INDUSTRIAL DESIGN

May 1959 *$1.50 per copy*

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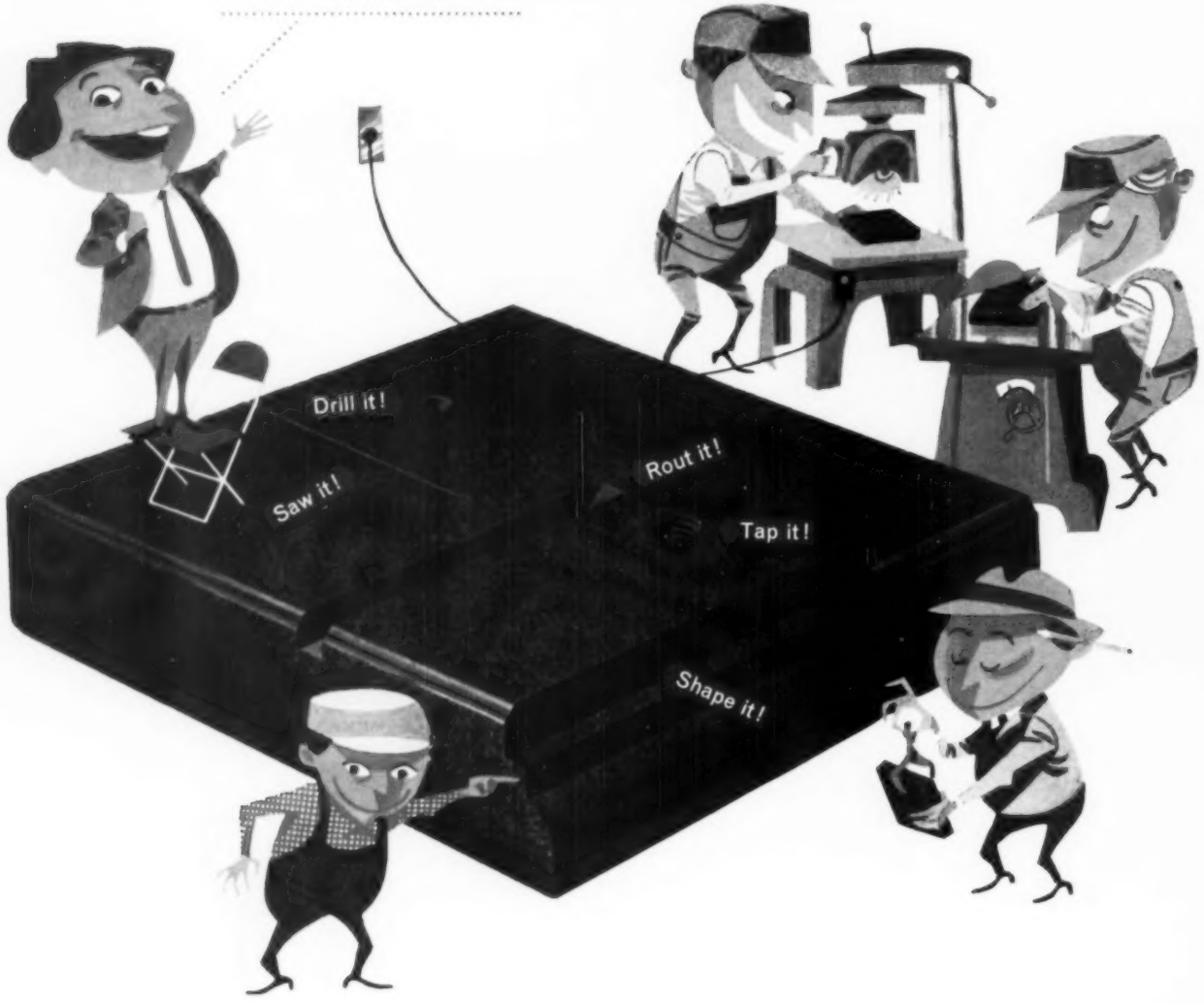

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MAY, 1959 VOLUME 6 NUMBER 5

INDUSTRIAL DESIGN

A monthly review of form and technique in designing for industry. Published for active industrial designers and the executives throughout industry who are concerned with product planning, design, development and marketing.

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Coming

IN JUNE—The architect and the industrial designer, a study of their overlapping roles.

IN JULY—Plastics in design—the first of a series exploring the applicability of each kind of plastic to both product and package design.

COVER: An article on museum installations installs Hermes on our May cover. Sculpture by Praxiteles, blue lines by Ward.

FRONTISPIECE: A carved Lucite figure, in the Museum of Natural History's projected Hall of the Biology of Man, illustrates the human circulatory system. Heart and lungs are enlarged for a detailed view.

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PUBLICATION OFFICES Whitney Publications, Inc.
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Tyler, Texas Weaver, Incorporated
P. O. Box 3142
Tyler, Texas

INDUSTRIAL DESIGN is published monthly by Whitney Publications, Inc., 18 East 50th Street, New York 22, N.Y. Subscription price $10.00 for one year, $18.00 for two years, $24.00 for three years in the United States, Possessions and Canada. Rates to countries of the Pan American Union are $12.00 for one year, $22.00 for two years, $30.00 for three years. Rates to all other countries are $14.00 for one year, $26.00 for two years, $36.00 for three years. Price per copy $1.50 in U.S.A., Possessions and Canada. $2.00 to all other countries. Second-class postage paid at New York, New York.

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Harley Earle creates a "Classic" in vinyl-on-metal...

Colovin Laminate lends pigskin glamour to

Bissell's problem: to transform a utilitarian household product into a gift item that could take its place unashamedly in the wedding display.

Bissell's solution: an imaginative new concept of the carpet sweeper's function . . . inspired styling . . . a revolutionary new material.

Designer Earle and Bissell agreed that the "Classic" model should be promoted as the easy clean-up sweeper for use after, or even during, a party.

On the basis of style alone the ideal surfacing material would have been classic English pigskin. But how to create a pigskin effect in a material that could withstand use and abuse?

Several materials were considered. Baked enamels, synthetic leathers, plastic coated metals. None could achieve the true texture and color of genuine pigskin.

As other designers have done, Earle found the perfect solution in Colovin vinyl laminated to steel. With this versatile new product it is possible to achieve multi-color printing, deep embossing, exact color and texture matching and custom effects not possible with conventional materials.

Bissell found Colovin laminate as practical in fabrication as it is high in style. It is formed on standard equipment as precisely as metal alone, and at no increase in cost. On the assembly line and in the home the Colovin surface is impervious to abuse, won't scuff, scratch, chip or stain.

The result? When a sweeper is among the prizes on a national TV show . . . when a sweeper is among the gifts at a bridal shower, it's invariably the Bissell "Classic."

Get the whole story in "Colovin Meets Metal": laminate samples, colors, textures, test specifications, industrial applications and list of laminators to whom we supply Colovin vinyl sheeting. Write for copy.

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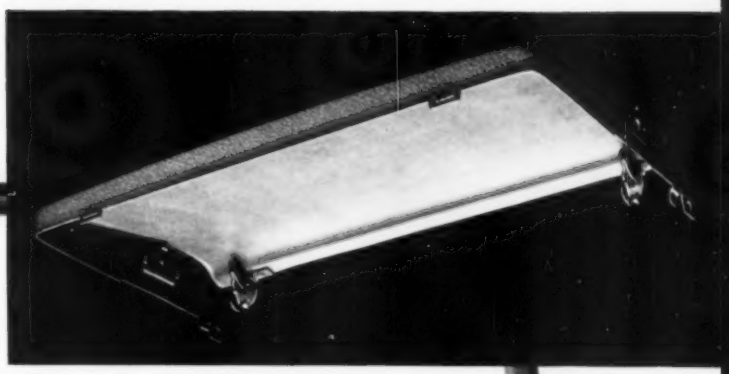
Bissell's "Silent Butler" of the floors



Colovin laminate cover of the Bissell "Classic" is stamped, punched and spot-welded as precisely as metal. There is no distortion of the leather texture at the corners. Note at the edge the permanent, almost invisible bonding of vinyl and metal. (Below) Chrome handle with palm-fitting plastic grip is in three sections for easier gift-packaging.

ACTUAL SIZE

in this issue . . .


Witteborg


Shapiro


Parr


Reekie


Carmichael


Lawless


Anglim


Taylor


Worland


Stern


List

Dr. Albert E. Parr, director of the American Museum of Natural History (see page 37), is Norwegian by birth, a marine biologist by training, and by nature a man of many interests — poetry, philosophy, architecture, sailing, music, movies, and whodunits. His first job in the U.S. was polishing fixtures in the old New York Aquarium.

Dr. Harry L. Shapiro, chairman of the Department of Anthropology at the American Museum of Natural History, joined the museum in 1926. His specialty is South Pacific physical anthropology; among his published works: *Heritage of the Bounty, Migration and Environment.*

Gordon Reekie, the American Museum of Natural History's general manager of exhibition and construction, received his art education here and in his native England, joined the musem as staff artist in 1953. Previously he was art director at Dell Publishing, Fairchild Publications.

Lothar Witteborg, chief of the American Museum of Natural History's Department of Exhibition, is an anthropologist turned artist who became interested in museum work when he was put in charge of one at Florida State while teaching there. Prior to his present post he was at Newark Museum.

Dr. Leonard Carmichael, secretary of the Smithsonian Institution (see page 31), was president of Tufts University for 15 years, joined the Smithsonian in 1953 where, as chief administrative officer, he heads eight separate museums, the national zoo, and two field research stations.

Frank Taylor, chief of the office of exhibits for the Smithsonian's U.S. National Museum and also director of the latter's sub-branch, the Museum of History & Technology, joined the Smithsonian as a laboratory apprentice, one year out of high school, left it briefly to acquire a BS in mechanical engineering from MIT, an LLB from Georgetown.

John E. Anglim, supervisory exhibits specialist under Dr. Taylor, oversees the design and preparation of exhibits in the 30-man shop for the Museum of Natural History and the 60-man shop for the Museum of History & Technology, both of which are under the U.S. National Museum.

Benjamin Lawless, exhibits specialist for the Museum of History & Technology, holds an MA in painting but loves history and airplanes and combined all three to join the museum as an exhibit aide in 1953. He owns an MG won in a Washington department store competition for the best-assembled model MG.

Donovan Worland, manager of exhibits projects at Latham-Tyler-Jensen, began working on the Hinsdale Health Museum (page 35) while still employed in a similar capacity at Chicago's Museum of Science & Industry. His other current work at LTJ includes U.S. Trade Fair at Poznan, Poland.

Walter Stern, who reports on this year's packaging show (page 58) is an authority of long standing in this field. Formerly packaging engineer for Montgomery Ward, Sears Roebuck, and Krafts Foods, he is now Technical Director of Packaging and Graphics at Raymond Loewy Associates.

Daniel List (interviewed on page 68) buys, sells, writes about, and even drives, foreign cars. Automotive editor of the *Village Voice,* a Manhattan weekly, List is considered transportation consultant to the entire Beat Generation, whose language he speaks.

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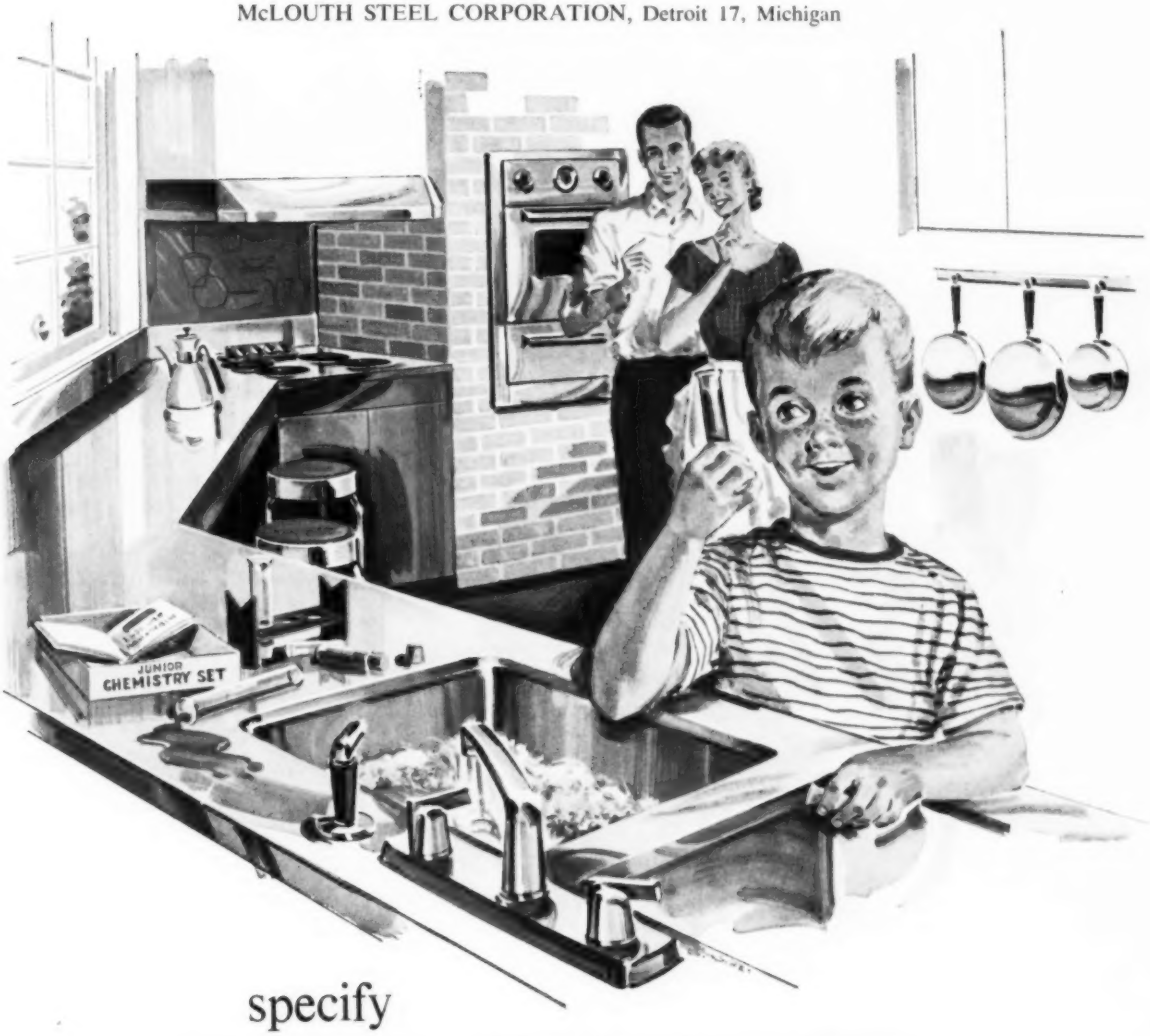

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LETTERS

Cigarette packs: a broadside

Sirs:
Gregory Dunne's survey of cigarette packaging in your February issue raises some important points.

If Reynolds had had the guts and stamina of the live model of their trademark symbol — the camel — they would have gone the whole way in their recent redesign. To introduce such minor changes makes nonsense of a serious matter.

Providing you have a reasonably decent product and promote it to the hilt, you can't go far wrong. Quantitative — not qualitative — advertising seems to be what counts. That much more impact could be achieved by using better design — this seems to escape the complacent hierarchy of tobacco barons. Basically, there is no difference in their attitude, whether they are American or British companies.

One of the largest tobacco companies prepares an average of 15 new package designs per week, every week of every year, and creates an almost equal number of stand-by brand names, most of which never go further than the preliminary stage. So it is hardly surprising that they seem confused, even neurotic.

Apart from a very few elegant traditional/modern or contemporary designs for some smaller Swiss and Swedish manufacturers, the only strikingly modern pack produced during the post-war years is the one (above) designed by Design Research Unit for the new British cigarette "Guards". Even in this case, the client had to spoil the design at the last moment, by adding useless copy in unrelated type on the inside flaps.

It seems extraordinary that not one of the leading American designers, such as Saul Bass, Morton Goldsholl, Will Burtin, has been called in by any of the large tobacco companies. It appears that the designing of tobacco packages is open mainly to design organizations rather than to the top free-lance designers. Could this be because tobacco companies need someone who is good at explaining statistical data, rather than someone with outstanding design abilities?

Has anyone ever analyzed the facts behind the apparent success of the worst designs in the tobacco field? Probably the brands that sell better — in spite of their bad design—do so because of the enormous sums spent on their promotion. Perhaps

British slide-pack by Design Research Unit.

the sales figures of some of the less popular but better-designed brands compare favorably with the ugly best sellers, taking into account that far less money is spent on their promotion.
W. M. de Majo
London

Pan Am plastic flight bag

Sirs:
I was somewhat amused with a statement in your article on Pam Am in the March issue, referring to the plastic flight bag. If 11 by 15 by 5½ inches is a large form and still experimental, someone should have told us. We have gone ahead and successfully molded items four times that size.
Robert K. Ostrander
Design Department
Loma Plastics, Inc.
Fort Worth, Texas

Perhaps Edward Barnes & Associates should have contacted Mr. Ostrander. They were able to find very few plastic fabricators who had any experience in molding forms of this size in high-density polyethylene plastic, although many were quite familiar with molding regular polyethylene plastic in forms of considerably larger sizes.—Ed.

Small cars, Big Three

Sirs:
The article entitled "This way to the new American small car" in your February issue is the most comprehensive, intelligent and best written article of its kind that I have had the pleasure to read: it covers the whole gamut of questions, events and ideas. Showing up as it does in ID, it is right under the noses of the average industrial designer, who has always had, rightly or wrongly, a disdainful attitude toward automotive styling in general. I think people are just tired and yearning for something new and exciting, not only in appearance but in the mechanical make-up as well. I have felt for some time that the strong undercurrent of public opinion has been missed by the Big Three. This is understandable for three reasons: there is the old cliché concerning the forest and the trees, there was wishful thinking and, perhaps most of all, the ostrich with his head in the sand has more to do with it than we would like to think.
Franklin Q. Hershey, IDI
Manager, Industrial Design Department
Kaiser Aluminum and Chemical Corp.
Oakland, California

Applied Babbittry

Sirs:
I would like to comment on the article, "Package Designers Council Holds Design Education Conference," in your March issue.

Whatever happened to the "time as space" relationship once taught in design school? Mr. Edward Adams of the Art Center says he is now confronted with the problem of getting the student to be conscious of "time as dollars." Back in school we read *Babbitt* for a close look at materialism, but nobody ever instructed us to practice it!

Mr. Adams says he wants "to know how to teach the professional youngster the responsibility he has, after leaving school, to make money for his firm." How about this motto for the firm which hires these young money-making package designers: PROFIT IS OUR MOST IMPORTANT PRODUCT!

A policy like this is sorely in need of the most beguiling packaging job it can get.
Ronald Beckman
Department of Industrial Design
Pratt Institute

Where credit is due

The photograph of the helicopter shaft and rotor which formed the background of ID's April cover was taken by aviation photographer Howard Levy.

THIS IS GLASS

A BULLETIN OF PRACTICAL NEW IDEAS FROM CORNING

NEW! A MIRROR THAT MAKES HEAT TO BEAT SLEET

You're jockeying a big trailer-truck along a winding road in New England. It's winter and you run into a real storm—a mixture of snow, rain, sleet. You flip a switch and . . .

Your outside rear-view mirror is *clear* in a matter of minutes. From a heavy coating of ice to *all* clear is only a matter of five minutes, even at −20°F.

The mirror, as you might guess, isn't just ordinary glass. It's one of Corning's PYREX brand glasses, and on its surface is an electrically conductive coating that's permanently fired in.

This coating (a metallic oxide) is what turns your mirror into a *heating* element when a current is applied. The heat melts ice and snow, prevents fog or drizzle from condensing on the surface.

If you use EC (electrical-conducting) glass for self-defrosting mirrors you get a bonus, since the coating also provides a non-glare surface.

But don't go away just because you gave up dreaming about driving a truck-and-trailer years ago. This PYREX® electrical-conducting glass comes in a wide choice of applications.

For example, there are some enterprising people who build radiant heaters, both portable and permanent, around such glass panels.

Comfort, safety, and convenience are the big selling points. Comfort because a panel of EC glass is an area *heat* source putting out long waves. Safety because there are no exposed wires or moving parts. Convenience since you have no burning, no need to do extensive remodeling in order to install it.

These same reasons have made PYREX brand radiant heating units attractive to industry—for heating, drying, curing, baking.

And, if you turn a panel of this glass *around*, it becomes an infrared reflector you can see through—blocking heat but still passing about 75% of the visible light.

Facts? Ask for PE-34, a 4-page data sheet, and/or PE-60, all about industrial heating units. Please use the coupon.

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At the Museum you'll find a comprehensive and renowned collection of glass *objets d'art*. You will find vases and other glass forms produced by by-gone civilizations. And you will see the ways in which today's craftsmen, around the world, use glass in varied art forms.

The Hall of Science and Industry is filled with exhibits and devoted to the roles glass plays in industry, business, and science. Many exhibits contain full-scale working models and demonstrations.

And, there's also a library devoted exclusively to books and other reference materials on glass.

It all awaits you. So come to the Glass Center. You'll find it stimulating and rewarding. Bring the family, too. You'll all enjoy the trip.

Open daily except Mondays from 9:30 to 5.

If you'd like a few more facts, send for a free folder. But plan to come soon.

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This is no ordinary floodlight lens. It produces, despite its circular shape, a rectangular beam.

Why? Because a large oil company asked Crouse-Hinds of Syracuse, N. Y., to provide a floodlight to illuminate rectangular signs, 4′ x 8′. Besides being rectangular, the request called for lighting that had no "hot spot" which might make the sign unreadable.

So Crouse-Hinds turned to Corning. And through the talents of one of our product engineers, we designed a *round* lens that puts out a rectangular beam.

Unusual? Yes, but typical of the special problems we handle almost daily (we once made a lens producing a square beam for the same people).

Moral: Whatever your interest—be it lighting, corrosion, high temperatures, precision shaping, or what have you—maybe we already make what you need from glass.

As a start, take a look through "This Is Glass." (To get a copy, check the coupon.)

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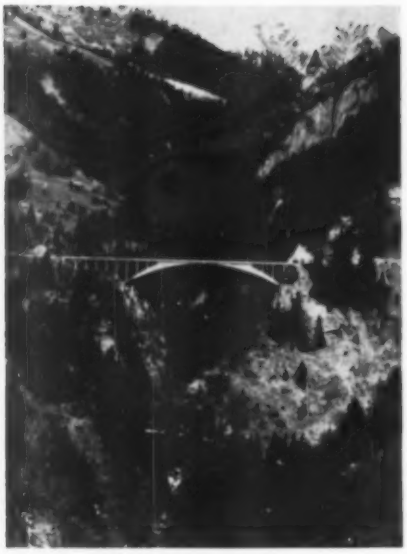

Beauty without argument

MASTERS OF MODERN ARCHITECTURE. *Selected, edited, and introduced by John Peter. 230 pages. Illustrated. George Braziller, Inc., New York.* $15.

This is a beautiful book. Although an editor's note warns the reader that some photographs of inferior quality have been included in the interests of documentation, the look of sacrifice does not hang heavy on these pages. The plates are handsome and lavishly displayed, and the absence of strain is in fact characteristic of the entire presentation. And since it is a book of "masters of architecture," rather than a book of "architects," the bridges of Robert Maillart (see Salginatobel Bridge above) are included without apology.

To the extent that the book has any "argument" at all, the thesis is comfortably simple: there is a modern architecture, and there are men who have achieved mastery in it. John Peter's introduction makes this point, and accounts in a very general way for how it came about. Citing Sullivan's "form follows function" formula (Sullivan's word), he points out that although Sullivan himself never understood this to mean the repudiation of decorative refinement, it was natural for the phrase used in that sense to become "the battle cry of the new architecture." All battle cries are oversimplification.

Between the editor's introduction and the display of buildings, is a section called "Architects on Architecture" in which some of the most articulate architects—Sullivan, Wright, LeCorbusier, Gropius, Mies van der Rohe, Nervi, Neutra—are represented by typical statements, although happily not by their best-known words.

The main section of the book begins with Wright, and it is hard to say anything more than that about its organization. The work is not arranged chronologically or, so far as we can tell, in either ascending or descending order of importance, influence, or anything else; some discernible pattern would have been helpful. More important, however, it is arranged with a feeling for the excitement in modern structure, and this is stunningly communicated.—*R. S. C.*

Revolution without a cause

A HISTORY OF TECHNOLOGY. *Edited by Charles Singer, E. J. Holmyard, A. R. Hall, and Trevor I. Williams. Vol. IV: "The Industrial Revolution, c.* 1750-1850." 728 *pages, illustrated. Oxford University Press,* 1958. $26.90.

With the aid of a grant from a large British corporation, Imperial Chemical Industries Limited, Oxford has issued a massive five-volume history of technology, beginning with prehistory and ending with Volume V: "The Age of Steel, c. 1850 to c. 1900." The present volume covers the century loosely marked off by 1750 and 1850.

A few years ago no lecturer on economic history failed to quote the Oxford professor who said that his average students knew that there had been an industrial revolution and his bright students knew that there had not been one. Judging from its title, the editors of this fourth volume feel that something important enough to be called a revolution did happen during that hundred years. What happened is related in a series of 23 monographs by experts in such various fields as, for example, "The Steam Engine to 1830," "Precision Mechanics," "Building and Civil Engineering Construction," or the somewhat more specialized "Fish Preservation." The text attempts, in general successfully, to strike a mean between intelligibility for the layman and information for the technician. It is beautifully and satisfyingly illustrated, in exactly the right way for a history of machines and techniques, with line drawings adapted from contemporary sources.

But there is something curiously missing in the story — an awareness that human needs created these machines and human lives were changed by their creation. Among the plates at the end of the volume are reproductions of paintings showing the countryside of Europe transformed by the factories, the iron bridges, and the slag heaps that were the result of the new technology, yet this transformation is not implied anywhere in the text. Granted, the text is the product of a large group of individuals writing on rather narrow subjects, each involving the slow heaping-up of details. But the idea of a revolution that changed Europe politically, socially, and intellectually is an exciting enough theme to have served as a unifying force. The industrial revolution applied mechanical power to work that was until then performed by men, it emptied the countryside of its inhabitants and funneled them into cities, it pulled its workers together in one spot and placed them under a stricter discipline than they had known before, and it gave the West a head start that the rest of the world is now trying violently to overtake. But whatever its failings, this will be a useful book for anyone who wants to write the story of the whole revolution. —*U. McH.*

Books received

MODELMAKING FOR INDUSTRIAL DESIGN. *By Ralph R. Knoblaugh.* 276 *pages. Illustrated. McGraw-Hill, New York.* $9.75. Covers modelmaking in all media. Special attention to plaster models.

THE AMERICAN AUTOMOBILE MANUFACTURERS. *By John B. Rae.* 233 *pages. Illustrated. Chilton Book Company, Philadelphia.* $6. A detailed historical survey going up to the present day. Has carefully annotated sources.

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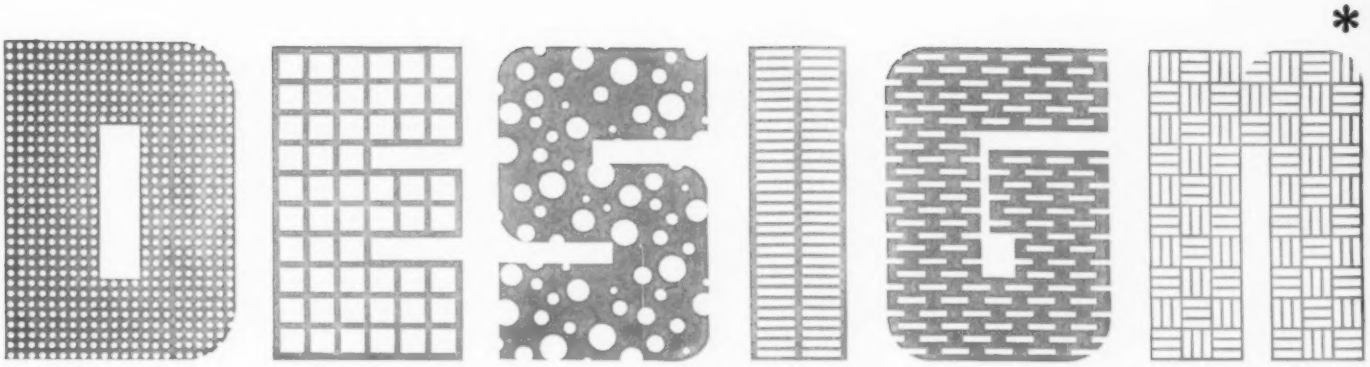

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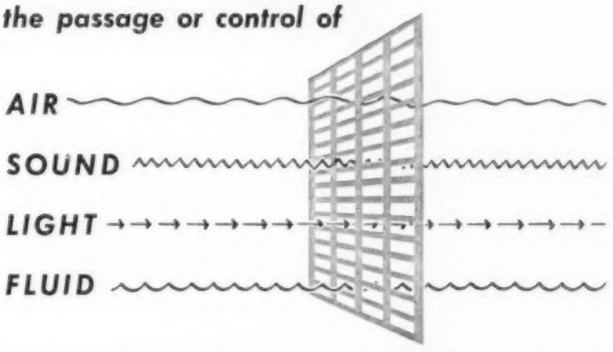

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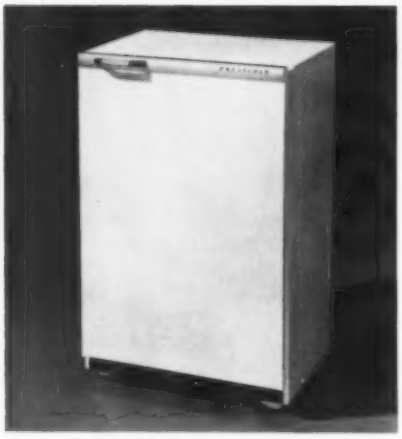

Walter Kennedy's professional tripod, John A. Hattersley's socket chisels, C. W. F. Longman and Edward H. Wilkes' refrigerator, David Mellor's silverplated tea set.

Britain picks year's top products

Sixteen of the hundreds of British products shown during the year at London's Design Centre have been selected as "Designs of the Year." Judges were asked to choose goods of any type which were outstanding in originality of design, economy, and workmanship.

Four of the prize-winning designs, announced at the Centre on May 16, are shown at left. In selecting Walter Kennedy's professional tripod for Kennedy Instruments Ltd., the judges remarked that "the distinguished appearance of this straightforward design is unusual in pure engineering." In the Pressed Steel Company's refrigerator "the absence of self-conscious 'streamlining' and 'styling,' coupled with almost classical proportions, add up to a design in the best modern tradition," said the judges. It was designed by C. W. F. Longman, Engineering Department of Prestcold Division of Pressed Steel Company, in association with Edward H. Wilkes, consultant designer. David Mellor's silverplated tea set for Walker and Hall Ltd. was singled out for a refinement "which, until recently, was thought worthy only of silver." Socket chisels manufactured by Ward and Payne Ltd. and designed by the company's engineering staff under the direction of John A. Hattersley were praised for detailing.

The dozen other products selected by the Design Centre's jury include: John and Sylvia Reid's fluorescent light for Atlas Lighting Ltd.; Audrey Tanner's carpet design for Carpet Manufacturing Company; H. El-Hayani's dining table for Design Furniture Ltd.; Roger Peach's lever handle for Dryad Metal Works Ltd.; Humphrey Spender's fabric for Edinburgh Weavers; David Mellor's room heater for Grahamston Iron Company; Derek Hodgkinson's "Planit" system ceramic glazed tiles for H. & R. Johnson Ltd.; Gwenfred Jarvis' "Malindi" furnishing fabric for Liberty and Company; Paul Boissevain's suspension lamp for The Merchant Adventurers of London; Ernest Race's "Flamingo" easy chair for Ernest Race Ltd.; Edward Pond's "Piazza" plastic-coated fabric for Bernard Wardle; Hulme Chadwick's hoe, designed in consultation with company designers for Wilkinson Sword Ltd.

The jury this year included Sir Colin Anderson, a Member of Council, Council of Industrial Design; Monica Pidgeon, editor of Architectural Design; Geoffrey Dunn, Chairman of Dunns of Bromley; F. H. K. Henrion, designer; Jack Howe, designer.

IIT citation to Raymond Loewy

Raymond Loewy, whose work appeared on the list of "100 Best Designs of Modern Times" (ID January, 1959, page 14; April, 1959, page 16) more often than that of any other organization or individual, was presented with a special citation of merit from IIT's Institute of Design at a dinner held in his honor in Chicago on April 29th.

In accepting the award, Mr. Loewy said: "At the end of the first World War I took off my combat uniform and embarked for the United States, hopeful and full of enthusiasm. Forty years later I am just as full of enthusiasm and hope. This is the miracle of the United States. The second miracle to me is industrial design, my profession, this young profession a handful of us started 25 years ago. This experiment has now become a major factor in successful modern management throughout the world."

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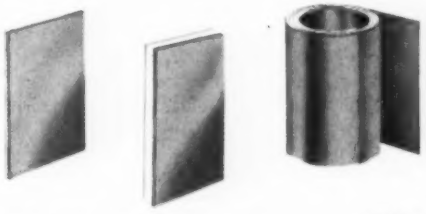

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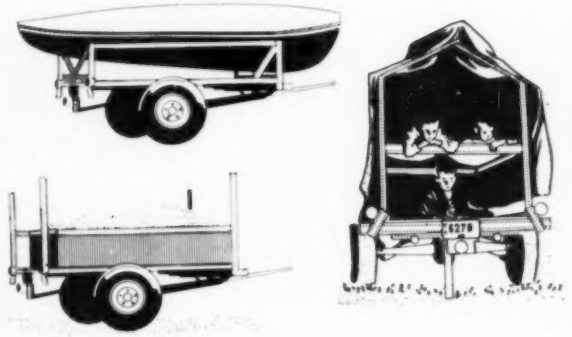

Varying the arrangement and amount of metal lumber, a flatbed trailer develops into a boat trailer able to support a 14-foot boat. Another tier of lumber converts this into a one-man office (left) and finally to a double-decked camp trailer sleeping four.

Metal lumber tested for trailers

A flatbed auto trailer with various superstructures is the first experimental consumer application for a slotted steel product called Metal Lumber made by the Berger Division of Republic Steel in Canton, Ohio. The product, which has been used industrially for storage racks, shelving, benches, and shelter buildings, is angled steel punched with holes at ¾-inch intervals, and finished in gray baked-on enamel. It is assembled with nuts and bolts, much like a child's Erector set.

Republic's first experiments with trailer variants include a luggage trailer and a dump truck with enclosed front, back, and sides. All models developed so far can be built from only two 100-foot kits of Metal Lumber—one heavy and one light gage. Each kit comes with a bag of plated bolts and self-locking nuts, and Republic has also designed a special cutter bar with indexing lug for measuring and cutting the product into modular sizes.

Pre-loaded baggage system

A system for faster loading and distribution of baggage at airport terminals has been developed by the Sancor Corporation, El Segundo, California, manufacturers of ground support equipment for commercial and military aircraft. The system, which will be used by American Airline's new Lockheed Electra commercial transports, completely eliminates the piece-by-piece handling of baggage by ground personnel.

The Sancor system consists of a special hoist, attached to the open baggage door of the plane, and fiber glass bins, six feet long, four feet wide and three feet high, capable of holding 400 pounds of luggage. The baggage is loaded into the bins at the passenger check-in point and the bins, numbered for routing, are then wheeled on dollies to the awaiting plane, where they are hoisted into the baggage compartment. Unloading time for an entire cargo of passenger baggage is approximately four minutes. American Airlines is contracting for initial delivery of 45 special hoists and 281 fiber glass bins.

Beall designs trophy for Martin

An aluminum, silver and lucite trophy (below) symbolizing air anti-submarine warfare has been designed for the Martin Company by Lester Beall. Martin will present the trophy each year to the Navy Fleet Unit which shows the greatest skill in the "search, detection, localization and kill" of a submarine target, and Mr. Beall represented these four factors in the four vanes forming the body of the trophy and in the four prongs embedded in the lucite sphere.

The four silver base panels, with mitred joints, are removable so that the name of the winning unit may be engraved on it each year. Lucite was substituted for crystal in the sphere because of fabrication problems. In the completed version the two sections of the sphere are banded together in silver—the hollow, clear upper half suggesting air and the solid, blue lower half suggesting water. Ebony, considered too brittle, was rejected in favor of black lacquered hand-rubbed aluminum for the fins. Topped by a silver bird, the 28-inch trophy, which weighs 35 pounds, was constructed by the Displayers, Inc.

Lester Beall's trophy for Martin.

Italian products shown

The first exhibit of contemporary Italian-designed products to be shown in the midwest was held May 4-14 at IIT's Institute of Design. Massimo Vignelli, instructor in graphic arts at the Institute, selected the articles, which included: chairs by Arflex, Tecno Bosani, Bonacina, and Cassina; lamps by Venini and Arteluce; automobiles by Lancia, Alfa Romeo, Ferrari, Farina, and Fiat; cookware by Logostina; a carpet sweeper by Kartell; glassware by Venini; a typewriter by Olivetti; a sewing machine by Necchi; a fan and an electric dryer by Ciminello; and a Galileo camera.

The exhibit was made possible through the cooperation of the Associazione per il Desegno Industriale and Giacomo Profili, Italian Consul General in Chicago.

ID wins Jessie H. Neal Awards

Industrial Design has won both of the first awards in its class in the Associated Business Publications' annual Jessie H. Neal editorial competition. Charles E. Whitney, publisher, and Ralph Caplan, editor, will accept the awards on May 25 at Skytop, Pennsylvania.

The award for the best single article goes to Douglas Meldrum, Gregory Dunne, Arthur Gregor, and James Ward for the report on reinforced plastics, October, 1958. The award for the best series of related articles will be given to Ralph Caplan, Hiag Akmakjian, Jane McCullough, Ursula McHugh, and James Ward for the September, 1958 issue: "The Client and the Designer."

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Teague's symbol for U. S. agriculture show

Teague designs mobile exhibit

Four trailers which open up into display units are part of a U.S. Department of Agriculture exhibit designed by Walter Dorwin Teague Associates for use throughout Italy. A figure holding balanced weights (above) was developed as the symbol for the show, which dramatizes the benefits of balanced livestock feeding.

Two of the expandable trailers operate together to form the main exhibit area. A third carries a two-ton replica of "The Champ"—a Hereford steer which visitors can walk through to see its internal functioning. "The Champ" was lent to the show by the Ralston Purina Company of St. Louis. The fourth trailer serves as office, library, movie projection room, and conference room for visitors.

The show opened at the Verona Agricultural Fair on March 8, and is now traveling through Bologna, Trieste, Rovereto, Cremona and Foggia.

More steps eliminated

When the federally-owned Washington International Airport at Chantilly, Virginia opens for air traffic in January 1961, a new form of passenger handling, especially developed for jet transport, will be in operation — the mobile departure lounge (below). This vehicle, measuring approximately 15 by 60 feet, will transport between 70 and 80 seated passengers comfortably from terminal to plane, thereby eliminating the tremendous amount of walking familiar to air travellers. Under present departure systems, such as the "finger" system (below), the average passenger hikes close to five times the length of a football field to reach his aircraft.

Use of the mobile departure lounges will permit grouping of aircraft around maintenance islands far from the terminal area. This will help cut the high cost of taxiing jet planes for great distances up and down the runways.

The mobile departure lounge was developed by the consultants involved in construction of the new airport: Eero Saarinen & Associates, architects; Burns and McDonnell, mechanical and electrical engineers, and Ellery Husted, consultant on site planning. The Washington International Airport will be the largest civil airport in this country, and is the first to be planned initially for jet traffic.

Computer translates to Braille

IBM mathematicians, in conjunction with the American Printing House for the Blind, have developed a process for translating English into Braille in a fraction of the time it takes a skilled translator. A 300-page book can now be translated from typed cards to metal printing plates in one hour, as compared to the six days it would take a skilled translator to do the same job. Knowledge of Braille by the computer personnel is not necessary with the new process, which uses the standard IBM 704 data processing system.

The text to be translated is first transfered to punched cards and then fed to the computer, in whose memory a program for conversion into Braille has already been stored. It then emerges in coded symbols on another set of punched cards. These cards are fed to a printer which reproduces the Braille symbols above the English text for editing purposes. Finally, the corrected cards are fed to an embossing machine which produces metal plates for use in a rotary press.

Textbooks and technical material are expected to be the first of many books to be translated by the new technique.

Design exhibit schedule announced

The American Federation of Arts has announced an exhibition schedule for 1959-1960, which includes 94 shows, ten of which feature design and craft work. The design and craft shows, which may be rented at prices ranging from $70 to $400 include: Designer-Craftsmen U.S.A., 1960, $350-$400; Fifty Years of Ballet Design, $150-175; Abstract Art in Ancient Textiles, $70-$85; Presenting American Art, $95-$110; Native Arts of the Pacific Northwest, $150-$175; Forms From Israel, $150-$175; Young Americans 1958, $250-$300; Contemporary Danish Design, $175-$200; Kaleidoscope, $110-$130; Style and Security, $150-$175.

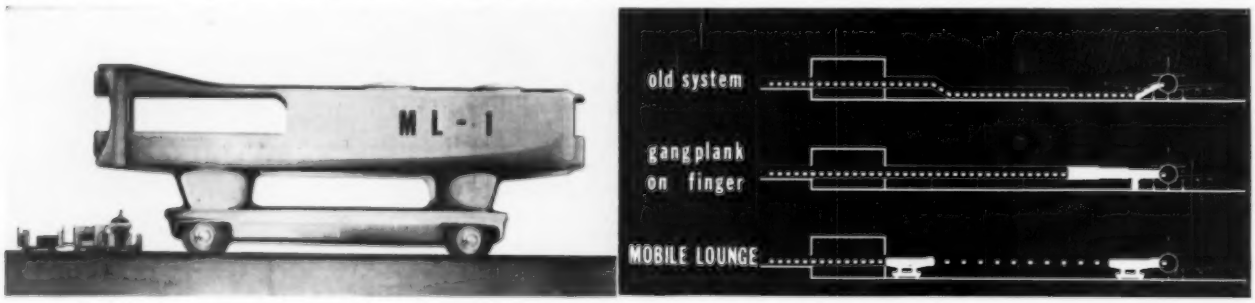
Further information may be obtained from The American Federation of Arts, 1083 Fifth Avenue, New York 28, N. Y.

Chicago trade fair opens in July

Sixty-five foreign nations will display their wares at the Chicago International Trade Fair July 3-18 when Chicago celebrates its establishment as a new world port with the opening of the St. Lawrence Seaway. Valued at $34,000,000, consumer products will run from home furnishings and appliances to automobiles, while the selection of industrial products will range from office equipment to heavy construction and mining machinery.

The Chicago Association of Commerce and Industry will spend $200,000 to decorate the Navy Pier Exhibition Hall, where the fair will be held. Naess and Murphy are consulting architects; Andrews Bartlett and Associates will design the interior. An estimated 150,000 buyers and visitors are expected to attend the Fair. Information may be obtained from the 1959 Chicago International Trade Fair, 30 West Monroe Street, Chicago 3, Illinois.

Design for mobile departure lounge (below) cuts passenger walking distance to a minimum as contrasted with older systems (below).



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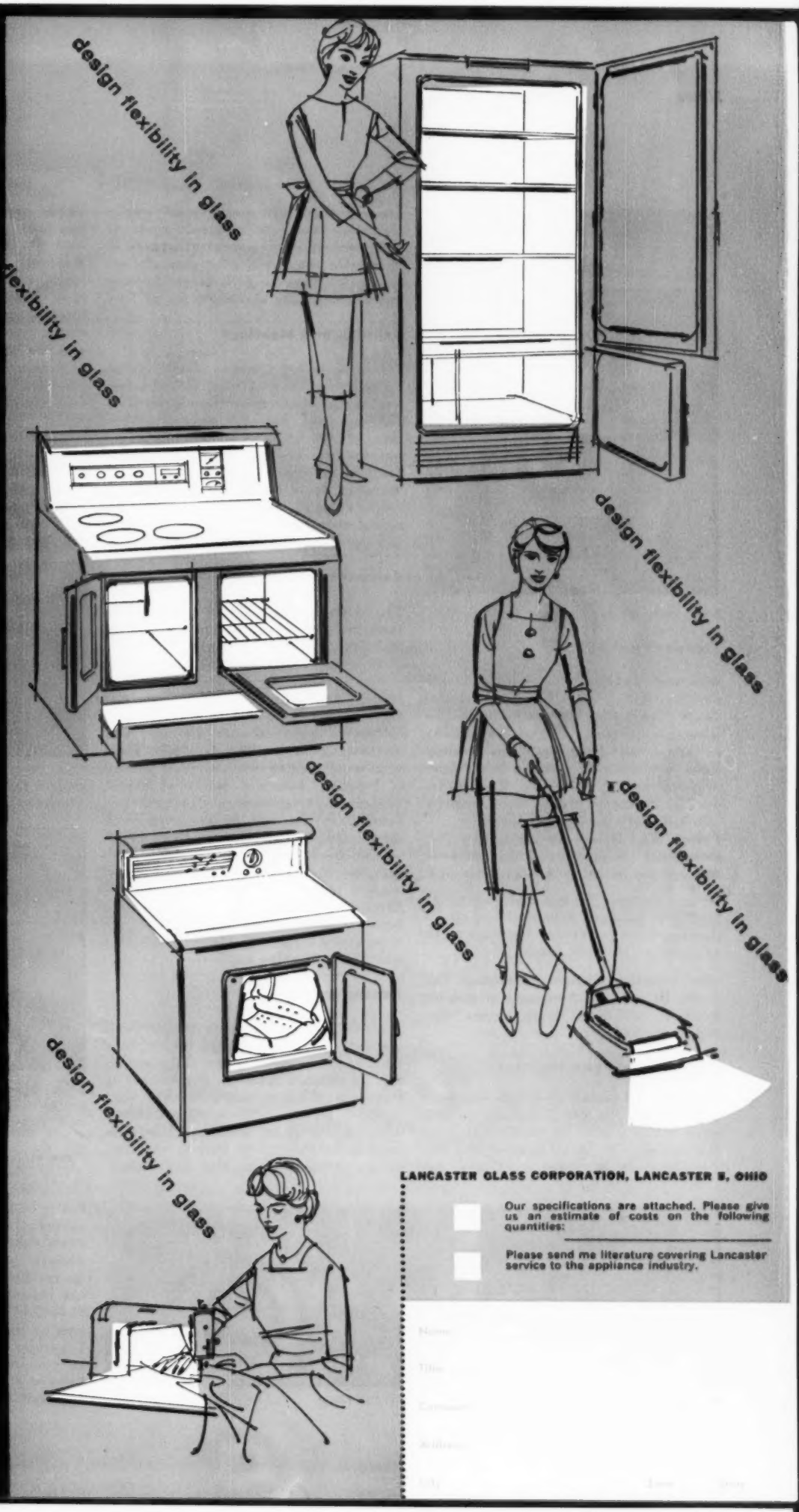

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Bell's redesign of telephone booth

Company News

RETAINED: Walter Dorwin Teague Associates by Columbia Mills, Inc., General Foods Corporation, and the National Life Insurance Company . . . Tom Lee (below) by the executive committee of the National Hotel Exposition, to design a hotel "room of tomorrow" . . . William Sherman/Industrial Design by Welby Clock Corporation and Navis and Smith, lamps.
Francis Blod Design Associates have just re-designed the graphics of the Ambassador beer line for the G. Krueger Company.

MOVED: Painter, Teague and Petertil to 230 North Michigan Avenue, Chicago 1 . . . Corning Glass to the Corning Skyscraper of Glass at 717 Fifth Avenue.

NEW OFFICES: William Armstrong and James Balmer and Associates at Stevens Building, 1025 East Maple Avenue, Birmingham, Michigan.

New Products and Services

Experimental models of a coin telephone shelf (above) by Bell Telephone Laboratories are on trial in Milwaukee. The shelf has vertical coin slots; handset and dial are placed on the panel . . . GE has just announced an instrument rental service for more than 70 different kinds of measurement. A cross-country network of 55 service shops will offer normally expensive instruments such as oscilloscopes and voltmeters for short-term rental.

Exhibits and Meetings

The Ohio Valley Chapter of IDI visited an exhibit of student work in the industrial design department (below, right) of Carnegie Tech, during a two-day conference of the chapter in March . . . New concrete masonry forms (below, right), designed by industrial design students of Michigan State University, were among concrete products featured at a recent spring meeting of the Concrete Products Association of Michigan.

Competitions and Awards

The executive directors of the Western Electronic Show and Convention, which takes place in San Francisco on August 18-21, announce a new annual competition to honor outstanding designers in the electronics field. Entries must be a commercial system, instrument, or component, directly related to the electronics industry, and marketed prior to May 31, 1959. Main criteria of judging will be visual clarity of function, ease and safety of operation, and appropriateness of appearance. Selected entries will be exhibited in a special area of the show "to focus attention on the industrial design profession," and those judged as particularly outstanding will receive the "WESCON Award of Excellence for Industrial Design." Entry forms, available from WESCON at 60 West 41st Avenue, San Mateo, California, must be filed by May 31.

Education

Southern Illinois University now offers a graduate program in design leading to a Master of Science degree. Information may be obtained from the Department of Design, Southern Illinois University, Carbondale, Illinois . . . "New Opportunities with Plastics" is the subject of the Engineering Institute to be held by the University of Wisconsin on May 26-27. Information may be obtained from Engineering Institutes, University Extension Division, 3030 Stadium, University of Wisconsin, Madison, Wisconsin . . . MIT will hold a special session on "Aesthetics of Surfaces" from July 20 through July 31. Surfaces invented in design projects will be discussed from the viewpoints of the plastic arts and of their technological potential in metals, ceramics, wood, laminates, and plastics. Application forms are available from the Director of the Summer Session, MIT . . . The University of North Carolina will hold three intensive courses on digital computers for engineers, scientists, and business users of digital computers, from August 17 through 28. Applications for enrollment may be obtained from James C. Steagall, University Extension Division, Box 1050, Chapel Hill, N. C.

C. A. Sirrine, of Concrete Products (left), student Kent Brown, and instructor Robert Alexander, at Michigan State exhibit.

Richard Felver (right), Carnegie Tech professor, shows student work to IDI members Irene Pasinski and Erwin Kalla.

People

APPOINTED: Will Burtin (left) as professor of design and chairman of the Department of Visual Communication at Pratt Institute . . . C. F. Graser (left) as manager of industrial design at IBM . . . George Bist (left) as director of the package design unit of Orr Associates, Ltd., Toronto . . . Shao C. Feng (left) as manager of product planning at the Silicone Transistor Corporation . . . Del Schmidt as vice-president of Donrico, Inc. . . . Richard W. Lanigan to the industrial design staff of Stowe Myers.

Graser *Bist* *Lee* *Feng* *Burtin*

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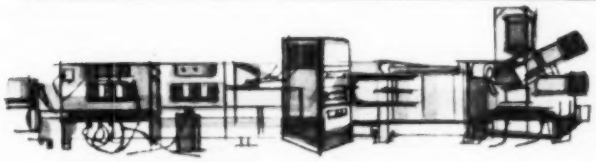
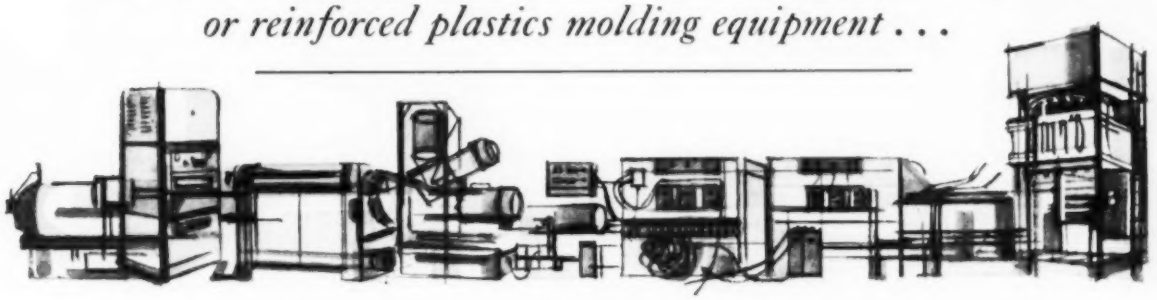


some have vacuum forming, extrusion, compression, injection or reinforced plastics molding equipment . . .



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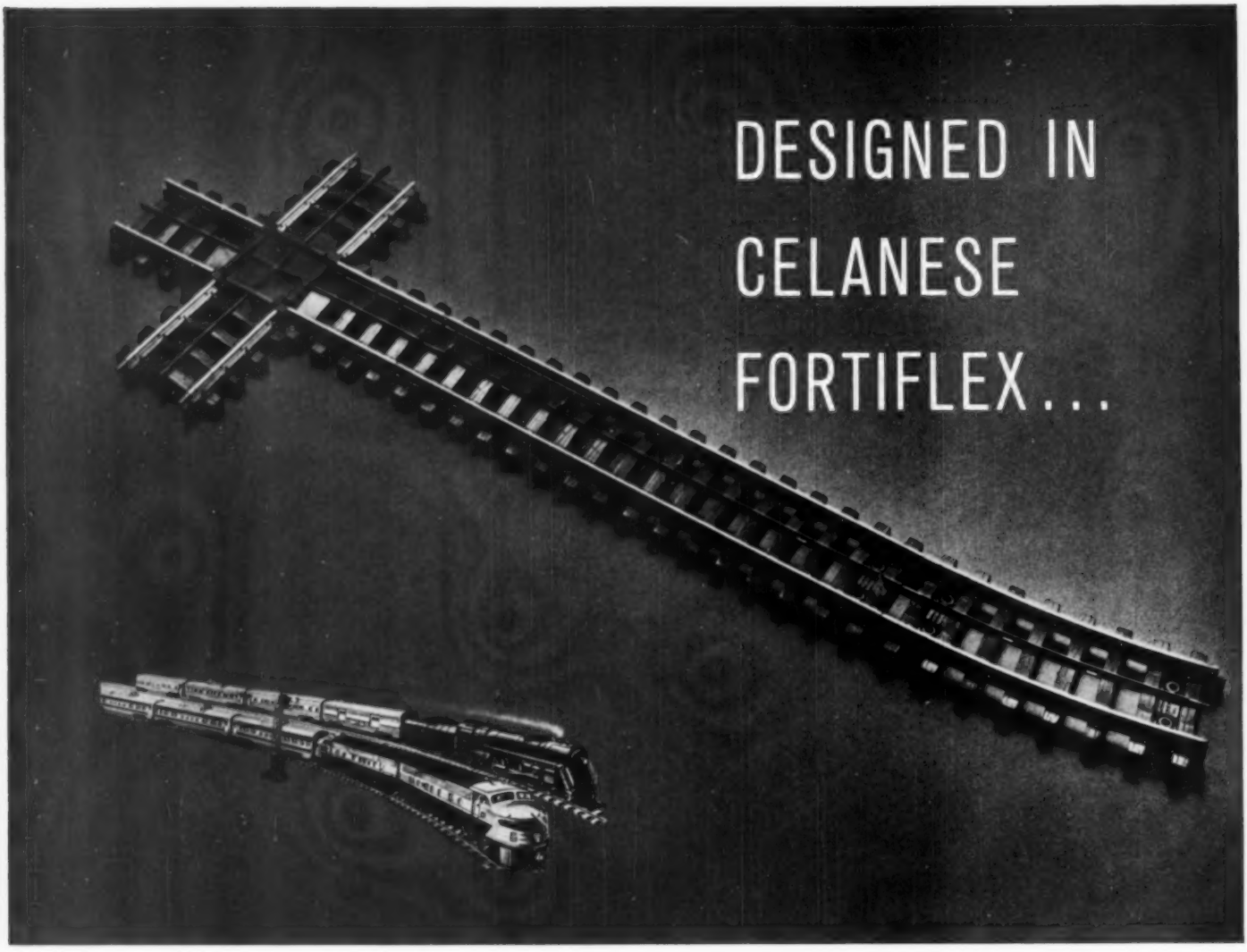

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Melt Index	D-1238-52T	—	0.2	0.7	2.5	5.0
Heat Distortion Temp. (66 psi)	D-648-45T	°F.	185	185	180	180
Brittleness Temp.	D-764-52T	°F.	—200	—180	—160	—100
Impact Strength, Izod (1⅛" x ½" injection-molded bars)	D-256-54T	ft. lb./in. notch	23	18	13	3
Tensile Strength, Max., 0.2 in./min.	D-638-52T	psi.	3700	3600	3500	3300
Elongation, First Tensile Yield Point	D-638-52T	%	25	25	25	25

Properties of Fortiflex "A" Not Affected by Melt Index

PHYSICAL PROPERTIES	ASTM METHOD	UNITS	VALUE
Density		g./cc.	0.96
Refractive Index	D-542-50	n_D^{25}	1.54
Hardness, Shore D	D-676-49T		65
Stiffness	D-747-50	psi.	150,000
Water Absorption (⅛" specimen, 24 hr. immersion @ room temp.)	D-570-54T	%, wgt. gain	<0.01
Flammability	D-635-44	in./min.	1.0
*Mold Shrinkage, length		in./in.	0.03 to 0.05
width		in./in.	0.02 to 0.04

*Measured on injection molded tensile bar. Mold shrinkage depends on part design and molding conditions.

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Sic, sic, sic

Since we, in our irascible way, always seem to be picking on designers, it is a relief to find that we're not the only ones. We have been observing with satisfaction (and with an eye for new techniques) how this sort of editorial persecution is accomplished overseas.

It all began last August when Kenneth Robinson, writing in the British publication *Design*, which names names, attacked "the one-upmanship jargon that is so popular among American designers." Then in January the magazine published a letter from a Chicago designer, expressing his own displeasure with "the clouded and verbose jargon of some American designers," and explaining that "most American designers are publicity-hungry." Then he began picking on *us*. American magazines, he complained, had never exposed the pretentious language of the profession, presumably because the editors were "as mystified as the designers would have them be."

Early this month Mr. Robinson introduced the subject again in an amusing article in the *Spectator*. To the examples he had used in August, he added a public relations man (which is cheating) and a designer who wrote words that *seemed* simple until they added up to bewildering statements like: "The visual aspects of a country's products are far more important than whether they are good or bad design."

Meanwhile the very same Chicago designer who had complained of the verbosity of his publicity-hungry co-professionals sent us a publicity release in which he had written the following plain talk:

> *Cost x desirability = value. In this equation, cost is the cost of the total product or of each part of the product; desirability is a generic term which covers function, adaptiveness, beauty, durability, and any of the attributes of the product. Therefore the value of a product is actually the summation of values, each determined by the same equation, substituting the desirability under question.*

Now we *were* mystified — until we submitted the statement to a semanticist we know, who explained that it means: the value of a product depends on what it's worth and what it's good for.

Of course a lot of designers use language pretentiously. But this is hardly a malady peculiar to them. Apart from public relations writers, politicians, critics and hipsters — for whom it is a basic material — professional and business people are all likely to use a fair amount of jargon. ("The instrumentation situation is very good potentially-wise," a management consultant said to us today, skillfully turning an adverb into an adverb.) This debasement of language comes from having to say something when there is nothing to say, and from trying — for reasons we all know — to make the simple sound complex enough to be scientifically respectable. The effect is not really mystification, but indifference and disbelief. Having caught the habit of talking, Americans have lost the habit of listening that once provided an automatic check on verbal nonsense. When we see a trite design solution described as "a totally new concept" — as we do about once a week — we do not puzzle over what it means. We assume that it means nothing, which is what the man or machine that wrote it assumed. Impoverished imagery, impersonal diction, private vocabularies, the triumph of the passive voice — these are symptoms of a cultural illness. Designers are not noticeably sicker than anyone else. Alas, they are not noticeably healthier either. The designer may even be unusually susceptible to the disease, for he is often expected to express verbally what can only be understood visually. There is no more seductive invitation to obscurity.

The language of the profession is worth examining seriously. In the meantime it is refreshing to watch Mr. Robinson do it lightly, with charm and wit and sensible good humor. It makes us more tolerant, irascibility-wise. — *R.S.C.*

The Designer in the Museum

Shaking off the dust of decades, the museum looks toward a dynamic future as combination research, social and education center. For the designer this can mean an opportunity to experiment with new approaches to exhibition.

by ANN FEREBEE

No one these days accuses man of having achieved much wisdom, but no one denies the vast accumulation of knowledge. Sometime before the emergence of either quantum mechanics or the quiz program, men built the tower at left to celebrate their knowledge. The tower, according to an early source, fell. This was partly because of the failure of communications, which plagues us still, and partly because the builders didn't know enough: to support a tower spiraling to an infinite point they would have had to devise a base that was infinitely broad.

Today we have buildings that *collect* the artifacts of man's achievement, as well as celebrate it, and the problem of these modern museums is not far removed from that faced by the builders of Babel: they must constantly broaden their base to accommodate the steadily mounting heap of information.

Collection of more and more objects has not necessarily created greater and greater understanding—for the public or for the collectors. Discussing the museum's need to bring order into what is becoming a chaos of unrelated knowledge, Francis Henry Taylor, longtime director of New York's Metropolitan Museum of Art, said that the museums must make a decision about their role. "We must make a choice," he said, "of becoming either temples of learning and understanding, or of remaining merely hanging gardens for the perpetuation of the Babylonian pleasures of aestheticism and the secret sins of private archaeology." The dilemma Mr. Taylor described a dozen years ago has not been resolved today. With more people visiting larger collections than ever before the museum's need to redefine and clarify its function is urgent. In the process of doing so, the museum has discovered design.

The industrial designer working within the world of the museum also has a problem. He must design a meaningful context for showing objects that have lost their context. This has become increasingly important as the role of the museum has developed over the past ten years. For rather than study a single exhibition systematically, the casual visitor to the museum typically turns to isolated items that interest him—the most exotic, the biggest, the smallest, or even the most familiar objects in the collection. He may enjoy his tour, but he doesn't necessarily learn very much. Yet in a world of increasingly complex, specialized and departmentalized knowledge, he wants to fit his information into a coherent framework. He seeks understanding as well as enjoyment from the museum. By finding new ways to present complex information to the non-specialist, the designer working within the contemporary museum can help him get it. If every generation has interpreted the word "museum" according to the social requirements of the day, the concept of the museum as a center of public instruction makes sense today. It will be a new role, developed only after centuries of evolution.

The museum evolves

The word "museum" has been associated with the curio cabinet and treasure store, as well as the library and research center, but the idea of public service has been associated with it for scarcely 200 years. The public collection was unknown to the Greeks, for whom the museum was literally a temple of the Muses, a place of meditation where the devoted could develop their arts and sciences—which the nine goddesses gave to man—to the highest point. The Arch of Titus, with its carved relief of soldiers marching home with the spoils from the Temple at Jerusalem, indicate that the Romans had a different idea about collecting treasures. But neither the Roman collections, whether created by plunder or purchase, nor the later ones of the church and the nobility were often open for public inspection. Only with the French Revolution did it become good politics as well as sensible economy to convert empty palaces into places of public instruction where people could take pride in national wealth and heritage. Thus, Europe's castles became the first public museums.

The museum as a public institution

The establishment of public museums solved the problem of what to do with abandoned castles, but raised a new one about the museum as a public institution. For one thing, it is considerably easier to please one patron than to serve an entire population. And since the day in 1793 when the Louvre opened its doors to the citizens of France (only for three days out of every ten), museums have been plaguing themselves as to their proper function. The contemporary museum now adds a host of questions to the original one. How much to store and how much to display? What relationship to the public library? How to

Solomon R. Guggenheim Museum

Ideas about gallery arrangement have come a long way since David Teniers painted the Archduke Leopold's collection in 1665. Director Sweeney of the Guggenheim Museum treats the bare wall itself as a frame for pictures in this exhibition at the museum's present building.

meet increased availability of leisure time? How to serve the specialist as well as the layman? In providing answers to some of these questions, the museum, now an extremely complex institution, has transformed itself in recent years. Most significantly, it broadened its social functions, developed a growing concern with exhibition as a teaching medium, and uncluttered its walls and exhibits.

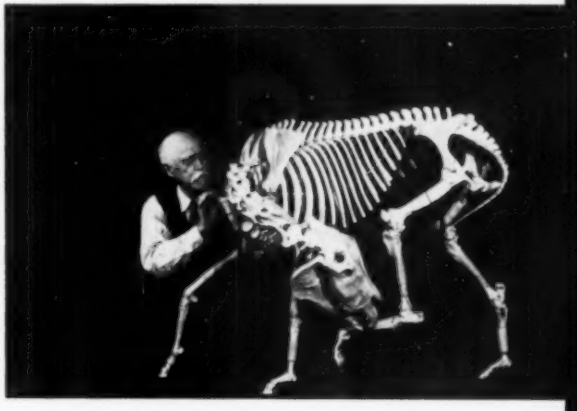
"Collecting on a grandiose scale has grown from a disease inherent in our society to a menace," says James Johnson Sweeney, director of New York's Guggenheim museum, who hopes that the trend toward larger museums, more comprehensive collections, more exhaustive—and exhausting—exhibits will stop. While the tradition of crowded walls and cluttered cases persists, Mr. Sweeney calls for a new turn from *collecting* to *selecting*. He feels that the comprehensive exhibition is no longer the best answer, and substitutes the "connoisseur's choice" for the more democratic approach which tries to give the greatest relative satisfaction to the greatest number of people. That such an approach makes sense was borne out some years ago in a test which indicated that the time visitors spent in a gallery increased when the number of pictures rose from six to twelve. The time continued to increase until 24 pictures had been hung. After that the length of time neither increased nor decreased when more pictures were added. Designers should not be surprised to learn that viewers have limited staying power, but the message has still not penetrated to many museums.

When a museum director recently sent a discreet questionnaire to his colleagues at other museums asking how they felt about serving sherry or liquor at their openings, he touched on a generally accepted practice which would have been unthinkable twenty years ago. In catering to the desires of its new patron, the general public, the museum is developing a host of auxiliary functions. While it has traditionally served the specialist as a research center, it now also offers to a less serious public movies, a restaurant, a children's room, concerts, and lectures. Sherry or no, the museum has evolved into a busily functioning community center which is probably here to stay—mainly because people really like it that way.

The designer enters

A growing interest in how things are shown as well as what is shown and a grudging admission that exhibit design is a complex skill, have opened the door of the museum to the industrial designer. Today the nation's two thousand museums of art, science and history represent an investment of nearly four billion dollars, and designers form part of active, large-scale exhibition departments at such museums as the Smithsonian in Washington and the American Museum of Natural History in New York. And since many museums have no exhibits departments of their own, industrial designers are being called in as consultants on specific problems. Although the pay scale is generally low, a top designer will occasionally take on a museum problem much as a famous lawyer takes a publicized case: for the fun of it, and for the prestige.

What to do with the objects in a museum sounds like an easy problem. "You either hang them from the wall, set them on the floor, or build a case around them," one



A passion for bringing realism into the museum led comparative anatomist S. H. Chubb to an early break-through in display technique. He devised a scaffold to position skeletons in natural poses.

museum designer remarked. Actually, it *may* be simple if the designer is simply asked to create a context for objects taken out of their natural environment. The habitat group of the natural history museum and the period room (below) of the historical museum have provided one kind of answer for years. But what about the explanatory exhibit, the exhibit of ideas rather than things? This type of exhibit is becoming more popular as museums discover that teaching involves more than arranging objects in glass cases. Within the explanatory exhibit the design possibilities are endless. Sound, animation, models, charts—any method he can think of may give the designer a technique for putting across the ideas in the exhibit. Generally, the non-art museums have pioneered in the explanatory exhibit, and here, barring official opposition—which may be considerable—the way is open for the designer to experiment with three-dimensional communication through the objects in the museum collection.

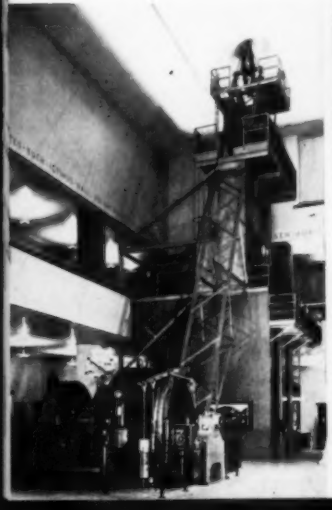
Designer's challenge

It is here that the designer will find his real challenge. But before he can do his job, the museum must decide: ideas about what and for whom? Unlike the school, the museum offers no specific curriculum and gives no grades. This makes it difficult to determine how much to show or even why to show certain things. The audience is neither specialized nor captive, which means that the designer must appeal to school children and Sunday strollers as well as scholars, and he must be imaginative to hold attention.

Official opposition, if the designer bumps into it, will come from the curator, for the curator as client may not understand or want the designer's services. This is because the museum curator is actually four men: research scholar, teacher, collector of objects, and, last, an exhibitor of them. Like the university professor who is more interested in research than in teaching, the curator may be more interested in what he can learn from his collections than in what the public can learn from them. He was hired for his ability as a scholar, and may pay least attention to his responsibilities as an exhibitor. Such museum men as Frank Taylor, director of the Smithsonian's Museum of History and Technology, and Alfred Parr, director of the American Museum of Natural History, are outstanding exceptions to this. Dr. Parr makes a judicial distinction between the designer's and curator's function. "The designer cannot be allowed to distort the exhibit's intellectual content by his art," says Dr. Parr. "Nor can the curator be allowed to be the final judge of artistic merit when intellectual content is not involved in a choice. As the precise boundary line can never be clearly marked, an independent arbiter is often required, normally the museum director."

With his specialized skills in the art of exhibition, the designer is already making an important contribution to the museum world. But real success in the field of museum design may depend on his ability to articulate for whom he is designing and why. A report on how designers at three very different museums are now solving quite real museum design problems begins on page 32. Four theoretical and thus far untested solutions to some museum design problems are presented overleaf.

Chicago's Museum of Science and Industry gives visitors a taste of real life within a mine shaft (left). Walter Dorwin Teague Associates recreate an earlier life in this period room at the new Hagley Museum. Many museums utilize both the "natural environment" exhibit and the object exhibit.



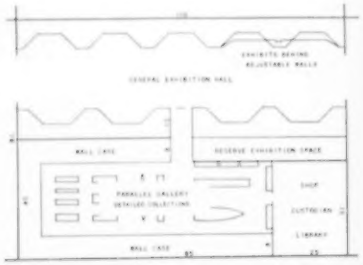
Leon Gordon Miller coordinates photo murals, edge-illuminated plastics, models, motion, color, sound, and graphics for exhibit emphasizing ideas, more than objects at Cleveland Health Museum.

Museum design has generated many "ideal" solutions and produced some controversial viewpoints

Frank Taylor

Parallel-plan gallery

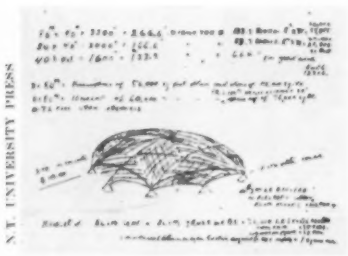
A parallel gallery plan was suggested some years ago by exhibits director Frank Taylor of the Smithsonian to solve the problem of combining storage and display in museums of record and exhibition. This plan divides the public halls of the museum into an easily traveled route of exhibition spaces for the visitor who comes to look, and a system of adjacent galleries with detailed material for the serious student. The visitor will take the broad path through the main exhibits, but nothing will prevent his digressing into a parallel gallery if he wishes to see further material on a subject which interests him. The study collections in the parallel gallery will be stored behind glass, to be handled by the scholar with the permission of an attendant. A third group of material, not suited to even limited display but still of historical significance, will be housed in office collections. Exhibit panels can be constructed on a modular basis, and combined to form either deep or shallow alcoves. The exhibits will be uncrowded spot displays, easily changed and flexible in size, arrangement, and relationship to one another. The room at the end of the parallel gallery may be used as a small workshop and study for the attendant. Plan is convenient but requires more space than conventional arrangements.



Alexander Dorner

The Living Museum

Rejecting the whole notion of the art museum as a storehouse of treasures, German museum director Dorner envisioned a "living museum" where the art of each age would be displayed in a room suggesting the atmosphere of the period, reflecting the various images of reality which have evolved since earliest primitive culture. By picking up earphones the visitor would also hear snatches of the music and literature of the period, and color transparencies would show what architecture and sculpture looked like when they were actually in use. "The traditional museum is dead because it is still trying to unite past and present in a static way. Our new museum could be living if it succeeded in creating new dynamic unity of growth that turns the past into a driving force toward a better working future," he said. Dorner believed that mass education was not only the prime justification for public institutions as large and expensive as museums, but also their guarantee of survival. His last dream was to turn the living museum into a museum of facsimiles, mass-produced—perhaps as a geodesic dome whose interior would be completely flexible —set up in different parts of the country. A core Museum Institute would prepare exhibits, books, and other material, and give graduate training to museum personnel.



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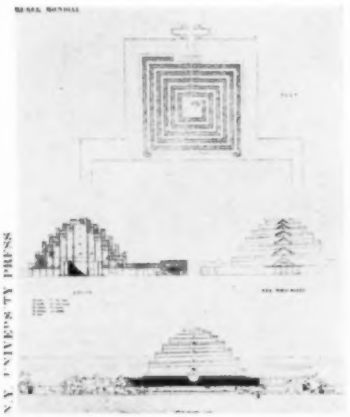
Le Corbusier

The Musée Mondiale

Corbusier's Musée Mondiale, a stepped pyramid anticipating Wright's Guggenheim Museum, was planned—but never built—on a much grander scale. A "Mundaneum" (the complex surrounding the Musée Mondiale) was to have been the center for a kind of United Nations of the intellect, located in Geneva next to the Palace of the League of Nations. Corbusier imagined a colossal politico-historical education service for all member nations. In the Musée itself, three juxtaposed ramps would wind down together to the bottom of the rectangular spiral: on one ramp, archeological documents, on the next one historical documents, and on the third presentations of the lands where the growth of arts and sciences took place. At a given moment in the descent of the spiral the visitor might see, for example, a statue by Phidias on the first ramp, a quotation from Plato on the second, and on the third a model of the Parthenon and a photograph of a modern Greek shepherd. History would unwind before the pilgrim-visitor as a complex development of different but interdependent cultures, to which he, with men of other races, was heir.



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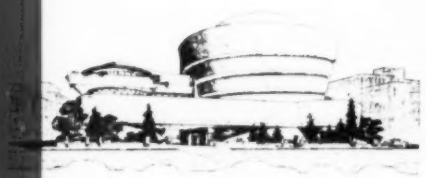
Frank Lloyd Wright

The Guggenheim Museum

A new solution to the problem of museum traffic will be tested for the first time in Wright's Guggenheim museum, which will be open within the year. The ¼-mile ramp will be used for exhibitions, and the visitor will be able to leave the gallery at any level he chooses. The very slope of the ramp will give him a constant orientation toward the exit. The problem of hanging pictures in a spiral gallery is neither that of the curved wall nor of an inflexible space, as some people have suggested. The big problem, says museum director Sweeney, will be learning how to compose an exhibit across a hollow core, since the visitor standing on the middle ramp may see both the ramp above and the ramp below him. As Sweeney explains, the ramp will have all along its length 48 gallery alcoves, each from 2 to 18 feet deep, which will create a variety of exhibit spaces.

Said Wright about the construction of the Guggenheim: "This building is built like a spring. You can see how the ramp, which is coiled in the shape of a true logarithmic spiral, is one continuous piece from top to bottom, integral with the outside wall and the inside balcony. When the first atomic bomb lands on New York it will not be destroyed. It may be blown a few miles up into the air, *but when it comes down it will bounce!*"



"I do think far too much emphasis has been placed on the integrity and skill of the designer. I would challenge any designer to put up as good a show as any intelligent museum man with a couple of carpenters and a good lighting man. The whole point of a good museum is that the objects speak for themselves; and they do not, if they are intelligently shown, require a particular setting designed for them."

Sir Leigh Ashton, former director of the Victoria and Albert Museum

"Most of the attention of the designers of museums has been devoted to either the architecture of the warehouse or the display character of the background of the objects. But it is our belief that this method as a means of educating people is obsolete in society as it exists today."

Richard Latham,
Latham, Tyler, Jensen

"Indeed, of all the institutions, both public and private, which have flourished in this country, few, if any have wandered so aimlessly towards undefined goals as have the museums."

***T. L. Lowe*, The Museum as a Social Instrument**

"The exhibit technique used by the museum is an art form, drawing upon all types of design and art experiences. The major advances today are to be found in the science rather than the art museums. The most obvious reason for this, of course, being that we are living in an age of rapidly increasing knowledge. As a consequence the need for quick comprehension of many complex ideas is great."

Lena Gordon Miller, designer

"The museum has a history steeped in a past of thousands of years. Yet as a public institution of a present-day society it is in its infancy."

Alma S. Wittlin, The Museum

"It is perhaps unnecessary to state that the primary purpose of any museum exhibit in science is to present facts and ideas to the visitor, not to illustrate some new exhibition technique."

Bobb Schaeffer and Mary B. Patsuris,
Curator, *American Museum of Natural History*

"I am a designer. My knowledge of museums is about as scanty as an ordinary visitor's; and I have found in my work with museum people that it is just as well that the designer should not know too much about the collections and the scientific background."

Elias Svedberg, architect

SMITHSONIAN *embarks on massive exhibits program for History and Technology Museum*

In 1955, when Congress appropriated $36 million for construction of a Museum of History and Technology (below, right) at the Smithsonian Institution, the exhibits office mushroomed (chart, right), and plans began for the construction of 47 major exhibit areas, a scale of operations rarely ventured in museum work. The assignment, now in progress and scheduled for completion by 1963, the opening date of the new museum, confronted exhibit designers with some very special problems. But the Smithsonian is a very special place.

The nation's attic

To many people, the Smithsonian is simply the "nation's attic," the wonderful Arts and Industries building (right) where the Wright brothers' first plane looks down on an array of military uniforms and where the original, bullet-riddled Star Spangled Banner molders away in its case on the wall. But this building is only one element in a vast Smithsonian complex which has grown to include ten bureaus (see chart at right). The Smithsonian boasts the largest collection of catalogued objects (at present over 51 million) in the world. It sprawls over more territory than the Louvre, and last year 10,200,000 people visited it. These facts, together with its peculiar relationship to the U. S. government and its position as the country's national museum, make it unique among the world's museums. The same facts also create some well-nigh insoluble problems for the Smithsonian.

Most important, the Smithsonian's complex relation to the government makes any kind of single-minded, long range planning a headache. Endowed in 1829 by James Smithson (whom the Smithsonian describes as an "English scientist," which he was, but whom everyone else delights to describe as the illegitimate son of the first Duke of Northumberland), the Institution devotes itself to the vague but laudatory aim of the original $550,000 bequest: "the increase and diffusion of knowledge among men." After debating eight years, Congress agreed to accept Smithson's bequest and thus assumed an unprecedented position: guardianship of a ward. As guardian, it has been sometimes parsimonious (last year appropriations reached $6,102,319), sometimes whimsical, but always interested, and the remarkable Institution which has developed in the last hundred years is the result.

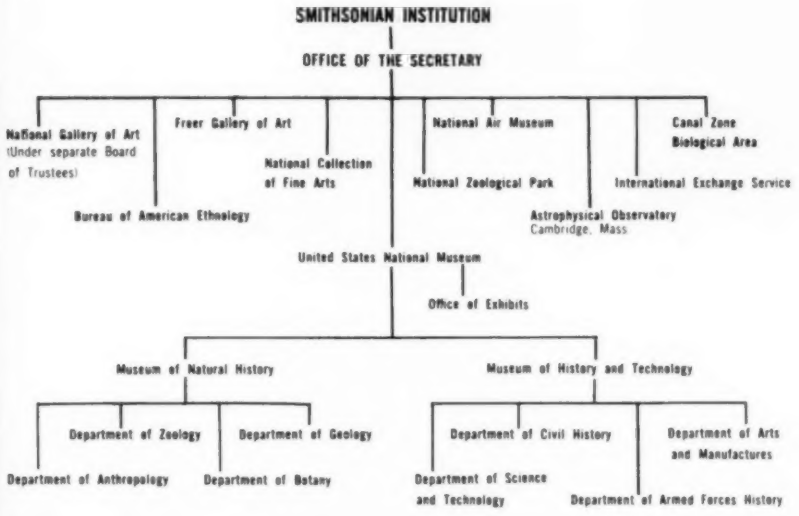
To accept responsibility for Smithson's bequest, Congress made the President, Vice-President, Chief Justice, and Cabinet, the members of the Institution. It also provided for a Secretary to act as executive officer. But it is *governed* by a Board of Regents. It has since been remarked that the "balance of power" arrangement under which the Smithsonian operates makes more sense in running a federal government than in running what has grown to be a huge institution. What started with James Renwick's Victorian castle (left) has developed into one of the most elaborate (and confusing) complexes of museums and research facilities in the world.

It seems illogical for instance that the National Collection of Fine Arts is housed in the Museum of Natural History. But it "can't" be housed in the separately run National Gallery because the two are "detached organizationally." And it can't be housed in its own building because Congress has not yet appropriated money for such a building. Indeed, a grand but unpublicized scheme for the architectural development of the Smithsonian includes a separate building for the National Collection—as well as a building for a National Air Museum, a planetarium, and wings for the Natural History Museum. But dependence on yearly appropriations makes planning ahead a chancey and frustrating business. And officials on such projects hush public discussion of future plans, apparently figuring that it's smarter—politically more expedient—to present projects to Congress piecemeal, as the opportunity for funds develops.

Plans for a new museum

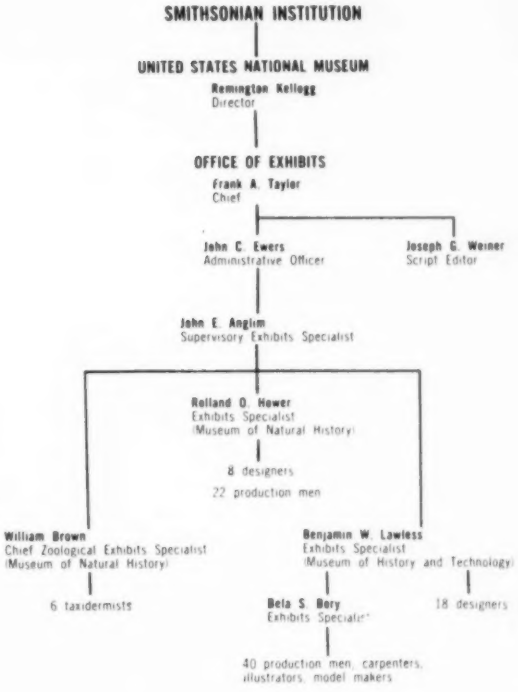
Plans for the new Museum of History and Technology went through an elaborate government procedure before they were accepted. After appropriations had been authorized by Congress in 1955, the General Services Administration's Assistant Commissioner for Buildings prepared portfolios on a number of architectural firms. Then, in January 1956, a committee from the Smithsonian, meeting with a committee from the General Services Commission, selected the firm of McKim, Meade and White as architects. McKim, Meade and White prepared scale models of more than 20 designs. Before the selected one was finally settled upon, it went for approval to a joint congressional committee, the Commission of Fine Arts and the National Capital Planning Commission, which had to approve the location of the building on the site.

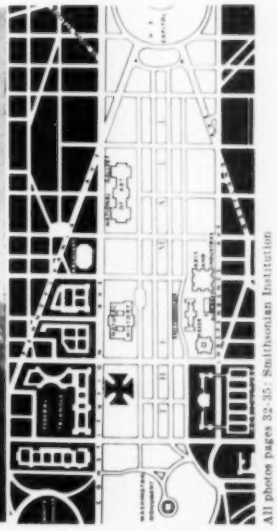
Director Taylor's idea—for a museum based on a parallel gallery plan (page 30)—was early discarded as being too impractical. Instead, McKim, Meade and White have come up with a huge rectangular building 77 feet high, with 280,000 square feet of exhibit space, about double that of the present Arts and Industries building, which now houses



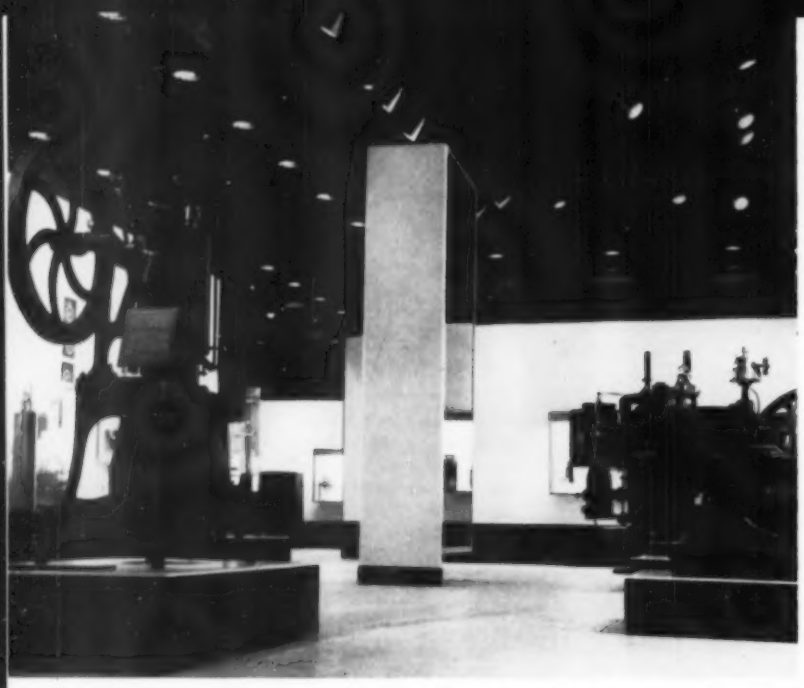
Smithsonian operations reach from the Canal Zone to Cambridge, Mass., include five separately-housed museums. The 100-man Office of Exhibits serves two of them: the Museum of Natural History and the Museum of History and Technology.

History and Technology collections now housed in 1881 Arts and Industries building (left), whose interior now looks more like a junk shop than a museum, will get new building (below and marked by cross on map). Proposed Air Museum will go opposite National Gallery as now planned it may be too large for scale of buildings along Mall, yet too small to house one of each type of U. S. plane.





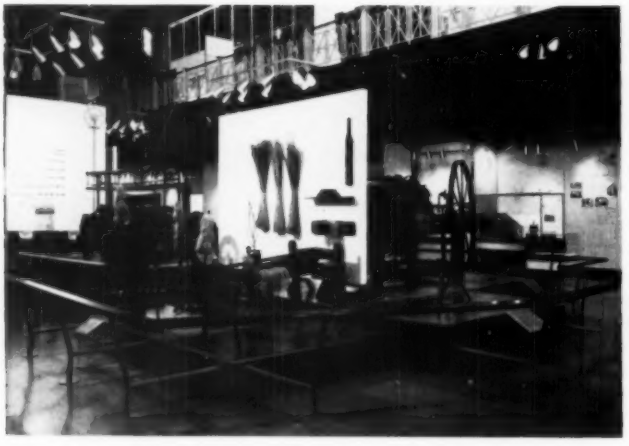
All photos pages 32-35: Smithsonian Institution

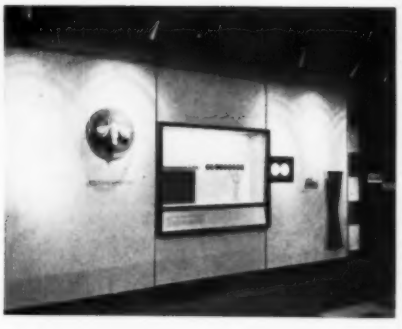


Engines in the Hall of Power Machinery have been restored to their original colors of blue, red, gold, and black to stand out dramatically against black and white walls. Flexible lighting system can be adjusted.

In the Hall of Health wall panels are installed by a leg extension system braced to ceiling and floor. Both panels and hollow cement wells (below) are portable, although new acoustical tile ceiling is not.

Smithsonian designs for permanence and portability





Antiquated Textile Hall (left) was renovated (above) with the Garcy Adapt-a-strut panel system which contains its own wiring system and will be adaptable to a number of arrangements in new building. Guard rail protects easily portable un-cased machines.

these collections. The first three floors will be open to the public, while the fourth and fifth floor will be used for reference, storage and curatorial workrooms. The architects have aimed for an unusually free interior space, with columns spaced fifty feet apart and wires for such services as lighting and phones running in under-floor raceways. Borrowing Corbusier's phrase, Smithsonian director Carmichael refers to the new building as a "machine for exhibition," and it is true that the architects have left space for such problem display items as a 122-by-16-foot locomotive. But it has been suggested that, like an air museum, a technology museum, with some specimens of such huge size, might more sensibly—and for that matter, more attractively—be housed in some type of open-air display and storage structure. To solve the problem of introducing visitors to the highlights of the History and Technology collections without boring him with secondary specimens, Frank A. Taylor, head of the new museum and director of the Smithsonian's exhibits office (organization chart, page 33), plans a huge exhibit running down the center of the main floor, to be called "The Growth of America." Introduced with two gems from the collection—the Star Spangled Banner which flew at Fort McHenry and Greenough's seated statue of Washington—it will present a chronological history of the nation's growth and leave the visitor with a dramatic impression of "the face of the nation." At the same time it will serve as a kind of capsule of the entire collection.

A challenge to designers

The problem facing the exhibits staff when they began planning for the new museum in 1955 was how to design all 47 exhibit areas between the time that the building was completed in 1962 and the time that it opened just 12 months later. Since the staff was already involved in a program for modernizing some of the existing exhibits, they decided to continue the program with the idea of transporting the renovated exhibits to the new building when it was ready. What they wanted was permanent but portable exhibit installations. As the date for moving to the new building has drawn nearer, the staff has achieved an increasing degree of portability in its exhibits.

The Hall of Power Machinery (left) was one of the first that the exhibits staff renovated with the new building in mind. Benjamin Lawless, exhibit specialist in charge of the renovation, here tackled the problem of portability by displaying the heavy machines and steam engines without cases. It will take a minimum of effort to move these machines with their lacquered, labeled bases to the new building. The exhibits staff worked out designs for the Hall of Health (left) after the new building appropriation was passed, but before they knew details of its actual plan. Consequently, Lawless and his staff devised a highly flexible panel system, adaptable to any pattern or ceiling height. Unlike the power machinery exhibit, this one had few actual objects from the collection, and most of the material could be displayed directly on the exhibit panels. And all units such as an aluminum and wood theatre section, the fiberglass base for the Transparent Woman, the hollow cement well display, can be moved with a minimum of difficulty.

Mass-producing exhibits

The Hall of Textiles, a nucleus for three textile halls in the new building, was the last as well as the most portable of the exhibits in the renovation program. By this time the designers considered the new building first and the renovation of halls in the old building simply as an opportunity to "store"—on view to the visitor—exhibits built primarily for the new building. Since designers agreed to avoid structural changes in the existing building, its Victorian shell as well as a large stained glass window and two World War I air planes had to be accepted as part of the plan. Designers minimized these elements by concentrating lighting on the new exhibits and by placing big textile machines directly under the planes, where attention will be drawn to them rather than to the planes. The designers selected a flexible partition system that would be appropriate to the present hall, and yet could be cut and arranged for the new halls.

The staff now has dropped its renovation of the Arts and Industries building to work full time on the remaining 40 halls in the new building. Under the original program the staff modernized a dozen halls (6 of which will go in the new building) in five years, or about two a year, a staggering rate compared to the 3 to 5 years often spent in renovating a single hall. But in the next three and a half years, to meet the 1963 opening deadline for the new building, the staff will have to complete about 10 halls a year. The former schedule, which allowed about nine months for planning a 50-case show of five to six thousand square feet, and about six months for production, will have to be stepped up. At the same time the staff has already expanded to nearly one hundred members and will probably continue to grow as pressure increases to meet the deadline. In the museum exhibit world this is real mass production. One overworked designer speculates that the museum might do just as well to open with one well-planned floor, allowing the exhibits staff a more leisurely pace for experimentation and reflection, and making news for the museum each time a new hall opens on the other two floors.

When the new Museum of History and Technology opens at least some visitors will recall with nostalgia the "old attic" where searching for the relics of the nation's past became an adventure full of surprises. Having lost their old treasure house, they will hope for more than the substitution of a fresh new attic for a romantic old one.

HINSDALE HEALTH MUSEUM *uses pushbuttons and audio-visual devices*

Thirty years ago a museum like the one sponsored by the Kettering Family Foundation in Hinsdale, Illinois, did not exist. For it is devoted to neither things nor ideas, but doctrine, and its subject matter is normally encountered in hygiene classes. Hinsdale Health Museum explains the mechanics of the human body, and its purpose is didactic —to teach good health. Its twelve exhibits—Body Cells, The Brain, The Coughing Man, The Mouth, The Teeth, Life Begins, The Structural Systems, The Eye, The Ear, The Skin, The Lungs, The Heart—were designed by Latham-Tyler-Jensen (Hinsdale is unusual in this, too: it retains an outside industrial design firm to do its exhibits).

Partly because of the museum's single-minded approach, partly because the designers felt that communication of complex biological processes to a lay public required special techniques, the LTJ exhibits are more dramatic than most museum presentations. They make maximum use of audience participation, of recorded sound and animated display. And they mix pure scientific fact with visual metaphor in a way that some curators of conventional museums might question—even though the metaphor scrupulously avoids distorting the fact.

Team decides nature of exhibits

To insure this accuracy, the concept and contents of the exhibits are jointly determined by LTJ's chief of exhibits, Donovan Worland, who functions as design consultant; the foundation's executive vice president and general counsel, Charles Cessna; the museum's director, Mrs. Elizabeth Lundy; and a committee of three doctors who act as medical advisors and are, in effect, Hinsdale's curators (see organization chart, right).

Worland actually became affiliated with the project before he joined LTJ. He was called in by the Kettering Foundation while he was still at Chicago's Museum of Science & Industry, shortly after the foundation itself was formed (1955) to implement "charitable, educational, civic, scientific, and research projects." The museum is one element of its first major project; a million-dollar Medical Center building with offices for fifty doctors, complete with library, laboratories, a pharmacy, and a "health theatre" for lectures and films.

Worland was part of a design team which also included an artist, a medical illustrator, and a script writer. Their assignment, as the foundation initially envisioned it, was to set up exhibits based on the use of "authorized" material purchased from "approved" sources—the sort of material, in other words, prepared by medical display houses for use in schools and colleges. Worland, however, had other ideas. He wanted to project the museum's message by more dramatic means.

Museum design concept develops

His ideas for doing this form the basis of LTJ's exhibit design philosophy, which might be called experimental. LTJ believes that a scientific exhibit should explain underlying principles; that the display of an object, no matter how meticulous its detailing, does not explain the physical laws governing its function ("a wing section does not explain why airplanes fly"); and that, just as many laws of nuclear physics cannot be explained in words, but require numbers, so many physical phenomena cannot be explained by exhibit models but require a combination of aural and visual experiences which are to some degree abstractions of the actual process, and which add up to an *experience* of that process, rather than to rational perception. The best example of this approach in the Hinsdale museum is LTJ's $40,000 exhibit on the brain (facing page) which uses pulsating light, a taped script, and atmospheric background sound —all activated by the viewer—to explain the brain's nerve cell, the body's nervous system, and the phenomenon of memory. LTJ considers Hinsdale only a beginning. On future museum exhibit projects, it hopes to carry this exhibit philosophy (reminiscent of John Dewey's educational philosophy) even further.

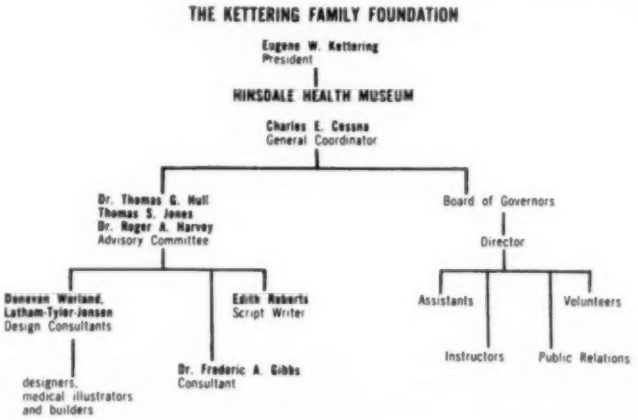
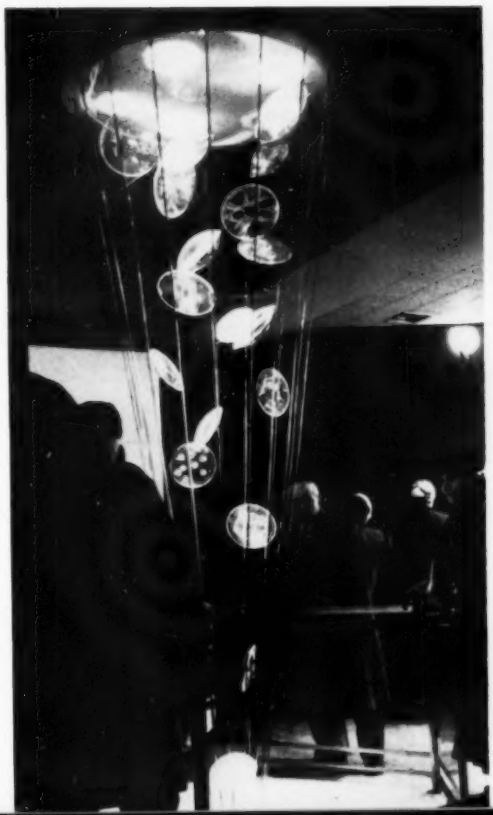


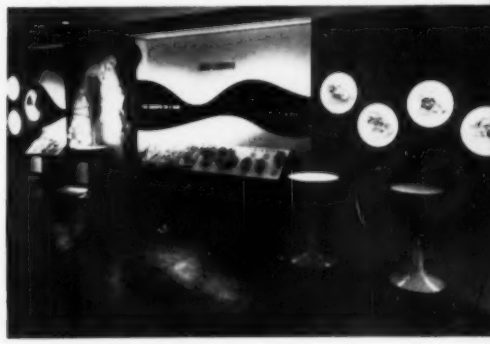
photo: Donald Stebbing

Orange light fades, intensifies, and moves across surface of translucent plastic nerve cells (right) to suggest electrical impulses. Synchronized taped script, heard over earphones on pedestals, has atmospheric background sound suiting the action of the light. Buttons on three-dimensional fiberglass brain are touched with wand to light up, on 7-foot silhouette, parts of nervous system which areas of brain control. Frieze of 15 ages of man is keyed into taped script of memories for each age; figures are illuminated in sequence. Slides of molecules, atoms, and particles flash across large nerve cell at right, to demonstrate brain's facilities for storing memories.

Activated by lever at one side, elastic polyurethane eyeball in eye exhibit (above) distorts to near-sightedness. Viewer then presses button causing corrective lens to bring image on retina back into focus.



Blood cells, muscle cells, nerve cells, (left) are etched in plastic disks suspended inside cone of brass rods. Script is heard over phones or public address system.



Panorama exhibit, Life Begins, uses flesh-colored Dickensen models in rim-lighted shadow boxes. Drums contain copy and/or exhibits on menstrual cycle, the placenta, the menopause.

MUSEUM OF NATURAL HISTORY *develops unique models for exhibits of ideas*

A new exhibit philosophy, based on the desire to present ideas as well as things, will take concrete form in a few years when New York's Museum of Natural History opens its new Hall of the Biology of Man (model, right), first in a series of five new halls now being planned. One of the aims of the new program, explains museum director Albert E. Parr, is to replace the printed label, as far as possible, with three-dimensional explanatory demonstrations. Work on the "new" program, now actually more than 10 years in planning, got underway in earnest in 1953 when John D. Rockefeller, 3rd, donated $95,000 for the project. Dr. Harry L. Shapiro, chairman of the anthropology department and guiding force behind the grand scheme, ultimately plans to complete five halls. Each will be devoted to the study of man: his biology, behavior, social organization, and cultural history. The fifth hall will be devoted specifically to American culture. These halls will depart from the usual approach of the anthropology exhibit, which shows man in his various environments. Instead, explains Dr. Shapiro, they will illustrate broad ideas and such significant anthropological concepts as evolution, the dynamics of population growth, and the nature and variety of status systems. "For the first time, anthropology will be exciting to the visitor, not through the display of exotic objects, but through the revelation of concepts," says Dr. Shapiro.

Explicit vs. implicit exhibits

Dr. Parr contrasts the teaching technique of the new exhibits with that of the plant and animal habitat groups, for which the museum is famous. "The habitat group, when offered by itself," says Dr. Parr, "places too great a demand upon the public, for the educational method of the habitat group is indirect." Since it presents total reconstruction of a scene in nature, in which the many natural laws and scientific principles are implicit rather than explicit, the habitat group's message may be misunderstood or even overlooked by the casual visitor. For this reason, a label or a lecture has always been an essential adjunct. "The museum's new program," says Dr. Parr, "calls for an increased emphasis upon displays of objects or segments of nature removed from their natural surroundings and placed in an artificial arrangement derived from a consideration of some particular natural law, so as to present an explicit visual demonstration of the law's meaning and significance."

The new Hall of North American Forests, completed just last year, combined both exhibition techniques. Habitat groups were devised to illustrate the more important types of forests while explanatory exhibits were used to demonstrate the principles governing the life of the forests and the relationships of forests to man. The Hall of the Biology of Man, which the exhibits department is now designing, will be the museum's first full-scale test of these concepts. It will be divided into three parts, with the first devoted to the concept of human evolution and the relationship of man to other organisms. The second section will describe how man functions as a biological organism, and the third section will present man as a member of a biological group and as an organism within an environment. The completed halls will give a comprehensive three-dimensional interpretation of modern anthropological research, which views man as an integral part of the world around him rather than as something isolated from his environment.

Designers work with curator

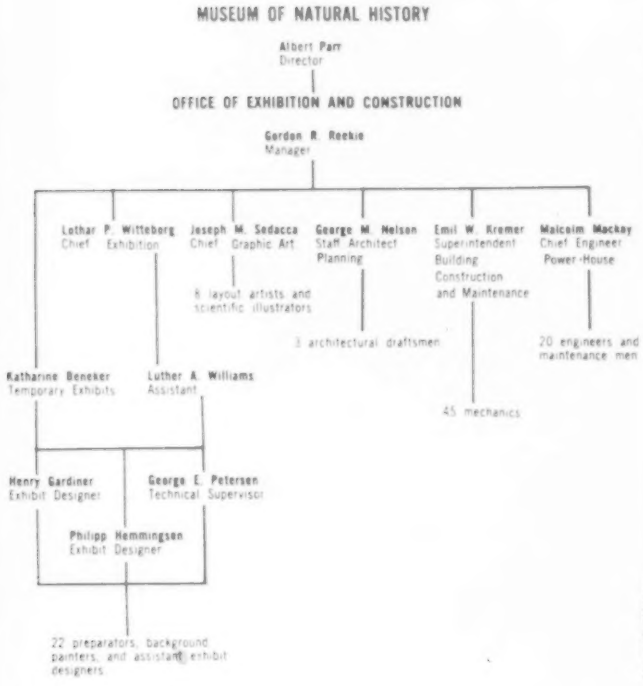
To translate complex ideas about the human organism into three-dimensional exhibits has required the closest cooperation between Dr. Shapiro and the museum's rapidly expanding (over 100 today) Office of Exhibition and Construction, under the management of Gordon Reekie. As soon as Dr. Shapiro had sold the board of trustees on the exhibit script and the Rockefeller gift was received, he called in the exhibits department. Conferences—including Dr. Shapiro, Gordon Reekie, Lothar Witteborg, chief of exhibition, began on how each idea in the script could be rendered. The designers under Witteborg then worked out these suggestions in actual exhibit pieces. Architectural planning for the hall as a whole did not begin until *after* exhibits for an individual section had been completed. Reekie feels that this sequence avoids the predicament of building a hall around a script which then has no relation to the exhibits. Designers actually work with curators and preparators in two waves, explains Dr. Parr. "As architectural designers they plan the entire form of an exhibition hall and the appearance of all its structural elements. As display designers they concern themselves with the arrangement of objects in each exhibit in a suitable milieu of colors and shapes."

Municipal munificance

As work on the new hall progresses, Reekie continues to sit in on all conferences, and watches costs to justify them to the city and to the museum comptroller. But how rapidly work progresses sometimes depends on the vagaries of municipal budgeting. Though partially supported by private donations (last year it received $176,708 in new gifts), the museum depends upon the city for about $2 million a year to maintain the physical plant and essential services, and to pay salaries of mechanics, guards, and teachers. This sometimes means that the building schedule may be tied to the city's budget schedule rather than to an ideal construction schedule. While the city's arrangement with the museum does not permit it to finance new projects, it does

Calvert Vaux designed the museum to look like a great castle, but the central tower and full quadrangle have never been completed. At present it covers 1,015,100 square feet, uses 40 per cent of space for exhibits. U. S. Grant laid cornerstone, 1874.

"Birds of the World" Hall (above) had spacious quality at its opening in 1877, though guests apparently paid scant attention to its monumental but overstuffed cases. (Sixteen years later spaciousness was lost with addition of more cases down center aisle.) Three sections of new Hall of Biology of Man (below)will deal with man's evolution, function and relation to environment, respectively.



Big 100-man exhibit staff includes architects and engineers as well as designers, since construction and maintenance of building comes under its care. Last month's schedule included exhibit work on six halls in addition to the Hall of the Biology of Man.

All photos: Museum of Natural History

Natural History design staff experiments with a variety of exhibit techniques

permit extensive renovation. In this case the city will take care of the $175,000 bill for masonry walls, built-in cases, and lighting; in fact, everything but the modular exhibit panels. The combination of private and public financing can make work scheduling complicated. The Hall of North American Forests, for instance, was financed by 16 separate funds.

Strollers and school children

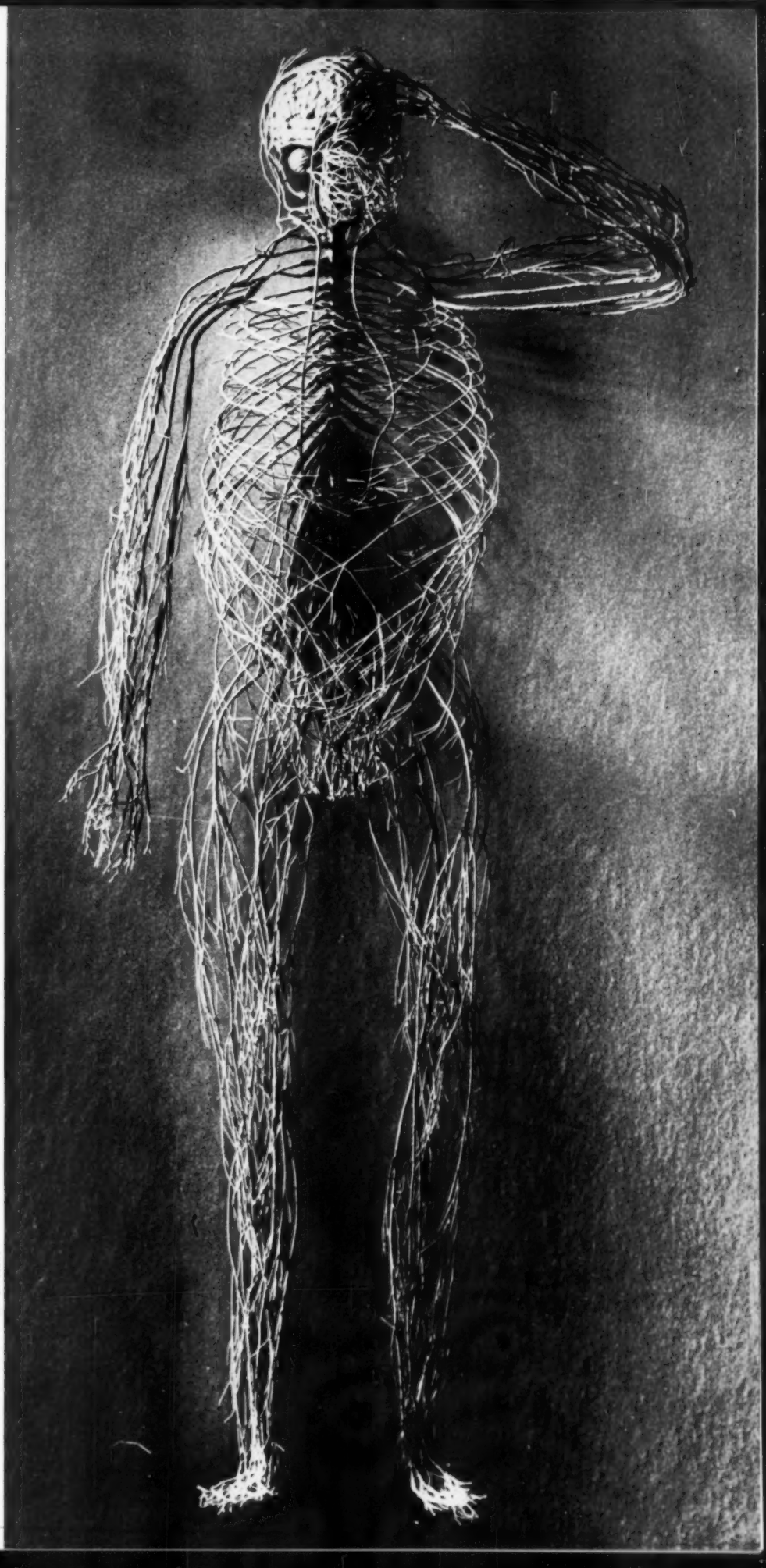
One of the most baffling problems faced by the Museum of Natural History—and by most public museums—is how to appeal to an unspecified audience which may include small school children as well as scholars. The parallel gallery concept (page 30), with study collections for the specialist running off the main exhibit area, is one answer. But Dr. Shapiro hopes he has found another solution in devising each individual exhibit to offer something to all viewers. As an example, Dr. Shapiro cites the nine-foot model of the kidney nephron (right). Because a human kidney is about the size of a small fist and contains something like one million nephrons, an enlargement of this magnitude gives the viewer an unparalleled look at what goes on at the microscopic level of the kidney. The specialist will find this exhibit (based on 25 years of research by a top researcher) interesting because it will allow him to see the functioning of the nephron in a detail that was impossible before. For laymen the model will serve as the introduction to an exhibit which goes on to show how nephrons are grouped in clusters and pyramids to make the complete kidney, which is, itself, illustrated in an enlarged longitudinal section where its architecture may be studied.

New techniques tested

The design group at the museum has also been experimenting extensively with lucite laminations—particularly where they wish to illustrate a variety of activities in a single model. To produce motion the designer superimposes sheets of Lucite on one another—showing successive stages of a cycle of action. By then passing a light source across their edges, he activates them one after another, creating the effect of motion. Thus, a single model (see frontispiece) demonstrates a pulsating heart in all the phases of a complete heart beat, the coordination of the opening and shutting of the valves, and the pumping action by which the heart controls the flow of blood through the body.

Both Dr. Parr and Dr. Shapiro recognize and encourage the need for experiment in exhibit design. They feel that the problems of setting up any given exhibit are apt to be unique and cannot be solved by already established principles. Says Dr. Parr: "The opportunity to experiment is essential."

Greatly enlarged cluster of tiny kidney nephrons (above) show how design staff is developing technique of making models with etched and illuminated Lucite laminations. Preparator (below) works on highly accurate two-foot Lucite globe illustrating the complex structure of a single human cell. Staff is also experimenting with preserving specimens by means of plastic impregnations which retain the specimen's natural size and color.



N. Y. Times

Half-life-size model of human nervous system contains 5,000 feet of wire, took 6 months to prepare with painstaking accuracy. It suggests the linear quality of a Leonard Baskin etching.

"SYMBOLOGY"

High promise, low fulfillment: a review of two conferences on graphic design

typography USA

An advertising man in Shanghai once lamented the state of chicken on the China coast. "It's always promising on the menu," he said, "and you always hope it will be great. But . . . "

A cynic might make a parallel observation in regard to the Big Conference that designers are partial to these days. As in the Hollywood extravaganzas that "have everybody in them" the promise of the cast is almost never fulfilled by the production. The two conferences presented here are, unfortunately, cases in point.

On April Fool's Day, and the day after, the Art Director's Club of New York held its 38th annual exhibition and its fourth communications conference. The conference — which featured communicators from such recondite disciplines as medicine, highway engineering, night club comedy, and religion — was devoted to the exploration of symbols, or to "symbology", which may mean the same thing. It claimed as its *raison d'être* the fact that although we all have access to a vast apparatus of media, in many crucial instances the message is "meaningless and incomprehensible." And it proposed to come to terms with what the conference director described as "the simplest and the most difficult objectives of our time: to find the universal language, a single world-system of symbols, to bring people and nations together after long millennia of separation, suspicion and distrust."

This is a laudable aim, perhaps not wholly in the right direction. Believers as we are in the significance of communication techniques, we nevertheless suspect that much of the separation mentioned above is due to genuine philosophical differences, that much of the suspicion and distrust is grounded in experience.

Often a message is meaningless not because the symbol is an inadequate carrier but because the mind sending it is an inadequate mind. Some messages *are* worthless! Yet it is important — so very important that it needn't be exaggerated — to have more effective, more reliable symbols. What kind will they be, and how do we get them?

We wonder whether the contrived universal symbol is what the art directors of the nation ought really to be working for. (We wonder too whether it is what many of them really care about.) The richest symbols the artist uses draw their life from the concrete world he lives and works in, rather than the abstract world he discusses at conventions. From the first of these he gets tradition, the womb in which the egg finds reason to develop, the atmosphere that lends context to its emergence.

Perhaps, since cultures are different, most symbols must be culturally limited. Perhaps the way to achieve world-wide togetherness (inspired by the *Bulletin of the Atomic Scientists*, of course) is not by fabricating a symbology that transcends all cultures but by developing some understanding of each culture, beginning with our own. This has always been hard, but for people of good will it has always been possible.

Is a conference, however genuinely conceived, the way to make symbols better? Or at least to inspire their enrichment? Certainly not until we learn to make the conference itself an effective instrument of communication. One auditor said of this one, "Any art director who didn't know already what he heard here today has no business practicing" and we think this must be a widespread feeling. On the whole it is not the fault of either the speakers or the planners, but may be attributed to the fact that each of a series of speakers on the same general subject understandably feels obligated to provide more background than discovery (unless they all work out the program together, which *would* make an interesting conference.) And the background presentations are invariably repetitive and elementary.

"Typography—U.S.A.", a forum sponsored by the Type Director's Club of New York, and held on April 18th, was, like the "Symbology" conference, ambitiously conceived, and planned with sincere good intentions and a tremendous amount of work and care. The panel members were so distinguished that if a bomb had gone off under the speaker's platform, the shape of American graphic design would have been substantially changed overnight. No bombs went off.

There were 18 panelists. Now 18 men can form two baseball teams; they can make up four tables of bridge with

two floating kibitzers. But 18 men cannot hold a coherent discussion — they are too many to do it, even if they wanted to. And many of these didn't especially want to. Several were united by the curious alacrity with which they expressed disinterest in the subject. Messrs. Goldsholl, Bass, Golden, and Lionni each said in turn that he was not terribly concerned with typography, U.S.A. "All this talk will not get us anywhere," said Matthew Leibowitz, adding, "this will mark my first and last appearance on a panel." George Krikorian bluntly confessed, "I find it hard as hell to keep interested in what's being said." He went on to admit that some things discussed were interesting — but they were available elsewhere. "Never again," said others privately. It will be interesting to see whether they mean it, for the call to symposia is, like the chicken in China, always a temptation.

One panelist, after not speaking for nearly two hours, was asked a direct question by the moderator. "Well," he said with winning modesty, "I've been so busy doing what you're all talking about that I've never developed much skill in talking about it. I have nothing to say." He didn't speak again. This was an admirable show of candor, but what was he doing on the panel at all? Why didn't he make his protest in a letter of refusal? We suppose he probably did, and a committee with good intentions but bad judgment refused to take no for an answer.

Ironically, this meeting far exceeded most in advance preparation. Each panelist had prepared a statement in answer to a questionnaire about the "new American typography." The statements were collected in a booklet, which was mailed to the anticipated audience. They in turn were invited to mail in questions, some of which were read to the panelists (who already had copies of them). The device was intended to do away with irrelevant excursions. It didn't, but it did do away with spontaneity. The advance statements are all extremely interesting, and many of them are very exciting, and all the material on pages 46 and 47 is taken from the advance booklet. At right is a full lineup of speakers at both conferences, and some excerpts from what they said appear on the next four pages.—*R. S. C.*

Symbology speakers

Rudolf Modley
Consultant to Ford Foundation
Dino Olivetti
President, Olivetti Corporation of America
Dr. Frank C. Laubach
Founder of the World Literacy Movement
Fairfax M. Cone
Foote, Cone & Belding
William G. Eliot, 3rd
Supervising Highway Research Engineer
U. S. Bureau of Public Roads
Domenico Mortellito
Manager, Design and Exhibits
E. I. DuPont de Nemours & Co.
George Nelson, designer
Dr. Irving A. Taylor, psychologist
Marvin P. Halverson
National Council of Churches of Christ
Dr. Felix Marti-Ibanez
Professor of the History of Medicine
New York Medical College
Dr. Frank Stanton
President, CBS

Typography panel

Moderator: Will Burtin, designer
William Golden
Creative Director, CBS tv promotion
Leo Lionni, Art Director, Fortune
Morton Goldsholl, designer
Herbert Roan, designer and educator
Southern Illinois University
Bradbury Thompson, Art Director,
Mademoiselle
Paul Rand, designer
Alvin Eisenman
Typographer, Yale University Press
Lester Beall, designer
Herb Lubalin
Vice-President, Sudler & Hennessey
Louis Dorfsman, Director of Art,
Advertising and Promotion, CBS radio
Gene Federico
Art Director, Douglas D. Simon
Matthew Leibowitz, designer
George Krikorian
Promotion Art Director, Look
Allen E. Hurlburt
Art, Director, Look
Saul Bass, designer
Robert M. Jones
Art Director, RCA Victor records
Ladislav Sutnar, designer

"SYM BOL OGY"

Speakers discuss the forms of communication, the neutrality of tinkling symbols

Mr. Modley: The possibility of a new science of symbology raises a number of questions. For example, is such a science likely to lead to standardization and sameness, and be another step toward conformity and the destruction of creativity? I think the answer can be "no"—provided we plan correctly. The development of the letters of the alphabet into their present standard form has in no way handicapped type designers and typographers. They can be creative within the limits of their medium. More than that, greater knowledge of graphic symbols will enable the artist and designer to use symbols more widely and more creatively than ever before.

Art and science are both ordering activities of the human mind. Art attempts to discern order relationships in nature. Data are set out in recreated sensed forms, and the felt order is expressed in sensible structures exhibiting properties of harmony, rhythm and proportion. The science of symbology will increase the scope of the known and broaden the base from which the artist and designer can create new symbols which have coherence and meaning for the eye and for the mind.

We need symbols which can bring closer to us the newly revealed aspects of nature and the increasingly complex workings of our social and economic world. If symbology is to be a science of symbols, it will depend on the artists and designers to make them a living part of our world. This is the challenge of symbology.

Mr. Olivetti: Symbolization is not only a means of communication among people—which make man a social being—but it is also, and principally, the ability to comprehend the concrete, to sublimate it in abstract form, to synthesize it into a principle which may be used to recreate new forms.

The summation of these processes of the human mind is the progression of man's efforts toward the achievement of perfection. What is applicable to mankind can also be applied to industrial enterprises, because these are actually made up of men, and therefore they act and think as men do. Just as men guide their lives by certain philosophies, so an industrial enterprise is the reflection of a certain industrial philosophy. In the case of the Olivetti company this philosophy is one which implies a strong sense of social responsibility and a profoundly humanistic viewpoint. I think the basis for this viewpoint can be stated as respect for the dignity of human beings.

Mr. Eliot: Perhaps there is some good psychological reason for associating the color red with danger, or, specifically, with a mandate to stop. At any rate, traffic signals throughout the world bring vehicles to a halt when they show red. Green and yellow also have recognized meanings in our traffic signals. This coding of colors probably derives from earlier marine and railroad practice, but the symbolism is none the less artificial. It is only certain sorts of red lights that stop us, of course. We are willing to follow indefinitely the red tail lamp on another automobile, and even to overtake and pass it. To be effective, a traffic signal must be conventional in other respects than color.

There may be something logical in the interpretation of a flashing or intermittent light as something less positive than a fixed light, or of a broken line as less restrictive than a continuous stripe along the highway in keeping vehicles in their assigned lanes of travel. A flashing red light, accordingly, is understood to permit proceeding *after* stopping, and a broken line is only a guide line that has no legally regulatory significance.

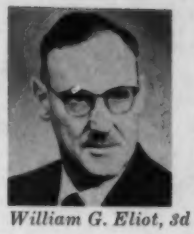
Because of these necessary associations of ideas, symbology on our highways is not a simple thing. It is possible, by mass indoctrination or conditioning, to make any symbol mean what we want it to. Conceivably, we could educate our American drivers to decipher all our signs from, say Chinese characters—which, we are told, are basically pictorial. But the fundamental logic and objective of symbolism is to provide a language that can be universally recognized and understood. To be accepted it must not seem to be something foreign, but rather something indigenous and familiar. If it also has taken root abroad, so much the better.

Mr. Cone: The primary interest of creative advertising people in this field must be in the suggestion of intangible

Rudolf Modley

Dino Olivetti

Fairfax M. Cone



William G. Eliot, 3d

Domenico Mortellito

George Nelson

things, and it is here that our use of symbology has become more and more sophisticated. It is here also that we have run into trouble with the economists and the social scientists, both of whom are apt to tell us that we use symbology with ill-conceived intent. An automobile—filled with the members of a happy family, as a symbol of success is probably the one that pains these people most. And, goodness knows, the pictures of social arrival in various cars have poured forth in profusion. I might add, I suppose, that the profusion has led also to a good deal of unease on the part of the public. The question just now must be whether the big, chromey car is a symbol to associate with, or one to trade down and away from.

The trouble is, that symbols, like everything else in advertising, are bound to be copied. And as they are, their effectiveness sooner or later wears out. But fortunately, in projecting symbols, as elsewhere, the projection counts almost as much as the symbol itself. And this makes it possible for the same basic symbol to appear tired and unappealing, or, through the use of imagination, fresh and convincing. It is not enough that the symbol be recognized. It also must be seen in context and appealingly.

Mr. Mortellito: I am constrained to say *let's stop kidding ourselves.* You in particular Mr. Mortellito, you Mr. Bass, Lubalin, Lionni, and all the rest of us. We would be very vain and false indeed in our integrity as creative practitioners if we thought we were really the child-bearing mothers of corporate images—even if we do help create symbols after the fact. Incidentally, we must not forget that you cannot create a symbol before the fact. (You know the Catholic cross came *after* the crucifixion, the eyeglass sign at the oculist shop came *after* glasses were conceived and made, and the CBS eye came *after* the concept of television.)

Most important, we must not forget that a visual corporate image is not a tangible thing. To begin with, it is the composite (corporate) impression which is conjured up in the minds of a passing, changing public who think in terms of growing, changing, corporate entities. Frankly, when we look at these subjects squarely and honestly as a challenge within the fundamental framework of our designers' abilities, I wonder if we have the courage and the capacity for dealing with it. And, incidentally, you should see what I get in the mail from men who are selling these services.

Today's most important creators of visual symbols and visual corporate images are the artist and industry. The artist and industry have an irresistible affinity for each other. One cannot live very well without the other. Industry needs art, but no less than art needs industry. There have been misunderstandings between the artist and the industrialist, but no more than between industry and government, or the church and politics.

The true modern industrialist is a client-patron representing the power, the money, and the ability to sustain a cultured world. Paradoxically he must visually communicate his identity and thinking, or he perishes.

Mr. Nelson: One thing that intrigues this designer—I've never really thought much about symbols—is that symbols seem to be neutral. Symbols look to me a little like fly paper—if you can think back to that pre-high-technology device—to which various things get stuck, and then the symbol gets to be a real symbol.

For instance, the Washington Monument is nothing but a stripped-down Egyptian Obelisk. They saved a lot of money by eliminating all the carvings that the Egyptians usually put on the sides. But the Washington Monument, quite clearly, has very precise symbolic meanings (we all know what they are) so that people in other countries around the world may know them too. To this stripped-down obelisk somebody attached a series of meanings and now you can't detach this particular obelisk from these meanings; but it could have been something else, presumably, to start with.

The greatest symbol of the Western World, the one that has had the most lasting publicity over the longest time, is the Cross which, again, would be nothing but two crossed sticks if you didn't have a story that went with it which had an appeal to a lot of people. So the Cross, like the Washington Monument, is this completely anonymous, neutral thing, to which certain feelings and ideas are attached.

typo GraPHY USA

Eighteen ways of looking at a questionnaire

William Golden

Leo Lionni *Morton Goldsholl* *Herbert Roan*

Paul Rand

Alvin Eisenman

Bradbury Thompson

Mr. Golden: I don't know what it is that impels so many designers to drop their work to write and speak so much about design. Is it the simple (and perfectly justifiable) instinct for trade promotion? Or have we imported the European propensity for surrounding even the simplest actions with a Gestalt?

Since our professional medium of communication is not verbal, designers don't seem to be lucid writers or speakers—on the subject of design. I have been frequently stimulated by the work of most of the people on this panel, but I have only rarely been stimulated by what they have said about it.

Mr. Lionni: There was a time when we were so fascinated by the expressive possibilities of type that we chose for each subject an appropriate face: a feminine one for a perfume, a masculine one for a machine, etc. It was a little like shifting the tone of our voices to a sudden falsetto when talking about women.

Then, tired of this masquerade, we began to disregard the personality of content altogether. We began to use enormous type to talk about very small things. We piled words onto words in uneasy balance. Fascinated by the cozy titles of the Architectural Review, we pulled out our finest wooden antiques and lovingly fed them into our newest machines. We stultified the fine, light geometry of our best architecture with heavily serifed characters. Today still, most typography looks either consciously playful or clumsily dignified.

Mr. Goldsholl: Typography was born out of a need to communicate. It is a form that expresses something other than itself. As a vehicle, it can not get so involved in its own appearance as to lose its prime function of legibility. Once it does, it passes qualitatively from typography into drawing. Unlike painting, which may be either a vehicle to content, or an expression of paint itself, simply a sensory statement, typography cannot indulge itself to this extent and remain typography. Between this discipline and transition there is a world of invention and expression.

Mr. Roan: In terms of tradition in typography, the question of "The New American Typography," in my view, becomes relatively unimportant. In the light of communication with an ever increasing interrelated world in which space and time have shrunk to an unprecedented dimension, who really cares if we have or have not a "New American Look"?

Mr. Thompson: It is continually important to remain masters of the machine. Most of all it is essential to strive for simple artistic integrity and the idealistic standards that have always been essential in making the printed word useful and pleasing to other people.

Mr. Rand: Good typography, American or otherwise, is not a question of nationality, but of practicality; namely, it is that of resolving the specific problem in adequate formal terms. In the early twenties, when Tschichold wrote his revolutionary book on modern typography, he did not call it German or Swiss or French, he called it simply — *Die Neue Typografie.*

Mr. Eisenman: The difficulty we run into in the absence of a consistent style is that the compositors and other workmen who are responsible for the great bulk of American typography are for the present flying blind—working without a set of organizing principles in the matter of design.

What they need more than another good-design exhibition is a good design manual, and the fact is that there is no such thing published in English today.

Mr. Beall: Retreat to the shelter of traditionalism or sun worship of avant-gardism is neither indicated nor realistic. Tradition is an historical accomplishment that the designer must grow upon and yet apart from. On the other hand, avant-gardism too often suggests an unfeelingness for any factors other than opportunism and "firstness." Furthermore, to categorize typography as traditional, liberal, conservatism or avant-garde is to ignore the overall question of how typographical design can best serve as an acutely sensitive instrument for communication between

Lester Beall

Herb Lubalin

Louis Dorfsman

George Krikorian

Allen Hurlburt

Saul Bass

Will Burtin

Gene Federico

Matthew Leibowitz

Robert M. Jones

Ladislav Sutnar

divergent ideas and divergent peoples. This, then, is the problem and it is a purely personal one for the individual designer. For he, and he alone, must set his own standards.

Mr. Federico: When da Vinci toyed with aeronautics the language did not change nor did the people begin to prepare themselves for space travel; the evolutionary need had not presented itself. Today we *are* preparing ourselves. And tomorrow we begin to sell tickets for quick trips to all points up. What was man's first symbol/word/picture? His latest is unquestionably the punched card—sad future for the "typographic artisan"!

Mr. Burtin: The absence of adequate training has produced a designer in America who uses sketch pad, scissors and rubber cement, but who hardly ever sees the lead of type or sets type himself. With few exceptions, European typographers have developed their ideas right in the composing room and it was mandatory for some time that a graphic designer go through an apprenticeship to enable him to shape a typographical image with his own hands. Something can be said in defense of our methods, inasmuch as photo lettering and photo composition have made significant inroads. However, the absence of a thorough training period in the development of a designer often results in a flippant attitude towards the craft and the skill of type handling. Most of all, it prevents the gradual ripening of knowledge of the practice and theory of communicative design which forms the basis of professional integrity.

Mr. Lubalin: I feel that now, for the first time we have emerged with typography that is distinctly American and which is contributing its influence to the world.

Mr. Dorfsman: The inventions of type and printing must surely be ranked among man's greatest. Yet the widespread communication of political, scientific, and philosophic thought have not prevented—and may, in fact, have even played a part in bringing us toward—our present period of absolute danger. If typography, as a tool of communication, is to continue to play a crucial role in man's affairs, it would be more than acceptable to everyone if through this instrument a solution might be found—and never mind the type face, or what the margins look like.

Mr. Leibowitz: If the designer is true to his instincts, the design and typography of his concepts will automatically fulfill the standard of excellence for which he is retained.

Mr. Krikorian: I really don't know if there is a "Typography, U.S.A.," or a "Typography, Sweden," or a "Typography, Bulgaria." If there should be, I feel most designers would ignore them. I rather think that in their work, they consider a particular type as a result of their planning, and don't give a damn where it's from, how it's presently being used, and who is using it.

Mr. Hurlburt: Like the automotive stylist, we are all frequently trying too hard to be different together, creating shallow style that can have little lasting effect on the mainstream of typographic design.

Mr. Bass: While one defends the unquestioned rights of creative expression against conservatism, it is important to make clear that these rights can be understood only if they are regarded in terms of an entire cultural heritage.

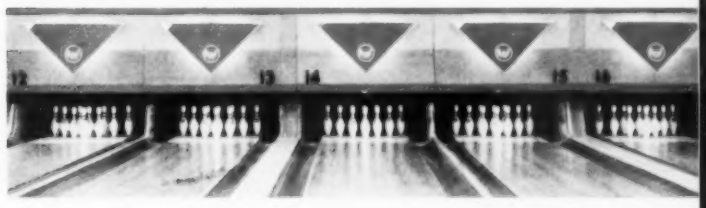
Mr. Jones: The effort of the graphic designer is insufficient to establish a "national" typography. It will take concerted action on the part of type designers, type founders, trade schools, the working compositors and printers.

Mr. Sutnar: In his book, *Vision in Motion* (1947) Moholy-Nagy devotes an entire chapter to discussing the idea that "designing is not a profession but an attitude." In recent years sincere efforts in espousing the original meaning of the new typography, with its endeavor to create lasting values, have been hampered by blurred imitations; advertising stunts have ridiculed the moral forces behind the movement. But the new typography could not be stopped.

NEW AMF EQUIPMENT SYMBOLIZES BOWLING'S SEARCH FOR STATUS

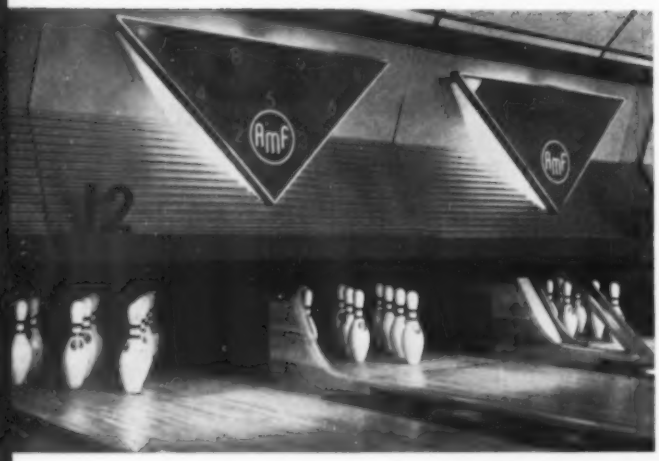
Bowling is a sport that—in one guise or another—has been around for centuries, a span of time long enough to establish a following and a reputation. Though this following and reputation have not always been good, it is unlikely that they have ever been better than they are at present. Anyone who drives along any highway that cuts through concentrated suburbia must be aware that the bowling alley, which ten years ago was allied with the poolhall, has acquired a new personality, a new kind of patronage—what old-time bowlers would call "class." All of this is symbolized in a new line of bowling equipment just completed by Henry Dreyfuss for AMF Pinspotters, Inc. (a division of American Machine & Foundry), the firm whose major product, an automatic pinsetting machine called a Pinspotter, is one of two influences chiefly responsible for what has happened to bowling. The other influence is women.

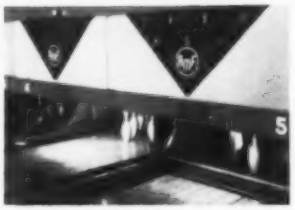
Seven years ago when AMF put its first Pinspotter on the market, the average bowling alley was an 8-lane affair, frequently in grubby surroundings, and always bedeviled by



a constant labor problem—the erratic, part-time pinboy. Today it is a palatial establishment running sometimes to 60 lanes, offering its patrons round-the-clock bowling and such creature comforts as air conditioning, luminous ceilings, wall-to-wall carpeting, locker rooms, restaurants and bars, and nurseries with full-time baby sitters. The last is a concession to bowling's newest clientele—6 million women.

AMF's machine, which started it all, is a complicated assemblage of rods, cams and gears that looks like something from a mad-scientist movie. Its electronic brain controls a jungle of conveyor belts, racks, bars and flashing lights, coordinated to 1) sweep away and replace fallen pins, 2) return the ball to the bowler via an underground passage, and 3) tell him what pins he has knocked down, by means of illuminated numbers and other symbols on a triangular Pindicator above his target. The first Pindicator was designed by Dreyfuss in 1951, when AMF went into the bowling business. The Pinspotter is still the heart of the AMF line, but its success led to lucrative additions. In a very short time, the firm was also supplying bowling equipment and accessories, as well as installing the lanes (these it marketed as outright sales, but the Pinspotter was, and continues to be, marketed on a rental basis.) AMF engineers worked constantly to keep abreast of bowling's growing prestige with refinements and improvements. But gradual changes were not enough—for one thing, AMF's stiffest competition, Brunswick-Balke-Collender, was acutely design-conscious. In 1956, AMF approached Dreyfuss and, under wraps of great secrecy, commissioned him to completely re-design the entire AMF line. The final result, now in pro-





New Pindicator (above) is three-dimensional in contrast to linear quality of old Pindicator (right). Triangular shields float in front of angled back panels, and are set off by diffused side lighting. Top of back panel is mat gray, bottom is gilded, corrugated steel.

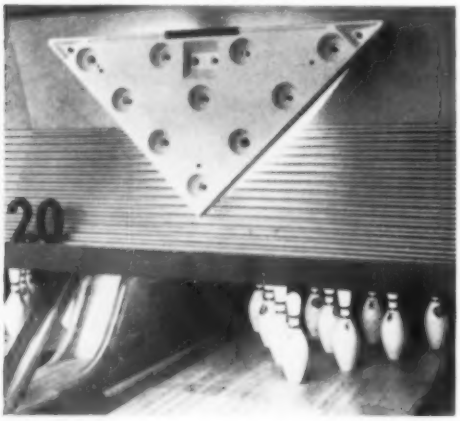
duction, was the collaborative effort of six key men. Dreyfuss himself, Robert Hose, partner responsible for the AMF account, and Tom Brendgord, job-captain, worked in New York and on-site with AMF engineers at the Pinspotters plant in Shelby, Ohio. Frank Downey, President of AMF Pinspotters, Inc., Fred Madeo, sales vice president, John Ernst, the division's director of operations, and Harold Jones, manager of engineering, were AMF's representatives.

Dreyfuss considers the new Pindicator to be the nucleus of the three-year assignment, since it is the focal point of the bowler's attention and therefore sets the pace for the design of the other items in the bowling alley. The old Pindicator was two-dimensional—the scoring triangles lay flat against the wall—and its illuminated numerals sometimes transmitted light unevenly and were difficult to read. The new Pindicator corrects this readability limitation and sets the motif for the line: a light, crisp look directed at the alley's new quality-folk customers. In the new Pindicator, the triangles and their background panel read as separate elements in three dimensions. The panel, in effect, is creased along the middle, forming two slanting surfaces, with the triangle floating before them in an aureole of light. The top plane of the angled background panel is light gray mat-finish enameled steel; the bottom plane is corrugated steel painted gold. The source of the diffused light is hidden between the triangle and the background panel to protect the bowler's eyes from distracting glare.

Legibility studies on numerals

The design of the triangle itself also centers on the problem of light, specifically on the tendency of internally-lit numerals to irradiate and transmit a fuzzy image. Dreyfuss experimented with a variety of forms, heights, and stroke widths to arrive at the final numerals: thin, crisp lines which permit just enough light to pass through to create a readable but unobtrusive scoreboard. Besides this improvement in readability, the Pindicator has a new backplate which simplifies assembly. It is a vacuum-molded polystyrene unit with integrally formed cups for light sockets; until AMF engineers conceived this new light holder, these cups were made in a separate operation and attached one by one.

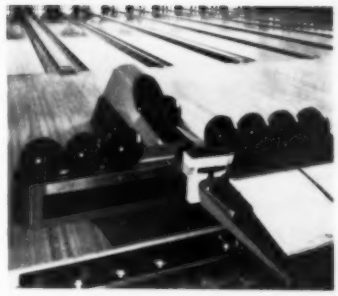
Backplate with integral cups for light bulbs is vacuum-molded from polystyrene; previous Pindicator had separate backplate and cups, and the latter had to be attached individually.



To bowlers, the most striking innovation in the new Pinspotter line is the "Magic Circle," a revolving turntable onto which the balls roll as they come up from the return trough. The "lazy Susan" principle of the Magic Circle was a late development. Most pieces of the new equipment were pretty close to final form by last summer, but the idea for the Magic Circle had occurred only a few months before. Both staffs, however—AMF's and Dreyfuss'—thought it an important enough development to justify a crash program to have the new ball return ready for this year's American Bowling Congress tournament which opened in February.

Not only does the Magic Circle literally turn on itself; it is also the pivotal element of the entire ball return unit which now, for the first time, includes the scoring table as an integral part. In the previous AMF equipment returning balls rolled onto a long transverse rack butted onto the end of the ball return. This T-bar was not completely satis-

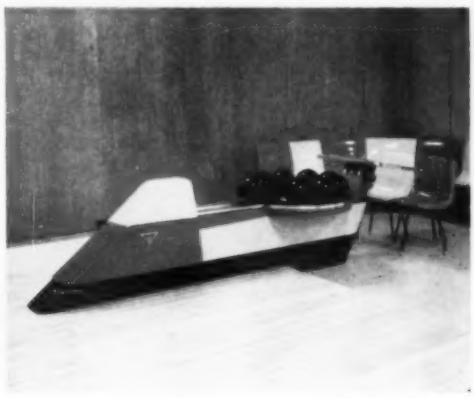
"Magic Circle" ball-rest (above) turns around stationary hub containing hand-dryer. Trough is stainless steel with black vinyl bumper; underside is heavily coated with sound-deadening compound.



Old T-bar ball-rest (above) now supplanted by "Magic Circle," required bowlers to walk into adjoining lanes to collect returning balls.

Curved-front scoring table (below) has a 10-degree pitch to discourage bowlers from bringing drinks into playing area (spills cause falls).

New housing for ball-return hood is fiber glass reinforced plastic sections bolted together along internal flanges so that no hardware shows and replacement of damaged sections is simplified.



Hand dryer in center of turntable has push-button control, red "on" light; it also contains new triangular insignia in See-Deep plastic.

Settee for players is assembled from individual seat units, audience version is a series of separate shells. Player seating has additional molded back section for structural strength. Both have same base.

Seats and lockers can be assembled in alternating colors, the ball gets cleaned under a plastic dome

Canted-front lockers have gasket edges to cut down noise; floor is recessed to keep ball from rolling out. Locker's key is its knob, eliminating any protruding hardware.

Ball-cleaner's Plexiglas dome must be closed for safety before motor turns on. Its shape is compatible with spinning ball inside.

factory since it required players, if the ball landed on the wrong arm of the T, to cross over to the adjacent lane to collect their balls. But it did have a reason for being: the T-return, unlike previous ball returns, received the balls from an underground track and stored them at the rear of the players' area. The balls were no longer lined up at the bowler's side, but moved back from the service line, adding vital elbow room and eliminating the noise and visual distraction of balls racing back and bumping together nearby. The Magic Circle grew out of this T-bar in a series of neatly logical steps. In the first study drawings the bar is shortened and has a double rack, taking two rows of balls. Later on, a similar conformation has rounded corners. Finally, the completely circular form emerged, and with it, the turntable idea. Wherever the ball lands on the Magic Circle, the bowler can walk up and swing the turntable around till his ball is within reach.

This led to a further innovation. Since the bowler no longer needed to walk around the ball return if his ball landed out of reach, the old, free-standing scoring table could be tacked on behind the turntable. The ball return and scoring table could become one unit, giving the bowler space behind him, as the old T-return had given him more lateral space.

The hub of the turntable is a blower-operated hand dryer, placed where the bowler can use it as he reaches for the ball. This is a light blue, See-Deep disk, perforated, containing a red pushbutton that lights up to indicate "on," plus the new insignia designed for the line—the AMF bullseye in a red triangle. The Magic Circle itself is stainless steel with a black vinyl bumper; it is thickly coated on the underside with an acoustical compound.

Small but significant detail

One other AMF-designed engineering detail played a significant part in the decision to attach the scoring table to the end of the Magic Circle. This is a new ball-check—a device, as its name implies, for checking the speed of the returning ball as it comes up out of the hood. The previous ball-check was hydraulically operated: sometimes the mechanism failed, the returning ball slammed into the other balls and occasionally dropped to the floor. The new, safer, quieter ball-check is a small, motor driven rubber tire recessed in the ball return trough just inside the hood opening; it turns in slow counter-motion to the direction of the ball, which is caught between the wheel and a taut strap. The ball's velocity is checked momentarily to zero, then the wheel eases the ball down the short stretch to the turntable.

The scoring table, now attached to the end of the ball-return, has curving front and back edges and flaring sides, but its shape, according to Dreyfuss, is only incidentally an echo of the Magic Circle. The curved front is primarily designed to accommodate two scorekeepers for two adjoining lanes and, at the same time, to separate them psychologically by seating them at opposing angles.

The hood element that completes this integrated ball return unit is fiber glass reinforced plastic, rather than the wood and metal of which early bowling equipment was constructed. The reason for the change: the plastic will neither dent nor chip if kicked or hit with a bowling ball. And if it is damaged it can be replaced much more easily than the older materials, for Dreyfuss has designed the housing in component parts which bolt together along hidden inner flanges. The parts are molded by the hand lay-up method, a process that results in a smoother, more wear-resistant finish. The player seating—large J-shaped settees—is formed in the same way for the same reason, but the seating for the audience—individually pallette seats—is match-molded, less expensive to produce, with a finish that shows the fibers, unlike the high-gloss, gel-coat surface of the hand lay-up product. All of these plastic elements—the seat shells and the hood components—are in the standard AMF colors of light gray and aqua, but besides this stock-order scheme Dreyfuss has suggested seven custom colors for special-order combination: flame red, medium blue, dark gray, pumpkin, turquoise, jade, and cocoa. Theoretically any combination of these can be ordered, but since the results could be pretty wild, Dreyfuss has suggested to AMF that it advise its customers to use the light gray as a constant, with the stronger colors as accent. The special-order color schemes will cost slightly more, and will involve a slightly longer delivery time.

Both types of seating are mounted on an identical base, but the shells of each are different. The player seats are molded individually but are designed to be butted together in one continuous settee. The audience seats, however, have contoured sides and are mounted as individual units—on the theory that there is less camaraderie among the watchers than among the participants. Both types are contoured in accordance with the Dreyfuss human engineering studies and the apron edge used on both shells is partly a point of conformance with these studies, partly a structural element. The softly curving apron provides a more comfortable edge for the human leg to rest against than the straight-edged shell does. Also, in testing straight-edged shells, the Dreyfuss office found that the back eventually splits into a V at the point where the seat curves up into the back. So will the apron—punished sufficiently—but it does add an extra margin of strength to the edge of the seat.

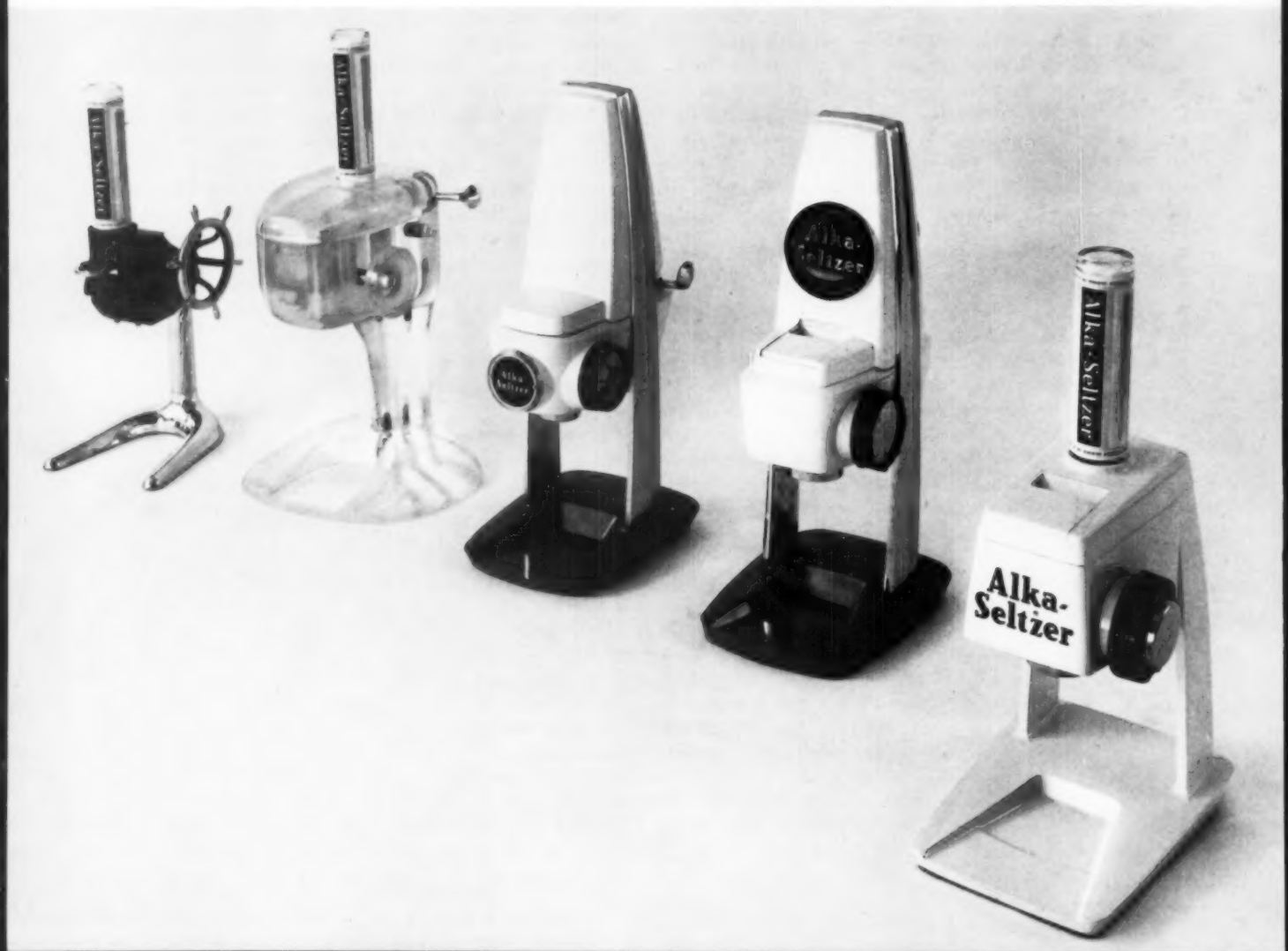
Besides these major items of equipment the new AMF line also includes such accessory items as a mobile ball storage rack, a bank of lockers subject to the same color combinations as the seating and ball-return, and a re-designed ball cleaner that encloses a prosaic operation in a big Plexiglas dome. The locker units have canted fronts that en masse create an undulating surface pattern. Knobs and handles have been eliminated to preserve the integrity of the surface, and the key itself opens the door. The ball-cleaner, contrary to the inference of the bubble dome, uses no water—the ball is cleaned and polished by brushes. The ball-cleaner's function is not only practical, but ceremonial: the sphere, as a symbol of perfection, has to be kept that way. In bowling's New Order, possibly the polishing of a ball is a substitute for the poolhall boys' incantations—B.D.

Believing that design might relieve some company headaches, Miles Laboratories retained the South Pasadena firm of Henry Keck Associates to design and engineer a new headache-remedy counter dispenser, described here in a case study.

DESIGNER'S CASE STUDY: A NEW COUNTER DISPENSER

By HENRY KECK

Left to right: old dispenser; Lucite model housing grinder; first wood model; test prototype; new dispenser.



Partners Henry Keck (standing) and Burnie M. Craig discuss proposed design changes after testing of prototypes.

Thomas K. Hale, of HKA, examines one of 200 preliminary production units while Keck discusses costs with manufacturer.

Early in 1955, Henry Keck Associates was approached by the Miles California Company, a subsidiary of Miles Laboratories, to consider the redesign of a tablet dispenser for Alka-Seltzer. This is a drug store merchandising device that operates like this: A bottle of tablets is screwed into the top. A fingertip-actuated slide extends below the bottle, and its forward movement delivers a tablet into the grinder. Turning a side knob rotates the grinder, and the freshly pulverized tablet drops into a glass of water below.

On previous machines the grinding mechanism had been a real problem. After short use it became clogged with Alka-Seltzer, and many druggists scrapped the clogged dispensers, rather than return them to Miles for repair or replacement. So the company was understandably reluctant to embark on a new design until it was assured of a foolproof grinding mechanism. By the time they came to us, they had one—in the form of a very unusual self-cleaning mechanism developed by the Hansen-Lynn Company of Burbank.

Following the basic design established for the grinder (second from left, opposite) HKA prepared a series of study designs for review with Miles Laboratories and Hansen-Lynn. On the basis of these early designs, Miles management decided to use HKA for the complete product engineering as well as for the appearance design, and they asked us to work directly with Miles Laboratories in Elkhart, Indiana and with Hansen-Lynn.

Our goal was a design that would stand out at the soda fountain by virtue of well-proportioned simplicity rather than dazzling display. After studying a number of possibilities, we centered on a two-legged design (third from left, opposite) which had a light yet sturdy effect, and would not obstruct vision if used on the front counter.

After client approval, we had an outstanding model shop —one of several we use—make an accurate wood and plastic appearance model. (Before this we had made several three-dimensional studies in our office, using balsa wood and modeling clay. Since then, our own model-making facilities have been greatly enlarged, and if we were doing the job now we would do much more model-making in our own shop. It has become for us an increasingly important design tool.)

Although when shown in Elkhart the model was generally approved, there were some objections. One was that the flush turning knob was hard for a moist-fingered soda clerk to grip; another was that the name, attractive at close range, was too small to be seen easily on the back counter.

In the middle of one of the Elkhart meetings, my partner, Burnie Craig, telephoned from Pasadena with a technical improvement—an idea for simplifying the release lever mechanism. Since the idea—replacing the lever with a finger-indented front slide—meant a major breakthrough in simplified operation and cost reduction, because of fewer parts, it was enthusiastically received by everyone at the meeting (the president, the executive vice president, and the chief engineer were there) and we decided to have a working appearance model made, incorporating the new feature. Such a model would take careful planning, since a lot of the parts were going to be plastic or die-cast in actual production. We suggested the substitution of vacuum formed parts for the plastic housing and a sand casting for the die-cast part. Once the model was properly buffed and fitted, it was difficult to distinguish it from a production item.

We tested the model for several weeks in the lobby of the main Alka-Seltzer plant, and it looked good and worked well, confirming our belief in the design approach. However we couldn't recommend production tooling until we had tested

Top: HKA designers Howard Miller (left) and Norman Roe (right) work with original dispenser at early stage of design project. Center: at staff meeting, Thomas Hale (left) and Paul Harrison (right) deal with slide problem on working-appearance model. Harrison is a mechanical engineer. Below: At Hansen-Lynn plant chief engineer John Curtin (left) and engineer Heinrich Hueldon (right) inspect dispensers.

it under the many varying climatic conditions it would be subject to in use. We believed that the only practical way to do this was to have a number of production prototypes made with actual tooling and, with the cooperation of Miles executives, we decided to produce fifty of them with tooling designed for low production. We prepared detailed drawings and worked closely with Hansen-Lynn in procuring bids and recommending vendors for various parts. Production took several months, but it was worth it. The prototypes were shipped to both foreign and domestic "testing grounds," the toughest of which was Hilo, Hawaii—one of the most humid spots on earth. The dispenser worked perfectly there, although some tablets were slightly enlarged from moisture.

Six months of testing proved that the mechanism was sound and that parts produced with low-production tooling would work for long periods without failure. But there were two major points brought out—one in merchandising, the other in cost. We discovered that our design, which enclosed the bottle and featured the logotype in a large, red bull's eye, did not adequately identify the product. Miles salesmen and drug store managers felt that the Alka-Seltzer bottle and label should be more in evidence since customers were already familiar with them. Also we found that it was desirable to aim at cost reduction even while effecting appearance features as desired, and we were relieved to find that an appearance change could be considered without obsoleting high-production tooling or a large inventory of parts, which could have cost hundreds of thousands of dollars.

Again we made a wood mockup and, after its approval, we prepared final engineering drawings, which Hansen-Lynn used in getting bids. A pilot run of 200 units enabled us to make further tests throughout the United States, and to correct a few minor errors in mold and die design. Early this year, full-scale production began, and our part of the program was complete—but not quite, for Miles Laboratories has asked us to make periodic quality checks and to analyze any additional changes requested.

Here are some of the details:

The knob required careful detailing to provide adequate gripping without looking like an ungainly appendage. We placed it slightly outboard of the main body so that fingers could reach around it and also obtain friction from deep indentions. For slight embellishment, we placed a stainless steel insert in the knob with peripheral directional arrows. The knob is molded of Forticel (cellulose propionate), which takes an excellent finish and has high impact resistance.

The heart of the design problem was to achieve adequate product identity for the unit. Since the problem was heightened by the usual viewing distance—6 to 10 feet—and the competition of adjacent products on the soda fountain counter, we emblazoned the words "Alka-Seltzer" in type as large as possible. We considered using 3-dimensional plastic or raised letters on the die casting, but there were drawbacks. For example, the raised letters on the die casting would have required an extra core in the die and would have left the imprint of the core's edge on the housing front

face, and sanitation would have been a problem. The 3-dimensional plastic, in addition to its high cost, would have introduced cracks where dirt could collect either if it were flush or attached to the front of the housing. On a unit such as this, subject to unusual abuse, any such cracks would have been intolerable. We used a paint highly resistant to strong detergents, with lettering silk-screened onto the front.

For the die-cast base and upper housing, we considered satin chrome plating which we felt would have been very attractive, but discarded this idea for two reasons: cost, and the unsightly appearance of chrome when finger-marked. We finally selected an off-white baked enamel finish, which has good abrasion resistance and hiding power, and gives a very clean look to the dispenser.

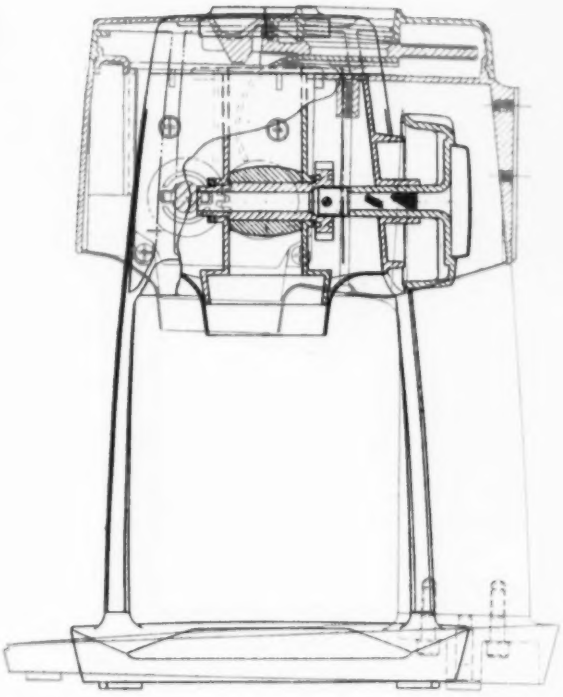
A small well was provided in the dispenser base so that clerks can, without looking, place any of several different sizes of glasses into the well, and the glass is automatically centered under the stainless steel funnel.

Because of the great turnover in drugstore help, it was imperative to equip the dispenser with adequate instructions for operating and cleaning. To achieve this end without disturbing the clean exterior appearance, we placed the cleaning instructions on the underside of the bottle holder. Operating instructions—printed on self-adhesive foil—were placed on the top of the die-cast housing and are readily visible when the bottle holder is removed.

After considering many materials, we specified injection-molded nylon for the roller housing and drive gears with integral shaft. Nylon is ideal for the housing since it has high abrasion resistance and will resist wear from the thousands of Alka-Seltzer tablets sliding over it and down the chute to the grinders. The molded nylon gears are self-lubricating, extremely tough, and have enough elasticity to permit the drive pin from the knob to be inserted and removed by snap-in action hundreds of times without failure. If anything goes wrong in the field with the roller housing and the enclosed grinding mechanism, the entire assembly can be replaced by the salesman in a few seconds.

Bottle holder and tablet slide are injection-molded of cellulose propionate plastic, chosen because of its lustrous surface finish, ease of molding, and high impact resistance. In operation, the slide at the front of the machine is pulled forward and, as this is done, the operator can see the Alka-Seltzer tablet slide into the grinding chamber. Under the slide, below the bottle, we designed a special cover, with upward spring tension, which seals off the unused tablets.

Ease of assembly and efficient shipping have substantially helped reduce overall costs. Assembly of the base and upper housing is accomplished with five screws—four to hold the base to the upper housing and one to hold the stainless steel funnel to the bottom of the upper housing. Assembly of the mechanical core of the unit is equally simple. Molded-in hexagon sockets prevent nuts from turning as the assembly is screwed together. The bottle holder assembly is achieved with equal speed, and consists of the attachment of two springs and two screws to hold the parts together.



Photograph above of dispenser in use at drugstore soda fountain points up crowding and lack of shelf space which dictated some design features.

The three lemons taken suspiciously by the child above are housed in a tray vacuum-formed of .005 polyvinyl chloride. *(See page 64)*

AMA's 1959 PACKAGING EXPOSITION

by WALTER STERN
Technical director of packaging and graphics, Raymond Loewy Associates

This year's show is characterized by the imaginative exploitation of earlier developments, and by the exploration in depth of papers, films, and foils, with new processes for seven-color printing on wet-strength board lamination, and new automatic and semi-automatic machinery.

Last year a rather bumpy trip on a DC-7 brought us to Chicago to cover the 1958 Packaging Show. This year we arrived in Chicago by Prop-Jet Electra and returned by pure jet. The much faster, more reliable flight with the same scalding coffee and uncomfortable seats, at slightly increased cost, proved to be an apt symbol of what had happened to packaging processes in one year.

The American Management Association's 28th National Packaging Exposition again, as in previous years, was visited by more than 28,000 people; and in number of exhibitors of new packaging techniques and designs, new materials and methods, and the latest in packaging machinery, it proved to be the largest AMA Packaging Show ever organized.

Generally speaking, however, while it presented a multitude of ventures into new territory, the emphasis was not so much on research and development as on exploration in depth of last year's developments, adaptation to specific industrial requirements, and increases in production speed. Perfection of laboratory and pilot processes, and exploitation of previously established ideas, rather than "breakthroughs," sum up the mode of progress in packaging during 1958 and early 1959.

Both exhibits and packaging seminars concentrated largely on the American Housewife and on supermarket and variety store distribution and sales requirements. The continuing phenomenal growth of self-service selling was reflected in emphasis on new techniques and designs and in the presentation of new materials intended to attract customers' attention in self-service outlets. Contrary to last year's experience, which gave us the feeling that the paper board industry seemed to have made few significant advances as compared to the many brilliant developments in foils and plastics, this year's exhibit showed growing use of quality papers, films, and foils in approximately equal extent and depth. Here are some of the significant developments we saw:

This year's exhibit of the Vaculite Corporation of Hamilton, Ohio, showed progress in the use of vacuum-deposited aluminum powders in metallized papers, and demonstrated the materials' versatility by showing production samples

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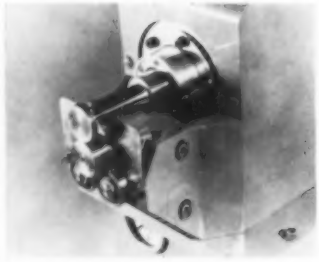

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now in commercial distribution. While certain papers carrying a vacuum deposition of an aluminum coating approximately 4 to 5 millionths of an inch thick (or approximately 1/65 as thick as .00035 inch aluminum foil) are said to compete in appearance with aluminum foil, the base material used by the Bressler Ice Cream Company in printed, embossed bags for chocolate-covered ice cream bars is glassine, which is apparently the only material of unlimited availability at present.

The possibilities of metallized glassine were demonstrated by Vaculite in the form of bags, embossed sheets, and single-faced corrugated trays and disks. The company furnished some interesting technical factors indicating impressive possibilities: compared to a typical lamination of aluminum foil and tissue, which might be made up of approximately 15 pounds of foil and 13 pounds of tissue, Vaculite metallized glassine of the same approximate weight would be 28 pounds of paper with less than .5 of a pound of metal. The savings are obvious.

Bressler, which had an opportunity to compare the vacuum-metallized bags in production performance with previously used laminated foil bags, states that they show at least 70 per cent less waste during bagging, handle more easily, and show less blocking. Other bag customers are said to have found that metallized glassine bags increase total output over 50 per cent with resultant manpower savings.

Metallizing apparently reduces susceptibility to moisture vapor penetration considerably; for example the 22-pound metallized glassine developed an MVT rate in the range of less than .5 to 2 grams per 100 square inches per 24 hours at 50 per cent relative humidity. This represents an improvement over the resistance of the raw glassine of approximately 40-to-60 per cent. Additional advantages are an infrared reflectancy of this product (based on tests conducted at the Massachusetts Institute of Technology) of 84 and 85 per cent or an equivalent of .14 emissivity rating. This seems to indicate thermal-protection potential.

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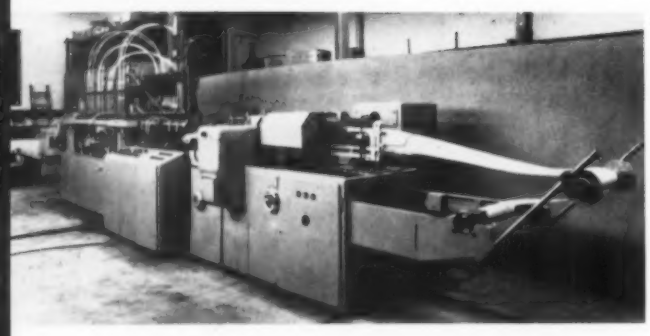

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From "blue sky" to profit

In the field of flexible and rigid aluminum foil containers, this year's show demonstrates how some of the advances have progressed from "blue sky" prototype development, intended mainly as show-stoppers, into a realistic and profitable phase. Ekco-Alcoa Containers, Inc., for instance, has made considerable progress in the hermetic foil and unit packaging field, and has developed acceptable filling and top sealing units for both package types (1, 2). A typical commercial application of this portion-control container is Smucker's single-service jelly package now manufactured in

Orrville, Ohio, for institutional and transportation serving.

Both Reynolds Metals Company and the several divisions of the American Can Company have also made considerable progress in the field of aluminum foil application to supermarket and variety store marketing. For example, as a result of the tremendous acceleration in the growth of new aluminum packaging applications in recent years, Reynolds developed a complete line of "Reycon" packaging machines for handling and closing rigid aluminum foil containers and other forms of foil packaging. Reynolds Metals and Hayssen Manufacturing Company jointly developed the new "Reycon Tuck Wrap" machine, which automatically positions and crimps aluminum foil covers on frozen dinner trays, pot pie pans, etc. Reynolds mentioned that 10 food processors have already installed models of the machine, and that several others plan to do so in the next two or three months.

In addition, Reynolds developed an aluminum foil vacuum container for luncheon meats and dairy products, a boilable "pillow pack" for baby foods, a boilable food package for pre-blocked frozen vegetables, and a cook-in foil carton for prepared vegetables and meats. Four new frozen food entrees in boilable aluminum foil bags are being marketed by Excelsior Quick Frosted Meat Products Company of Long Island City, New York. One of the principal advantages of packaging in this fashion is said to be greater vitamin and flavor retention, cooking and serving convenience. As far as price is concerned, the bag is apparently competitive with bags made from films (3).

Beer, oil, and cheese

The American Can Company showed impact-extruded aluminum cans, and as part of the exhibit demonstrated an operating model of an extrusion press turning out rigid aluminum forms similar to those used commercially for pencils, butane lighter fuel, small aerosols, and other products. Recent developments in this process, which has been used commercially in Europe for a number of years, include aluminum beer cans, being made in Hawaii and in Golden, Colorado, as well as two types of cheese containers contemplated by the Kraft Foods Company. In addition, test programs have been pursued during the last two years by two major oil companies. At present, for instance, all of Esso's East Coast production of quart-packaged motor oil for domestic use is shipped in aluminum. For the current year, cans are being made by Crown Cork and Seal Company and National Can Company. Apparently one of the principal difficulties encountered by the aluminum industry in developing this market is the extreme difficulty of proving that the material's advantages far outweigh its higher cost when it comes to meeting the serious competition of tin plate.

In the field of aluminum foil packaging, Sonobond Corporation, a subsidiary of Aero Projects Inc. of Westchester, Pennsylvania, exhibited equipment for continuous high speed ultrasonic welding for practical production operations. This equipment is made by them in several basic designs. In the "Sonoweld" unit shown here, (4) the material passes between two rollers. The upper one is the active welding tip which delivers the ultrasonic energy; the lower, in this case, is inactive and is used only as a means to support the work piece. Both rollers are powered and turned at the correct rpm to provide the desired traversing speed for the sheets being welded.

The welders are produced in various sizes, types, and power capacities for handling the thinnest of foil, as well as sheet material. Ultrasonic energy is applied continuously, and produces a pressure-tight, truly continuous seam weld. Examination of a number of samples closed with welding of this type indicated helium leak rates per inch of seam far less than the detection limit of the test apparatus (6×10^{-9} cc p. sec.). Joint efficiencies of high structural integrity (90 per cent or more) have been achieved, and apparently it is possible to weld thin metal foils not only to other thin metal foils, but also to heavier materials. At the same time, since ultrasonic welding is accomplished without fusion, combinations of dissimilar metals can be welded to each other without formation of inner metallic compounds.

One of the disadvantages of this process appears to be the facts that only unmounted foil can be welded to unmounted foil, or that adhesions can be achieved only on foil-to-foil surface positions. This disadvantage was brought out rather drastically, if inadvertently, by the fact that samples of ultrasonically welded foil were passed out to prospective customers in a neat paper-foil laminated envelope, which was formed and closed by use of conventional adhesives.

American Can Company also showed a combination metal-paper "piggy-back-pak," designed to merchandise "go-together" foods and help further the convenience of supermarket shopping (5). This package consists of two containers that snap together, half of the package being American Can's new string-opening container with paper body and metal end, the other being a sealed, sanitary-type metal can with a special end that snaps into a recessed end on the paper container. Though developed for the packaging of biscuit dough, the string opening paper container, in combination with the snap-type metal can, is expected to open new areas of both food and non-food merchandising. For example, pizza dough, spaghetti, or biscuits can be packed in the string opening container, while items such as pizza topping,

tomato sauce or creamed chicken can be packed in the accompanying "piggy-back" can. It was also pointed out that any combination of a dry or moist product could be packed with a liquid product, giving packers dozens of possible commodity combinations. The presently produced container has an overall length of $9^{3}/_{8}$ inches, with the string opening portion being $5^{1}/_{2}$ inches long, and a diameter of $2^{1}/_{8}$ inches.

Just as in last year's packaging show, an increasing ratio of exhibit area was occupied by plastics raw material producers and converters, and plastics packaging production machinery. The following examples are of considerable interest, and open possibilities of the ideal plastics packaging operation: machinery feeding rolls of raw materials (plastic film, sheeting) at one end, and delivering at the other end the filled, sealed and printed plastic package.

Leedpak, Inc. has succeeded in thermo-forming plastic bottles from roll stock, a packaging concept introduced from Europe, where it has been used commercially in the retail selling of vinegar and other items. The package is explored here in collaboration with the Chemicals Research Division of W. R. Grace & Company. At present only polyvinyl chlorides are used in this country; however polyethylene, polypropylene, nylon, polystyrene, acetate, and many other films are now entering the test stage. The machine is approximately 9 feet long, 4 feet wide, seems to be suitable for making almost any shape of container in any size up to one quart, and combines easily with continuous filling and sealing operations. It is said to have a capacity of up to six thousand finished containers per hour, depending on size and other circumstances. Empty container handling and the warehousing cost connected with it, as well as freight cost for incoming empties, are completely eliminated. The containers were demonstrated in modifications to take internal or external screw closures, plugs, caps, or a plain heat-sealed closure. The machine (7) produces the bottles (6) by providing the continuous film web with a center crease, and then vacuum-forming one half of the finished bottle simultaneously from each of the two opposing film web halves. The opposing halves are then brought into juxtaposition and heat-sealed together, with a final die-cutting process relieving them from the web. This results in a bottle which, structurally reinforced by horizontal ridging, is now being considered by a prominent gasoline company in the United States for the distribution of outboard motor oil.

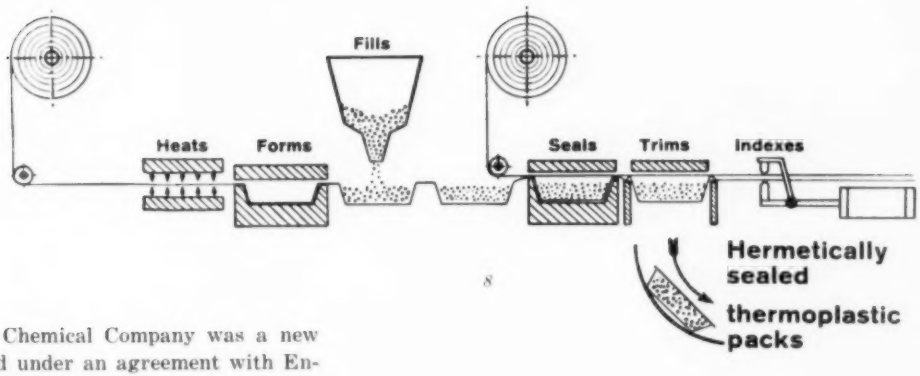
Another important development in the complete integration of plastic packaging, in this case at a basic machine cost of approximately $15,000 to $20,000 was demonstrated by the Conapac Corporation of New York City. This machine, called Formseal, is one of a series of automatic and semi-automatic plastic packaging machines sold and leased in the United States by the Roto-Wrap Division of Conapac, and supplied by Hydro-Chemie Ltd. of Zurich, Switzerland. The Formseal machine measures approximately $9^{1}/_{2}$ feet in length, and is a fully integrated line that combines and synchronizes all of the necessary packaging elements such as roll stock feed, package forming, product filling, package sealing and trimming, and rotogravure or flexigraphic package printing. The machine manufactures and fabricates rigid plastic packages of the type previously produced in this country only on the Kraft Foods Company's patented "Foodie" portion-control packaging machines.

The automatic Formseal employs vacuum or plug-assist techniques to form the pre-softened thermoplastic film into widely varied types of plastic containers. The machine at the show utilized oriented polystyrene film and was said to have a maximum production rate of 12,000 containers per hour. Films of various vinyl formulations, polyethylenes, styrene alloys, polyamides, cellulosics, and many other types have all been run on the Formseal in Europe, where the company now has ten units in operation. Space is provided on the machine for installation of all standard filling units capable of feeding powders, viscous liquids, tablets, or solids of almost any shape. Normally, and as demonstrated at the packaging exposition, a second film web is automatically sealed over the moving containers to hermetically close the package. The completed packages are trimmed from the web in a completely automatic operation, and the total appearance of the package is neat, crisp, and well-controlled.

While the basic container produced by this machine is a plastic form of shallow or deep proportions and various dimensions, additional mechanical modifications are said to enable the Formseal to produce blister, contour, and skin packaging. Also, the machine is apparently capable of forming, filling and sealing plastic bottles, and is thereby in direct competition with the Leedpak development described above. Action at the filling, closing and trimming station described above is shown in a closeup view (9). The diagrammatic drawing above it shows the in-line efficiency of this continuous flow operation (8).

New markets for plastics

In the field of plastic raw materials and fabricated plastics, considerable differences were found in the degree of development. Spencer Chemical Company hinted at new potential markets in oil and grease packaging, hardware packaging, aerosol bottles, and pouches for autoclave sterilization, all made of nylon film or fabricated nylon. Reactions of oil companies to the proposed new flexible types of packaging for motor oil are, however, said to be varied, and tempered by the practical considerations of large investments in metal can filling lines.



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Also presented by Spencer Chemical Company was a new polypropylene film, marketed under an agreement with Enjay, which is said to be entering pilot production and should be ready for full production in 1960. Among the areas explored by Spencer for this film were skin packaging to uncoated board, taking advantage of the ability of polypropylene to adhere to uncoated board; overwrapping, taking advantage of the additional stiffness of polypropylene over polyethylene films and therefore its improved machine-handling characteristics; and food packaging, taking advantage of the grease and abrasion resistance of polypropylene film, its strength in thin gages, its heat resistance (aimed at boilable food pouches), and its excellent clarity.

DuPont de Nemours and Company offered a new 600-gage polymer-coated cellophane film called 600 K. Inasmuch as this film is twice as heavy and thick as the widely used 300-gage cellophane, it has a stiffness which keeps packages looking better after handling and stacking than the average cellophane film does.

The Dow Chemical Company announced and demonstrated the development of an anti-fog treatment for polystyrene, marketed under the trade name "Trycite". Commercial production of the treated film is expected by June, 1959. The anti-fog treatment is said to banish water condensation brought about by changes in temperature and humidity on package windows and wraps; meat, produce and bakery packages are key examples of expected use. Illustration (10) shows a laboratory demonstration of the anti-fog qualities of the treated Trycite film used to cover the beaker at the right. The fog film on the beaker at the left is on untreated material; both beakers were half filled with warm water, and sealed at room temperature, and then they were placed in a refrigerator.

A tremendous variety of formed and fabricated plastic film packages were shown at the exhibit, some of which may be of considerable interest to industrial designers. Plastofilm Inc. of Wheaton, Illinois, showed a new container for the Ekco Wall Can Opener, consisting of a three-piece transparent box of fabricated cellulose acetate sheeting, beaded at top and bottom, creased, and sealed in at one edge, with the can opener held securely in position by two thermoformed white, high-impact polystyrene inserts locked against the beads of the acetate prism (11).

One of a series of formed plastic film packages with which we were particularly impressed in 1958 was the "Panta-pak" of vacuum-formed nesting trays of .005 polyvinyl chloride, marketed by the Pantasote Company of New York. (see ID, July, 19, '58). Since then, the Pantasote Company has made great inroads in the field of formed plastic tray packaging. The package has been used successfully for the marketing of electric Christmas tree bulbs, for cookies and

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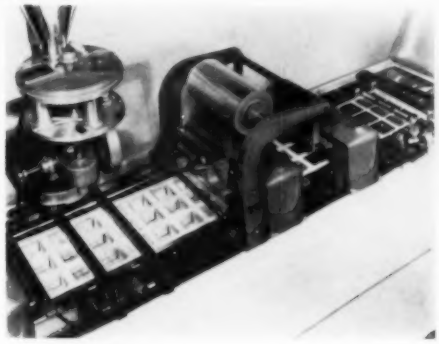

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crackers, as gift box dividers for candied fruits, for candies, for retail fruits and vegetables as in the illustration on page 58.

Nothing seems even remotely to equal the pace and breadth of development in plastic films shown by the polyethylenes. The often-cited Spencer Chemical Company showed a low-cost, boilable polyethylene food pouch, marketed by East Coast Marketers, Salisbury, Maryland, under the intriguing trademark "V for 1". These pouches consist of polyethylene-coated paper; illustration (12) demonstrates their use in the serving of vegetables. In one hand is shown a spoonful of peas which has been prepared by immersion in boiling water; in the other hand is a single-serving pouch of peas pre-cooked in steam, frozen, and then prepared by thawing in boiling water. The difference is said to be that the peas in the boilable pouch still "taste like peas" since they have been protected from the boiling water which "leaches away flavor and color."

Another polyethylene "cook-in-pack" was demonstrated by the Western Waxide Division of Crown Zellerbach Corporation, and is apparently a combination of polyethylene and parchment (14). This package has an incorporated zip tear string opener (15) for easy opening after cooking, an item of considerable importance to anybody who has had his first experience with boil-in-bag items. Crown Zellerbach also showed a polyethylene-coated paper pouch in an overwrap, used for strawberries and other fruits and berries packed in syrup or sugar. This package was said to provide up to 25 per cent savings in packaging costs, in addition to many other advantages over standard paper board with metal end, or straight paper board cannisters (13). Because the package is fully collapsible, savings that can be achieved on in-plant storage space and shipping weight are obvious.

A particularly ingenious example of vacuum-formed, high-density polyethylene sheet packaging was exhibited by W. R. Grace & Company. This new type of package, for Air Force jet engines' spare-part turbine vanes, combines the advantages of effective resistance to corrosion and rust with a saving of 30 per cent in cost, and an alleged reduction of 20 per cent in cubic volume. The turbine vanes, 25 pieces per package, are used in overhauling jet engines produced for the Air Force by General Electric. The vacuum-formed package is heat-sealed to a .060 board (17, left photo) that has been laminated to a polyethylene-foil-kraft paper combination to supply sufficient stiffness. The polyethylene blister itself is a tray arrangement designed for twelve and thirteen vanes respectively, and so developed that it can be used for nine different part numbers. This

package is formed from 20 mil. sheets of Grex high-density polyethylene; careful controls assure that the thinnest areas will not be less than 6 mils.

In the field of paperboard packaging, Mead-Atlanta, of Atlanta, Georgia, demonstrated a system of particular importance to the packaging of dry products, or products that must be kept virtually dirt- and germ-free in extended storage. This system, which seems to be especially suited for frozen foods, was introduced under the name "Solowrap", and has a background of testing and distribution in Sweden where it was developed under the name "Expresso". A method of automatically sealing the Solowrap carton with thin strips of coated paper (16) and then heat-sealing both ends with conventional cover flaps, makes the container absolutely leak proof. Special die-cutting employed in the carton corners gives a fiber-fluffed and "plastic-like" edge, reinforcing the tightness of the package. The advantages of the Solowrap package are said to be the hermetic sealing process of the carton which eliminates the need for overwraps and the fact that the sealing strip on the end of the Solowrap carton can be a transparent as well as an opaque membrane, thus permitting visibility of the product. The fact that the carton has no inner bag or lining, and that the walls are completely smooth, is said to promote product freezing. Also, because the container walls are polyethylene-coated, the content is released easily, and emerges in a smooth, attractive block.

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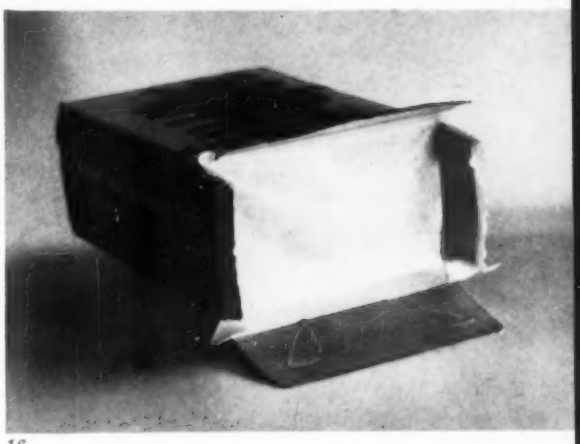
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Advances without glamour

While innovations in the paper and paperboard field seem at first glance not quite as striking as those in the rather "glamorous" plastics field, considerable advances have been made. In many cases they do not consist of basically new formulations or combinations of materials, but rather of new and ingenious methods of exploiting present materials. Two instances of possible signficance and interest are concerned with four-color process printing on boards that have previously resisted such printing techniques.

In a new entry in the beverage carton field Canada Dry Corporation, in collaboration with Raymond Loewy Associates, developed a new four-color process rotogravure Handipak, a version of the universally used six-bottle carrier, which combines slick paper reproduction quality with the utility and durability required of bottle carriers; the manufacturer is Julius B. Slevin Co. Inc. of Lansdowne, Pennsylvania. The chief problem was to find a paperboard with a printing surface fine enough to reproduce the subtle tones of transparencies, and yet contain wet strength qualities. The solution is a laminated board composed of one ply of

coated, bleached Fourdrinier Kraft laminated with moisture-proof adhesive to one ply of natural Fourdrinier Kraft. The item uses all seven color units of a special rotogravure packaging press designed and built by R. W. Hartnett Company of Philadelphia. Two line colors, four process colors and one station for clear top lacquer were used in this production.

Another development in the field of high-fidelity full-color illustrations, this time on corrugated board, was demonstrated by the Progress Lithographing Company of Amberley Village, Cincinnati, Ohio. This is a process similar to the FW process recently announced by Ft. Wayne Corrugated Paper Company, on which few details have so far been disclosed. Basis for both processes is apparently preprinting of liner board by rotogravure or offset process, which board is then combined on a corrugator equipped with a cut-off register control system. The limitations of this process were mainly concerned with the fact that the printing press must be web-fed to provide printed rolls to be run on the corrugator. In view of this limitation, the Progress Lithographing Company has made available a service which offers pre-printed liner board in rolls, ready to run on the combiner, and pre-printed corrugated sheets, cut off in exact register, ready for die-cutting or slotting. Usually, the pre-printed liners are bleached board, with or without special coating; however, the company is said to be also able to pre-lithograph natural Kraft and jute grades in a wide range of calipers.

Another item of interest to industrial designers and packaging engineers concerned with crating problems, which was demonstrated on an experimental scale the year before last, has now reached full maturity. We are referring to the "Klimp" fasteners, utilizing a new concept in shipping containers, with previously unknown strength-weight ratios, designed particularly for the current boom in air freight. One of the prime features of containers of this type is the knock-down and reuse capacity of the container panels, which can be stored flat instead of warehousing "dead air in boxes." At destination, these containers can be completely dis-assembled in less time than it takes to remove the lid from a nailed box. Freight rates on used flat panels are a fraction of the cost of the container; thus the containers can be reused repeatedly at a continually decreasing packaging cost. Illustration (18) shows the manner in which modular panels are assembled into open containers, and the method of using polyurethane strips, wrapped around parts or interleaved between items to eliminate the need for built-in braces, which would tend to reduce the amount of panel interchangeability.

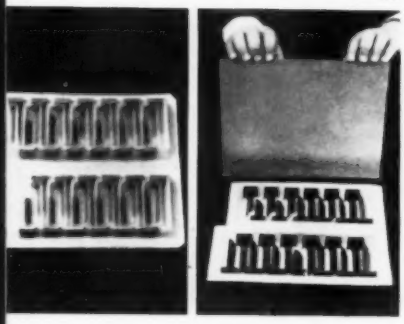
In addition to crating, other fields of industrial packaging benefited from new developments. United States Steel Corporation of Chicago, Illinois, showed a packaging system using a high speed packaging machine that automatically delivers and straps cartons of nails. The machine shown here (21) automatically applies round steel strapping to the output of four nail packaging lines at the Donora works of the United States Steel's American Steel and Wire Division. It replaces the two semi-automatic machines formerly required to handle the big nail mills' production.

Other developments in this field were a power-driven strapping machine by The Acme Steel Company of Chicago, Illinois, especially designed for fast application of strapping to all types and sizes of packages or bundles. These machines are manufactured for $\frac{3}{8}$-inch, $\frac{1}{2}$-inch, $\frac{5}{8}$-inch, and $\frac{3}{4}$-inch strap width, and apply each strap under constant tension, adjustable by a dial on the control panel (19). Acme also showed a fully powered, steel strapping tool which combines tensioning, sealing, and cutting at predetermined tension (20).

Concurrent with the AMA exhibit, the Association brought out a 207-page research study called *Packaging Research: an Inventory* by Spencer A. Larsen. Prepared under the auspices of the AMA Packaging Division Exhibitor's Advisory Committee, this study offers to the industrial designer a comprehensive, classified inventory of printed reference material on packaging research. A listing of literature on every important aspect of packaging (package planning, design, development, materials, measurement, etc.) is included. Current trends in packaging research, based on new materials and methods, are described, and principal sources of packaging information (periodicals, directories, manuals, educational associations, packaging trade associations, etc.) are listed.

The study also includes a survey of the packaging research needs, and goals of packagers and suppliers. The special requirements of particular industry groups, such as consumer groups and services, and industrial groups and services, are reported. Unfortunately, the book fails to cover the all-important area of package sales testing, market testing, and analytical package research concerned mostly with the interpretation of potential design success.

In summary, this year's packaging exposition was one of the most sober, serious, and optimistically production-minded expositions seen so far. It was marked by a noticeable minimum of give-aways and hoopla, by a businesslike, attentive and inexhaustibly inquisitive audience, and by exhibits that did their best to demonstrate the astonishing degree to which some of last year's intriguing ideas have achieved consolidation and practical application. This kind of information is something every designer needs.



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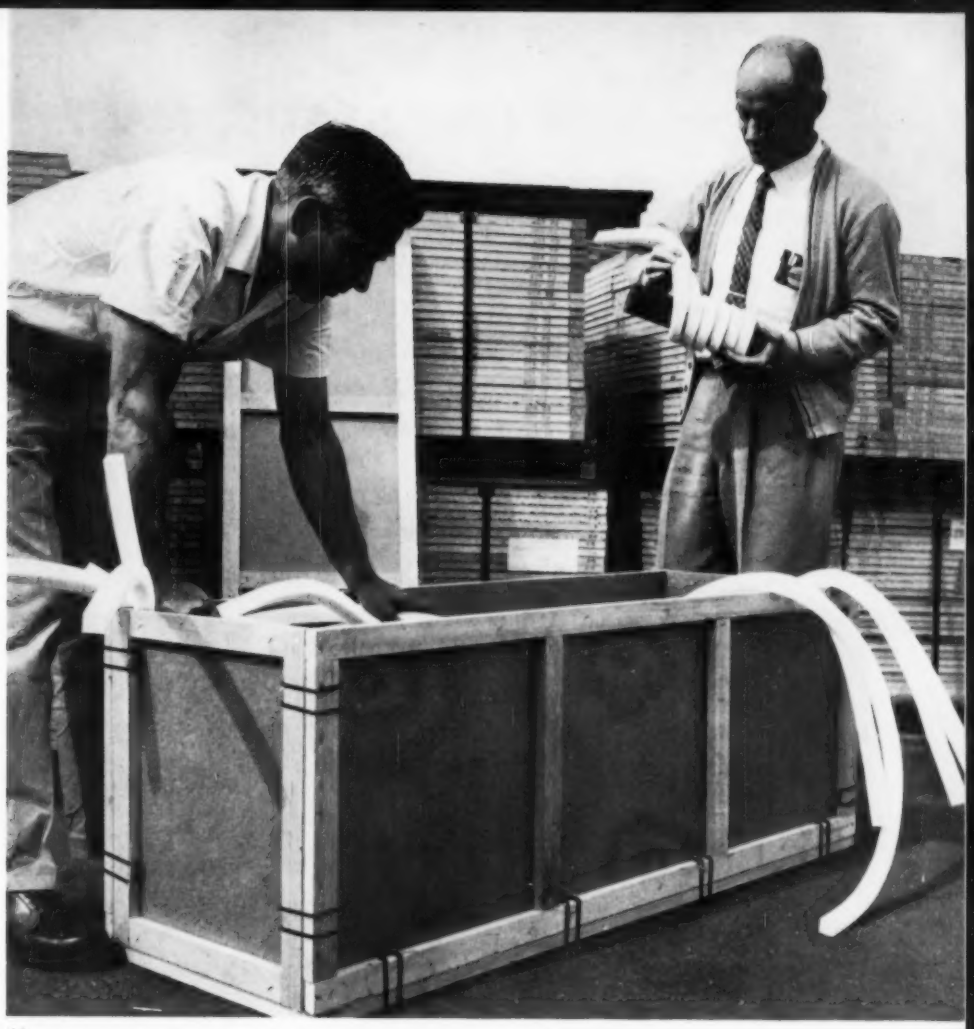

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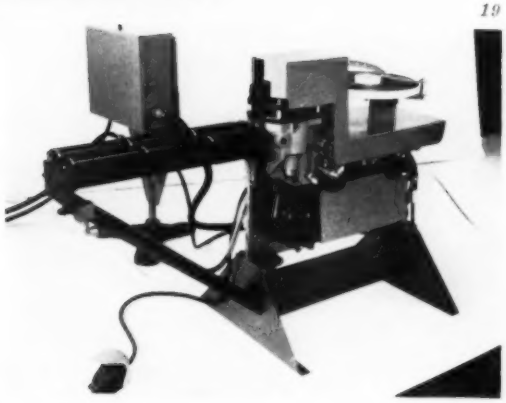

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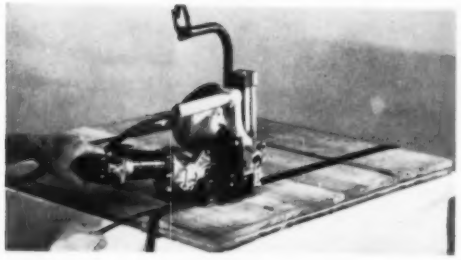

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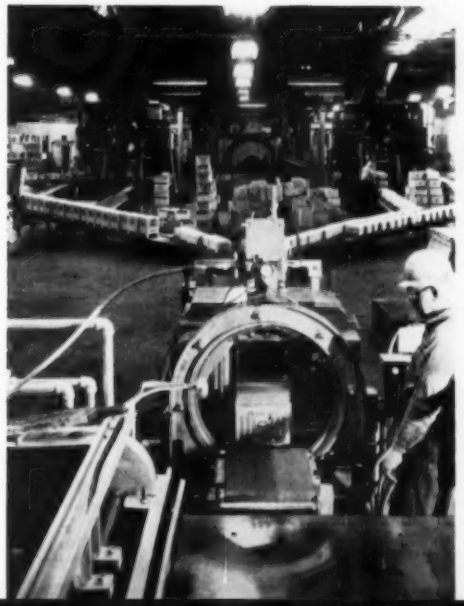


21

"IT'S LIKE STATIC, MAN"

The biggest International Automobile Show yet was directly influenced by the American recession and the Big Three small car announcements, as foreign auto makers leaned toward Americanization in their styling and watchful waiting in their predictions.

When the doors opened at the International Automobile Show in New York's Coliseum on April 4th, spectators poured into an automotive candyland to gape, point, and (if the attendants were taking five) paw over 600 two-, three-, and four-wheeled mechanical sugarcanes packaged in a variety of colors and forms. But despite the crowds and the slightly shrill fanfare surrounding the show, the foreign automakers were talking confidence and thinking caution. Their confidence was well-fed by the 8 per cent wedge of the American market that they had sliced for themselves in 1958. Last year they sold 377,548 units in this country and, aided by the U. S. recession, for the first time manufactured more cars than were produced within our continental limits. Doughty Volkswagen, the wondrous gnome, was so muscle-bound with sales that in the words of ID's special correspondent, "they stiffed the show completely this year." Detroit was showing outward concern over the foreign car situation by piping copy into New York editorial offices that boiled down to the single phrase, "Foreign car, go home." But foreign auto manufacturers were nevertheless uneasy. Privately they admitted to being intimidated by the smokescreen hovering over Detroit, and they searched each pontifical pronouncement from the Big Three for some hint of their small car plans. Because small cars loom large economically, mechanically, and conversationally this year, ID asked Daniel List, author of the column "Hubcaps" in the "*Village Voice*," a weekly paper published in New York, to comment on trends he noticed at the show. The following informal interview took place in a subterranean cafe in Manhattan's Greenwich Village.

Mr. List?

None other. So?

What was your overall impression of the automobile show?

It's like static, you know. Like there was nothing but cars.

I see. Were you able to discern any major trends in automotive design?

There was no really swingin' iron anywhere in the whole pad. All those foreign cats seemed like they were holding hands with Detroit—like they were trying to aim right at Uncle Sugar's supermarket.

Can you be specific?

Take the wheels from England—the Rootes and BMC lines, for instance. Chrome and fins and colors like Disneyland, all that two-tone jazz. And they're big enough like for a community sing.

You mean that the sales direction of the foreign cars seems to be changing?

You read the map, lad. A foreign car used to be for the people at the end of the line. Like it had status—like it separated the cats from the cubes. Now they tag it "medium priced" and sell it over tv to the living room set. Like they've got SAABs and Volvos down on the farm.

Were there any impressive cars in this medium price range?

The Czechs' Skoda is a nice automobile. It was the only Iron Curtain car shown except for the Wartburg from East Germany, a three-cylinder job with a two-stroke engine. If Skoda was on our side of the line, they'd do well. Nice craftsmanship, nice trim design, but inferior materials. All the good steel, they put it on a train and ship it east.

Were there any other new cars that were being shown for the first time?

The Japanese exhibited this year for the first time. They showed four makes, the Toyopet, Datsun—they call that the taxicab of the Orient—the Prince, and some three-wheeled scooters from Diahatsu. You see a lot of the Hillman influence here, mainly because there's a big Hillman operation in Japan. Zenwise, I suppose the Toyopet is the most successful of the lot—light, compact, good fuel consumption.

What about the larger vehicles?

Well, like they're all trying the jeep bit. The Japanese have put out the Toyota and the Nissan, the Germans have the DKW, and there's the Land Rover and the Austin Gypsy from England. The best of the lot is the Land Rover. Nothing is left to chance. It has a rust-proof aluminum body, a double roof for the tropics, to carry off the heat, and it can run safely in a sideways position on a 45 degree slope.

Anything else?

You see them pushing the station wagon this year for the country club cubes, and there's no flies on the people trying to copy the Volkswagen bus. Count them—Thames, Morris, Goliath, et cetera and so forth.

How about the traditional European small cars?

You still find a lot of minicars. Some new ones like the DAF and the Moretti were shown for the first time this year, and Austin-Healey has put out a new tiny sports car called the Sprite. I was particularly large on the Goggomobile; it's like wild. They're all priced for the city car owner—cheap, economical, and they don't use up the juice. Well, I've got to split now.

Thank you, sir.

"Now they tag it 'medium priced' . . ."

Visitors at the Coliseum during the International Show saw a new emphasis in foreign imports—the family-type automobiles combining economy with big car comfort. Great Britain presented the largest group of these cars which are designed to carry four or five passengers "to suit the requirements of the typical American family." Many of the new English cars are equipped with automatic transmissions, and there is a noticeable Italian influence in the styling of body chassis, as indicated by the Farina body designs on the Austin lines. A novelty to American eyes is Czechoslovakia's Skoda 450, a neat four-seater sports roadster with a new aluminum block engine, dual down-draft carburetors, a tubular-backbone chassis, and independent four-wheel suspension. Simca's new sedans, which are distributed through Chrysler Corporation, incorporate American styling in their grilles, visored headlamps, wraparound windshields, and curved rear windows. Renault's streamlined Caravelle is a racy four-passenger coupe with recessed headlights and tail lights mounted in the rear fins. Its front tapers gently from the windshield and is completely without chrome decoration.

Renault's *four-passenger Caravelle will be available in three models—coupe, convertible with removable hard top (right), and convertible with soft top. The squarish back features a chromed grille, and an arrow of chrome runs along the sides. Price*: $2500.

MG Magnette *Mark III features a body by Pinin Farina, tail fins, and wraparound windshield. Price*: $2740.

Austin A-55 Cambridge *was especially designed for young family with American-style comfort. Price*: $2200.

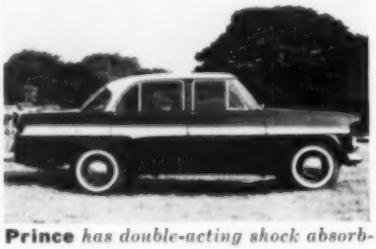
Skoda 450 *has a four-stroke, four-cylinder, water-cooled petrol engine. It gets* 32 *miles to the gallon. Price*: $2495.

Simca Vedette *is a six-passenger car with an* 84 *hp V-8 engine. Directional signals are grouped in fins. Price*: $2300.

Volvo 122S *is a six-passenger car that is making its American debut. It is powered by an* 85 *hp engine. Price*: $2239.

Japanese cars are exhibited for the first time at International Show

Toyopet Crown Sedan *has added weight for comfort. Its top speed is 80 mph. Price*: $2329.



Prince *has double-acting shock absorbers installed at an angle to absorb vibration and check rolling action.*

Four Japanese automakers used a teahouse setting to show off the first cars they had ever shown at an international exhibition. The Toyopet is a roomy four-door sedan that boosts an economy of operation of up to 33 miles per gallon. It is tailored for export with heavier springs for easier handling and a double-steel hull for safety, and extra chrome and lacquer for other reasons. The Datsun is a 4-cylinder car that is popularly known as the taxicab of the Orient. Six passengers can be seated in the Prince, a family car with a panoramic rear window and finger tip gear control. Diahatsu offered a Trimobile that would perform a variety of commercial tasks from a single three-wheeled chassis.

Datsun 1000 *sedan is a 4-cylinder 37 hp car and is the most popular auto in the Far East. Price*: $1616.

Land Rover *has an 88-inch wheel base, carries 3 passengers in front, has 4 fold-up seats in rear. Price:* $3160.

"They're all pushing the specialty bit."

Many car owners are more than willing to trade passenger comfort for carrying space. European designers have shown a facility for building multiple uses into relatively small bodies, making the distinctions between commercial vehicle and private automobile all but indistinguishable. These vehicles have all the advantages of their larger American counterparts, but include compactness as an added dividend. Britain's Land Rover accommodates seven passengers and has power take-off points for high performance over muddy roads, in sand, snow, and in hill climbing. It is used by police of 40 nations. The Thames 800, also from England, offers a maximum payload of 180 cubic feet, while France's Peugeot 403 station wagon has 99 cubic feet of cargo space. The Goliath station wagon has a water-resistant, shock-proof floor and a 46 hp, 4-cylinder water-cooled "airplane type" engine.

Thames 800 *leads all other British commercial vehicles in U. S. sales, has optional side loading door. Price:* $2056.

Goliath *is equipped with extra large 4-wheel hydraulic brakes. Price:* $2090.

Peugeot 403 *is 15'1" in overall length and has 114" wheelbase. Its price is* $2490.

"You still find a lot of minicars."

Traditionally, foreign automobiles have been thought of in this country as tiny, inexpensive economy cars for city dwellers or trend-setting exurbanites. Though foreign manufacturers are pouring bigger family automobiles into this country, the foreign cars featured in the tired repertoire of cartoonists and comedians are still the minicars. For the ultra-practical, Britain's York Noble Industries, Ltd. had the Nobel 200, a 672 lb. wart-shaped three-wheeler that can be assembled from a do-it-yourself-kit with a wrench and screwdriver. It carries four people as fast as 63 mph on 85 miles per gallon. The Italians broadened their influence in the U. S. economy car market with the Moretti Spyder four-cylinder convertible and Super Tourisimo coupe. Lambretta scooters offered a complete series of commercial equipment such as hot dog stands, police wagons, rickshaw cabs, and fire engines. Austin-Healey's Sprite is the lowest priced sports car in this country, took four prizes at Sebring in 1959.

Goggomobile *comes with or without an automatic clutch. It is a 2-cylinder* 22 *hp car with a* 70" *wheelbase. Price*: $1095.

Nobel 200 *has a fiber glass body and can be bought either assembled or disassembled. It has* 1 *cylinder,* 10.5 *hp. Price*: $998.

Fiat 600 *sedan has* 21.5 *hp and a wheelbase of* 78.75". *It gets over* 30 *miles per gallon of gasoline. Price*: $1398.

Moretti's Super Coupe *made its first American appearance at the show. It is a 4-cylinder,* 100 *hp car. Price*: $2995.

Lambretta Firefly *can be used in factories, institutions, and/or civil defense. It includes ladder and extinguisher.*

Austin-Healey Sprite *is a 4-cylinder,* 45 *hp roadster with an* 80" *wheelbase and overall length of* 11'4". *Price*: $1795.


DGF-H124

DESIGNERS DEFINE MARKET FOR NEW MATERIAL

A major steel company develops a process for supplying vinyl-coated steel sheets directly from the mill—a design team adapts the material to existing product lines, and suggests new ones

In the fabrication section of an article on vinyl laminates (ID November 1958), we pointed out that these combination materials are made by two separate industries: the suppliers of the plastic who texture and color the vinyl, the fabricators who laminate the patterned coating to the base material. Now, by developing a process for applying a plastic coating to steel sheets in the form of vinyl plastisols (see right, below), the United States Steel Corporation has succeeded in combining steel sheets and vinyl coatings into a single material, *vinyl-coated steel sheets,* which the company is able to ship in sheets or coils as a "mill" product.

From the point of view of US Steel there were two main reasons for this product development. First, the company had been in the coated-steel sheets market for some time. Zinc, tin, lead, aluminum etc., had been used to coat steel for protection or decoration, and the company had been turning out the coated materials in volume and economically as a result of high-speed continuous coating operations. With the advent of plastic coatings, the company sought to broaden its coated-metals market by combining the decorative advantages of plastic with the strength and inherent fabrication potential of steel sheets. The other reason was the competition which the company was beginning to feel from many sides. New structural materials such as reinforced plastics, pressure-processed wood, a greater use of aluminum were beginning to invade product fields and application areas that had previously belonged to steel.

The main problem that confronted the team of scientists and technicians at work on the project of developing a plastic-coated steel sheet mill product (at the company's Applied Research Laboratory in Monroeville, Pa.) was to find a way to apply mill coatings to sheets so that the final product would be able to withstand the standard shop operations and manufacturing processes used with sheet steel fabrication. To achieve this, it was necessary to find a method of retaining the sharp pattern outlines after such difficult fabrication processes as deep-forming and bending. This was finally solved by "baking" the pattern into the product (see following page for curing and bonding process).

The two types of vinyl-coated products

While US Steel was engaged in solving the production problems of this new mill product, chemical companies began to supply decorated vinyl films to fabricators who combined the plastic with a base material (steel, aluminum, plastic, hardboard) into a laminate. At present, the US Steel mill product differs from vinyl-to-steel laminates made by other fabricators, in that it cannot be supplied in the latter's vast variety of patterns, textures, colors, and color combinations. Since the US Steel product has its coating applied to it in liquid form, rather than as a pre-patterned vinyl film, a combination of colors in a single product present certain production problems which have not yet been settled, and the vinyl-coated steel sheets are now produced in single colors only, in any color specified.

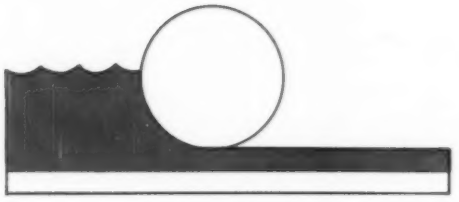
There is another consideration which sets apart the two product types: a mill product operation is very expensive (the initial setup can run into millions of dollars) and must operate at a volume high enough to bring the cost down below that of comparable laminated materials. And to sell

← Fabrication characteristics of the new steel product are similar to those of standard steel sheets, and are indicated by parts shown here.

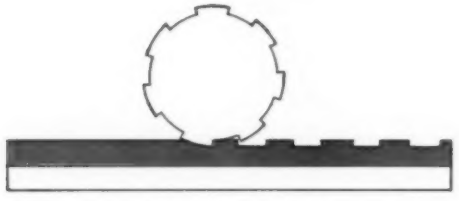
The coating is applied to the new → mill product in the form of liquid vinyl plastisols inspected here before use on coated sheet production.

The production process *distinguishes the vinyl-coated steel sheets from laminated materials which are manufactured in a dual process; the new US Steel coated sheets are produced in a continuous process in the following sequence: Cold rolled or galvanized sheets in coils are fed into a cleaning unit for a thorough "washing"; the base material is then etched slightly before a thin film of thermosetting adhesive is roller coated onto the sheet. The next step is optional. It consists of coating the reverse side for corrosion protection and is undertaken only when requested by a customer. Once these preliminary coatings have been applied the sheets are cured in an oven. With laminated materials the textured vinyl film is put onto the sheets at this point, but with the new mill product the plastic coating is applied in form of liquid vinyl plastisols by a reverse roller coater and is heat-cured on the steel to produce a permanent bond. The sheets are given the specified pattern while they are still hot; the steel strip is passed through embossing rolls where the texture is "imprinted" into the vinyl. The continuous production process comes to an end with cutting the sheets to required length or coiling them; this is done once the sheets have cooled and the vinyl has formed a permanent bond with the base material.*

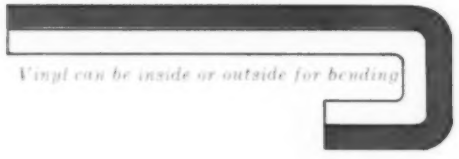
Fabrication methods *are generally the same as for products made of cold rolled sheets. There is no surface deformation after such operations as shearing, high-speed blanking, and brake-press forming. Parts bent into shapes with sharp edges (Z shapes, for example) may have the vinyl covering on the inside or the outside of the bend, and sharp corners may be produced if desired; with stamping operations, a slight deformation cannot be avoided. Deep-drawn parts can be fabricated using the vinyl-covered steel (the material has been used in the manufacture of such deep-drawn parts as automobile instrument panels and chair seats), but consideration must be given to sufficient die clearances needed for closed-die operations. Joining techniques are the same as for other steel sheets, except for spot welding, which the coating prevents. It is however possible to achieve weld-joints by indirect welding — projection welding, magnetic force welding, etc. Stud welding is possible on the steel surface of the material without damaging the vinyl. Bonds can also be made by applying adhesives for a steel-to-steel joint or vinyl-to-vinyl. The sheets retain good adhesion after being elongated 30 per cent and subjected to humidity, high heat, and other environment tests.*



Reverse roller coater applies liquid vinyl

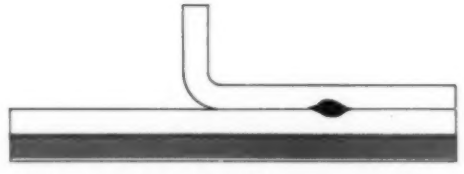


Embossing rolls imprint texture into vinyl

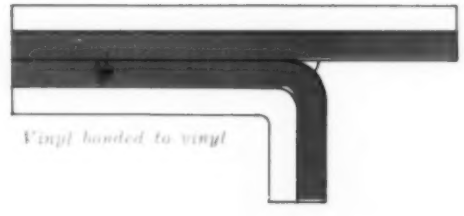


Vinyl can be inside or outside for bending

Parts can be deep-drawn



Indirect welding is possible



Vinyl bonded to vinyl

the vinyl-coated sheets in mill product quantities, its good forming ability had, of course, to be guaranteed.

Once the research team had found a way to bond and cure the liquid vinyl on the sheets, a pilot production line was set up at the US Steel Irvin Works near Pittsburgh, and the new material was given fabrication tests. These showed that products made of the vinyl-coated sheets could be fabricated essentially in the same way as cold-rolled sheets (see opposite page for fabrication methods) except for some of the standard joining techniques.

The commonest method of joining—spot welding—is of course not possible with vinyl-coated sheets (vinyl is an insulator and even if current could be passed through it, the material would burn). Mechanical fasteners (metal screws for cabinets and other structural use) and pressure and heat-bonding adhesives (on doors and panels) present no problems, but in applications where weld-joints are necessary, indirect welding (magnetic force welding, etc.) must be used. It is also possible to join the coated sheets to other materials by the use of adhesives, but to make a joint in this way the materials must be similar: steel can be joined to steel, vinyl to vinyl.

The new US Steel product is now available (it was shown to the press in March) as mill products in coils or in sheets in gages 18 through 28, in width from 24 to 52 inches and in length that can run from 30 to 144 inches. The coating varies in thickness from .008 inch to .020 inch depending on customer requirements. Sold on a square foot basis, price variations depend mainly on steel gage and on quantity. A typical price for .010 inch of vinyl on an 18-gage sheet in quantities of 20,000 square feet of a single color would be 35 cents per square foot. The cost is inversely proportional to the gage of the steel sheet (the same vinyl on a 24-gage sheet would be about 24 cents, on a 28-gage material the price would drop to approximately 20 cents.

A detailed market survey

Industrial design played a signficant role in the emergence of the material. When the development of the process was concluded and the fabrication properties of the new material had been determined, US Steel engaged the Pittsburgh industrial design firm of Peter Muller-Munk Associates to "define the product market of the vinyl-coated steel from the design point of view and provide us with their professional opinion of the material as well as the market."

The aim of the design team was to arrive at "an impartial study of the appearance and functional characteristics of the US Steel vinyl-coated steel sheets as a new material for industrial designers and product planners."

Before the material was given its "public debut", it had been test-marketed for about two years by USS assisted by the Muller-Munk design group. They made investigations of the end use potentials of the material in five major industrial areas: consumer products; automotive; architectural; office equipment and institutional furniture; surface transportation. The problems that confronted PMMA in this project, the patterns they designed, their method of investigation and their conclusions follow overleaf.

Consumer product applications

These chair seats were produced by standard sheet steel fabrication methods. Scuff-resistance and durability are important material properties in this application.

The housing of this electric space heater was manufactured of the new US Steel plastic-coated sheet steels which offer good resistance to the rough handling of such portable equipment.

Design team evaluates five major product areas and suggests just how the material can be used

The job assignment of the Muller-Munk group—headed by partners Anton Parisson and Raymond Smith—extended far beyond determining the new material's appearance which can vary according to customer needs, since the material can be given any texture that can be engraved on a printing roll. Of the eight textures that are now kept in stock, four were designed by the Muller-Munk group (see top picture, opposite page) and these were used for advertising and sample stock. But the real task that faced the design team was to determine the market for the new coated sheets, and to suggest exactly how they could be used in a number of product categories. This aspect of the industrial design assignment is perhaps best explained by a number of questions put to the US Steel Product Development group, and their answers.

What prompted US Steel to bring in an industrial designer while the material was being developed?

Since vinyl-coated steel sheets are a styled product and their acceptance is based considerably on consumer approval, we felt that some of the aspects of marketing and evaluating this product were outside of our normal experience. We concluded that it would be advantageous to bring in an industrial designer to assist us in carrying out this project.

Was this the first time the services of a designer had been used in this capacity by US Steel?

Yes, it was.

What precisely was Muller-Munk's function?

The group was to aid us in the identification of the market for vinyl-coated steel sheets within selected industrial areas; they were to help us develop field testing methods and procedures to reach and interest management responsible for developing and specifying a product in vinyl-coated steel sheets.

What was the method of procedure? How did the design group work with your company? Did they collaborate closely with US Steel's a) marketing; b) sales; c) production departments?

They worked closely—and still do—with our marketing and sales organizations, and they are reasonably familiar with our production facilities.

How the design group functioned

The group concentrated on five major product areas for their market investigations: consumer products (appliances, housewares, recreational goods); automotive products (passenger cars, station wagons, buses and trucks); architectural (interior structure surfaces, architectural components, and prefabricated structures); office equipment and institutional furniture; and surface transportation (subway car interiors, railway car interiors). The design group worked with product planning personnel of selected companies in these industries to evaluate the specific application value of the new material and to determine any possible production problems should the new sheets be used.

Following preliminary studies to find out just how and where the material could be used in these industries, the design group made up ⅛-scale models (see opposite page) to incorporate their findings in an immediate, visual expression. With these and color slides of the vinyl-clad steels, raw and in use, the Muller-Munk group—members of US Steel's Applied Research Staff went along to handle technical questions—presented to management of the investigated industries a proposal indicating how the vinyl-covered sheets could work out in the manufacture of their present products as well as in future product developments.

In each of the product areas surveyed, it was finally agreed by company management that the new material could be incorporated in existing and new products. In consumer goods: in such applications as exterior surface panels for refrigerators, laundry equipment, steel cabinet fronts, ranges, outdoor furniture; in automotive products, for station wagon floors, side seat panels, instrument panels, trays; for decorated wall surfaces in commercial buildings, etc. The material is now planned for use in products manufactured by Westinghouse, International Metal Products Company, Steel Partitions Incorporated, E. B. Metal Products Company, The Wright Line, Inc., Kawneer Company.

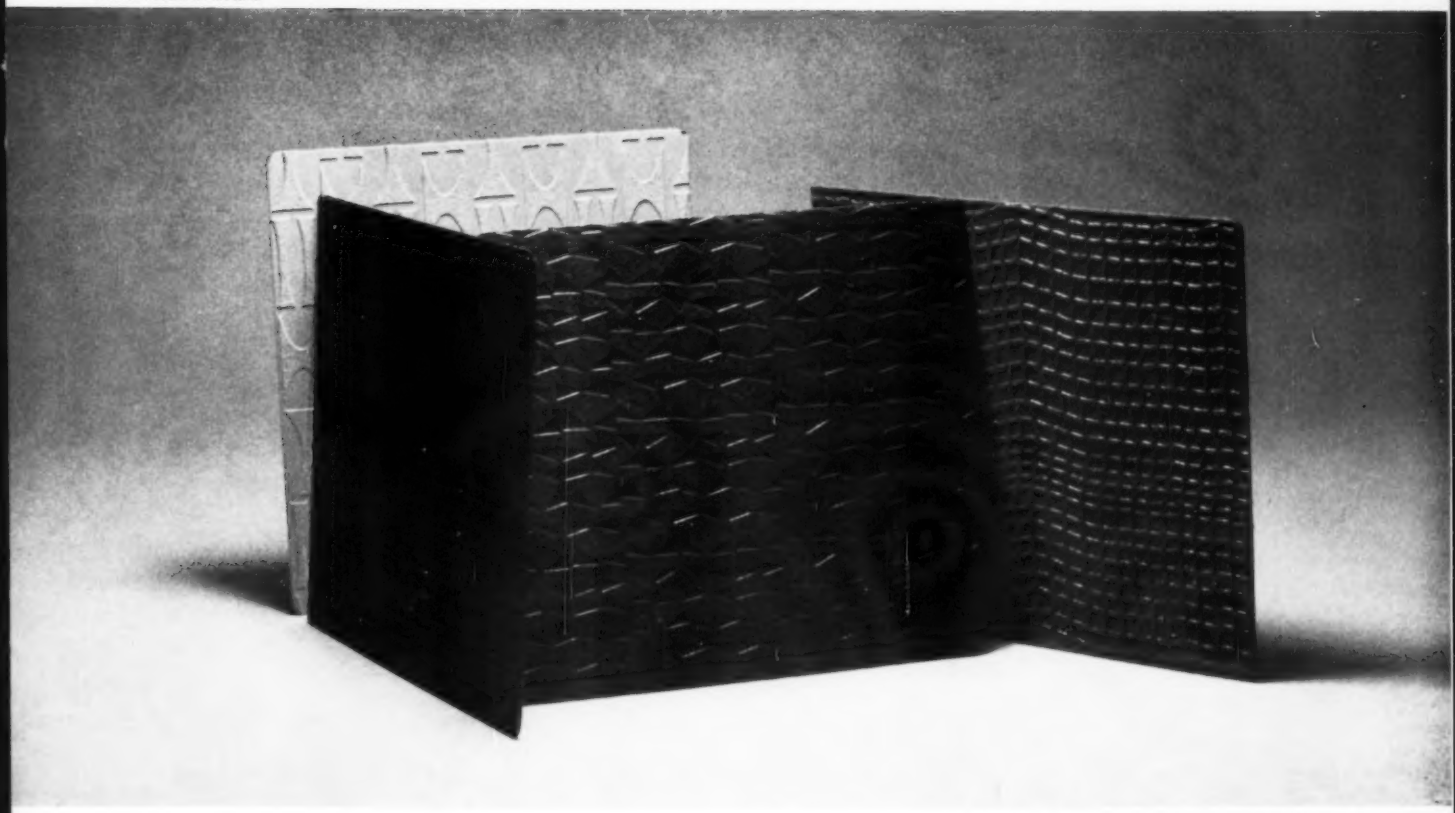
Muller-Munk team designs data brochures

The design group was also charged with handling all the graphics needed to identify the material and the fabrication characteristics of the new steel sheets. Based on their preliminary investigations and meetings with production and product planning personnel, they prepared graphic presentations of their conclusions. Incorporated in a file box (somewhat larger than a standard portfolio and about 2 inches thick), these data sheets—divided into categories: general, automotive, welding, seating, office equipment, railroads, appliances—serve as both a concise presentation of the full meaning of the new US Steel product as well as a means for keeping management, designers and product planners aware of the new mill product. The kit is designed in a flexible way which permits addition of brochures. It was also used as the press packet at the conferences some weeks ago at which the new process and the material made their official public "debut".

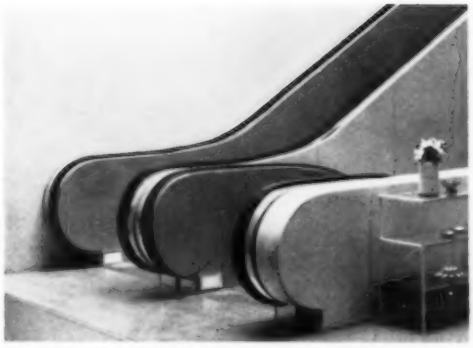
The design team continues

Although the new steel material is now ready for sales, the design team continues to explore product areas—those already researched and others not yet investigated—for further use of the new sheets. They are able to inform responsible groups that the product exists, and do it in a way that is more design-oriented than the advertising methods used in the usual promotional programs. Continuously abreast of industry demands, the designers are also in a position to suggest textures and applications that express the (sometimes unformulated) needs of product planners.

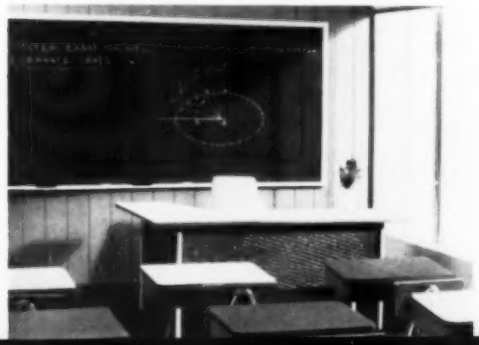
Photo: Matilde Lourie



Some of the textures now available in the new vinyl-covered steel sheets. Of the eight textures kept in stock, four were designed by the Muller-Munk group.



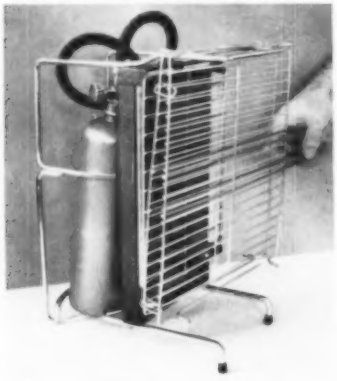
To suggest use of the new material in a variety of product categories, the Muller-Munk design team demonstrated $\frac{1}{8}$-scale models to management.

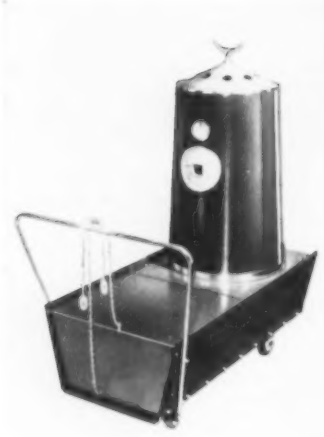


DESIGN REVIEW

Specialized accessories for leisure show ingenuity simply (to make a boat portable, just cut it in half) or complexly (the flameless barbecue that uses a chemical process to charcoal broil without charcoal, the Chinese oven that, like the gourmet shelf in the supermarket, brings the exotic East right onto American paper plates.) Toys are bare framework to be used as the imagination directs—in the case of the construction toys, to be *built* as the imagination directs.

↓ **Devonair Products'** combination vertical broiler and radiant heater burns liquid gas at surface of catalyst-coated screen, weighs 9 lbs.





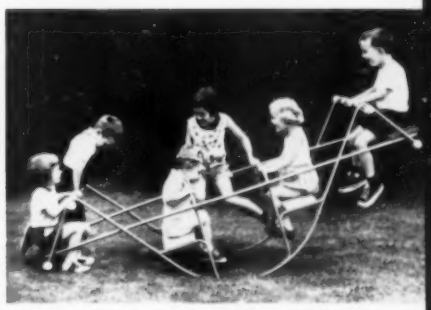
↑ **Fowler Chinese Oven** cooks and smokes meats suspended, or on a rack, in the chimney. Firebox is filled with fruitwood or hardwood to produce aromatic smoke.

→ **Pixie,** cross between canoe and rowboat, is built of hot-molded mahogany, with watertight rubber-sealed joint. Fairey Marine Ltd.

↑ **Play-Make** construction toy comes in kit containing flexible plastic tubing plus four types of connectors. Tubing can be cut to shorter lengths. Modern Research Development Company.

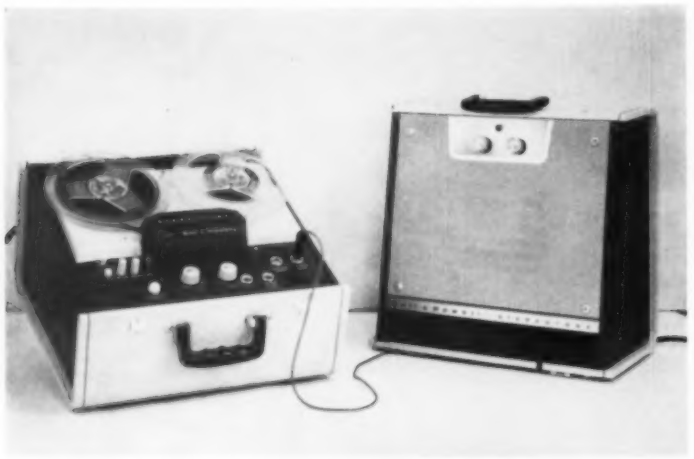
↓ **Baby Bathinette Corporation's** tub, of Grex high-density polyethylene, fits most bathinette frames, can be converted to other purposes.

↑ **Play Spaces** is a set of six 24" x 24" hardboard panels finished in primary colors, some with cut-outs. Plastic snap hinges are permanently attached. Design Industries.



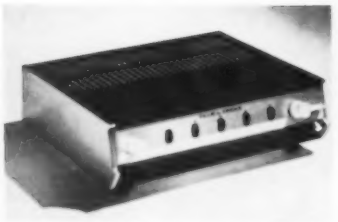
↑ **Teeter Gym,** constructed of steel tubing, can also be used upside down. Designed by Marlan Polhemus of the Harley Earl office and manufactured by Trimble, Inc.

Communication and atmosphere control are performed by units that daily grow smaller; and since it isn't only size that determines portability, they take on more convenient shapes: the dictating machine resembles a book; the sun lamp looks, and is carried, like an old-fashioned lunchbox. Heating and air conditioning systems are often hidden in the walls and, for these, control panels are designed to indicate the complexity and luxury of the machine they represent.



← **Bell and Howell's** tape recorder plays stereophonic and single-channel tapes, does monaural recording. Auxiliary speaker contains its own power cord and amplifier system.

← **Steelman Transitape,** two-speed tape recorder designed by Monte Levin, uses batteries, transistors, to achieve portability. Weight: 6½ pounds.

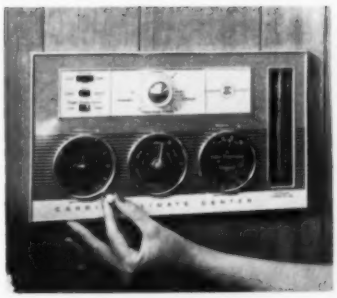


↑ **Talk-a-Phone's** intercommunication unit, designed by Dave Chapman, Inc., stands three inches high. Vinyl-clad top has leatherette finish; bottom pan is part of chassis.

↑ **Scribe** dictation unit incorporates controls in handle of microphone. Pre-loaded magazine contains tape for quick insertion and removal.

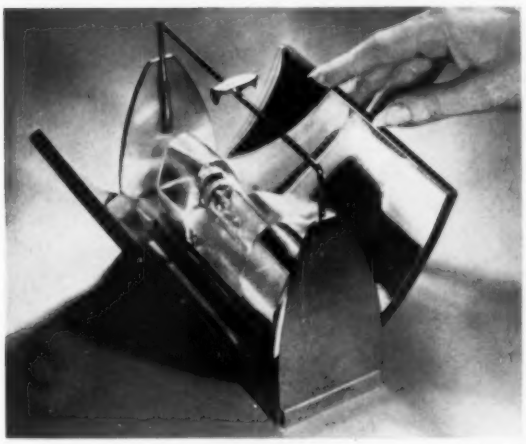
↑ **Edison Voicewriter** dictating machine is automatically turned on when microphone is lifted from cradle. Transistors eliminate warm-up period. Designed by Carl Otto.

→ **Carrier Corporation's** Climate Center groups controls for thermostat, fan, heating-cooling switch; indicates humidity, barometric pressure, indoor and outdoor temperature. Designed by Raymond Loewy Associates.



↑ **Westinghouse's** experimental portable dehumidifier uses thermoelectric principle to produce cold without compressor. Fan dissipates heat from electric current.

→ **Portable air cooler,** by General Electric, also operates as fan. Plastic water distribution system, water chute in lower left corner.



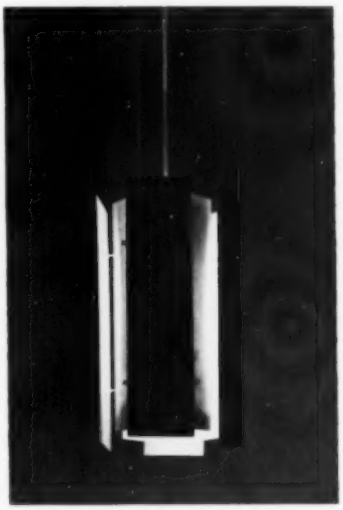
↑ **Portable sunlamp,** produced by Engelhard Industries and designed by Raymond Loewy Associates, is carried like a purse, stands up on end when in use.

↑ **Whirlpool's** 1959 air conditioners include the thermostatically controlled Custom model. Designed by Sundberg-Ferar, it is two feet wide and a foot and a half high.

→ **Igloo fireplace,** of fireclay reinforced with steel rings, can withstand temperatures of more than 2000°F. Designed by Susan Norton-Taylor, made by Strawberry Bank Craftsmen.

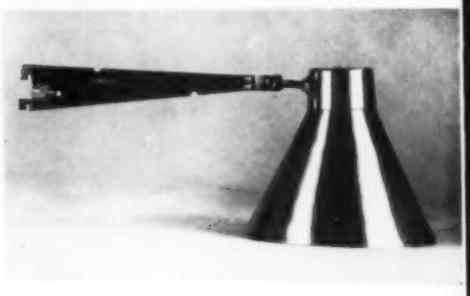
Lighting fixtures, as a consequence of the contemporary tendency to hang everything from the ceiling or the wall, place more emphasis on the source of light itself and less on the standard that supports it, so that the light itself becomes a part of the design. Often the bulb is hidden and light appears only as it plays on planes of metal arranged in panels, spirals or tiers in a sculptural composition—abstract except for some first signs of a strong mushroom influence.

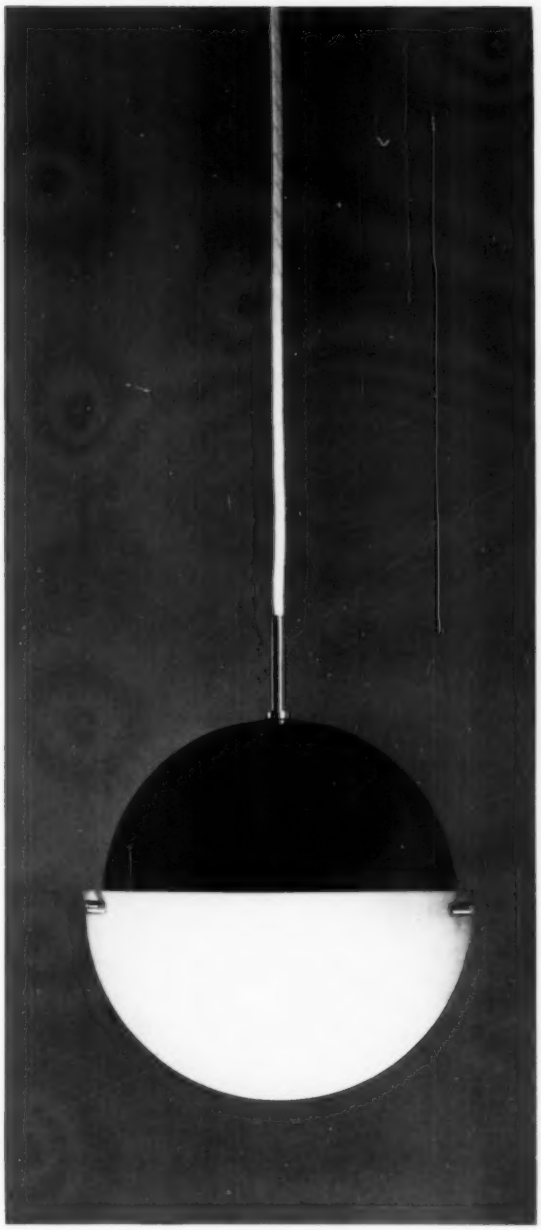
↑ **Architectural Lighting's** tiered metal hanging lamp is a Danish design by Poul Henningsen. Aluminum petals are colored enamel outside, white inside.



↑ **George Tanier's** lantern, by Danish designers Kotja and Th. Resting, is composed of panels of brass and black lacquered metal. Inner surfaces are laquered white.

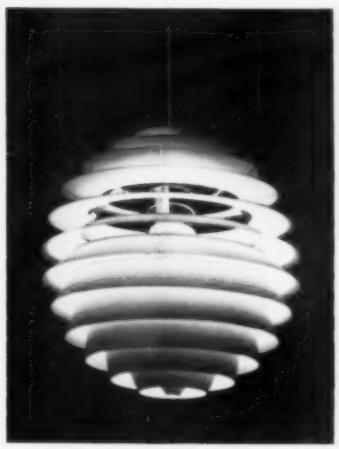
↓ **Harry Gitlin's** classic pyramidal lamp, designed by Ward Bennett, appears in several versions, here on a bracket that fits into slotted wall standard. Extends 16" from wall.





↑ **George Tanier** shows an eclipse-like fixture of unequal hemispheres, with bottom diffuser of white fiber glass, top of gray lacquered metal. Designed by Johs. Hammerborg.

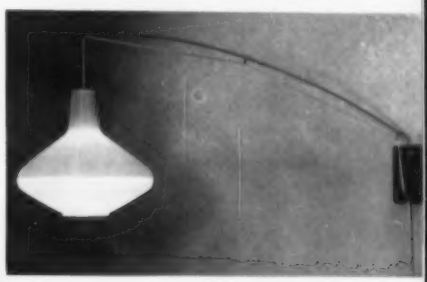
↑ **Harry Gitlin** designed this ceiling fixture for widespread illumination without glare. Bulb is shielded by louver at bottom.



↑ **Architectural Lighting's** spherical lantern is composed of 13 separate steel spinnings. Bulb is invisible. Designed by Poul Henningsen.

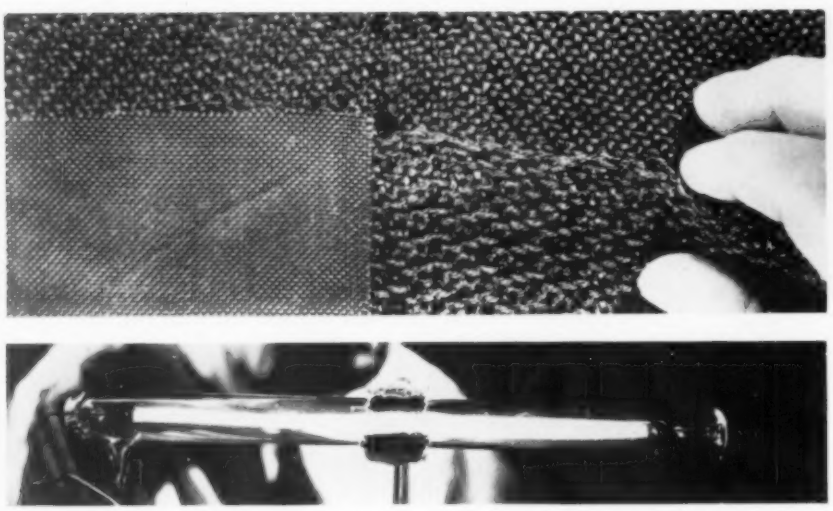
↓ **Lightolier's** outdoor light is equipped with a spike to stake it into the ground. Black hood and perforated white metal grille.

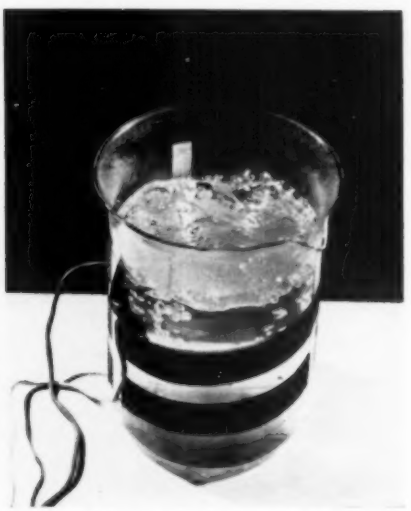
↓ **Heifetz** suspends a two-tone Tenite globe, made by their Rotaflex extrusion process, from a fish-pole arm and a wooden wall bracket.



↑ **Vanguard's** table lamp, 12 inches high, has a solid base of teak or walnut, globe of opal satin-finish glass. Designed by Ruth Benson.

TECHNICS *a catalog of new products, materials, processes and finishes*





Top: Woven graphite fibers shown above in several weaves; immediately below, fibers used as lamp filament; right, as heating element.

Graphite cloth produced

A newly developed process makes graphite available in the form of flexible cloth. The useful refractory material has hitherto existed only in brittle block form, preventing it from being used in many applications which will now become open to it. Any organic textile form, which includes almost all synthetics as well as wool, cotton and flax, can be transformed into 99.9 per cent pure graphite by means of a complex thermo-chemical conversion process in which the textile is subjected to temperatures approaching 5400°F. The process changes the structure of the material to that of graphite similar to the manufactured graphites used for electrodes in electric furnaces, nuclear reactor structures, metallurgical molds, and many other industrial applications.

Graphite's qualities make it useful for high-temperature situations. At ordinary pressures it has no melting point, and sublimes (passes directly from a solid to a gaseous state) at about 6600°F. Though it is not very strong initially as a structural material, its strength increases with increasing temperatures, and, at 4500°F., is about twice what it is at room temperature. It oxidizes at 750°F., however, and above this temperature must be kept from contact with air. At minus 320°F. the known properties of graphite cloth remain unaffected. The textiles are resistant to acids, alkalis and organic compounds (except those of a highly oxidizing nature), and will not react with many molten metals. Their electric and thermal characteristics are similar to those of solid graphite, which means that they are very good for such applications as resistance-heating elements and containers for molten metals. Because of their flexible form, they are immune to thermal shock and consequent breaking; and they possess graphite's well known lubricating properties.

So far, all uses of graphite cloth have been experimental, but its developers envision applications in many fields. The cloth is being evaluated as a reinforcing agent in various plastics and refractory materials used at high temperatures, such as in nose cones of missiles and rockets. Materials subject to repeated alternations of heat and cold will also benefit from being replaced by or reinforced with graphite cloth; valve packings and gaskets would be capable of lubricating themselves.

Graphite fibers could be used to impart electrical and thermal conductivity to non-conducting materials such as plastics, ceramics and textiles. Other possible electrical uses include radiant heating panels for rooms, and heating for fliers' clothing. Electronically, graphite fibers can be used wherever wire cloth has been used, with the additional advantage of being able to withstand higher temperatures.

Graphite cloth is being considered for use as bag-type filters for hot, non-oxidizing gases; for equipment to handle corrosive fluids; in electrostatic precipitators, curtain walls, and flame arresters. Graphite felt could be used as thermal and acoustical insulation. Graphite cloth is now available in experimental quantities for testing by industry and by military organizations. An example is a cloth of basket weave, 28 threads to the inch, which is made in 40-inch widths and lengths up to 7 feet, with an average thickness of 0.024 inch. Manufacturer: National Carbide Corporation, 30 East 42nd Street, New York 17, N. Y.

Delayed action mending tape

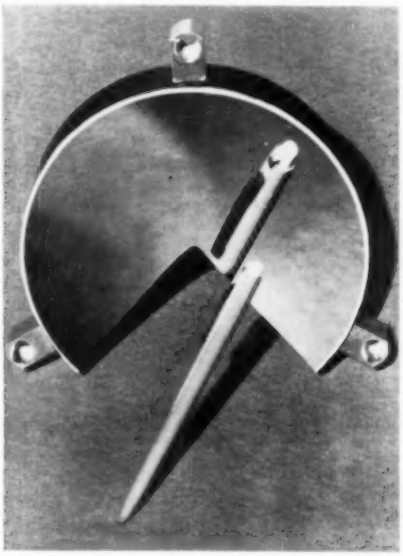
A transparent adhesive film with delayed setting action to make accurate placing easier has recently been put on the market by Keuffel and Esser Company.

The film, called Dulseal because of its mat surface is available in wide sheets and rolls, and as mending tape. When its protective wax coating is removed the film becomes tacky enough to stick to paper. Several hours later it can still be moved around if necessary. After about 24 hours the adhesive sets, forming a permanent bond with the paper or cloth to which it was applied. The mat surface will take pen and pencil, and will stand up under repeated erasings. Manufacturer: Keuffel and Esser Co., Hoboken, New Jersey.

Plastic mirrors reduce costs

Mirrors made of cast epoxy resins are said to reduce mass production costs to a small fraction of those entailed by older methods of production. A negative mold is made from a precision-ground glass mirror, and used for casting positive replicas. Both negative and positive are made of a special epoxy formulation. The reflective surface is an aluminum coating applied by vacuum deposition and coated with a protective film.

The mirror, called Repli-Kote, faithfully duplicates the most intricate configurations, including paraboloids, hyperboloids, ellipsoids, and more complex aspheric surfaces that are not reproducible in glass by mass production methods. The physical qualities of the plastic are superior to those

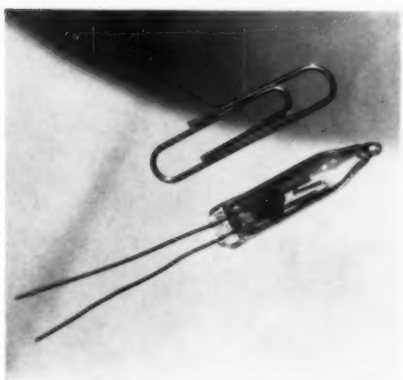


of glass for certain applications. For instance, the manufacturer says that in shock-resistance tests, epoxy samples have withstood as much as 22,000 g impact, which is about the impact of a medium sized car traveling at medium speed. Also, epoxy acts better under sudden changes of heat and cold, because it conducts heat better. Repli-Kote mirrors have been taken out of dry ice baths and immersed in boiling water without showing any ill effects.

Since the mirrors are made by casting, their mounting brackets and various mechanical and electrical components can be cast into the backing, which simplifies their use with electronic systems. In addition, epoxy is much lighter than glass, although, if weight is desired, filler materials can be added. The corrosion resistance of the reflective surfaces of Repli-Kote is equal or superior to that of the reflective surfaces of conventional glass mirrors. The rate of production of plastic replicas is much higher than that of glass reflectors. In spite of the ease with which the plastic mirrors are manufactured, they are extremely accurate: 6-inch paraboloid mirrors with 5¼-inch focal lengths are precise enough to concentrate 90 per cent of incident collimated light within a circle of 0.1 mm diameter. Manufacturer: Singer Military Products Division, Singer Manufacturing Company, 149 Broadway, New York 6, N. Y.

Subminiature circuit breaker

A circuit breaker, controlled by time and temperature, vacuum-sealed in a glass envelope about the length of a straight pin, has been developed by Sylvania. The device is called the Mite T Breaker. It is 1⅛ inches long and ⅜ inch in diameter. It provides circuit protection by interrupting current flow when excessive current or external heating occurs. As temperature decreases or the overload is removed, the current path is automatically reset. The first use of the new device is in 1959 automobiles for protection of small windshield-wiper motors. Manufacturer: Sylvania Electric Products Inc., 1740 Broadway, New York 19, N. Y.



Aerosol spray gun

A completely self-contained spray gun, that can be operated with one hand and will spray any liquid that can be thinned to the proper consistency, has been put on the market.

It consists of two containers: one is a pressure-can filled with propellant, the other is a jar holding the liquid to be

sprayed. They are connected with a device that works on the principle of a fixatif sprayer. Extra jars are available, making it possible to use the same can of propellant for many liquids. Manufacturer: Sprayon Products, Inc., 2075 East 65th Street, Cleveland 3, Ohio.

High-strength tile adhesive

A new plastic and ceramic tile adhesive that remains workable up to 12 hours, but eventually forms a chemical bond with the tile, has recently been placed on the market. The adhesive is a white rubber-based composition that remains permanently elastic and does not oxidize.

It is designed for gluing polystyrene wall tiles or panels to clean surfaces, but can be used, according to the manufacturer, with excellent results, for attaching ceramic tile. For about 12 hours after the cement has been spread, tiles can still be set in it. After a while it forms a chemical bond with a plastic tile, making it impossible to remove the tile without breaking it. It is supposed to cover two-thirds more area than commonly used oleoresinous mastic. Manufacturer: Armstrong Cork Company, Lancaster, Pennsylvania.

"Unitizing" reduces motor size

Because of its unique "inside out" construction, General Electric's "unitized" motor promises to operate at up to 40 per cent more efficiency than conventional motors of the same size. At present, the motor is available in several types and horsepower ratings up to 1/15 hp. It is designed to be used in machines such as ventilators, heaters, air conditioners, recorders, projectors, and small business machines, as well as in other kinds of small-motor-driven equipment.

The construction of the motor begins with the establishment of the air gap between rotor and stator — critical because of its effect on noise levels, starting characteristics and efficiency—after which the motor is literally built up around the air gap. "Unitizing" is accomplished by fixing the mechanical relationships of the motor with a new resin material developed for its extreme holding power. The resin also acts as insulation, providing high mechanical and dielectric strength. Its life expectancy, according to GE, is ten times that of conventional paper-slot insulation.

The new motor can be adapted easily to many product-needs in the small-motor-driven equipment field. It can be mounted in any position, for instance, because of specially developed bearings and lubrication system. The variety of mounting arrangements, shaft extensions, and lead materials and connections that can be accommodated by the motor further extend its applicability. Also, it is smaller in size for a given output than motors of traditional design, giving designers and users a number of options based on their needs. Compared to conventional motor design, the "unitized" motor offers either higher output for the same size, input and temperature rise; lower current input for the same size, output and temperature rise; or lower temperature rise for the same size, input and output. Manufacturer: General Electric Company, Schenectady 5, New York.

Small, inert-gas welding torch

A Heliarc torch, number HW-20, which is small enough to weld inside a 3-inch pipe and strong enough to carry 200 amperes on continuous-duty cycles, has been put on the market by the Linde Company. A high-velocity water-cooling system is one of the reasons that the torch can be so small

yet operate on large currents. According to the manufacturer, it is ruggedly constructed in spite of its size. An argon gas shut-off valve (for controlling inert atmosphere) can be mounted on the torch handle as an accessory. Manufacturer: Linde Company, division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y.

Mechanized gummed tape machine

Better Pack 555, the electric paper tape dispenser shown below incorporates several new features, which are designed to speed sealing, aid in handling mixed carton sizes rapidly, reduce fatigue in the operator, economize on tape, and activate the glue more thoroughly than other secure-closure machines. Eleven selector keys allow the operator to choose, by a light touch of the finger, the length of tape which is proper for the job to be done. Length-selector scales are available ranging from 6 inches to 36 inches, and from 15 inches to 45 inches. An extra release key allows the operator to select shorter or longer lengths if necessary. The manufacturer says that the varying-length selector is advantageous for speeding carton runs of mixed sizes.

A built-in heater keeps moistening water at the proper temperature for most efficient glue activation. Manufacturer: Better Packages, Inc., Shelton, Conn.

Silicon carbide foam

Pilot plant production of silicon carbide foam, a lightweight, corrosion resistant material with high porosity, and thermal insulating qualities up to 4000° F., has begun at The Carborundum Company. In all likelihood the material will be used in nuclear reactors, furnaces, missiles, and in some aspects of non-ferrous metallurgy. It is easily machined with standard steel tools, and can be made into complex shapes at close tolerances.

Foams are being used more and more frequently nowadays, because of their lightness, insulating properties and structural characteristics. The new silicon carbide foam, according to the manufacturer, will be a big help in supplying industry's need for lightweight, high-temperature insulation and for filters for hot or highly corrosive fluids. One of its advantages as a refractory material is that the foam structure makes it less likely to break. Sharp blows merely crush a small area, instead of smashing the whole piece.

The foam varies in density from 16 to 35 pounds per cubic foot; the densest foam can support weights of about 800 psi. Source: The Carborundum Company, Niagara Falls, New York.

Nylon snap bushings

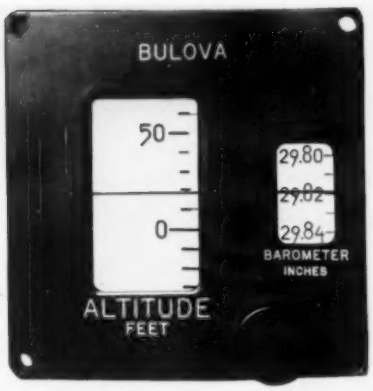
The nylon bushing shown above snaps into a ⅞-inch-diameter hole in an electronic equipment chassis, and locks there under finger pressure. No threaded holes or nuts are required to keep it in place, and it cannot be removed without compressing the step-clips on either side of it. Wire, cable, hoses or tubing can be run through the bushing, which provides insulation as well as a neat appearance. It may be used in panels of varying thicknesses, and is available in a number of inside diameters. Manufacturer: Heyman Manufacturing Company, 1200 Michigan Avenue, Kenilworth, New Jersey.

Sensitive, quick-reading altimeter

An altimeter sensitive enough to mark a two-foot change in altitude (at sea level), whose dial design is said to cut reading time in half, has now been developed by Bulova Watch Company.

In a conventional altimeter, readings are indicated by a pointer over a circular dial. In this one, figures are printed on a 40-foot tape which passes behind a window, so that the viewer sees only the figure showing his altitude and a few readings on either side. The manufacturer has conducted tests indicating that the average time needed to assimilate the information displayed by the instrument is 3.4 seconds, less than half of the 7.3 second average time needed to read a standard altimeter. A subsidiary dial shows pressure in inches of mercury corresponding to the altitude shown on the main scale.

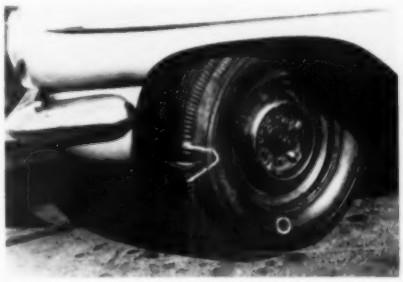
One of the reasons for the altimeter's



accuracy is the combining of three Melchior aneroid capsules in series. A Melchior capsule is a shallow, thin-walled metal can about three inches in diameter, evacuated and sealed. It expands at high altitudes as air pressure becomes lower; a change in air pressure corresponding to a 100,000-foot change in altitude causes the capsule to stretch ⅛ inch. The three capsules stretch a total of ⅜ inch. A magnetic detector and amplifier change the movement into electrical impulses to run a motor that causes the tape scale to turn past the window. Since the tape scale is 40 feet long, the movement of the capsules must be multiplied by about 1,300 times for the indicator to read correctly.

The electro-mechanical system transfers the output of the aneroid capsules electrically to the indicating mechanism, freeing them of all mechanical work except moving their own weight. This reduces friction and increases the sensitivity of the instrument to a point hitherto unknown in altimeters, and helps to shorten the time-lag caused by the purely mechanical transmission of information in a conventional altimeter. Altimeters are considered to be the cause of, or a major contributing factor to 28 accidents in the past five years.

The Air Force is testing 25 Bulova altimeters with a view to installing them in their planes if they prove as successful in practice as they seem to be in tests. Manufacturer: Bulova Watch Company, Inc., Jackson Heights, N. Y.



Solid "indestructible" tire

A plastic-foam-filled automobile tire seems to be bringing to realization a 50-year-old dream of the automotive industry of a safe, blowout-proof, airless tire that would provide as comfortable a ride as the conventional, inflated tire. Tests performed on experimental prototypes by the manufacturer, Dayton Rubber Company, indicate that the tire will not deflate even after extensive mutilation.

The tire is ordinary-looking from the outside, but it is filled with Polyrubber, a controlled density urethane foam of special formulation, instead of air. Polyrubber forms a permanent bond with both tire casing and metal rim, its adhesive power being as great as its cohesive power. Initial road tests indicate greater stability and less sidewise distortion during turning than air-filled tires, and better shock absorption, without any reciprocal "bouncing" effect.

Destructive tests included drilling holes in the tire, shooting it with dum-dum bullets, and finally cutting a three-inch wedge out of it. After each of these operations the tire was tried out. The filling remained intact, without dissipation or protrusion during subsequent driving.

Polyrubber has been used extensively in the manufacture of specialized aircraft and missile components and assemblies requiring a material that maintains high hysteresis (tendency to retain shape, and, when distorted, to return to it) and resilience under extreme conditions of corrosion, vibration, high pressure and exposure to the elements that distort natural and synthetic rubber.

The material is virtually inert to most chemicals, hydrocarbons, oxygen and other active substances.

At present there are no production plans, since the new tire has to be subjected to a complete series of developmental tests before being put on the market. Source: Dayton Rubber Co., Dayton, Ohio.

Flexible plastic magnet

A flexible magnet, made of vinyl plastic, is being produced by B. F. Goodrich Industrial Products Company. The magnet, which is said to react exactly like metal or ceramic magnets, can be produced in continuous lengths in diameters ranging from spaghetti-size to that of garden hose. It can be cut without changing its magnetic qualities, and, like magnetic recording tape, can be spot- or shape-magnetized. It is an electrical insulator.

Production is now about 17,000 yards a week, primarily for use as refrigerator gasket seals. The magnetic strip is placed inside a flexible vinyl gasket, which forms a perfect airtight seal around the perimeter of the refrigerator door; it is said to be a more positive closure than the spot

magnets now used. The cost of a magnetic-strip closure is competitive with that of a conventional latch.

The manufacturers believe that closures are the most logical, immediate field of application for the product. In addition to refrigerator door seals, there are excellent possibilities for the plastic magnet's use in automobile glove-compartment doors, compacts, jewel and cigarette boxes, and in irregularly shaped cases and containers.

Projected electrical uses include earphones for radios, telephone and hearing aids, and field magnets in miniature motors. The manufacturers say that possible applications exist in the toy industry and in such office-supply products as calendars, note-holders, bulletin boards, and paper-clip holders; and in the home for such things as kitchen note-pads, non-spilling shelves for spices and condiments, and sewing boxes. Manufacturer: B. F. Goodrich Industrial Products Co., division of B. F. Goodrich Co., Akron, Ohio.

Ballastless fluorescent lamp

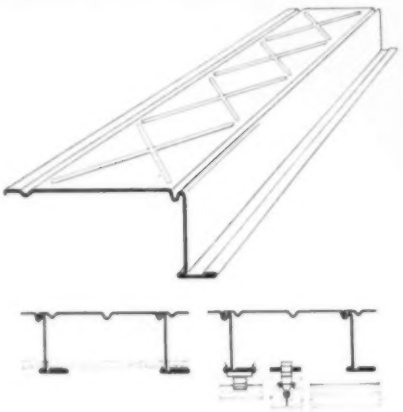
A fluorescent lamp that screws into an ordinary incandescent lamp socket, and requires no ballast or starter for operation, has been developed by Westinghouse. The lamp contains a built-in switch similar to that included in a conventional fluorescent starter, and an incandescent tungsten filament as a substitute for the large external inductor ballast usual in a fluorescent lamp. The use of an internal filament to replace the heavy external ballast customarily used with fluorescent lamps results in the important advantage that the filament emits light, adding to the total output. Fluorescent lamps produces most of their light in the yellow-blue-green range of the spectrum, which is excellent for visibility (the peak sensitivity of the human eye occurs in the 5,500 to 6,000 angstrom range of yellow light), while the incandescent lamp leans to the red end, which is a much warmer light. The combination of the two kinds of light in the new Westinghouse lamp makes for much more complete and pleasant total illumination.

The internally ballasted lamp can be made either double-ended or with the socket at one end. A threaded base can be applied so that the lamp can be used in a incandescent bulb socket. The lamp can also be made in various decorative shapes, permitting it to become a fixture as well as simple light source.

Although Westinghouse engineers are working with designers and architects to determine the scope of its application, there are no plans at present to market the lamp. Uses envisioned are as decorative and special-effects lighting sources in displays and public spaces. In the home the lamp could supplement or replace conventional bulbs; according to Westinghouse, the self-ballasted lamp would have far greater efficiency and several times the life of ordinary household incandescent bulbs. Source: Westinghouse Electric Corporation, Lamp Division, Bloomfield, New Jersey.

Heat resistant magnesium alloy

Quantity production of an alloy of magnesium, didymium and zirconium, which retains its strength at temperatures as high as 500°F., was begun recently. Because of its light weight, magnesium is excellent for certain missile and flying machine uses, but until now its rapid weakening at high temperatures held back its employment. According to the manufacturer, the new alloy has double the strength of any other light alloy at 500°F. Its mechanical properties are: ultimate tensile strength, 26,000 psi; yield strength, 16,000 to 19,000 psi. Manufacturer. Castalloy Company, Inc., West Central Street, Natick, Massachusetts.



Long-span roof decking

The salient feature of a recently developed low-cost, long-span steel roof decking is, according to the manufacturer, its adaptability. Called Fentura, it can be left exposed in industrial buildings, loading docks, canopies and similar installations, or can be finished with lighting troffers or any ceiling material in schools and offices. The illustration above shows the ease with which various kinds of ceilings can be applied to the new decking.

Fentura is made in a continuous cold-forming operation to insure uniformity of structure, and is available in 4½-, 6- and 7½-inch depth, in 18, 16 and 14 gage metal for spans of varying lengths. The basic unit comes in three types, which differ in configuration of the top, or compression, flange stiffening, so that maximum strength is achieved with a minimum number of sections. Spans of 32 feet and more are possible under certain roof-loading conditions. The longer lengths are provided for overhangs, double spans, and similar needs. The deck, with its continuous top sheet (see illustration) is easily adapted for use as a roof diaphragm against sidewise forces due to wind or earthquakes. Manufacturer: Fentura, Inc., 2250 East Grand Boulevard, Detroit 11, Michigan.

Fiberglass-reinforced film

A polyethylene film reinforced with fiberglass has recently been introduced by Gering Products, Inc. The film is lightweight and easy to handle; it is said it will not stretch or bag, and to be resistant to tearing. It is called Ger-Pak, and is supplied with ½- or ¼-inch mesh, transparent or black, in 4- and 8-mil thicknesses, in rolls of 100 and 150 feet. Manufacturer: Gering Products, Inc., North 7th Street and Monroe Avenue, Kenilworth, New Jersey.

Automated map-making

The Stereomat, a new instrument which automates the production of maps from aerial photographs by performing automatic profiling and semi-automatic contouring, has great possibilities in many fields which require fast, accurate mapping service, the manufacturer says. Its use in applying contour lines to aerial photographs might eliminate the need for conventional maps in many cases.

Up to now, elevation data were gathered from photographs by use of a manually operated device requiring a highly skilled operator. The gathering was the main bottleneck in the otherwise well developed science of photogrammetry. The new device is more reliable and accurate than the human eye and hand, and is at least five times faster, the manufacturer says. Operators will still be needed, but will be able to concentrate on problems involving judgment and interpretation.

The Stereomat is basically an automatic scanning correlator which can be mounted on conventional projection map plotters in place of manually operated stereo mechanisms. A cathode ray tube replaces the usual platen. Vertical movement of the tube and leveling adjustments for the projectors are controlled by servo motors. The instrument traces correct contour lines by means of a complex array of electronic, optical, and mechanical apparatus. Manufacturer: Benson-Lehner Corp., 11930 West Olympic Boulevard, Los Angeles 64, California.

Manufacturers' Literature Supplement

A bibliography of currently available technical brochures dealing with materials, methods, components, and machines

MATERIALS—METALS

1. **Rare Earths.** Research Chemical Division, Nuclear Corporation of America. Data sheet on rare earth metals, contains a price list of 16 of them: yttrium, lanthanum, cerium, praseodymium, neodymium, samarium, gadolinium, terbium, dyprosium, holmium, erbium, ytterbium, scandium, europium, thulium and lutetium.

2. **Equipment File for Metal Finishing.** Allied Research Products, Inc. Equipment file describes specialized finishing service as well as specific items of equipment. Specialized finishing service makes available to manufacturers one-source engineering, installation and service for complete finishing systems. Specific equipment covered in the file includes Wagner Silicon and Selenium rectifiers as well as Auto-Loaders.

3. **Steel Balls.** Sterling Commercial Steel Ball Corporation. 4 pp., ill. Describes products in which Sterling Carbon Steel Balls are used. Gives available sizes ranging from ⅛" to ¾" in diameter.

4. **Anodized Aluminum Screens and Grilles.** Morris Kurtzon, Inc. 8 pp., ill. Brochure describes Karvalum line of screens and grilles. Specifications, sizes, weights, etc., included. Also, list of available extruded aluminum sections and detailed drawings of typical installations.

5. **Open-web Steel Joists.** Ceco Steel Products Corporation. 28 pp., booklet #3001-0 and load table bulletin #3009-A. Booklet 3001-0 contains descriptions and diagrams of open-web steel joists, including Ceco's Series "S," "L," and "E/C." Series E/C are electrochannel joists whose top chords are replaced by hollow ducts which serve both as structural members and as underfloor electrical distribution ducts, allowing outlets to be wired at any point along the joist. Booklet is complete with tables of available dimensions, allowable loading, complete specifications, and recommended handling and erecting procedures.

6. **Structural Components for Aircraft.** Prewitt Aircraft Company. Brochure illustrates production processes for structure, sub-assemblies and other components for missiles, rockets, aircraft, marine and general industrial applications. Among products depicted are a pressurized battery box of reinforced plastic and an asbestos-phenolic nose cone, both used in missiles.

7. **Molybdenum Pricing Schedule.** Refractomet Division, Universal-Cyclops Steel Corporation. 22 pp. Price book covers molybdenum and its product forms and is the first of a series of complete pricing and availability manuals on Refractomet products.

8. **Martensitic Stainless Strip Steels.** Uddeholm Company of America. Book presents information on how martensitic stainless steels, usually alloyed with chromium and molybdenum, can be used in many applications previously restricted to straight high carbon strip steels. Three types of Uddeholm martensitic strip in particular are covered—with information on analyses, heat treating, and recommended applications.

9. **Pressure-sensitive Metallic Materials.** Decorative Products Division, Avery Label Company. Lists current uses in the design and decorating of products, new developments, and cost-saving advantages of the latest in pressure-sensitive materials. Contains swatches of available materials.

MATERIALS—PLASTICS

10. **Cellular Glass Insulation.** Pittsburgh Corning Corporation. 20 pp., ill. Catalog contains descriptive information on the uses of Foamglas insulation on roofs, parking decks, core walls, curtain walls, perimeters and ceilings. Drawings and specifications for typical applications, technical data, including charts for computing required U Value, are also included.

11. **Pipe Insulation.** Dow Chemical Co. 12 pp., ill. Brochure 157-57-58 gives sizes, uses, thickness of styrofoam pipe- and vessel-coverings.

12. **Rubber and Vinyl Flooring.** The Rubber Manufacturers Association, Inc. 16 pp., ill. Booklet contains data on the construction of rubber and solid vinyl flooring; colors and patterns; a summary of installation procedures and a data chart.

13. **Translucent Fiber Glass Panels.** Alsynite Company of America. 4 pp., ill. Leaflet (AE-458R) gives light and heat transmission values for 30 different Alsynite translucent fiber glass panels. Brief technical test reports on flammability, insulation value, load strength, impact and chemical resistance and other characteristics.

METHODS

14. **Gold for Industry and the Arts.** Chemical Division, Engelhard Industries, Incorporated. 12 pp. Contains both general and specific information about the many uses of various types of gold—24 kt., light yellow, pink and green gold. Data on Atomex® Immersion Gold Solution and a list of the metals that may be coated by this process are included. Also describes Chemical Division's new hydrogen-purifying unit that produces ultra-high-purity hydrogen by the Engelhard Palladium Diffusion Process.

15. **Corrugated Packaging.** Hinde & Dauch. 32 pp., ill. Book in two sections contains information on selection of the proper corrugated packaging for a new or existing product. The first section is devoted to basic corrugated box designs, the second to special corrugated box designs.

16. **Pressure-Sensitive Materials.** W. H. Brady Company. 12 pp., ill. Describes 20 most common pressure-sensitive materials used for marking, labeling, sealing, holding products and components manufactured in the industrial field. Illustrates case histories of made-to-order special

markers and includes technical and engineering application information on a wide range of tapes in chart form to enable the proper type of self-sticking material to be specified for end product use.

17. **How to Decentralize with Centralized Control.** Remington Rand Division, Sperry Rand Corporation. An 8-page article by Louis A. Allen, reprinted from a leading trade publication, discusses appropriate organizational structure for decentralization. This brochure should be of interest to management personnel, especially users and prospective users of Synchro-Tape typewriters.

18. **Rubber Printing Plates.** Markem Machine Company. Illustrated folder describes rubber printing plates used for marking products, labels, or packages, and facilities and services available including artwork, photography, engraving, and platemaking.

PARTS AND COMPONENTS

19. **Selsyns and Synchros.** General Electric Company. 16 pp., ill. Discusses Selsyn and Synchro generators, motors, control, transformers, differential generators, differential motors, tandem Selsyns, and system operation. These are electromagnetic devices for exetremely accurate transmission of electrical angular data between two or more points. Includes schematic and line drawings, figures, tables, charts, and dimension.

20. **Heavy Press Extrusions.** Harvey Aluminum. Brochure covers the design and production of heavy press aluminum extrusions.

MISCELLANEOUS

21. **Rotary Relays.** Couch Ordnance, Inc. Data Sheet describes and illustrates the 4C Relay CVE Type, which features a contact rating of 5A at 30 VDC, 4 PDT, and was specially designed to withstand military usage. Includes mechanical, electrical and environmental specifications, as well as mounting charts, contact rating curve chart, and coil data tables.

22. **Hexagon Nuts.** National Machine Products Company. 8 pp., ill. Data and specifications on hexagon nuts sizes ¼" to 3"; 12 Pointer Nuts sizes ¼" to ⅝" Conelok, Huglok and Marsden locknuts sizes ¼" to 1½".

23. **Hydraulic Piston Pump.** Dynex, Inc. Two bulletins (PF6006 & A-1), 2 pp. each, on a high pressure, axial piston hydraulic pump for mobile and industrial applications. Provides data on design, performance, displacement, horsepower, weight, installation, and application.

24. **Automatic Programming for Business Applications.** Remington Rand, Division of Sperry Rand Corporation. Folder U1507 reports origins and development of automatic programming, and of the most recent methods: Flow-Matic (for business) and Math-Matic (for science).

25. **Diamond Wheels for Carbide Grinding.** The Carborundum Company. 4 pp., ill. Brochure on diamond wheels (both natural and man-made diamonds) for carbide grinding, deals with bond types, infeed and table speeds, wet grinding, diamond concentration, types of wheels. Recommendations are listed on the 6 most common applications.

26. **Hardboards.** Weyerhaeuser Timber Company. Includes detailed drawings and descriptions of actual structural practices and principles for firm's hardboards.

27. **High Tensile Fasteners.** Elastic Stop Nut Corporation of America. 38 pp. Booklet gives high tensile fastener (nuts) design considerations; reproductions of all relevant NAS and MS bolt specifications; three tables cross referencing 160,000-psi, 180,000-psi and 220,000-psi bolts and nuts; and a complete set of high tensile self-locking fastener standard drawings.

28. **Abrasives Workshop.** The Carborundum Company. Periodical publication containing articles of interest to those having dealings with machine grinding and similar things.

29. **V-belt Drives.** The Gates Rubber Company. 32 pp., ill. Design in formation on the company's line of belts. Tables, charts, monographs.

30. **Hydraulic and Vacuum Piping.** Lenz Company. Helpful information about piping and fittings. Complete data on the company's tube fittings, flare fittings, pipe fittings, tube benders, etc.

31. **Wood Bibliography.** Forest Products Laboratory, Forest Service, U. S. Department of Agriculture. 14 pp. Semiannual supplement to lab's subject lists. Catalog papers and articles on many phases of wood chemistry, treating; logging; laminating; etc., some available from the laboratory, some at local libraries.

32. **Power Talks.** D. W. Onan & Sons, Inc. New series of pamphlets deals with the various technical phases of firm's electric generating plants, air-cooled engines, separate-generators, their operation, and their use.

33. **Industrial Sapphire.** A. M. Gatti, Inc. 26 pp., ill. An engineering, design, and specifications guide to the complex field of jewel bearings and other industrial applications of sapphire. Contains five sections: General information, which refers to the properties of industrial sapphire and the availabilities of material; jewel bearings, which designates the types, nomenclature, and tolerances of the five basic jewel bearing types; design data, which includes graphs, and formulae for calculating frictional losses, basic design factors, and listings of stock sapphire vee and ring jewels sizes; jewel bearing assemblies, which provides information on mounting methods, housings and typical engineering drawings; typical sapphire applications, which gives examples of the jewel's use in solving many industrial problems such as optical and infra-red windows, electronic control devices, wear parts, etc.

34. **Plywood Catalog.** North American Plywood Corporation. Covers range of plywood from standard types to rare and exotic limba, gaboon, teak and other distinctive woods from Africa, Asia, Europe and the Philippines. Sizes, thickness and other important descriptive details of interior, exterior and marine grades are presented.

35. **Masonite Panels.** Masonite Corporation. Two new guides for designers—Masonite Panel Products for Interior Applications and Masonite Panel Products for Exterior Applications—contain tables showing properties and available sizes, descriptions of various hardboard types, directions for working with Presdwood, application details, and architectural specifications.

MANUFACTURERS' LITERATURE

This popular service for INDUSTRIAL DESIGN's readers makes available copies of technical literature of wide interest.

To request any of the bulletins listed on the preceding pages, just use the prepaid postal cards. The brochures are divided into general categories to make it easier to find what you want. Any literature that interests you may be obtained by circling the appropriate numbers on one of the attached cards and dropping it in the mail.

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Coming in the June 1959 *issue of*

INDUSTRIAL DESIGN

Architecture and Industrial Design

As building design becomes influenced more and more by space-planning studies and prefabricated components, the work of industrial designers and architects tends increasingly to overlap. ID will examine the relationship between the two fields — how they affect each other — in a series of case studies on industrial designers who practice architecture and/or are involved in the design of architectural products, and on architects who have become directly involved in industrial design.

Fastening Techniques

Part 1 *of a three-part series will investigate welding techniques and their special applicability to various kinds of materials. Included will be such conventional methods as arc-welding, resistance-welding, brazing, and soldering, along with the newer methods of ultrasonic welding and magnetic-force welding. Part* 2 *of the series, to follow in July, will cover the field of mechanical fastenings; part* 3, *in August, will cover chemical methods of bonding.*

Design Office Study

Number 3 *in a series on the internal operations of design offices will explore the working methods, the research techniques, the design staff set-up, and the client relations of Francis Blod Design Associates, a New York firm that specializes in package design.*

Boat Hull Design

In a sequel to ID's January story on Johnson outboard motors, John Beinert, industrial designer and boating enthusiast, will discuss the problems of designing hulls for the consumer who may or may not relate the size of his motor to the size and structure of his boat.

Design Review

Overseas products displayed in May at the World Trade Fair in New York's Coliseum will be culled for significant design developments in the more than 60 *countries represented in the show.*

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MISCELLANEOUS

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Index to Advertisers

For Your Calendar

May 20-21. Building Research Institute conference on building illumination. Statler-Hilton Hotel, Cleveland.

May 22. Society of Plastics Engineers' regional technical conference: encapsulation, printed circuits, etc. Van Orman Hotel, Fort Wayne, Indiana.

May 25-28. Design Engineering Show. Convention Hall, Philadelphia.

June 1-20. 27th International Samples Fair, Barcelona. U.S. exhibit by Charles H. Clarke, Office of International Trade Fairs.

June 1-September 15. "Glass 1959". Exhibit at the Corning Museum of Glass, Corning, New York.

June 7-21. International Trade Fair. Poznan, Poland.

June 9-30. "Swedish Textiles Today". California Palace of the Legion of Honor, San Francisco. (Smithsonian Institution, traveling exhibit.)

June 9-30. "British Artist-Craftsmen". Lincoln, Mass. (Smithsonian Institution, traveling exhibit.)

June 11-13. Annual meeting of the Manufacturing Chemists' Association. White Sulphur Springs, West Virginia.

June 14 - August 16. "Fulbright Designers". Hagerstown, Maryland. (Smithsonian Institution, traveling exhibit.)

June 14-18. Semi-annual meeting of the American Society of Mechanical Engineers. St. Louis, Missouri.

June 14 - July 31. "Contemporary Indian Crafts". Minneapolis. (Smithsonian Institution, traveling exhibit.)

June 17-27. International Plastics Exhibition, London.

June 19-21. Third Conference of American Craftsmen, sponsored by the American Craftsmen's Council: purpose and use of craft products, the craftsman's education, etc. Silver Bay, Lake George, New York.

June 21-27. Aspen International Design Conference. "Communication: the Image Speaks". Aspen, Colorado.

June 22-24. Fifth annual creative-problem-solving institute. University of Buffalo, Buffalo, New York.

June 22-26. Western Summer Market. Western Merchandise Mart, San Francisco.

June 22-26. American Institute of Architects' 1959 convention. New Orleans.

June 22 - July 3. "Creative Engineering and Comprehensive Design". Course at Stanford University, Palo Alto, California.

June 24-26. Symposium of the nuclear industry division of the Instrument Society of America. Idaho Falls, Idaho.

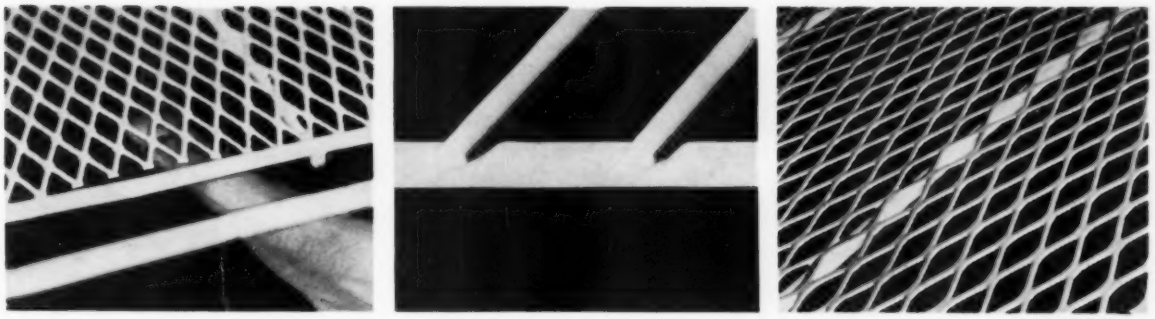
June 30 - August 10. Soviet Union Exposition. New York Coliseum.

June 30. "Plastics for the Automotive Industry". Regional technical conference of the Society of Plastics Engineers. Sheraton-Cadillac Hotel, Detroit.

July 3-18. International Trade Fair, Chicago. Navy Pier Exhibition Hall.

July 6-10. Second annual institute in technical and industrial communications. Colorado State University, Fort Collins, Colorado.

July 25 - September 5. American National Exhibition in Moscow. Moscow, U.S.S.R.



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