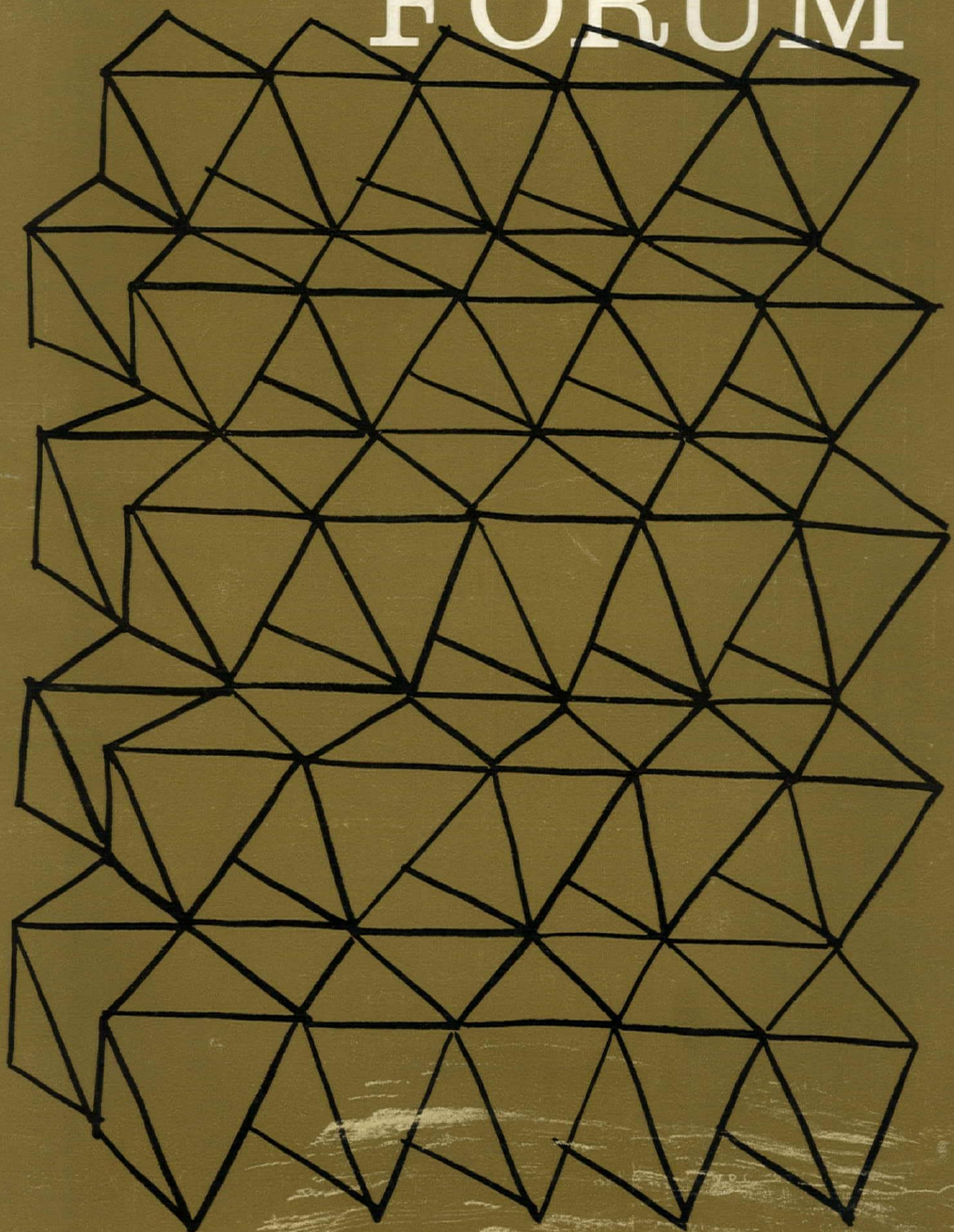
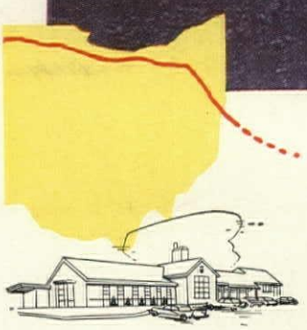
Architectural Forum / the magazine of building / January 1957

FORUM



TECHNOLOGY — 1977



WHO CHOSE FORMICA® Laminated Plastic for Ohio Turnpike Restaurants?

Sixteen beautiful, modern and efficient restaurants are in operation along the length of the Ohio Turnpike. Involved in their construction and furnishing were three different leasing operators, three contractors, two decorators and one architect.

There is little uniformity of decoration or equipment. But the standard of excellence of all sixteen is their lavish use of genuine Formica surfaces. It's not surprising that there should be unanimity of opinion on Formica, because there are more Formica surfaces in America's public eating places than all other plastic laminates combined.

If you would like a free copy of the brand new Formica architectural catalog containing color chips of the complete Formica line, write **FORMICA CORPORATION,** *Subsidiary of* CYANAMID
4602-7 Spring Grove Ave., Cincinnati 32, Ohio
In Canada: Arnold Banfield & Co., Ltd., Oakville, Ontario

Demand This Certification

Customers buy Formica because it is a brand name they know and trust. We protect this faith in our product by certifying every sheet with a wash-off Formica marking. It is for your protection and guarantee that you are getting genuine Beauty Bonded Formica.

This mark certifies genuine

RUB OFF WITH LOTS OF BAR SOAP ON A DAMP CLOTH

Seeing is believing. If this wash-off identification is not on the surface, it's not FORMICA.

Guaranteed by Good Housekeeping

Beauty Bonded FORMICA® Laminated Plastic Pays in Performance

Architectural Forum / the magazine of building / January 1957

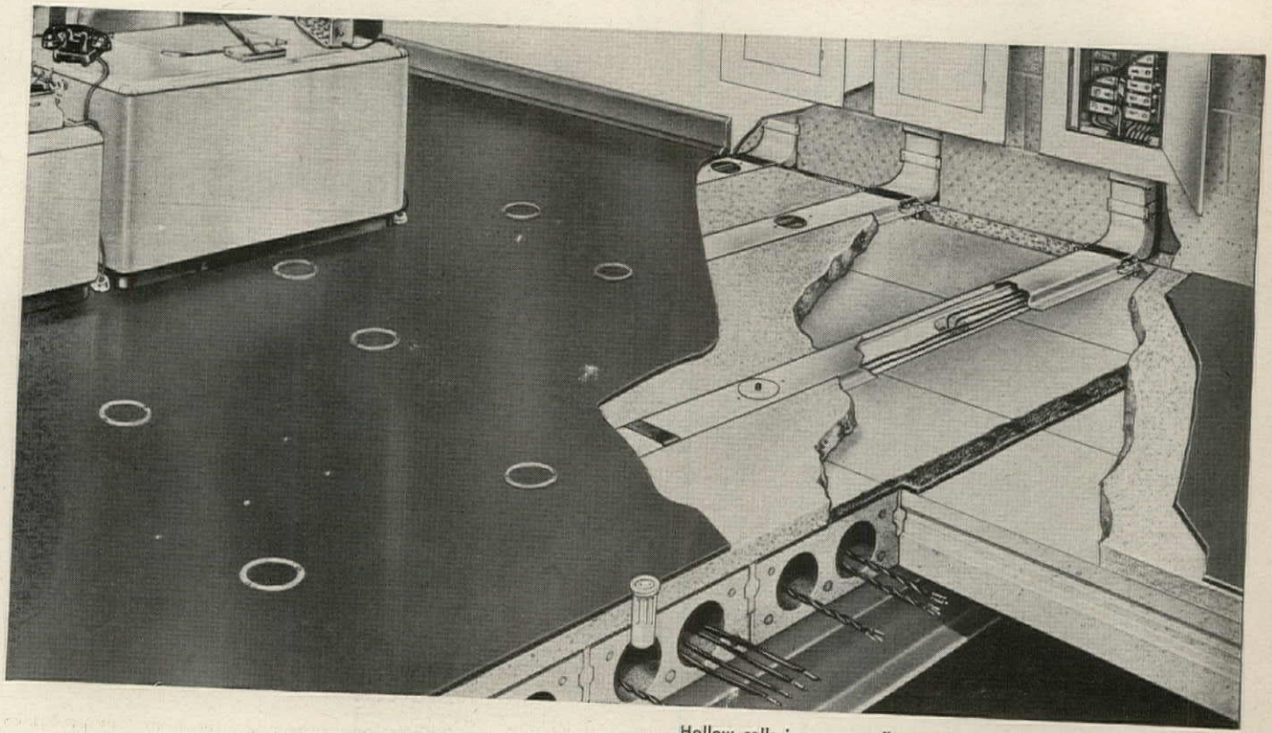
Technology–1977

Cover: Design by Ray Komai based on the crystalline molecular structure of an aluminum compound. For more on the architecture of molecules, see p. 104

VOLUME 106, NUMBER 1

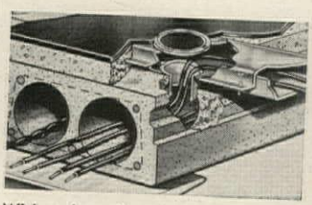
Published monthly by Time Inc., 9 Rockefeller Plaza, New York 20, N. Y.
Entered as second-class matter at New York, N. Y.
Subscription price $5.50 a year

ACKNOWLEDGMENT: The editors are deeply indebted to Lawrence Lessing, formerly a member of FORTUNE's Board of Editors, for his guidance in the preparation of this special issue and for his contribution of the articles on materials and fabrication. The editors are also indebted to the many architects, engineers, scientists and producers—too numerous to list individually—who contributed their knowledge and their advice.

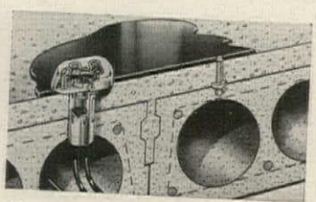


Hollow cells in concrete floor are electrical raceways. Cells are electrified by header ducts which run from panel box across floor at right angles to the cells. Floor outlets install at any point along cell.

Now! Electrical Availability



Wiring drops from header duct into cell at handhole junction.



Wiring then runs either way through cell to floor outlet.

To install outlet: drill hole at outlet location.

Next, install fitting in floor and fish wire.

Last, attach electric or telephone outlet box.

Gives Unlimited Distribution

The hollow cells in a Flexicore precast concrete floor become approved electrical raceways with this new underfloor distribution system. The cells are large circular voids, spaced 5⅓″ or 8″ on centers, depending on the Flexicore unit selected. Standard header duct is 4″ wide and installs directly on the precast floor. A concrete fill, usually 1½″, is leveled to the top of the header duct. Finish floor conceals the header. Handhole junction cover plates give access to the system at the intersection of header and cell.

Floor outlets install quickly at any point along a cell, giving unlimited electrical availability. Any number of systems can be used; electrical, telephone, intercom, and any others desired.

The use of this system is covered by Article 358 of the 1956 National Electrical Code. Electrical fittings are manufactured by the Conduflor Corporation, Cleveland, Ohio.

flexicore® **ELECTRIFIED FLOORS**

with Conduflor® Electrical Fittings

OFFICE BUILDING MANUAL
Flexicore Electrified Floors

New 32-page booklet available to architects, engineers and contractors. Write nearest manufacturer for your copy.

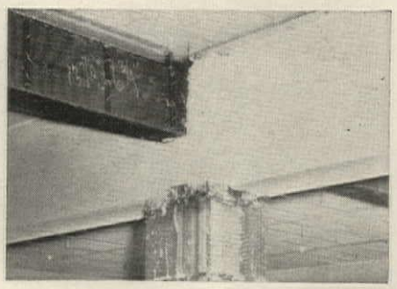
Wisconsin Farm Bureau Building Cooperative office building, Madison, Wisconsin. John J. Flad & Associates, architects. Berman Electric Company, electrical contractor.

Continental Casualty Building, Toronto. Marani & Morris, architects. H. H. Angus and Associates, mechanical and electrical engineers. Canadian Comstock Co., Ltd., electrical contractor.

National Cash Register Engr. Research Bldg., Dayton. Lorenz & Williams, architects. Schweiger, Heapy & Assoc., consulting mechanical engrs. Wagner-Smith Co., elect. contr.

Erection of Flexicore concrete structural floors is fast on steel frame, above, or on concrete frame or masonry walls.

Smooth, safe work deck is ready for other trades 24 hours after erection of floor. Flexicore clear-spans from girder to girder.



Structural concrete floor requires no extra fireproof ceiling. Columns, girders and beams get usual fireproofing treatment.

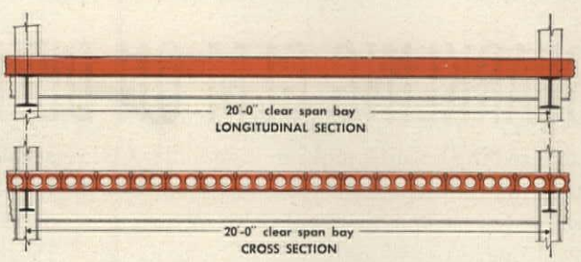
in Flexicore Precast Floors

Needs No Fireproofing

The structural floor of this system is formed of monolithically cast Flexicore concrete units, and requires no fireproofing. Underwriters Laboratories gives a 3-hour fire rating to an 8″ Flexicore floor with 1½″ concrete topping.

The basic advantages of this system for office building construction include savings in job time and investment. The dry erection of the lightweight units saves construction time. Less structural framing is required because of long, clear spans. Plaster fireproofing on the underside of the floor is eliminated and concrete topping is reduced in thickness to 1½″ because of the fire-resistant qualities of the structural floor itself. As a by-product of these savings, overall job time is reduced, providing earlier occupancy.

The Flexicore method is a time-tested system and has been used on over 24,000 buildings in the United States and Canada.



LONG SPANS SIMPLIFY STRUCTURAL DESIGN

The use of Flexicore precast concrete floors in office buildings permits 20′ x 20′ clear span bays. This means simple framing without intermediate beams, and results in savings in steel and in total weight. The new Flexicore Office Building Manual contains design information, including properties of the Flexicore slab, load curves, special design conditions and design examples.

WRITE OR PHONE YOUR NEAREST FLEXICORE MANUFACTURER

ALABAMA,
Birmingham 1, PO 630
The Alabama Cement Tile Co.

COLORADO, Denver 1, PO 366
Flexicore Company of Colorado

FLORIDA, Tampa, PO 2189
Universal Concrete Pipe Co.

ILLINOIS, Chicago
PO 277, Franklin Park
Mid-West Concrete Pipe Co.

INDIANA, E. Chicago, PO 539
Calumet Flexicore Corporation

MICHIGAN, Livonia, PO 2006
Price Brothers Company

MINNESOTA, St. Paul E-4
Molin Concrete Products Co.

MISSOURI, St. Louis Flexicore
PO Box 552, Collinsville, Ill.

NEW JERSEY, Camden
Camden Lime Co.

NEW YORK, Buffalo 6
Anchor Concrete Products, Inc.

NORTH CAROLINA, Lilesville
W. R. Bonsal Company, Inc.

OHIO, Akron-Cleveland
Lake Erie Flexicore, Inc.
PO 563, Kent, Ohio

OHIO, Columbus 22
Arrowcrete Corporation

OHIO, Dayton 1, PO 825
Price Brothers Company

PENNSYLVANIA, Monongahela
Pittsburgh Flexicore Company

RHODE ISLAND, Saylesville
Durastone Flexicore Corporation

TEXAS, Houston, 4511 Kyle St.
Flexicore of Texas, Inc.

WEST VIRGINIA, Wheeling
Universal Concrete Pipe Co.

WISCONSIN, Beloit, PO 325
Mid-States Concrete Products Co.

CANADA—Toronto, Ontario
Murray Associates, Limited

CANADA—Montreal, Quebec
Creaghan & Archibald Ltd.

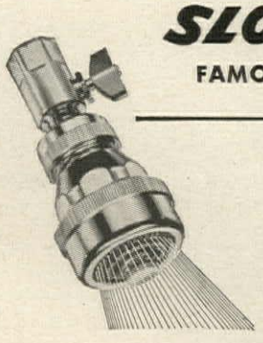
CANADA, Woodstock, Ontario
Schell Industries Ltd.

PUERTO RICO, Rio Piedras
Flexicore Co. of Puerto Rico

THE VAST MAJORITY OF THE NATION'S FINE BUILDINGS ARE SLOAN EQUIPPED

SPARKLING GEM ON DETROIT'S CIVIC PLAZA

• Centered in Detroit's multi-million dollar Civic Plaza is the recently dedicated auditorium which is destined to become the focal point of the city's cultural interests and activities. Its gem-like exterior is of Georgia white marble with Swedish blue pearl granite, faceted to enhance its brilliance. The completely air-conditioned interior is equipped with facilities for diversified performances, from operas and symphony concerts to recitals and lectures; from dramas and motion picture spectaculars to radio and television broadcasts. Richly upholstered seating is provided for nearly 3000 persons on the main floor and in the balcony. Detroit cars may go directly down to a two-level underground garage or to a large open parking area. Cars from the Canadian shore, through a highway tunnel, may proceed directly into the garage or up to the surface parking area. As are thousands of other fine buildings, this ultramodern auditorium is equipped with SLOAN *Flush* VALVES.



SLOAN *Flush* VALVES

FAMOUS FOR EFFICIENCY, DURABILITY, ECONOMY

SLOAN VALVE COMPANY • CHICAGO • ILLINOIS

Another achievement in efficiency, endurance and economy is the SLOAN *Act-O-Matic* SHOWER HEAD, which is automatically self-cleaning each time it is used! No clogging. No dripping. Architects specify, and Wholesalers and Master Plumbers recommend the *Act-O-Matic*—the better shower head for better bathing.

Write for completely descriptive folder

New FHA moves help rental housing program in some ways, scare builders in others

In some respects, FHA apparently is trying to stimulate more rental apartment construction. In other respects it seems to be equally determined to discourage it.

When FHA increased its allowable rate on home mortgages from 4½ to 5%, it also raised the ceiling on Sec. 220 urban renewal area apartment projects from 4.25 to 5%. Rates on regular Sec. 207 apartments and Sec. 213 cooperatives were allowed to go from 4.25 to 4.5%, a statutory maximum for these two titles, and on Sec. 8 military housing remained 4%.

What struck observers most in this oddity of three different FHA apartment project interest rates was the fact the Sec. 220 ceiling was now equal to the maximum single-family house rate. This was a departure from previous FHA and general market practice. Usually large loans on multifamily projects are made at a differential below the interest rate on home loans; for one thing, it is much easier to service one big loan than an equal amount invested in a series of small mortgages.

New "windfall" drive

Contrasted with the special help the 5% Sec. 220 rate extended to apartment builders, a possibly hostile FHA attitude was reflected in a new anti-windfall campaign the agency launched against Sec. 8 military housing builders. On Nov. 1 it demanded construction cost data from owners of 250 Wherry Act projects. Only about half replied immediately. In mid-December, FHA announced nationally that it was moving to take control of five projects that had not yet supplied the requested data, although its press release said Commissioner Norman Mason "emphasized that there were no allegations of improper use of the mortgage proceeds, FHA was merely trying to determine actual construction costs."

The five threatened projects promptly complied with the original request for their cost data. The incident was a small one, but for industry observers its meaning was big: under a velvet glove, FHA still held a whiphand, and even without any charge of impropriety it was prepared to seize any project from a builder who did not comply fast enough with its orders.

New charter effects?

Insisting that FHA was the apartment builders' best friend, FHA General Counsel Robert B. Wolf took exception last month to reports on the new FHA rental housing corporation charter and new Sec. 220 regulations in the November FORUM. He was "all for further changes" in the charter if they were necessary, he declared, and he leaves no doubt of his own personal desire and determination to do everything he can to make the charter a fair and workable FHA-builder contract, by his lights.

L. L. GREIF, JR.

WOLF

FHA Commissioner Mason has credited the new charter with a marked uptrend in builder interest in rental projects. The figures do show a decided spurt, but not any huge volume of business. In the seven months from January through July, builders applied for insurance covering 3,239 units of Sec. 207 and Sec. 220 housing; in the four months from August through November, after the new charter was introduced, comparable applications totaled 4,710 units—still a rate scarcely over 13,000 a year. In New York there was a marked increase in Sec. 207 applications, but since Sept. 1 New York builders have had another special inducement to bolster their interest in this program: a "high cost area" designation allowing loans up to $1,000 per room above normal Sec. 213 and Sec. 207 mortgage limitations, or an extra $4,500 on a 4½ room unit.

First court case over FHA rent control

Recently FHA rental housing builders have complained about the agency's delays or failure to act on applications for rent increases to compensate for rising expenses. Last month General Counsel Wolf journeyed to Tampa to deal with a legal precedent, the first court test of FHA's right to control rents in projects it insures.

Owners of two FHA military housing projects at Patrick Air Force Base

had asked permission to raise rents. FHA approved only a portion of the requested increase. After the owners raised them by the full amount they had requested, FHA moved to take over the projects for charter violations. The owners sued to restrain FHA from assuming control, contending FHA should have granted the full increase, and a new brand of litigation was born.

By a headquarters directive last August, field offices were given main responsibility for approving increases; owners were authorized to raise rents to their original allowable maximum if they were below that figure, with no formality except notifying FHA of their action. Last month the Chicago FHA office reported that it has no backlog of unapproved applications, and has never refused any builder permission to raise rents enough to obtain his original income formula: usually a 6.5% return on the value of the project after a 7% vacancy and loss factor.

One big hitch for some builders: FHA was holding up some increases as a lever to compel 608 builders to settle "windfall" disputes. After a settlement it also reduces the income on the basis of the project's valuation minus the windfall amount.

COMMUNITY PLANNING

Interest keeps mounting in regional government

Steadily and irresistibly rising last month was the tide of interest in the formation of metropolitan area governments to deal with the countless complex modern community problems that transcend pre-auto era local political boundaries.

In Washington, for instance, Planning Consultant Carl Feiss, president of the American Institute of Planners' chapter and urban renewal consultant to FORUM, proposed that the District of Columbia be returned to Maryland and an areawide "federation" be established to solve the metropolitan problems of what would then be Washington, Md. His proposal was made without any buildup before a League of Women Voters meeting. What was remarkable, however, was the way it was seized upon and featured in the Washington press. His full text was printed in the following Sunday's *Star*, and all three papers printed generally favorable editorials about it.

Typifying the growing public interest in more effective local government on some "areawide" basis, the *Star* editorialized:

"We are much more inclined to agree than to argue with Feiss . . . He chose a picturesque method to emphasize the difficulties of obtaining one governing body for a metropolitan area that is criss-crossed by a seemingly hopeless tangle of geographical and political boundary lines . . . His proposed solution . . . is of course, nebulous and incomplete. But we agree heartily with his suggestion that the time has come when Congress, and in our opinion the President, should move toward the creation of a commission to study how best to meet, through uniform and coordinated planning and its execution, the common problems facing the people of (our) metropolitan area."

Miami takes first step

On Election Day metropolitan Miami took a long step toward becoming the first US regional city. By 244,817 to 120,340, a state constitutional amendment was adopted that granted home rule to Dade County, so it may revise its own powers and those of Miami and all 25 other municipalities within its borders. Next a revised county charter will be prepared that will probably preserve the identity and certain local powers of each existing community, but provide for coordinated metropolitan area action on planning, building codes, police and fire protection, public works and uniform taxes, etc.

Accepting the Gold Medal of the National Planning Association in Washington last month, Dr. Luther Gulick, former City Administrator of New York, also warned that entirely new kinds of government structures will be needed to solve the problems of burgeoning metropolitan areas that have only just begun to reveal the magnitude of their complexity. The most critical need in each area today, he said, is for "a single center of responsible thinking, planning, program drawing, debating and acting" on problems affecting entire regions.

PUBLIC BUILDING

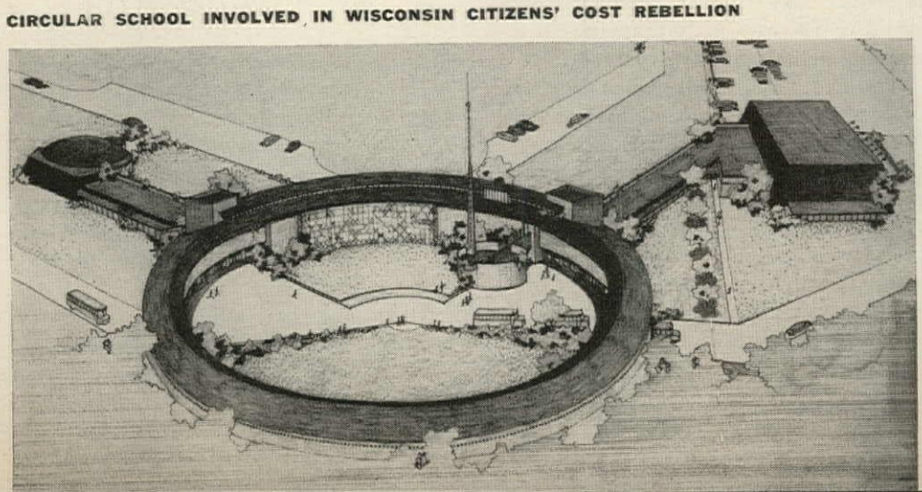
Citizens balk at cost hike, —school board quits

Soaring costs brought an extraordinary crisis for the Southwest Walworth County union high school board in Wisconsin.

At the board's disposal was a $1,497,000 bond issue voted last February for a contemporary circular school estimated then to cost $1,429,000. But the low bid obtained in November was $1,895,381 (eventually trimmed to $1,688,198 in negotiations). At a public meeting last month, however, a citizens committee resolution opposing any contract in excess of the bond issue was adopted 120-to-64. Considering this a "no confidence" vote, the chairman and three other board members promptly resigned. At month's end the fifth and only remaining member was in a hospital recovering from a heart attack, was not told of the furore.

The proposed school (see cut) was designed by James Dresser, associate in the firm of Durrant & Bergquist, of Dubuque, Iowa and Boscobel, Wis., a protege of Frank Lloyd Wright. Making the most of a depression on the 40-acre site, Dresser planned an amphitheatre within the school's full circle of classrooms, and under the classrooms a sheltered busport. Minor opposition to the offbeat design was voiced at the meeting that opposed increased costs, but resigned Chairman Robert Herrick summed up the trouble this way: "We felt we wanted to put up a building to provide a well-rounded education in academics, arts and athletics. Everybody always wants you to leave off something from the art or academic program, but the gym is sacred."

CIRCULAR SCHOOL INVOLVED IN WISCONSIN CITIZENS' COST REBELLION



EDUCATION

Accrediting board at Yale next month

Reports last month that suggested that the Harvard and Yale architectural schools faced some prospect of losing their accreditation or were on "probation" from the National Architectural Accrediting Board drew prompt clarification from Dean Jose Luis Sert at Harvard and Thomas K. FitzPatrick, secretary of the accrediting board and head of the University of Virginia architectural school.

When he became dean of the Harvard School of Design at the start of the 1955-56 term, Sert explained, he overhauled and revised the curriculum and brought in an almost completely new faculty for the architecture department. Under these circumstances the accrediting board said it would consider the Harvard program an experiment for a two-year period, continuing, however, to accredit all its graduates as they had in the past. At the end of two school years the board would have another look at the department and its achievements under its regular routine of periodic checkups. "That is certainly not being on probation," said Sert.

Confirming this in every respect, FitzPatrick explained that both Harvard and Yale accreditations are technically listed as "provisional," but this is not an unusual or in any way a prejudiced situation, and it in no way jeopardizes students' interests. Procedure, he said, is for the accrediting board to visit and check a school once every five years. But if programs are in transition, or the board decides for any other reason that it might prefer to take another look at a school in less than five years, its accreditation is termed "provisional."

At Yale, Dean Boyd M. Smith declined to comment beyond a statement that the accrediting authorities would visit the school next month. FitzPatrick, however, said this visit had been scheduled ever since a regular visit by the board two years ago, when Yale's accreditation likewise was made "provisional." FitzPatrick said these two Yale visits by the board were both routine and said there was no truth in reports that the board was making a special check on Yale because of direct and indirect complaints from both students and faculty.

PROFESSIONAL RELATIONS

AIA starts centennial year with new public relations counsel, new *Journal* editor

As the AIA strode into its second century with plans for appropriate centennial celebrations, it also announced several administrative personnel changes for the Octagon and board action on a number of business and professional policy matters for architects.

Highlights of the centennial anniversary program will include:

- Ceremonies on Feb. 23 dedicating a bronze tablet at 111 Broadway in New York, the site of the institute's founding.
- A comprehensive exhibition of a Century of American Architecture from May 14 to July 15 in the National Gallery of Art in Washington, being prepared by Frederick Gutheim—with three circulating editions scheduled for exhibition throughout the US, Europe and Asia over the next two years.
- The centennial year convention in Washington, May 14-17, centered on the theme, "A New Century Beckons."
- If the Post Office approved, there would also be an AIA commemorative postage stamp. Member Robert J. Schultz, of South Bend, Ind., won the institute's $500 first prize for a proposed design, which was submitted to the Post Office, but not released, pending official decision whether such a stamp would be authorized.

Octagon executive changes

At its final 1956 meeting in Houston a month ago, the AIA board of directors approved the selection of Henry J. Kaufman & Associates, of Washington, as institute public relations counsel starting this month. Robert R. Denny, director of the firm's public relations department, who appeared before the board and is expected to direct the firm's efforts for AIA, won notice in architectural circles a year ago last summer during the controversy over building materials for the design of the new Air Force Academy in Colorado Springs. Then he played a major role for the Kaufman agency and pro-masonry interests, who fought contemporary glass design for academy buildings as "alien," and "an insult to American heritage and traditions" (AF, Aug. '55).

By resolution, the board also expressed its gratitude to Henry H. Saylor, who is retiring as editor of the *Journal*—but not before completing a centennial anecdotal history of the institute for the magazine. Joseph Watterson is succeeding Saylor as *Journal* editor, and the board approved recommendations he made for merging the *Journal* and the *Bulletin* by next January, and developing a more uniform style for other institute publications.

Mandatory rules; package deals

This board meeting added the following statement to existing institute policy on endorsements: "An architect shall not permit the use of a statement in advertising which could be construed as representing him as endorsing a product or method." (Scarcely a month before, Nov. 12, a full-page, full-color ad in TIME had pictured Architect C. J. Paderewski, AIA—supervisor of California architects' conduct, as president of that state's Board of Architectural Examiners—in a huge glass-walled living room, while the ad's big headline type proclaimed: "Why architect selects [brand name] glass for own home.")

On the troublesome mid-20th Century "package dealer" problem, the Houston board meeting commended the committee headed by Cyrus E. Silling, of Charleston, W. Va., for its proposal that methods be devised by which architects, while performing ethically and in a professional manner, can themselves become "package dealers." Many architectural firms are doing just that, the committee declared, but with a significant difference from commercial "package dealer's" practice—insofar as the architect continues to practice as a professional whose prime interest is the client's welfare.

South Atlantic Region Director Herbert C. Millkey, a member of this committee, also made some pointed comments on the "package dealer" problem at the recent Florida Architects Assn. convention. After defining the dealer as "any person who does building and design and such other related things

continued on p. 9

as financing, site acquisition and development, etc.," Millkey added: "I feel resentful toward that person because he does a job on a commercial basis instead of a professional basis. I think of him as a little contractor who just quietly does this work. And in Atlanta he's doing at least 25% of the buildings. The important thing is that he is not doing quality work."

PUBLIC HOUSING

CHA director resigns over internal row

Family dissension in the Chicago Housing Authority culminated last month in the resignation of its executive director.

In a letter given to Mayor Daley on Dec. 5, Lt. Gen. William B. Kean (retired), 60, often decorated for his World War II and Korean heroism under fire, resigned effective Jan. 31, stating simply that he wished to move to Florida and enter business there. He had been executive director since Sept., 1954, when he retired as commander of the 5th Army, headquartered in Chicago, and succeeded public housing pioneer Elizabeth Wood. But the "real reason" Kean quit, said Chicago's *Daily News*, was contained in an Oct. 24 resignation letter he gave CHA that charged an "undercurrent of uncooperativeness" among certain board members. This was returned to him with a request that he rewrite it, omitting references to the authority's internal turmoil.

KEAN

Kean's original letter gave no names, but the *News* said the family "feud" over administrative and purchasing policies within CHA lined up Chairman Joseph P. Sullivan (a retired DuPont executive) and Architect John Fugard behind Kean, and on the other side Labor Leaders John Yancey and Martin J. Dwyer, and "young and ambitious" Charles R. Swibel, 30, who was appointed by Mayor Daley last January and "reportedly has his eye on the chairmanship." Said a *News* editorial:

"We suggest to Gen. Kean that he could do the community a service by relating what his successor will encounter."

Public housing vacancies climb to 3.5%; "problem families" drive away others

An increasing vacancy rate that has been perturbing public housing officials was discussed rather gingerly at NAHRO's fall convention (AF, Dec. NEWS). It was only when called on to fill a gap in the program while waiting for a tardy speaker, for instance, that Asst. PHA Commissioner Warren Vinton in a brief unscheduled report placed the national vacancy rate at roughly 3.5%—at an estimated extra $5 million a year expense to PHA. He could recall, he said later, when the rate was only 0.1%.

Main factors behind growing vacancies appeared to involve racial integration problems, and increasing proportions of "problem families" who are causing many otherwise eligible low-income families to leave or shun public housing projects. Except for one frank address on the "problem family" situation by fiery Elizabeth Wood, former Chicago Housing Authority director, most speakers tended to minimize or skirt the subject of vacancies.

Miss Wood urged a middle course, so projects would not become overloaded with "problem families" on one hand, nor be so antiseptically managed that only impeccable families are admitted. The latter course, she said, would be shirking a social obligation to help the redeemable errant. She proposed higher tenant income limits, so decent families would not have to avoid bettering themselves, or lie about extra earnings. Instead of depending on outside welfare agencies, she suggested that housing authorities undertake more welfare case work themselves to help "problem" tenants.

Said Miss Wood: "So long as public housing is the temporary home of the capable, the honest, the ambitious—a home such people would rather not accept, if possible—but is the permanent home only for the damaged, the non-normal, the deceitful—public housing will not produce good neighborhoods . . . [On the income ceiling score] the rejection of our projects by normal families is an indication of an illness that may well be fatal. It is to me one of the magnificent expressions of the unimpeachability of the American people. They don't sign petitions against the injustices of definitions of net income, they don't talk about freedom, they just go elsewhere."

Survey shows varying problems

A FORUM survey of the vacancy-integration-problem family situation in the largest non-southern cities disclosed widely varying conditions:

BOSTON reported an "almost non-existent" vacancy rate for its almost 15,000 units.

NEW YORK had a vacancy of only 0.2% in its almost 90,000 units in August, compared with only 0.1% in Aug., '55 and '54. It has a steady 9% turnover rate, with about a quarter of its voluntary departures "buying their own homes."

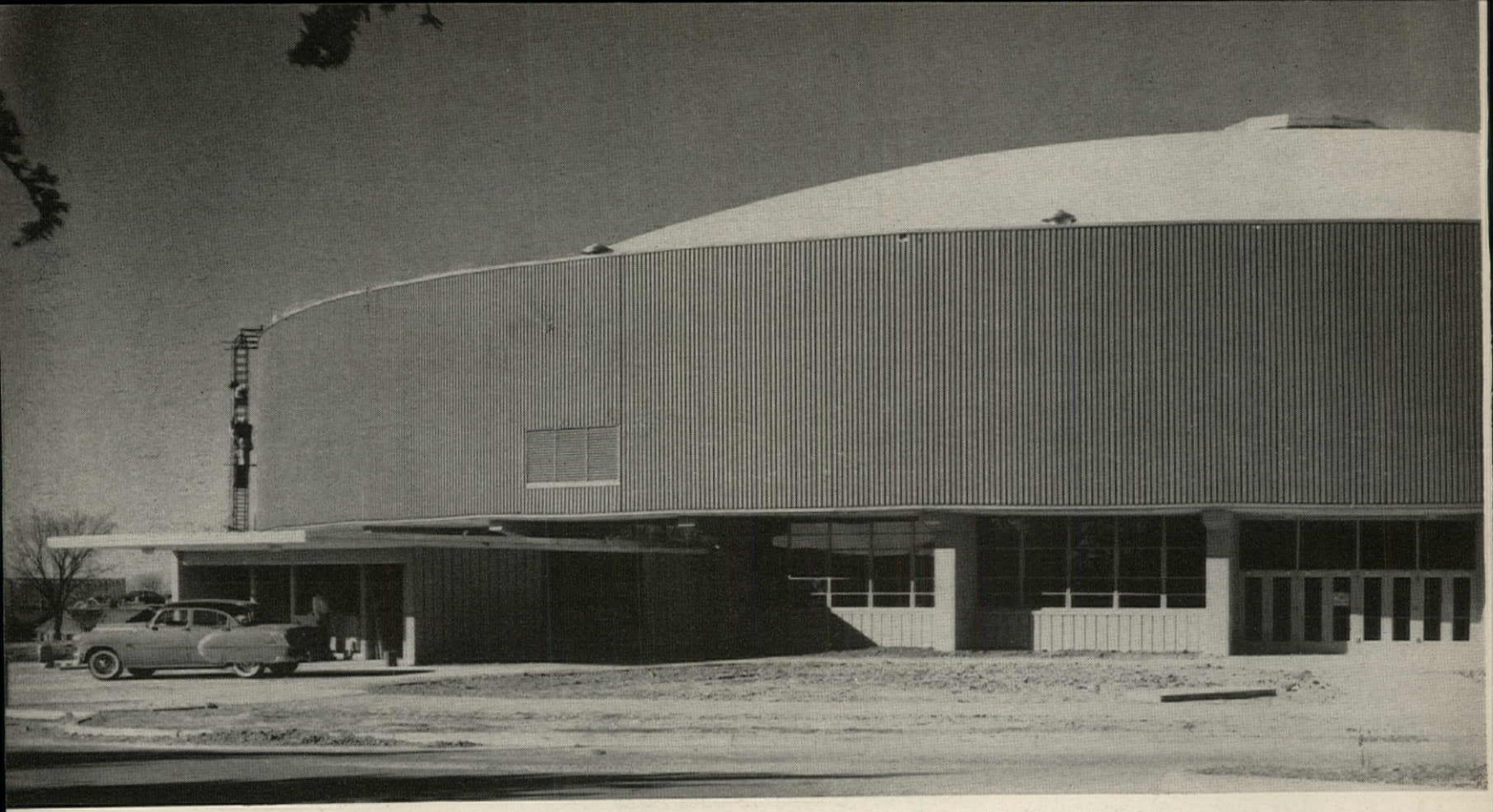
BALTIMORE has about a 3.5% vacancy. This could be filled almost immediately with nonwhite families if authorities were not fearful this would quickly lead to 100% nonwhite occupancy of all projects. It admits that "problem families" have given some projects "reputations" that cause other families to leave, and applicants to decline apartments there.

CHICAGO reports vacancies of 0.1%, compared with 2.3% in September 1952, 3.9% in September, 1954. Executive Director William B. Kean attributes the improvement to "better administrative procedures." He says delays in filling vacancies used to result from Miss Wood's efforts to "control" the balance of white and Negro occupants. He has instituted a simple "first come, first served" policy, regardless of race, without any "perceptible" change occurring in the former balance—roughly 70% Negro, 30% white.

A match for Miss Wood in forthrightness, Kean says CHA surveys show that the "strongest single reason" for eligible families leaving its projects is "undesirable neighbors or neighborhood." This boils down, he says, to "the fact these parents don't want their children playing with children from 'problem families.'"

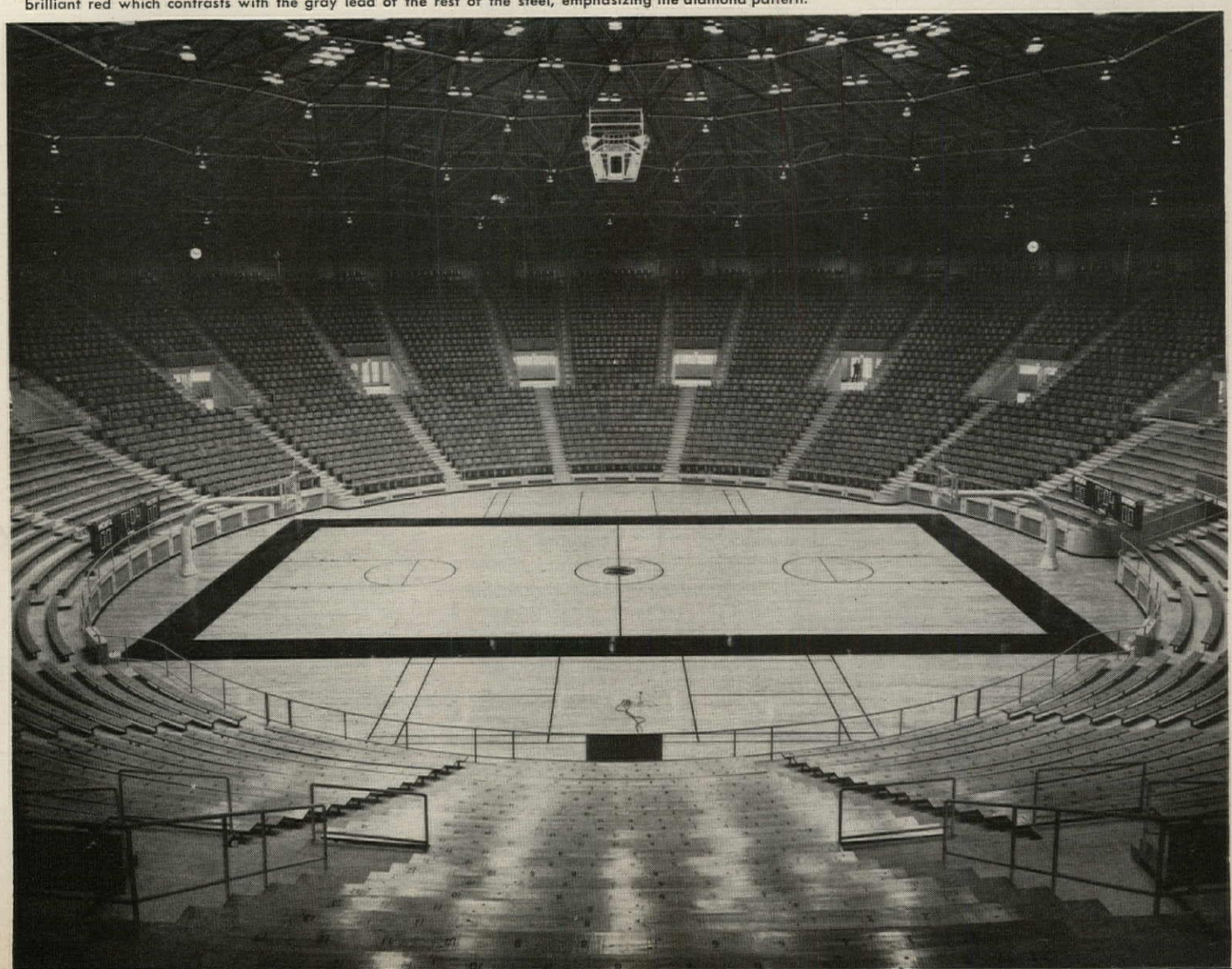
DETROIT has a 1.7% vacancy in its 8,155 units, compared with *100%* occupancy three and four years ago. But all but ten of its 145 vacancies are in two far west side projects that have

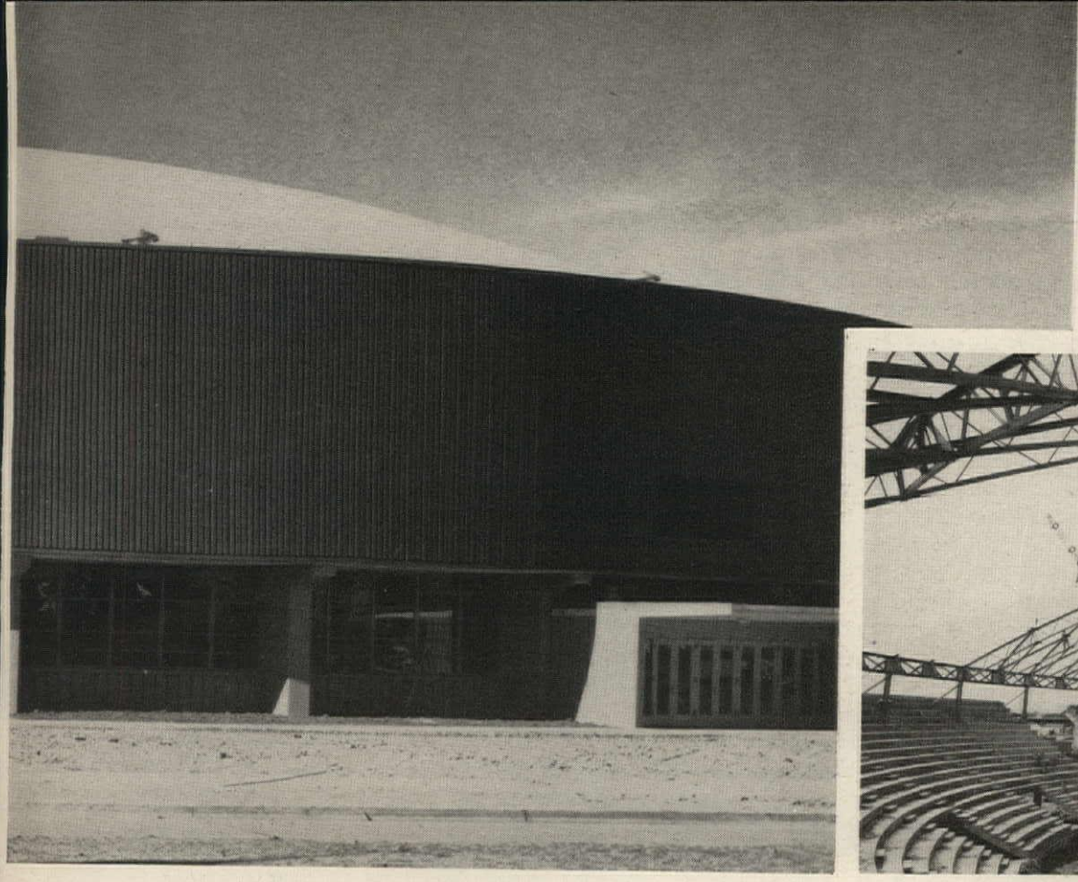
continued on p. 12



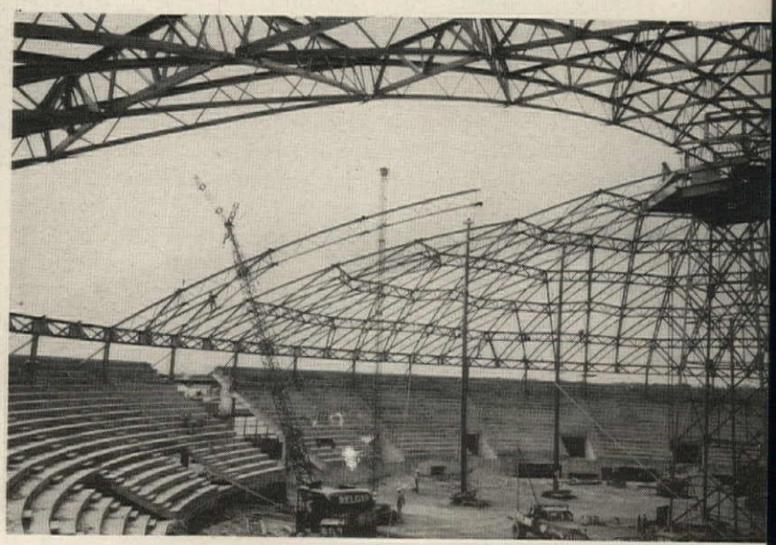
University of Wichita field house features unique 267-foot diameter

THE ALL-WELDED, EXPOSED STRUCTURAL STEEL framework actually enhances the attractive interior of the building. The soffits of all trusses are painted a brilliant red which contrasts with the gray lead of the rest of the steel, emphasizing the diamond pattern.





UNIVERSITY OF WICHITA FIELD HOUSE. **Architects:** Lorentz, Schmidt, McVay, and Peddie, Wichita, Kansas. **Steel Fabricator:** Watkins Inc., Wichita. **General Contractor:** Dondlinger and Sons Construction Company, Wichita. **Designer and Engineer of Lamella Roof Structure:** Roof Structure Inc., Webster Grove, Missouri.



THE ROOF STRUCTURE is supported by 36 10WF39 columns. A trussed ring girder, 39 inches deep, rests on top of the columns and runs the entire perimeter of the building. Into this ring girder are framed 12 radial trusses which span to the compression ring at the apex of the roof. Also springing from the ring girder at intermediate points are curved roof trusses which intersect the radial trusses, resulting in the characteristic diamond-shaped lamella pattern.

lamella dome of Structural Steel

432 tons of steel erected in only 14 days

The unique lamella dome of Structural Steel which crowns the University of Wichita's new field house is the *first* such dome ever to be constructed. It was designed, developed and put to use for two practical reasons—economy, and speed of erection.

Spanning 65,000 square feet, the 432 tons of Structural Steel were erected by two crews in the spectacular time of just 14 days! Starting on opposite sides of the building, the two crews worked around in one direction until closure was effected. The only falsework required was a central tower supporting the compression ring, or "lantern," at the apex of the dome. All connections were bolted during erection, then field-welded.

Built at a total cost of $1,405,700, the ultra-efficient structure includes such features as a complete heating and ventilating system (with radiant heating in the locker rooms), and color-corrected vapor lighting for the arena. And, with peripheral seating, not one of the 10,235 seats is more than 86 feet from the playing surface.

Where economy, speed of erection, and dramatic design are the keywords of construction, that's where you'll find versatile Structural Steel. Moneywise, Structural Steel is the most economical of load carrying materials. And, it's the strongest. It will withstand more abuse than other structural materials, effectively resisting tension, torsion, compression and shear. Once enclosed in buildings, it lasts indefinitely, requiring no maintenance.

USS STRUCTURAL STEEL

UNITED STATES STEEL

Structural Steel may be riveted, bolted or welded, and may be erected in any weather. Since steel members are fabricated indoors, weather can have no effect on the quality of workmanship. Want more information? Return the attached coupon.

UNITED STATES STEEL CORPORATION, PITTSBURGH
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS

SEND FOR THIS INFORMATIVE BOOK NOW!

United States Steel Corporation
525 William Penn Place, Room 5565
Pittsburgh 30, Pennsylvania

Please send me a free copy of HOT ROLLED CARBON STEEL SHAPES AND PLATES.

Name .....

Company .....

Address .....

City ..... **State**.....

a combined 6.2% vacancy rate. Asst. Director Mark K. Herley says none of Detroit's vacancies could be attributed to integration or problem family situations. He ascribes the larger number of current vacancies to the location of the west side projects, and their predominant number of one-bedroom units.

SAN FRANCISCO Managing Director John W. Beard reports no vacancies and no problems.

LOS ANGELES has both city and county housing programs, and both reported increasing vacancy rates, but for different reasons.

Assistant Executive Director Alfred Lord set the county vacancy rate at 2.2%, compared with about 1.2% four years ago. He suggested this was even a good thing, because by his figuring about a 3% vacancy is needed for most efficient maintenance. Lord said most county projects were planned in the thirties for small families, so now they are short on three- and four-bedroom units, but overloaded with one-bedroom apartments. Waiting periods are: One to five years for four bedrooms; one year for three bedrooms; only a few months for two bedrooms; immediate occupancy for one bedroom. As a result the county is now converting 50 one-bedroom units into 25 four-bedroom units.

A "spokesman" for the city program said its vacancy rate had been increasing for the last few years, but claimed it was impossible to figure the exact rate, and declined to make even a "guesstimate." Commissioner Robert W. Gilbert said the bitter political fight over Los Angeles housing several years ago was a "primary" reason for increased vacancies. Widespread attacks on housing then, he said, "created in the minds of many people who normally would be applicants a fear that they would be socially condemned if they lived in public housing."

Gilbert also said other eligible people live in bad housing rather than move into better public housing because it is in outlying areas. On this point he was at odds with County Officer Lord, who said location of projects is a "minimal" problem—"in Los Angeles people are used to distance from the cradle to the grave. You have to be geared to distance to live here, and people are adjusted to it."

Capital explanation

At a NAHRO session PHA Commissioner Charles Slusser said PHA was studying why so many eligible families were moving out of low-rent projects. He suggested that the main reasons might be: religious factors (no church of their denomination nearby); transportation (too far from employment); school conditions (overcrowding, obsolete, or too far distant), and just plain resistance to "project-type living."

Later Slusser told FORUM that PHA would regard 2.5% to 2.8% as a "normal" vacancy, compared with about 3.3% at present. He also revealed that PHA, because of its greater deficits, is now putting the heat on some local housing authorities that have been accommodating relief agency tenants for especially low rents—with the US thus underwriting local welfare expenses. PHA wants local relief agencies to pay the top legal rents in such cases, said Slusser. (In some cities, however, such as New York, relief case tenants cannot be admitted, every new tenant must have a job.)

New adjustable header duct junction units assure a level finished floor

National Electric has developed an easily adjustable junction unit ring for its Header Duct Steel Underfloor Raceways.

The new Header Duct junction unit ring is designed to eliminate the raised spots and depressions that occur when underfloor raceway junction boxes protrude above or become recessed in the floor due to minor variations in the level of the concrete. Adjustment of three easily accessible recessed screws in the cover of the unit is all that's required to level the ring with the concrete surface . . . assures a smooth, level, attractive finished floor.

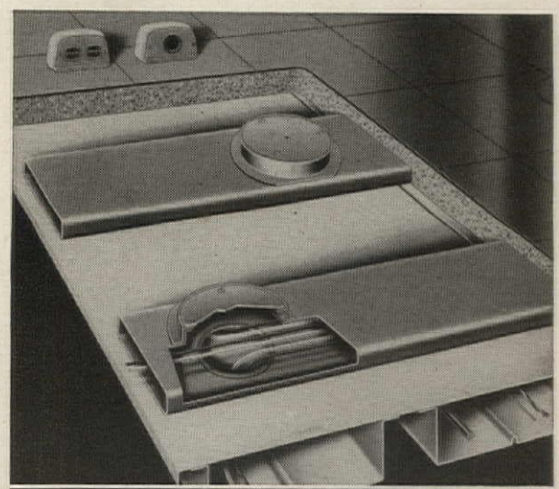
National Electric junction unit rings can be moved *down* as well as up after the concrete has set. A galvanized steel collar around the junction unit ring keeps concrete from bonding to the ring and preventing a downward adjustment.

This newest Header Duct improvement is typical of how every detail in NE Header Duct is engineered to help you give the owner complete flexible electrical distribution for power, light, communication or telephone—where and when it's needed.

If you're planning for cellular steel floors make sure you include Header Duct—the all-steel grounded feeder raceway from distribution panel to the raceways formed by the cellular steel floor panel.

National Electric Products

PITTSBURGH, PA.
3 Plants • 10 Warehouses • 36 Sales Offices



Where you plan cellular steel floors with underfloor electrical distribution always specify

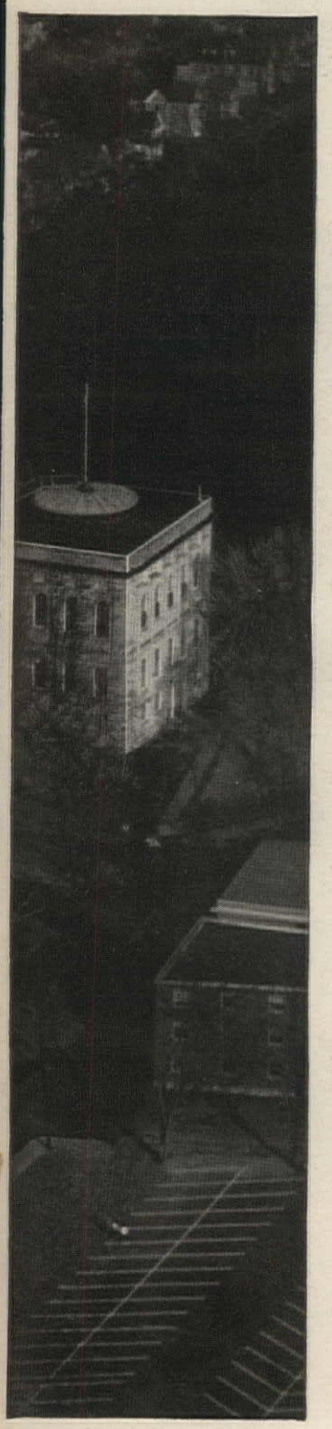
HEADER DUCT

5 miles of *Gold Seal*® Floors exclusively for Maine State Office

ARCHITECTS: Miller & Beal, Inc., Portland, Maine. ASSOCIATE ARCHITECTS: Desmond & Lord, Boston, Mass. FLOORING CONTRACTOR: Portland Veos Tile and Flooring Co., Inc., Portland, Maine.

Aerial view of the new Maine State Office Building with the Capitol building at the rear.

specified Building!



Here's an interior view showing a small part of the installation of Gold Seal Inlaid Linoleum. Actually, about 3½ acres of floor space are covered with this ⅛" burlap-backed "Veltone."

MORE than 148,000 square feet of Gold Seal Veltone® ⅛" Inlaid Linoleum has been specified and installed in the new Maine State Office Building at Augusta, Maine.

Originated by Gold Seal, "Veltone" provides an attractive, long-wearing, all-over decoration for use in all public buildings, schools, hospitals, offices, etc. Veltone's excellent resiliency provides quiet and comfort under foot. The unique design of this Inlaid Linoleum literally hides foot marks . . . it's exceptionally easy to clean and keep clean because of its density and surface smoothness. This ease of maintenance naturally reduces the expense of building service and upkeep. For those who prefer the modern textured look in Inlaid Linoleum, Gold Seal offers Sequin®—⅛" thick—with all the advantages of "Veltone."

Gold Seal Vinylbest* Tile and Gold Seal Asphalt Tile were also used in special areas such as the food and photo laboratories.

Specifications—Gold Seal Veltone: 6′ wide yard goods, ⅛" gauge, burlap-backed. Install over suspended wood, or suspended concrete under-floors. Available in 8 colors—Pompeian Grey, Heather Tan, Spicewood, Bermuda Grey, Light Tan, Grey, Brown, Surf Green. Also made in standard gauge for residential use—in 9 colors.

Send for Free Technical Data Book— "Why Resilient Floors"—containing 36 pages of information to help you specify the correct resilient floor for any type of commercial, institutional or residential building. Address Architects' Service Department, Gold Seal Floors and Walls, Congoleum-Nairn Inc., Kearny, N. J.

PROVIDE YOUR CLIENTS WITH THE FINEST IN FLOORING — SPECIFY GOLD SEAL

FOR HOME...BUSINESS...INSTITUTIONS:

BY THE YARD AND TILES—Inlaid Linoleum • Nairon® Plastics • Vinylbest* Tile • Cork Tile • Rubber Tile Asphalt Tile

PRINTED FLOOR AND WALL COVERINGS—Congoleum® and Congowall®

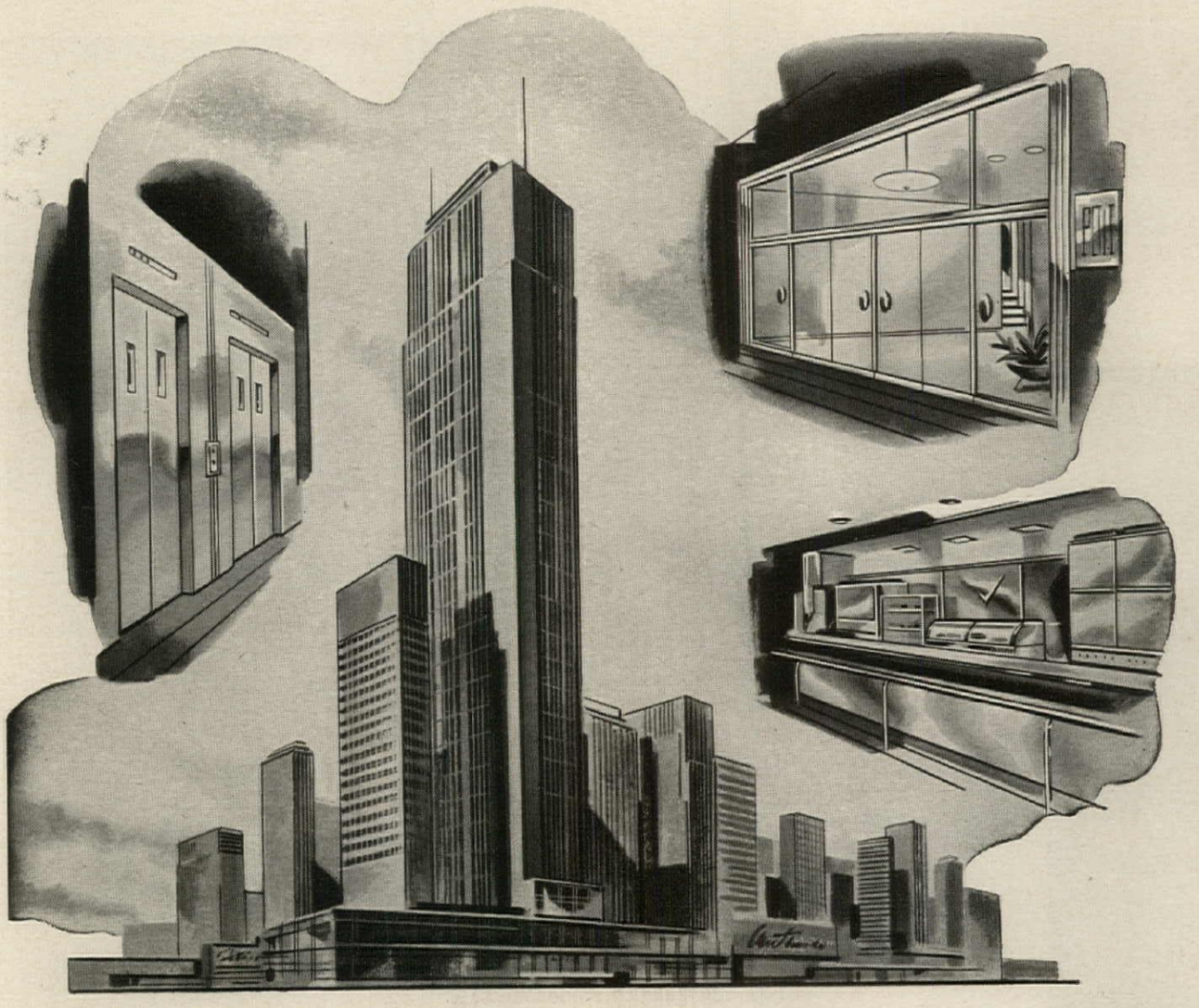
RUGS AND BROADLOOM—LoomWeve®

SATISFACTION GUARANTEED OR YOUR MONEY BACK

FOR THE LOOK THAT'S YEARS AHEAD

Gold Seal® FLOORS AND WALLS

*Trademark



in buildings...
everybody benefits from stainless steel

the architect specifies long-lasting Stainless Steel for its strength, its beauty and its economy of maintenance. In heavy use areas and for weather-exposed panels and trim, nothing stands up or keeps its smooth finish like Stainless Steel.

the builder likes working with Stainless Steel. It is easy to install, does not dent, peel or discolor and presents no problem on matching or replacement.

the tenants enjoy living or working in buildings that are bright, clean and attractive because of Stainless Steel.

Mc LOUTH STAINLESS STEEL

For the product you make today and the product you plan for tomorrow specify McLouth high quality sheet and strip Stainless Steel

McLOUTH STEEL CORPORATION DETROIT, MICHIGAN • MANUFACTURERS OF STAINLESS AND CARBON STEELS

STEELCASE

Sunshine Styled

OFFICE FURNITURE

WORKSHOP

... but a handsome workshop to be sure ... with furniture designed by Steelcase to make your working hours more productive ... more enjoyable. New Steelcase Custom Line design ... new two-tone styling are two more reasons why "whenever more than price is a factor ... when quality, efficiency, convenience and styling are of major importance ... Steelcase is consistently first choice!"

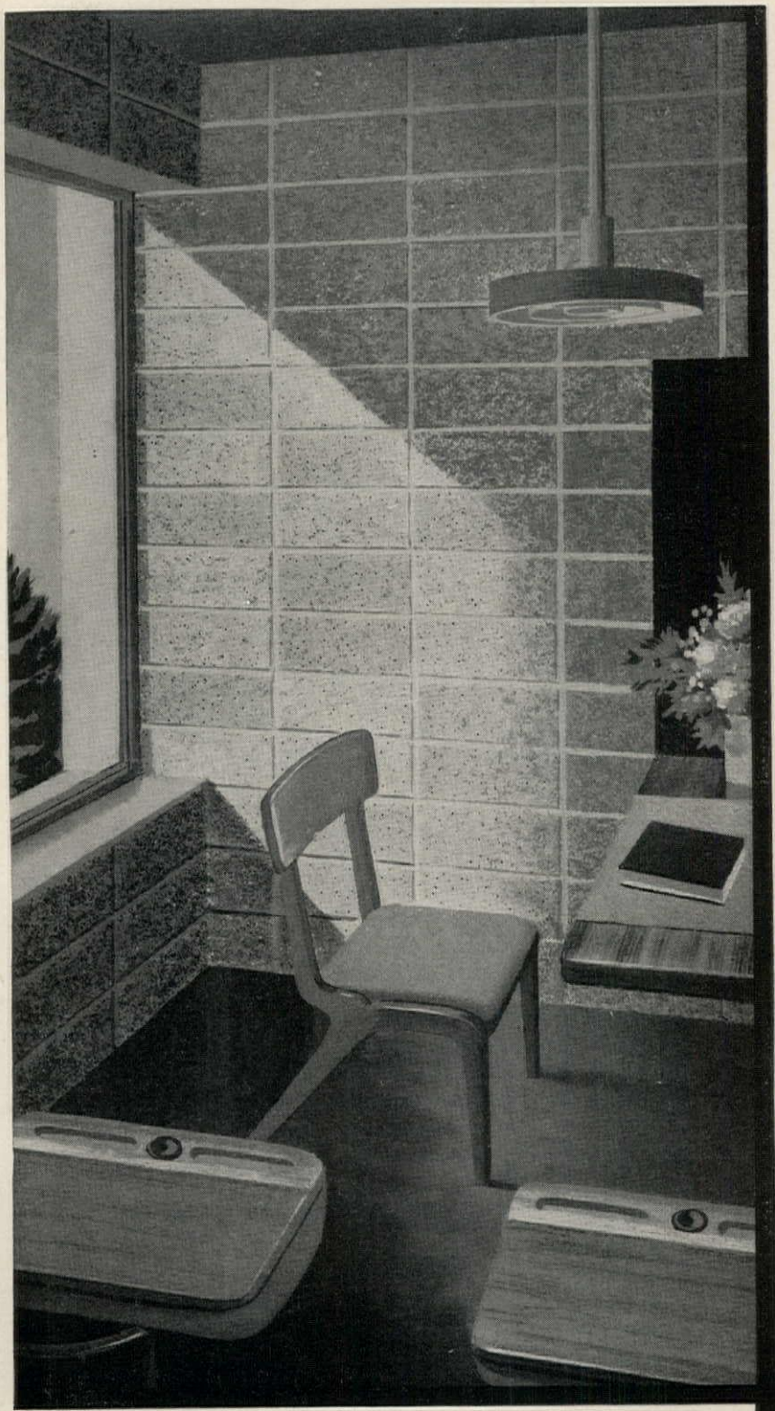
Ask your secretary... to send for the new full color Steelcase Showcase brochure on the startling new Custom Line office furniture by Steelcase. Just write Department A.

STEELCASE INC
Grand Rapids, Michigan
Authorized dealers in principal cities
In Canada
CANADIAN STEELCASE COMPANY, LTD. • Toronto

Recent Steelcase installations include major offices for

- Caterpillar Tractor Company
- Ford Motor Company
- General Mills
- Jewel Tea Company
- Lumbermens Mutual Casualty Company

STEELCASE



A WAYLITE SURFACE

needs no acoustical treatment

In addition, it has high thermal insulative qualities . . . offers many decorative possibilities . . . it is low in cost . . . fire-safe

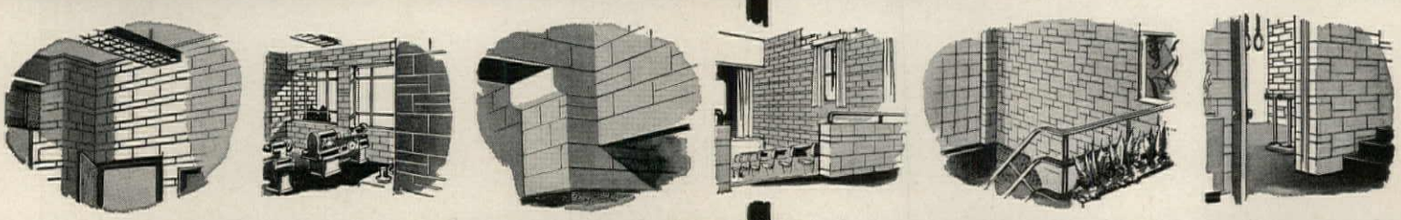
A large number of schools are being built these days of Waylite concrete masonry units.

The fact that the exposed surface of Waylite is one of the most efficient acoustical treatments known is in part responsible. Rooms that are comfortable to the ear are equally important in churches, auditoriums, offices, and many other structures.

Exposed Waylite is not only comfortable to the ear, but it is pleasing to the eye. The unit patterns shown give some idea of the varied decorative effects that can be easily achieved. The natural surface of Waylite units is attractive in color and texture. Units may be painted—or pigmented during manufacture.

Waylite concrete masonry units are structurally adequate and give a combination of four important factors: (1) high thermal insulative qualities; (2) excellent acoustical values; (3) a wide range of decorative possibilities; (4) low in cost—and fire-safe.

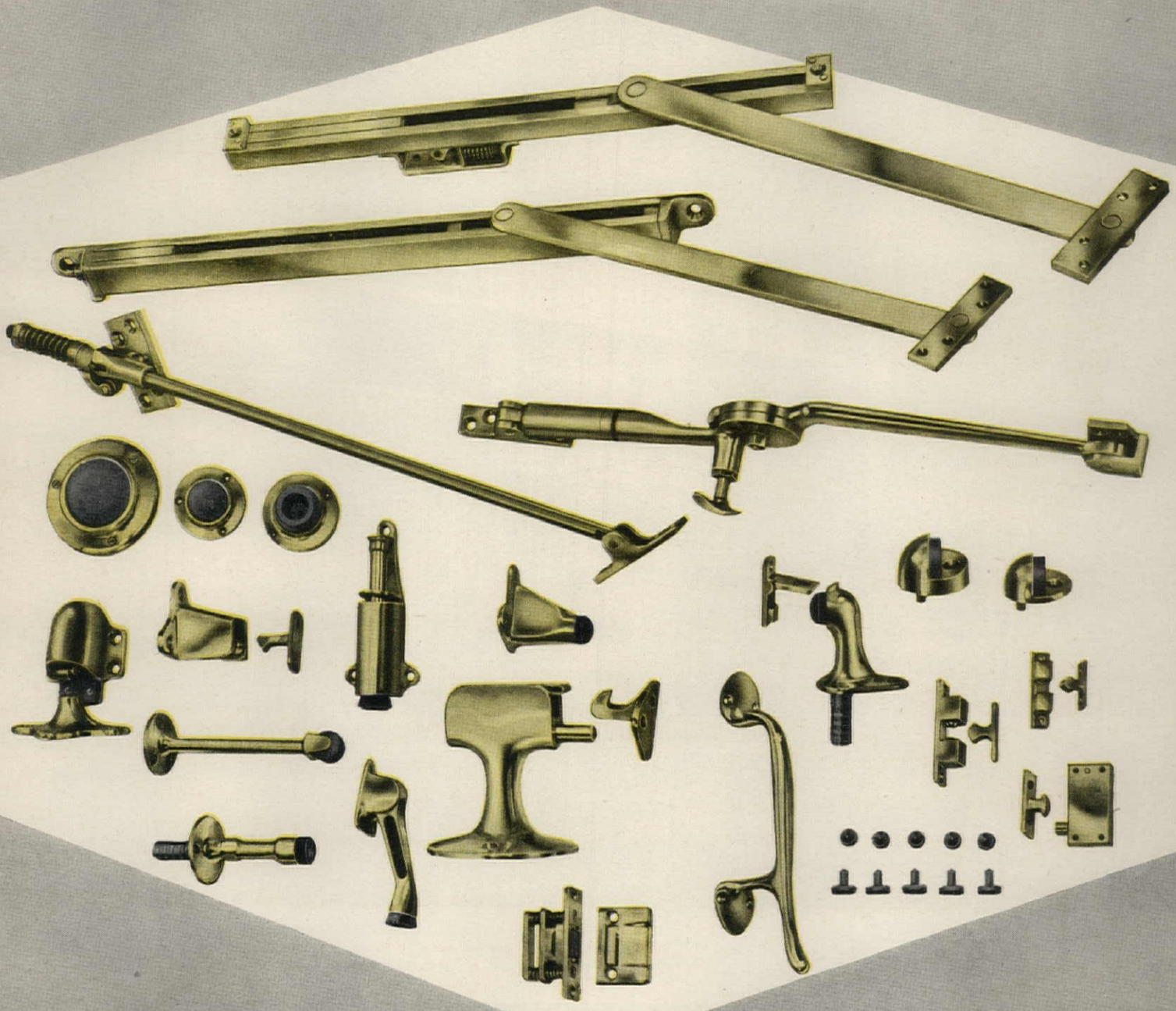
You will find 24 pages of engineering data on Waylite in Sweet's Catalog. Additional information is available on request. Address the Waylite Company, 20 North Wacker Drive, Chicago, Illinois or Box 30, Bethlehem, Pennsylvania.



WAYLITE

MASONRY UNITS

the satisfaction of specifying PROVEN quality...



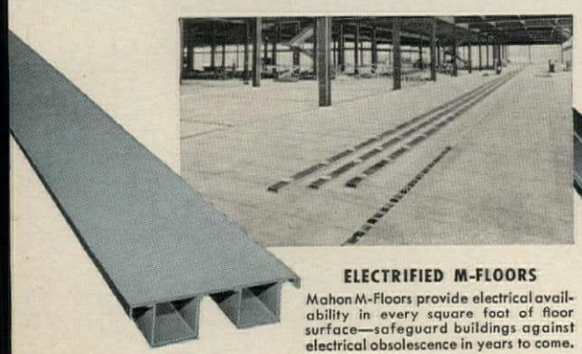
GLYNN · JOHNSON
door control hardware

since 1923

write for details and templates GLYNN • JOHNSON CORPORATION • 4422 north ravenswood avenue • chicago 40, illinois

INSULATED METAL WALLS Provide

Office Building and Plant of the Schlumberger Well Survey Corporation, Houston, Texas. Over 20,000 sq. ft. of Mahon Insulated Metal Walls were employed in the design of this outstanding structure. Mackie & Kamrath, Architects. Tellepsen Construction Company, General Contractors.



ELECTRIFIED M-FLOORS

Mahon M-Floors provide electrical availability in every square foot of floor surface—safeguard buildings against electrical obsolescence in years to come.

STEEL ROOF DECKS

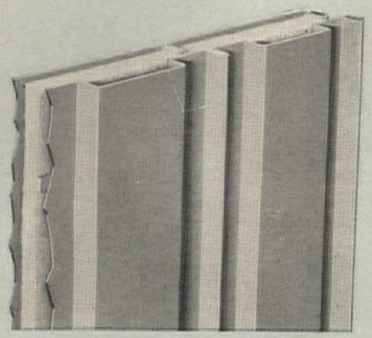
Standard Double Rib, Wide-Flange Double Rib, and Long Span M-Decks, which can be furnished perforated and fitted to provide an efficient acoustical ceiling.

ROLLING STEEL DOORS

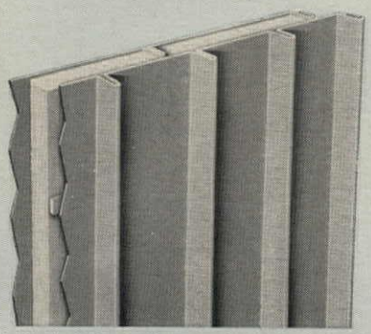
Standard Manually, Mechanically or Power Operated Rolling Steel Doors and Grilles. Underwriters' Labeled Automatic Rolling Steel Fire Doors and Fire Shutters.

Low-Cost Permanence and Lasting Beauty!

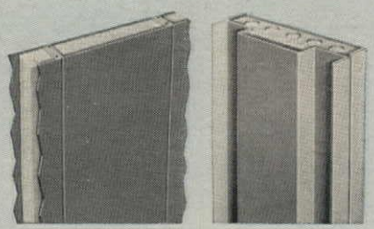
. . . Enterprising Architects Produce Striking Effects in Attractive Exterior Design



MAHON FLUTED WALL
FIELD CONSTRUCTED



MAHON RIBBED WALL
FIELD CONSTRUCTED



FLUSH FLUTED
MAHON PREFAB WALL PANELS

In the past sixteen years Mahon Insulated Metal Walls have been employed by architects in virtually every type of industrial and commercial building . . . the number runs into thousands.

In recent years, enterprising architects have employed this versatile product skillfully and to good advantage, costwise, in producing some outstanding design effects in office buildings, schools, sports arenas, parking garages, technical and research centers, and in some monumental buildings.

Bright metal—aluminum or stainless steel—in combination with brick, ornamental stone, glass block or other materials, offers unlimited possibilities in architectural treatment of exterior design. The building at the left is an excellent example.

Mahon Insulated Metal Curtain Walls are light-weight, permanent construction . . . thermal properties are superior to those of a conventional masonry wall with furred lath and plaster. Erection is fast . . . buildings can be quickly enclosed with metal curtain walls—even under low temperature conditions. They are economical, too . . . savings amount to as much as 50% of the cost of masonry walls in some types of buildings.

Mahon walls are available in the three patterns shown at the left . . . in the "Fluted Wall" and the "Ribbed Wall", vertical joints are invisible—symmetry of pattern is uninterrupted across the wall surface . . . and, both of these walls can be field erected up to sixty feet in height without a horizontal joint—two features of Mahon walls which are extremely important in powerhouses and other types of buildings where high expanses of unbroken wall surface are common. These two important design features were engineered into Mahon Insulated Metal Curtain Walls to give you a finer appearing job free from unsightly joints. You'll want these "better look" features in the wall you select for your next building.

See Sweet's Files for information, or write for Catalog W-57.

CONCRETE FLOOR FORMS

Mahon Permanent Concrete Floor Forms in various types meet virtually any requirement in concrete floor slab construction over structural steel framing.

THE R. C. MAHON COMPANY • Detroit 34, Michigan

Sales-Engineering Offices in Detroit, New York and Chicago
Representatives in all Principal Cities

MAHON

Snap!..and 3 ft. of duct is insulated with SNAP*ON

New idea! — insulate high-velocity round ducts with Snap*On pipe insulation, the one-piece pipe insulation of molded fine glass fibers. Just spread the single seam . . . snap it on the duct . . . seal the vapor barrier seams . . . and that's *that*.

This new Snap*On method is becoming increasingly popular because (1) you save time on installation (2) Snap*On is thermally superior to *any* other duct insulation on the market (3) the finished job is neat in appearance and absolutely uniform in thickness — no bulges, no "thin spots".

Snap*On in diameters up to 33" and with vapor barrier already adhered is available through Gustin-Bacon's nation-wide network of distributors.

*Trademark Reg.

SEE SWEET'S FILE OR CALL YOUR LOCAL DISTRIBUTOR LISTED UNDER "G-B INSULATIONS" IN THE YELLOW PAGES.

GUSTIN-BACON

Manufacturing Company GUSTIN gb BACON

Thermal and acoustical insulations • Pipe couplings and fittings.

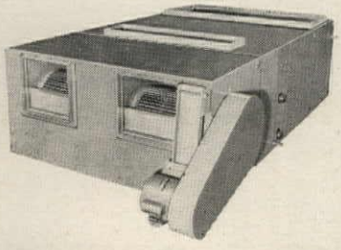
258 W. 10TH ST., KANSAS CITY, MO.

...Announcing

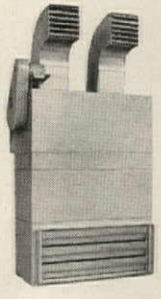
New Herman Nelson

Roll-O-Vent

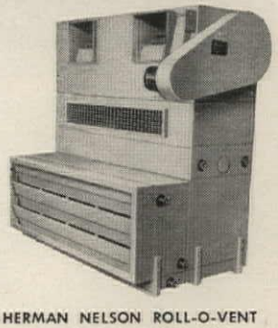
Heating, Ventilating and Cooling Units that change their own filters



HERMAN NELSON ROLL-O-VENT HEATING AND VENTILATING UNIT



HERMAN NELSON ROLL-O-VENT INDUSTRIAL UNIT HEATER



HERMAN NELSON ROLL-O-VENT AIR CONDITIONING UNIT

It's new. It's completely automatic. It's the exclusive Roll-O-Matic Filter now available on these three popular Roll-O-Vent air handling units. You simply put the roll of media in the unit—and forget it—for up to a year. It does *all* the work *automatically*. Just look at the better filtering and savings advantages provided only by new Roll-O-Vent units:

You save on the costly, time-consuming job of periodic filter changes.

You save by gaining maximum filtering efficiency *all year 'round* – because media is automatically changed at just the right time.

You save because ROLL-O-MATIC roll media *costs only half as much as* disposable filters.

Only Herman Nelson Roll-O-Vent "packaged" heating, ventilating and cooling units offer you Roll-O-Matic Filtering—exclusive development of American Air Filter Company. Write for new catalog.

Better Air Is Our Business

AAF herman nelson

American Air Filter

COMPANY, INCORPORATED

427 Central Avenue • Louisville 8, Kentucky

MISCO...

Thousands of travellers pass through these beautiful doors of Polished Misco every month. Note the distinctive, crisp design that typifies modern trends to combine beauty and utility.

SEE OUR CATALOG IN SWEETS (S) OR WRITE FOR COPY

M I S S I S S I P P I

NEW YORK • CHICAGO • FULLERTON, CALIF.

WORLD'S LARGEST MANUFACTURER OF

PERFECT PATTERN FOR MODERN DESIGN

Beautiful Misco Wire Glass Protects Passengers in Concourse Partitions and Doors at New Lambert-St. Louis Air Terminal

Acclaimed for outstanding design, the new Lambert-St. Louis Air Terminal achieves beauty and utility . . . employs so many modern ideas and materials. Misco Wire Glass, with its distinctive diamond-shaped, welded wire netting, is used extensively in partitions and doors of the heavily-travelled concourses. Misco meets the test of traffic at these vital points, withstands the press of crowds, affords a fresh concept of wire glass design that adds beauty to function.

The unusually attractive pattern of this wire glass, so perfect in modern design, enhances the crystal clarity of the dividers . . . fits the modern decor of the entire terminal.

Misco Wire Glass has so many uses in today's structures . . . in doors, windows, skylights, partitions. When you build or remodel, specify glass by Mississippi. Available in a wide range of patterns and surface finishes wherever quality glass is sold.

Write today for free catalog 57-G. Address Department 6.

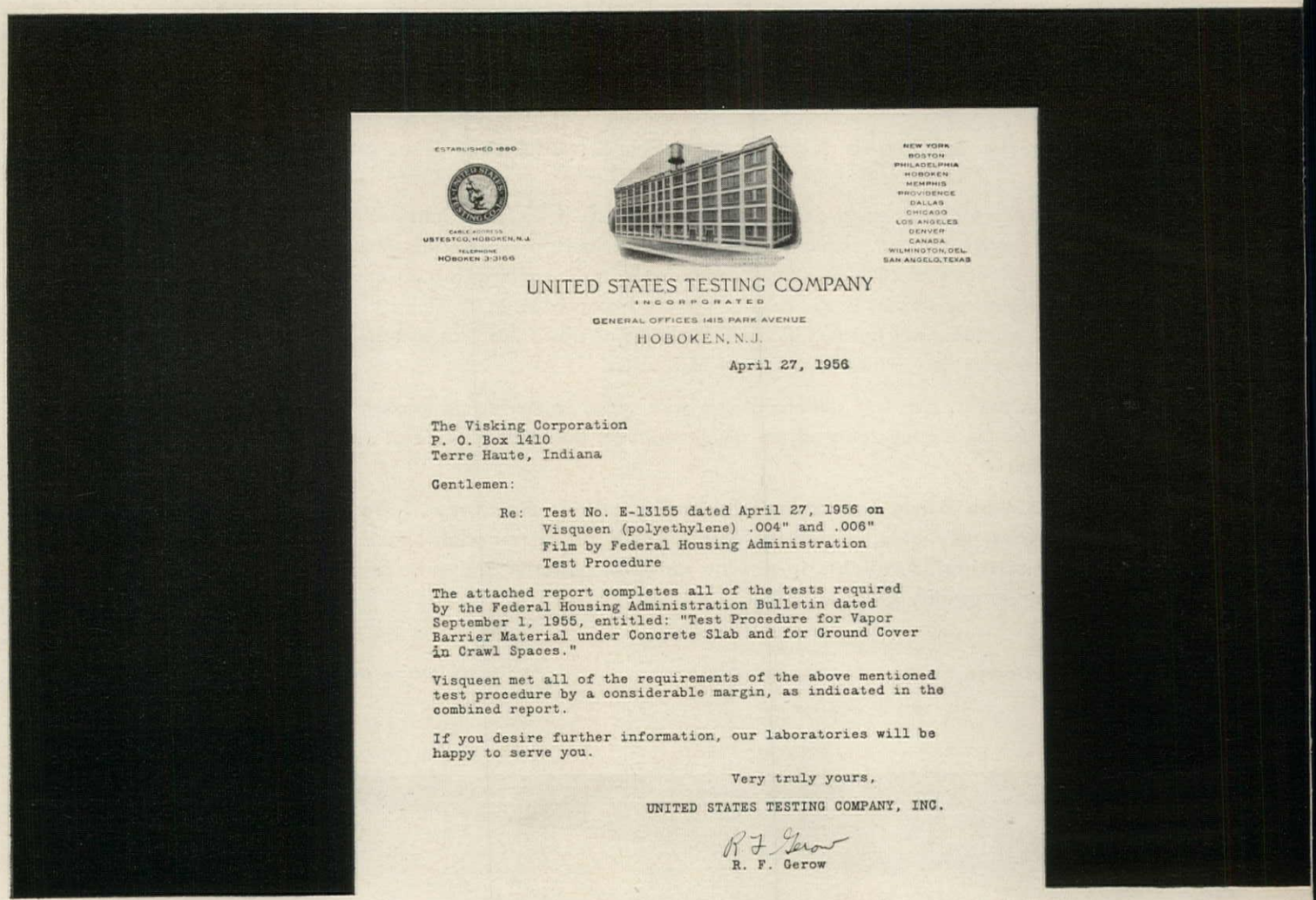
GLASS COMPANY

88 Angelica St. • St. Louis 7, Mo.

ROLLED, FIGURED AND WIRED GLASS

VISQUEEN film surpasses rigid FHA test requirements

T.M.



ESTABLISHED 1880

CABLE ADDRESS
USTESTCO, HOBOKEN, N.J.

TELEPHONE
HOBOKEN 3-3166

NEW YORK
BOSTON
PHILADELPHIA
HOBOKEN
MEMPHIS
PROVIDENCE
DALLAS
CHICAGO
LOS ANGELES
DENVER
CANADA
WILMINGTON, DEL.
SAN ANGELO, TEXAS

UNITED STATES TESTING COMPANY
INCORPORATED
GENERAL OFFICES 1415 PARK AVENUE
HOBOKEN, N.J.

April 27, 1956

The Visking Corporation
P. O. Box 1410
Terre Haute, Indiana

Gentlemen:

Re: Test No. E-13155 dated April 27, 1956 on
Visqueen (polyethylene) .004" and .006"
Film by Federal Housing Administration
Test Procedure

The attached report completes all of the tests required by the Federal Housing Administration Bulletin dated September 1, 1955, entitled: "Test Procedure for Vapor Barrier Material under Concrete Slab and for Ground Cover in Crawl Spaces."

Visqueen met all of the requirements of the above mentioned test procedure by a considerable margin, as indicated in the combined report.

If you desire further information, our laboratories will be happy to serve you.

Very truly yours,

UNITED STATES TESTING COMPANY, INC.

R. F. Gerow

R. F. Gerow

VISQUEEN film has successfully passed the test requirements for Vapor Barrier Material established by the Federal Housing Administration, as evidenced by the letter of the United States Testing Company, Inc.

Use VISQUEEN film with utmost confidence that it will do everything a vapor barrier should.

Protect the homes you design or build from moisture damage *for the life of the building.*

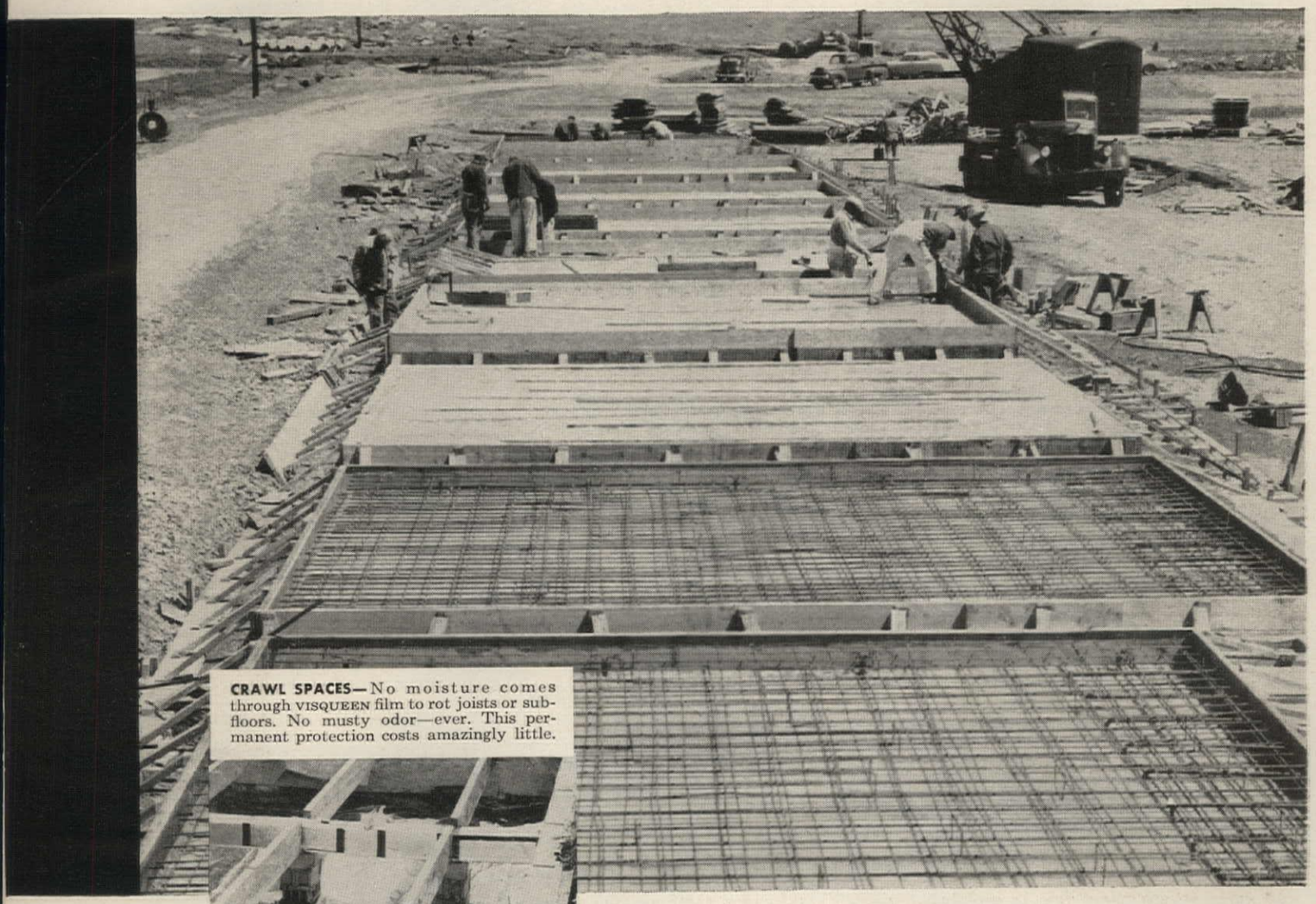
Save up to 50% on your vapor barrier costs because VISQUEEN film is so inexpensive to install.

Many other uses for VISQUEEN film on every job. Use it again and again for temporary closures, equipment covers, all-weather protection for lumber and materials stored outside.

Only VISQUEEN film offers a width for every job. Check this list! 3′, 4′, 6′, 8′, 10½′, 12′, 14′, 16½′, 20′, 24′, 26′, 28′, 32′.

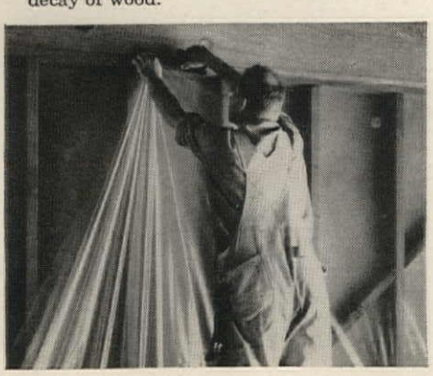
Important! VISQUEEN film is all polyethylene, but not all polyethylene is VISQUEEN. Only VISQUEEN, produced by process of U.S. Patents No. 2461975 and 2632206, has the benefit of research and resources of The VISKING Corporation.

SLAB FLOORS—Cut your labor costs up to 50%, get permanent protection against moisture with tough, seamless VISQUEEN film under concrete slabs.



CRAWL SPACES—No moisture comes through VISQUEEN film to rot joists or subfloors. No musty odor—ever. This permanent protection costs amazingly little.

WALLS—VISQUEEN film on the warm side of the walls prevents condensation within studwall, cracking or peeling of paint, decay of wood.



Look for this name on the selvage

information request tag

VisQueen®

clip this tag— ALI
attach to letterhead, mail.

THE VISKING CORPORATION

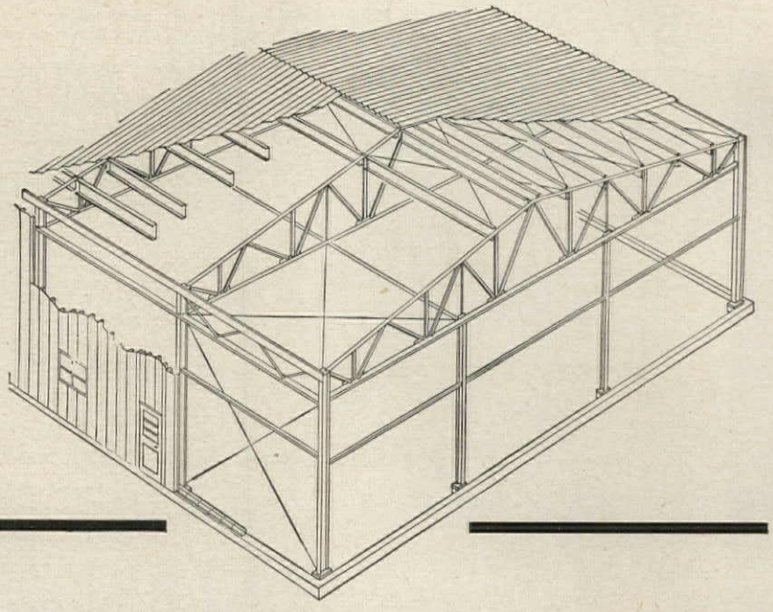
World's largest producers of polyethylene sheeting and tubing

Plastics Division, Box 1410, Terre Haute, Indiana

IN CANADA: **VISKING LIMITED,** LINDSAY, ONTARIO
IN ENGLAND: BRITISH **VISQUEEN LIMITED,** STEVENAGE

Look at the design advantages you get in truss-type Armco Steel Buildings

You can meet client needs and save time for yourself by designing with Armco Steel Buildings. Armco Buildings meet AISI and AISC Specifications. You save the time and cost of designing each individual beam and column yet you retain complete freedom of treatment.



Unique Truss Design

All space in truss-type Armco Steel Buildings is usable up to the bottom chord of the truss. The traditional knee brace has been eliminated. There are no obstructions to craneways or other facilities. You can meet your client's specific needs from a selection of five different wall heights, from 12 to 24 feet.

Total floor area is unlimited, with clear span widths from 60 to 100 feet and any lengths in increments of 20 feet.

All surfaces are accessible to maintenance painting. In addition, the truss components are self-cleaning.

Walls are made of flat interlocking STEELOX® Panels that take any architectural treatment you desire.

Specify roof covering of either STEELOX Panels or special deep corrugated sheets. Roof and wall covering can be any one of three different types of Armco Steel: Armco ZINCGRIP® Steel, with a durable galvanized coating; Armco ZINCGRIP PAINTGRIP® Steel for best paint adherence; or Armco ALUMINIZED STEEL®, aluminum-coated steel which combines the surface characteristics of aluminum with the strength of steel.

The wide spans, economical design and freedom of treatment make these truss-type Armco Buildings ideal for applications such as auditoriums, gymnasiums, manufacturing plants, warehouses and wherever else you need clear, unobstructed floor space. Write us for details including facts about smaller Armco Steel Buildings, featuring frameless and rigid frame design. Armco Drainage & Metal Products, Inc., 3007 Curtis Street, Middletown, Ohio. Subsidiary of Armco Steel Corporation. In Canada: write Guelph, Ontario. Export: The Armco International Corporation.

ARMCO STEEL BUILDINGS

ARMCO®

accent on youth

Student Lounge area,
Orange Coast College,
Costa Mesa, California.
Robert E. Alexander,
Architect, Los Angeles.

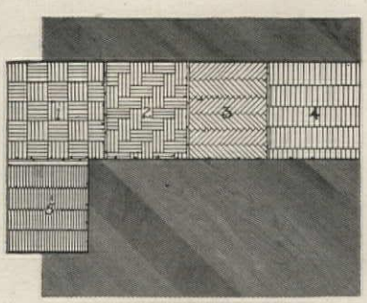
Dining area,
Orange Coast College
Both areas floored with block-patterned Northern Hard Maple.

the finest floor that grows

foot-friendly

NORTHERN HARD MAPLE

In today's concept of the ideal educational environment, cheerful brightness, *for sound reasons*, is swiftly supplanting the somber austerity of yesteryear's scholarly surroundings. Happily, architect and schoolman find, ready-to-hand, in abundance, Nature's most nearly perfect flooring material to help advance this concept . . . Northern Hard Maple, **MFMA**-certified. Its rich, bright lustre leaps into life under routine maintenance. It fights scuffs, scars and dents for generations. It adds "muscle" to the structure. It's versatile—meets every school area use admirably, sports and social, classroom and administrative. It is far from costly—cheap, in fact, when endurance and low upkeep are considered. Trust **MFMA** Northern Hard Maple, America's *forever*-modern flooring. For technical data SEE SWEET'S (Arch. 13j-MA). Write for latest (1956) listing of **MFMA**-approved floor finishing products and methods.



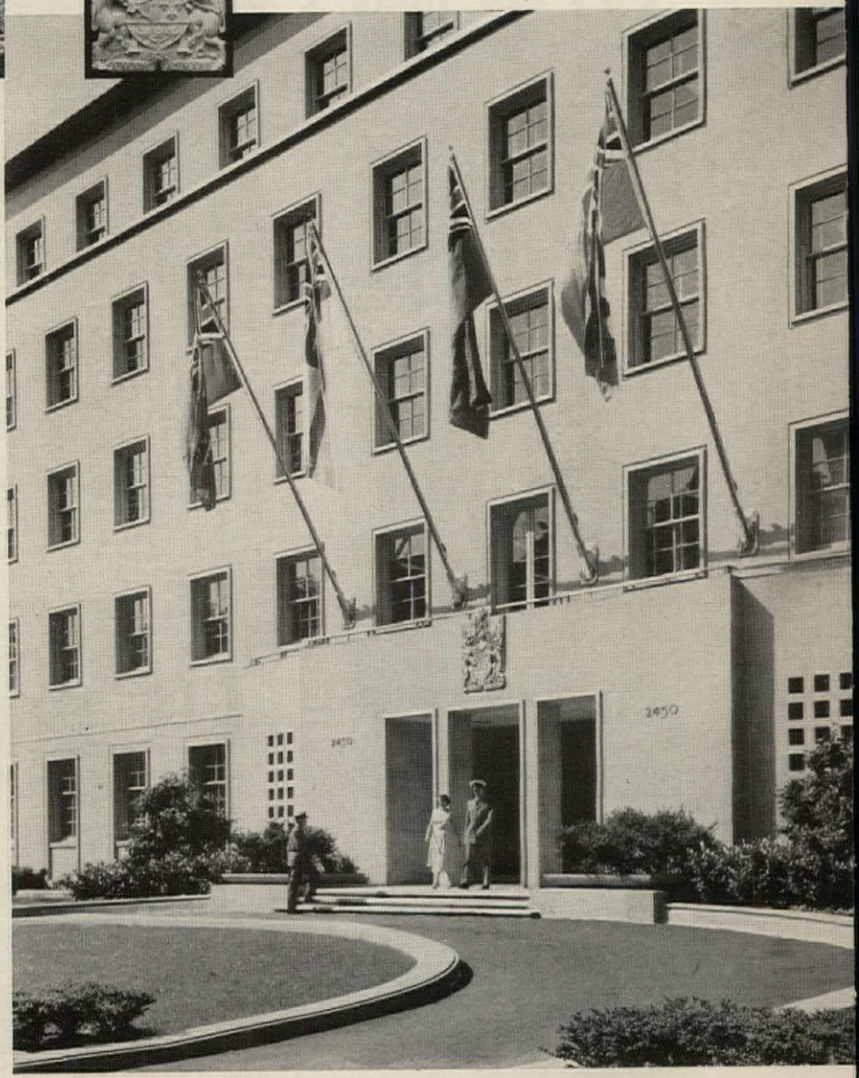
MFMA-certified Northern Hard Maple is available in blocks and modern patterned designs as well as the more conventional strip form. Readily laid in mastic, over concrete or softwood sub-flooring.

MAPLE FLOORING MANUFACTURERS ASSOCIATION
Suite 564, Pure Oil Building, 35 East Wacker Drive, Chicago 1, Illinois

FLOOR WITH* NORTHERN HARD MAPLE, *BEECH AND BIRCH

POWERS Control provides

CANADIAN JOINT STAFF BUILDING
Washington, D.C.



Architects:
Marani and Morris, Toronto, Ont.

Associate Architects:
Faulkner, Kingsbury and Stenhouse
Washington, D.C.

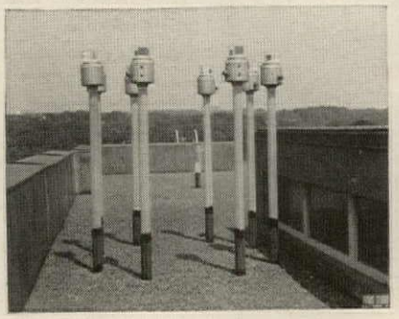
Mechanical Engineer:
Charles S. Leopold, Philadelphia, Pa.

Mechanical Contractor:
W. G. Cornell Co., Inc., Washington, D.C.

Primary air supply regulated by Sub-master Thermostat and Powerstroke damper motor.

Far Right: Powers Master Control Panel

Electronic Solar Sensing Instruments on roof of building



→

(c86)

ideal comfort in Canada's Washington "Pentagon"

This imposing new structure on Washington's Embassy Row, houses offices of the Canadian Joint Staff and Department of Defense Production. An atomic bomb shelter here provides working facilities for key personnel in time of an emergency. Teletype lines from the communication room link the building with both the U.S. Pentagon and Ottawa. A Powers modern control system maintains the proper air conditioned "climate" so essential for people making vital decisions. It also insures efficient operation of heating and air conditioning equipment.

Economy in Refrigeration Horsepower achieved here. Conditioned primary air is supplied to 199 perimeter induction air conditioning units. Cooling for four exterior zones is automatically established by Powers electronic type solar equipment which measures solar gain on each exposure of the building. Operating in conjunction with a Master outdoor temperature thermostat, this equipment establishes the highest allowable temperature to meet load conditions. This control results in maximum economy of refrigeration horsepower. Perimeter induction units are individually controlled by Powers thermostats and packless valves.

Interior areas are supplied with conditioned air which is reheated as required by 23 booster coils individually controlled by Powers thermostats and packless valves. Temperature of forced hot water for the booster coils is controlled by a Powers Mastrol system.

Are You Planning a New Building or modernizing an old one? If so, ask your architect to include a Powers Quality system of temperature and humidity control. They have been time-proven dependable and more economical in thousands of prominent buildings since 1891.

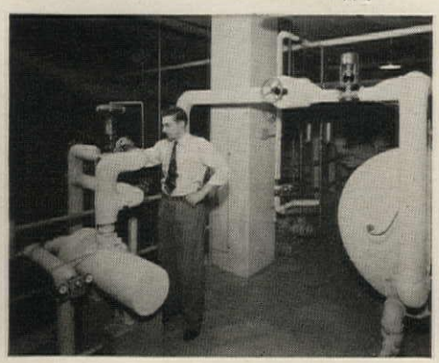
THE POWERS REGULATOR COMPANY

SKOKIE, ILLINOIS | *Offices in Chief Cities in U.S.A., Canada and Mexico*

65 Years of Automatic Temperature and Humidity Control

Vortex damper operated by Powerstroke Motors regulated by Powers Static Pressure Control

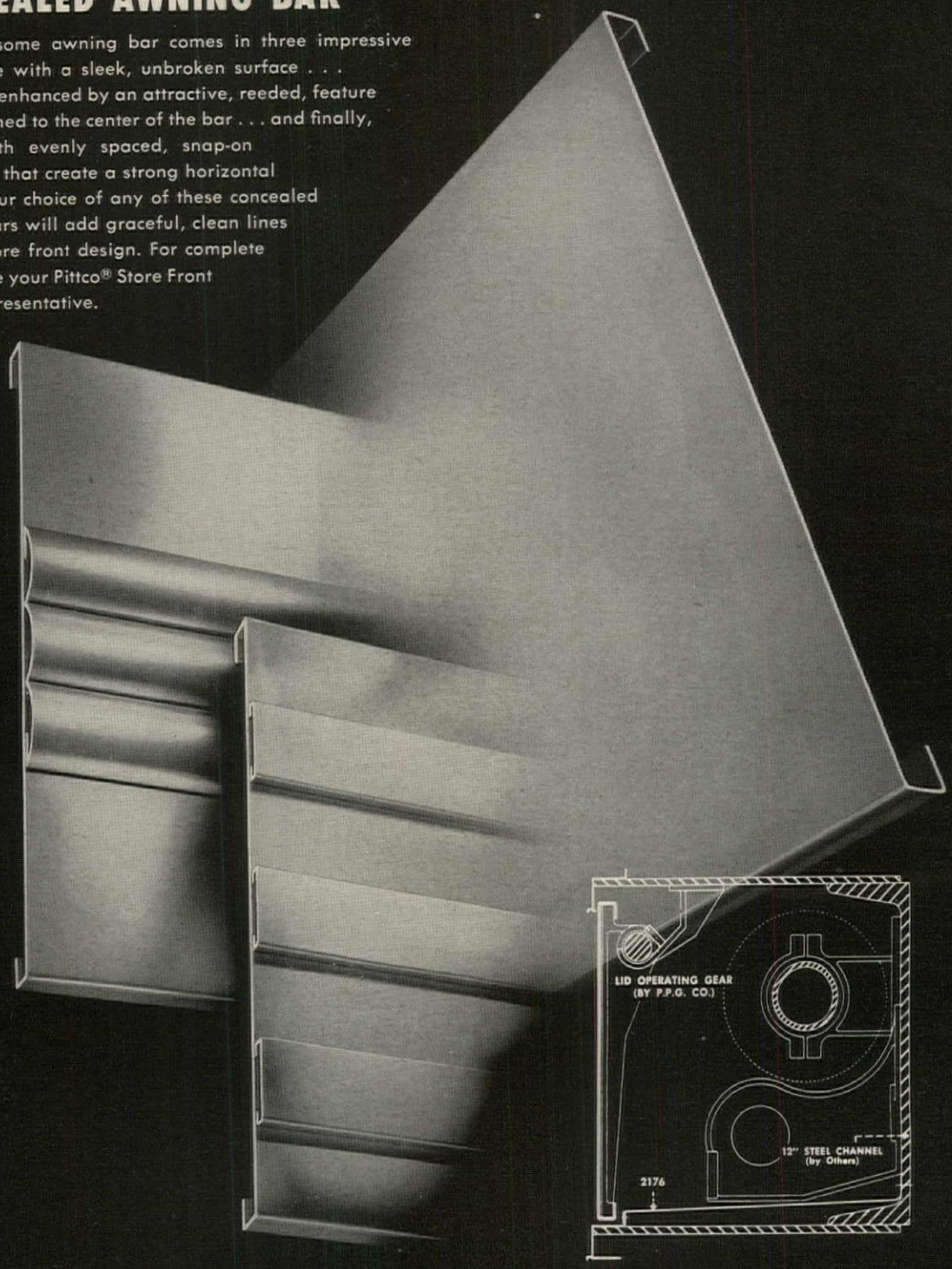
Powers controls on domestic hot water supply



Powers MASTROL system for forced hot water heating

Pittco NO. 91
CONCEALED AWNING BAR

This handsome awning bar comes in three impressive styles. One with a sleek, unbroken surface . . . another is enhanced by an attractive, reeded, feature strip fastened to the center of the bar . . . and finally, a bar with evenly spaced, snap-on mouldings that create a strong horizontal sweep. Your choice of any of these concealed awning bars will add graceful, clean lines to your store front design. For complete details, see your Pittco® Store Front Metal Representative.



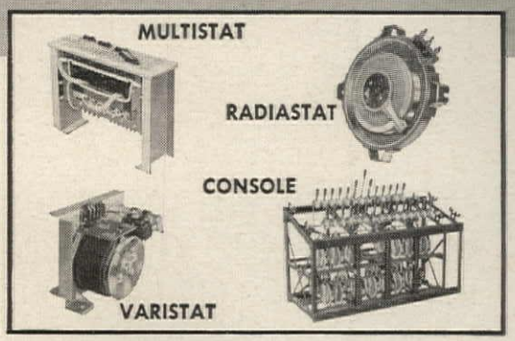
PAINTS · GLASS · CHEMICALS · BRUSHES · PLASTICS · FIBER GLASS

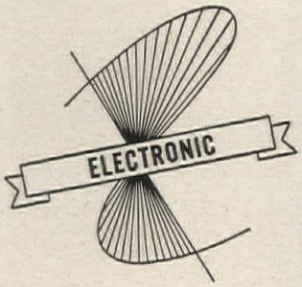
PITTSBURGH PLATE GLASS COMPANY

IN CANADA: CANADIAN PITTSBURGH INDUSTRIES LIMITED

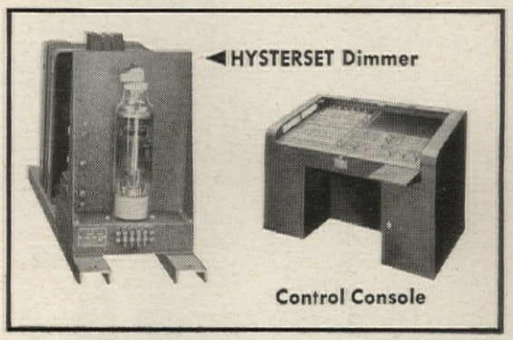
One source for all lighting control

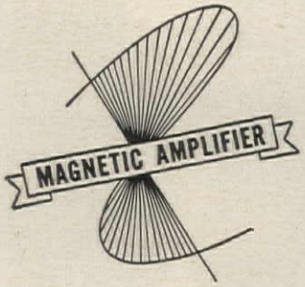
. . . for full range, flickerless and efficient control of incandescent and fluorescent lighting in smallest size. The 2.5 KW VARISTAT, the 6.6 and 8 KW RADIASTATS and the 6 and 12 KW MULTISTATS are available for non-interlocking or interlocking control, manual or remote-control motor operated. BULLETINS 76, 76F and 76M.



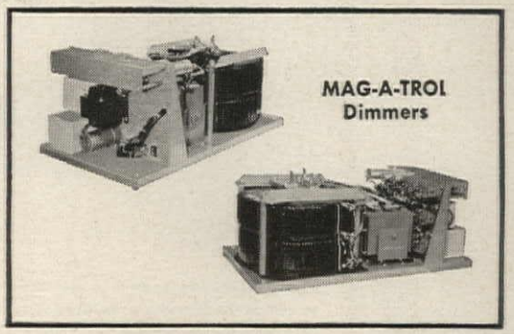


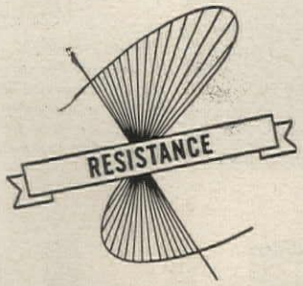
. . . for miniature remote control of lighting, HYSTERSET electronic controls, with remote control console and reactance dimmers, feature single tube per circuit, fast response, miniature pilot controls, extreme flexibility of circuit arrangement, mastering, presetting, and minimum maintenance. BULLETIN 74.



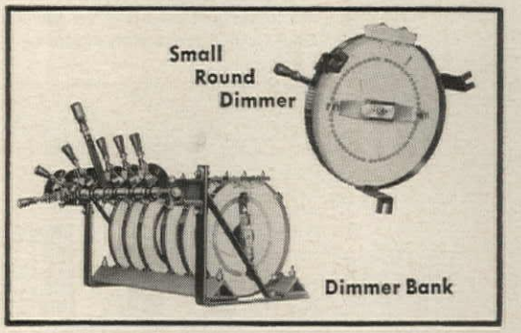


. . . for large theatres, auditoriums or TV studios . . . newest concept in lighting control. MAG-A-TROL magnetic amplifiers feature wide load range, instantaneous response, miniature low-power controls, and *no maintenance*. Ratings from 2.5 to 25 KW per unit. BULLETIN 74 MA.





. . . for smooth, flickerless lighting control with maximum simplicity. VITROHM resistance dimmers, single or in banks, feature steel-plate construction, self-lubricating contact shoes, oil-less center bearings. Ratings to 3.6 KW per plate. Complete selection of accessories. BULLETINS 71 and 72.



WRITE FOR THESE BULLETINS TODAY!

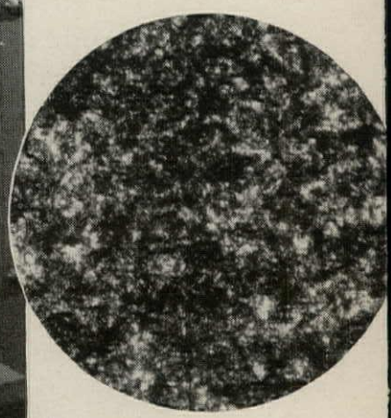
WARD LEONARD ELECTRIC COMPANY
24 SOUTH ST., MOUNT VERNON, N.Y.
In Canada—Ward Leonard of Canada Ltd.—Toronto

Result-Engineered Controls Since 1892

NOW...Republic Steel Lockers to preserve fine finish

Gym lockers are certain to get their share of scratches. Here's where moisture eats into steel not protected by Bonderizing. Shown above are Republic's Gymnasium Lockers, combining a single tier locker and six triple tier locker openings. Small locker is permanently assigned each student.

Photomicrograph, 100 times enlarged, of a piece of plain sheet steel. The surface is glossy smooth with no porosity to give the finish a foothold.



Photomicrograph, 100 times enlarged, of Bonderized steel. The surface is crystalline phosphate. Enamel will penetrate microscopic pores, dry, and become securely anchored to the metal.

REPUBLIC

REPUBLIC STEEL®

World's Widest Range of Standard Steels

are BONDERIZED and protect against rust

Bumps, scratches, moisture—whatever the punishment, a Republic Steel Locker can take it and still retain a glistening, handsome finish that will not chip, peel or flake off.

That's because the steel is now Bonderized to provide a superior base for anchoring the enamel finish to the steel surface and, at the same time, to guard against the spreading of under-finish corrosion which eventually causes peeling and flaking.

Republic Standard Steel Lockers offer three locking systems—are available in many types and sizes for every conceivable storage requirement.

One of the world's biggest locker manufacturers, Republic's Berger Division has behind it more than 65 years of locker-making know-how—plus thousands of successful installations. This is the kind of experience you can always depend on when you want the best in lockers.

Berger offers architects and school administrators a complete planning and installation service, too—from technical planning and engineering assistance to full responsibility for proper installation—right down to the final bolt. Get the facts from your Berger representative. Or mail coupon for illustrated booklet giving specifications and prices.

STEEL

and Steel Products

ALSO BONDERIZED FOR LASTING BEAUTY is Republic's big shelving line, made by Berger. Shown above are Book Shelf Units—sturdy, attractive, and widely used in school libraries. Republic makes a complete line of shelving for every school requirement from the stock room to the shop. Berger's shelving experts will be glad to help you plan. Send coupon for facts.

BONDERIZED TRUSCON STEEL DOORS CAN BE PAINTED TO MATCH any color decor. They refuse to stick or bind because steel can't swell or warp. Perfect for schools, offices and other institutions. Truscon makes sound-deadened Interior Swing Doors and Sliding Doors that glide noiselessly on nylon rollers. Send coupon for literature.

REPUBLIC STEEL CORPORATION
Dept. C-2941
3108 East 45th Street
Cleveland 27, Ohio

Please send me information on:
- ☐ Republic Steel Lockers with new Bonderizing
- ☐ Republic Steel Shelving
- ☐ Truscon Steel Doors

Name_____ Title_____

Company_____

Address_____

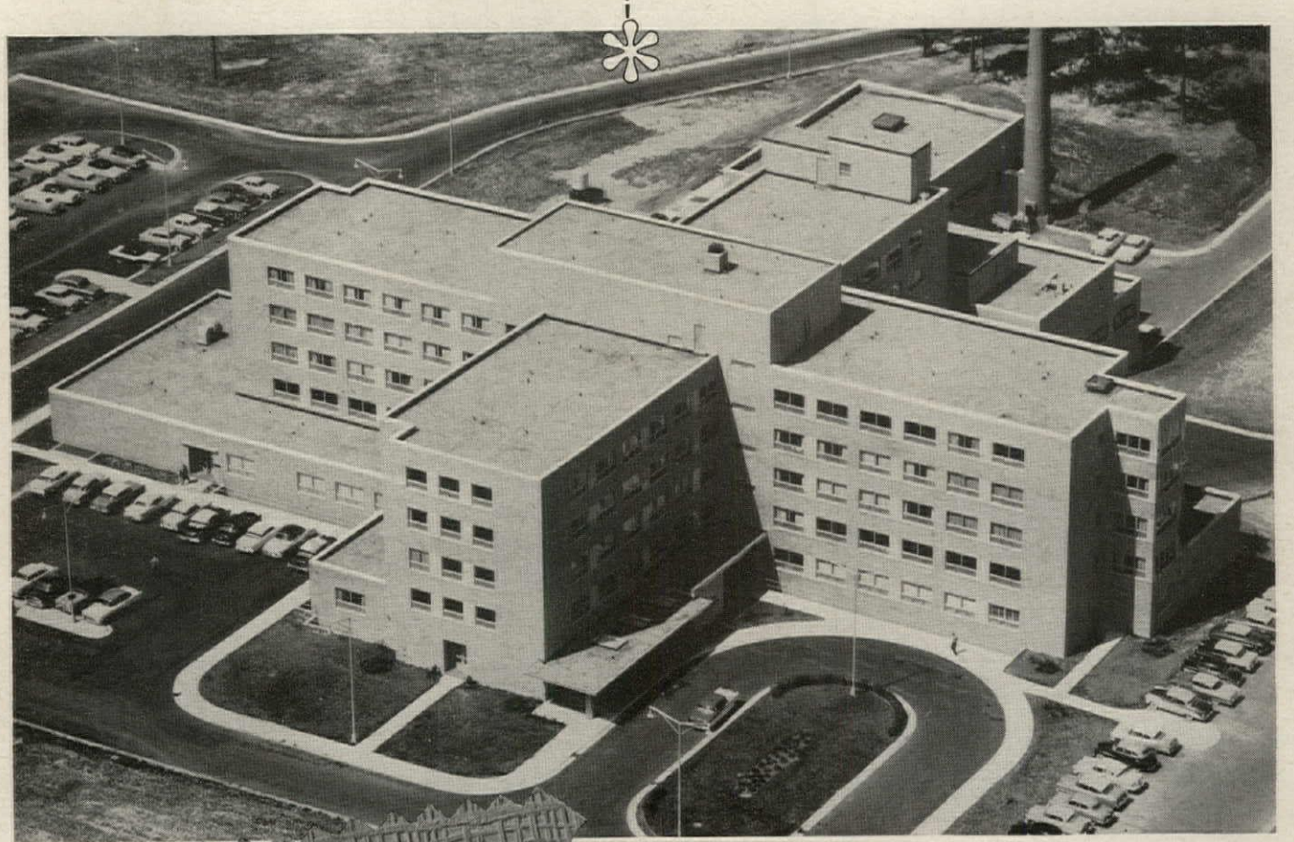
City_____ Zone____ State_____

Again... and again...
the best designed buildings
in the world specify

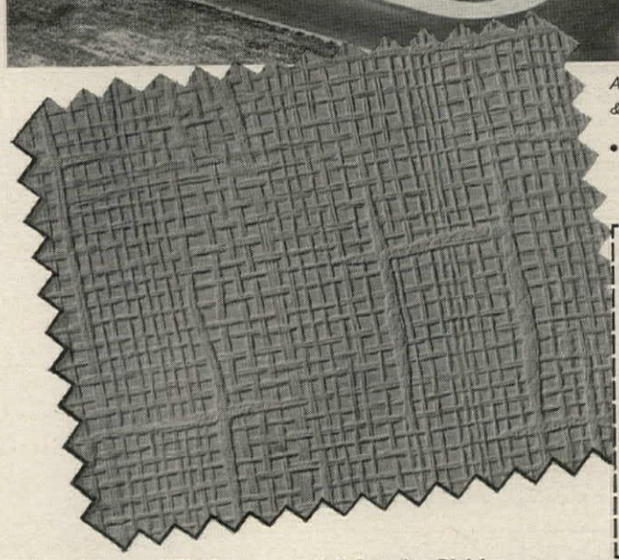
Joanna *Vinyl* Wall Fabric

"Why, this hospital is beautiful!" This public tribute to modern hospital interior design was heard repeatedly—on "opening day" of the new 1500 bed Indianapolis Community Hospital. Enthusiastic response was merited by the fine techniques and materials used... including, of course, Joanna Vinyl Wall Fabrics for the interior walls.

Learn for yourself why Joanna Vinyl Wall Fabric is the choice for America's best designed buildings... again and again. Write for samples and complete literature.



Aerial View of Indianapolis Community Hospital. Designed by Daggett, Naegele & Daggett, Inc., Indianapolis.



- New colors
- New styling
- Longer lasting
- Easier to install
- Easier to maintain

Joanna Western Mills Company
Dept. 10A
22nd and Jefferson Streets, Chicago 16, Illinois

Gentlemen:
Please send samples and further information on Joanna Vinyl Wall Fabric.

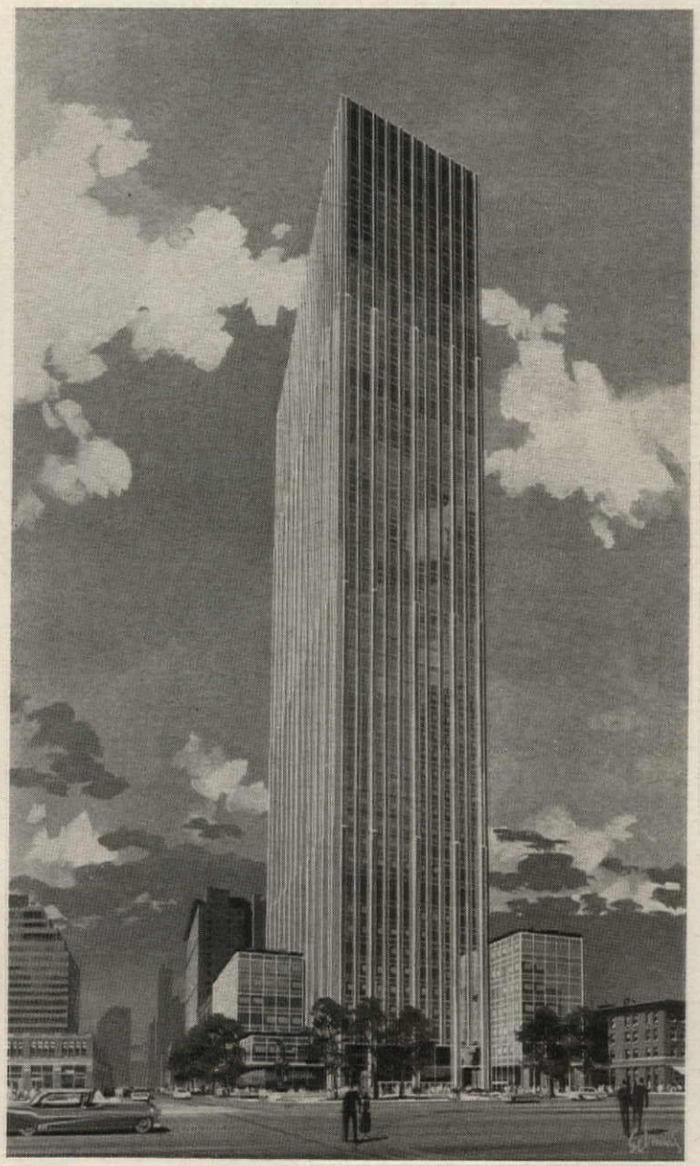
Name_____

Company_____

Address_____

Joanna Western Mills Company • Wall Covering Division
22nd and Jefferson Streets • Chicago 16, Ill. • New York Sales Office: 261 Fifth Avenue, New York 16, N. Y. • Canadian Distributors: Daly & Morin, Ltd., Montreal

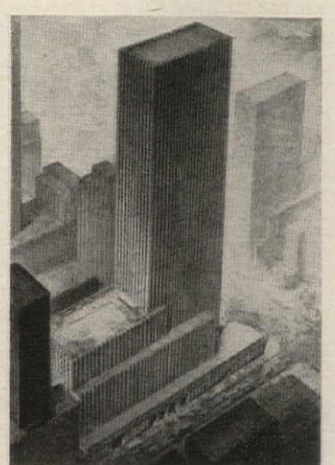
A roundup of recent and significant proposals



TWO NEWEST N.Y. TOWERS

For a new Time & Life Building, Rockefeller Center, in partnership with Time Inc., will erect a $70 million 47-story structure (left) that will be New York's largest single-shaft tower, rising 550′ from two setbacks at the third and eighth floors. Preliminary plans for the building, designed by Harrison & Abramovitz, include a block-long plaza.

Also adjoining Rockefeller Center, John W. Galbreath and Peter B. Ruffin, builders of Socony-Mobil Building (AF, Jan. '55), will erect a taller (60-stories), but slimmer tower to cost $50- to $60-million, also designed by Harrison & Abramovitz. (For a story on the financing of this building and the unusual history of the site, see p. 46.—ED.)

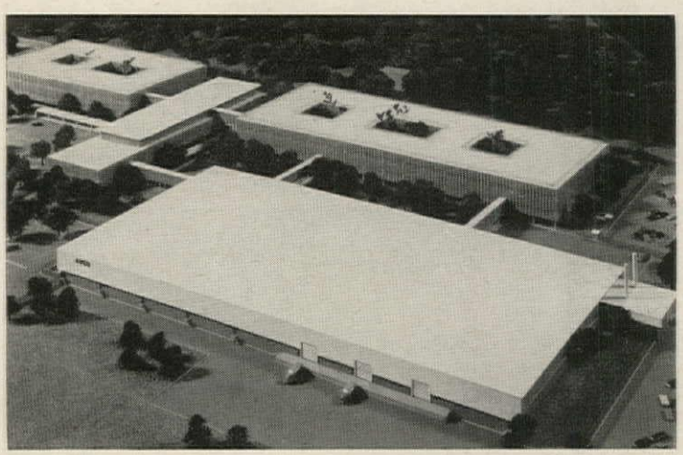


New Time & Life Building (superimposed on photo) will be 16th building in the Rockefeller group, and the Center's first on the west side of the Avenue of the Americas, opposite Music Hall. Area "A" on photo will be site of new Galbreath-Ruffin building; and Area "B" a new 50-story home office for Equitable Life.

COLLEGE LIBRARY TO HAVE H-P CONCRETE ROOF

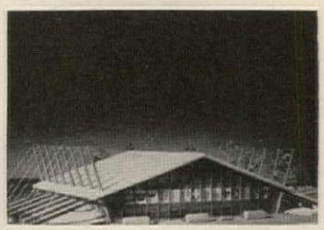
New York City will acquire its first structure with a hyperbolic-paraboloid thin shell concrete roof when this new library (r) is erected on the Bronx campus of Hunter College. Designer for both the one-level 180′ x 120′ library building and the connected, common-entrance three-story classroom structure (l): Marcel Breuer, with Farkas & Barron as structural engineers. Structurally, the classroom building will be an ordinary masonry wall-bearing building.

Exteriors of the two buildings will be identical, with large glass wall areas. The two sunny sides of each will be shielded by honeycomb grille screens of foot-square clay-colored flue tiles that stand 4′ in front of the walls, in color match the brick used on Gothic buildings already on the campus. Classrooms will measure 20′ x 20′, and the inner court of the academic building will be used mainly for faculty affairs. Bids are to be called for before the end of this year.



AIR-BORNE TREES AND SPACE SHIPS IN MASSACHUSETTS

Avco Manufacturing Corp. will build this $15 million research and development center in Wilmington, Mass., designed by Pereira & Luckman of Los Angeles. Here engineers will investigate problems of bringing a man-carrying satellite back into the earth's atmosphere from outer space. To give them a feeling of aloftness, the 100-acre wooded site will provide "airborne views" of trees (only the treetops visible) from especially planned window exposures. Largest building is a prototype-testing and fabrication area.



TRIPLE-PURPOSE ARENA

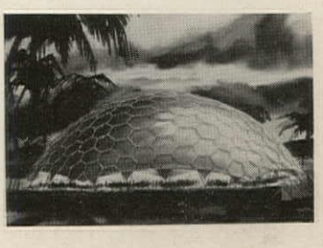
The enclosed ice arena for the 1960 Winter Olympics at Squaw Valley can be converted after the games to a year-round ice skating and hockey rink or a convention and exhibition hall. Architects Corlett & Spackman, Kitchen & Hunt, designed the 300′ clear roof span to support heavy snow loads. The arena is enclosed on three sides.

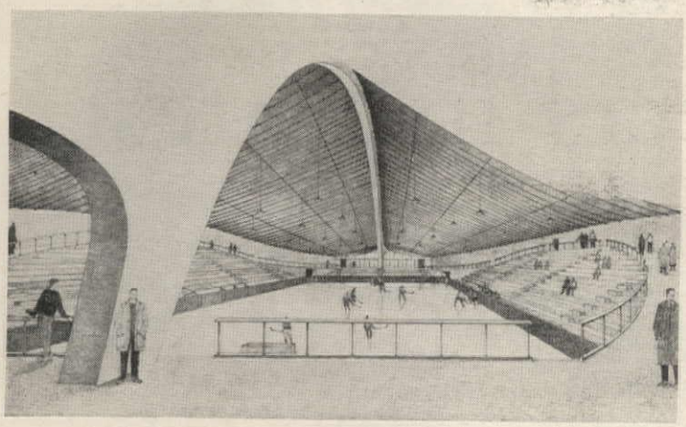
HIGH, WIDE SKYSCRAPER FOR BALTIMORE HOSPITAL

Because of the unavailability of any roomier central city sites, Mercy Hospital in Baltimore is conducting an $8 million campaign to build an entirely new 21-story hospital on its present downtown site. The hospital chapel will be covered with a peaked canopy (l). Other departments in the lower portion will be administration, emergency, service, outpatient, pharmacy, and operating. Floors in the slimmer neck section are for dining rooms, laboratories, and medical records. The wider upper floors will be nursing units, with two maternity floors, and one for pediatrics. Hospital Consultant Dr. Anthony J. J. O'Rourke worked on plans with the architects, Taylor & Fisher of Baltimore and Westermann & Catalano of New York.

"HAWAIIAN VILLAGE" DOME

The auditorium for Henry J. Kaiser's Hawaiian Village in Waikiki will be of aluminum stressed skin designed by his own engineers and based on Buckminster Fuller's geodesic dome. It will be 147′ in dia., 45′ high. Welton Becket & Associates of Los Angeles designed the auditorium facilities, acoustical treatment and lighting.





THREE ALUMNI JOIN IN PLANS FOR YALE HOCKEY RINK

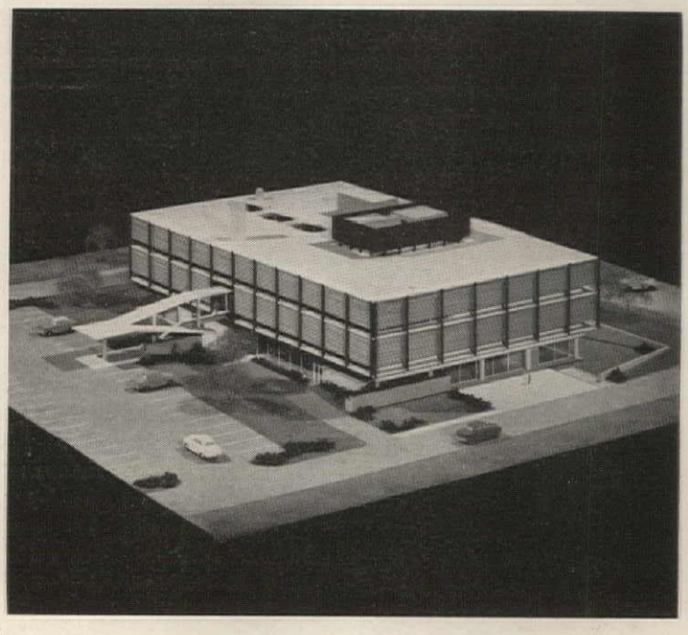
Eero Saarinen, Yale, '34, has designed this unusual hockey rink which will honor Yale's father-and-son hockey stars—David S. Ingalls Sr. '20 and David Jr. '56. The central arch will carry an aluminum roof suspended by cables, eliminating the need for interior columns. The main entrance (below) will be a glass and aluminum wall. With an ice surface the building will seat 3,000 hockey fans; without ice, 5,000.

CHAPEL IN THE ROUND

Stained glass windows will pierce the 55′ aluminum dome topping a new chapel at Chaminade College, a Catholic boys' school in St. Louis. Aluminum cross and angels will be lighted at night. The chapel interior (right) will seat 260 around a center altar with bronze communion rail. Murphy & Mackey, St. Louis architects, designed the chapel as part of the school's $1 million expansion program.

SAN ANTONIO BANK

Early Texas history will be illustrated in both depth and width in the new San Antonio Bank of Commerce. Instead of a mural, on the west wall of the main banking floor a special silver and copper inlay, made in Hong Kong, will show city and state historic incidents in 16 panels 80′ long, 15½′ high. Architects: Kenneth Franzheim; Ayres & Ayres, associates.



1,000 ROOMS WITH A VIEW FOR RUTGERS STUDENTS

Three new dormitories and a lounge building (center) will rise on the banks of the Raritan River, New Brunswick, N. J. The three dormitories, of brick-faced cavity exterior walls, will contain two floors of classrooms below ground level, a ground floor lobby, and six floors of dormitory quarters. Each floor is planned as an integral unit with living, study and recreational space for 56 students. Architects: Kelly & Gruzen of Newark and New York, Martin L. Beck, associate.

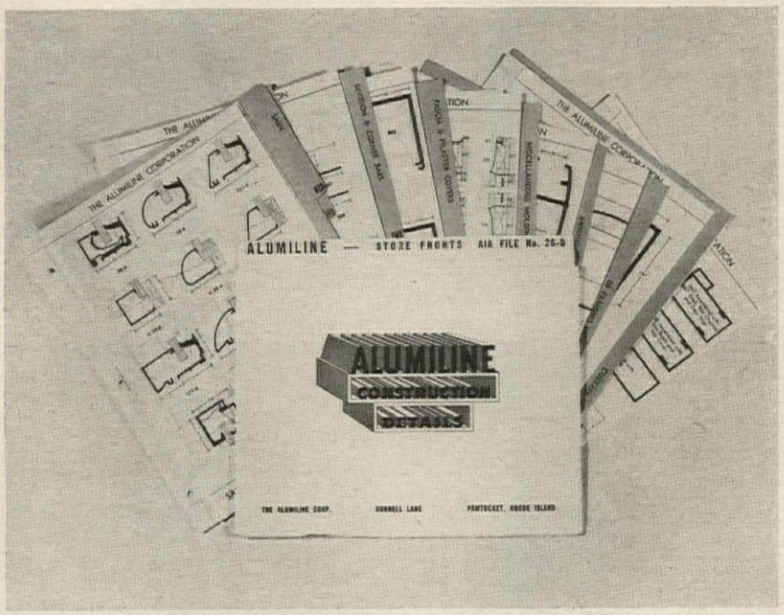
COLORFUL SERVICE BUILDING

The Missouri Public Service Company will move into cheerful red, white and blue headquarters on a 21-acre site near Raytown. A system of louvers and special overhangs will protect office workers from heat and glare; blue aluminum louvers turn automatically with the sun. Service departments, a cafeteria and utility rooms will occupy the first level; operating offices the second. The third floor executive offices, board room and library will have a floor area of 10,200 sq. ft. Architects: Kivett & Myers & McCallum.

ALUMILINE Offers

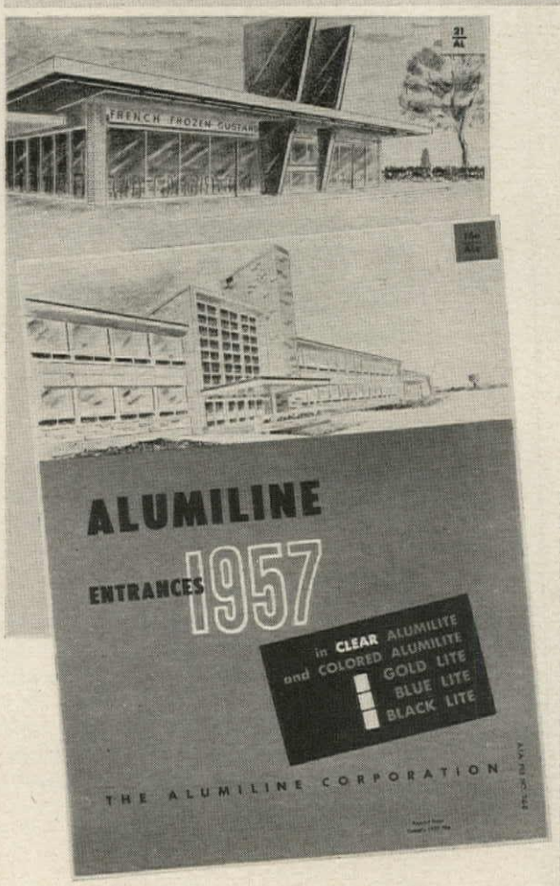
All Architects its Latest 1957 Publications

No charge . . . No obligation — They are yours for the asking!



ALUMILINE FULL-SIZE CONSTRUCTION DETAILS

FULLY Indexed and sectionalized for your easy and convenient use. You will find innumerable occasions to refer to—and save time with—these new 1957 Alumiline Full-Size Construction Details. Enclosed in an especially designed file folder are transparent drawings covering: Sash, Heads, Sills, Jambs, Facia, Pilaster Covers, Miscellaneous Mouldings, Awning Flaps, Awning Hood, and Curtain Wall. Ask for your Full-Size Details today. Send coupon below.



ALUMILINE 1957 CATALOGS STORE FRONTS • ENTRANCES

Practical and specific, expressly planned and prepared with your needs in mind are these two brand new reprints from Sweet's 1957 File. Many new innovations are featured in both Catalogs. Please request your copies by filling in coupon below.

the ALUMILINE CORPORATION

Architectural Aluminum Products

DUNNELL LANE **PAWTUCKET, RHODE ISLAND**

Yours FREE—Mail Coupon Today

The ALUMILINE CORP., Dept. F
Dunnell Lane, Pawtucket, R. I.

Please send, without obligation, copies of your new 1957 Publications, as follows:

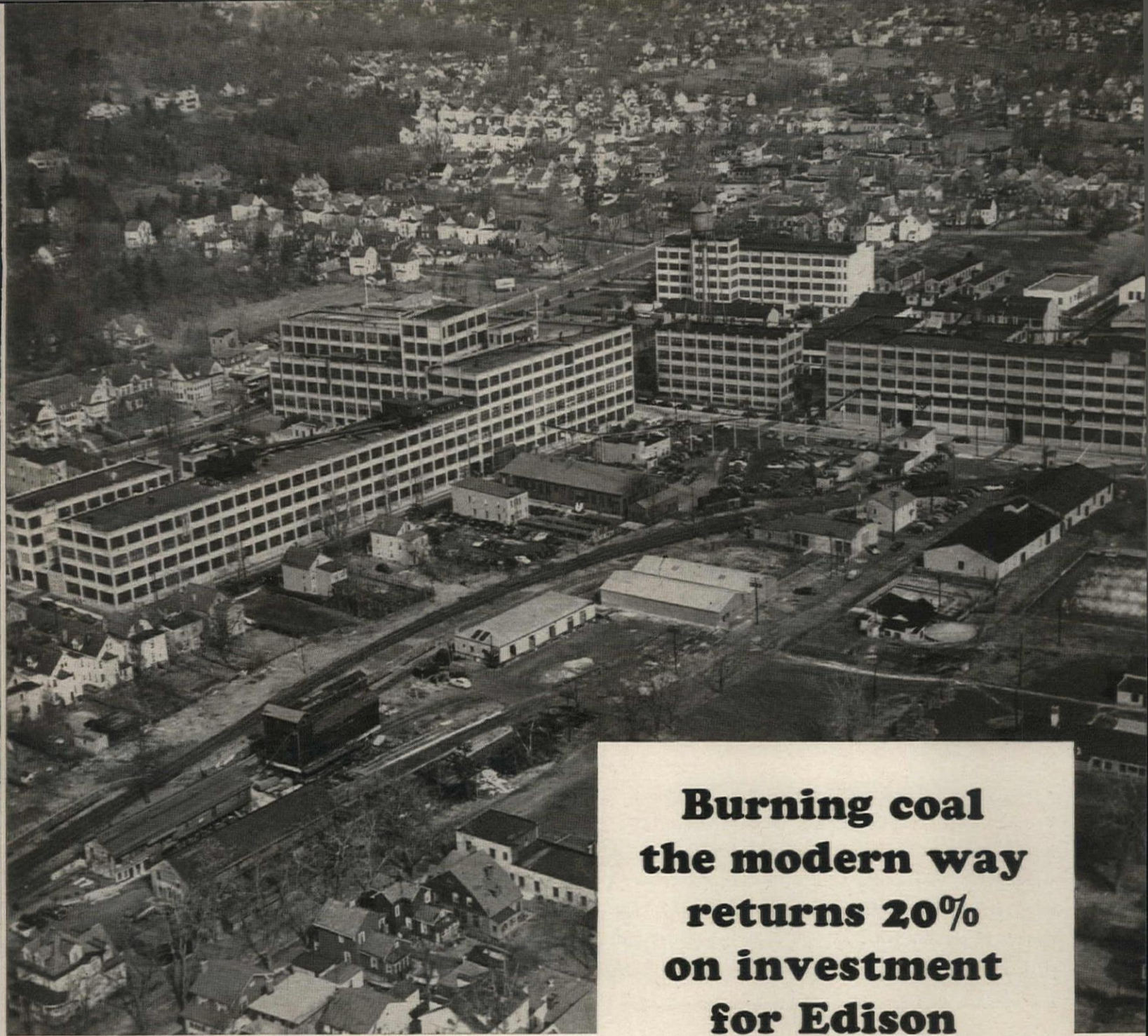
☐ ALUMILINE Full-Size Construction Details
☐ ALUMILINE Store Front Construction
☐ ALUMILINE Entrances and Doors

Firm .....

By .....

Address .....

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



Burning coal the modern way returns 20% on investment for Edison

Consult an engineering firm

Designing and building hundreds of heating and power installations a year, qualified engineering firms can bring you the latest knowledge of fuel costs and equipment. If you are planning the construction of new heating or power facilities—or the remodeling of an existing installation—one of these concerns will work closely with your own engineering department to effect substantial savings not only in efficiency but in fuel economy over the years.

facts you should know about coal

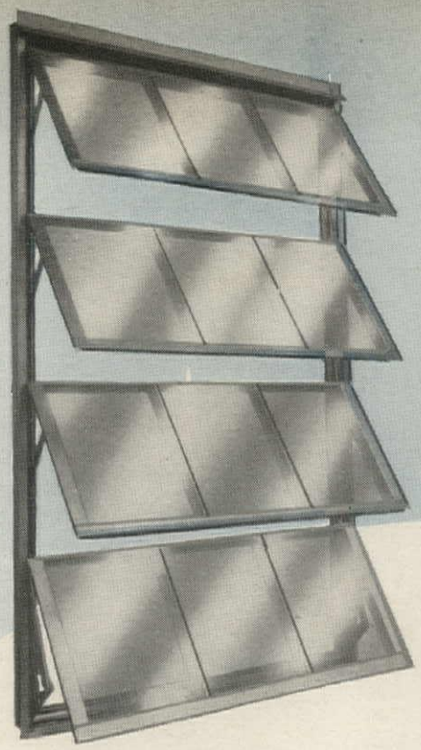
In most industrial areas, bituminous coal is the lowest-cost fuel available • Up-to-date coal burning equipment can give you 10% to 40% more steam per dollar • Automatic coal and ash handling systems can cut your labor cost to a minimum. Coal is the safest fuel to store and use • No smoke or dust problems when coal is burned with modern equipment • Between America's vast coal reserves and mechanized coal production methods, you can count on coal being plentiful and its price remaining stable.

The firm of Thomas A. Edison, Inc., West Orange, N. J., was faced with a common problem—rising steam plant costs. A thorough survey indicated the need for modernization of the power system. As a result, six 30-year old boilers were replaced with two 60,000 lb./hr. units. FD and ID fans, pneumatic ash systems, coal pulverizers and related equipment were installed.

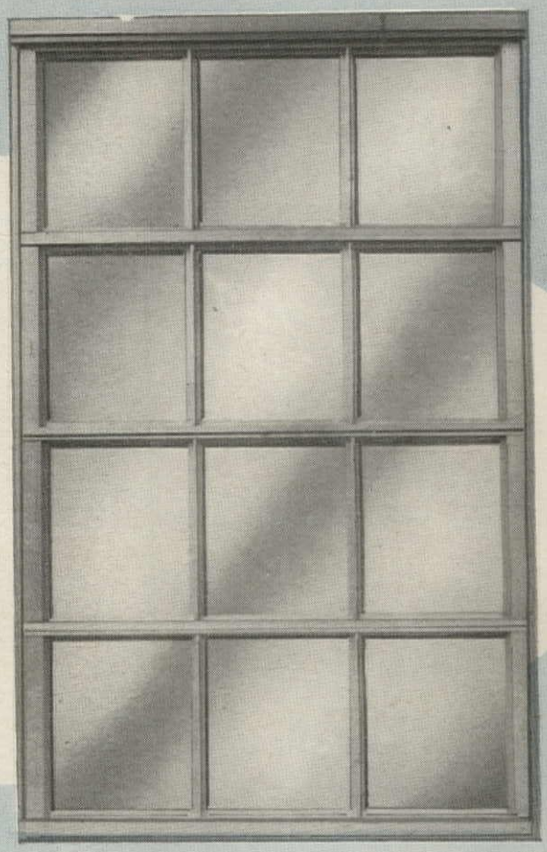
Modernization has paid off at Edison! Steam-generating capacity per sq. ft. of boiler room space has been doubled, labor costs have been cut, fuel costs are down, boiler efficiency is up 16% and modernization gives a 20% annual return on a net investment of 2.7 mils per BTU!

For further information or additional case histories showing how other plants have saved money burning coal, write to the address below.

BITUMINOUS COAL INSTITUTE
Southern Building • Washington 5, D. C.



THE BIRTH OF A CONCEPT



. . . the first new window concept in a long time.

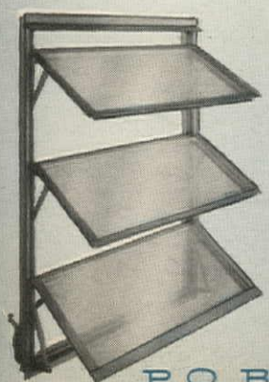
You remember when the original Miami Window first brought freedom from maintenance to the awning window. You've seen the Miami All-Aluminum Window set new standards for integrity of design . . . quality of construction . . . and dependability of operation.

Now you're seeing a new concept . . . the modern window with complete freedom of design and specification . . . the one window that complements any architectural style.

Now . . . with this new Miami Traditional Window . . . you not only have the vertical lines of the traditional window . . . you control the position of those lines . . . because you control the vertical muntins . . . placing the exact number you want . . . where you want them.

You can be confident you are specifying more quality and more performance than any other modern window can deliver . . . and at the same time, you are enjoying more freedom of design than any old-fashioned window can provide. Here is tradition at its very best.

It's something to think about . . . this new Miami Traditional Window.



The Window With
Maximum performance at minimum maintenance.
Guaranteed operator
Draft-free fresh air . . . even during rain
Tightest sealing vents ever built

Now Has A Traditional Look

IT'S NOT A MIAMI WINDOW ®
UNLESS IT'S MADE BY
MIAMI Window CORPORATION®
THE FIRST ALL-ALUMINUM AWNING WINDOW

P. O. Box 877 International Airport Branch, Miami 48, Florida

Record construction outlays trail 1955 spending in terms of 1947-49 prices

As 1956 drew to a close, Commerce and Labor statisticians reported record new construction expenditures for both November, and for the first eleven months of the year (see chart and table).

Still the biggest riddle in construction, however, was the actual physical volume of building being erected with current record expenditures.

Last month, for instance, BLS data on total new construction outlays "in 1947-49 prices," showed that last year's record outlays in current dollars were actually less than comparable spending in 1955 for every month through October (see chart). Instead of a 3% gain in spending, when adjusted to 1947-49 prices, last year's January-October outlays totaled only $28.3 billion (compared with $36.9 billion in current dollars), and was 2.3% *less* than 1955's $28.9 billion outlays in 1947-49 prices.

The great disparity in the government's January-to-May statistics on construction spending and construction employment that was noted in these columns last summer (AF, Aug. '56) still persisted through October. Even though there is no basic comparability between these two construction industry surveys (the employment surveys include contract maintenance and repair work), there was still no accounting for the great percentage increases reported in employment, compared with the small increase (if not an actual decrease) in construction spending.

The remarkable comparison in BLS estimates of the number of workers employed by all building contractors (excluding highway and other non-building construction workers) during 1955 and 1956:

	1955	1956	% Increase
Jan.	1,839,000	2,185,000	18.8
Feb.	1,780,000	2,189,000	23.0
March	1,844,000	2,244,000	21.7
April	1,935,000	2,376,000	22.8
May	2,013,000	2,501,000	24.2
June	2,067,000	2,666,000	29.0
July	2,134,000	2,679,000	25.5
August	2,170,000	2,746,000	26.5
Sept.	2,164,000	2,729,000	26.1
Oct.	2,120,000	2,703,000	22.8

Productivity is sometimes a large factor in construction labor costs, particularly in a tight labor market. Last summer a large prefabricated house manufacturer who was faced with a need to halt a threatening decline in profits took drastic action and laid off

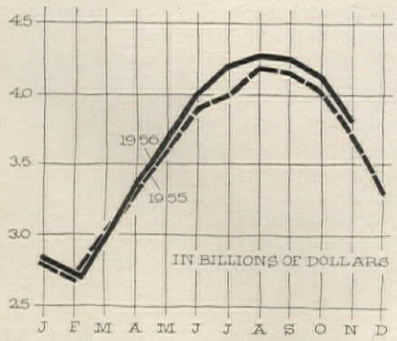
continued on p. 45

SPENDING BY BUILDING TYPES

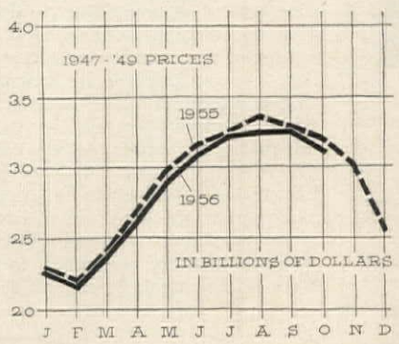
(millions of dollars)

	Nov. '56	First 11 months 1956	1955	%±
PRIVATE BUILDING				
Residential (nonfarm)	1,297	14,086	15,316	—8
Nonresidential	794	8,033	6,933	+16
Industrial	271	2,795	2,176	+28
Commercial	288	3,034	2,773	+9
Offices; lofts; warehouses	131	1,234	1,027	+20
Stores; restaurants; garages	157	1,790	1,746	+3
Religious	75	700	672	+4
Educational	48	491	448	+10
Hospital; institutions	31	295	324	—9
Public utilities	445	4,663	4,235	+10
*PRIVATE TOTAL	2,650	28,302	28,137	+1
PUBLIC BUILDING				
Residential	25	255	242	+5
Nonresidential	341	3,745	3,941	—5
Industrial	37	399	691	—42
Educational	216	2,352	2,256	+4
Hospital; institutions	25	283	311	—9
Military	134	1,300	1,200	+8
Highways	430	4,795	4,257	+13
Sewer; water	112	1,184	1,005	+18
*PUBLIC TOTAL	1,156	12,481	11,596	+8
*GRAND TOTAL	3,806	40,783	39,733	+3

**Minor components not shown, so total exceeds sum of parts.*

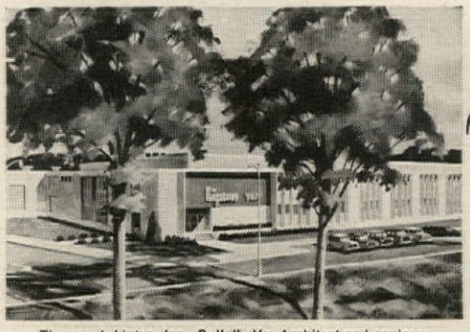


TOTAL EXPENDITURES for new construction in November amounted to $3,806 million, according to Commerce and Labor estimates, and for the first eleven months of 1956 were $40.7 billion, or 3% greater than comparable outlays a year earlier—in current dollars.



EXPENDITURES for new construction, when measured by the Commerce and Labor Depts. "in 1947-1949 prices," however, trailed comparable 1955 outlays last year every month through October—even though other federal data showed over 25% more workers employed.

1956 Award Winners, FACTORY Magazine



Thomas J. Lipton, Inc., Suffolk, Va. Architect and engineer: R. W. Naef, Architect-Engineers, Jackson, Miss.

Sylvania Electric Products Inc., St. Marys, Pa. Architect and engineer: Sylvania Facilities Planning Office, Williamsport, Pa. Paul H. Van Wert, AIA, Architect

General Electric Company, Bloomington, Ill. Architect and engineer: Vern E. Alden Company, Chicago

Briggs & Stratton Corp., Milwaukee, Wis. Architect and engineer: F. A. Fairbrother and Geo. H. Miehls. Albert Kahn Associated Architects & Engineers, consultants

Photographs reproduced from FACTORY MANAGEMENT AND MAINTENANCE, April, 1956. Copyright by McGraw-Hill Publishing Company.

Parker-Kalon Division, General American Transportation Corp., Clifton, N. J. Engineers and builders: Walter Kidde Constructors, Inc., New York City and Houston

Bradley Washfountains provide the ultimate in sanitary washing facilities,—save space, installation time and costs.

Sikorsky Aircraft, Division of United Aircraft Corporation, Stratford, Conn. Architect and engineer: F. A. Fairbrother and Geo. H. Miehls. Albert Kahn Assoc. Architects & Engineers

P. Lorillard Company, Greensboro, N. C. Architect and engineer: Lockwood Greene Engineers Inc., New York City

The Ebco Manufacturing Company, Columbus, Ohio. Architect: Merle Robert Maffit, Columbus. Engineer and builder: F & Y Building Service, Inc., Columbus

Eight of the Nine Winning Manufacturing Plants are Equipped with Bradley Washfountains

In the April issue of *Factory Management & Maintenance*, nine Award Winning *manufacturing* plants were shown. It is significant that the washrooms of eight of these fine plants are equipped with modern sanitary Bradley Washfountains.

A few comments made concerning these plants:— "Best in manufacturing service, employees' facilities, etc."; "Equipped with top service for both operation and workers"; "Plant services adequate, and employees work in safe, comfortable surroundings"; "New high in plant protection and employee comfort"; "Equipped with best in employee facilities".

Complete specifications of Bradley washroom facilities,— group Washfountains and Showers are included in Catalog 5601. A copy will be forwarded on request by BRADLEY WASHFOUNTAIN CO., 2235 W. Michigan Street, Milwaukee 1, Wisconsin.

BRADLEY *washfountains*

Distributed Through Plumbing Wholesalers

Write Today for Cat. 5601

20% of his workers. Then the seeming miracle occurred: his total productivity *increased* 10%.

Presumably this was an isolated case, and it manifestly would be unfair to imply that the productivity of buiding labor in general had deteriorated to any such extent.

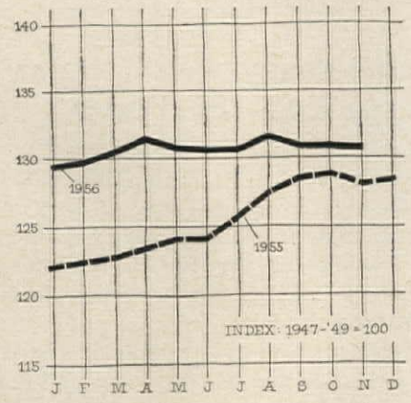
The real answer to this riddle was probably still wrapped up in what a leading Washington construction expert called the "glaring inadequacy" of the government's statistical services for this $60 billion a year industry.

MATERIALS

Lumber to head upwards; steel record expected

Average wholesale prices for building materials registered a fractional decline from October to November (see chart). This was caused mainly by the continued downward movement in lumber and wood product prices, which more than offset increases for concrete and structural clay items.

Last month, however, industry observers in the Northwest felt lumber and wood product prices had scraped bottom and were ready to head upwards again. At midmonth, in fact, the Georgia-Pacific Corp. took the lead to reverse the trend, boosted its standard grade plywood from $67 to $72 per 1,000 sq. ft. Two other producers promptly followed suit; more were expected to do so before mid-January.



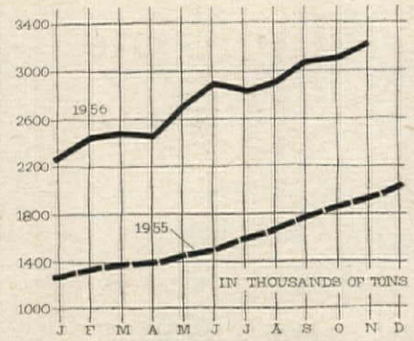
BUILDING MATERIALS PRICES declined 0.2% in November on the average of wholesale prices compiled by BLS. Decreases in lumber and wood products (off 2.8% from a year earlier) were mainly responsible for the decline. The total index was still 2.1% higher than in Nov. '55.

Steel and cement rising

As the threats of war in Egypt and the Near East eased somewhat, Washington observers felt the steel industry probably would be spared any "defense" rationing or priorities on its output that would complicate builders' problems. Supplies of structurals would continue tight, nevertheless, and deliveries slow; and another price hike was inevitable, to offset the midyear increase in mill workers' wages this year that was included in last summer's steel strike settlement. Bellwether "extra" charges were already on the way up last month.

Providing some cheer was a prediction by AISC President N. P. Hayes that structural steel output this year would rise to another record. Hayes said 1957 shipments would exceed 3,800,000 tons, or a 14% increase compared with about 3,250,000 tons shipped by the end of 1956, and roughly 3,000,000 tons in 1955. New orders this year, he predicted, would rise about 4%, reach 4,050,000 tons, compared with about 3,900,000 tons last year. Hayes noted that last year's peak production and shipments of structurals were achieved despite the steel strike setback. Structural rolling capacity of the industry was increased about 16% during the year, he added, and this should soon begin to help reduce the time required for deliveries.

Although actual road building under the new federal highway program may not be as great this year as first anticipated, because of delays that usually develop in almost all public works projects, cement is expected to be in tight supply this year, as well as more costly. On Jan. 1 prices were boosted 15 to 25¢ a barrel by most other producers, to match or exceed the increases that were put into effect by eastern producers on Oct. 1.



STRUCTURAL STEEL unfilled orders on Nov. 1 rose to a new peak of 3,215,486 tons, according to the American Institute of Steel Construction. New January-October orders last year were 10% greater than comparable 1955 business. Shipments, despite the summer steel strike, totaled 2,631,658 tons, a 6% gain for the same period.

MONEY

Credit choice as seen by Federal Reserve boss: tight money or expensive buildings?

Construction was one of the most interested bystanders last month when a joint Congressional subcommittee on economic stabilization held hearings in Washington on current Federal Reserve policies and the administration's efforts to combat inflationary trends by opposing unchecked credit expansion.

Scarce and expensive credit is often the high cost of a boom, when demand for money (credit) frequently outruns the supply. On the basis of the latest available data, for instance, US life insurance companies invested $5.1 billion in new urban mortgages from January through October last year, compared wtih only $4.7 billion a year earlier. But while their total mortgage lending was greater than ever, they still had more applications than they could satisfy, as well as mounting bids for loans from other business and industry sources beyond their capacity to supply. Other lenders were in a similar predicament—one of the problems of prosperity.

Martin on school costs

The Federal Reserve's efforts to provide adequate credit for a high volume of business, but not so much that it would feed inflationary forces, was explained to the Congressional committee by Chairman William McChesney Martin. Of particular interest to construction in this respect were some of his replies, when cross-examined by two not-so-friendly Democratic critics on the committee, Representative Wright Patman, chairman, and Senator Joseph

O'Mahoney. TIME aptly summarized the substance of these exchanges:

"Does Martin realize that high interest rates are preventing school districts from selling their bond issues and thus preventing school construction? Said Martin: If too many schools are built too fast with cheap money, a $3,000,000 school might wind up costing $3,500,000.

"Well then, does Martin want to delay school building? The calm reply: 'I think it is preferable to delay than for everybody to rush in on a limited quantity of steel and building materials and bid the prices up'."

Everyone paying more

To induce savers to bank or invest more of their funds desired by borrowers, including those who would "build now, pay later," financial institutions were raising the ante they offered the thrifty. Starting this month, the government was allowing commercial banks to pay 3%, instead of 2½% on savings deposits.

Bigger investors were also being offered higher yields for their highly coveted capital. To build an immense new municipal power plant, Memphis last month sold a $163 million long-term bond issue at an average yield of 4.47%, compared with 3.5% it had anticipated paying a year ago. Three-month US Treasury bills were sold last month to yield 3.31%, the highest rate in 23 years, and long-term 2.5% US bonds were being traded at new lows around 88, to yield 3.48%.

FINANCE

One "easy way" to get a loan—just once

One way to obtain multi-million dollar financing for a huge new New York office building: make it part of the deal in leasing the site for the structure from one of the nation's biggest insurance companies.

Granted, there are mighty few such opportune situations to be capitalized on. But at least that helped John W. Galbreath and Peter B. Ruffin launching the 60-story tower they plan next to New York's Rockefeller Center (p. 37) on property leased from the Equitable Life Assurance Society. Also calculated

continued on p. 50

STAINLESS STEEL MAKES THE DIFFERENCE

...its effect on modern architecture

A variety of textures and colors. Many standard shapes and sizes. The ability to blend easily with other materials. That's how stainless steel helps architects achieve the modern, clean lines so effective in the best of today's skyscrapers, shopping centers, industrial buildings and elsewhere.

Stainless steel can save money, too! Superior corrosion resistance reduces maintenance. Superior strength and hardness keep trim and doorways dent and scratch free. When it's built of stainless steel, it's a permanent job.

For more information about stainless steel and the contribution it can make to your plans, see your stainless steel supplier or write ELECTROMET—leading producer of more than 100 alloys for the metal industries, including chromium and manganese used for making stainless steels.

ELECTRO METALLURGICAL COMPANY
A Division of
Union Carbide and Carbon Corporation
30 E. 42nd Street UCC New York 17, N. Y.

METALS DO MORE ALL THE TIME ...THANKS TO ALLOYS

Electromet
TRADE-MARK

The term "Electromet" is a registered trade-mark of Union Carbide and Carbon Corporation.

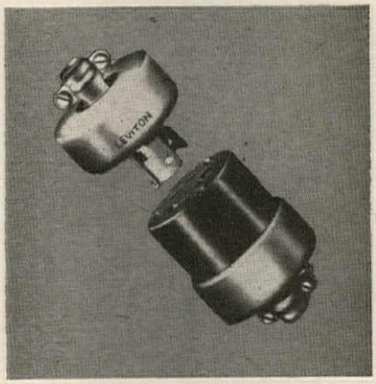
Socony Mobile Building
New York, N. Y.

Look for new colors . . . new textures . . . new standard shapes. Through strength, beauty, durability and easy maintenance, stainless steel opens exciting possibilities for the architect.

Advertisement

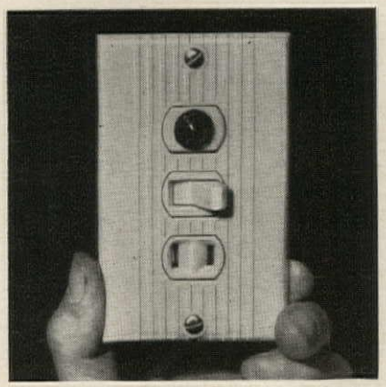
PRODUCT NEWS

Midget 2-Wire Lev-o-Lock Assures Dependable Connection



This latest addition to the Leviton Lev-o-Lock Line assures you safe, dependable connections under severest conditions of vibration, motion or accidental pull-out. Especially useful where space is important, these midget 2-wire devices lock securely with a turn of the cap. Caps and cord connectors are made of sturdy brown phenolic. Cap blade assemblies, made of heavy gauge brass, are accurately aligned for positive contact at all times. Connectors feature phosphor bronze double wiping contacts. Rating 10 A.-250 V.; 15 A.-125 V. Listed by U.L. and C.S.A. Other Lev-o-Lock devices are available in 2, 3 and 4 wire caps, connectors and receptacles in 10 and 20 Amp. ratings.

Interchangeable Line Provides Right Combination for Job



Now Leviton brings you a newly designed series of devices that can be made up in combination and installed right on the job with minimum inventory and maximum efficiency. Any combination of one, two or three devices on a single gang can be assembled quickly and easily. Each device locks into the strap with a twist of the screw driver. These devices are interchangeable with other devices of the same type for replacement purposes. Components include single-pole, double-pole, 3-way and 4-way switches; convenience outlets; push button; pilot light; and duplex and triplex outlets. Listed by U.L. and C.S.A.

For complete information write Leviton Manufacturing Company, Inc., Brooklyn 22, N. Y.

Announcing

Milcor Ribform

...a new, stronger form for short-span concrete slabs

Milcor Ribform is a new, permanent, high-strength steel form for concrete floor-and-roof-slabs poured over steel joists or beams. It is quickly laid in sheets and welded to the steel supports where it becomes a rigid, non-porous base for the concrete.

This newest addition to Milcor's growing family of quality building products is fabricated from a high-tensile steel and has a unique ribbed shape that is stronger than ordinary corrugated patterns.

Being a rigid-type of centering, Ribform never need be stretched during installation. It cannot twist or deform the joists. No expensive temporary bracing is required.

Ribform can be used to form concrete slabs, over pipe trenches or other inaccessible locations where it is impractical and expensive to "strip" wood forms.

Send for Milcor Ribform Catalog No. 245

MILCOR® Ribform

Ribform is easy to handle. Just weld it to the joists —the rigid sheets need no supplementary bracing.

INLAND STEEL PRODUCTS COMPANY

DEPT. L, 4031 WEST BURNHAM STREET • MILWAUKEE 1, WISCONSIN

BALTIMORE • BUFFALO • CHICAGO • CINCINNATI • CLEVELAND • DALLAS
DENVER • DETROIT • KANSAS CITY • LOS ANGELES • MILWAUKEE
MINNEAPOLIS • NEW YORK • ST. LOUIS

M-176

to help make Equitable look favorably on the loan for this particular project: it would face Equitable's own proposed new home office building directly across the street. Galbreath and Ruffin were already one of the company's biggest financing customers, having erected the Socony-Mobil Building with funds borrowed from Equitable.

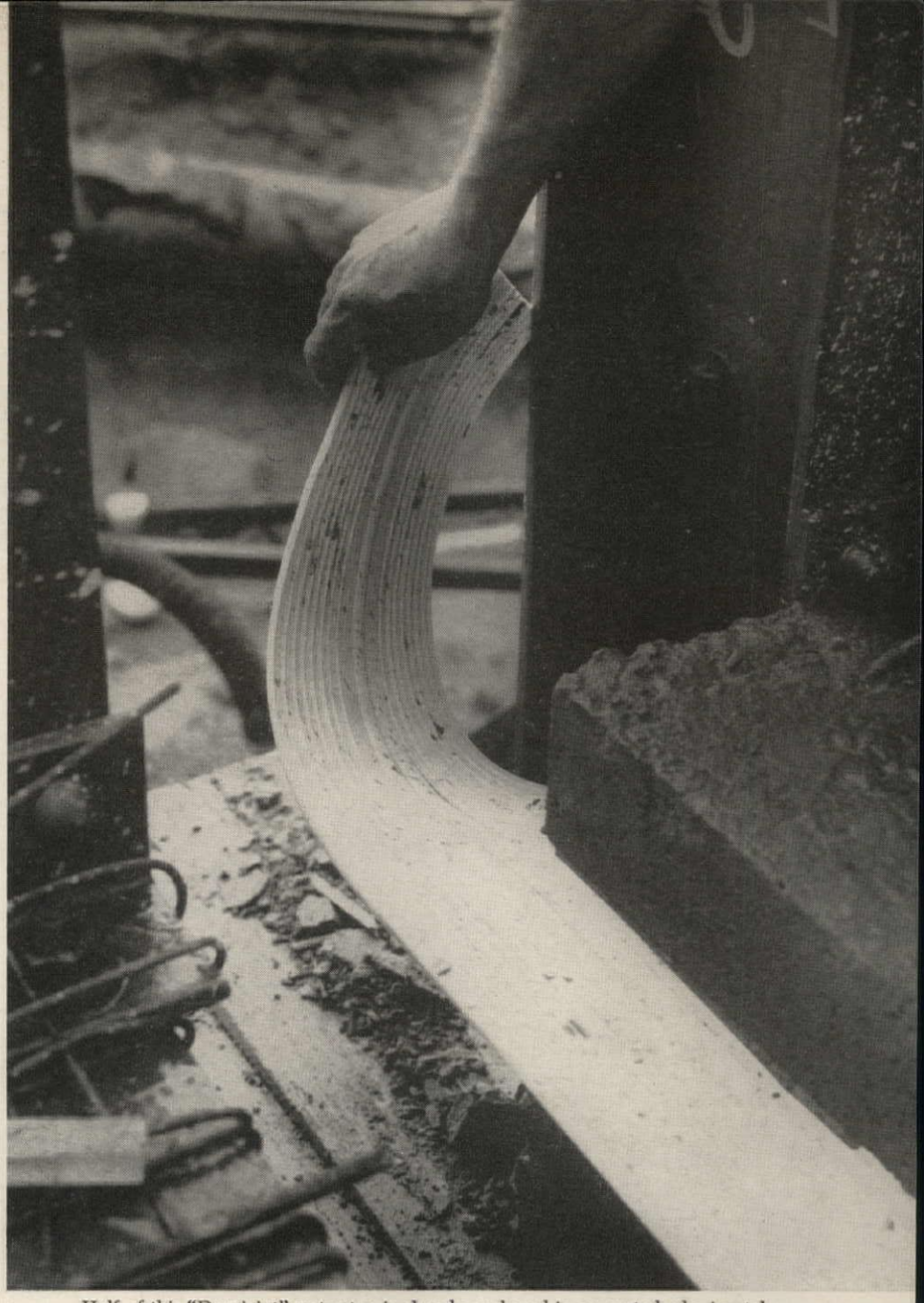
But fully as interesting as the "ease" with which Galbreath and Ruffin obtained their financing in this case was the realty history of the site on which they would build. Originally most of it was assembled for the Rockefellers for the possible expansion of Rockefeller Center. But deciding against expansion at one point after the war, the Rockefellers put it back on the market, and the Astor interests bought it for investment purposes. A few years ago the Astors gave a lease on it to New York Realtor Leonard J. Beck, who started to clear the property of some of its ancient brownstones, long since converted into night clubs, and announced a huge office building for the site. (As a broker, Beck also had played a large role in assembling the property for the Rockefellers, and in transferring it to the Astors.)

But the proposed Beck building lagged, as New York's major wave of office construction was slow to reach as far west as the Avenue of the Americas. Meanwhile, looking for a suitable site for a new home office building, Equitable bought the property from the Astor interests, and made a settlement with Beck on his lease. Simultaneously it also was acquiring the block-front on the opposite side of the Avenue. After finally deciding to build its own headquarters on the west side of the avenue, Equitable considered various plans for the best development of the east side. In complete control of the situation, it was able, in effect, to select its own neighbor-developer, and at the same time create an attractive mortgage investment on a property it would never want to fall into control of weak or unfriendly hands.

One famed institution to be replaced by the Galbreath-Ruffin building is Toots Shor's Restaurant. A new home for him will be built in one wing of the skyscraper in such a way that he will be able to continue business in his present restaurant until the new restaurant is ready. To complete the assembly of the building site, the Shor realty was acquired at night club prices, both literally and figuratively.

Splicing two sections of "Durajoint" waterstop is accomplished in the field by butt-welding ends after heating, without vulcanizing and with readily available equipment (soldering iron, hot plate and plumbers' torch). Operation is fast, clean, and efficient. It results in a strong, watertight bond.

Light weight and toughness are features of these waterstops extruded from BAKELITE Elastomeric Vinyl. Fifty-foot coil is compact, easy to carry, and resistant to rough handling, falls, blows, other hazards.



Half of this "Durajoint" waterstop is already anchored in concrete by horizontal outer ridges. Center ridge is tubular, and will accommodate transverse movements. This installation for the St. Lawrence Seaway project is typical of large-scale uses of these waterstops.

Plastic waterstop solves seepage problems

Anchored into adjoining concrete sections, these heavy-gauge extrusions of BAKELITE Brand Elastomeric Vinyl Plastic seal the joint; expansion and contraction take place as readily as ever, but water can't get through.

Known as "Durajoint" waterstops, product of Electrovert Inc., they are virtually immune to shearing by the shifting masses of concrete. According to the manufacturer, they have a tensile strength not less than 1900 psi and their average elongation exceeds 250 per cent. In addition, they are resistant to acids, alkalies, chlorinated water, oil and fungus.

These waterstops can be installed vertically, horizontally, or on edge (at the junction of slabs and walls). They come in eight different widths, ranging from 3¾ to 9 inches. All sizes are shipped in 50-ft. coils, the narrowest weighing 15 lbs., the widest 125 lbs. There are two grades—*Standard*, for temperatures from minus 4 deg. F. to plus 176 deg. F.; *Arctic*, for temperatures from minus 58 deg. F. to plus 176 deg. F.

For more information on "Durajoint" waterstops, contact W. R. Meadows, Inc., Elgin, Ill., distributor in midwest, southern and eastern U. S., or Tecon Products, Seattle 4, Wash., distributor in the western states.

BAKELITE BRAND PLASTICS

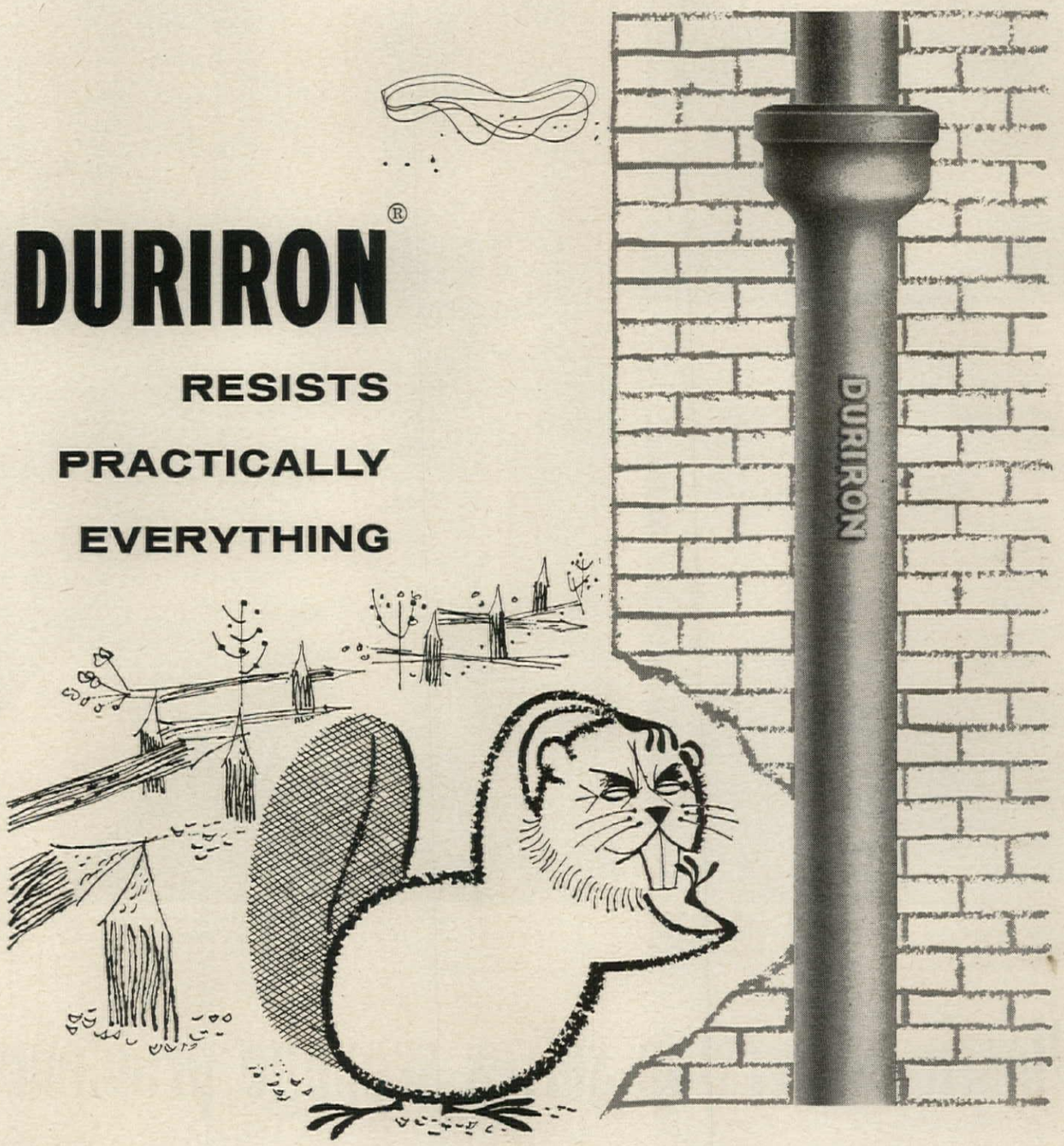
BAKELITE COMPANY, *A Division of Union Carbide and Carbon Corporation* UCC 30 East 42nd Street, New York 17, N. Y.

In Canada: Bakelite Company, Division of Union Carbide Canada Limited, Belleville, Ontario

The term BAKELITE and the Trefoil Symbol are registered trade-marks of UCC.

DURIRON®

RESISTS PRACTICALLY EVERYTHING



DURIRON® CORROSION RESISTING DRAIN PIPE

Duriron has been specified for more than thirty years by leading architects and engineers for corrosive waste disposal systems. Duriron is the *one* quality high silicon iron that provides *permanent* safe handling of virtually all commercial acids and other corrosive solutions.

Duriron is installed by ordinary plumbing methods, and is carried in stock by leading wholesalers, everywhere. Specify Duriron. Insist on Duriron.

DURIRON
LOOK FOR THE NAME ON EVERY PIECE

THE DURIRON COMPANY, INC.
DAYTON, OHIO

NEW

STANLEY

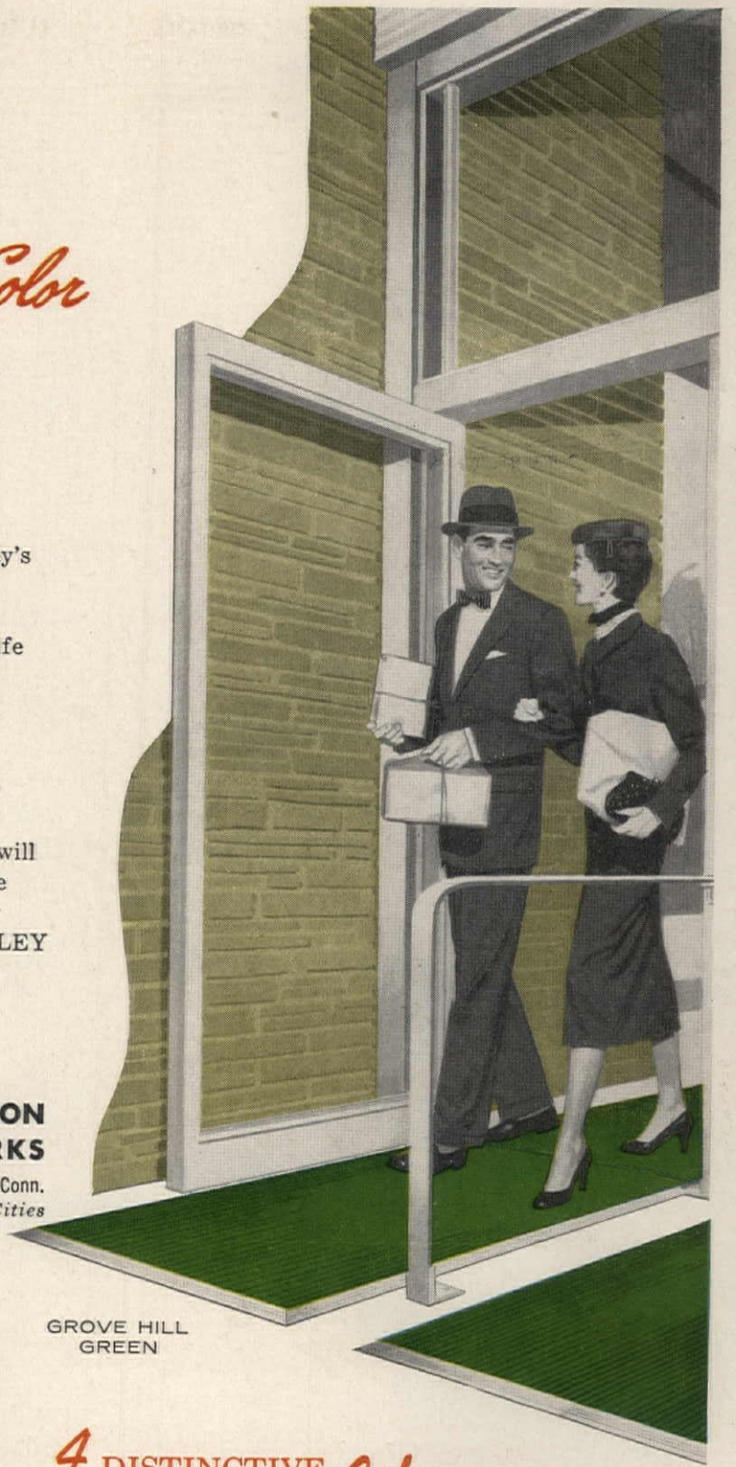
Magic Carpet in Color

the automatic door control
that combines functional
efficiency with beauty

Give your clients the advantages of Stanley's new Magic Carpets in color . . . the *first* colorful new idea in automatic door controls! Here is superior operation, easy maintenance, long life – plus the new STANLEY feature – a range of appealing colors that will enhance the architectural style of any building entrance.

Enhance the entrance of the *next* building you design with the added automatic *attraction* of STANLEY Magic Carpets in color. The color will remain bright and beautiful year after year despite daily exposure to weather and heavy traffic. For complete information and help in selecting STANLEY Magic Carpets in color for your clients, invite the Stanley Representative to call and show you color samples.

MAGIC DOOR DIVISION
THE STANLEY WORKS
Dept. A, 1002 Lake St., New Britain, Conn.
Representatives in Principal Cities



GROVE HILL GREEN

CLINTON GRAY

RUSSELL BLUE

BAILEY BROWN

4 DISTINCTIVE *Colors*

STANLEY TOOLS • STANLEY HARDWARE • STANLEY ELECTRIC TOOLS • STANLEY STEEL STRAPPING • STANLEY STEEL

The most colorful floorings ever!

"None but the finest from Amtico"

Beauty begins at the floor and ends in sheer delight when you select the finest of all . . . Amtico. Over 100 fabulous flooring colors and designs in Amtico Vinyl Flooring . . . a multitude of beautiful choices in luxurious Amtico Rubber Flooring or economical Amtico Plastex Rubber Flooring. • Top-rated by leading consumer research organizations, Amtico Vinyl Flooring is all-vinyl, with through-and-through colors. Exclusive designs include new elegant Eldorado in gold-and-black or silver-and-black . . . striking, bolder Flair . . . smart, natural-looking Cork Design . . . as well as the popular, stunning Terrazzo Design. Choose wisely for colorful beauty and unsurpassed quality, and you'll insist on Amtico!

Amtico

VINYL & RUBBER FLOORINGS

AMERICAN BILTRITE
RUBBER COMPANY
TRENTON 2, N. J.

Amtico, Dept. AF-1, Trenton 2, N. J.
Please send detailed literature and FREE complete set of samples of Amtico Rubber and Vinyl Floorings to:

NAME_____

ADDRESS_____

CITY_____ ZONE____ STATE____

(Please attach coupon to your business card or letterhead)

A New Idea in Radiant Heating with Temperature Control by Johnson

In what is reported to be the first application of its kind, planners of the University of Maryland's new Activities Building provided a radiant heating system designed to meet the special comfort requirements of spectators. Heat is delivered at floor level, beneath each of the arena's 12,000 fixed seats, by circulating hot water through pipe embedded in the concrete treads supporting the 26 rows of terraced seats.

Successful operation of this unique system is accomplished by a specially engineered system of Johnson Automatic Temperature Control.

Each of the building's two radiant heating zones has its own convertor and circulator. Johnson Thermostats and Valves regulate the temperature of the hot water supply to insure consistent comfort throughout the arena. Johnson Master Thermostats, which compensate for changes in outdoor temperatures, anticipate the need for more or less heat and take corrective action *before* the need is felt inside.

The discomforts of cold floors and overheating are effectively eliminated, and occupants enjoy continuous comfort. Fuel is saved by matching the heat supply to outdoor temperatures.

Ventilation equipment for the arena, as well as numerous heating and ventilating units and unit ventilators serving the offices and other rooms, are also Johnson-controlled.

The unmatched comfort and economy features of Johnson Control are applied to all types of air conditioning, heating and ventilating systems. Why not discuss your control problems with a nearby engineer from the specialist Johnson organization? His recommendations are yours without obligation. Johnson Service Company, Milwaukee 1, Wisconsin. Direct Branch Offices in Principal Cities.

Activities Building, University of Maryland, College Park, Md. Hall, Boarder & Donaldson, architects, Baltimore; H. Walton Redmile & Associates, mechanical engineers, Washington, D. C.; Wm. H. Singleton Co., Inc., heating contractor, Arlington, Va.

JOHNSON CONTROL

SINCE 1885

PLANNING • MANUFACTURING • INSTALLING

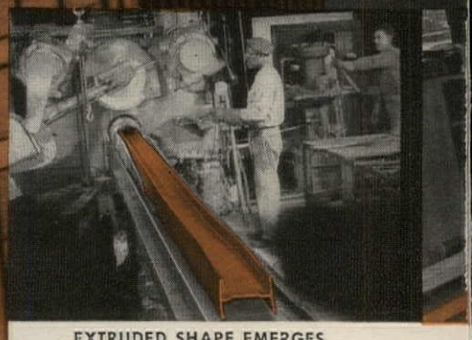
CHASE® helps to create

Architects
Mies van der Rohe and Philip Johnson

Associate Architects
Kahn & Jacobs

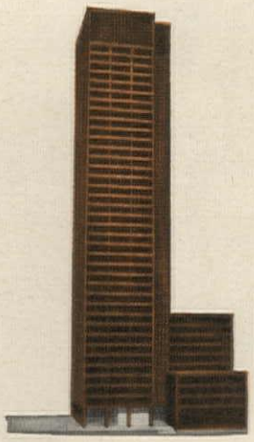
General Contractor
George A. Fuller Company

Architectural Metals Fabricator
General Bronze Corp.



EXTRUDED SHAPE EMERGES
from the die in rough form.
At this stage, still wavy.

world's first bronze building



HOUSE OF SEAGRAM uses largest bronze shapes ever extruded commercially

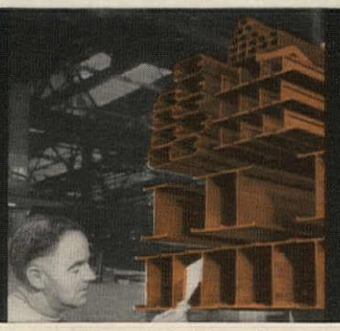
The architects had a dream: to give New York's Park Avenue the world's first bronze skyscraper. And Chase engineers helped make it real. Constructing the Seagram Building "Curtain Wall" entailed fabrication of straight, true I lengths larger in diameter than ever considered practical. Chase, working with the architects, the General Bronze Corporation and other mills, played an important part in opening new horizons in design.

WHY BRONZE? Mies van der Rohe and Philip Johnson chose bronze for its nobility, beauty of color and structural flexibility. Moreover, the copper alloy called "Architectural Bronze" has mellowing qualities that will give the building a rich brown *patina* as it ages. Practically speaking, bronze requires a bare minimum of maintenance. But first came construction problems.

WHY CHASE? Technical "know-how" plus the most modern facilities eminently qualified Chase for its share of the job. Many of the specially-designed extrusions that make up the bronze facade are historical "firsts." Chase made valuable contributions to the engineering and modification of these shapes—as well as to the production of them. Perhaps you, too, have an architectural dream... *Chase is at your service.*

STRAIGHTENING PROCESS involves drawing shape through a second die.

PAINSTAKING HAND WORK assures that dimensions are micrometer-perfect.



QUALITY CHECK is made at factory of four shapes produced by Chase.

CAREFUL PACKAGING makes sure shapes reach building in flawless condition.

Chase® BRASS & COPPER CO.

Subsidiary of KENNECOTT COPPER CORPORATION • WATERBURY 20, CONNECTICUT

The Nation's Headquarters for Brass, Copper and Stainless Steel

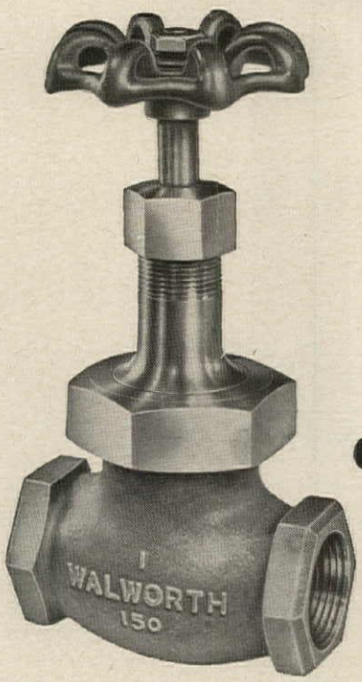
Atlanta Baltimore Boston Charlotte Chicago Cincinnati Cleveland Dallas Denver Detroit Grand Rapids Houston Indianapolis Kansas City, Mo. Los Angeles Milwaukee Minneapolis Newark New Orleans New York Philadelphia Pittsburgh Providence Rochester St. Louis San Francisco Seattle Waterbury

WALWORTH

Toothed Lock Washer: Prevents loss of stem nut due to vibration, thereby holding the handwheel securely.

Newly Designed Handwheel: Air-cooled, finger grip handwheel affords sure grip even with greasy gloves.

Improved Packing: Molded packing of lubricated asbestos reinforced with copper wire. Suitable for practically every service. Valves can be repacked under pressure.



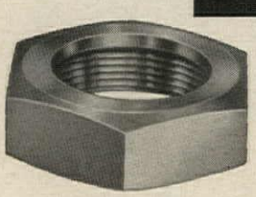
IMPROVED

No. 95 BRONZE GLOBE VALVE

also available in Angle Type (No. 96)

The service ratings of the Walworth No. 95 are 150 pounds per square inch steam at 500F, and 300 pounds per square inch non-shock cold water, oil, and gas. In the manufacture of this quality bronze valve, more than 47 gages are used in machining parts to micrometric accuracy, thus insuring interchangeability of parts. For further information see your local Walworth distributor, or write: Walworth Company, 60 East 42nd St., New York 17, N. Y.

note these 7 Great Features



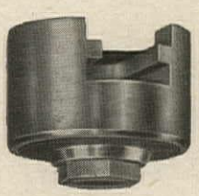
Hexagonal Union Bonnet Connection: Eliminates any chance of distortion or leakage even though valve is repeatedly taken apart and assembled.

WALWORTH

valves and fittings

60 EAST 42nd STREET NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD



New Cylindrical Disc Holder: The design of the top portion of the disc holder keeps the disc accurately guided under all operating conditions.

Renewable Asbestos Disc: This disc is suitable for steam up to 500F and is resistant to oil, gasoline, and many chemicals at atmospheric temperatures. Discs for special services are available.

Extra Strong Body: Made of Composition M (ASTM B61) bronze thick enough to provide a high safety factor. Valves undergo hydrostatic shell test of 450 psi.

A Remarkable Heating-Ventilating System at Unusual Low Cost.

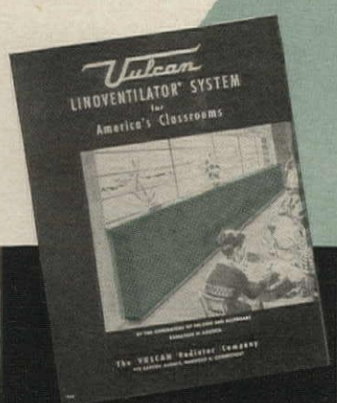
Vulcan® LINOVENTILATOR for Classrooms

the Quality H-V SYSTEM that meets all requirements at Low Cost

The LINOVENTILATOR System meets all the exacting requirements for schoolroom heating-ventilating.

It has been designed for economy, efficiency and functional beauty, with remarkable savings in installation and operating costs. This has been made possible by unique Vulcan engineering that introduces an entirely new concept in heating and ventilating.

- NO DAMPERS REQUIRED
- LOW INSTALLATION AND OPERATING COSTS
- ELIMINATES NEED FOR AUXILIARY RADIATION
- SIMPLIFIED AUTOMATIC CONTROLS
- LOW MAINTENANCE COST
- NO WIND "BLOW-THROUGH"



FREE

8 Pg. Catalog

. . . that tells a unique engineering story.

The VULCAN Radiator Company

775 CAPITOL AVENUE

HARTFORD 6, CONN.

Write for FREE 8-page Catalog Today

The VULCAN RADIATOR CO.
775 Capitol Avenue
Hartford 6, Conn.

At no obligation, please forward me your FREE 8-page LINOVENTILATOR Catalog.

Name .....

Address .....

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

ITEM: ALUMINUM

that raises and stores like a

A dramatic example of the versatility of Kaiser Aluminum in meeting the weight-saving, space-saving, maintenance-saving design requirements of industrial architecture

This rolling door demonstrates many of the advantages aluminum offers for industrial architecture.

For example, it weighs *only one-third as much* in aluminum as the same door in steel, Yet, the Kaiser Aluminum used in its construction meets the most exacting strength and performance requirements.

Thanks to its light weight, the door may be easily operated manually. Or, when a power-operating mechanism is used, only a lightweight, economical unit is required.

Bright... Attractive in Appearance

A second advantage aluminum offers for industrial architecture is its bright, natural look... a clean simplicity that conforms to modern design ideas. Whether concave or convex surface... box or flat-panel effect... virtually any styling gains appeal in aluminum.

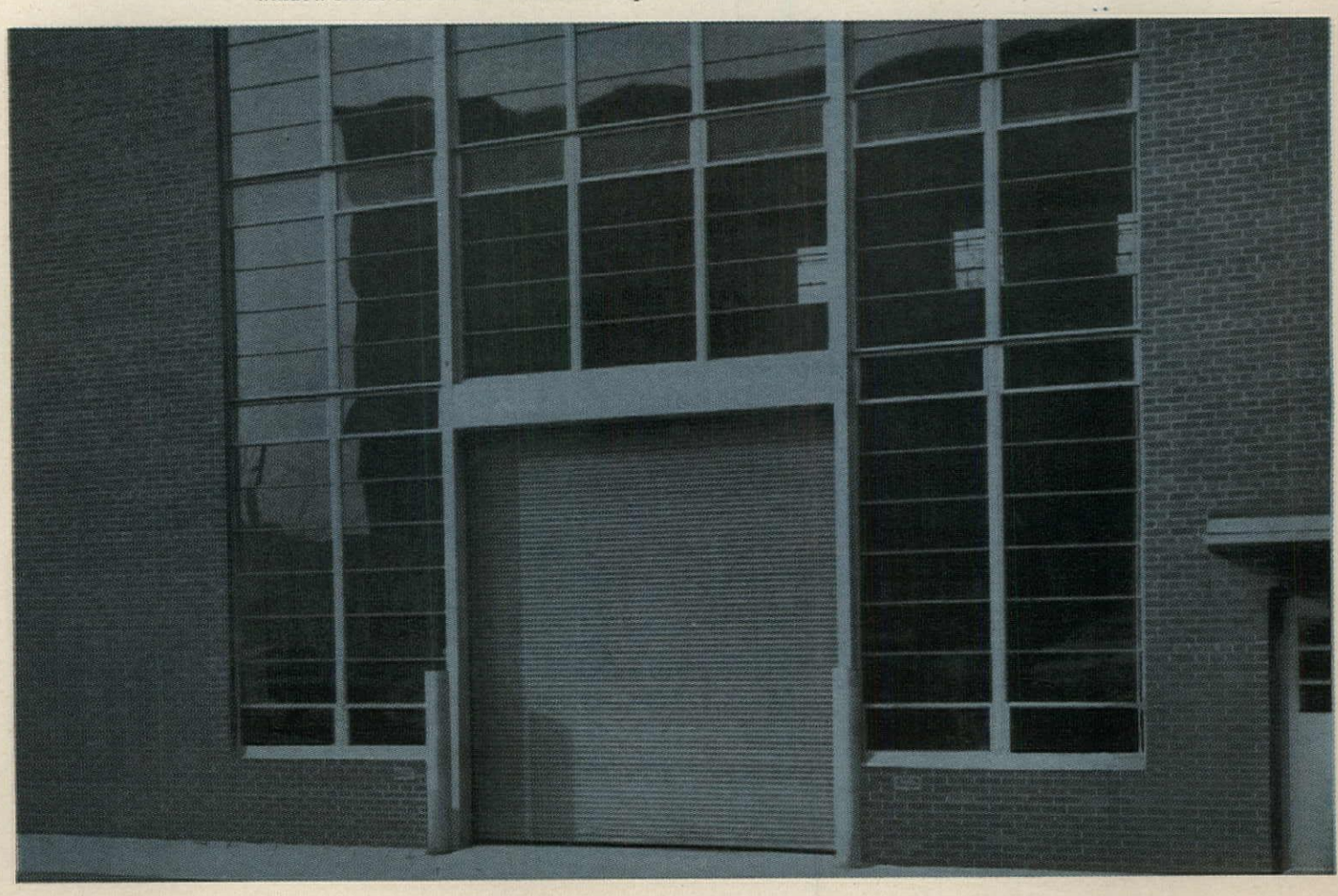
Even in simple remodeling applications, a common door *in aluminum* goes a long way toward modernizing building appearance.

Durable... Minimum Maintenance

Outstanding among aluminum's unique combination of useful properties is its resistance to corrosion.

Because aluminum requires no painting or rust-proofing, maintenance is practically eliminated. It resists both weather-wear and the corrosive attack of severe industrial atmospheres.

In this engineering building "rolling door," interlocking aluminum slats coil like a window shade around barrel inside compact hood located above and behind doorway.



DOOR

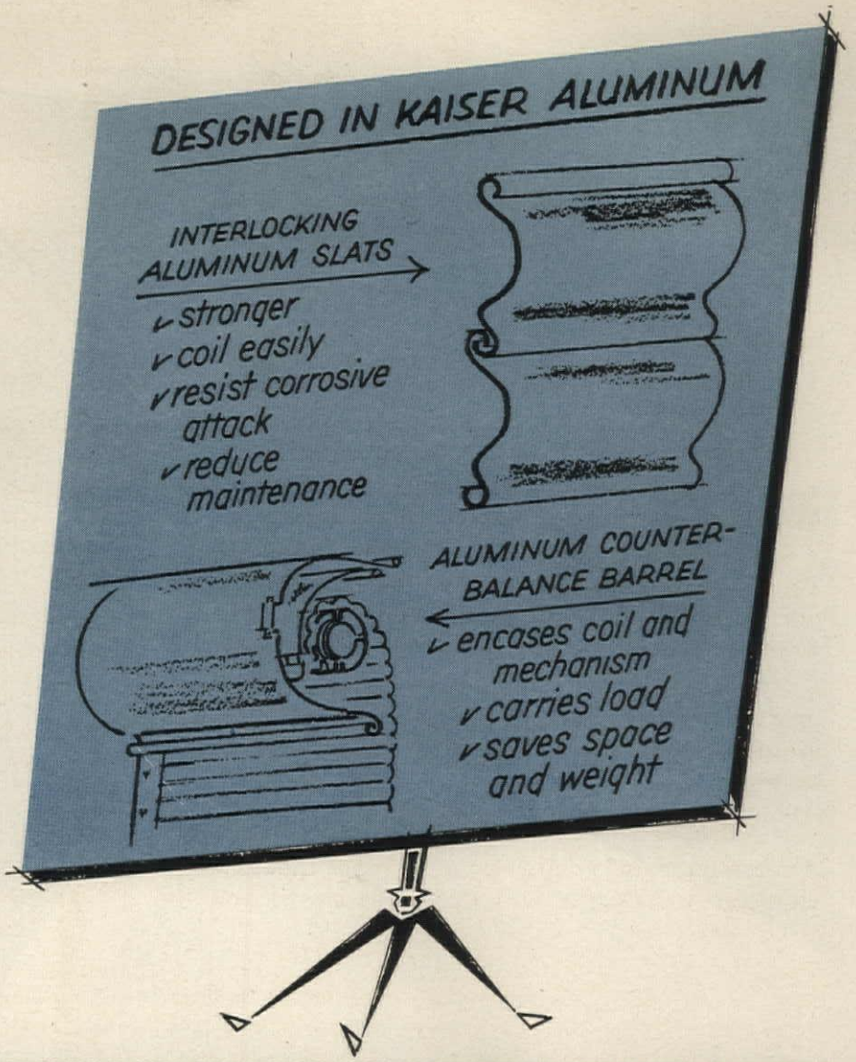
window shade

In addition to this "rolling door," many other types of doors take advantage of aluminum's efficiency and economy. The four types shown below are recommended for specific applications.

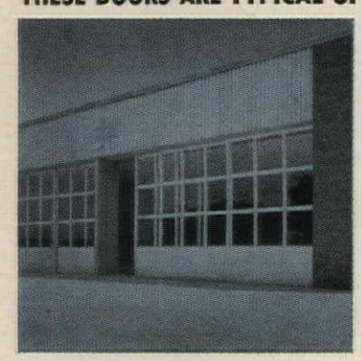
Kaiser Aluminum architectural representatives are ready to give you immediate assistance and counsel in your selection of aluminum for any architectural use.

* * *

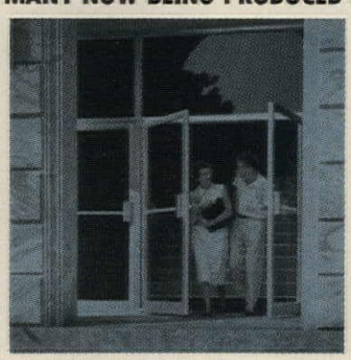
Contact the Kaiser Aluminum sales office listed in your telephone directory, or write Kaiser Aluminum & Chemical Sales, Inc., *General Sales Office,* Palmolive Bldg., Chicago 11, Ill.; *Executive Office,* Kaiser Bldg., Oakland 12, Calif.



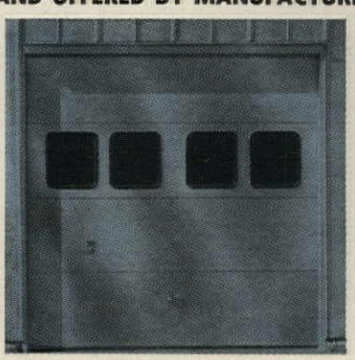
THESE DOORS ARE TYPICAL OF MANY NOW BEING PRODUCED AND OFFERED BY MANUFACTURERS USING KAISER ALUMINUM



Sliding Doors of aluminum tubes and aluminum sheets roll sideways into compact pockets to allow maximum unrestricted indoor-outdoor space use.



Entrance Doors of aluminum assure lasting strength and beauty . . . will never rust . . . cannot warp . . . require virtually no maintenance.



Overhead Doors of aluminum permit flush exterior design with strength and simplicity that assures trouble-free performance in all climates.

Flush Doors of embossed aluminum facings laminated to hardboard and honeycomb core are built on high-strength extruded aluminum frame.

Kaiser Aluminum

See "THE KAISER ALUMINUM HOUR." Alternate Tuesdays, NBC Network. Consult your local TV listing.

KAISER ALUMINUM ARCHITECTS' SERVICE
919 N. Michigan Avenue, Chicago, Illinois

☐ Please send names of suppliers of aluminum doors. I understand there is no obligation for this information.
☐ Please have your Architectural Representative call.

NAME_____

ORGANIZATION_____

ADDRESS_____

CITY & STATE_____

450,000

Square Feet of

PERMALITE PLASTER*

PITTSBURGH STATE OFFICE BUILDING

Pittsburgh, Pennsylvania

Columns and Beams:
270,000 sq. ft. 4-hour fire ratings have been gained here by Permalite plaster, applied 1¾" thick over self-furring lath on beams and columns. Ceiling, spandrel, and girder beams are plastered with Permalite plaster, 1" to 1½" thickness.

Ceilings: 180,000 sq. ft. Metal lath ceilings are fire-protected by one inch of plaster (measured from the face of the lath). Permalite plaster is applied here as a ¾"-thick brown coat, by an E-Z-On plastering gun.

**Permalite plaster refers to plaster made with Permalite perlite aggregate.*

Perlite Division, Great Lakes Carbon Corp.
612 So. Flower St., Los Angeles 17, California

Permalite
the largest selling perlite aggregate in the world

Architects: Altenhof and Bown, Pittsburgh
Engineers: Tower, Levinson & Long, Pittsburgh
General Contractors: Navarro Corp., Pittsburgh
Plastering Contractors: Siciliano Brothers, Pittsburgh
Permalite Supplied by: Tom Brown, Inc., Pittsburgh
Permalite Processed by: Perlite Manufacturing Co., Carnegie, Penna.

ANNOUNCING...

The First Sliding Glass Door for Cold Climates

Designed exclusively for dual glazing

Insulated to overcome condensation

Double weatherstripped to control heat loss

the *Thermo Door* by *Ador*

Now...
an entirely new kind of sliding glass door– the insulated Thermo Door

What is the THERMO Door?

It is the first sliding glass door designed to overcome the problem of condensation of moisture on the frame by insulating the frame—outside from inside.

Why is the THERMO Door needed?

Because condensation on the frame of ordinary doors is a serious problem which results in moisture dripping over the glass, and running onto floors and damaging carpets.

Where is the THERMO Door a necessity?

In every climate where temperatures drop to 32° or lower. At these temperatures condensation forms on the inside of the ordinary sliding glass door frame as low exterior temperatures are conducted through the frame to the warmer interior surface.

How does the THERMO Door overcome condensation?

The insulated THERMO Door, which was engineered by Ador—America's leading all-aluminum sliding glass door manufacturer—uses a temperature barrier composed of continuous strips of insulation which completely insulate all exterior surfaces from all interior surfaces. In addition, a new Ador-designed cold climate weatherseal, which consists of a double row of weatherstripping, completely encircles the door.

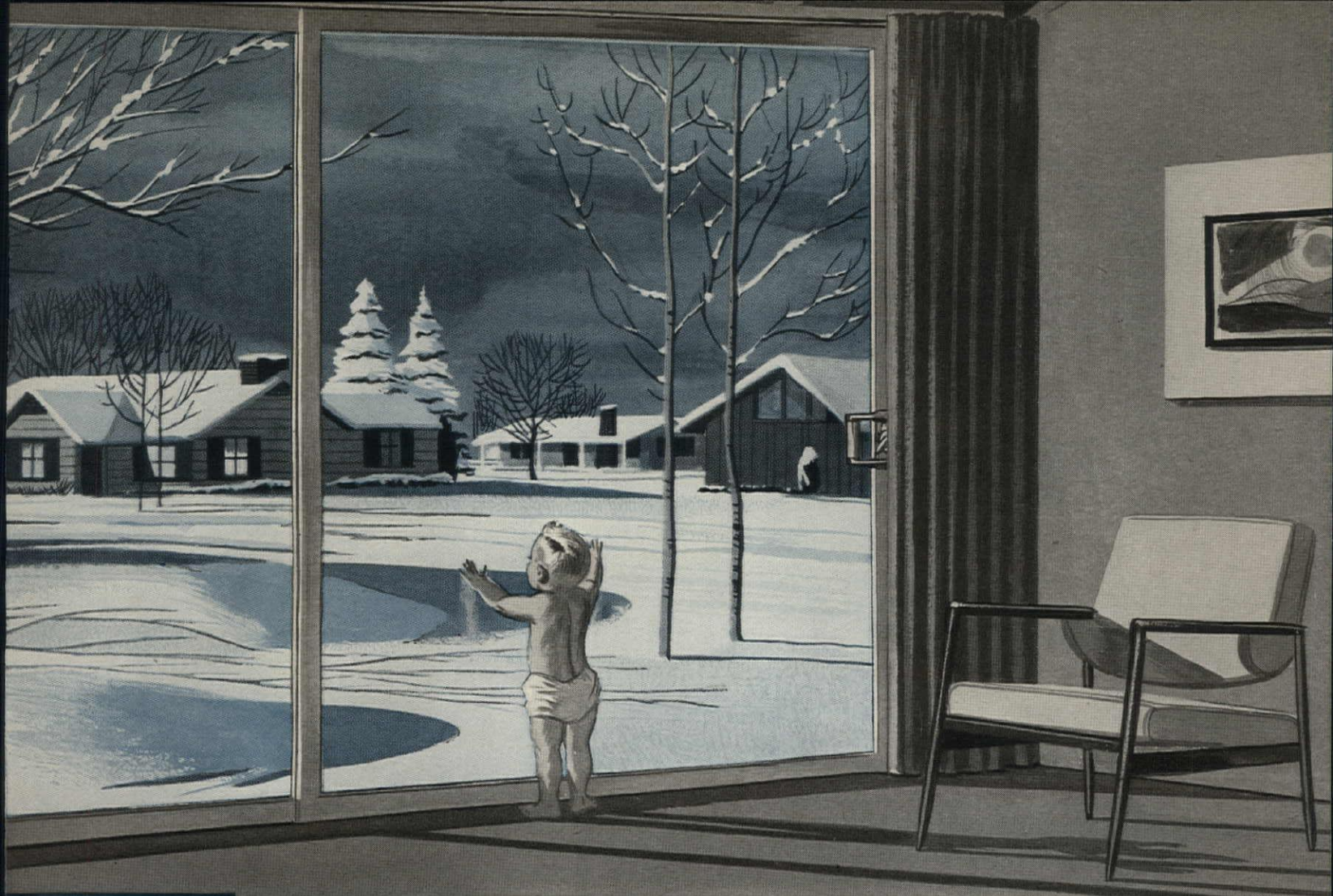
the new insulated

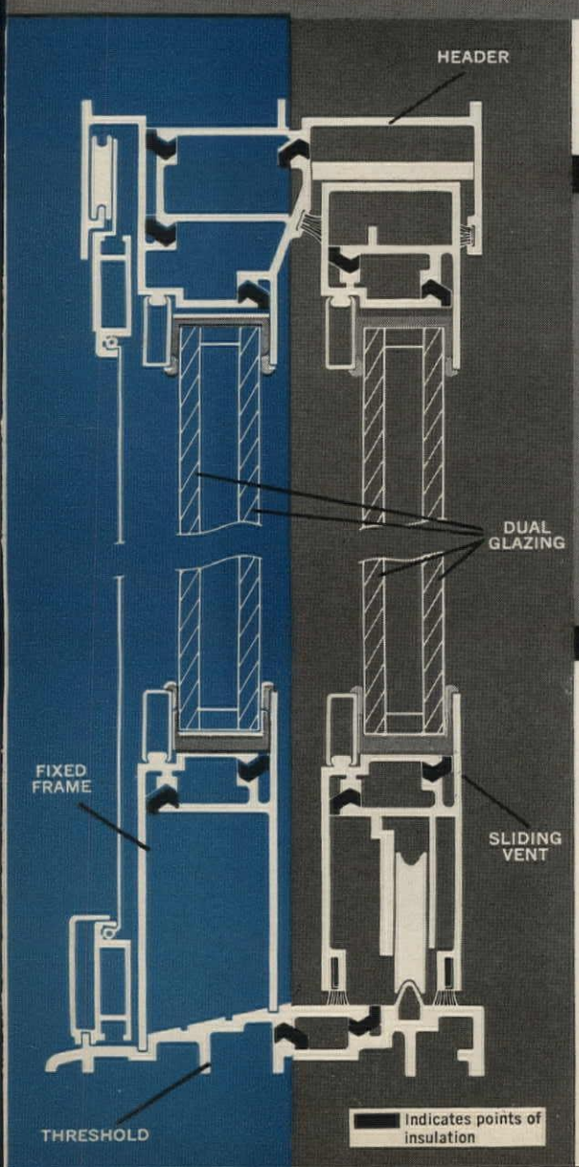
Thermo Door

by *Ador*

Why is the Ador THERMO Door important to the building industry?

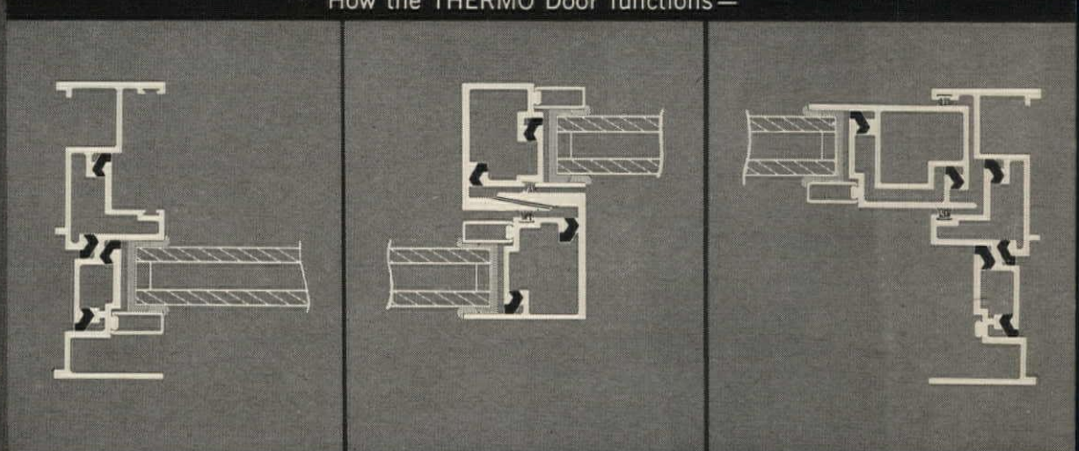
Because, for the first time architects and builders have available a sliding glass door designed to provide protection against condensation and created exclusively for use with dual glazing. The Ador THERMO Door now extends the practical use of the sliding glass door to every climate, regardless of temperature. Through the compatible combination of insulated door and insulated glass, this door is the only sliding glass unit which provides full benefits to the user of dual glazing.





The new Thermo Door now extends the use of sliding glass doors to every cold climate area, with assured year around comfort.

How the THERMO Door functions—



FIXED JAMB	INTERLOCKER DESIGN	CLOSING JAMB
Controls Heat Loss	Overcomes Condensation	Double Weatherstripped

For information on the THERMO Door, mail this coupon, or see your Ador dealer.

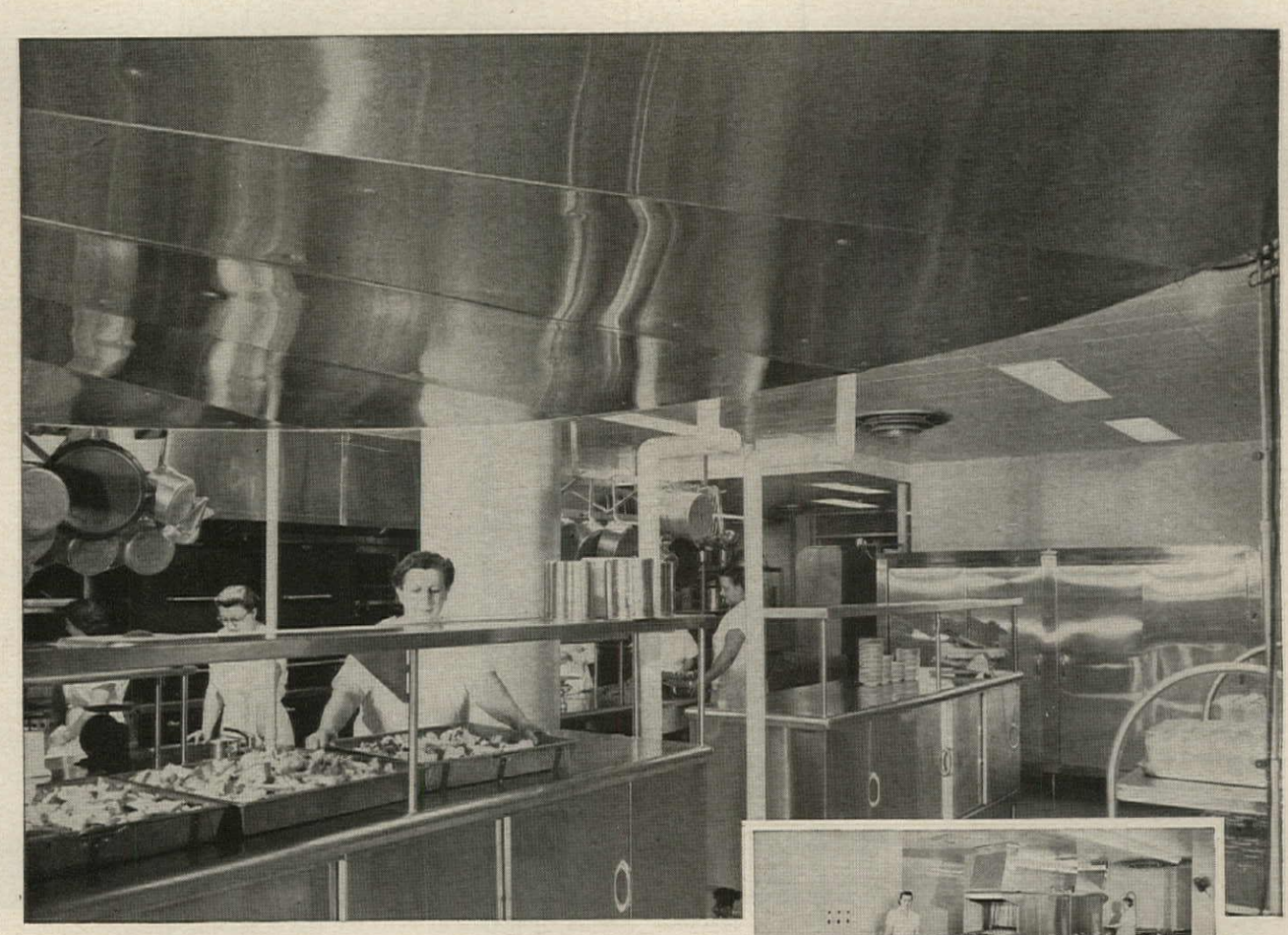
Ador Sales, Inc.
2345 W. Commonwealth Ave., Fullerton, California
Please send details of the THERMO Door.
I am an architect ☐ a builder ☐

name_____

firm_____

address_____

city_____ state_____



Help your clients to run top quality kitchens

. . . *at rock-bottom cost!*

Write for your copy

"STAINLESS STEEL for STORE FRONTS and BUILDING ENTRANCES"

Either for modernization or new construction, this 40-page booklet contains many ideas on handsome treatments for you. (Note: A new booklet on "AL Stainless in Food Preparation and Serving Equipment" is in process—write for one of the first copies when available.)

ADDRESS DEPT. B-85

Sure, the owners will need a good chef and good management in their kitchen and dining-rooms—but first of all, they'll need stainless steel equipment! That's where to start for the highest sanitary standards—the easiest, quickest cleaning and lowest-cost maintenance. And that's where to start for the greatest long-term economy, too—because stainless steel can't chip, crack, peel or wear off. It costs a building owner much less than anything else in the long run because it literally lasts for a lifetime . . . stands up under the heaviest service and stays beautiful all the way. ● In the kitchen, in the dining-room (and for structural details, too) specify *stainless steel* . . . it pays! ***Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pa.***

WSW 6070 B

Make it BETTER-and LONGER LASTING-with

AL Stainless Steel

Warehouse stocks carried by all Ryerson Steel plants

AL ALLEGHENY LUDLUM ®

Bolta Floor

4 Important Reasons Why *Homogeneous Vinyl* Bolta-Floor is being specified

1. Bolta-Floor offers unlimited design opportunities to residential, commercial and institutional interiors. It is superior in quality, more versatile in color and style. Demand this beauty.

2. The high vinyl content and fully homogeneous construction of Bolta-Floor guarantees a lasting lustre that resists scuffs, stains and wear. It's non-porous... is unharmed by water and detergents.

3. The resilient qualities of premium vinyls permit Bolta-Floor to yield quietly to impact and resist permanent indentation. Bolta-Floor recovers more quickly. Demand this comfort.

4. Bolta-Floor has dimensional stability... will not chip, crack, peel or shrink. It retains its original beauty year after year, even in heavy traffic areas. Demand quality! Specify Bolta-Floor.

THE FINEST QUALITY FLOORING FOR

HOSPITALS
SCHOOLS
THEATRES
HOTELS
HOMES
MOTELS
BANKS
APARTMENTS

FOR SAMPLES WRITE **THE GENERAL TIRE & RUBBER COMPANY**

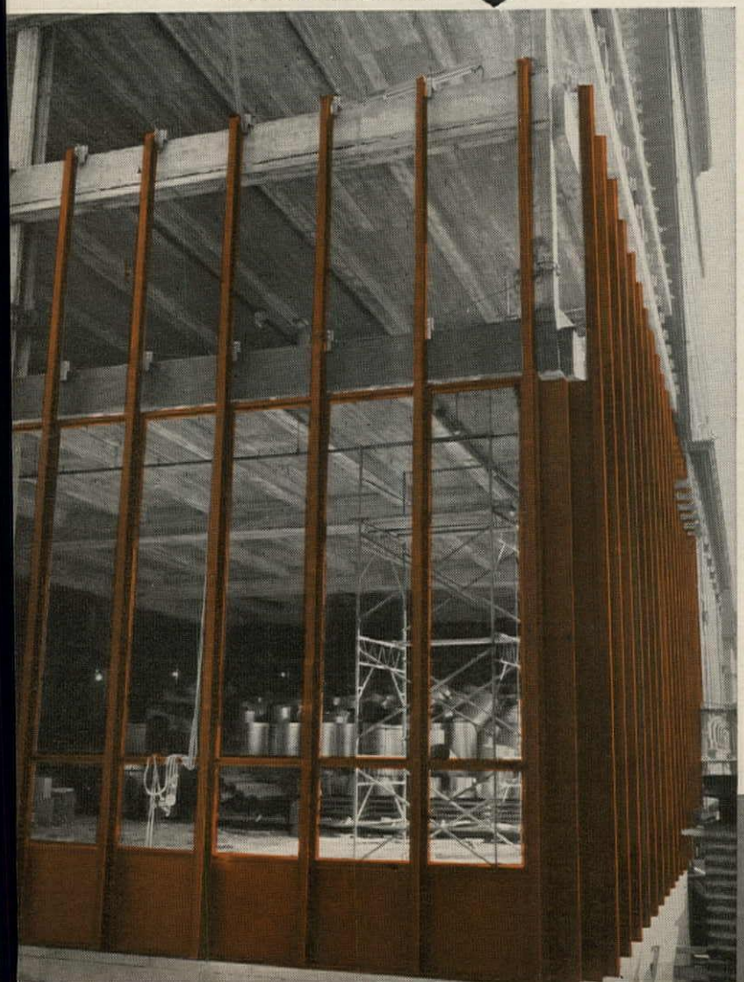
Flooring Division • Akron, Ohio

This is the house that

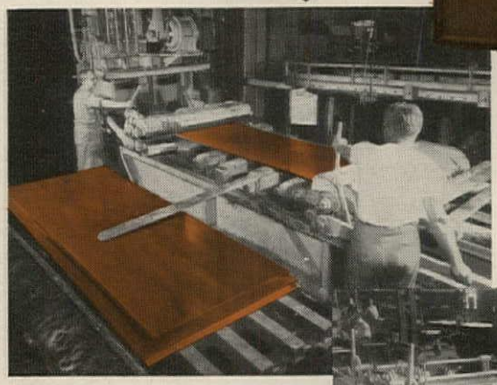
LOWERING ONE OF THE BRONZE PANELS into place. Panels using Revere architectural bronze sheet for spandrels were prefabricated by GENERAL BRONZE CORPORATION and delivered at the site ready for slipping into place. Panels are 4'7" wide by one-story high.

SHOWING ONE OF THE 4,554 PANELS each containing a spandrel sheet of Revere Architectural Bronze, weighing a total of 325,000 lbs.

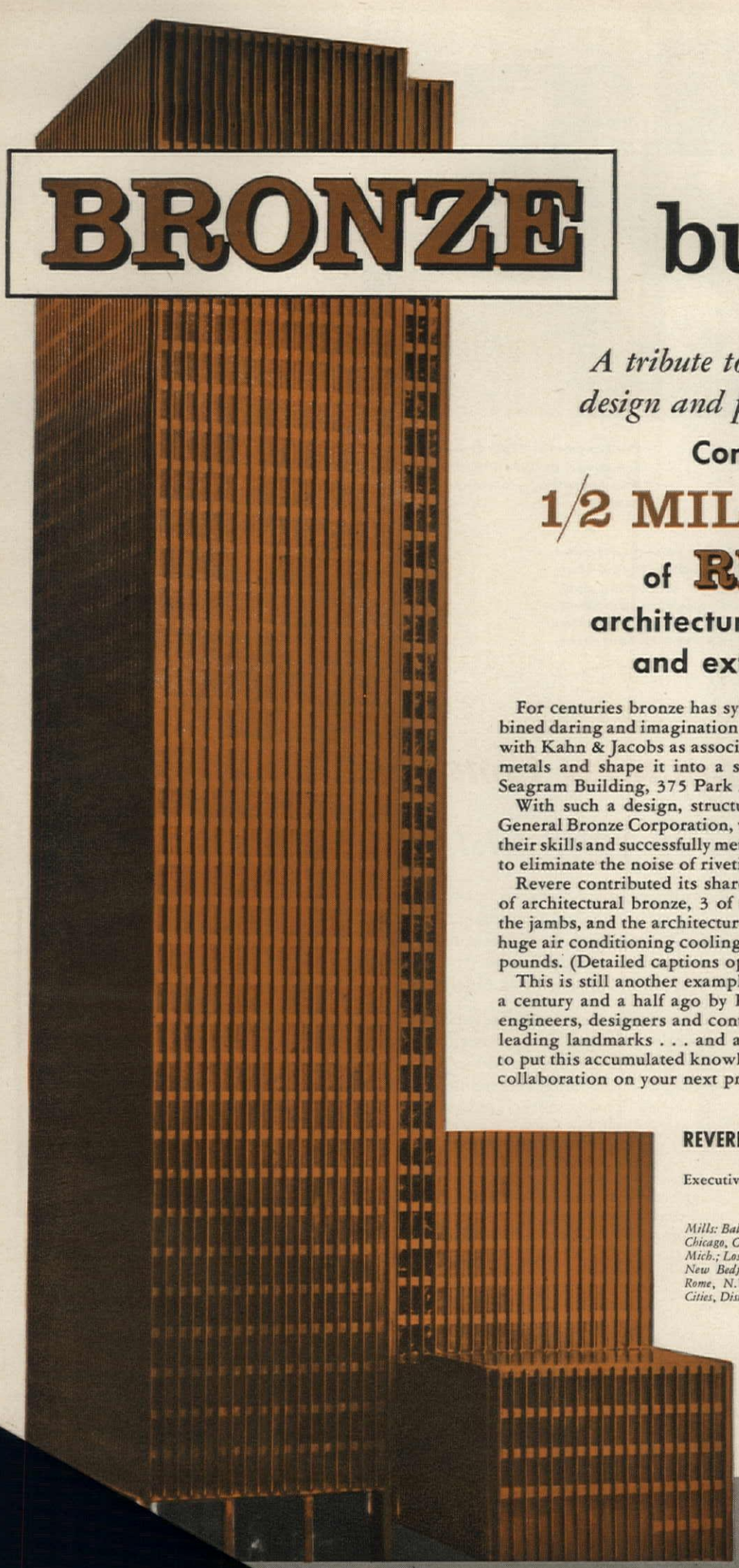
SECTION SHOWING FIRST-FLOOR PANELS in place and mullions ready to take additional panels on floor above. GEORGE A. FULLER CO. is the general contractor. Revere Extruded Architectural Bronze in 3 different shapes is used for the muntins and jambs, while Revere Architectural Bronze Sheets are used for spandrels in the panels and the louvers in the air conditioning cooling tower.



NO ROOM FOR ERROR HERE — Directly below you see the spandrel sheets being stretched at Revere's New Bedford plant prior to being shipped to GENERAL BRONZE CORP.



HERE YOU SEE — Revere Spandrel Sheets being tested for flatness. Great care had to be exercised by Revere workmen in order to make certain each sheet was absolutely flat throughout its length and width and that all corners were square.



BRONZE built

A tribute to modern structural design and production ingenuity

Contains over

1/2 MILLION LBS.

of REVERE

architectural bronze sheets and extruded shapes

For centuries bronze has symbolized endurance. But it took the combined daring and imagination of Mies van der Rohe and Philip Johnson, with Kahn & Jacobs as associate architects, to take this most ancient of metals and shape it into a striking, modern, 38-story landmark . . . Seagram Building, 375 Park Avenue, N. Y. C.

With such a design, structural problems were bound to occur. But General Bronze Corporation, working with various suppliers, combined their skills and successfully met those challenges. Bolting the steel girders to eliminate the noise of riveting, for example, was a major innovation.

Revere contributed its share by furnishing all of the spandrel sheets of architectural bronze, 3 of the extruded shapes for the muntins and the jambs, and the architectural bronze sheet for the louvers used in the huge air conditioning cooling tower, a total of more than a half-million pounds. (Detailed captions opposite page.)

This is still another example of how Revere, since its founding over a century and a half ago by Paul Revere, has worked with architects, engineers, designers and contractors in creating many of the country's leading landmarks . . . and another good reason why it will pay you to put this accumulated knowledge to work for you by seeking Revere's collaboration on your next project.

REVERE COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

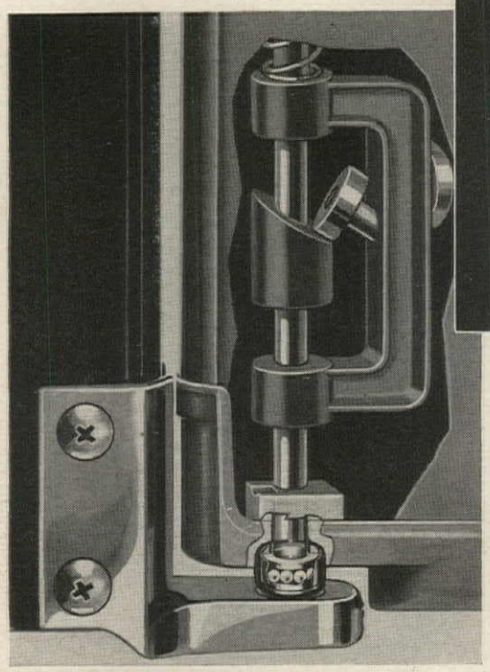
Executive Offices: 230 Park Avenue, New York 17, N. Y.

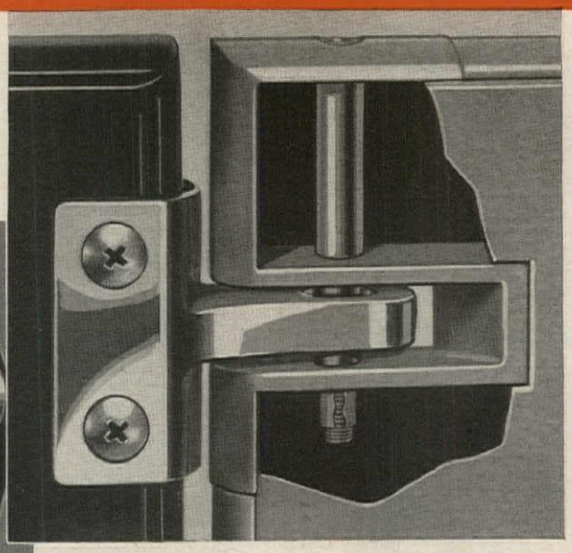
Mills: Baltimore, Md.; Brooklyn, N.Y.; Chicago, Clinton and Joliet, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Newport, Ark.; Rome, N.Y. Sales Offices in Principal Cities, Distributors Everywhere.

COPPER • BRASS • 1801 • REVERE • ALUMINUM

Manufacturers of Revere Sheet, Roll and Strip Copper for roofs, gutters, downspouts and flashing . . . Revere Architectural Bronze extruded shapes and sheets for spandrels, muntins, mullions, jambs, louvers and decorative purposes . . . Revere Copper Water Tube for hot and cold water lines, plumbing lines, vent, waste and drainage lines, underground service and processing lines, radiant panel heating, air conditioning lines, and oil burner lines.

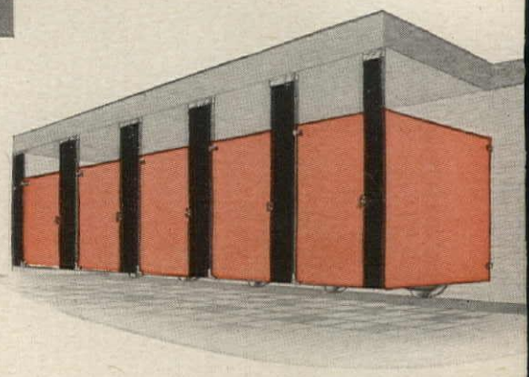
TOILET COMPARTMENT CONSTRUCTION THAT *Saves money for building owners*





The Sanymetal 7700 Clevis Type Top Hinge, designed for trouble-free operation—no maintenance expense.

The Sanymetal Concealed 7700 Bottom Hinge, bearings at all moving parts —simple door adjustment —permanent lubrication —no replacement ever.



NOW

with the famed Sanymetal Concealed 7700 Hinge

the first cost is your last cost

SANYMETAL'S Concealed 7700 Hinge is a good example of how Sanymetal *improvements* save, from installation-day to the end of building life.

Since its introduction this hinge has been outstanding for design and economy. It is notable for—

attractiveness . . . concealed within door

durability . . . wearing qualities proved by tests, made by independent laboratories, through 301,000 cycles of use

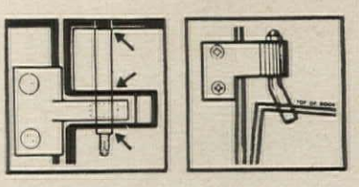
strength . . . so designed that a heavy man can swing on the door without harm to the hinge

engineering . . . the "clevis" principle noted at right

In addition to these facts, the 7700 Hinge is also more easily adjusted to position. Just loosen one adjusting nut, swing the door to the desired rest position, and tighten the nut—an easier and quicker adjustment that saves man hours.

This is typical of many features found in Sanymetal Toilet Compartments. Specify Sanymetal, to get attractiveness, trouble-free service, low installation and maintenance costs, which only quality materials properly tested and engineered can assure.

See Sweet's, or send for Catalog 93 describing all Sanymetal Compartments. If you wish we will mail you all advertisements in this series explaining construction details that mean quality.



RIGHT AND WRONG—TOP HINGE PRINCIPLE with 3 points of support is right—nothing to get out of line—permanently strong; the door does not rise or lower when it swings.

LOOK FOR THIS

NAMEPLATE WHICH IDENTIFIES EVERY SANYMETAL INSTALLATION

Sanymetal® PRODUCTS COMPA

1687 URBANA ROAD • CLEVELAND 12,

64338 East Canning St., Los Angeles 22

Get this long-life feature, STANDARD *on all Sanymetal C*

Letters

CITY PATTERN

Forum:

Your article on "City Pattern" (AF, Sept. '56) is an inspiration. I heard about this from friends at an MBA meeting in Chicago, and it was pronounced as required reading for anybody concerned with urban renewal.

I believe at long last the powers that be in the city halls of the country are beginning to realize that planning is not just a world reserved for dreams.

GUY T. O. HOLLYDAY
Chairman of the Board
The Title Guarantee Co.
Baltimore, Md.

WRIGHT'S COSTS

Forum:

Though my personal admiration for the verbal prestidigitatory powers of Frank Lloyd Wright usually knows no bounds, there comes a time in every man's life. . . .

If one doesn't speak up occasionally in protest against the periodic displays of Wright's sleight of hand when the object being manipulated is cost, Mr. Barnum may be led to believe that he underestimated the frequency with which gullible architects are born. The statement that the proposed mile-high office building would cost $5 a sq. ft. (AF, Nov. '56) presents us with one of these occasions.

The marginal cost curve relating to the construction of this leviathan would undoubtedly be a J-shaped curve and I shudder to think what the last incremental story would cost. The magnitude of that figure would be sufficient to cause weak men to faint, strong men to flinch, and *responsible* architects to take to drink. Skol!

IRVING D. SHAPIRO
Architect and urban land economist
New York, N.Y.

ARCHITECTURE AND PEOPLE

Forum:

Congratulations on the hospital section of the November FORUM. What a long way you have gone from purely descriptive text and lifeless pictures! Your pictures of the UMW chain of hospitals, instead of showing the interiors, as of old, cleanly swept of humanity, are animated by men, women, and children immersed in the new environment. A new dimension has been added—architecture in terms of people!

ISADORE ROSENFIELD, *architect*
New York, N.Y.

WHO DOES WHAT?

Forum:

"Who Does What in Urban Renewal" (AF, Nov. '56) is a very timely article.

The urban renewal program in Los Angeles is having a struggle to get going on a large enough scale to make any noticeable headway against blight. One of the difficulties which we encounter is the lack of public knowledge about the urban renewal program and what it can do. A wide-spread reading of your article would go a long way toward informing the people what they can do to help.

TRACY H. ABELL
City planning landscape architect
Department of City Planning
Los Angeles, Calif.

Forum:

This is the kind of information which should be distributed to the people in Cleveland who are working so hard to make our program a success.

Could we have 200 reprints?

JAMES M. LISTER, *planning director*
Cleveland City Planning Commission
Cleveland, Ohio

▪ *Reprints in large quantities are available at reproduction costs; in small quantities, at 35¢ each.*—ED.

APARTMENT BUILDING

Forum:

We compliment you on your article in the November issue, "Why Apartment Building Lags." It is a very accurate and detailed survey of existing conditions, and your analysis is most excellent.

SEYMOUR B. FAIN, *president*
S. F. and G. Inc., builders
Washington, D.C.

SCHOOL COSTS

Forum:

I read your article "Wanted: A Sensible System of School Cost Reporting" (AF, Oct. '56) with keen interest.

So many schools have been lost at the polls by voters who have made improper cost comparisons that it is time this warning is sounded.

It is not enough to say that good tools for comparisons do not exist. We should encourage voters to analyze before voting. So it is doubly important that some reputable group furnish the tools.

HENRY TOY JR., *president*
National Citizens Council for Better Schools
New York, N.Y.

continued on p. 76

Facts You Should Know About Masonry Reinforcement

By Edwin L. Saxer: Professor and Chairman, Civil Engineering Department, University of Toledo

For some time, there has been a growing tendency to rely on steel reinforcing in mortar joints to improve the capacity of masonry walls to resist the stresses which develop.

The usage of joint reinforcement has often proven unsuccessful in the past. The chief reason for this has been the failure to use reinforcement in more than every third or fourth joint—a practice which provides little or no benefit to the intermediate joints.

A contributing factor in many cases has been the inability of some forms of reinforcing to develop adequate bond strength.

As a result of research at the University of Toledo, and at other laboratories, the principles of effective joint reinforcement are now well understood. All indications point to the fact that reinforcement should be used in every joint, or at least in every other joint, to insure reasonable effectiveness.

Our research on the effectiveness of Key-Wall leads us to the following conclusions: (1) The design of Key-Wall results in a highly efficient distribution of steel. (2) The use of Key-Wall can reduce significantly the cracks resulting from shrinkage of the masonry; and (3) Key-Wall is effective in improving the lateral strength characteristics of masonry walls.

why it pays to specify Key-Wall

the new type of masonry reinforcement that gives greater value at lower cost

The effectiveness of Key-Wall has been clearly demonstrated by tests at the Research Foundation, University of Toledo.

It's being specified and used by leading architects and builders today. It will offer you advantages on any jobs you build.

Key-Wall is made for the following wall thicknesses: 4″, 6″, 8″, 10″ and 12″.

- Reduces shrinkage cracks
- Adds effective lateral strength
- It's galvanized to prevent rusting . . . assures maximum bond
- Lap joints give continuous reinforcement
- Does not interfere with bedding of units
- Improves mortar joint because multi-directional reinforcement holds mortar in place; gives better bond
- Masons welcome it, because it's easy to handle; easy to cut and fit; doesn't interfere with joint thickness
- You save on material cost, as well as labor cost

FREE—SAMPLE AND TEST REPORT

KEYSTONE STEEL & WIRE COMPANY
PEORIA 7, ILL.

Please send me free sample and copy of Key-Wall masonry report made by the Research Foundation, University of Toledo.

Name_____

Firm_____

Street_____

City_____ Zone_____ State_____

Letters
cont'd

Forum:

Certified public accountants, as parents, citizens, and professional accountants, are deeply concerned with helping to find sound accounting procedures which will give us a measure of our national, state and local needs for new schools and contribute to the wise administration of those we now have. We don't want to promise easy solutions. From long experience we know the difficulty of establishing uniform accounting standards which provide a sound plane of reference and yet have the flexibility required by changing times and circumstances.

Yet a beginning must be made if we are to meet our responsibilities to future Americans. I have therefore authorized the appointment of a new committee of the American Institute of Accountants, the national association of CPAs, to deal with school accounting problems. Through this committee, our profession is eager to contribute its experience and skills to an advisory council such as you propose in your article, and to work with other groups toward our common goal.

MARQUIS G. EATON, *president*
American Institute of Accountants
New York, N.Y.

Forum:

I do not wish to sweep the subject of school costs (AF, Oct. '56) under the carpet, but I feel we compound our problem by giving it undue emphasis at the expense of the creative aspects of the school building program.

Whether the proposed method is one that should be described as "sensible" is a question. Personally, I regard it as a way of jumping to snap judgments and avoiding the painful process of thought. Our real problem is to devise means for involving the voter more deeply in the whole problem of public education.

Any method of cost reporting must misrepresent to some degree. In any event, it is no substitute for careful analysis and synthesis. I am grateful that education in this country does not yet fit itself neatly into a series of carefully sized pigeonholes.

Rather than isolate price of school plants, I would like to see studies made of the long-range relationship of plant cost to the total cost of education.

We would support with enthusiasm studies which would show (I am sure) that on any reasonable time scale, the cost of physical plant is relatively unimportant in relation to teachers' salaries and all the other costs which enter into producing an educated citizen.

PHILIP WILL JR.
Perkins & Will, architects & engineers
Chicago, Ill.

continued on p. 78

You needn't budget your imagination on low budget buildings...

create distinctive, custom-styled buildings at modest cost with the Butler Building System

The client with the tight budget needs your creative services most. His planning must be sound. His building must be within his means, yet suited to his purposes. He cannot afford mistakes.

To help a client in this situation, many architects are now creating distinctive, custom-styled buildings, at modest cost, by designing on a basic Butler Building.

Here the preliminary engineering of structurals and roof system are already completed. Mass production of components keeps costs lower than custom fabrication. And since all parts are pre-fitted at the factory, erection time and costs are held to a minimum.

These economical components are the base on which these architects create strikingly beautiful buildings for clients who are financially limited by tight budgets.

The photos below show how the non-load bearing walls can combine various building materials with the emphasis on beauty rather than strength. The weight of the building is carried on the rigid steel frame.

Be sure to get all the facts on the Butler Building System from your Butler Builder. His name is listed under "Buildings" in the yellow pages of your telephone directory. Also ask him to show you the sound film, "Architectural Opportunities from the Butler Building System". . . or write direct.

Imaginative use of brick, glass, and exposed steel structurals produce a truly distinctive, modern building.

Lots of windows combined with brick sidewalls and metal trim create a custom-styled building that looks expensive.

BUTLER STEEL PRODUCTS

BUTLER MANUFACTURING COMPANY

7336 East 13th Street, Kansas City 26, Missouri

see our catalog in Sweet's or write for copy

AISC

Manufacturers of Steel Buildings • Oil Equipment • Farm Equipment • Dry Cleaners Equipment • Outdoor Advertising Equipment • Special Products

Sales offices in Los Angeles, Richmond, Calif. • Houston, Tex. • Birmingham, Ala. • Minneapolis, Minn. • Chicago, Ill. • Detroit, Mich. • New York City and Syracuse, N. Y. Washington, D. C. • Burlington, Ontario, Canada

SOLAR OFFICE

Forum:

We appreciate the article in your Oct. '56 issue on our new solar-heated office building. However, you said that the cost of $60,000 for 4,400 sq. ft. is high and that the cost of the heating and cooling system was about twice as much as a conventional air-conditioning system. We have designed the mechanical systems for quite a few buildings in New Mexico with conventional year-round air-conditioning systems when the construction cost greatly exceeded the actual $13.60 per sq. ft. of this building. About the only type of system that would cost half as much as the one we have in our building would be a very minimum system with direct gas fired heating and a self-contained air-conditioning unit.

Your article also said that "enough solar power falls onto those collector plates in a day to keep the building supplied with all of its power needs for a month." This is quite inaccurate. The efficiency of our collector plates will be from 30 to 75%, depending on the outside temperatures and the time of year, but we feel that we will average an efficiency of at least 40%. If our collectors were 100% efficient, we could collect only enough heat in one day for only two or three days of the heating requirements alone.

FRANK H. BRIDGERS
Bridgers & Paxton, consulting engineers
Albuquerque, N.M.

ARCHITECTURAL FORUM is published monthly by TIME INC., Time & Life Building, 9 Rockefeller Plaza, New York 20, N. Y.

SUBSCRIPTION DATA: Sold to architects, engineers and other individuals or firms engaged in building—design, construction, finance, realty; material distribution, production or manufacture; government agencies and supervisory employees; commercial and industrial organizations with a building program and their executives; teachers and students of architecture and engineering; libraries, professional clubs, society and trade associations connected with the building industry; advertisers and publishers; US, possessions and Canada, $5.50; elsewhere, $10.00. Single copies, if available, $1.00.

SUBSCRIPTION CORRESPONDENCE should be addressed to ARCHITECTURAL FORUM, 540 N. Michigan Ave., Chicago 11, Ill. When ordering change of address, please name the magazine and furnish an address label from a recent wrapper envelope, or state exactly how the magazine is addressed. Both the old and the new address are required. Allow four weeks for the change.

EDITORIAL CORRESPONDENCE should be addressed to ARCHITECTURAL FORUM, 9 Rockefeller Plaza, New York 20, N. Y. FORUM will not be responsible for unsolicited manuscripts or illustrations submitted, and it will not return such material unless accompanied by postage.

ADVERTISING CORRESPONDENCE should be addressed to the advertising director, ARCHITECTURAL FORUM, 9 Rockefeller Plaza, New York 20, N. Y.

TIME INC. also publishes TIME, LIFE, FORTUNE, SPORTS ILLUSTRATED and HOUSE & HOME. Chairman, Maurice T. Moore; President, Roy E. Larsen; Executive Vice President for Publishing, Howard Black; Executive Vice President and Treasurer, Charles L. Stillman; Vice President and Secretary, D. W. Brumbaugh; Vice Presidents, Bernard Barnes, Allen Grover, Andrew Heiskell, C. D. Jackson, J. Edward King, James A. Linen, Ralph Delahaye Paine Jr., P. I. Prentice; Comptroller and Assistant Secretary, Arnold W. Carlson.

Desks, wash basins, shelves *at Arthur Talmadge School, Springfield, Mass., have "kid-proof" melamine laminate surfaces.*

melamine laminates at windows, wash basins and work areas protect school property with minimum maintenance

Melamine surfaced school desks and counters have proved they "pay their way" in lower maintenance costs. That's why melamine laminates are more and more being used for window sills, doors, push and kick plates, toilet partitions and wall paneling in public buildings as well as homes.

Sold in a wide variety of colors and patterns under different trade names, these laminates require an absolute minimum of maintenance. They never need painting or finishing. The smooth tough surface washes clean with a damp cloth—no need for scrubbing, waxing, or buffing. Melamine laminates provide good resistance to scratches, dents, chipping, cracking, burns or stains. They withstand heat up to 275° F.—are unharmed by alcohol, most acids or alkalis.

MONSANTO supplies melamine resins for laminates sold under these names: Consoweld, Corlex, Decarlite, Farlite, Fiberesin, Lamin-Art, Micarta, Nevamar, Pionite, Railite, Resilyte, Richelain, Textolite, Wilson Art. If you would like additional information about any of these, we will be glad to refer your inquiries to the manufacturer.

A New Report, *"Pipelines to the Future," containing an evaluation of different types of plastic pipe is available at $1.00 each. This study was compiled by Monsanto's Structural Plastics Engineering Group. You are invited to write them on any question pertaining to the use of plastics in construction. Monsanto Chemical Co., Room 228, Springfield 2, Mass.*

MONSANTO

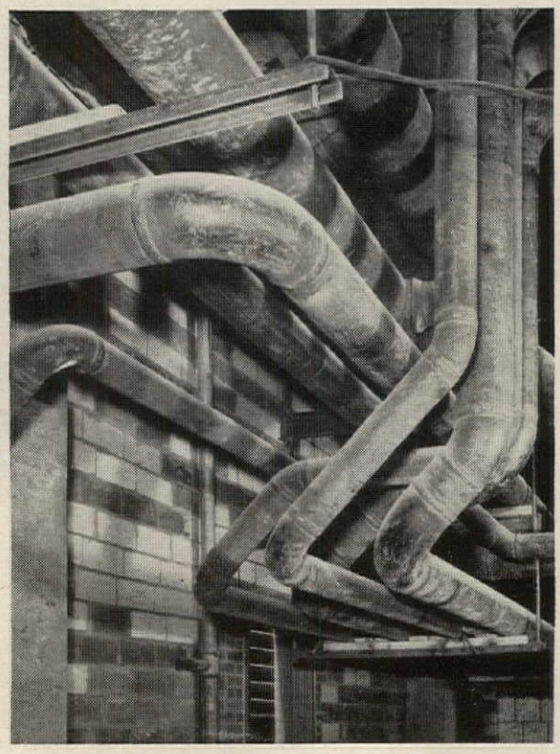
NATIONAL SEAMLESS PIPE

used for heating and air conditioning system of new Texas National Bank Building

USS National Seamless Pipe, in sizes from 4" O.D. to 16" O.D., was utilized in the heating and air conditioning system of this new Houston, Texas, building, owned jointly by Texas National Bank and Continental Oil Co., as follows:

Sizes 4", 6", 8", 10" and 12" are used for combination hot and chill water lines to the primary and zone conditioners as well as the perimeter units. The 16" O.D. pipe is used for handling condenser water.

The 14" O.D. pipe is part of the steam piping system which in turn converts the water into hot water for heating through the use of converters.



USS National Seamless Pipe is consistently the number one choice of engineers and contractors throughout the country for air conditioning, heating and power installations. Its ability to render efficient, trouble-free service under all types of pressure and temperature conditions has given National Seamless a reputation for safety and dependability excelled by no other pipe. For further information, or assistance with your pipe problems, get in touch with our engineers.

NATIONAL TUBE DIVISION, UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.

COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS · UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS TRADE MARK

NATIONAL Seamless PIPE AND TUBES

WALLS WITHOUT WELDS

UNITED STATES STEEL

Problem:

How to provide SOUND CONDITIONING without limiting architectural features.

The First City National Bank of Houston, Texas, where wall and ceiling panels are sound conditioned with Sprayed "Limpet" Asbestos.

Answer:

Specify SPRAYED "LIMPET" ASBESTOS.

Sprayed "Limpet" Asbestos PERMITS FREEDOM OF ARCHITECTURAL TREATMENT, EFFICIENTLY CONTROLS SOUND. It might be the answer to similar problems for your clients. Sprayed "Limpet" Asbestos is fireproof asbestos fibers that are actually SPRAYED on and adhere permanently to any surface. There's no expensive surface preparation . . . no cutting, fitting or attaching. Sprayed "Limpet" Asbestos is applied by K & M distributors who are experienced applicators.

AND SPRAYED "LIMPET" ASBESTOS . . .

Efficiently insulates (on single layer roof it can save as much as 50% in heating costs).

Provides fire-safe lining (approved by Underwriters' Laboratories as a lightweight fire retardant on beams, columns, cellular floors).

Eliminates "sweating" effect (excellent for controlling condensation on walls and ceilings in any type application).

For complete information see SWEET'S ARCHITECTURAL FILE or write to us.

K&M best in asbestos®

KEASBEY & MATTISON
COMPANY • AMBLER • PENNSYLVANIA

Going Up!

a handsome new addition to the St. Louis skyline... strengthened and stabilized with

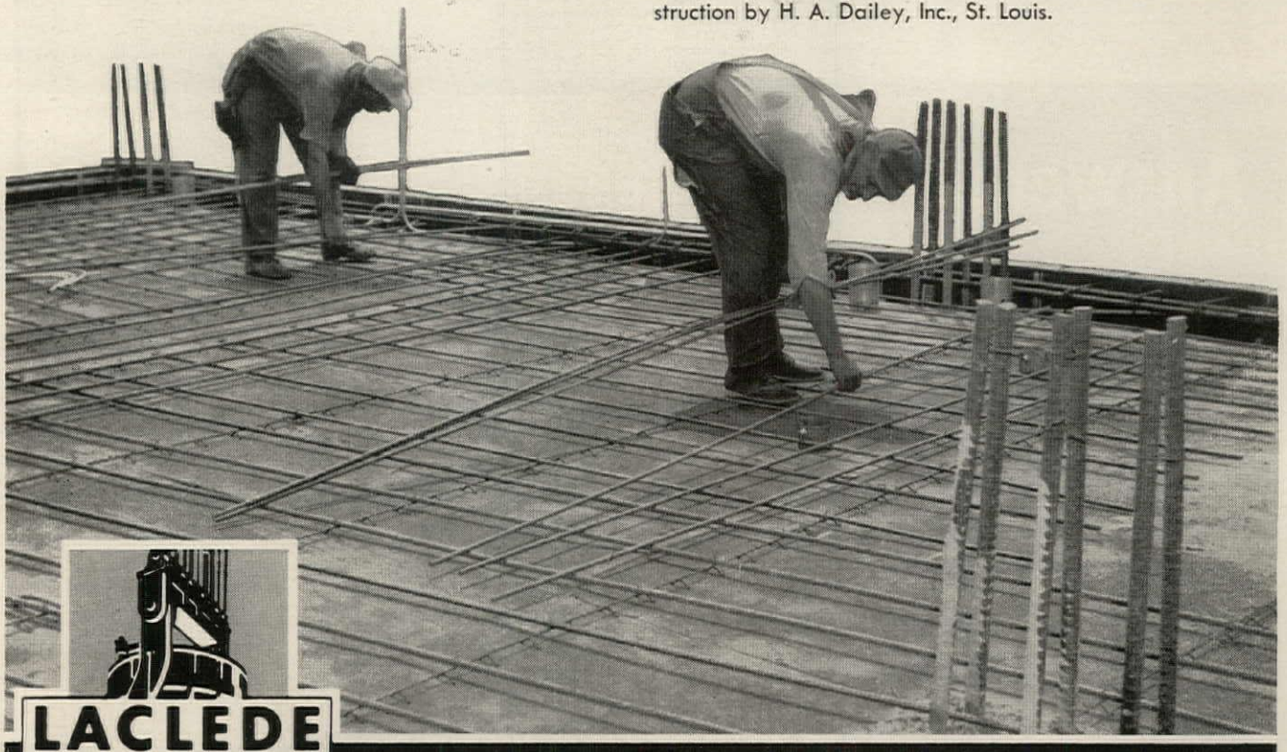
LACLEDE STEEL REINFORCEMENT

The new Frontenac Apartments, owned by Joseph A. Campagna of St. Louis and John J. Campagna of New York City, will soon add another note of simple, gracious living to St. Louis' fashionable West End.

Overlooking famed Forest Park, this building's 200 apartments will rise 15 stories, with four penthouse suites at the 16th floor level. Also included will be a restaurant, shops and 160-car subsurface garage.

In this skyscraper dwelling, designed by Sylvan Bien and Robert L. Bien of New York City, strength and permanency are assured through the use of Laclede Round Reinforcing Bars. The multi-rib deformations of these high-strength steel bars provide maximum anchorage, plus real economy by eliminating hooks and reducing embedment length.

General contractor for the project was John B. Gutmann Construction Co., Inc., St. Louis, and consulting engineers were Wells & Wells, St. Louis. Concrete construction by H. A. Dailey, Inc., St. Louis.



LACLEDE®

LACLEDE STEEL COMPANY

SAINT LOUIS, MISSOURI ■ Producers of Steel for Industry and Construction

Mortgage expert heads economic advisers; AISC elects N. P. Hayes

SAULNIER

SAULNIER GETS ECONOMIC POST

Having stayed in government service two years longer than he originally intended, **Dr. Arthur F. Burns** resigned last month as chairman of the President's Council of Economic Advisers. To succeed him President Eisenhower named **Dr. Raymond J. Saulnier** (pronounced Sohnyay), 48 who like Dr. Burns, had been recruited from the Columbia University economics faculty. Saulnier was a real estate credit consultant to the Federal Reserve Board in 1950 to '51, and has authored a number of texts on mortgage lending. The change in command of the council, however, would bring no change in the administration's current credit restraint policies.

G. MOULIN STUDIOS

SWINERTON

CASSIDY

AWARD WINNERS

As 1956 ended, San Francisco's Building Industry Conference Board gave its annual Achievement Award to Contractor **Alfred B. Swinerton**, of Swinerton & Walberg, who entered the construction field as an estimator in 1907, and among California's 69,000 licensed contractors, holds license No. 94. His firms in recent years have erected the Memorial Opera House and Veterans Building, the Sir Francis Drake Hotel and other large San Francisco commercial buildings, as well as projects in South America, Alaska and Turkey. Recipient of the board's Honor Award: Brig. Gen. **W. F. Cassidy**, South Pacific Division Engineer for the Army Engineer Corps, who was cited for his "leadership and efficiency as an engineer and executive which resulted in the saving of many possible lives and property in the California flood disaster Christmas week in 1955."

On the East Coast, the two men chosen to receive the annual awards of The Moles for "outstanding achievement in construction," to be presented in New York Feb. 7, were Member **Louis R. Perini**, of Framingham, Mass., president of both B. Perini & Sons and of the Milwaukee Braves, and **Guy F. Atkinson** (nonmember), 81, former president of the National Assn. of General Contractors.

TRADE GROUP JOINT VENTURES

Fourteen trade associations in the wood industry are expected to support a joint $200,000 to $300,000 promotion campaign this year slated to start with a "package" sales drive to spur modernization of business, store and office properties "with friendly wood."

Richard D. Behm, of the Hardwood Plywood Institute, Chicago, is chairman of a steering committee that is composed also of **Henry A. Bucklin**, Architectural Woodwork Institute; **John R. Gray**, National Office Furniture Assn.; **Charles E. Devlin**, National Plywood Distributors Assn.; **Ormie C. Lance**, National Woodwork Manufacturers Assn. and **Robert E. Spelman**, Wood Office Furniture Institute.

Another newcomer among building materials trade groups: the National Assn. of Distributors and Dealers of Structural Clay Products. For its first officers, this organization, formed to boost sales and work in liaison with manufacturers through SCPI, elected **Harry M. Spaulding**, of Spaulding Brick Co., Boston, as president; **Durwood L. Boeglen**, of Cushwa Brick & Supply Co., Washington, as vice president; **John Donohue** 3rd, Corning-Donohue, St. Paul, secretary-treasurer.

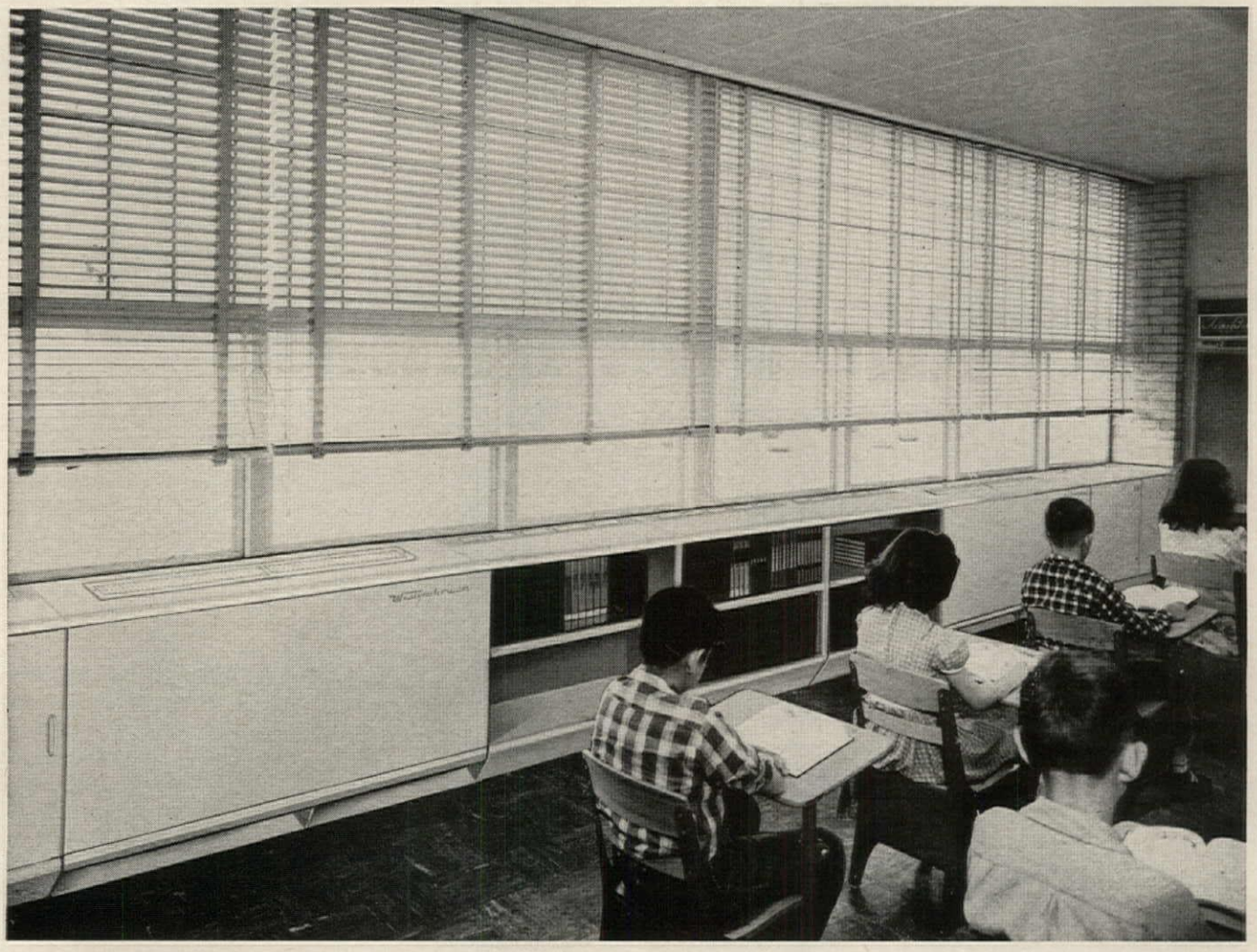
NEW ASSOCIATION CHIEFS

At its annual convention at White Sulphur Springs the American Institute of Steel Construction elected as president **N. P. Hayes**, head of the Carolina Steel & Iron Co., of Greensboro, N.C., the

continued on p. 85

FABIAN BACHRACH

HAYES



New Westinghouse Air Blender...

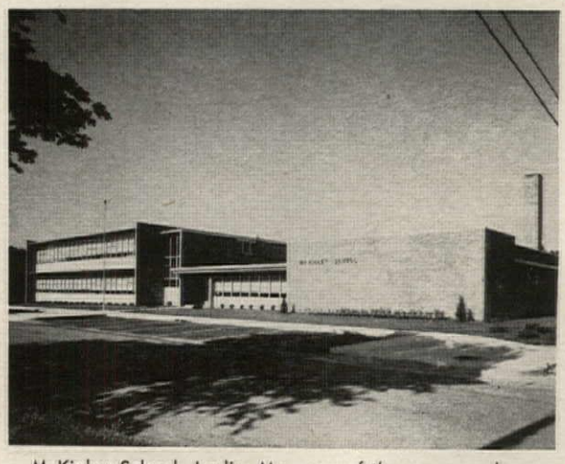
An Improved—Low Cost—Method of School Heating, Ventilating and Cooling!

You'll save all these ways with Westinghouse Air Blenders

- Eliminate fans, filters, motors, and electric wiring in classrooms.
- Eliminate costly and unsightly outside wall boxes.
- Eliminate cold window down drafts with "draft stabilizer" units.

Compare this new concept in school heating and ventilating with any other system. You'll find the Westinghouse Air Blender adds up to operating savings – and a s-t-r-e-t-c-h-e-d budget dollar!

Ask your nearest Westinghouse-Sturtevant Sales Engineer for details, or write for informative booklet to Westinghouse Electric Corporation, Sturtevant Division, Dept. 7-A, Hyde Park, Boston 36, Mass.



McKinley School, Joplin, Mo., one of the many modern school plants equipped with Westinghouse Air Blenders.

WESTINGHOUSE AIR HANDLING

J-80608

YOU CAN BE SURE...IF IT'S Westinghouse

first Southerner chosen to direct AISC. **H. Buckley Dietrich**, president of Dietrich Bros. Inc., of Baltimore was elected first vice president, succeeding Hayes.

The New England Council elected **L. Douglas Meredith**, executive vice president of National Life Insurance Co., of Montpelier, and a nationally known leader in the mortgage field, as its president for 1957. Meredith, a pioneer in promoting FHA, open-end and package mortgages, would also pioneer in regional economic and industrial development programs. He feels the New England states could act jointly, or more like a single state, on many tax, labor and economic problems without any sacrifice of their individual state's rights.

YES—IT'S ART

To help the public better realize that the architect's creations are "art," the Sarasota-Bradenton (Fla.) Association of Architects held a special exhibit as part of the Sarasota Art Association's recent observance of National Art Week. Member architects who participated in the display of renderings, sketches and plans, in an unoccupied downtown store, included **Paul Rudolph, Ralph S. Twitchell, Jack West** and **Victor Lundy.**

LOUIS J. HOROWITZ DIES

Louis J. Horowitz, 81, one of the nation's outstanding builders from the turn of the century until he retired in 1934 as president of the Thompson-Starrett Co., Inc., died Dec. 1 in Palm Beach, Fla. Structures erected under his supervision included the Woolworth Building, New York's Municipal Building, and the John D. Rockefeller residence in Pocantico Hills, N.Y. Arriving in the United States

KAIDEN-KAZANJIAN

HOROWITZ

from Russia at the age of 16, Horowitz started work as a $3-a-week errand boy. He engaged in the real estate business from 1896 to 1902, after recovering from a tuberculosis infection that incapacitated him for six months, joined Thompson-Starrett in 1903, had become its president by 1910. On his death he bequeathed $9 million to New York University, the largest gift in its history.

HERBERT U. NELSON DIES

Herbert Undeen Nelson, for 33 years the nation's "Mr. Real Estate," died Nov. 19 in Evanston, Ill., 13 months after his retirement as executive vice president of NAREB.

Though in failing health since suffering a stroke in 1954, Nelson, 70, had attended the realtors' convention in St. Louis the week before his death.

In his 33 years as executive head of NAREB, Nelson built the organization

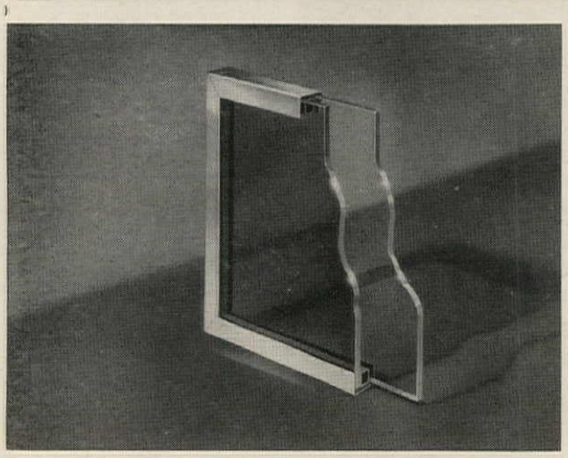
WALTER DARAN

NELSON

from 413 local boards to 1,200, from 16,000 members to 55,000. He worked for license laws. He organized NAREB's institutes —brokers, management, appraisal, industrial, farm brokers, and the Urban Land Institute—all steps which did much to professionalize the real estateman.

Nelson was born in Ellsworth, Wis., graduated from the University of Minnesota, worked briefly as a silver miner, seaman and newspaper reporter in Seattle. He became secretary of the Minneapolis Real Estate Board in 1917 and there, as secretary of the Minneapolis planning commission, before joining NAREB as its executive vice president in 1922, drafted one of the nation's early zoning ordinances.

OTHER DEATHS: **Lieut. Gen. Lewis A. Pick**, 66, retired Chief of the Army Engineers and famed as the builder of the Ledo Road connecting India and China during World War II, Dec. 2, in Washington; **Archibald Manning Brown, FAIA**, 75, past president of the Architectural League of New York and three-term architect member of the Municipal Art Commission, Nov. 29, in New York; **Henry Stewart McKee**, 88, Los Angeles civic leader and banker, former president of the Community Development Assn., builders of the Los Angeles Coliseum, Nov. 19, in Los Angeles; **Robert Wentworth Lea**, 70, former president of Johns-Manville and authority on business management, finance and corporate organization, Nov. 13, in New York; **Gray Phelps**, 54, past president of the Building Owners and Managers Assn. of Los Angeles and owner of a property management firm, Nov. 23, in Pasadena.



SOLEX-TWINDOW® offers all the advantages of Twindow—the windowpane with insulation built in—plus a means for reducing the strong heat and brightness of intense sunlight. The sectional view here shows the composition of a Solex-Twindow unit. The outer pane is Solex Plate Glass, the inner light clear-vision Plate Glass. Between these two panes is a sealed-in air space. The entire unit is enclosed in a stainless steel frame which protects the seal and glass edges and makes handling safe and easy.

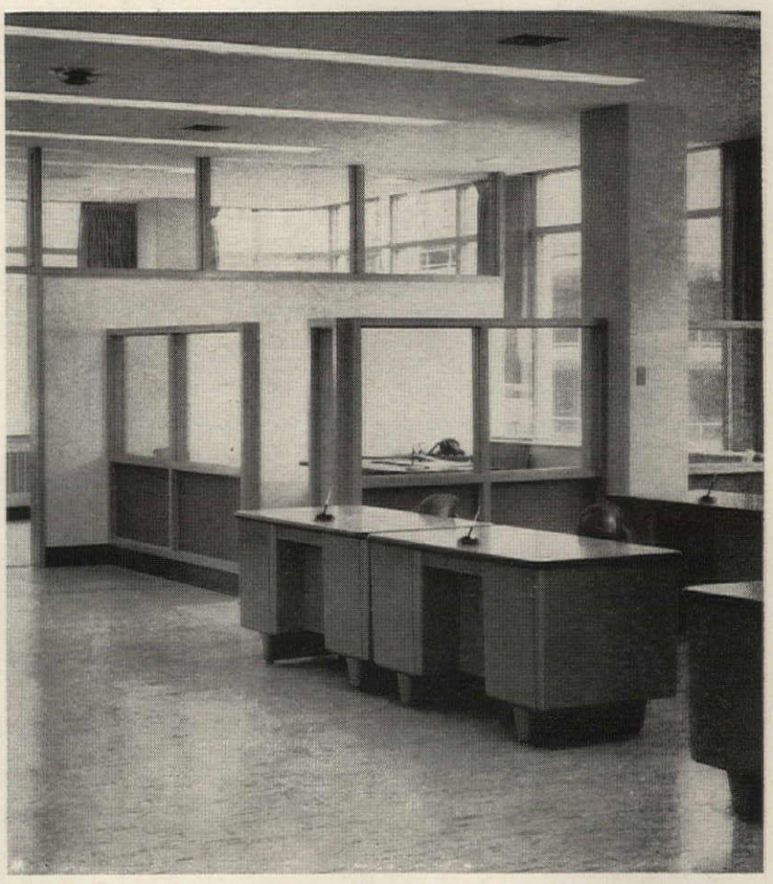
Design it better with

PITTSBURGH GLASS

Lutheran Brotherhood's New Home Office Building in Minneapolis, Minnesota, features

SOLEX-TWINDOW INSULATING GLASS

One of the Twin Cities' first completely modern, air-conditioned office buildings, the Lutheran Brotherhood Life Insurance Society home office building embodies advanced thinking in both community and employee facilities, as well as in architectural design and mechanical equipment. A feature of this building is its "curtain wall." For the vision areas in this "skin," *Pittsburgh's* Solex-Twindow Insulating Glass was selected. These units assure more comfortable interiors for the building's occupants, for they reduce solar heat and glare and keep offices cooler. Moreover, Solex-Twindow adds to operating economy, because less load is placed upon the air-conditioning system. Perkins & Will, Architects-Engineers, Chicago, Illinois, and White Plains, N. Y.



THIS VIEW of one of the departments of the New Lutheran Brotherhood building shows how the various offices gain visual spaciousness and bilateral daylighting through floor-to-ceiling partitions, glazed with Pittsburgh Polished Plate Glass.

PRIVATE AND SEMI-PRIVATE offices in this building acquire well-distributed daylighting through partitions glazed with Pittsburgh Polished Plate Glass.

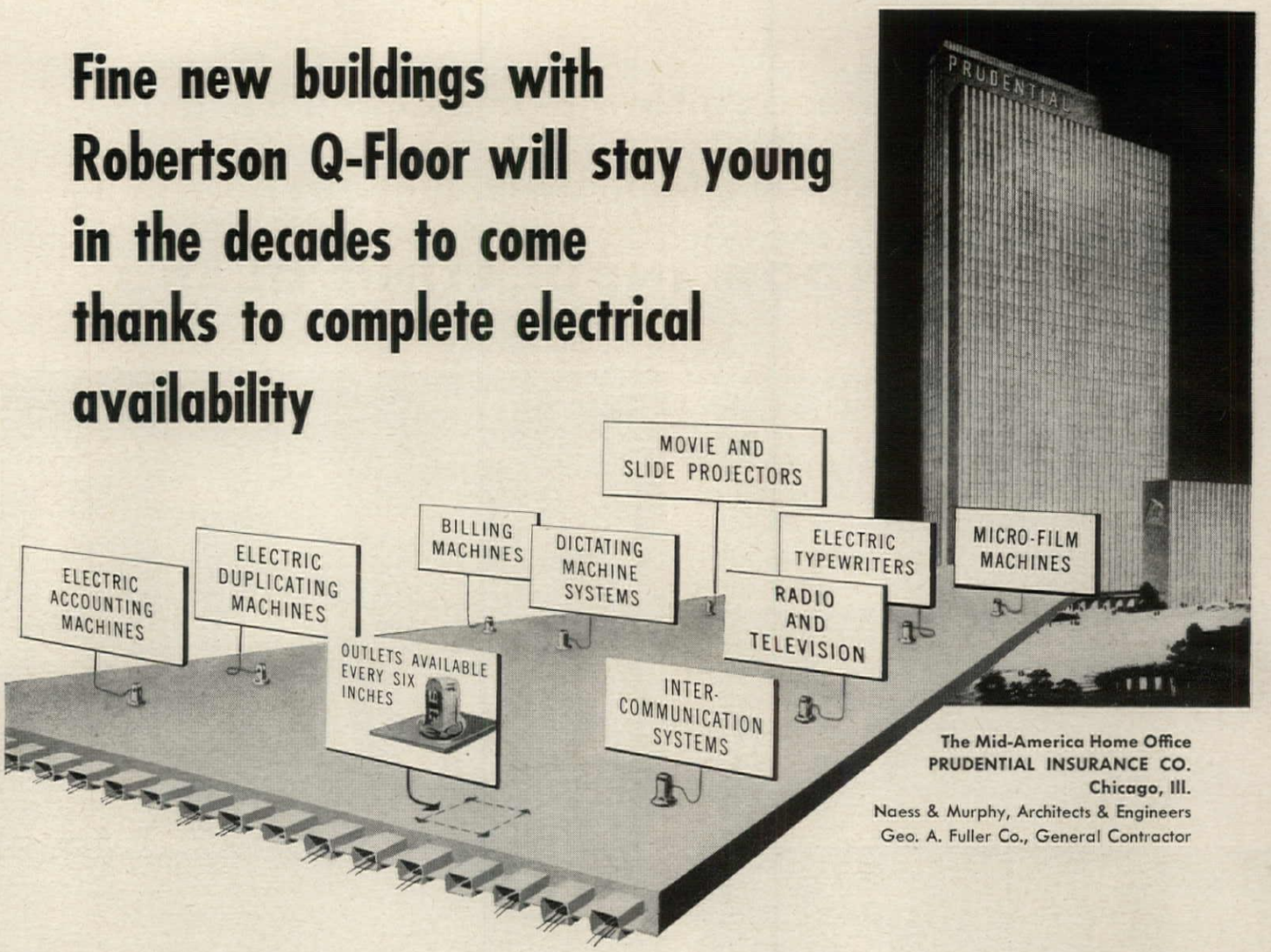
Your Sweet's Architectural File contains detailed information on all Pittsburgh Plate Glass Company products . . . Sections 7a, 13e, 16d, 21.

PAINTS · GLASS · CHEMICALS · BRUSHES · PLASTICS · FIBER GLASS

PITTSBURGH PLATE GLASS COMPANY

IN CANADA: CANADIAN PITTSBURGH INDUSTRIES LIMITED

Fine new buildings with Robertson Q-Floor will stay young in the decades to come thanks to complete electrical availability

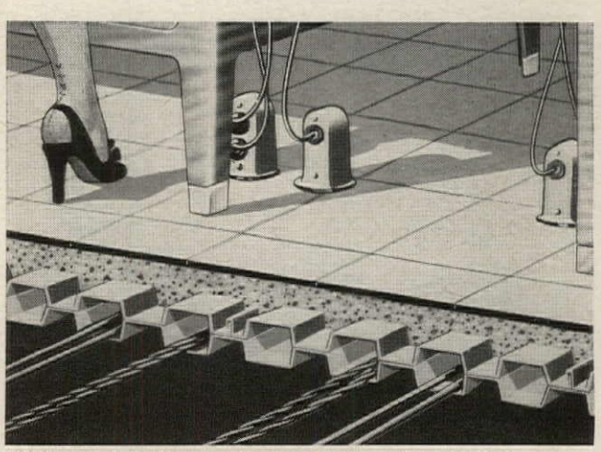


The Mid-America Home Office
PRUDENTIAL INSURANCE CO.
Chicago, Ill.
Naess & Murphy, Architects & Engineers
Geo. A. Fuller Co., General Contractor

When you build with Robertson Q-Floor you assure a long and useful life for your building since you will have provided for any conceivable amount of office automation. The large steel cellular raceways in Robertson Q-Floor, on six-inch centers, make it possible to run wires for electrical and telephone outlets to any point in the building quickly and inexpensively. Thus, no matter how many electrical devices are added or moved, the Q-Floor building will have adequate electrical facilities.

Not only does Q-Floor provide complete flexibility of electrical outlets, but it also saves construction time and money. Weight saved in the floor itself means lesser loads and savings in the supporting foundations and structural steel. And during construction, Q-Floor immediately becomes a safe, fireproof working platform for all trades.

Build for the future while keeping an eye on today's costs by using Robertson Q-Floor. Use the coupon to write for the new 44-page Q-Floor Manual.



Cellular steel Q-Floor construction makes outlet installation easy—provides 100% electrical availability.

Today's finest buildings are built with **Robertson**

Q-Floor

the original cellular steel floor

H. H. Robertson Company

2403 Farmers Bank Building, Pittsburgh 22, Pa.
In England—Robertson Thain Ltd., Ellesmere Port, Cheshire
In Canada—Robertson-Irwin Ltd., Hamilton, Ontario

Please send 44-page Q-Floor Manual.

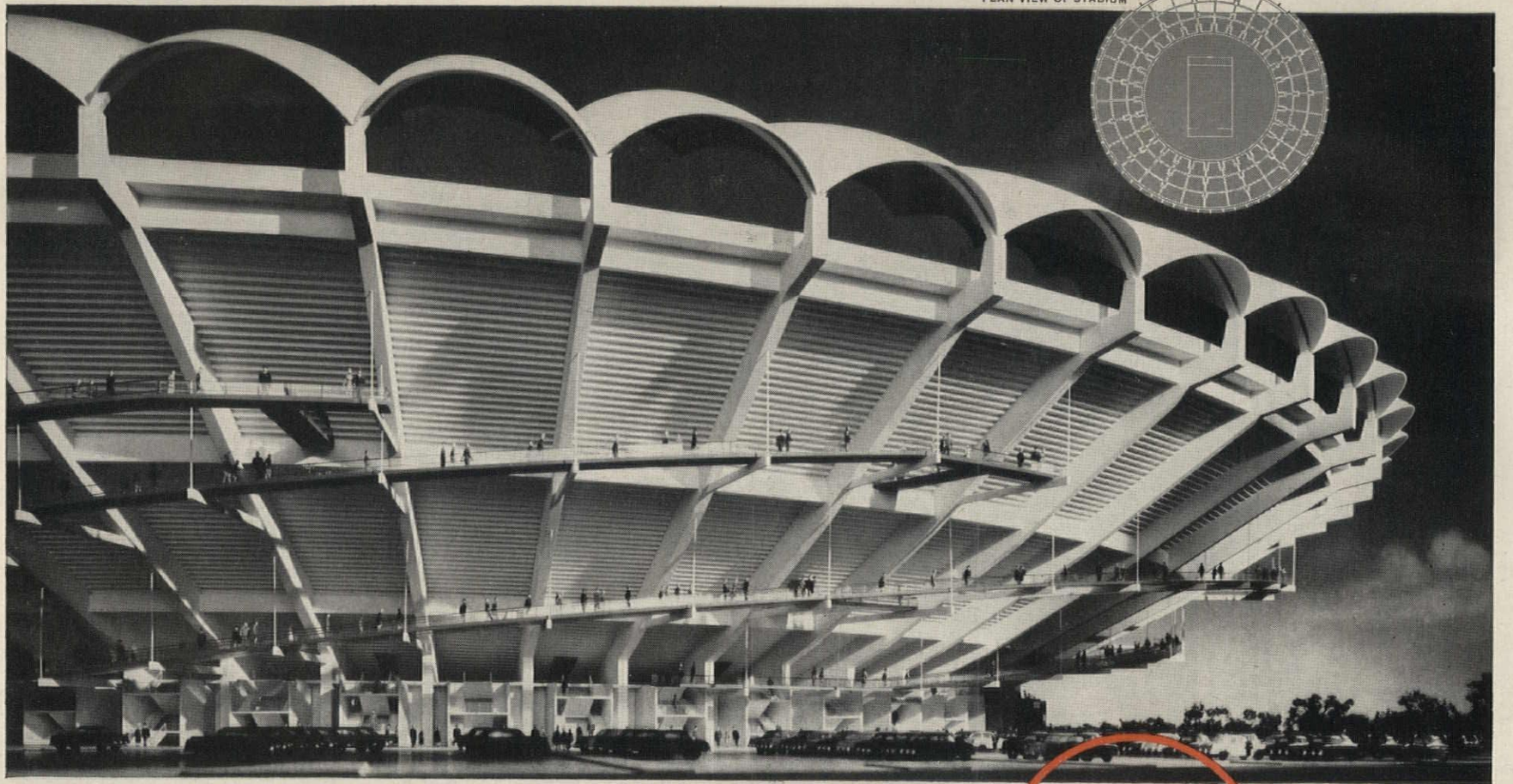
NAME

COMPANY

ADDRESS

F. Ellwood Allen Organization, Recreation Consultants

PLAN VIEW OF STADIUM



DAMORA

TOMORROW'S STADIUM: concrete bowl that makes double use of land

"While the inside of this huge covered concrete bowl offers complete facilities for 100,000 people, its underside shelters ample parking space, thus conserving land. Entry and exit of spectators are speeded up by ramps which channel people to and from their seating areas. This unique structure exploits—as never before—the potential of concrete, using a thin shell roof, precast panels and prestressed structural members—another example of the creative uses of this most adaptable building material."

ANTONIN RAYMOND & L. L. RADO, *Architects* • PAUL WEIDLINGER & MARIO SALVADORI, *Engineers*

■ One of a series of advertisements being presented in national magazines by Universal Atlas—to promote interest in architectural contributions for a greater America through the medium of concrete. For more about this building method, write to Universal Atlas, 100 Park Avenue, New York 17, N. Y.

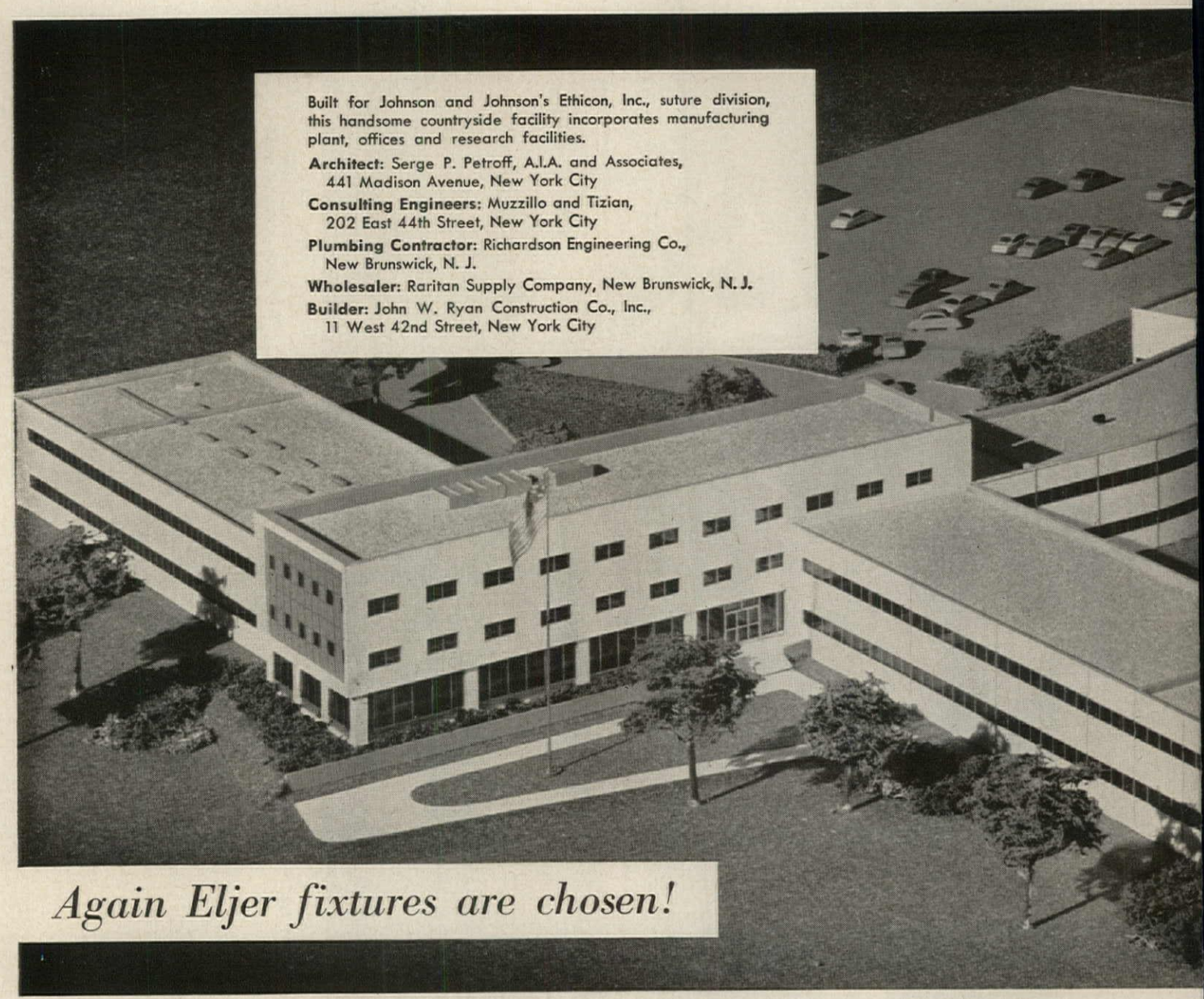
UNIVERSAL ATLAS CEMENTS

ATLAS PORTLAND CEMENT
UNIVERSAL PORTLAND CEMENT
ATLAS DURAPLASTIC PORTLAND CEMENT
UNIVERSAL PORTLAND SLAG CEMENTS
ATLAS MORTAR CEMENT
ATLAS WHITE PORTLAND CEMENTS
ATLAS LUMNITE CEMENT
UNAFLO OIL-WELL CEMENT

USS

UNIVERSAL ATLAS CEMENT COMPANY—MEMBER OF THE INDUSTRIAL FAMILY THAT SERVES THE NATION—**UNITED STATES STEEL**

"UNIVERSAL," "ATLAS," "DURAPLASTIC," "LUMNITE" and "UNAFLO" are registered trademarks of Universal Atlas Cement Company.



Built for Johnson and Johnson's Ethicon, Inc., suture division, this handsome countryside facility incorporates manufacturing plant, offices and research facilities.

Architect: Serge P. Petroff, A.I.A. and Associates, 441 Madison Avenue, New York City

Consulting Engineers: Muzzillo and Tizian, 202 East 44th Street, New York City

Plumbing Contractor: Richardson Engineering Co., New Brunswick, N. J.

Wholesaler: Raritan Supply Company, New Brunswick, N. J.

Builder: John W. Ryan Construction Co., Inc., 11 West 42nd Street, New York City

Again Eljer fixtures are chosen!

High standards set for new Ethicon

One guiding factor in the selection of Eljer plumbing fixtures for this multi-million-dollar project was their unsurpassed record for efficient, dependable performance. For, obviously, the highest standards of sanitation are a *must* in a surgical plant.

Eljer, through advanced quality-control facilities in all four large factories, is able to achieve and maintain a remarkably high level of workmanship.

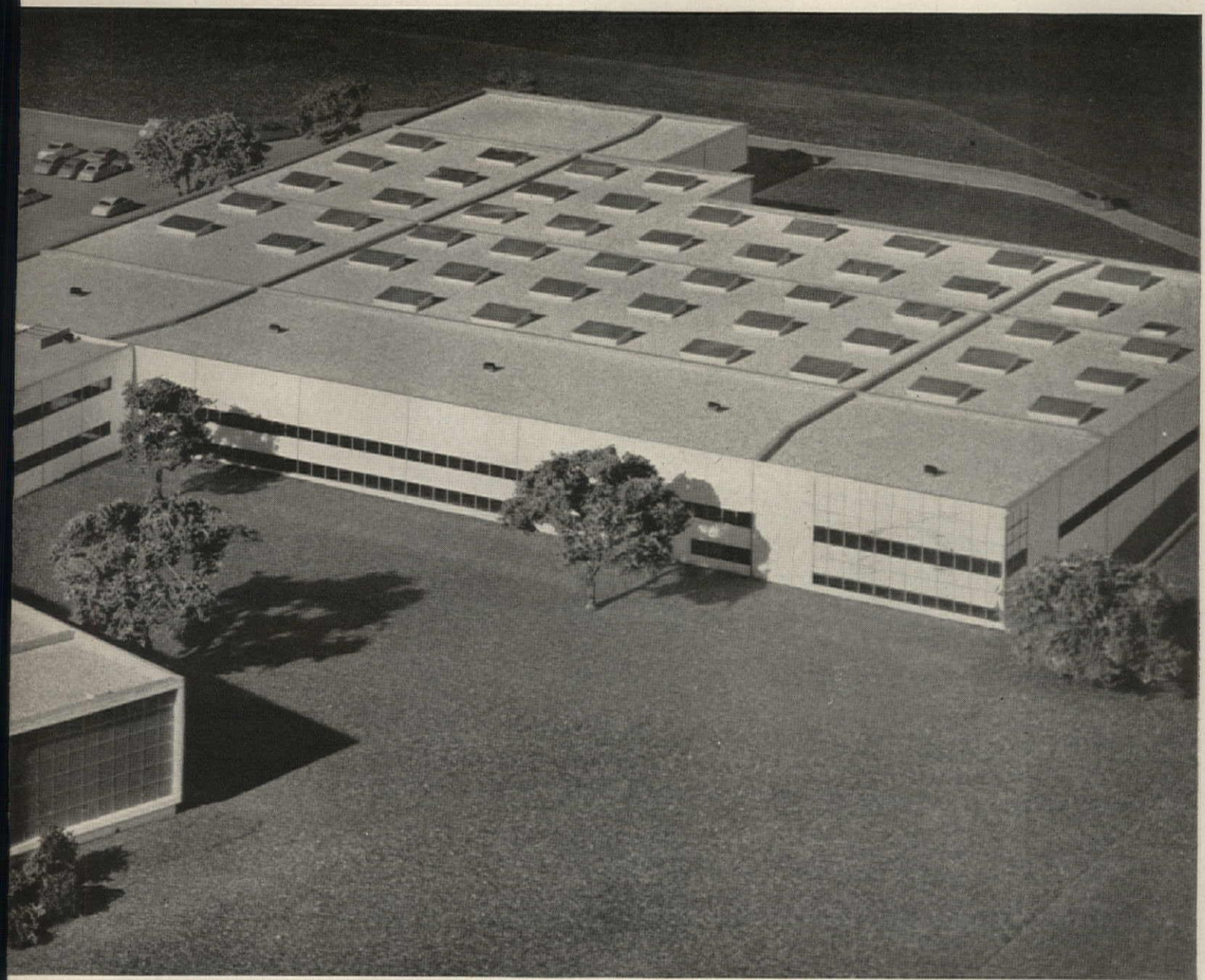
As a result, Eljer fixtures . . . whether in colors or white . . . in vitreous china, formed steel or cast iron . . . are sure to meet your demands for fine quality. Modern, completely renewable brass fittings are available on Eljer fixtures for long, trouble-free operation.

One of our representatives is at your service and will be glad to aid you in planning the fixture requirements for your projects.

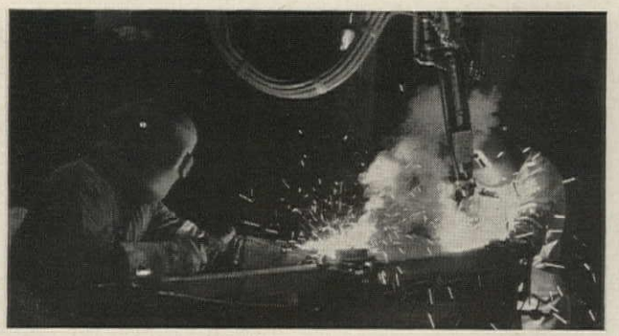
ELJER*

DIVISION OF THE MURRAY CORPORATION OF AMERICA

*ELJER—the only name you need to know in plumbing fixtures



plant demanded ELJER quality



Skilled specialists in cast iron, formed steel, vitreous china and brass use the most up-to-date production equipment to assure high volume, prompt deliveries.

Rigid inspections throughout every step of production maintain Eljer's high quality standards. Fixtures and fittings are thoroughly water-tested, color-matched and checked for uniformity.

ELJER Division of The Murray Corporation of America, Three Gateway Center, Pittsburgh 22, Pa.

PRUDENTIAL INSURES SNOWLESS SIDEWALKS WITH A STEEL PIPE MELTING SYSTEM

When bitter winds whip in from the lake and pile up snow on Michigan Boulevard, sidewalks and entrance areas of Chicago's great new Prudential Building will stay as snow-and-ice-free as on a summer day. They were foresightedly protected by a Steel Pipe Snow Melting System!

Automatic snow and ice melting systems are much more than a "convenience." In the snow belts of the nation, installation costs may be repaid in just a few seasons by elimination of costly manual snow removal methods. Add the advantages of accident prevention, attraction of pedestrian traffic, reduction of lobby floor cleaning costs, and you have good reasons why steel pipe snow melting is an economical investment.

Steel Pipe is first choice for such installations, as it is for radiant heating, fire sprinkler systems, plumbing, power, steam, air transmission lines and electrical raceways. In fact, it's the most widely used pipe in the world.

Send for the free 32 page booklet "Steel Pipe Snow and Ice Removal Systems."

Committee on
STEEL PIPE RESEARCH
AMERICAN IRON AND STEEL INSTITUTE
150 East Forty-Second Street, New York 17, N. Y.

Steel Pipe is First Choice

PUBLISHED BY TIME INC.
EDITOR-IN-CHIEF: Henry R. Luce
PRESIDENT: Roy E. Larsen

EDITOR:
Douglas Haskell, AIA

MANAGING EDITOR:
Joseph C. Hazen Jr.

ART DIRECTOR:
Paul Grotz

ASSOCIATE EDITORS:
David Allison, Frank Fogarty, Mireille G. Gerould, Marilyn Grayboff, Jane Jacobs, Mary Jane Lightbown, Walter McQuade, AIA, Joan Dumper Mebane, Richard A. Miller, Richard Saunders, Ogden Tanner, Stephen G. Thompson, Mary Elizabeth Young

ASSISTANTS:
Anne LeCrenier, Dorothy O'Shea, Henry Martin Ottmann, Ann Wilson

ART STAFF:
Ray Komai, associate director; Martha Blake, Charlotte Winter

CONSULTANTS:
Miles L. Colean, FAIA
Carl Feiss, AIA
Lawrence Lessing

PUBLISHER:
Ralph Delahaye Paine Jr.

GENERAL MANAGER:
Charles B. Bear

ADVERTISING DIRECTOR:
S. C. Lawson

ASSISTANT TO THE PUBLISHER:
John Fistere

TECHNOLOGY–1977

Twenty years in the life of a person is a long time, marking the full span from birth to adulthood. Twenty years in the life of a building is short—shorter than it was. In 20 years a building erected today will be facing fierce competition from the new buildings of a younger society using a newer technology. Many will succumb. Sturdy large buildings, rushed up during the hustling Twenties, got a respite from new competition during the war; but despite this many of them are already coming down, and others show a serious weakening, not physically but financially as useful, profitable enterprises. The best way to safeguard today's building ventures is surely to anticipate seriously what is to come.

Of course nobody can devise a schedule for the next 20 years but there does emerge a broad possible pattern. The friendly bout between architecture and modern technology has already gone two rounds, and a fast third round is already started.

In the first round architecture was contending with a new age of iron and steam. Out of this struggle came the big suspension bridges and the American skyscraper, as new wonders under the sun. The era of industrialism was at hand.

The second round was an intense struggle with the broad problem of "the machine"—meaning a factory system based on the new continent-wide electric power grid and the new networks of transportation and communication. The entire system of planning and design of the earlier handicraft societies had to be overhauled, and "modern architecture" was on its way.

Today these are miracles no longer. The results of science and invention pour in upon us in such a flood that we have all we can do to keep our heads above water and direct the torrent. So the third round we are entering might be called the age of control—controlled development.

Building, for example, has always had a foundations problem and some preliminary preparation of the earth was necessary. Today, however, with the new giant apparatus at work, earthmoving has suddenly reached proportions that are almost geographic; and

SAMSONITE SUPPORTS OVER 1,200 POUNDS IN REMARKABLE TEST!

It's the Strongest Folding Chair for Every Use!

Imagine—the world-famous Wazzan Troupe put their combined weight of more than 1200 pounds on this all-steel Samsonite chair!

Yet, remarkably enough, it didn't buckle one bit—*stayed as strong and firm as ever!*

Here is extraordinary proof that Samsonite is the sturdiest, most practical folding chair you can have. It's the smartest, too—designed in 10 beautiful decorator colors that transform every room with new richness and brightness! Order Samsonite for every use—the only all-steel folding chair that brings you all of these quality features:

Chip-resistant baked enamel finish • Safety-guard seat hinges • Reinforcing steel cross braces on chair legs • Bonderized to resist rust • Electrically welded tubular steel construction • Comfort-curved seat back and design • Replaceable plastic feet • Will not tip, tilt or wobble • Easy, compact folding Heavy-duty vinyl upholstery at no extra cost.

Samsonite

ALL STEEL FOLDING CHAIRS IN **10** DECORATOR COLORS

Shwayder Bros., Inc., Institutional Seating Division, Dept. AF-1, Detroit 29, Mich. Also makers of famous Samsonite Luggage, Classroom Furniture and Card Tables and Chairs for the Home. Also available in Canada through Samsonite of Canada Ltd. Queens Highway East, Stratford, Ontario

Don't Forget to Visit the Samsonite Booth #L-2 at the NEA Show, February 15-20 at Atlantic City!

bringing it under architectural control is the only approach that can save our land itself from being messed up and scarred beyond salvation.

As we look at materials, the problem shifts from huge machinery to the microscope and the test tube. Discovery has already brought us new building materials in great quantity; but now the chemical industry is turning its attention to building; and this means a new approach—materials created under deliberate, planned programs, and again under control, indicating an entirely new epoch.

As we look at manufacturing, we find other big consolidations and integrations. We used to look to separate producers for separate building parts. Now these are being pulled together, again under deliberate programs of integrated design—best illustrated in new projects for the integrated panel wall, which will carry new inventions of heating and lighting in, and on, its own thin but powerful body.

By the same token, the idea of "controlled conditions"—air conditioning for example—is being newly considered in a way that combines mechanical and structural considerations together as a single problem.

Structure itself has achieved the first moves of a break-through, destroying the initial monopoly of the common steel or concrete frame and the handbook engineer. The new theoretical engineer will rule a domain of suspension roofs, shells, masts, and other forms which the architect and owner must now understand and manage.

In every one of these fields what is at hand is not so much a new realm of science as a fresh approach to existing problems, which used to be familiar but are suddenly new again. This applies even to the way we think about architectural space, and the way we reintroduce precious urban space into our reviving cities.

So this issue of FORUM will concentrate not so much on predictable fact as on the nature of these new approaches. Of course by 1977 we shall still be in a recognizable world, and no doubt wooden houses will still be built, people will still gather at fireplaces, city buildings will be mainly rectangular, and building occupants will still complain of cracks and leaks. Yet even the most cursory examination must reveal the imminence of the new controls, for during the next 20 years construction can hardly escape adding up to more than $1,000,000,000,000—a trillion of today's dollars, and horsepower in magnitudes still more astronomical. This will all occur on the same old land, and it will still have to serve, please, and express people. In short, it must be converted into architecture: tomorrow's architecture.

A new approach to LANDSHAPING

The bulldozer and its monstrous progeny are pushing earth sculpture into the art of architecture

Amid the dust and roar of high-speed diesels, man is cutting and filling a whole new geography of his own. Entire communities are being benched onto steep hillsides or set down on brand new fingers of land dredged out of swamps. Fields and forests are being smashed and recontoured for new factories, new schools, new hospitals, new shopping centers. Highways, no longer bound to nature's profiles, ram six lanes straight or curving through mountain and marsh alike. Great dams, themselves giant sculptures of earth and concrete, are transforming rivers into inland seas and altering the landscape of whole regions with new water and power.

Earthmoving has become cheap. Technically, the growing armies of high-speed bulldozers, scoops and carriers need stop at nothing. The bigger the jobs become, however, the more carefully their manifold effects must be considered. In the years ahead the real measure of the big blade will be not how much it can cut, but how well. Since architecture is defined as the shaping of human environment, landshaping is a major new area of participation for the architect.

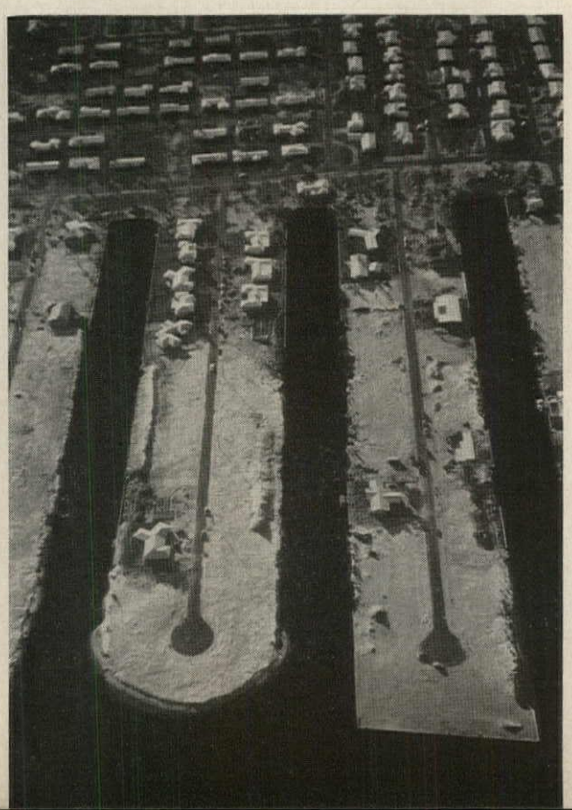
Giant trucks carry load after load of rock and dirt for a dam in North Dakota.

Giant tractors towing scrapers cut through Idaho woodland to shape a new highway.

Giant steps make level house lots on a treeless Los Angeles hillside close to town.

Whole new communities are carved out of the hills,

dredged out of the sea



Bulldozer and dredge carved these luxury housing peninsulas out of mangrove swamp at Ft. Lauderdale, Fla.

A swarm of earthmovers organizes a Colorado valley into mammoth levels for the Air Force Academy's "Acropolis."

Cats and carryalls eat away a West Virginia hillside.

Sculptured freeways splay open the mountains

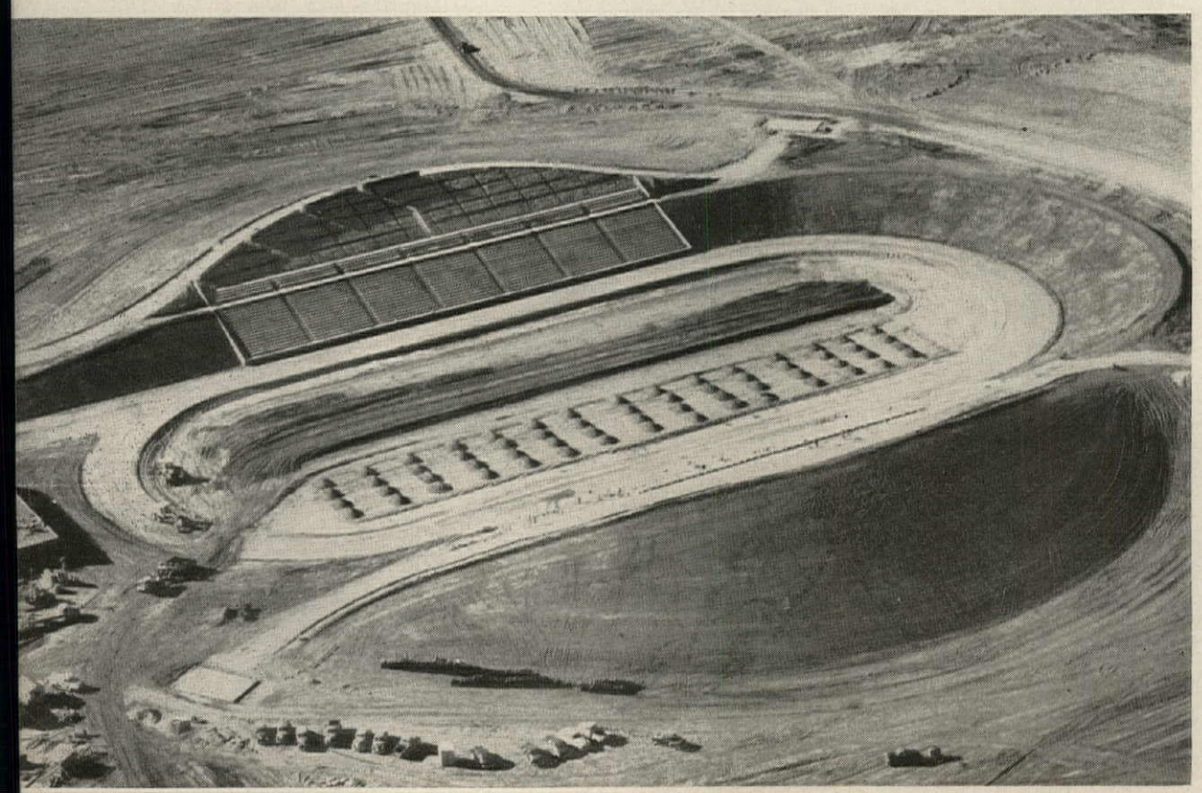
and ramp the lowlands

Turnpike throws its own sweeping roadscape across the New Jersey flats.

Hollywood Freeway makes a wide gorge out of a hilly little street, opens up whole area.

Scrapers, trucks and shovels race to quarry earth for a huge airport runway.

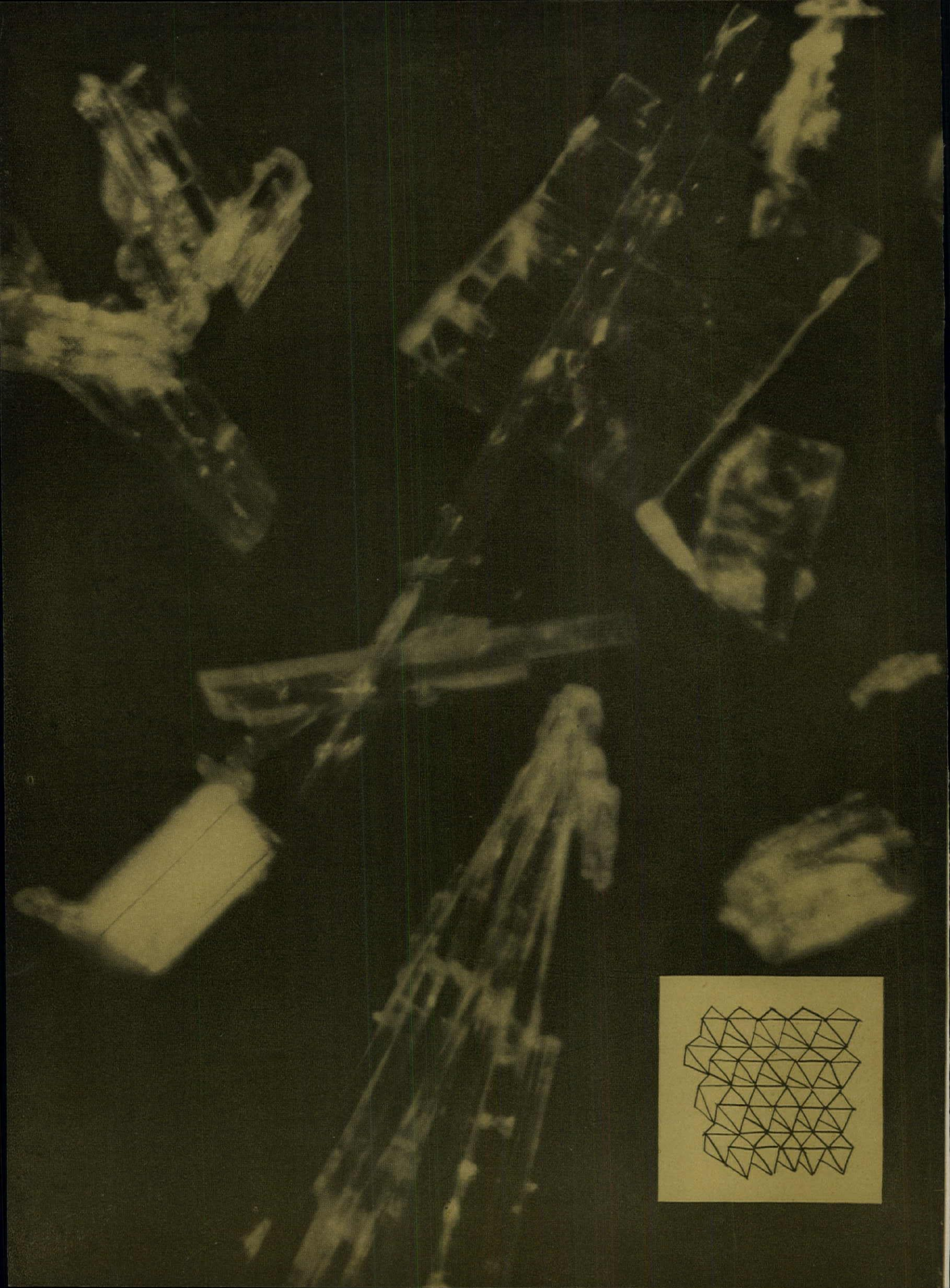
Great earth structures change the face of fields, reshape whole regions



Dirt scooped up and rolled rock-hard makes a graceful, economical bowl for Texas stadium.

PHOTO CREDITS: p. 96—LIFE photo by Howard Sochurek; p. 97—Caterpillar Tractor Co.; p. 98—Pacific Air Industries and FORTUNE by Carroll Seghers, Black Star; p. 99—Air Force photo; p. 100—Standard Oil Co. (N.J.) and LIFE by Yale Joel; p. 101—Ford Motor Co.; p. 102—Standard Oil Co. (N.J.); p. 103—LIFE by Howard Sochurek

Sidetracking the big Missouri, engineers build up North Dakota's Garrison Dam, a two-mile wall of earth to make a 200-mile lake behind.



A new approach to MATERIALS

The molecular remodeling of matter promises an endless stream of new building materials

Nearly all the technological forces that have helped to shape the architecture of today are as nakedly visible as the giant earthmoving machinery we have just seen and the great steel, glass and concrete structures that arise on the sites prepared for them. The next phase of development is likely to be more subtle in many ways, less readily visible to the naked eye, at least to begin with. It involves a revolution, already well underway, in the molecular structure of materials and the organization of materials in entirely new ways.

This revolution, which began exactly a century ago when William Henry Perkin, a 17-year-old British schoolboy, discovered a new mauve dye in a coal-tar mess he was preparing, has not yet deeply penetrated the building industry. Within the next two decades, however, the direct entry of the chemical industry and chemical thinking into building is bound to effect a transformation as profound and far-reaching as any in the past century. It will leave untouched no basic materials of building, old or new, and bring forth many new ones as yet unheard of. Since materials are indeed basic, subtly influencing all the forms in which men work and live, the architecture of 1977 is likely to be as strikingly different from that of today as today's is different from architecture at the turn of the century.

The molecular framework

Essentially, what was discovered a century ago was the fact that by tearing down and rearranging the basic atoms and molecules of simple matter, such as that contained in coal, materials could be created which not only simulated natural products but also went beyond them in the creation of entirely new products with properties not found in nature. As this rearranging of the basic stuff of matter progressed through simple compounds, the modern chemical industry was formed, based wholly on research and the creation of new materials.

Less than 30 years ago the further discovery was made that many complex materials which had resisted synthesis depended on the joining of many small molecules into giant molecular structures. This was first demonstrated in the creation of synthetic fibers, in which small molecules were repetitiously joined end to end to form giant chain-like molecules, many thousands of atoms long. Almost simultaneously many rubber-like materials were created by building the same type of long-chain molecules, then cross-linking them in a certain way to produce a loose, elastic, mesh-like structure. And at the same time a host of new plastic materials arose in which the giant molecular structure took various cross-linked chain and ring-shaped formations of enormous size and subtlety, rivaling or surpassing those in nature. The fact common to all these new materials was that their properties and ultimate uses depended not so much on their ingredients—which in all instances were simply carbon compounds—as upon the structural arrangement of their atoms in space.

Architects will understand more readily than laymen this structural basis of materials. What makes a fiber a fiber is simply the architectural arrangement of its molecules into long thread-like chains. What makes rubber a resilient, elastic material is the cross-linked, coil-like structure of its long-chain molecules. Form follows function, or function form, in submicroscopic detail. Moreover, a similar structural order was soon seen to extend up through even more complex materials. The strength and properties of metals are largely ordained by the geometric arrangement of their atoms and molecules into large, closely packed crystal and lattice structures, whose mysteries are now being unraveled at a great rate. The tissue of all living matter is formed

FRITZ GORO—LIFE

Molecular structure: Symbolized in these crystal and crystal-lattice structures is the frontier on which the chemical and basic building materials industries are now occupied in developing an unending flow of new and improved materials.

largely of spiral or helical protein molecules of enormous complexity, only just beginning to be elucidated. Thus the forms of earth and trees, the color of flowers, the shapes of all the visible world are defined by the architectural structure of molecules.

The significance is simply this: Once the chemist understands the structure of a class of substances, he not only can modify and control that structure in nature, but, through the building up of complex molecules from simple chemicals, he can ring endless changes upon structure to outrival nature itself. Man is finally free from the limitations of a few materials, laboriously won over the centuries and used in much the same forms as nature first presented them to him. The full import of this chemical explosion in new materials is only beginning to be understood in this century.

The revolution has been slow to penetrate the building industry for reasons quite apart from the traditional inertia of that industry, which in any case is lessening. First, the laying of the chemical industry's foundations was initially a slow process in the accumulation of basic knowledge and basic chemicals. Second, chemistry's early approximations to the products of nature were often crude and frequently faulty. Third, until recently the major part of the chemical industry's growth was in so-called organic chemistry—the almost innumerable carbon compounds basically associated with living things—and its products possessed much of the transitoriness and non-durability of life, rather than the permanence and rigidity required in most building materials. But chemistry constantly improved the structure of its materials and invented new ones, with ever-accelerating force. One after another it invaded and took over, wholly or in part, the dyestuffs, fertilizer, drug, textile, rubber, fuels and metals industries, while indirectly feeding to nearly all others across the board. By the 1950's, the basic chemical industry, having grown in less than half a century in the US from practically nothing to sales approaching $20 billion a year, was looking for new worlds to conquer.

The entry of chemistry

In October 1954, a national conference on plastics in Washington, sponsored by the Building Research Advisory Board under the auspices of the National Academy of Sciences, set the stage for an historic announcement. The US chemical industry was prepared to put its now immense resources into an attempt to make a direct entry into building markets. Behind the move were nearly all the leading chemical producers, including Du Pont, Monsanto, Dow, Union Carbide & Carbon, Allied Chemical and American Cyanamid. And behind their determination was a productive capacity, growing at the phenomenal rate of close to $1 billion a year in capital plant additions since the war, which needed new markets to keep expansion going.

"We must be assured of outlets for our materials," said Monsanto's Robert K. Mueller in the keynote address of the conference, "and we are willing to spend for the research and development work necessary to match the requirements of builders and architects."

At the base of the attack being mounted on building markets is a total synthetic plastics output now rising beyond 2,000,000 tons a year, making this the fourth largest basic industry, preceded only by steel, lumber and glass. But the major mobile weapon in this battle is the industry's growing mastery of the technology of molecular structures. There are now 17 distinct families of plastics, with an enormous range of types, properties and physical forms. There are over a dozen families of synthetic rubbers. From being materials once almost wholly devoted to colorful novelties and atrocious gewgaws, plastics rapidly came of age in the war. Many measured up to the most rigorous structural or other special requirements in aircraft, electric and electronic gear and military equipment of all kinds. Many went on to a vigorous postwar development in jet airplanes, light trains, automobile, truck and trailer components. Some even found their way into building, in such forms as light interior paneling, insulation and plastic piping, though the main use of plastics in building continued to be the peripheral ones of decorative or protective coatings and claddings. Not content with this less than skin-deep penetration, which is only about 10% of plastics production, the chemical industry set out in 1954 to seek the entry of plastics into the very structure of building.

Progress is not likely to come overnight. For one thing, the structural building market is so huge that if the chemical industry were to capture as little as 5 or 10% of it, it would probably require a doubling of chemistry's present plant. Fast-growing as the chemical industry is, it is not that fast. And for another, the industry, having had trouble with the misuse of plastics in the past, is moving with extreme caution, for no one recognizes more clearly than the chemist that building material requirements differ greatly from those for which plastics previously have been designed.

Nearly all past emphasis in plastics research has been on getting bright, transparent, easily moldable materials for objects of only nominal size, strength and durability. For most building purposes, almost

the opposite properties are needed: long life, high strength in large sections and dimensional stability under temperature changes and under load. If chemical history shows anything, however, it is that the plastics of today are not those of yesterday and that those of tomorrow are certain to be even more varied and different.

Many of today's plastics are already greatly changed in physical properties over their earlier forms, and some of the newer ones come well within building specifications. These advances have been achieved in three ways. By modifying molecular structures such variations in type have been produced as high heat-resistant phenolics and polyethylenes and high-impact polystyrenes. By linking inorganic atoms into organic structures, as in the new silicones and fluorocarbons, hybrid molecules have been achieved which possess some of the toughness, imperviousness and extreme heat-resistance of inorganic matter. And, finally, by mechanically combining plastics with such materials as glass fiber, aluminum, wood, paper and other fibers and metals, ever larger industrial laminates have been created of great structural strength, lightness and rigidity. In this wonderfully pliant range of materials there are plastics with some of the hardness of porcelain or stoneware (melamines), some of the lightness and structure of balsa wood (styrenes, urethanes), some of the breathing yet moisture-excluding properties of skin (vinyls, silicones), and, in the laminates, plastics that rival steel in tensile strength and impact resistance (polyesters, epoxies). Many have begun to move, almost of their own volition, into building.

The chemical industry is occupied on a wide front in filling in the gaps of basic knowledge in these materials, through large-scale testing and research, to define more sharply their limitations, properties and potentials for construction. It also is busy examining dozens of undeveloped plastics on its laboratory shelves, rejected because they did not meet previous requirements for transparency or decorativeness, but which show greatly superior strength and other qualities for building. The structural plastics of the future lie in this direction, held back only by a lack of fabricating equipment. Two major problems remain to be solved in structural plastics. They are fire-resistance, in which nearly all present plastics are deficient, and cost, in which, at an average of about 50¢ a pound, plastics are still to be classed as high-priced materials, though on a strength-to-weight basis this price is deceptive.

The chemical industry is moving on these problems in its usual way, from the molecular ground up, creating the structure of its materials to a defined purpose. Traditionally, it develops not only its own materials but its own markets. It is already launched on experiments to discover how plastics as new structural materials can be put together in new ways—some results of which will be seen in the next article beginning on page 108—for, to the industry's mind, there is no point or profit in merely substituting plastics for conventional materials in the conventional way and thereby failing to take advantage of plastics' unique properties. Out of this will come new prefabrication techniques, new building methods, new enclosures which by their efficiency or attractiveness will get around plastics' initial high cost and may eventually hold one of the brightest promises for the industrial or mass-produced house of the future. Assurance of this is to be found in the fact that the chemical industry annually spends more on research than any other, about 3% of sales or currently about $500 million a year. And chemical research does not take "No" for an answer.

All is chemistry

But research in materials is not confined to the chemical industry proper. All materials are in their ultimate analysis chemical products. Indeed, all building materials might be defined as plastics, a rather loose word upon which the chemical industry has no patent, for even brick and stone are in their origins plastic materials. Since the war, manufacturers of traditional building materials, once laggard in research, have been stepping up their laboratory programs on a large scale. This will accelerate as the chemical industry enters the field, for the effect of this industry's entry into one industry after another in this century has been to increase research all down the line and to exhibit the essential chemical base of all industry. In fact, practically the only large-scale research going on in the building industry is in the materials sector, threatened by new suppliers. And while this research is not yet so broad or basic as chemical industry research, it is aimed in the same exciting direction: the molecular modification and improvement of materials.

For instance, cement and concrete have been used for over a century, but only recently have we begun to study the complex chemical structure of these amalgams. Now companies like Johns-Manville, with special interests in cement compositions, are undertaking and sponsoring basic research in these materials with the hope amounting to certainty that as their structures are better understood and controlled they will give stronger, lighter, less brittle and more elastic compositions of a new order. Even clay product manufacturers are now banded into

continued on p. 194

A new approach to FABRICATION

The integration of materials into thin wall panels, combining everything from structure to lighting to heating-cooling, opens the way to new continuous manufacturing processes

The most immediate impact of the immense proliferation and specialization of modern building materials—examined in the preceding article—is upon wall structures. Within the next decades, the evolution of the wall or concept of the wall—as sheath or skin or continuously articulated membrane—is likely to constitute one of the key advances in modern building technology. It is already leading to a new organization of materials. It is drawing in its wake new manufacturing and construction techniques. It must eventually lead, by the very nature of the materials and structures into which they are growing, to the coordinated manufacture of building components on a flexible plan made possible by the new instruments of automation.

The direction in which these developments are moving has become increasingly clear for a decade. It is toward a conception of the wall as a series of self-contained panels or a continuous sheath, prefabricated at a distance or upon the site, and rapidly assembled into the structure in the manner of industrial subassembly components. In its widest implications, this concept of the wall is moving toward the prefabrication of integral, multipurpose wall structures or enclosures in which exterior and interior surface, air-space, fenestration, insulation, wiring, lighting, heating and air conditioning form a complex yet homogeneous tissue as organic as the human skin or the carapace of a firefly. In many instances, these wall components will integrally contain their own structural ribs or other supporting members to form complete enclosures. This is already foreshadowed by such advanced designs as the geodesic dome (see p. 141) in which the wall *is* structure, roof and edifice.

Thus the mechanized building up of wall components from small units to large may join with larger architectural conceptions in an industrial marriage that holds great promise for the future—not only in large buildings or the light enclosure of large space but also, by a transfer of skills, in small buildings or the mass-production house, that longtime challenge to the industrial revolution.

Curtain-wall panel symbolizes an architectural and industrial reaching for mechanized building techniques. It is but the beginning of complex integral wall structures.

The rising curtain

The beginnings are to be found, of course, in the development of the so-called curtain wall, the lightweight sheathing of large structures in aluminum, glass, porcelain, stainless steel, bronze and other materials that has become a flashing symbol of the postwar era. Technically, such a wall became possible, if not functionally imperative, with the development of the strong skeletal steel-frame structure about 1880. A few daring, individualistic prototypes appeared. But building inertia, plus the opposition of labor unions and building codes closely wedded to masonry construction, delayed the development of the curtain wall for over half a century. A few forerunners of the modern curtain-walled building appeared in the freer field of industrial plants in the Thirties and rose mightily in numbers under the forced construction of war. It was 1948, however, before the first large urban building went up (Pietro Belluschi's Equitable Loan Building in Portland, Ore.) with non-masonry walls that showed the minimum characteristics of a true curtain wall: thin, non-loadbearing panels (glass and aluminum) attached to a skeletal structure (reinforced concrete) to form a lightweight closure or membrane between columns.

Belated as it is, the curtain wall is a major technical advance because of the large forces it has set loose in two directions. It is beginning to thrust part of construction back upon the factory, where mass-production skills can begin to play upon the problems; it is pushing forward fast assembly-line techniques on the building proper, replacing laborious bit-by-bit manufacture of walls on the site.

The vitality of these forces is displayed by the ever-rising variety of panels, core materials and techniques. Panels now run the gamut of sheet metals from aluminum to copper, and include porcelain-on-steel, vinyl-plastic-on-steel, asbestos-cement composi-

tions and glass, both transparent and opaque. Even marble (in wafer-thin slices), clay products (in thin preformed panels) and concrete (in relatively light precast slabs) are getting into the act. Problems of jointure, attachment, weather-sealing, condensation, insulation and rigidizing behind metal skins are drawing in a stream of materials new to building, including neoprene gasketing, rubber-base adhesives, polyethylene tubing, glass-fiber mats and plastic foams and films of enormous variety. The putting together of these materials is spawning a new industry. Altogether there are no less than 100 manufacturers of curtain walls in one form or another.

But the curtain wall is still only at an intermediate stage of development. Few wall units yet meet the maximum requirements of an integral curtain: a "sandwich-wall" unit complete with exterior and interior finish, insulation and structural core, delivered to the site for simple attachment. Most curtain walls are simply thin exterior paneling backed up at the site by insulating core material, 2" to 4" of cinder-block or other fire-resistant material—still required by building codes for opaque but not for transparent wall areas—and interior finishing. While dramatic savings in time have been made in finishing the exterior of curtain-wall buildings—sheathing a building between dawn and dusk—most of the potential economies of curtain-wall construction have not yet been realized due to the partial state of the development. Most of the factory procedures are still in the mechanized stages of early automobile production, with short runs, single-piece jigs and many hand operations. But industrial-plant curtain walls, lacking the esthetics and code restrictions of urban building, are again leading the way to production-line sandwich constructions. And a number of well-engineered wall systems point the way to the standardization that must take place before flexibility in production can flower.

The expanding sandwich

Meanwhile, flowing mainly out of the aircraft, light train and home-trailer industries, a host of sandwich panels, largely for specialized or interior uses, is crowding in on the building market. These, along with the sandwich constructions beginning to appear in curtain walls, constitute the fastest-growing area in building manufacture. New sandwich constructions are appearing so fast, in fact, that it is hard to keep up with them. Monsanto Chemical is this year sponsoring a study project at MIT's School of Architecture and Planning to survey structural sandwich panels of all types from all sources, collate data on them, develop some coordinated ideas for architectural application and otherwise try to bring some order out of chaos. Its initial survey request for information went out early last fall to some 300 manufacturers, and it is looking for more.

Industrial curtain wall of ribbed aluminum skins and glass-foam insulating core shows the essential simplicity and speed of assembly that such sandwich-wall panels bring to building.

In elementary form, the sandwich panel or wall is simply two thin skins of surfacing material bonded or laminated to a structural core. Simplicity departs the moment one tries to encompass the riot of materials and forms these sandwiches are taking. Skin elements may be any of a wide variety of sheet metals, plastics, plywoods, glass or other vitreous materials. Cores may range through corrugated or expanded metals, wood particle or fiber boards, gypsum and asbestos-cement compositions, lightweight concrete aggregates, plastic-impregnated paper, and a multitude of glass and plastic foams in rigid form.

Two families of sandwich construction probably hold the most interest for the future. One of these is the metal or plastic sheet stretched upon a honeycomb core of phenolic-impregnated kraft paper or upon a large cellular core extruded along with the plastic facing itself. The other is the all-plastic sandwich composed of polyester-glassfiber skins upon a rigid core of styrene or phenolic foamed plastics, which, as still more improved materials come along, is capable of vast development. Both form structures of great lightness, strength and rigidity, containing their own airspaces and some measure of heat insulation and acoustical control (in the honeycomb type by filling interstices with fine silica or other light aggregate). Both are capable of forming very large self-supporting or structural panels.

Only a few of such advanced sandwiches have been used experimentally in buildings as yet. The polyester-styrene-foam sandwich is used in an experimental

building at the University of Michigan and, in the first large curtain-wall panel of this material so far developed, on a new Monsanto laboratory building in St. Louis. The largest problems still facing such panels are jointure (due to the large coefficient of expansion for most plastic materials) and cost. But the industry's Plastics Study Group, with no building trade inhibitions, is movng in radical ways to circumvent them. The jointure problem may be solved by moving away from modular design in planes to modular design in cubic volume, by allowing sandwich constructions to form their own joints, mullions or other joining members, and by designing structures without expansion joints in compound curvatures as unbroken as the hull of a ship. Cost may be outwitted by using high-cost materials in new and more efficient ways, such as making windows or transparencies integral with the sandwich panel itself, banishing window frames, or designing a sandwich floor that sustains itself without I-beams. In one form or another, most of these ideas are now being tested.

Parallel with all this, and little noted in a comprehensive way, is an integration of lighting, heating and cooling apparatus in wall or panel structures that compliments in the integration of materials in sandwich walls themselves. This is to be noted in the number of ceiling lighting systems, roof-and-ceiling systems, floor utility systems and, more slowly, panel-heating-and-cooling systems arising on all sides. Many of these are still in an early stage of mechanical complexity, but they point the way. Experimental curtain-wall designs show architects and engineers beginning to grapple with the problem of getting the now bulging utilities apparatus of modern buildings into more compact, efficient and functional wall structures for the control of interior environment (p. 116).

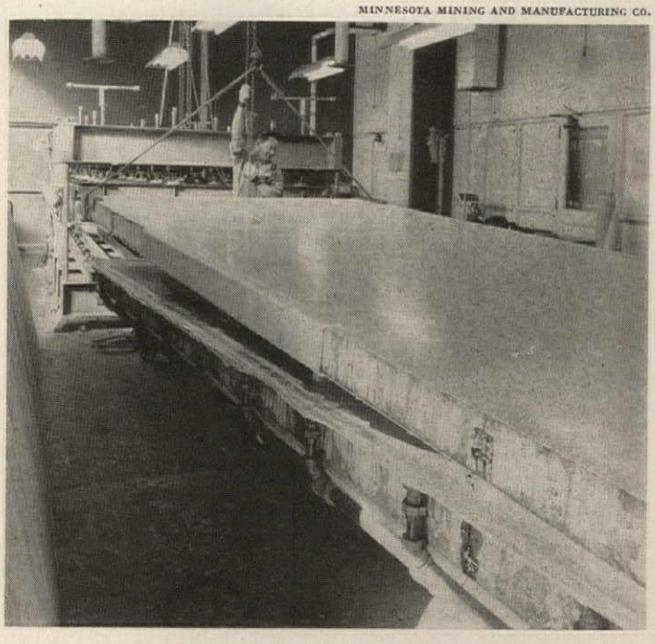
Many new and as yet unintegrated developments are lying about. These include printed circuits on plastics that may provide sandwich panels with their own integral "wiring," and new expanded sheet metals with integral tubing, used mainly thus far in refrigerator compartments, that could lend themselves to panel heating and cooling. Two of the most radical developments are thermo-electronic heating and cooling (p. 112) and electroluminescent lighting (p. 115).

Perhaps the key development in the movement of utilities into the wall is the electrical heating and cooling system in its many varieties, small in volume but steadily growing, based on the heat-pump and on electrical resistance heating (and cooling, if thermo-electronic methods work out). This development offers a large range of means—small-duct high-velocity air systems, tubular circulation of hot or cold water, panel heating in glass, rubber, metal or simple resistance wiring—for making heating and cooling an unobtrusive part of wall structure. It is steadily improving in efficiency. With any cutting of costs through atomic or other new power sources, such as solar energy, it will grow even faster than projected. Some 18,000 commercial buildings and 250,000 homes are now heated entirely by electricity, and heat-pump installations are expected to double to 24,000 this year. Major power companies and electrical manufacturers are ready to go aggressively after this market, for electrical heating of all types consumed over 4 billion kwh last year and is projected to take over 77 billion kwh by 1970.

The integrated skin

Ideally, the structure toward which building enclosures are moving has often been likened to the human skin, that remarkable multilayered organ, the largest of the human body, which entirely encases, protects, adjusts and sets forth the organism in its environment. In the skin's homogeneous yet differentiated structure are the nerve endings that keep the body in touch with the outer world, the vascular network that controls peripheral body heat, the sweat glands that perform the function of evaporative cooling, the insulating tissue that protects inner organs, all contained in a thin, continuous, translucent envelope that runs to horn at the fingertips, hair on the head and transparency over the window of the eye. To approach this structure even clumsily in his building, man must make at once a great simplification and complex integration of his materials. Since no one

MINNESOTA MINING AND MANUFACTURING CO.



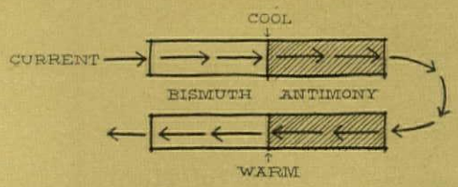
Big sandwich-wall panel of epoxy-plastic-and-glassfiber skins laminated to a balsa wood core—for a refrigerator car unit—shows plastics on the move toward huge wall structures.

material can have the range of properties required to perform the variable functions of building enclosure, the trend is to multilayered structures, complex internally but simple and homogenous as a whole.

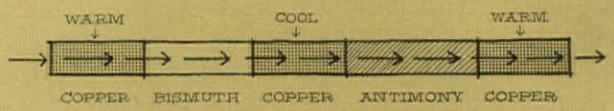
Such an integration of materials as is implied in this growing sandwich-wall structure requires an organization and concentration of industrial mechanisms on a scale of automation that is just beginning to appear. It is foreshadowed in the chemical industry, where the highly controlled continuous-flow production line has been embodied for over a decade in plants that take in basic liquids and gases at one end and roll out finished or semifinished products at the other. Even now, if sufficiently large markets developed, the chemical process industries could roll out the simpler type of sandwich panels in compact plants which would take in raw materials at one end and continuously extrude finished panels at the other.

To attempt to roll out more complex sandwiches, with lighting, heating, cooling and other elements included, would require much more complex and controlled production lines. The apparatus and controls are here in various types of "electronic brains," servomechanisms, beta gauges for closely regulating the thickness and dimensions of materials, and numerous electronic sensory organs for guiding and inspecting all stages of operations. They are beginning to be integrated into the chemical, electronic and automobile industries. It is easy to imagine a sandwich-wall production line in which the inflow of materials, forming and laminating operations and incorporation of subassembly components would be directed from a master control into which specifications and instructions would be fed. The flexibility of such automatic control would allow a much wider flexibility of dimension, color, texture and structure in the finished product than is possible in present rigidly standardized production lines. This would free the architect from the increasingly monotonous module or grid, allowing him to specify such things as regularly variable window sizes, variable panel or skin conformations and larger, more continuous stressed-skin structures, such as are beginning to appear on light railroad cars. It would open that new era in architecture toward which the new structures and free forms displayed on later pages are visibly yearning.

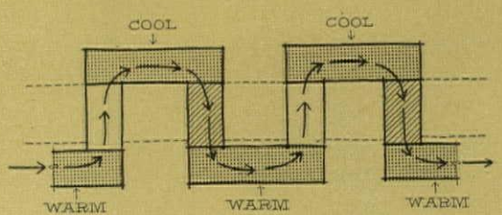
Since such automatic production systems are only beginning to appear rudimentarily in such industries as the automobile industry, it might be predicted that it will be at least another 20 years before the much more complex and dispersed building industry begins to get them. The lag of mechanization in building has been a sore problem for over half a century. But new forces and the entry of new elements in the field, such as the chemical industry, will greatly quicken things.



Thermoelectric principle: Direct current going through two dissimilar metals in one direction (top bar), cools their junction; in the opposite direction, heats it.



If copper contacts are placed between the metals in series, the current entering the first metal heats the contact, entering the second metal cools the contact, and so on.



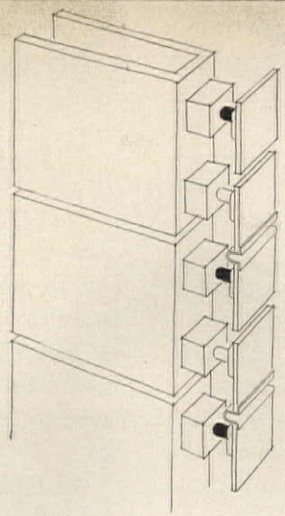
Here the thermoelectric metals and copper contacts are schematically arranged in a wall structure so that all warm contacts are on one side, all cool ones on the other.

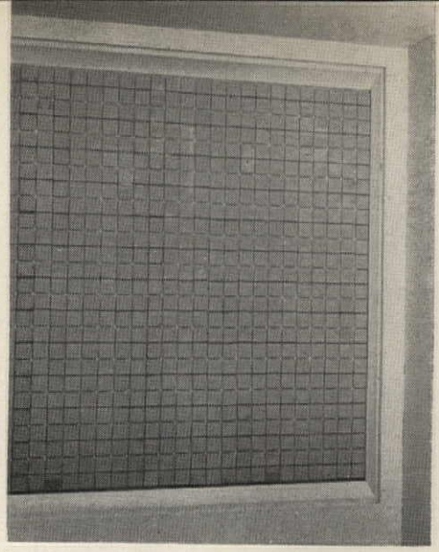
Thermoelectronic heating and cooling promises to do with wires what now is done with miles of expensive piping and ductwork

Five years ago an unusual means of heating and cooling began to be investigated in the laboratories of the Radio Corporation of America. It consisted simply of two tiny slugs of dissimilar metals, joined by an electrical contact. When a direct current is passed through the metals in one direction, it produces a cooling effect at the junction of the two metals. When the current is reversed, heat is produced at the junction. This dual action is known as thermoelectrical—or more properly thermoelectronic—heating and cooling. It is the newest, most radical, most controversial development on the horizon, combining heating and air conditioning in a single system.

Last year a large number of such thermoelectronic units were linked up in series in panels to show that, without moving parts and simply by reversing the current, they were capable of heating or cooling a small demonstration room. It must be recognized at

PHOTO-ASSOCIATES





Thermoelectric panel, whose exterior is being examined above by its chief developer, RCA Engineer Nils E. Lindenblad, is made up of the basic strip unit above, in which tiny rods of thermoelectric metals are mounted between copper fins and squares. The squares form the interior of the wall panel above. By simply reversing current, the panel heats or cools a room.

once that this system is nowhere near production as yet, that it is still in the early stages of development, which accounts for the controversy. But the development is moving fast, is already drawing in other industrial laboratories and shows promise for the future. In addition, it fits compactly into the type of panel-wall construction toward which building technology is trending.

Peltier's Effect

The principle of thermoelectrical cooling was discovered some 120 years ago by the French physicist Jean Charles Athanase Peltier. He observed that the passage of an electrical current through two closely joined metals, such as bismuth and antimony, produced not only a heating of the junction when current was moving in one direction, as might be expected from the well-known fact that conductors heat up when carrying electricity, but an absorption of heat, or cooling, when current was moving in the opposite direction. This mysterious cooling action became known as the Peltier Effect. For over a century it remained a minor laboratory curiosity.

When, in 1951, at the request of RCA's Chairman David Sarnoff for an electronic method of air conditioning, the RCA Laboratories began searching for some known phenomenon to build on, the quest soon narrowed down to the Peltier Effect. By then the inner structure of metals was quite clearly seen as a close crystal structure of atoms with their shells of electrons loosely held so that electrons might roam freely between the atoms. And the number of known metals and alloys had increased enormously. Moreover, great strides had been made recently in the understanding of a class of materials known as semiconductors, in which the movement of electrons (i.e., electricity) could be initiated and controlled to useful ends. It seemed probable that the Peltier Effect might now be fruitfully studied.

A small group under Nils E. Lindenblad, RCA research engineer, began to hunt for more efficient metals which in combination would improve the Peltier Effect. The goal is to achieve the widest temperature difference between the cold junction and the hot, thereby getting a maximum of heating and cooling for power expended. In five years of searching Lindenblad has come up with materials that increase the efficiency of the unit about eight to ten times over the original starting materials. For obvious competitive reasons RCA is in no hurry to reveal their composition, but they are not simple semiconductor metals. A typical combination, though not one of the best, is zinc antimonide and lead telluride.

How it works

The first result of this improvement in materials was a small experimental refrigerator unit demonstrated two years ago, followed last year by an improved refrigerator and the room air-conditioning panel previously noted. These presented essentially new problems in engineering and design, particularly in constructing the air-conditioning unit.

The ingenious solution arrived at is shown in the diagrams above. The basic unit consists of two tiny rods of thermoelectrical metals mounted on a 4″-long copper-coated aluminum fin and capped by thin 2″ squares of conductive metal. Connecting a great number of such units in series forms a wall panel 6″ thick, in which the squares of conductive metal present a flat surface to the interior of the room while the fins extend out in back to the exterior air or an air passage. Sandwiched between them, in the interstices between thermoelectrical rods, is a layer of styrene foam plastic or similar material to insulate the warm surface from the cold one, as the case may be. In the cooling cycle, current passing through the units in one direction cools the squares, which thereupon absorb heat from the room and pass it back through the rods to the fins, which by self-convection dissipate the heat to the air. In reverse cycle, the

squares are heated while the fins are cooled to a point below the outdoor temperature, thereby drawing heat from the air which, added to the resistance heating of the panel's thermoelectric units, heats the room. In effect, the unit is a reversible heat-pump in which the pumping action is performed by the movement of the electrons between thermoelectrical materials, alternatively heating or cooling an enclosure.

This is by no means the final structure of the system, which may take other and different forms. Further improvements in thermoelectronic materials will allow a reduction in fin size and a consequent reduction in panel thickness and weight. Or the fin surface may be reduced simply by using a fan to aid in heat dissipation or by circulating a coolant. But the present experimental panel was designed to realize the ultimate advantages of the system: no moving parts, no noise, no drafts. Two panels, about 5′x5′ in dimensions, were installed in an experimental room, 6′x7′ in floor area. Estimations are that the same panels would be adequate for a room about four or five times that area. On 600 watts input to the panels, about 3,600 B.t.u. per hour for heating or cooling are produced to achieve a 25° F. differential in room temperature. This is about 6 B.t.u. per watt hour against 25 B.t.u. produced by a conventional quarter-ton air conditioner.

The electronic future

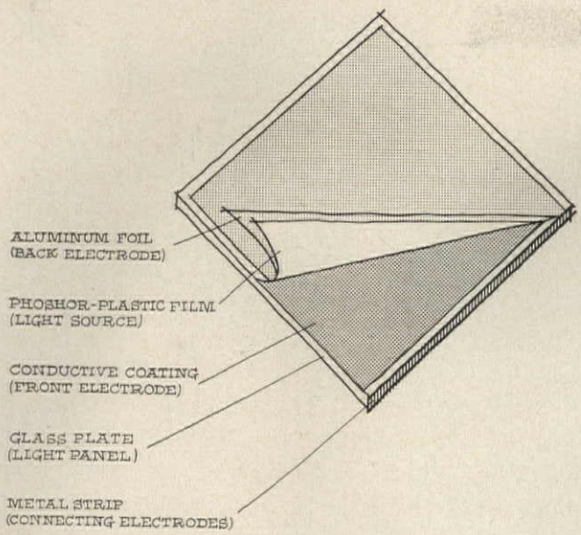
Obviously, all this is still far from the efficiency of conventional air-conditioning equipment as well as the mechanical heat-pump. Lindenblad estimates that the present thermoelectronic system is overall about one-fourth as efficient as conventional systems, though some competitive critics would place it even lower. Thermodynamically, this system, like the heat-pump, operates most efficiently on a 10 to 15° differential in temperature or less. To get more cooling or heating—and experimentally RCA has pushed this up to an 80° differential—the system must operate with less efficiency and a consequent greater consumption of power. Hence, thermoelectronics has the inherent limitations of the heat-pump, particularly as applied to heating.

There are other and lesser problems, chief among which is the problem of condensation. As in the common refrigerator or in panel-cooling systems employing the circulation of cold water, the thermoelectronic cooling surfaces condense moisture from the air. Lindenblad's solution for this is to run one part of the panel colder than the whole to act as a dehumidifier, meanwhile providing a small trough at the bottom of the panel to run off any residual condensation. This would require humidity thermostatic controls, now readily available. In addition, of course, since the whole system runs only on direct current, a rectifying unit would be required in nearly all locations to convert a.c. to d.c., but this is readily solved by small vacuum-tube units, or by even more compact semiconductor rectifiers now coming to the fore.

RCA is confident that the problems can be solved. Actually, with one year given over to a general search of the field, Lindenblad and his group have been working intensively on the Peltier Effect for only four years. Based on the progress made thus far, RCA estimates that it may be ready for production in about five years. For very special applications, where high operating costs might be justified, it is ready now. The major task ahead is to find still more efficient thermoelectronic metals. "We haven't by any means come to the end of the road with respect to achieving greater and greater temperature differences," says Dr. E. W. Engstrom, RCA executive vice president. All electronics grew out of a tiny phenomenon noted in one of the earliest incandescent lamps and called the Edison Effect after its discoverer. Other electrical and electronics companies are not so sanguine about the Peltier Effect, but all the major ones are investigating it and a group of large air-conditioning firms, including such giants as Carrier Corp., have a cooperative research project going on it. Oddly, the largest number of published papers on the subject is now coming out of Russia.

The ultimate target is to bring thermoelectronic heating and cooling up to the efficiency of the heat-pump. Actually, something less than this might be settled for, since economy of operation is not the sole criterion, otherwise much of present-day air conditioning would never be installed. There also is an economy of means which must weigh to the advantage of a system requiring no ducting, no fans, no central plant, no compressors—the whole weight of apparatus yearly growing more complex and consuming a greater and greater part of building costs. This system requires only wire lead-ins to small built-in units or room panels. In the kitchen it may lead to the disappearance of the refrigerator in favor of freeze-drawers and cabinets built into the work area at points of convenience. In buildings it would lead to the incorporation of heating and cooling as an integral part of wall structure or in ceilings (in which case an exhaust stack would be required). Architecturally, the possibilities are varied and the technicians expect that architectural design will do much to shape the system to final use.

Thermoelectronics is representative of many other developments which seek new, more subtle and freer means to handle such problems as light and energy. It is research that opens up the future.



WESTINGHOUSE

"Sandwich of light": Composition of new electroluminescent panel is shown in diagram above. Various phosphors and different frequencies produce a subtle spectrum of soft light.

Electroluminescent lighting may some day convert the wall or the ceiling itself into a paper-thin light fixture

In 1936 the French physicist Professor Georges Destriau and a small band of co-workers discovered an entirely new method for obtaining light. It consisted simply of a thin layer of phosphors, such as the coating on a television tube, between two thin conductive plates. When an alternating current of high enough voltage was applied between the plates, the excited phosphors emitted a faint light. This differed from the fluorescent lamp, then in development, which employed invisible ultraviolet light from a mercury-glow discharge to excite phosphors into emitting visible light. And it differed from all other means of phosphorescent emission, which included X-rays, as in fluoroscope tubes, and cathode rays, as in television. The new method, in which the two thin plates acted as condensers to create an electromagnetic field, became known as electroluminescence.

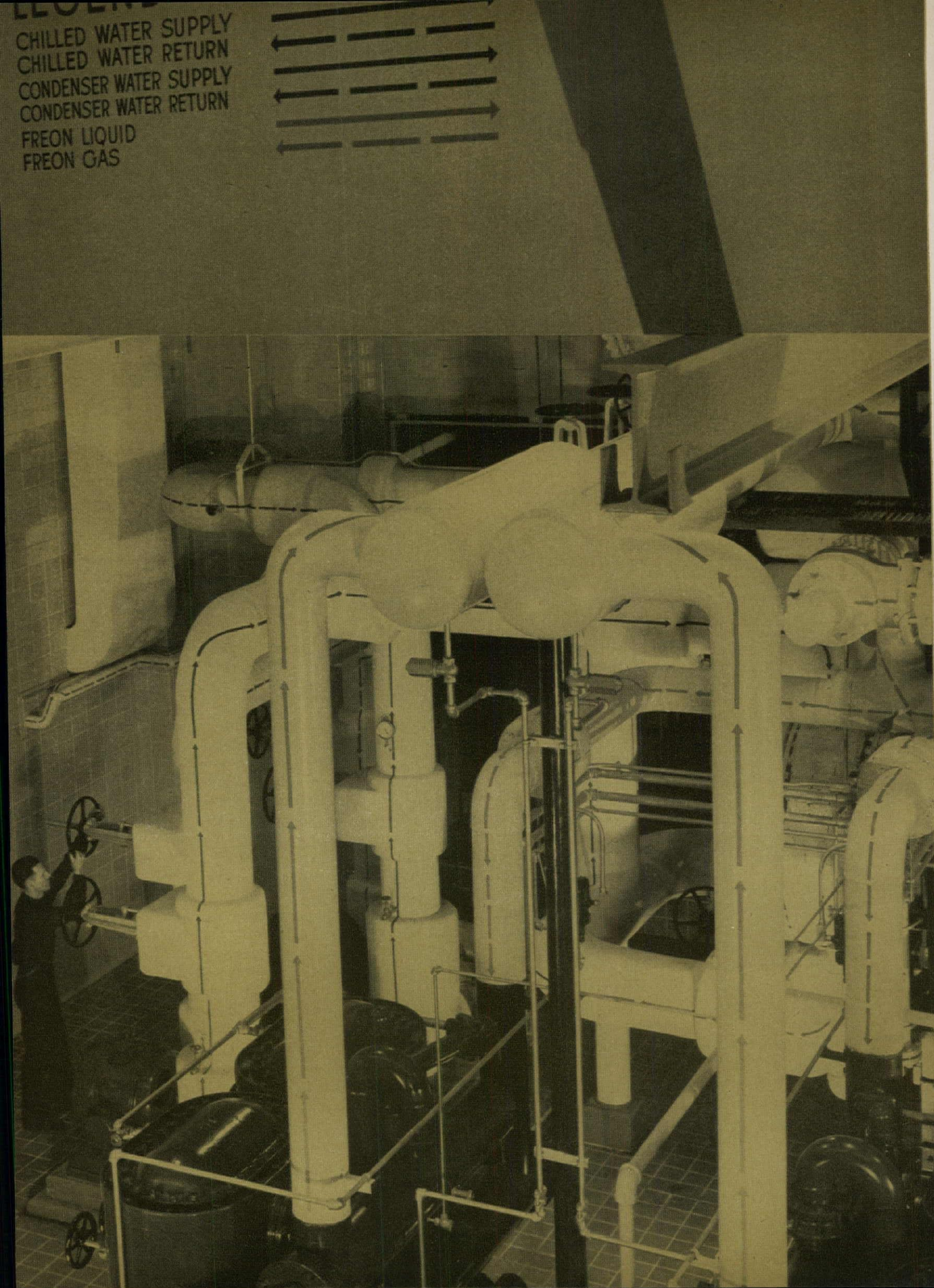
Today electroluminescence is in exciting development by nearly all the larger electric and electronic industrial laboratories, headed by Westinghouse, which was quick to take on Destriau as consultant, and by Sylvania Electric. As a practical light source, electroluminescence is not yet efficient enough for wide use, but it is moving up with great speed. And it holds not only the physical potential of outdistancing all other light sources in efficiency but also the potential of providing the first truly architectural use of light. For, like so many developments crowding in, electroluminescence lends itself, with great economy of means and elimination of clumsy apparatus, to panel fabrication. It is, in fact, a sandwich panel of light.

Up phosphors

As with all such advancements in the apparatus of man's living, beginning with rush lights in the caves, the development starts off with great inefficiency and high cost, in one way or another. When Destriau made his first observation of the new light source, it was necessary to allow the eye to adjust for several minutes in the dark in order to see the faint spectral glow produced. Nearly all the great discoveries of our time are based on the observation of just such tiny, imperceptible effects or phenomena. It was 1947, with war intervening, before Destriau raised the glow sufficiently to publish the first comprehensive paper on electroluminescence. Following this, industrial laboratories, led in this country by Westinghouse, launched a basic investigation into the production of light in solids, which began to get off the ground only in 1954.

The reason that the development has moved so fast since 1954 is that converging streams of knowledge have come together to give it a great push. The rise of solid-state physics, producing many exciting new developments in electronics, is widening the understanding of energy states in solids. The development of television is bringing forth many new phosphors. And the ability of chemistry to go beyond natural

continued on p. 198


LEGEND
CHILLED WATER SUPPLY
CHILLED WATER RETURN
CONDENSER WATER SUPPLY
CONDENSER WATER RETURN
FREON LIQUID
FREON GAS

A new approach to ENVIRONMENT

The consideration of controlled environment as an integral part of structure offers new vistas in the architecture of human comfort

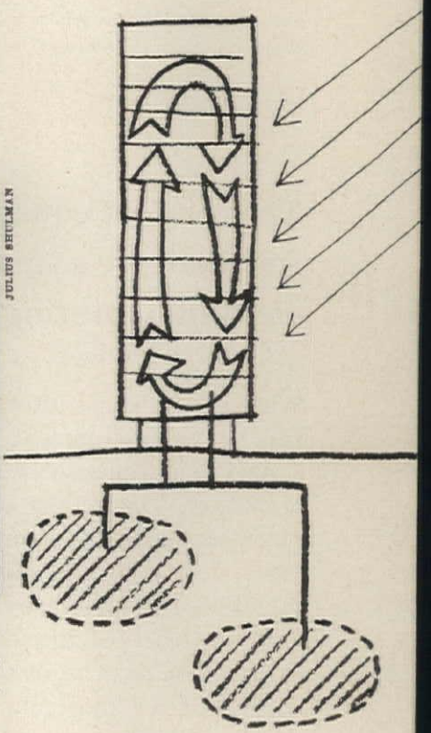
Of all the technological force massing for a sweep through the building industry, probably none will have a more far-reaching effect on the shape of tomorrow's architecture than the drive for a more precisely balanced control of environment. New materials, new components, new structural techniques will play their role. But in our growing ability to control indoor environment to specific forms of human activity there lies an integrating force which, involving the building as a whole, must soon draw these technological elements into a new synthesis of structure.

Here as elsewhere there is no lack of technical means. Indeed, there is a plethora of control instruments and control systems, daily growing more complex, wonderful and precise. Given the environmental factor to be controlled—whether it be air temperature, humidity, noise-level, light volume, brightness-contrast or whatever—there exists a device to measure it and a second to set in action a third to control it. In fact, hardly any set of environmental conditions can now be imagined which could not be created and controlled in any given situation.

But the question behind the controlled environment now is: controlled to what ends and at what cost? For this new comfort carries a price tag which can be high or low, depending on the approach made to the problem. And, ironically, the cost of comfort is not necessarily indicative of the degree of comfort secured.

We are just beginning to emerge from a period when the architect, with little thought to integration, has led the practitioner of environment control over a dizzying series of jumps—of which the broadest is the ever-growing expanse of heat-entrapping window walls. This has led to the highest costs for comfort in history. The next era must look to an integration of architecture and environmental control, if costs are not to go out of sight. In scattered instances this integration has already begun. The building shown on this page is one such beginning: The Simms Building in Albuquerque, N. M., is one of the first—if not the first—large structures in which the heating-cooling problem has been tackled in terms of the architecture, rather than in spite of it.

JULIUS SHULMAN



Integration of solar energy and heat pump principle give Simms Building low-cost heating-cooling.

At first glance the Simms Building is just another "slab" office building, one of many such designs to follow the path blazed by the UN Secretariat. But, unlike the Secretariat, the Simms Building faces north and south, and employs a heat pump to salvage the enormous amount of solar heat entering its south wall (thus comfortably cooling this side of the building) and redistribute it to the north side of the building to heat that space as needed. The result is a year-around conditioning system which costs only $3 per sq. ft. of gross floor area, and which supplies simultaneous heating and cooling at the cost of only one service. Perhaps Architects Flatow & Moore saw the potentialities of the "slab formula" in sunny New Mexico, but the integration of building design and environmental control was a joint venture between the architects on one hand and, on the other, a firm of young consulting engineers, Bridgers & Paxton, also of Albuquerque. The Simms Building is indicative of the synthesis that can take place in meeting the needs of human comfort.

With today's equipment, virtually any environment can be controlled with precision. The next step for architecture will be into an era of integration of building design and environmental control.

HEDRICH-BLESSING

effective heat production — *evaporation* = ± *radiation*

$$M \pm \Delta S - \times Aw\,(P_s - P_a) = \pm eAr\,(R_s \pm R_w)$$

Metabolism (varies with activity and emotional state)

Withdrawals from, and additions to body-heat "storage"

"Wetted area" (increases and decreases with rate of perspiration)

Difference between vapor pressure at skin surface and of surrounding atmosphere (influence of humidity)

Body "radiation area" (less than convective area due to legs facing legs, etc.)

Difference in absolute radiation between body and surroundings (varies with radiant temperature)

The comfort equation is complex, for there are so many complex elements entering into it

What exactly constitutes the elements of human comfort in an environment is a question that has had a good deal of puzzled scientific investigation for over a century. One of the early theorists was a British physician named William Heberden, who proposed 130 years ago that humidity, as well as temperature, might have an effect upon human reactions.

Since Heberden, the science has become so rich with information as to be, at times, almost overwhelmed by it. Indeed, we know now that there are so many factors which affect the way we feel that one leading scientific organization, the American Society of Heating and Air Conditioning Engineers, concludes, "There is no precise observation by which comfort can be evaluated." In its research studies, the Society has found that human comfort is related to a number of inter-related factors. One, of course, is air temperature; another, just as Heberden proposed, is its moisture content.

If these, alone, could be considered in an evaluation of human comfort, then a satisfactory method of comfort control would be easy to attain. But as the science matures, we find that there are at least a dozen such factors, some related to others, some completely unrelated, which make up the comfort equation. Most, in one way or another, relate to the temperature of the air, and it is these with which the heating and air conditioning industries are directly concerned. But others, such as the ionic character of the air, which have no relationship to air temperature or moisture content, are known to fit into the equation. It is known, for example, that the presence of negative ions of such gases as oxygen, nitrogen and carbon dioxide do make us feel better, though unaccountably so. A negative ion is a molecule of gas which has picked up extra electrons. These electrons are linked to the gas molecules by an ionizing device which puts an electrostatic charge on the molecules, attracting electrons. Scientists at the University of Pennsylvania Graduate School of Medicine have been studying the effects of ionization for several years. On the basis of present knowledge, it is quite possible that ionization, rather than air filtration, may be the way to make hay fever victims more comfortable during the pollen season.

Another point at which knowledge is breaking new ground is in the matter of odor control. Carbon filters have been used for some years with considerable success to control odors in large air conditioning systems. They are now beginning to be applied to smaller systems and even to window air conditioners. Meanwhile, research by two large air conditioning firms—Carrier and York—promises even greater improvement. A few years ago, Carrier researchers moved a long way toward solving the problem of measuring odor. More recently, York, building upon this measurement technique, discovered what appears to be an intimate relationship between odor and humidity. Apparently, odor particles normally ride "piggyback" on water-vapor molecules, and are diffused throughout the atmosphere by this mechanism. This seems to suggest that the air conditioning coil itself is a potent deodorizer. What is needed to take advantage of this property is only a method of operating the coil to make the most of its ability to condense moisture—and therefore odor particles—out of the air.

The thermal elements

In the area of strictly thermal comfort, scientific knowledge has advanced tremendously in the past 25 years, with at least some effect on the control of comfort conditions. From research at the John B. Pierce Laboratory of Hygiene in New Haven, we have learned a great deal more about the mechanisms of bodily heat loss, and particularly of heat loss—and heat gain—by radiation. With this missing piece fitted into the puzzle, we understand better the complex process whereby the body loses or gains heat by convection to the air, radiation to surrounding objects and evaporation of moisture. Thus, we are in a bet-

$$\pm \text{convection} = \pm c A_c \sqrt{V} \left(T_s \pm T_a\right)$$

Body "convection area" (actual area, or equivalent area exposed to rapidly moving air)

Velocity of surrounding air

Difference between temperature of skin and clothing and temperature of surrounding air

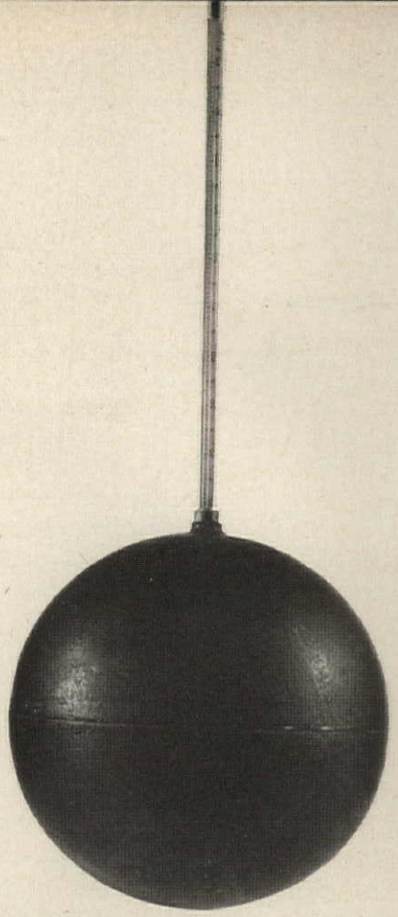
ter position to assess the inter-action of air temperature, radiant temperature, relative humidity and air movement in creating a comfortable environment. We realize, for example, that the presence of solar radiation, or radiation from a high-intensity lighting system, can make a difference of several degrees in the comfortable air temperature, or, conversely, that cold wall surfaces or large single-glazed windows, by absorbing bodily radiation, can make such a difference in the opposite direction.

Along with this increased understanding has come realization that human *activity* is always a decisive factor in the comfort equation; that there is not a single, ideal condition, but rather, that the heat must be allowed to escape from the body at the average rate that it is being generated, which varies a great deal with activity. Thus, there is a comfortable environment for, say, a basketball player on the one hand and a spectator at a basketball game on the other. We are in a position, on the basis of present knowledge, to take cognizance of this in our designs.

So long as our understanding of thermal comfort was limited to the conception that air temperature alone, along with vagrant, unplanned air movement, determined it, we lacked the capacity to *manipulate* thermal factors toward a desired end. Now, as is already being done in large factories, we are capable of producing, with controlled radiation from space heaters, little "islands" of comfort within large, partially heated enclosures, to "snap on the heat" the way we snap on the light in intermittently occupied rooms or structures, and even, where there is sufficient reason to do so, create warmth or coolness out of doors.

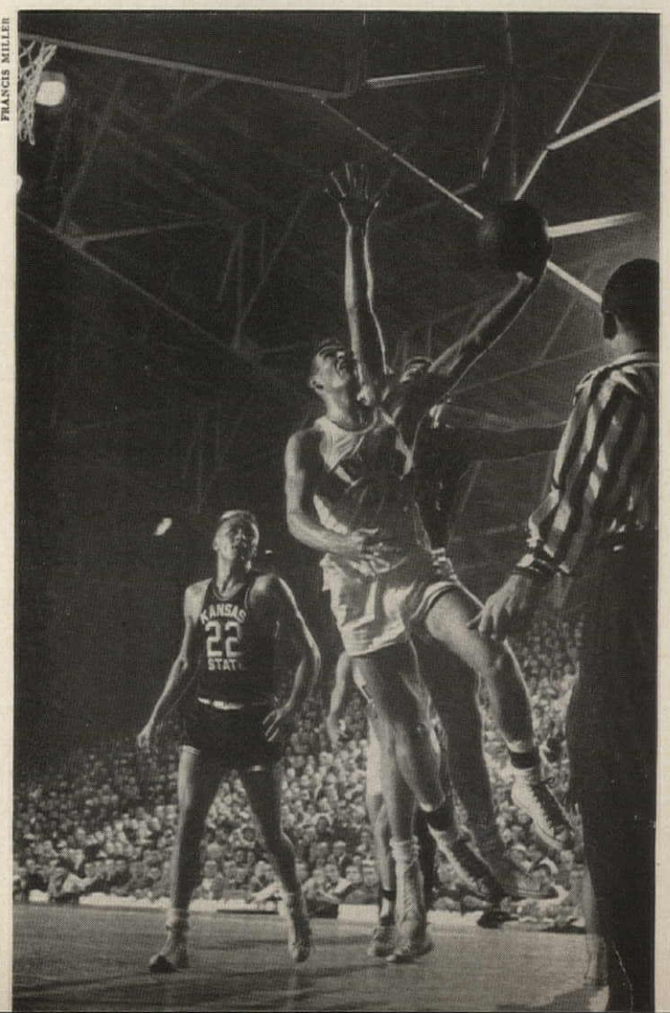
The five factors

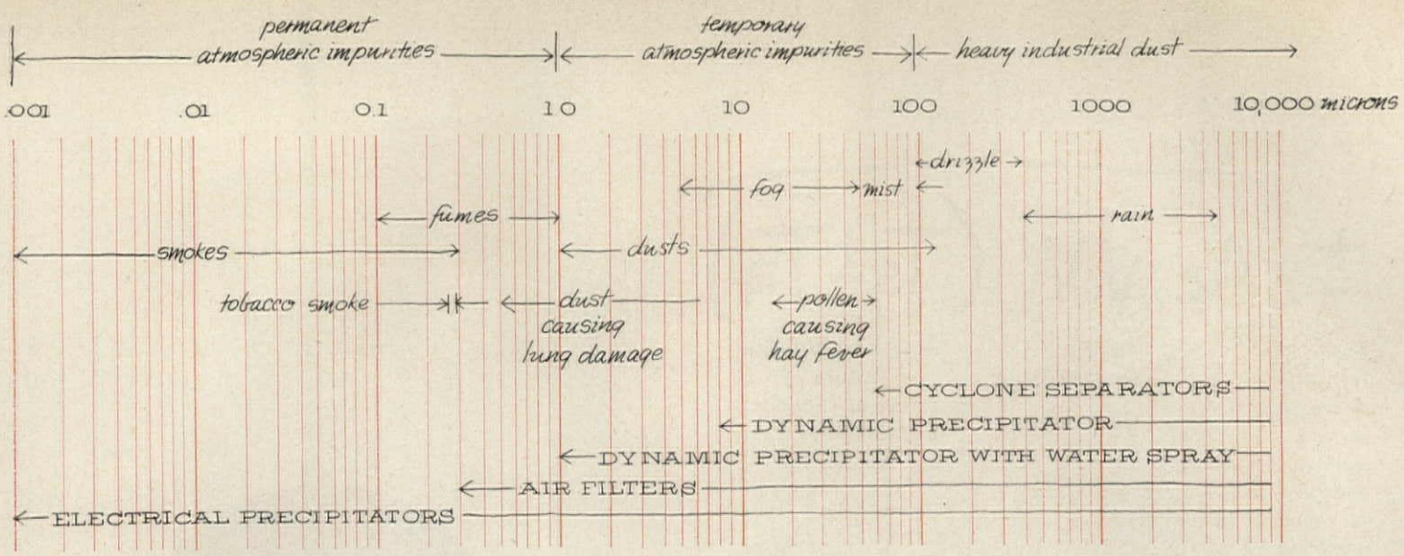
When the air conditioning engineer became an influential member of the building group—along with the architect, structural engineer and others—the sealed window became a feature of the age. This sealing of the building gave the comfort scientist his greatest challenge and greatest opportunity. At first, he concentrated on thermal effects, but within the past year the emphasis has changed, and air purity



Globe thermometer is one of best devices for measuring thermal conditions. Thermometer, which is enclosed in 6″ dia. sphere, is affected by air temperature and radiant temperature in about the same way as a person is.

Complex problem in environmental control is symbolized here. Within same enclosure, thermal conditions must be such that players and spectators both are comfortable, though activity stimulates heat production in players that is several times that of spectators.





enjoys a higher rank than ever among the factors which fit together in the "official" definition of the term air conditioning.

The old definition held that air conditioning was "the simultaneous control of all, or at least the first three of those factors affecting both the physical and chemical conditions of the atmosphere within any structure." The first three factors were: temperature, humidity, motion. The new definition states that air conditioning is the process of treating air so as to control its temperature, humidity, cleanliness and distribution. Redefinition still has a way to go. The fact is, air-conditioning engineers are no longer concerned, basically, with air alone, but with the creation of comfortable environmental conditions. Radiation, for example, cannot possibly be fitted into the above definition; yet, it has much to do with comfort, whether or not panel heating or cooling methods are used. A fifth factor has thus been added to the four already officially recognized, and a problem very much on the agenda of the "comfort" control industry is to devise means for measuring radiation effects and controlling air temperature accordingly, rather than continuing the attempt to "shield" control devices from this influence.

Radiant heating and cooling, having gained recognition as useful tools which have greatly increased the possibility of deliberate environmental control, need no longer be regarded as alternatives to air processing as such, but may be seen as simply another means for achieving a desired end. Thus, where cold walls or cold floors are the problem, this may be solved by panel heating, or, alternatively, by suitable insulation and finish materials. Similarly, while it is probably true that warmed and cooled panel surfaces offer the best means for introducing large amounts of heat to an enclosure or extracting large amounts of heat from it, it also is true that considerations of quick response, control of humidity, and control of ventilation and air purity call for continued use of air handling equipment, even where panel heating and cooling are employed.

The "other" factors

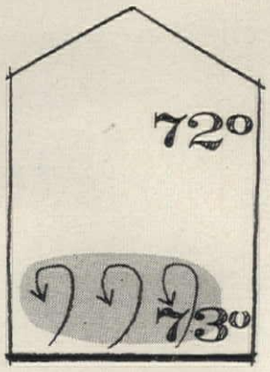
But when all five of these factors are under control, we cannot be certain even then that we will be creating a truly comfortable environment. For example, the negative ion, which is still too little understood to merit consideration in today's control system, might prove too important to be overlooked. Also, odor and smoke control have so far eluded the one-two-three process by which we handle other comfort control problems.

In a discussion of comfort which centers on thermal and atmospheric conditions, other considerations are likely to be shoved into secondary place. The reason, very likely, is that control of thermal and atmospheric environment has turned out to be such a complex problem, and such a costly one, that it dwarfs such concomitant factors as noise, lighting and color. In practice, of course, we know that any one of these, with the possible exception of color, can make a room every bit as uncomfortable as the hottest August weather. Manifestly to be successful, any building must balance all these factors.

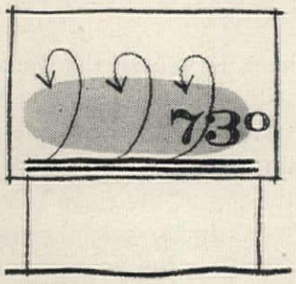
Like a rolling pebble on a mountainside, our understanding of the indoor environment has picked up speed and scope since the time of Heberden's notion about humidity. In 130 years, at least half a dozen industries have literally come out of nothing to positions of extraordinary importance, simply because the frontier of knowledge in this still-maturing science has been pushed forward. On the one hand, these new industries, with their devices and materials, offer ambrosial hopes for bright, new, indoor tomorrows. But on the other, they threaten to turn the building industry inside out, simply by proving that any structure can be made livable, provided the air conditioner is powerful enough.

In the final anlysis, despite the waste that has been so characteristic of our civilization, there is here a vast multiplying of technical means for a more orderly and economic organization of our building. And the future lies in the hands of the architect and engineer who can integrate structure with environment.

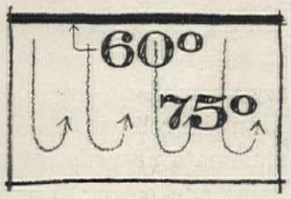
Six rules of thumb in space heating and cooling



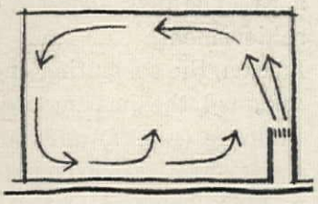
1. High spaces are best heated from floor. Warm air from floor mixes with returning cold air and stabilizes room's temperature.



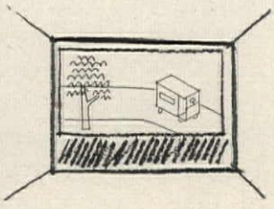
2. Heated floor is good way to avoid stratification of cold air in elevated room. Without floor system, floor tends to remain cold.



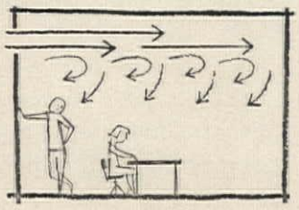
3. Ceiling is ideal location for draftless panel cooling system. Colder ceiling air mixes with warm air below, moderating the temperature.



4. Forced air circulation, as in schools, may also be used to produce comfortable floor temperatures. Insulating floors also helps.



5. Heating panel beneath large window compensates for the radiant cooling effect of the cold glass, making space near window comfortable.



6. High velocity air distribution system uses unoccupied upper part of room as mixing chamber for warm and cool air.

The need for architect-engineer collaboration is coming to a focus in panel heating sytems

Panel heating, as much as anything else, is focusing attention on the need to relate heating methods to design and construction. Because panel systems stir up very little exchange of air between one part of a building and another, and even between various parts of a room, it is essential that they supply heat precisely where it is needed and in the correct quantity. Since *where* heat is needed is dependent upon heat loss, and thus upon architectural design, good panel heating has meant heating which is carefully tailored to the peculiarities of the individual building. And this means intimate collaboration between the heating engineer and architect.

Experience with panel heating has demonstrated, among other things, that there is no single "cure all" capable of solving all comfort problems. The end results of panel heating, when good, have not been too different from the end results of good convection heating in well-insulated structures. Despite the theoretical differences between the two methods, such differences have proved of minor importance. But really well-designed panel heating systems have produced a comfort condition in which the heat source, in addition to being invisible, is barely perceptible—which is the ultimate objective toward which all quality heating systems, regardless of type, are moving.

Partly as a result of the increased integration of the heating-cooling system in the building design, some of the more advanced systems have involved combinations of panel and convective heat transfer. An example is the Alcoa Building in Pittsburgh, in which the ceilings are used as heating-cooling panels in conjunction with a system of forced-air distribution. Of course, such integration puts a new burden upon both architect and engineer, for each must now know more about the other's specialty.

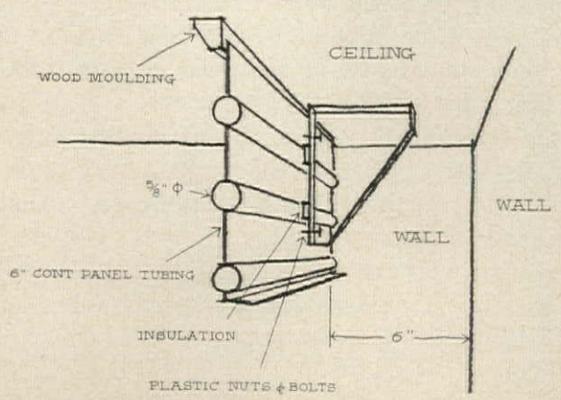
Already, some building owners are learning about the high annual cost of the glass curtain wall. Depending upon one's outlook, this cost will be traced to the exorbitant expense of air conditioning, the shortcomings of glass, or the "impractical" nature of modern architecture. The hope, however, is that increasingly intimate collaboration will yield heating-cooling systems and building designs which work so well together that costs are minimized. For a look at one such system, turn the page.

Solar Building, in Albuquerque, is first commercial structure to demonstrate great potential for solar energy.

Solar energy is closer on the horizon, along with more practical systems of heat distribution

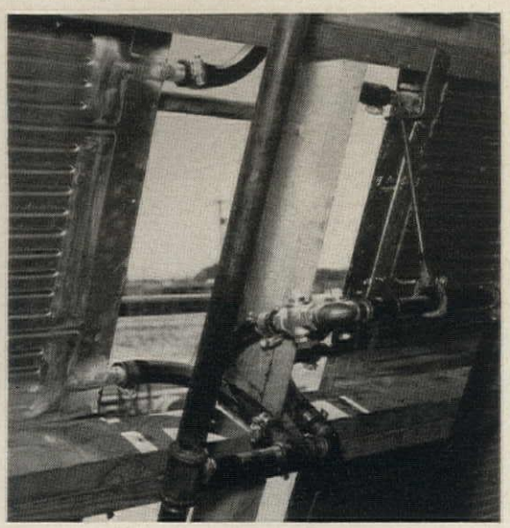
In the offing are many possible combinations and systems of heating and cooling, supplemented by solar heating, held back now only by conventional thinking. Years ago we learned to warm rooms by heating large amounts of rapidly moving air and then pushing it through space. Today we use the same technique for air conditioning, except, of course, that the air is cooled and usually filtered. The basic shortcoming of this method is that a large quantity of air is capable of carrying only a small amount of heat, and the use of air as the sole means of heat distribution and removal necessitates the movement of much more air than is otherwise desirable. This makes it difficult to do the heating or cooling job under adverse conditions without creating drafts.

The opposite of this method is a radiant system of heating and cooling. Most existing systems which are based on the principle of radiation are not truly "radiant," because the surfaces of a room which are heated or cooled have an effect upon the air of the room. Thus, the system begins to work by both radiation and convection. The system sketched below, which is a modification of a system in use in a number of buildings in Cincinnati and elsewhere, gets around this by using walls and ceilings which reflect radiant heat. In winter, the walls reflect heat to the occupants, with relatively little effect on air temperature. In summer, body heat is reflected by the walls and ceiling to cold piping which is suspended, as shown, from the top of the room. The system demands only "one-way" ducts, which keep the rooms supplied with clean, fresh air the year-around. This system is a development of Dr. C. A. Mills, of Cincinnati. In time, the building industry may adopt some such idea. But at present progress is slow. The building and air-conditioning industries are deeply committed to convection, largely because that is the system the building industry knows best how to use.



In the related area of solar energy, much the same stalemate prevails. Within the past year, the idea of using sun power to heat a building has taken on new force and glamour, though the proposition is one which has flirted on the fringe of building for decades. The new glamour has come, in part, from the achievements of Frank H. Bridgers and Donald D. Paxton, the consulting engineers of Albuquerque, who designed the heating-cooling system for the Simms Building (p. 117) and, more recently, built themselves a solar-heated office building (above, and AF, Oct '56, p. 176), believed to be the first commercial building in the world to be completely solar heated.

Because of this project, plus other substantiating experiments with solar power in less sunny climates, such as that of Colorado and Massachusetts, there is now little doubt among the solar scientists that this development has strong potentialities for building. Scientists at Massachusetts Institute of Technology, for example, where solar energy research dates back to 1938, have shown that residential buildings in New England, when equipped with solar heaters, need only 20% of the fuel they would normally consume; solar energy can supply the other 80%. Within the next few weeks, men at MIT's Godfrey L. Cabot Solar Energy Conversion Research Project will have built their fourth solar house, a two-story structure of conventional appearance, except for its second story south wall, which will be a glass-enclosed heat collector.



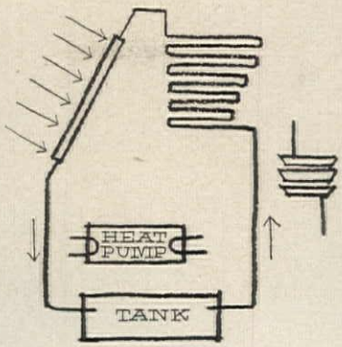
Collector panels in Solar Building cover 790 sq. ft. of south wall. Heated water from panels is distributed as shown in sketches right.

The scientists believe that the present solar heating systems are about as efficient as they can be. Between 70 and 80% of the sun's energy can now be collected; it is doubtful that further development work would yield much greater amounts. The next move, before solar heating can begin to take on commercial significance, must be made through industry rather than through further solar research.

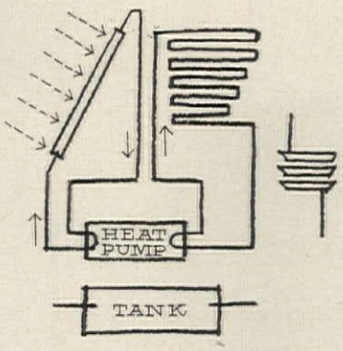
A number of important corporations, including Dow Chemical, General Motors, Libbey-Owens-Ford, Monsanto Chemical, Olin Mathieson Chemical, Pittsburgh Plate Glass and Reynolds Metals, have had a running interest in solar energy's possibilities in the building industry. But, typical of so many ideas which try to force their way into building, this one cuts across many lines, which means that it will probably require a joint effort of several outside industries to make it take hold in a big way.

Of course, more solar buildings will be built. Whether ready-made components are in production or not, there will be increasing activity over the next decade, for the pioneers have demonstrated that radiant cooling, solar energy, and the glass wall—to name three elements—belong together in architecture. The Albuquerque architects and engineers have shown this by designing the glass walls of the Simms Building so that they are integral with the heating system. They showed, too, in both their buildings, that the heat pump is a natural link in a solar heating-and-cooling system.

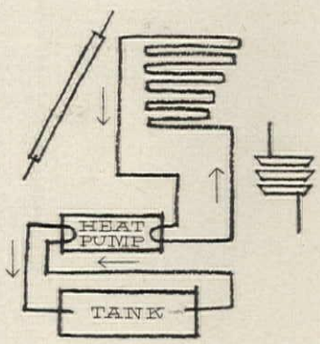
The total of this points to integration. Rather than creating buildings which become progressively more difficult to heat and cool, design will blend with the requirements of environmental control. The heating-cooling system will work only during the peak seasons; during the rest of the year design will help to create the comfortable indoor environment.



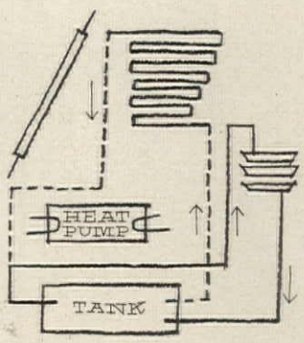
Mild weather heating:
Water is pumped from collectors to storage tank, out of tank through heating panels. Warming effect of collector is sufficient to raise water temperature for building's heating needs.



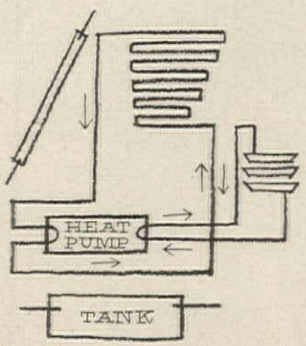
Cloudy-weather heating:
Chilled water from heat pump is warmed by solar heat collector, then sent back to heat pump for more chilling. Hot water from other side of heat pump goes through heating panels.



"No-sun" heating:
By striving to cool water in tank, heat pump produces hot water for heating. Heat-storage capacity of tank is vastly increased, since heat can be produced down to tank temperature of 35°.



Mild weather cooling:
At night, water from tank is pumped through cooling tower for evaporative cooling. In daytime, cool water accumulated in tank is used for panel cooling.



Hot weather cooling:
Heat pump supplies chilled water for panel cooling, expels heat through cooling tower. Only items added to typical chilled water cooling system for year-round heating and cooling are collector and storage tank.

A new approach to STRUCTURE

New forms as graceful as spiderweb suspensions, giant seashells, the branches of trees and soap bubbles arise out of the new technology

In the realm of structure the salient fact is that almost any building conceivable today can now be built. This has exciting, but somewhat frightening, implications for the future. "People bring me drawings of buildings and ask, 'Can this be built?' " says one noted engineer sardonically. "Unfortunately, the answer is almost always 'Yes.' "

The tremendous break-through in technical limitations, which we have seen taking place in materials, fabrication and other building areas, here rises to a strange and wonderful climax in new structures that, as displayed on the next 20 pages, seem to breathe a new air and foreshadow the very look and shape of 1977.

Nearly all these new structures make use of the technological forces so far examined—chiefly the great rise in strength-to-weight ratio in materials. But the main advance making them possible is in the realm of mathematics. Progress in structural engineering depends squarely on ability to analyze destructive forces inherent within a building, such as shear, bending moment and torque. Today the science of engineering has advanced to a point where any type of structure can be analyzed and dealt with accurately enough to build it. The major new types of buildings that are beginning to appear—suspended-roof structures, thin concrete shells, space frames, hollow cores, bubbles and domes of great variety—all depend on this new ability to analyze complex structural problems.

The new and heady freedom implicit in these new forms requires above all discipline. The only effective discipline is economy, most specifically economy of materials and means. This is the key to all the structures on the following pages.

The economy of form expressed in these structures begins to approach the intellectually and esthetically satisfying economies of structure in nature; the beautifully ribbed and membraned economy of a leaf, the thin and convoluted economy of a seashell, the deceptively fine yet durable span of a spider web, the magical tension of a bubble of foam, the sweeping cantilevered crown of a tree.

In the real world of seashell, spider web and building, everything is three dimensional. It is only on paper that two dimensions exist. But the structures we were all brought up with are an uneasy amalgam of the world of paper and that of space. One engineer, describing the common transfer of loads in the two-dimensional concept—stringers to beams to girders to columns to foundations—calls it not a division of labor among structural members, but a "duplication and triplication of labor." Another characterizes the two-dimensionally conceived skeletal frame as "burdened with vast quantities of inactive material performing the functions of space enclosure but playing the part of a passenger in the structural vehicle."

The new structures jettison a lot of inactive passengers. In the suspended roof, for instance, the space enclosure may play the active structural role of leashing the cable's flutter; in the cylindrical shell, space enclosure and beam are one and the same; in the hollow-core skyscraper, a mast against the wind and a trunk for the branching floors is simultaneously a vertical enclosure of space. Such structures as these also take advantage of the three-dimensional "democracy" of materials—a transferring back and forth of loads from one structural element to another, as the need arises, so that no part need fail until the system as a whole has approached its capacity. This property is graphically plain in the space frame but it is a quality of all structures (even conventional structure, in which it is much less exploited).

The economy of materials and methods in these new structural concepts is closely related to economy of money. This relationship is sometimes blurred by the extra investment required for something new, simply because it is new though not inherently expensive. But, irritating though it may be, dollar-and-cents economy is also one of the best disciplines for structure because it is so direct a measure of life—of the effort and time put in by men to build.

The seashell and leaf are habitations and products of life, and much as we may admire them as abstractions in structural economy, we must also take into account their purposes and means of manufacture

when we call them economical. Purpose and building technique are related parts of the structural economies devised by men. In the structures that follow, building methods are as important as the results.

With so many of the old limits off, nothing will save us from a certain number of highly spectacular freaks, fakes and grotesqueries in the next 20 years. For instance, it can be safely predicted that we will see an increasing number of perfectly valid round buildings because the circle, instead of being the fussy and expensive structure it is when warped out of materials better used as linears, is a most efficient form for many of the new building methods and the utilities they must contain—and sometimes for the activities they must house. But it can also be safely predicted that we will see a good many curvilinear buildings with no more justification than fashion or uninformed good intentions.

Architects' desire for the new structures already sometimes outruns their understanding or their particular consultant's ability at analysis. The temptation then is to imitate the form, using traditional structure analysis and methods. One of the effective counters to this is the gradual systematization and dissemination of handbook calculations for the new space structures. This process has begun. As one instance, cylindrical shells were long the monopoly of a few patent licensees, a monopoly enforced not so much by patents as by the secrecy with which tables of calculations were kept; it took six months for anybody not in on the secret to calculate a true cylindrical shell. The Thin Shell Committee of the American Society of Civil Engineers finally worked out and published a manual of cylindrical shell design. Even this did not solve the problem for the manual proved pretty complicated for general use. The Portland Cement Association took the next step of abridging the manual, and design of true cylindrical shells is now practicable for any engineer who bones up on it. A similar process will be followed fairly rapidly for other types of shells. It may also become necessary for engineers to go back to school periodically, as doctors commonly do now.

How fast the new design tools spread and how successfully they are used will depend a good deal on demand, which means on the speed with which clients and architects grasp the real sense of new structures and value the possibilities of economy and suitability in the new freedom. It takes more than a skin-deep look. Economy is required in everything but ideas, for economy has its price, too, and the price is always brainwork.

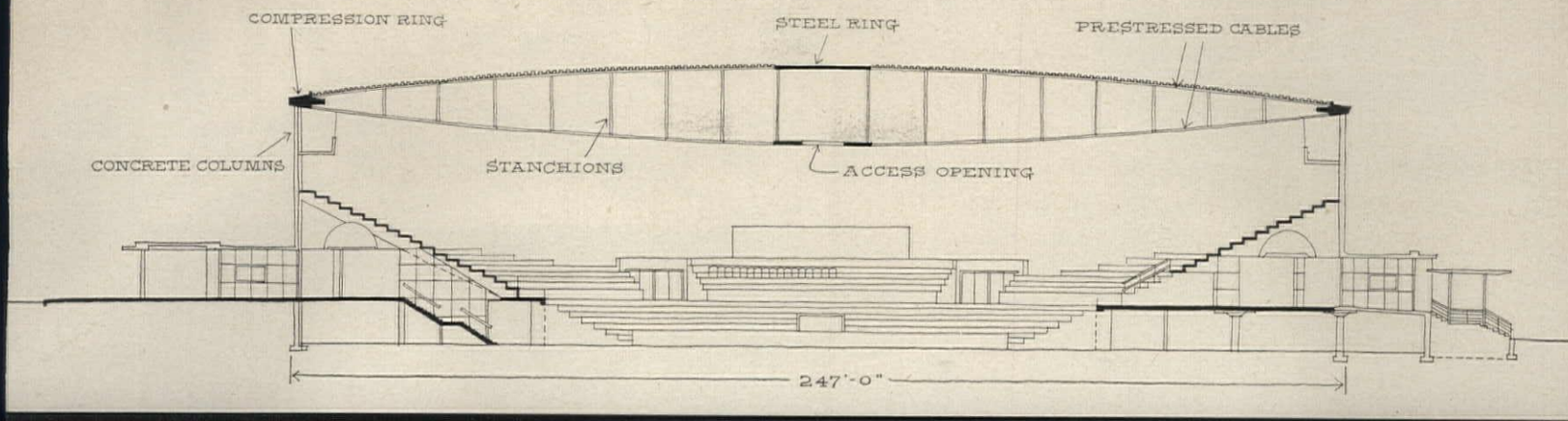
Suspension roofs framed like giant spider webs, bicycle wheels and cable bridges are clearing columns from huge meeting halls and factories

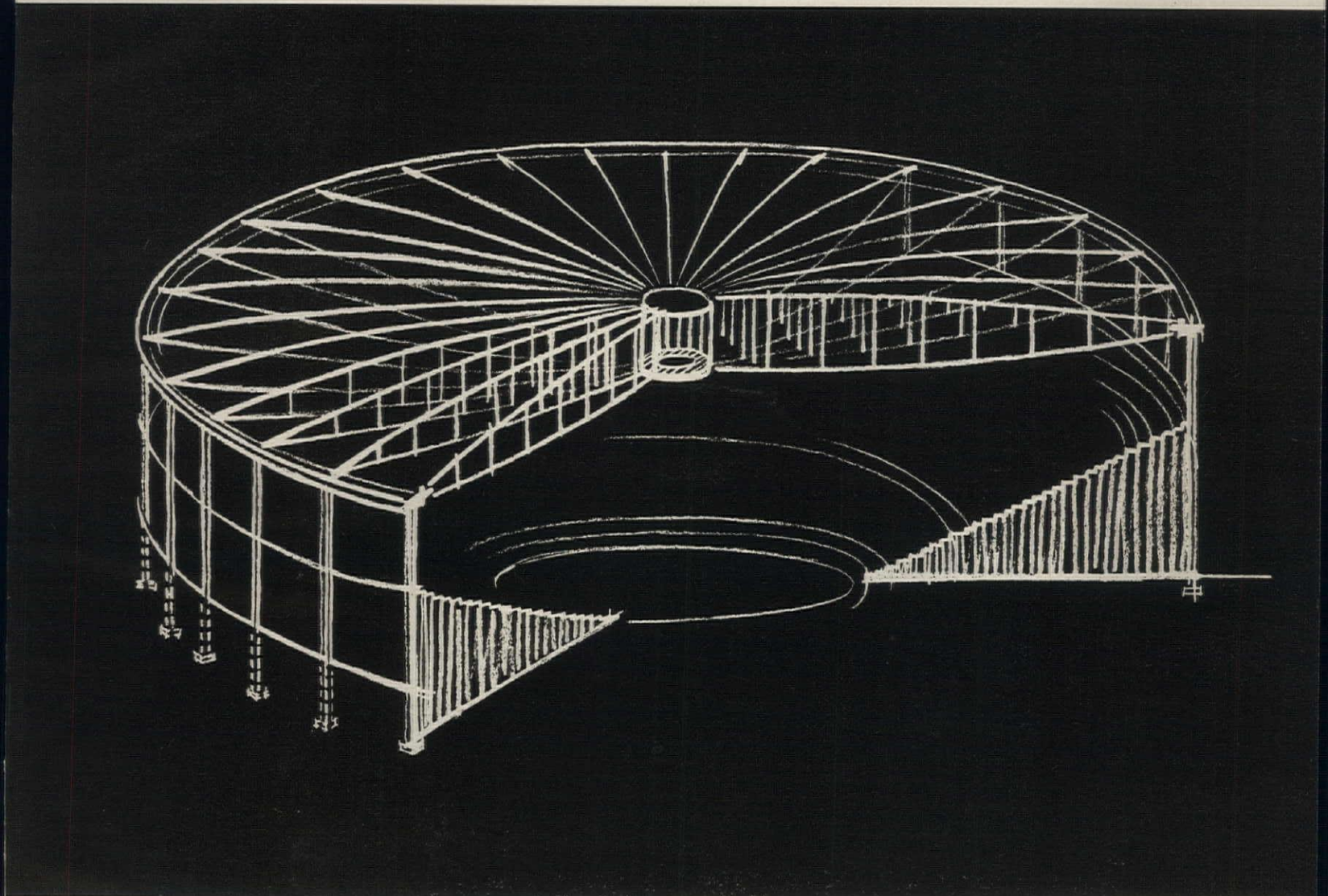
The suspended-roof structure makes use of the fact that, ideally, the most economical steel span is a cable. A steel beam—a member half in compression, half in tension—can carry its own weight for a maximum of only about 220′ and to do this it would have to be the largest available wideflange beam (36″), whereas a steel cable of any size whatever could carry its own weight for an incredible 44,000′—more than eight miles. Such is the meaning behind the sober commonplace that steel is most efficient in tension.

Here is a material to tug at the imagination of engineers and architects—and it has. But cable construction has difficulties that have confined its use mainly to suspension bridges. A catenary curve is the natural line of a cable. But a catenary, which can resist downward forces so well, has little resistance to upward or sideward forces, such as wind or suction. Cable structures are thus susceptible to the terribly destructive forces of vibration or flutter, a weakness dramatized in the famous Tacoma bridge failure. Furthermore, as ordinarily conceived, a catenary requires heavy buttresses at its anchorages. So between buttressing cables up and tying them down, the ideal of a cable roof has usually succumbed to a patchwork of expediencies. Even the bold, exciting and already much imitated Raleigh pavilion, current symbol of the suspended roof, has its share of these flaws.

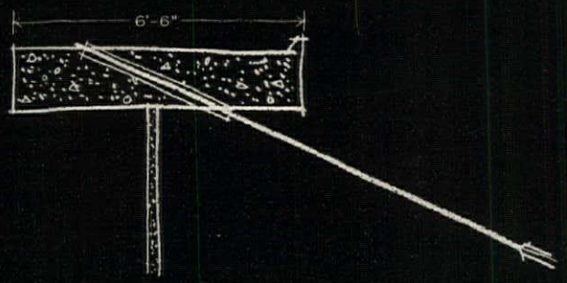
The pages following show why this frustrating past has no lien on the future of the cable roof. The first two roofs shown are especially important as immense leaps forward in the art of cable engineering. Both these roofs use pretensioning, which tautens the cables. Flutter is eliminated by different means in the two roofs, however: in one case by an ingenious balancing of highly pretensioned cables against each other; in the other, by a compression action ingeniously designed into the roofing as an integral part of a milder pretensioning operation. In both roofs, cable anchorage to a ring eliminates buttressing.

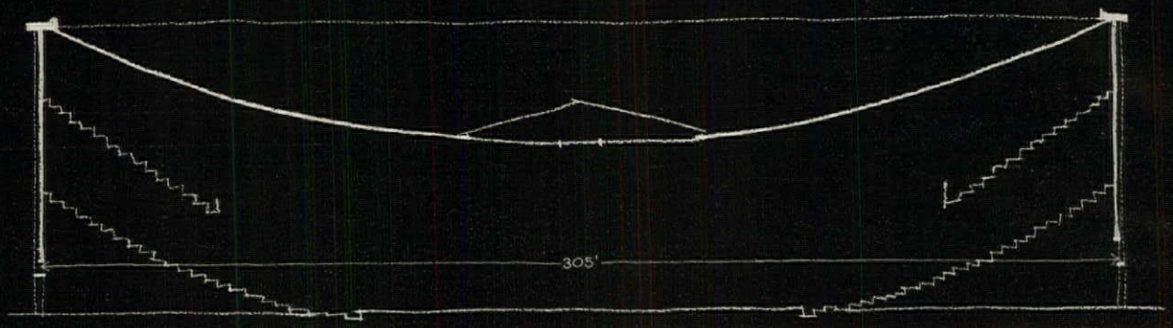
Plainly, during the next 20 years, the potential efficiency of steel cable will be well and often realized in buildings. The suspended roof is emerging from its tour-de-force era to become part of the works—a wonderfully economical way to create big space.



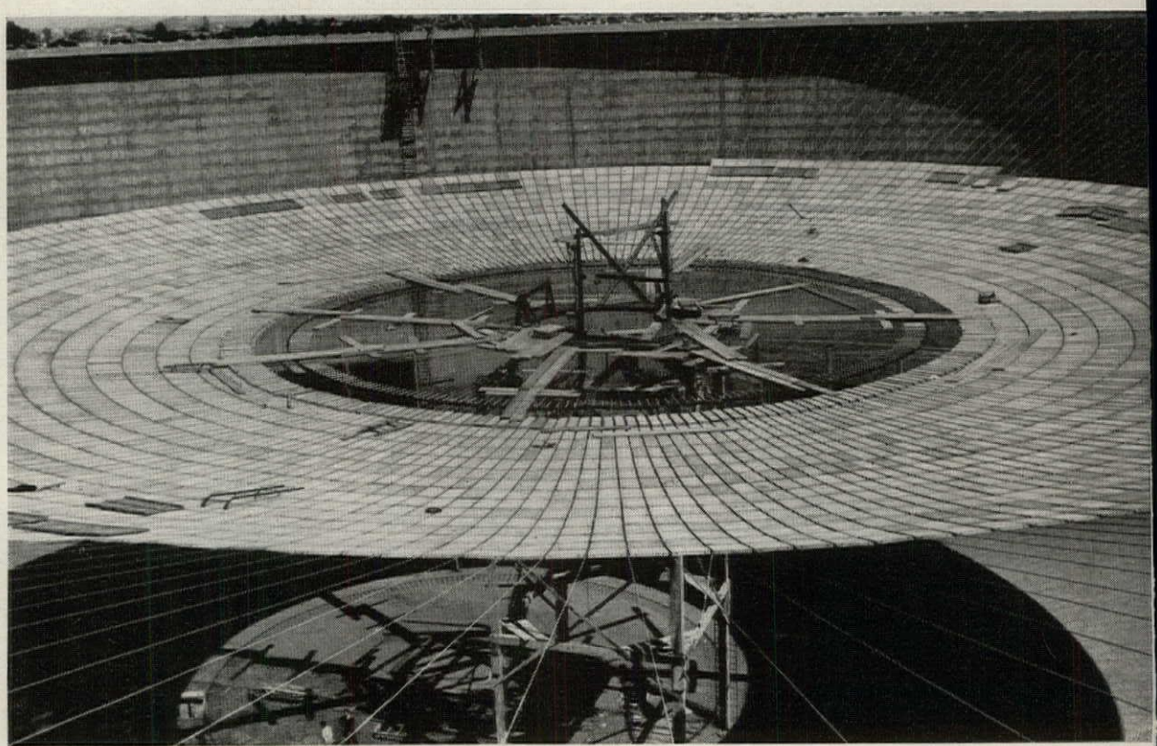


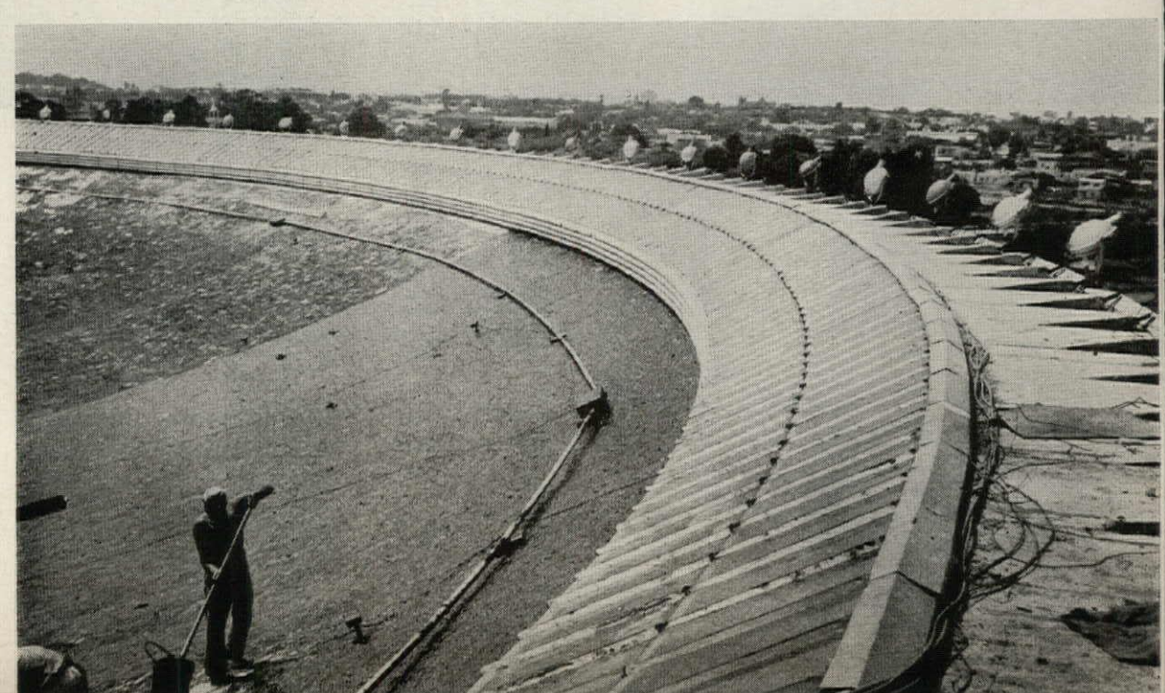
Wheel-like roof designed for 240′-dia. municipal auditorium in Utica, N.Y., consists of two paired layers of pretensioned cables, separated by vertical studs. The 72 cables of each layer are anchored to the inner steel tension ring and outer reinforced concrete ring which, being under constant compression, needs no expansion joint. Flutter is eliminated and unsymmetrical or upward forces self-canceled by compensating response from partner cables. Engineer Lev Zetlin cites these other advantages: Simple drainage; little waste cubage because lower surface drops only 1′ for every 30′ horizontally; lightness (the covering is light metal decking with cables themselves doubling as purlins). Exhaust fans go inside steel ring, ducts between cable layers. All cables and fittings are identical. One erection tower is needed to raise inner ring; the two rings give working area for pretensioning of the cables. Much larger spans are possible without increased cost per sq. ft. because steel per sq. ft. and erection work would be about the same. Gehron & Seltzer, architects; roof design by Consulting Engineer Lev Zetlin and Tyge Hermansen, associate.



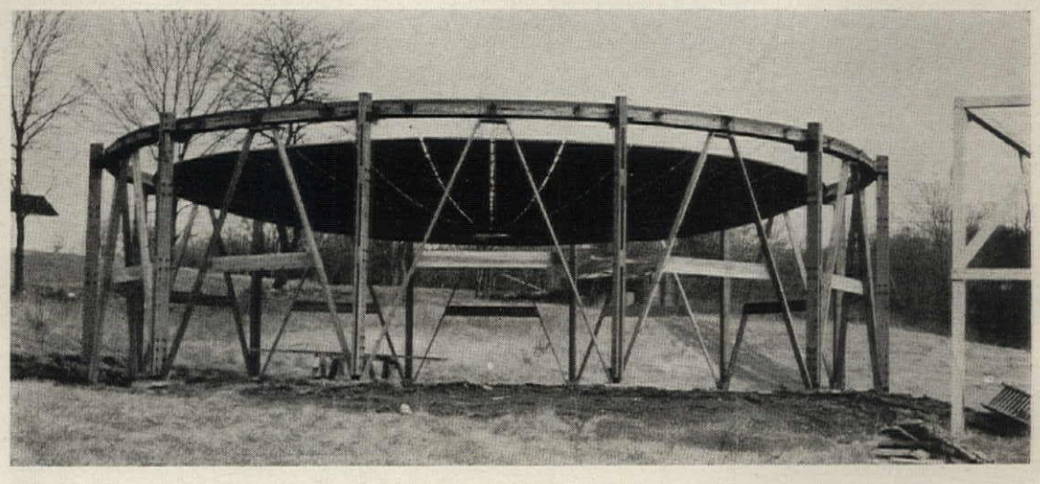


Inverted dome of 310′-dia. arena in Montevideo, Uruguay uses 256 cables anchored to central steel tension ring and peripheral reinforced concrete compression ring. On cables were hooked 9,000 trapezoidal 2″ concrete slabs, precast in graduated widths. To pretension the cables, a 50% overload of bricks was placed on slabs; the gaps which thereby widened in between planks were grouted over cement asbestos form boards, left in place. With load removed, the thwarted tendency of the roof to rise again throws concrete roofing into compression. The pretensioning of the cables is balanced by the precompressioning of the concrete. The roof drops about 1′ for every 10′ horizontally; drainage is through leaders from periphery of central skylight, across ceiling. Cost of roof was substantially lower than for conventional systems. Alberto S. Miller, C. E. and Lucas Rios, architects; roof designed by Engineers Luis Alberto Mondino and Leonel Viera, with assistance from Preload Co. of New York.

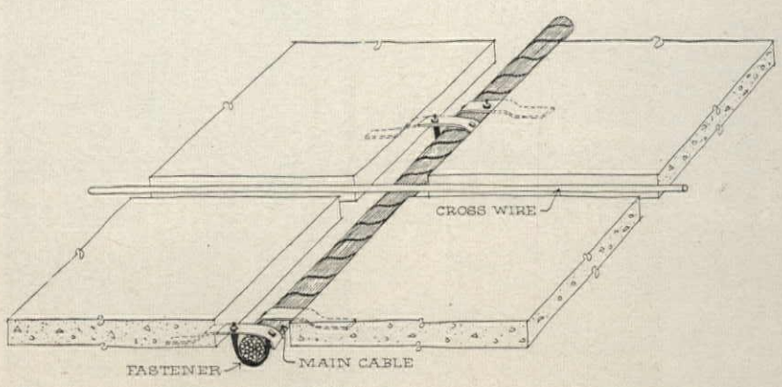


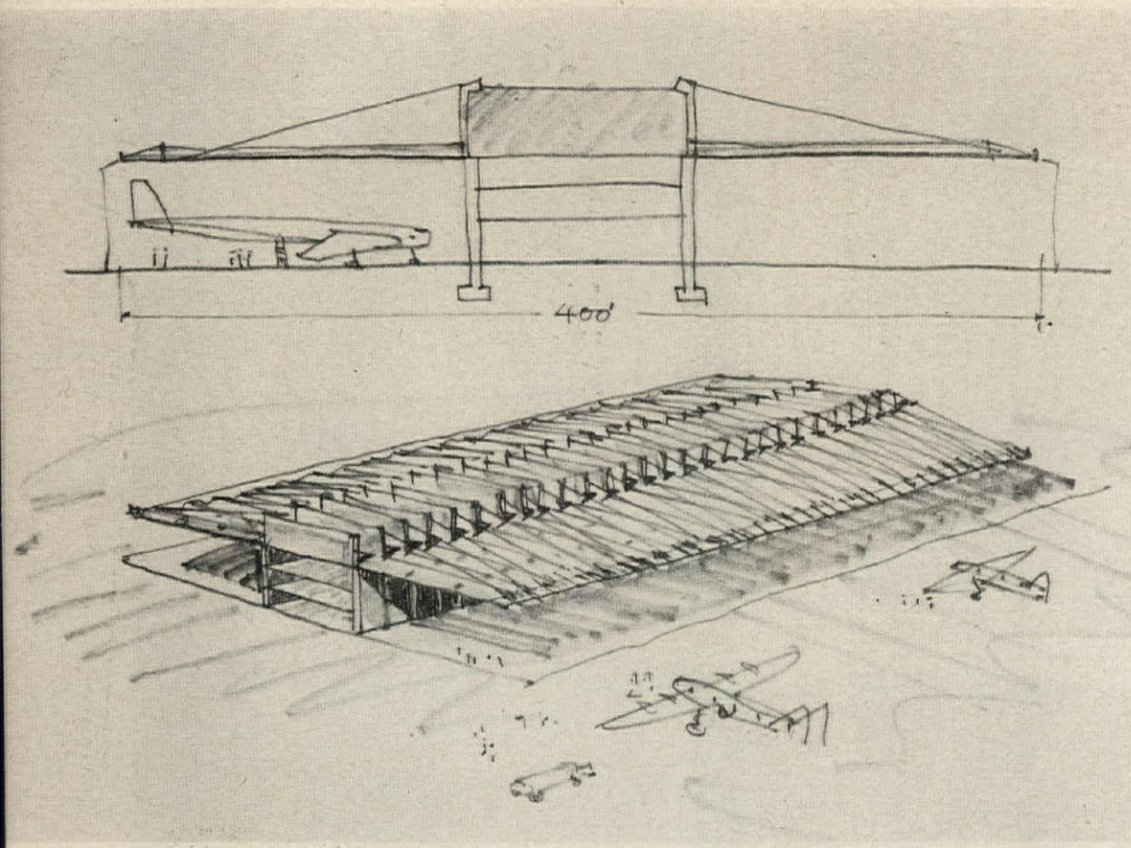


Miniature of Montevideo roof system 50′ in dia., using 36 cables, was designed and built last summer in Columbia University camp at Litchfield, Conn., by architecture and engineering students under supervision of Bruno Funaro and Mario Salvadori. Compression ring is laminated wood stiffened by steel. Temporary overloading was with sandbags. Drainage here is simply into pool below open oculus; normally it would be handled by sump pump. Salvadori says snow and ice accretion would be no problem.

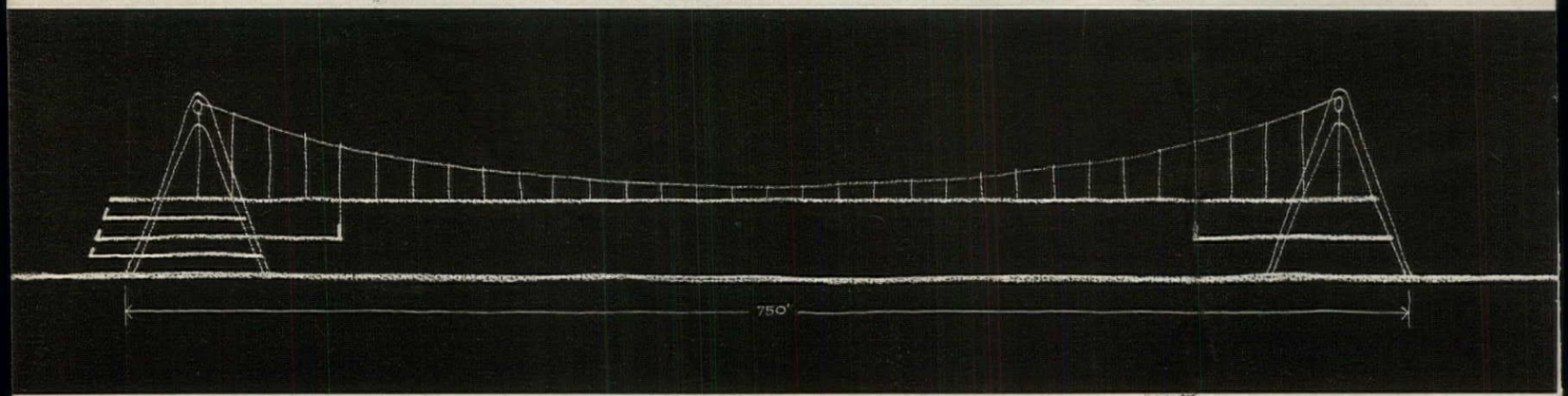


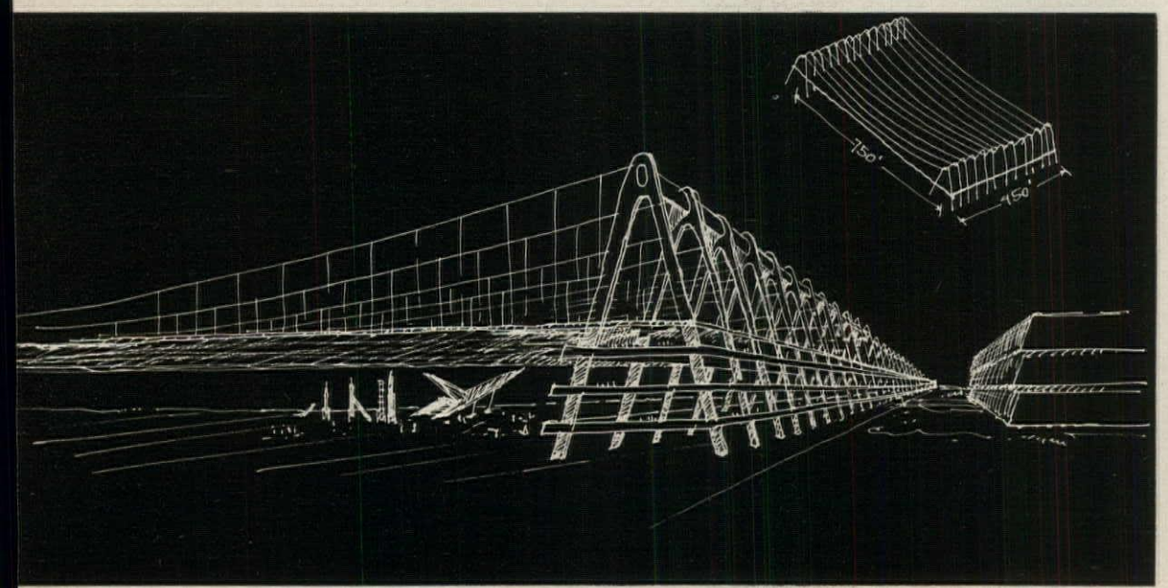
Cable-hugging prestressed concrete slabs for suspension roof of Berlin conference hall (AF, Sept. '55) now under construction, use ingenious U-bolt fastening devised by Engineer Fred N. Severud. Slabs for the roof will combat flutter by weight and by serving as transverse ties like strands that tie together long cables of a spider web. Hugh Stubbins, architect; Severud-Elstad-Kruger, engineers.





Shell-and-cable roofs of TWA overhaul hangar at vast new Kansas City industrial airport give two immense 818′ x 150′ column-free spaces, not counting 10′ door overhangs. Roofs are thin concrete folded plate. Cables anchor into central anchor walls. At the other end, they are anchored low in 5′-9″ valleys of plate corrugations which run transversely to direction of suspension. Burns & McDonnell and Ammann & Whitney, architects and engineers.





Suspension "bridge" is proposed by Architects and Engineers Pereira & Luckman for a factory with a 670′x450′ clear span. Sheer width and mass of roof would greatly reduce flutter problem, which is at its worst in narrow bridges. But edge of roof would likely require stiffening, such as truss. Buried concrete "dead men" anchoring 100′-high A-frame buttresses would be of practical dimensions, probably in neighborhood of 5′x7′. Frames would also serve to hang stacked office floors.

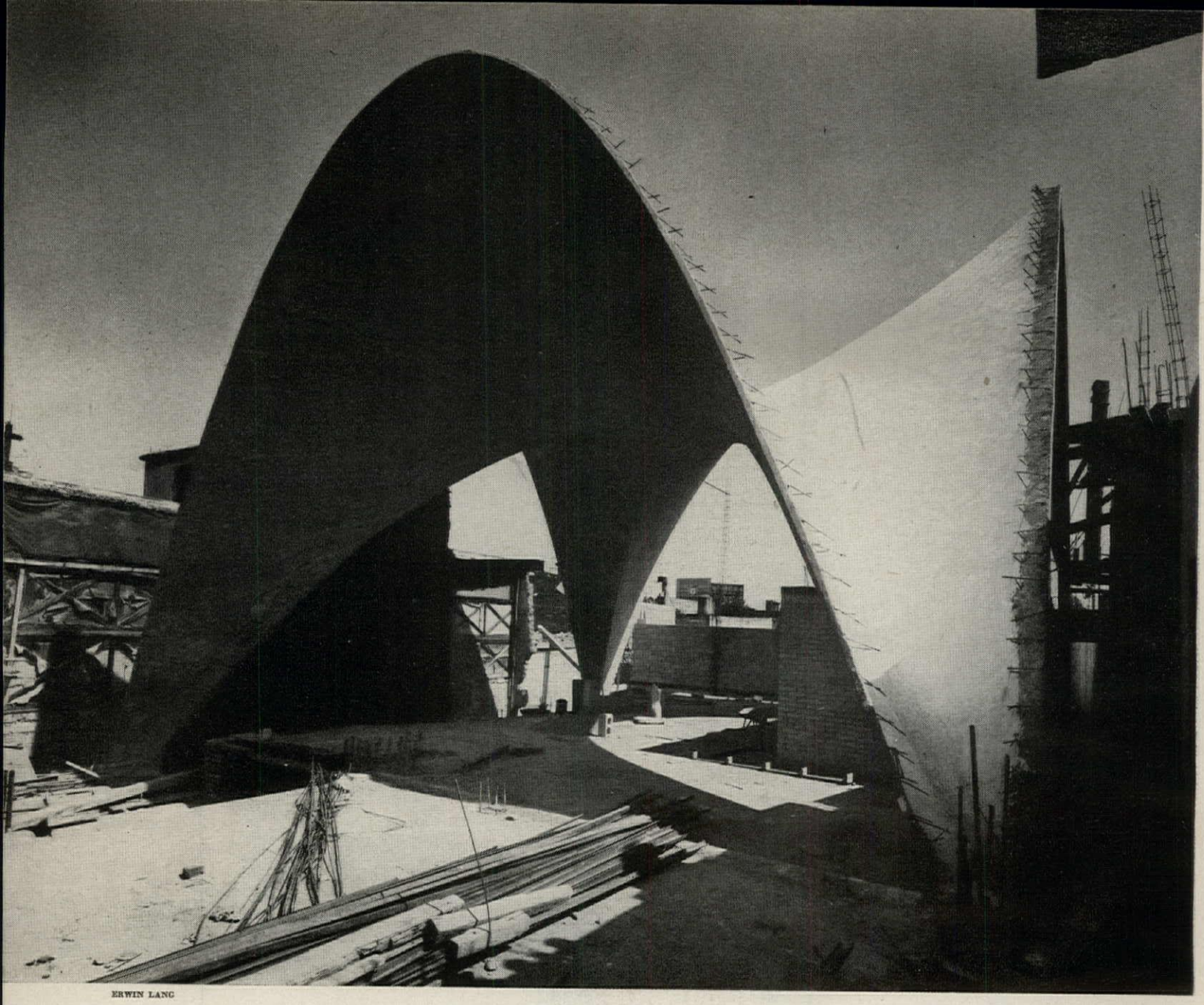
ERWIN LANG

Marketplace under construction in Mexico. Architects: Pedro Ramirez Vazquez, Rafael Miljares, Felix Candela

Shells of concrete, as thin as sails and just as graceful, are showing economical ways to use cheap materials in spanning great rooms

Architecture in the US already has a running start in one area of its structural future, shaped concrete construction. Spans which five years ago would never have been considered economical for anything but steel are today being bridged by flaring sculptural forms of thin hyperbolic paraboloids, shell domes and lean slabs folded like paper hats. This technique is on everyone's drawing board.

Will this itch for spectacular concrete outlive the steel shortage? The answer is an almost certain yes, because the steel shortage has been only one of the reasons designers have turned to shell concrete. It was first embraced in this country for esthetic reasons. Shell construction had long been dismissed as too expensive in terms of our construction labor costs to fit

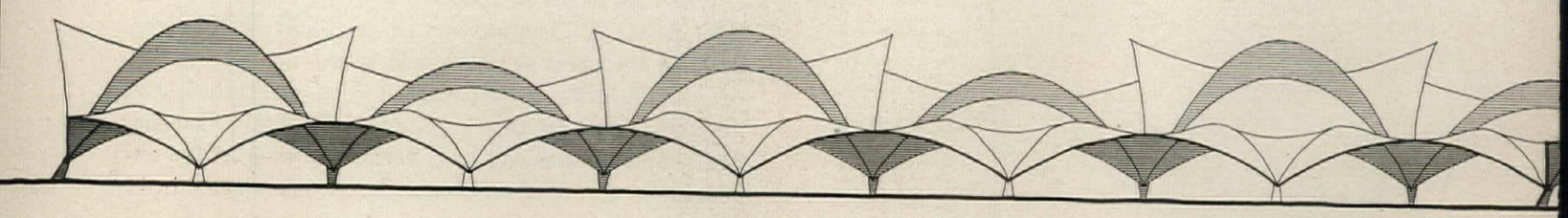


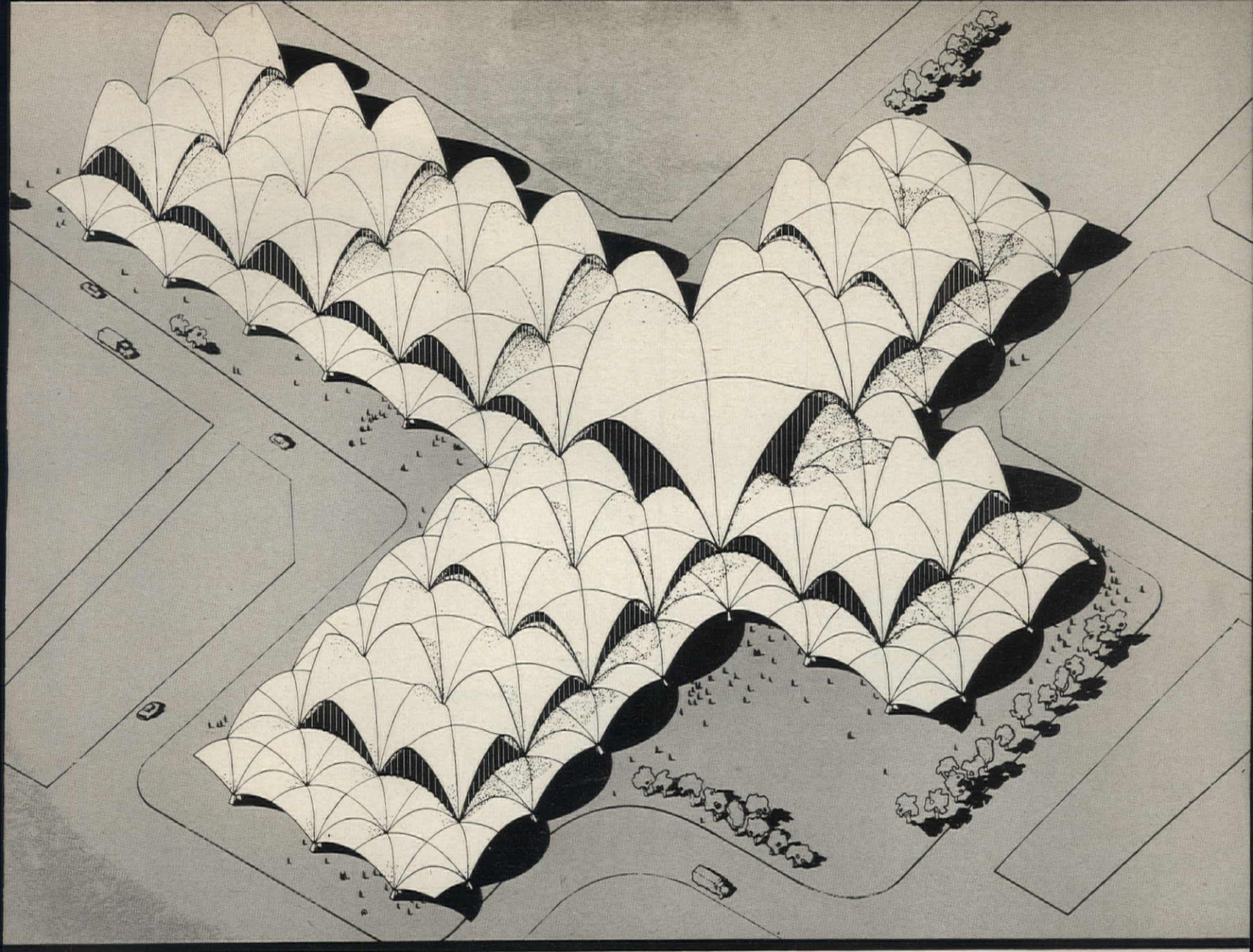
ERWIN LANG

into US building budgets, but then the more advanced designers began hankering after the beautiful shapes that shells could bring to their linear architecture, and it became an idea whose time had arrived. Now, like the automobile, shell concrete is refusing to stay in the luxury class, thanks in large measure to new forming materials and techniques which simplify the construction—see p. 155.

Although the shell technique is now a citizen in the US, many of tomorrow's ideas in shell construction are still germinating outside our borders. In Mexico and South America, engineers like Felix Candela and Guillermo Gonzalez a decade ago were predicting what US architects are beginning finally to perform, and it seems sure that the two decades ahead will bring today's spectacular predictions to reality.

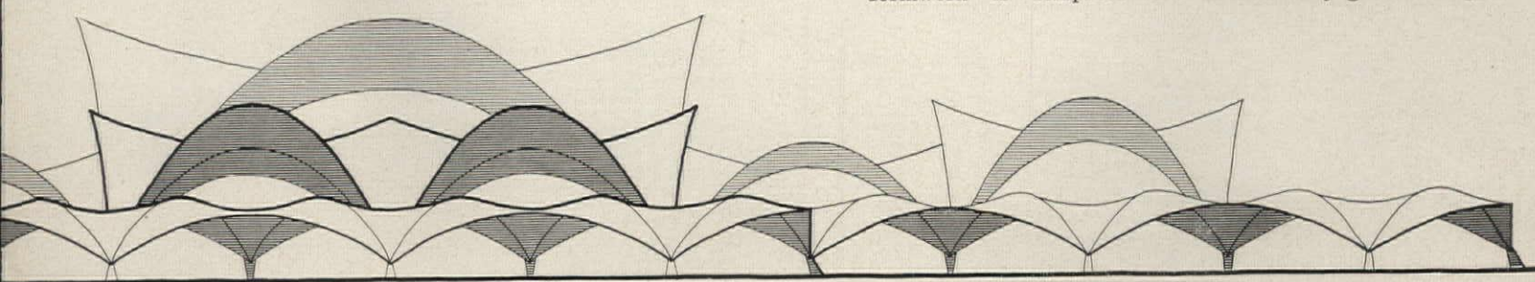
Candela's surf of intersecting hyperbolic paraboloids (birdseye sketch right, elevation below) has precedent in the simple, graceful shapes he has engineered and built singly. The seemingly fantastic design to shelter a large market is simply a repetition of the kind of shell which covers the parish church of San Antonio de las Huertas (above), by Architects Enrique de la Mora y Palomar and Fernando Lopez Carmona. At present it is estimated that something between 300′ and 400′ is the span limit for a single thin concrete shell, but possibilities seem endless for repeated shells.

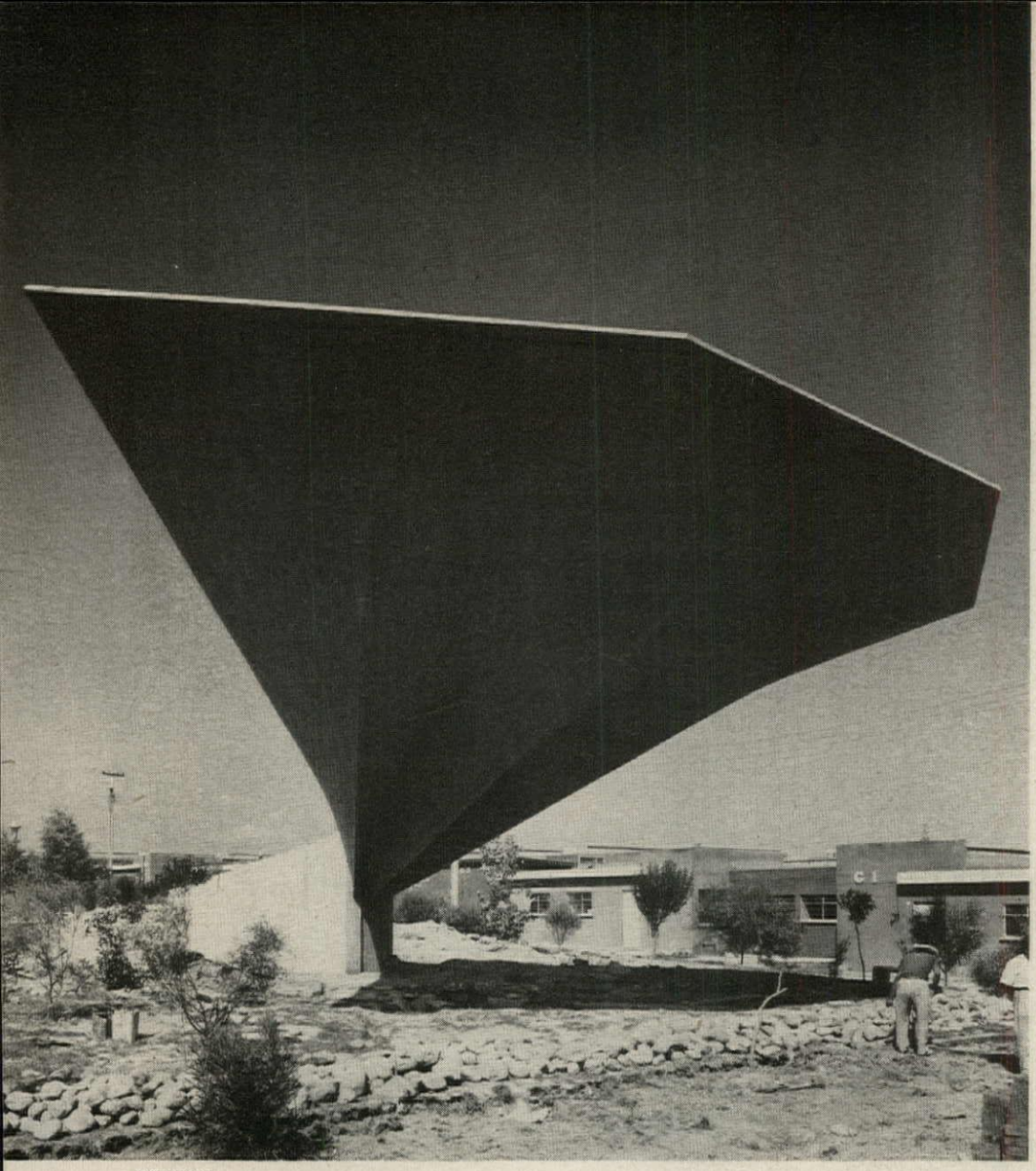




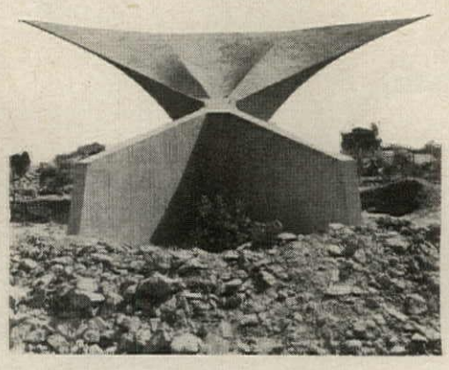
Market project uses intersecting hyperbolic paraboloids of two heights, opens up intersections in clerestories, in an enormous repetition of the shape of groined vaults. Structurally the problem was to transfer normal and tangential stresses at the edges to the groins. Candela accomplished this by using each generator of the surface as a tie-rod or strut. Since each point of the groins is joined by two generators to two points on the edges, many structural variations were possible. A lengthy process of trial and error established this design as the easiest and most economical form. All the formwork is composed of straight lines in the hyperbolic paraboloid shape.

In this design, both vertical and tangential forces act on each groin as a result of the normal stresses from both contiguous surfaces. These forces may be resisted by the angular member formed by increasing the shell at both sides of the groin in the form of a V-beam, which makes each groined member in fact a three-hinged arch, eliminating the need to introduce any other member. Each vault is square in plan, so there are no shear forces acting in the perimetrical edges, and it has been possible to eliminate stiffening ribs, resulting in an extremely graceful edge.



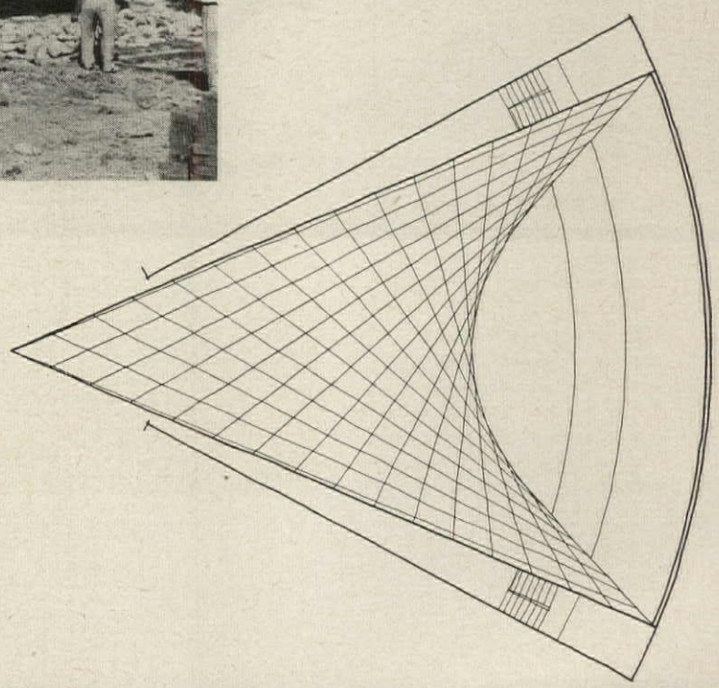


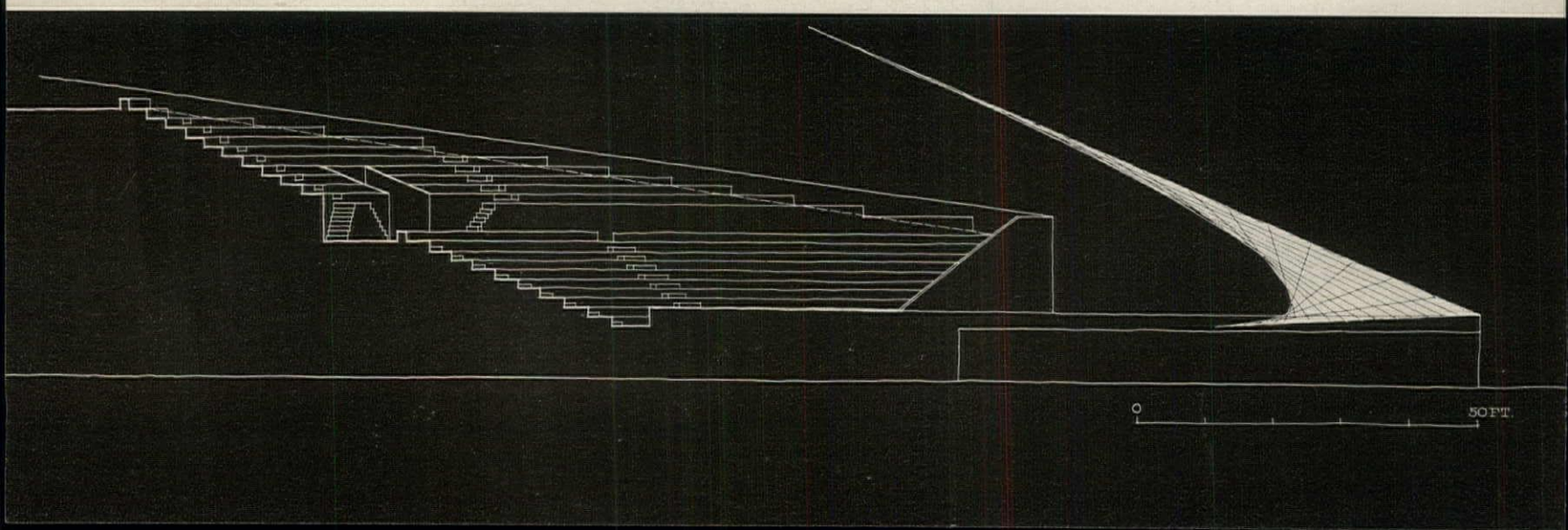
ERWIN LANG

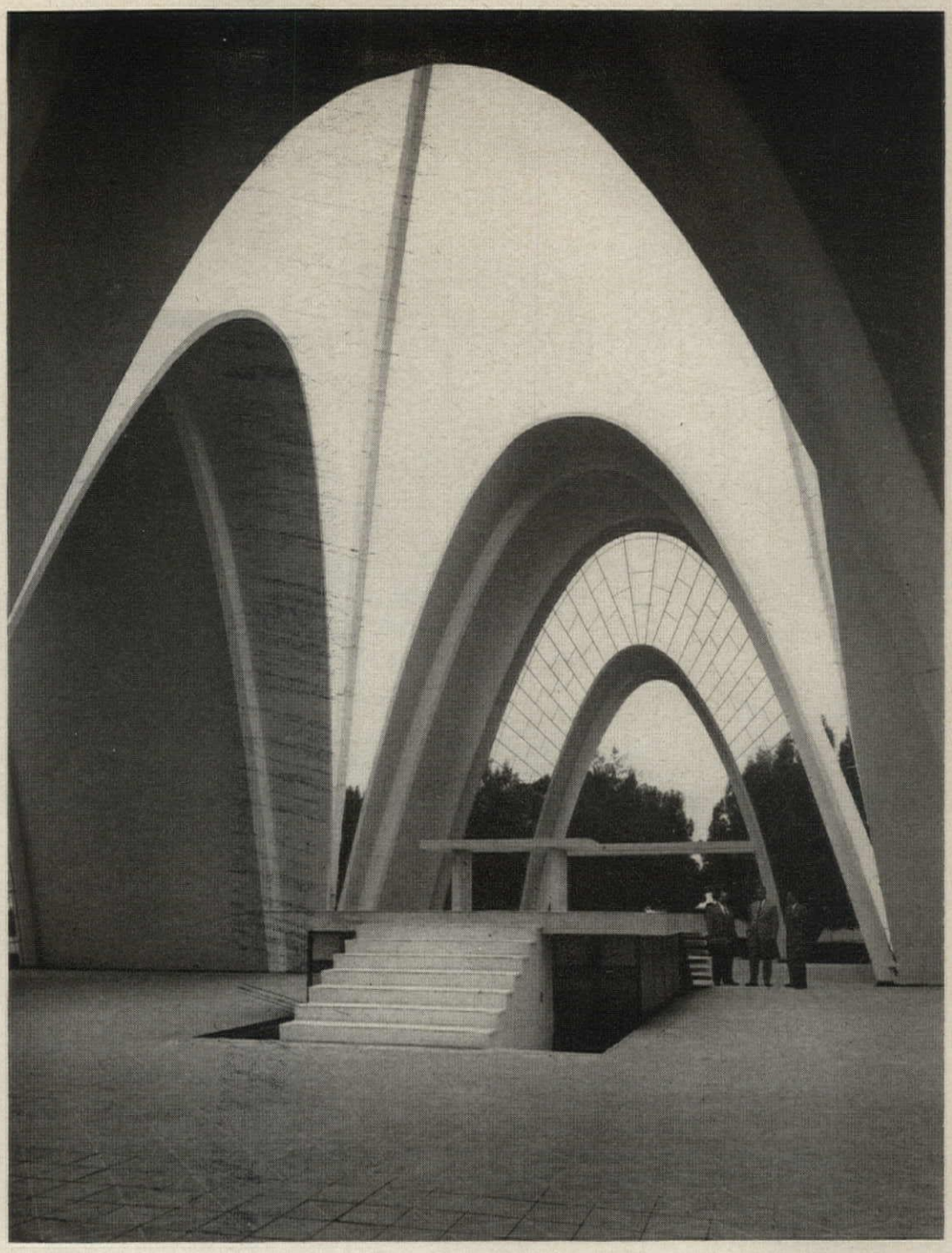


Bandshell from behind base.

Bandshell for open-air concerts in the new housing project of the Instituto Mexicano del Siguro Social (Mario Pani, architect) extends a plane of reinforced concrete 40′ over space. It is a triple-cantilever formed by six hyperbolic paraboloids. Each paraboloid starts from its base as a vertical, and ends at the edge as a horizontal. All the formwork was composed of straight lines and Engineer Felix Candela reports it was a very simple structure to design and erect. The solid bastion below ground to the rear is heavy enough to compensate the cantilever. This shell is only a mild indication of what Candela has in mind, however. He has proposed the bandshell shown in drawings at right and below for the Normal School of Guadalajara, again a hyperbolic paraboloid. Its cantilever would be 100′.







School church at Chapinero in Colombia is a good concrete example of the engineering skill of Dr. Guillermo Gonzalez, another brilliant shell impressario. Shown during construction, the church is a grouping of shell domes with concrete arches over the crossing, shown right, designed by Architect Juvenal Moya. Stained glass, framed like a section of spider web, fills vertically between the shells.

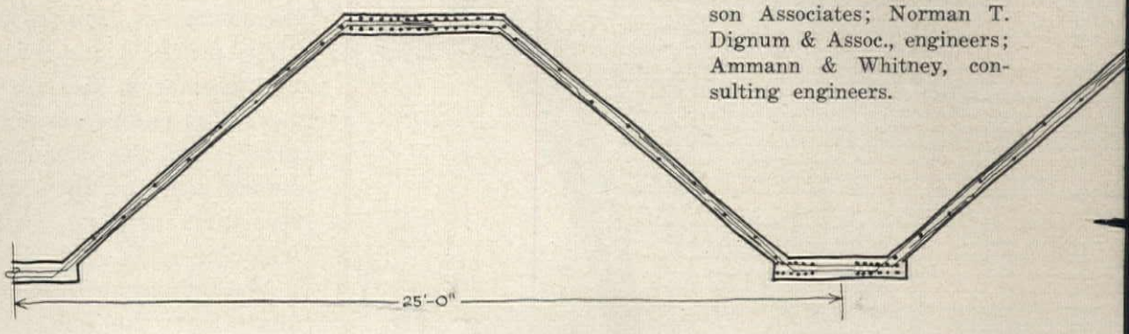
Stack of shells are roofs, cast on the site to be lifted into place over housing designed by Architects Ortega and Solano for Vacuum Concrete de Colombia. A good example of technical exportation, this South American work actually is performed under licensing from Billner Vacuum Concrete of Philadelphia. The building climate along the Schuylkill at present does not favor this use of the patents at home, but the next 20 years is expected to bring a change.

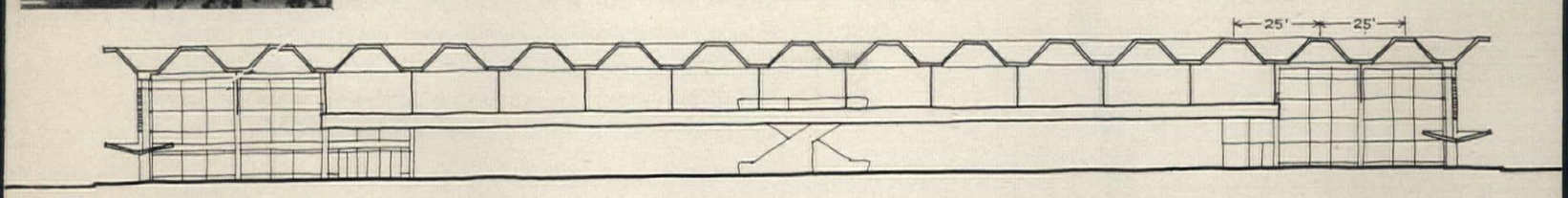
HAMILTON WRIGHT

Great folded slab of concrete houses the base terminal of the new cable railroad from Caracas, Venezuela, up 7,000′ high Mt. Avila (cable car en route, right). A different category of shell concrete from the curved shapes shown on preceding pages, it develops directional strength in its creases. Designer: Dr. Alejandro Pierti.

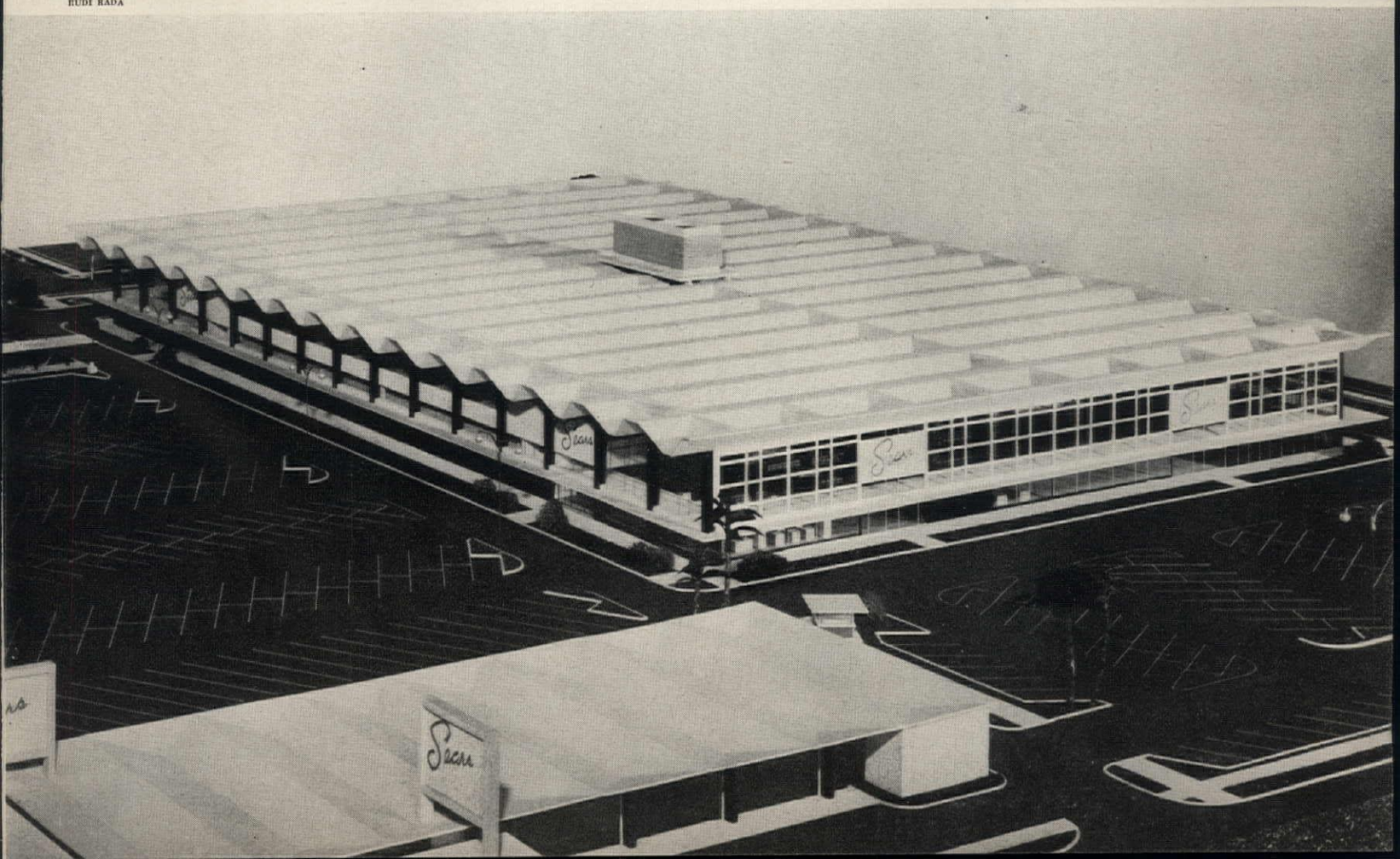
Accordion pleated slab of concrete will support the roof of the office building in the US Embassy group Jose L. Sert is designing to be built in Baghdad. Here new concrete technology will be used, as Le Corbusier uses it, to make a firm architectural statement. The roof technique is made to match and extend the linear character of the rest of the cast concrete structure.

Hipped plate concrete roof will span 125′ in new Sears Roebuck store being built in Tampa, Fla. This folded roof construction does a double job. Besides creating a large columnless first floor sales area, the roof structure also carries a mezzanine floor, which is hung by tension "columns." At the left is a detail of the roof structure; below, a longitudinal section and model photograph. Architects: Weed, Russell, Johnson Associates; Norman T. Dignum & Assoc., engineers; Ammann & Whitney, consulting engineers.





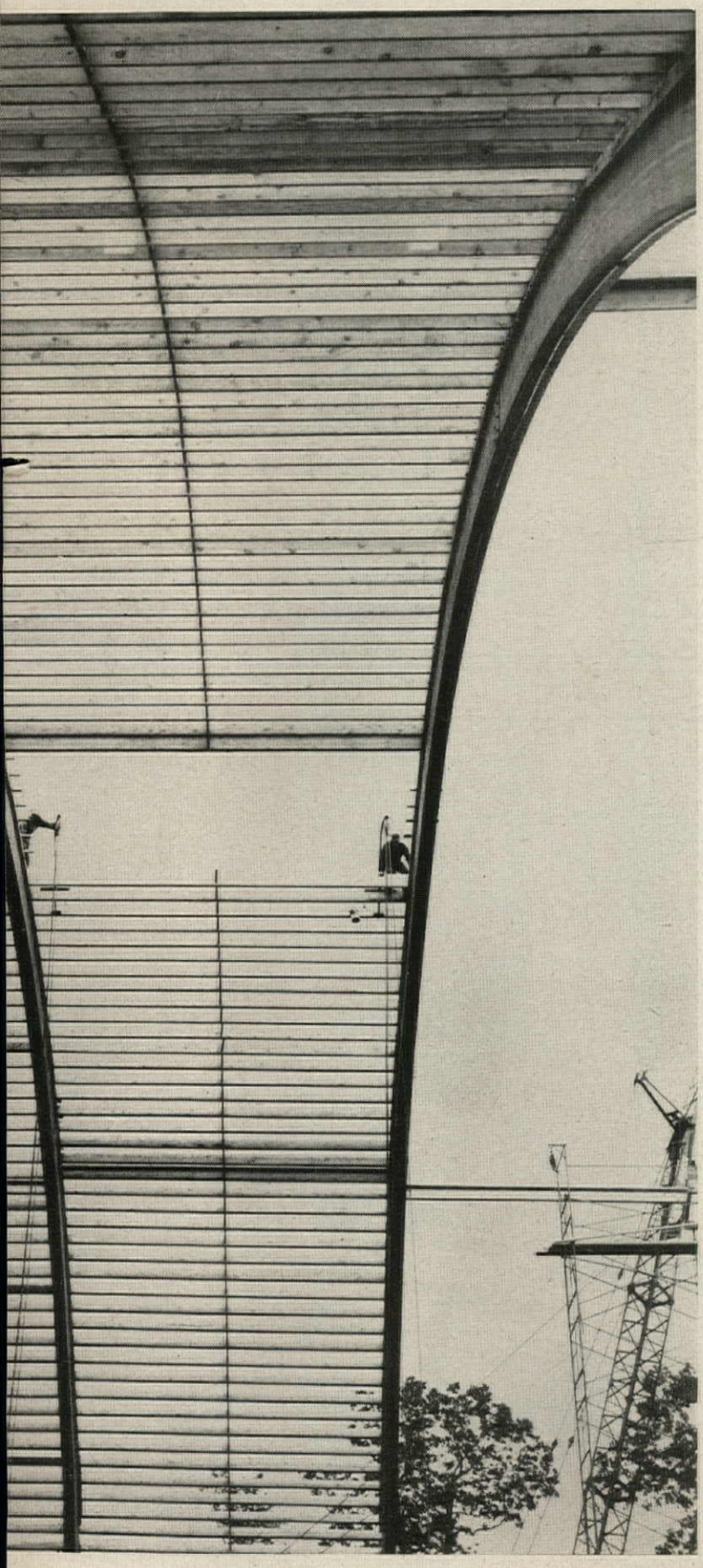
RUDI RADA



Other spanning techniques, such as space frames, geodesic bubbles and frameless balloons, are taking the limits off interior space

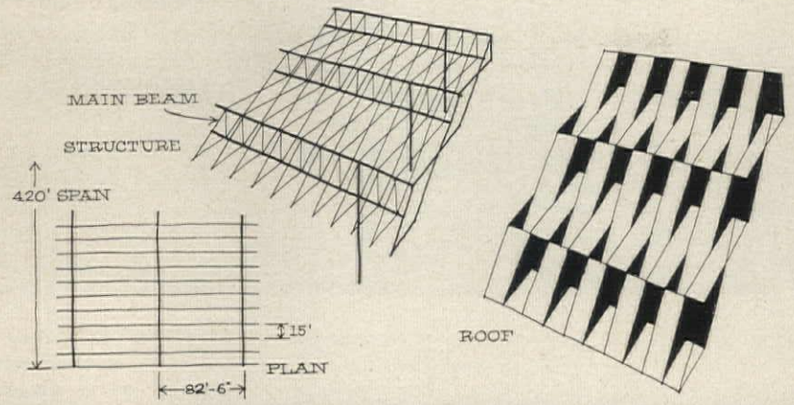
In the prevailing US technical tide, strong currents continue to run toward increased prefabrication, prestressing, and timber lamination. Still in prospect more than in practice is the postwar space frame, which had stirred US designers even before shell concrete. These strong, strutted networks of three-dimensional trussing are still in the process of being absorbed into practice, but should be a standby two decades hence. The more rudimentary, more immediately practical improvements in prefab, prestress, and lamination also are undergoing constant investigation by engineers and manufacturers and so will grow with the decades. On these four pages are shown some of the interesting results these other structural processes will soon be producing on a widening scale.

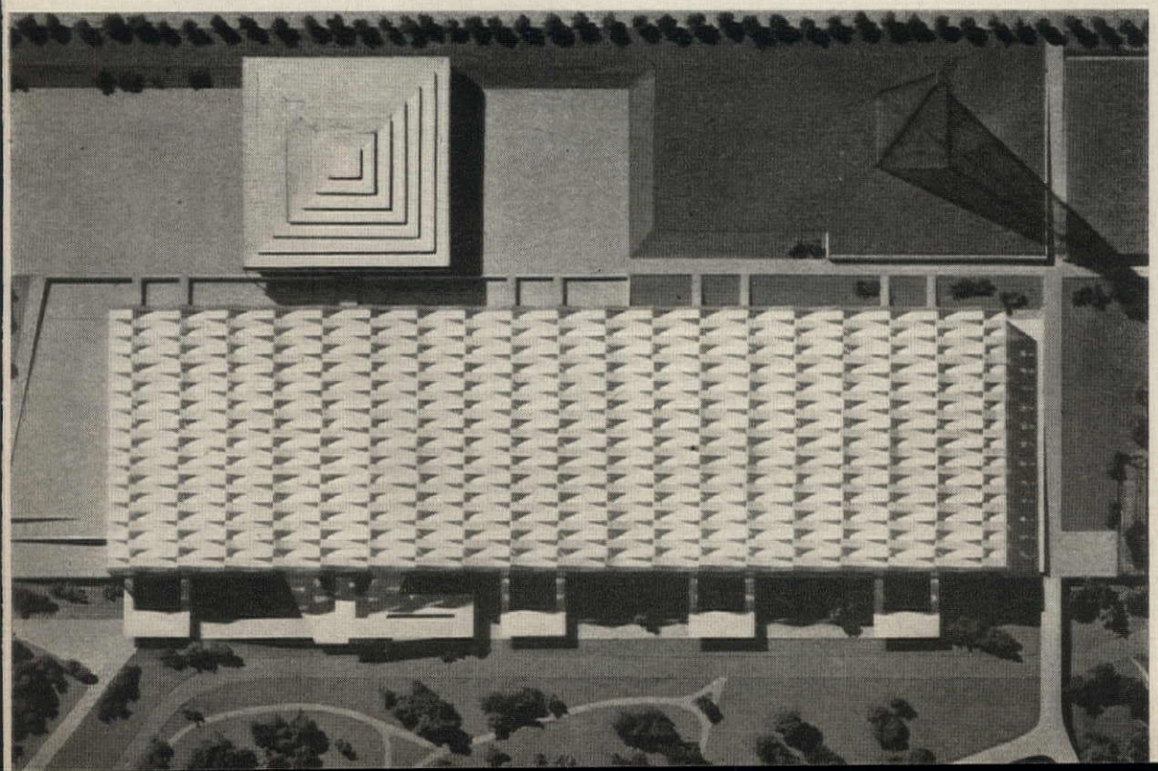
The refining process in all these structural methods, apart from the skin solutions in shell concrete and fabric, is to isolate tensile and compressive forces, and by defining each emphatically, trim down the material necessary to solve the stresses. This is particularly evident in the tension structures.



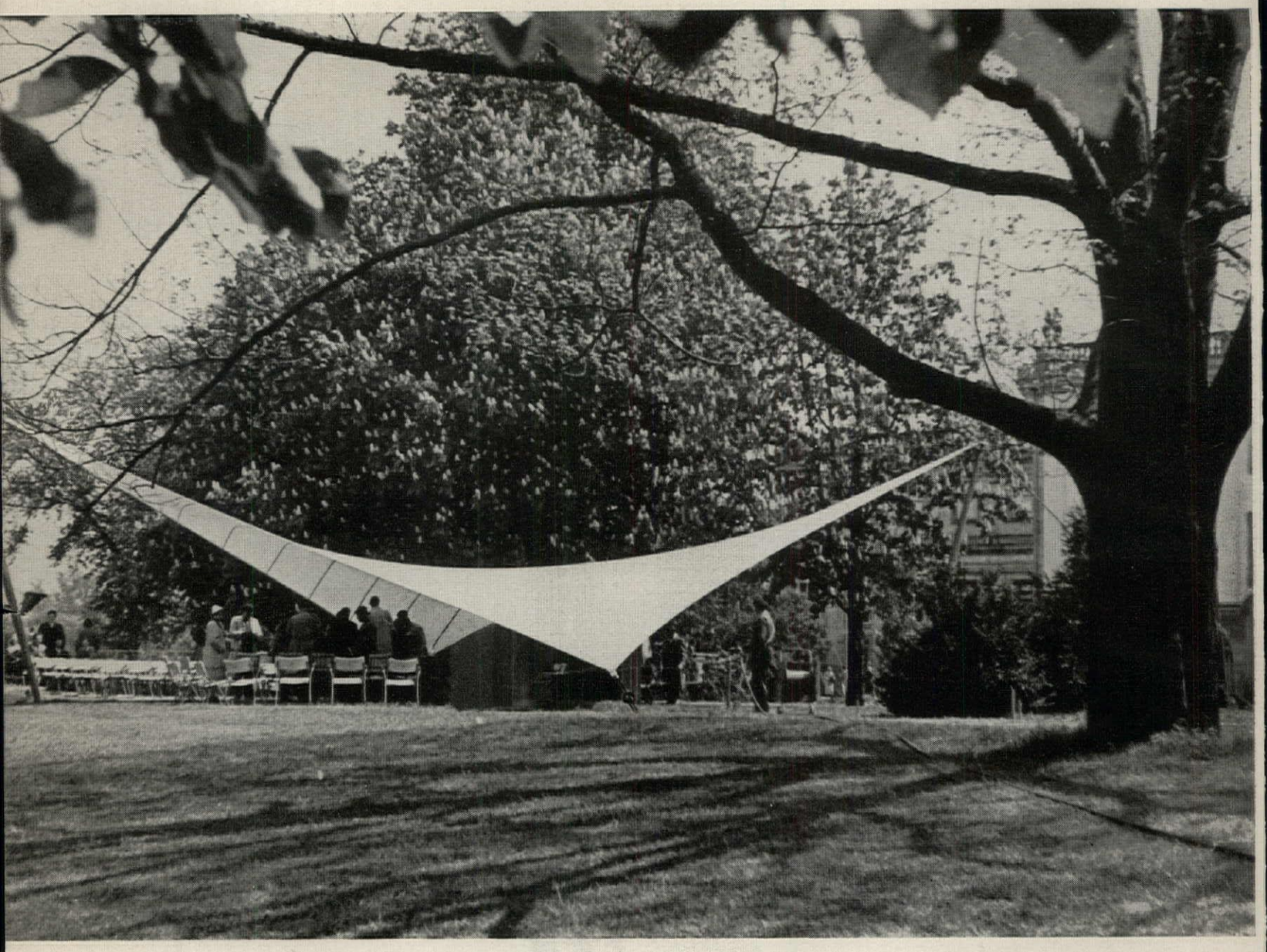
Laminated timber arches, spanning 190′ in the new field house of Union College at Schenectady, are a long shadow of the future already with us. Every year architects are getting bolder, stretching the manufactured timber further. Each of these lean arches weighs 12 tons. Architects, McKim, Mead & White; Severud-Elstad-Krueger, structural engineers; arches by Timber Structures, Inc.

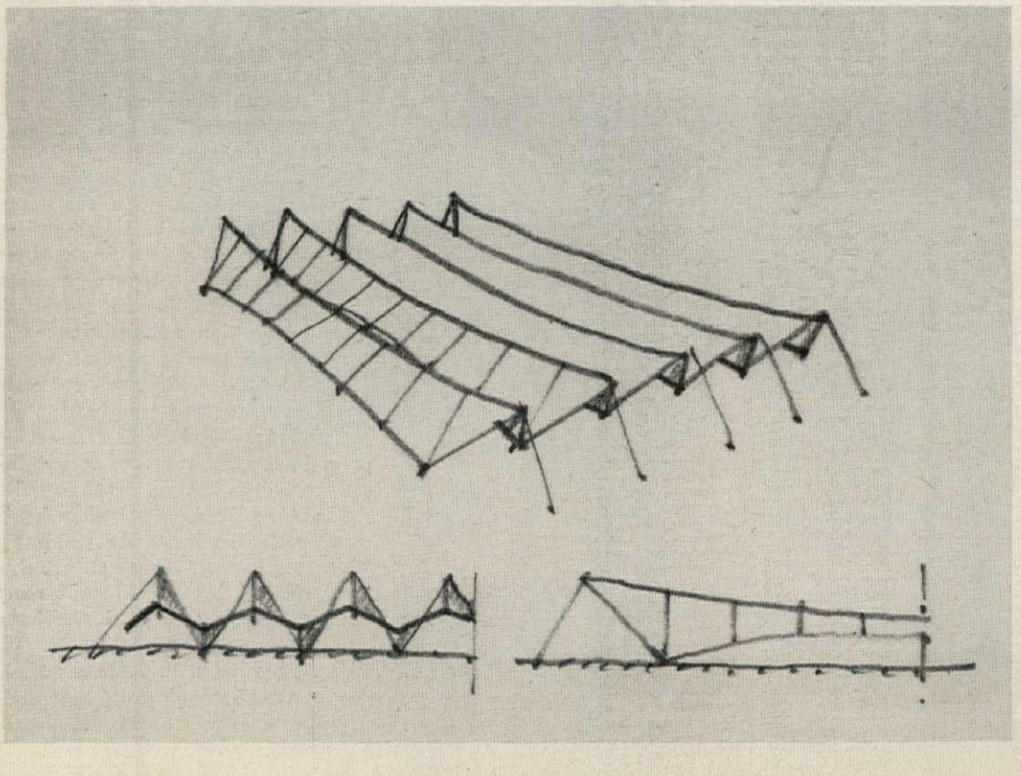
PHOTOS: © LONDON COUNTY COUNCIL



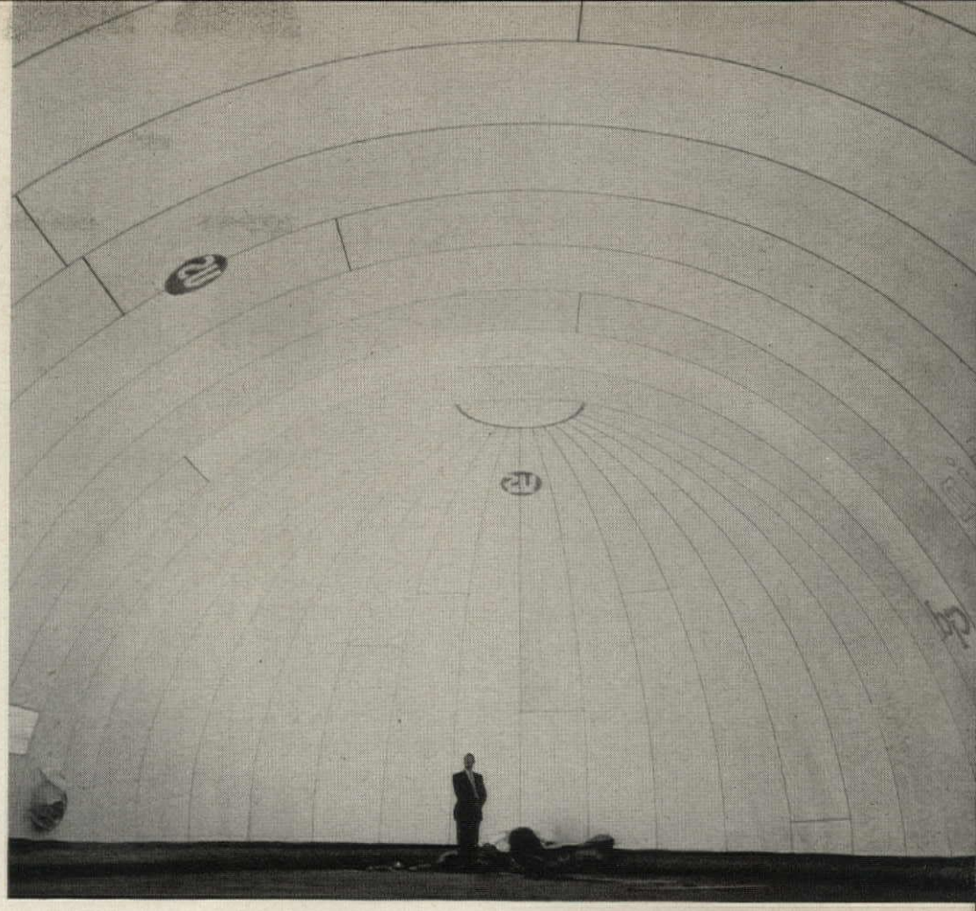


Space frame for a historic site in England. In 1936 the famous Crystal Palace, a landmark of modern architecture put up by Joseph Paxton in 1851, burned to destruction. On its site the London County Council now projects a group including this enormous exhibition center, which looks in elevation like a WPA reforestation program at the sapling stage, with one important difference: there are very few trunks in this bower. The enclosure, covering 500,000 sq. ft. column free, would be built up from a series of double cantilever steel trusses springing from a main truss the width of the building. A vast fabric of interwoven planes from above (drawing and air view, left) the roof would include also many sizable windows; its vertical planes would be filled with glass for natural lighting, rivaling the old Crystal Palace itself. Service ways and runways will be included in the depth of the space frame. Its hollow depth will also house the building's mechanical services. Architect: Dr. J. L. Martin; Deputy architect, I. G. West; Assistant architects, N. W. Engleback, B. G. Jones, M. J. Attenborough.





Stretched skin of canvas in Germany by Engineer Frei Otto arrives at shape of hyperbolic paraboloid, but by reverse route from concrete designers. Entire structure is in tension, with equilibrium achieved by cables anchored in ground. Sketches show some possible combinations of these tense shapes, for construction in more durable materials.



Balloon construction means this in the new structural vocabulary. The roof and walls of this portable warehouse, large enough to hold 2 million lb. of package goods, are supported by air. Made of a paper-thin, tough, vinyl-coated nylon, the skin is inflated by a small compressor, which continues to maintain constant pressure, even when doors are used frequently. Anchored to ground by a base tube containing 23,000 lb. of water, it measures 40x 80′, weighs 400 lb., costs about $2,000. Developer: US Rubber Co.

PHOTOS: U. S. RUBBER C

Plastic fabric also is newest advance in R. Buckminster Fuller's constant improvement of his geodesic dome structures. This one, erected by US at trade fair in Afghanistan recently, wears a taut nylon skin. Night view is shown below.

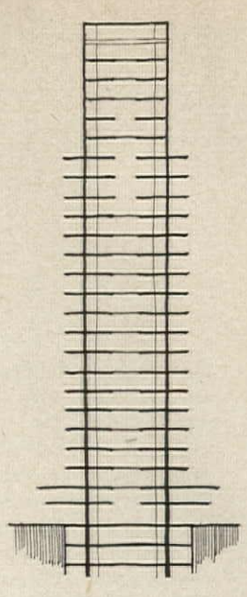
Hollow masts, like tree trunks, are carrying the utilities—and the people—to the branching floors which they support

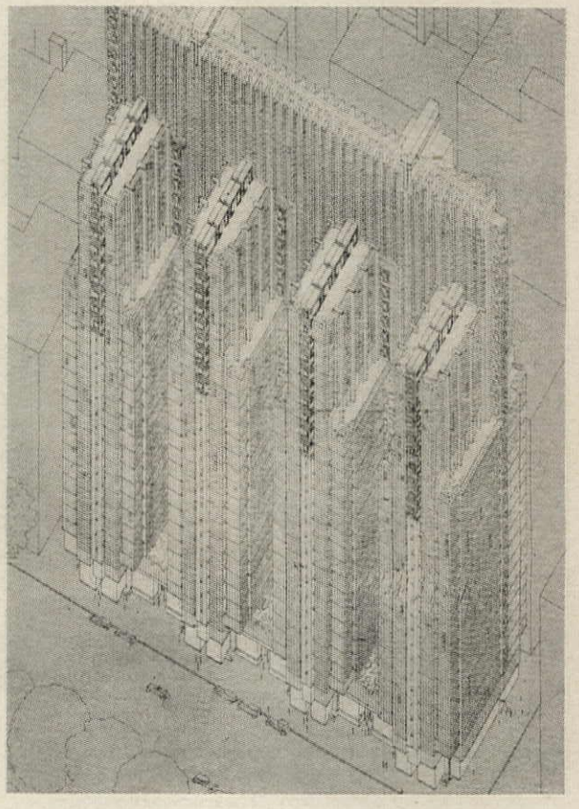
Today's skyscrapers are elaborate steel cages on which are hung walls, floors and service shafts. Tomorrow's tall buildings may reverse this arrangement by making the service shafts large hollow cores or backbones, like tree trunks, from which floors branch out like limbs and walls become almost vestigial curtains, light and transparent as gossamer, enclosing space.

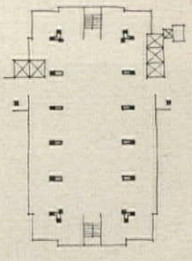
A number of prototypes already have appeared. As skyscrapers have been pushed upward and flattened into broad surfaces, without the stabilizing effect of heavy masonry walls and with only narrow foundations to brace them against wind and earthquake, their frames repeatedly have had to be strengthened with oversized structural members, gussets, brackets and shear walls. But even these have not entirely protected them from the cracks and distortions resulting from sway, and the beefing-up process is beginning to reach an uneconomic point not only in structure but in the disposition of the building's mounting utilities.

Gradually, the principle of combining structure, function and enclosure in one organic shape, as in nature, has found its way into tall buildings. The dead weight of shafts enclosing elevators, stairs, ducts, washrooms and closets is beginning to be put to work to support and stiffen the structure, instead of merely going along for the ride. Since all these shafts are essentially cellular spaces, they can be formed with reinforced concrete into hollow tubes, one of the most efficient structural shapes under compression.

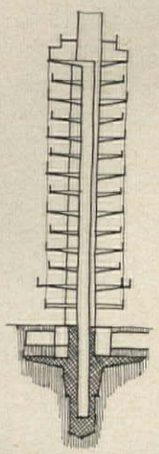
As might be expected, the pioneer in this idea was Frank Lloyd Wright with his many-masted National Insurance Co. project in 1924, since carried further in his Johnson Wax tower, in which air ducts, elevators, washrooms and pipe shafts are carried in a single mast. A newer and more significant example is the 22-story B. C. Electric Co. tower being built in Vancouver, designed by Sharp & Thompson, Berwick, Pratt, with Severud-Elstad-Krueger of New York and O. Safir of Vancouver as consulting engineers. Here an oblong cellular core acts as shear bracing, limiting wind deflection at the top to 2¾". Gradually the older line of modular structure development may combine with the newer one of structural cores, into some future system of large modular cores.

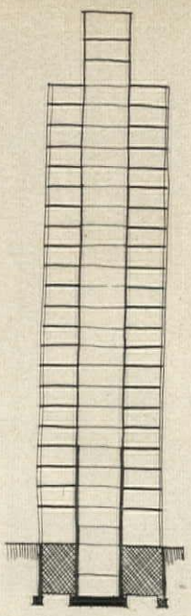




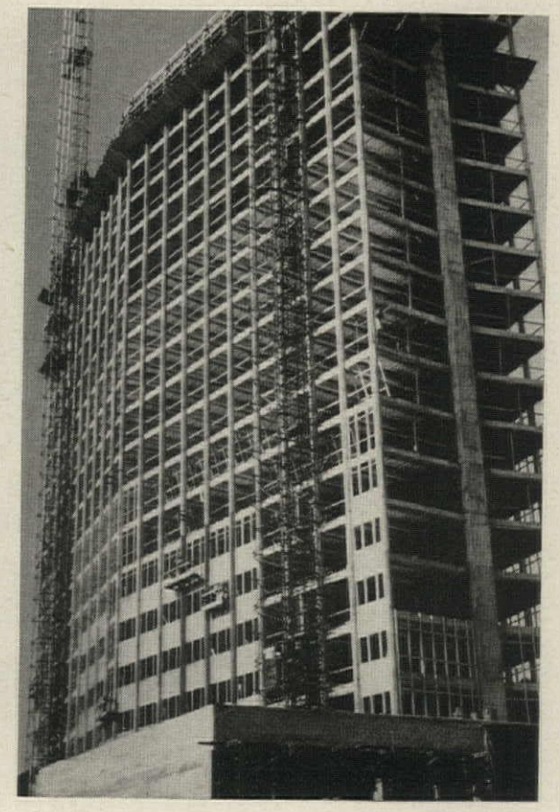


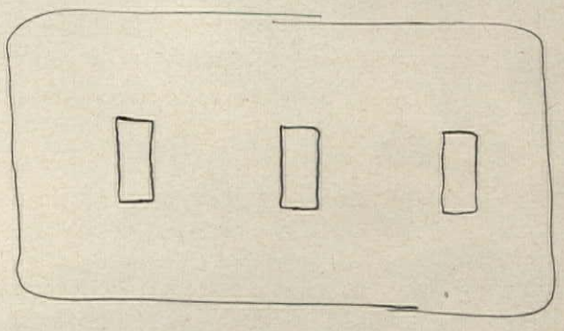
Modular cores, hollow columns containing piping and wiring, supported floors in Wright's 1924 project for the National Insurance Co., leaving windows unobstructed on cantilevered lower floors, floors unobstructed in towers.





EZRA STOLLER

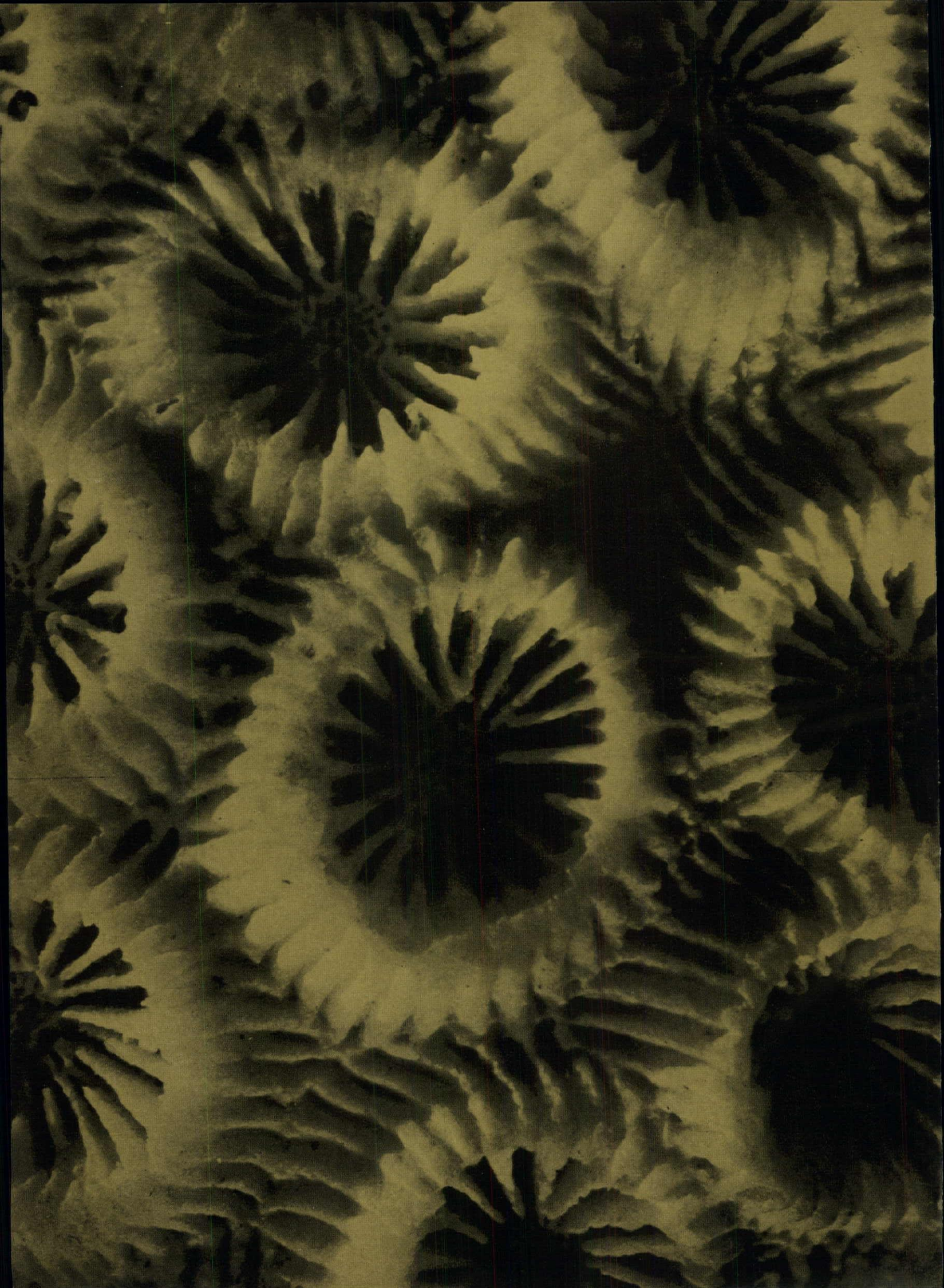




Cellular core of Wright's later Johnson Wax tower put elevator and air shafts to work as well, in central tubes of reinforced concrete branching into small (40′ dia.) laboratory floors. Mast is held by deep tap-root foundation.

Large cellular core of B. C. Electric Building, containing full-size elevator banks, washrooms and stairs, supports full-size office floors, which for economy also rest on toothpick-size structural window mullions.

Large modular cores may be the next step. These could permit still larger buildings of more flexible design, economically supported on stiff structural-mechanical spines which leave floors and windows free of columns.



A new approach to THE CITY

The growing interest in urban renewal presents a chance to develop a new architecture of city space to match the spaciousness of the new technology

The next 20 years will see the mighty centrifugal force of urban growth reach its crest, leaving a more or less total fabric of urbanization stretched over the land. At the vortex of this force, our central cities will be rebuilt, if only because there is a tendency to fill a vacuum.

Although the course of technological development during the next two decades can be foreseen with some confidence (as shown on the previous pages), no matching confidence can be mustered when it comes to applying that development in reshaping our central cities. Technological development adds freedom to our opportunity. But freedom can be a heady thing for a people without experience. And the sad fact is that we are gaining this freedom and this opportunity with less background and experience in the architecture of city space than at any time since western civilization began. In many previous eras there was an almost conversational knowledge of this kind of architecture which in our time is unknown.

Our new chance to fulfill the promise of cities will yield results no more palatable than before unless we evolve an architecture of cities to match tomorrow's technology.

DMITRI KESSEL

Inner city's walled courts. Peking, China.

THOMAS D. MCAVOY—LIFE

Fair time in Loudonville, Ohio

Going to school

Therefore, our best architects are going to school in history, recognizing that modern architecture, built upon a less integrated technology than that which lies ahead, has left the entire concept of city architecture out of its equations. Now these architects are looking again at such dispersed examples in time and space as the walled city of Peking, Georgian Bath, the Moorish Alhambra, and the villa gardens of the Italian Renaissance. Beyond looking at these consciously shaped examples of city space, they are seeking to understand the happy accidents—the turn-of-the-century American country fair, the cow-path streets of Boston, the courtyards of medieval Germany and the close-built alleys of Casablanca's Casbah.

Water castle of Burgsteinfurt, Germany

FRITZ GORO

Like today's spreading urban fabric, star skeletons build coral reefs by meshing together at their outer edges, leaving voids at their centers.

The only real attempt at city architecture we know, the "City Beautiful" movement of the early 1900's, is of little help. With few exceptions the results were pompous and windy. The movement took the last gasp of the Renaissance—the megalomania of Louis XIV's Versailles—as the culmination, and then compounded the error by considering it a suitable model for the American city.

One exception is the development of Wacker Drive at Michigan Avenue, where the Chicago River met Burnham's grand plan. It is not too important that the credit should perhaps go to the fortuitous curve of the river. It is enough that it is good.

Progress by squares

The New York Public Library, completed in 1911 at the height of the "City Beautiful" movement, waited until 1935 to receive a suitable setting. At that time, a panel of lawn surrounded by a bosk of trees was set below the great terrace of the library. Now, with the trees full grown, Bryant Park and the library provide the essential contrast of a big and ordered space containing areas of quiet intimacy.

At the same time the Park Department was redoing Bryant Park, Rockefeller Center was being built up the street. The complex of structures, occupying three city blocks, was organized around a plaza, about one-tenth as big as Bryant Park. At base, the plaza was the shrewdest real estate coup of the century. It took 57 feet of Fifth Avenue prestige and led it back into the middle of the project.

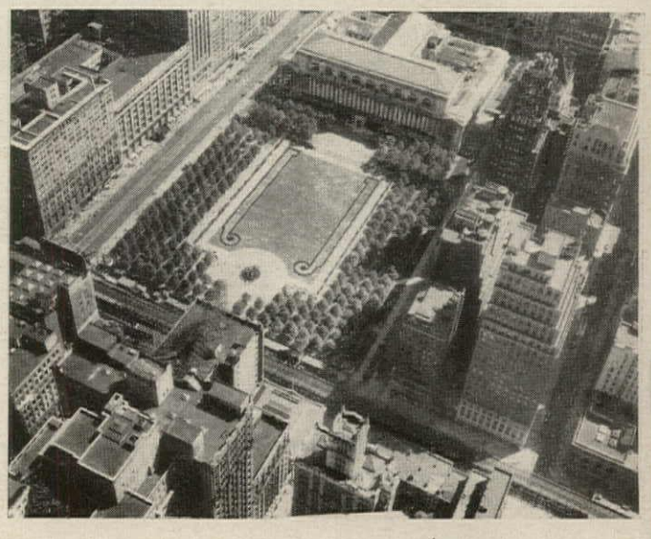
Today the plaza is the quintessence of city space. There is no grass, the trees can almost be counted on your fingers, the rest of the planting (in a few geometric flower beds) is actually sparse, yet it makes Rockefeller Center more than a complex of buildings. It is the promise of a city.

Nearly 20 years later, they took the measure of the Rockefeller Plaza into Pittsburgh and carved Mellon Square out of the built-up heart of the Triangle. The design, in its play of diverse shapes, levels and textures, compensates for the less lively aspect of what goes *on* in the space (as compared to the perpetual fair atmosphere of Rockefeller Plaza). Mellon Square's design indicates the more dynamic quality achieved when modern architecture deals with modern city space.

Now there are a whole host of projects afoot attempting to establish a more open and dynamically shaped city space. Most can be dismissed as merely introducing a little prestige by leaving an uncovered

WIDE WORLD

Contrast of a big ordered space containing areas of intimate human scale under the trees makes New York's Bryant Park a fine example of city space.



CHICAGO AERIAL INDUSTRIES

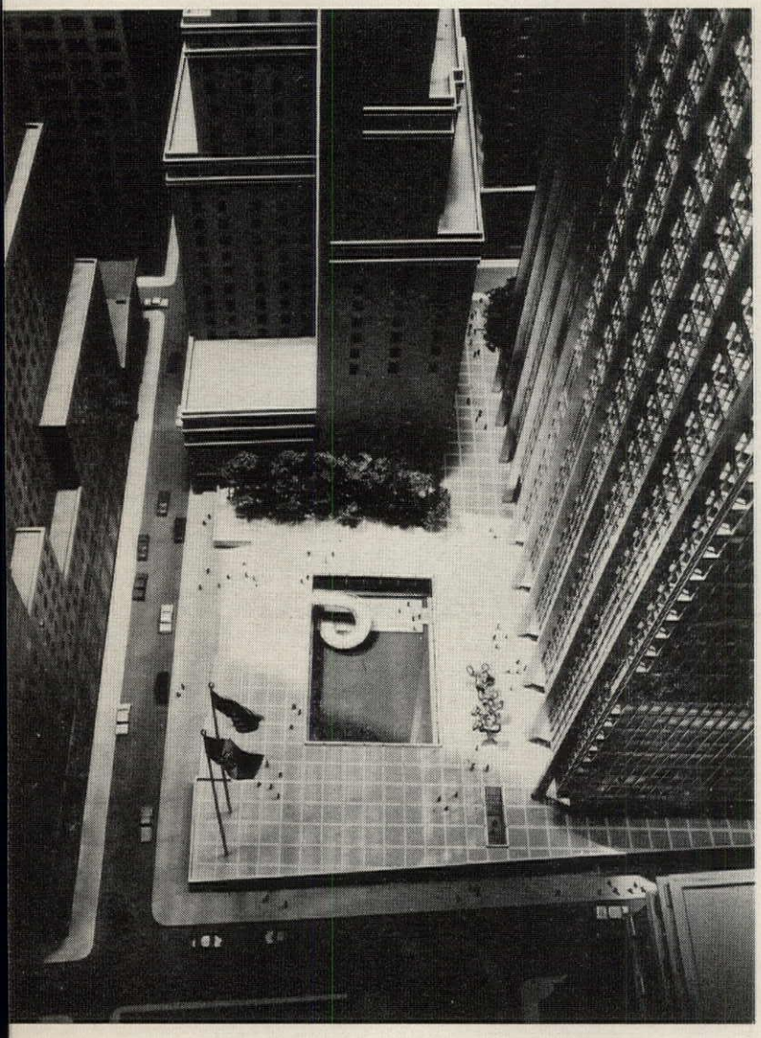
Beyond the Tribune Tower, Wacker Drive hugs the edge of the river, shaping a lively spaciousness sympathetic to the spirit of Chicago.

EDWARD RATCLIFFE

Rockefeller Plaza, after 25 years, is still exceptional. This small space in the heart of New York is like a perpetual fair—and the people love it.

Mellon Square, for the practical soul, is the roof of a parking facility. But for Pittsburgh it is a breath of fresh air in the built-up Triangle.

SAMUEL A. MUSGRAVE



Tight-packed Wall Street area of New York is opened up with a 2½ acre raised platform base for Chase Manhattan's 60-story headquarters building. Skidmore-Owings-Merrill, architects.

niche in the zoning envelope. At best, these projects yield a kind of efflorescence of the street. They are only incidents awaiting the organization of more fundamental features of city space.

There are also many city centers now being projected in rude resemblance to LeCorbusier's "Ville Radieuse" project of the 1920's. Most of these projects will be as windy and dull as Cleveland's "City Beautiful" type mall.

A few of the projects in the works promise much. The re-doing of Chicago's Fort Dearborn project will lift all the buildings up on stilts, giving a fine unbroken sweep to the terrace playing in and out under the structures. The Chase Manhattan project will put a 60-story office tower over a 2½-acre plaza in the midst of New York's jammed Wall Street area.

Space by blocks

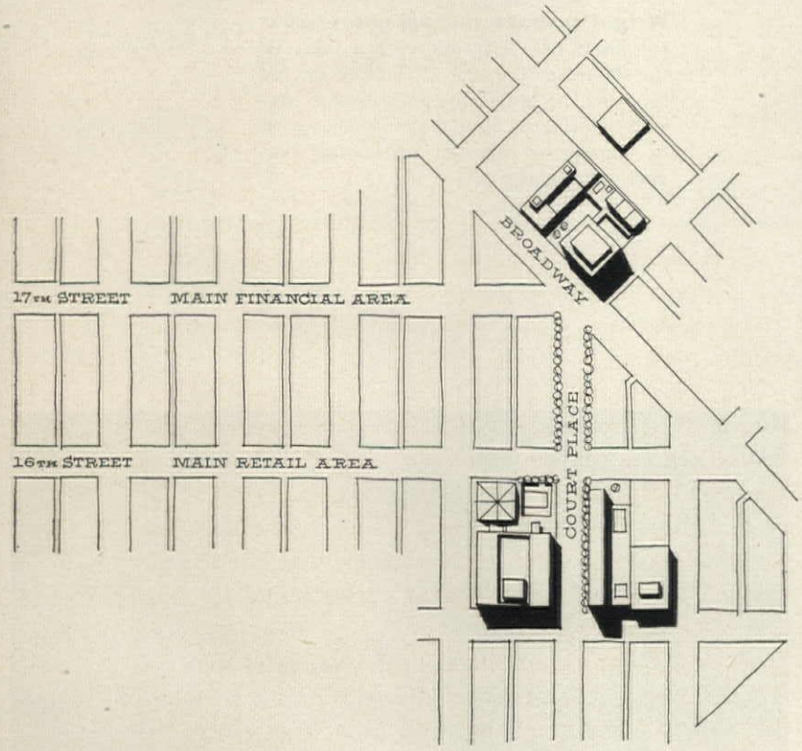
The wide-open gridiron plan of downtown Denver is being organized around an important feature in Courthouse Square, now being built by the realty firm of Webb & Knapp. A two city block area, tightly knit, will contain a hotel, a department store, a television studio, innumerable shops and three levels of underground parking.

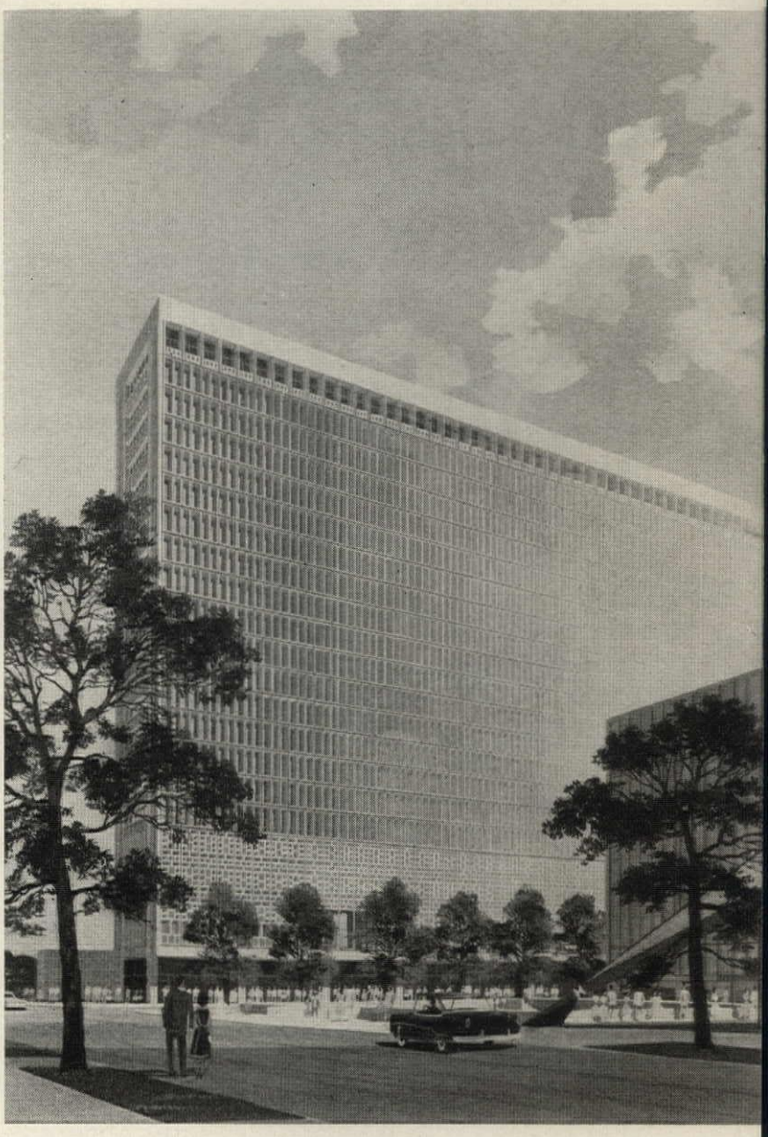
The project, one block from Webb & Knapp's earlier Mile High office center (AF, Nov. '55), is organized around a plaza containing an ice skating rink dropped one level below the street. This plaza, in terms of its relationship to Mile High and its openness to 16th Street (Denver's major retail street), will provide an implicit challenge and a cogent opportunity for the rest of downtown Denver.

Webb & Knapp's architect, I. M. Pei, tried hard to get the two blocks of Court Place running through the project and connecting with Mile High closed to traffic and developed as a pedestrian esplanade. (The street was actually closed for nine months during the first stages of construction with no apparent ill-effect on traffic.) But the city didn't see it his way. Failing this, he now plans to leave a row of trees along this connecting street as a visual hint of what might be. Perhaps the trees will entice the city to reconsider. In any case, the plan suggests that the textured slab of the hotel and the paneled block of the department store could act as a terminal for a larger area than the square itself. This quality of inspiring and encouraging extension is something that Rockefeller Center doesn't have.

Word now comes that the architects of Denver are setting to work with the city-county planning depart-

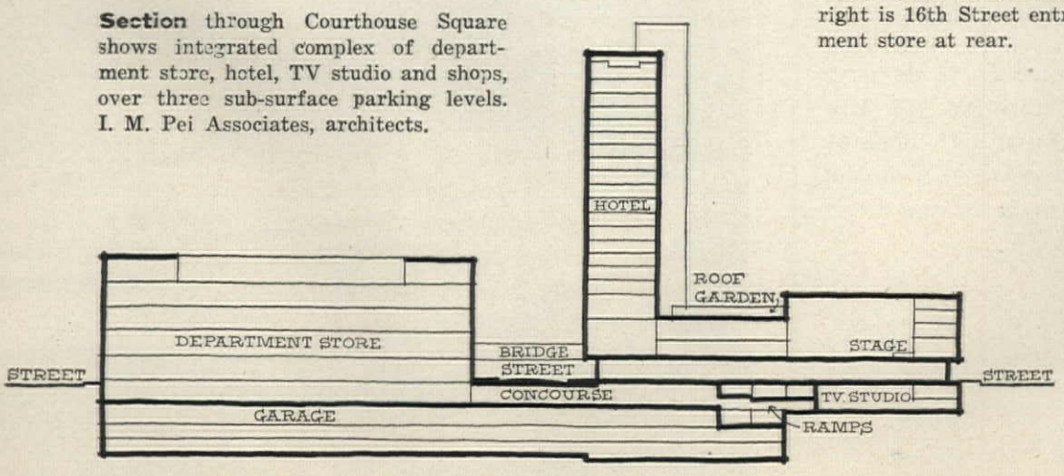
Mile High Center, Webb & Knapp's first Denver development, sets precedent for open plan of Courthouse Square. Pedestrian esplanade linking Mile High's court (seen above) and plaza of Courthouse Square is still possible.





Denver's Courthouse Square viewed from 16th Street. Row of trees in front of textured slab of hotel marks Court Place. Glass enclosed shell structure on right is 16th Street entrance to department store at rear.

Section through Courthouse Square shows integrated complex of department store, hotel, TV studio and shops, over three sub-surface parking levels. I. M. Pei Associates, architects.



ment and the Downtown Improvement Association to replan the city's central area. Perhaps Denver can evolve a pattern—a dynamic kind of block-by-block approach to city architecture involving not only space but time.

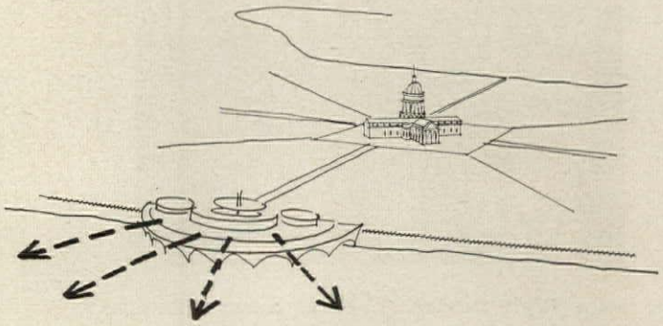
The master stroke

In Madison, Wis., another experiment in space creation is under way. Frank Lloyd Wright, not often acknowledged as a master of city architecture, nor as a respecter of traditional city values, will demonstrate both of these qualities when his Monona Terrace project—a civic center for Madison, Wis.—is built. He will prove this by accepting the challenge of a city built between two lakes without decent exposure to them. He will prove this by extending an axial street held down on one end by a capitol building with a huge Renaissance dome on it—symbol of everything he fought to get rid of in a new American architecture.

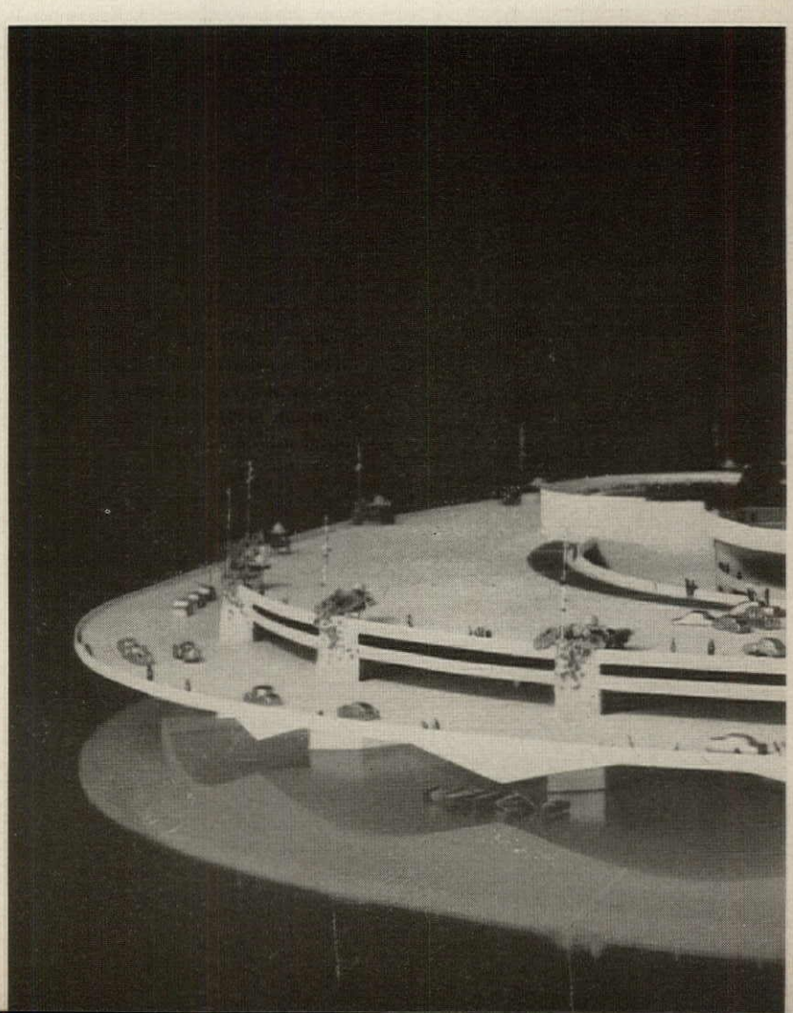
The civic center will be a stack of semi-circular terraces built over the lake, topped by a cluster of circular terraces at the level of the present street. Its effect on central Madison will be that of a megaphone—a space megaphone—opening out the tight little existing terminal to the wide drama of Lake Monona. Here is something completely new, something beyond historic emulation, yet its net effect will be to enhance the old—not destroy it.

The deceptive thing about Wright as a master of city architecture or as a respecter of tradition is that he does not believe in timid gestures of obeisance. When he deals with the past, he adds to it boldly. When he deals with the city, he makes it something beyond its original equations. If this boldness is tempered by innate sensitivity to the conditions at hand—an essential quality in Wright's greatness—it becomes a master stroke for re-creation of the city.

Perhaps the Wright project may serve to indicate the architecture of cities that must evolve in the next 20 years if we are to prove our civilization. We have the technology to build such cities; we lack none of the means or techniques. Now what we need is the vision and thought and fight to make of the city's fabric a living and spacious thing.

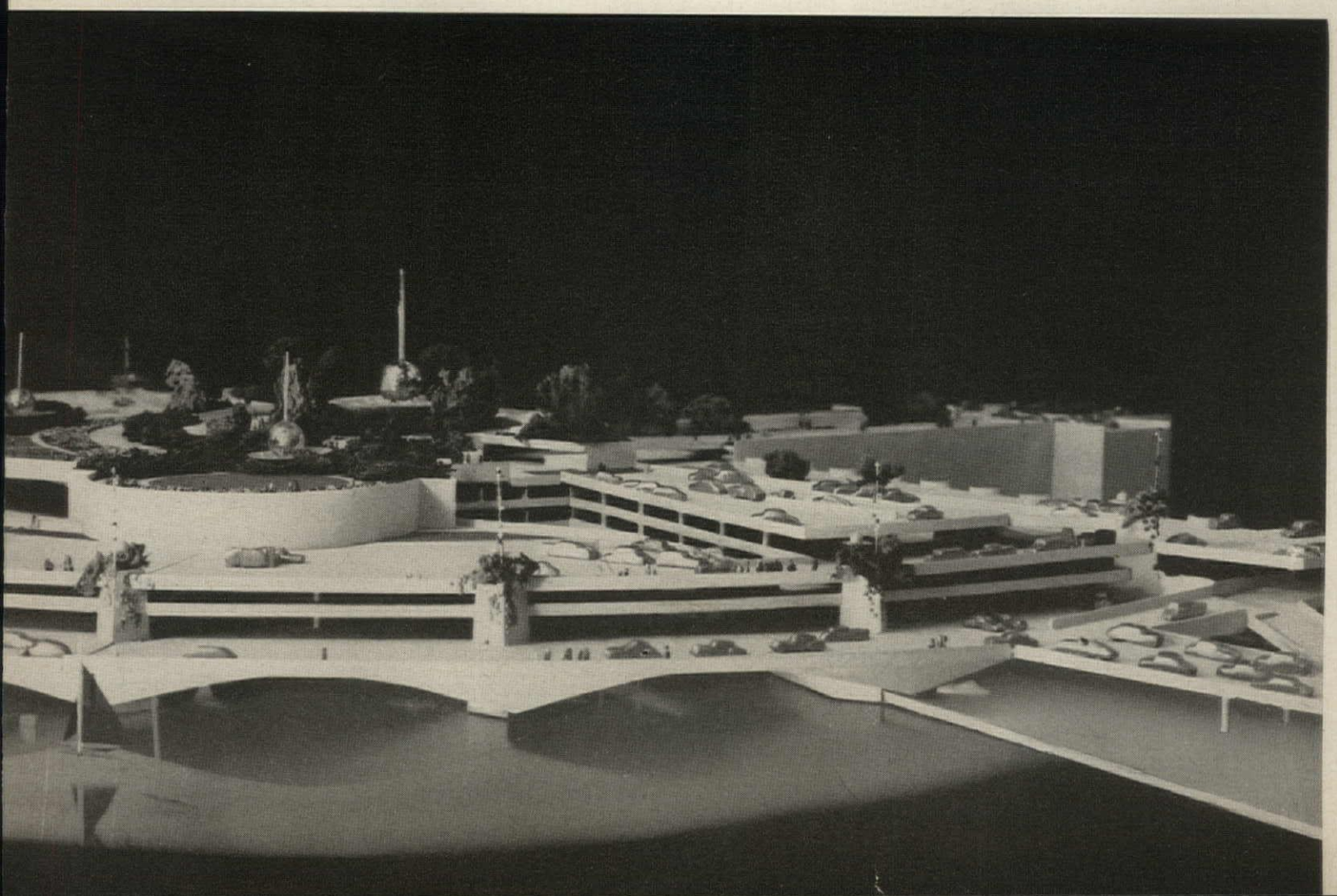


Wright's space megaphone extends the heart of a city out over a lake. In the Monona Terrace Civic Center for Madison, he builds up semicircular concrete platforms from water level, topped by cluster of planted pedestrian terraces at former street level.



FAIRCHILD AERIAL SURVEYS

Madison, Wisconsin is ideally set between two lakes, but railroad tracks on Monona shoreline cut city center from lake. Wright would bridge over tracks.



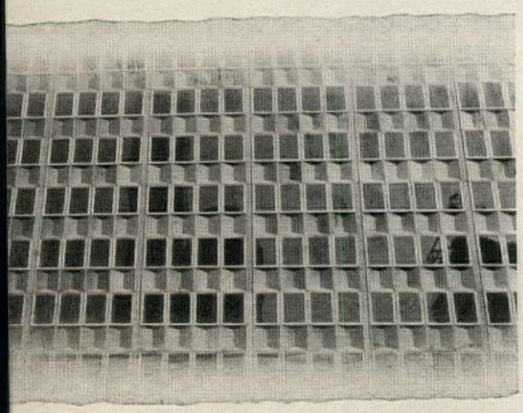
The Machine-made Parthenon

Page 109 of this issue carries a tantalizing technological prediction. By 1977, fabricators of building parts may be able to "talk" to their machines through electronic signals, ordering them to vary the product within feasible limits. Mass production industries already do this: the automobile procession coming off an assembly line today is made up of cars not all alike but varied in color, style and details of equipment.

Shape and size are the important characteristics of building parts which promise to escape rigid standardization. For example, a single wall might be drawn up by the architect with a whole range of slightly different panels and windows, and these could be produced by the manufacturer without pause and in proper sequence.

Difficulties would have to be overcome, of course; but imaginative men are surely entitled to an evening's speculation on the possibilities.

A wholly new world of architecture emerges.



"An underlying one-one-one-one rhythm."

Today our streets are becoming an ever more monotonous picture of standardized repetition. Even the greatest modern architects usually design on unit "modules." Since not all architects can be virtuosos, our current architecture as a whole betrays the meagerness of its underlying "one-one-one-one" rhythm.

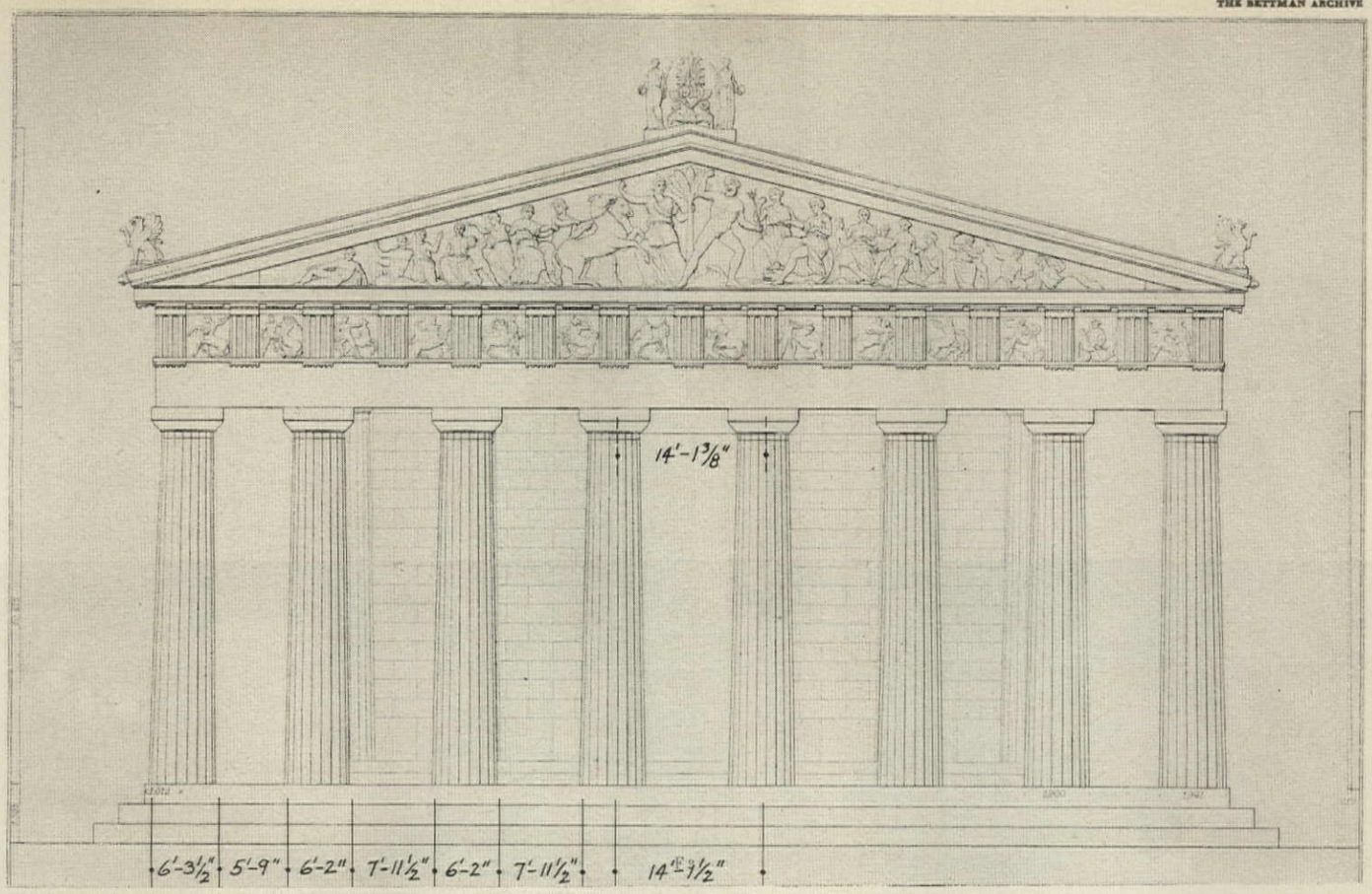
Now the Parthenon itself was based on fully standardized elements. Its geometry looks so beguilingly exact that dozens of scholars have sought to reduce it to one or another rule, and the practical-minded Romans derived modular systems from it. Yet its liveliness has eluded them all and will baffle them forever; for the inescapable fact about the Parthenon is the subtlety with which its "standard" components are modified in shape and varied in dimension. Thus, as every architectural student knows, the columns are not cylindrical but tapered, and on most the taper is eccentric toward the building; the corner columns are slightly thickened, and those near the corners of the building stand closer together. So too the base of the building swells gently upward, and indeed all the horizontals are almost invisibly curved to be more beautiful.

The workmen on the Parthenon were able to fit all these divergencies together because they all understood the standard requirements of the underlying system, the procedure. Now this is just what our production men seem to be on the point of teaching our machines to do.

Invariably the great artist seeks to rule his tools to produce delight, instead of letting them rule him. If, now, instead of letting "mechanization take command" we can teach it to take commands, plural, can we perhaps begin to dream of the new "machine-made Parthenon" — modern and wonderful?

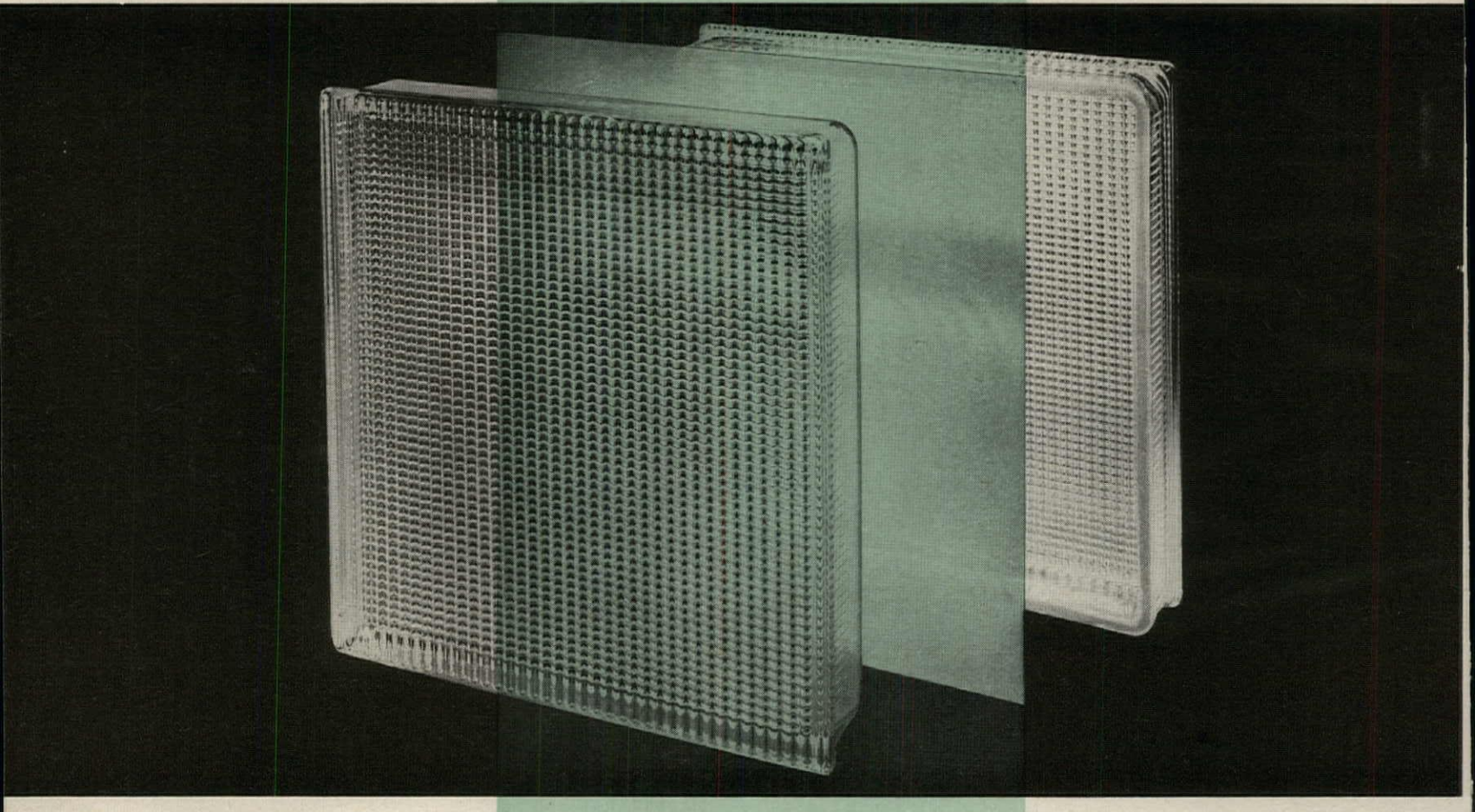
D. H.

THE BETTMAN ARCHIVE



"All the standard components are subtly modified in shape and varied in dimension."

DMITRI KESSEL—LIFE



SUNTROL...
color... function

Subtle green Suntrol adds the design expression of color to glass block fenestration. A sealed-in fibrous green screen, shown in the exploded view at the left, produces a pleasing accent tone on panel exteriors . . . a soft, cool glow inside.

Functionally, Suntrol keeps out more heat and glare than other types of glass.

A modular product, Suntrol is available in two sizes—8″ and 12″—and in three types—light-directing, light-diffusing, and toplighting.

Specified for color, or for function, or both, subtle green Suntrol offers the architect a versatile material for forecast designing. Suntrol is an exclusive PC product.

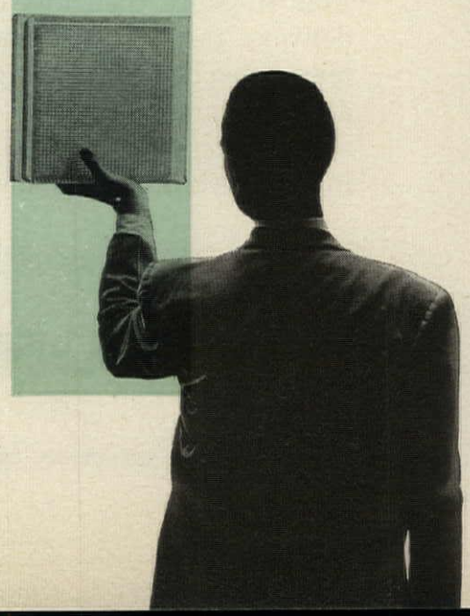
For details, write Pittsburgh Corning Corporation, Dept. E-17, One Gateway Center, Pittsburgh 22, Pa. In Canada: 57 Bloor Street West, Toronto, Ontario.

PC Suntrol* Glass Blocks

*T.M. Reg. applied for

PITTSBURGH PC CORNING ®

Also manufacturers of FOAMGLAS® insulation

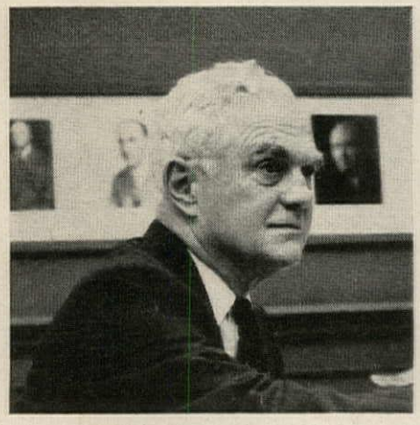


"We must reach and influence every factor in the buying decision"

says **D. D. Hunting,**

Vice President and Sales Manager

STEELCASE INC



"We believe that the most efficient, best looking offices are planned as an integral part of the building. Because of this we try to get early and active co-operation of everybody concerned with the buying decision — even before the building itself is designed!"

"To ensure the best results from our modular system of design, the owner's decision to install Steelcase furniture must be enthusiastically supported by the architect, design engineer and, in many cases, the general contractor. So we must reach and influence every factor in the buying decision."

"We get strong selling assistance from our advertising in FORUM. In fact, FORUM is our primary book in the architectural-building field because—and we have learned this from experience—FORUM reaches and influences decision-making factors most important to us."

David Hunting of Steelcase, a stand-out sales director in every way, has one thing in common with every other successful building product salesman. He knows that effective selling in the building field is the direct result of selling the entire building team.* That is why effective building product sales require the constant support of an advertising campaign in Architectural FORUM. More than any other magazine FORUM delivers the highest concentration of building team members: not only architects, engineers and contractors but also decision-making clients who are *actively* engaged in building new buildings, maintaining and modernizing old buildings.

architectural **FORUM**
the magazine of building

THE MAJOR INFLUENCE IN AMERICAN BUILDING

*HOW BUILDING PRODUCTS ARE SOLD. Dun and Bradstreet's report on a personal interview study made among leading building product sales directors and distributors. Write for your copy: Market Research Manager, Architectural FORUM, 9 Rockefeller Plaza, New York 20, New York.

QUICKLY-ERECTED CURTAIN WALLS FOR ALL TYPES OF BUILDINGS

Do 3 Jobs in 1! Cemesto Panels provide a *structural wall* . . . thermal *insulation* . . . maintenance-free incombustible *finished surfaces* inside and out. Save on heating and air conditioning costs. They blend harmoniously with brick, stone, wood, glass, and metals. May be worked with ordinary tools on the job, or pre-cut to required special sizes at the mill for faster application. Panels fasten to steel framing with metal accessories, or to wood framing with nails or screws.

Attractive Extruded Aluminum Accessories harmonize with gray Cemesto Panel surfaces to lend beauty to curtain walls. Built-in Neoprene gaskets assure weather tightness.

Architects specify this remarkable all-purpose building material for *curtain walls, roof decks,* and *movable interior partitions.* Write today for New File 5500 . . . 52-page simplified data book on design and application details of Cemesto Structural Insulating Panels. The Celotex Corporation, Dept. AF-17, 120 S. LaSalle St., Chicago 3, Ill.

Another Famous CELOTEX *Product*

CEMESTO
REG U S PAT OFF

STRUCTURAL INSULATING PANELS

THE CELOTEX CORPORATION • 120 S. LASALLE STREET • CHICAGO 3, ILLINOIS

for INDUSTRIAL BUILDINGS

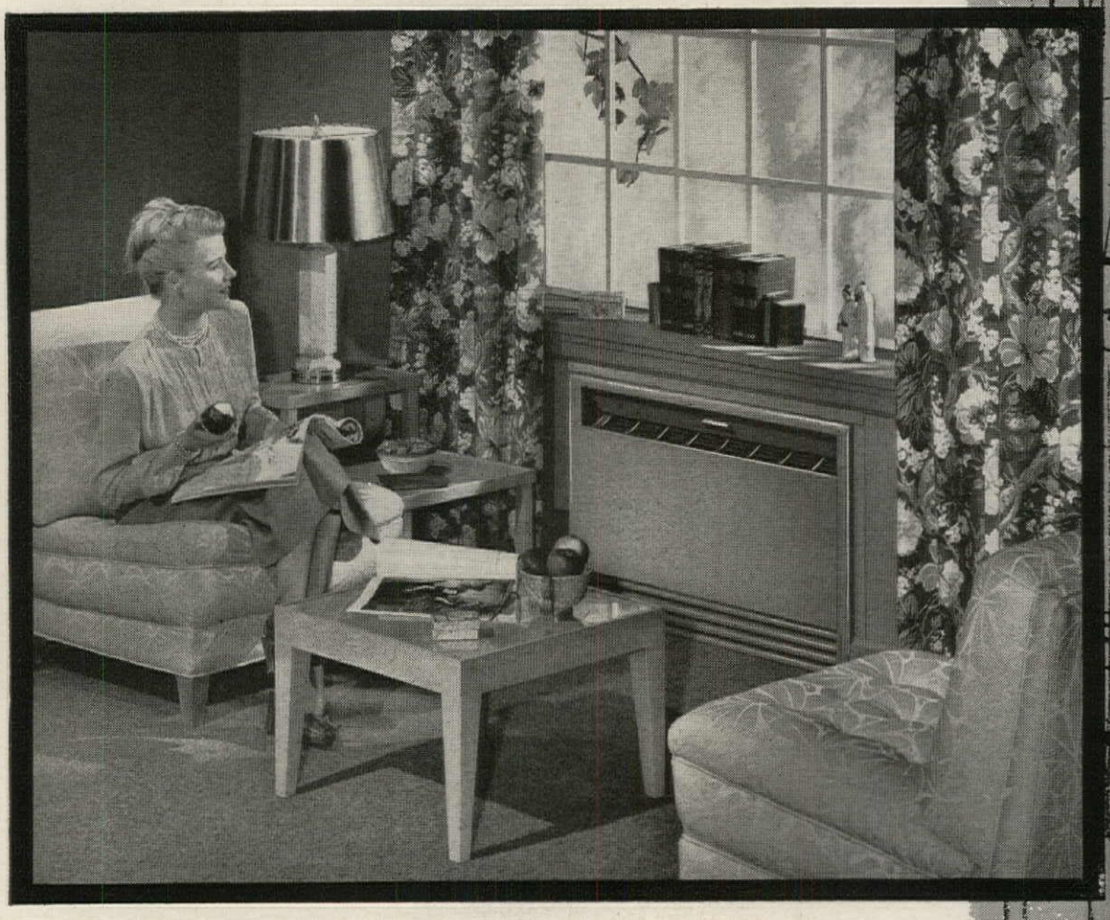
for COMMERCIAL BUILDINGS

for SCHOOL BUILDINGS

for RESIDENTIAL BUILDINGS

***Cemesto Panels** are strong, rigid, permanent structural insulating units. Their core is Celotex cane fiber insulation board effectively protected against dry rot and termite attack by the exclusive Ferox® Process. Non-combustible cement-asbestos facings are bonded to both sides of this insulating core by a moisture-proof adhesive. Cemesto Panels resist fire, weather, and wear, need no painting or maintenance.

Gentle heat uniform, healthful



...yours from Modine –

first name in convector radiation

FOR those who want modern heating at its finest, there's only one answer — Modine convector radiation. Unmatched performance is combined with quiet beauty . . . long life with uniform, healthful heating. Exclusive features, like fingertip damper control, are further reasons why architects and engineers select Modine for their finer buildings.

You can choose from 30 types, 8000 sizes of Modine Convectors—deluxe, standard and institutional models—free-standing, fully and partially recessed. Call the Modine representative listed in your classified phone book, or write Modine Mfg. Co., 1507 DeKoven Ave., Racine, Wis.

Modine
CONVECTOR RADIATION

R-1304

In Canada: Sarco, Ltd., Toronto

Forms, the brake on bold concrete engineering, are also its biggest hope

"Although reinforced concrete has been used for over 100 years and with increasing interest during the last few decades, few of its properties and potentialities have been fully exploited so far. Apart from the unconquerable inertia of our minds . . . the main cause of this delay is a trivial technicality: the need to prepare wooden forms."— Pier Luigi Nervi, the great Italian master of reinforced concrete.

Here is indeed the maddening paradox of reinforced concrete construction: The nature of the material is plastic. Most efficiently and fittingly (and beautifully) used, it embodies variable cross sections and curved surfaces. But this has nothing to do with the efficiency of the sawmill, source of the traditional material for forms.

The cost of first erecting a wooden building, then a concrete building, then dismantling the wood building, is high at best; when the carpentered structure must be curved and complicated, the cost becomes impossible in the US.

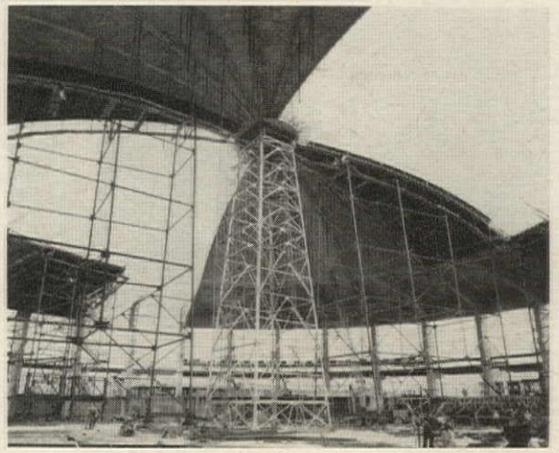
Prefabrication of columns, girders, bents and panels, lift slab, incorporation of metal pans and cardboard boxes into forms, are all excellent means of cutting forming costs. But as ordinarily conceived, these methods do not come to grips with the problem Engineer Nervi is talking about—the problem of forms for structures designed to take maximum advantage of reinforced concrete's uniqueness.

In the next two decades, we may expect solutions to Nervi's problem from pursuit of these four approaches:

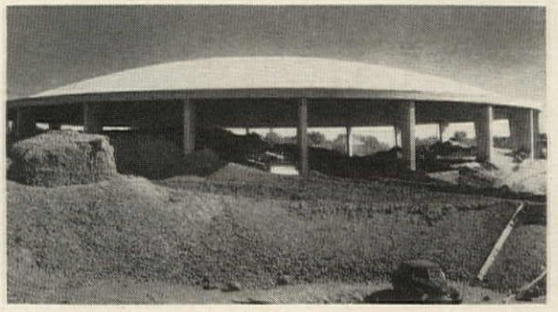
▸ Large structures can be designed for repetitive use of curving or complicated forms. The Dallas auditorium, with its rotating falsework, is a good example of this most promising approach to large structures. Consulting engineers Ammann & Whitney, noting that formwork for large roof areas high above ground costs $4.50 to $8 per sq. ft. of floor area, report a 9-time reuse of forms can cut those costs to between 70¢ and $1 per sq. ft.

continued on p. 157

Formwork for one of the masterly shells by Architect Felix Candela in Mexico illustrates complex wood construction ironically required for bold exploitation of reinforced concrete's plasticity.



Revolving falsework for long-span dome of Dallas auditorium: Dome is divided into 16 pie slices butting against a central circular plate (temporarily held by oil derrick) and arising from a cantilever arm at the outside. Each pair of slices forms a self-supporting arch, thus one pair was poured at a time, in turn. Dome is 204′ in dia., cantilever arms are 48′, giving 300′-dia. arena. George L. Dahl, architect, Ammann & Whitney, engineers.



Mound of sand and gravel, shaped and covered with plywood, was form for 220′-dia. dome of Albuquerque auditorium. Columns were sunk into ground before dome was poured; after pouring and setting, structure was dug out. Ferguson, Stevens & Assoc., architects and engineers.

PHOTOS: C. E. REDMAN

Every Foldoor is built around this "beefier" hinge

Leave the grunt-and-groan test to the wrestlers. All we want to point out is: strength and durability of a folding door hinge primarily *on the hinge*. Rods and pantograph parts are important, of course. But it's the hinge that takes the stress and strain of suspension and operation. The stronger the hinge, the more durable the door. That's why FOLDOOR designed the exclusive, 5½" Multi-V hinge—*and uses it in every* FOLDOOR *made*. This hinge is structurally solid, without cut-out "soft" spots. It provides extra rod support. It contains more *working* metal, inch for inch, than any other folding door hinge known. And because it is "stubbier," it's bound to be extra rigid. Combined with FOLDOOR's unique multipoint hinge-to-rod welding—heavy track—special trolley wheels—this Multi-V hinge assures the durability you demand on *any* installation. Ask your FOLDOOR Distributor. He's listed under "Doors" in the yellow pages.

HOLCOMB & HOKE MANUFACTURING COMPANY, INC.
1545 Van Buren Street, Indianapolis

In Canada: FOLDOOR OF CANADA, Montreal 26, Quebec
Installing Distributors in All Principal Cities

ONLY FOLDOOR IS DIFFERENT AND BETTER THESE SIX WAYS

1. Easier operating **2.** Neater installation **3.** Better appearance **4.** Greater space-saving **5.** Structural durability **6.** Long life in actual service.

HOLCOMB & HOKE
FOLDOOR®
THE SMARTEST THING IN DOORS

F

Gentlemen:
Please send free copy of new 1956 A.I.A. FOLDOOR Catalog

NAME_____

FIRM_____

ADDRESS_____

CITY_____ STATE_____

STRUCTURE *cont'd.*

▸ Large portions of orthodox formwork can be eliminated through design. The Albuquerque hall, with its use of Mother Earth in place of scaffolding, is an odd and ingenious example. But this approach has obvious limitations.

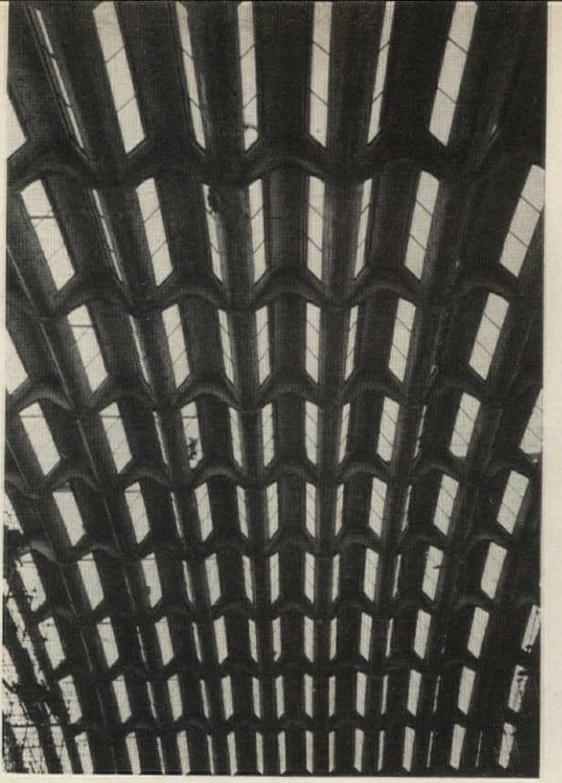
▸ Forms may be made in the future of large, re-usable plastic-glass fiber laminates—plastics coming to the aid of a plastic structural form—which can be molded to contain their own struts and other supports.

▸ Large, relatively complex elements can be designed for on-site prefabrication. The great Turin hall by Nervi is composed of prefabricated ferro-cemento sections (steel mesh cement plastered). As done by artisans in Italy, with the cement virtually spoon fed into the mesh, this technique is unsuitable for the US, but Engineer Mario Salvadori suggests the feasibility of factory-like production of ferro-cemento. Ferro-cemento is not reinforced concrete but a new kind of steel-and-cement material.

A very different example of on-site prefabrication is a supermarket roof, its twelve reinforced concrete shells poured one after another on the same form during the last two weeks of December in New Canaan, Conn., and now being hoisted. The shells weigh 12 tons each, measure 24′ x 24′. Such shells are suitable not only for serial use as here, but individually for small buildings, say, gas stations or hamburger stands.

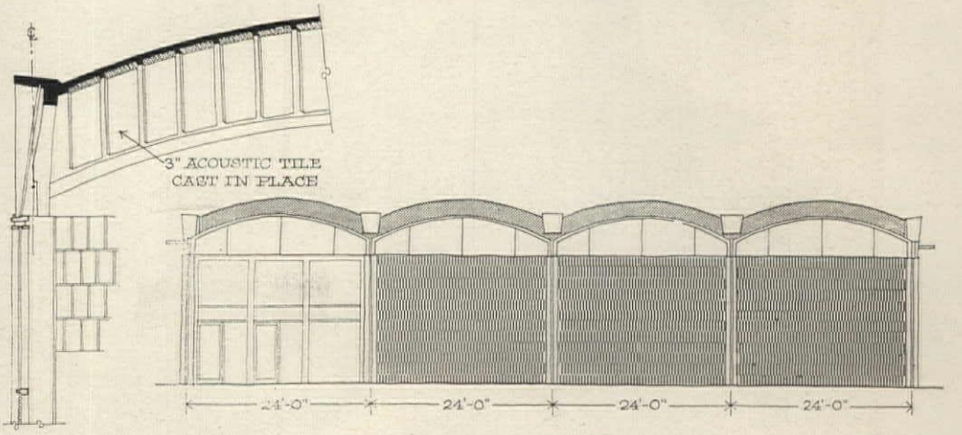
The supermarket is completely practical; it got eager bids from four local contractors; the roof is costing $1.90 per sq. ft, beating out all competitive methods and materials—as good a demonstration as any of the inherent economy that lies in exploiting the innate properties of a material well.

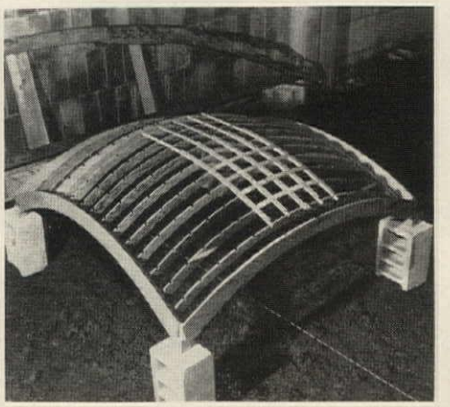
Describing the ancestry of this structure, Salvadori, consultant to Architect Victor Christ-Janer, says, "In the Mediterranean countries, putting tiles together is an old story." Putting together tile shells himself in Italy in 1955, Salvadori pondered the possibilities of using immensely larger tiles, reflecting that the sections of Nervi's Turin hall were essentially tiles too. Nervi's tiles were 13′ long, weighing less than two tons, the maximum which cranes available in Italy could handle. "Shows how rather simple technological deficiencies can set limits," says Salvadori. "The 12-ton supermarket shells are by no means the largest we can handle."



MONCALVO

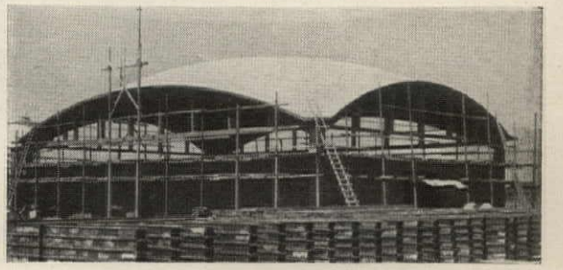
Vaulted roof of Turin exhibition hall by Nervi is made of repeated precast sections, each section embracing a pair of glazing openings. Trough shaped, the sections also served as "forms" for poured-in-place joints along their crowns and hollows.





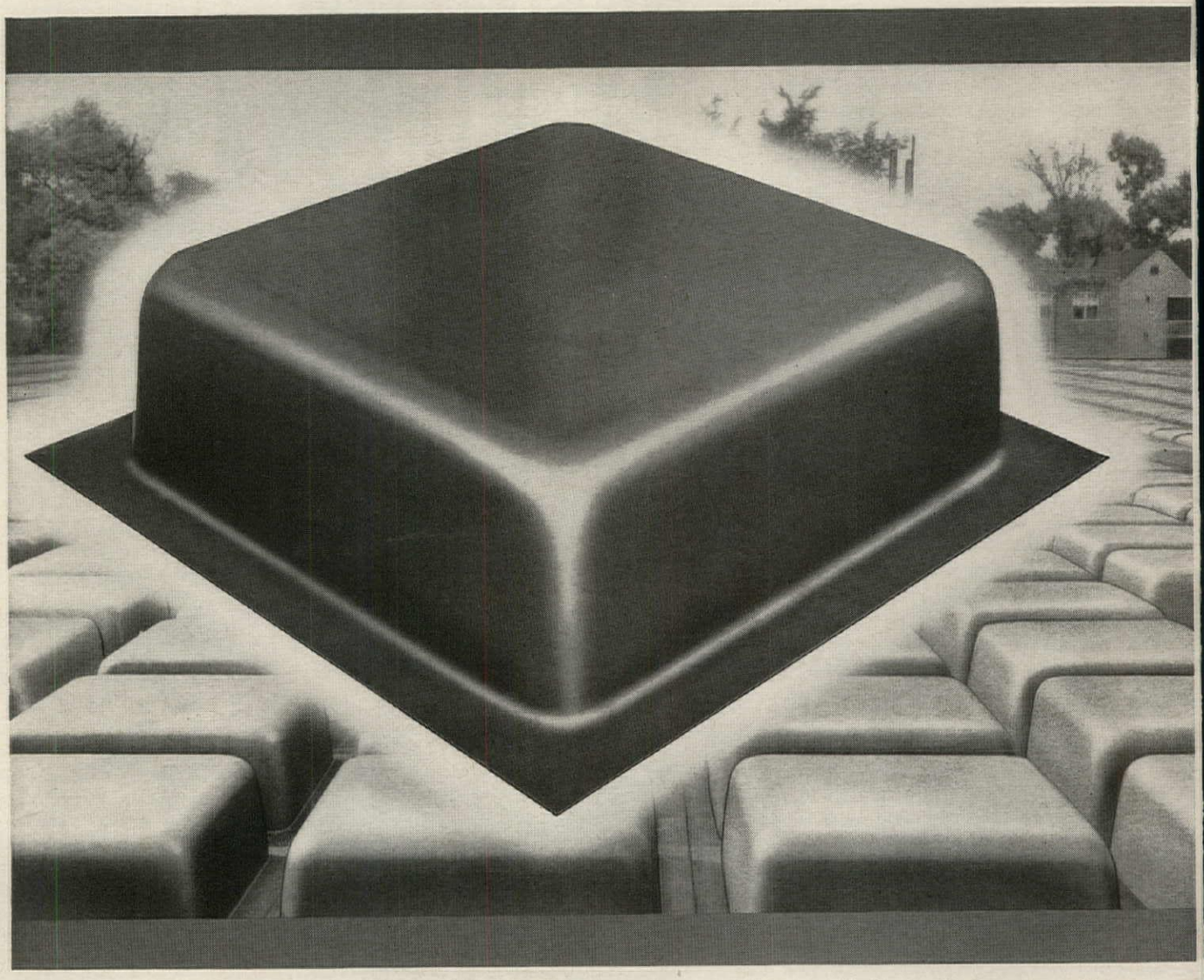
E. J. CYR

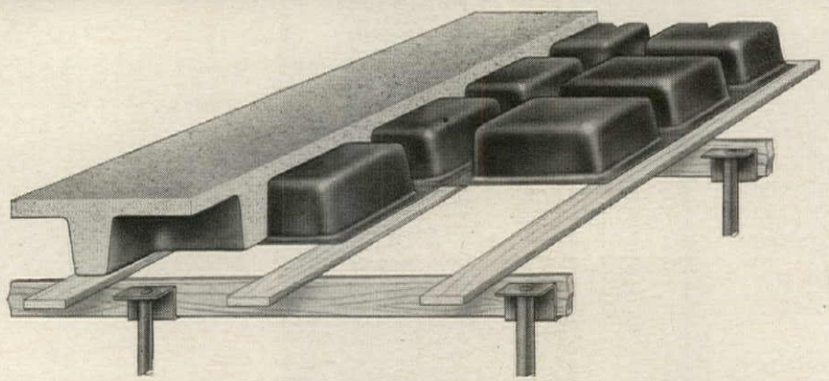
Shell-roofed supermarket, now under construction, uses 12 precast shells, poured at site, then hoisted. Behind quarter-size model of form is actual form rib. Insulation blocks will complete the form and be incorporated in finished shells. Victor Christ-Janer, architect; Weidlinger & Salvadori, engineers.



Tile shell built by Salvadori in place on forms is 61′ x 92′, uses hollow tiles 12″ x 8″ x 5″ covered with 1/10″ wire and 1″ of concrete. Wire reinforcing weighs only ½ lb. per sq. ft.; under load of 25 lb. per sq. ft.; shell deflects less than 1/10″.

WIDE OPEN *SPACES...*





Showing how Steeldomes are used in forming waffle-type (two-way) concrete joist construction. Steeldomes are rigid, deep-drawn, one-piece units. Flanges forming standard-width joist soffits are an integral part of the Steeldomes. When erected Steeldomes are butted at all soffit joints, and eliminate the common defects of forms which must be lapped. Wide column spacings for open floor areas are easily achieved, because of (a) the basic economy of two-way construction, and (b) the saving of dead-load through use of a joist framing system. Story heights are decreased by the elimination of deep beams. Standard Steeldomes have a void of 30" x 30" and an overall plan size of 36" x 36" including flanges. Standard depths are 8", 10", 12", and 14".

WITH ECONOMY...FOR TODAY'S CONSTRUCTION

...ALL MADE POSSIBLE WITH THE NEW CECO-MEYER ONE-PIECE STEELDOME METHOD OF FORMING WAFFLE-TYPE CONCRETE JOIST FLOOR SYSTEMS

Maximum use of floor space is a must in today's functional buildings. And the most practical way to design wide open floor areas . . . with no projecting beams . . . is by using waffle-type concrete joist construction formed with Ceco-Meyer one-piece Steeldomes. The new Ceco method is the most economical way of forming waffle-type concrete joist construction. In most cases you save up to 30% in materials . . . up to 40% in floor weight compared with the use of flat plate. Besides saving money, labor and materials, Ceco Steeldomes form smooth concrete surfaces for exposed ceilings of high quality finish—pleasing waffle-pattern design at no extra cost. R/C duct underfloor electrification may be readily installed—and pipes, ducts and other mechanical equipment can be located without interference of projecting beams. In planning your next building project, call in your Ceco product specialists.

CECO STEEL PRODUCTS CORPORATION

Offices, warehouses and fabricating plants in principal cities
General Offices: 5601 West 26th Street, Chicago 50, Illinois

IN CONSTRUCTION PRODUCTS CECO ENGINEERING MAKES THE BIG DIFFERENCE

Ceco-Meyer Steelforms / Concrete Reinforcing / Steel Joists / Metal Roof Deck / Windows, Screens and Doors / Metal Lath

CECO STEEL

"CREATIVE ENGINEERING" BY CECO—with a variety of building methods and products to meet any design problem. See CECO in the early planning stage for Steel or Concrete Joist Floor Systems—the most economical underfloor electrification—the widest line of Steel and Aluminum Windows and Curtainwalls. All will help you achieve individuality in building design. And at CECO construction materials and services can fit the tightest budget.

CECO STEEL PRODUCTS CORPORATION
5601 West 26th Street, Chicago 50, Illinois

Please send me your descriptive bulletin on Ceco Steeldomes, No. 4006.

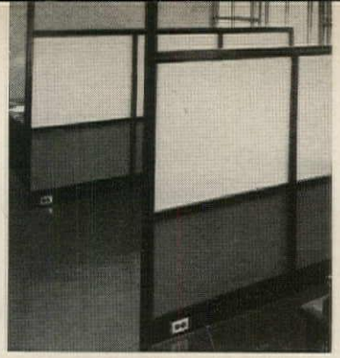
Name_____

Address_____

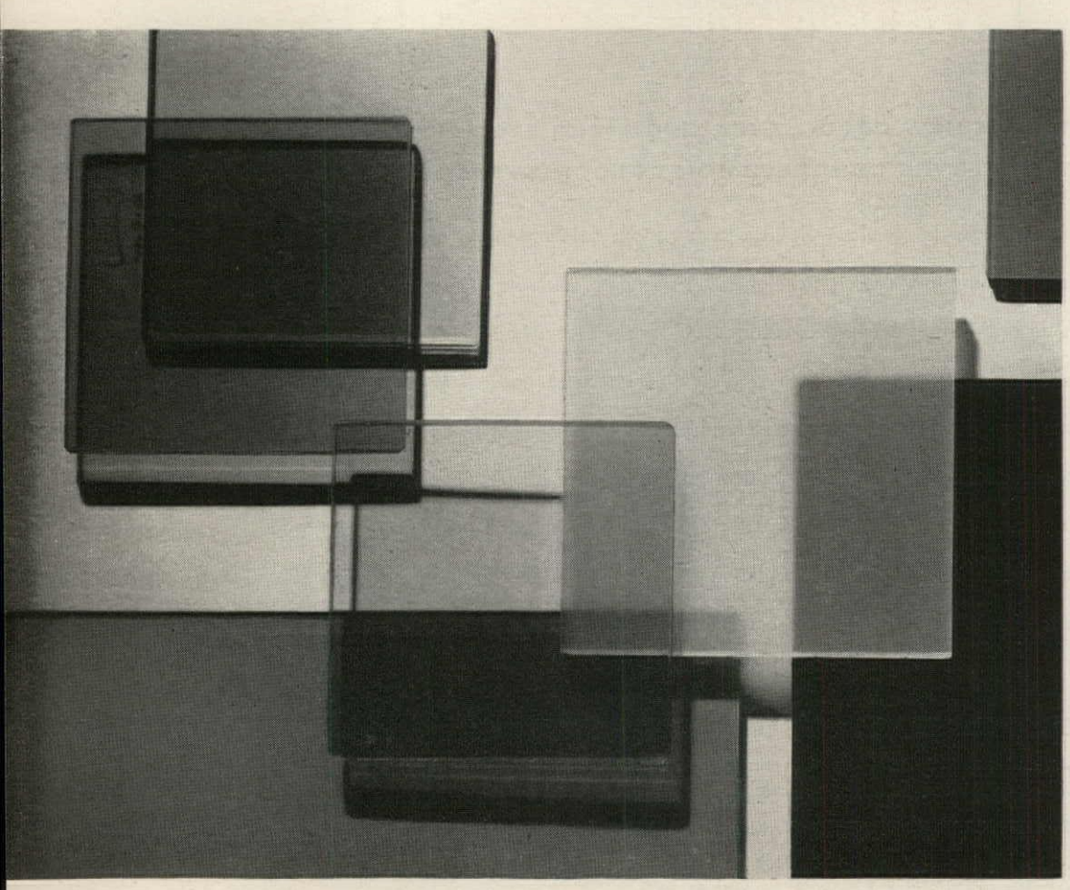
City_____ State_____

AF

PRODUCTS



For more data use coupon, p. 172



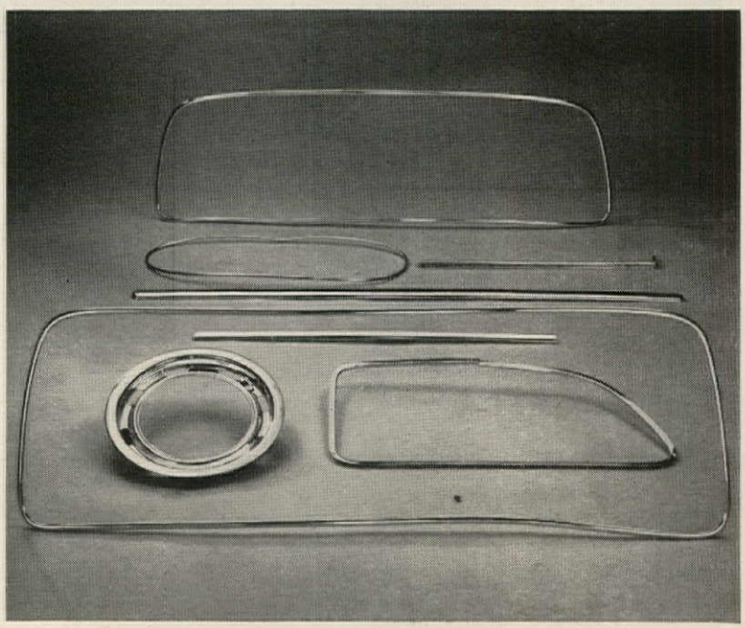
(1) SAFETY GLASS from Germany comes in fadeproof colors

Detag, Bavarian producer of windshields for Mercedes and Porsche cars, is making its safety-glass laminate in sizes and colors suitable for architectural glazing, partitions and spandrels. Colors are achieved simply by substituting pigmented vinyl for the transparent sheet laminated in automotive safety glass. Like the automotive type, the new architectural glass is shatterproof. It is less expensive than tempered glass and can substitute for this material in many applications. Two translucent tints, white and gray, and five clear colors called *Colortrans*, and 12 opaque shades called *Colorspan*, are available in the US in 7/32" and ¼" thicknesses. Maximum sheet size at present is 3'-10" x 7'-10". Production batches can be matched perfectly, and all pigments are reported to be colorfast. Contractor's quantity price is around 90¢ a sq. ft. Delivery time is two months from receipt of order.

Importer: Mondial United Corp.

(2) PURE ALUMINUM has lasting silvery brightness

Lurium, a high-purity aluminum with lasting brightness, is another material moving over from the automotive field into the architectural. It retains its luster almost indefinitely under an anodizing coat, due to the lack of contaminating impurities in the metal. Introduced on German cars about five years ago, it may be recognized by foreign-car enthusiasts in the Mercedes windshield frame and wheel cover (left) and in the Volkswagen's rear-window trim. It also forms the bumper overrides on the Porsche and the golden V on the Cadillac. So far its main uses here have been in jewelry, photographic reflectors and appliance trim, but it is moving into storefront letters and hardware. Anodized *Lurium* has the shiny whiteness of a freshly minted coin. Its reflectivity is 85% against 89% for lacquered silver, 63% for chromium, 59% for stainless steel. It also is highly resistant to corrosion. After 40 weeks of test exposure to an industrial atmosphere, *Lurium* retained over 80% of its brightness, while all other metals visibly dimmed. The metal is distributed in sheet, strip, rod, wire and bar, in four alloys and in hard and soft tempers. The purest grade, Alloy L, is hardly an alloy at all, being 99-99/100 aluminum. The other three contain .5% to 2% magnesium. Tensile strengths range from 8,500 to 50,000 psi.



Manufacturer: Fromson Orban Co., Inc., Aluminum Division.

continued on p. 164

Another **Adlake** aluminum window installation helps make an older building look like new

Blue Cross-Blue Shield Building, Detroit, Michigan

Architects and Engineers: Smith, Hinchman & Grylls, Inc.

Contractor: J. A. Utley Co.

Equipped with Adlake Aluminum Windows

Adlake
PROVEN QUALITY WINDOW

This window meets or exceeds all quality industry specifications for aluminum windows.
THE Adams & Westlake COMPANY
Elkhart, Indiana

This handsome building at 441 East Jefferson Street, Detroit, is a typical example of wise remodeling with Adlake windows.

- **Minimum air infiltration**
- **Finger-tip control**
- **No painting or maintenance**
- **No warp, rot, rattle, stick or swell**
- **Guaranteed non-metallic weatherstripping (patented serrated guides on double hung windows)**

Adlake
99th year
of serving the transportation, building and control industries

The Adams & Westlake Company

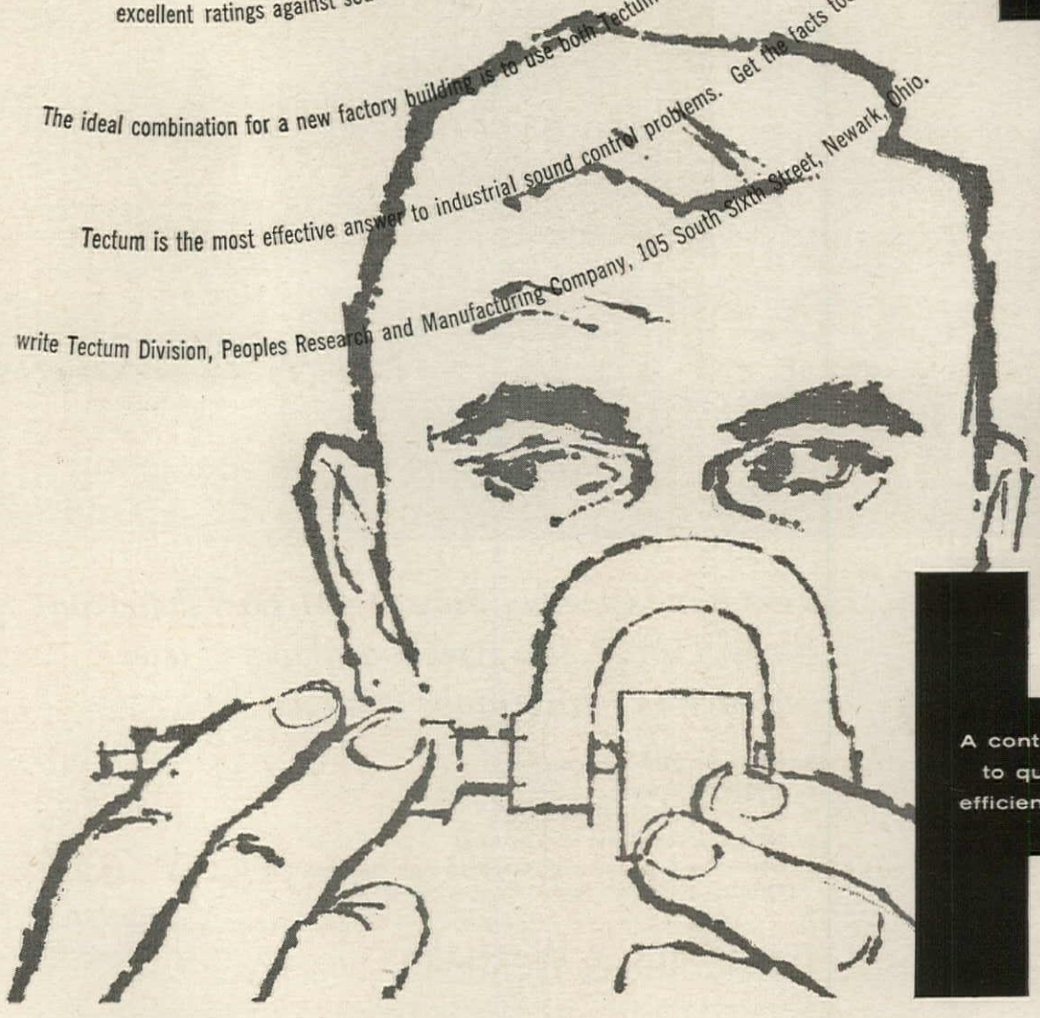
Established 1857 • ELKHART, INDIANA • Chicago • New York

A New Concept in Industrial Sound Control

Tectum...a specification for noise reducing sidewall and roof deck construction

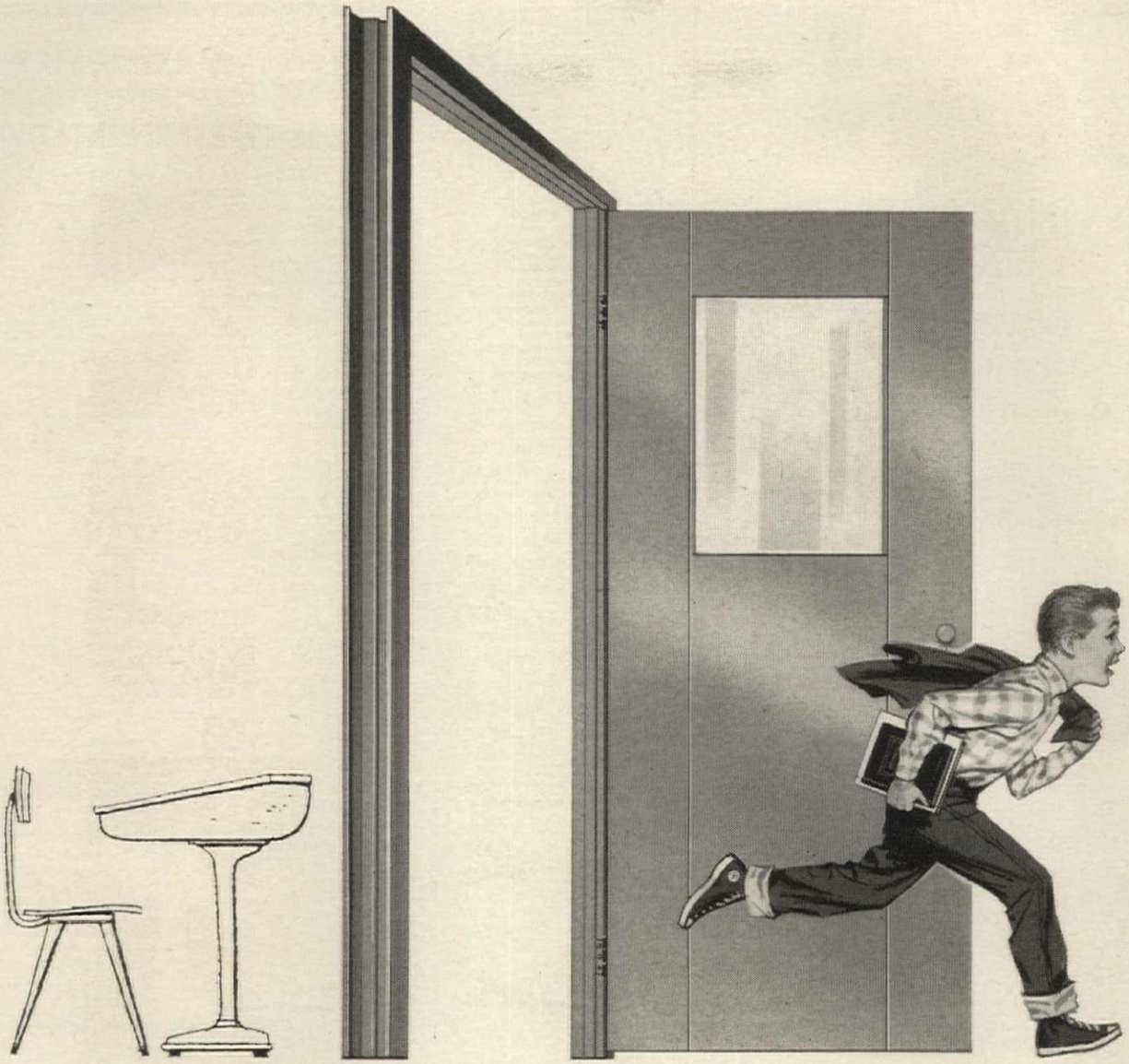
Are reflected industrial noises affecting your shop efficiency? Hard floors, ceilings and walls actually amplify the clatter of busy shops. Tectum absorbs sound, has excellent ratings against sound transmission and reduces industrial noises to a marked degree. The ideal combination for a new factory building is to use both Tectum Sidewall Panels and Roof Deck in the construction.

Tectum is the most effective answer to industrial sound control problems. Get the facts today for your file, write Tectum Division, Peoples Research and Manufacturing Company, 105 South Sixth Street, Newark, Ohio.



tectum

A contribution to quieter, more efficient work areas



the best way out of a classroom problem...

If you're facing a tight budget on school or other institutional construction, Steelcraft **standard** steel doors and frames can meet your requirements most economically. A wide variety of types and sizes, solid or prepared for glass, is factory-stocked for immediate shipment. Door "packages" are shipped complete with hardware, fully machined and mortised . . . ready for fast installation. Both standard duty (20 gauge) and heavy duty (16 gauge) are available. Specify Steelcraft standard steel doors to save money and specification time. See Sweets' Catalog or write for details.

standard steel doors by STEELCRAFT

THE STEELCRAFT MANUFACTURING COMPANY • ROSSMOYNE, OHIO

STEEL Craft

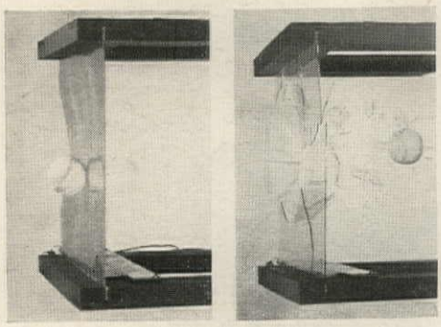
THE INDUSTRY'S MOST COMPLETE LINE OF STANDARD STEEL DOORS

PRODUCTS *cont'd.*

For more data use coupon, p. 172

(3) VINYL GLAZING resists acids, oil and fly balls

Seilon rigid polyvinyl sheeting is suitable for glazing where frequent breakage or corrosive fumes make glass a problem. Suggested for school, factory and laboratory fenestration, this self-extinguishing plastic is produced in pale green and gray panels, clear or translucent in sizes up to 4′ x 8′. Standard gauges 1/16″, 3/32″ and ⅛″ cost about 97¢ to $2.05 per sq. ft. for flat



sheet and $1.12 to $2.24 for corrugated. Slabs 1¼″ to 2″ thick are also available for special building purposes.

In an informal test of *Seilon*'s impact resistance, laboratory technicians hurled baseballs at panels of glass and the ⅛″ plastic. The results are shown above. The *Seilon* (left, above) bounced back to normal after the blow. Although polyvinyl chloride may cloud and darken slightly after prolonged sun exposure, *Seilon* glazing should stand up to many conditions under which other window materials fail. The plastic can be machined, drilled and sawed with regular woodworking tools.

Manufacturer: Seiberling Rubber Co., Plastics Division.

(4) FORM MAKER slurries fibers into shape for plastic molding

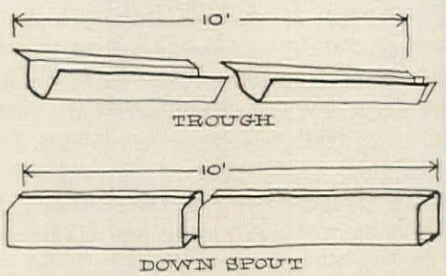
Pressureform automatic preforming makes mass-production of irregularly shaped reinforced plastic components technically and economically possible. In this unique mechanized process, a hydraulic press and

metering unit take the place of the expensive hand layup operations usually needed to make preforms (layers of reinforcing fibers or cloths shaped for resin impregnation). Eliminating trimming, retouching and sanding, *Pressureform* makes its most significant contribution to plastics engineering by creating parts with nonuniform sections in uniform densities. Ribs and corner sections of the container above have the same ratio of fiber and resin as the thinner shell. A pilot plant is currently producing military shipping containers ($42 apiece compared to $118 for hand-shaped boxes), at the rate of one form every 90 seconds. The same technique is adaptable to large structural shells; size is limited only by the capacity of the press. Proportions of fiber, filler and water (later dehydrated in an oven and displaced by resin) can be regulated for different strength requirements. Minimum organic filler is 10%. Reclaimed blue-jeans make up 30% of the containers pictured.

Manufacturer-Licensor: Pressureform Co.

(5) COLORED GUTTERS molded of fiber reinforced plastic

Fabricator Kenneth Fleischauer makes sensible use of reinforced polyester in a simple building product, *Permadrain* gutters and downspouts. Troughs, elbows and snap-in spouts in 10′ lengths, with inside and outside mitered corners, are molded of resin-and-glass-fiber in trim rectilinear shapes. Components are bonded together chemically on the job. Gutters and corner



pieces have recessed flanges on one end for a neat unbroken line. All parts are integrally colored with white or copper pigment. Said to be stronger and more impact resistant than metal gutters, *Permadrain* will not sag over long spans. Installed cost, including elbows and downspouts, averages $1.60 a running ft. of roof trough.

Manufacturer: Permanent Products, Inc.

continued on p. 166

B.F.Goodrich

Lexsuco Roof Construction with Koroseal guards Boeing against attack by fire

LEXSUCO Fire Retardant Roof Construction with Koroseal flexible material vapor barrier assures extra fire protection at the Boeing Flight Test Hangar at Moses Lake, Washington. Since Lexsuco Roof Constructions eliminate flammable asphaltic materials from between the roof deck and insulation, fire within a building cannot spread or be fed by the built-up roof.

Koroseal Vapor Barrier and the Lexsuco securement methods *will not* support combustion.

Factory Mutual tests prove that Lexsuco Roof Vapor Barrier of Koroseal and Securement Constructions are fire retardant and prevent the spread of fire on the underside of the roof deck.

Koroseal is unsurpassed as a vapor barrier. Unless the roof deck is guarded, moisture can permeate and adversely affect the insulated built-up roof. Koroseal provides that extra protection!

Koroseal flexible material also may be used under slab constructions or wherever a vapor barrier is needed. Koroseal Vapor Barrier is a specially compounded, fire retardant material made by *B.F.Goodrich Industrial Products Company, Marietta, Ohio.*

B.F.Goodrich

INDUSTRIAL PRODUCTS CO.
MARIETTA, OHIO

LEXSUCO, INCORPORATED
Dept. AF-1-7
4815 Lexington Ave., Cleveland 3, Ohio

Please send me informative folder on the Lexsuco system of roof construction.

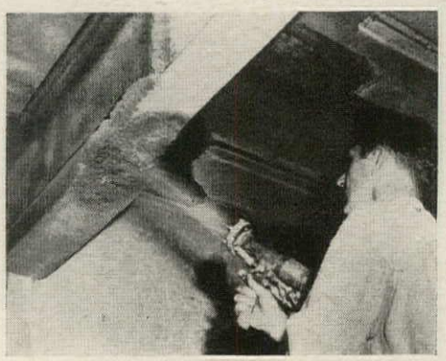
Name_____
Company_____
Address_____
City_____ Zone____ State_____

PRODUCTS *cont'd.*

For more data use coupon, p. 172

(6) ASBESTOS FROTH fireproofs structural members and floors

Limpet, a lightweight blanket of asbestos fibers, now carries Underwriters' ratings for fireproofing structural steel. Sprayed directly on a 15″ *I*-beam in a 2½″-thick coat, the inorganic cladding provides four-hour fireproofing. A 2″ layer has a three-hour rating. *Limpet*'s weight—20 oz. per sq. ft. in 1″ thickness—is about 1/10 that

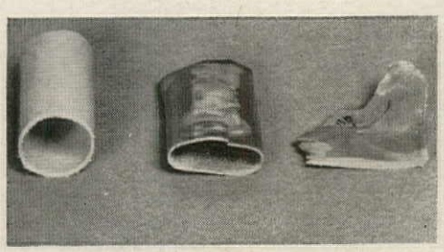


of concrete needed for the same fire ratings. This fireproofing material, a denser cousin to *Limpet* sprayed acoustical fiber, has good sound reduction value. It can be used on floor undersurfaces and above hung ceilings for noise control as well as thermal insulation. Any vapor penetrating the sprayed felting is quickly absorbed by the natural capillary action of asbestos fibers. The steel stays dry and free from rust. *Limpet* application costs vary according to local labor rates. One economy is evident: the less dead burden that fireproofing puts on the building, the more tons of steel can be saved on the structure. Los Angeles, Philadelphia and Cleveland are three of the cities that approve *Limpet* fireproofing.

Manufacturer: Keasby & Mattison Co.

(7) IRRADIATED PLASTIC has high strength and heat resistance

As known for sometime, radiation toughens polyethylene much as vulcanization toughens rubber. The new irradiated plastic becomes a practical reality in the *Hyrad* process. In this process polyethylene is first modified with additives, then bombarded by an electron-beam generator (cost: $75,000) to convert it from a thermoplastic to thermosetting material. A semiskilled operator can handle the machine, which employs no cobalt with its dangerous gamma



radiation. After irradiation, the plastic retains its original excellent electrical-insulating and moistureproofing properties, but has greatly improved tensile strength and heat resistance.

Untreated polyethylene, famous as the squeeze-bottle plastic, is being used in construction for cold water piping and, in thin transparent sheet, for vapor barriers and concrete curing blankets. The new irradiating process will make it practical for hot water lines and radiant heating. Although untreated polyeth goes limp at 300° F., the *Hyrad* sample withstood the same heat for 96 hours (see photo, bottom left). A wire coated with the plastic showed no effects after being dipped in molten solder at 600°. Initial commercial application is in *Hyrad 90* wire insulation.

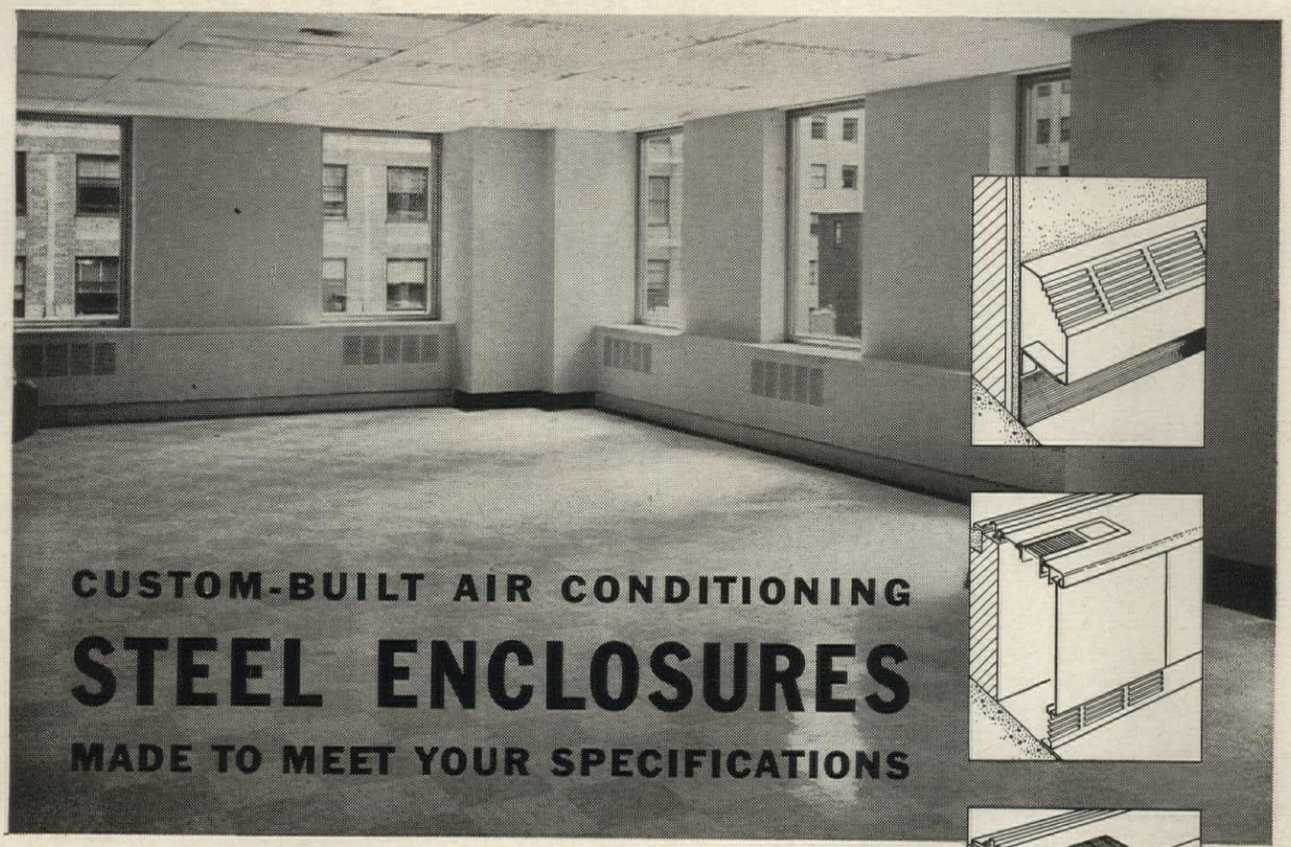
Batches of rugged, irradiated polyethylene are also being turned out by General Electric's Chemical Development Dept. The G-E experimental material, produced in tube, sheet and strip, is called *Vulkene 107-E*. It is filled with carbon black before irradiation for use in electrical applications as a semiconductor. Price: $3 a lb.

Information: Hyrad: W. R. Grace & Co., *Vulkene:* General Electric, Chemical Developments Dept.

(8) FOAM INSULATION in flexible sheets fits snug over curves

Armstrong's foam insulation for pipe, *Armaflex*, is now available in flat sheets for adhesive application to any clean dry surface. Fitting easily over curved and irregular forms with minimum cutting, the flexible plastic is practical for insulating large tanks and conduit lines and air-conditioning equipment. It can take temperatures up to 160°F. without distorting and will not support flame. The material's

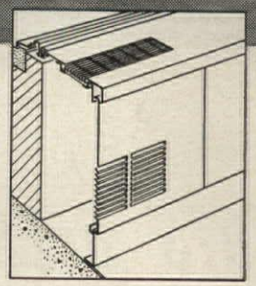
continued on p. 168



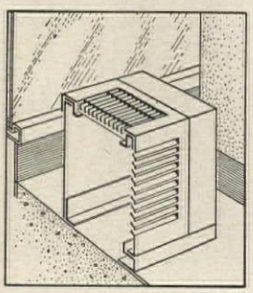
CUSTOM-BUILT AIR CONDITIONING

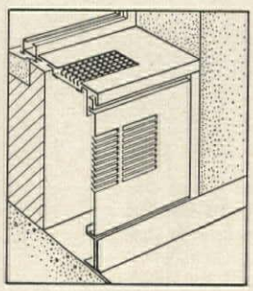
STEEL ENCLOSURES

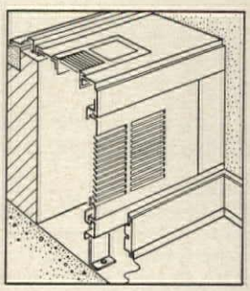
MADE TO MEET YOUR SPECIFICATIONS

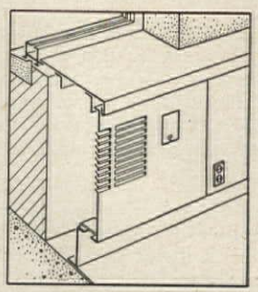


Style, construction and flexibility make *Pomeroy* Enclosures ideally suited to meet your special engineering and design requirements. The new Socony-Mobile Building interior as shown above is a typical example of the many installations of Pomeroy Enclosures going into today's fine structures.









SINCE **POMEROY** 1897

Many exclusive features are incorporated that effect economies in modernization work as well as in new building projects large or small. Call or write Pomeroy today!

see our catalog in Sweet's or write for copy

engineering service is available for any size job!

S. H. POMEROY CO., INC., 25 BRUCKNER BOULEVARD, NEW YORK 54, N. Y.

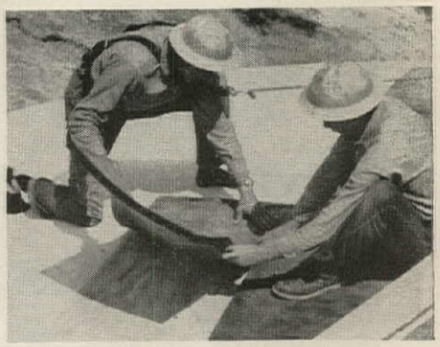
manufacturers of

- DOUBLE-HUNG WINDOWS
- VERTICALLY PIVOTED WINDOWS
- CUSTOM-BUILT ENCLOSURES
- SPANDRELS SYSTEMS
- ACOUSTICAL CEILING SUSPENSION SYSTEMS
- METAL PARTITION STUDS

FABRICATION IN ALUMINUM — STAINLESS STEEL and COATED STEEL

PRODUCTS *cont'd.*

For more data use coupon, p. 172



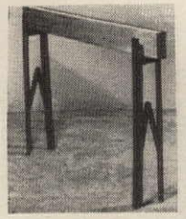
K factor is .28, its vapor permeability 0.1. No moisture barrier is necessary, but on outside applications the manufacturer recommends a topcoat of aluminum or asphalt paint. Sold in 3′ x 2′-6″ sheets, *Armaflex* costs about 50 to 60¢ a sq. ft. in ½″ thickness. It also comes in ⅛″, ¼″ and ¾″. In application the sheets are laid down with edges slightly lapped. When set, the edges are spread with adhesive and jammed together for tight butt joints.

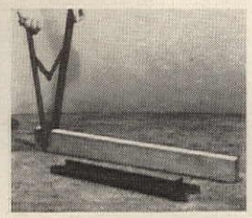
Manufacturer: Armstrong Cork Co.

(9) **DIAMOND DRILL quietly bites round slugs out of concrete**

Grinding its way noiselessly through granite, tile or reinforced concrete, the diamond drill *Kor-It* is an ingenious substitute for a jack hammer. The new self-sharpening apparatus exerts constant pressure to cut clean cores 1″ to 6″ in diameter at the rate of 1″ a minute. A water jet piped from a tank or tap keeps it cool. The machine weighs 150 lb., and operates in horizontal or vertical position. It can be used to cut holes in existing masonry floors and walls for conduit and piping or to extract test cores from highways and buildings for laboratory analysis. *Kor-It* is furnished with electric motor or gasoline engine. Price with 2 hp motor is $515.

Manufacturer: J. F. Hamlin Co., Inc.





(10) **STEEL LEGS unfold as slender but sturdy platform base**

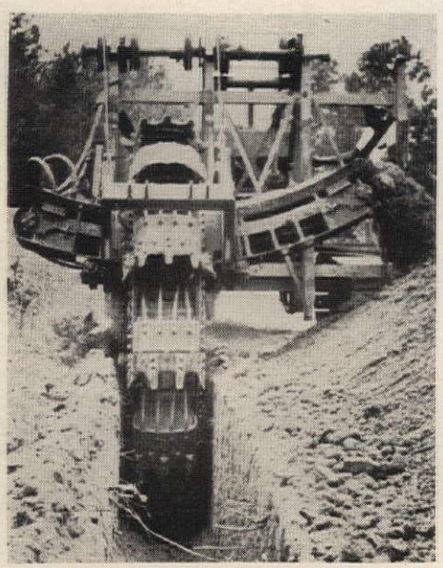
Weldon steel legs seem destined to join other good-looking utility items like *Garcy* brackets and *Unistrut* framing in more elegant architectural surroundings. The trim folding *A* frames of riveted ⅛" angle iron are toothed at top to bite into a 2 x 4. Manufactured in heights of 1'-2", 2'-1", 3', 3'-6" and 4', the rugged legs can serve as saw horses, scaffold underpinnings, and drafting and dining table supports. One pair weighs about 10 lb. and, depending on size, takes on a 500 lb. to 1 ton load. Prices range from $4.25 to $7.70 a pair. Vertical and horizontal flanges keep legs aligned and tabletops teeterless.

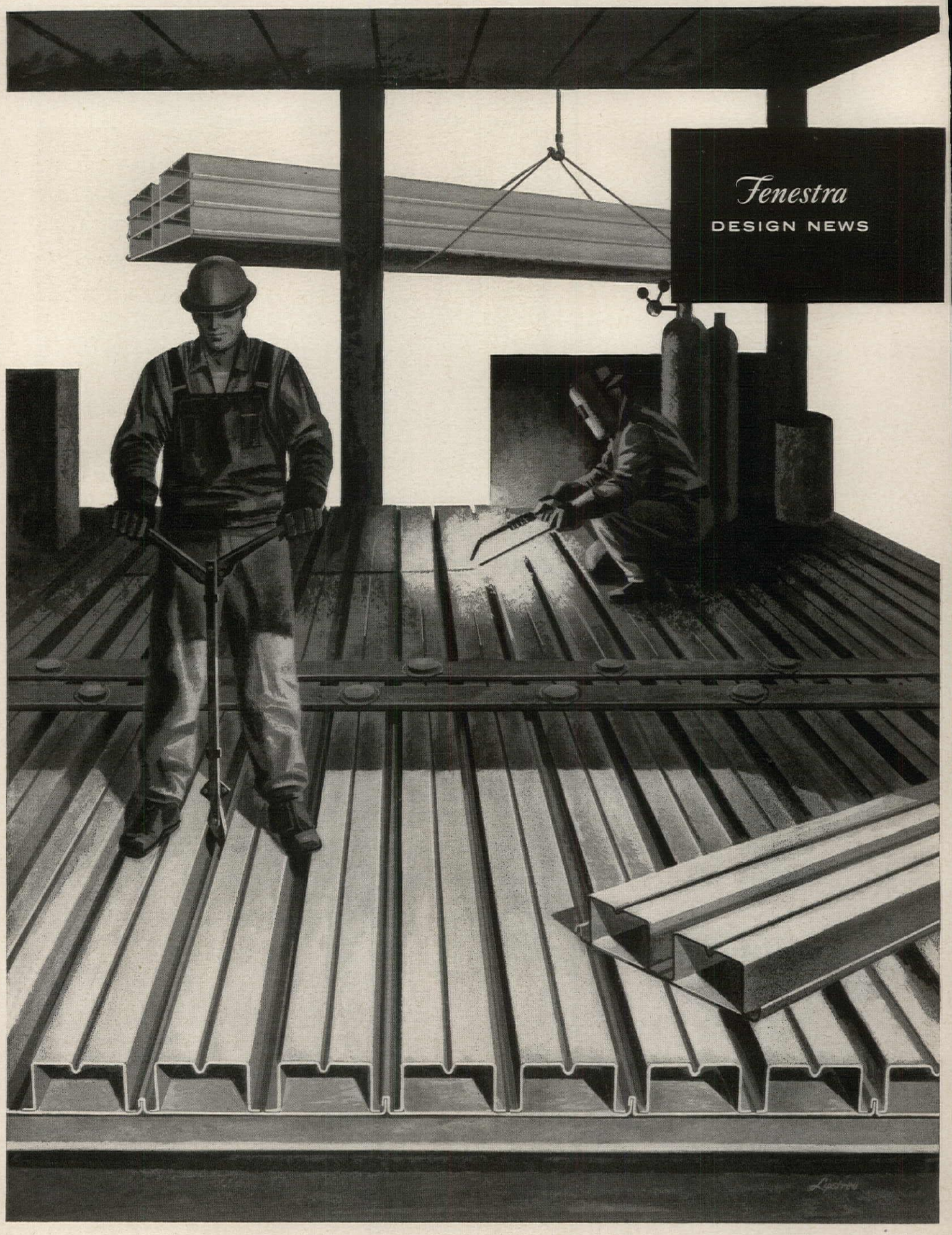
Manufacturer: Weldon Products.

(11) **NO STRADDLE DITCHER can dig in its own tracks**

Gar Wood's *Buckeye 308 TP* ditcher knows no obstacle. Deftly skirting by poles, fences, building walls and other obstructions, the new hydraulic digger can cut a

continued on p. 172




Fenestra
DESIGN NEWS

General Telephone Company, Santa Monica, California. This new 6-story office building uses Fenestra Electrifloor for "built-in" electrical availability and as a lateral diaphragm to resist earthquake and wind loads. *Architects and Engineers*—Albert C. Martin and Associates. *General Contractor*—George A. Fuller Company. *Electrical Header Duct*—National Electric Products Corporation.

How Fenestra Electrifloor® gives you a*

NEW CONCEPT OF WIND AND SEISMIC DESIGN

New design and construction methods with Fenestra Building Panels improve lateral stability and provide 100% electrical availability.

Today's trend to tall slim office buildings challenges the structural and electrical designer with new problems of lateral bracing and electrical distribution. Fenestra Electrifloor Building Panels give you a unique solution for both requirements.

Fenestra Building Panels, with flat-plate design in all depths, make it possible to utilize the cellular steel floor system as a lateral diaphragm to resist wind and seismic thrusts for any depth of panel. Basic engineering data for this application is based on extensive tests at the California Bethlehem shipyards in 1950 and approved by the Pacific Coast Building Officials Conference.

Fenestra has just completed 21 new full-scale tests of lateral diaphragm design at Cornell University. These tests provide additional data on several new applications of this design. Also included were tests of new methods of attachment and welding patterns to reduce construction costs. For example, the use of Fenestra's riv-clinching device to replace welding of longitudinal joints. These results are fully described in our 1957 Building Panel Catalog.

Whether you are designing a building for an earthquake zone where lateral bracing is required by codes or for any part of the country where wind loads are to be carried by the structural steel system, you can provide increased lateral stability at low cost with this Fenestra design technique.

In addition, Fenestra Electrifloor Building Panels give you "built-in" electrical availability! Header ducts on top of the panels convert the large area cells to underfloor raceways for electrical, telephone or other wiring circuits. Outlets may be added or moved any time in every square foot of floor space.

To take full advantage of all the economies of Electrifloor, your building should be designed around it. In most cases these strong, light-weight building products can give you and your client many extra benefits *at no extra cost!*

The New 1957 Fenestra Building Panel Catalog gives you complete information and data on Electrifloor and other Fenestra Building Panels. Mail the coupon below today for your FREE copy or call your Fenestra representative.

*Trademark

Fenestra INCORPORATED

ELECTRIFLOOR

Your Single Source of Supply for

BUILDING PANELS • DOORS • WINDOWS

Fenestra Incorporated
Dept. AF-1, 2296 East Grand Blvd.
Detroit 11, Michigan
Please send me FREE copy of New 1957 Fenestra Catalog including data on wind and seismic design.

NAME_____

FIRM_____

ADDRESS_____

CITY_____ STATE_____

PRODUCTS *cont'd.*

For more data use coupon below

5'-6" deep furrow within 2¼" of the outside edge of its right or left crawler. Not obliged to straddle its own trench, the ditcher promises to eliminate much costly hand digging on pipe line and utility installations. Its digging wheel can be shifted, without a crane or special tools, to three different positions: either side or directly in front of the main frame. Cutting width can be varied from 8" to 2'. *Manufacturer:* Gar Wood Industries, Inc.

PRODUCTS INFORMATION COUPON

For additional information on any product reviewed in the January issue check the corresponding key number below and mail this coupon to Architectural FORUM (Room 7-06) 9 Rockefeller Plaza, New York 20, N. Y.

- ☐ 1. Mondial glass laminate
- ☐ 2. Lurium pure aluminum
- ☐ 3. Seilon plastic glazing
- ☐ 4. Pressureform molding process
- ☐ 5. Permadrain gutters
- ☐ 6. Limpet asbestos fireproofing
- ☐ 7. Irradiated polyethylene
- ☐ 8. Foamed plastic insulation
- ☐ 9. Kor-it concrete saw
- ☐ 10. Folding steel legs
- ☐ 11. Gar Wood ditcher

name _____

title _____

company _____

street _____

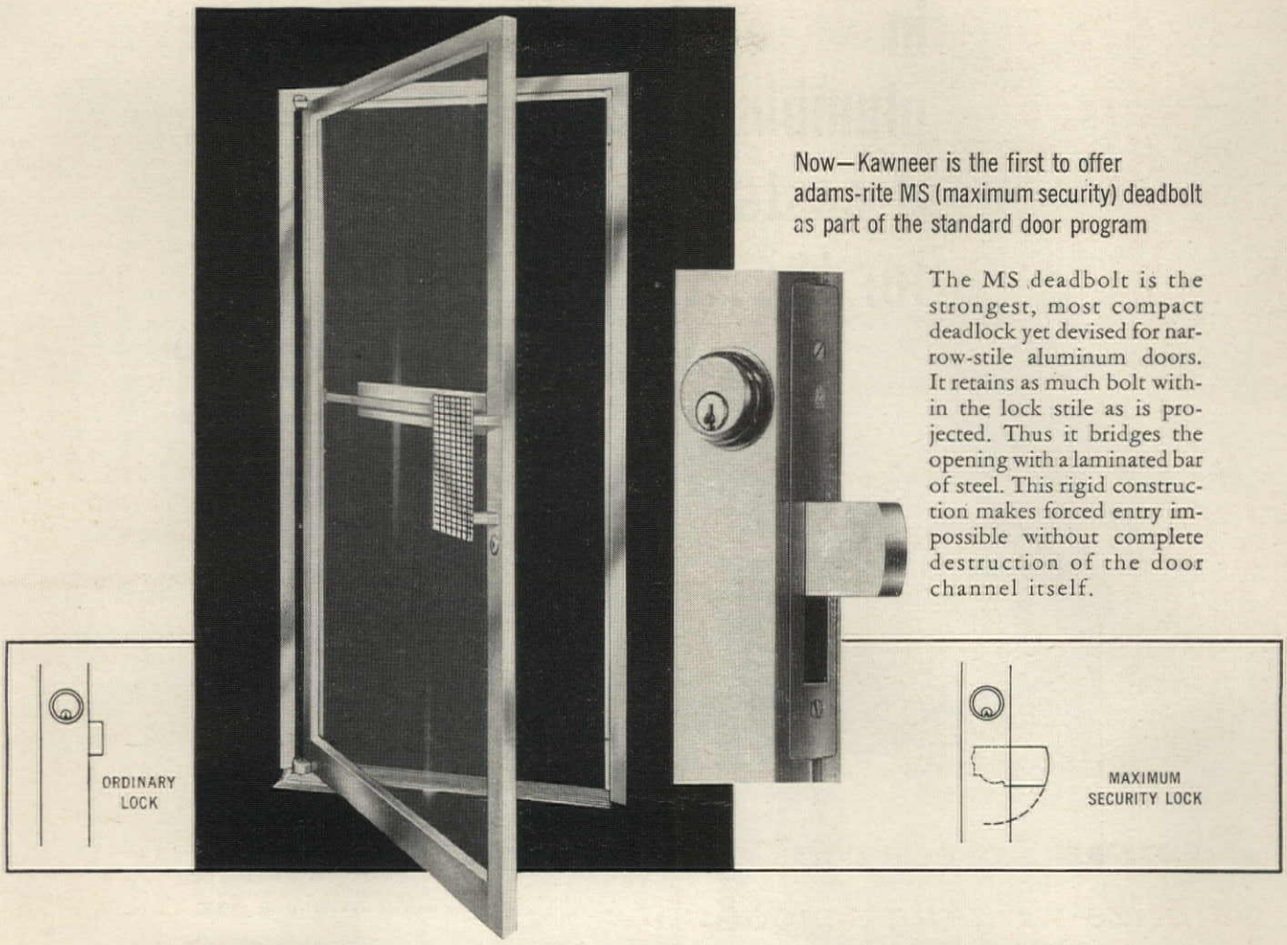
city _____

state _____

NOTE: This request cannot be honored after March 31, 1957

Please enter my subscription to Architectural FORUM for ☐ one year at $5.50 or ☐ two years at $8.50 (These rates for US and possessions and Canada only.)
☐ Renewal ☐ New

_____
Signature



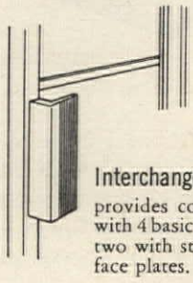
Now—Kawneer is the first to offer adams-rite MS (maximum security) deadbolt as part of the standard door program

The MS deadbolt is the strongest, most compact deadlock yet devised for narrow-stile aluminum doors. It retains as much bolt within the lock stile as is projected. Thus it bridges the opening with a laminated bar of steel. This rigid construction makes forced entry impossible without complete destruction of the door channel itself.

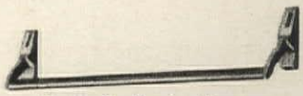
ONE BASIC DOOR

with hardware for every need

The new Kawneer narrow-stile door has all the qualities of a "custom-made" product. Welded construction is used to insure maximum strength with slim, attractive lines. Deep etch alumiliting and no exposed screws assure continued good appearance. The wide selection of hardware provides great flexibility of design. See Sweet's $\frac{16a}{Kaw}$ for complete information.



Interchangeable Hardware
provides complete flexibility with 4 basic push-pull groups, two with standard or custom face plates.



Panic Device by Kawneer
is designed with fewer parts, a bar shaped to fit the hand and for lower cost.

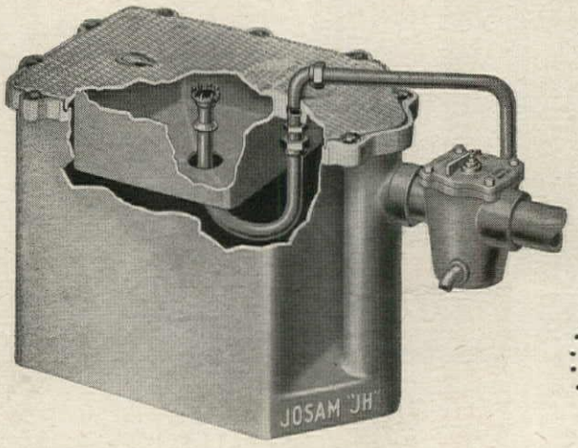
Kawneer
General Offices
NILES, MICHIGAN
ARCHITECTURAL PRODUCTS DIVISION

THE KAWNEER COMPANY CONSISTS OF A NATIONWIDE NETWORK OF STRATEGICALLY LOCATED SALES ENGINEERING OFFICES, FACTORIES AND WAREHOUSES:
EXECUTIVE OFFICES—Niles, Mich. **FACTORIES**—Berkeley, Cal., Lexington, Ky., Niles, Mich., St. Charles, Ill., Toronto, Ont., Kawneer de Cuba, Havana, Kawneer de Mexico, Mexico City
WAREHOUSES—Atlanta, Ga., Brooklyn, N. Y., Cambridge, Mass., Chicago, Ill., Cleveland, O., Dallas, Tex., Los Angeles, Cal.

SALES ENGINEERING OFFICES:	Buffalo, N.Y.	Cincinnati, O.	Denver, Colo.	Los Angeles, Cal.	New York, N.Y.	Phoenix, Ariz.	Richmond, Va.	St. Louis, Mo.	Toronto, Ont.
Albany, N. Y.	Berkeley, Cal.	Cambridge, Mass.	Cleveland, O.	Detroit, Mich.	Memphis, Tenn.	Oakland, Cal.	Portland, Ore.	Seattle, Wash.	Stamford, Conn.	Havana, Cuba
Atlanta, Ga.	Brooklyn, N.Y.	Chicago, Ill.	Dallas, Tex.	Kansas City, Mo.	Minneapolis, Minn.	Philadelphia, Pa.	Pittsburgh, Pa.	Sacramento, Cal.	Wichita, Kan.	Mexico City, Mex.

in plumbing drainage... it costs no more for the...

VERY BEST



The *only* interceptor that provides for *automatic evacuation* of intercepted grease at "the turn of a valve"—without removing cover, without touching the grease. *A far-reaching advancement in grease removal—pioneered by JOSAM.*

Josam

series "JH"

GREASE INTERCEPTORS

WITH AUTOMATIC GREASE DRAW-OFF

• JOSAM "JH" Interceptor revolutionizes grease interception. It not only intercepts over 95% of the grease in waste water, but now, for the first time, it encourages grease removal because it is accomplished so easily and quickly, thereby keeping the interceptor always operating at top efficiency. It is smart to use the best — it costs *less* in the "long run". *In plumbing drainage, you use the best when you use JOSAM.* Send coupon for free literature.

Josam — STANDARD OF THE WORLD

JOSAM MANUFACTURING COMPANY

General Offices and Manufacturing Division
MICHIGAN CITY, INDIANA

REPRESENTATIVES IN ALL PRINCIPAL CITIES

West Coast Distributors
JOSAM PACIFIC COMPANY
San Francisco, Calif.

Canadian Manufacturers
JOSAM CANADA LIMITED
Toronto, Canada

Josam products are sold through plumbing supply wholesalers.

JOSAM MANUFACTURING COMPANY
Dept. AF-1 • Michigan City, Indiana

Please send copy of Manual JH on Grease Interception

Firm ..... Business .....

By .....

Address .....

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

Lankenau Hospital/Health Center
ARCHITECT: Vincent G. Kling
CONTRACTOR: Wark & Company

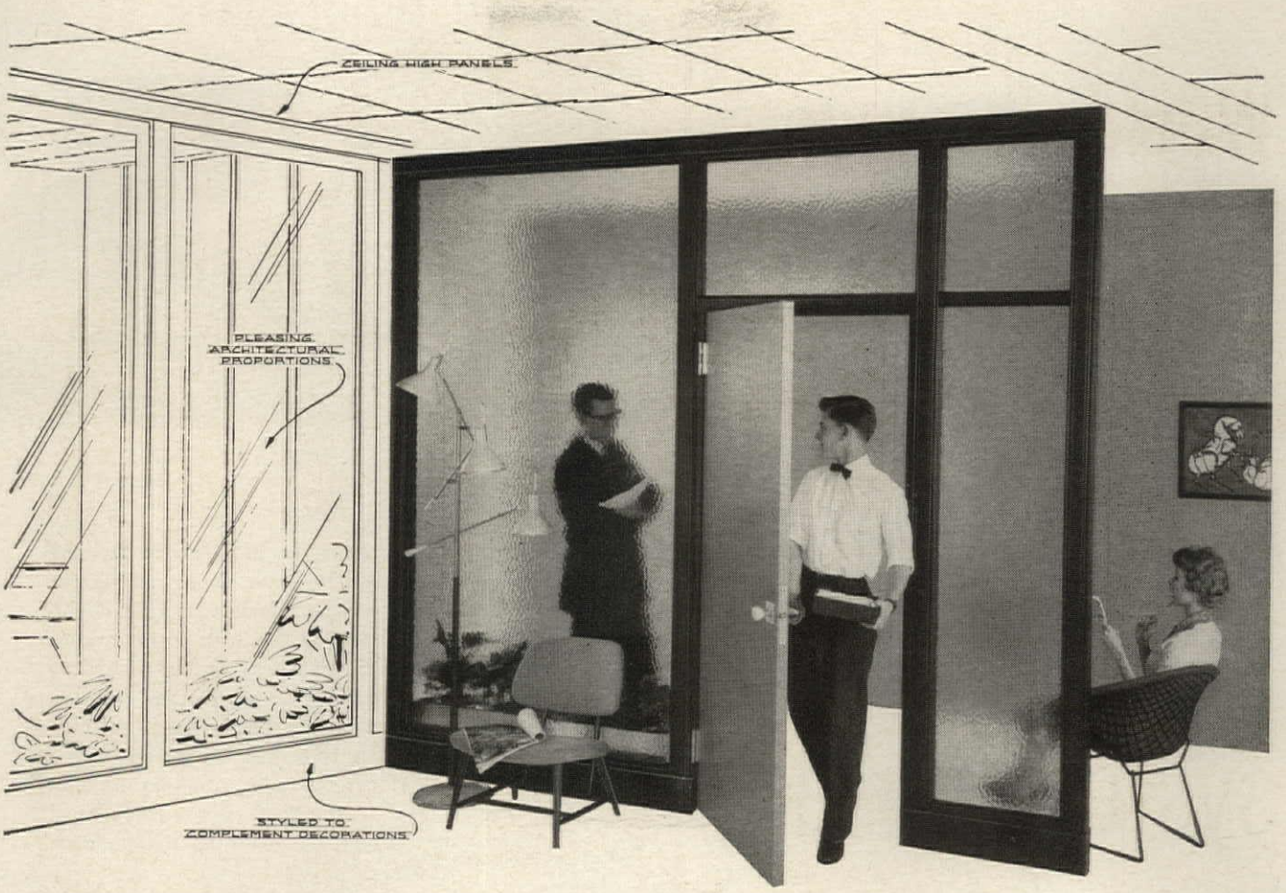
Designed to incorporate all known technical and planning advances for buildings of its type, the new Lankenau hospital outside Philadelphia provides an excellent example of today's architectural achievements. Only the finest materials and products were used in its construction and completion. The "OVERHEAD DOOR" was selected for use wherever garage doors were needed. The fast, dependable and quiet operation of The "OVERHEAD DOOR" is well known to all architects and builders.

HOSPITAL ASSURED OF DEPENDABLE GARAGE

Location: Overbrook, Pennsylvania

In site organization and plan, the new Lankenau takes full advantage of natural opportunities. Built on a former golf course, the buildings crown the highest portion of the land. The main driveway separates to reach parking areas and the garage, where in-and-out operation of vehicles is fast and easy with The "OVERHEAD DOOR."

New Sweet's Catalog—with separate spreads for each door and complete specifications on each spread—provides traceable details drawn to scale, plus a list of The "OVERHEAD DOOR" distributor service organizations.



your new interior designs come alive with

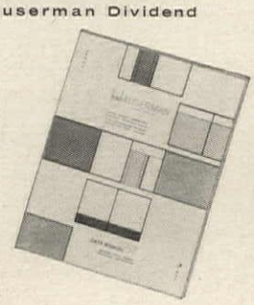
MOVABLE *Hauserman* INTERIOR WALLS

Movable HAUSERMAN Walls give you new freedom to create imaginative interior designs . . . give your clients lifetime interior flexibility to handle inevitable floor-plan changes. HAUSERMAN's sound architectural engineering, expansive use of interesting glass patterns and wide choice of colors suggest applications as broad as the architectural horizon.

HAUSERMAN helps you save expensive drafting time by working closely with the architectural team to provide detailed working drawings. Time-stealing field supervision is also cut to a minimum with HAUSERMAN because there is just one source of supply, eliminating the need to coordinate the activities of several trades.

MOVABLE HAUSERMAN INTERIORS

National Lifetime Service . . . An Exclusive Hauserman Dividend



THE E. F. HAUSERMAN COMPANY
7130 Grant Avenue, Cleveland 5, Ohio
Hauserman of Canada, Ltd., Toronto, Ontario

Please send your new Data Manual 57 covering complete HAUSERMAN technical details to:

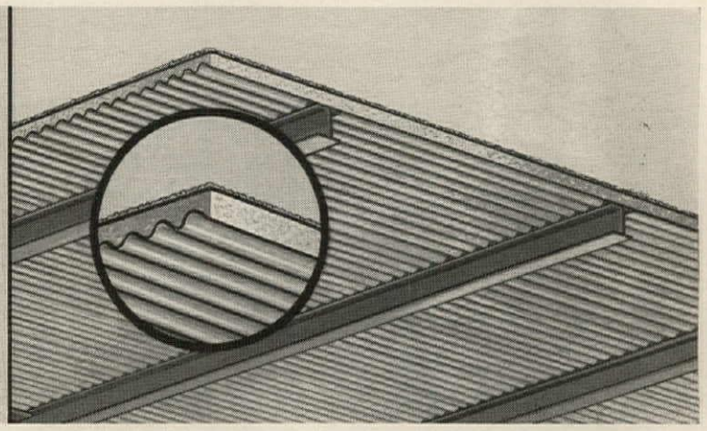
Name _____

Company _____ *Title* _____

Street _____

City _____ *State* _____

ROOFS



Now! A Granco® roof or floor system for any type of framing you specify...

See our catalogs in Sweet's Architectural and Industrial Files

GRANCO® STEEL PRODUCTS COMPANY
6506 North Broadway, St. Louis 15, Missouri

A Subsidiary of

GRANITE CITY STEEL COMPANY
Granite City, Illinois

DISTRICT OFFICES: St. Louis • Kansas City
Cincinnati • Dallas • Chicago • Minneapolis
Atlanta • San Francisco

Distributors in 80 Principal Cities

1. EXPOSED CEILINGS

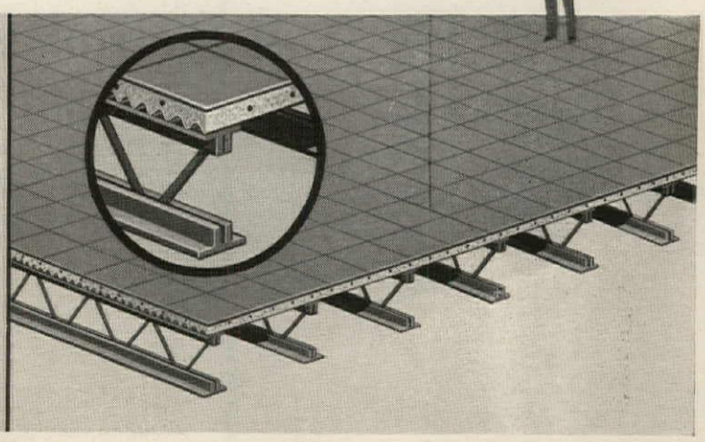
In warehouses and factories, high-tensile Tufcor® galvanized steel deck provides a strong, permanent base for insulating concrete, makes possible a lightweight, economical roof system with positive vapor barrier and maximum fire safety. Tufcor weighs up to 6 lbs. per square foot *less* than other decking, is easy to handle and place. Sheets span up to 7', are easily plug-welded to beams. Tufcor provides a safe working platform for trades, saves on the high cost of structural framing and fill. Granco Steel Roof Deck may also be used with exposed ceilings.

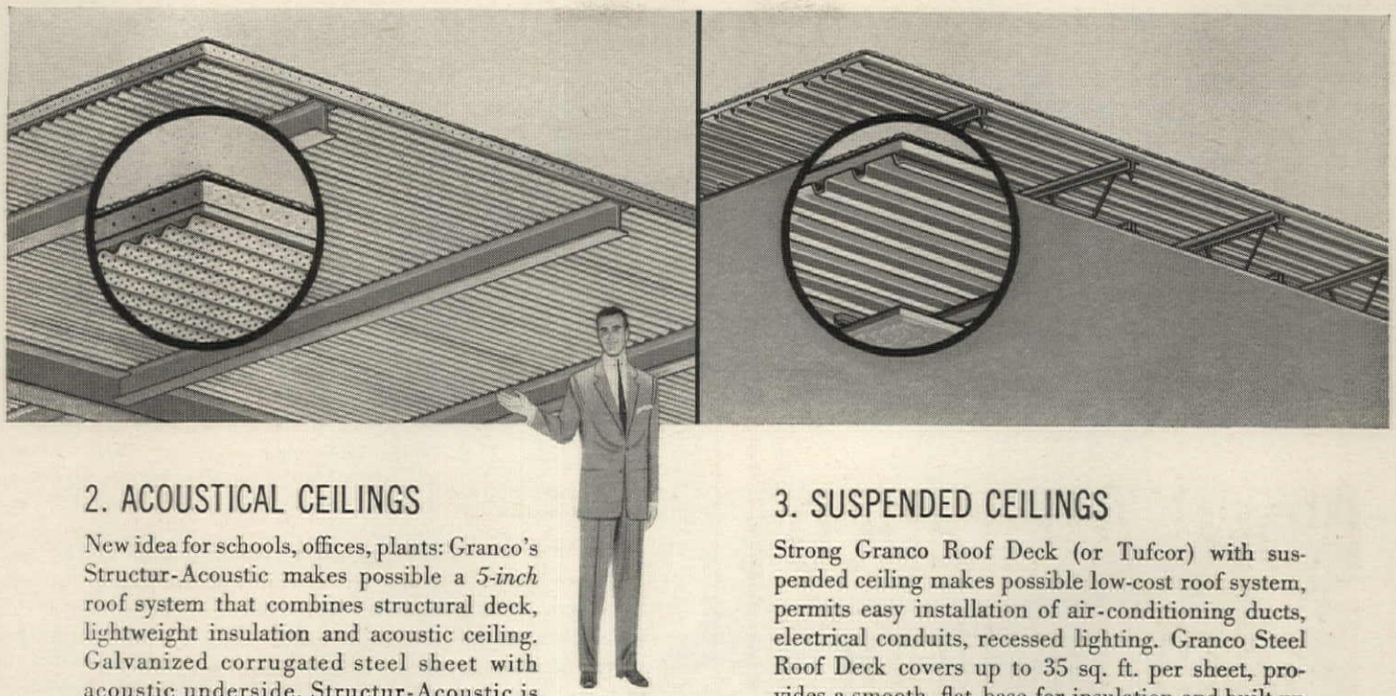
CHOOSE THE PRODUCT DESIGNED TO

4. UP TO 30" SPANS OVER STEEL JOISTS

Granco Corruform® (100,000 psi and stronger) is a simple, economical means of forming concrete floor slabs over open web steel joists. Corruform retains the cement paste, speeds finishing, combines placing and finishing of concrete in *one* operation, offers rigidity that assures true and level finish. High-strength sheet won't sag, saves up to 20% on concrete with no sacrifice in slab design. Corruform is easy to handle and place, easy to clip or weld to supports, withstands denting, gives added stiffening to joists or beams.

FLOORS





2. ACOUSTICAL CEILINGS

New idea for schools, offices, plants: Granco's Structur-Acoustic makes possible a *5-inch* roof system that combines structural deck, lightweight insulation and acoustic ceiling. Galvanized corrugated steel sheet with acoustic underside, Structur-Acoustic is strong, economical, attractive, won't rip or dent... provides a firesafe base for acoustic board, concrete slab and built-up roof . . . saves 11″ to 15″ in wall height... offers one-third more roof for your dollar! All materials assembled at job site by local labor.

3. SUSPENDED CEILINGS

Strong Granco Roof Deck (or Tufcor) with suspended ceiling makes possible low-cost roof system, permits easy installation of air-conditioning ducts, electrical conduits, recessed lighting. Granco Steel Roof Deck covers up to 35 sq. ft. per sheet, provides a smooth, flat base for insulation and built-up roof. Low dead weight (10-12 psf) saves up to 10¢ a sq. ft. over heavier types of roof deck! Deep, open rib design offers maximum strength, permits fast plug welding from above. Granco Roof Deck is rotary press formed for uniformity—no sheet "crawl"!

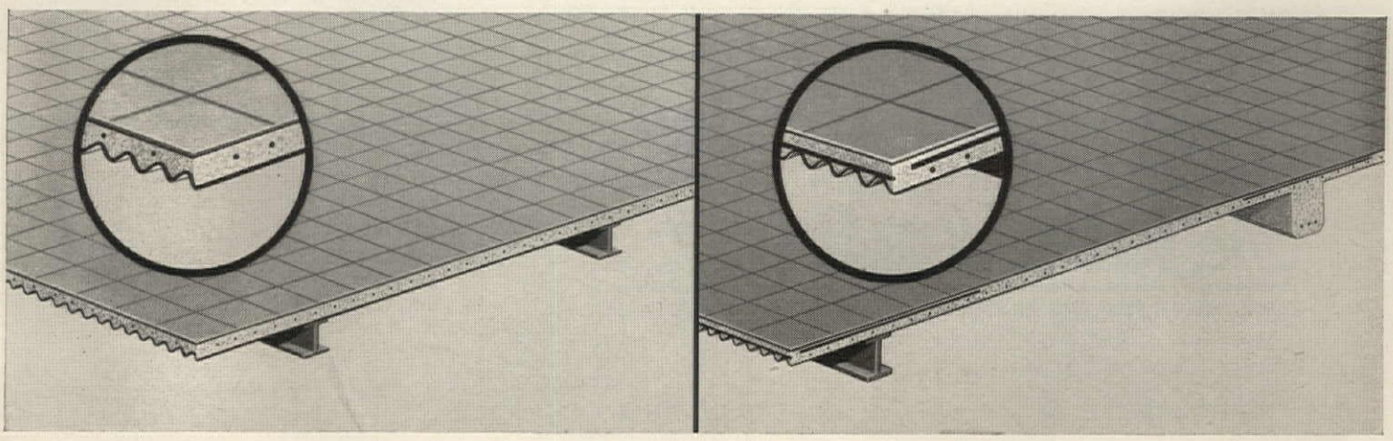
SAVE YOU TIME, WORK AND MONEY ON SCHOOLS, STORES, PLANTS, ETC.

5. 30″–8′ SPANS OVER BEAMS

Tufcor is tough-temper, high-strength steel designed to fit wider spacing and accommodate heavier loads in flat slab construction where conventional forming costs are high. In floors, Tufcor serves as a permanent stay-in-place form for structural-grade concrete, provides a good platform for workers. Tufcor arrives pre-cut to fit framing members, speeds concrete placement by eliminating form stripping, provides a tight, solid base for concrete. Permanent slab form construction is incombustible, eliminates fire hazard during the construction period.

6. 8′–14′ SPANS OVER BEAMS

High-strength, deep-corrugated Cofar® steel units —with transverse wires welded across corrugations —combine form and reinforcement in *one* operation! Cofar offers in one product all the positive and temperature steel needed in the reinforced concrete slab . . . eliminates cutting, fitting, removal, repair and storing of wood forms. Cofar construction is equally suited to steel or concrete frame. After concrete slab is placed, a fire-resistant, high-strength reinforced concrete floor results. Attractive Cofar underside may be painted for a finished ceiling.



BOOKS

SHOPPING CENTERS. By Paul E. Smith; National Retail Dry Goods Assoc., 100 W. 31st St., New York, N.Y. 9" x 6". Illus. $10

The author, a professor of business at Michigan State College, reports on a study of 21 regional and district centers, incorporating findings into general background material. It is truly remarkable how little new or interesting information the study turned up. Perhaps the key to this lies in the treatment of a center manager's remark that a department store owning its center can get, in effect, its rent free. Can it? We will never know from Smith. "That is a controversial point," he says, "that depends so much on the local conditions that it seems pointless to pursue the subject any further." To those who need acquaintance with the "noncontroversial" aspects of shopping centers—the rules-of-thumb as they stand at the moment—here they are, plus a bibliography, its items listed without comment or description, and no index.

THE CHANGING SHAPE OF METROPOLITAN AMERICA: Deconcentration since 1920. By Amos H. Hawley. Published by The Free Press, 1005 W. Belmont Ave., Chicago 13, Ill. 184 pp. 5½" x 8¾". Illus. $4

This book is an intensive analysis of population redistribution within all metropolitan areas of the US which were reported in the 1950 census and for which comparable data were available for the five preceding censuses. The relation of differential growth or redistribution, to distance is examined with reference to size of central city, 50-year average annual growth rate of central cities, types of location of central city, trend proportion of metropolitan labor force engaged in manufacturing the trend of industrial relocation within metropolitan areas, and region.

The most general finding is that in the period from 1900 to 1920 the trend within metropolitan areas was toward increasing concentration of population in and close about central cities. Deconcentration set in after 1920 and accelerated through the following decades to 1950. The effects of this deconcentration were most prominent in unincorporated areas.

TIMBER DESIGN AND CONSTRUCTION HANDBOOK. Prepared by Timber Engineering Co. Published by F. W. Dodge Corp., 119 W. 40th St., New York 18, N.Y. 622 pp. 6¼" x 9¼". Illus. $12.75

Written by 25 engineers and specialists, and edited and reviewed by a special nine-member editorial committee this new work serves two purposes: it is a comprehensive timber design reference and it is also a practical field handbook. It offers the information needed to develop and construct the best, most economical wood structures.

The book is organized into three main sections. The first section covers the fundamental structures and characteristics of wood: its types, grades and ways of preservation. This enables the designer to obtain maximum efficiency and economy from his material. The second section explores and analyzes preliminary considerations, general design procedure, design details, fabrication and erection. The third section provides design and engineering specifications and tabular data in simplified form.

LICHTARCHITEKTUR. By Walter Kohler and Wassili Luckhardt. Published by Ullstein A. G., Berlin-West, Germany. 232 pp. 8½" x 11". Illus.

A collection of striking night photographs showing the importance of electric lighting in architecture plus a long discussion of the subject—all in German.

american LUSTRAGRAY* sheet glass
helps provide balanced brightness in schoolrooms

By reducing glare sources, it eliminates eyestrain and fatigue

AMERICAN LUSTRAGRAY, a neutral gray tint glass, permits a balanced brightness between natural and artificial light in schoolrooms. It transmits needed daylight without glare, thereby removing a deterrent to comfort and efficient learning.

Because of these LUSTRAGRAY properties, distinct vision through large glass areas is possible, making the classroom an unconfined, pleasant place to study.

Non-fading LUSTRAGRAY gives the added safety of a heavy strength glass, and yet is very economical —no special installation requirements. Drapes or blinds become optional and are not required.

AMERICAN LUSTRAGRAY is now available through more than 500 glass jobbers. Check your classified telephone directory for listing.

american

***LUSTRAGRAY DATA**

- **Thicknesses: 7/32", 1/4"**
- **Maximum Size: 6' x 10'**
- **Slightly larger sizes on request when available**

MODERN GLASS
Best at a Glance

AMERICAN

american
WINDOW *Glass* COMPANY
PITTSBURGH, PA.

PLANTS: ARNOLD, PA. • ELLWOOD CITY, PA. JEANNETTE, PA. • OKMULGEE, OKLA.

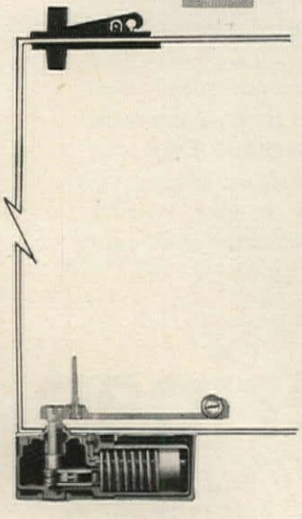
WSW 6392

RIXSON

DUO • CHECK

concealed • in • floor closers

2 WAY safe control for double acting interior doors



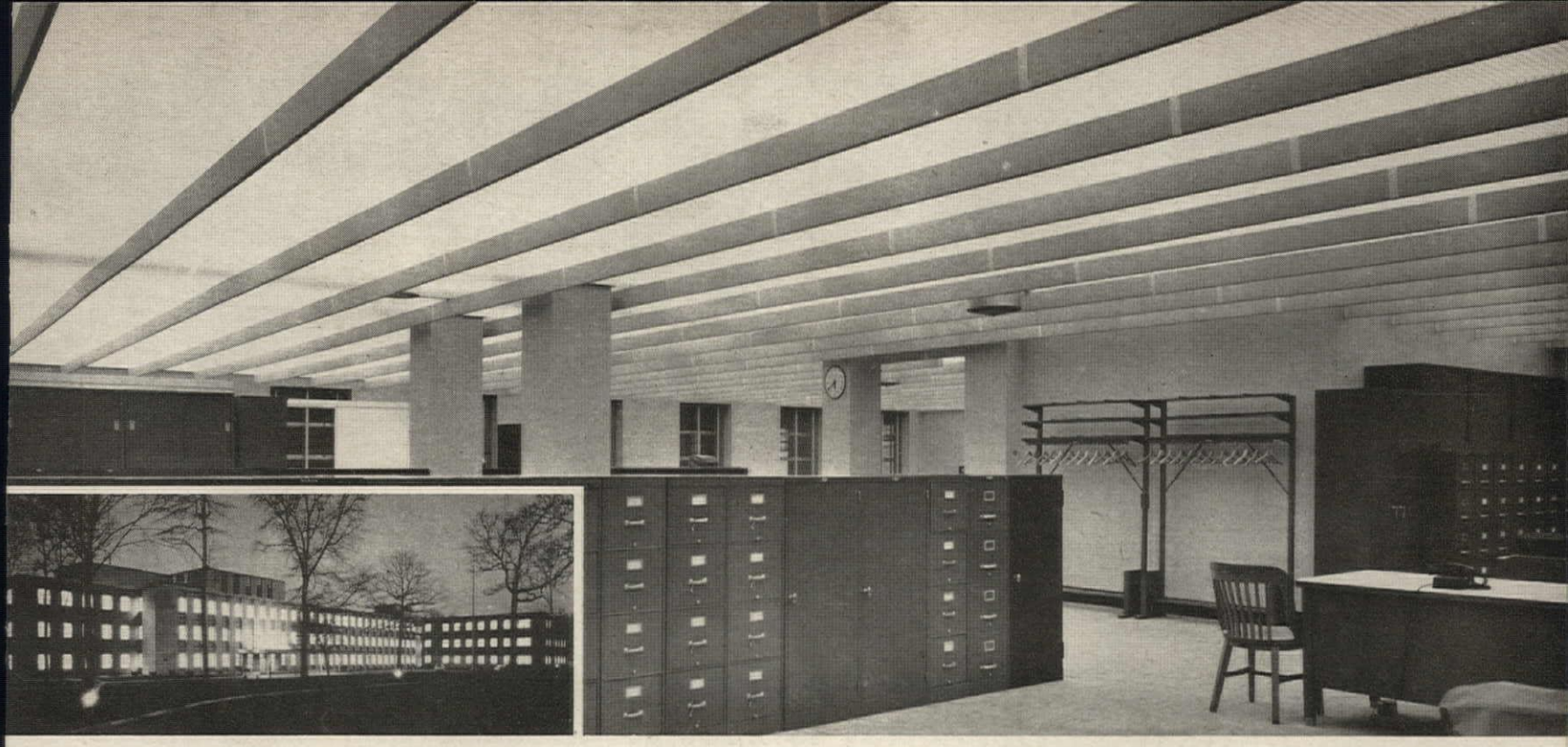
Push the door either way—the return to closed position is gentle and quiet, making two-way door traffic safer and more rapid. RIXSON Duo-checks are especially desirable for doors where busy people pass through with loaded arms . . . carrying trays, pushing wheeled carts, etc. Where specified, a hold-open is built in that automatically holds the door when pushed open to 90° on either the right or left swing or both. A gentle push or pull releases the hold-open.

completely invisible . . . RIXSON Duo-checks are concealed in the rigid floor. The door is pivotal hung with no unsightly arm, mechanism or hinges exposed to gather dust or dirt.

ideal for *hospital doors leading to utility and supply rooms; cafeteria and kitchen doors leading to dining areas; all double acting light interior doors. Write for descriptive literature and templates.*

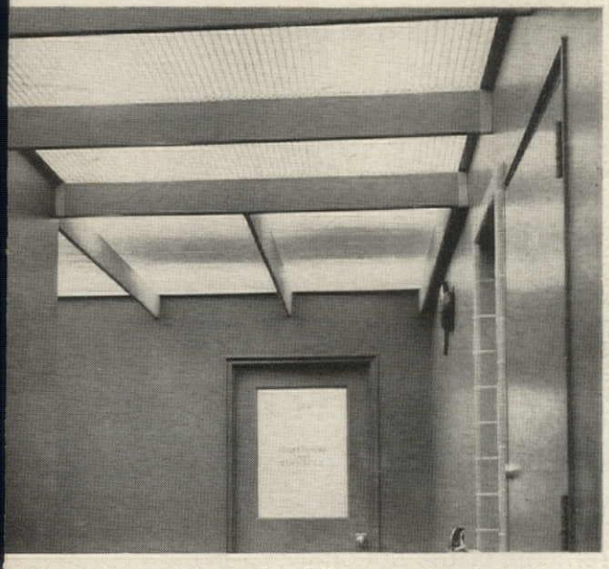
THE OSCAR C. RIXSON CO.

9100 west belmont ave. • franklin park, ill.
43 racine road • rexdale, ontario

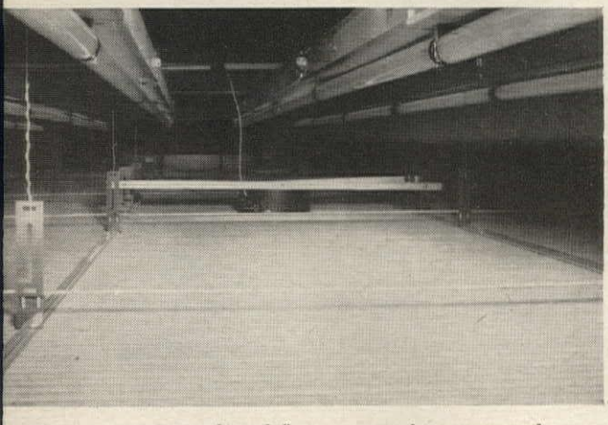


Cabin Hill, new central office of West Penn Power Company, Greensburg, Pa., has almost 90,000 square feet of illuminated ceilings. The ceiling components by **Sylvania Electric Products Inc.**, Wheeling, W. Va

The illuminated ceilings were planned to give office workers the benefits of high intensity lighting, free from annoying glare and shadows. The lighting level of each location is designed to fit the work in that area... for example, 130 foot candles in the drafting room. Accoustical baffles cut down noise.



The ceiling panels, made of BAKELITE Brand Rigid Vinyl Sheet, slide into pre-formed channels. Thus, they are easily removed for cleaning, replacement of fixtures, or other maintenance.



There are seven miles of fluorescent tubing mounted above the ceilings at Cabin Hill. The sprinkler system, air-conditioning ducts, and wiring are all concealed above... a UL approved installation.

New West Penn Power Company building features

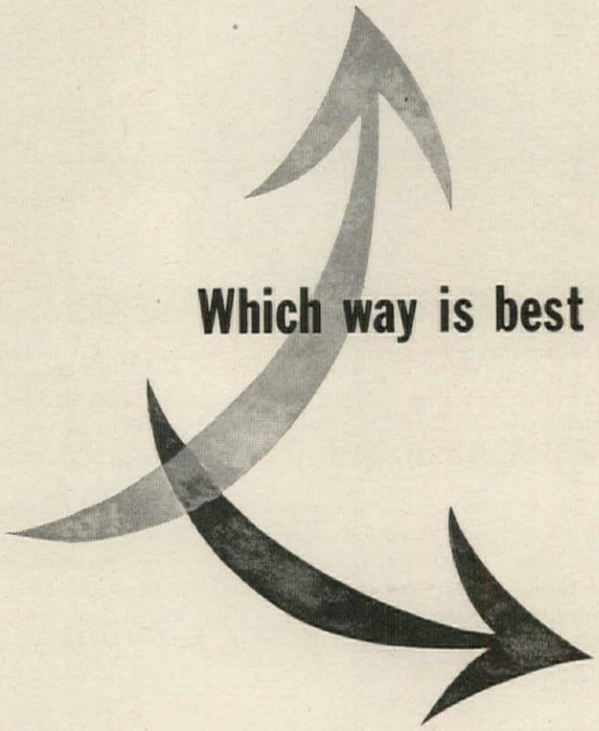
illuminated ceilings throughout offices and corridors

Better lighting, better appearance, and economical construction result from specifying illuminated ceilings made of BAKELITE Brand Rigid Vinyl Sheet. They won't warp, crack or discolor with aging. They resist moisture, oil, combustion, and are dimensionally stable. They clean easily, and are light in weight for easy handling. For complete data, write Dept. VO-2.

BAKELITE BRAND PLASTICS

Hoffman and Crumpton, architects; O. H. Martin Associations, general contractor; H. P. Foley, electrical contractor; Carl J. Long, consulting electrical engineer.

BAKELITE COMPANY, *A Division of Union Carbide and Carbon Corporation* UCC 30 East 42nd Street, New York 17, N. Y.



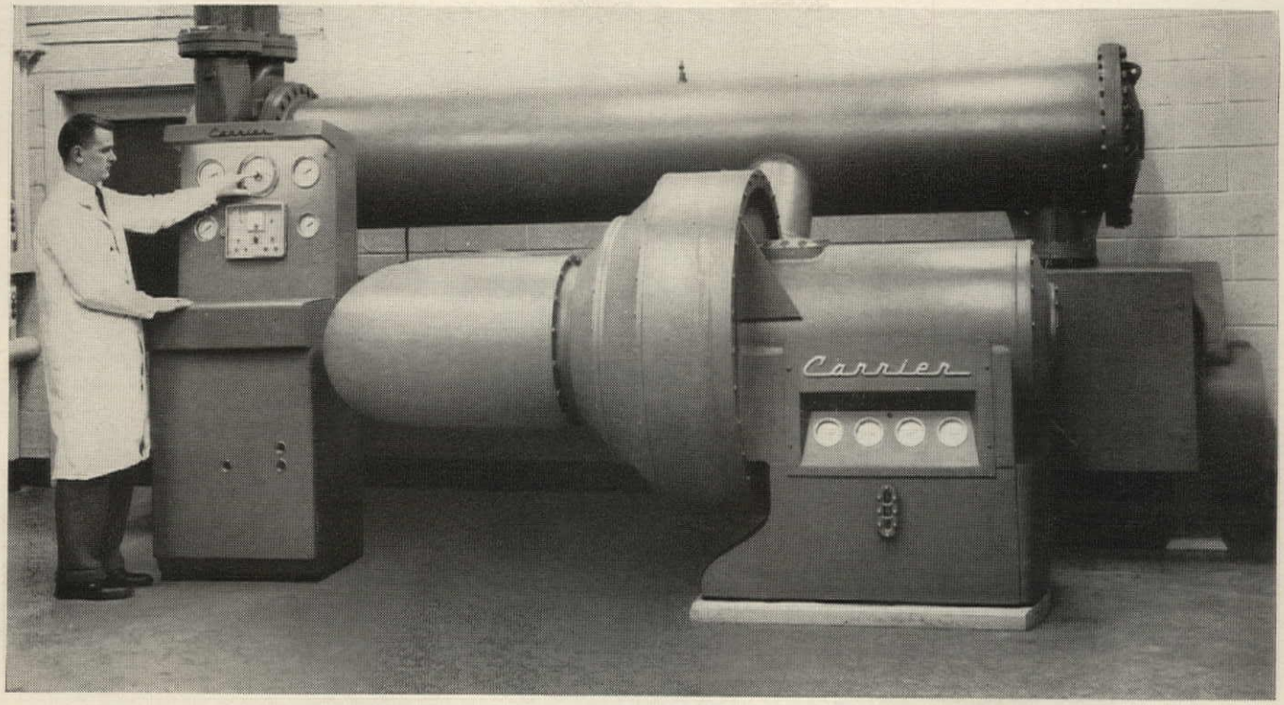
Which way is best to air condition a building?

Every building poses different problems. Take the refrigerating machine, for instance. Where should it be located? What kind of energy is available? What are the capacity requirements of the building?

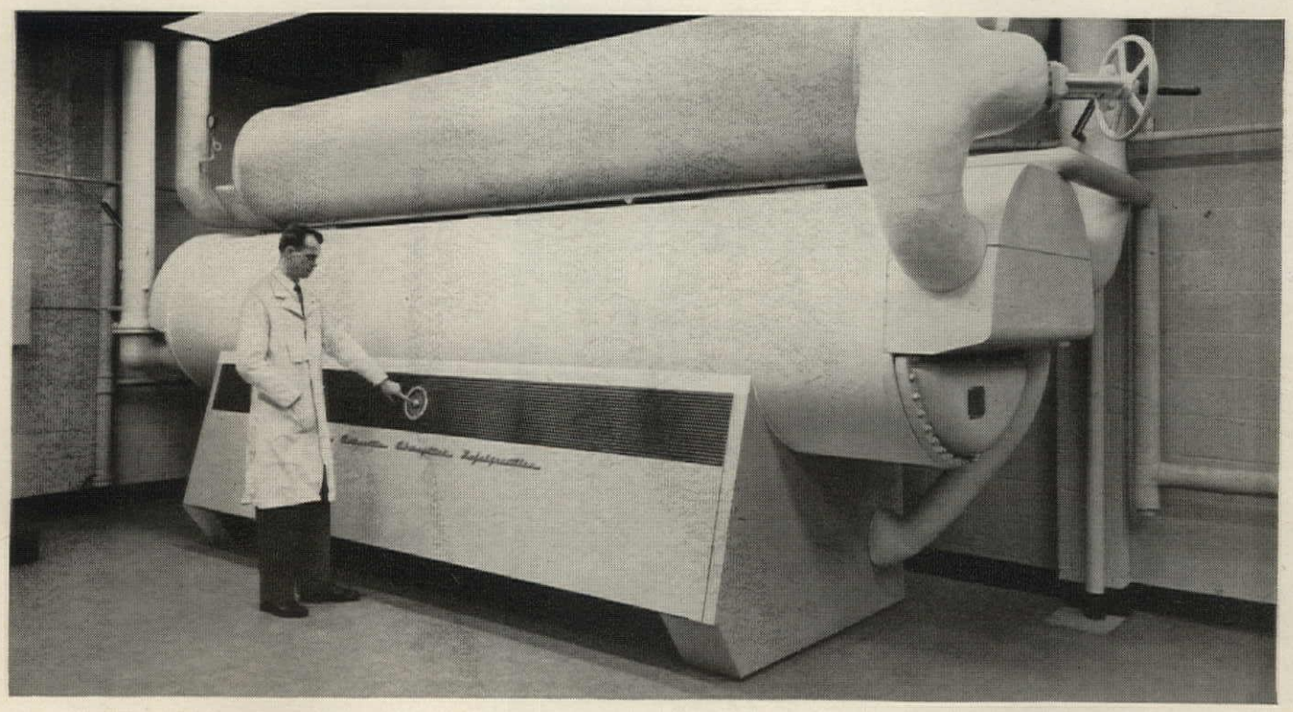
Only Carrier gives you a choice of these two refrigerating machines. Which is best? Each provides unique advantages under special conditions. For complete information about them, call your nearest Carrier office.

Or write Carrier Corporation, Syracuse, New York.

Carrier



If you have low-cost power, the new Carrier Hermetic Centrifugal Refrigerating Machine offers unmatched advantages. It's the only hermetic with such advanced features as a refrigerant-cooled motor, hydraulic powered capacity vanes, and electronic controls for completely automatic operation. Its compact design and light weight minimize space and structural requirements. Capacities from 90 to 1000 tons. Other Carrier Centrifugal Refrigerating Machines up to 4000 tons. For smaller buildings, there are "packaged" Carrier Reciprocating Water Cooling Machines ranging from 3 to 200 tons.



If you have low-cost steam, the best way may be a new Carrier Absorption Refrigerating Machine. It cools with heat energy derived from low-pressure waste steam or hot liquids to cut costs. Operates automatically at the push of a button. Follows fluctuating loads electronically from full load to zero capacity. It's safe—with water the refrigerant, a simple salt the absorbent. And it's so compact and vibration-free you can locate it wherever there's space to spare—on the roof, in the basement or anywhere in between. Cooling capacities in this new Carrier line range from 60 to 700 tons.

EXCERPTS

Opinions expressed in these excerpts are not necessarily those of FORUM's editors

Architectural education

Excerpts from an article in Architectural Design *of Britain by Professor F. E. Towndrow, dean of the faculty of architecture at the New South Wales University of Technology in Sidney*

It takes all sorts of specialized activity to make a vital architectural profession. The community will need several different kinds of architects. No one man can encompass within himself all the special kinds of knowledge and ability required for the production of complicated modern buildings. In our architectural education we should prepare the way for these different types of specialists who should work together in partnership, i.e., the architect-planner (we can give him the art business as well), the architect-constructor (or architect-engineer) and the architect-administrator (including the public official, the businessman, the organizer and the job controller). They should all be equal academically and professionally.

Some architects should go on to the boards of directors of building companies. They may not be allowed to call themselves architects, but they would be architects in fact. In this way they would take an active part in all the phases of production—*from conception to completion*—just as is still customary with mechanical and civil engineers, who do not lose professional status because they are also contractors.

In the future, perhaps the architect-master-builder will be equipped to control the situation from start to finish so as to produce fine building at a cost that the community can afford to pay. Isn't this a possibility that our architectural schools could keep in mind?

Contemporary church art

Excerpts from the preface by Maurice Lavanoux, editor of Liturgical Arts, *to a recent book of which he is also editor**

It seems that all art and architecture, prior to the nineteenth century at any rate, *was modern in its day*, and it was modern in the proper sense of that much-abused word for the simple reason that no one called it so. It was unconsciously modern; it is when we become consciously modern that our troubles begin.

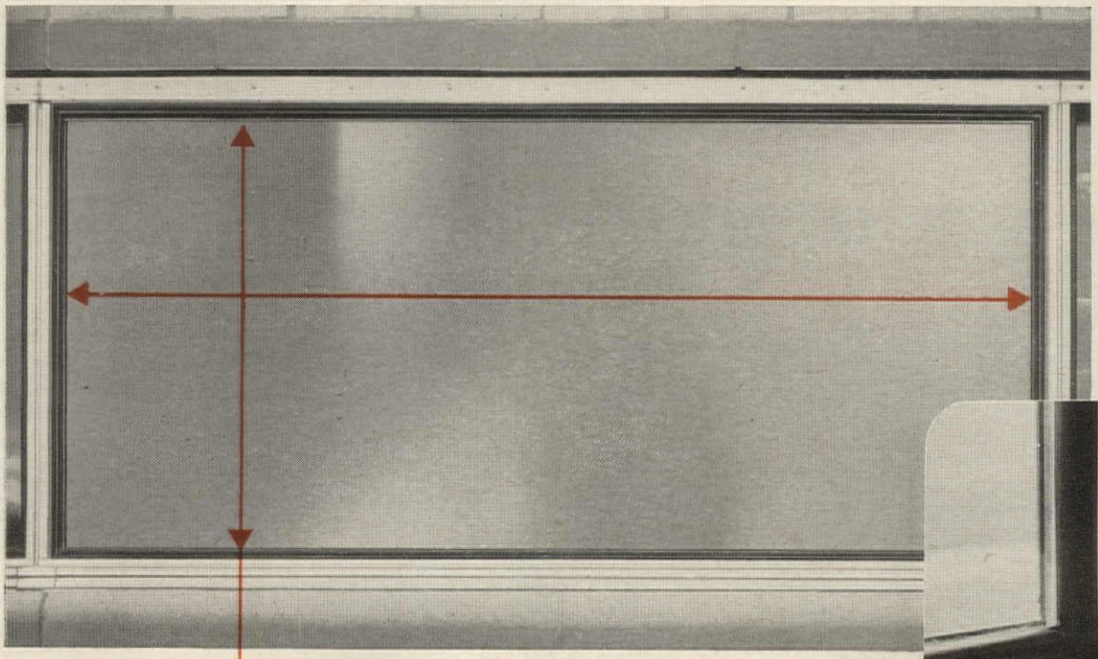
The history of architecture furnishes us continuous evidence that the great practitioners of past ages worked out their problems with imagination, daring, creativeness, a sense of proportion, a sense of tradition; they even risked failure, but always in a free manner and with intuition. It is true, of course, that the ancient architects were aware of much of what had been done before their day and were influenced in various ways by the work of their predecessors, but they did not slavishly copy; rather did they allow their work to evolve in a normal fashion, with due respect for the needs of their time.

The confusion which reigns today and stiffens the resistance of the die-hard is due in large measure to our having, so to speak, reached the bottom of the barrel, as far as design is concerned. The past 25 years have witnessed the gradual disappearance of meaningless ornament and

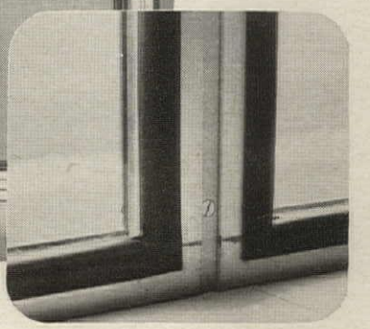
continued on p. 190

* CONTEMPORARY CHURCH ART. By Anton Henze and Theodor Filthaut. Published by Sheed & Ward, 840 Broadway, New York 3, N.Y. $7.50

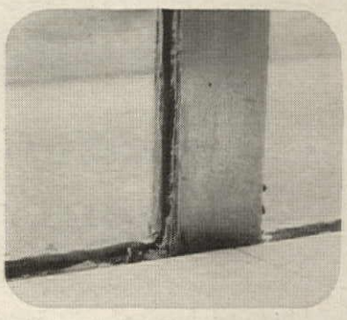
New LEAKPROOF INLOCK structural weather strip obsoletes present glazing methods



In July, 1956, ribbon windows in a 10-year old office and factory building were completely reglazed, because for years, considerable leakage had been experienced. Half the lights were reglazed by conventional methods, the other half were reglazed by the same workmen using INLOCK Structural Weather Strip.



Unretouched photo (inset) shows interior view of molded Inlock one-piece corner. Note neat eye-appealing finish. No distortion has occurred.



Unretouched photo taken, **less than four months** after reglazing. Note how movement due to expansion and contraction has forced putty out of channels.

Inlock—an exciting new discovery in structural weather strip, is a self sealing, permanent weatherproof setting member that never leaks. It is ideally suited to modern ribbon window installations, curtain wall construction, windows in combination with insulated panels, and other building applications. Made of Neoprene, it needs no binders, cement or other caulking. Corners are injection molded. No mitered corners or joints to leak because of expansion or contraction. Permanent wax blooming, water-repellent surface adds a fine shadow line frame to windows. Maintenance-free, needs no paint, finish or pointing. Will not deteriorate. Available in standard gasket sections, or can be designed to your specifications.

Specify . . .

INLOCK
STRUCTURAL WEATHER STRIP

INLAND MANUFACTURING DIVISION
General Motors Corporation, Dayton, Ohio

INLAND MANUFACTURING DIVISION
General Motors Corporation
2734 Inland Avenue, Dayton, Ohio

Send complete information and catalog.

Name_____
Title_____
Company_____
Address_____
City_____ Zone_____
State_____

false trappings based on antiquarian mistakes. In church work, these mistakes took the form of plaster vaults and fake buttresses, revolting statuary and insipid paintings. But today we are coming close to the obliteration of art with the excessive use of glass and aluminum, the *total* elimination of moldings, etc.; the engineer is disturbingly in the ascendant, the artist is feared, and many architects are reluctant to take the responsibility of employing great artists, or even to run the risk of apparent failure. We have reached a point where *pure* design reigns supreme, to the extent of sterility. The danger now lies in the fact that certain clichés of the present may take the place of the imitations of recent decades. The architects who liberated us from the shackles of past aberrations have now acquired their imitators among those who chronically imitate —owing to lack of ability, timidity and want of conviction—and never invent.

What we sorely need today, in the field of religious art and architecture, is the realization that man is not only a creature of intellect but also one of emotion; he cannot be reduced to the level of a thinking machine. In the design and decoration of our churches we must add the warmth that comes from the artist's work—the painter, the sculptor, the ceramist, the enamelist, the stained-glass worker, the iron worker, the silversmith, the worker in textiles, the calligrapher, the printer, all working in close collaboration with the architect. How all this can be done is the problem of our day.

As if life was not difficult enough as it is, a normal evolution of religious art is choked off and obstructed by the semantic battle which fogs all official pronouncements, to say nothing of the commentaries of many whom the mere hint of a fresh idea calls to do battle with fate. It is such a useless battle! Instead of inveighing against the hopes of artists who wish for nothing more than to devote their God-given talents to the creation of that beauty which we all wish to see in the House of God, it might be wiser to concentrate our efforts on the elimination of the trash that clutters so many of our churches and which is still sold in such quantities. The efforts of many artists who are labeled "modern" (and what a bugbear that word has become!) have not even been given a chance to validate the claims of architects and artists who stand ready to work for a renewal of that artistic climate which must be a prelude to a sane outlook in matters of religious art. But seldom do we hear any official outcry against the continuance of a regime of commercialism that can only be called a prostitution of all we hold dear in manifestations of beauty on earth.

If, as the catechism tells us, we are created in the image and likeness of God, then the faculties and talents which the Creator has bestowed on some of us must not be thwarted or stifled by personal prejudices, individual tastes or ignorance, invincible or otherwise. As artists, we must accept the responsibility for our actions, but it remains true that those whose responsibility it is to provide the fabric in which the liturgy will be performed in all its majesty and dignity, and who are further charged with the responsibility of bringing beauty into our churches, are also bound to act in such a way that the talent bestowed by God may be not wasted or hindered through ignorance or prejudice.

The artists are legion who wish to work for the Church. The time is at hand for a vigorous renewal of the creative manifestations of our time. It remains for us all to make that renewal possible for the greater glory of God.

NEW CHRYSLER PLANT

USES 20,000 FEET OF CLAY PIPE

Architects-Engineers:
F. A. Fairbrother & Geo. H. Miehlf,
Detroit

Consulting Engineers:
Albert Kahn, Inc.,
Detroit

Pipe Contractor:
Gorman-Lavelle Plumbing & Heating Co.,
Cleveland

TWINSBURG, OHIO—Hundreds of acres of former farmland have been transformed into the site of a mammoth body stamping plant—part of Chrysler's new expansion program.

As in other major construction projects, Clay Pipe plays an important role here. Approximately 20,000 feet, in diameters from 6 to 36 inches, were specified.

With Clay Pipe, a future of trouble-free service is assured. It can't rust or rot . . . can't corrode . . . can't crumble. It combines the lowest cost-in-place with the highest performance standards of any pipe made.

Remember these qualities when you build for the future and specify Clay Pipe—the only pipe with a proof-of-performance *long-term guarantee.*

The Public *KNOWS* Clay Pipe Is Best

Vitrified

CLAY PIPE (CLAY PIPE NEVER WEARS OUT!)

NATIONAL CLAY PIPE MANUFACTURERS, INC.
1820 N. Street, N.W., Washington 6, D.C.

206 Connally Bldg., Atlanta 3, Ga. • 100 N. LaSalle St., Rm. 2100, Chicago 2, Ill. • 703 Ninth & Hill Bldg., Los Angeles 15, Calif.
311 High Long Bldg., 5 E. Long St., Columbus 15, Ohio

C-457-4

like no other building device

Spanall®

HORIZONTAL SHORING

helps contractors save time, labor and money

S-L Spanall assembles fast and conveniently to desired span lengths—without need for intermediate supports

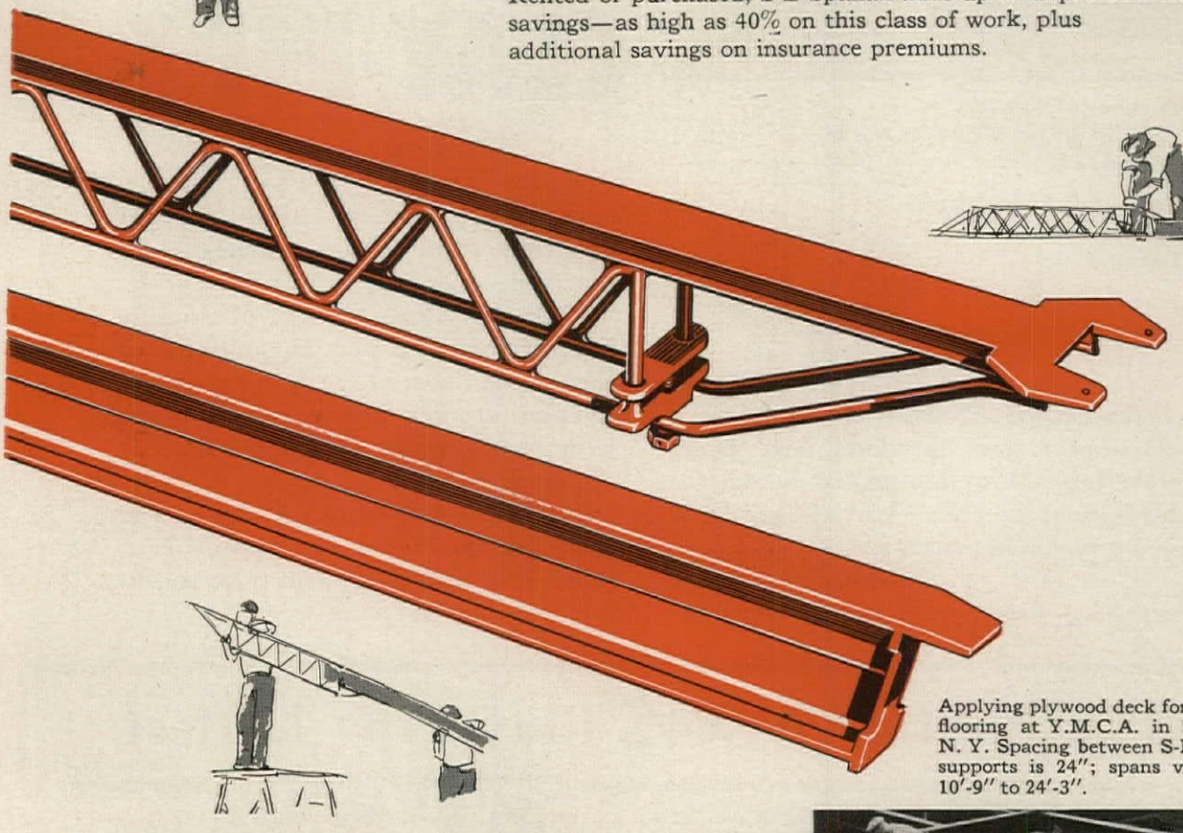
—frees work areas on floor below

—adjusts quickly to desired span lengths

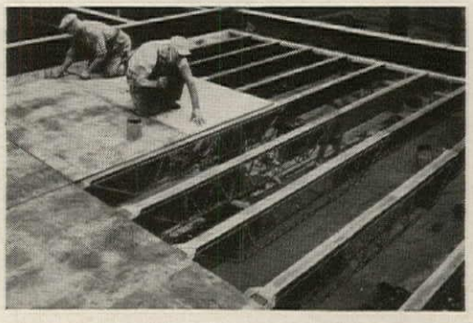
—supports 44 times its own weight—with safety factor of 2.17

—*and* **Spanall** *features built-in camber,* easy to set and automatically correct for any span length.

Rented or purchased, S-L Spanall adds up to unprecedented savings—as high as 40% on this class of work, plus additional savings on insurance premiums.



Applying plywood deck for concrete flooring at Y.M.C.A. in Syracuse, N. Y. Spacing between S-L Spanall supports is 24″; spans vary from 10′-9″ to 24′-3″.



SPANALL OF THE AMERICAS, INC.
787 United Nations Plaza, N.Y.C. Telephone MUrray Hill 5-7100

UNIVERSAL BUILDERS SUPPLY CO., INC.
787 United Nations Plaza, N.Y.C. 408 No. Midler Ave., Syracuse, N.Y.

SPANALL OF CANADA, LTD.
P. O. Box 171, Postal Station E Toronto, Ontario

Complete information and engineering service available through local distributors in United States, Canada and Latin America.

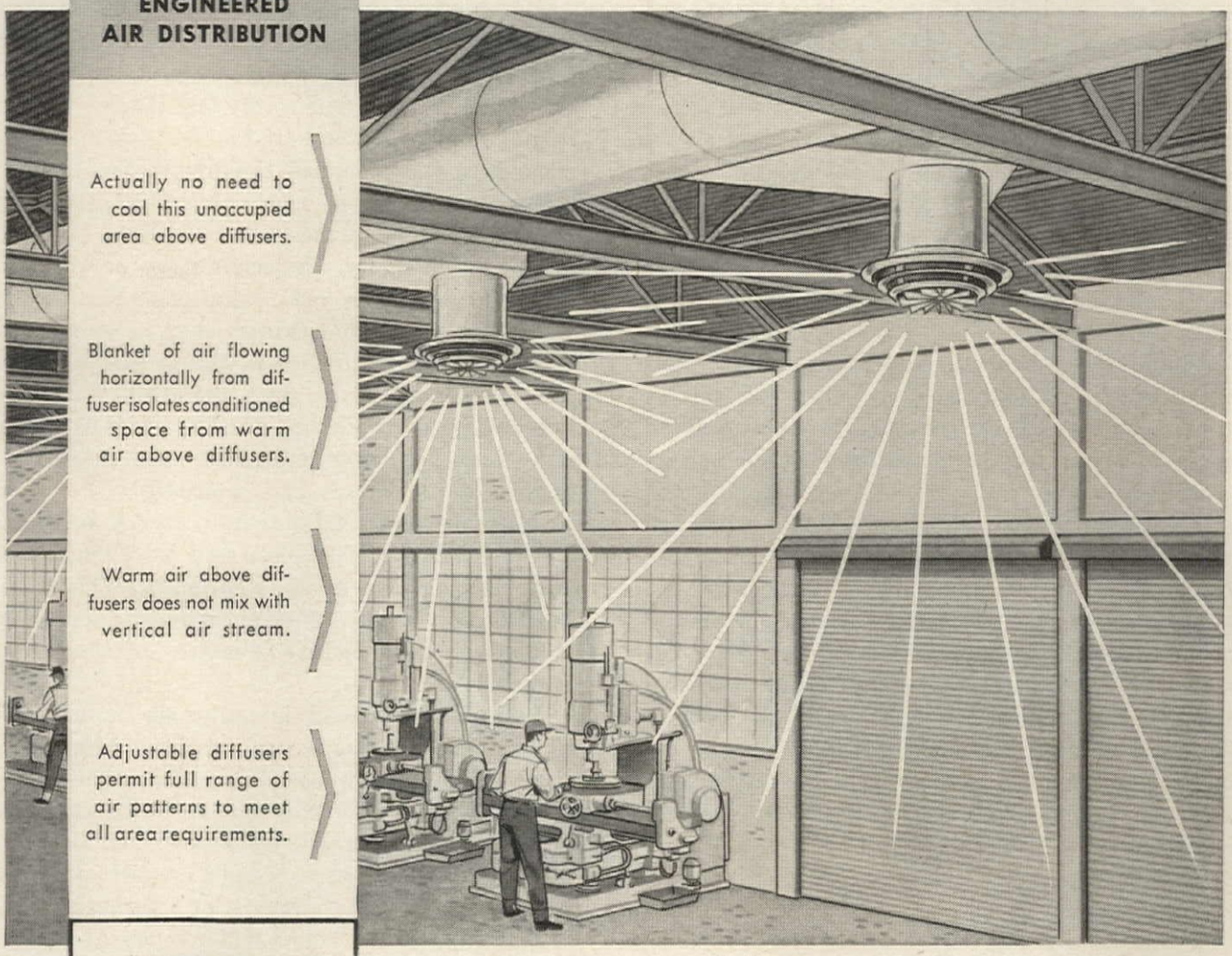
THE MARK OF QUALITY

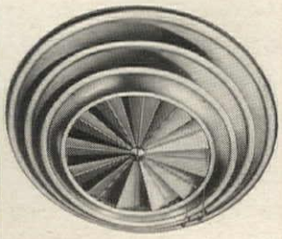
BARBER COLMAN

Uni-Flo

ENGINEERED AIR DISTRIBUTION

Industrial Venturi-Flo Diffuser reduces waste cooling of overhead space





New Model BP Industrial Venturi-Flo Diffuser for high or low ceiling cooling and heating in industrial plants, gymnasiums, auditoriums, hangars, TV studios, etc.

Now you can efficiently deliver spot or area cooling from an unfinished ceiling and virtually ignore the heat load of the large unoccupied space overhead.

Performance of the new Industrial Venturi-Flo Diffuser, as illustrated here, is guaranteed by Barber-Colman Company when diffusers are applied in accordance with published data.
Get complete details from your nearby Field Office, or write us today!

Only Barber-Colman Company combines skills in *both* air distribution and automatic controls for *undivided* responsibility.

BARBER-COLMAN COMPANY

Dept. M, 1135 Rock Street, Rockford, Illinois. Field Offices in principal cities

cooperative though less basic research along the same lines. Starting from such extremely low-cost raw materials as clay, gypsum, cement, wood fibers and particles, the so-called conventional building materials will more than hold their own. Indeed, with aggressive research, they will be the vehicles of the revolution, combining old and new materials, such as plastics, in new forms.

Even more advanced and exciting are developments in the silicate compounds known as glass, where research into the structure and composition of these materials in the last two decades points the way to a mounting variety of different types designed to special purposes—glasses to absorb or deflect heat, glasses to transmit a maximum amount of it and glasses to control all forms of radiation. More basic research underway in the controlled arrangement of glass molecules may greatly raise its structural strength and put it among the full-scale structural materials. Still another spate of new materials is coming out of the electrical and electronics industry, investigating the dual aspects of chemical materials as matter and energy. These include new phosphors and new ceramic-metal combinations which offer powerful new light sources, and a whole range of weird new metals including germanium and silicon, which as transistors, solar batteries and thermoelectrical devices offer new, exceedingly compact methods for the control or conversion of energy for heat, light and air conditioning. Together they may spell a revolution in building utilities, some aspects of which will be examined more fully in succeeding pages.

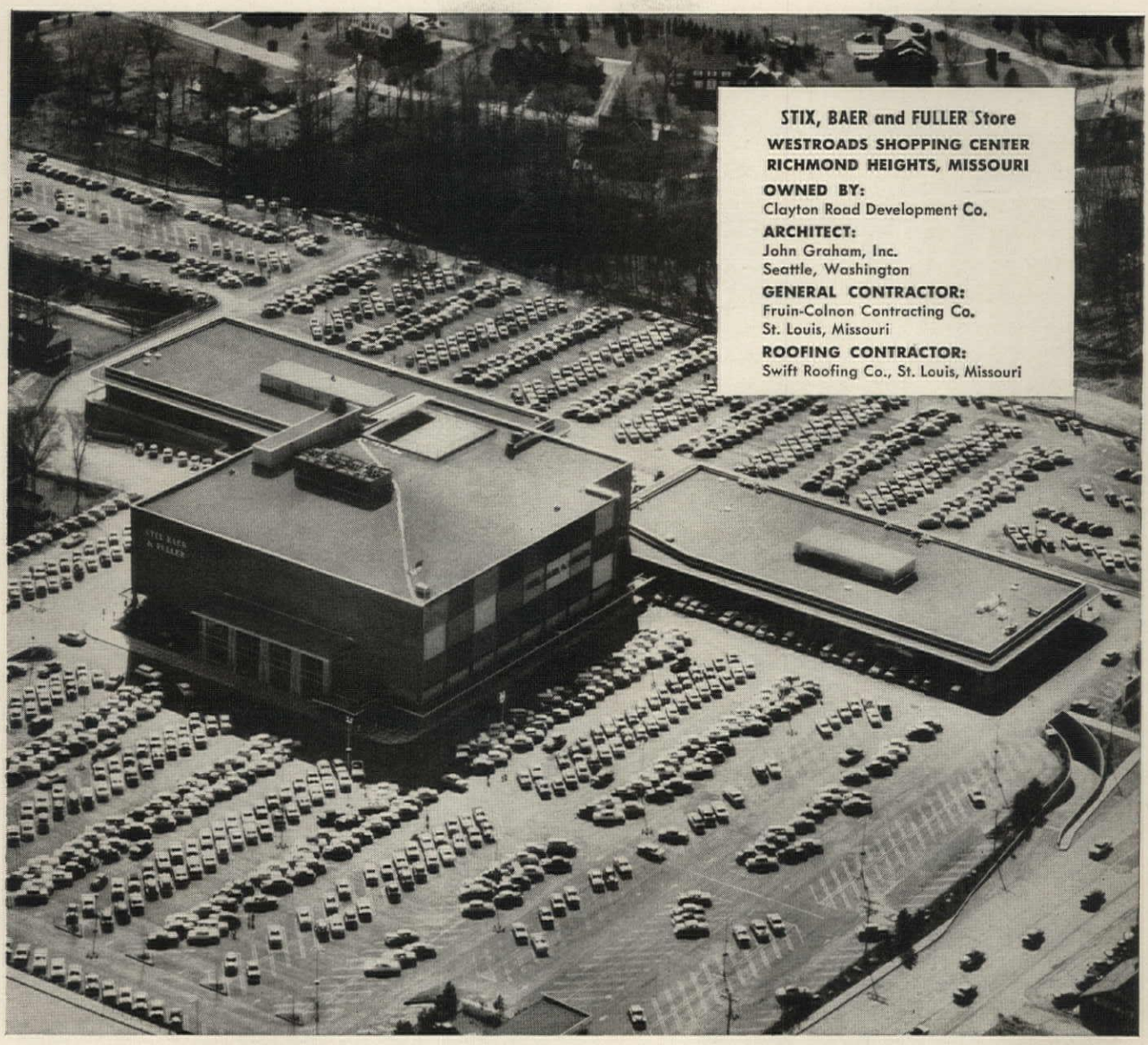
Perhaps the most significant developments are beginning to appear in the structural metals. After long neglect, the basic metals are getting basic research from a number of converging directions. Besides the rise of new metals like aluminum, magnesium and titanium, primarily stemming from the chemical industry, there is a rising tide of developments in older metals. These include methods for precisely designing alloys for specific uses, new vacuum-melting techniques for removing impurities from metals to achieve much higher strengths and changed characteristics, new forming processes in which metal fibers are laid down in sheets or mats and molded like plastics into complex curvatures and shapes of great structural strength. But perhaps the most basic development, one in which a great deal of fundamental research is going forward, is the discovery that single or perfect crystals of pure metal, grown in a certain way, exhibit tensile strengths and other properties far higher than any so far achieved in commercial metals. This discovery, plus the new understanding of alloys, may give metals some of the enormous flexibility in design of organic chemicals. The prospect is that the atomic and crystal molecular structure of metals may be controlled and oriented in such a way that metals may be created with greatly increased strength, corrosion-resistance or other properties of an even more startling nature. Indeed, U.S. Steel has a research project going on "transparent" steel, investigating the possibility that crystal structure may be so oriented that steel in thin sections may transmit light.

The plastic shape of things

This enormous ferment in new materials, from synthetic plastics to metals, requires the cooperative attention of architects, engineers and builders alike. Every indication points to the fact that we are on the threshold of a new era. If that era is not to lead to chaos thrice compounded, the architect must master a new orchestration of materials in industrial forms and direct them in the path of beauty, texture and structural integrity. Underlying the problem is the basic fact that the old limitations of materials to which the architect had learned to accommodate his designs almost instinctively—the weight of stone and metal, the fragility of glass, the grain of wood—are everywhere disappearing. In their place is a flood of new materials, ever mounting, with entirely new ranges of limitations and properties. The architect and engineer must not only keep abreast of them, but in the future he must more and more engage in research and formulate his requirements. These will be limited only by the ability of men and manufacturers to redesign the structure of matter, of which the end is nowhere in sight.

Basically, the trend in materials is toward ever higher tensile strengths and breaking stresses, which introduces vast new possibilities in architecture and design. For most of this century building has been moving steadily away from dependence on compressive strengths and great weight toward lighter structures employing the strength of improved materials in tension. This movement will accelerate as more and more materials allow engineering to approach the plastic limits of design. The trend is already physically exemplified, as will be seen in the section on structures beginning on page 124, in new structural concepts that point the way to a new freedom in space-spanning methods and plastic forms whose curvatures begin to have some of the non-linear qualities of living cells, seashells or leaf formations.

"On the whole," says the British physicist and Nobel Laureate Sir George Paget Thomson, speculating on the rising strength of materials in his provocative little book, *The Foreseeable Future*, "engineering structures will tend to become more like biological ones in which fairly large extensions are acceptable. . . . The world of the future may be expected to look more ethereal, more like fairyland, than the world of the present or of the past."



On this Stix, Baer and Fuller Suburban Store . . .

RUBEROID SPECIAL ROOFING BITUMEN

Assures Long Life, Low Maintenance

Roofing Bitumen is specially formulated by Ruberoid to give extra protection and durability to built-up roofs. Rigid manufacturing controls assure uniform quality on every square. For your next built-up roofing job, consider the advantages of Ruberoid Special Roofing Bitumen.

1. **Crack Resistance** — greater ductility means added resistance to cracking at low temperatures.
2. **Low Maintenance** — A low melting point means better self-healing properties.
3. **Long Life** — Special Bitumen's improved formula means more years of superior roof performance under even the most severe weather conditions.
4. **Easy Application** — Actual tests prove that Special Bitumen flows easier in application . . . means improved handling in kettles . . . faster spreading . . . saves time and money.

For extra years of low-maintenance, trouble-free built-up roofing, ask your Ruberoid Approved Roofer about the extra benefits of Special Roofing Bitumen.

see our catalog in S or write for copy

The RUBEROID Co.

Asphalt and Asbestos Building Materials

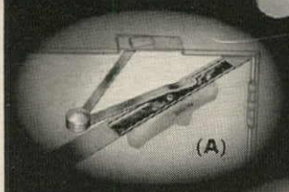
500 Fifth Avenue, New York 36, N. Y.

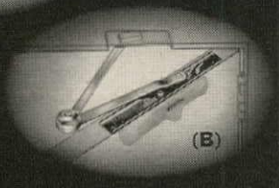
A continuous series of distinguished office buildings, schools, churches, hospitals and industrial structures using NORTON DOOR CLOSERS

Skidmore, Owings & Merrill Architect — Bryant & Detwiler General Contractors

NORTON® "INADOR"

Designed to harmonize with clean-lined modern architecture





Available with (A) regular arm or (B) holder arm . . . 4 sizes to satisfy all requirements.

900 NORTON INADOR® CLOSERS INSTALLED IN FORD'S DISTINCTIVE NEW CENTRAL OFFICE BUILDING

The primary reason for such extensive use of INADOR® concealed type closers here is, of course, that they are so completely in harmony with the clean-lined modern styling of the doors they serve. No less important, however . . . their compact, fully concealed mechanism packs all the rugged dependable power found only in a true, liquid-type closer plus the reliability, low maintenance and precision workmanship common to all *Norton Door Closers*. Current catalog gives complete data on all models. Write for it today if you don't already have one.

A complete line of Norton Surface type closers is available for installations where concealment is not essential.

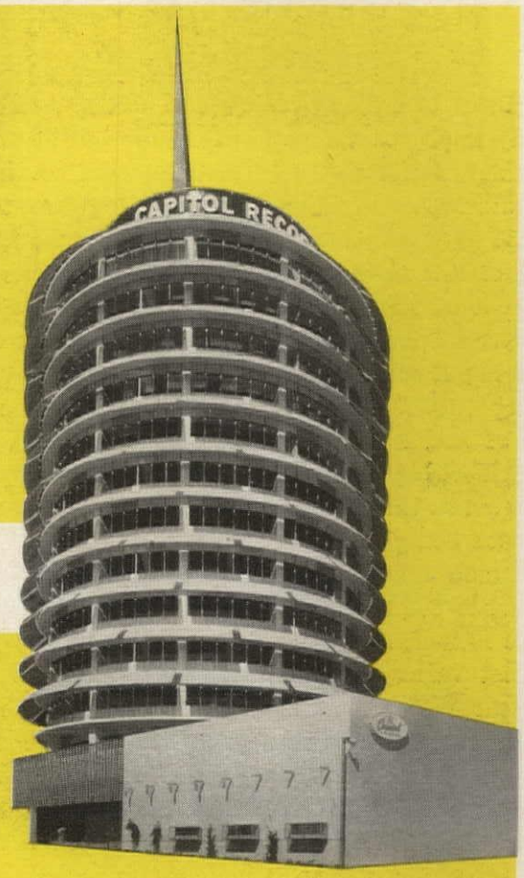
NORTON® DOOR CLOSERS

Dept. AF-17, Berrien Springs, Michigan

Within steps of world-famous "Hollywood and Vine" is a striking new Pacific Coast landmark . . . Capitol Records' revolutionary $2,000,000 circular office building . . . another outstanding example of design flexibility made possible with reinforced concrete. The structure, composed of a *reinforced concrete* cylinder thirteen stories in height and ninety feet in diameter, rises above a rectangular one-story base. This unique design achieves substantial economies in construction, operation, and maintenance because stairs, elevators, washrooms, and duct shafts are located in the central core.

REINFORCED CONCRETE

provides clean, functional design for the world's first circular office building



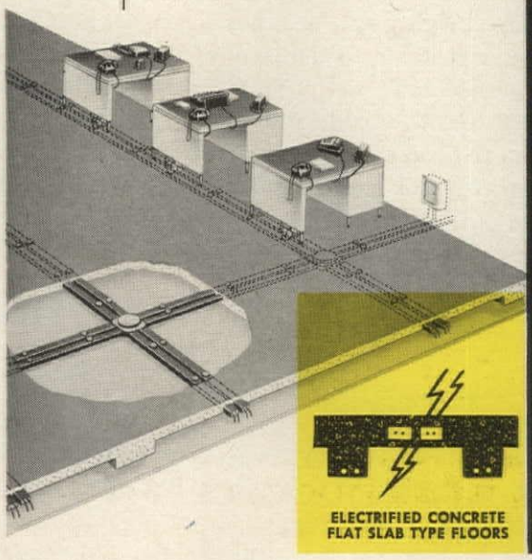
Building	Capitol Records Office Building Hollywood, California
Architect	Welton Becket, F.A.I.A., and Associates Los Angeles, California
Structural Engineer	Murray Erick Los Angeles, California
General Contractor	C. L. Peck Company Los Angeles, California

. . . and R/C DUCT FLOORS
(FLAT SLAB TYPE)

provide 100% electrical flexibility

For the Capitol Tower, the architects chose a reinforced concrete frame with flat slab type R/C Duct Floors which provide a complete network of underfloor electrical outlets for power, light, telephone, and intercom systems—at a new low cost. Outlets can be connected to convenient risers in a matter of minutes without ripping up or drilling through floors and ducts.

R/C Duct Floors, which meet all building code requirements, consist of *standard* steel electrical distribution ducts set in reinforced concrete joist or slab floors. Cost studies show that R/C Duct Floors average 19% less than cellular steel floors! Before you design your next building, investigate R/C Duct Floors. Write for new 16-page Bulletin.



ELECTRIFIED CONCRETE FLAT SLAB TYPE FLOORS

CONCRETE REINFORCING STEEL INSTITUTE

38 South Dearborn Street

Chicago 3, Illinois

CONCRETE REINFORCING STEEL INSTITUTE C.R.S.I. FOUNDED 1924

substances to create by molecular alchemy not only greatly improved synthetic phosphors but also many other new materials swells the tide upon which electroluminescence is riding. When Westinghouse turned in 1954 to develop synthetic phosphors to the specific needs of this form of luminescence, the results were almost immediate and spectacular. A typical electroluminescent panel now consists of a plate of glass on which is put down first a thin, transparent conductive coating (developed by Corning Glass), then a thin layer of zinc sulfide phosphors embedded in a polyvinyl chloride plastic film, then a layer of aluminum foil to act as the second plate or electrode—the whole sandwich being little more than ⅛" thick.

The main areas in which improvements in efficiency are due to come are in phosphors and the dielectric plastic in which they are embedded. New phosphors of great variety are arising almost monthly. Late last year Westinghouse put on a public demonstration in which it showed how in five separate panels different phosphors produce green, blue, yellow and red light, while a mixture of the first three produces white; how, using different phosphors on a single panel, green light may be changed to blue or white to pink simply by raising the frequency of the current from 60 to 10,000 cycles; and how, by stacking four different transparent color-emission panels together, frequency changes can produce in turn all the primary colors of the rainbow. A demonstration room paneled with 112 panels, each a foot square, operating on 350-v alternating current at 3,000 cycles, produced a greenish light with a brightness of about 100 foot-lamberts (50 foot-candles at working surfaces) or an efficiency of 3 lumens per watt. This is about 1/10th the efficiency of a translucent-screened fluorescent ceiling.

Brightness is still obtained at the expense of efficiency. A brightness of over 2,000 foot-lamberts has been achieved experimentally in the laboratory, well over that of the fluorescent lamp, but at the expense of 600-v, 20,000 cycle current. At ordinary 110-v, 60 cycle house current, the panel light is considerably dimmer than a television screen. Progress on low-voltage phosphors has been made by both Sylvania and Westinghouse, though the probability is that the system will always require for best results higher than ordinary voltages and frequencies, which means circuitry to convert to these. At the present stage, on a comparable basis, electroluminescence at its best has reached an efficiency of about 10 lumens per watt against 16 for the 100-watt incandescent lamp and 60-70 for the 40-watt fluorescent tube.

But electroluminescence has climbed to this efficiency from a low of only 0.5 lumen per watt three years ago. And, whereas the incandescent lamp and fluorescent tube have about reached the practical limits of their efficiency, the phosphor sandwich is only at the beginning. Theoretically, due to the simplicity and physical nature of the system, its likely maximum efficiency is estimated to be about 240, which would be about four times the efficiency of the present very efficient fluorescent light, with even less heat produced than by that notably cool light source. Broadly, therefore, in its effect on power consumption and air-conditioning load, the development of electroluminescence has high promise and significance.

The shaping of light

Architecturally, electroluminescence opens even more exciting prospects. These do not lie simply in the direction of simplifying the luminous ceiling, growing in beauty and complexity, from its present one-foot of fixtures, ballasts, reflectors and screening to a panel less than an inch in depth. They lie even more in shaping a new, soft, glareless, shadowless and seemingly sourceless light to architectural structure, for there are no foreseeable limits to the size or shape such panels may take. They may be curved to fit completely luminous shell domes or other free-form structures that are now rising. They may be molded into luminous balustrades, stair wells or stair risers and to other useful and decorative interior or exterior effects. They free lighting from the point source or fixture.

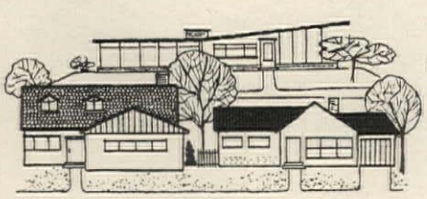
Moreover, electroluminescence introduces some quite new concepts into room lighting. Lighting may now move away from the ceiling toward extensive wall friezes of light to promote the psychologically warmer, more intimate effects of lighting at shoulder or head heighth. Two knobs would control such lighting, one for brightness, the other for color. Brightness would be adjustable to the level of outdoor light and to the interior task and need. Color would be adjustable to the mood. Panel light could be turned toward the warm red end of the spectrum for gray, drab, cold days, toward cool blue in hot summer weather. The dramatic possibilities for commercial buildings are, of course, almost limitless.

It may be some time before this new lighting is feasible on any large scale, though a period well within five years seems practical for some uses. It will probably appear first in large buildings and industrial plants, where the prospect of completely lighted interior structures holds promise for increased efficiency in specialized operations. But panel lighting is a development that architects and engineers must take into account for the future in the full range of their art.

WRIGHT

RUBBER AND VINYL FLOORING

helps reduce 4 o'clock drag!



When there's work to be done, and mother's "done in", children can grate on nerves. But you can come to the rescue—by specifying WRIGHT flooring. Completely comfortable underfoot . . . wonderfully sound-softening, WRIGHT flooring helps reduce 4 o'clock "drag" in any home. WRIGHT colors and rich-looking patterns, its unmatched ease of maintenance have instant appeal for homemakers. WRIGHT is the perfect choice in flooring for every home . . . for every project.

Consider WRIGHT next time you specify flooring.

WRIGHT MANUFACTURING COMPANY • A Div. of Mastic Tile Corporation of America

Houston, Tex. • Joliet, Ill. • Long Beach, Calif. • Newburgh, N. Y.

WA26

MAIL COUPON TODAY

WRIGHT MANUFACTURING CO., DEPT. W6-1, BOX 986, Newburgh, New York
Please send me free samples and full information on WRIGHT Rubber and Vinyl Tile Flooring.

NAME.....ADDRESS.....CITY.....ZONE.....STATE.....

PROGRESS REPORT ON THE

World's first building with curtain walls of Architectural Bronze

As massive walls give way to lightweight "curtains" of glass and metal, exciting new possibilities in building design are being opened.

In the new Seagram Building now rising on Park Avenue in New York City, rich, warm architectural bronze is being used in this way for the first time. Large extrusions of architectural bronze will stand out from the walls, creating long, sharp shadows which will give the building crisp, vertical accents. With these and smaller extrusions and rolled sheet bronze spandrels, a special arrangement of parts was designed for assembling a strong, yet light, setting for the floor-to-ceiling windows.

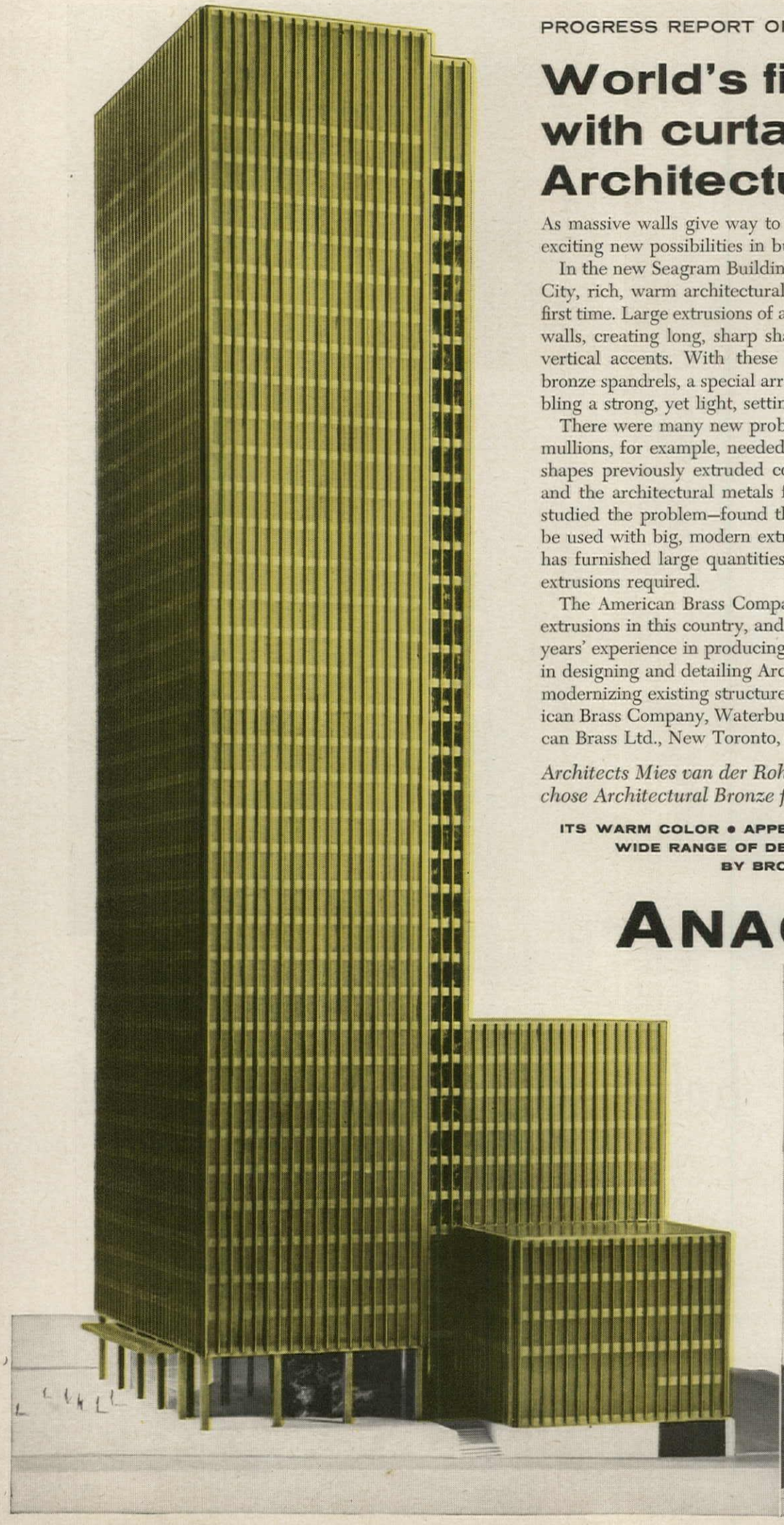
There were many new problems to face and overcome. The I-shaped mullions, for example, needed to be much larger than any architectural shapes previously extruded commercially. Working with the architects and the architectural metals fabricator, The American Brass Company studied the problem—found the answer with specially designed dies to be used with big, modern extrusion equipment. As principal supplier, it has furnished large quantities of the I-shaped mullion and many other extrusions required.

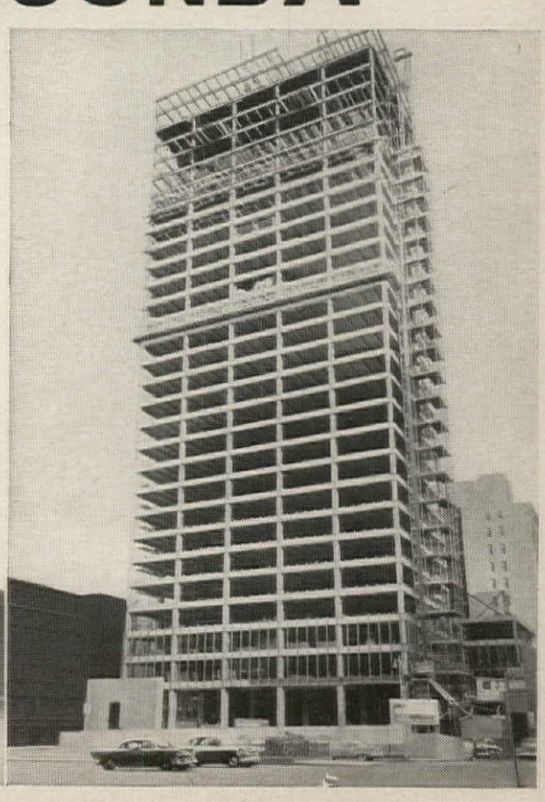
The American Brass Company pioneered the development of bronze extrusions in this country, and the knowledge gained from more than 50 years' experience in producing extruded shapes is available to assist you in designing and detailing Architectural Bronze for new buildings or for modernizing existing structures. For more information write: The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont. 5650

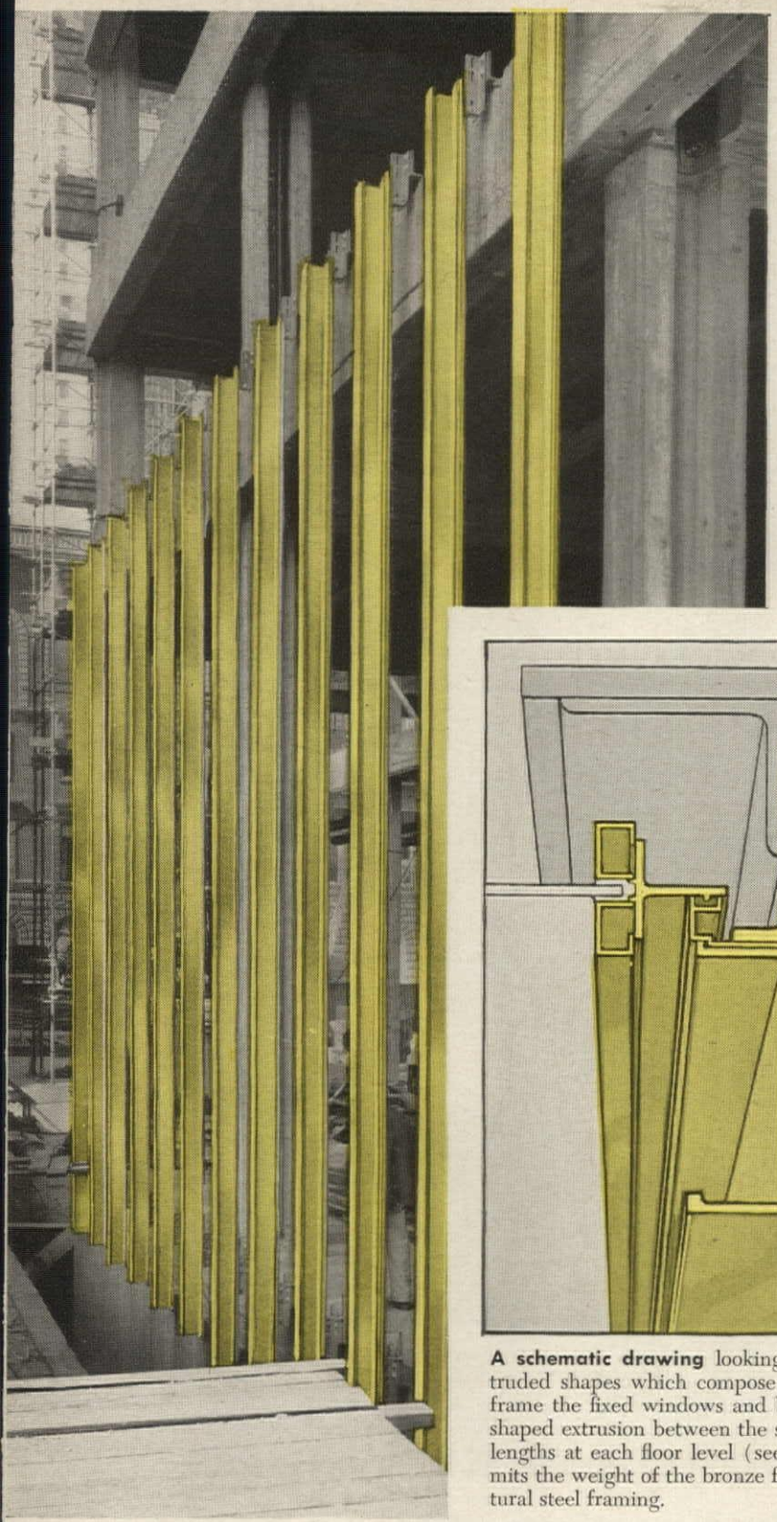
Architects Mies van der Rohe and Philip Johnson chose Architectural Bronze for:

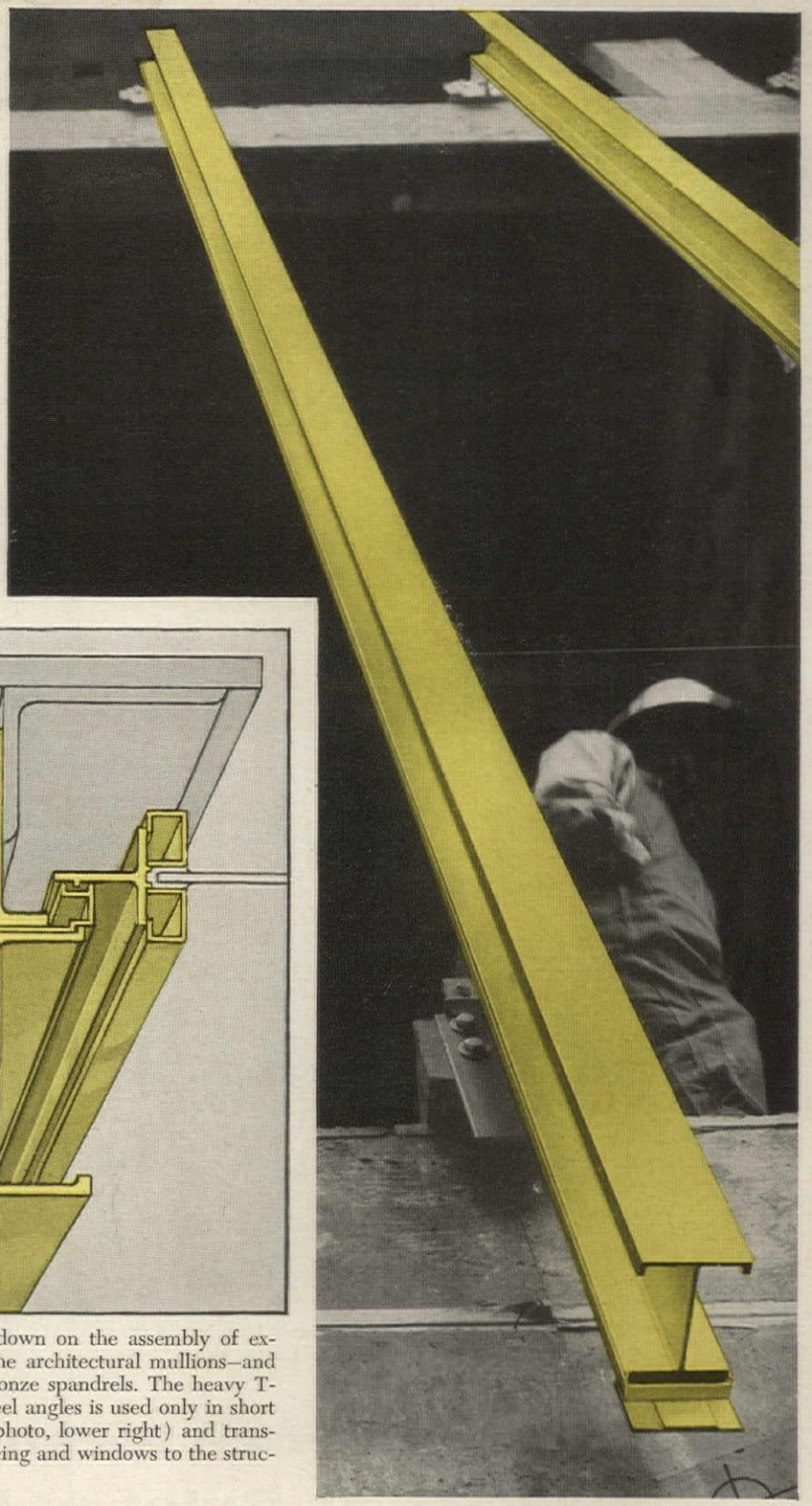
ITS WARM COLOR • APPEARANCE THAT IMPROVES WITH AGE
WIDE RANGE OF DESIGN POSSIBILITIES OFFERED BY BRONZE EXTRUSIONS

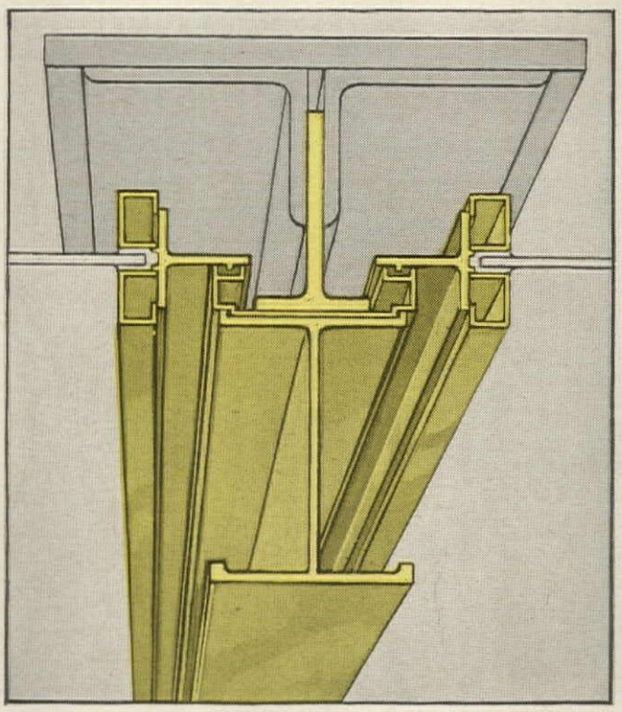
ANACONDA®











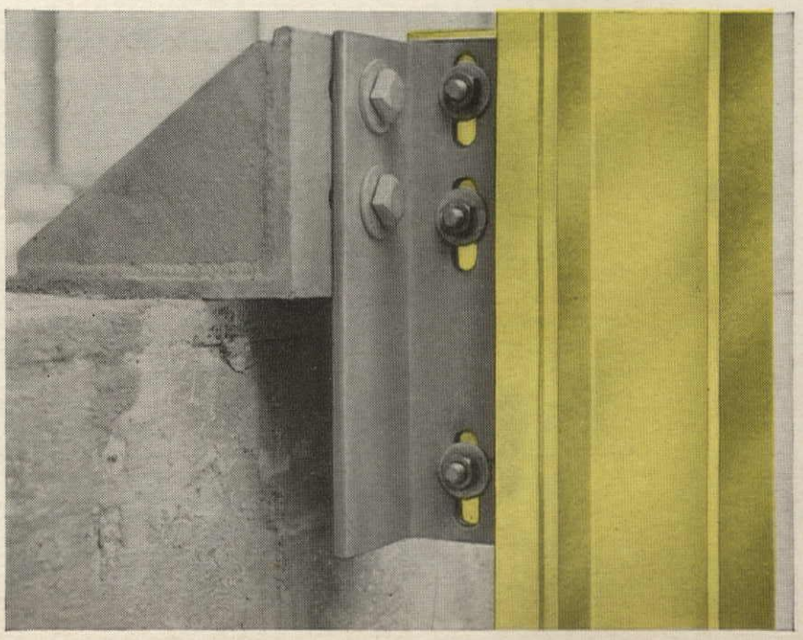
A schematic drawing looking down on the assembly of extruded shapes which compose the architectural mullions—and frame the fixed windows and bronze spandrels. The heavy T-shaped extrusion between the steel angles is used only in short lengths at each floor level (see photo, lower right) and transmits the weight of the bronze facing and windows to the structural steel framing.

Above: The first I-shaped mullions of architectural bronze are set in place on the 53rd Street side of the East Wing. These are the longest extrusions—26′ 4″—used on the building.

Above, right: End view of one of the I-shaped mullions. Projecting piece at bottom will join the mullion with a waterproofing system behind the stone facing used at the base of the building.

Right: Detail showing how mullions are fastened to building structure at each floor. Special jacks make possible precise positioning before bolts are tightened in steel angles.

Left: The Seagram Building begins to take shape. **Far left:** a model of the Seagram Building as it will appear when finished. Architects: Mies van der Rohe and Philip Johnson. Associate Architects: Kahn & Jacobs. General Contractor: George A. Fuller Company. Architectural Metals Fabricator: General Bronze Corp.



Independent sound laboratory engineer checks decibel readings in one of many New York executive offices tested.

Sound level meter readings were also taken while elevators were traveling from floor to floor in normal operation.

Tests Prove Westinghouse Elevators are as Quiet as Executive Offices

Westinghouse Engineering rids elevators of noise...increases passengers' comfort

Comparative sound meter tests performed recently throughout the New York Metropolitan area prove that you enjoy the same quiet atmosphere in today's Westinghouse Elevator as that found in the finest top-executive offices. Yes, noise has been successfully engineered out of elevators by the perfection of a scientifically sound deadened system. Noise isn't "masked" in a Westinghouse elevator—it just isn't there to begin with.

If you are planning a new building—or thinking of modernizing an existing one—why not experience a "proof of performance" test for yourself—and take your own decibel readings in a Westinghouse Elevator. Call the Westinghouse office nearest you to make arrangements for this eye-opening demonstration and also learn how you can save up to $7000 per car per year with operatorless elevators.

Westinghouse elevator installations are the embodiment of prestige . . . highest achievement in comfort, safety and efficiency for you and your tenants. Made possible by Westinghouse automation in elevatoring which produced:

1. Selectomatic for master supervisory control
2. Synchro-Glide for accurate, smooth, soft landings
3. Traffic Sentinel® for safe, courteous yet time-saving passenger handling
4. Automatic Traffic Pattern for Traffic Controlled Elevatoring
5. Shuntless Relays and Electric-Driven Selectors for reliable operation

AUTOMATED **Westinghouse Elevators**
AND ELECTRIC STAIRWAYS

YOU CAN BE SURE...IF IT'S Westinghouse

J-98727BA

new thin wall stone panel construction

REDUCES WALL WEIGHT, INSULATES AND SPEEDS ERECTION

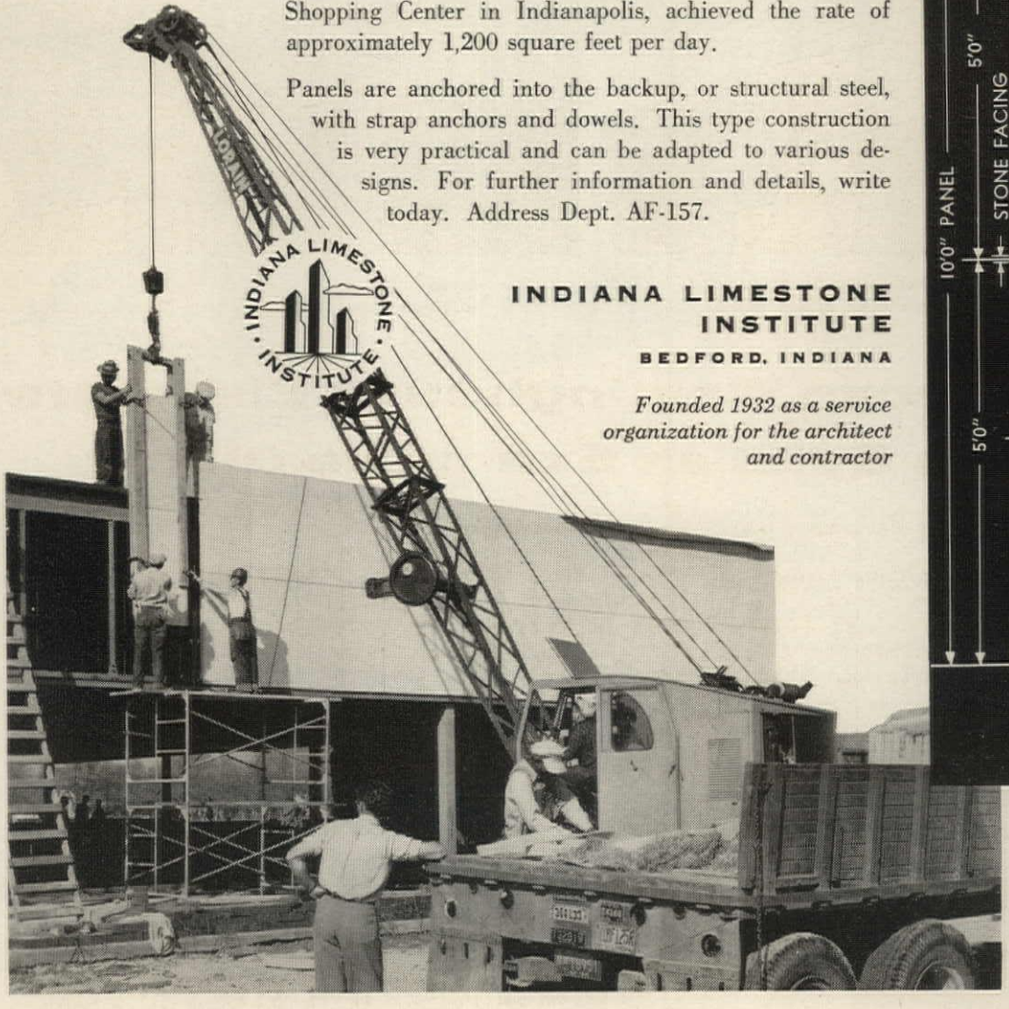
Only 4″ in total thickness, a new thin wall panel recently perfected by the Indiana Limestone Institute which provides a very high insulating value, is composed of 2″ of limestone facing mechanically fastened to 2″ of Tectum, a rigid-type insulating board.

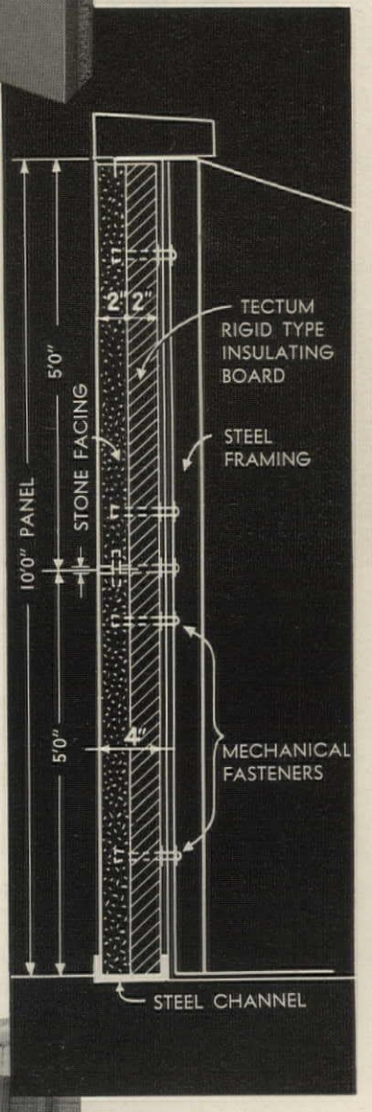
Several pieces of stone applied to a single piece of Tectum are set as one unit, or a large panel. Masons working with this new material for the first time on the Meadows Shopping Center in Indianapolis, achieved the rate of approximately 1,200 square feet per day.

Panels are anchored into the backup, or structural steel, with strap anchors and dowels. This type construction is very practical and can be adapted to various designs. For further information and details, write today. Address Dept. AF-157.

INDIANA LIMESTONE INSTITUTE
BEDFORD, INDIANA

Founded 1932 as a service organization for the architect and contractor

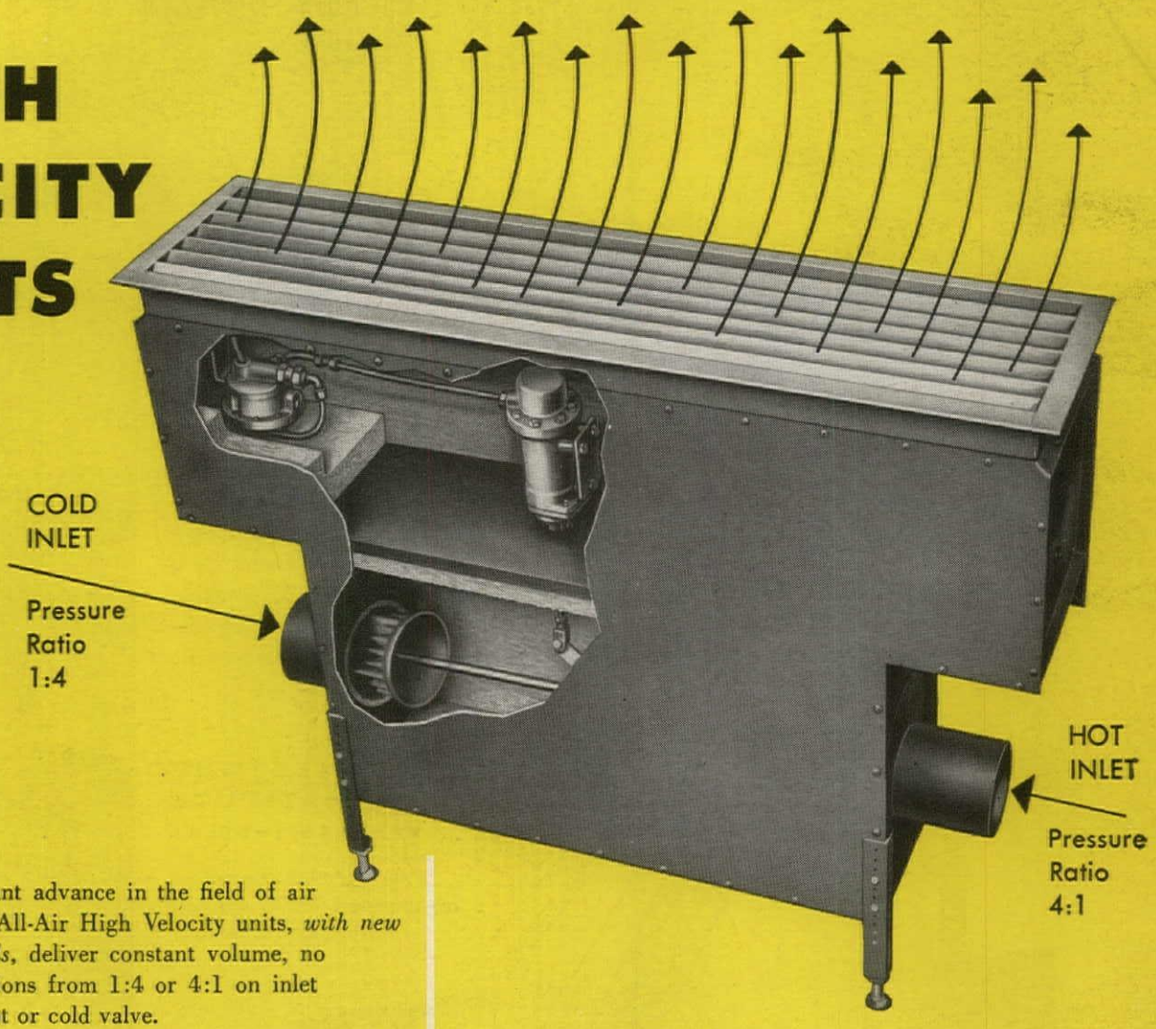




WALL DETAIL
Meadows Shopping Center
Indianapolis, Indiana

ANEMOSTAT *Announces . . . .*

ALL-AIR
CONSTANT VOLUME
HIGH VELOCITY UNITS



Here is a vitally important advance in the field of air distribution. Anemostat All-Air High Velocity units, *with new simple automatic controls*, deliver constant volume, no matter what the fluctuations from 1:4 or 4:1 on inlet pressures of either the hot or cold valve.

Each unit is a single package including the controls and integral thermostats if required. There is complete accessibility of all controls through removable diffusers. No access panels are required. Capacities of CONSTANT VOLUME units can be pre-set at the factory.

These Anemostat CONSTANT VOLUME units

- Assure scientific draft-free distribution of air.
- Are available in 100% induction units.
- Include Anemostat die-cast metal rocket-socket valves. More than 50,000 of these valves are in service, and not a single one has needed maintenance.
- Operate on standard 15 lb positive acting compressed air systems.

See your nearby Anemostat representative for complete details on these revolutionary Anemostat All-Air CONSTANT VOLUME High Velocity units.

Anemostat: The Pioneer of All-Air High Velocity Systems

ANEMOSTAT®

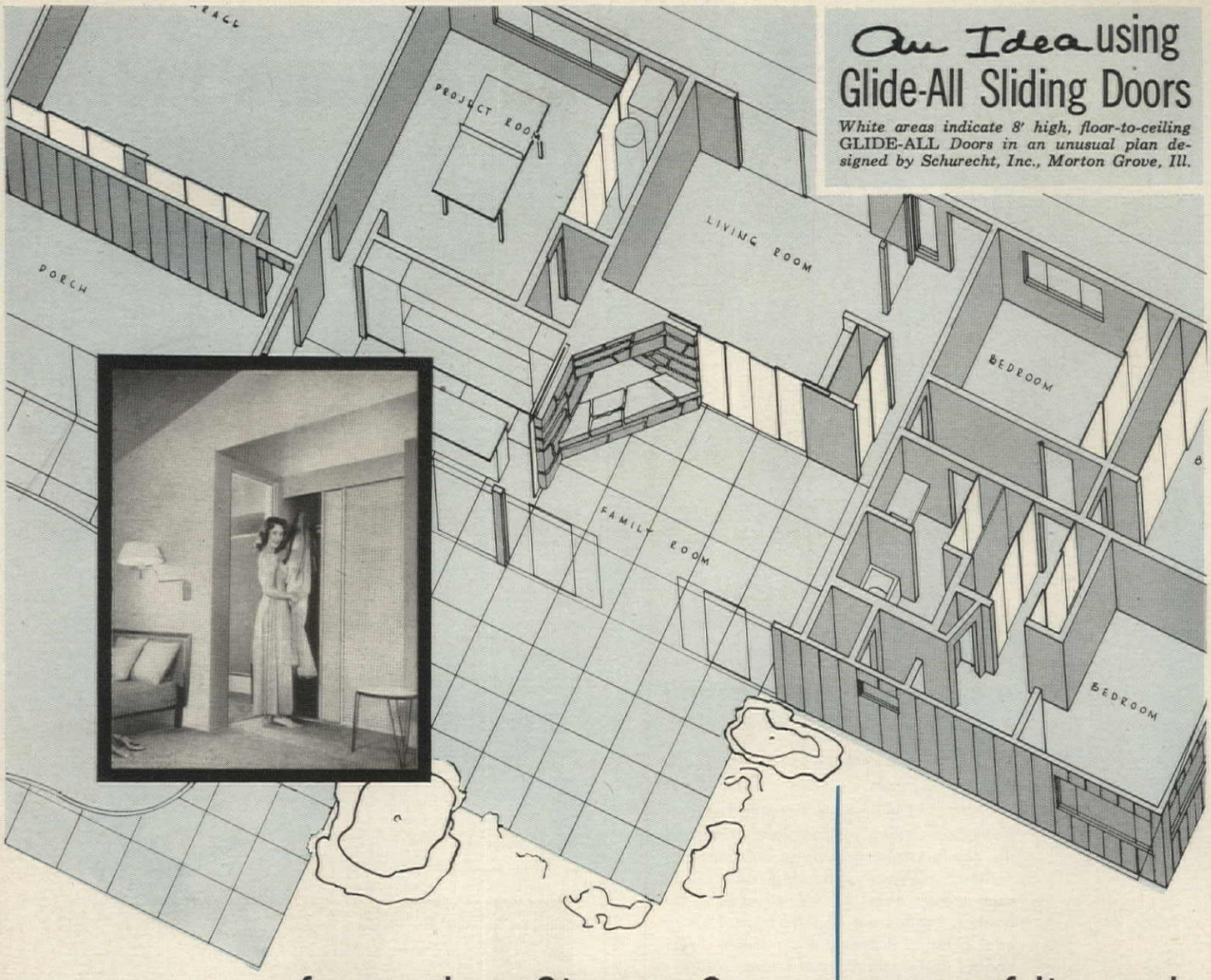
DRAFTLESS *Aspirating* AIR DIFFUSERS

ANEMOSTAT CORPORATION OF AMERICA

10 EAST 39TH STREET, NEW YORK 16, N. Y.

Representatives in Principal Cities

AC 1344



Our Idea using Glide-All Sliding Doors

White areas indicate 8' high, floor-to-ceiling GLIDE-ALL *Doors in an unusual plan designed by Schurecht, Inc., Morton Grove, Ill.*

for modern Storage Space...more of it...and economically too!

GLIDE-ALL® *Sliding Doors*

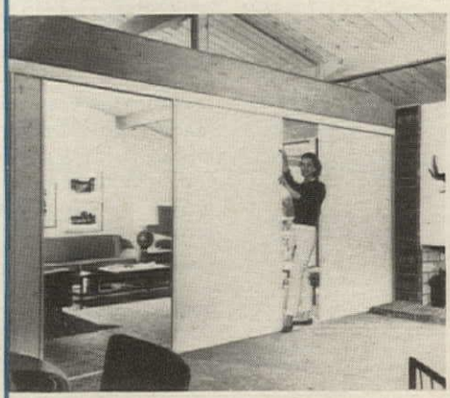
■ Perfectly "at home" in *any* kind of house . . . an extensive custom ranch . . . or modest low-cost units, GLIDE-ALL Doors provide the *extra* storage space that home buyers demand. *Here are their advantages:*

APPEARANCE OF QUALITY — As modern wall panels they become part of the room, may be decorated in any way desired.

ECONOMY IN FINAL COST — Floor-to-ceiling installation saves construction time and materials. Through Woodall Engineering and Manufacture you are assured of the lowest "package door" unit cost.

INSTALL QUICKLY – ADJUST EASILY — They're installed in three simple time-saving steps, unusual adjustment features designed by Woodall fit them to the openings with little time and effort.

Big house, little house, you'll find GLIDE-ALL Doors the better choice for Modern Storage Space . . . More of it . . . At Lower Cost. See Sweets Catalog Files or write the Woodall Plant nearest you for complete details.



GLIDE-ALL *Doors are available in principal cities throughout the United States and Canada. For information write Plant nearest you.*

GLIDE-ALL DOORS ARE A PRODUCT OF

WOODALL INDUSTRIES INC.

DETROIT 34, MICHIGAN

CHICAGO, 3508 Oakton St., Skokie, Ill.
EL MONTE, Calif., 801 West Valley Blvd.
FRANKLIN, Ohio, P. O. Box 290
LAUREL, Miss., P. O. Box 673
NEW YORK, Glen Cove Rd., Mineola, N. Y.
SAN FRANCISCO, Cal., 1970 Carroll Ave.

Advertisers Index:

For the world's first circular office building...

Capitol RECORDS

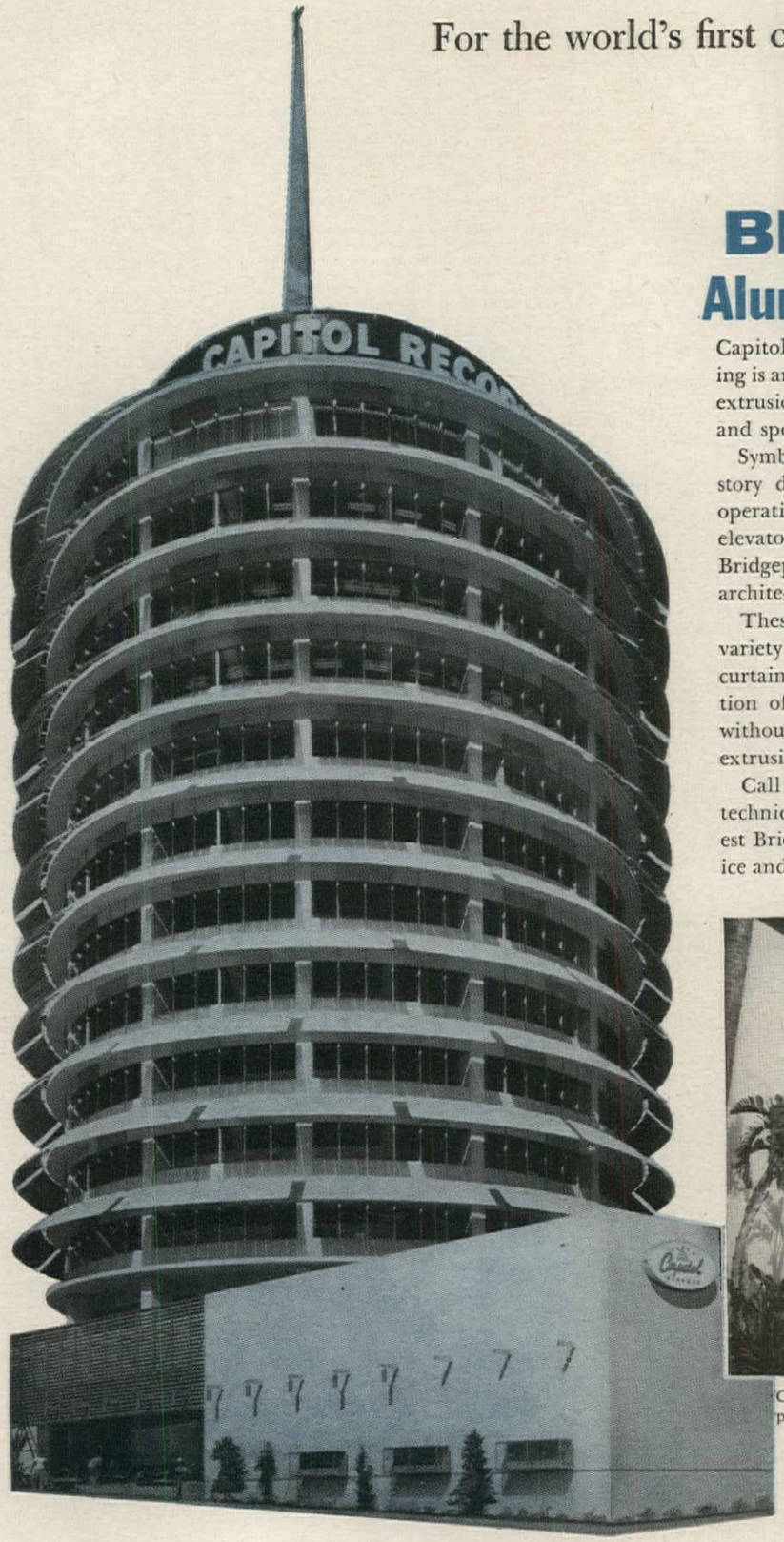
BRIDGEPORT
Aluminum Extrusions

Capitol Records' dramatic, new circular office building is another example of how Bridgeport aluminum extrusions make possible flexible, simple design... and speed fabrication and construction.

Symbolizing Capitol's product, the unique 12-story design achieved economies in construction, operation and maintenance by centralizing stairs, elevators, wash rooms and ducts in a central core. Bridgeport supplied aluminum extrusions for the architectural fabrications of this building.

These sections are typical of Bridgeport's wide variety of architectural extrusions for store fronts, curtain walls and interior partitions. A large selection of standard architectural shapes is available without die charge. Wherever your design requires extrusions, Bridgeport is ready to produce them.

Call on Bridgeport's light-metals specialists for technical assistance on your next project. Your nearest Bridgeport sales office can give you prompt service and expert advice on your extrusion needs.



Close-up showing building entrance for which Bridgeport furnished aluminum shapes.

Capitol Records Office Building, Hollywood, California

Architect—
Welton Becket, F.A.I.A. & Associates, Los Angeles

General Contractor—
C. L. Peck, Los Angeles

Glass and Glazing Installation—
W. P. Fuller & Company, Los Angeles

Architectural Aluminum—
Rebco, Inc., Los Angeles, Dallas and West New York, N. J.

For the very newest in

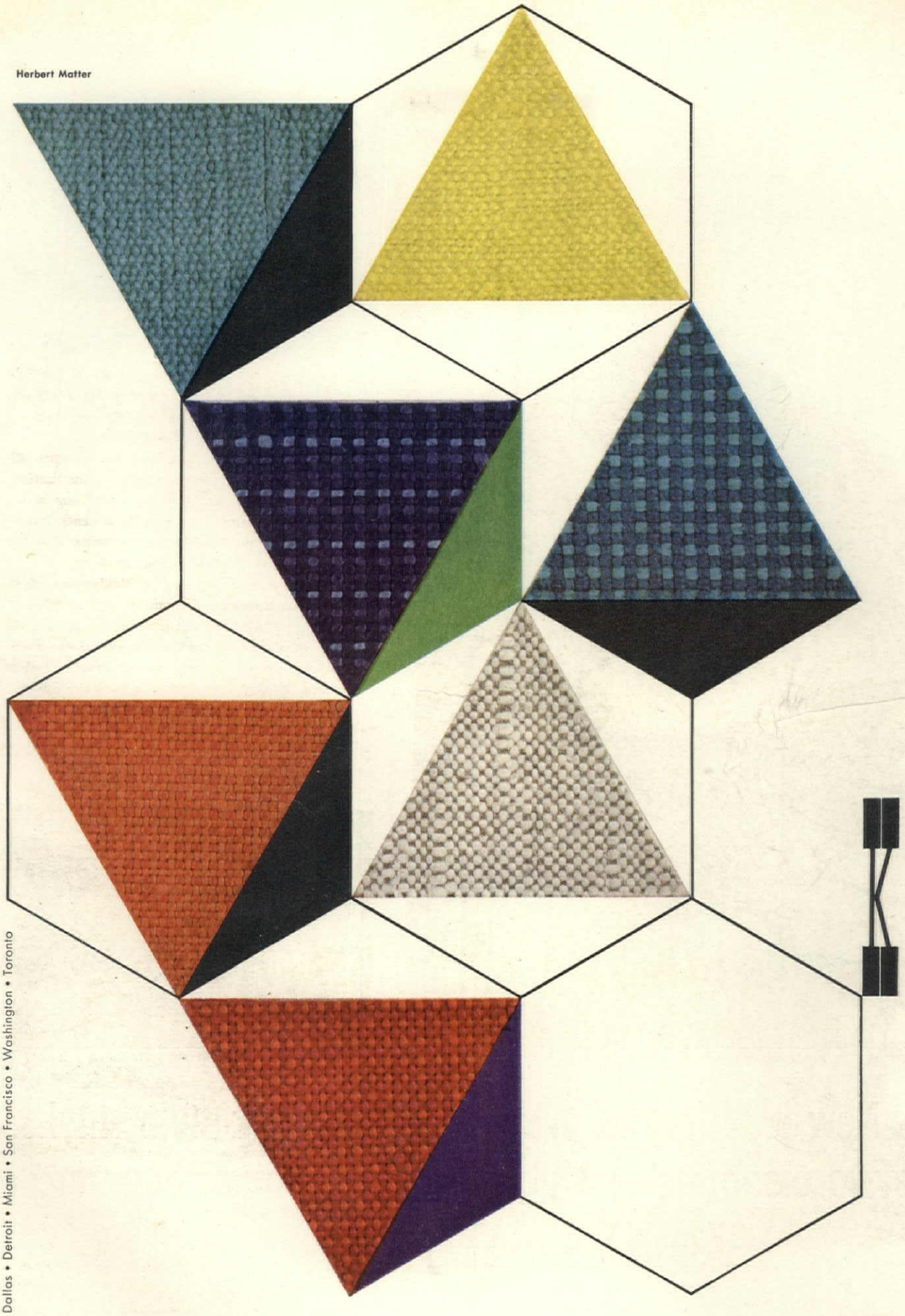
BRASS Bridgeport CO.

BRIDGEPORT ALUMINUM

EXTRUSIONS, DIE AND HAND FORGINGS

Bridgeport Brass Company, Aluminum Division, Bridgeport 2, Connecticut • Offices in Principal Cities

Herbert Matter



Boston • Chicago • Dallas • Detroit • Miami • San Francisco • Washington • Toronto

KNOLL TEXTILES INC., 575 MADISON AVENUE, NEW YORK 22, N.Y.

SCOTCH LINENS designed for the Knoll International collection in a varied range of weaves and colors. Swatches on request.

Floor above illustrates natural color variations in Birch Woodgrain KenRoyal Vinyl. Wall Base is brown Kencove.

New WOODGRAIN KENROYAL plank style vinyl... easy-to-clean resilient floor with the look of fine hardwood

Panel below shows Mahogany Woodgrain.

Something your clients have always wanted . . . the distinctive look of gleaming, freshly waxed wood floors without the care these demand. New Woodgrain KenRoyal vinyl flooring, more beautiful than wood itself, is now available in smart new 4″x36″ plank style in Standard Gauge (.080″) and ⅛″ gauge. Stunning Birch and Mahogany colors provide the natural variation of shade found in hardwood flooring; give you new decorating freedom for every type of room.

Woodgrain KenRoyal is homogeneous vinyl; long-wearing, resilient, greaseproof, and one of the easiest floors to clean. Tile-deep colors won't wear off. It can be installed on any firm, smooth, clean interior surface; even over concrete that is in contact with the earth if KenGrade (660) Adhesive is used, providing slab is 12″ above surrounding grade level and drainage is away from the building. For samples write on your letterhead to Kentile, Inc.

KENROYAL VINYL TILE by the makers of **KENTILE FLOORS**

Kentile, Inc., 58 2nd Avenue, Brooklyn 15, New York

Makers of KENTILE * KENCORK * KENRUBBER * KENFLEX * KENFLOR * KENROYAL *Reg. U. S. Pat. Off.