INDUSTRIAL DESIGN

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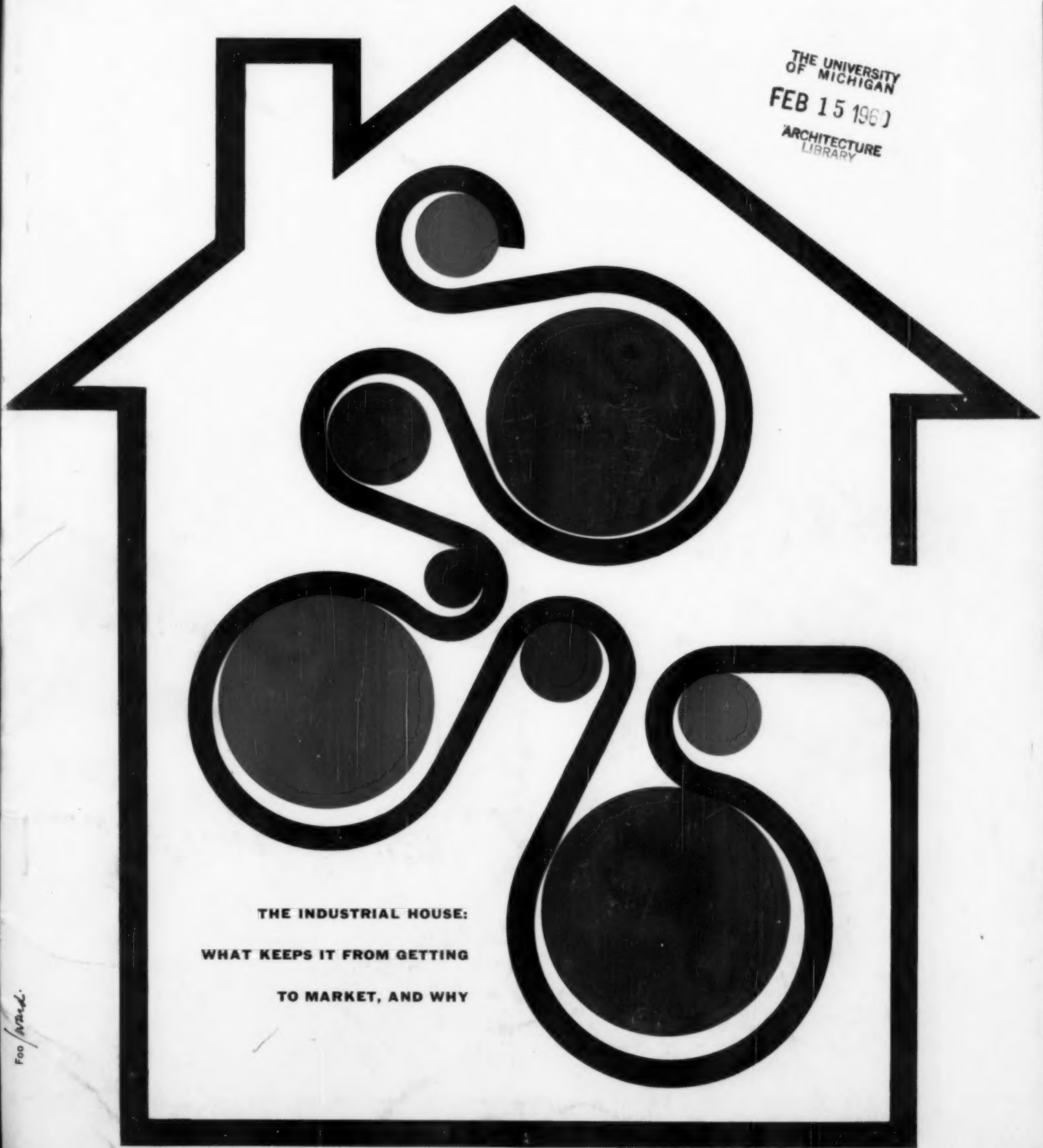

THE INDUSTRIAL HOUSE:

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TO MARKET, AND WHY

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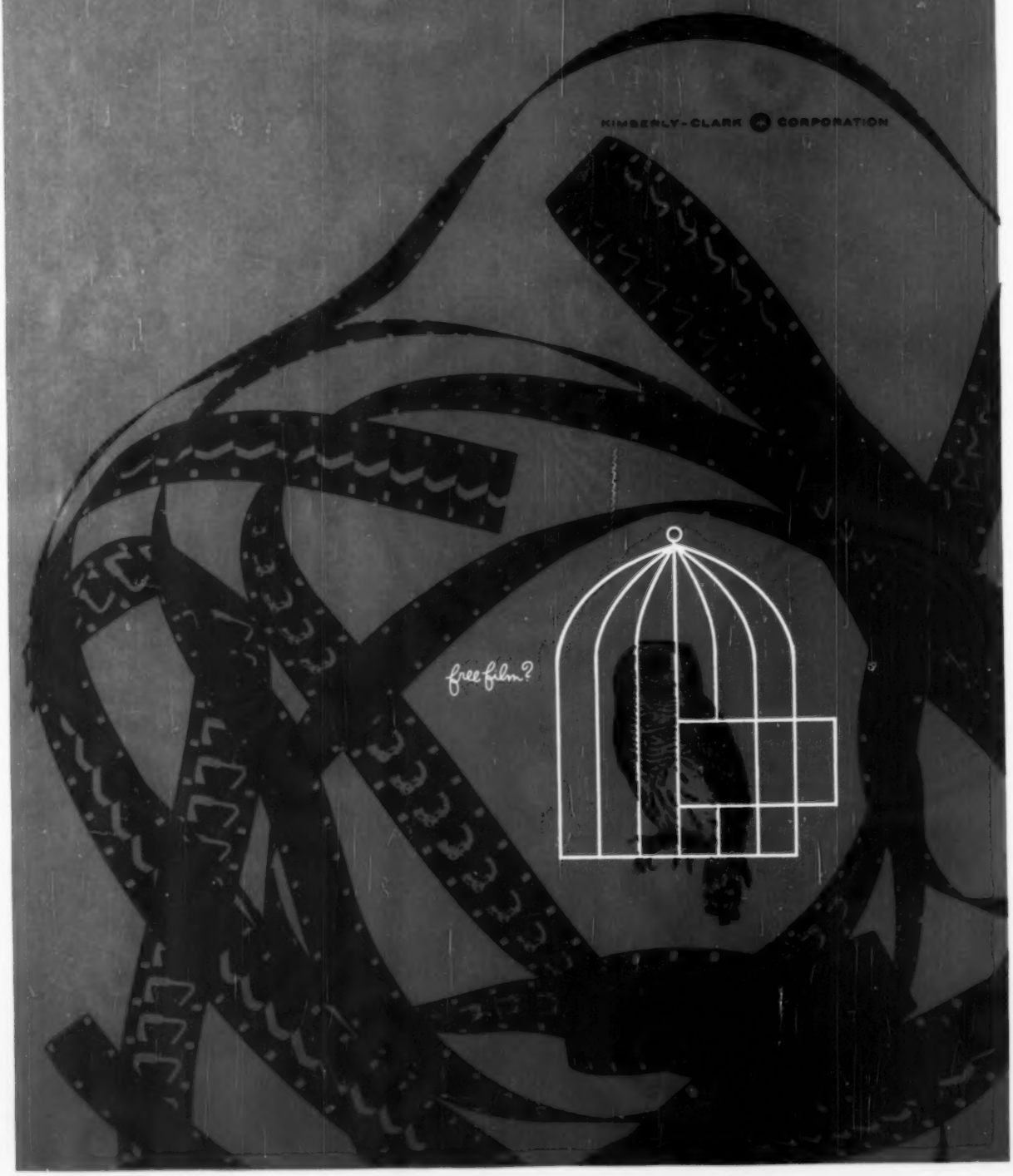

FEBRUARY, 1960 VOLUME 7 NUMBER 2

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.

CONTENTS

Coming

IN MARCH—A comprehensive survey of contemporary European design thinking.

IN APRIL—Reports on film making for industry and on design in Israel.

COVER: Mei Lou Foo and Jim Ward collaborated on our February cover to draw a house out of an assembly line. The past and the future of prefabricated houses are further explored in the article that begins on page 38.

FRONTISPIECE: The partially prefabricated house is a growing part of the construction scene today, as evidenced by these pre-assembled rafter plates in an experimental house sponsored by the Douglis Fir Plywood Association.

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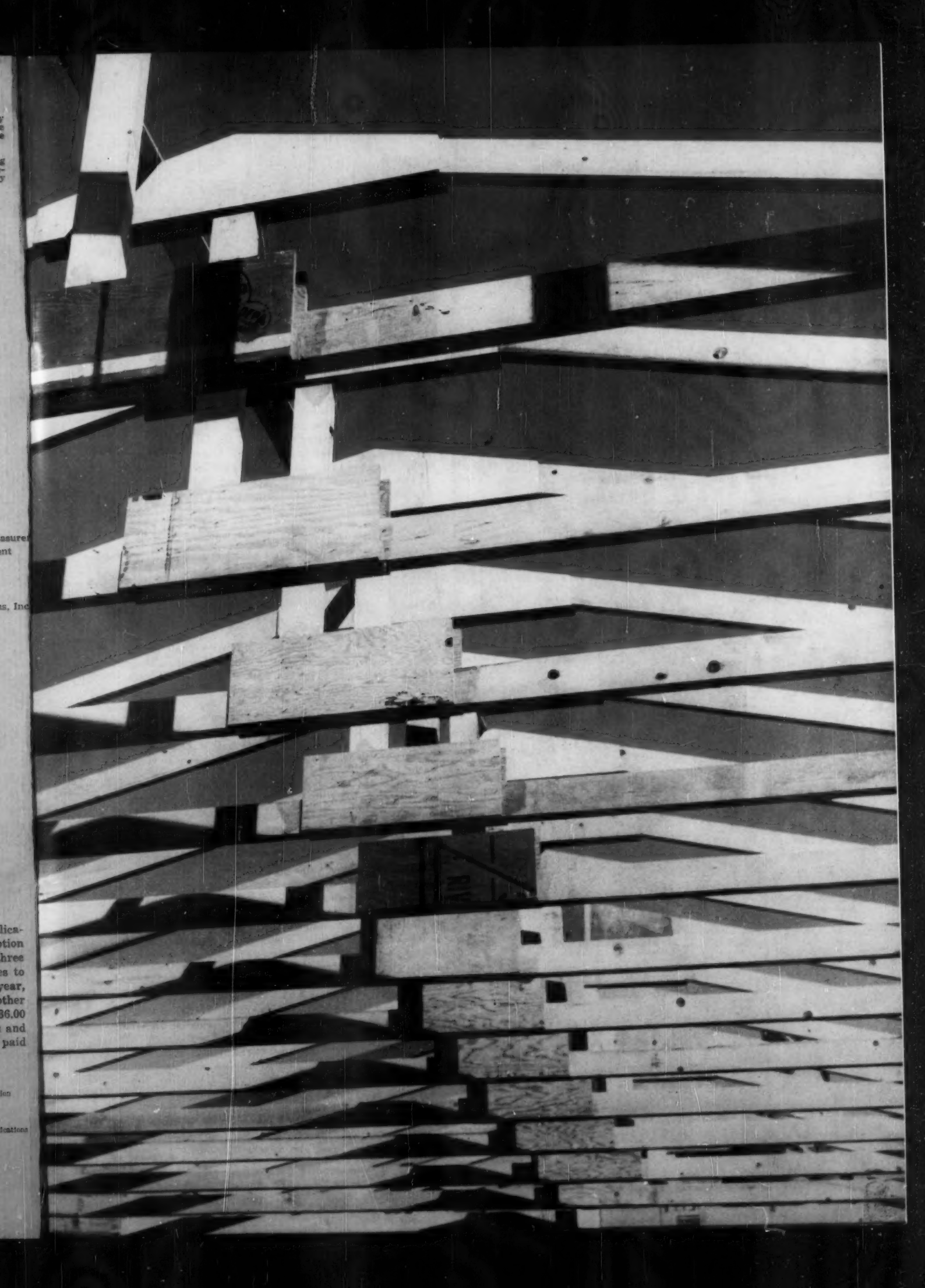


in this issue...

Blake

Peter Blake's prog ess report on the industrial house, page 38, is the product of his interest in both architecture (a member of the AIA, he is a practicing architect, chiefly in the New York area) and industrial design (his writings on the subject include the history of the Hardoy chair, written jointly with Jane McCullough, which appeared a couple of years ago in *Harpers*). He is presently Associate Editor of *Architectural Forum*, and is a former Curator of the Department of Architecture and Design at New York's Museum of Modern Art. He has designed two government exhibitions: the section on U. S. architecture included in the Moscow Exhibition last summer and the American contribution to the Interbau exhibition in Berlin in 1957.

Kjaerholm

Poul Kjaerholm, the designer of Danish furniture with a difference (page 60), was born in 1929, became a cabinetmaker at nineteen, and from that day has never looked back. He graduated from the School of Arts and Crafts in Copenhagen in 1952, started to teach at the school that same year, and has since worked in the studios of Erik Herlow and Hans Wegner. His own work is on exhibit in museums in Denmark and Norway, and his furniture has won a series of prizes at home and abroad—notably, a Grand Prix at the Milan Triennale in 1957 for his lounge chair of steel and leather. Kjaerholm is a designer of exhibits as well as of furniture, and is presently teaching furniture design at the Royal Academy in Copenhagen.

Malone

Robert A. Malone, whose reflections on design appear on page 56, says he began his art education at the 1939 World's Fair, when he was twelve. He continued his education somewhat more formally at Wesleyan University and at Yale, where he studied under Albers and designed a zoo under Kiesler, in which, he says, he "came to grips professionally for the first time with the problem of man's structure and function in relation to his environment." He is now Chairman of the Design-in-Industry Department at the Parsons School of Design, and maintains a private practice in design.

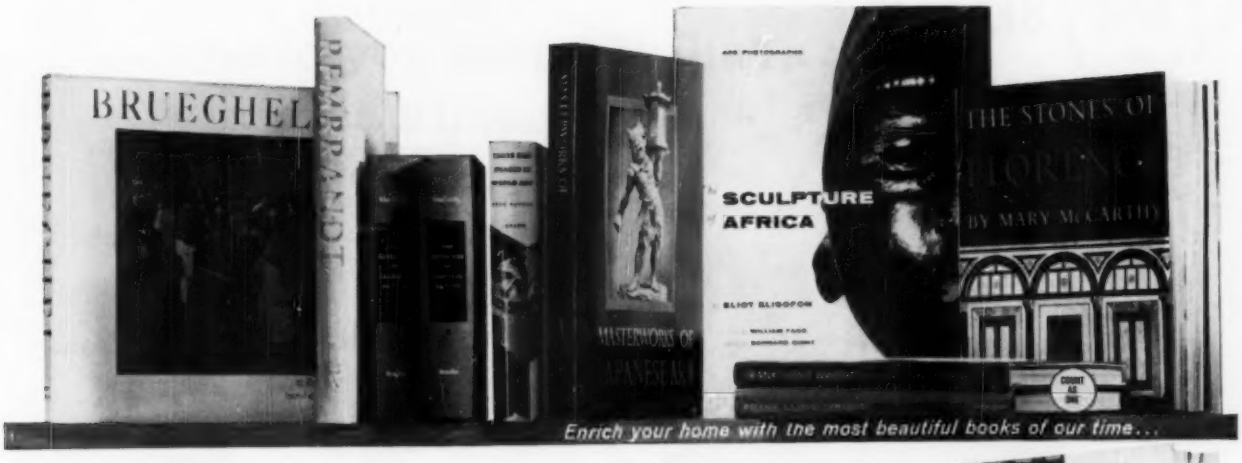
Sudo

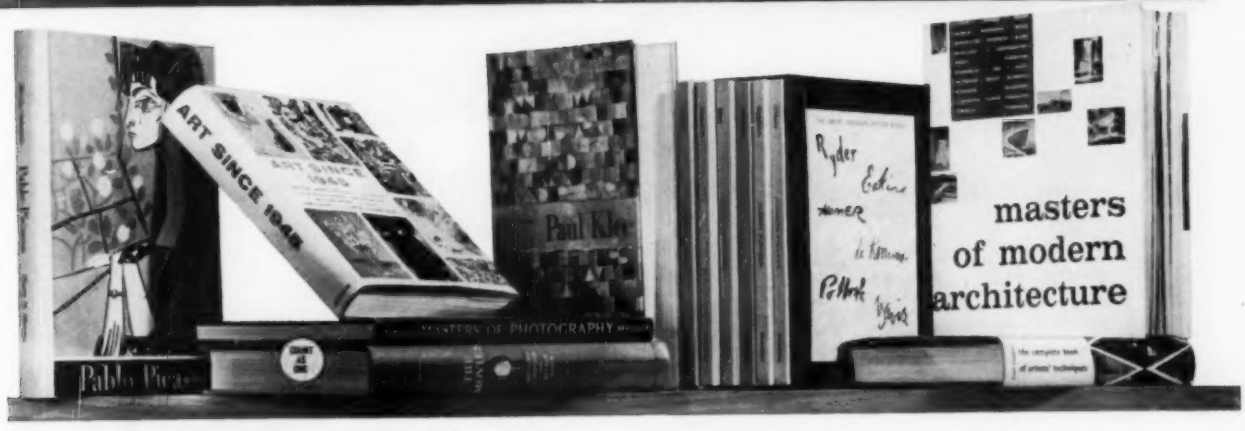
Masaji Sudo is Professor in Charge of the Design Branch at the Tokyo University of Arts, Arts and Crafts Division. The work of seven of his students appears on pages 76 and 77, and evidences the promising quality of young Japanese designers—a quality so far unmatched by quantity. Both Japanese design schools (the other is at Chiba University) graduate a total of only about thirty industrial designers a year, and it has been estimated that the Japanese economy could use at least six times that number.

Gwynn's Smith

Daniel Last

Frederick Gwynn, whose character Mr. Smith (page 70) finally gets the martini (see cut) is Chairman of the English Department at Trinity College. His years of involuntary research into what's wrong with packages led to the article on page 68. Mr. Gwynn is the editor of *College English*, and has taught at Harvard, Penn State, and the University of Virginia. He is the co-author, with Joseph L. Blotner, of *The Fiction of J. D. Salinger*, and is one of the editors of *The Case for Poetry: a New Anthology*, and of *Faulkner in the University: Class Conferences at the University of Virginia*. His study of *Sturge Moore and the Life of Art* appeared in 1951.





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LETTERS

What's missing?

Sirs:
I regret that your article on Street Furniture in the November issue of ID neglected to deal with one of the most important items of all: What the Englishmen call, with suitable dignity, the "public convenience."

Perhaps the most important study on the subject is Holdendorff's eleven volume "Introduction to the Methodology of Public Convenience Research." This is not yet available in English and the original German edition was never distributed in this country, so far as I am able to determine. However, Holdendorff's essential theory is well known among students of the subject. A brief summary of this theory might be helpful to you.

Simply stated—though the issues are far from simple—Holdendorff's Law may be phrased as follows: "The Public-ness of the convenience increases as one approaches the Equator and, conversely, decreases as one nears the pole."

For example, Professor Holdendorff points out that public conveniences in northern nations, like Germany and the United Kingdom, are normally under ground. As one moves into France, the structures move above ground, as in the case of the Paris pillbox, which even ventures to expose the user's ankles. (In the appendix to Vol. IV, Holdendorff notes, in passing, the inventiveness of the Paris advertising community, who have used the exterior walls to advertise the very beverages that encourage consumers to make maximum use of these conveniences.)

Moving further south, to Italy, one finds that the design of the public convenience is further simplified to a pair of partitions, projecting from the side walls of buildings, both public and private. Significantly the dimensions of these panels decrease as one moves south, until in rural Sicily the public-ness of the convenience is left entirely to the discretion of passers-by. (In the appendix to Vol. VIII, Prof. Holdendorff advances the startling theory that the unique weathered quality of Italian stonework may have less to do with climatic factors than with the design or location of the P.C.)

Holdendorff's speculation about the absence of public conveniences in the United States is particularly noteworthy. His theory is that a nation that has succeeded in breeding citizens who do not perspire—admittedly, with the aid of externally applied chemical compounds—may also have succeeded in developing a populace that no longer requires the public convenience.

DON HOLDEN
New York

Design and Research

Sirs:
Mr. William Capitman, one of the panelists at the Southern New England symposium of the IDI, made some remarks (ID, November, 1959) perhaps designed to be provocative; but on second evaluation I believe it is time that a statement be made on the method and thought by which the industrial designer arrives at a particular solution. Mr. Capitman engages in market research, but it is erroneous for him to think —as he states—that a "hunch" is a factor in determining the direction of a new product. His peculiar interpretation of the architectural "starkness" apparent in our new buildings—particularly on Park Avenue—is also one of his pet gripes.

There are so many contradictions in the way a researcher goes about impressing his audience and snaring a client that it is time we, as designers, speak up. Research has its place, but not in the field of industrial design, where creativity plays such an important role. There is no method by which you can do market research and then write a successful play, or create a successful new product. But you can find out the likes and dislikes of people if you present them with ten packages and ask them which label they like best. (This is being done constantly by all the good package designers.) Even in this area the industrial designer has made telling contributions. When Raymond Loewy was asked by the Lucky Strike people how to improve their dark green and red package with the bullseye, his answer was instantaneous—"Make it white." This suggestion still holds today. Was it based on a hunch? No.

However, every time any major effort has been put into market research for a three dimensional product it has ended in a bewildering farce. General Motors questioned whether the public wanted chrome or fins, others inquired whether radios should have four or six legs, and any number of other examples can be cited. After much prodding these scientifically prepared questionnaires came back with the information that people like—or disliked—an existing fact.

The primary concern of the industrial designer, however, is to open new horizons and new methods of approach to both form and function. He has to contend with pressures from sales managers, product development experts, top management—including promotion and advertising—and now the sterile research expert. I believe the latter should be called in only when something has really gone sour, to find out why.

It took a long time for Detroit to wake up to the fact that a new compact car was needed in this country, while their research was mainly concerned with how much chrome they could put on.

This seems a good occasion for a definition which will dispel the references to the so-called "hunches" that the industrial designer is supposed to indulge in. The creative drive is the result of unconscious accumulated experience, and mastery is the ability to release this drive at will. This is the stuff that the industrial designer is made of. This is the manifestation of the new professional man of this age—the industrial designer.

JOHN VASSOS
New York

The right pitch

Sirs:
May I commend you for the article in the November, 1959, issue, entitled "The Way The Ball Bounces." Your artful contrast of football vs. baseball with the captions "violent and warlike, vs. pacifists and genteel" should prompt all readers to remain with the display indefinitely. I did.

I am more familiar with baseball and wonder if these current players appreciate the efforts of the manufacturers of equipment in improving their defensive play—such as that huge mitt for first basemen.

SID C. KEENER
National Baseball Hall of Fame and Museum, Inc.
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Addenda

In the December (ADR) issue the following credits have been added: the designers of products numbers 42, 203 and 318 are members of Harley Earl Associates; the grille of product number 98 was fabricated by Plaxall, Inc.; product number 103 was designed by Lawrence Levow, staff designer, and Roy Trohaska, consultant; and product number 186 was designed by Peter Schladermundt.


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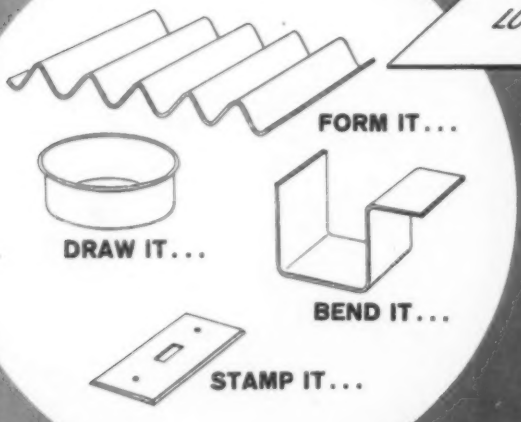

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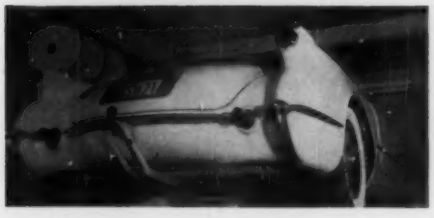

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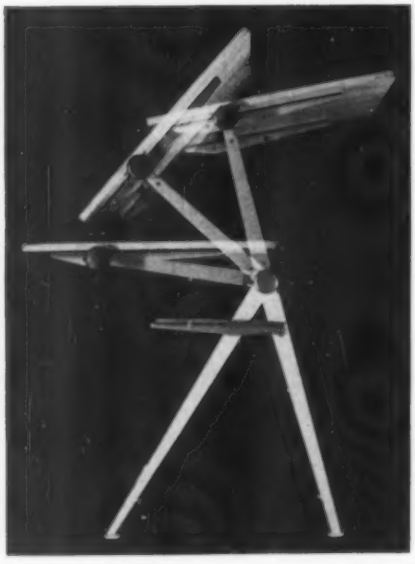
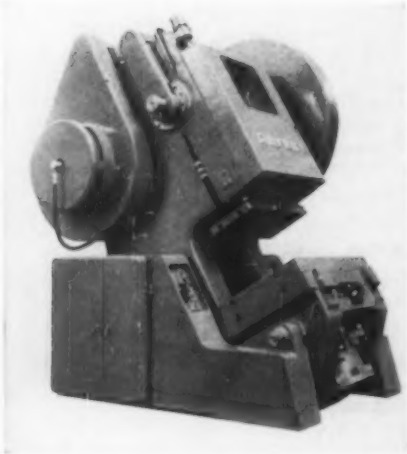
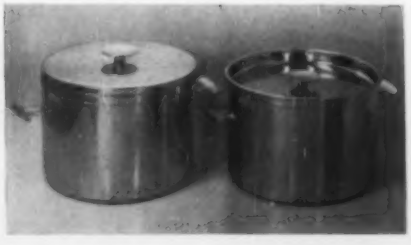






Belgian design show

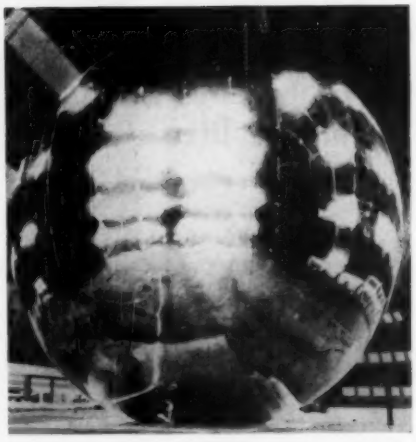
As part of the celebration of its 100th anniversary, the Brussels department store, Au Bon Marché, will mount a three-week international industrial design sales-exhibition on February 18th. Some 300 to 400 products from 15 different countries will be shown to promote sales of the products and, according to the sponsors of the display, "to familiarize the Belgian public with present-day esthetic and functional values and to spread knowledge and appreciation in Belgium of industrial design." The show has the patronage of ICSID and is being organized by Le Signe d'Or Industriel the Belgian industrial design association. Among the products on display will be some of the winners (left) of the Signe d'Or (Golden Signet) competition of last October. These include: a student's folding drawing-board (top), called the "Re-ply," designed by W. Rietveld and manufactured by N. V. De Cirkel (Holland); an inclinable press (middle) designed and manufactured by Ateliers Hubert Raskin (Belgium); and "Zilmeta" casseroles designed by Dick Simonis for Gerofabriek (Holland). About 40 American products will be shown, but final selections have not yet been announced.

Plastic satellite will be launched

Neither conceived by Jules Verne nor built by Hollywood, the balloon shown above, right, is the main item in the National Aeronautics and Space Administration's "Project Echo." Bearing a micro-thin coating of aluminum, the balloon stands ten stories high, has a diameter of 100 feet, and is made of an expandable plastic film (DuPont Mylar) only 0.0005 inches thick. Later this spring, NASA will rocket three such balloons into an orbit 1,000 miles above the surface of the earth and covering all countries lying between latitudes 50°N and 50°S.

Purpose of the project is to determine the feasibility of using such satellites as passive reflectors for a global ultra high frequency communications system. UHF radio signals (tv, for example) are not reflected by the ionosphere; which is why UHF communications are presently limited to direct transmission only as far as the horizon, or to indirect transmission through cable.

The balloon was designed in NASA's Langley Research Center in Virginia; fabrication was the result of a collaboration among: National Metallizing Corporation (who provided the aluminum coating), General Mills (who cut and prepared the film provided by DuPont), and G. T. Schjeldahl and Co. (who assembled the pieces of metallized film).

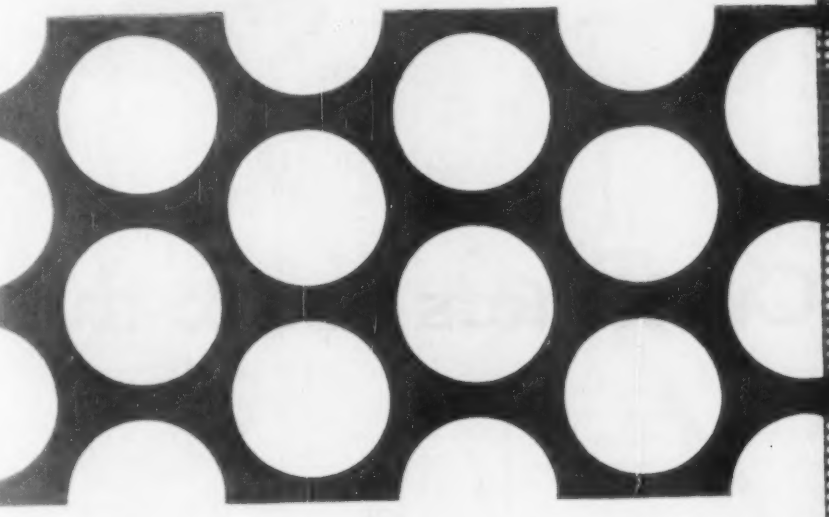


NASA made a preliminary launching of a 100-foot sphere late last October. The balloon was packed in a 28-inch ball in the nose of a rocket carrier. After ejection 250 miles above the earth the balloon was inflated by the vaporization of four pounds of water carried inside the package. Similar methods will be used in the coming launchings.

Packaging show scheduled for April

The American Management Association's 29th National Packaging Exposition and National Packaging Conference will open its four-day stand in Convention Hall, Atlantic City, on April 4th. For the exposition, some 300 firms will mount displays of the latest developments in packaging machinery and equipment, materials, and services. The conference will take up problems in the economics of package production, the integration of package development in new product programs, "creativity" in packaging, and problems of package promotion and merchandising for industrial products. The list of conference speakers includes Karl Fink (Karl Fink and Associates, New York), Walter Stern (technical director of packaging for Raymond Loewy Associates, New York), and Saul Bass (Los Angeles).

H&K



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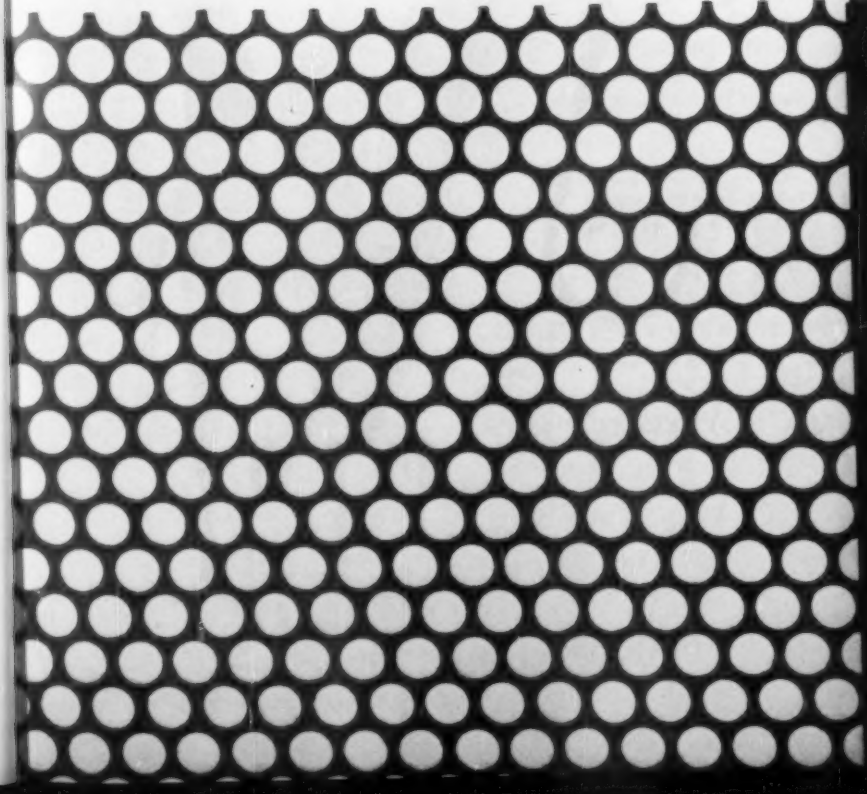

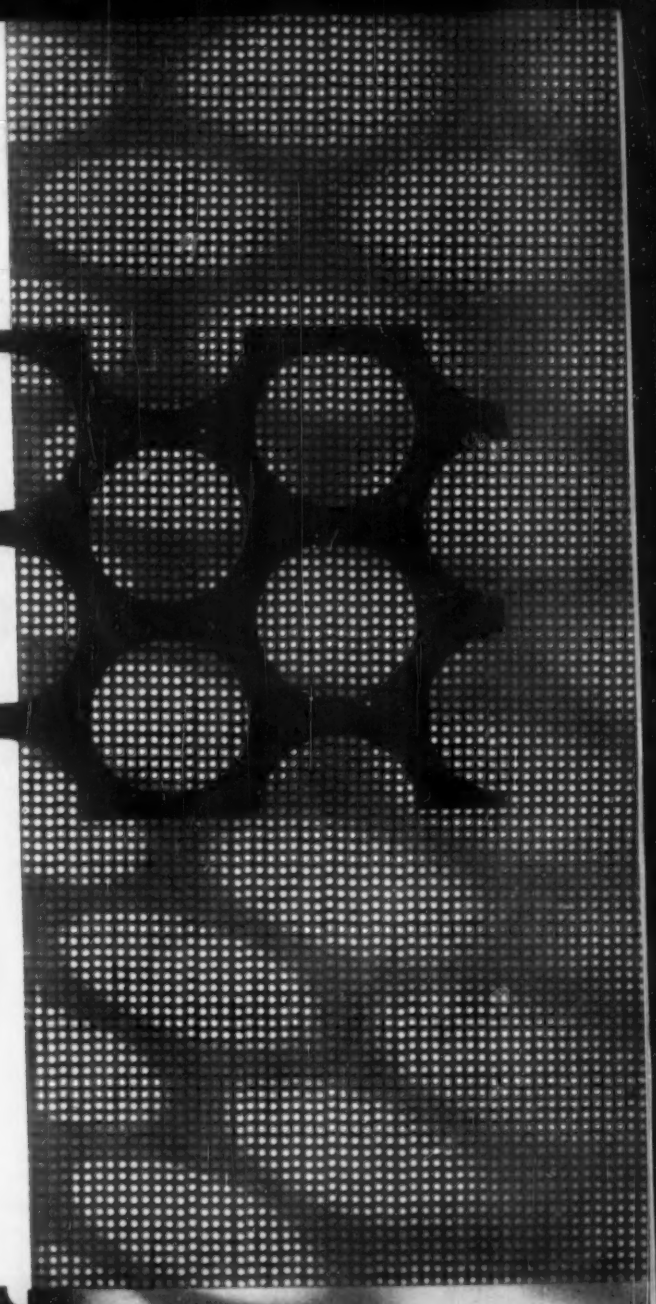

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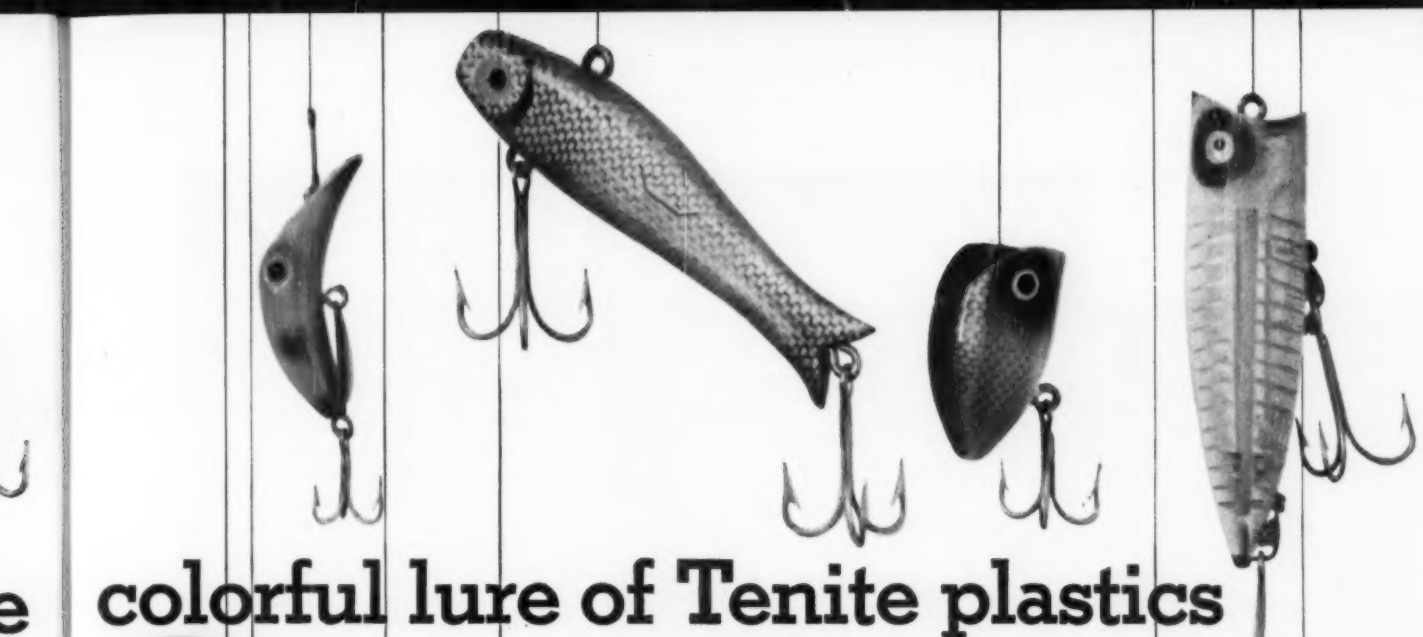
We'll be glad to mail you names and addresses of over 60 manufacturers of lures made of Tenite Butyrate.



colorful lure of Tenite plastics

■ *To sell a product once, make it attractive.* ■ *To sell a product over and over, make it dependable.* ■ *To make products that are both attractive and dependable, make them of tough Tenite plastic.*

The fish lures shown here are a good example of how the properties of the versatile Tenite plastics can be matched to the demands of a specific application. Made of Tenite Butyrate, these lightweight lures have a buoyancy that permits them to dart and wiggle through the water with graceful, realistic vigor. Yet not even the most savage jaws will break them, so tough is the plastic. Moreover, the plastic bodies undergo little change in salt or fresh water, since Butyrate resists water absorption and neither rusts nor corrodes. Color effects, too, are lasting...for they're applied with durable lacquers that form an integral bond with the plastic.

Is Tenite Butyrate or some other Tenite plastic a possible answer to one of your own material problems? Easy and economical to injection mold or extrude, these Eastman plastics are available in clear transparent or in any color you desire...transparent, translucent, opaque, pearlescent or variegated. Versatile Eastman plastics include Tenite Butyrate, Tenite Acetate, Tenite Propionate, Tenite Polyethylene and Tenite Polypropylene. EASTMAN CHEMICAL PRODUCTS, INC., subsidiary of Eastman Kodak Company, KINGSPORT, TENNESSEE.

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ACETATE • POLYETHYLENE
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plastics by Eastman

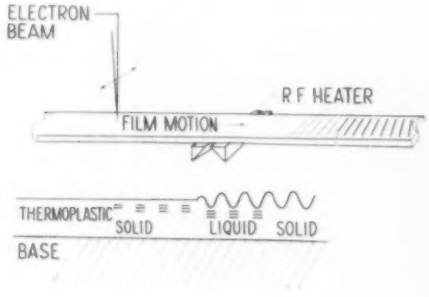
Above, Dr. Glenn plays back TPR recording of tv broadcast through modified photo-film projection gear. Schematic diagram below shows how TPR recordings are made.

GE displays new recording method

Microscopic ripples in a thermoplastic film are causing more than inaudible murmurs of interest and wonder (and, among magnetic-tape recording people, apprehension) in the electronics industry. General Electric Company three weeks ago made public a report on the development of a new method of electronic recording, storage, and play-back of audio and video information.

Called "thermoplastic recording" (TPR), the new system, still in development, was invented by Dr. William E. Glenn of the GE research labs. TPR will record audio or video (black-and-white or color), will store quantities of information in unheard-of concentrations (24 volumes of the Encyclopedia Britannica on a reel the size of a spool of thread), and will play back this information either in the form of an electrical output signal or by a simple modification of standard photographic projection equipment (above). As with magnetic tape, information can be erased and the reels re-used. TPR thus combines many of the features of both magnetic-tape and photographic methods of information recording, adding the speed and miniaturization characteristic of many current developments in electronics.

A TPR recording is made (diagram, above) by an electronic beam which charges the thermoplastic coating of a strip of film similar to motion-picture film. As the film moves along through the recorder, that part which has been charged is heated to a point where minute ripples are formed in a physical pattern corresponding to the electronic "pattern" of the charge. Thus, the information is "frozen" for storage and playback. This process takes a fraction of a second. (Erasure is



made by re-heating the film to a higher temperature. This causes the plastic to reform itself in its originally smooth state, which, in turn, destroys the electronic charge.)

By special modification of the optics of a standard projector—a very simple modification, according to Glenn—the original electronic signal of a TPR video recording can be displayed visually, either in black-and-white or in color.

At present, GE officials see many military applications for TPR, in such areas as radar and infrared detection, electronic countermeasures, missile guidance, and radio communications. GE also has its eye on commercial applications, in competition with photographic film and magnetic tape. But Harold A. Strickland, Jr., vice-president and general manager of the Industrial Electronics Division, admits that "considerable work must still be done before commercially practical equipment can be made available for potential commercial markets."

Americans as advisors

Peter Muller-Munk and Paul Karlen, partners in Peter Muller-Munk Associates, Pittsburgh, have accepted a joint assignment to initiate and establish product development programs for the European Productivity Agency of the Organization for European Economic Cooperation. The two designers will spend a total of 14 months in the 17 OEEC countries, developing seminars and workshops in industrial design techniques. Mr. Muller-Munk will begin the project in Paris on March 5, and Mr. Karlen will assume his duties in September.

IDI policy statement

Officers of the Industrial Designers Institute have just announced the result of an effort to rethink the organization's objective, especially in regard to admission standards. After its first meeting of the year, held last month in New York, IDI's Executive Board, headed by President H. Creston Doner, issued the following statement:

"Heretofore, the profession of industrial design has been defined as dealing only with design of mass-produced, three-dimensional products, despite the fact that the practice for the past twenty years or more has been a comprehensive design service. The industrial designer practices the art of directing the attractive transformation of all kinds of materials into useful objects and structures for mankind. He may be involved in design as a practicing designer, design manager, design consultant or educator. His work may encompass numerous activities in such fields as consumer goods; general furnishings; transportation; design for business, industry, institutions and government; three dimensional display and exhibits; packaging and specialized fabrics for mass production.

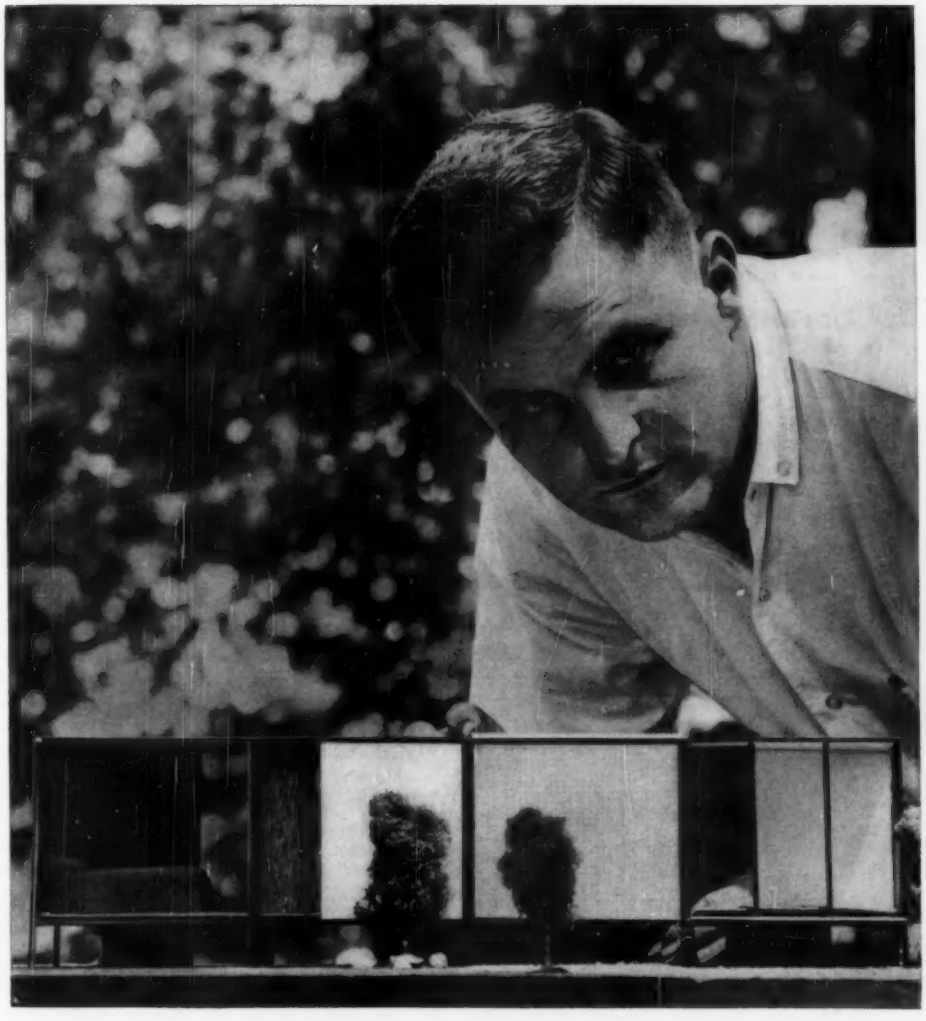
"In effect every major design office in this country has been engaged in design in several of these areas. Design staffs of most manufacturers participate in many phases of company design.

"Within this concept, which recognizes the scope of the 'comprehensive designer', the standards and qualifications for membership which have been established by the IDI are to be maintained, improved and defined in greater detail."

The Board will issue a more detailed statement of IDI admission standards in the near future.

Canadian packaging conferences

The Packaging Association of Canada has scheduled its National Packaging Conference for March 8-9 at the King Edward Sheraton Hotel, Toronto. Highlight of the event will be a day-long international (Canada, England, USA) symposium on product and package images.



ALCOA
STUDENT
DESIGN
AWARD

Above — William E. Stumpf and James R. Shipley, head of the Department of Art, University of Illinois

WILLIAM STUMPF'S MODULAR ALUMINUM MOVABLE HOME won him an Alcoa Student Design Award in his senior year at the University of Illinois. This award is part of a fully integrated Alcoa program with leading design schools and is administered under the direction of the school faculty.

His goal was to develop a new concept in completely versatile living—a home which could grow in size and still be mobile. His research showed an interesting fact, 75 per cent of mobile homes are moved by specialists *just once* to a preselected homesite. This study, and his own design solution to the problem, convinced instructor Edward J. Zagorski, assistant professor of art, and the jury that Stumpf's work was handled in an imaginative and professional manner.

Aluminum cubes on a 10-ft modulus are the building blocks of Stumpf's design. They can be joined horizontally or stacked vertically, modified to suit many choices in curtain wall materials. The cubes are trucked from dealer to site, can be disassembled and relocated easily. Elimination of running gear cuts costs, breaks artificial size limits, improves appearance.

Stumpf chose aluminum for many reasons: it's lightweight for transportability, corrosion resistant for long life, easily textured and colored for beauty, economical to form and fabricate. Walls of Alply* panels—a foamed plastic-aluminum "sandwich"—are structurally strong, high in insulating value. This Alcoa Student Award is another in a series intended to encourage and reward college students who already show great promise as designers.

*Trademark of Aluminum Company of America

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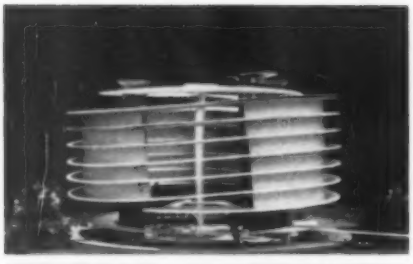
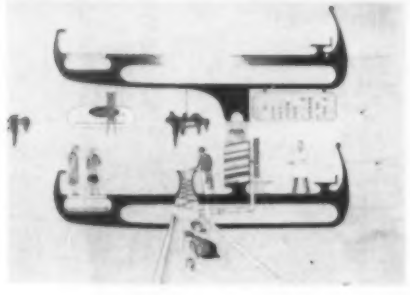




Super-supermarket

While Walter Dorwin Teague was telling participants at ASID's annual conference last November that man is on the verge of completing the construction of a totally artificial environment, "with fatigue and discomfort banished utterly, and a lot of free time on our hands," Pratt Institute architecture department chairman William N. Breger was putting the finishing touches on his speculative design for an automated "Supermarket of the Sixties" that all but takes your foodstuffs home and heats 'n' serves 'em for you.

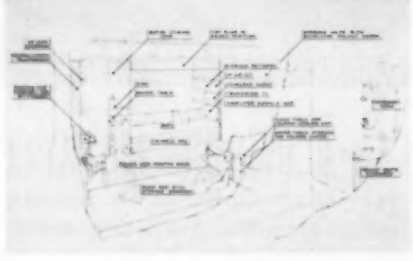
A scale model of the market was put on display at last month's Food Exposition and Country Fair at the New York Coliseum by the 93-store Daitch-Shopwell chain, sponsors of the project.

It would work like this: the shopper is whisked by a continuous elevator to the top of a seven-level circular ramp equipped with a moving sidewalk which takes her past all the foodstuffs on display. Those she wants she designates with a specially-coded marker. These items are automatically conveyed to a check-out station. Arriving at the check-out point, the shopper may reject any items she has already selected, or may press buttons for those she has forgotten. Having made her final choice, she inserts her marker in a computer which automatically produces a cash total for the shopping list, receives cash, and returns change. While the shopper is then making her way along a moving sidewalk that conveys her to her car, her selections are being conveyed to a receiving station on the lot, where she picks them up.

According to Breger, who was assisted in the project by designer Michael Brill, the super-supermarket uses electronic and magnetic sensing instruments, high-speed computers and printers, and advanced techniques in automation, all of which either are currently in use or have been shown, theoretically, to be practicable. Enthusiastic over Breger's design, Ted Dubin, vice-president of Daitch-Shopwell, wants to build such a market for his chain within the next few years.

IDI design exhibit

A traveling industrial design exhibit, educational in character, has been prepared by the Chicago chapter of IDI and is currently available, after a four-week showing at the Furniture Mart, to interested educational and civic organizations. The exhibit comprises a sampling of "good design" by members of IDI representing all regions of the country. There is no fee for use of the exhibit, but subscribers must pay shipping charges.



Family fallout shelter on view

Currently on view at the National Design Center in New York, and presented by the AID and the Office of Civil and Defense Mobilization, is "The Family Room of Tomorrow" (above) designed by Marc T. Nielsen as a six-person shelter against fallout from a nuclear bombing, and, when the bombs are not falling, as a guest- or game-room. The 8'6" x 12' room is equipped with all the essentials of modern living (bombs or no bombs), including: a two-week food supply, six beds, 40 gallons of water, cooking and lavatory facilities, first-aid supplies, storage for clothing, tv, radio, books, a wall-size map of the globe, an inlaid hop-scotch game for the kids, a 40-year calendar, and a stationary bicycle which, when pedaled for exercise, ventilates the room. The motif in the wallpaper of the sleeping-sitting alcove bears a fitting resemblance to the primitive cave-drawings of Lascaux.

Big splash at the Coliseum

Waves of boating enthusiasts in record numbers flowed into the New York Coliseum January 15th when the 50th National Motor Boat Show tied up for a week's lay-over, launching a boating season which promises, like everything else for 1960, to be the biggest ever.

A few relics from a by-gone era of boating, a fantasy created by Brooks Stevens for Evinrude, an increased use of fiberglass hulls, as well as of chrome ornament, forward-looking tail fins, pastel colors, sports-car upholstery, and dished steering-wheels, were some of the more noticeable features of this year's boatorama. Also exhibited were a folding catamaran, called the Waverider, which is being imported from England for the first time this year; the new Scott 7.5 hp outboard, which weighs under 40 pounds; and an 18' Buehler Turbocraft runabout propelled by a marine jet engine which is claimed to have removed the disadvantages of all the marine jet engines produced so far. ID will publish a complete review of the show in March.

The graphics for the show were given a special treatment this year. Joseph E. Choate, show manager, asked Communication Corp., a Stamford (Conn.) design firm, to integrate design of the entire exhibition. After a year's study and work, Communication's designers came up with the Golden Anniversary logo-symbol (below) in red, blue, black, and gold which was used in all the show's publications, tickets, lobby directories, and booth identification signs. Integration of the show's graphics provided an important element of consistency that helped clean up the disorder which inevitably results when a great number of out-size objects are exhibited in a hall too small to receive them.

Company news

RETAINED: **James May**, head of the James May Organization, by the Home Furnishings Division of Bates Fabrics, Inc., to consult with Bates' design staff on the development of new color and design techniques for the bedspread and drapery lines; **Stuart and Gunn** by Studley Paper Co. (Far Rockaway, N. Y.) for design study and exploration.

MERGED: **Ernst Ehrman Associates** and **George Reiner Associates**, to form **Ehrman and Reiner, Inc.**, with Mr. Reiner as president and Mr. Ehrman as secretary of the new firm.

GOING PLACES: **Sundberg-Ferar, Inc.**, to its brand-new Design Center in Southfield (near Detroit) Michigan; the New York office of **Charles Luckman Associates** to Canada House, 680 Fifth Avenue.

ESTABLISHED: **ALVECO, Inc.**, specializing in hotel and other commercial interiors, with offices at 730 Fifth Avenue. Directing triumvirate of the new firm includes the former wife of the present French Ambassador, Mme. Claude Alphand (president); the former public relations director for Christian Dior, Mme. Colette A. Combemale (vice-president); and architect-designer Robert de Veyrac (vice-president). . . . **D'Elia/Stolarz Associates** (Edward Stolarz and Anthony D'Elia, formerly Chief Designer and Director of Sales and Research, respectively, for Richard Arbib Co.), specializing in design research, product development, and packaging, at 245 Fifth Avenue, New York.

People

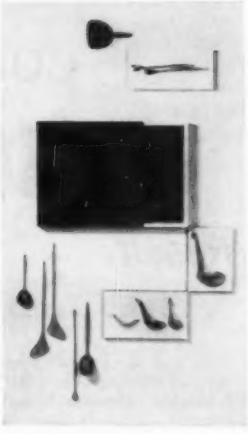
RETIRING: **Dr. Edwin S. Burdell**, president of The Cooper Union for the Advancement of Science and Art for 22 years, to become president of the Middle East Technical University (part of UNESCO), in Ankara.

DIED: **Otto Haas**, founder and chief executive of Rohm and Haas Company, chemical manufacturers, at his home in Philadelphia on January 2nd. New president of the firm is Dr. F. O. Haas, son of the founder.

ELECTED: **Richard S. Latham** and **George Nelson** to the board of directors of Aluminum Extrusions, Inc., Charlotte, Mich. . . . **Bob Robb** (Chairman), **Earl White** (Vice-Chairman), **Myron Davis** (Secretary), **Shurley Harris** (Treasurer), **Ted Clement** and **George Beck** (Trustees) to IDI Central New York Chapter posts.

Competitions and awards

The Art Directors Club of New York will hold its 39th annual exhibition at the Waldorf-Astoria, April 12-20. . . . **"Designed and Handcrafted for Use"** is the theme of the American Craftsmen's Council's national competition for American designer-craftsmen. Entries will be judged in terms of intent or use rather than within strict media categories. They will be grouped in five classes: (1) objects designed and handcrafted for organic architectural use on exterior walls and on floors; murals, tiles, screens, carpeting and other permanent coverings . . . (2) objects for interior use, such as tapestries, rugs, draperies, furniture, tableware, decorative objects, etc. . . . (3) garden furniture and ornaments . . . (4) personal apparel, accessories and fabrics . . . (5) a special-problems class including objects which represent solutions to unusual problems of design or material, and which may be prototypes for industry and mass production. Accepted entries will be exhibited at the Museum of Contemporary Crafts in New York from May 27 through September 11. Subsequently, the exhibit "Designer-Craftsmen U.S.A. 1960" will be circulated to other museums throughout the country by the American Federation of Arts. . . . **The Type Directors Club**, whose competition last year was restricted to advertising and editorial typography, has broadened the scope of the 1960 type contest to include any design which "by any reasonable stretch of the imagination" can be considered typographical in character. Appropriately, the theme of the competition is "Typography Everywhere." Closing date for submissions is February 15. Winning entries will be shown during the month of May at Mead Paper Company's Library of Ideas at 230 Park Avenue, New York. . . . **Antti Nurmesniemi** and **Arne Jon Jutrem**, Finnish and Norwegian designers, have won the ninth annual Frederick Lunning Prize, an award of $5,000 for use in travel and study abroad. The award is sponsored by Georg Jensen, Inc., New York, to recognize promising Scandinavian designers.



Woodcraft panel of the current American Craftsmen's Council exhibit.

Exhibitions

"Visual Communication in the Crafts," a show mounted by the American Craftsmen's Council as part of its traveling exhibit program for schools, museums, and craft groups, will be on view at New York's Museum of Contemporary Crafts until February 15th. Included are objects handcrafted in wood (above) and on the loom. . . . The **Philadelphia Home Show** opens February 15th at the Commercial Museum. The show will consist of about 300 exhibits of architectural styles, home building materials, furnishings, and appliances. . . . Included in Southern Illinois University's current **Fine Arts Festival**, which opened on January 31st, are four contemporary design exhibits: "Printing for Commerce," "Fifty Best Ads of the Year," "Contemporary American Crafts," and "Made in USA: Good Design for $1."

Ehrman

Reiner

Mme. Alphand

Mme. Combemale

de Veyrac

Burdell

"Design is a vital tool of creative merchandising"

THE ALCOA INDUSTRIAL DESIGN AWARD Presented to the Product and Package Design Department, Montgomery Ward, in recognition of notable achievements in design incorporating imaginative and effective use of aluminum. Deborah Allen, Alfred Auerbach, William Friedman, Ada Louise Huxtable and Arthur Pulos comprised this year's distinguished jury of critics, editors and educators in the design field which chose recipients of the award from the Alcoa collection of industrial design.

Thus Frederick W. Priess, manager of Montgomery Ward's Product and Package Design Department, sums up the creed of his staff at the giant Chicago-headquartered retailing firm.

"Our operation covers not only individual products and product line design, but display packaging, labeling, shipping carton design, informative literature, and packaging engineering," Mr. Priess continues. "Our basic philosophy is that industrial design is a vital, functional tool of creative merchandising."

Ward's designers concern themselves with every phase of the total marketing operation from product concept to implementation of the final sale. Two recently developed products, a new orbital sander and a radical "square" fractional horsepower electric motor, shown on the following pages, help tell a fascinating story typical of the multifaceted operation of Montgomery Ward's Product and Package Design Department.

THE NEED FOR THE NEW PRODUCTS IS ESTABLISHED . . .

At Montgomery Ward, each buyer is responsible for planning his line and the products in it. As he foresees new needs, he fills them—with the constant objective of offering the customer better value.

Time was when this meant "shopping" the market place, selecting only from products that happened to be available. Nowadays, products are designed to fit into a line "look" with a careful eye to price and value—"creative" buying, rather than "off-the-shelf" buying. The function of the industrial designer in Ward's operation is to come up with products and packages to meet these requirements.

These pages tell of some of the problems which were met and overcome in designing two new Ward products.

1. Montgomery Ward's R. T. Jackson, buyer for portable electric tools, determined that there was a rewarding market for an economy orbital sander. His problem: the going price for such an item was about $49—double what research indicated customers wanted to pay. Setting his requirements, he discussed possibilities with his department manager, R. L. Reeves. Goal: a private label sander to fit into Ward's growing line of Powr-Kraft* power tools, priced in the $24 area.

*Registered Trademark of Montgomery Ward & Co., Inc.

2. About the same time, Reeves and another Montgomery Ward buyer, W. R. James, launched a re-examination of Ward's Powr-Kraft line of fractional horsepower electric motors. No significant change had been made in this line in several years. A meeting was set up with W. L. Morris, Ward's division merchandising manager for hard lines, and Fred Priess.

3. An orbital sander requires a rugged, compact motor (one reason why the price for this tool was traditionally high). One likely solution was to use the same motor that powers Ward's electric drill, which is mass produced in quantities permitting substantial savings. It was powerful, fast, and turned out to be perfectly suited for the job. Checking preliminary design direction, George Mendenhall, manager of the Product Design Section, reviews progress with chief designer Richard Stawowy, senior designers Gene Schugart and Orville Bolte. Jerry Dobslaw, representing Portable Electric Tool Co., manufacturing "source" for the sander project, weighs the problem of motor mounting.

4. Ward's de luxe line of Powr-Kraft portable power tools is identified by its polished aluminum "look." Aluminum was selected several years ago by Ward's, because it offered a unique combination of functional lightness and long-lasting good looks at a realistic price. Accordingly, John L. Baker, president of P.E.T., and Richard E. Bigelow, V.P. and quarterback on the sander project, called in Jim Hutchinson of Alcoa's district sales office to discuss the new tool. Special problems were vibration, sanding dust.

5. First "tight" designs, supplied by P.E.T., get close scrutiny by design-oriented Priess and Mendenhall with an eye to human factors, engineering and aesthetic appeal. Buyer Jackson checks production figures, estimates on packaging and other data which will affect final retail price. Montgomery Ward's suggestions for refinements are sent back to "source" for incorporation into working mock-up.

6. Meanwhile, first designs are submitted by Westinghouse, "source" for electric motor project. Buyer James and designer Mendenhall go over requirements with M. Brasseur, chain marketing representative of the electrical firm. It is decided to remove the ungainly, hitchhiking capacitor from the top of the motor casing, to enclose it to reduce over-all dimensions and allow cleaner appearance. Already, aluminum has been specified for end-bells and other components to cut down dead weight, dissipate heat.

7. Second stage is wooden model (which proved to be almost identical with finished product). Decision to use aluminum would cut shipping weight by 8 lb, permit price reduction to consumer. New design, incorporating aluminum unitized fan and rotor, promised to improve heat dissipation markedly and reduce annoying fan "whine." In addition, a nonmagnetic aluminum fan would eliminate disturbing eddy currents, run cooler. Here, Priess and Mendenhall check housing, rotor and other newly redesigned components.

8. Final okay: two bright new stars in Montgomery Ward's line of Powr-Kraft merchandise, complete with shipping and display packaging, instruction sheets, and all graphic material necessary to sell and to use. Since the next stage is production, everything gets checked carefully by all concerned. Final approval calls for a favorable nod from Vice President Edmund Platt, Ward's general merchandising manager, who is briefed on all particulars by Fred Priess. Every item has been supervised from its inception by the Product and Package Design Department to achieve a completely coordinated selling package for each of the products. When sales promotion manager E. M. Powell takes them to market, his total merchandising program will represent the combined talents of these aforementioned departments and of his Catalog Sales, Advertising and Display personnel as well.

9. Proof of the pudding—weeks after introduction of the two new Powr-Kraft products, sales figures reflect resounding success. Buyers Jackson and James express complete satisfaction with the customers' reaction to the merchandise on display in the stores.

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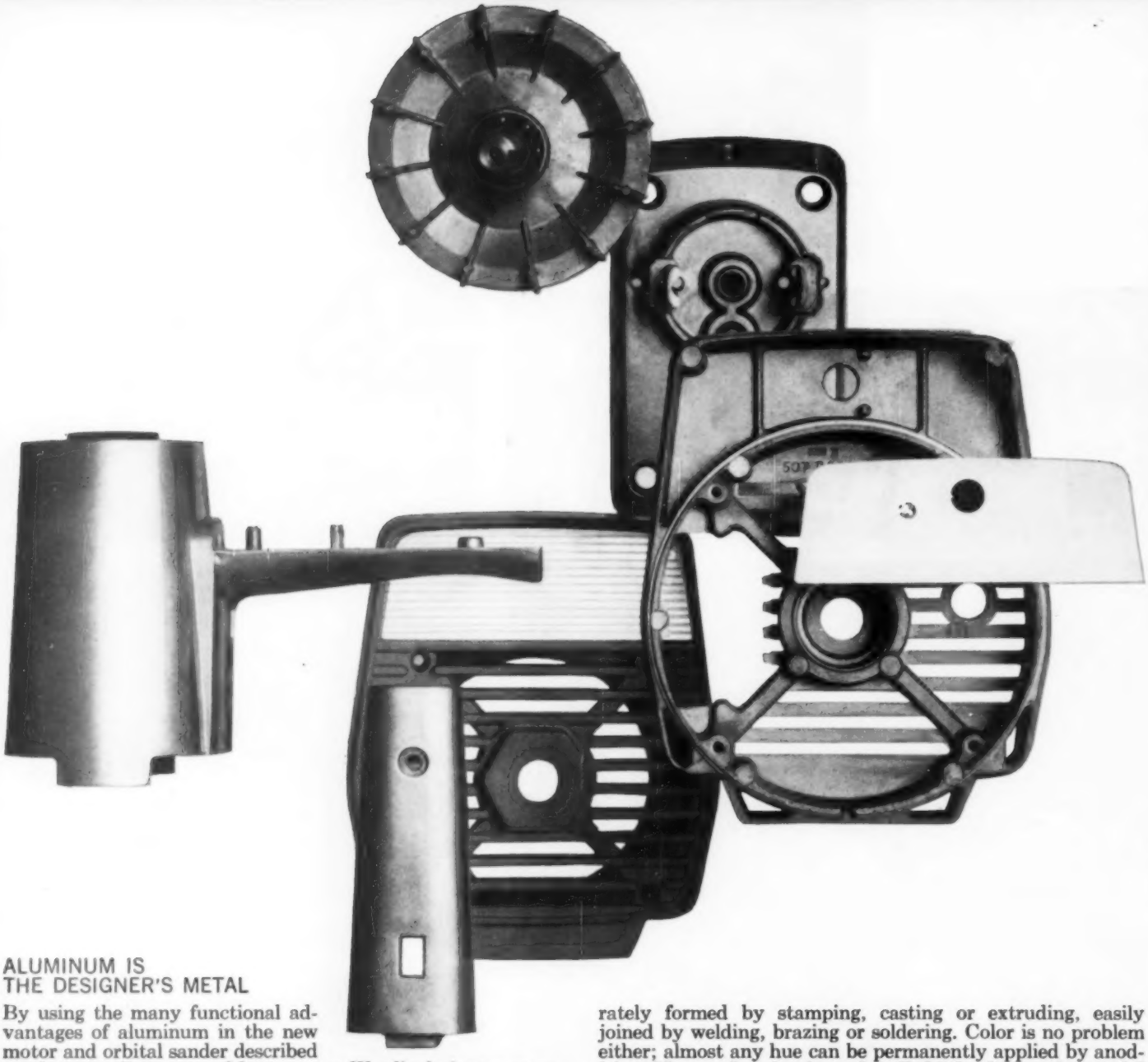


ALUMINUM IS THE DESIGNER'S METAL

By using the many functional advantages of aluminum in the new motor and orbital sander described on the preceding pages, Montgomery Ward's designers were able to engineer new dependability and good appearance into their product. Working closely with Alcoa's research and design personnel, ideal alloys were chosen to cut weight, improve operating efficiency and contribute to better appearance at no sacrifice in price. For example, the shroud on the sander is aluminum, can be easily painted on the low-priced model, yet will take a polished mirror finish to fit into the Ward "family" of top-quality power tools. The new motor weighs less and runs smoother and cooler because die-cast end-bells, fan and rotor exploit aluminum's unusual qualities of heat dissipation. On both sander and motor, aluminum filled the bill for a versatile metal combining improved performance and good appearance. For other designers, aluminum offers the same advantages. It can be easily and accurately formed by stamping, casting or extruding, easily joined by welding, brazing or soldering. Color is no problem either; almost any hue can be permanently applied by anodizing. No wonder aluminum is called "the designer's metal."

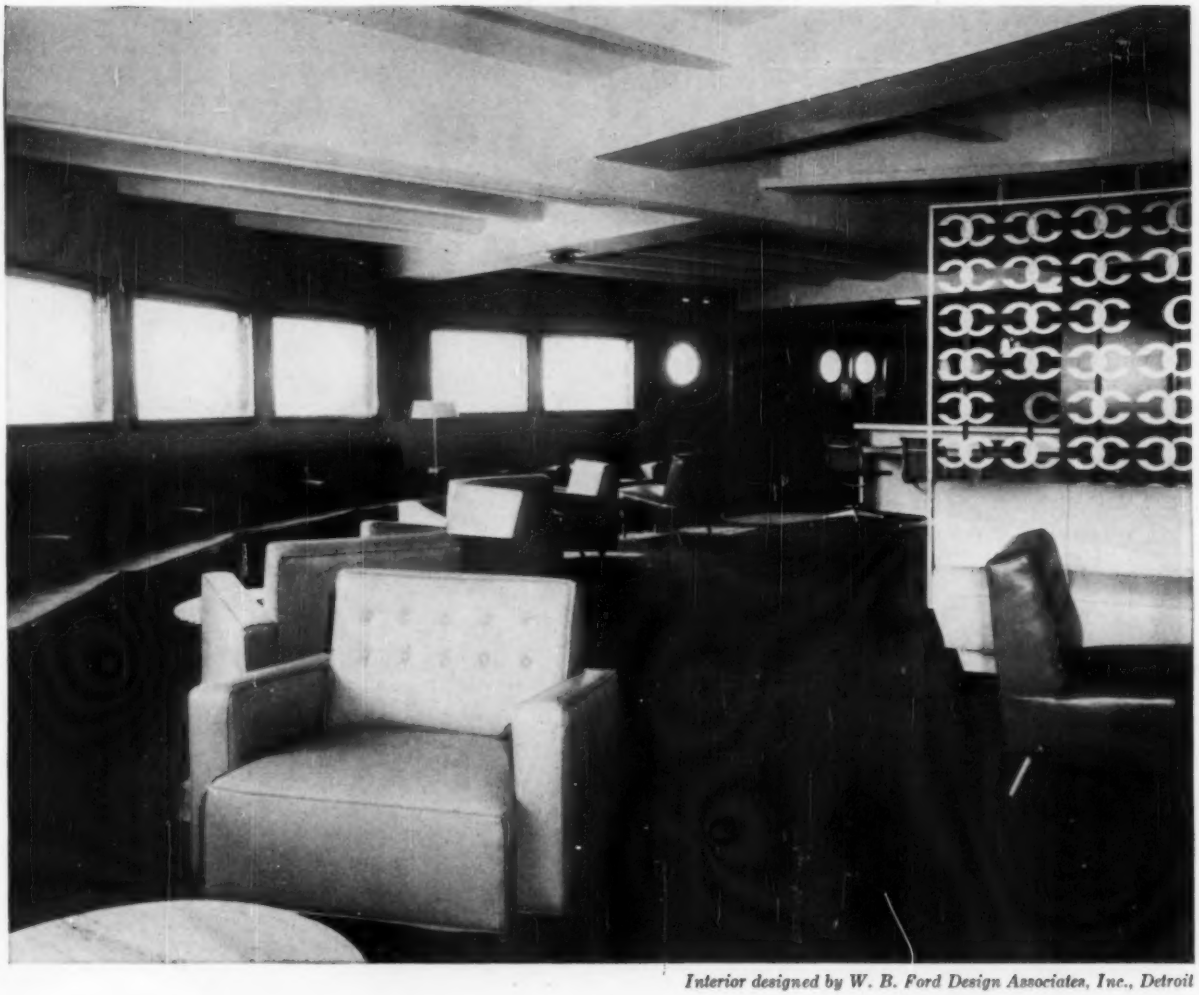
ALCOA IS THE DESIGNER'S ALLY

When the industrial designer approaches your product, he has an invaluable ally in Alcoa® Aluminum and in the technical resources Alcoa provides. No metal can be formed, joined, fabricated and finished by so many methods. No other metal matches its ratio of strength to weight. No other metal affords, in every pound, the access to authoritative counsel on problems of application. This assistance is offered without obligation to you, your staff designers or the independent industrial designer you retain. Call your local Alcoa sales office or send a letter to: Aluminum Company of America, 1971-B Alcoa Building, Pittsburgh 19, Pennsylvania.

Your Guide to the Best in Aluminum Value

ALCOA ALUMINUM

ALUMINUM COMPANY OF AMERICA, PITTSBURGH



Interior designed by W. B. Ford Design Associates, Inc., Detroit

CAPROLAN®

. . . SMARTEST CARPETING AFLOAT

The last word in modern luxury on the Great Lakes is the new passenger ship, the S.S. Aquarama. Everything about it is ultra-modern and advanced . . . including carpet of Textured Caprolan, by Croft Carpet Mills, covering the entire floor of its luxurious entertainment center, the Commodore's Club.

This installation is one of the largest ever made aboard an inland water vessel.

Textured Caprolan, the continuous filament nylon fiber by Allied Chemical, is ideally suited to this kind of installation. The look of luxury . . . colors never before possible in nylon . . . the durability to withstand years of busy activity . . . the rich promise of superb texture retention. No matter how many guests enjoy its lush depth, it does not pill, shed, or fuzz. And maintenance costs are cut to a minimum, because it cleans easily with simple home methods. Beautiful, and best of all . . . it's *certified for performance.*

Allied Chemical

Fiber Marketing Dept., 261 Madison Ave., New York 16, N. Y.

Fishing Tackle Maker Gets a New Angle on Plastics

Many manufacturers are now looking to Grex high density polyethylene for new products and new profits. One such company is B. F. Gladding Co., Inc., manufacturers of quality fishing lines since 1816. Gladding's choice of the Grace plastic for a new line of tackle boxes marks a major innovation in the company's products.

To Gladding, high density polyethylene has proved to be a truly remarkable material. The Gladding Grex Tackle Boxes are tough and rigid—withstand the roughest treatment without breaking, shattering, cracking or denting. Drop one in the water, and it floats. Spill battery acid, oil, gasoline, bug repellents or silicones on the box. Such chemicals—normally harmful to other materials—wipe clean from Grex without staining, softening or marring the finish. Changes in temperature or weather will not cause warpage. Salt water will not corrode. These new boxes will still look new even after seasons of rugged use.

What more could a fisherman want? Or for that matter, what more could you want in a high grade plastic that can be economically fabricated to keep manufacturing costs down and profits up? Find out more about high density polyethylene by calling in the experts. Grace has the production facilities, technical service and experience to help put your product in the Grex profit parade. Everyone says we're easy to do business with.

Grex is the trademark for W. R. Grace & Co.'s Polyolefins.

W.R. GRACE & CO.
POLYMER CHEMICALS DIVISION
CLIFTON, NEW JERSEY

imagination
& DU PONT PLASTICS

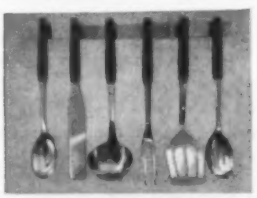
ZYTEL® *nylon resins*

Du Pont ZYTEL nylon resins are versatile, high-quality design materials. They are being used to make a host of parts and products that work better, look better and often cost less than products made of other materials. Designers have taken advantage of the remarkable combination of properties offered by ZYTEL in such applications as household appliances, sporting goods, business machines, housewares, clothing fitments, toys, plumbing and hardware items, automobiles and many others.

ZYTEL nylon is not just one plastic. There are more than 20 formulations developed to provide special properties for special uses. When the design problem involves high or low temperatures, lubrication, close tolerances, weatherability, appearance, intricate shapes, color, textures or some other important consideration, one of the many ZYTEL nylon resins may be able to do the job better than any other material. Some products actually exist today only because nylon exists.

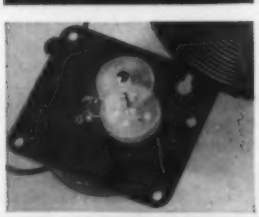
What ZYTEL offers to designers

easy processing and model making: Parts of ZYTEL are readily mass-produced by conventional injection-molding machines. Such parts require little or no finishing. The spin-welding technique is also useful for the fabrication of ZYTEL, as are blow molding and extrusion. Models and prototypes can be machined easily from stock shapes which are readily available.

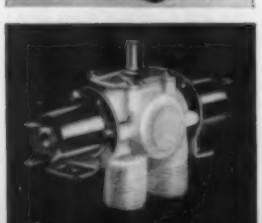


attractive appearance: ZYTEL is available in a variety of colors. Parts of ZYTEL can be painted, metalized and produced with textured effects. The color stability and attractive texture of ZYTEL have led to its use in a variety of consumer products, such as the kitchenware handles shown at left.

weather resistance: Products made with all formulations of ZYTEL resist wind, snow, ice, heat and salt spray. Some are designed to resist sunlight as well. As a plus, ZYTEL also resists greases, oils and gasoline. The marine air horn, shown at left, is an example of a product which is exposed to all of these conditions.



strength, toughness, dimensional stability: The mechanical properties of ZYTEL are outstanding. Together with good frictional properties and high abrasion resistance, they make possible such demanding applications as clock gears (left), rollers, slides, gunstocks, shower heads and many others. These desirable properties are retained over a wide range of temperatures.

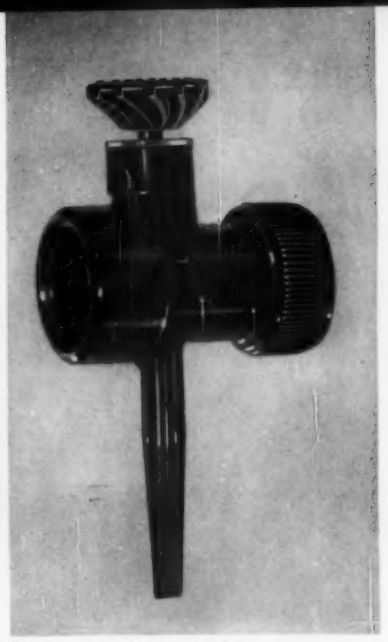


cost savings: Often one part made of ZYTEL will replace several parts of other materials. Costly finishing operations are also eliminated. The result is reduced cost. An excellent example of the latter is this valve housing (left). Previously made of metal, it is now molded of ZYTEL at dramatic cost savings.

New designs made possible by ZYTEL

Holding the protective window in a welder's helmet, the lift-front retainer must meet a number of difficult requirements. It must be strong and durable, resist high temperatures. The use of ZYTEL solved all these problems and permitted further design improvements because of its strength in thin sections and its ability to allow use of self-tapping screws. (By Sellstrom Mfg. Co., Palatine, Ill.)

Remington's new 22 rifle, the Nylon 66, is the first rifle ever to be made with a structural-nylon stock. The stock is chip-proof, waterproof, oilproof and only ⅛ the weight of wooden stocks with no loss of ruggedness. No warpage develops, and no lubrication is needed. The result—the most trouble-free autoloading 22 action ever known. (By Remington Arms Company, Inc., Bridgeport, Conn.)



Lawn-sprinkler attachment to ordinary garden hose is durable, eliminates rust and corrosion problems. Made entirely of ZYTEL, it offers dependable performance at reduced cost. (Molded by Berea Plastics Co., Berea, Ohio, for Jaco Manufacturing Co., Cleveland, Ohio.)

Sometimes the design improvements made possible by ZYTEL nylon resins are not visible to the eye, but are immediately apparent in terms of superior function. For example, cams and other components of ZYTEL provide smooth, quiet operation for the adding machine shown above. In addition, the use of ZYTEL for these vital parts saves money by eliminating waste and machining steps. (By Underwood Corp., Hartford, Conn.)

What problems can ZYTEL help you solve?

The applications shown on these pages may suggest ways in which the unique properties of ZYTEL can help you solve some of your design problems. Du Pont technical personnel are ready to assist you in your evaluation of ZYTEL nylon resins, as well as the other high-quality plastic materials offered by Du Pont, such as ALATHON® polyethylene resins, DELRIN® acetal resins, LUCITE® acrylic resins. For more information about any of these materials, write us. Address: E. I. du Pont de Nemours & Co. (Inc.), Dept. T-2, Rm. 2507Z, Nemours Bldg., Wilmington 98, Delaware.

In Canada: Du Pont of Canada Limited, P.O. Box 660, Montreal, Quebec.

POLYCHEMICALS DEPARTMENT

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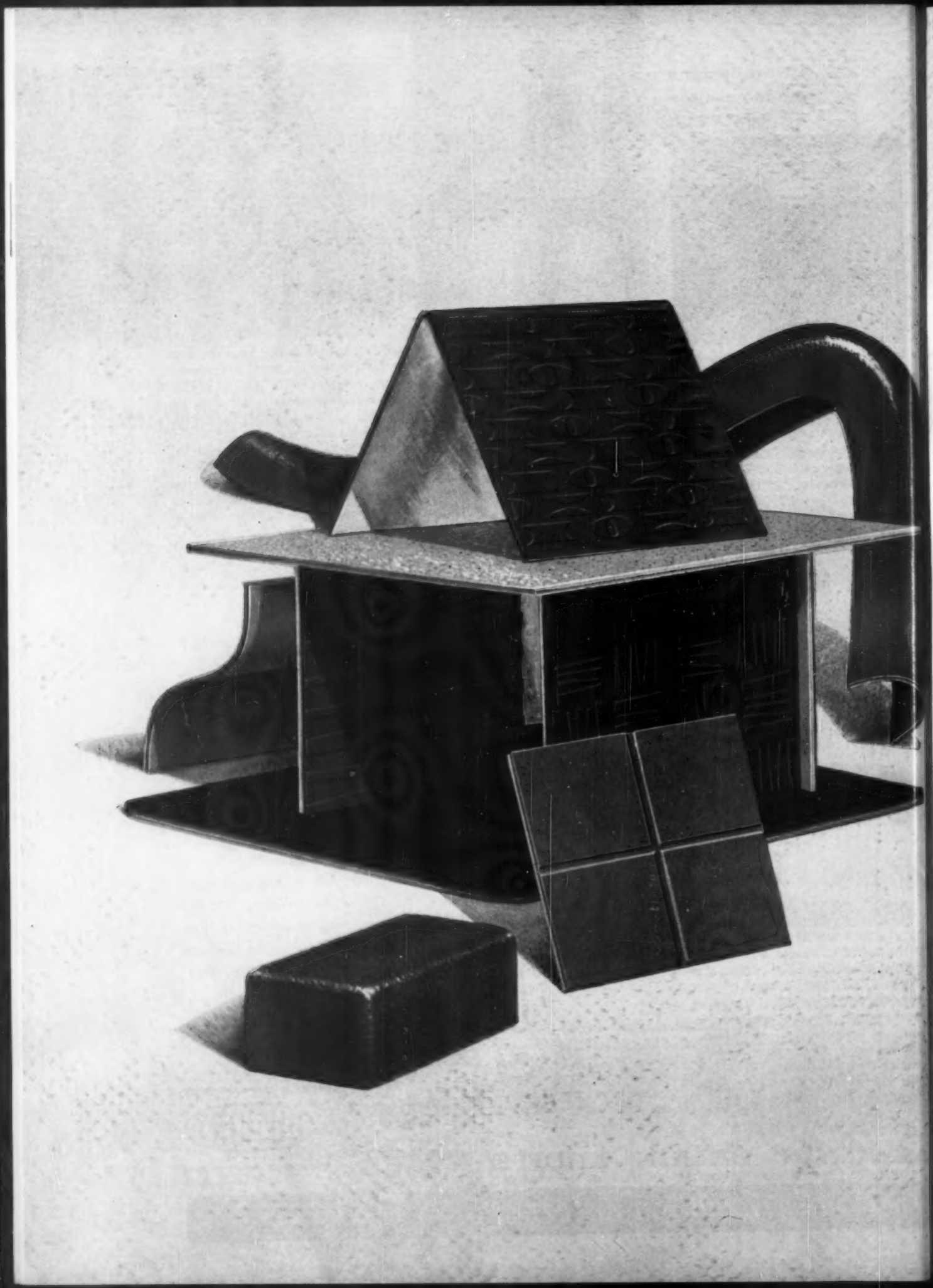
BETTER THINGS FOR BETTER LIVING ... THROUGH CHEMISTRY

ALATHON® polyethylene resins **DELRIN®** acetal resins **LUCITE®** acrylic resins **ZYTEL®** nylon resins

Du Pont's problem-solving plastics



The strength of metal, the decorative beauty and protection of plastics . . .

Vinyl-on-Metal is a marriage of materials that creates new dimensions in form, color, and texture . . . presenting new combinations of properties that can improve existing products or inspire new ones. Both tough and attractive, it is low in cost, easy to fabricate. Vinyl-on-Metal is already being successfully used for TV cabinets, airplane and automobile interiors, luggage, typewriter cases, radio sets, card tables and chairs, interior and exterior wall partitions.

Vinyl-on-Metal offers

COLOR: a wide range of colors, all fast with minimum fading

FINISH: thick, resilient and cushioned; thin, hard and smooth; or highly decorative textures; glossy, dull, or pattern embossed

ABRASION RESISTANCE: mar and scratch resistant, long wearing

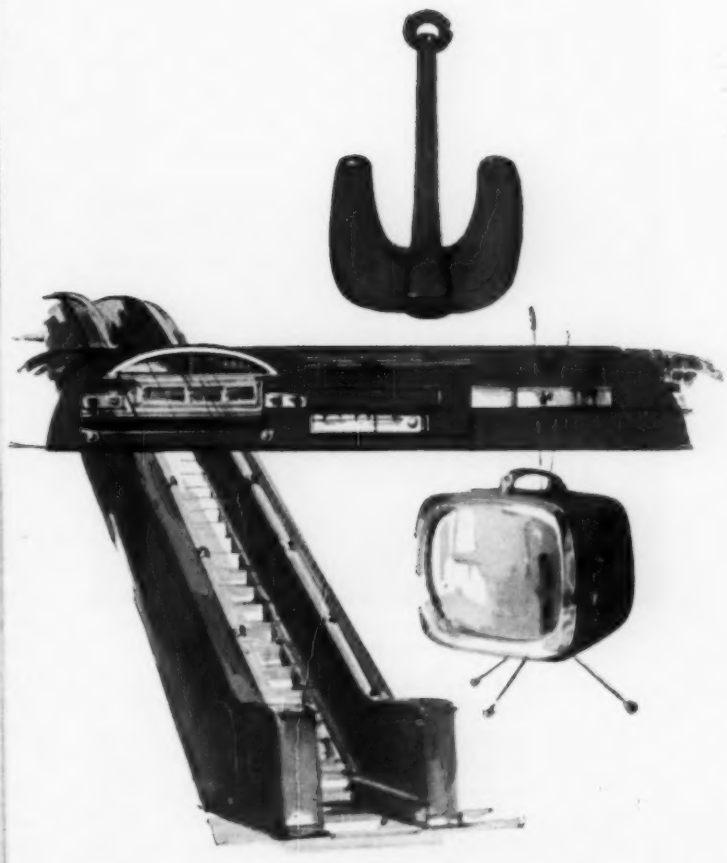
CHEMICAL RESISTANCE: resistant to acid corrosion, alkali attack, oxidation

MOISTURE RESISTANCE: resistant to water, washable with soap and water

WEATHER RESISTANCE: resistant to prolonged exposure to industrial atmosphere and accelerated weathering tests

EASE OF FABRICATION: can be formed, stamped, bent, punched, even welded into major components, eliminating almost all post-forming finishing

For handy reference booklet on Vinyl-on-Metal, write to Monsanto Chemical Company, Plastics Division, Room 1400, Springfield 2, Massachusetts.



MONSANTO INITIATOR IN **PLASTICS**

Monsanto

Monsanto Opalon® and Ultron® vinyls are the basic materials for superior vinyl finishes on metal, wood, paper, and glass.

To the Executive
who watches his Competition closely . . .

Are you investigating Clad-Rex Vinyl-Metal Laminates?

Don't wait *too* long! Because Clad-Rex really reduces manufacturing costs *and* increases product sales appeal. And *that* kind of advantage would be better yours than your competitor's. Many other manufacturing executives are already using Clad-Rex vinyl-metal laminates for electronic equipment cabinets . . . automotive trim . . . appliances . . . furniture, etc.

Here are the facts:

Clad-Rex is a calendered, semi-rigid poly-vinyl chloride film laminated to sheet metal. All alloys and tempers of aluminum and steel (including galvanized and aluminized) are commonly used. Other metals can be used where their special properties are important to end product performance.

The most obvious advantage of Clad-Rex vinyl-metal laminates is styling. It's unlimited! Simulated woodgrains and leathers as well as a wide variety of colors and textures in sparkling burnishes (including high metallics), or non-reflective matte finishes. You can design your own if you prefer!

Not so obvious, *but most important of all*—Clad-Rex vinyl-metal laminates are practical. There is no complex technique or special tooling required to fabricate Clad-Rex. It can be fabricated in almost as many ways as any *un*-finished sheet metal. Furthermore, and without charge, a Field Fabricating Engineer is provided to show your production people how easy it is to get into production with Clad-Rex.

Actually, Clad-Rex *simplifies* your manufacturing operations. It's finished before you get it. Movement of sub-assemblies, etc., through your plant becomes more direct—out of your dies into assembly.

Clad-Rex lowers your end product cost. Although Clad-Rex costs more than *un*finished metal coming into your plant, elimination of expensive handling and finishing adds up to *less cost* when your product is ready to ship. Clad-Rex resistance to abrasion often eliminates the rejects common to *un*finished or other pre-finished metals. This includes the costly efforts to salvage those rejects, too.

Your product may need these other characteristics of Clad-Rex vinyl-metal laminates—high dielectric strength, and resistance to the corrosion of acids, alkalis, and household detergents.

So, see for yourself. Write for details. No obligation, of course. Perhaps you won't be first in your field to begin using Clad-Rex. But why risk competitive disadvantage by being last?

VINYL-METAL LAMINATES BY **CLAD-REX** DIVISION OF SIMONIZ COMPANY

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In steak or plating, thickness counts. A good thick layer of Nickel under the chrome will give your product a finish that not only *looks* like quality but also *keeps* that look despite hard use.

Brushed Nickel-Chrome...an enduring finish that gives a quality look at a practical cost

Look at the door of this built-in oven . . . at the top of the drop-in range.

The rich beauty you see is brushed Nickel-Chrome Plating.

You may have heard of this finish as "brushed chrome" or "satin chrome." By any of these names, brushed Nickel-Chrome Plating offers you a way to dress up your products at little — if any — increase in production cost!
Here are five big reasons why:

Quality Appearance. A brushed Nickel-Chrome finish tells your customer that the article he is buying is of high quality — inside as well as on the surface.

Durability. This finish keeps on saying "quality" despite hard use. One or even two punishment-taking layers of Nickel, flash-coated with chrome, resist nicking, scratching, wearing, and corrosion. What's more, this finish resists staining, is easy to clean.

Easy to Fabricate. Brushed Nickel-Chrome can be . . . is being applied to all the easy-to-fabricate metals — steel, zinc, aluminum, copper, brass — to take advantage of the physical and mechanical properties of these metals. Less common metals can also be readily plated.

Versatility. Brushed Nickel-Chrome has many unique advantages. For example, by selective buffing, you can get bright trim effects without using trim hardware.

Practical Cost. Experience of manufacturers already using brushed Nickel-Chrome shows that this eye-catching finish costs only a few pennies more than ordinary finishes.

With Nickel in ample supply as far into the future as any man can see, you can take alvantage of brushed Nickel-Chrome Plating to give your products extra sales appeal. For more ideas, write for our booklet, "Practical Answers to 40 Practical Questions about Nickel Plating."

The International Nickel Company, Inc.
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INCO **Inco Nickel**... *makes plating perform better longer*

Giving up the ghost

A newspaper columnist reports that a television comedy writer will be hired to provide Vice President Nixon publicly with what his supporters feel he lacks privately: a sense of humor. This highlights a trend that is not merely political; it is no secret that in business, as in politics, public statements are not necessarily conceived by the men credited with making them.

Once the publicity director of a fairly large design firm brought us "an important statement" by the head of the firm. It was a personal view ("The more I think about it, the more I am convinced"), with a curious catch to it: the designer himself had not yet read and approved it; he was out of town during its conception. We had an opinion straight from the horse's mouth, and the horse hadn't even been told what it was! Not that it mattered much. The opinion was (as, under the circumstances, it had to be) so general and platitudinous that no one could disagree. However, the designer, once he had read it, took a strange pride in what he referred to in a proprietary way as "my remarks." Maybe he had forgotten that they weren't his, or maybe he simply meant that he had paid for them.

While that kind of absentee ghostwriting is unusual, it is increasingly noticeable that, where authorship is concerned, things are not what they seem. The most popular way of describing material credited to someone who did not write it is to take the noun "byline," and use it as a verb. Thus editors are offered, say, "an article bylined by F. Garfield Heep." This euphemism means that while Heep, like the benevolent old men in 19th century novels, did not actually father the article, he is eager to bless it with the legitimacy of his name. Of course this practice, which is not intended to deceive editors, can be defended with some logic. The customary argument is that since the fertile-minded executive often has neither the time nor the skill to set down his ideas, he just naturally gets a specialist to do it for him. The result is one man's thinking in another man's words. Nothing wrong with that, but we find it hard to divorce word and idea so cleanly. Anyone supplying the words in an article or speech is likely to be supplying some ideas as well. If he isn't, he may be supplying words devoid of ideas ("It was felt that this was an important factor in the frame of reference of a totally new concept"), or words that mechanically carry ideas too stale and obvious to be worth saying.

Look. If we designed a chair, it might bring prestige and publicity that we can't get just by *writing* about design. Trouble is, we haven't got time. Also we're untrained. Oh, and by the way, we haven't got an *idea* for a chair. Now wouldn't it be a bit ridiculous (to say nothing of what else it would be) to expect someone else to do it for us?

On the other hand, if we *had* a good chair idea, we'd look for someone competent to develop it. We'd have to credit him, though. Despite Plato, an idea for a chair is not a chair; and an idea for an article is not an article. Any designer with an idea should get as much help as he needs in giving the idea form. (If this help goes far enough to be called "collaboration," then that's what it should be called.) But when a designer without ideas hires someone else to express and disseminate the ideas he hasn't got, he is doing a disservice not just to himself and the profession, but to something far more important than either: the idea of ideas, the fact that thinking really can happen and that when it is does, someone — a man with an identity of his own — is responsible. At a time when we are campaigning to get the credit we deserve, we ought to deserve the credit we get. — *R.S.C.*

THE INDUSTRIALLY-PRODUCED HOUSE

PROGRESS REPORT ON A DREAM

Ever since the machine became the basis of civilization, men have toyed with the notion of making it produce the basic shelter called "home." For a long while the notion cropped up only sporadically, mostly in the form of fanciful doodles by Mad Inventors. But some 40 years ago, shortly after the first World War, the idea began to be taken seriously by professional designers and engineers who believed that somehow, in some way, the methods and new materials of technology should be applied to the production of what was, after all, an essential product—with the biggest mass-market of all. The great hope of an industrially-produced house has been around ever since. It has inspired no end of remarkable solutions (for proof, see the following pages). Some have been based on the concept of the house as an entity: the repetitive unit was simply the house itself, either as a monolithic form or as an assemblage of parts that were not standardized within each house but became so when the house was repeated 10,000 times. Others have been conceived as a collection of modular components to be assembled in various arrangements—and sometimes to be joined by devices as intricate as a Chinese puzzle (which some of them resembled). There have been houses sprayed from guns, houses cast on site in enormous wooden forms, houses that literally and purposely came apart at the seams so they could be moved to another site—and, of course, there was Buckminster Fuller's house suspended from a mast.

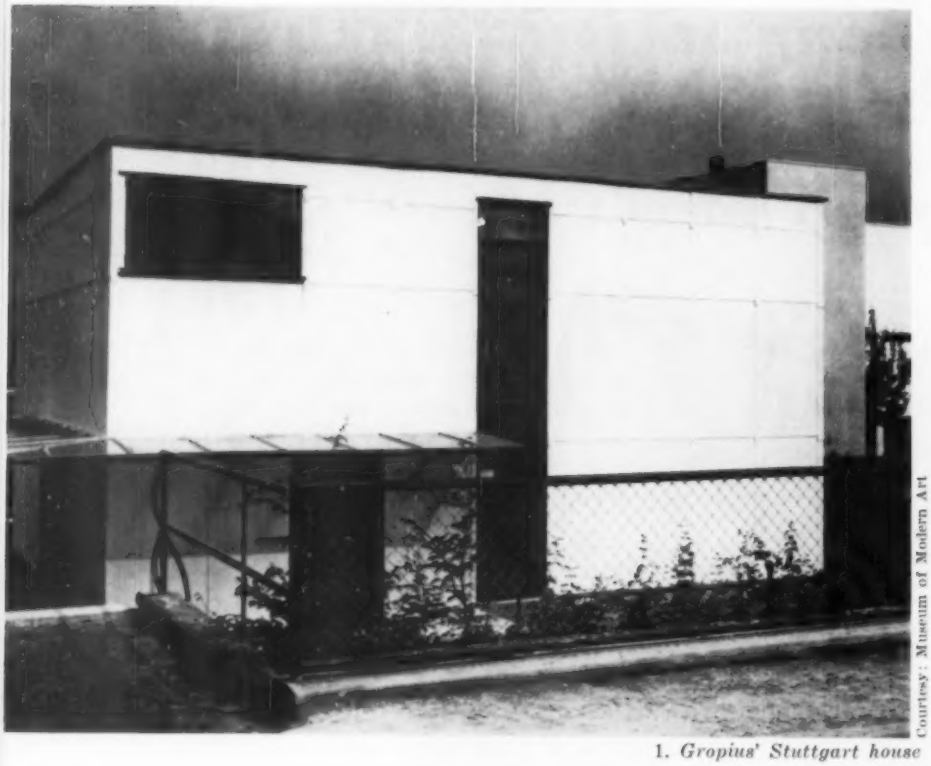
After all this time, and with this much display of ingenuity, one would think we would all be living in industrially-produced houses (the automobile and the airplane were pretty rudimentary 40 years ago, and look where *they* are today). But the fact is that the House of the Future exists only in Sunday Supplement articles, which have sounded pretty much the same for the past 20 years. The average citizen is still coping with leaking roofs, sweating walls, peeling paint; with doors that contract in the winter, leaving a wide crack for cold air, and expand in the summer, forming an hermetic seal with the frame; with rooms too small, walls too thin, and inflexible partitions; with wiring and plumbing that can't be gotten at simply and sensibly for alteration or repair; and with meeting the payments on the loans, mortgages, and daily expenses of owning, operating, and maintaining the anachronism he calls home.

Obviously, the disparity between what's promised and what's performed cannot go on indefinitely. When and, perhaps more important, where will the changes come? Some of them will have to come within the building industry itself, which can scarcely be considered an industry in the modern definition of the word, since it is based on artisanry—and dictated to by the unions and codes which grew out of the building crafts. On page 46, architect Peter Blake discusses in detail the pitfalls and roadblocks that currently lie in the path of any one who wants to build a "different" house, and explains why the present "prefab" house is still a handmade product, although it now comes in larger pieces (see right). He also makes some predictions about what the building industry must become—or else. The alternative is that the house will become a product of another industry.

More important than re-vamping the building industry, however, is re-thinking what a house is, and what a shelter *might* be. If people have been reluctant to buy the industrial house as it has been offered to them so far, and if investors have been unwilling to put money into its production, the whole answer may not be conservatism. As a "better house," it simply may not be offering them all the improvements they want. Obviously some of these improvements must be in the realm of the physical and the practical; there are advantages in having a house that never needs repainting and that can be washed down, inside and out, with a garden hose. But the "better house" must offer something more than this. Homes have always enclosed more than space, and have always been used for more than eating, sleeping, bathing, and coming into out of the rain. They have been expected to provide certain emotional, even spiritual, comforts and satisfactions—and one of them has been that within his house man felt not only sheltered from his environment, but superior to it. Historically, this environment has been nature, and we dominated it by domesticating its products, turning rocks into two-foot thick stone walls and trees into wide-board floors. But perhaps the threat from our environment has changed. Perhaps we no longer need to feel superior to nature (which we now have somewhat under control), but superior to technology (which surrounds us on every side and frequently seems to threaten our existence). The "better house" might be one in which the products of technology are domesticated, and are used to reassure us that, at least within our homes, the machine does not have the upper hand. Such a house would use the methods and materials of industry to provide homeowners with something more than just simplified maintenance. —*B. D.*

Designers have designed it
and there is no question of
industry's ability to produce it,
but the industrial house remains
more fiction than fact

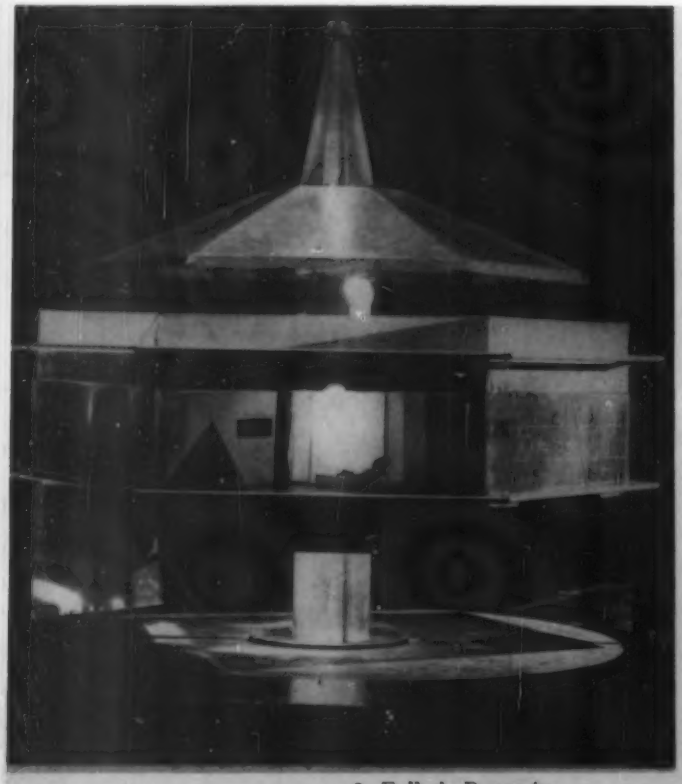
A Portfolio of Prefabricated Houses: Plenty of Ideas but a Shortage of Capital and Customers



Courtesy: Museum of Modern Art

1. *Gropius' Stuttgart house*

In the late 1920's Walter Gropius' experimental Stuttgart house (1) used cement asbestos panels over cork cores on a steel frame; in America, Buckminster Fuller's Dymaxion (2) was designed to enclose a maximum of space with a minimum of weight and surface. During the '40's, the John B. Pierce Foundation developed the Cemesto house (3), horizontal cement asbestos panels over a cane fiber core; Wallace Neff designed a hemispherical Airform house (4) of cement sprayed over wire mesh supported by a balloon form; and the TVA developed for its construction workers a portable, sectional house (5). Another portable was William Stout's "suitcase house" (6) for Pa!ace Corp.; its wings unfolded from an 8-foot unit containing utilities. In 1946, George Keck designed a "solar house" (7) for Green's Ready-Built, with the first prefabricated window wall. At about the same time, Ibec introduced its cast-on-site concrete house (8), using huge cranes and house-size forms. And in 1947, Fuller again made history with his aluminum-skin hemisphere (9).



2. *Fuller's Dymaxion*

Courtesy: John B. Pierce Foundation

3. *Cemesto house*

4. *Neff's Airform*

Courtesy: Bemis Foundation

Courtesy: Bemis Foundation

5. *TVA sectional house*

Courtesy: Ibec Housing Corp.

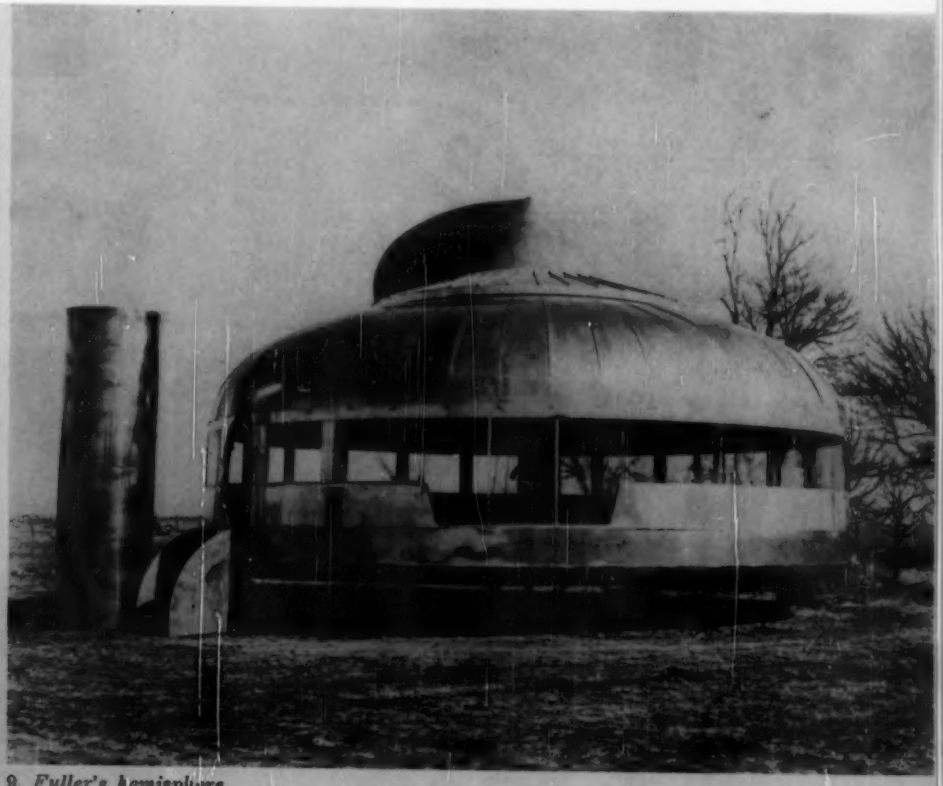
8. *Ibec concrete house*

Courtesy: Museum of Modern Art

6. *Palace folding house*

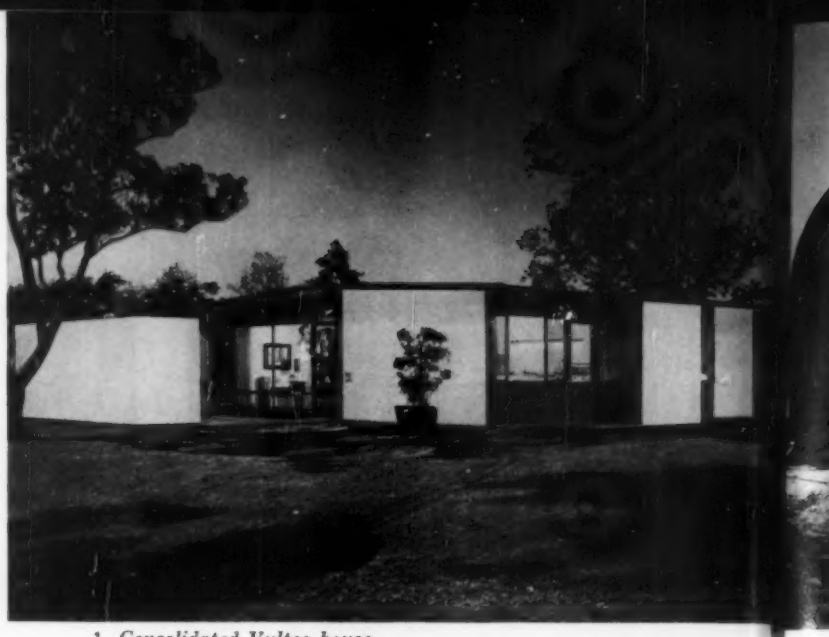
Hedrich-Blessing

7. *Green's Ready-Built solar house*

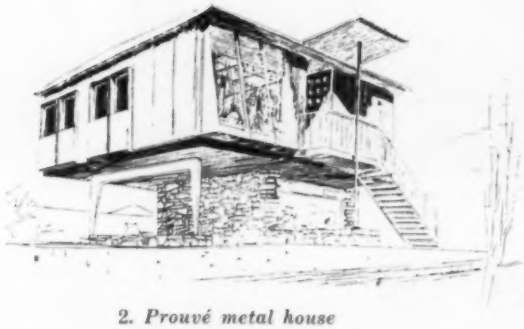


9. *Fuller's hemisphere*

In 1947, Consolidated Vultee retained Henry Dreyfuss and Edward Barnes to design a paper-cored aluminum panel house (1) but never produced it. A metal house of component parts (2) was also proposed in post-war France by Henri Prouvé. The most famous of the metal houses, however, was the Lustron (3) of enameled steel on a steel frame; it was trucked to site complete with wiring, plumbing fixtures (including a dishwasher), and heater (the Lustron's metal ceiling was its "radiator"). In recent years the metal house has been limited to such experimental projects as Charles Goodman's Carefree houses (7) for Alcoa, and George Nelson's house of decentralized units (6). The early '50's also produced Carl Koch's and John Bemis' Acorn house (4), a paper-cored plywood panel structure which unfolded from a 9 by 24 foot unit containing utilities; its hinged joints were sealed with neoprene gaskets. Also in the early '50's, Le Tourneau developed a cast-on-site concrete house (9) similar to Ibec's, but used its giant Tournalayer to place the wood forms; and Eliot Noyes refined the sprayed-on concrete dome in his "bubble house" (5). The only plastic house is Monsanto's cruciform (8).

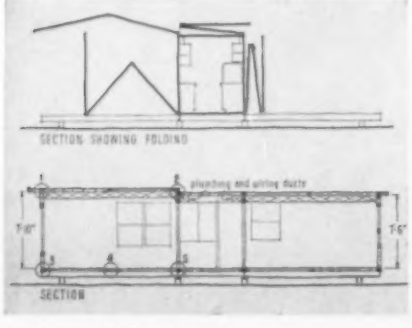


1. *Consolidated Vultee house*

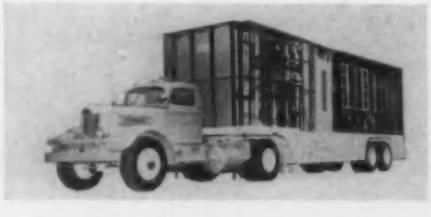


Courtesy: N Y Public Library

2. *Prouvé metal house*



4. *Acorn folding house*



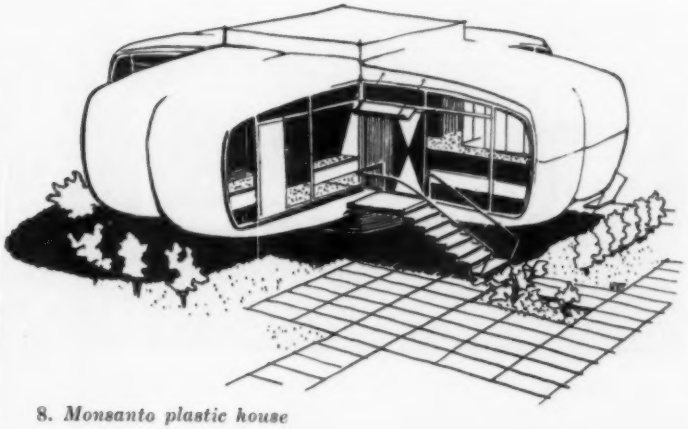
3. *Lustron house*

Courtesy: Bemis Foundation

5. *Noyes' bubble house*

6. *Nelson's decentralized cubes*

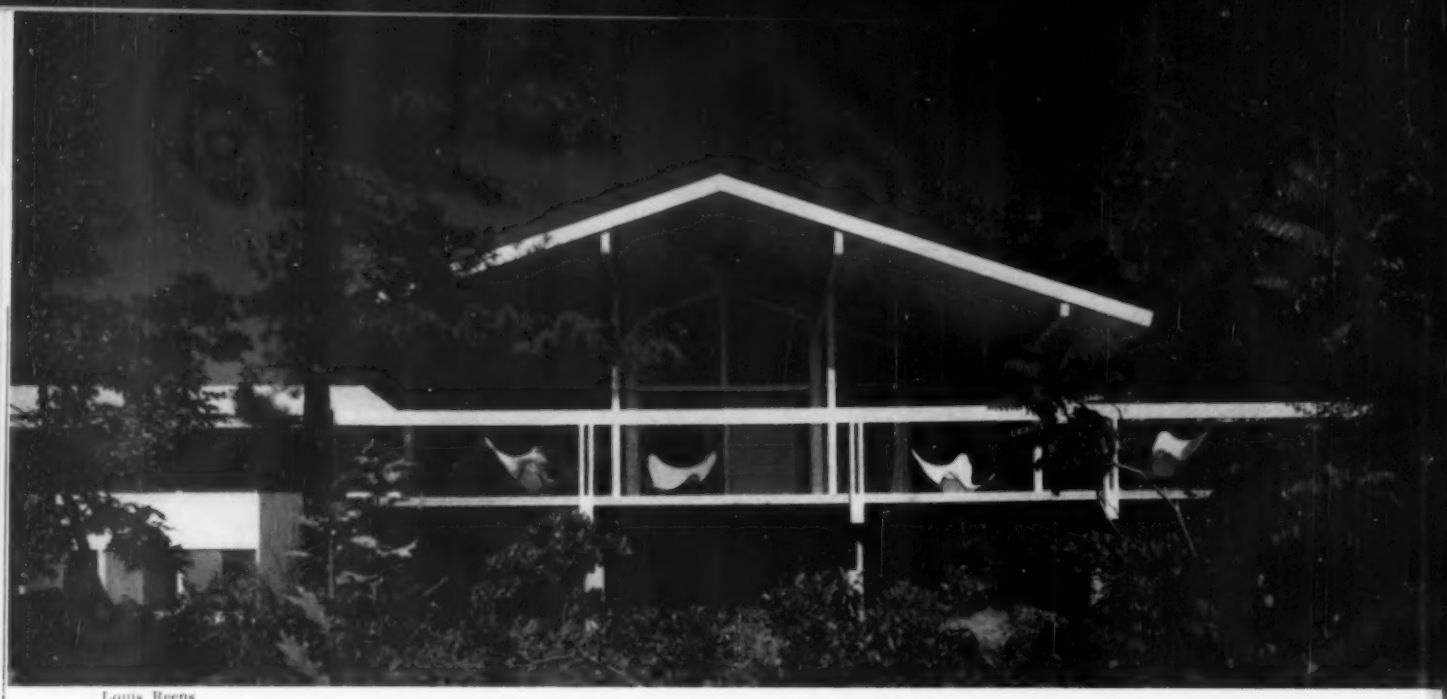
7. *Alcoa Carefree,* 1958 *version*



8. *Monsanto plastic house*

9. *Le Tourneau's cast-on-site concrete house*

Courtesy: R. G. LeTourneau



Louis Reens

1. *Koch's Techbuilt*

Ernest M. Silva

2. *Cherner's Prebuilt*

Courtesy: Ferro Corp.

3. *U. S. Steel/Ferro Enamel house*

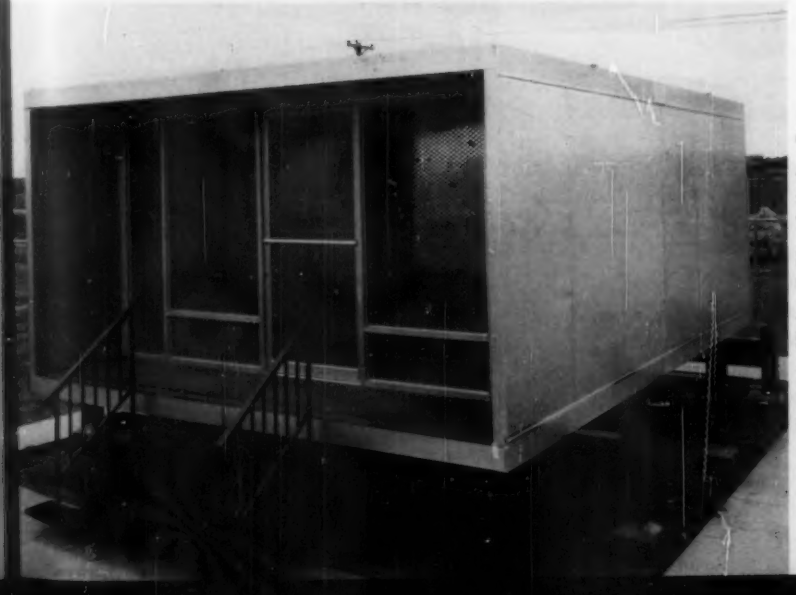
4. *IIT plastic house*

5. *U. S. Army inflated domes*

Courtesy: Hooker Chemical Corp.

6. *Canadian radome*

7. *MMM tape-joined house*



Courtesy: Minnesota Mining & Manufacturing Co.

Carl Koch's Techbuilt (1) and Norman Cherner's Prebuilt (2) are just about the only currently produced prefabricated houses that use the module and modern design—and even these use conventional materials. The Techbuilt is assembled from 4-foot panel elements in three related heights; its framework is laminated post and beam. The Prebuilt uses wood bents (in effect, a series of ribs) connected by a plywood panel skin which gives them rigidity. But of course the idea of using materials of advanced technology persists—if only in research or special-purpose shelters. Later this year U. S. Steel and Ferro Corp. plan to build an experimental house of enameled steel panels (3) designed by Carl Koch, for which American Standard may employ some prefabricated plumbing concepts if development time permits. And at IIT, design students will build a triangulated panel house (4) of fiberglass-reinforced plastic with a plastic foam core; its kitchen, bath, heat source and outlets, and all its electrical outlets, will be incorporated into a free-standing cube in the center of the house. Even more blue-sky in terms of application to residential use are the air-supported domes (5) now used by the U. S. Army to shelter equipment; the polyurethane foam dome (6) joined by foam "mortar," developed by the National Research Council of Canada and the Royal Canadian Air Force for use as a radar tracking installation. And Minnesota Mining & Manufacturing Company has just built an experimental house (7) joined entirely by tape, which will be tested through this winter for its resistance to Minnesota's cold weather.

PREFABRICATION IS BLOCKED BY TRADITIONAL ATTITUDES / *by Peter Blake*

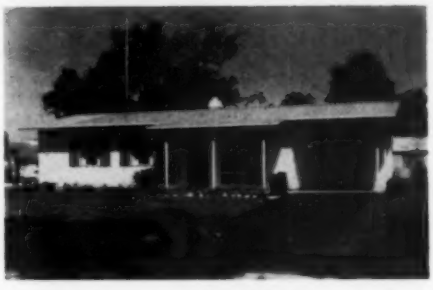
The building of houses is one of the two or three largest industries in the U.S. today—and just about the most backward. Although the output of the industry is little short of phenomenal (more than a million dwelling units per annum over the past few years), the methods by which these units have been put together are as archaic as those employed by witchdoctors and soothsayers. Indeed, it is something of a miracle that we have been able to put up any decent houses at all: almost nothing that goes into today's house can be fitted, dimensionally, to anything else that goes into the same house; almost nothing that goes into its structure conforms to the best engineering know-how available to us today; and few items that go into its interior and exterior finishes could pass the stringent performance tests employed in most other comparable industries. In short, today's mass-produced American house is a conglomeration of largely unrelated objects that have been, somehow, stuck together by hook, crook, nails, screws, adhesives, or pure magic to form a single product that will not come apart at the seams —at least not for a remarkably long period of time.

Just about every thoughtful person in the housing industry is aware of these facts. Just about everyone knows—to take one example—that most windows and doors manufactured today are dimensioned to fit into brick walls, although most of our houses are made of wood; or, to take another, that the inadequately seasoned wood in most of our house-construction today is so full of water (and other problems) that no *scientifically*-run industry would seriously consider using it. And, finally, everyone knows that conflicting codes, conflicting labor union policies, conflicting financing practices and unavoidably conflicting climate conditions make a rational approach to *standardized* housing almost impossible.

Yet, despite these and many other discouraging factors, there are still a few idealistic dissidents in the housing industry who remain convinced that house manufacture should make sense—and can. This intrepid minority has been fighting a lone battle for more than 30 years—a battle for some sort of industrially-produced housing: prefabrication of entire houses, or of large components of houses. (To be quite accurate, nobody believes that the *entire* house can be prefabricated today; too many elements — e.g. foundations, utility lines, etc.—must still be installed on the site.)

Judging by the latest performance figures, the prefabricators have made very little progress in the 30 years during which they have been trying actively to revolutionize the housing industry: in 1959, only about 80,000 out of a total of 1.35 million non-farm dwelling units produced in the U.S. were prefabs of one sort or another—while, at the same time, the house-trailer industry (to take a related example) was able to sell 150,000 units, and Detroit was able to sell 5 million cars in the U.S. alone. In short, prefabs remain a very tiny drop in the housing bucket.

Why have the prefabricators had such limited success? Where have they failed?



Largest commercial prefabricator in U. S. is National Homes, with 12 plants in as many states. It offers a wide range of sizes and styles, such as Lorraine (top), Roseclair (below), at prices which run from $8,000 to $108,000, at plant.

Two other examples of U. S. prefab operations are Loctwall Corp. whose houses (top) are assembled from stressed-skin plywood structural panels, and Modular Homes (below) which uses post-and-beam construction, modular curtain wall panels.

In Finland (two photos above) prefabricated houses are made entirely of wood, using traditional structural systems; many do not even use plywood. Design is prosaic, but carpentry is excellent.

Austrian prefabricators also work primarily with wood, but offer such on-site custom touches as stucco-like finish on house directly above. Framing system on house at top unfolds like pantograph.

The answers to these questions are most easily found by asking still another question—namely, why should people buy a prefab anyway? What does a prefab have that a conventional house doesn't?

Ideally, the answer to that ought to be: a prefab is cheaper, better designed and more rapidly available. But, in fact, the prefabs produced in the U.S. to date have almost none of these assets. Generally speaking, they are no cheaper than conventionally built houses (in some areas, they are actually more expensive); their design—with a very few, notable exceptions—is no better than of houses found in a conventional development (indeed, their design seems to be getting somewhat worse); and, finally, it takes just as long to get a prefab as it does to get a conventional house (and in some cases, longer).

To find out why this is so will provide several important clues to the probable future of prefabrication in the U.S. For if it can be demonstrated that prefabricators, by and large, have been heading in the wrong direction, it might also be possible to point the way to the right one.

Why aren't prefabs cheaper?

The cost of an average, 3-bedroom house can be broken down into these percentages: the shell itself costs about 25 per cent of the total; the kitchen and baths, including plumbing, cost about 20 per cent; the heating and wiring cost another 10 per cent; and the balance is accounted for by interior finishing, foundations, and cost and improvement of lot.

Most prefabricators operating in the U. S. today sell a "package" to their dealers—the package consisting, primarily, of the shell, and only secondarily of kitchen, bathrooms, utilities, interior and exterior finishes. Mechanization can reduce the cost of all these items; but even if mechanization reduced the cost of the shell in a prefab by as much as 20 per cent over that of a site-built shell, the total saving in cost for the entire house would still be a mere 5 per cent. By the time this shell has been delivered to site from the plant in which it has been prefabricated, most of the savings effected through mechanization may be wiped out by high shipping costs.

So the first reason why prefabs are not cheaper than site-built houses is that (a) most prefab manufacturers concentrate on the shell; (b) the shell is a very bulky item and, hence, expensive to ship; (c) most plants are still located in the Midwest, where prefabrication got its start (although some dispersal is becoming evident), and most cannot ship beyond a 300-mile radius without losing their price advantages over site-built houses, and finally (d) very little can be saved—at least today—by prefabricating the shells of houses.

The reason for this last point is that the housing industry is, at present, prevented from using the best kind of shell made possible by today's technology. Such a shell might consist of extremely light, extremely thin, and extremely strong sandwiches of metals and plastics—all completely familiar to every other industry engaged in making "shells."

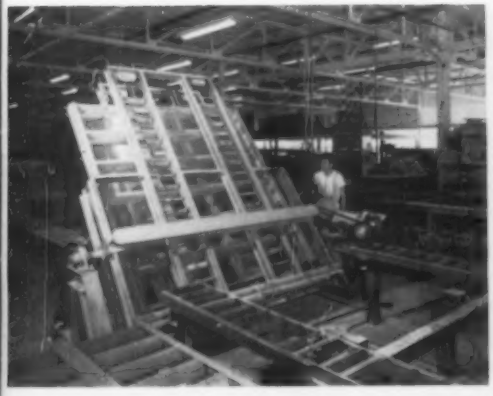
Unfortunately, however, such familiar sandwich materials are virtually ruled out for the time being in the housing industry because many local building inspectors have never heard of such materials, and neither, apparently, have many private financing institutions. (If anyone told the airplane industry that the design of its jet engines would have to be approved by men who barely understood the valve-in-head engine, he would be led off to the nearest padded cell; but in housing such procedures are considered eminently logical.) It is true that some developers on the outer fringes of suburbia have been able to write their own, modern, building codes; it is also true that some financing institutions have come around to the thought that metals and plastics may be here to stay. But the numbers, as yet, are small, and no real cost-cutting can be achieved through the use of most of these new materials until they are mass-produced. (A traditional, wood-framed, site-built wall may cost about $1 per square foot, in place; but a metals-and-plastics sandwich panel, at present, costs up to $3 per square foot because it is still, by and large, a special-order item.)

Because codes and financing policies vary from town to town across the U.S. nobody has been able, so far, to come up with a mass-produced shell—or even the design for one—that will satisfy the codes and policies in Sarasota as well as those in Dubuque. There are some areas around Detroit, for example, where you may not build a house unless a certain minimum percentage of its exterior wall is faced with brick. There are reasonable limitations, too: roofs in Florida, for example, don't have to be strong enough to support snow-loads, but roofs in Vermont obviously do. The list of special demands raised by special, local conditions is almost endless. But it all adds up to a single, depressing fact: the kind of standardization of house-shells without which mass-production *at low cost* cannot be achieved is almost impossible today—except within a 300-mile radius of a plant, and using more or less traditional materials. So the second reason why prefabs are not cheaper is that their manufacturers are unable to make use of the technological know-how available to them.

The third reason is that very few prefabricators have been successful in attacking the real, hard core of the cost of an average house. That hard core of cost is in the utilities and related fixtures; and while many designers have, over the years, developed excellent solutions for factory-produced utility cores and similar mechanical packages, the realities of present code and union situations have made the manufacture of such packages very difficult.

In principle, the national headquarters of plumbers' and electricians' unions have frequently admitted that industrialized housing, including the prefabricated mechanical core, would greatly benefit the personal lives of their own members. But on a local level the story is something else again, and many builders feel that to buy mechanical cores is simply to ask for trouble. (Every potential manufacturer of such mechanical packages is aware of this problem and, consequently, few such units are on the market today.) There

COMMERCIAL PREFAB, IN PLANT AND ON SITE



The closest thing to an industrial house is National Homes' Viking Line, which is aluminum clad, although panels look like conventional siding. Structural frames (left) are assembled, and panels (center) are spray-finished and baked in factory. Entire house is trucked to site (right) inversely loaded: parts used first are first to be unloaded.

have been famous case-histories of builders buying such packages only to find that no plumber or electrician would install the package unless it was first disassembled on the sidewalk, then carried piecemeal into the house, to be reassembled indoors. Admittedly, this situation is slowly improving: for example, the packaged kitchen units presently made by several large manufacturers have encountered relatively little resistance. But no manufacturer of bathroom fixtures has, to date, seriously attacked the problem of a complete plumbing wall, with all fixtures, cabinets and accessories built in; and no serious attempt has been made to unify all the utilities, including heating and air conditioning, in a series of flexible integrated packages that could form the core of any kind of house and would eliminate costly on-site labor where it really counts.

Why aren't prefabs better designed?

But even supposing that prefabs were no cheaper than site-built houses, people might still buy them if they saw that the prefab was better designed. Here, again, the facts of the situation are disappointing: with the exception of one or two models, the prefabs on the American market today are no better in design than their site-built competitors.

The reasons for this are two: first, most prefabricators equate design with styling, and consider it merely a way of making their product more saleable. And second, most are just not big enough to employ good designers and, therefore, merely try to follow design trends in the housing market. To the average prefabricator, the "shell" of his product is simply the wrapper that will do a large part of the selling job for him. In today's prefab market you can buy wrappers ranging from "French Provincial" to "Split Level," and you can buy some astonishing mongrels that defy all description. All of this may make sense to the average salesman, but it seems to fail in two related respects: first, this kind of selling technique is identical with styling and selling techniques employed by site-builders; and, secondly and conversely, it does not offer the potential buyer anything really new and thus, at the very outset, reduces the incentive for buying a prefab.

For the truth is—or seems to be—that people will buy a variation of an established product if that variation has something special to offer. Alcoa understood this when it named its experimental prefabs of recent years "Carefree Houses"; it was selling low maintenance, a big "extra" over a house put together of materials requiring periodic repair and attention. And *one* reason, surely, why trailers have been outselling prefabs by 2 to 1 over many years is that trailers, too, offer something distinctly different: what Burnham Kelly of MIT (author of *The Prefabricated House*) calls "minimal involvement" living. This is not to suggest that prefabricators should start copying trailer-design; it *is* meant to suggest that they stop copying the men they are trying to put out of business.

This is much more easily said than done. Unlike the big automobile manufacturers, who may produce as much as 50

Pre-assembled structural panels of Viking house are erected on site (left), then aluminum siding is laid over them. Roof panels (center) fit over pre-formed aluminum hangers. National, which also makes wood prefabs, offers the Viking Line in numerous models, among them the Fair-L-Wood (right) in California Contemporary style, designed by Charles Goodman.

per cent of their industry's output, the biggest prefabricators are responsible for little more than 1 or 2 per cent of the annual housing production of the country. This means, among other things, that even the biggest can barely afford to hire first-rate designers. Worse still, he cannot afford to back his own designs with the sort of advertising campaign that would help create a widespread demand for such design. And, finally, even the biggest prefabricator is so small in proportion to the housing industry as a whole that he cannot, singlehandedly, wage a very effective battle for more modern, more unified codes, financing policies, and labor union practices. Yet, unless he wages and wins such a battle, his future opportunities will remain very limited.

And why aren't prefabs more readily available?

Still, if a customer could buy a prefab today and see it delivered and erected on his site tomorrow, he might disregard all other drawbacks and pick a prefab over a similar, less expensive, site-built house. Unfortunately, few such miracles of distribution have been performed by the industry to date. Indeed, distribution has proved to be one of the most serious obstacles in the prefabrication industry. To find experienced local dealers (who should be contractors, for every prefab needs *some* on-site work before and during erection); to set up dealer-financing arrangements similar to those in operation in the automobile industry; and to stimulate a steady, more or less even flow of orders from dealers (without which no prefabrication plant can operate efficiently)—all these are problems that have proved to be the undoing of more than one enthusiastic pioneer in prefabrication (Lustron is a famous example).

Yet, short of instituting state-planned housing, the problem of distributing prefabs must be solved by methods similar to those employed in the automobile industry. National Homes, the biggest U. S. prefabricator today, has worked hard to perfect efficient dealer set-ups. In most cases, National Homes dealers are, in effect, local homebuilders who buy the complete "package" from the nearest plant and use it to create communities not very different from those put up by any other developer. The advantage to the builder over the old system is that he does not have to subcontract for anywhere near as much work on the site, that he gets a package that includes good design (if he wants it), advantageous financing, good site-planning (if desired), national advertising, and the manufacturer's guarantee. These advantages are not to be sneezed at, but the fact remains that most buyers have little choice of site (except within a development of more or less similar houses), and that the time-lag between ordering a house and occupying it is just about what it would be in the case of a site-built house.

Moreover, National Homes is the shining exception: most prefabricators still operate on a special-order basis and include far fewer items in their prefab packages. And most have had great difficulties in developing *uniformly* efficient dealer set-ups: they may have fine dealers around Boston, but terrible ones around Baltimore; and since so much of the quality of the finished house still depends upon the way it is actually put together on the site, such discrepancies in the quality of the distributor set-up have had a serious effect upon the quality of the final product, and the success of the entire operation.

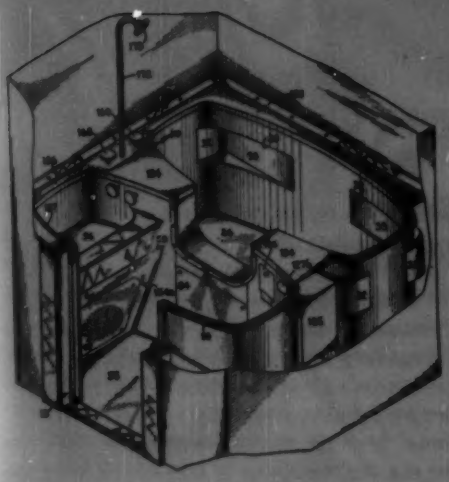
Something will have to give

This long and dreary catalog of troubles faced by the prefabrication industry in the U.S. should be enough to discourage all but the most insouciant. As one ex-designer of prefabs put it: "It's as if you were trying to design automobiles to comply with thousands of conflicting safety and police regulations—and then to sell the cars by mail-order." Indeed, the future of prefabrication in the U.S. would be bleak except for these facts: by 1965 or thereabouts, the annual need for new houses is going to be so phenomenal—something like 2 million a year—that the U.S. will not have enough skilled labor, not enough traditional materials, and not enough other resources to meet the demand. At that point a good many things are going to "give": foremost among these will be archaic codes and similar standards, union practices that encourage feather-bedding and outdated techniques, and the conservatism of the housing industry in matters of design, engineering, and distribution.

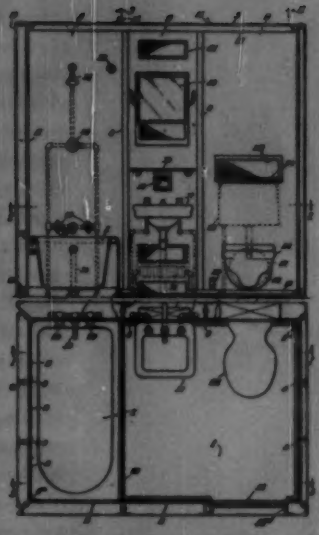
When that happens, prefabbers will get their first, real opportunity to show what they can do. The only question is—do they themselves know what it is that they ought to be doing?

Not many of them seem to, judging by past performance. Too many are still tied to traditional building trades and materials, too few of them have analyzed their problem in industrial terms. And this is where designers will have to take the lead once again.

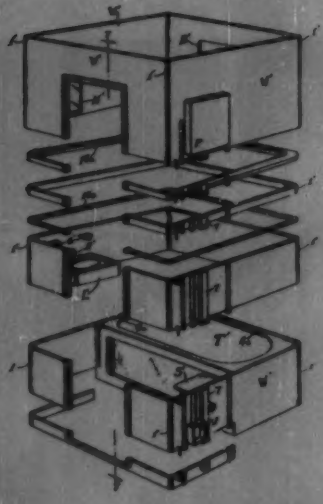
There are three specific services that designers can render to tomorrow's prefabrication industry: first, they can analyze the house and all its elements in terms of cost, and persuade the prefabricator to forget about mass-producing complete shells and, instead, concentrate upon the mass-production of certain costly components. Some of these components are bound to be parts of the shell—such as transparent or ventilating walls and large roof panels—but most of the components will be in the area of mechanical equipment. As a corollary to this, it is essential that there be intelligent agreement within the industry on the matter of modular coordination, for obviously none of these components can be mass-produced without it. Much work in this field has already been done, but a great deal more is needed to go beyond such relatively meaningless small-scale modules as the 4-inch dimension, or the confusion of meaning that exists, for example, in the statement of a window frame manufacturer that his product comes "in sizes to fit 25 different modules." It would also help to have the module studied for its relation to the proportions and functions of man, since a house, unlike a factory (where the machine is the vital statistic) or an office (where the filing cabinet is the basic measurement), is intended primarily to accommo-



Buckminster Fuller's bathroom for Dymaxion house, designed to be pressed from metal in two sections with all components completed formed; 1938.

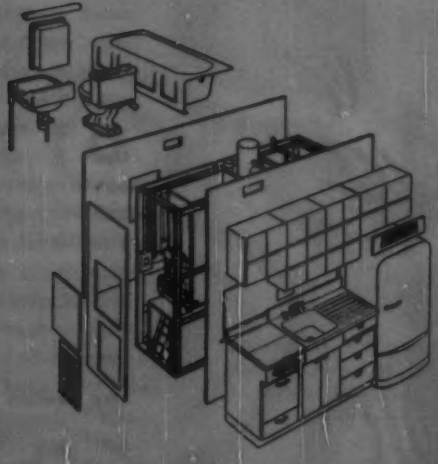


Patent drawing for a bathroom to be fabricated as connecting vertical panel sections; 1931.



Patent drawing for a bathroom to be fabricated as layered horizontal cells; 1931.

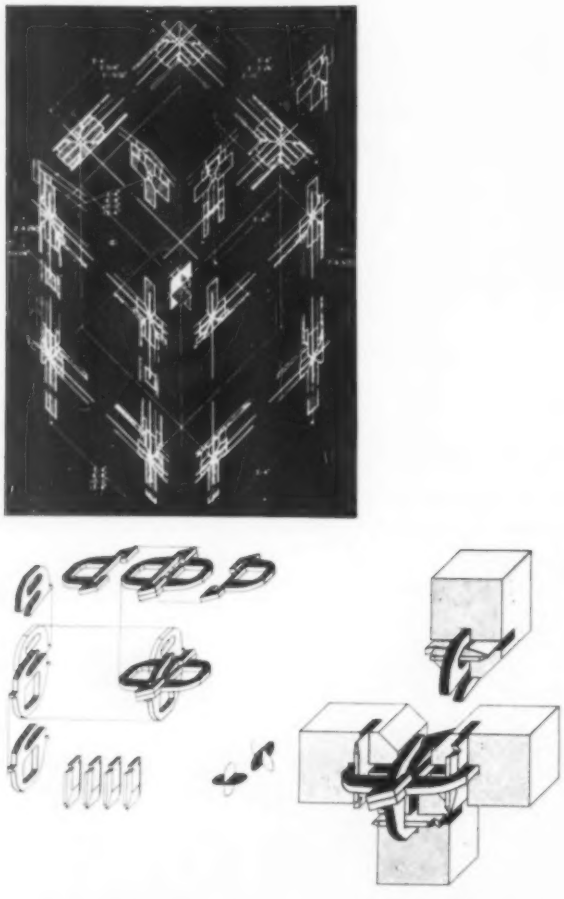
Sundberg-Ferar's modular kitchen and bath, sandwiching a utility core; for Federal Machine & Welding; late 1940's.



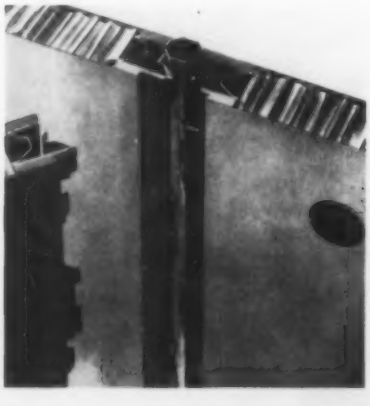
Donald Deskey's kitchen-bath-utility core for Ingersoll division, Borg-Warner; 1948.

IIT project; spherical bath to be installed as a unit; integral heat, air circulation, drainage, under floor.

Henry Dreyfuss' bathroom for Monsanto house, of plastic, in two molds; 1957.



Walter Gropius' and Konrad Wachsmann's famous General Panel house, assembled with a universal joint that handled all possible structural connections, evolved from studies of structural planes (top) and designs for joint itself.



Joining system for paper-cored aluminum panels, designed at IIT, uses brackets that clamp around octagonal post.

date the dimensions and activities of people.

The second service that must be rendered by designers is in the area with which they are most familiar, i.e. design. Unfortunately, the prefabricated house has acquired a bad name in the U.S. because it has been most in evidence during emergencies—as temporary low-cost housing during economic depressions or in times of war. To shake off this stigma, prefabricators have reverted to design that is indistinguishable from traditional housing on the assumption that the prefab will thereby acquire the status of traditional housing. The fallacy of this is obvious to any designer, but the prefabricators—if they knew it once—have for a long time chosen to ignore it. They must be persuaded that competing with site-built houses means offering their potential customers a product that is better in a distinctively different way. It must be better in appearance, better in engineering, better in long-term performance, but, most important of all, these improvements must be based on the standards of excellence that apply to the machine and not—as at present—to those that apply to a hand-crafted product.

Finally, designers can be of some help in solving some of the marketing problems. In order to guarantee round-the-clock operation of mass-production facilities, the prefabricator must have a distribution system wide enough and efficient enough to guarantee a steady flow of orders, and the anchor man of this system is the individual house-salesman. One important reason why badly designed houses all over the U.S. continue to outsell well-designed houses is that most house-salesmen are incapable of selling anything of a level of taste higher than their own. It is unreasonable to expect a new kind of design in houses to sell without salesmanship of a fairly sophisticated sort. Designers can't be expected to hold seminars for salesmen, but they will have to increase their own ability to communicate what they have done, and the expected basis of its appeal.

The prefab of the immediate future

By concentrating upon the prefabrication of costly components (that can be shipped in compact packages) the industry will be able to vary the appearance of houses sufficiently to avoid excessive monotony. What this means, to put it bluntly, is that success is likely to spoil prefabrication as it exists today. Only the most inexpensive house may be produced as a complete package, with the shell a factory-designed and factory-produced item—a sort of Model T of prefabrication offering little variation in design. Still, the Model T prefab will solve a good many problems that are now being solved inadequately by hand-me-down design.

Much more important will be the component house, assembled in an outdoor factory, i.e. on the site. By 1965 or thereabouts, this component house will make almost every major builder a sort of prefabricator: the only handicraft work done on the house will be those special touches applied to the shell to give the houses "individuality"—a quality for which customers will have to pay, just as they have to pay for it in hand-tailoring or custom body-work on automobiles.

In short, today's prefabricator who manufactures only, or primarily, the shells of houses is probably on his way out unless he starts to reexamine his operation. And the prefabricator of today who also manufactures the expensive mechanical components of his houses will, in all likelihood, move farther and farther away from the manufacture and distribution of bulky shells, and concentrate more and more on the development of components that can work with *any* shell.

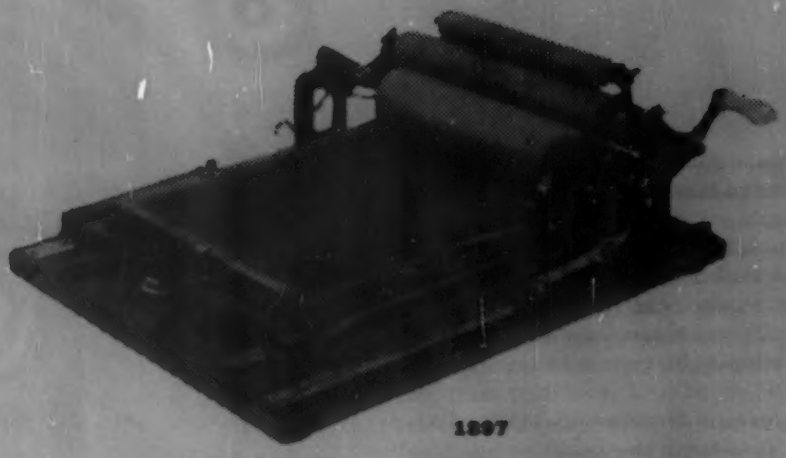
This means that a large part of the prefab industry may soon be taken over by an entirely new group of manufacturers: big corporations that have the necessary distribution system to put their products on a wide market, and the necessary funds to do the sort of engineering research that is needed to make prefabricated components better and more economical than their hand-made predecessors. This is a bitter pill for many pioneers in prefabrication to swallow, but it is an old story in almost every industry. Not many of today's prefabricators will survive the invasion of this field by the industrial giants.

The step beyond the next one

Meanwhile the component house is by no means the ultimate answer. Indeed, the sort of dwelling unit required in another 20 or 30 years may not be a house at all (we are rapidly running out of land). But even in the more immediate future there are problems that must be solved by creative designers before the industrialized house becomes a reality.

Perhaps the man who understands these problems most clearly is Buckminster Fuller, whose concept of the "autonomous house" suggests the logical, next step. What he means by the "autonomous house" is a house totally divorced from all the many things that tie it to the site—a house without an umbilical cord. Such a house would have its own, built-in, sources of energy and its own ways of collecting water and disposing of wastes. It would also have a system of foundations or footings that is much less dependent upon the quality of soil and site than the various systems in use today. For, obviously, so long as foundations must be dug, so long as water supply, gas, oil, electricity, telephone and soil pipes must be connected up to every house, there will have to be a great deal of site-labor—with all the attendant inefficiencies and attendant high costs.

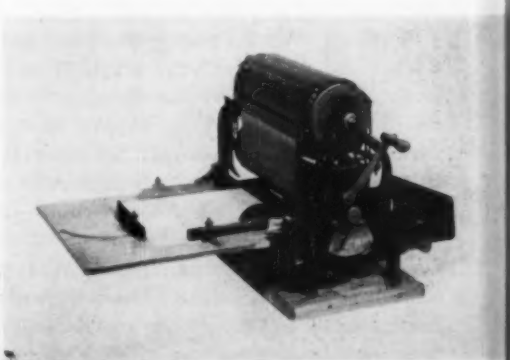
What the ultimate prefab house will look like is anybody's guess. And, to be perfectly frank, it doesn't really matter. Eventually, the logic of prefabrication-technology will create its own vocabulary of forms. We don't know what these forms will be because we are not too sure about the nature of tomorrow's prefabrication-technology. So it makes little sense to create "Houses of Tomorrow"—panellized, curvaceous or tetrahedral—because this is not really the problem. Designers are naturally concerned about the appearance of tomorrow's house; but as serious investigators in an area dominated by technology and economics, designers will have to concern themselves first with the problems posed by these two disciplines.



1897

A DUPLICATOR, A DESIGNER, AND A 28TH ANNIVERSARY

The contrivance above is an Automatic Cyclostyle. Introduced in London in 1897, and priced at 3 pounds, 3 shillings, (Unmeltable Rollers for Hot Climates supplied at extra cost) it launched its inventor, David Gestetner, in the business of making duplicating machines which today, as Gestetner Ltd., operates a 400,000 square feet factory in Tottenham, London, N. 17, and markets its product around the world. More than most firms of similar longevity, Gestetner is remarkable for the constancy and logic of its growth. Its founder was a perfectionist about even the smallest of details, and his personal credo has its corporate counterpart in the autonomous character of its present operation: Gestetner farms out almost nothing. It has its own injection molding machines and pressure die-casting machines; it even makes the felt used on the duplicator's rollers. Naturally enough, it also has its own design workshop and laboratories. For all this, it was one of the earliest firms to recognize the need for consultant industrial design, and it has been constant about that, too. Since 1933, each successive Gestetner model has been designed by Raymond Loewy Associates (by now, it is probably common knowledge that a Gestetner duplicator was the first product Raymond Loewy ever designed, and he was given five days to do it). As this quick panoramic review shows, the Automatic Cyclostyle (which featured an embryonic form of the oscillating inking system) has grown up—but not out of character.



1903 *Model number 3, Gestetner's first rotary duplicator; its dual cylinders were made of plaster of Paris.*

1926 *Electric model with motor inside wooden cabinet; loading tray capacity was increased to hold a full ream of paper in one loading.*

1933 *First model designed by Loewy substituted automatic handle clutch for antiquated wheel.*

1946 *Model 160 was first to use a semi-automatic inking device — a suction pump operated by a lever.*

1953 *Model 260 expanded automation: inking was fully automatic, and so was copy-counting.*

1959 *Model 360 has sharply defined planes; color-coded controls are based on human engineering.*

ESSENTIAL DESIGN

by Robert Malone

The use of traditional forms in design today may show that our roots in the past are yielding the nourishment for growth. Generally, however, the use of these forms demonstrates a lack of clarity, a timidity, or a type of security: a guarantee of respectable style, without reference to the buyer's own less coherent sense of values. The "periods" are well established, if the times we live in are not; so we are offered either new antique "designs" or antiqued "new" design. Either of these is, of course, a less than positive solution, but the two approaches to design permeate our surroundings from Sears to Abercrombie & Fitch, from coast to coast, imported and exported, in graphics, furniture, manufactured products, and recently in architecture.

An alternative to Traditionalism, old or new, in the public mind is Modernism. It has often seemed to people who look around them thoughtfully that the history of the Modern movement in this country consists of a gradual killing off of what Louis Sullivan spent a lifetime building up. The various components of his integrated idea have disintegrated and followed each its own path toward a conclusion. In "Miesmodern" we have the classical and constructional aspects of the idea. The emphasis is on the precision of finish and the rectilinear quality, and man's relation to the design is that of appreciative observer. In "Wrightmodern" the baroque and sculptural elements emerge as most important. The interpenetration of interior and exterior becomes more important than either the interior or the exterior spaces. The human function in such a building is to remain in motion (and emotion); the spatial relations are properly experienced at a slow walk, with all the associative organs operating at full, as when conducting a tour. Finally, with "Stonemodern", structural design has almost dissolved, and the rococo phase comes into its own with the emphasis on decorative treatment of surfaces. The human function in this case is merely to commission the work.

There is also a vociferous school of eclectic design today, noticeably in household furnishings. It has its practical aspects, in that any ingredient can be mixed with any other ingredient; this is a relatively inexpensive form of decorating, and allows the owner to value each object for the particular effect emanating from it in his own awareness.

It might seem from the preceding discussion that design has changed, so to speak, from an arrow in flight, to a splintered arrow in flight, to splinters in random motion; from Sullivan to his followers, to those who use the manners of his followers for their own widely divergent purposes. One source of impetus for this disintegrative process is our economy of (relative) abundance and planned obsolescence. Luxury goods of all kinds, including the buildings of our towns and cities, in order to be sold or rented at an unflagging rate, must be constantly changed and must *look* changed. Really fundamental changes involve re-tooling or re-structuring, and in our present system this can be done only at great cost. However, to rearrange only the surface is cheap and, to a large portion of the well-trained public eye, every bit as enticing. What may be the fundamental weakness of a designed object, possibly its motor, can remain static for years, while the sculptured fender goes through centuries of art formations within the same time. As more and more of our manufacturing processes have been mechanized in this century, more of the design problems involved have become too expensive to re-evaluate frequently. This has tended to reduce all elegance from the mathematical sense to the superficial sense, to reduce the designer to a stylist and the architect to a decorator. The structural necessities are left to the appropriate specialists in one or another field of engineering; the esthetic necessities involving the whole design are usually just left.

Of course, professional designers and critics of design have not been unaware of these paradoxes and perplexities. Solutions have been recommended on various levels; different analyses of the problem have each located the source of the difficulty in one or another cleavage or blockage. The "skin" men have blamed the "guts" men, and vice versa; the "machine" men blame the "crafts" men, who return the compliment with interest. The consumer has blamed the leaders of our business, who point to the motivation researcher, who is only tabulating what the consumer tells him. The Mumfords blame the Moseses and the Moseses the Mumfords. The puzzle is always to find just what is wrong, and who is responsible, and there seems no end to it. But one thing should be evident: what seemed genuine when it had unity and integrity will begin to seem spurious when it is artificially broken apart into specialties, fabricated separately and then reassembled. Neither a creature nor a product can survive long where there is a division between skin and guts. However, in the interests of our own particular kind of efficiency we have drifted along, allowing the division to perpetuate itself, until our creative energies are dissipated in all directions. We have reached the point where sound and essential design seems uneconomic, because of the huge efforts necessary to bridge one gulf after another in our technical knowledge and attention. The energy which should go into the product itself is channeled off into the desperate effort of stylist and engineer to communicate with each other.

It is not inventiveness that is lacking, but a serious concern for the basic relationships between people and things.

A design educator's view of where we are and what we need

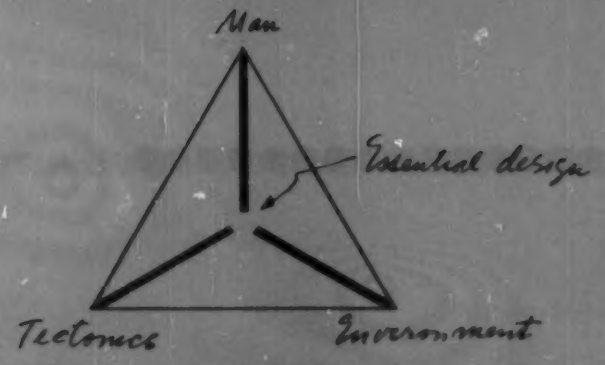
We are capable of producing all sorts of hydra-, dyna-, supermatic components to please people; but when we begin to consider our products in a slightly philosophical way, we are all too prone to atavism. We are eager to jump to a historical solution (arts-and-crafts movements, do-it-yourself enthusiasms) or an academic one (concentration on initiating a small group of would-be designers into some particular theory of color or drawing). This would be salutary if we adopted essential disciplines of the past or present, although even these need rephrasing. But the adoption is of manners, surfaces and emotive satisfactions. In spite of their great wisdom, Ruskin, Morris and Gandhi all made this mistake. We cannot restore integrity to design by a worship of the pseudo-natural. The great danger of such "reforms" is that they promise so much and realize so little; and the disillusionment arising from them tempts us to assume that there is no hope of rescuing the race from gradual dehumanization. We apologize despairingly for the inhumanity of the machine, while we neglect the huge possibilities for humane design if we were to design *for* people *through* the machine, instead of requiring that most design be geared (physically and mentally) to existing processes. If we are to be whole, we must deal with machines as the extension of human factors that they are, not as alien and disrupting factors in a human environment. These extensions can and must be reformed, but they cannot, at this date, be dismissed.

The Condition of Education Today

The education of a single human being today requires a remarkable number of collections. Every institution of learning must collect a faculty, a student body, a curriculum, and enough money to house and equip all the collections. Unfortunately, the collecting tends to be done on a shotgun pattern, and once collected, the various items are labeled, superficially classified, and that is all. The school has a man to teach this and a man to teach that, but the Professor of This rarely has any knowledge of the content or method being used by his colleague in That. It is tacitly assumed that the student who is exposed to the required number of semester hours in This and That will be able to integrate for himself what the faculty and administration have neglected to integrate before he got there. His task is made more hopeless by the fact that the jigsaw pieces he is given are not even parts of the same puzzles; in the interests of balanced education, we generally give him parts of four or five. It seems as if we have replaced the integrated but narrow classical education of yesterday with a haphazard assortment which is, we feel vaguely, more inclusive of a scientific approach.

Having found that integrating a curriculum presents too many problems, we next set about integrating the classroom. The order of the day is participation. Ignorance, like some forms of emotional disease, is to be treated by group therapy. It is true that enthusiasm is contagious, and group interest, once thoroughly stimulated, carries along the learning process with a certain momentum; but the mature quality of disinterest is unable to crystallize in an atmosphere of eager competition or of eager cooperation. It seems more likely that the development of either a professional person or a responsible citizen will be delayed or hindered by the built-in irresponsibility of groups. The only solution for the student in search of a professional identity is to specialize further and further. In the interests of efficiency or of job-insurance, or even in the name of scholarship, we are encouraged to confuse the means of acquiring information with the ends of understanding and creation. In pursuing the fraction of a study, we fail to take precautions against achieving the fraction of a teacher, or the fraction of a student. We merely bewail the fact that communication becomes more and more difficult at each level of learning, and that division of labor must inevitably produce a disintegrated civilization. One of the most astonishing manifestations of our cycle of expansion, specialization, fragmentation, more specialization, more expansion, and so on, is the way we assume that it is inevitable to need experts in communication itself. Our whole approach to technology, scholarship, and life itself seems to have taken a long step toward chaos when two experts must, so to speak, stare at each other in mute frustration until a third, who knows very little about either of their subjects, can explain to them what they are saying to each other. And naturally, since no one else is qualified to check up on the expert's recommendations, in any given field, the temptation to irresponsibility or self-aggrandizement must be enormous.

These general factors in education have particular forms in the case of design education. The history of design itself is one of the major hurdles in the way of developing a genuine esthetic for this country. During this century, even the more cultivated segments of the public have been left in an artistic near-vacuum. The general school of "modernism" (including the so-called International style) was neither indigenous to America nor successfully transplanted. It was the product of a culture (Western European) in a state of fundamental break-up and rapid transformation; and it represented the license that accompanies the destruction of one order and the not-yet-visible formation of another. In the primitive and booming atmosphere of America, it was imported as a rather artificial academic exercise, as



most previous European styles had been at one time or another. Our art and design schools teach "contemporary" design as a style, as full of academic and technical clichés as any Beaux Arts class. The sequence of Dada, Surrealist, Impressionist, Expressionist movements started up as a normal artistic response to a world which had begun to seem more and more cockeyed; but here we are in a world which we are trying to restore to sanity, using the leftovers of these same schools, which are no more palatable in pure form than in their double-filtered, highly polished and cellophane-wrapped commercial manifestations.

To build a foundation for design education requires that we have a foundation for education in general and an understanding of what properly constitutes design. We must not be discouraged by the fact that there has been no serious systematic foundation so far. (After all, the medical profession had the same problem to conquer, not so long ago.) Neither must we conclude from the discomfort of designers in academic and artistic surroundings that there exists no good place for design education.

Essential Design

The content of essential design is the extension of the whole man by means of tectonics. Tectonics we already have in plenty, but if we are to relate the human environment to the psycho-physical wholeness of the human being, we must develop a modified and growing tectonics on a new plane—or several new planes. The necessary and hoped-for result would be to revise the structure and function of man's implements and enclosures into a living environment, capable of growing, changing, adapting, renewing, in response to the needs of a growing and changing race. Man is organic not only in the sense that he is biologically alive, but also in the sense that all his functions — breathing, balancing, perceiving, consuming, symbol-making, society-generating—are vitally inter-related and interdependent. The tectonics which serve him dare not be restricted mechanical systems; although they must be systematic, they must also be flexible enough to achieve structural formations by any means whatever which are harmonious with the initial human factors. We should not describe our methods in a linear sequence from man to means to environment, but rather as a simultaneous relationship, as in the diagram (above).

Essential design is concerned with a unity of design, including city planning and its ramifications, architecture (both exterior and interior), product design (including garments), packaging and graphics. The absurdity of these distinctions as they are now made in practice is particularly manifest on the fundamental level. What, for instance, is architecture? Certainly it can't be thought of as the technique of arch-building. What, if any, limitations can we put on the practice of architecture today? Given the present ingredients of engineering, contracting, decorating, sculpture and industrial design, where does architecture as a separate discipline stand? If, on the one hand, it has no well-defined province, and, on the other hand, includes or overlaps with so many different fields, can its practice be said to exist at all? Perhaps it is not an accident that so many architects are gravitating toward city planning nowadays. Would it not make more fundamental sense to say that within the field of essential design there are different levels of complexity, of which one may be concerned with the relation of human and structural factors in a material, or set of materials, providing enclosure? There is no logic of necessity in making the development of such enclosures a totally separate study, and the contemporary tendency for architecture to overlap and merge with other fields bears this out.

The essential unity of design, in turn, calls for designers capable of dealing with design as a whole. This does not, of course, refer to what is now called "total" design—a service provided by industrial design firms to corporate bodies, in such areas as packaging, consumer research, public identity and so on. This is properly design-as-advertising. When applied to the internal aspects of such corporate bodies, it is design-as-efficiency-engineering-and-traffic-control, and so forth. The fact that there is a demand for such integrated services is very hopeful, for it points out the growing awareness that our system has been increasingly and chaotically disintegrated up to now; but it must not be thought that such services can resolve the basic dilemma.

The components of essential design may be thought of as human processes, rather than mechanical processes or separate techniques. We can think of these components as initiation, development, production, and evaluation, leading to reinitiation, always recognizing that the processes are more likely to be simultaneous than sequential.

Presupposing a unified design system, we have first to establish, by careful analysis, at what level of complexity the problem belongs. Is it, for example, a tool that needs to be redesigned, or is it the whole method of manufacturing in which the tool has been used up to now, or is it the product that needs to be re-thought in relation to its ultimate purpose? It is extremely wasteful to assume that the answer to these questions is obvious to casual inspection.

The next matter for attention (which also throws light on the first analysis) is to place the problem in its historical perspective. Any design problem inevitably corresponds to one or another group of human extensions, and proposes to fill certain human needs. The history of the emphasis or de-emphasis of these particular needs, and the manner in which they have been met is vital to the understanding and initia-

tion of future products, or systems, serving the same needs as they are re-assessed and re-grouped with other needs, other systems, in a changing culture. When the human and historical coordinates of the idea become clear, certain principles can be applied to determine what phase of the idea is being dealt with.

For example, it is possible to place an object (enclosure, implement, symbol) roughly on a continuum between primitivism and sophistication according to the locus of its connections. The more primitive solutions to a problem tend to use external connections: the components tend to become segments, each expressing its role, but related to each other only at the connecting points, necessary to each other only or primarily in sequence. The more sophisticated solutions, on the other hand, tend to be integrated to a degree which causes the connections to be internal, inherent; the components relate to each other at many points simultaneously, on several levels of necessity. (The construction is "turned inward" so to speak, with the parts performing their functions in a mesh of mutually necessary relations, and the exterior aspect showing only the final unified object in its relation to its human use.) The ability to sort out such information will depend largely on the development of a new vocabulary in the design disciplines, capable of describing the exact anatomy of any design. Just as biology contains angiology (the study of the vascular system) so design contains many systems of study and areas of practice which must be identified and developed, if the practice of design is ever to emerge from the cloudy pragmatism which holds it down, as it held down the practice of medicine for so many generations.

Another useful category for analyzing a design problem is that of convergence and divergence. This relates closely to the historical analysis mentioned before. Just as the whale appears to diverge from its mammalian relatives and converge with the unrelated fish, so an object of design may, on close inspection, prove to have its roots in a system far removed from the one it now occupies. (For example, the automobile was first conceived as a horseless carriage: an improvement on a method of travel involving feet, wheels, gravity and solid earth. It is rapidly approaching the jet aircraft in appearance and, if there is any promise in the recently publicized experimental notions, even in operation! This is a method of travel which has little reference to solid ground; in fact its first use was by undersea creatures such as the squid, to whom fluidity and the action-reaction equality were more important than gravity or a smooth surface. We have begun to use the fluid properties of air in ways only a fish could have predicted a generation ago.) Much bad design results from the inability to recognize the nature of underlying structural systems; and to the contrary, a great deal of good design can result from careful examination and comparison of specific objects in relation to the systems they now occupy *and* in relation to the objects to which they are structurally related in other systems.

The anatomy of every essential design corresponds to real physical forces which must be understood and coped with by the designer. Every natural structure shows a strong impetus to be what it *must* be to survive. But in an artifact, a man-made structure, the impetus must be in the designer. In order to work successfully with the inherent physical forces, the designer must be fully conscious of the directions an object, or system of objects, is taking with respect to the fulfillment of functional necessities and formal possibilities.

The primary functional necessities, for design development, must be the human factors. If we assume that any design is either a good or bad extension of man, the primacy of the human is self-evident. A design in these terms is an organic substitution, and as such should be recognizable and usable not only by the "five senses" of man, but also by the inner senses, both psychological and kinesthetic. Actually, of course, the division between the outer perceptions and the inner responses of man is artificial; as useful as it may be for the study of psychology or philosophy, it merely impedes the development of a coherent human-factors study.

It is obvious that in order to think coherently on design as a problem in human extension, we must have some sort of an answer to the philosophical question of "What is man?" And this is a very large, if not downright impossible, order. But it *is* possible to become conscious of some contradictions, some anachronisms, some discrepancies in our implicit assumptions about the question. For example, a great deal of what we call "human factors analysis" consists of static measurements of certain human proportions in certain prescribed positions. We are, in other words, still using the nineteenth century notions of "bodies occupying space". Why have we not yet absorbed the interesting twentieth-century idea of "centers of energy within a space-time continuum"? We *must* understand that the environment of man always has more than three dimensions; man's living space can never be measured in cubic inches. Size or distance alone cannot provide a full description of any value; (Julian Huxley remarks that you can "Simply magnify an object, without changing its shape, and without meaning to, you have changed all its properties.")* And when the designer gets into the infinitely complex area of scale, and its relation to function and proportion, it should be clear that he needs a deeper understanding of human needs than is easily available now. But that is a subject for another article.

*"*Man in the Modern World.*" *Julian Huxley*

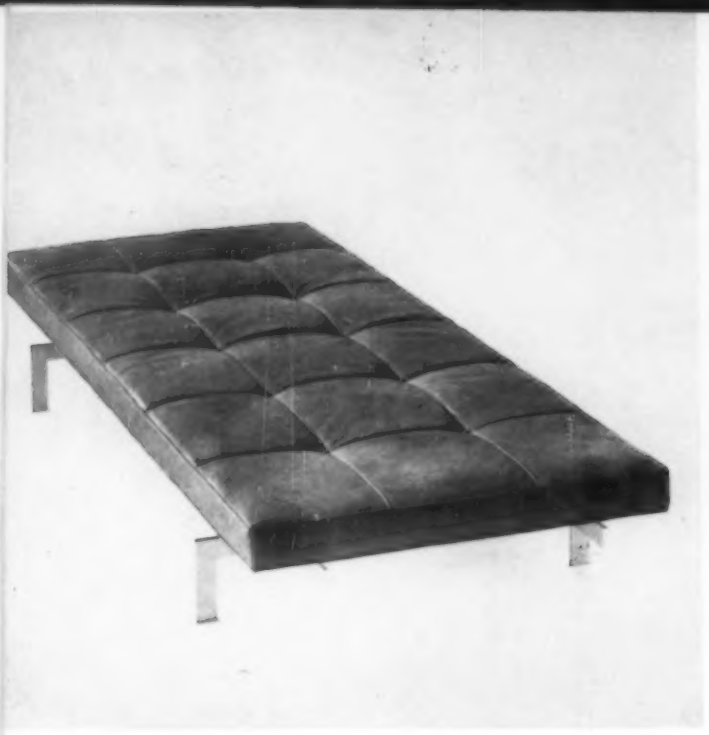
Chrome chair combines support for seat, connection for legs, in two curved bands; table has asymmetrical legs and top.

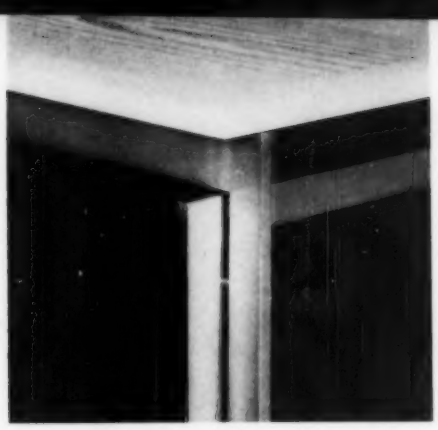
POUL KJAERHOLM: *A Young Danish designer trained in traditional cabinet-making applies the disciplines of a craft to the materials of industry. In his furniture he explores the nature of materials and analyzes structure.*

All photographs: Keld Helmer-Petersen

Semicircular chair back is many small strips of wood fitted and glued together; legs are chrome.

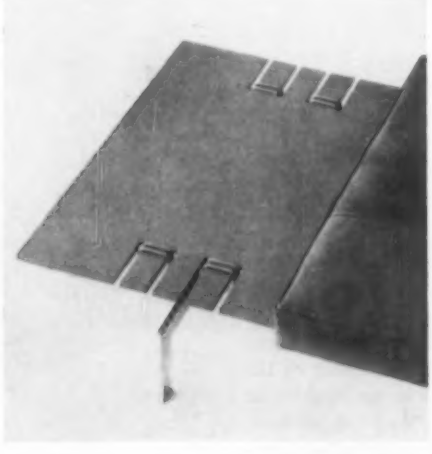
It is customary to compare modern Danish furniture to sculpture and poetry, describing it in such terms as lyrical, graceful, sensitive, warm, imaginative. Some of these words could be applied to the work of a young Danish designer named Poul Kjaerholm. But some do not apply at all. Kjaerholm, like his countrymen, uses materials with a fine regard for their nature and arrives at his final forms by a painstaking refinement of line. But he has chosen to work, for the most part, with materials other than wood—chrome combined with leather, slate, canvas, parchment, glass — and, perhaps because of this, he does not conceive of a piece of furniture as an organic whole, with every part flowing into every other in a sort of natural inevitability. Instead, he gives each part a separate identity; and the points at which they make contact, joining to become structure, are expressed with a finite precision. By the same token, he does not accept that materials in design must conform to the shapes in which they are supplied by nature or the manufacturing process. He will hand-bend a flat bar of steel (as in the chair on the facing page), turning it up slightly at the ends, in a manner that suggests resilience and plasticity rather than rigidity. Or, in an example that shows his contradiction of the cabinetmaker's traditional approach, he will dissect wood (as in the back of the chair, above), then re-compose it into a form that discovers new qualities in the wood's structure and grain. For more Kjaerholm designs, see overleaf.—*M.D.*

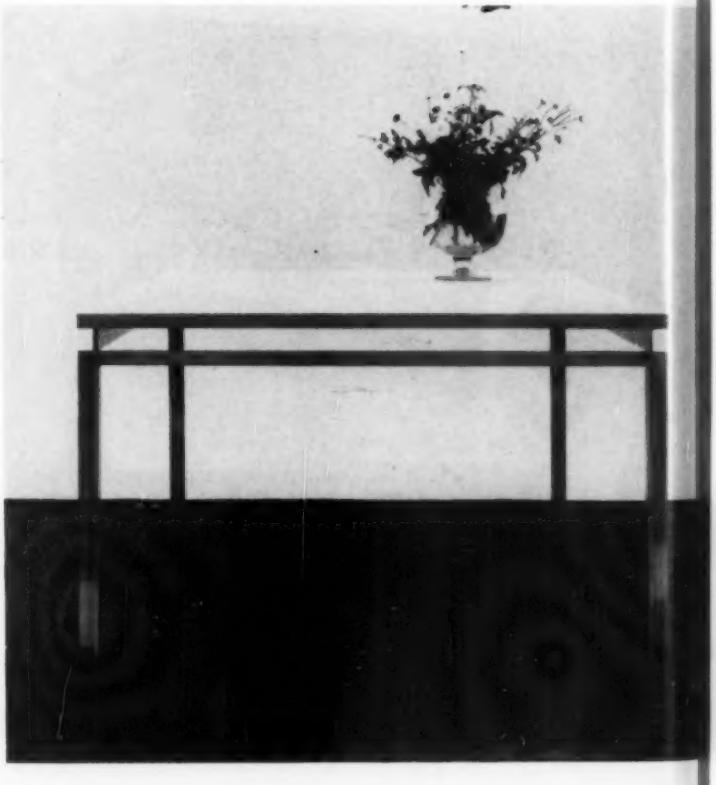




Four legs of a table (above and below) are formed by bracket-shaped members slipped one over another, forming intersecting planes. At no place do the brackets touch each other; small pins separate them at intervals down the length of the legs. The top of the table rests only on the higher set of brackets. The legs are chrome, the top, oak or ash. It is made in two heights: coffee table and dining table; the latter is 25½ inches, somewhat lower than standard height.

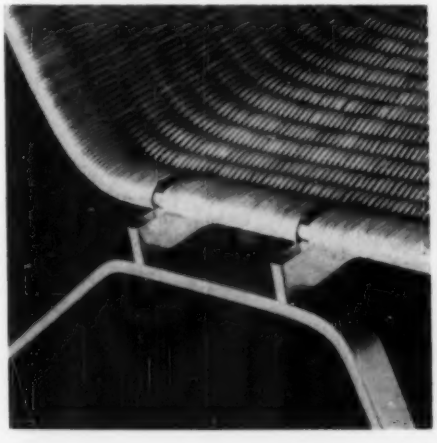
Low couch (above) of tufted leather appears to float above its base like a magic carpet. Two chrome bars set on end support the cushion slab; they are joined to two bracket-shaped leg members about five inches in from edge of couch so that joining is invisible. Even so, they do not make direct contact: the bars are lifted off the brackets by rectangular steel blocks. In an arrangement that seems casual by contrast, the cushion slab is connected to the base (below) by round rubber bands that lace through four slots.





In Kjaerholm's furniture every part has a distinct identity: forms exist as a series of intersecting

Cane chair (above and below) also comes with oxide cover, as shown on page 60. Its chrome legs are shaped by hand and are connected by two chrome bands which curve downward in inverted arches beneath the seat: these also support the seat, as their cradle-like form implies. The joining of seat, supports, and legs is concentrated in one place, and the chair's impression of resiliency is heightened by the fact that it is visibly screwed together, rather than welded.



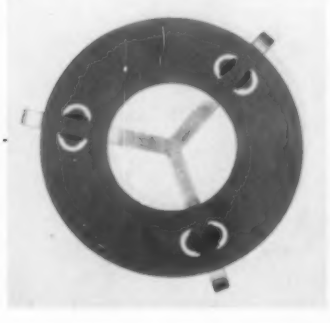
One piece of metal, slashed and folded, forms a chair frame.

planes whose intersections become the pivotal element of the design

Three leather armchairs can be joined to form a couch. In contrast to strict geometry of their forms, the cushions are filled with down.

Although many of Kjaerholm's pieces can be combined only with other Kjaerholm pieces (much of it is several inches lower than normal, and dining tables, for instance, can only be used with chairs designed especially for them), the pieces themselves can be assembled or used in a variety of ways. Tables can have interchangeable tops, and chairs, interchangeable covers; the couch shown at left is actually three chairs (minus superfluous arms and legs); and the stacking stools not only stack compactly, but form an intriguing pattern (their supporting frame is joined to the legs by the same slot and rubber band arrangement used on the couch on the preceding page). Because of the nature of the joining devices, most of the Kjaerholm furniture can be easily assembled and dis-assembled, making it more economical to export. It was introduced in the U. S. at the beginning of 1959 in an exhibit at Georg Jensen. The Kjaerholm designs are all made by Kold Christensen, and although the simplicity of their construction is in the spirit of design for mass-production, they are actually made by a combination of machine production and hand cabinetwork.

Chrome stools with leather cushions; tips of legs, as in all Kjaerholm pieces, are precise U-shaped brackets slightly narrower than leg.



Element of park bench is a continuous slab of concrete, to be joined in rows of varying length.

In contrast to the sophistication of his forms, Kjaerholm's description of his work is modest: "I always hope to design furniture that is contemporary, beautiful, and useful."

REdesign

CINDERELLA TREATMENT: THE LOWLY MOP GETS A CLEAN-UP IN LOOKS AND ASSEMBLY

Plebian, prosaic, and strictly utilitarian, the mop is one of the least attractive of all household cleaning implements (even a feather duster has more class, largely because of French maids in turn-of-the century drama). It is also the least changed. The time-honored way of making a yarn mop head has been almost a custom operation: women sewed, stitched, tacked, and assembled them individually—a procedure that was costly and time-consuming.

Palma-Knapp Associates of Chicago, has recently interrupted this stodgy pattern by re-designing the methods and materials for O'Cedar's classic triangular dust mop. They have also provided an entirely new companion mop with a round, rotating head. And they have packaged both in new, rigid polystyrene containers which conform to their shape and are intended to enhance impulse-sales appeal.

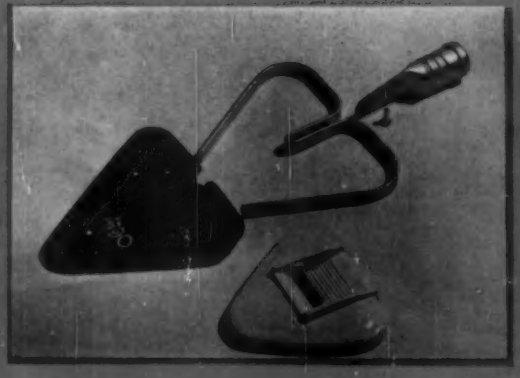
The heads of both mops are of molded polyethylene. The triangular one is in two sections: the head itself, and a handle socket that snaps onto the head with a spring clip and axle (and snaps off to permit throwing the soiled mop into the washing machine). The round mop has a three-section head which also detaches from the handle for washing; the additional section is a plastic grommet which fits into the head's center hole and supplies the rotating action.

Both heads have grooved channels on the underside into which the yarn mitt is fed; the triangular mop has a mitt of dacron-cotton yarn and the round one is nylon-cotton.

Both yarn combinations will, of course, wash and dry more quickly than the conventional cotton yarn mitt. But their most significant difference from previous mitts is in their method of assembly. Instead of sewing the yarn to cloth tape, then folding the tape to form a bumper which is slipped over and tied onto the head's metal frame, the yarn is now sewn onto an extruded vinyl plastic tape with a corded edge that is inserted permanently into the channel on the underside of the head. The plastic-bound yarn is formed in continuous rolls and can be cut to mitt length without the necessity of bar-tacking the ends, since the plastic is self-sealing.

Manufacturer: O'Cedar Division, American-Marietta Company, Chicago.

O'Cedar's new round mop (top, facing page) and re-designed triangular mop (left) have white polyethylene heads and yarn mitts of yellow, pink, or blue. Handles, more slender than previous mop handle, are in harmonizing or contrasting color. Yarn mitt has narrow corded vinyl plastic tape (above) that fits into groove on underside of head, uses less yarn, fewer production steps than previous cloth bumper. Below, old and new head assemblies; at right, old and new packaging.



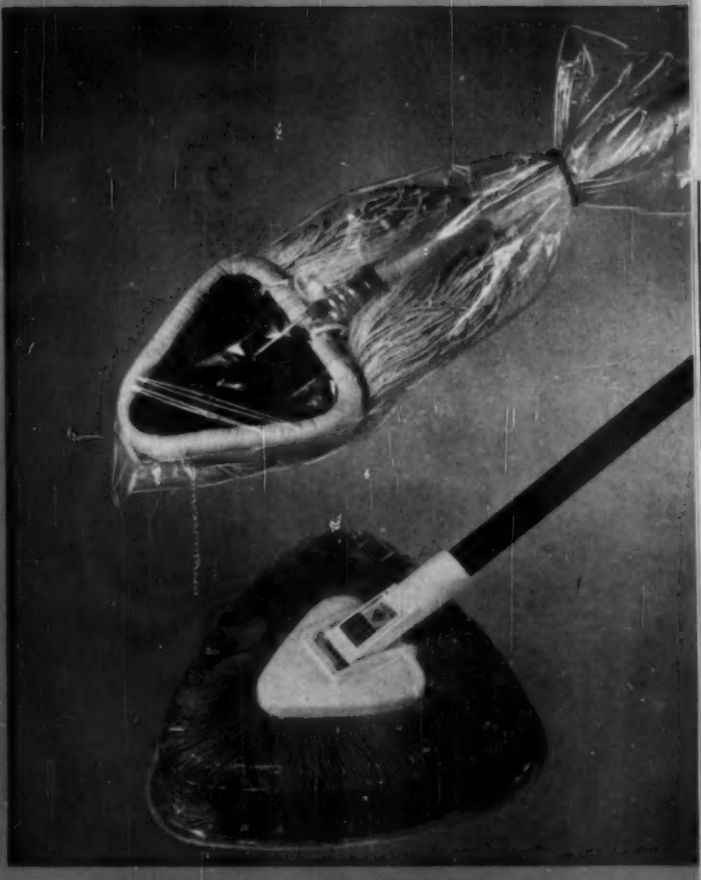


Photo: Lou Klein

Package Deal

or

The Consumer as Safecracker

by Frederick L. Gwynn

This morning in the bathroom I decided to begin a new life by reaching for a new toothbrush. It came in a glass tube sealed at one end with plastic tape. But the tape would not peel, and to get through it I had to work the nail of my little finger back and forth across the opening, which began to stretch like an acrobat's net. A final push and the tube shot into the bathtub, breaking into twenty-seven pieces of glass that did not include the taped end. A new life had indeed begun, but it already involved me in some recollections of previous incarnations—lifetimes in which I struggled daily with impervious, impenetrable packages, boxes, jars, canisters, bags, bottles, cans, and almost any other commercial container listed in my Roget under "Receptacle."

Tearing (I mean it) a clean shirt from (1) a rubbery transparent envelope, (2) a cardboard collar-holder, and (3) a great sheet of stiff paper covered with animals suitable for coloring by my children, I dressed and went down to make breakfast (I make breakfast in our family). First I opened the frozen orange-juice can on the organ-grinder opener, spilling only a few slivers of juice on the floor and letting the top of the can drop into the remaining contents only up to the second joint in my index finger. The milk carton was easy: I have long since learned to use a cold chisel on the foiled corners. (This tool is not mentioned on the box, a rectangular parallelepiped that advises one to "see back" for directions.) The seals on the long box of eggs all warned me Not to Accept if Broken, but there was little danger, since no tool, including a chisel, will puncture a scalloped flap. This morning I broke one egg while breaking the box—something of an achievement in the light of my life-long inability to open properly any egg, the original and still the most baffling of packages.

The bread was child's play, and I uttered thanks to my wife for buying the loaves wrapped in that thick opaque wax sheeting that keeps the color, consistency, and slicing of the bread a secret until you have extracted the heel—a great improvement over the vitreous packaging that enables you to identify the bread conclusively but not to get at it. We had instant coffee in the house, and I was once again grateful to the housewife who had already opened the jar, a process that involves tearing off a flimsy paper circle that rips into slices resembling all phases of the moon, and leaves your right thumb covered with caffeinized glue. I avoided serving bacon this morning: adept at shattering the picture-window on the bacon-folder, I am unable to replace the cellophane in any way for re-refrigeration. I knew that the children would be asking for jam, but I could not face that thin jar-cover, which, because it has not been *screwed* on to preserve the preserves, must be levered off with a blunt instrument, leaving a permanently bent raised opening shaped like a fish-mouth. And if the children asked for waffles or pancakes, I had only to hand them a pristine box of ready batter-mix, whose upper corner has some dots around a place to press one's thumb but no weakening of fibres there to allow entry. (I once tried a spoon in this space, with the same results achieved by following the directions for opening most small condiment cans—that is to say, a bent spoon, suitable only for a clamp in an emergency appendectomy on a submarine.) Besides, last Sunday morning's waffle-rites had involved a losing battle with 100% maple syrup. By "losing," I mean that we lost the syrup: the top of the can responded only to an ice-pick, and the spigot, situated just to left of center in the top, threw the golden liquid right over the waiting pitcher onto the table.

On my way to work I thought with charity on the packages and containers my wife would be struggling with during the day that I spent teaching at the University. But I had forgotten that walls are no longer cloistered, that mail is delivered at the Ivory Tower, and that nothing, not even an Eternal Verity, comes to one unpackaged these days. Letters arrived, (1) so tightly sealed as to present not even the smallest hole for a letter-opener to enter, or (2) so loosely sealed so as to fly apart like a tent in a hurricane at the first entry of the opener. Books arrived, each one sealed in a paper bag bearing a legend stating that the package "may be opened for postal inspection." This hanky-panky is cleverly paralleled by the printing that seems to cover all four edges of the bag: Open Other End.

Years of trying to find the other end, of probing with a dagger at brown paper tape the thickness of mummy wrappings, and of hacking at staples that only a dentist could extract have taught me to ignore all directions and to stifle all normal approaches to the book bag. Now I call in a colleague. He and I don linen dusters. He holds one Open Other End edge and I hold another. With my free hand I shove a pair of tinsmith's shears at the middle of the package, and as a mushroom cloud of dusty confetti emerges

Photo: Lou Klein

from the lining, we pull. Out drops the book. The floor looks like the deck of a barbershop, the dust-jacket of the book may have been shredded and the binding itself scored, but the book at least is outside, not inside, the package.

At the end of this day (in which I had exhorted a number of students to lead the examined life but had carefully avoided examining my own packaged existence), I rushed home to what promised to be a pleasant cocktail hour, and began the hors d'oeuvres wrangle in the kitchen. I never can resist the little cans of Vienna sausage opened by keys attached to the bottom of the can. (Once we bought a can whose key had been ripped untimely from its bottom. We still have an extra can, since if you take a key from Can B to open Can A, then you have to take a key from Can C to open Can B, and so on into the next fiscal year.) I reeled the key around the can, making the little gap that eventually reveals all. There were the sausages, and I turned them over onto a silver dish, forgetting as always that the oil will come out while the sausages stay in.

At last it is time for my drawing-room entrance. I carry a dish that displays one piece of sausage resembling a healthy thumb and one bleeding thumb resembling a piece of sausage. After greeting our guests, the Smiths, I mix cocktails, and reach into the olive-bottle, which, made in the dimensions of a test-tube, contains four olives wedged into the remote bottom. My fingers dangle in the juice like the legs of a man treading water. Not a chance of reaching an olive. So into the onion jar, a beveled *objet d'art* suitable for a mantelpiece but not for releasing the packed pearls in its depths. On to the cherry urn. Here, making pliers of my longest fingers, I catch a stem, pull, and emerge—bearing a stem.

The Smiths are now interested, and tolerant smiles creep over their neighborly faces. I call for drums and increase the tempo gradually as I (1) wedge an impossible spoon into each bottle-neck, (2) stab at olives, onions, and cherries with the ice-pick until their containers foam with oily debris, and (3) finally up-end everything into the ice bucket and pound the bottles till they are empty. In desperation I pour all the mixed martinis and manhattans into highball glasses and jam them into the Smiths' hands.

One incident remains to complete the packaged day. Settled with drinks uncontaminated by olive or cherry, Mr. Smith and I got to know each other.

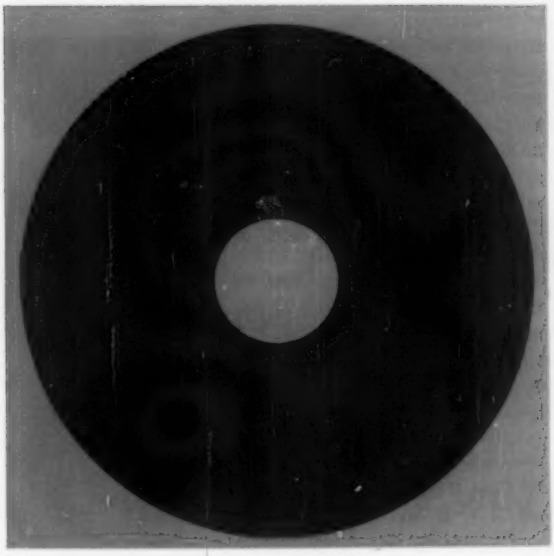
"What's your business?" I asked.

"Vaults," he said. "Bank vaults."

"How is it going?" I asked.

"So-so," he said. "As fast as we develop new what-we-call impenetration layers and new what-we-call pre-warning devices, the safe-cracking fraternity as-we-call-them develop electronic keys, circuit-breakers, and what not. Matter of fact," said Smith, "the man who can come up pretty soon with something that defies all opening will go down in our history."

Suddenly my day and my life among the packages had a meaning. "Smith," I told him in triumph, "I'm that man." And I rushed toward the kitchen for the evidence. Then I stopped at the door. "On second thought, Smith," I declared confidently, "you'd better come out with me. This may take what-we-call all night."



RECORD COVER DESIGN: *Graphic Variations on the Marketing Theme*

When Mort Nasatir, Decca Records' advertising and merchandising director, asked Jerry Lewis to compose the jacket blurb for a release he made a few years ago, Lewis wrote: "There are billions of albums sold each year, and not because of the contents but because of the sexy pictures on the cover. For example, last week I bought an album because the cover was a picture of a beautiful girl in a negligee draped across a leopard skin couch. And what do you think the record in this album was? Harry Truman's acceptance speech." But, continued Lewis, who evidently has more talents than he has yet displayed in public, "I danced to it anyway."

Record covers are not usually so deceptive as that one, but often they are just as badly designed. Tasteful design is always the golden needle among haystacks of hard-sell, and record covers are no exception to the rule. Graphic designers themselves, perhaps more keenly than anyone else, are aware of the rarity of well-designed record covers. Leo Lionni, who wishes they were "more civilized," thinks that perhaps the best design, in view of the situation, would be no design at all — just the name of the record in a type face "small enough to read." Bob Jones, art director for RCA-Victor, asserts that when it comes to the design of record jackets, "you've got to forget about esthetics."

Graphic designers who don't want to forget about esthetics are forced at least not to forget their place. Especially when working for the big record companies (Columbia, Victor, and a few other giants who gobble up the largest portion of this 400-million-dollar industry, leaving over 500 other labels to squabble for leftovers), the artist is only one small part of the machinery of management, sales, and merchandising which finally produces a record cover. "The most an artist can contribute to such a procedure," says Joseph Low, who executed a number of civilized designs for the unmechanized but now defunct Haydn Society, "is technical slickness and a kind of gimmicky ingenuity," And Reid Miles, who has won a number of awards for his covers, complains that the cover design usually produced under these conditions is just "a rainbow of color chosen by a housewife-decorator with a mad passion for cabbage roses."

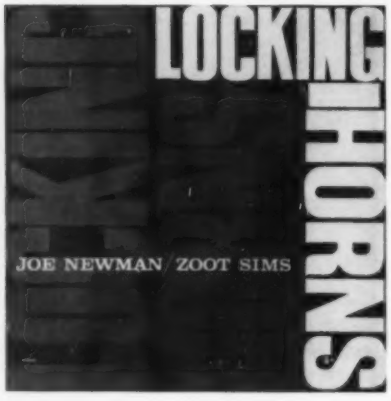
The salesmanship theory behind the use of sex-appeal, "elegance," sheer color, or of any of the other standard merchandising clichés, is that, where the music of the recording itself is sexy, or "elegant," or a matter of sheer sound, such visual decoration is altogether appropriate; and where it is not appropriate, the ostentatious jacket will not hurt sales to the connoisseur (who buys his records out of the catalog and not on impulse), and may even convince the discount-house browser that Bach is for him.

A graphic designer may work on the fairly strict prescriptions of such a theory, or he may enjoy the almost complete freedom given him by the limited budgets and less ambitious operations of the smaller companies, but in either case his design problem is approximately the same: to label the package with its contents, and to present, more or less obtrusively, an advertising message. The solutions to this problem typically fall into four patterns: a juggling of typography for a particular visual effect (page 72); the designer's personal interpretation of what is playing on the disc (page 73); an abstract design that has no apparent connection with what is on the recording but that suggests a mood (page 74); or a realistic visual representation of the instrument, the composer, musician, or ensemble connected with the record (page 75).

These patterns frequently overlap, of course. Ivan Chermayeff's "Eroica" cover (page 74) for Victor's Camden series is an example of the use of a strong typographic motif in what is basically an abstract collage. But these categories, while arbitrary, provide a means of looking at the various ways in which graphic artists solve the problem of record cover design. Overleaf is a portfolio of some representative examples of each. Not all the designs shown are prize-winners (although some have already won awards and a few have been entered in the 1960 competitions), but some are unusually successful applications of art to an intensely competitive field of business.—*R.M.*

A novel use of typography in each of these covers effectively combines the two purposes served by record album design: to identify the contents of the package and to arrest the eye of a prospective buyer. Devotees of Palestrina might not know *Max* Roach (right, 3) from any other Roach, but jazz enthusiasts will know instantaneously what is inside this jacket designed by Emmett McBain of Chicago. Andy Warhol's mother (whose name is Sarah and whose son is a professional artist) speaks no English, copied Reid Miles' typewritten text for the "Monk" cover (right, 2) in her own inimitable hand.

1. *Tom Hannan, designer; Arnold Meyers, AD; Roulette Records.*
2. *Reid Miles, designer; hand lettering by Andy Warhol's mother; Prestige Records.*
3. *Emmett McBain, designer; Mercury.*
4. *Herb Lubalin, designer; Decca.*
5. *Reid Miles, designer; Prestige.*



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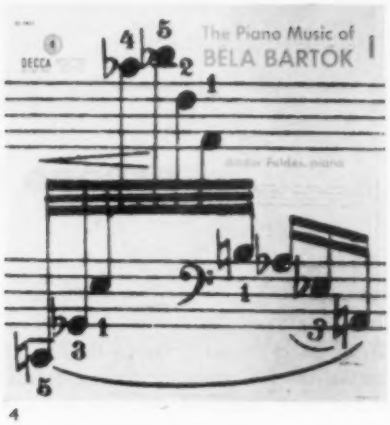

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Visual accompaniment to the music and the spoken word is the common motive in all these designs. More or less deliberately disguised "interpretation" of what the music is about is the usual form. Where the music is not programmatic (6 and 10), the album bears an appropriate period setting. The "painting" for the Paich cover (9) was executed by Miles on a blank wall somewhere on New York's Lower East Side.

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6. *Clara Genchy, designer; Bernie Friedman, photographer; S. Neil Fujita, AD; 18th century wood carving in the Medina Gallery, New York; Epic.*
7. *Louis Le Brocquy (England), designer; Elizabeth Clancy, AD; Tradition Records.*
8. *Ken Deardoff, designer; Tom Allen, artist; S. Neil Fujita, AD; Epic.*
9. *Reid Miles, designer; Melvin Sokolsky, photographer; Cadence Records.*
10. *Joseph Low, designer; Jules Halfant, AD; Vanguard Recording Society.*
11. *Saul Bass, designer; Decca.*
12. *Merle James, designer; Caedmon.*

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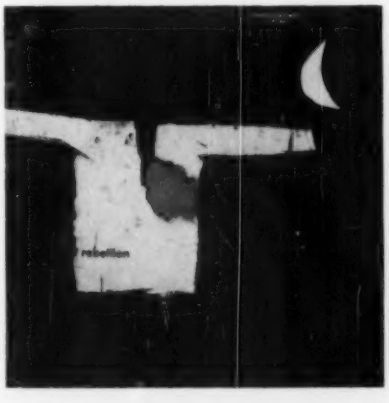

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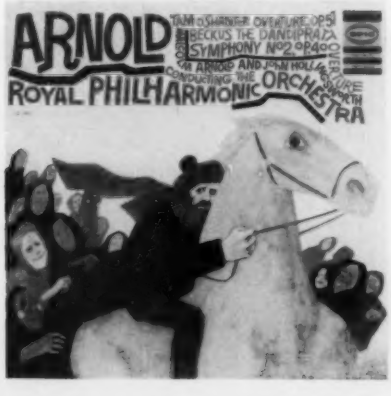

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Abstract design is one common solution for the cover of a package containing "abstract" music, although the catalogs are full of attempts to impose a graphic "story" on music that tells none. Chermayeff's cover for Beethoven's third symphony (left) combines a typographic motif with an original paper collage. Erik Nitsche's design for the Well-Tempered Clavier jacket (4) is one of several he free-lanced for Decca a few years ago before becoming graphic designer for General Dynamics. For the Suk cover (2), Miles used a blow-up of a small part of the pattern on a Russian uniform painted by Jules Maidoff for another album.

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1. Ivan Chermayeff, designer; RCA-Victor.
2. Reid Miles, designer; Jules Maidoff, artist; Artia Recording Corporation.
3. Joseph Low, designer; Haydn Society.
4. Erik Nitsche, designer; Decca.
5. Gobin Stair, designer; Caedmon.

2

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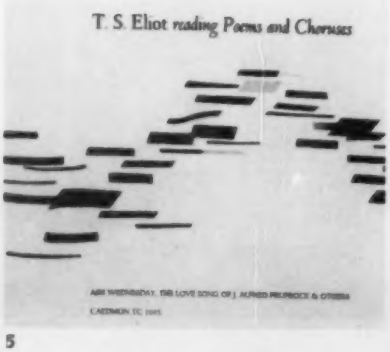

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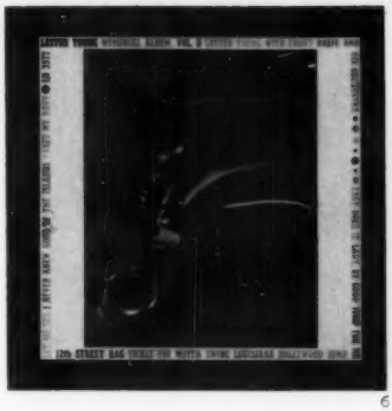

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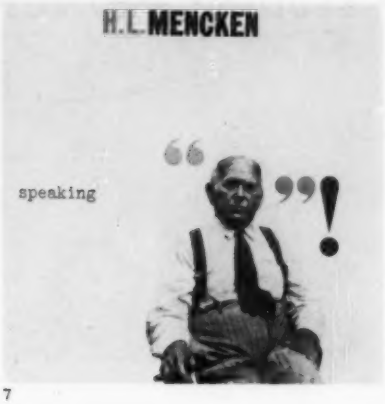

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Representation of composer, musician, or instrument is one way of creating an immediate impact while conveying the information that a record jacket, as a label, must present. This form of design is used so commonly that the long locks and glowering face of Beethoven and the plump figure of Brahms have become graphic clichés, while the faces of such contemporary musicians as Bruno Walter are almost as familiar as Marilyn Monroe's.

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6. Matthew Leibowitz, designer; Caedmon.
7. Clara Genchy, designer; Art Kane, photographer; S. Neil Fujita, AD; Epic.
8. S. Neil Fujita, AD/designer; Seymour Mednick, photographer; Epic.
9. Marvin Israel, designer; Lee Friedlander, photographer; Atlantic.
10. Janet Czarnetski, designer; John Groth, artist; S. Neil Fujita, AD; Columbia.

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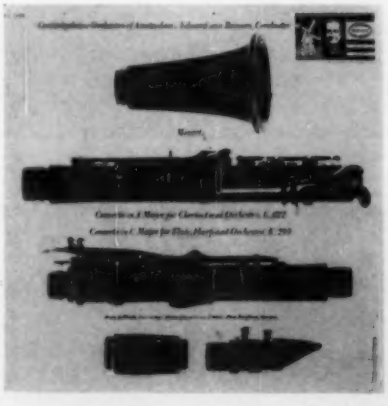

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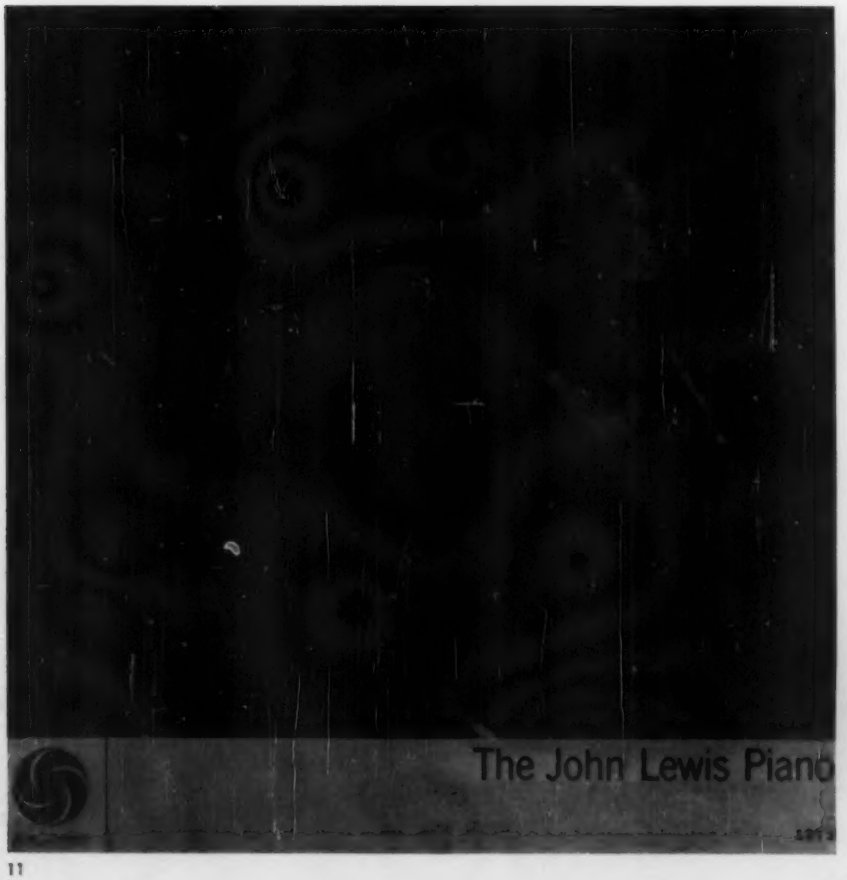

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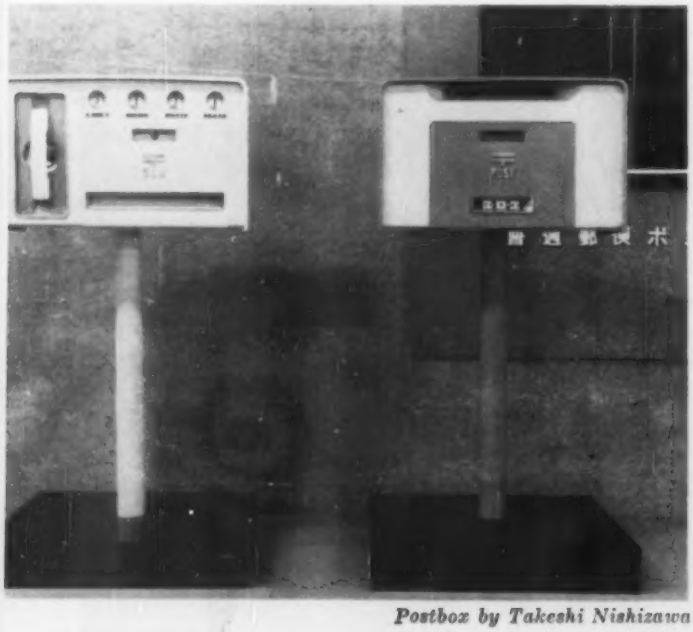
STUDENT PROJECTS FROM THE JAPANESE

The reflective moment above occurred recently in a classroom at the Tokyo University of Arts, which was founded seventy years ago as a school of arts and crafts and took on the status of a university in 1949, when it was amalgamated with the Tokyo Music Academy. The design branch of the university includes industrial design and graphics. Students, who are admitted by competitive examination from high school, take both for the first two years, then specialize for two years. In their last semester, they work solely on projects of their own choice. The pictures shown here, the work of members of last March's graduating class, were brought back by Jay Doblin, director of the Institute of Design in Chicago, who spent part of this winter visiting Japan, and observed that "there is every indication that the Japanese schools can equal our own in every way, except for quantity."

Kitchen appliance set by Kazuko Watanabe

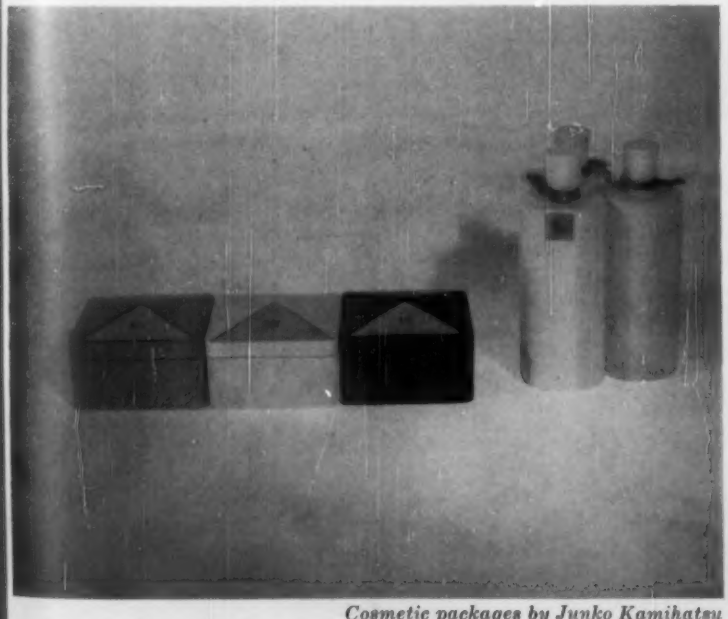


Postbox by Takeshi Nishizawa

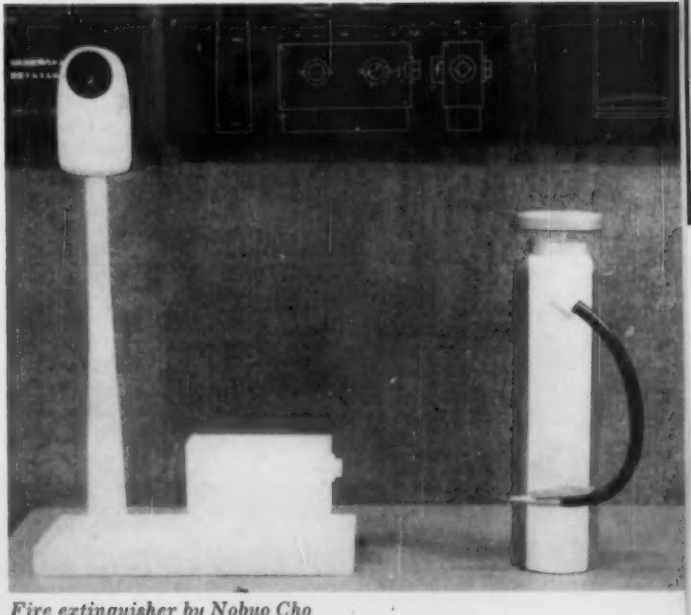
Hand saw by Akira Mimori

Motor bike by Tetsuya Shikuwa

Copying machine by Hiroko Akiyama



Cosmetic packages by Junko Kamihatsu



Fire extinguisher by Nobuo Cho


IBM

Development News

IBM RESERVATION SYSTEM FOR AMERICAN AIRLINES CUTS TRAVEL IRRITATIONS

New SABRE system links passenger inquiry (left) to central computer that monitors entire airline (right) through reservation desk console (center), eliminating reservation cards seen in stacks of boxes on facing page.

Within the short span of a few years, the computer—which began as an esoteric tool for scientists — has been transformed into a practical servant of industry. Its capacity to collect, coordinate, and make available data stored in its "memory" is being used to eliminate, among other things, the clerical tedium of large business offices. And if size reductions continue at the present rapid rate (see page 80) there are indications that the computer may become a sort of electronic abacus the size of a box, serving the consumer in myriad ways.

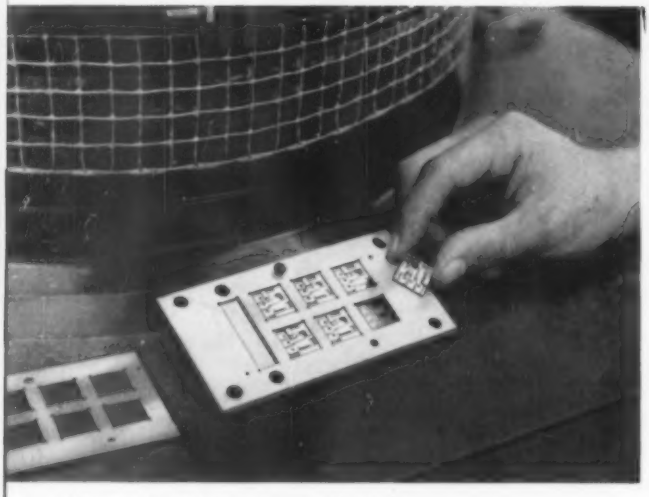
In a new application forecast for next year, the computer's function as a super-clerk will have a direct effect on large numbers of travelers: they will no longer be exposed to long waiting lines, oversold flights, and some other inconveniences which are now part of air travel. American Airlines and International Business Machines Corporation have announced plans for the installation of a computer system that will coordinate and handle all data relevant to the airline's flights and reservations.

Known by the code name of SABRE, the new reservation system will be to air travel what the SAGE system is to air defense.

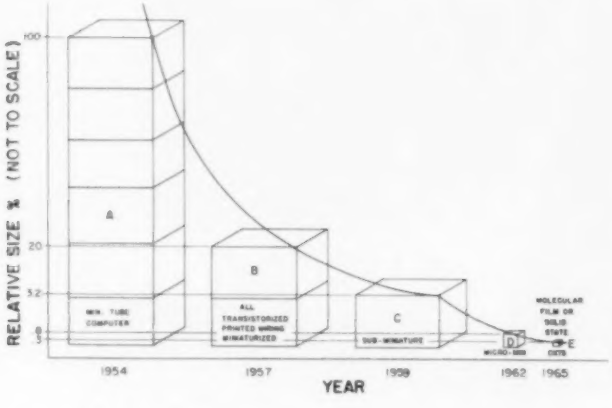
All of SABRE's 1,100 reservations desks (to be set up in 61 cities throughout America) will be tied in with the system's central computer, which will be constantly and almost immediately "aware" of flight schedules, arrivals, departures and delays, of space availability on all flights, reservations entered, kept, and cancelled. Inquiries made to any of the 1,100 desks in person or by telephone will be handled in practically no time at all. The agent takes incoming calls at the reservation desk (the console at left is a demonstration model) into which she inserts flight inquiries by means of punched cards. This is fed to the central computer (probably to be located in the New York area) by telephone lines, and the computer responds through indicator lights on the console. The agent recommends the flights which best suit the passenger's needs, and when the passenger makes his decision, the agent presses a button marked "Sell," which instructs the computer to record a reservation and to subtract a seat from the inventory for the specified flight and date. A record of the sale is printed automatically on the agent's printer and is stored in the passenger record.

SABRE is the largest electronic processing system ever designed for business use. It will store more than 600,000,000 characters and will handle more than 7,500 complete airline reservations per hour. Six years of research and development work by both IBM and American Airlines have preceded the production of the consoles, the computer, and accessory equipment. Installation of SABRE is scheduled for late 1961, but the entire network of cities will not be tied into the system until the end of 1962. The IBM 9090, which is IBM's designation for the SABRE equipment, will be leased to American on a yearly loan basis, and the cost of running it is estimated at 5 million dollars per year, half of which is the rental to IBM, and the other half, operation cost. Although the system was developed to meet the specific needs of American Airline's operation methods, SABRE can be organized to meet the requirements of other airlines who may want to replace their present reservation system with the SABRE method.

NEW FILM TECHNIQUE MAKES PASSIVE CIRCUIT-COMPONENTS WAFER-THIN



New micro-circuits, way ahead in miniaturization, consist of film of condensed metal vapors deposited on each side of glass substrate. At International Resistance Company, Philadelphia.



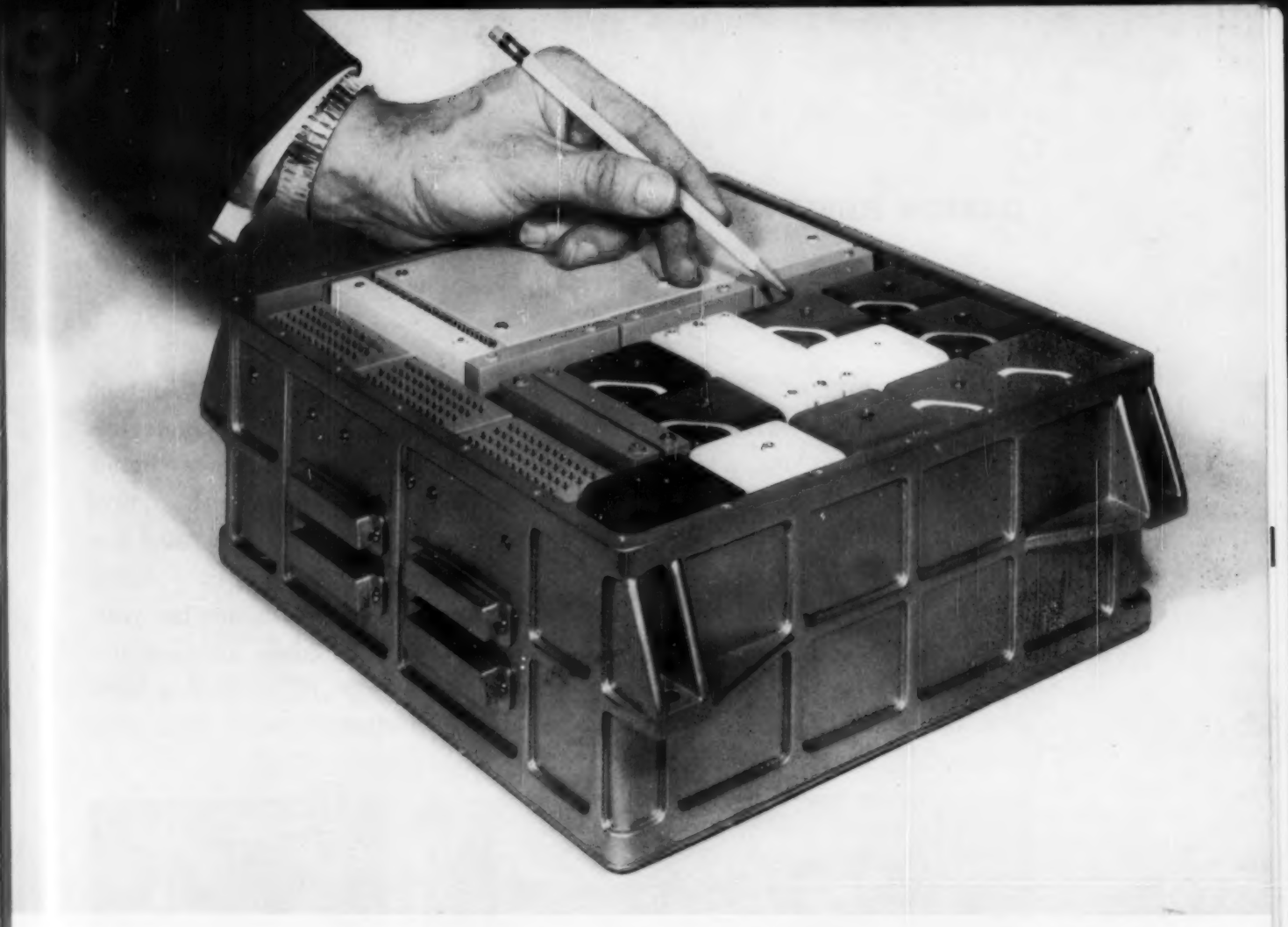
Use of micro-circuits in missile-borne computers now under development by Arma, will reduce them by 75 per cent (above); further reduction is anticipated (last example above).

The crystalline structure of evaporated films changes with time and temperature. Process is observed through window of electron diffraction equipment at IRC.

The passive components of electronic circuits — those responsible for resistance, capacitance and inductance—seem to be headed toward a miniaturization which will exceed the shrinking undergone by the active components—transistors, diodes, rectifiers. This is being accomplished, not by a mere reduction in the size of the components, but by the replacement of the tubular or rectangular components with extremely thin films of condensed metal vapors deposited on tiny substrates of glass. The application of this process in molecular engineering to the production of circuits promises to reduce them to parts that have almost no third dimension. In fact, the films are so thin that they are almost weightless. Just what this development in film technology will do to the large variety of electronic circuits, and the products which they make operative, can be indicated by a development in micro-circuitry in which two companies, the International Resistance Company and the Arma Division of American Bosch-Arma Corporation, are participating.

The advantages of much smaller airborne computers over those now used for flight determination and control are, of course, self-evident. For missiles it is naturally essential that the computers they carry be as small as possible. The development of tiny, missile-borne computers has been the target of a research program at Arma Division of American Bosch-Arma Corporation. Their aim is to make operative the computer model shown on the opposite page, which occupies a volume of 0.35 cubic foot and will weigh only 15 pounds. When this computer is a working reality—and it is expected that this will happen within the next two years—it will represent a reduction in size of 20:1 based on computers of equivalent capacity now in use. And Arma hopes that this will be extended even further (see diagram, top of page). The performance of these "bread-box" computers will extend beyond the missile use; it is expected that they will be able to control the guidance and navigation computations for submarines and aircraft.

The Arma Division is basing its hopes on various micro-circuits that have re-



Incorporation of micro-circuits into digital computers for guidance control in navigation will result in all-solid state equipment. Projected computer (above) will weigh 15 lbs. and will occupy a volume of 0.35 cubic foot. By Arma Division of American Bosch-Arma Corporation, Garden City, N. Y.

cently been developed by the International Resistance Company, Philadelphia, which has been active in film technology for some time. The process which makes micro-circuitry possible consists of vaporizing various metals which are applied in the form of condensed films to wafers of glass no bigger than postage stamps. A single wafer replaces an entire circuit, and circuits that have been prepared in this fashion for the Arma development include multivibrators used in the adder of a computer. The entire multivibrator circuit was contained inside two wafers 5/8 x 5/8 x 1/25 inch, each of which held the equivalent of nine components: three resistors, two capacitors, three diodes and one transistor. The tolerance to which these wafers can be held at this stage of progress in this new microminiaturization field is plus-or-minus 5 per cent, but it is expected that closer tolerances will be possible before long. Other circuit functions which the tiny IRC wafers can replace are high, low and band pass filters, delay lines, constant current-regulated and voltage-regulated power supplies.—*A. G.*

DESIGN REVIEW

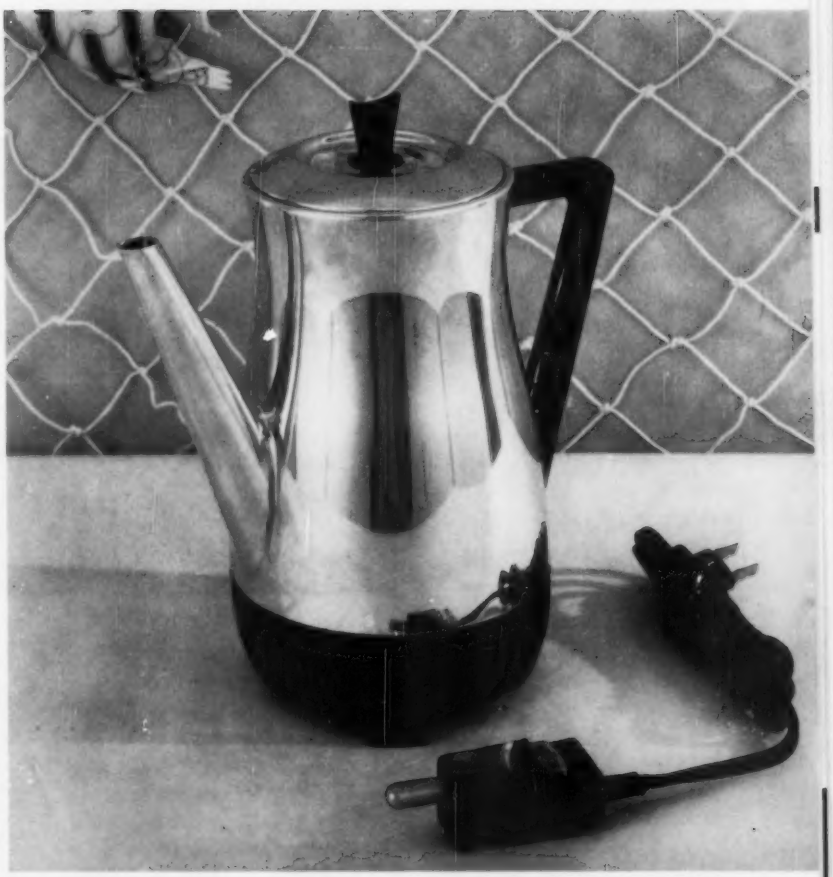
The Housewares Show, that mammoth parade of goods from more than 1500 manufacturers, offered little this year in the way of new design. Most manufacturers were content to "upgrade" their products (and prices), thereby nearly eliminating the inexpensive household tool. The originally modest can opener, which acquired an electric motor several seasons ago, this year sprouted legs and incorporated new functions, like telling time. And many companies gilded their lilies by gold-plating everything from coat hangers to lawn mowers. A number of designs, new last year, appeared only slightly altered at this year's show under other labels. This was due at least in part to the growing practice among manufacturers of purchasing parts from competitors (Hamilton Beach's percolator, for instance, appears to have the same body as Presto's, ID, December, 1959).

Burgess Vibrocrafter *electric can opener looks like useful, small kitchen tool with its simple, white thermoplastic housing, neat lettering. Counter model,* $19.95. *Dave Chapman, Inc., designers.*

Rival *Can-O-Matic Aristocrat includes clock and timer, has retractable legs for tall cans.* $34.95 (*18-karat, gold trimmed,* $100). *Sheldon Rutter, consultant.*

Swing-A-Way *leggy can opener has appearance of major kitchen appliance.* $24.95. *Frank Roth, designer.*

West Bend *completely immersible polished aluminum percolator has rounded silhouette. Six-cupper,* $14.95. *Painter, Teague, Petertil.*



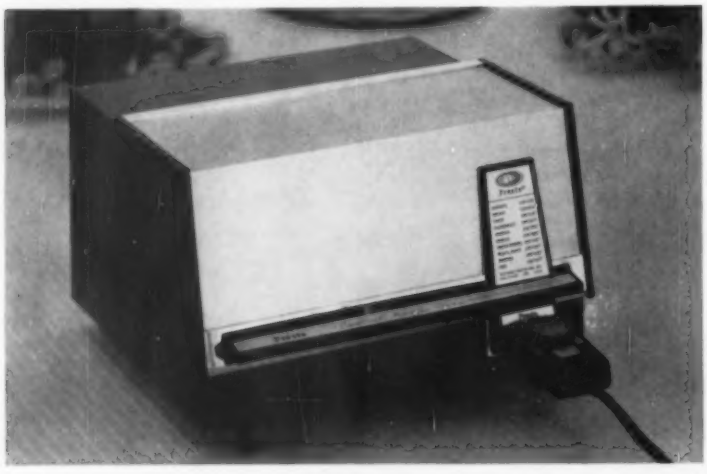
Corning *Pyroceram percolator comes in cornflower pattern match-other items in fast-growing line as well as in star pattern shown. Six-cupper,* $9.95. *Staff design.*

Hamilton Beach *stainless steel immersible percolator has tapered spout minus crevices to simplify cleaning.* $26.95. *Dave Chapman, Inc., designers.*

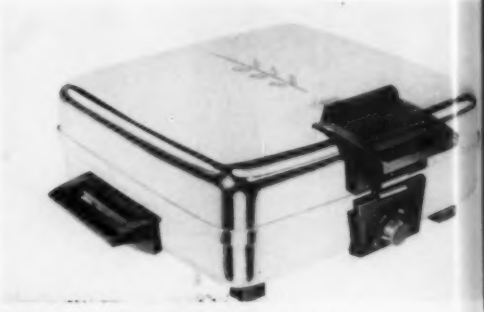
Mardigian Corporation *stainless steel Helena is completely automatic and immersible, has wide top for easy cleaning.* $23.95. *Smith, Scherr, and McDermott.*

Landers, Frary & Clark *Universal Coffeematic has non-drip spout, heat-guard handle. Comes in stainless steel. Five to* 10*-cupper,* $32.95. *Staff design.*

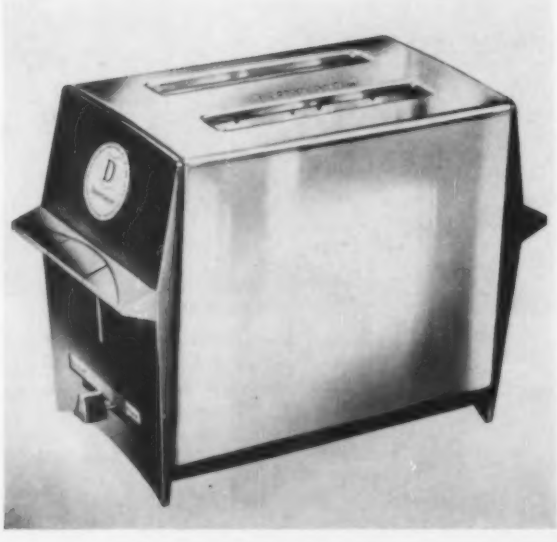
Electricity powered more small appliances than ever before at the Housewares Show, and some products, like Presto's new oven, required a new design approach to go with the new power source. Occasionally, design ingenuity brought practical economies to the manufacturer, as in the double functioning of plastic molds for two Northern Electric Products (right). Products ranging from toasters to step-on cans have now been adapted to the "square look," and bright colors, especially in plastic wares, are an important element in many of them.



Presto *oven, which completes a line of portable cooking units normally incorporated in stove, virtually eliminates need for stove.* $27.95. *Mel Boldt Associates.*

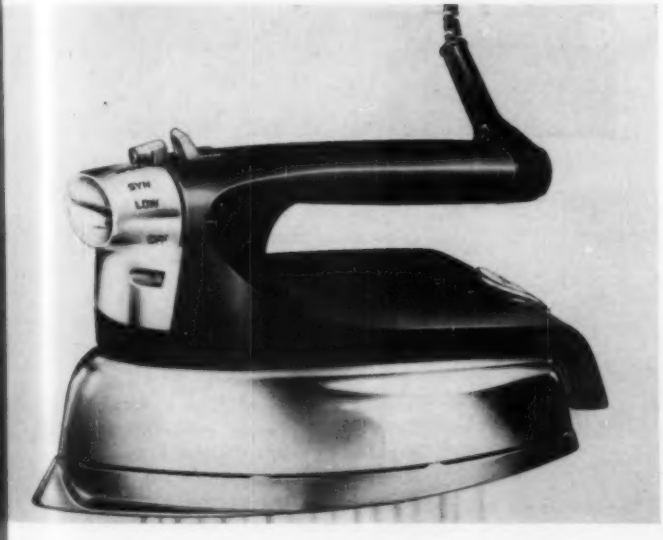


McGraw-Edison *Fostoria grill-waffle baker has snap spring for simple change of grids. Square handles and legs. Staff design.*

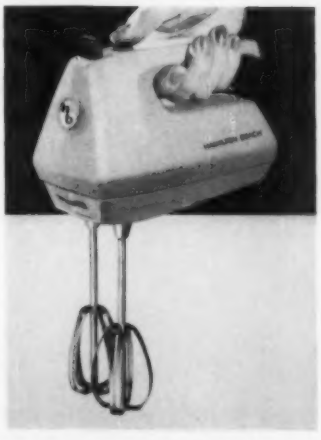


Dormeyer *toaster emphasizes a slim contour by combining thinly sculptured plastic ends with rectangular stainless steel body.* $21. *Jack Morgan and Associates.*

Sunbeam *vacuum has low, compact silhouette with motor unit less than 8 inches high. Requires little storage space, light weight enhances mobility.* $89.95. *Robert Ernest.*



Dormeyer *steam and dry iron, with extra wide funnel, looks like big diesel locomotive. Swivel cord allows for both left and right hand ironing.* $18. *Jack Morgan Assoc.*



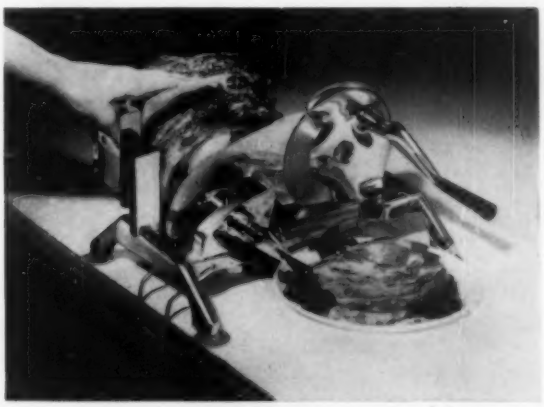
Hamilton Beach *powerful* 3*-pound Mixette has pleasant, unpretentious sculptured look. Comes in white, pink, yellow and turquoise.* $21.50. *Dave Chapman, Inc., designer.*

Northern Electric *makes a single set of plastic molds do for two products, a humidifier (right) and baby bottle sterilizer, below.* $10.95. *Don Lowe, designer.*

Northern Electric *humidifier has three-speed vapor control, small night light, and automatic safety shut-off. Comes in aqua and white.* $11.95. *Don Lowe, designer.*

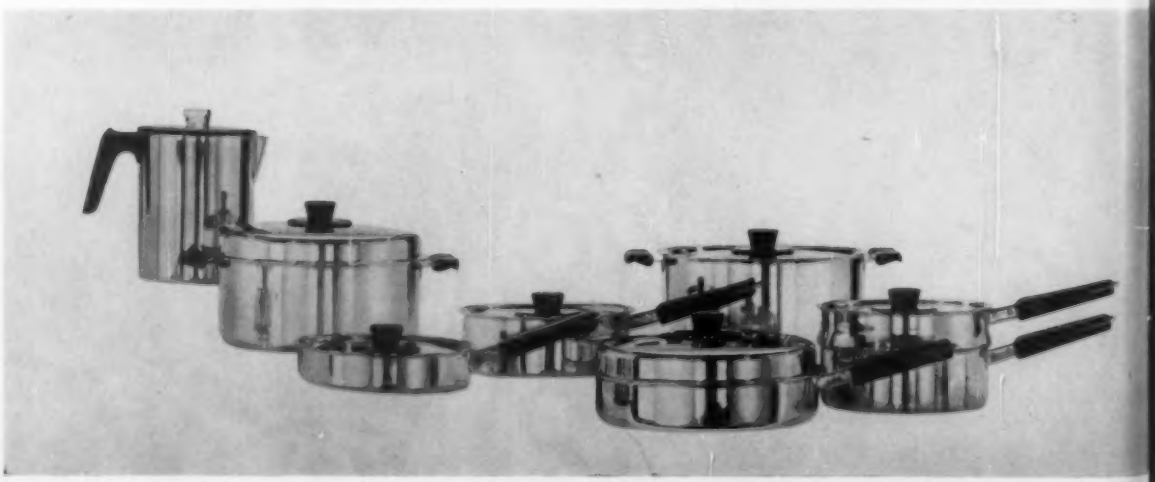
New forms have been developed to meet new conditions in a number of non-electric housewares. Besides contributing a contemporary look, squared edges on the trash can, right, let it fit easily into corners. The new look in Revere's Designers' Group comes in part from wider, flatter bottom surfaces, eminently practical in covering the entire burner for more even heat. It also comes from the substitution of bright stainless for its famous copper, now bonded between two sheets of steel.

Rival *Ice-O-Mat comes in dramatic black and chrome combination as well as in colors. Goes on wall or table. $9.98. Sheldon Rutter.*



Rival *Protect-O-Mat slicer can be disassembled in less than a minute for cleaning or storage. Both electric and mechanical, from $19.95 to $79.95. H. J. Talge, designer.*

Revere *Designers' Group emphasizes low silhouette with flat lids slightly recessed into broader straight-sided, flat-bottomed pans. Revere's famous copper bottom is now encased in stainless steel. From $6.95 for 1-quart pan (25 per cent more expensive than regular line). W. A. Welden, designer.*



Wagner *Roller-matic works on both floors and carpets. Uses two rollers on either side of a revolving brush to trap scraps normally pushed ahead of sweeper.* $16.95. *Brooks Stevens Associates, designers.*

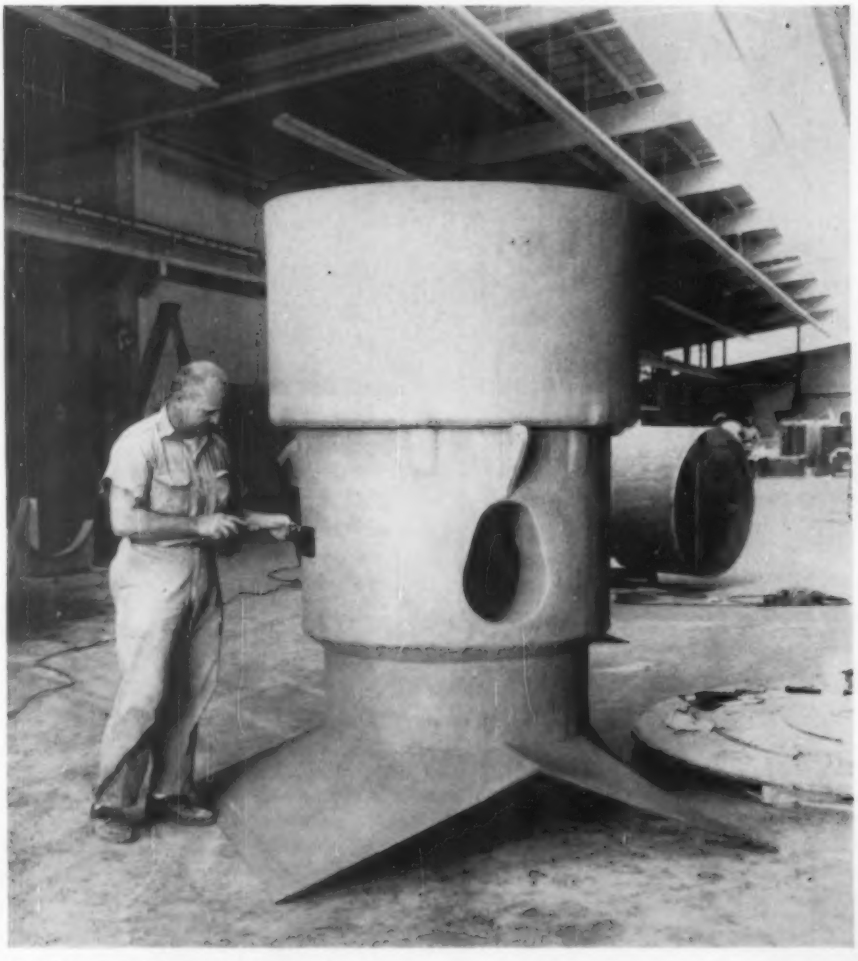
Empire Brushes, Inc. *has a Sno-Brush which breaks down into three parts for storage but extends to 30 inches to reach inaccessible areas of car.* $1. *Monte Levin.*

SvenskaMetallverken *Skultuna line uses deep-drawn, heavy-gage aluminum, anodized colored covers. Imported from Sweden at* $3.75 *for 1-quart pan. Erik Fleming.*

Plas-Tex *(division of Cal-Dak) Marlex, step-on can with removable lid is unbreakable, rust-proof, dent-proof. Yellow, white, pink or turquoise.* $5.98. *James K. Gerrie.*

Lincoln *Step-on can features square silhouette and wide, recessed foot pedal. In all-enamel, all-chrome, or combinations. From* $8.98 *to* $18.98. *Sid Silverstein, designer.*

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



Plastic ventilators for industry

A plastics manufacturer has developed roof ventilators for use in chemical factories, where sulfuric and muriatic acid fumes would corrode metal fan blades and housings. Beetle Plastics Division of Crompton & Knowles has sold six of its roof ventilators to a large chemical manufacturer in New Jersey, and is in the process of making five more for the same client.

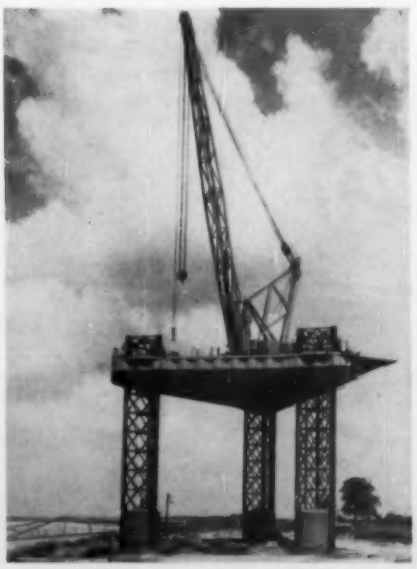
Specifications called for ventilators 7½ feet high with a 36-inch propeller capable of delivering 29,000 cubic feet per minute with automatic dampers in a complete corrosion-resistant plastic housing to fit the pitch of the roof. The four-blade propellers are powered by 5-hp GE motors. Manufacturer: Beetle Plastics Division of Crompton & Knowles, Fall River, Massachusetts.

Ambulant machine builds bridge

Another of R. G. LeTourneau's earth-shaking machines (see ID, November '58) will shortly begin to construct a six-mile concrete bridge across Lake Maracaibo in Venezuela. The "Electric Bridge Builder" — like LeTourneau's Scorpion, which went into operation in 1956 — is a three-legged island which raises its steel feet from the lake bottom, lowers its platform to the water, and moves on to a new location when its work in one spot is finished. The platform is equipped with a self-leveling device: if one leg begins to settle more than the other two, a warning horn sounds, and nine electric motors on that leg bring the platform level again.

A marine crane with a lifting capacity of 250 tons is mounted on the platform to handle the pre-stressed concrete beams from which the bridge will be built. The crane has a 210-foot boom extended 65 feet out from its base, and is powered essentially by diesel engines totaling about 1200 hp. It pivots on a steel ball and socket 20 inches in diameter.

In addition to placing the masonry sections of the bridge, the island and crane will drill and set the concrete piles which support the structure. After the bridge is built, the unit may be used as a mobile off-shore drilling platform. Lake Maracaibo is a recently-developed source of crude oil, and the bridge will be used to connect the oil city of Maracaibo with central and eastern Venezuela. Of Swiss design, the bridge is being built by a German and Venezuelan joint construction company. Manufacturer: R. G. LeTourneau, Inc., Longview, Texas.



Building a sound barrier

Ear muffs that serve as sound barriers are described by their manufacturer, the Willson Products Division of the Ray-O-Vac Company, as complete protection against hearing impairment under high noise levels. The ear muffs are vinyl cushions filled with a harmless fluid that conforms easily to the irregular contours of the head and ears. A complete noise seal can thus be effected, says Willson, with no excessive pressure. The mouth cup is equipped with a carbon microphone which is controlled by an off-and-on toggle switch, and makes it possible to maintain audible communication in the noisiest environment. Manufacturer: Willson Products Division, Reading, Pennsylvania.

Nylon turbine fan wheel

A nylon fan wheel, said to be the first single-piece molding of a fan incorporating the turbine principle, has been incorporated into a vacuum cleaner manufactured by Sunbeam Corporation. The fan wheel is used to drive the Turbine Brush, an optional accessory on Sunbeam's Dual De Luxe model, and was designed by Sunbeam engineers working in collaboration with the molding company. Nylon was selected as the molding material because of its resistance to small metal objects, such as paper clips and hairpins, likely to be picked up by the vacuum cleaner, and the curved, injection-molded blades are spaced to allow for the intake of such objects. The wheel is driven by air from a 1.5-hp motor. Manufacturer: Chicago Molded Products Corporation, Chicago.

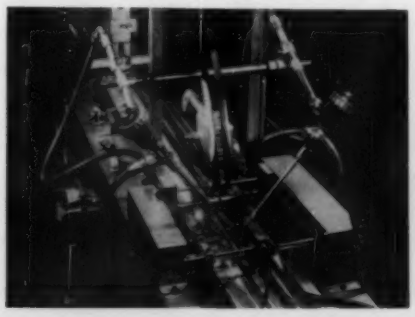
Insulating board resembles lumber

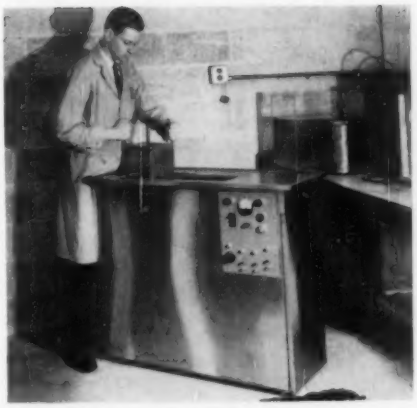
A light, strong inorganic insulating material that can be nailed, sawed, drilled, and planed like lumber has been announced by Union Asbestos & Rubber Company. Suggested uses for the material, known as Unarcoboard, are in ovens, ceilings, partitions, back-up-board for pre-laid tile or brick facing, duct work, firewalls, fireproofing structural steel, and high temperature test chambers.

The material, composed partly of asbestos, will not burn. Although its smooth-sealed surface does not require finishing, it can be laminated, covered by veneers, or painted with alkali-resistant paint. For precision modelmaking applications, say the manufacturers, it can be planed to .001 accuracy. The sheets are available in sizes up to 4 by 8 feet, and in thicknesses ranging between 1 and 3 inches. Structural properties are said to be practically unaffected by moisture or by temperatures up to 1200°F. Manufacturer: Union Asbestos & Rubber Company, Fibrous Products Division, Bloomington, Illinois.

Automatic spray coater

A machine which will spray-coat coaxial lead components at the rate of 4000 per hour has been developed by Conforming Matrix Corporation. Racks, loaded with diodes, move continuously through the spray station, where a coating material, such as an epoxy compound, is applied completely automatically. The coating is confined to the desired area by two traveling strips, and the diodes are spun in the racks to assure an even coating. As a result, there is no excess coating to interfere with soldering or to crack if wires are bent for insertion in a printed circuit board. The machine, the Model HD-2 Remote Masking Spray Coater, shown below, may be adjusted to accommodate components of various lengths. The process makes it possible to form a completely light-tight seal for selenium diodes and other small electrical and electronic components. Color band coating on capacitors and fuses can similarly be provided with a baked heat- and abrasion-resistant clear coating. (The diodes remain in the rack during both the coating and baking operations.) Source: Conforming Matrix Corporation, Toledo, Ohio.





Grease removed ultrasonically

The Branson Ultrasonic Corporation has put on the market a new ultrasonic degreaser which makes it possible to remove metal chips and insoluble soils from intricate components and small motors without dismantling them. The unit, Model AC-25 Sonogen, measures 44 by 18 by 36 inches and, as a guard against corrosion, all parts in contact with the water are made of stainless steel or TFE plastic. The cleaning tank measures 10 by 8 by 8 inches.

After being cleaned by the ultrasonically activated water, the components are spray-rinsed by hand and placed in the vapor zone to dry. A water cooling system limits evaporation loss, and an automatic interlock shuts off the sump's strip heaters if the cooling system fails. Another interlock shuts off the power when the cabinet door is open. The ultrasonic generator stops automatically when there is no more water in the cleaning tank. Manufacturer: Branson Ultrasonic Corporation, Stamford, Connecticut.

Redesign of ball bearings

The design of a new line of ball bearings permits more balls to be inserted into the rings, making the bearings stronger and more rigid. The manufacturer claims that the line has a load capacity from 19 per cent to 55 per cent greater than standard ball bearings of equal size.

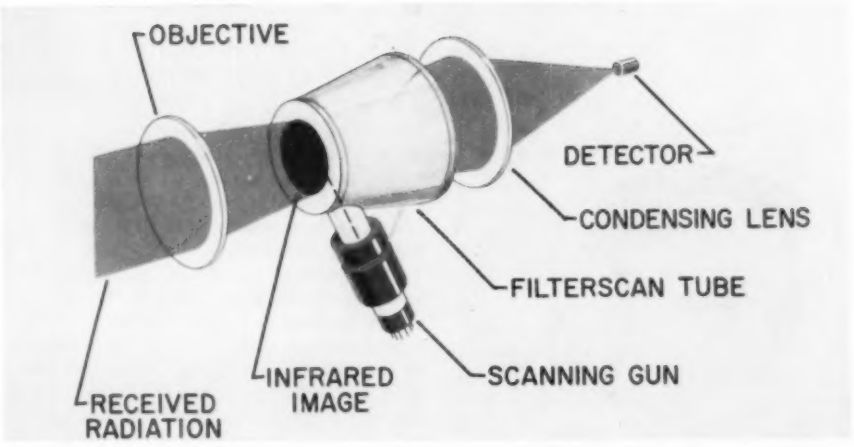
The manufacturing method consists of fracturing the outer ring of the bearing at one point and spreading it wide enough to allow the introduction of from two to six more balls than are contained in standard bearings. The makers say that the outer ring is not weakened by the fracture, and that the bearings can carry thrust loads from either direction. Manufacturer: Split Ballbearing Division of MPB, Inc., Lebanon, New Hampshire.

IBM builds a smaller computer

In order to provide engineering and research firms with a computer smaller in size and lower in cost than existing systems, IBM has developed the 1620 Data Processing System, which, it is expected, will be available at the end of this year. The system will rent for $1,600 a month and sell for $74,500. It consists of two units: a central processing unit and a paper tape reader and punch, which together require the space of an average-sized desk or drafting table.

The processing unit contains the operator's console, a modified IBM electric typewriter, a magnetic core storage unit, and an arithmetic and logical unit. The storage unit has a capacity of 20,000 alphameric digits, each of which can be made immediately available for processing. It uses variable field length, which means that only those memory locations required to express a number are used and only useful data is stored.

Information is introduced into the 1620 system by means of the IBM 1621 Paper Tape Reader, by the keyboard of the electric typewriter, or by both. The tape reader reads eight-channel paper tape at the rate of 150 characters per second. The 1620's output devices are the 961 tape punch (included in the 1621 cabinet), which can record data on a paper tape at the rate of 15 characters a second, and the typewriter, which prints 10 characters a second. The two-address instruction format reduces the number of instructions required to perform an operation: this simplifies the programming and reduces the amount of storage space required. The programming system is compatible with larger IBM data processing systems and can be used in support of those systems. Manufacturer: IBM Data Processing Division, White Plains, New York.



Detection system for heat waves

The Research Division of Philco Corporation has announced a method of reproducing an image of heat-emissive targets by detecting the infrafed waves that they send out. The system, which Philco calls "Filterscan", produces a picture which resembles a television image, except that the pattern is coarser: 150 lines to the inch as compared with 525 lines per inch in a standard television image. Its inventors believe, however, that the Filterscan image could be scanned at higher rates if particular applications should call for a sharper definition of the picture.

Electronic scanning is a great deal faster than mechanical scanning, which uses a moving mirror to detect rapid changes in direction and heat-intensity. Active methods of electronic detection (radar, for example) use directional radio waves that are reflected from a target back to the transmitter and thus may turn the transmitter itself into a target. Infrared systems, on the other hand, are passive and cannot be jammed, or even detected by an enemy missile. Infrared detection is being used in industry to monitor equipment for hotspots and to inspect components coming off an assembly line. Manufacturer: Philco Corporation, Philadelphia.

Paper tape reader and punch and processing unit of the IBM 1620 system.

Oscillograph made up of modules

The modular construction of a new oscillograph adapts it to a variety of applications in fixed or mobile ground data-handling stations. The Type 5-123 Oscillograph, manufactured by the Electro Mechanical Instrument Division of Consolidated Electrodynamics Corporation, can be built to a number of configurations and specifications by assembling a combination of modules: mounting, record transport, optical, drive, and front panel controls. Although 36 channels and 50 channels will be basic, other sizes are possible by changing magnet blocks in the optical module. Record speeds from very slow to 160 inches per second are possible with the drive module.

The oscillograph can be mounted on any standard 19-inch relay rack without extra accessories. Its universal, independent wiring harness permits electrical interconnection with only a screwdriver. Manufacturer: Consolidated Electrodynamics Corporation, Pasadena, California.

Tensile bolting for prefabrication

A few years ago building construction underwent a minor revolution when high tensile bolts began to take the place of rivets in structures erected in the field; and the revolution now shows signs of spreading into prefabrication. The bolts operate on the principle of clamping parts together so tightly that loads are carried from member to member by friction rather than by shear and bearing. Resistance of a joint so bolted is much greater than that of a riveted joint, and the bolts, unlike rivets, are not affected by external factors such as workmanship and weather.

High tensile bolting is now being applied to shop fabrication, and a recent

study demonstrates its advantages in lower cost and higher production rates. The cost comparison study was undertaken by a bolt manufacturer working in cooperation with engineers of the Mississippi Valley Structural Steel Company, and was based on the production record of the steelwork in a 500-ton job designed for shop riveting rather than bolting. Half of the trusses, braces and beams were riveted and half were bolted. The results, the report of the study said, showed a 66 per cent increase in tonnage per man hour, together with a saving in material and a decrease in the floor space required. Potentially, since bolts are stronger than rivets, a designer will be able to utilize fewer bolts or bolts of smaller diameter, so that the cost will be still further reduced in joints designed for bolted connections. Source: Russell, Burdsall & Ward Bolt & Nut Company, Port Chester, New York.

Versatile laboratory clamps

LaPine's new line of laboratory clamps is designed to hold objects of any shape and of diameters up to 3½ inches. Shown above is the wide-range burette clamp with fixed jaws that do not rotate. The three prongs act like the thumb and two fingers to grip irregularly-shaped or tapered objects securely. Jaws are die-cast aluminum alloy coated with resilient, chemical- and wear-resistant clear vinyl plastisol to protect glassware. A single screw turning through threaded trunnions in upper and lower jaws opens and closes the clamp like a drafting compass. Manufacturer: Arthur S. LaPine and Company, Chicago.

Railroad car for atomic fuels

The Eddystone Division of Baldwin-Lima-Hamilton Corporation has started work on a rail-mounted car for handling nuclear fuel. The car, the Transfer Cask Car, is scheduled for delivery next June to the Power Reactor Development Company. It consists of three major sections: a vertical, barrel-like shielded cylinder for carrying and handling the atomic fuel charges grouped in sub-assemblies, a heat transfer system for dissipating decay heat from the hot fuel elements carried in the cask, and a control cab to house the operator.

The car is a necessary accessory to the operation of the atomic power plant. When the fuel in the core of the reactor becomes saturated with fission products, it must be replaced by fresh fuel sub-assemblies. The spent fuel charges in their sub-assemblies are first transferred to sodium-filled pots inside the reactor shell where they lose much of their radioactivity. At the next plant shutdown, the cask car, carrying fresh fuel cartridges, will move into position over an exit pipe from the reactor. Specifications for the car require it to stop at a point with a margin of error of less than one-sixteenth of an inch and to raise spent fuel cartridges and lower fresh cartridges through the narrow exit pipe, from which air must be completely excluded. The car will operate over a track with a total length of less than 100 feet, running from inside the reactor building to a storage and decay building for the deposit of spent fuel. Manufacturer: Baldwin-Hamilton-Lima Corporation, Philadelphia.

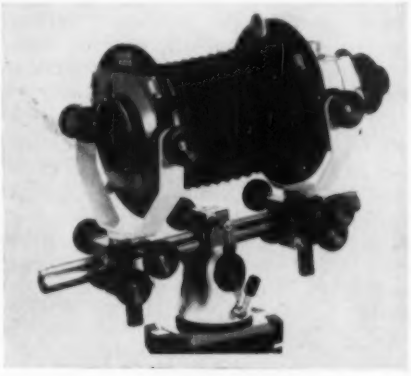
Auto antenna rolls with the punch

The construction of a new automobile antenna enables it, its manufacturer claims, to withstand tremendous impact without damage. A heavy-duty stainless steel spring mounted at its base allows the antenna to give without breaking or permanently bending when hit by an obstruction. It is available in two or three sections, with or without a swivel mounting. Manufacturer: Telco Electronics Manufacturing Co., Rockford, Illinois.

Gage tests crimped connectors

The Hunter Terminal Pull Tester (above) is an instrument designed to test the strength of solderless electrical connections, which, although usually standard in design, vary widely from one application to another. The tensile strength of the joint between a particular connector and the wire to which it is crimped depends on such variables as the type and size of the wire and its insulation and upon the geometry of the crimp itself. For this reason, the depth of the crimp must be adjusted to its application by changing the depth of the crimping jaw or the radius of the grooved anvil.

The gage shown here is designed to test the connectors with samples of the wire to be used in actual production operation. Its turret head is notched to accept a variety of common wire sizes, and the connector to be tested is hooked in the appropriate notch. Extending from the air motor is a jaw-type clamp which grips the free end of the wire lead. Pressing a button operates the compressed air motor, closing the jaws and pulling the wire until the crimped connection fails. The gage holds the maximum reading, showing the force of the pull at failure, until it is reset. An adjustable hydraulic speed control can be set to provide the desired rate of pull. Its makers say that the gage is accurate to plus or minus ½ per cent at full scale reading. Manufacturer: Hunter Spring Company, Lansdale, Pennsylvania.



35mm camera for studio work

A new 35mm view camera, intended for laboratory and studio work where high precision is a requirement, has been announced by the Industrial Products Division of Fairchild Camera and Instrument Corporation. The camera, (above), the Kennedy K-I Monobar 35mm, has, its manufacturer says, almost unlimited correctibility. Full-frame viewing and critical focussing is done through the focussing hood containing the ground glass, hood, and adjustable magnifier. With the magazine removed, the hood is pressed forward for viewing and is hooked against the rear panel.

The 35mm magazines are interchangeable, allowing the photographer a selection of films according to the needs of the job, so that a day's shooting can ordinarily be done on one or two rolls of 35mm film as compared to a day's requirement of film holders. The camera has a rotating back and a companion tripod which can be turned upside down for low angle shots.

The K-I Monobar Camera is available in another, simpler model: the Fixed type, designed for use where corrections are not normally required, such as in microfilming or other kinds of copy work. Standard equipment on both the Universal and Fixed cameras is a 4-inch Dallmeyer lens f/4.5 in a Compur shutter with speeds of 1 to 1/500 of a second, and M X synchronization. Other lenses are available.

Fairchild describes the 35mm camera as capable of all the microfilming, slides, medical work and other kinds of still photography normally done with a studio camera. Manufacturer: Fairchild Camera and Instrument Corporation, Syosset, New York.

Epoxy dies for automotive parts

An automotive company has reported on the success with which it is using epoxy resin based dies for drawing parts for its line of custom-made taxi cabs. The company, Checker Motors, has drawn as many as 18,000 parts with a single epoxy die, and believes that there is no theoretical limit to the number of draws possible with such a die, provided that down time can be taken for repairing and overhauling.

The company, which has experimented with epoxy dies for a number of different body panels, now is using the dies to draw wheel houses, hood hinge reinforcements and floor pans. Some dies are constructed entirely of the epoxy resin. However, the wheelhouse die is boiler plate backed, and the floor pan die (shown below) is epoxy faced.

Epoxy resin dies, the company finds, provide substantial savings in labor. For example, compared to most steel dies, epoxy dies can go from engineering into production in approximately one-third less time. The epoxy resin mixture can be cast by using only simple hand tools to place and shape the plastic on the master, and because it requires no special machinery, the job can be done practically anywhere in the plant.

The series of pictures below shows a floor pan and the lower die and punch used to draw it. Both die and punch are faced with epoxy resin filled with glass fibers. (Different fillers are used for different applications: the epoxy used in the wheelhouse die, for example, is reinforced with iron and steel powder.) In the first picture the liquid which appears on the die is a mineral lubricant. In the second picture, the floor pan appears just as it comes from the die, and in the third picture the finished floor pan shows the many sharp break lines and curves which led to the choice of an epoxy die for its manufacture. Company officials have estimated that it is 40 per cent easier to draw the floor pan with an epoxy die than a steel die because of the distribution factor. Molder: Checker Motors, Kalamazoo. Supplier: Ren Plastics, Lansing, Michigan.

Model shows atomic behavior

A research laboratory has constructed a mechanical model to demonstrate the supposed behavior of atoms in gases, liquids and solids. The model consists of a round glass plate with a rim around it, suspended from springs and vibrated constantly by a motor mounted beneath it. Glass beads, representing atoms, are poured onto the platform, to be photographed as they move and jostle each other.

The model was developed by Robert Cormia and David Turnbull (above) of the General Electric Research Laboratory, chiefly to study the random movement of atoms in liquids. Although the model cannot demonstrate atomic attraction, it does show the increasingly distinct pattern as more beads are added and the "liquid" gradually becomes a "solid." Source: General Electric Research Laboratory, Schenectady, New York.

New series of ceramic components

Minneapolis-Honeywell, which has for the past few years been experimenting with production techniques for precision ceramics components, has begun full-scale commercial production. The company has set up a new engineering department to develop special ceramics formulas to satisfy particular customer requirements, and the department is prepared to supply small lots of engineering samples.

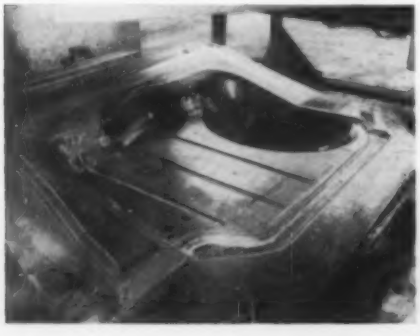
Honeywell's ceramic components fall into three general categories: ceramic-to-metal seals for use in connectors, headers and other electronics components; piezoelectric transducers for converting mechanical energy to electrical energy (or vice versa); and small precision parts that serve as electrical insulators for high temperature applications. Source: Minneapolis - Honeywell's Ceramics Laboratory, Minneapolis.

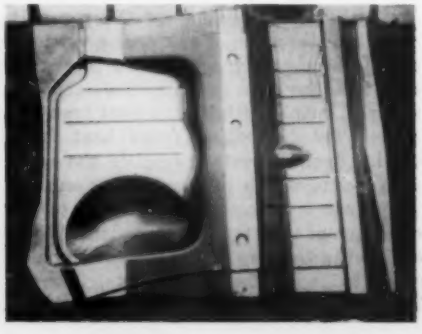
Circuitry strips for action

A recently-developed method of preparing printed circuit layouts is said by its users to cut down on drafting time and to obtain greater accuracy and design flexibility than the usual inking and taping methods. The method, developed in cooperation with the Keuffel and Esser Company, Hoboken, New Jersey, requires outlining the circuit paths with specially designed scribing instruments and then stripping them out through use of a photographic resist-coated polyester-base film.

The first step in the system is to scribe the circuitry on scribe-coat Stabilene film, using steel alloy points made in graduated widths. The scriber actually makes two very narrow lines outlining an area which will later show up as a solid line representing the circuit path. This first copy is then used to print a line image on peel-coat Stabilene film. Alcohol is used to deepen the lines down to the Mylar base, and the photo emulsion layer is washed away in a Chlorox bath. Finally, the peel-coat between the double lines is removed, leaving the finished circuit paths.

The technique, it is felt, is especially suited to jobs requiring irregular shapes, long runs, and complex grounding and shielding. Source: General Electric (Heavy Military Electronics Department), Syracuse, New York.





Manufacturers' Literature Supplement

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

Materials — Metals

1. **Refractory Metals.** The Pfaudler Company, division of Pfaudler Permutit Inc. 8 pp. Bulletin describes tantalum, titanium and zirconium in terms of process characteristics, fields of application, and types of standard and custom equipment available.

Materials — Plastics

2. **Plastic and Chemical Materials.** General Electric Company. 12 pp. Brochure describes GE's complete line of polycarbonate resins, phenolic resins, varnishes and molding powders, and fused magnesium oxide.

3. **Flexible Silicon Power Rectifiers.** I-T-E Circuit Breaker Company. 8 pp. Bulletin describes silicon power rectifiers which can be built to supply any described voltages and currents.

4. **Fluoroflex-T Flex Joints and Bellows.** Resistoflex Corp. 4 pp. Bulletin describes molded Fluoroflex-T Flex Joints and Bellows made from Teflon for non-standard low and high temperature and corrosive applications.

5. **Strip-a-Tube.** Jessall Plastics, Division of Electric Storage Battery Company. Bulletin provides information and application engineering data on Strip-a-Tube, which consists of 10 tubes of flexible plastic material, joined together in a compact tape-like form for use in low-pressure fluid distribution systems, multi-pressure measurement applications, and as harness in electronic consoles. Samples included.

6. **Custom-molded Plastics.** Chicago Molded Products Corp. 8 pp. Brochure presents a value analysis approach to the design and purchase of plastic parts and components.

7. **Fire-Retardance Afloat.** Hooker Chemical Corp. 4 pp. Brochure describes how fiberglass boats incorporating fire-retardant Hetron® polyester resin provide a maximum margin of safety against fire loss and damage afloat. Illustrated.

Methods

8. **Remote Control Systems.** Teleflex Inc. 12 pp. Aircraft catalog describes and illustrates the uses of Teleflex control systems in airframe, missile and jet engine applications. Engineering information listed.

9. **Color on Shipping Container.** Stone Container Corp. 20 pp. Booklet emphasizes the use of color on corrugated boxes. Howard Ketcham, color planner, cites 10 situations which call for use of color on shipping containers.

10. **Metal Processing Equipment.** Metal Processing Dept., Pennsalt Chemicals Corp. 15 pp. Brochure describes the range of machines, materials and manpower services of Pennsalt for metal processing requirements. Includes discussion of custom-built finishing systems.

11. **Metal Lath Specifications.** Metal Lath Manufacturers Association. 20 pp. Booklet contains fire-resistive ratings, design tables, specifications for hollow partitions, solid partitions, sound insulating partitions, ceilings, vertical furring, and centering. Sections relating to materials and corner joint reinforcement are also included.

12. **Temperature Uniformity in Heat Treating.** Ipsen Industries, Inc. 8 pp. Booklet discusses temperature uniformity and furnace design and describes a series of tests conducted to measure temperature variations within the heating zone when a charge is placed in the furnace and brought up to heat. Graphs are included.

13. **Hydraulic Tracer Control Systems.** True-Trace Corp. 4 pp. Bulletin describes and illustrates hydraulic tracer control systems for 1, 2 and 3 dimensional applications on machine tools.

14. **Questions and Answers about Anodizing.** Reynolds Metals Company. Booklet answers such questions as: What is the cost of anodizing aluminum? Can anodized parts be formed? How much heat can anodic films withstand? Does anodizing change the dimensions of a part?

15. **Industrial Temperature Measurement and Control.** Partlow Corp. 23 pp. Booklet discusses kinds of responses to temperature; ways of putting temperature response to work; the Partlow element for mercury-bulb instrumentation; the nine basic Partlow types of controls; and a score sheet for the mercury-bulb system.

16. **Drafting or Artwork for Reproduction.** Para-Tone Inc. 37 pp. Catalog of decorative patterns and type designs to be used for reproduction includes color sheets and map symbols, etc.

17. **Guide for Welded Construction.** The Lincoln Electric Company. Bulletin contains charts and illustrations providing information on the application of welding symbols and other basic design data on welds.

18. **Machining Thermoplastics.** Cadillac Plastic & Chemcal Company. 8 pp. Booklet outlines recommended procedures for machining and finishing of thermoplastic sheets, rods and tubes. Procedures discussed include sawing, routing, drilling, turning, shearing, punching, grinding and finishing. Special machining characteristics of acrylics, nylon, fluorocarbons and polyethylene are also covered.

19. **High Velocity Spray Technique.** Cobehn, Inc. 8 pp. Booklet describes and illustrates how to achieve chemical cleanliness for such components as transistors, diodes, vacuum tubes, jewel bearings, pivots, electrical contact points, miniature slip-ring assemblies, high fidelity transformers, dynamotor potentiometers, and other precision parts in the electronic, electro-mechanical fields.

Miscellaneous

20. **Automatic Self-Grounding Power Connectors.** A. P. M. Corp. 1 p. Bulletin illustrates and describes Part No. N-UP 121M, a flat, armored power connector with a pivotally-mounded grounding blade which provides automatic ground connection when plugged into either 2- or 3-pole receptacles.

21. **Turbocharged HRA-T Compressors.** Clark Bros. Company. Bulletin presents the turbocharged, redesigned line of Clark HRA-T gas-engine-driven compressors. Described and illustrated are the crankcase, bed section, pistons, crossheads and running gear, all of which have been made heavier and more massive to handle the additional horsepower developed from turbocharging. Includes specifications and dimensions.

22. **Oil Cooler.** Young Radiator Company. 10 pp. Catalog lists complete data on Young oil-to-air and oil-to-water oil coolers for torque converters, industrial applications and marine transmissions.

23. **Molybdenum.** Sylvania Electric Products, Inc., Chemical and Metallurgical Division. 12 pp. Brochure describes the applications, physical properties and production processes of molybdenum. It lists the forms available commercially and discusses new advances in the refractory metals field.

24. **Multi-Shielded Drip-proof Motors.** Sterling Electric Motors, Inc. 4 pp. Bulletin illustrates the five outstanding design features of Sterlicone motors and explains in detail how they can replace totally-enclosed motors in many applications where adverse conditions of moisture, humidity, dust, oil and chemicals prevail.

25. **Grille Selector.** F. P. Smith Wire and Iron Works. Bulletin contains actual size reproductions of 39 grille styles and gives full details on color selections and finishes.

26. **Synchro Components.** Induction Motors of California. Reference data brochure contains general electrical specifications for torque receivers, torque transmitters, control transformers, resolver transmitters, vector resolvers, linear transformers, and control differentials.

27. **New Concepts With Pneumatics.** The Presray Corp. Brochure presents construction and operating principles of the Presray Pneuma-Grip with photographs and line drawings and information on the Pneuma-Seal.

28. **AC Drawn-Case Capacitors.** General Electric Company. 4 pp. Bulletin provides information on general purpose ac capacitors used for improving motor performance and power factor. It contains graphs, outline drawings, terminal, bracket and case data, application information and a list of available ratings ranging from 1-50 micorfarads at 165 to 440 VAC.

29. **Flame-Cutting Machine.** Air Reduction Sales Company, division of Air Reduction Company, Inc. 8 pp. Catalog discusses the design, construction and operation of the Linagraph. It explains the principal features such as centralized operator control, pantograph design, motorized torches and its adaptability to various tracing devices.

30. **Cell and Wedge Inserting Machines.** Possis Machine Corp. Bulletin describes the operation of the inserters used in the manufacture of armatures, and gives capacities, specifications and dimensions.

31. **Hole Punching Units.** Punch Products Corp. Catalog illustrates and describes the manufacturer's seven standard hole punching units, corner notching units, 90° V-notching units and edge notching units.

32. **Impulse Test Machine.** Resistoflex Corp. 4 pp. Brochure describes a high temperature, high pressure impulse test machine for hydraulic components. The impulse testers, called Hydrapulse, provide hydraulic pressure to an operating level of 500 psi with 7500 psi surges.

33. **Wafer Capacitors.** Corning Glass Works. 4 pp. Data sheets describe glass-dielectric wafer capacitors which are said to be the smallest high stability capacitors currently available.

34. **Two-Stage High-Head Pumps.** Chempump Division, Fostoria Corp. 4 pp. Bulletin describes a new series of two-stage, high-head leak-proof "canned" pumps for heads up to 600 ft., temperatures to 850° F, and pressures to 3500 psi.

35. **Airborne Transistorized Power Supplies.** Southwestern Industrial Electronics Company. Bulletin describes and illustrates the SIE airborne transistorized power supplies, Models TPC-18A and 19A, and includes applications, schematic drawings and specifications.

36. **Impregnated Felt Tape.** Coast Pro-Seal & Mfg. Company. Folder describes general industrial uses for impregnated felt tape such as an anti-vibration material, bedding material, general gasketing, special shape gasketing, and packaging and crating material.

37. **Hardboard Paneling.** Marsh Wall Products, Inc. Catalog illustrates and describes entire line of Marlite plastic-surfaced hardboard paneling and accessories and moldings to match or harmonize with the paneling.

38. **Thermal Insulations.** Johns-Manville Sales Corp. 54 pp. Catalog describes thermal insulations for all types of commercial and industrial requirements, in applications ranging from —400° F to 3000° F. It includes sections on insulations for plumbing, heating and air conditioning; refrigeration; insulating firebrick and refractories; finishes and weatherproofing materials; and miscellaneous insulations, including asbestos papers, millboard, felts, blankets, and similar products.

39. **Cast Iron Boilers.** Peerless Heater Company. 8 pp. Catalog covers the full line of industrial cast iron boilers consisting of 33 sizes with ratings from 600,000 to 5,400,000 B. T. U. input for hot water and steam heating systems. Dimensional drawings and specifications are included.

40. **Thermo-Couples** Research Instruments, Inc. Catalog illustrates and describes metallic-sheathed, hard-packed, oxide-insulated thermo-couples and extension wire. Special and typical mounting attachments are also included.

41. **Automatic Checkout Equipment.** Equipment Division, Epsco, Inc. 4 pp. Brochure describes RMS-to-DC converter, a voltage-to-digital converter, a timer-counter and a digital printer.

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(*Continued from page 97*)

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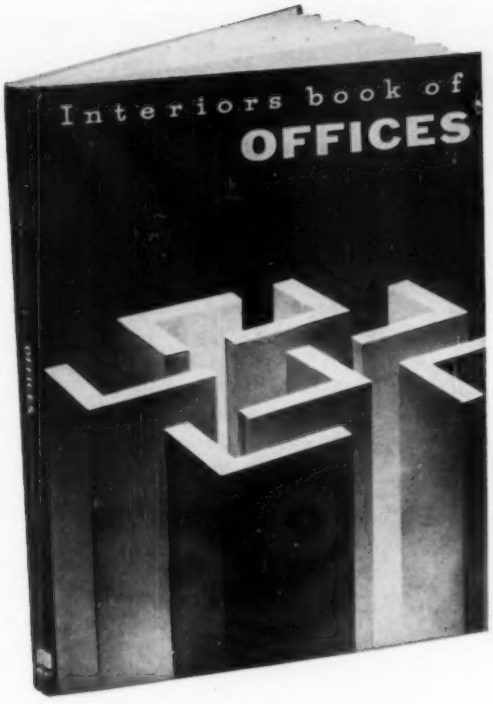

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For Your Calendar

Through February 15. "Visual Communication in the Crafts." Museum of Contemporary Crafts, New York.

February 8-28. Street Furniture exhibition. Purdue University, Lafayette, Indiana.

February 12-March 6. The Work of Nivola. University of Pennsylvania, Philadelphia, Pennsylvania.

February 12-March 6. Creative Engineering: The Work of Nervi. Bowling Green State University, Bowling Green, Ohio.

February 13-March 4. Kaleidoscope Design exhibition. Montclair Art Museum, Montclair, New Jersey.

February 16-17. Plastic Bottle & Tube Manufacturers' Institute. The Society of the Plastics Industry, Inc. Hotel Roosevelt, New Orleans, La.

February 16-18. First national symposium on Nondestructive Testing of Aircraft and Missile Components. Sponsored by the southwest section of the Society for Nondestructive Testing, Inc., and Southwest Research Institute. Hilton Hotel, San Antonio, Texas.

February 17-April 10. The Sense of Abstraction. Photography exhibition. Museum of Modern Art, New York.

February 18-22. National Photographic Show. New York Coliseum, New York.

February 18-March 11. Structural Steel in Today's Architecture; photographic exhibition. Washington University, St. Louis, Missouri.

February 19-23. Third International Electronic Parts Show. Paris, France.

February 25-May 15. National Gold Medal exhibition. Sponsored by the Architectural League of New York and the American Craftsmen's Council. Museum of Contemporary Crafts, New York.

February 26-March 20. Form Givers at Mid-Century. Architecture exhibition. Virginia Museum of Fine Arts, Richmond, Virginia.

February 28-March 6. National Antiques Show. Madison Square Garden, New York.

Through March 15. "Midwest Designer-Craftsmen." Smithsonian Institution traveling exhibition. University of Notre Dame, Notre Dame, Indiana.

March 1-22. "National Ceramic Exhibition," Sixth Miami Annual. Smithsonian Institution traveling exhibition. Quincy Art Club, Quincy, Illinois.

March 6-9. 5th National Electrical Industries Show. New York Coliseum, New York.

March 13-June 19. "British Artist-Craftsmen." Smithsonian Institution traveling exhibition. Commercial Museum, Philadelphia, Pennsylvania.

March 15-April 17. "The Story of American Glass." Smithsonian Institution traveling exhibition. Georgia Institute of Technology, Atlanta, Georgia.

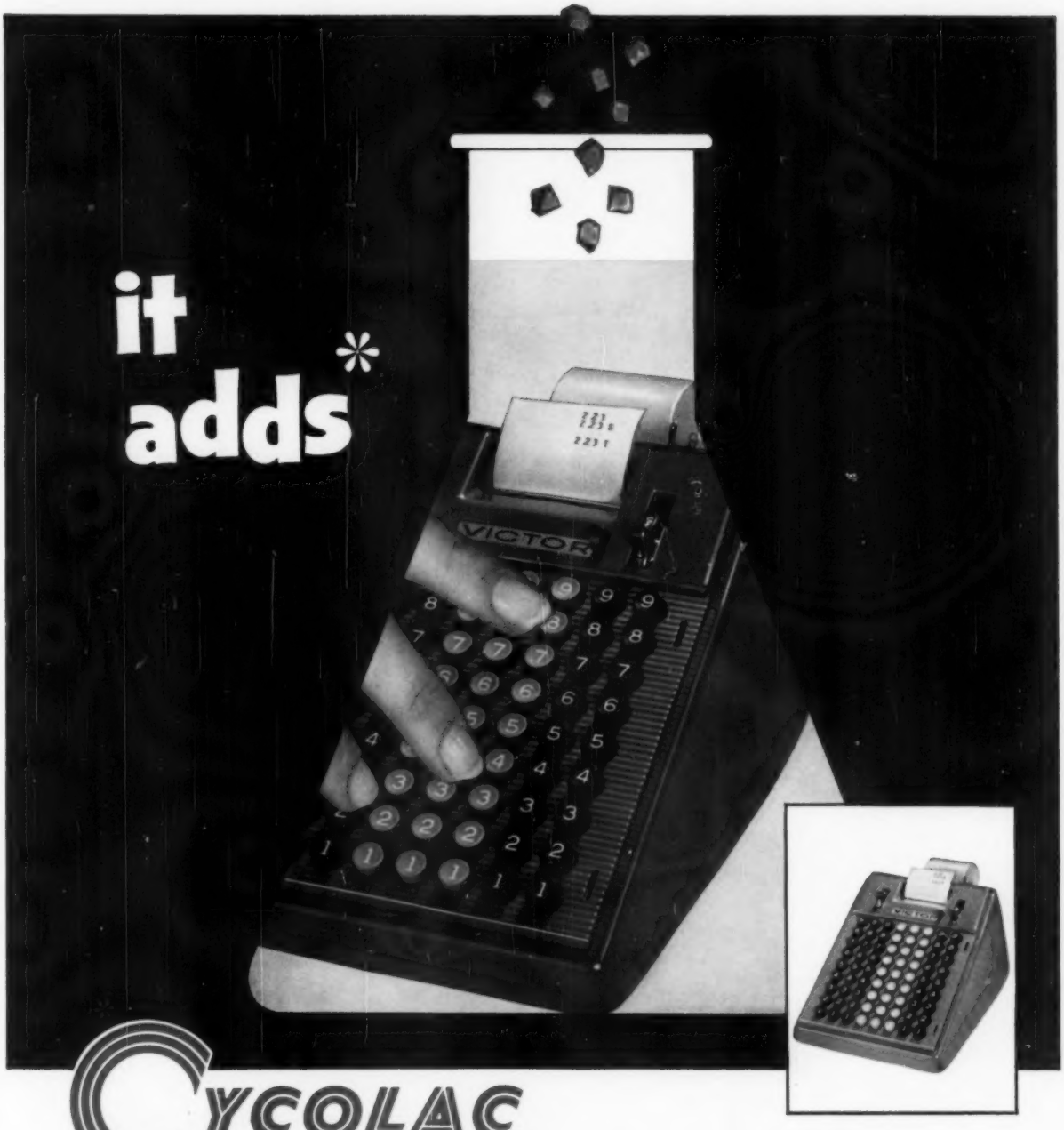
March 27-April 24. "Fulbright Designers." Smithsonian Institution traveling exhibition. Madison Art Association, Madison, Wisconsin.

March 28-30. Advertising Essentials and National Sales Aids Show. Hotel Biltmore, New York.

March 30-April 3. Science and Industry Show. Berkshire Hall, Danbury State Teachers College, Danbury, Conn.

April 4-8. Nuclear Congress and Exhibit. The American Society of Mechanical Engineers. New York Coliseum.

April 16-24. Fourth International Automobile Show. New York Coliseum.



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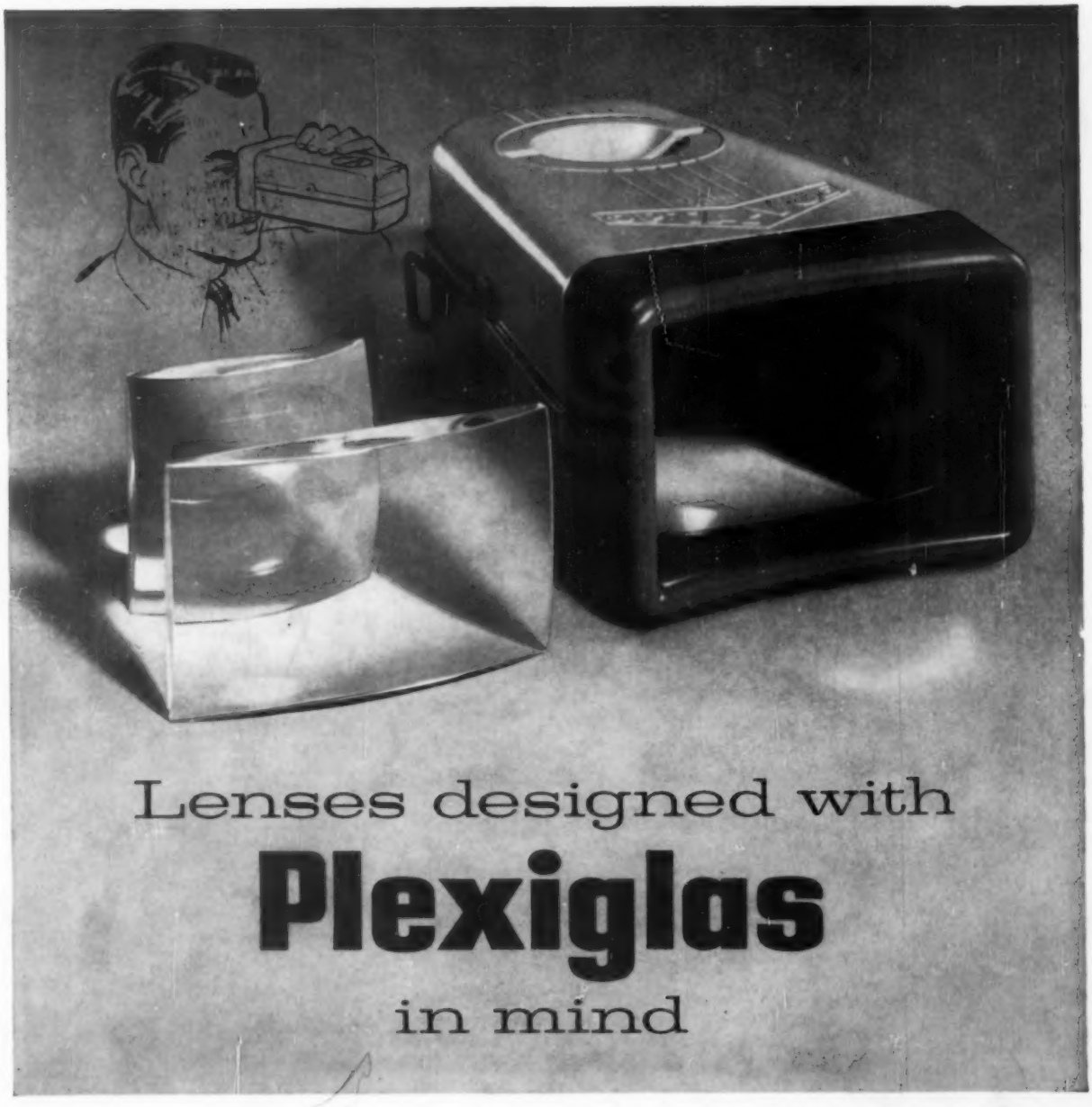

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