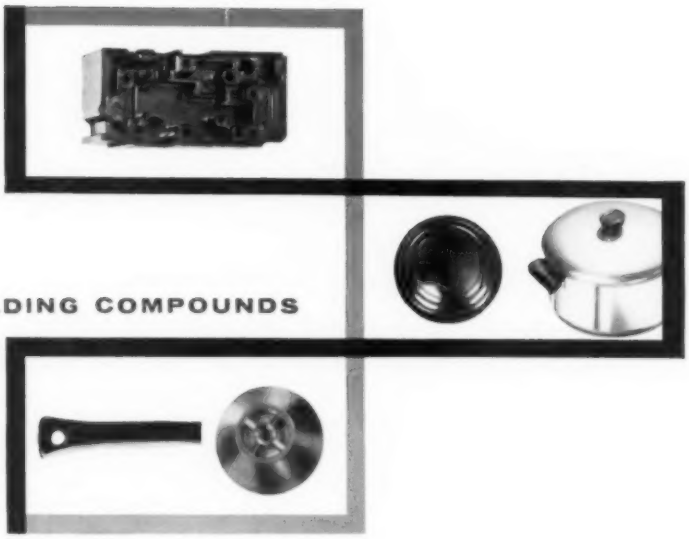
INDUSTRIAL DESIGN

4 *April 1958* *$1.50 per copy*

DESIGN FOR THE U.S. AIR FORCE ACADEMY: *phase 1*

Copper and Brass: a reappraisal



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APRIL, 1958 VOLUME 5 NUMBER 4

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 MAY—Color standards: systems and techniques used in industry to minimize color problems in today's products.

In JUNE—Design behind the Iron Curtain: how Russian designers work and what they produce.

COVER: A plan view of the United States Air Force Academy, the Army's aircraft insignia, and a plan view of the academy's cafeteria tables combine to represent Walter Dorwin Teague Associate's "equipment engineering" project for the Air Force.

FRONTISPIECE: Jim Ward took this picture of a transcribing mechanism—an enlarged model of a measuring device converting angle measurements into digits. This was one of many displays on digital presentation seen at last month's IRE show covered on pages 88-89.

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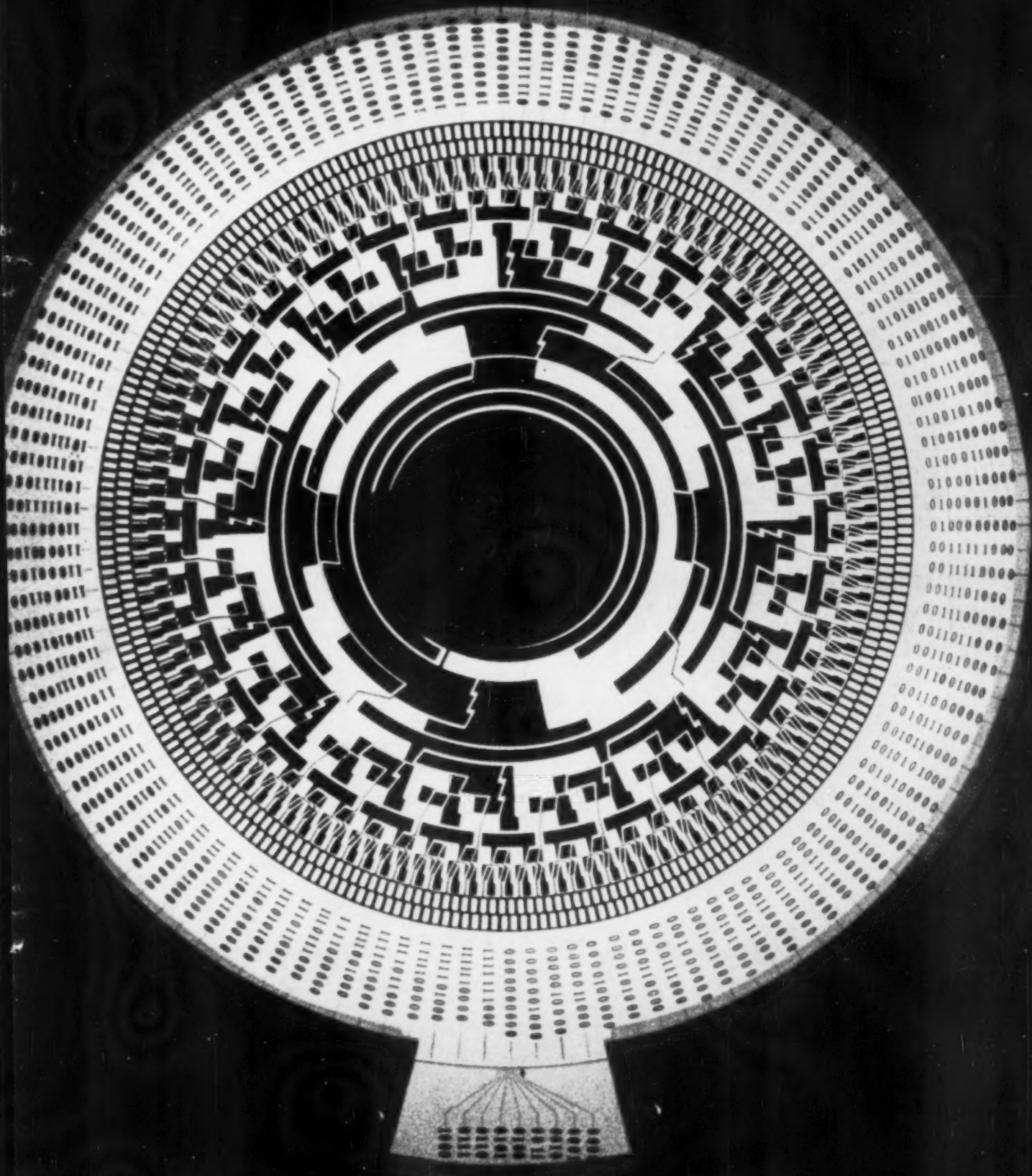

in this issue...


Eames

Charles Eames, who felt at first that there were enough real problems in this world without inviting hypothetical ones to solve, finally talked himself into undertaking to create the delightful solar energy toy (pp. 63-65) for Alcoa. Immediately thereafter, he and his wife left for India.


Thomson

Peter Thomson, Product Division Head at Raymond Loewy Associates, supervised the design program for Partlow Corporation's temperature control devices (pp. 56-57). A graduate of Chouinard Art Institute, Mr. Thomson has practiced industrial design in Detroit and New York.


Kaufman

Edgar Kaufman has long been interested in Art Nouveau (pp. 38-41), as he is, in fact, in all aspects of the applied arts. He was director of the five-year Good Design program at the New York Museum of Modern Art, is the author of two books: "What is Modern Design?" and "What is Modern Interior Design?" (both published by the Museum of Modern Art), and has edited two books about Frank Lloyd Wright: "Taliesin Drawings" and "An American Architecture." He is presently departmental editor for the applied arts, at the Encyclopaedia Britannica.


Stahl

Gerald Stahl, after graduating from the Rhode Island School of Design, spent the war as an engineering officer, first of the flight test and development of the B-29, and later of the 509th bomb group, which tested the atomic bomb. In 1945 he opened the firm of Gerald Stahl Associates, whose Waring Drink Mixer design is shown on pp. 66-69.


Teague

Walter Dorwin Teague's design office is one of the few organizations large enough to handle a job as immense as equipping the new Air Force Academy, shown on pp. 28-37. The Academy's furnishings are expected to serve it well into the 21st century, giving Mr. Teague a relative immortality rare in these days of planned obsolescence.


van Doorne

Dr. H. J. van Doorne, whose DAF car we introduce on page 70-71, developed his automotive factory (van Doorne Automobielfabriek, whence "DAF") from a trailer-building concern founded in 1928. In 1950, the van Doorne assembly line at Eindhoven, second in size only to the Ford works in Holland, began to turn out trucks and delivery vans, and with the new passenger car a long-cherished project of Dr. van Doorne's is realized.


Ungerer

Tomi Ungerer (whose beard doesn't show in picture) is Alsatian, a former member of the French desert police, and the author-artist of several children's books about an enterprising pig family named Mellops. His activities for grownups include doing wine labels, greeting cards, illustrations for Fortune and Harper's, and advertisements for, among other organizations, the Burroughs Corporation. His product interpretations appear on pp. 58-61.

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CAMERAS—The optical qualities of LUCITE, along with its light weight and economy, solve many design problems in lenses. For these reasons LUCITE was chosen for the photoelectric cell of Bell & Howell's unique 16-mm. electric eye movie camera. (Molded by Stimsonite Division, Elastic Stop Nut Corporation of America, Chicago, Illinois.)

LAMPS—This decorative diffuser of LUCITE is a Fresnel lens directing soft, controlled light without reducing normal illumination . . . conceals bulb and socket. (Molded for Sears, Roebuck & Co., Chicago, Ill., by Rupert Manufacturing Company, Blue Springs, Missouri.)

SIGNS—Economically molded in a wide variety of shapes and colors, LUCITE makes eye-catching signs and displays. This panel of LUCITE resists shattering and weathering. (Molded for Shell Oil Company, New York, N. Y. by Kent Plastics Corp., Evansville, Indiana.)

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LETTERS

Appreciation

Sirs:
Jane McCullough certainly is to be complimented on the wonderful job she has done on the magazine. I believe it is the best professional publication I have ever seen, and she has done more to dignify the profession of industrial design than any force in the field.
Jay Doblin, Director
Institute of Design of IIT
Chicago, Illinois

Sirs:
I should like to tell you how much I feel Jane McCullough has contributed, not only to your publication, but to the furtherment of our profession. I am sure the recent editorial in the magazine expressed the feelings of the many designers that you have worked with as well as of the editors who wrote it.
Anthony R. Morrow
Dave Chapman, Inc.
Chicago, Illinois

Sirs:
To my mind the publication which Jane McCullough has been so instrumental in putting together is one of the most outstanding jobs of its kind that I have ever seen. In concept, format and content it is an outstanding piece of journalism and it does an excellent job of representing the profession in a most favorable and fair way.
William M. Goldsmith
President, ASID

Sirs:
Thank you for your nice tribute to Jane McCullough in the February issue. It speaks well not only of her, but for your wisdom in choosing to pursue the distinguished course marked out by her. It is comforting to ID fans who have admired Mrs. McCullough's work to feel that the magazine has not lost an editor, but gained one.
Barbara N. Muhs
Publications Director
Vincent G. Kling
Philadelphia

Is planned obsolescence obsolete?

Sirs:
Will you please accept my hearty congratulations on the article in the February issue of INDUSTRIAL DESIGN by Richard S. Latham and entitled "Is This Change Necessary?" This expresses a point of view with which we here are completely in sympathy.

I believe that these annual style changes, merely for the sake of beguiling the public with no added value in the product, have had a great deal to do with the present recession. The public has come to resent the waste and excessive costs resulting from phony design and has been buttoning pockets with genuine enthusiasm.

I have asked all our partners here to read Latham's article — exceptionally well written, by the way — and I shall read it again myself and keep it at hand for ready reference.
Walter Dorwin Teague
Walter Dorwin Teague Associates
New York

In focus

Sirs:
Your article, "Photographing Your Product," is one of the finest I have read on this subject. With simplicity and directness you have helped to dispel some of the verbal haze surrounding this vital area of communication.

You have helped me to define the visual vocabulary of my medium. As a photographer, I thank you.
Hank Koch
Coconut Grove, Florida

Sirs:
I enjoyed your February issue very much, particularly the section entitled "Photographing Your Product." I am sending a copy to a designer who prepares considerable literature for us and also to the photographer who does most of our product shots. On page 49 you show one of the photographs that we once upon a time sent to you — this is the Putnam plastic ladder. I am sorry that it's used as an example of poor photography, although we can understand your point easily since the maze of electrical equipment in the background does take attention away from the ladder. However, one of the most important advantages of this plastic ladder is its insulating qualities. Therefore, in friendly defense, I think this powerplant background gets across that point strongly. We are still happy that you chose to use this picture, and I am making sure that our customer, Putnam Rolling Ladder Company, sees this issue.
N. L. Prince
American Cyanamid Company
New York

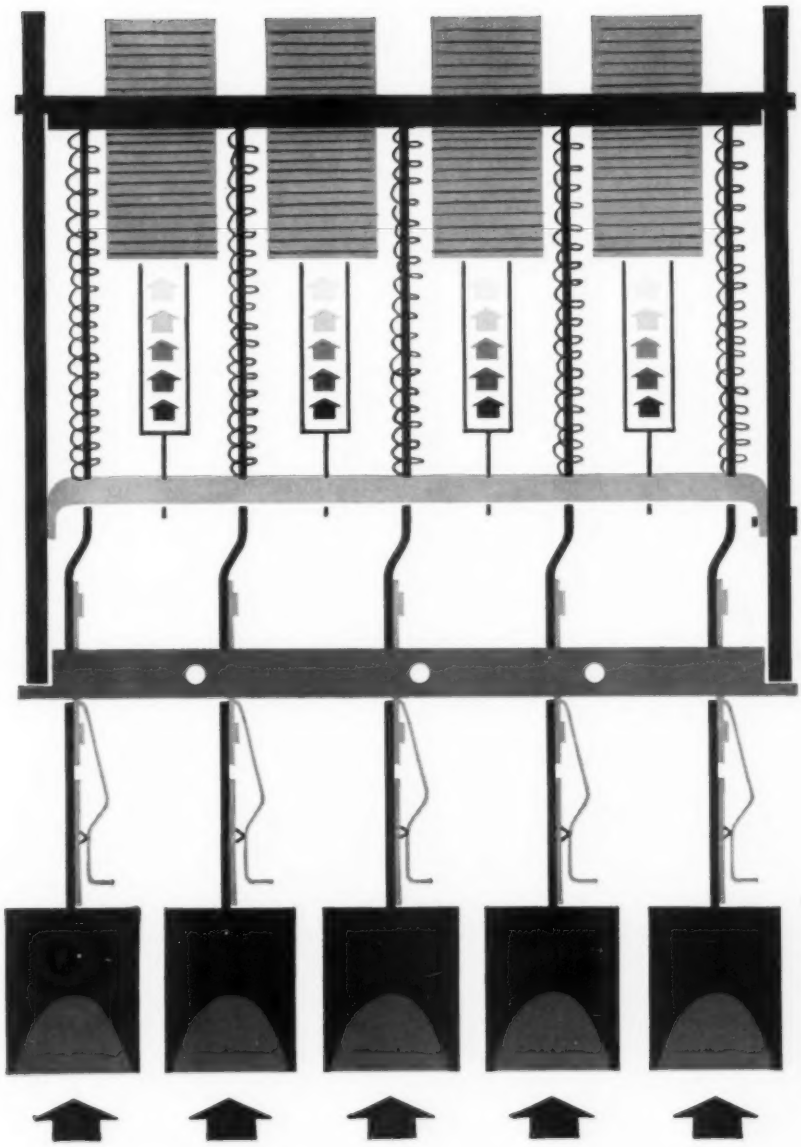
January enjoyed

Sirs:
I want to take this opportunity to compliment the staff of INDUSTRIAL DESIGN for the January issue. It is a wonderful job — we all enjoyed reading it.
John Newell
John Newell Associates
Chicago

More research on MR

Sirs:
I just found out that Elmo Roper conducted the association tests and provided the guidance for the Philip Morris, Marlboro and Parliament packages. This information is news to me and to hundreds of others, since it is widely known that Color Research Institute conducted several hundred studies leading to these packages.
Louis Cheskin, Director
Color Research Institute
Chicago

On ID's checking with Philip Morris, Inc., marketing vice president George Weissman said: "Our market research program for Philip Morris, Marlboro and Parliament package changes was a team effort which included Elmo Roper Associates, Color Research Institute, the Design Laboratory of Container Corporation of America, and our own staff personnel." ID selected the Roper organization's work for its Survey Research section, but inadvertently omitted mention of Color Research Institute's participation.—ed.



The illustration details the principal action of pushbutton radio tuner. Though each pushbutton travels the same distance "in", each positions the cores differently in relation to the tuning coils.

you call the move . . . we'll make the motion

Go right ahead, call the *move!* . . . up, down, over, under, around, right, left, in, out, one at a time, all at once . . . we'll make the *motion*, the whole motion. Your *move* will be designed and manufactured as a complete actuating package, fully tested and operation proved.

Radio Condenser *Custom-Made* Electromechanical Assemblies offer *programmed motion at a touch.* In the fast-growing field of pushbutton dynamics, for example, R/C assemblies can make a finger do most anything . . . tune a radio, "switch" TV channels, do the wash, shift gears, cook breakfast . . . you name it!

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CONTROLS DIVISION

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NEWS

H. Creston Doner *Carl Bjornerantz* *Robert E. Redmann* *Leon Gordon Miller* *George A. Beck*

New officers for IDI

The Industrial Designers Institute held national elections at its Twentieth Anniversary Conference (to be reported next month) in Detroit, February 27 to March 2. Robert E. Redmann, former executive vice president, was elected president. Mr. Redmann is head of the Industrial Design Department at the University of Bridgeport in Connecticut. Other new officers are Carl Bjornerantz, product designer for Sears Roebuck, Company, executive vice president; H. Creston Doner, design director for Libbey-Owens-Ford Glass Company, secretary; Leon Gordon Miller, designer and chairman of the Ohio Valley Chapter, treasurer.

Former president George A. Beck was elected to the new office of Chairman of the Board and, in this capacity, will serve on the National Executive Committee.

IDI's next annual meeting will take place during October, coinciding with the Fifth Annual Southern New England Chapter Symposium. Plans for the next meeting will be made under the direction of John S. Griswold, and The Southern New England and New York chapters will be hosts.

Exhibit designers form group

Chicago exhibit designers met recently to form a new organization, the Exhibit Designers Council. Officers of the new group are Walter Severson, president; Roger Reith, vice president; Nick Guardalabene, secretary; Richard Detrich, treasurer. Purpose of the new group is "to promote the use of better exhibit design, to augment the prestige and dignity of the profession (through a program of information to the general public, exhibitors, exhibit management, schools), and to foster high standards of practice on the part of the members."

The Council has already met several times and has divided itself into research groups (on structure, animation, etc.) that report and demonstrate their findings. At the last meeting, on March 13, Dave Chapman discussed European exhibit design, illustrating his talk with color slides of the Milan Triennale.

ASID announces annual meeting

Bedford Springs, Pennsylvania has been selected as the site for the 1958 national meeting of the ASID. Dates for the meeting are October 18 to 21, and program arrangements wil be published in ID as soon as they are available.

The annual meeting committee, composed of Samuel Scherr, Roy Paul Hess, Bernard A. McDermott and Read Viemeister, has said that the Bedford Springs Hotel has been completely renovated and an outside swimming pool added since the annual meeting held there in 1953.

World Trade Fair at Coliseum

More than sixty nations will exhibit at the U. S. World Trade Fair, which runs from May 7 to May 17 at the New York Coliseum. The entire nine-acre, four-floor area will be taken up with over 3,000 exhibits, and designers will discover new sources of supply, new merchandising methods, and new basic materials.

The participating nations at the Fair will include Austria, Belgium, the Belgian Congo, Canada, Ceylon, Czechoslovakia, Egypt, France, Germany, Great Britain, Greece, India, Indonesia, Ireland, Israel, Italy, Japan, Korea, Liberia, Luxembourg, Mexico, Morocco, the Netherlands, Poland, Rumania, Spain, Switzerland, Uruguay, Venezuela, Viet-Nam, Yugoslavia, the Dominican Republic, West Germany, and Puerto Rico.

Products displayed will fall into eight groups:

Group 1: national pavilions, tourism, transportation, institutional exhibits, information, books, and publications.

Group 2: textiles, clothing, furs, footwear, haberdashery, jewelry, cosmetics.

Group 3: home furnishings, carpets, floor coverings, sewing machines.

Group 4: housewares, luggage, gifts, gold and silverware, clocks, stationery, works of art, religious articles.

Group 5: foodstuffs, confections, beverages, tobacco.

Group 6: hardware, electrical appliances, lighting fixtures, light agricultural equipment, sporting goods, photographic equipment, toys, musical instruments, radios and TV, cutlery, bicycles, and boats.

Group 7: office equipment, business machines, printing materials.

Group 8: machine tools, power equipment, scientific instruments, basic materials, electronic equipment, electrical equipment and motors, building materials and supplies.

Charles Snitow, president of the exposition, anticipates a "substantial increase over last year in volume of business between buyers and exhibitors." An increase over last year's turnout of 127,780 is also expected, he said.

CYANAMID

PLASTICS NEWSFRONT

Breakfast Brightener is Good Insulator

This colorful toaster's pastel-toned ends, panels, base and control lever, molded of BEETLE® urea plastic, will brighten any kitchen or breakfast nook. With the smart luxury look, BEETLE brings practical advantages of insulation against heat and electricity, resistance to scratching and discoloring, and easy damp-cloth cleaning. The toaster and a grill with matching handles of BEETLE are made by Capitol Products Co., Winsted, Conn.

Solves pH Meter Housing Problem

Housings for Pocket Model and Zer-o-Matic* Bench Model pH meters must be tough, strong, impervious to chemicals and corrosion-resistant. Beckman Instruments, Inc., chose CYMEL® 1077 melamine molding compound. This tough, break-resistant plastic protects the delicate mechanism, provides color that cannot wear or chip off and eliminates use of metal subject to corrosive attack.

**Trademark Beckman Instruments, Inc.*

No heat problem for flash unit

The new Anscoflash Type IV holder and battery case, molded of CYMAC® 201 methylstyrene-acrylonitrile compound, remain dimensionally stable under heat, thus assure tight fit for all parts and good electrical contact. The CYMAC 201 holder is tough, resistant to perspiration and staining, and is itself a good insulator. CYMAC molding compounds are available in a rainbow of brilliant and pastel colors.

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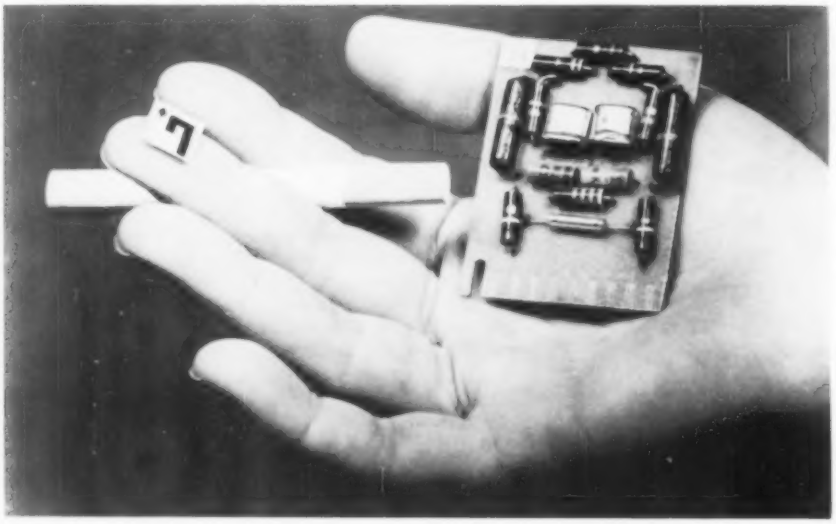


Miniaturization Award announced

On the middle finger of the hand in the photograph above is the winner of the 1957 Miniaturization Award. The tiny transistor unit, shown next to one in common use, was developed by the Diamond Ordnance Fuze Laboratories, a part of the Army Ordnance Corps. The Miniaturization Award was established in 1957 by Miniature Precision Bearings, Inc. to recognize outstanding developments in this growing (or, more accurately, shrinking) field.

The award was presented at a dinner March 23 at the Waldorf-Astoria, New York. Ten other award certificates were presented by Horace D. Gilbert, the chairman of the Miniaturization Awards Committee and president of Miniature Precision Bearings, Inc.

The prize-winning transistor is the result of new photo-lithographic processes and printing techniques that make it possible to form microminiature electronic sub-assemblies in which all components are formed on, or mounted in, holes in a ceramic plate.

Ceramic Society meeting on design

The Design Division of the American Ceramic Society has prepared the program for the Society's 60th annual meeting at the Penn-Sheraton Hotel, Pittsburgh, April 28-30. Peter Muller-Munk will deliver the opening speech: "Product Planning vs. Product Styling."

The meeting will include three panel discussions: "Design for Progress," "Design Faces Trade," and a special session on "The Designer-Craftsman—Today and Tomorrow." Included in this last discussion will be reports on crafts from Japan, Scandinavia and Central Europe, and a paper by Frederick Clayter, Carnegie Institute of Technology.

U.S. plans trade fair exhibits

The Commerce Department's Office of International Trade Fairs has announced its plans for the U. S. exhibits at the trade fairs at Casablanca, designed by Charles Shaw, (April 25-May 11) and Poznan (June 8-22), designed by Reino Aarnio.

While the American exhibits, designed by Becker & Becker, at the Osaka and Milan fairs now underway are a general display of our developments in technology, capital equipment, and consumer products, the Casablanca and Poznan displays are devoted to education and small enterprises respectively, and are geared to the country's own needs. For example, the education display at Casablanca will include classroom demonstrations of how reading and writing are taught to children and adults, with such auxiliary items as audio-visual reading aids and copy reproduction equipment. The Poznan exhibit will demonstrate a variety of small shops and businesses: a shoe repair shop, a milling and woodworking shop, a launderette, etc.

Art directors salute management

The Art Directors Club of New York presented its Management Awards April 1 at a luncheon at the Waldorf-Astoria. Citations went to Morse G. Dial, President of Union Carbide; Robert E. MacNeal, President of the Curtis Publishing Co.; Marion Harper, President of McCann-Erickson; and George V. Allen, Director of U.S.I.A.

New photography magazine

A new monthly, *Photo Methods for Industry*, (PMI) began publication in January. The magazine, put out by the publishers of *Modern Photography* and *Photo Dealer*, is intended for professional photographers in industry, business, research, science and government.

Designers plan automotive future

The two avant-garde vehicles shown below are automobile stylists' visions of our future transportation. The styling departments of Ford and Studebaker-Packard produced the experimental cars, which would both be powered by nuclear fuels.

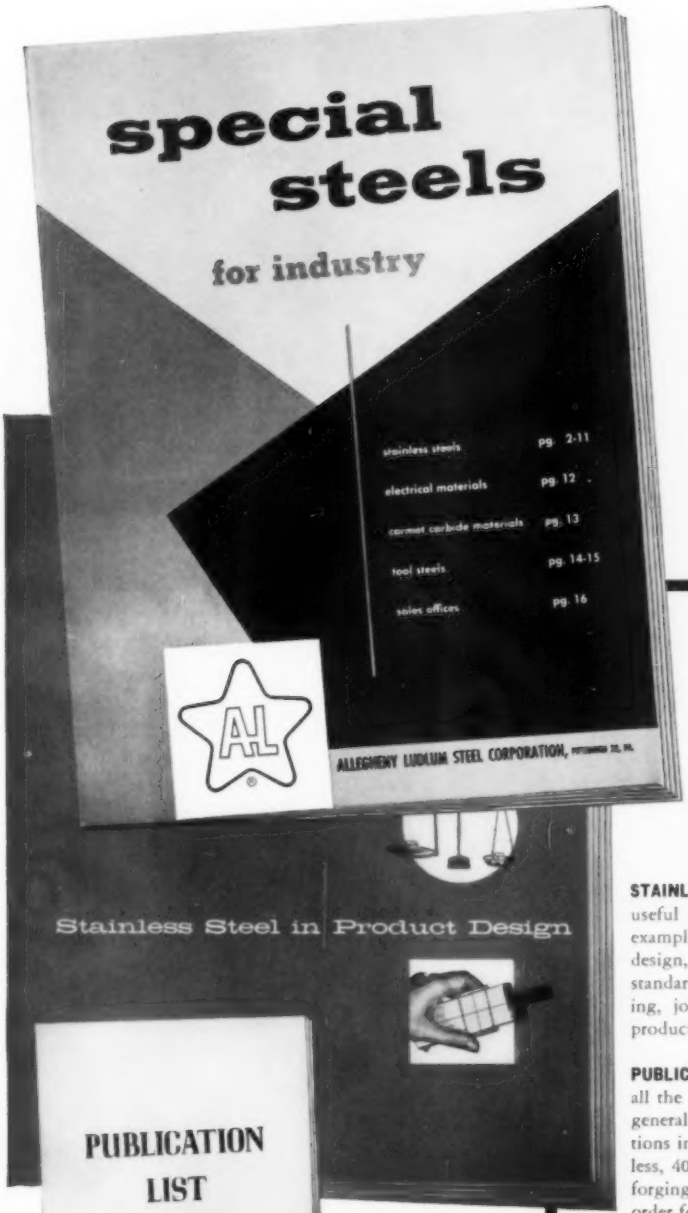
The upper photograph shows Studebaker-Packard's "Astral," designed to be equally at home on land, on water, or in the air. The machine could have a nuclear-powered engine, but in heavy traffic it would receive its power from beams broadcast from a central source. The beams would be received from the "Astropod" at the rear and converted to jet thrust.

Taking another step into the space age, the "Astral" would be light enough to be carried aboard a large space ship for purposes of exploring the face of a planet. A telescreen in front of the pilot would show him the area below, and the same image would be projected to a monitor in the mother ship.

Ford's "Nucleon," while not intended for exploring Mars, represents almost as large a step into the future as the Astral does. The car shown below is a ⅜ scale model, whose tail fins are actually twin booms from which a power capsule is suspended. The capsule would contain a radioactive core whose power output could be controlled at the driver's option, as the intensity of the reaction in a nuclear pile is controlled. Depending on the size of the core, the car might travel 5,000 miles or more without recharging. (The stylists foresee charging stations replacing the present service station.) The car was designed on the assumption that the bulk and weight of nuclear reactors will one day be reduced.

Studebaker-Packard's Astral

Ford's Nucleon



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As *the* major producer of special alloy steels for industry, Allegheny Ludlum naturally offers much more than steel. Ten strategically located plants provide prompt mill deliveries and stock shipments are made from warehouses in all industrial centers. Staff specialists from the mills working with the sales engineers from the sales office provide assistance when requested. Whenever you have a problem involving stainless, high-temperature, electrical, magnetic or tool steels or sintered carbides, let us help. ***Allegheny Ludlum Steel Corporation, Oliver Building, Pittsburgh 22, Pennsylvania.***

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CHALLENGE TO INDUSTRIAL DESIGN: *Specify a material with the look and texture of leather which can be deep-drawn, punched and spot welded as precisely as metal.*

Motorola encases new transistor radios in vinyl-on-steel laminate

Motorola's specifications in a highly competitive field called for elegant styling plus the precise engineering required to give "big set" reception.

Since a transistor radio is carried frequently, Motorola designers wanted a case material with the rich color and soft hand of high style leather such as might be used for a briefcase or handbag. Motorola engineers required a material with the structural qualities of steel.

Their mutual solution was Colovin vinyl laminated to lightweight steel. Suntan morocco grain was selected for "His" radio, white elk grain for "Hers". Each contrasts handsomely with the gold trim used on both cases.

In addition to meeting style specifications, Colovin Laminate passed every engineering test. The Motorola case is a drawn shape. Neither the Colovin surface nor the bonding was affected after 48 hours of 190° heat.

The hinging of the case requires 8 punched perforations. The handle is attached through two disc-shaped die cuts. Neither operation causes the vinyl to break loose from the steel base.

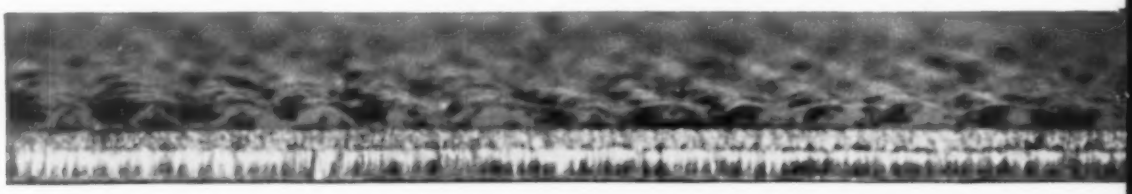
The case is closed by snap fasteners which are spot welded, a process never before attempted with a laminate. Motorola reports rejects from this operation practically nil.

Manufacturers of many products from appliances to airliners have found Colovin Laminate a perfect solution to the all-too-frequent conflict between Engineering and Design. It provides unlimited opportunity for color, texture, dimensional effect. It tailors smoothly around contours without distortion. It requires little or no change in production techniques, eliminates hand operations and the need for finishing machinery.

Write us for samples suitable for test forming. We'll include "Colovin Meets Metal", showing colors and textures, test specifications, industrial applications, and list of laminators to whom we supply Colovin sheeting.

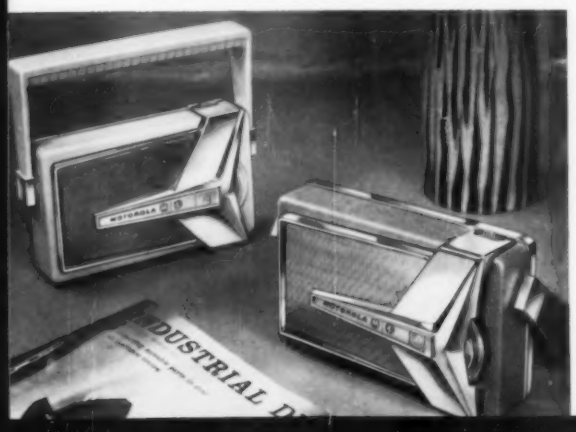
COLOVIN® **... first and finest in the vinyl laminate industry**

COLUMBUS COATED FABRICS CORPORATION, COLUMBUS 16, OHIO



Enlarged cross section of Colovin vinyl laminated to steel. Note the permanent, almost invisible, bonding of plastic and metal. The laminate can be deep-drawn, stamped, sheared, crimped, bent, drilled, punched, embossed or welded. The vinyl coating is virtually indestructible, actually protects the metal beneath and provides electrical insulating qualities.

Two views of the Motorola transistor radio case in Colovin vinyl laminate. Notice in the upper view the clean edges of the punched perforations and the smooth "tailoring" of the rounded corners with no distortion of the vinyl. Lower view shows snap fastener and chassis locator flange spot welded to the laminate, die cut for handle, and hinging.



Foreground, Motorola "His" radio in suntan morocco grain Colovin Laminate, model 7X24S. Rear, "Her" model in white elk grain, 7X24W.

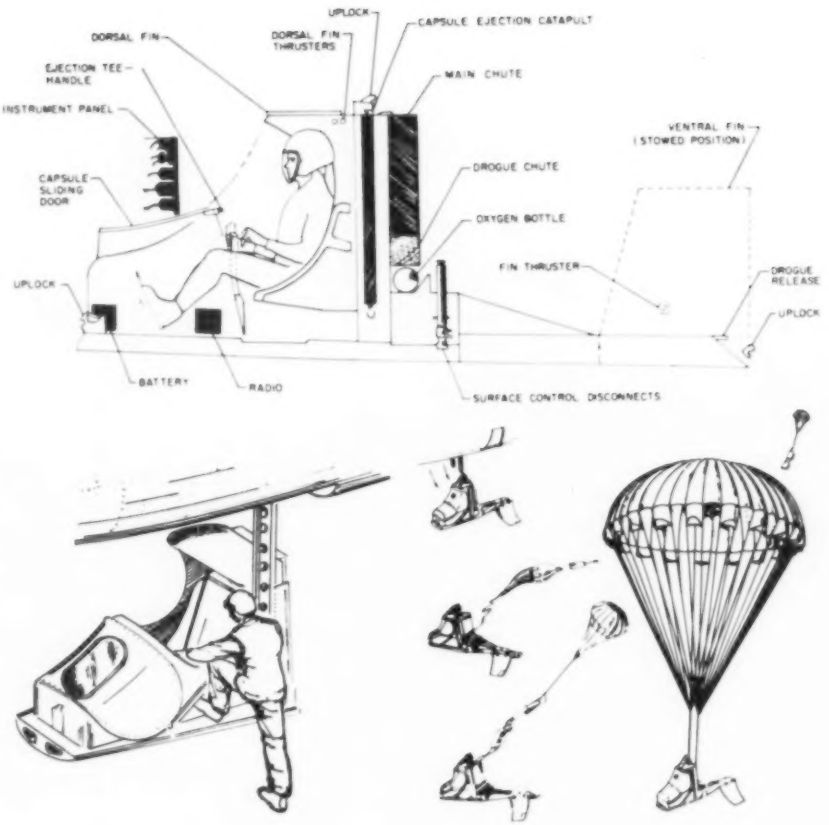
Republic devises new escape system

A new system for parachuting a man back to earth from extreme altitudes is now being tested by Republic Aviation Corporation. Consisting of a closed capsule and a system of parachutes which are ejected from high-flying supersonic aircraft, it is the first inclosure escape system to be given an Air Force contract.

The system is a compromise between those escape capsules that consist of the whole front end of the plane and those including only the seat and pilot. This one houses pilot, seat and some control instruments. When the pilot wishes to bail out he first presses an ejection handle (see top sketch). A complex series of devices then locks his shoulder harness into place and closes a sliding door to seal his capsule. Design problems were especially difficult because the capsule had to be utilized for entrance to and exit from the plane (bottom left) as well as for emergency escape.

With the capsule sealed, air pressure is maintained and the capsule may then be blown down a set of rails and out the bottom of the plane by two explosive charges. Fins extend from the capsule to steady it during its fall. Two parachutes are released in series—the first pulling the second out, then detaching itself (bottom, right). Although this slows the descent, some shock-absorbing equipment is necessary.

The project, which will soon undergo supersonic testing at Hurricane Mesa, Utah, is under the direction of C. W. Russell of Republic.



Harley Earl designs Convair interior

Harley Earl Corporation of Center Line, Michigan has just completed interior design on General Dynamic's new Convair 880. Chief aim of the design was to avoid the usual tunnel effect of plane interiors and to create varied groupings in the passenger cabin and club compartment.

The club compartment (below), which has informal seating for twelve people, takes up no more space than does conventional row-seating for twelve. Varying ceiling levels in the passenger cabin and the insertion of coat-closet dividers at any of six points, according to seating required on a particular flight, subdivide this area.

The interior of the plane will be larger than that of most commercial planes now operating. Aisles will range from a minimum of 24 inches up to 28 inches. Seats, too, will be wider than usual.

The first Convair 880 will be completed in San Diego in November, and orders will then be filled for Trans World Airlines and Delta Air Lines.

ICA plans summer seminar

The Institute of Contemporary Arts, Boston, announces that the summer program of advanced study in design will be under the direction of James R. Shipley, a member of the art department at the University of Illinois. The major theme of the conference will be "Communications for Designers;" the minor theme will be "Creative Thinking." The program is scheduled for Saturday, July 12 to Sunday, July 27. It will take place at M.I.T.'s Endicott House in Dedham, Massachusetts, except for the final three-day session which will be held at Wellfleet, Massachusetts, where the group will study with graphic designer Gyorgy Kepes, whose studio is there.

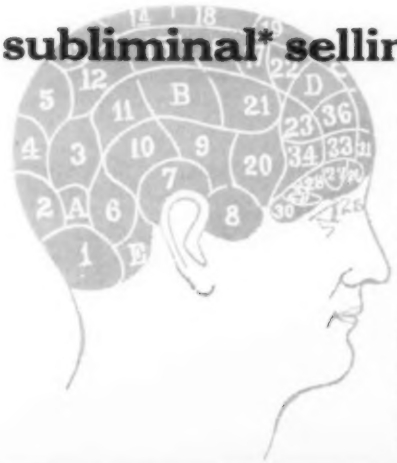
Those interested in further details may write to Center for Design Studies, Institute of Contemporary Art, 230 The Fenway, Boston 15, Massachusetts.

Kaiser builds commercial domes

The geodesic domes that have been representing the United States at trade fairs all over the world have now begun to find commercial applications. Kaiser Aluminum announces it will soon build such a dome as part of a shopping center in Caracas, Venezuela. Kaiser has already erected four domes: auditoriums in Hawaii and Texas, a convention center in Virginia, and a conveyor equipment plant in Texas. (For an example of a steel dome, see page 22).

One of the first firms to enter the geodesic field, Kaiser in 1953 supplied the aluminum frame for the Ford Rotunda in Dearborn, Michigan, designed by Buckminster Fuller, the originator of geodesic structures. Kaiser's engineer for that project was Donald Richter, who subsequently developed his own theory of geodesic structure incorporating frame and skin.

subliminal* selling at its best



This attractive young lady is not the type that usually tries to spruce up her husband. But right now she's doing a great selling job because that's the most attractive suit she's ever seen. In fact, everything in the windows of Moore's new San Francisco store looks especially "buyable." The secret, of course, is in the lighting. Moore's uses display window ceilings of Honeylite to diffuse a soft, even, completely shadow-free light that makes window shopping a pleasure—buying a must. The outstandingly low surface brightness of Honeylite displays merchandise in its finest light—and it is subliminal* (below the threshold of consciousness). ■ Robert Israel, Moore's general manager in San Francisco, appreciates that modern lighting is a part of modern building and merchandising. That's why he chose Honeylite...light-diffusing aluminum honeycomb by Hexcel. ■ For prices and design information on Honeylite see your nearest lighting distributor or write Hexcel Products Inc., 2741 9th Street, Berkeley 10, California.

HONEYLITE®
Modern lighting by Hexcel Products Inc.

Steelways

Freight train for the Arctic

A block-long, trackless freight train (above) is presently transporting Army goods across the deep snows above the Arctic Circle. The train is manufactured by R. G. LeTourneau, Inc., Longwood, Texas, which has built a similar vehicle for desert haulage.

Power is supplied by a 600-hp diesel engine with a 500-gallon fuel tank. The roof of the control car is a transparent dome, serving as an observation post and a kick-out escape hatch, and enabling the driver to navigate by the stars when necessary. The train, whose tires are ten feet high and four feet in diameter, can carry nearly 100,000 pounds of military supplies. The 15-ton flat-bed trailers are self-propelled units with all-wheel drive. Each wheel contains an electric motor in its center.

Packaging to be displayed, discussed

The American Management Association is holding its 27th National Packaging Exposition May 26-30 at the New York Coliseum. One of the features of the exposition will be packing processes in action. Nearly 400 manufacturers of packaging materials, machines, equipment, supplies and services have prepared displays for the show.

The AMA's National Packaging Conference will run May 26-28 at the Hotel Statler, New York. Theme of the conference this year is "Cost Reduction in Packaging." Registration is through the American Management Association, 1515 Broadway, New York 36.

Dorfsman thrice honored

Louis Dorfsman, Director of Art, Advertising and Promotion for CBS Radio, received three awards—for a direct mail booklet and two magazine advertisements—at the 37th Annual National Exhibition of Advertising and Editorial Art and Design of the Art Directors Club of New York. The exhibition took place April 1-10 at the Waldorf-Astoria.

New factory concentrates on looks

A colorful and attractive interior has been substituted for the usual factory drabness in the new Johnson & Johnson manufacturing center in New Brunswick, N. J. Designed and built by Walter Kidde Constructors, Inc., New York, it features mosaic panels of birds and a room divider of stained glass abstract patterns set in black lacquered aluminum channel frames (below). Both are by Max Spivac. The golden-yellow brick wall, like Mr. Spivac's designs, are part of an effort to get as

much color as possible into the main lobby. The ceiling is an off-white of acoustical plaster, the floor a white vinyl tile with a black speckle. Light comes from ceiling wells which are covered by translucent plastic globe diffusers.

Located on a 300-acre site, the Johnson & Johnson plant consists of three main buildings arranged diagonally and connected by smaller office and laboratory structures. Windows in the long, low buildings are arranged to let in light but little sun. East and west walls have vertical or horizontal ribbons of windows arranged in columns. In the south wall, where sun is strongest, the ribbon window has been placed under the eaves. The northern side of the building has large areas of blue glass.

On the plant exterior, color is based on the traditional Johnson & Johnson color scheme—white complemented by red and blue. Plant walls are predominantly white stucco, office walls glazed red brick, while most windows and cover plates for wall columns and girders are blue.

In its handsome exterior the Johnson & Johnson plant represents what seems to be a trend toward building factories with esthetic appeal. The new factory, no longer a blot on the landscape, becomes an instrument of company advertising. The attractive factory building acts as an incentive in drawing employees, and serves as a permanent ad for the company.

Sales Aids Show opens in June

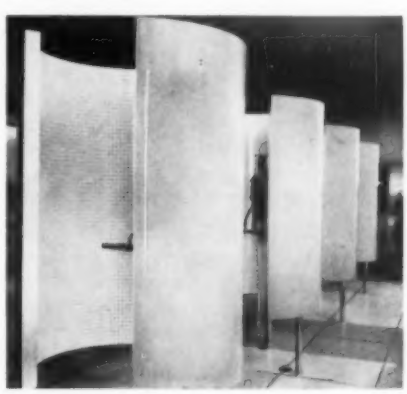
An audience of 8,000 advertising and sales promotion executives will attend the Fifth annual National Sales Aids Show, to be held at the Shelton Hotel, New York, on June 10-12. Exhibitors this year are expected to present the newest developments in displays, graphic art, advertising specialties, direct mail, packaging, lettering, and sales presentations.

Admission is by ticket only, and tickets may be secured by writing on a business letterhead to Thomas Noble, Advertising Trades Institute, 135 East 39 Street, New York 16, N. Y.

Ford gets circular phone booths

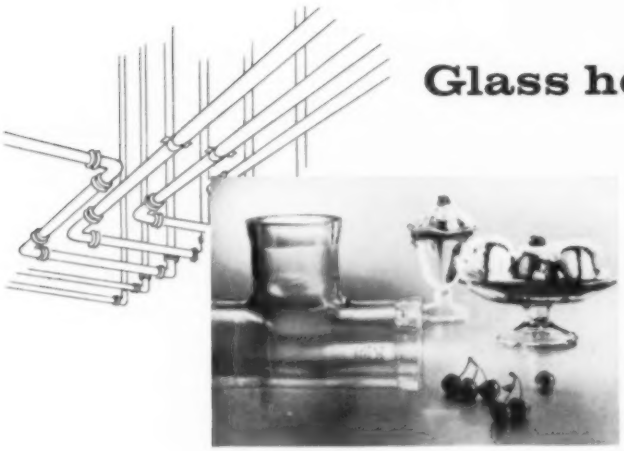
Circular phone booths, designed by Skidmore, Owings and Merrill for Ford Motor Company's new central office building in Dearborn, Michigan, trap sound by means of perforated hardboard panels backed with Fiberglas. Three poles hold each of the seven-foot booths about two feet off the floor. Peg-board is attached to this framework of poles; then Fiberglas is applied on the outside surface and a light coat of enamel sprayed into the holes of the peg-board. Formica is applied to the outside of the framework (creating a sandwich for the Fiberglas) and several coats of enamel are sprayed on the interior to provide its finish.

The new booths need no doors because sounds inside them travel through the perforations in the peg-board to be absorbed by the Fibreglas.



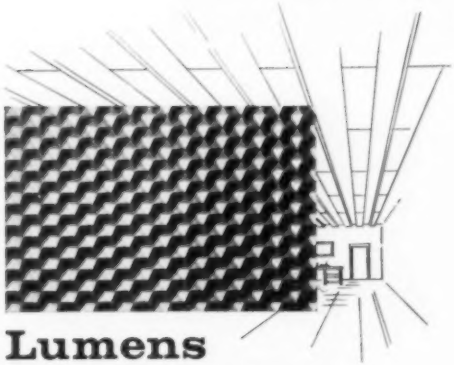
THIS IS GLASS

a report to men who make decisions



Glass helps pass the *"zest test"*

Name it—wine, mayonnaise, mustard, tomato juice, fruit toppings. They all add zest to eating. That's why customers flock to buy 'em. And if you stepped into plants where many of these and other tasty items are made, you'd run into glass piping. Why glass? Because glass *doesn't add to* or *take from* what you put in it. It keeps all the delicate flavor in the product where it belongs. What's more, glass keeps pure what you pipe through it. There's no place for contaminating material to build up on the smooth surface of glass! Glass is rugged, too, especially a PYREX brand glass. It can cope with most acids and alkalies, handle hot and/or cold materials without harmful effects. And you can tell at a *glance* when glass is clean, inspect every inch with the pipe in place. That can add up to big savings in reduced down time. How about it—want to pass that *"zest test"* with flying colors? Ask for Bulletin PE-3.



Lumens for humans . . .

how to do it right and bright

It's a big problem, this putting your offices, stores, waiting rooms and work areas in the right light. And today proper illumination is just one consideration. The other? The role lighting fixtures play in interior design. Coping with *both* is where Corning's engineered lighting glassware shines. Pattern No. 70, shown above, is an example. Made from a crystal glass, with prisms in one surface, such panels provide plenty of glare-free light. And they look good, adding texture and a smart design element to any setting. All the facts pleasantly spelled out in our "Commercial Lighting Application Guide." Get a copy *before* you start building or remodeling.

Warm things up . . .

think up a new product with glass that conducts electricity

It's true — in most instances glass is an effective insulator. But here's a glass that *conducts* electricity! What can you do with it? A number of enterprising businessmen have put panels of this glass to work where drying is needed. The heat that comes from such panels is *radiant* heat, *uniform* and clean. And there's no need for ducts, no need for extensive alterations. It's the perfect way for economical drying of textiles, paper, printed materials and what have you. Radiant heating panels are also being used for home heating—available as *portable* units or *permanent* installations. With a portable, just plug in and the heat's on! Glass that conducts electricity is one of 65,000 different kinds developed by Corning. Could be that among this collection is one you can use. Why not inquire? Ask for (a) details on PYREX brand industrial radiant heaters, Bulletin PE-60; (b) names of firms now making heaters; (c) or you may wish to make heaters yourself. Whatever your interests, write.

64 pages crammed with facts and pictures about glass at work. That's "This Is Glass." A note on your letterhead will bring this informative volume to your desk.

CORNING GLASS WORKS

54-4 CRYSTAL STREET, CORNING, NEW YORK

Corning means research in Glass

Which of these qualities do you want to add to your product?

- ☐ Beauty with outstanding colors
- ☐ Controlled sheen—high gloss to satin finish
- ☐ Durable finish—retains gloss and color
- ☐ Smooth finishes—unmarred by sags, drip marks or bridging at intersections
- ☐ Resistance to salt spray, water and sunlight
- ☐ Toughness, impact and abrasion resistance
- ☐ Uniformity and good adhesion of finish
- ☐ Electrical and thermal insulation
- ☐ Completely uniform coverage—including sharp edges, corners or projections

announcing...NEW

CORVEL Cellulosic Finishes
set a new standard
of quality and durability

CORVEL Fusion Bond Finishes are resin powders of various types specially formulated for use with the WHIRLCLAD® Finishing Process. This new production process for cladding metals and other materials with plastics is exclusively licensed in the U.S. and Canada by Polymer Processes, Inc., an affiliate company.

CORVEL*

Fusion Bond Finishes

CORVEL Cellulosic Finishing Powders open up new product possibilities for you. Castings, steel wire parts, stampings, etc. can now be clad uniformly with cellulosics in just one dip, with thicknesses that can far exceed those obtainable with conventional finishes. You get a premium appearance with improved durability, and costly machining or preparation of substrate surfaces is often eliminated. CORVEL resins are especially prepared for use with the WHIRLCLAD* Finishing Process.

CORVEL Finishes are applied by dipping the heated object into a fluidized bed of dry CORVEL powders. The powders bond by fusion to the surface of the part. The finishing powders are in a state of "whirling suspension", and the bed of dry powders assumes penetrating flow characteristics much like a liquid.

Get complete details now! Write for our bulletin on CORVEL Finishing Resins including Cellulosics, Nylon, Polyethylene, K-51 (Chlorinated Polyethers) and others.

NATIONAL POLYMER PRODUCTS, INC. / Reading, Pennsylvania
A subsidiary of The Polymer Corporation

*Polymer Corporation Trademark for finishing materials

POLYPENCO*

Company News

The **Steel Founders' Society of America** has produced a 27-minute film on "Photoelastic Studies of Joined Section in Castings and Weldments," available to technical societies and colleges. Bookings can be made through the Product and Market Development Committee, Steel Founders' Society of America, 606 Terminal Tower, Cleveland.

The new Wall Street offices of the **Manufacturers Trust Company**, New York (right), designed by **Eleanor LeMaire**, are a study in contrasts. The street floor is sleek, lofty modern, while the executive offices take their inspiration and much of their furniture from the 18th century.

The Iraqi government has commissioned **The Architects Collaborative**, Cambridge, Mass. to build an Arab university in Baghdad. With a total enrollment of 10,000 expected, the new university on the Tigris will serve as a cultural center of the Arab world. Two TAC partners, Walter Gropius and Robert McMillan, have just completed a preliminary survey of the site.

The **Union Tank Car Company** is constructing an all-steel "Union Dome" (below) in Baton Rouge. One of the first industrial buildings in the country to employ the geodesic dome, the structure will also be the world's largest circular building without internal supports.

Bruce Kamp Associates, Philadelphia, have been retained as industrial design consultants to the **Symphonic Electronics Corporation**, New Brunswick, N. J.

On April 13, an NBC broadcast, "America on the Go," sponsored by the **North American Van Lines**, took the occasion of the 1958 Design Engineering Show to explore the work of the design engineer, hailing him as "one of the greatest and least known influences on our way of living."

Competitions

To stimulate the imaginative use of plastics, the Chicago Molded Products Corporation has inaugurated the **Bachner Award**, open to all manufacturers of products which employ plastic components or are totally plastic, and are molded, extruded, or vacuum or pressure formed. The prize, "for outstanding contribution to the application of molded and formed plastics to the products of industry," is $1,000, and a plastic plaque (designed by Jean Reinecke). Information and entry blanks can be obtained from William T. Cruse, The Society of the Plastics Industry, 250 Park Avenue, New York.

New offices of Manufacturers Trust

The deadline for the **ASID Student Awards Competition** (see February ID) has been extended to May 15. Entries should be submitted to ASID Student Awards Competition, 1958, Art Department, Northwestern Univ., Evanston, Ill.

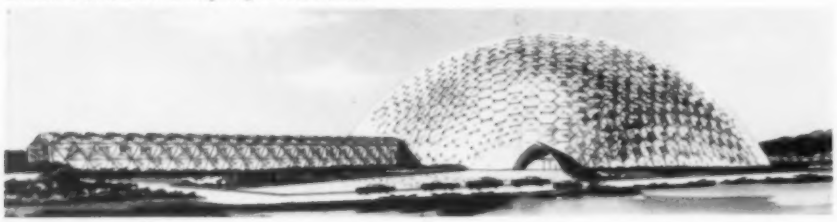
Going Places

NEW DESIGN COMPANIES: **George Goshco Associates**, 1044 Chestnut Street, Valley Stream, N. Y. . . . **Brundage Associates**, 870 North Point Street, San Francisco.

NEW BRANCHES: **Albert Pines**, Newark, N. J., at 1139 East Jersey Street, Elizabeth, N. J. . . . **Lawrence H. Wilson Associates**, Detroit, at 10217 Franklin Avenue, Franklin Park, Illinois.

NEW ADDRESSES: **James Shade: Design**, 2420 North Beachwood Drive, Los Angeles 28. . . . **Waldheim-Köepke Associates**, 1513 North Farwell Avenue, Milwaukee 2. . . . **Center for Research in Marketing, Inc.**, Route 9, Phillipstown, N. Y. (Sales offices still at 40 East 49th Street, New York.)

Union Tank Car Company's steel dome



Design education

Alfred B. Girardy, industrial design consultant presently working with the ICA in Japan, was visiting lecturer during February and March in the College of Engineering and Architecture at Pennsylvania State University.

A memorial loan fund for Yale architectural students has been created in memory of the late Robert T. Coolidge, who was for nine years a member of the Department of Architecture at Yale.

M.I.T. announces two special summer-session courses: "The Dwelling House: an Emerging Technology" (June 23-July 2), and "Design and Dynamics of Mechanisms" (September 2-12).

People

APPOINTED: **Mildred L. Patschke** and **Thomas C. Mills** (below) as associates of Palma-Knapp, River Forest, Illinois . . . **George Tscherny** as graphic design consultant to the Ford Foundation, New York . . . **Norman Schoelles as Chairman of the** Plans Board of Lippincott and Margulies, New York . . . **Eugene Gordon, Jr.** as vice president of Forest Wilson Associates, Chicago . . . **Ralph Johanson** (below) as product design director of Charles Butler Associates, New York . . . **Bruno W. Kersten** to the staff of Ken White Associates, Westwood, N. J. . . . **Kenneth A. Matticks** as manager of product development, Stainless Steel Sales Division, Crucible Steel Company of America, Pittsburgh . . . **Donovan Worland** to the staff of Latham-Tyler-Jensen, Chicago, as manager of a new department of industrial and museum exhibits . . . **Marion Weeber** (above) as designer for Stadler-Neuwirth Inc., New York lamp manufacturer . . . **Rudy H. Koepf** as manager of IBM's Industrial Design and Industrial Design Engineering Department, Product Development Laboratory, Poughkeepsie.

Patschke

Mills

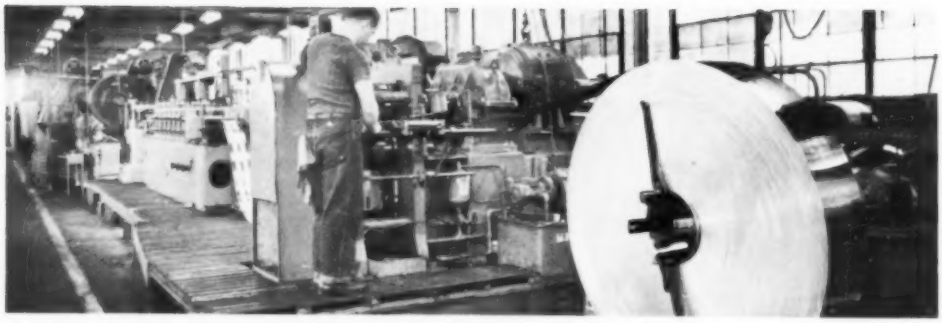
Johanson

Weeber

Aluminum is texture . . . Alcoa is Aluminum

Texture translates the feel of an idea; a task perfectly suited to aluminum. Expressive, impressionable, receptive to the subtlest shadings of tone and pattern, aluminum mirrors imagination as no other metal can. Alcoa invites you to share its intimate knowledge of this most versatile metal. How? Just turn the page.

Aluminum Company of America



ROLL-EMBOSSING AT STANDARD PRODUCTS—a pioneer producer of decorative aluminum. Alcoa teams up with leading fabricators like Standard Products to provide you with a complete and unparalleled aluminum design and fabricating service. For information, write: Standard Products Company, Cleveland, O.

Aluminum is texture . . . *the metal of many faces . . .*

Texture puts character in a product finish. It supplies that "infinite delight in variety" that enthralls the eye and invites the touch. Aluminum, more than any other metal, endorses this prime design aim most eagerly. Enduring, obliging, workable aluminum wears a thousand different faces at will, assumed through mechanical, chemical, metallurgical and organic means.

MECHANICAL FINISHES

Polishing and buffing give aluminum a mirror-like brilliance, bringing its natural luster to the highest peak. *Sandblasting*, in contrast, subdues its glow, produces a mellow matte effect. *Scratchbrushing* highlights the metal's graininess; a *satin sheen* emerges when a finer brush is used. *Burnishing* produces a fairly smooth surface useful on many low-cost items; hundreds of items can be handled at once. *Hammered* aluminum emulates hand-wrought silver in its rich variegation of irregular patterns. *Embossing, coining and engraving* aluminum produces unlimited patterns and designs in sharp, clear, minute detail. *Perforating* offers a wide variety of decorative effects for panels and screens.

CHEMICAL FINISHES

Anodizing aluminum imparts a sapphire-hard surface of unmatched wear and corrosion resistance, with infinite color, tone and texture possibilities. *Plating* can be done with a broad range of metals, using proper surface preparatives. *Electro-brightening* creates a lustrous brilliance akin to a buffed surface, at lower cost than mechanical polishing, and is particularly suited for irregular shapes and curved surfaces. *Etching* with acids or alkalis offers a wide variety of three-dimensional effects, from sparkling frosted finishes to smooth, reflector surfaces. *Deep etching* creates intricate design patterns of unusual eye appeal. Use of *photosensitive resists* assures accurate and fine detail. With *masks, resists and stop-off methods*, numerous combinations of the above techniques are possible.

METALLURGICAL FINISHES

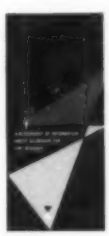
Spangling aluminum with Alcoa's new controlled-growth grain process produces a glittering, multi-faceted surface that reflects light from myriad angles; anodic colors can be added as desired. Certain *alloys* give important color and tone advantages: high-purity alloys give a clear, transparent finish; silicon alloys impart a gray tone, chromium a pleasing yellow tint, and manganese a brownish coloration.

ORGANIC FINISHES

Painting, lacquering and enameling of aluminum, in clear finishes or opaque coating, have both protective and decorative value. Aluminum's high adherence for paints and pigments make it an excellent base for all color coatings of the conventional type.

Get more information on designing in aluminum

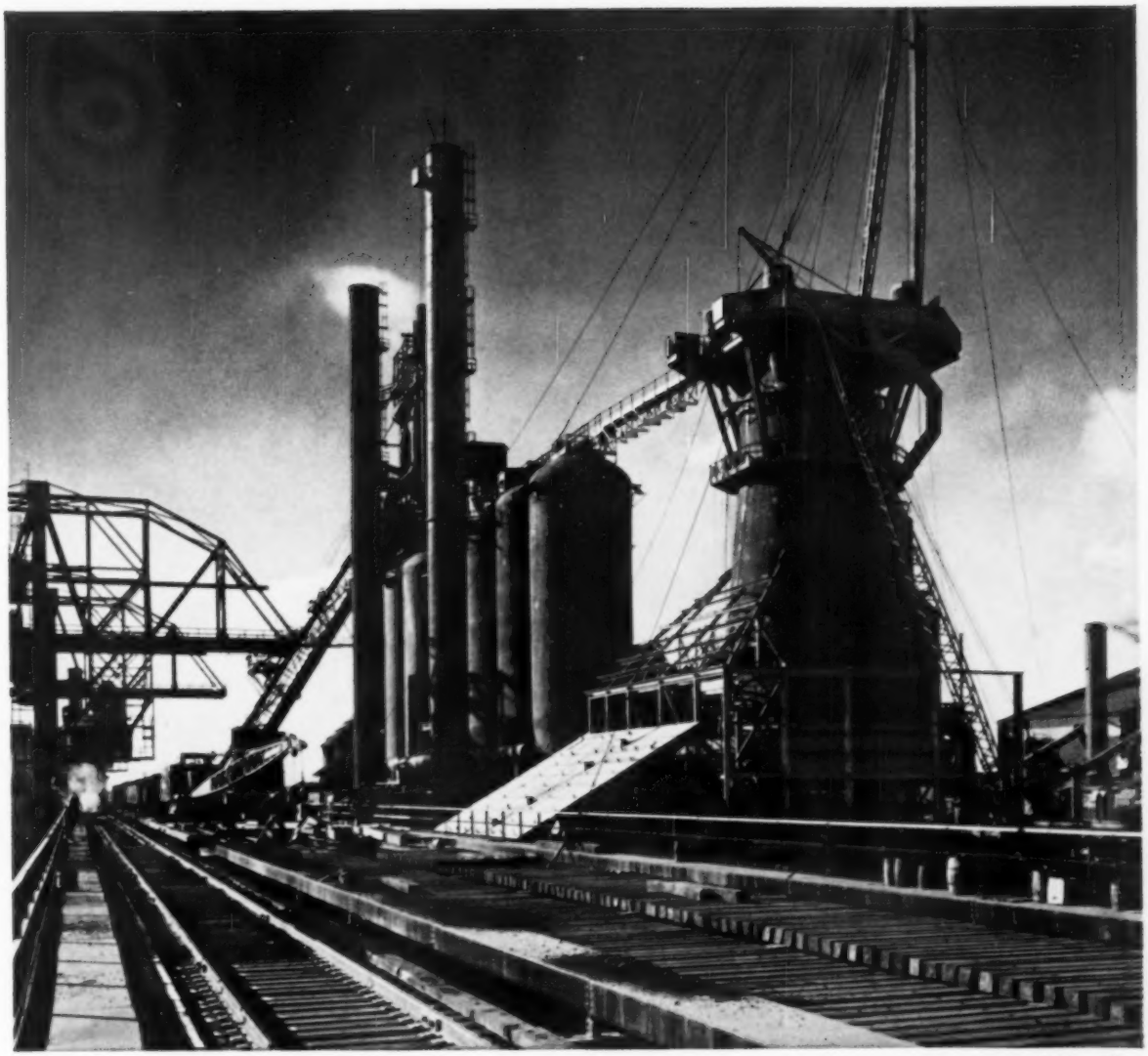
Write for Alcoa's inspirational bibliography which describes Alcoa books and films to help you design in aluminum. Write: Aluminum Company of America, 2184 Alcoa Building, Pittsburgh 19, Pennsylvania.



Your Guide to the Best in Aluminum Value

ALCOA ALUMINUM

"ALCOA THEATRE"
Exciting Adventure
Alternate Monday Evenings



Under construction—Trenton, Michigan, Plant

McLouth Blast Furnace No. 2

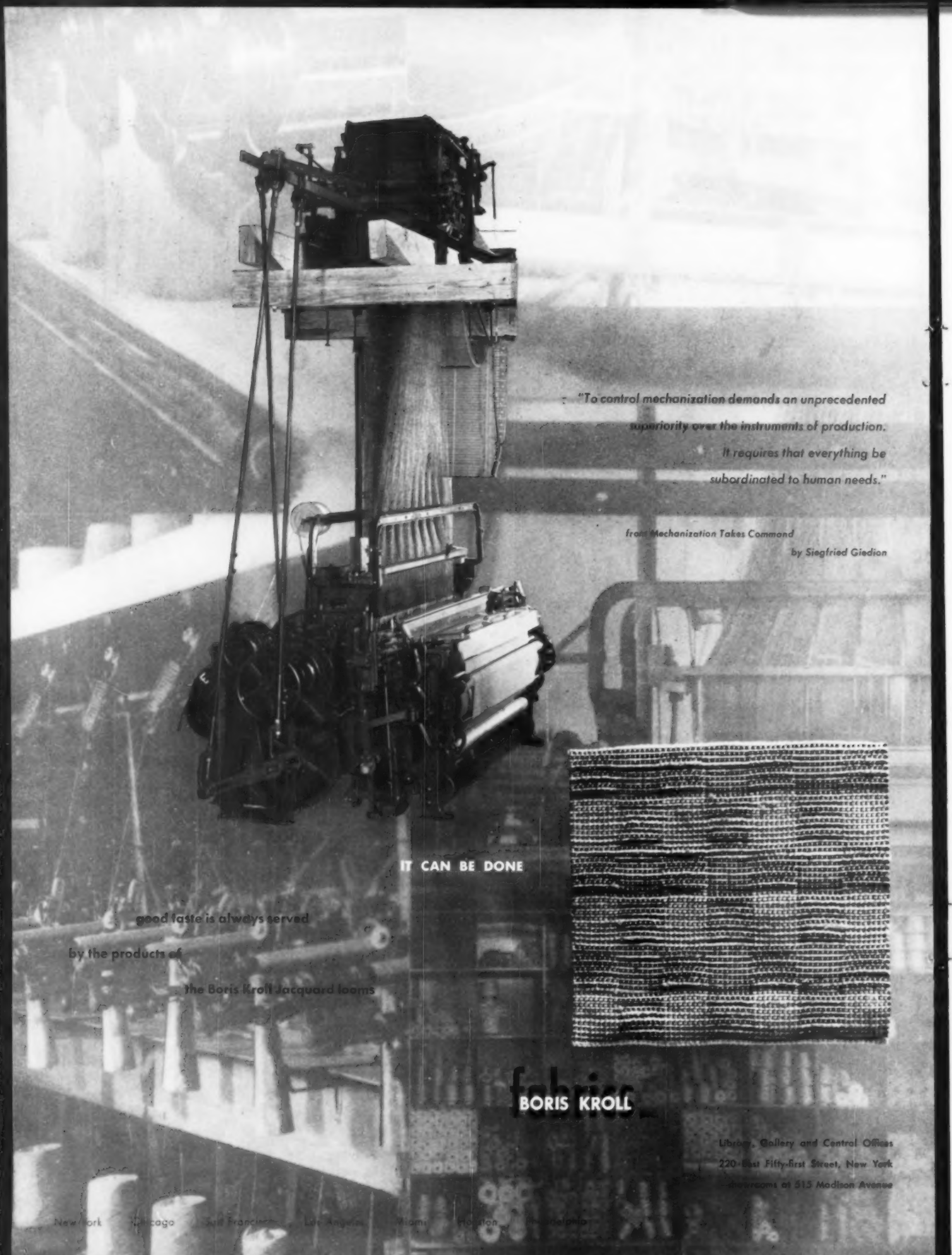
The second major expansion in four years is nearing completion at McLouth Steel.

We are again adding to our facilities to bring you better steels for the product you make today . . . and the product you plan for tomorrow.

McLOUTH STEEL CORPORATION

Detroit 17, Michigan

Manufacturers of high quality stainless and carbon steels.


"To control mechanization demands an unprecedented superiority over the instruments of production. It requires that everything be subordinated to human needs."
from Mechanization Takes Command
by Siegfried Giedion
IT CAN BE DONE
good taste is always served
by the products of
the Boris Kroll Jacquard looms
fabrics
BORIS KROLL
Library, Gallery and Central Offices
220 East Fifty-first Street, New York
showrooms at 515 Madison Avenue
New York Chicago San Francisco Los Angeles Miami Houston Philadelphia

Public relations and poor relations

A few days ago a personable young man called on us with a familiar message: "I have an interesting story for you." For all we know, he may have had one, but it did not emerge during the hour we talked. What did emerge were some fairly unspectacular facts: the young man had just been retained to "do public relations" for, let us say, Hannibal Bauhaus Associates; the firm had designed a new line of portable gimcracks for the Amalgamated Gimcrack Co.; the new line was thought to be "very unique."

We asked to see pictures, and were shown one modeled photograph retouched to a point where it might just as well have been an early Disney. To our lay eye it looked like any other gimcrack, but we noticed what seemed to be a control knob on top.

"What's the knob for?" we asked.

"Some sort of control," he replied.

"Why on top?"

"I can get that information for you," he said, making a note of it.

We queried him about exactly what the designer had done, what improvements he had made over the old gimcrack, and what problems he had overcome in the process.

Our man consulted a typed fact-sheet. "There were three major design problems," he read. "First, appearance—research had proved that consumers wanted gimcracks to be good looking. Secondly, function—it had to work. The third problem was lightness." It seems that research had demonstrated that portable gimcracks should be light enough to lift.

"A peculiar and formidable set of problems," we said with a low whistle of sympathy. "What did the designer do about them?"

"I don't have the details," he said, "but I can get that information for you."

* * *

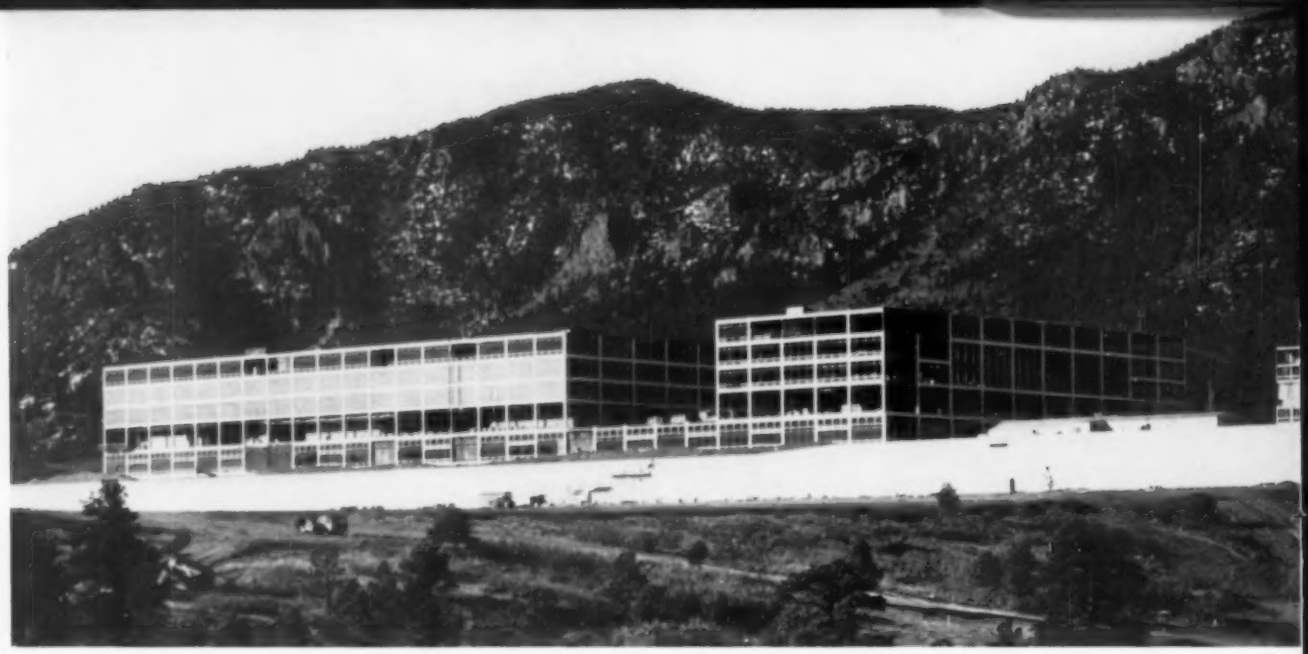
The scene above is not much exaggerated, and it is not mockery. It is not even "very unique." Often we are approached by sincere and capable informants who are singularly unencumbered by information. They are equipped with adjectives and generalizations rather than with facts, and we suspect it is not always their fault. When a PR man announces soberly that design is a matter of function and appearance he may sound platitudinous, but he is speaking in candor and innocence: he has discovered industrial design. The trouble is, someone should have told him it had been discovered before.

Who ought to have told him? The designer, of course. Who else cares? But, curiously, many designers who have always argued that they are only as useful as the client allows them to be are unable to apply the same reasoning when *they* are the clients. If professional PR representatives can help educate industry and public to the efficacy of industrial design, then more power to them. But designers must then *give* more power to them—the power of information. Teach them that they may teach. A designer who equips his spokesmen with nothing more than the most hackneyed generalizations of a profession that abounds in them does neither himself nor his profession a service.

We have at hand a letter from the PR director of a fairly large design office, and it is a good example of designer-PR cooperation. He suggests a potential story, tells why he thinks it has pertinence and immediacy, says briefly but concretely who did what for whom, and why. From the workmanlike way in which he keeps our readers in mind we can guess that he shows the same concern when dealing with consumer media. His secret is simple, and we're perfectly willing to reveal it: he has learned to think like a designer. (He has also learned to think like an editor—a less desirable trait, but it has its merits.)

Such a PR man does not flood the mails with urgent releases every time his client draws a breath or a blueprint. He doesn't have to: he was not retained as a stenographic service. His business is to say on behalf of designers what they would say if they had the skill and the experience and the time. Since his employers know this, he is free to go about his business. This is what makes him a public relations man instead of a press agent.

Too many designers hire press agents. And too many designers hire competent public relations men, then use them as if they were press agents. It might be a good rule to do unto your consultants as you would have your clients do unto you.—*R.S.C.*



Furnishing for fifty years

This coming September, the cadets of the United States Air Force Academy will move into the sleek, glassy building pictured above—their new home near Colorado Springs. When they do, they will find themselves in a designed environment that makes the barracks they have been living in look as obsolete as a B-18. This is the work of Walter Dorwin Teague Associates who, in February 1956, were retained by the Air Force to undertake the largest assignment an industrial design firm has ever tackled: the equipping of an academic city of 12,000.

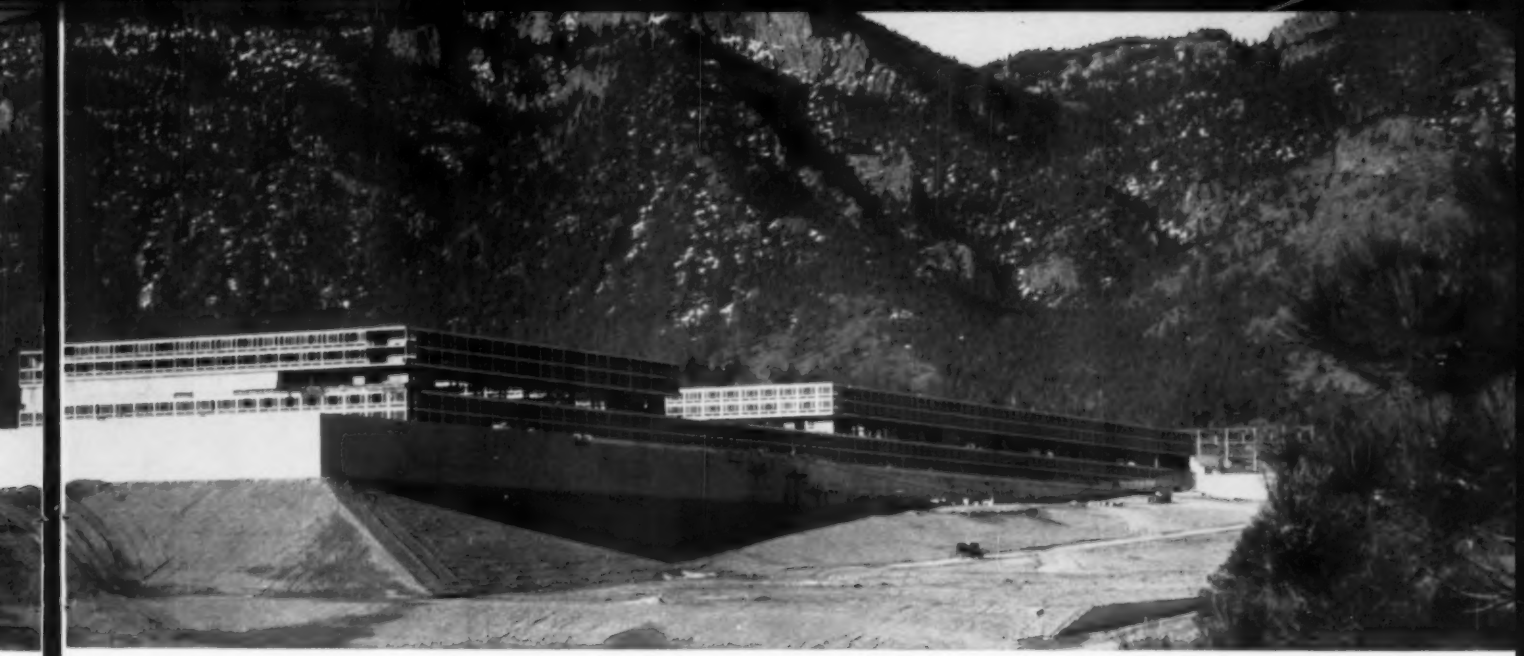
No newcomers to government contract work, the Teague office has since 1942 done research and development for the armed forces, including devising what is now the standard materials inspection system for the Navy's Bureau of Ordnance (ID, February '55).

But because of its size, the Air Force Academy project was in a class by itself. The interiors to be planned and furnished by WDTA cover some 3,500,000 square feet of floor space—nearly 80 acres. To equip these areas, WDTA designed or chose over 1,700 different kinds of items, numbering hundreds of thousands of units, for which the Air Force will spend some $15,000,000.

Guiding WDTA in their design planning were four basic requirements set down by the Air Force. The first—as one might suspect—was economy. With public money at stake, Teague's multi-millionaire client was understandably insistent on this point. In fact, the Air Force officials at Lowry Base in Denver were only a part of a multiple client which included civilian and Air Force officials in Washington (where the Teague project had to compete with allocations for new weapons) and, ultimately, the real client — the U.S. public.

An important economy feature—and another Air

Top: Conference in N. Y.: Lee, Harper, Jones (in charge of procurement specifications) and Teague discuss welded aluminum tubing. Below: Design in Denver: Conrad (pointing) analyzes floor coverings.



Suggestively dubbed "the Acropolis," the academic and living core of the new Air Force Academy nestles against the Rockies on part of the Academy's 17,500- *acre site*

Force requirement — was standardization. This of course made possible the economies of mass purchasing; and it permitted interchanging of pieces within the Academy.

Compatibility with the Academy's Skidmore, Owings and Merrill architecture was another stipulation. However obvious, this requirement was not a simple one to meet: contemporary interiors might be one thing, but was not military life another? WDTA's resolution can be seen on the following pages, but an example is their treatment of color in the cadets' rooms. To introduce the color notes these neutral rooms demanded, WDTA gave color a rationale in the Academy's life: a different key color was assigned to each cadet class, and this color—red, blue, gold or blue-gray —appears on the cadets' blankets and bathrobes, providing both relief and identification—and, perhaps, *esprit de corps* as well.

The Air Force's fourth requirement was perhaps the most challenging of all. This was its stipulation that the Academy's furnishings last fifty years. From Teague's point of view, this meant not only durable equipment (and minimum maintenance) but, importantly, enduring design.

In terms of the Teague office's own operation, the Air Force assignment posed another problem: distance. From March, 1956 to the present, a group of about twelve Teague men under Project Director Carl Conrad has been in Denver, working in collaboration with both the Air Force and SOM people. Backing up Conrad's task force is a group of about twenty men in New York, under supervisor John Lee. In general, the New York people execute finished, or definitive, plans and designs from Conrad's Academy-approved preliminary ones. They also do research into available commercial items, and are responsible for complete follow-through on equipment, including preparation of procurement documents. Coordinating both New York and Denver operations are Teague and his senior partner and Director of Design, Robert Harper.

Phase I of the Academy project is now complete. WDTA has equipped four of the six major building complexes on the "Acropolis" and with them, set the tone—and costing—for all the Academy's furnishings. Phase I covered:

The Cadet Quarters Complex, with its two miles of cadets' rooms. It also contains assembly, hobby and club rooms—even a "ham" radio shack.

The Academic Complex, the sciences and humanities center. In addition to classrooms, lecture halls, laboratories and a 250,000-volume library, it has its own film library and a shop where audio-visual aids are produced. Offices for the Commandant of Cadets and the Dean of Faculty are provided here.

The Cadet Dining Hall, in which 3,000 people can be fed in one half-hour sitting.

The Administration Building, where the Superintendent of the Academy (a two-star general) has his offices. Other administrative functions are housed here.

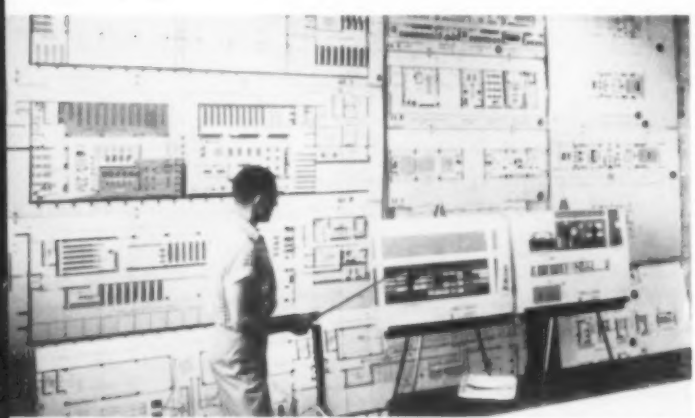
Phases II and IV cover the whole chain of work stages necessary to obtain the equipment planned in Phases I and III—going right up to, but not including, actual procurement.

The next phase, in terms of planning and design, is Phase III. This is already well advanced, as WDTA completes its work on the "Acropolis" with the Cadet Social Center and Theater, and turns to providing not only housing, but even a supermarket, a theatre and bowling alleys for the teaching staff and other personnel of this extraordinary city.

"Equipment Engineering" meant plans, presentations, and acres of paper

Because of the scope of the Academy assignment, the Teague designers had a dual role to play. On one hand, they chose or designed furnishings, selected colors, fabrics, floor-coverings—much as if the job were one of decorating on a grand scale. But the necessity for specifying items in the tens of thousands (and specifications for one article alone might run to 20 pages) determined their other function: the Air Force calls it "Equipment Engineering."

The backbone of this aspect of WDTA's job is the 13-digit IBM code, which keys each item of equipment. It is an impressive tribute to the versatility of the Teague people that, in a field not properly their own, they were able to devise a code which in its last seven



With so much ground to cover—literally and in terms of infinite detail—Carl Conrad finds that a rehearsal is necessary before he makes his official presentation to the Equipment Review Board.

digits provides complete identification of every piece of equipment and all its infinite variations. How it looks and works is shown at right.

In a way, the code is a symbol of what equipment engineering can mean. It is an operation grounded in and revolving around an amount of paper work that must have seemed at times to dwarf its creators, as the photograph of Conrad above suggests. Few design offices in the country could (in terms of staff and experience) have undertaken such an assignment.

The Air Force, as noted on page 29 preceding, organized the work into four contractual phases, each of which had to be completed before the next could be contracted for. Phase I takes in planning and design for certain buildings; Phase II, the preparation of procurement documents. Phases III and IV repeat the pattern for the remainder of the Acadmy.

WDTA's first contract was signed on February 20, 1956. From that time until March 4, 1958, Teague staffmen had put in 94,075¼ man-hours on the project. Here's how they spent them:

Phase I: Planning

PRELIMINARY

1. *Basic design character* of the Academy's furnishings was established at the outset. Conrad, in Denver, was joined periodically by Teague, Lee and Harper for meetings with Colonel Jones and others of the Air Force, and Gordon Bunshaft and Walter Netsch of SOM. Classes of equipment and an overall furnishing plan based on use of walnut and aluminum (echoing their extensive use in the buildings) were determined. How far actual design had been carried within the first few months is shown in the scale model of a cadet room (below), which in its essentials is very close to the finished design.

2. *Planning of space* ran concurrently with designing as Conrad, often in consultation with SOM's Netsch on basic floor plans (building had not yet begun), worked out locations of equipment in the plan. From March '56 to the present, the mails have been heavy with rough layouts from Denver crossing "finished" plans from New York. During this time, full-scale furniture was submitted to two tests.

3. *Selection of commercial equipment* kept pace with planning as WDTA, comparison-shopping across the nation, worked out budgets and detailed accountings for each agency.

Grand finale of the preliminary stage was the presentation to the Equipment Review Board. The Board, presided over by Colonel Wingate B. Jones, the Academy's Deputy Chief of Staff for Materiel, included representatives of all Academy departments and commands. With the aid of large (¼" scale) renderings, color-keyed for each subdivision of space, Conrad made his presentation in two sessions: a morning meeting, where plans and designs were submitted to the using agency for functional approval, and an afternoon session, when the Board weighed WDTA's proposals in terms of cost, compatibility and uniformity throughout the Academy. The Board's approval was the prerequisite for the next stage.

Within a few months of contracting for the Academy job, WDTA had worked out basic character of cadet room, as this ⅛" scale model shows. But detailed refinements evolved over a much longer period.

CODE FOR A CHAIR

3500-NLR-1221611

3500 NLR	1	2	2	1 6	1	1
First four digets here indicate category: Furniture, *NLR: non-listed research (new-item)*	*General Description:* Seating	*Type:* Lounge chair with arms	*Frame Material:* All metal	*Flexible category (1-99) for adding new items, or showing hard-to-classify ones. Here means simply: 16th chair designed.*	*Upholstery material:* Simulated leather	*Color:* Tan

This code, devised by WDTA, is key to problem of keeping track of huge quantities of equipment. Code number, marked on each article and its crate, makes identifying items in Academy's warehouse as simple as finding a number in a telephone book. Used with WDTA's keyed definitive floor plans, fast and foolproof furniture arrangements are assured.

Typifying the kind and quantity of paper work involved in the project are a Flimel (open in foreground), a set of Master Catalogs (upright) and set of catalogs arranged by agency.

DEFINITIVE

The definitive stage saw the approved preliminary plans and designs put into their final form, *via* a number of documents, including:

1. Definitive floor plans, by building, with each item in place and keyed to its code number. These were in ⅛" scale, and colored to correspond to preliminary renderings in their identification of space.
2. "Flimels"—master equipment lists. (Flimel=Facility Line Item Master Equipment List.) Each Flimel lists all items, with codes and quantities, for a given command area.
3. Catalogs of equipment, by agency (as, Superintendent's Headquarters, Cadet Dining Hall, etc.). Each catalog page shows a separate item, in line drawing, accompanied by desciption and code.
4. Master catalogs. These are by item alone, and grew out of the need to have a comprehensive view of all items in the Academy, without the duplication that was inevitable in agency catalogs. New items are added here. The two sets of catalogs and a "Flimel" appear in photograph above.

Phase II: Procurement

The Air Force's authorization to WDTA to prepare working drawing and specifications set Phase II in motion. This meant a new contract for Teague, which called for, among other things:

Recommendation of bidders. According to the contract, WDTA recommended at least three bidders for each piece of stock equipment that was to be purchased, but the manufacture of specially designed pieces had to be open to general bidding.

Checking manufacturers' shop drawings. WDTA is at this point working with manufacturers to insure that specified standards will be met—even to the extent of suggesting new methods of manufacture. WDTA is also responsible for inspecting manufacturers' "first articles" (the actual production models) as a further check on standards. At this writing, both offices are deluged not only with shop drawings, but with samples (six sets from each producer) of wood finishes, upholstery, etc., to be double-checked for compatibility with original samples and each other.

And even while this goes on, so does Phase III—as the Cadet Social Center and the remainder of the Academy move into definitive stages.

Handsome but austere cadet room provides comfort plus inspiring mountain views

Exterior shot of mock-up building where equipment for cadets' rooms was tested. Temporary barracks were similarly furnished for "living" test by cadets.

Dresser for cadet has compartmentalized section for fast selection of accessories. Recessed handles and melamine top are standard for all cadet furniture.

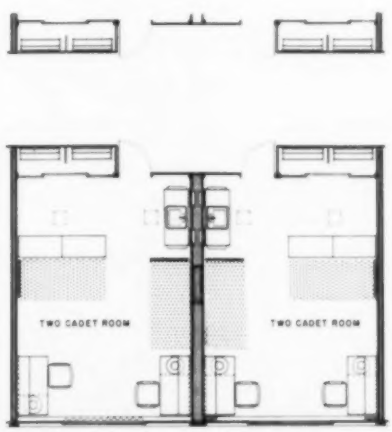
Valet unit has pull-out laundry hamper, medicine cabinet, towel racks for each cadet, plus section for shoe-shine equipment. Perforated bottoms provide ventilation. Rifles (reflected in mirror) will not be issued.

The barracks bedrooms had to be planned to accommodate the cadet's double function of student and military man. They also had to allow for the hard wear that generations of energetic young men would give their living quarters. Because the cadets change their uniforms several times a day, storage arrangements and organization of floor space had to facilitate quick changes.

The solution to all these qualifications, the room shown on these two pages, will be duplicated 1320 times, in about two miles of bedrooms, each one accommodating two men. The room is heated by metal "wafers" set under the windows and connected to a central unit, and is lighted by ceiling lights at dressing areas and by two desk lamps of WDTA design. (An example of the standardization of equipment, the desk lamp will also be used throughout the faculty housing.) The floor is gray vinyl asbestos tile, and all horizontal surfaces are covered with light gray melamine plastic. Curtains are a specially-designed dacron, resistant to dust, moisture, and the Colorado sun.

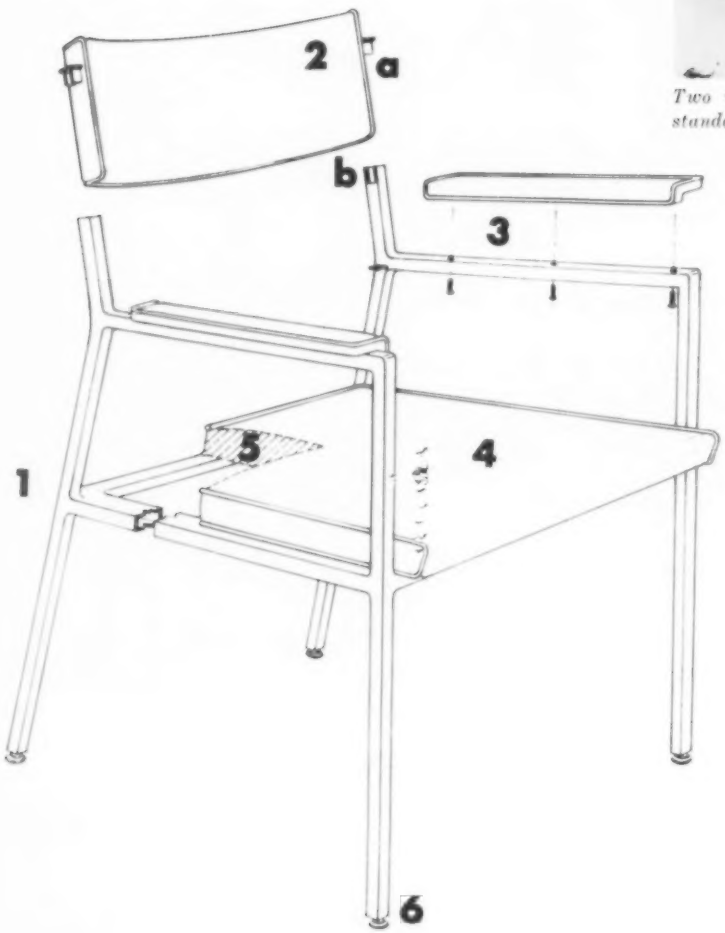
Cadets, like monks, have few personal possessions. One of the rare exceptions permitted them by the Academy is a record player, and the eye-level shelves above the desks have been designed to hold one (as well as books). A cadet will also be permitted a photograph—just one—necessitating, it would seem, a choice between his mother, his girl, and his dog Spot. Almost the only other individual note will be his name on a plate outside the room.

Floor plan shows arrangement of two cadet rooms, with wardrobes flanking branch of corridor from which rooms are entered. Dimensions of each room are 13'4" x 18'6".



Above: Cadets can enjoy mountain scenery or draw light-modulating curtains. (Academy has over 23 miles of this type of curtain fabric.) Below: view of room looking toward wardrobes and entry.

Two versions of chair show how Teague achieved variety in standard item. Armless chair is cross-braced for support.



1. *Frame: made of ⅛" thick aluminum tubing for strength (average chairs use 1/16"). Tubes are 1" sq. except under seat, where section is 1½"x1". Special welding technique made possible virtually undetectable welds.*
2. *Backrest: made of soft-density foam rubber. Special rigid attachment uses flange (a) which fits into keyway milled into face of tube (b) and acts as cap for tubing. Screw through flange (c) below pins backrest in place.*
3. *Arm rest: made of sponge rubber, which permits sharper contour in upholstery of small area. Three countersunk screws hold armrest in place.*
4. *Seat: covered in vinyl coated cloth (as are back and arms) upholstered so welts are away from points of wear: note waterfall front.*
5. *Seat section: shows medium density foam rubber. Between rubber and vinyl fabric is layer of cotton wadding covered in muslin. Seat rests on perforated steel pan (not shown) to which wire hat rack may be attached.*
6. *Swivel slide: prevents damage to floors if chair is tilted.*

Basic chair (in 3 versions) was designed for use throughout the academy

The chair shown above is one of the key pieces of equipment that Teague designed for the Academy. There are three versions of it: the basic one— plastic upholstered arm chair, used in cadets' rooms, in the library and elsewhere; an armless version of it, which is used as an occasional chair and as officers' Dining Hall seating; and an armless chair with molded plastic seat and back, used in classrooms, and in the Dining Hall (with the addition of a hat rack) by cadets. Upholstered chairs come in four colors, molded ones in five. WDTA used color to establish the character of an area and create uniformity, and to gain variety in an item which is repeated 13,000 times.

Designing the chair for the military posed another problem, one which was as peculiar as it was traditional. The Academy requires that freshmen cadets sit on the first four inches of their chair-seats. Since this presumably develops a posture befitting an airman as well as giving him a look of alertness and attention at all times, the principle was not destroyed, but the chairs were designed so that the first four inches were at least tolerable. The design has a further application in that it makes for forward balance in the chair. Also, as the splay of the back legs suggests, the chairs had to be virtually tilt-proof. The reason becomes clear when one ponders on a class-full of cadets springing to their feet when an officer enters the room.

A special welding technique, worked out by WDTA in cooperation with the Aluminum Company of America, made possible anodizing and heat-treating of the aluminum frame *after* welding. This, meant a considerable saving to the Air Force, as the anodizing preserves the aluminum and makes a finish that is virtually maintenance-free.

Air Force Academy classrooms are colorful places: chairs in primary colors with book boxes that contrast, bring cheer to these windowless rooms.

Academy's 168 classrooms were designed to implement advanced teaching techniques

For the Academy's heavily-scheduled cadets, classrooms like this one are calculated to provide a stimulation that is visual as well as mental. Light emanates from the ceiling, which is a fine (½ inch square) egg crate of aluminum backed by sound-absorbent material. Because the classrooms are windowless, they are air-conditioned by two air-diffusers in each room. The blackboards are spacious enough to be used by all the cadets in a room (twelve to sixteen) simultaneously, and any piece of blackboard can be seen from any part of the room. The wall behind the instructor (extreme right, above) is a sliding blackboard panel backed by a cork wall. All classrooms are wired for audio-visual aids and for the eventual use of closed-circuit television. The cadet's chairs have molded plastic seats and backs in four different colors (red, yellow, black, and blue), the color motif being repeated on the door and on the clothing rack in the alcove (connecting this room with four others like it). The desk tops (like all horizontal surfaces in the cadets' rooms) are of light gray melamine, resistant to stains and scratches. The book box (under cadet's desk) is molded of fiber glass-reinforced plastic and is in a contrasting color. The instructor's desk is walnut; the floor, vinyl asbestos tile.

Cadet's classroom desk and chair. Desk has anodized aluminum frame and light gray melamine top. Chair also is constructed of anodized aluminum with molded plastic seat and back. Book box under desk is fiber glass, in color contrasting with seat.

Accomplishment to date: Phase I—complete . . . Phase II—well under way . . .

Suggestive of a control tower, the dining room of the Superintendent of the Academy overlooks cadet grounds.

Superintendent's office, like those of Academy's two other generals, has upholstered furniture, wood-panelled wall.

With the design of equipment for the cadet's quarters and classrooms, the controlling design approach was established, solutions for basic furnishings were evolved, and a pattern was created which could guide WDTA not only in the remaining areas of Phase I, but also in the somewhat different problems posed by the social complex now being treated in Phase III.

The essence of WDTA's approach might be stated in a paradox: versatility through standardization. Standardized variations worked on the basic chair, for instance, fitted it for use in areas of widely differing function and character, as the rendering of the library (below) suggests. Not only the chairs, but the library tables are standardized: in leg construction and in their gray melamine tops they are the same as those used in the cadets' dining hall and elsewhere. Reason for the extensive use of the gray melamine: not only its sound-deadening properties, but also its 50% light reflectivity, which minimizes eyestrain.

Similarly, of the thousands of different desks used in the Academy, only three (those for the three general officers) were specially designed. All others are derived from a modular system of seven major components. As for the generals' suites, they have a common design theme, with color (of carpets and upholstery) and type of wood for panelling being chief sources of variation. Moreover, even these special furnishings are essentially re-statements of the Academy's basic design theme, as illustrations at left (of the office and dining room of the Superintendent of the Academy) show.

Now, with the workaday life of the Academy provided for, WDTA has turned, in Phase III, to designing for its social life and for the shopping and housing

Standard chairs in a variety of colors, plus use of aluminum, walnut and white marble make library both impressive and informal.

Phase III—Cadet Social Center and Cadet Theater in advanced preliminary stage

needs of the rest of the Academy's community. Cadets' off-hour recreation, and public festivities of varying degrees of elaborateness will take place in the social center—which will even have its own theatre. One problem facing Conrad's group is the planning of traffic and equipping of space for areas which may on occasion hold thousands of people, or relatively few. The location of such basic facilities as kitchens and rest rooms is part of the job; but also involved are such seemingly minute decisions as the best place for a table in the Academy Hostess' suite. One function of the table: traffic control.

Aside from the general excitement created by the Academy, the Teague assignment has a special significance for designers. In an age of corporate "bigness," designers may increasingly be faced with similar problems of large-scale, or "organizational" design. Solutions may be as numerous as the design offices which enter this field, but Teague's approach—decentralization, delegating authority, detailed tabulation (based on a central system of standardization)—may be a guide. A measure of his success—at least in terms of client-satisfaction—can be seen from this statement by Colonel Wingate B. Jones: "At this point we have little doubt that equipment-wise the Air Force Academy will be the finest of its kind in the world at the same time without being extravagant."

Spaceman of tomorrow? Grooming is important part of the Academy routine today.

Art Nouveau and all that....

by EDGAR KAUFMANN, JR.

Color and form mirror nature in these two flower-form vases of Louis Tiffany's famous Favrile glass.

It was around 1900 that Art Nouveau was seeking to create a new way to design, rooted in new construction, and eloquent of new human attitudes and insights. Whatever has this to do with industrial designing today? Quite a bit, stemming from the fact that Art Nouveau and industrial design were hatched in the same nest. This nest had been built before 1900 by Viollet-le-Duc, "restorer" of Carcassonne, Notre Dame de Paris and other Gothic relics. He said, "Let us frankly adopt the appliances afforded us by our own times and apply them without the intervention of tradition." Viollet was, in fact, the strong spirit of the latest, logical, phase of the Romantic movement. In immensely influential books he preached a bold expression of structure that struck fire in the next generation, particularly in Belgium, where Victor Horta put the theory into practice with steel and glass and a symbolic flourish of quasi-vegetable ornament as rich as that of Louis Sullivan, but freer. Horta, in fact, established the Art Nouveau on Viollet's principles. More than the backward-glancing Arts-and-Crafts Britishers—Pugin, Ruskin and Morris—the Art Nouveau Frenchman and Belgian are the fathers of a modern design suited to a world of modern technologies.

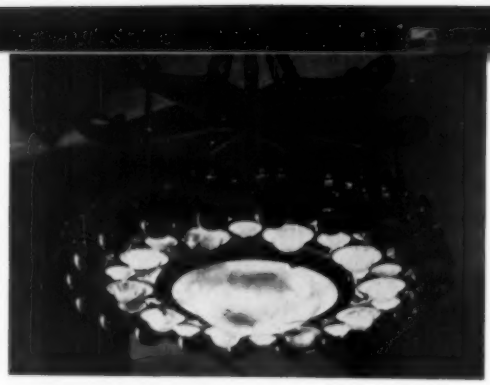
From their efforts to the beginnings of industrial design as we know it is a short step. It was Horta's verbose compatriot and competitor van de Velde who victoriously revealed Art Nouveau to Germany, where one of the first converts was that prototype industrial designer, Peter Behrens. Behrens and his generation shed most of the lingering traces of Romanticism and, hewing to Viollet's logic, prepared the way for such artists of modern technology as Gropius, Mies, and Le Corbusier, all of whom worked at one time or another in Behrens' office.

Today, the reliance on just logic has lost its appeal in design, even for certain of its former champions; and the expressive fantasy of Art Nouveau again intrigues many keen designers who, while keeping logic as the basis of their work, want to carry it on to a fuller, more appealing, more subtle fulfillment. Two New York museum shows have recently provided visual fare for the new hunger for sculptural and decorative richness: *Gaudí* at the Museum of Modern Art and *Louis Comfort Tiffany* at the nearby Museum of Contemporary Crafts. Tiffany's work equals the fantasy and freedom of Art Nouveau, but misses its structural logic. This is because Tiffany (like Louis Sullivan and Gaudí) grew up artistically in the 1870's, before Art Nouveau was even an urge. If the architects Sullivan and Gaudí heeded Viollet, the painter-craftsman Tiffany did not; in fact he was an outstanding practitioner of a forgotten but once acknowledge nineteenth century style —the Decorative Style. (In 1909 Georg Lehnert accurately mapped the previous century's design fashions thus: till the 1830's, Neo-classicism; 1830's-1870's, a dry surfacy Ornamental Style; 1870's-1890's, a rich impressionistic Decorative Style; the 1890's, a Structural Style which included both Art Nouveau, technologically alert, and the nostalgic Arts and Crafts movement).

Those who are curious about how an earlier generation of designers approached the problems of richness, subtlety and ornament without cribbing from their past, may wish to know something of the illustrated books recently published on the design of the 1880's-1910.

First, a word about the catalogs of the two museum shows mentioned. *Louis Comfort Tiffany* has an excellent essay and bibliography by Robert Koch, whose full-scale biography on the same subject is promised. Good illustrations, three in color. This is the only recent monograph and best survey in its field. *Gaudí* has a run-of-the-mill essay by Henry Russell Hitchcock, no bibliography. The illustrations are fair, but a small pocket book, *Antonio Gaudí*, put out by Astra-Arengarium (Milan) is available in the U. S. with a better

Antoni Gaudí's facade for the Casa Batlló, an apartment house in Barcelona, built 1905-1907.



This lamp by Tiffany was made in 1890 for the Havemeyer House. The University of Michigan now owns it.

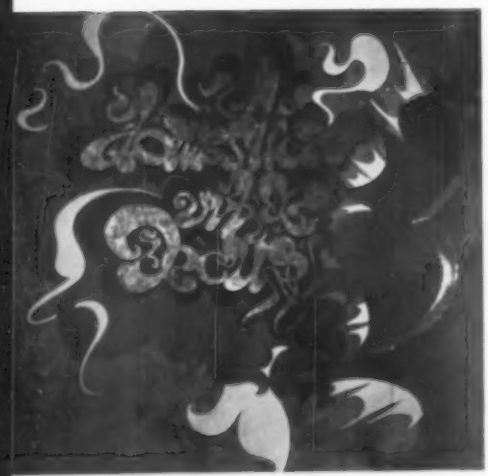
pictorial selection and color plates—which are essential for Gaudí—and a brief essay in French. The authoritative book on Gaudí's work is *Antoni Gaudí* by Joan Bergos. In Catalan, but decipherable by readers of Spanish. It has poor but plentiful plates (no color) and fascinating line cuts.

Art Nouveau now has two publications in English. Henry Lenning's *The Art Nouveau*, with adequate plates and a restricted scope, and Stephan Tschudi Madsen's *The Sources of Art Nouveau*, a big assemblage of useful information, its many pictures and facts both fuzzy.

The best essay in English on Viollet-le-Duc is in John Summerson's *Heavenly Mansions*. One of the links between the insular tradition of Arts and Crafts and its continental parallel, the Art Nouveau, was a gifted Scot; *Charles Rennie Mackintosh*, by Thomas Howarth, is his full-scale, well illustrated biography. Another somewhat related artist of the period is recorded in a book of wonderful photographs, *The Idea of Louis Sullivan*, by John Szarkowski.

In placing these men in the development of modern design two books are most helpful. *Pioneers of Modern Design*, by Nikolaus Pevsner, is itself a pioneer and a classic and admirably crisp, with good illustrations.

These graceful arabesques are from a mural decoration Gaudí completed for the Chapel at Santa Coloma.



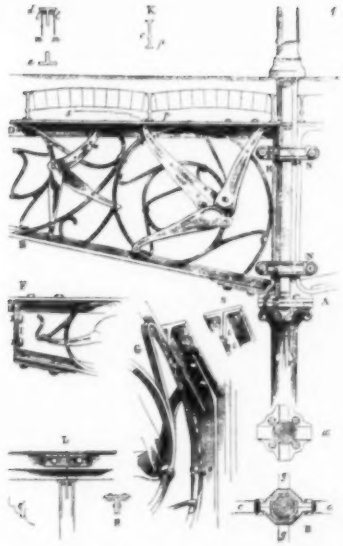
Stimulating ideas are also well documented visually in Sigfried Giedien's *Space, Time and Architecture;* Sections III and IV deal with our topic.

It is hard to remember that Frank Lloyd Wright was in there pitching in those days too. Recommended reminders: the best picture survey of Wright's buildings through 1941, Hitchcock's *In the Nature of Materials*, and the illustrated survey of Wright's theory of design, *An American Architecture*.

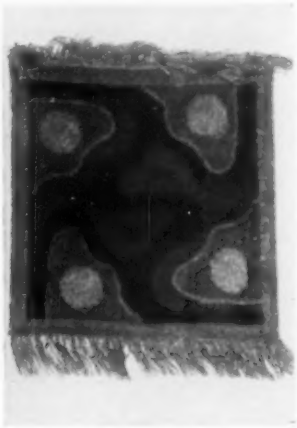
Some worthwhile illustrated books on work of this period have been issued abroad, in pocket size, and are available here. Astra-Arengarium has *Gustave Eiffel*, *Tony Garnier* and *Auguste Perret*, as well as *Gaudí*. Il Balcone (Milan) has similar, less beautifully printed, monographs on *William Morris*, on the gifted Austrian, *Joseph Maria Olbrich*, and on an Italian of the 1900 style, *Raimondo d'Aronco*. Each has many plates, a brief essay, a list of works, bibliography and portrait. They are admirable books. Two small museum booklets are worth having: the Zurich Kunstgewerbemuseum's *Um 1900* with first-class plates, all on Art Nouveau, and the Victoria and Albert Museum's small picture book Number 34, *Victorian and Edwardian Design*, which offers more diversified delights. The separate catalog of the exhibition so named is a storehouse of reliable facts clearly presented. Two well illustrated books in German are on sale here: Henry van de Velde's *Zum Neuen Stil*—the confused essays of a leader in Art Nouveau—and Friedrich Ahlers-Hestermann's *Stilwende*, the recollections of a German painter looking back at design in the 1900's of his country.

As they examine the intriguing designs in these volumes, and read a bit about how Art Nouveau designers fought, first for a clear program and then for acceptance, modern industrial designers will find a good deal to think about. Unsuspected solutions to familiar problems appear, despite all the differences fifty years of unrestrained technological expansion have brought with them. Technology is of course always on the move, but effective expressive devices are likely to keep their punch, once they begin to take their places in historical perspective, as Art Nouveau is in the process of doing just now.

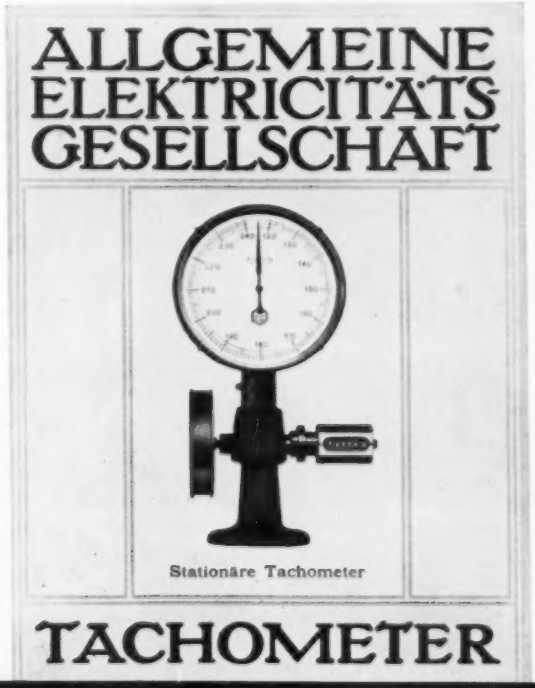
All books mentioned in this article are available at George Wittenborn, Inc., 1018 Madison Avenue, New York City.



In his Entretiens *Viollet-le-Duc showed how iron could be used as economically as stone.*



Rug, tachometer, and graphics for tachometer ad, suggest breadth of Behrens' work.



A balcony detail from Victor Horta's own home, built in 1898, *shows full Art Nouveau style.*

Fourth in a series on fabrication techniques

Copper poured from a converter during refining. The ankh (top right) is the ancient alchemists symbol of copper and its alloys.

COPPER: INDUSTRY WITH A FUTURE?

"Unstable prices and overdependence on traditionalism have withered copper as a primary fabricating material."

Major manufacturing executive, March, 1958

"Copper's future is still unlimited. The industry is bursting with new ideas and new techniques."

Copper industry official, March, 1958

Pessimism from major copper consumers, optimism from within the copper industry —a sharp divergence of opinion awakens a new interest in the future of copper as a fabricating metal. There are elements of truth in both points of view, but each lacks perspective. What ultimately will happen to copper is open to question, but although the industry today is barely holding its own, there is evidence of a new spark which may stimulate it from its lethargy. The copper industry is reappraising itself. Manufacturers, fabricators, designers—those who use or specify materials—should also take a long second look.

Copper is in a state of decline; the figures tell the story. Since the spring of 1956, copper prices have tobogganned down the price charts in a steady slide from $.46 to the present $.25 per pound. Government stockpiling has tapered off, and the transportation and electrical industries, both large-scale consumers with a history of erratic purchasing habits, are living off their inventories. But it is important to remember that an industry in decline is not necessarily a dying industry.

Price cycles have been a periodic phenomenon of the copper industry since the beginnings of contemporary industrialization. Because of the intricacies of supply and demand, copper's prices have fluctuated from boom highs to recession lows. Today, however, there are further considerations which make the present decline the

most serious with which the copper industry has had to cope.

Cheaper, lighter, and more economically stable materials, such as aluminum and stainless steel, are challenging and winning many of copper's traditional markets. The economy-oriented consumers of copper alloys no longer need to risk the seesaw price structure of the metal, but can utilize, wherever possible, other alloys or combinations of alloys which have copper's basic properties of high thermal and electrical conductivity, pleasing appearance, long wear, and corrosion resistance. For example, aluminum, whose electrical conductivity compares favorably with copper's, has virtually usurped the overhead high tension wire market where copper once held exclusive domain. Lower priced stainless steel housewares are competing equally in an area where utility and ease of maintenance are closely allied with appearance. And competition is coming not only from the staple alloys, but from exotic new materials like zirconium, whose superior corrosion resistance and non-neutron absorption tendencies have made it an essential metal in the almost unlimited field of nuclear energy.

Two questions, then, must be asked. How, in an era of unprecedented industrial expansion, did copper allow its market to shrink so drastically? And what is the copper industry doing to meet the challenge?

The Metal and the Industry

Before examining the situation in detail, it is necessary to understand something of copper and brass and the industry they have spawned. Historically, copper was the span between the stone age and the age of metals. It is the first and oldest of the structural metals; it has had the longest opportunity to demonstrate its valuable qualities and to undergo metallurgical improvements. Its alloys are defined by the Copper and Brass Research Association as metals which contain not more than 99.2 per cent and not less than 40 per cent of copper (as long as copper remains the major constituent). Basically, brass is an alloy of copper and zinc, bronze, of copper and tin. In modern terminology, however, brass is considered to be any copper-base alloy in which zinc is the major element, even if small quantities of other elements are also present. Some brasses have names which includes bronze (e.g. commercial bronze, 90% Cu, 10% Zn), but only because they resemble traditional bronzes in color.

The range of natural colors of copper and copper alloys is the traditional trademark of the metal. This color spectrum extends from the deep red of pure copper to the silver of nickel silver (65% Cu, 18% Ni, 17% Zn), and includes the golden color of the brasses, and the deep brown of the bronzes. There is, to be sure, considerable overlap of the alloys' functions, but the introduction of specific elements (like phosphorus in a copper-tin mixture to add greater resiliency, hardness and fatigue endurance) can enhance the property values necessary for certain applications.

Loosely defined, the copper industry breaks down vertically into three categories: producers, custom smelters, and fabricators. Each is responsible in a different way for the price fluctuations of the industry.

Many of the major producers have integrated corporate structures combining mining, refining, and fabricating facilities. But because of varied limitations within the system, they are unable to control the inevitability of price cycles. Variation of production costs depending upon the richness and accessibility of the deposits being mined, plus the competition of foreign imports which operate from within a more volatile price framework, cause constant fluctuations in the price of the primary metal. The custom smelters, unwilling to stockpile and gamble against future prices, try to undersell the major producers in order to maintain their profit margin by volume operation. The independent fabricators who buy this stock get a better initial price, but must face the possibility of endangering their relationship with the giant integrated refiners, who, in lean years of short supply, are inclined to be touchy about the absence of long-term loyalty. Common sense diplomacy, then, plays an important part in copper's price complexities.

Reproduction of medieval two-furnace copper smelter.

The Past and the Present

One basic fact about copper must be underlined: its history as a fabricating material stretches back many thousands of years into antiquity. Primitive peoples were surprisingly well-versed in alloying copper, and articulate in using it in both the functional instruments of daily living and the design of some lasting monuments to their culture. Through the centuries, artisans passed on their experience to other craftsmen who continued to exploit copper's advantages with the help of new processing techniques.

But with the gradual evolution of technology, and its resultant specialization, the creative force of the craftsman-designer gave way before mass consumption economics. Equipped with high thermal and electrical conductivity, easily processed and unsurpassed for its corrosion resistance, copper found ready-made markets where its properties were urgently needed. Because there were no substitutes, copper virtually sold itself. The industry could afford to sit back, rest on its reputation, and weather the irregularities of its price structure.

However, the twentieth century has added a new dimension to copper's economic picture. New materials became readily available, materials whose properties either overlapped or paralleled those of copper. Since these metals were cheap and easy to produce, consumers turned to them as a hedge against copper's recurring difficulties. Furthermore, the new metals were not inhibited by well-defined areas of application. Their newness forced them to explore a wide variety of potential markets which opened rich new sources for expansion. Importantly, the booming young industries were not the least bit hesitant toward exploiting new developments. Designers and consumers were kept aware of each new technological advance, metallurgical property, and upgrading of standards. Finally, the world crises of this century created a constant demand for metals which made government supported expansion and research available to copper's competitors as a further impetus to their development.

Machine made medallions (below) are a contemporary manifestation of copper's ancient tradition of decorative luxury handicraft.

The Challenge of the Future

In the face of this challenge, the copper industry, as befitted its role as the elder statesman of the metal world, looked on and watched as its traditional markets were being nibbled away. For too long, there had been a lack of integrated communication about new developments in copper research. The industry had been delinquent both in promoting implementation of old techniques and encouraging expansion into areas whose potential had not been fully explored. Minimum standards had not been kept up to date, decreasing the value of copper as a tool for designers and engineers. Now, the threat of being reduced to a specialty status has finally awakened copper to the necessity of braking its decline.

There is a growing awareness within the copper industry that the metal can no longer be relied upon to sell itself. Constant research and development are necessary to keep pace with ever changing markets and innovations in industrial methods and products. An industry-sponsored survey of copper consumers was recently initiated to probe copper's trouble spots. Among the information sought was comparison data about copper and other metals, the influence of copper economics on purchasing habits, difficulties experienced with copper and alternative materials, and the effectiveness of communications to the copper consumer.

Along with this new-found faith in research, there has been renewed technical experimentation. New materials for, and methods of, fabrication (e.g. fine-grain drawing brass and impact extrusion) have been perfected to take advantage of the possibilities which still exist for copper when there is a concerted effort to utilize and project its properties.

To be sure, the apparent revitalization of the copper industry is a defense measure. It will never again regain the ground it has lost, but from within its shrunken position, it can try to allay further diminution of its potential. New fields such as solar energy and electronics present the type of challenge which copper has been forced to accept; its status as a major metal depends on how well it meets this challenge.

On the following pages we present some examples of the sober re-evaluation and revitalized thinking upon which copper's rank in the metal world must finally depend.—*JOHN G. DUNNE*

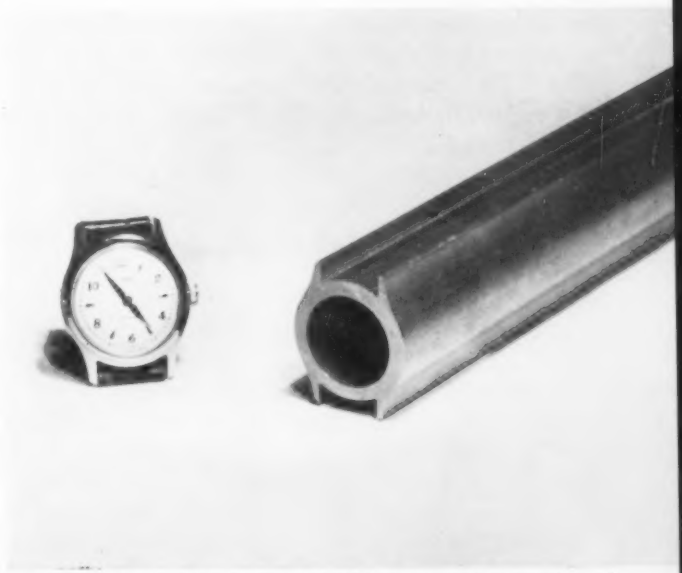
TYPE	% COPPER	% LEAD	% OTHER	COMMENTS	APPLICATIONS
the coppers	99.90 - 99.92		phosphor 0 - .02	can be fabricated by most of the usual processes - especially useful where high conductivity prime factor	
low zinc brasses	80.00 - 95.00	5.00 - 20.00		widely-used for hardware, jewelry and personal adornment - excellent cold working properties	
high zinc brasses	60.00 - 70.00	30.00 - 40.00		should not be cold worked - high tensile strength, good hardness and wearing - good hot working properties	
free cutting brasses	61.5	35.5	lead 3.00	the outstanding material where machinability the prime consideration - used for high speed screw machine parts	
forging brasses	60.00	38.00	lead 2.00	the standard alloy for hot forged or die pressed parts - excellent low cost machinability - low porosity	
tin brasses	58.5 - 71.00	28.00 - 39.25	tin .75 - 1.00 iron 1.00 manganese .75	particularly suited for maritime applications - high corrosion resistance - used for welding rods	
nickel silver	55.00 - 65.00	17.00 - 27.00	nickel 10.00 - 18.00	especially suited for etching, enameling and silver and chromium plating - high malleability-ductility	
phosphor bronzes	90.00 - 98.75		phosphor trace to .35 tin 1.25 - 10.00	great resiliency, fatigue endurance, and hardness - low friction co-efficient - can be used under severe conditions	
leaded brasses	57.00 - 65.00	33.00 - 40.00	lead .05 - 3.00	may be hot worked if the metal is supported mechanically - lead added to increase machinability	
silicon bronzes	94.8 - 96.00		silicon 1.5 - 3.00	non-magnetic and highly resistant to fatigue - well-suited for welding and rod - high corrosion resistance	
aluminum bronzes & brasses	76.00 - 95.00	0 - 22.00	silicon 0 - 2.00 aluminum 2.00 - 7.00	outstanding resistance to liquid and solid corrosive agents - resists scaling at elevated temperatures	

Extrusion: A laboratory for future design possibilities

Because copper is a semi-precious metal, scrap, and the reclamation of scrap, becomes a major consideration and economic problem. Therefore the process of extrusion, since it involves virtually no material waste at all, has particular appeal to fabricators of copper products. And the constantly increasing variety of shapes that can be turned out by this method makes it the answer to many design problems. Although lengths of copper pipe and tubing have been extruded for many years, there has been considerable activity recently in the development of more advanced extrusion processes for the production of complex copper parts, eliminating scrap and many machining and finishing operations. Specially designed extruded shapes are being produced for parts where fabrication costs, rather than the cost of the material, determine the per-unit price. The watch case backs (below, right) are extruded to reduce radically the number of machining operations, cut down on scrap, and consequently reduce cost. Bars are extruded in the specified shape, and shipped in bar form to the watch manufacturer, who cuts them, like a loaf of bread, in the desired thickness. "Chipless machining," as this is known, is widely used for the production of many hardware parts, such as hinges and padlocks.

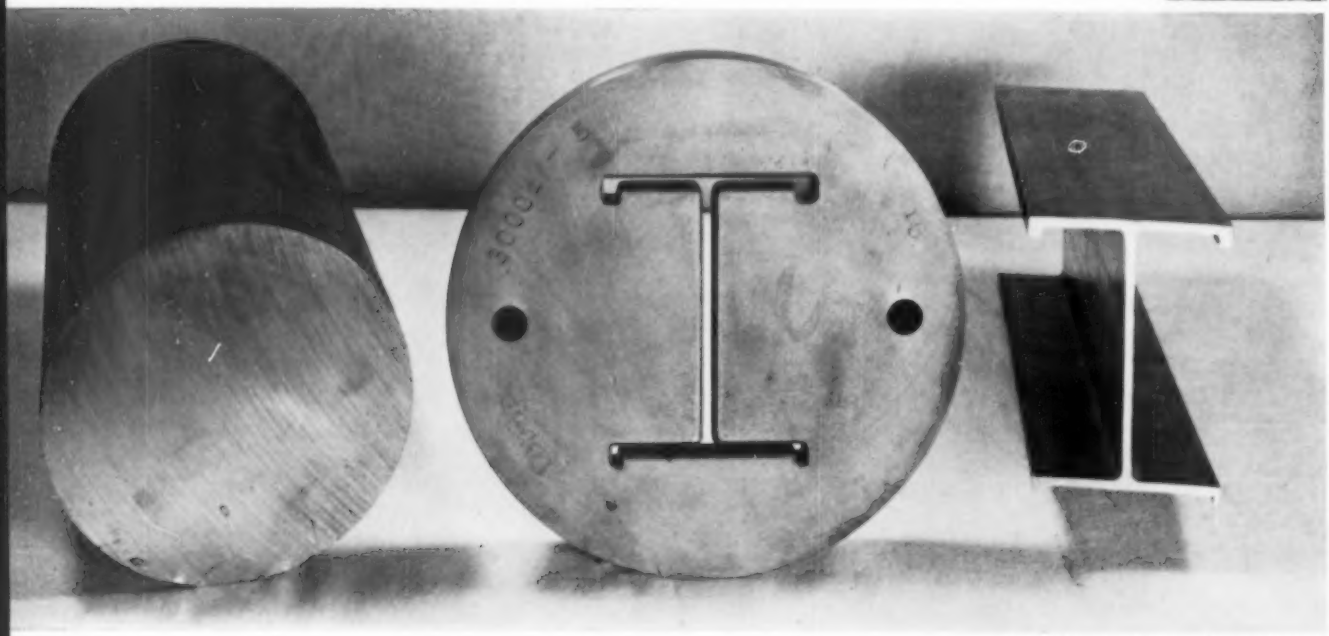
The size of extrudable copper shapes has been increased by the development of new extrusion presses, alloys, and lubricating methods. The widely publicized "bronze house," the Seagrams Building, on New York's Park Avenue, has sharp-edged, specially extruded bronze mullions rising in an unbroken line from pavement to roof. These extrusions, among the largest ever produced, are explained in detail overleaf.

The term "impact extrusion" is becoming more familiar—particularly through the progress reports of aluminum manufacturers, who have advanced greatly in the mass-production of impact extruded containers. Copper fabricators, working with a material that is harder to impact extrude than aluminum, have not been standing still. Although the first commercial copper impact extrusion (page 49) only recently went into production, research leading to the solution of many major problems faced in these fabricating methods could open new doors for broader application of copper and its alloys. One of the largest stumbling blocks facing copper fabricators involved in the extrusion of copper parts is that tool design is limited and tool wear is great. Many feel that an industry-wide research program investigating these problems (much on the order of the efforts of the aluminum industry to investigate theirs), would result both in their solution and, subsequently, in wider acceptance and application of extruded copper products.



Copper watch case backs are extruded as a continuous piece of metal, shipped as bars to the watch manufacturer, and then sliced into the desired thickness like a loaf of bread. The case backs are then machined and chrome plated. The entire process reduces the number of machining operations and cuts costs.

The Seagram Building: Proving ground for architectural firsts

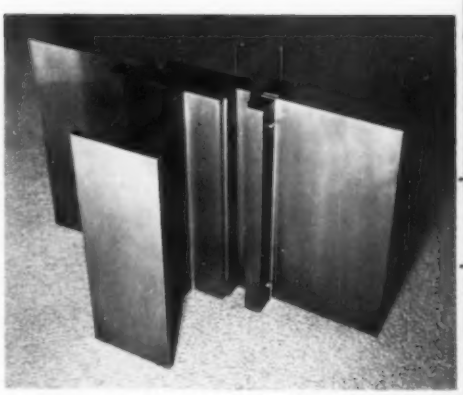


Four-hundred-pound cast bronze billet, steel extruding die, and extruded 6" x 4½" I-shaped mullion.

The thirty-eight-story Seagram Building stands as a monument to experimentation, and to the teamwork between designer and fabricator. It also marks the first use of a copper alloy in curtain-wall construction. Large architectural bronze extrusions make up the mullions (vertical divisors between windows) which are an outstanding design feature of the building, while smaller extrusions frame the windows and spandrels (horizontal divisors between floors). The weathering characteristics of the metal will cause its natural color to mellow, allowing the building to grow in beauty over the years.

The six- by four-and-a-half-inch I-beam extrusions used for the mullions are unique in size and form. Previously extruded shapes were limited in size to those which could fit completely within the diameter of a six-inch circle. But by the use of the most modern extrusion equipment and carefully designed dies, the principle bronze members were made larger than heretofore considered practical.

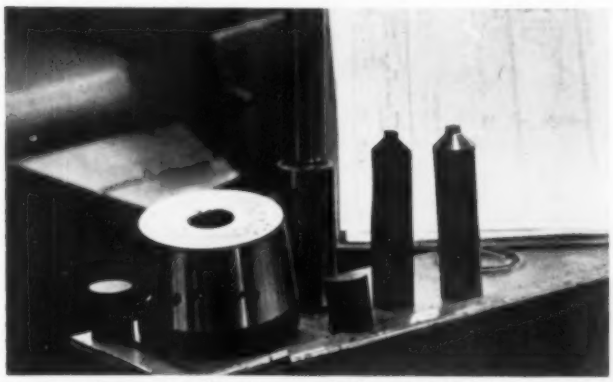
Moreover, the production of these I-shaped beams in straight and true lengths of up to twenty-six feet, four inches was another fabricating first consistent with many other innovations represented in the building. Since no bending is involved in forming the bronze, it is possible to achieve sharp corners—known architecturally as arrises. These create well-defined shades and sharply thrown shadows that heighten the esthetic effect of the bronze outer skin.



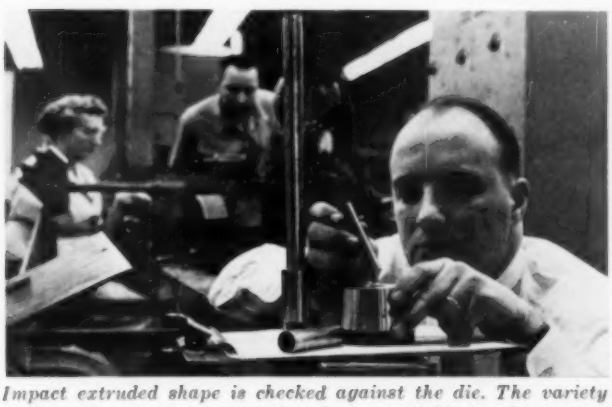
Assembly shows mullion and smaller extruded shapes which frame windows and spandrels. All windows are fixed in nonmovable sash, requiring only bronze glass stops. Most spandrels used in the building measure 39¼" x 48⅜" with fractional dimensions on length and width held to very close tolerances. Corners must be exactly square so that parts will align when assembled.

Impact extrusion: Precision metal working in tubular form

Designer checks specifications of impact extruded assembly. Blueprints can specify a variety of internal design components which can be impacted as an integrated part of the finished part.



Copper slugs, extrusion die, mandrel, and finished pieces. The slug is cold forced through the die by the mandrel to produce the desired close-tolerance shape. Scrap loss is all but eliminated.



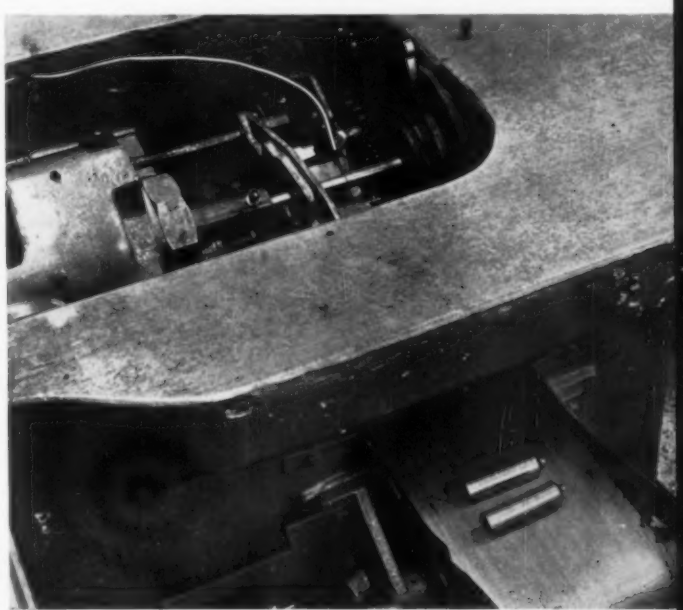
Impact extruded shape is checked against the die. The variety of flanged or cupped-end tubular shapes available for this process is unlimited. Rectangular or oval shapes may also be impacted.

Finished part rolls from impact extrusion press. The elimination of internal machining operations is a major economy factor in the mass production situations suitable for impact extrusion.

A designer, seeking to utilize copper's corrosion resistance, machinability, and high thermal and electrical conductivity for complex, closed-end tubular shapes, might well examine the possibilities in impact extrusion. This process guarantees a dense, porosity-free, cold-forged structure, with close tolerances and a minimum of excess metal to be machined away. The smooth, scale-free surface can be painted or lithographed with little or no preparation. All of these attributes are built into impact extrusions with one press stroke.

During the past four years, salesmen for a major tube fabricator began to run into specialty requests requiring copper or brass impact extrusions. Borrowing from techniques learned in the extrusion of collapsible aluminum tubes, its researchers sought to perfect the process for specific copper applications. They feel that impact extruded parts have great potential in the automotive and electrical industries, where high volume production lends itself to the economy factor inherent in this chipless method of fabrication. Currently it is producing for an atomic energy application what is claimed to be the first commercial impact extrusion in copper. Specific information about the use and composition is listed as "classified."

There are a variety of derivitive advantages to be gained in impact extrusion. Besides the basic cylindrical design, it is possible to extrude square, rectangular, or oval shapes. Internal design components, such as recessed cavities or tubular projections, can be impacted into place as an integral part of the construction. Sidewall thickness and inner wall complexities are controlled by providing the steps in the extrusion die.

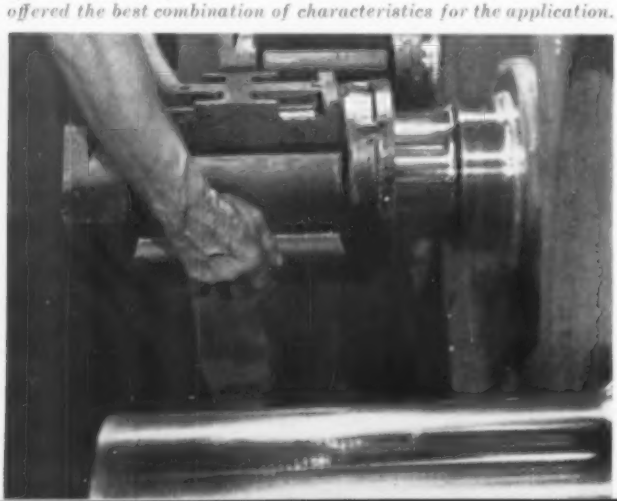


An 120° saddleback bearing is compared to 360° unit recently introduced by American Brake Shoe Co. New journal box unit for freight cars contains over 70 pounds of copper alloy, compared to the old casting that contained about seven pounds.

Casting: More copper cures a railroading headache

All-bronze cartridge journal bearing combines in one sealed unit all components to keep freight car journals sealed, lubricated, fastened in position, and cool. It is made in standard sizes.

New bearing design fitted to journal. It gives better distribution of load and perfect fit. Other metals were tried, but bronze offered the best combination of characteristics for the application.



One of the oldest headaches of the railroad industry is the "hotbox", or lubrication failure in a freight car journal bearing. This causes local heating, melts the babbitt, destroys the bearing, and makes it necessary to put the freight car out for repairs. The National Bearing Division of the American Brake Shoe Company set out to develop a self-contained unit which would eliminate the hotbox as an expensive factor in freight car maintenance. Cast and machined, the finished 360° unit weighs more than 80 pounds, of which over 70 is copper alloy. Copper's high compressive strength, compatibility with steel, and wear resistance make its use advisable in this application.

Prior to the development of this cartridge bearing unit, freight cars were equipped with 120° saddleback bearings (top, left) which contained about seven pounds of copper alloy. Switching and coupling impact often displaced the bearing from the journal (axle) allowing waste to creep in. When the bearing re-sealed properly, the waste caused the hotbox. This danger necessitated almost daily maintenance and lubrication.

The 270° design of the bearing itself gives better load distribution and a perfect fit from the time it is installed. This prevents displacement between bearing and journal during impact, and cuts down on failures and excessive wear. The sealed unit protects itself from foreign material, and the lubricating pack contained within reduces maintenance to a minimum.

With a potential market of two million freight cars, the sealed cartridge bearing unit holds the possibility of an enormous increase in the consumption of copper and shows that traditional fabricating methods like casting can still enhance the uses of this metal.

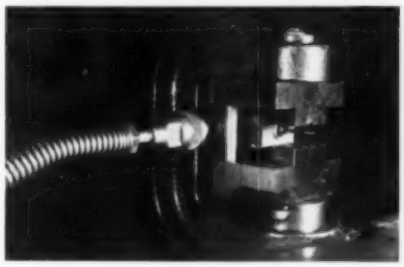
Tube-In-Strip: Metal is blown up for heat exchange applications

Metals are literally blown up by a process developed in 1956 by Revere Copper and Brass Inc. for use in heat exchange applications such as refrigerators and air conditioners, automobile radiators, and radiant panel heating systems. This recent development, which has not yet begun to realize its full potential, is particularly applicable to copper because of the metal's superior thermal and electrical conductivity, but can be used with aluminum, titanium, and other alloys. Tube-In-Strip is a combination of hollow tubing and metal strip in a single sheet of metal, and is formed by casting strips of easily crumbled material in the form of resist rods in the mold. The finished product is one piece of metal, with expandable portions which can be inflated by the user. Tube-In-Strip is shipped flat to the customer, and he can stamp or draw it into any desired shape before the tubes are inflated. Diameter and spacing of the tubes can be varied to suit specific needs.

Inflation is accomplished by closing off one end of the sheet and inserting a needle in the tube area at the other end. Depending on the pressure and gages required, air, water, or oil is fed through the needle to provide the degree of inflation specified. Each sheet can have a variety of tube diameters. Special shapes can be readily produced by placing restraining dies or plates above and below the strip prior to inflation.

Sheet of Tube-In-Strip after inflation, showing the different tube diameters that can be obtained in a single sheet.

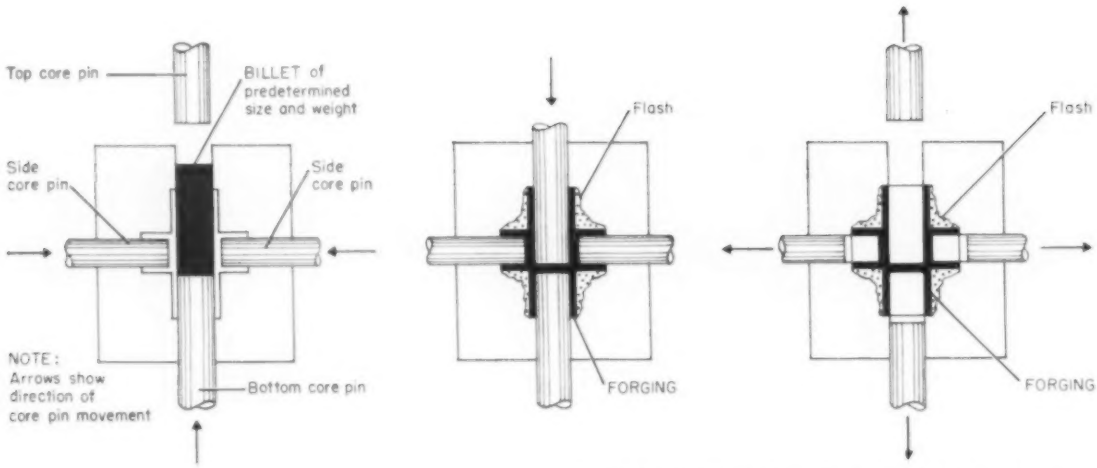
For inflation, the needle, held in a vice, is inserted into tube at end of metal sheet. Air, oil, or water pressure is fed through needle to give desired degree of inflation.



Tube-In-Strip sheets or coils can be formed by any standard method after inflatable tubes have been introduced into the sheet.

After being formed, tubes are inflated by crimping one end, inserting needle, and expanding to desired gage.

Price: Hidden cost-saving factors



Cored forging is produced by a combination of extrusion and die forging. The metal is forced to flow by displacement, extruding around the cores to form the cavities. (Drawing courtesy of Materials in Design Engineering.)

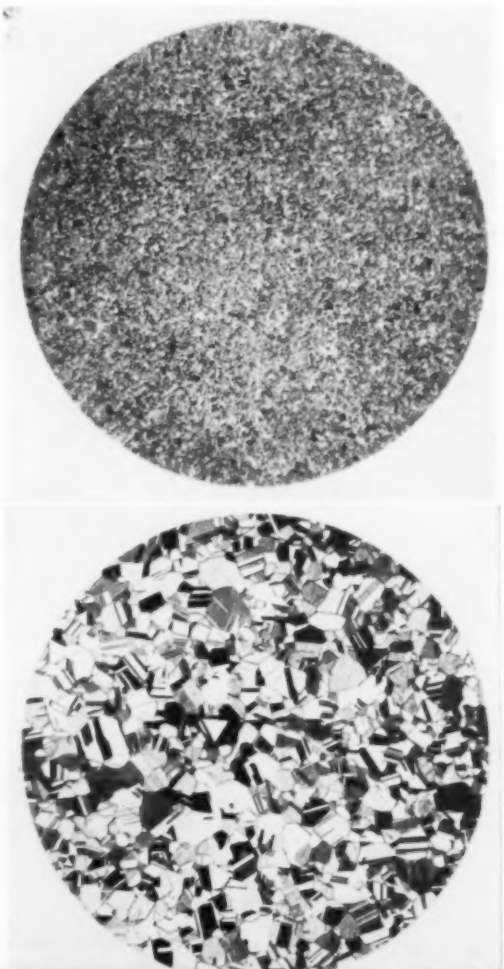
In applications for which cost is an especially important factor, the copper companies are modifying old and proven techniques and improving upon basic materials to try to remove the curse of the price factor from post-fabrication operations.

For example, cored forging is a recently developed modification of conventional die forging that produces parts with cavities in a one-step operation. In the fabrication of brass hardware such as pipe fittings, valves, and traps, cored forging is expected to effect great cost savings because machining and drilling are greatly reduced, and close tolerances held. In some cases, scrap loss is up to fifty per cent less than that of closed die forging followed by machining.

In the area of materials, superfine-grain drawing brasses have been developed for applications where the metal is to be formed or drawn into products whose finishing is an important expense factor. Corollary features of the fine grain brass are its exceptionally good polishing and finishing characteristics, high tensile strength, hardness, and excellent ductility. In phosphorus bronze alloys, the superfine grain structure greatly improves the metal's fatigue resistance and formability. Test applications of fine grain phosphorus bronze under a variety of closely controlled conditions proved that its endurance and long fatigue life at high stresses were far better than those of materials not treated with this process. Yet despite the specially developed processes for producing the superfine grain alloys, there is no increase in cost over ordinary mill products manufactured for the same purposes.

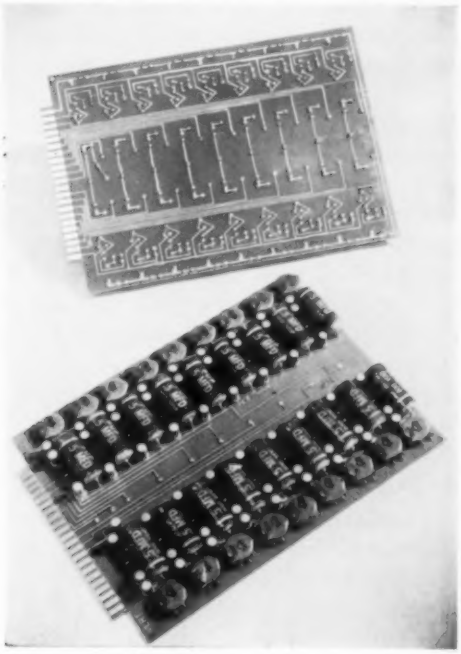
By scaling down machining costs, increasing durability, and diminishing the need for high cost finishing for a series of operations, the copper industry has sought to improve its post-purchase price picture.

Comparison of 75X magnifications of superfine-grain Formbrite brass and ordinary drawing brass which has been used for decades for stamped or drawn brass products. (*Formbrite is a registered trademark of the American Brass Company.)*



Molded printed circuit board. Copper is punched into the molding board, stripped, and cut away to form the finished molded printed circuit.

Baseboard and completed circuit. Printed circuit replaces the complicated mass of wires with a neat package unit simplifying final assembly.



Electronics and Solar Energy: Two fields which challenge an industry

In an age of miniaturization, mechanical thinking, and electronically controlled flight, manufacturers of precision-made electronic instruments have come to depend on the combination of copper's electrical conductivity and corrosion resistance, as well as on the contingent attributes of its alloys (formability, hardness, easy machinability). Remington Rand's large Univac, for example, uses nearly 16,000 pounds of copper and copper alloys, or roughly forty per cent of its total weight of 41,000 pounds. And on the miniaturized scale, copper's electrical conductivity makes its use essential in printed circuitry.

Far less advanced than electronics, but potentially a much more vast consumer of copper, is the field of solar energy. Scientists claim that as the supply of fossil fuels decreases, man will have to harness the sun's energy for his fuel. In experimental solar heated houses, huge copper collectors trap the sun's rays, which, in turn, heat water circulating through the pipes. Hot water tanks store a supply of this fuel to guard against the possibility of prolonged bad weather.

Winning design in a solar house competition in Phoenix, Arizona. Louvers absorb sun's rays, heating water circulating through copper pipes.

Cold Hobbing: Built-in accuracy at any cost

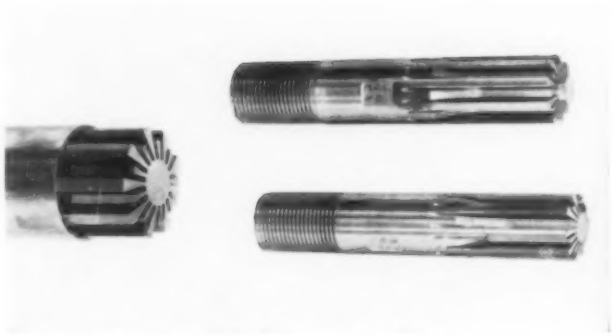
In order to produce an intricately shaped and highly accurate multiple cavity magnetron (the heart of radar transmitters) with a single stroke of the press, Raytheon Manufacturing Company's Microwave and Power Tube Department worked for fifteen intensive and painstaking years. The magnetron cavity requires extreme accuracy and considerable design intricacy to perform its highly important function of keeping radio frequencies that guide or detect missiles constant.

Cold hobbing is a process for mechanically displacing a relatively ductile metal with precise control over the dimensions of the part. As for the metal used, there is practically no other choice than copper. Oxygen-free high-conductivity copper has all the characteristics needed for multiple cavity magnetrons—good electrical conductivity and heat transfer, sufficient ductility and workability, and a fine finish.

The start of the cold hobbing process is in the preparation of the slugs. These are made by hot-forging rectangular cast ingots into round bars approximately the diameter of the slug; the bars' oxidized surfaces are then machined off in a lathe, and the bars cut into slugs which are machined to their correct dimensions.

Equally as important as the preparation of the copper slugs are the methods for making the hob. The variety of complicated shapes needed for multiple cavity magnetrons demands the highest quality steel and rigidly controlled grinding operations to produce the precise configurations of each hob. The grinding machine had to be developed by Raytheon since there was no machine on the market that could meet their specifications. It takes nearly three weeks—in which every operation is checked and cross-checked to assure foolproof performance—to make each tool.

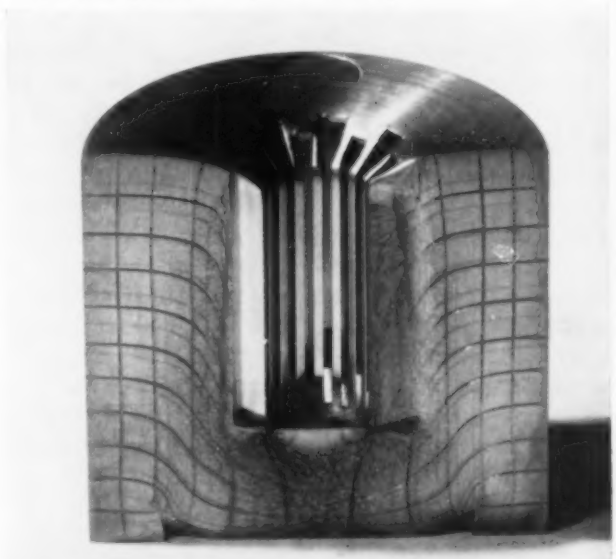
In spite of the long series of preliminary operations, there are substantial advantages to be gained from cold hobbing. First, it is the only method which can be seriously considered for producing multiple cavity magnetrons in quantity. A complete press cycle takes only ninety seconds — and on production runs, the time is lower. Estimated savings run as high as 1,000 to 2,000 per cent over machining. More important, cold hobbing imparts a degree of accuracy which cannot be matched by any other method. Copper meets the demands of this method of fabrication—and of the application.



Hob designs are varied and intricate. Each hob takes up to three weeks to produce.

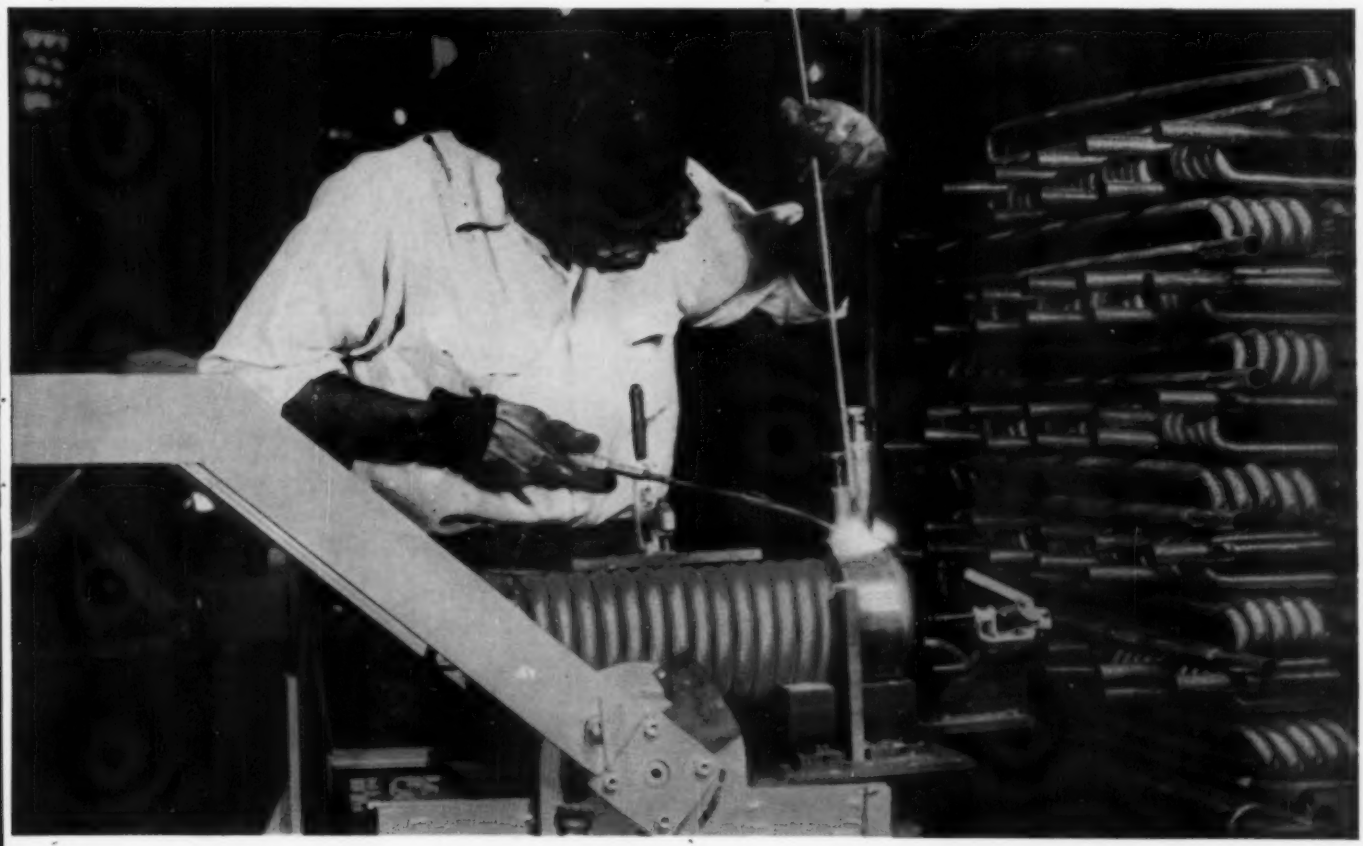
Cavity (right) assumes exact detail of hob. No further finishing operation is needed.

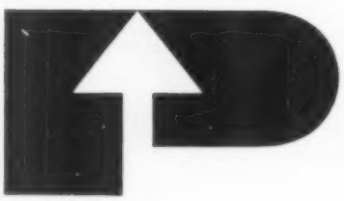
Stress lines show direction of metal flow. Tremendous pressure imparts accuracy.



Copper: The Sleeping Giant

Despite some gloomy predictions about its future, copper offers the designer and fabricator specialized characteristics and fabrication techniques that make the metal mandatory for many applications. The copper industry, aware that its product is threatened with limited utility, has instituted research and development programs to explore new methods and new fields for expansion. But an awareness within the industry is not enough to brighten copper's future substantially. The user, too, whether designer or manufacturer, must have a greater understanding of the variety of solutions copper holds for a vast number of dissimilar problems. For too long, copper has been taken for granted. Designers and manufacturers must realize that they can call upon such highly specialized processes as cold hobbing, as well as basic techniques like casting, for diverse applications ranging from electronics to the internal components of blast furnaces. The judicious selection of copper alloy and fabricating technique can ease the pressure of problems other metals could not solve. With an increased inquisitiveness on the part of the designer, and a concerted industry effort to extend its potential, copper can look forward to a healthy future.





is now for **PARTLOW**

Manufacturer turns to design for identification in highly specialized industrial field

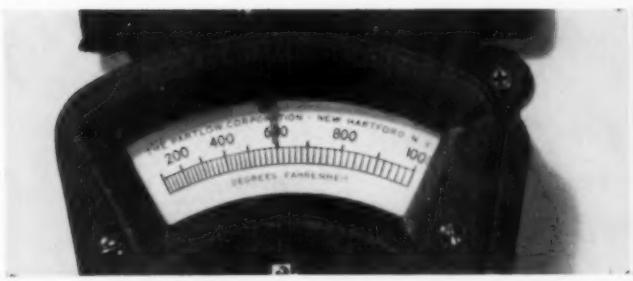
Both Partlow meters on the left perform the same function. The new design has eliminated the unsightly junction box on the top. To flush-mount the new model, the element projection is first inserted into an aperture in a control panel. The tapered back of the case permits the top rear of the case to clear the aperture, and the flange provides an edge to fit to the panel.

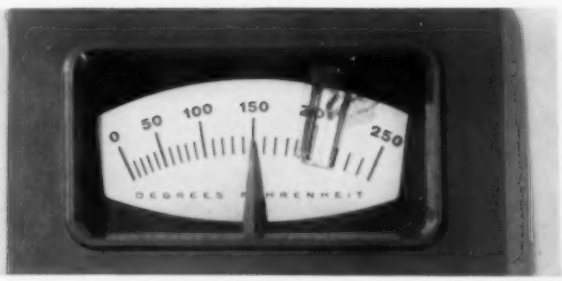
Partlow's old trademark

Perhaps any description of the elaborate escutcheon (above, right) that for more than 35 years served Partlow Corporation as a trademark should be made in terms suitable to a heraldic symbol. In this case, the field is quartered, the Sinister Base displays the god Mercury, a cartouche inscribed with PARTLOW is blazoned from Dexter to Sinister across the Ness, and the Dexter Chief contains — of course, a temperature recorder. These are logical elements for Partlow's trademark, since this New Hartford, N. Y. company manufactures mercury-actuated temperature control devices. Last year, however, people at Partlow were prompted to change the appearance of their trademark and their instruments. Since 1920 the design of their products had been based entirely on engineering specifications, and it was finally realized that their appearance was out of phase with many of their applications. Industrial ovens and refrigeration equipment, for instance, have been redesigned in recent years, making use of new materials and color. Because their meters were rapidly becoming conspicuous for an obvious lack of attention to design and appearance, Partlow — a small company, engaged in the manufacture of highly industrial instruments — sought design assistance to help keep up with competition and to get out in front in a very specialized field.

A series of requirements for a new design was outlined by Partlow and presented to Raymond Loewy Associates for analysis. The primary aims were functional: to design a better meter that could be flush rather than wall-mounted, to improve its readability, and to make the case more rugged. Other objectives were to give the instrument an identifying appearance that would harmonize with other industrial equipment, particularly the new control panels. Recommendations by Peter Thomson, Product Division Head at Loewy and supervisor of the Partlow program, included changing the material for the case from die cast aluminum to plastic. Glaskyd, a fiber glass reinforced polyester, was finally chosen for its heat resistance, lightness, and integral color.

The case design was changed so that the top tapered down toward the back, thus solving the problem of flush mounting. Design of the dial, described below, included enlarging the area, incorporating an acrylic magnifying pointer, and revising the graphics. The setting knob was changed from metal to plastic to reduce weight. Result: a new instrument that is lighter, stronger, and costs about four per cent less. The new trademark complements the meter design, and is flexible enough to be used effectively on letterheads and packing cartons. It is a working graphic symbol of Partlow's new lease on life in the industrial temperature control business.

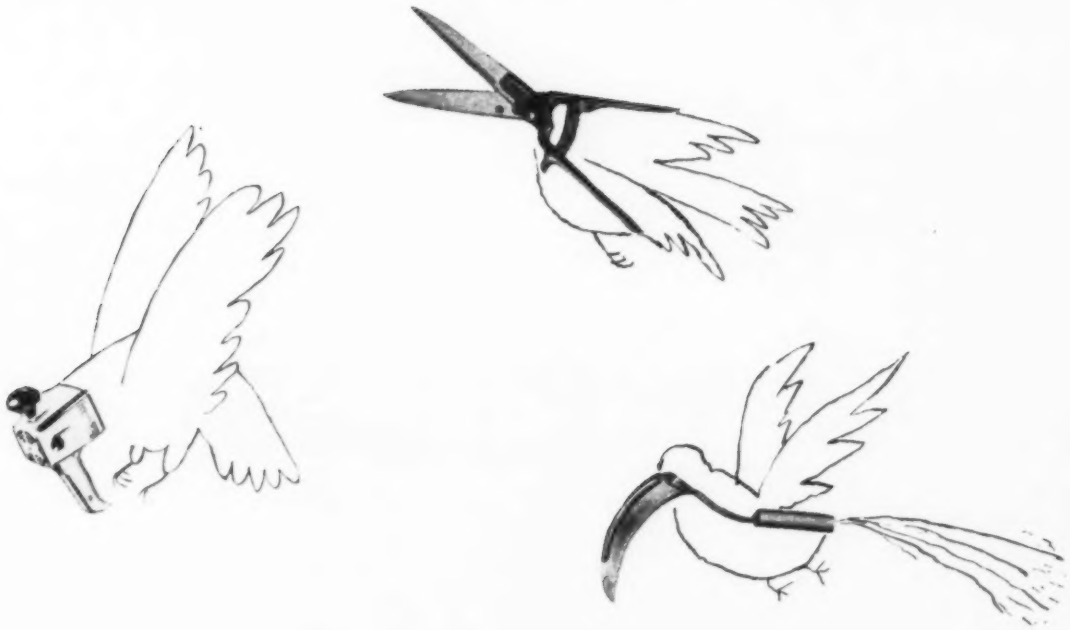




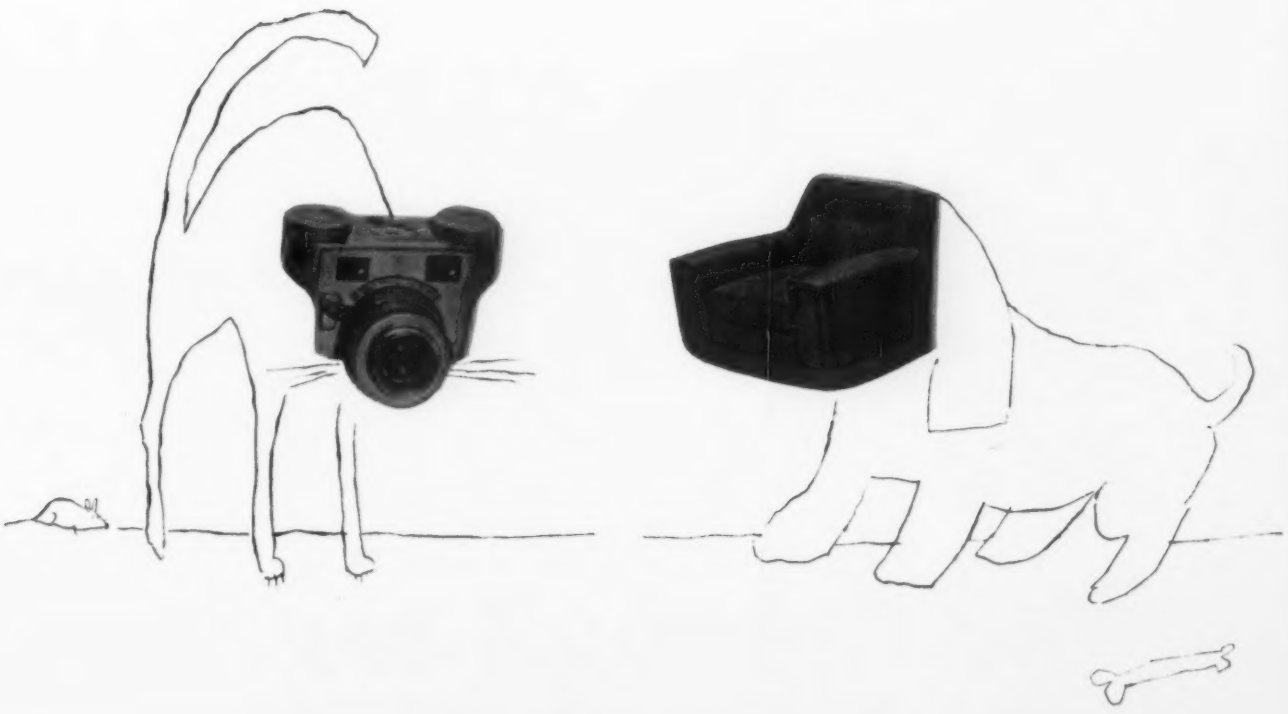
The dial was completely overhauled to give greater readability at both close and distant ranges and to reduce setting errors. The acrylic setting pointer is convex on the bottom for magnification. Two hairlines are molded-in on the front and back for parallax sighting. Calibrations are larger, and a bright orange indicating pointer contrasts with the blue numbers.

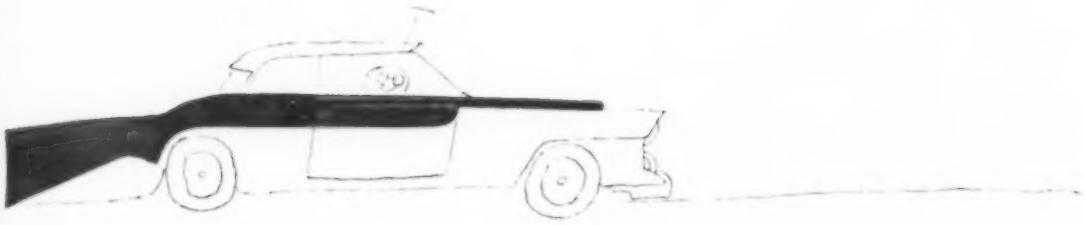
SPQR!

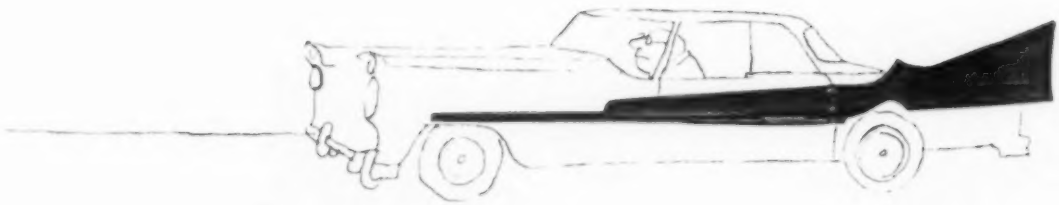
"This is for the birds!" mutters the tight-lipped centurion as he takes arms against a skyfull of them created by cartoonist Tomi Ungerer. When Ungerer focuses his perceptive and wayward eye on the fruits of industrial design, the result is an art that, frivolous though it is, traces its crooked root to the basis of all poetry: metaphor. Although the metaphor in this case is graphic, the approach is reminiscent of the 17th century metaphysical poets: witty puns, wild but convincing analogies between vastly disparate objects.



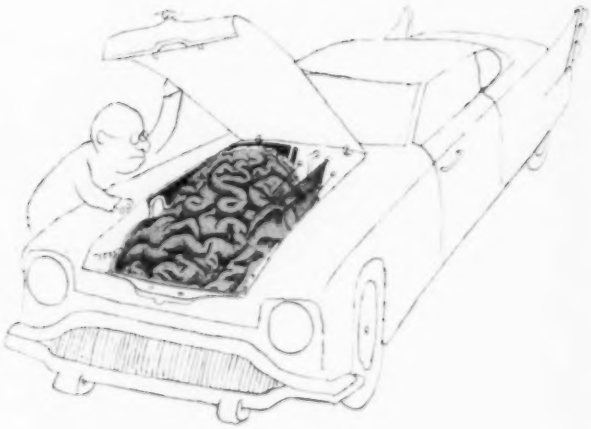
Ungerer seems to live in a fresh and lovely world to which no product planner will ever seek admission. Nothing holds still. Show him a pair of shears and he sees a sardonic starling; put him in a room with a Saarinen pedestal chair, and he stands on his head to discover a Roman helmet; try to frighten him with a medical school skeleton, and he finds that the pelvis is by Bausch & Lomb. Show him some copies of ID, and . . . well, look.

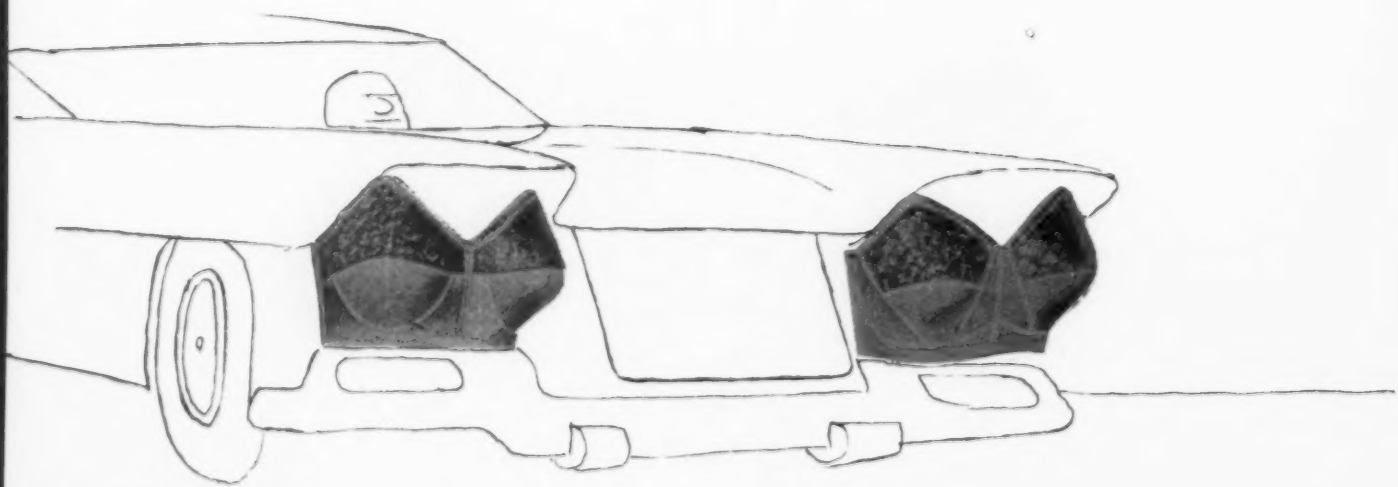


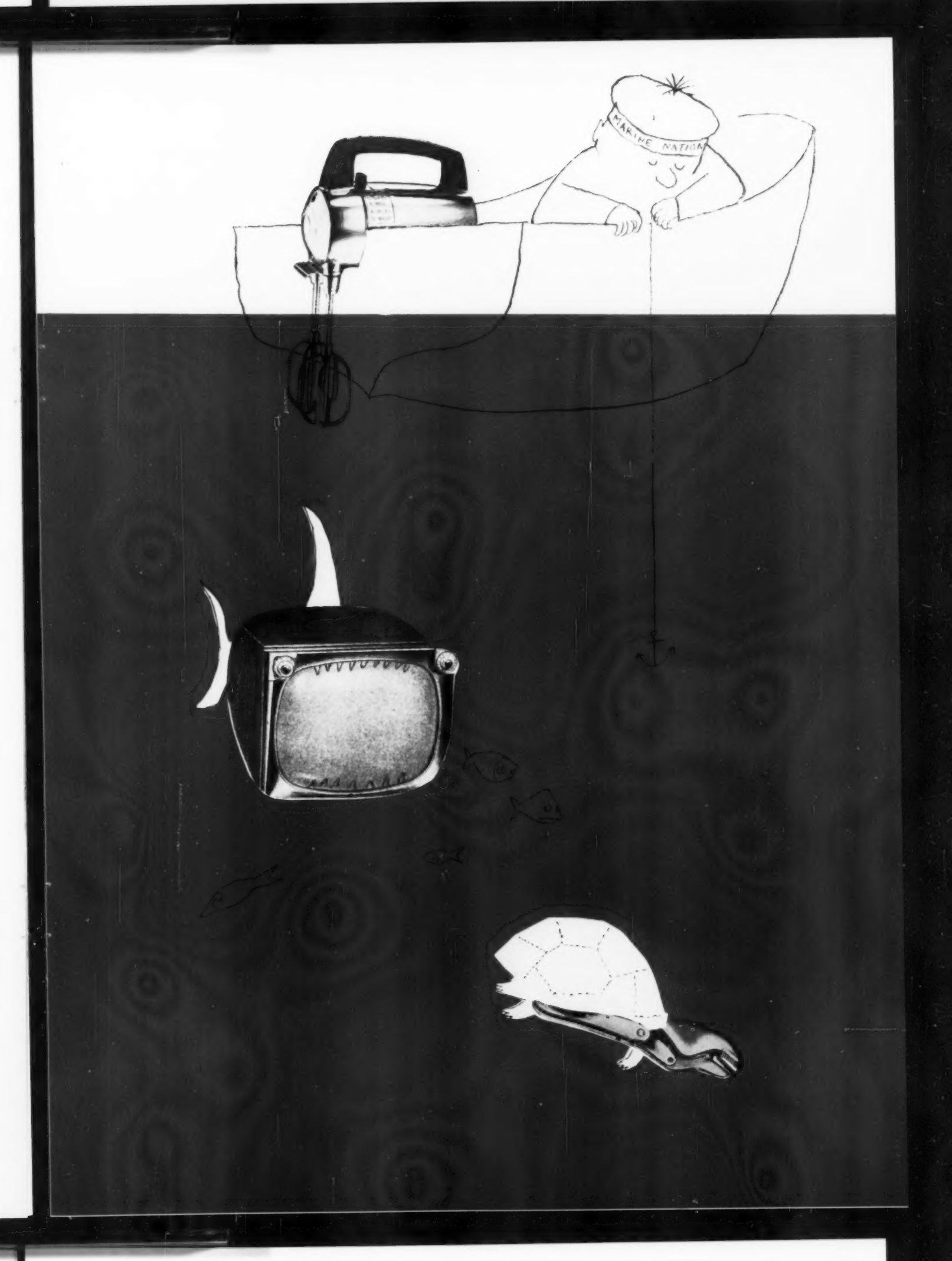


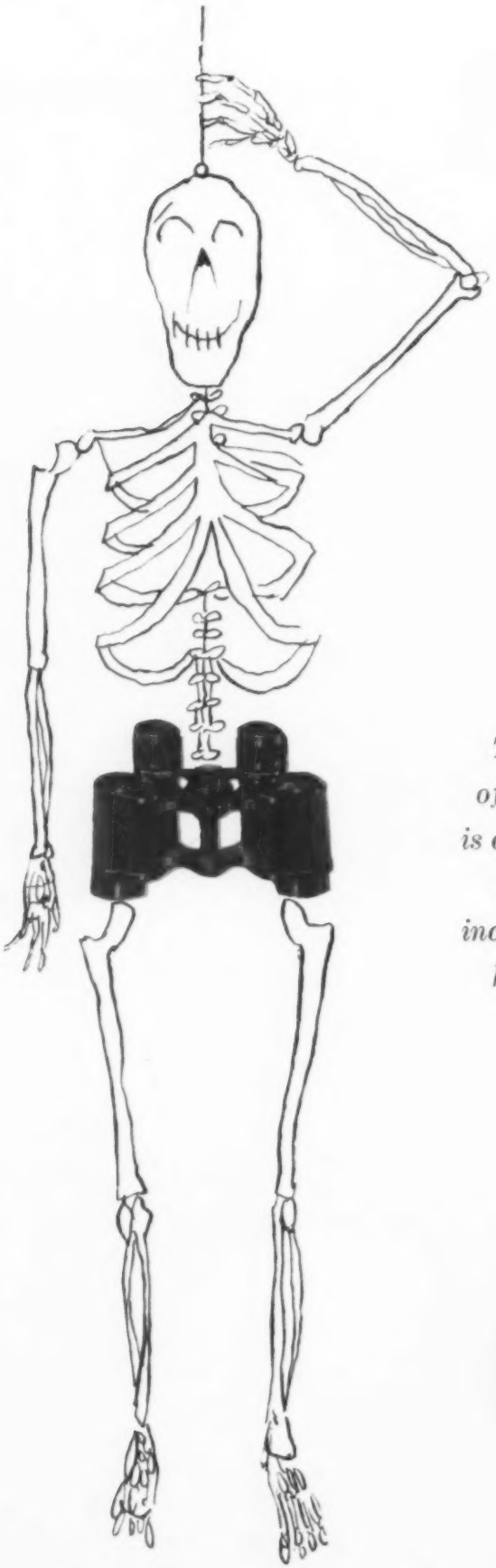


This has been a bad year for Detroit. Ungerer's drawings, montages, or whatever (no one has found a name for them) don't make it any better.





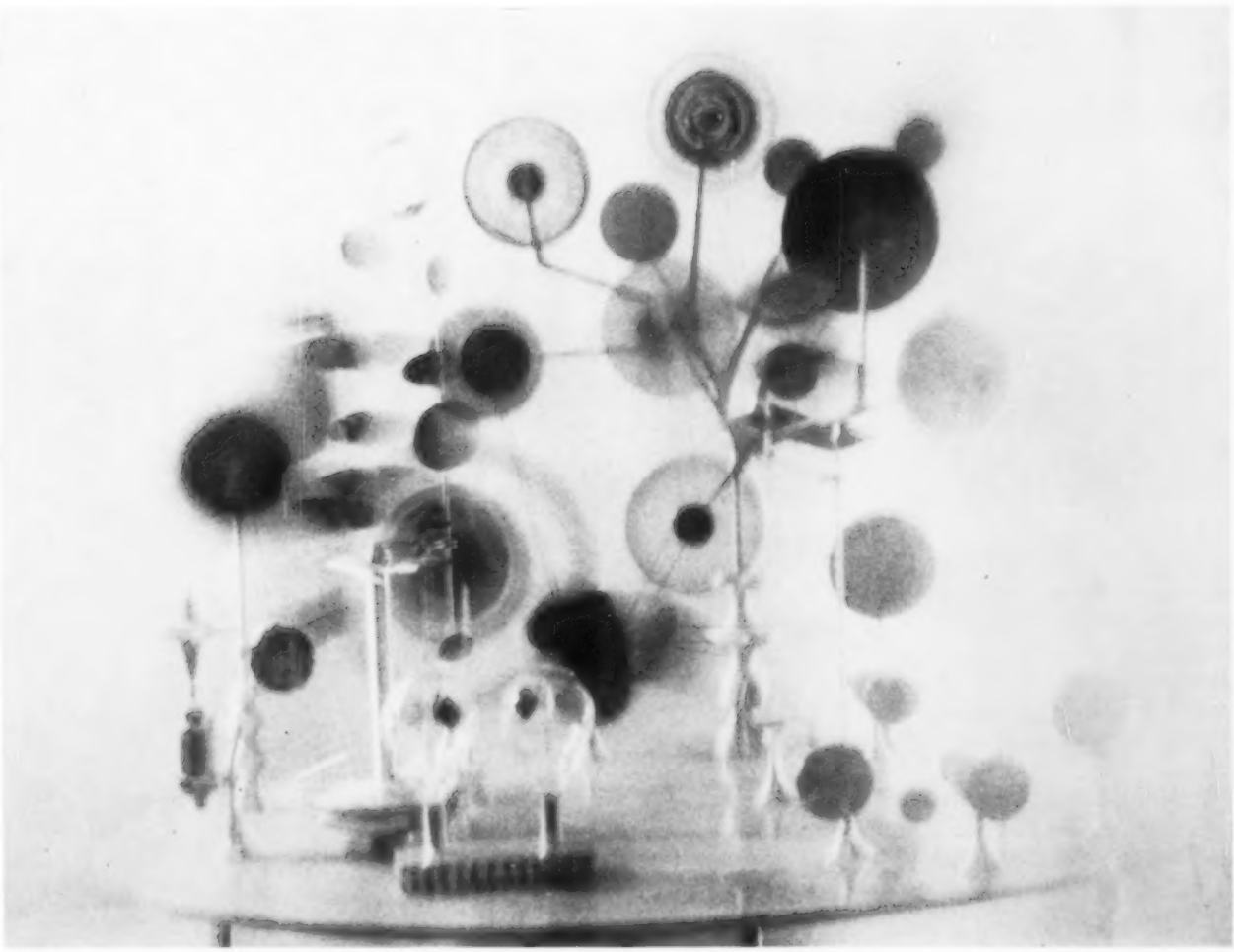

MARINE NATION



The hipbone, according to one
of our most charming spirituals,
is connected to the thighbone.
This of course is anatomically
incorrect, as the piece of
human engineering on the left shows.

the end

Tomi Ungerer



Matilde Laurie

SOLAR MACHINE TOILS NOT, BUT IT SPINS!

For Alcoa's "Forecast" program Charles Eames designs a solar energy toy for purposes of edification, and for fun

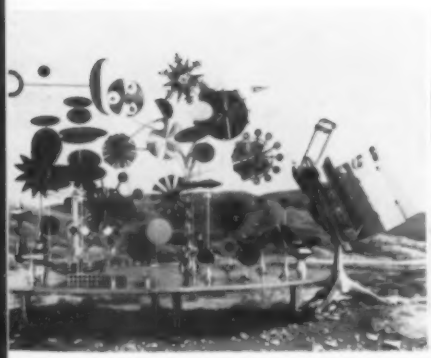
"Where did you go?" "Pittsburgh."
"What did you do?" "Nothing."

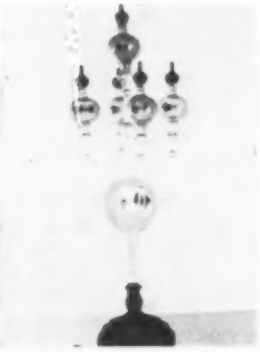
The blend of light and motion twinkling irresponsibly above is, despite appearances, going about its business. It is a solar machine—the most recent addition to Alcoa's "Forecast" program of prophetic designs in aluminum—and its business is to have none. The device was created in a spirit of whimsical adventure by Charles Eames, who felt that the most effective way to dramatize aluminum's place in the sun would be to build a monumental toy driven by the sun.

Why a toy? Because the point was to demonstrate an idea, not a specific use. And to make the point Eames decided to build a "do-nothing machine," a device meant to demonstrate the delight in wonder, rather than applicability to production. Philosophically the approach is in line with "pure research" as opposed to the pragmatic expediency of the technician.

Yet all that is far too sober. The idea was *play*, and play has its own architecture. Once the designer had

Charles Eames' design playfully sheds light on problem of how to use light





In photo at far left designer Eame's motion-sculpture stands still for photographer Eames. Next to it (showing that nothing under the sun is not new) is a radiometer —a solar amusement device built before the turn of the century. Vanes surrounded by colored liquid revolve around axis when exposed to radiant energy.

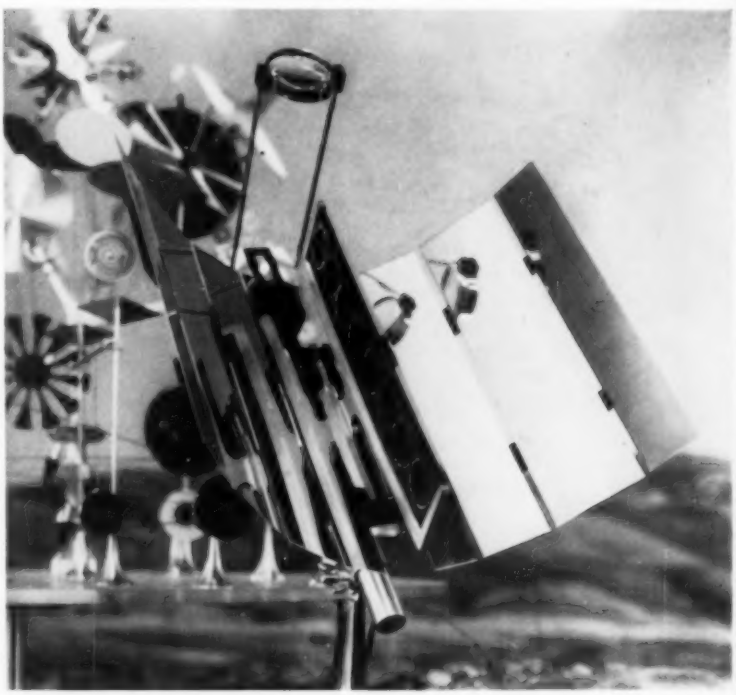
set about to make something that would do nothing, he was faced with a curious question: what *kind* of nothing? One could do nothing in a Baroque way, a Gothic way, an Expressionist way. There was the nothing of Romanticism and the nothing of Realism. Eames sought in his design to cut across all such lines, to create a "transcendental nothing," a sort of nothing-but-the-truth.

It runs like this. An aluminum collector gathers solar rays and focuses them on silicon cells, which convert the rays into electricity. This powers the color-anodized aluminum wheels, circles, balls and flowers that flutter their frantic way through a variety of useless and charming motions. Unlike the Biblical source of do-nothingism, the components of the solar toy spin. They also shake, rattle and roll. They whir and pulsate in an optically teasing array of changing shapes, at times threatening to swing right out of the idiom.

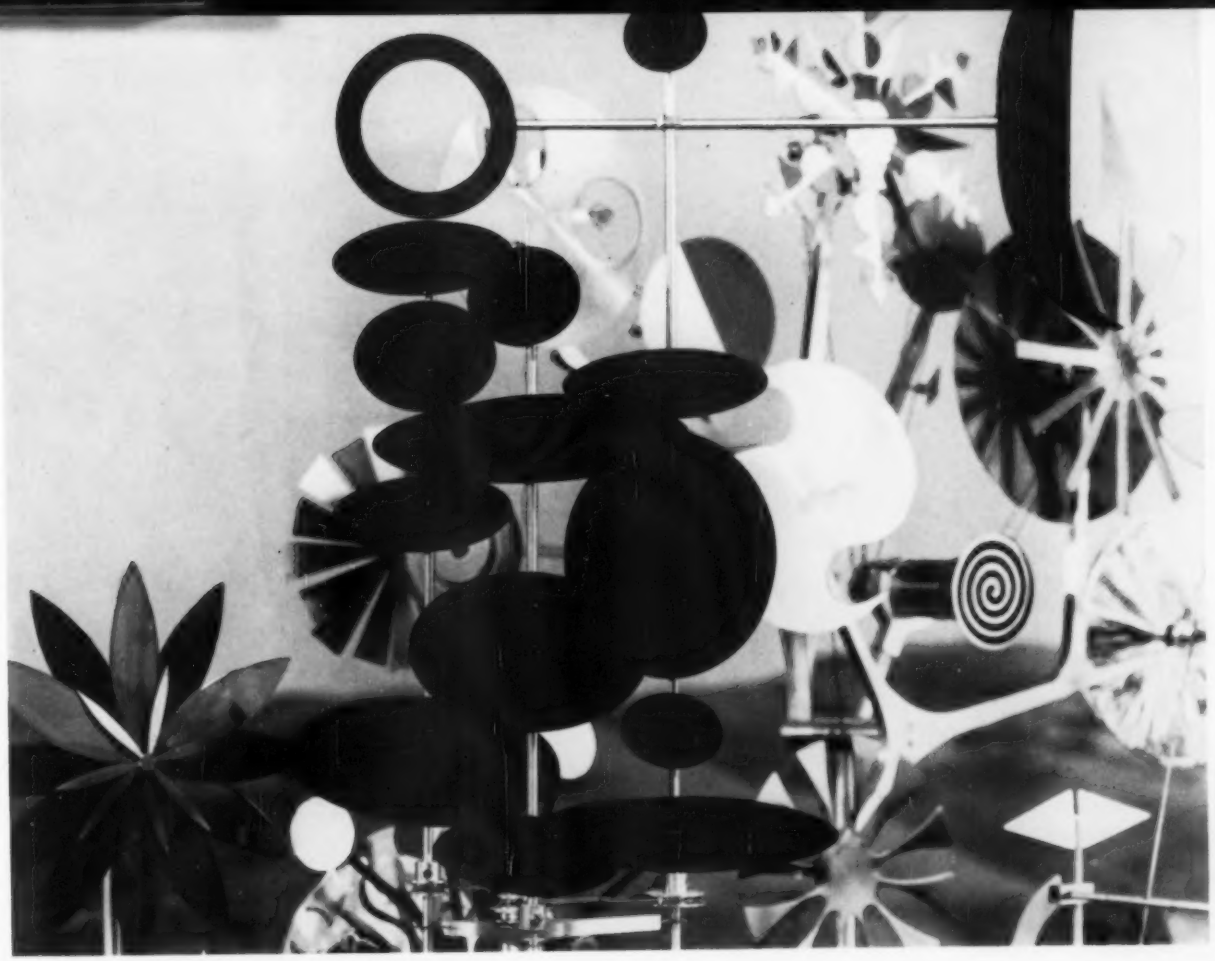
The toy has, to Eames' mind, three elements: the collector, the static device, and the device in motion. The last adds to the sculpture the further dimension of time.

What does the do-nothing machine do for the Aluminum Company of America? By featuring aluminum's most famous properties, lightness and color, and linking them to our most advanced concept of power, Eames is able to suggest in the broadest terms the meaning of solar energy and the future of aluminum. The machine is characterized by a stunning irrelevance. But irrelevance can lead to something. When Eames and his staff began working on a method of converting solar energy they turned to the California Institute of Technology for help, expecting Cal-Tech to send over one man who could show them the most direct route. Instead, they sent five people — to find out what Eames had discovered.

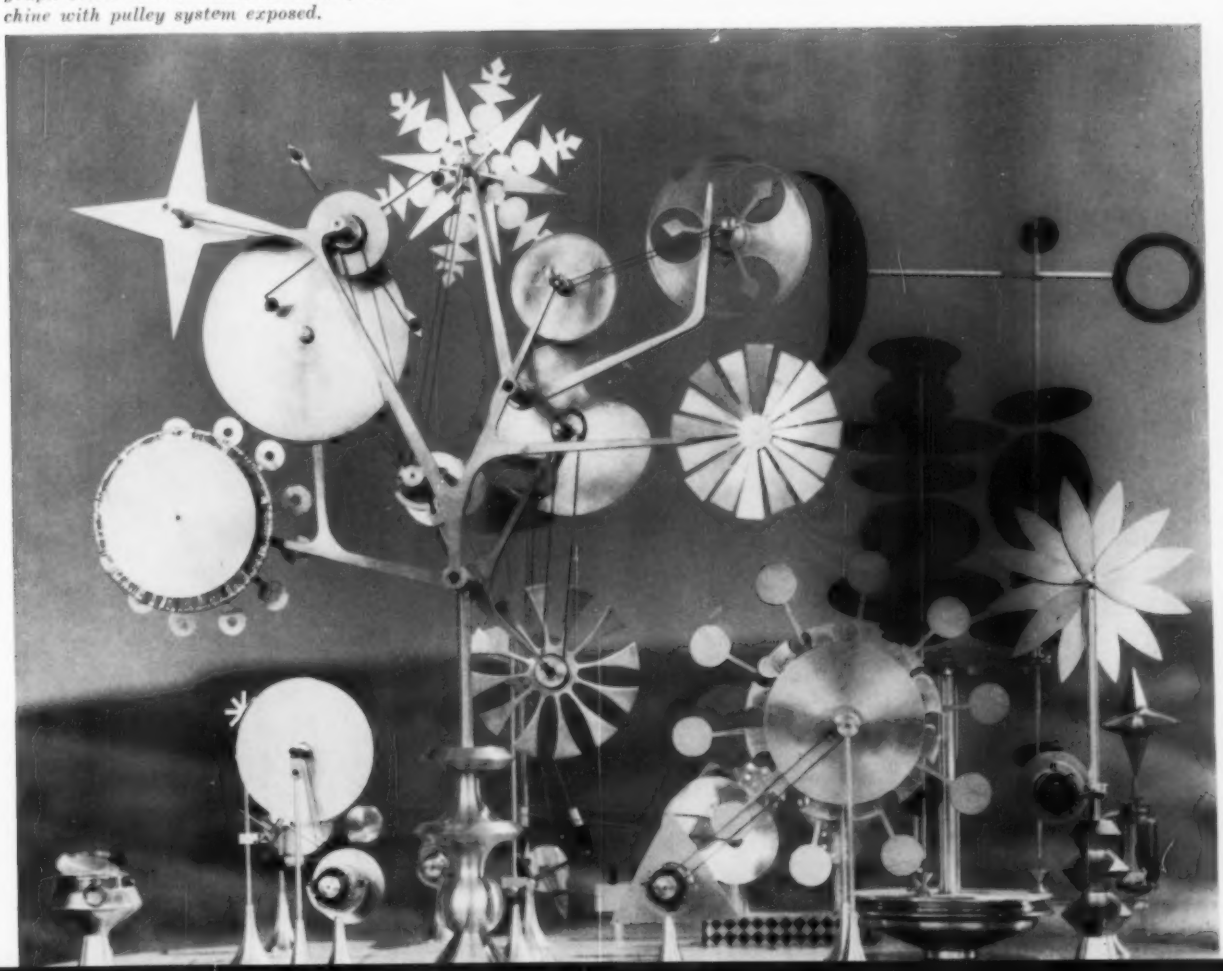
It was a cosmic toy.



Aluminum sheet reflector tracks the sun, collects solar rays, focuses them on silicon cells about the size of a half-dollar.



Variety of shapes above expand into even greater variety when in motion. Photograph below shows uncolored back of machine with pulley system exposed.



Melamine Mixer

← A sample casting of sulfur (far left) is made before molds are completely finished to show miter lines and indicate possible minor design changes. Finished product is molded of melamine.

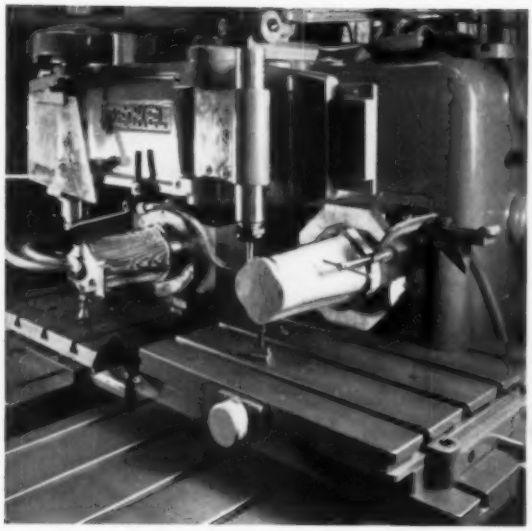
→ Mold cores are rough-cut on machine at Liberty Tool and Machine Co. Master core made of a mixture of cement and plaster (right) is guide for cutting tool. Core is then precision ground.

The new addition to Waring Products Corporation's line of electric blenders, the Drink Mixer, retains the familiar clover-leaf shape that has identified the Waring Blendor for years, but the family resemblance stops there. In the new model, which sells for $24.95 as compared to $49.95 for the Blendor, glass is replaced by plastic (melamine); a handle has been added; and, most important, it is a single unit, with the motor and mixing cavities contained in one component, rather than having the mixing cavity a removable piece on a separate base containing the motor.

Waring wanted to introduce a portable mixer that would outshine inexpensive blenders in quality, yet compete with them in price. The project demanded the cooperative efforts of top management at Waring, who had to okay the expense of a new venture; industrial designers at Gerald Stahl Associates; engineers at Waring; plastics experts at American Cyanamid, who supplied the material; and mold designers at the Shaw Insulator Corporation, who did the molding. Work on the new mixer started more than two and a half years ago, and one of the most pressing preliminary decisions to be made was the choice of the best material for the job. Since Waring wanted to promote the blender for use outside the kitchen as a serving appliance, the ability to produce it in a variety of colors was a primary requisite. Aluminum was suggested, and considered until it was discovered that the casting method would require an aluminum alloy that could not be anodized. Investigation showed that melamine, although it is expensive, offered the desired molding and physical characteristics and could be produced in a wide color range. Actually, the high material cost of melamine was compensated for because it made it possible for the mixer to be molded in one piece, eliminating many labor and assembly costs. In addition, melamine moldings have a natural lustrous surface that requires no finishing operations.

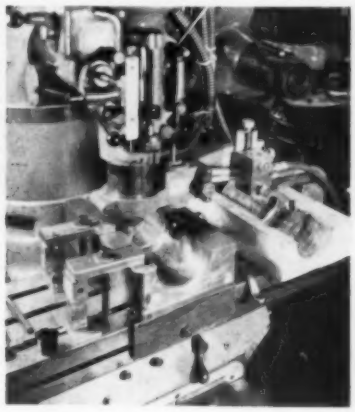
When preliminary designs were presented to plastic molders, several insisted that the form could not be produced. However, the team of industrial designers, plastics people, and molding experts found the solution

Waring blends many talents in creating new appliance



↑ *Half of the cavity of the mold nears completion of rough cutting. Highly skilled technicians—and precision instruments—are needed for these operations.*

↓ *Mold cavity is precision ground. Master mold (right) is made of cement and plaster directly from original wooden model carved from design and engineering drawings.*

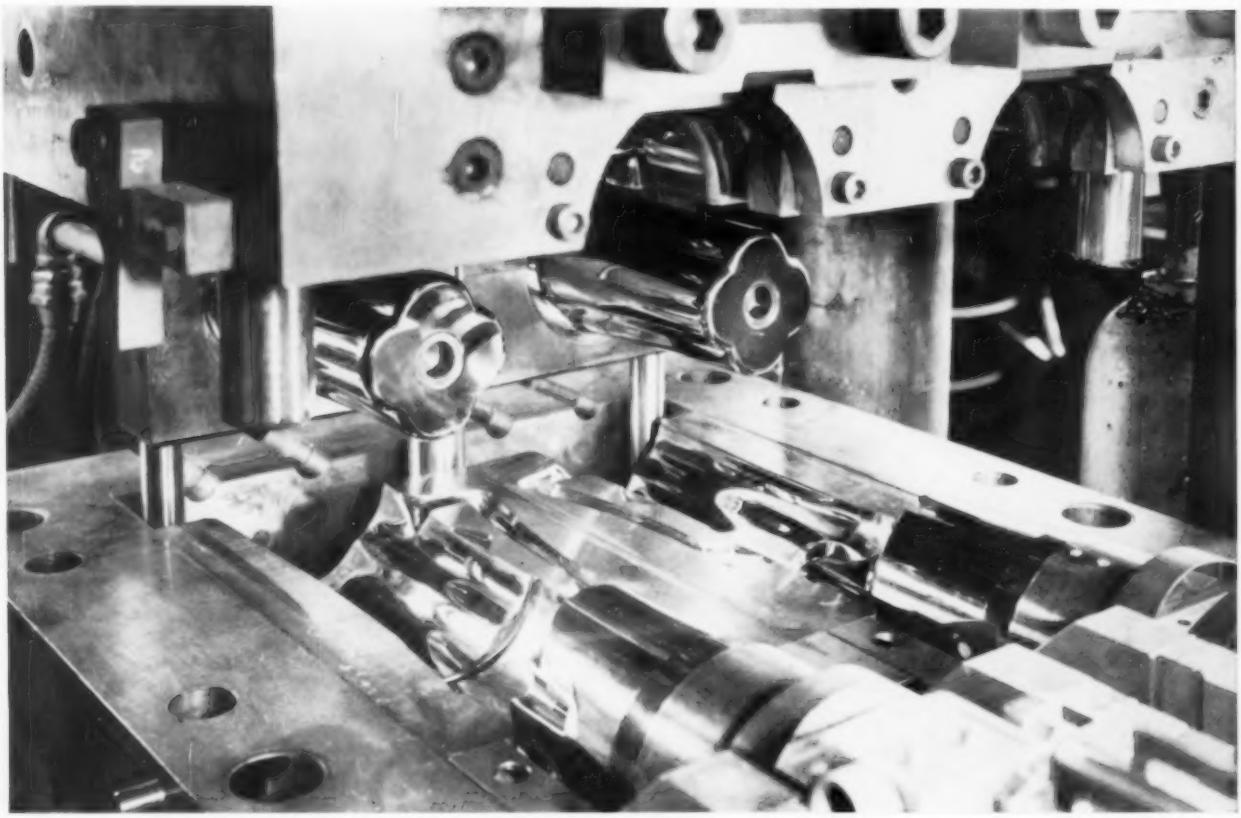


in a technique known as three-plate plunger transfer molding. In this process, a floating plate in the mold guides the plastic material to the various cavities. The method of making the molds is shown on these two pages; the actual molding process is shown overleaf.

Since, for reasons of competition, cost was so important, some features found on the more expensive Waring Blendor had to be eliminated. The new Drink Mixer has a simple "on-off" switch that does not give a choice of speeds. The motor itself is smaller in size than the one in the Waring Blendor, but gives comparable performance, except for the variable speed feature. Like other appliances with built-in electric components, the Drink Mixer cannot be totally immersed in water. The desire for portability forced Waring to sacrifice some of the versatility of their other blendor: it is not possible to attach other appliances, such as a coffee mill or ice crusher, to the same power plant. But since the price is so much lower and the Drink Mixer is virtually a new appliance, Waring is confident that there is a substantial market for it.

↓ *Mold maker uses a "rippler" to smooth tooling grooves before the mold is finally polished. Hand work like this contributes substantially to the quality of the product.*

Two-cavity transfer mold is open with mixer cavity cores elevated. Cores in front, shown retracted, are for the motor housing.

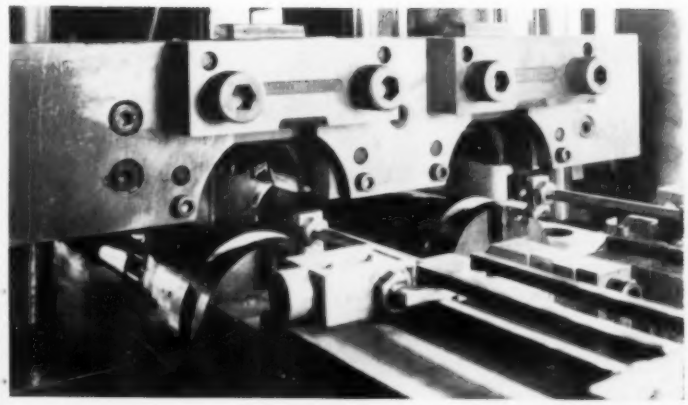


Largest melamine molding ever done by transfer process solves complex

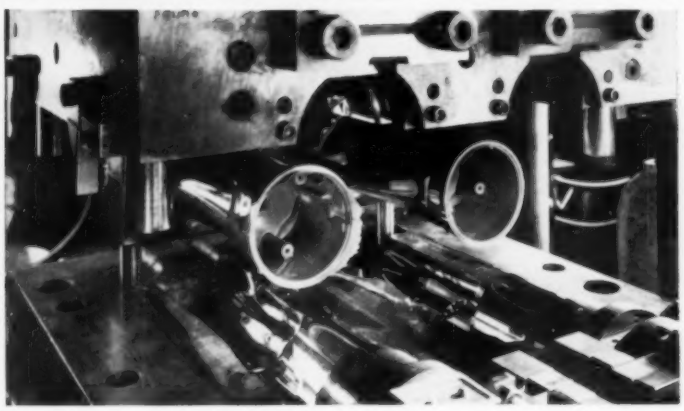
Early experiments with melamine to develop flow pattern. Problem was to get both the handle and the body to fill out properly.

Transfer molding was chosen as the most suitable process for forming the new Waring mixer. This molding method, used to form the thermosetting materials, involves two steps. First, the plastic is heated and softened by pressure in a chamber; then it is transferred to a closed mold for final curing. In this case, melamine preforms (six preforms measuring 2⅞" x 2⅞" x 1" are needed for each shot of 1200 grams that produces two blender housings) are preheated for 55 to 60 seconds. The actual curing cycle takes about 90 seconds with molds at 285°F and the cores at 310°F. The molds for the housing were designed with two cores, one for the mixing cavity, the other to form the motor housing. The motor cavity core incorporates an opening for the plug receptacle, eliminating the need for another core. Motor mounting bosses are part of the molding. The photographs on these pages illustrate the major stages of the molding cycle.

A major problem in molding this mixer was to obtain a molding flow pattern that would satisfactorily



Mold is partially closed; front cores moved up, and rear cores moved down to meet at the contour line. Mold is then completely closed for curing cycles.



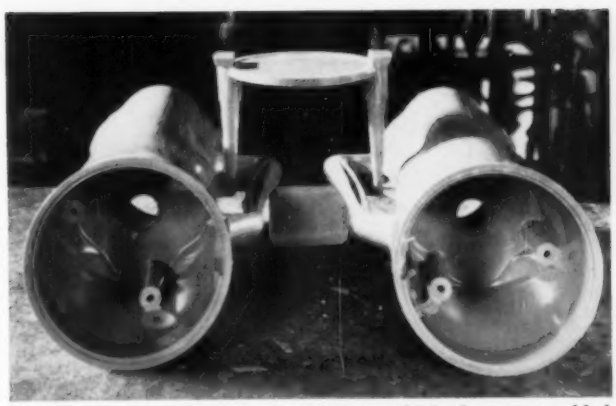
Mold opened after 90-second curing cycle. Front cores are retracted, bottom of mold drops, and rear cores are elevated. Parts are then removed by hand.

problem of mixer with built-in motor

reach both the body and handle sections of the housing. The parting line, which was designed into the mixer as a decorative element to minimize finishing operations, had to be the highest part of the mold. Any undercuts would cause the plastic to tear when the mold was opened. Over a pound of melamine is used in each mixer, making this molding the largest ever formed in melamine by transfer molding.

To ensure that the mixer cavity is leakproof, the mixing blade shaft is run from the motor through the center hole in the mixer cavity and then through a spinning steel washer. The washer is seated so that tension loaded bellows can be snapped onto the rim below the center hole, making the mixing cavity watertight.

The finished mixer has a capacity of 24 ounces, weighs three and a half pounds, and is twelve inches high. The five colors in the line are advertised as flame red, antique white, skipper blue, curry yellow, and deep charcoal. A pouring spout is molded into the housing and the top is molded by the compression process.



Molded housings shown in position in which they are molded. Viewed from the bottom, it can be seen how the bosses for the motor mounting are integrated in the molding.

After the gate has been knocked out, flash is removed and the gate area buffed. How the contour line dividing the front and rear cores is incorporated in the design can be clearly seen.

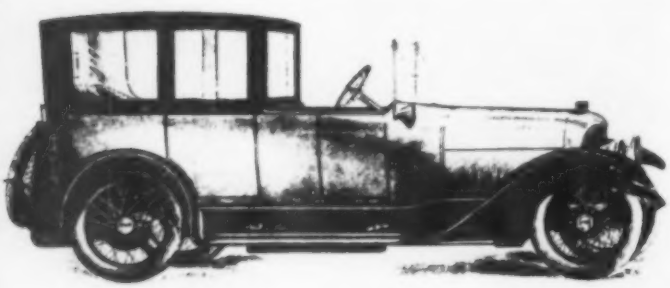
Holland prepares to go to market with a new small car

DAF will feature automatic transmission, low price

Not since the fleet and fancy Spyker (below) won auto prizes during the first quarter of this century has The Netherlands produced its own automobile. But this year, at the International Motor Show in Amsterdam, the van Doorne Automobielfabriek unveiled the DAF, first car in the small, low-price class to have a fully automatic transmission. Dutch consumers responded enthusiastically, and have already placed orders for the total 15,000 units to be produced this year. Through the next two years, as expansion on its factory at Eindhoven is completed, van Doorne hopes to bring its production up to 50,000 units a year and, by 1960, to compete in the European Common Market, and to join the ranks of European auto makers on the U. S. market, who last year exported 200,000 cars to this country (more than double the 1956 figure).

The new DAF, which will sell here for approximately $1,600 to $1,700 (in Holland the standard model is $1,085, the deluxe, $1,139), will aim at the same market that the Volkswagen, Renault Dauphine, and Fiat 1100 now occupy. Only consumer reaction to DAF's actual performance will indicate its ultimate success but its maker expects DAF's major drawing card to be a highly simplified, completely automatic transmission (bottom, right) and clutch. This new system provides a continuing change in ratio from "first gear" to "overdrive," automatically adjusting ratio to speed.

Other features of the DAF are the low fuel consumption (48 miles per gallon) made possible by its two-cylinder, four-stroke engine. However, with maximum speed of only 57 m.p.h. its appeal to long-distance motorists may be limited to that of a "second car." Engine, transmission and suspension members are carried on flexible rubber mountings. This eliminates the servicing of lubrication points and makes for a smooth, quiet ride. Van Doorne uses a chassis-less construction of pressed sheet steel, electrically spot-welded.

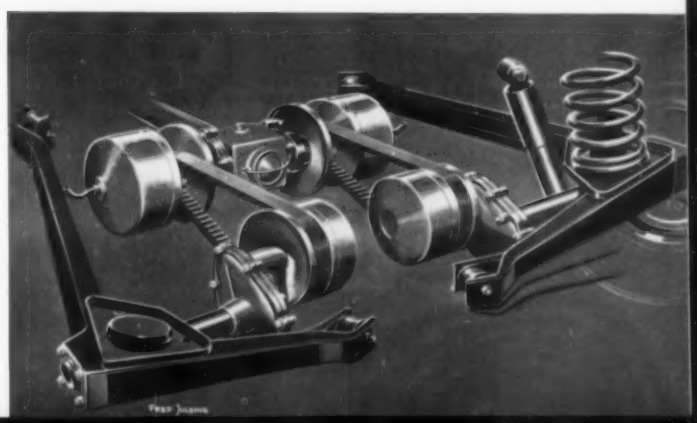


Lines are simple, chrome at a minimum in the two-door, four-passenger (142 by 56 inches) DAF. A scooped hood—possible because the engine is horizontal — helps cut wind resistance.

Unusually large windows give passengers impression of roominess, driver a clear view. The large (12.5 cubic feet) luggage compartment, which contains spare tire, has flat floor, wide lid.

Compact dashboard carries fuel, oil pressure indicators (uncommon in this type of car). Levers below wheel control signals, horn, and headlights. Brake and gear shift are between front seats.

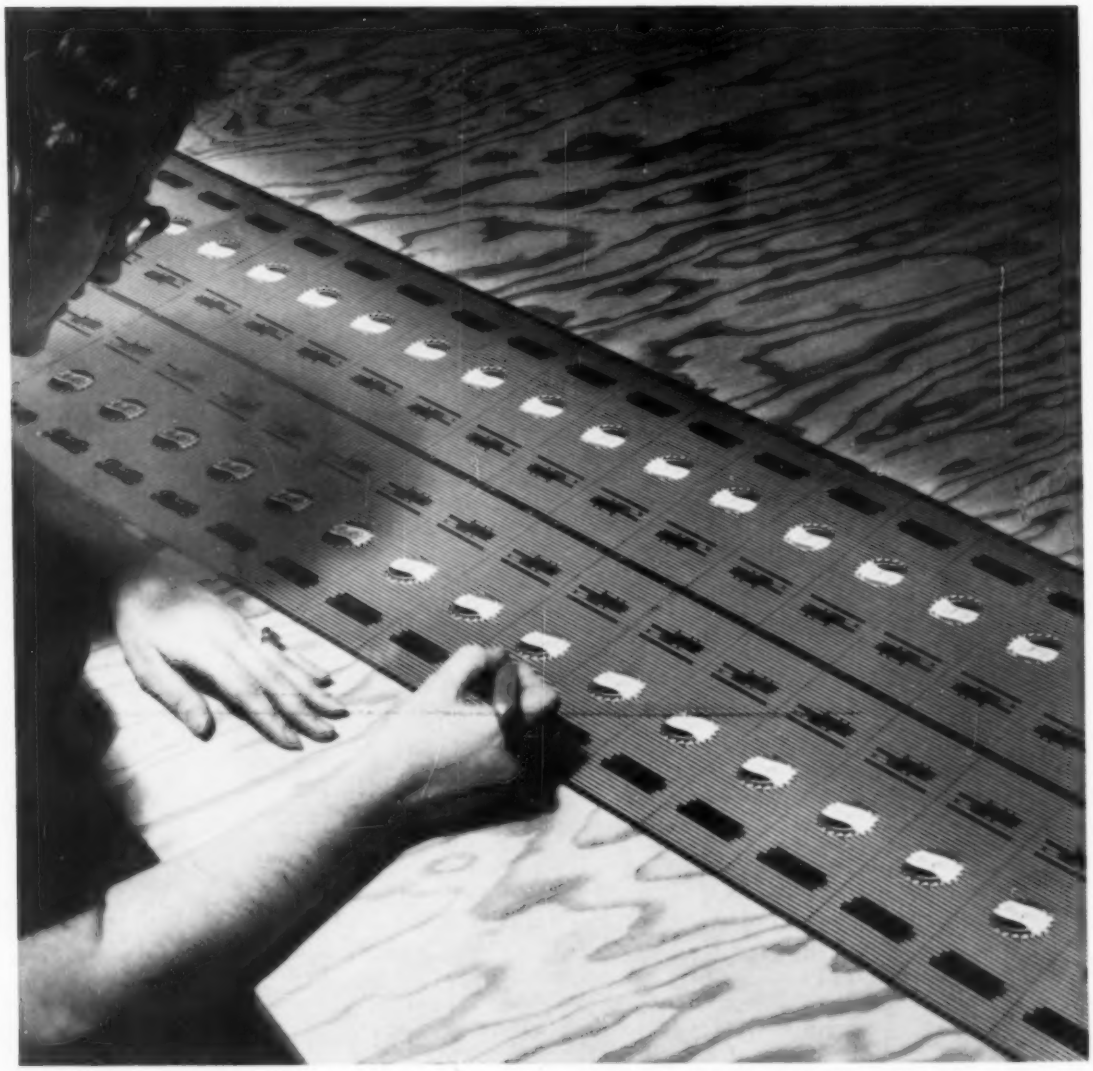
DAF's unusual transmission employs a V-belt and variable diameter pulley system which changes power ratio in direct relation to requirements. Key to the system are the two front pulleys, both of which are halved and change their working diameters by widening and closing the distance between the two sides of their V-like bearing surfaces. As the halves of each pulley come together they pinch the pulley belts toward the periphery of the pulleys. This enlarges their working diameter and smoothly transforms the power ratio from "low" through to "high." Closing action of the pulley halves is ocntrolled by centrifugal weights which are thrown outward as motor revolutions increase, forcing the halves together. (Spring-loaded rear pulleys change dimension in reaction to the front pulleys).



PS 2 *Production Specialties*

A young Flushing, N. Y. company, very attentive to current market and design conditions, is offering to designers a special service in decorative trim parts. The company has limited itself to one method of mass-producing all manner of trim and product identification. The following article outlines the techniques Park Nameplate Company, Inc. employs and the unique results they achieve by . . . .

SELECTIVE ANODIZING ON THIN ALUMINUM



Embossed and textured areas on thin aluminum foil are inspected at Park Nameplate before they are separated into plates.

Park is now headed by (from left to right) Joseph Loesing, sales manager, Dave Kend, vice president, Jerry Shore, president, and Anthony Chiesa, vice president. Last three founded company.

The three young men who started Park Nameplate Company early in 1954 were brought together by a common interest in metals and color. Jerry Shore, Dave Kend, and Anthony Chiesa all had considerable background in the manufacture of product identification plates and other decorative parts; they were familiar with the process and the problems of applying color to metal. Alert to technical possibilities and open-eyed to the requirements of the consumer market, the three had been looking for ways to overcome the shortcomings in the production methods then in use. A chance—and a challenge—presented itself when the newly formed company learned of the predicament in which the Remington Rand Shaver Division found itself in regard to its 1954 electric shaver. The problem was that the nameplate on the shaver did not hold up for very long. The plate was made of chrome finished brass with etched lettering and to assure resistance to wear and corrosion, the plate had to be lacquered. But the lacquer surface broke down and the plate began to tarnish after a period of handling that fell very short of the life of the shaver. Pooling their experience, the three young men came up with a solution. They simulated the brass background of the original plate with a brass anodized aluminum plate, and put to excellent use a property inherent in anodizing: self protection. Being a protective coating itself, an anodized finish does not, of course, require any additional spray or lacquer to ensure a corrosion-free and wear-resistant surface. The three men developed a way of etching and anodizing lettering and patterns with sharpness and clarity, and the result was a new nameplate for Remington Rand that was inexpensive (the material used was thin aluminum) and at the same time offered a durability that could not be achieved with the earlier plate. The advantages were obvious. Remington Rand gave the trio a large contract; this helped to give the company a solid base.

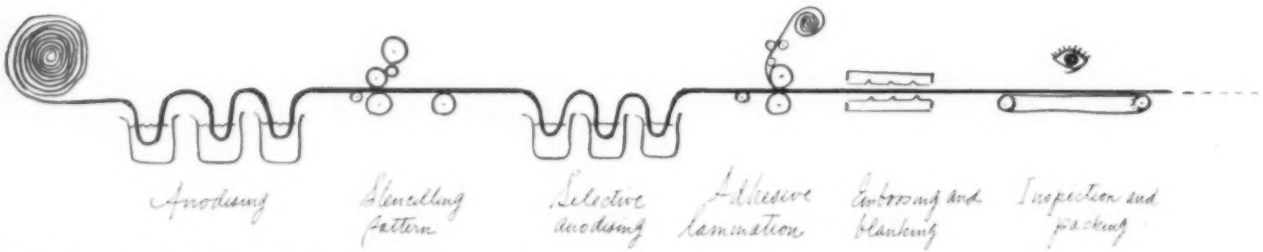
It cannot be said that the Park group had invented a process. Since aluminum forms its own natural oxide film as soon as it is exposed to air, anodizing—the electrolytic formation of an oxide film to desired thickness—invented itself, so to speak. Anodized finishes had been put to use during the war as rust protection on some military equipment, and shortly after the war, they began to appear on consumer products (mostly on refrigerator and automobile parts). But anodizing was not yet widely used as the sole process for decorative metal finishes. Manufacturers of product-identification devices knew it was possible to etch patterns into an anodized aluminum surface, but this method proved to have one serious drawback which prevented its popularity: fuzziness. Manufacturers found that sole anodizing—etching on an anodized surface and covering the etched area with another coat of anodized color—could not duplicate the clarity of patterns lithographed onto a plate, and they kept away from sole anodizing in spite of its advantages.

If the Park group cannot be called inventors, they certainly were explorers. Their survey into existing methods of color-to-metal application took them not only across the country but to Europe. By the time they settled down and opened their Flushing, N. Y. plant (now they have added sales offices in California and Chicago to their busy New York operation), they had familiarized themselves with all the possible ingredients, had found the acid resists needed to eliminate the troublesome fuzziness and had developed methods by which they could achieve a *clear definition* of lettering and decorated surfaces by *selective anodizing only*.

By devoting to this young company an installment in this series, we do not mean to suggest that they represent the country's product-identification industry. There are companies that have been in this field much longer than Park, and have accumulated wide experience in engraving, embossing, etching and lithography. But the Park group has limited itself to one area of working—aluminum thin plates (.003 or .005 mostly) treated with selective anodizing and etching—and in doing this has been able to achieve a *surface clarity* that is now the unique feature of Park products. Park has gone further than most companies in this single field not only because of ability, but above all, because of specialization and concentration. The experience they have today in chemical combinations and electrolytic techniques, as well as production methods with which they turn out millions of decorative parts, is the result of experimentation, and they continue to experiment in various directions within the field of anodized aluminum.

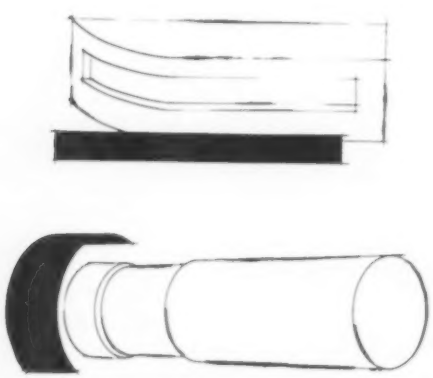
Since the inception of their company, the Park group has worked directly with a long list of designers and company design departments. With them they discuss the production aspects of new ideas for product trim and make their own recommendations. The product features they offer, their methods of fabrication, and some examples of the work they have done, follow on the next four pages.

Multi-color surfaces are made permanent by application of colors in "reverse."



Flow diagram of production cycle; only major steps are shown.

Patterns are applied to aluminum fed from rolls. Raw foil is polished before actual production cycle starts.



Properties inherent in thin aluminum foil—ductility, pliability—are main features of thin plates. Backed with adhesives, they are easily applied to round surfaces and curves.

The diagrams on this page illustrate the major properties of thin plates and show how they are processed on Park's production line. The features of thin aluminum used in conjunction with products are obvious, but the obviousness does not diminish their special usefulness — *ductility*, and an ability to "*merge*" into a product and produce the effect of an *integrated whole*. These qualities are indicated by the diagrams below. All of Park's thin plates (and their tradename for them actually is "Thinplates") are given an adhesive backing during the production cycle; the type of adhesive depends upon the material and shape of surface on which the part is to be used. The finished plate is applied with equal ease whether the surface is straight, round, or curved, and literally "falls" into the recessed area for which the part has been designed (sometimes by Park's own art department.) Again, the advantages here are almost too obvious to mention, but the manhours saved by not having to drill or rivet — operations necessary with conventional, heavier plates—can hardly be overlooked.

Park's first products used one color on an anodized background, but once the major objective—clarity—had been met, Park began to work with two colors on a color surface, and also developed chemical preparations and techniques to obtain matte or high polish finishes, singly or in combination. In addition to *durability* and *permanent color* inherent in any type of anodizing, Park's process offers these design features:

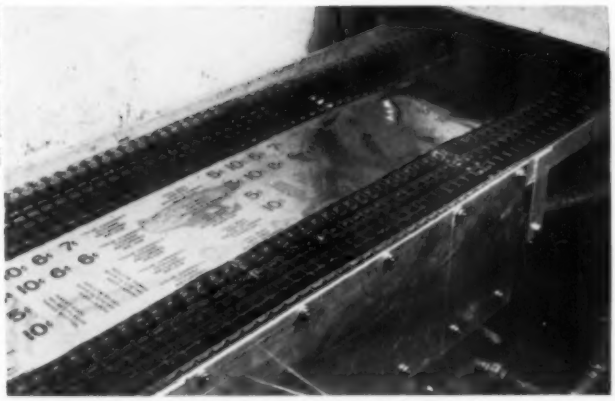
multi-color in matte and/or high polish finish—Park now claims sufficient know-how to handle color combinations in any selection and amount.

textures—Application of Park's techniques have yielded three-dimensional effects on flat surfaces.

embossed parts in anodized multi-color combinations—This is Park's "Thinplate Dimensional," which achieves a rich surface — a sculptured, heavy metal effect — although made of .003 aluminum foil.

It need hardly be said that the uniqueness in Park's production method lies in the way they are able to achieve clarity on anodized multi-color parts. They are not willing to disclose this process beyond the fact that the clear surface results from certain combinations of acid resists, organic coatings and electrolytic techniques. What they have done, of course, is to refine the processes developed by Alcoa and other pioneers in aluminum anodizing. The diagram above

All photos: Frank Bauer



After anodizing, pattern is stencilled into foil and areas that are to retain this color are masked with protective film.

The protective film—acid resists—are backed into the pattern not to be affected when areas to be anodized again are etched.

After etching, the foil is cleaned and acids are washed off in a machine specially designed by Park for this operation.

After all colors have been applied, finished parts are separated from the aluminum sheet; this machine is also used for embossing.

illustrates the major production steps that make up Park's production cycle, but within each step there are other operations that are not indicated here.

To follow through with an example, let us assume that Park is about to process a job intended to have a gold background with black lettering on .003 aluminum foil (the more standard material.) The colors will then be applied in what appears to be a *reverse* order. The first color anodized on the foil will generally be not the background but the color of the lettering (an electric current is passed between the aluminum and an electrolytic bath in which the aluminum functions as the anode). The lettering, or pattern, is then transferred onto the black surface by stencilling, and the areas that are to retain the black color are masked with a protective film (top picture)—an acid resist backed into the surface (left, second from top) to shield it from the next step: the etching of the exposed black surface. After etching, the acid is washed off the foil (left, third from top) and the gold "background" is then applied to the exposed surfaces; this is, of course, done again by anodizing. This method of "reverse anodizing" gives the plate a structural compactness that obviates fear of peeling or wearing out of printed areas.

Finished parts are inspected for damage before shipping.

Sharp, clearly defined areas on trim parts help to further total design intention

1 *A .005 gold & white anodized plate (front) for Casco electric griddle was bent and hole punched by Park. Instruction plate on handle is also Park product.*

2 .003 *Thinplate fits into recessed tv-frame area.*

Throughout the short life span of this company, the managing group has aimed to combine these two major areas—materials and color—in ways that are not only compatible with the demands of contemporary design but are directed toward furthering its potential. Park advocates the use of multi-color anodized aluminum with molded plastic parts to bring sharp accents to otherwise monochromatic areas, and its special chemical combinations and manufacturing techniques bring clarity not only to the decorated parts but help in establishing the designer's intention of simplicity and sharpness. This is evident from the examples shown here.

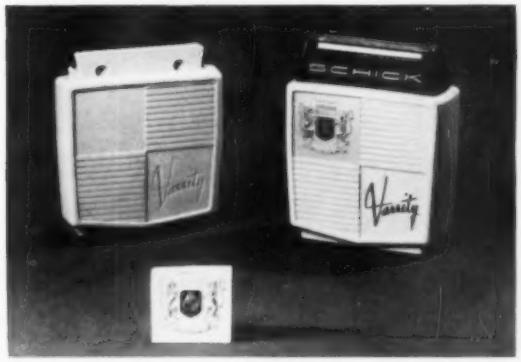
Aluminum foil trim parts are being used for identification and instruction plates or a variety of decorative purposes not only on home and industrial appliances (air conditioners, refrigerators and freezers, washers and driers, cameras, vending machines, tool and laboratory equipment in addition to the types of products shown here), but also on packages (liquor, cosmetics, etc.) The materials with which they are used are wood, glass, ceramic, plastics, die-castings and painted surfaces. They are made of .003 foil for two-color plates intended for curved surfaces, and of .005 stock for larger parts with multi-color finish. Although most of Park's products are either thin flat plates, or thin embossed plates, Park is equipped to mass-produce parts requiring additional operations. One of the plates in (1) was made of .005 aluminum, and was bent and the center hole punched out, as part of the total production cycle, which included a gold and white anodized finish.

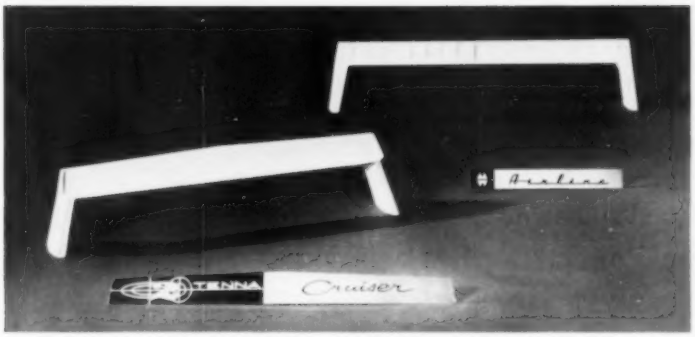
The rest of the examples illustrate the two major types of Park products: flat plates, and embossed plates.

The before-and-after shots in the examples make it clear that the molded frames and handles with which the plates are used gain an added dimension with the addition of metal and color, and that the impression created by the completed housing—with plates added—is that of a unified whole. The flat, .003 black and gold Thinplates (2, 3) fit into areas that are either recessed or have a raised border.

Decoration is, of course, a means of livening up a surface. By embossing patterns on very thin material it is possible to achieve the aims of decoration while eliminating the use of heavy metal that is not only more expensive but, for decorative purposes, a waste. In (4, 5) the .003 two and three color anodized plates not only identify the product but incorporate an emblem and a trademark in the overall decoration. In (6) three embossed spots create the effect of raised dots of red, and give the finished case (Schick Razor) a quiet but clear, decorative quality. Like the flat plates, the embossed trim parts are placed in recessed areas and give the impression of being cast into the surface. Park, continuing to look ahead, is also developing techniques for embossed patterns on much larger surfaces.

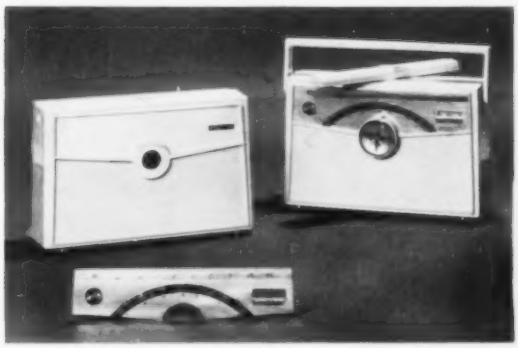
4 *Embossed .003 plate for Schick razor has polished red & black raised pattern on matte silver background.*





3 *These .003 black & gold Thinplates with polish finish for Montgomery-Ward tv portable (Airline) and Westinghouse portable radio, fit recessed handle areas.*

5 *Embossed two-color .003 plate (Thinplate Dimensional) includes dial, trademark and company name.*

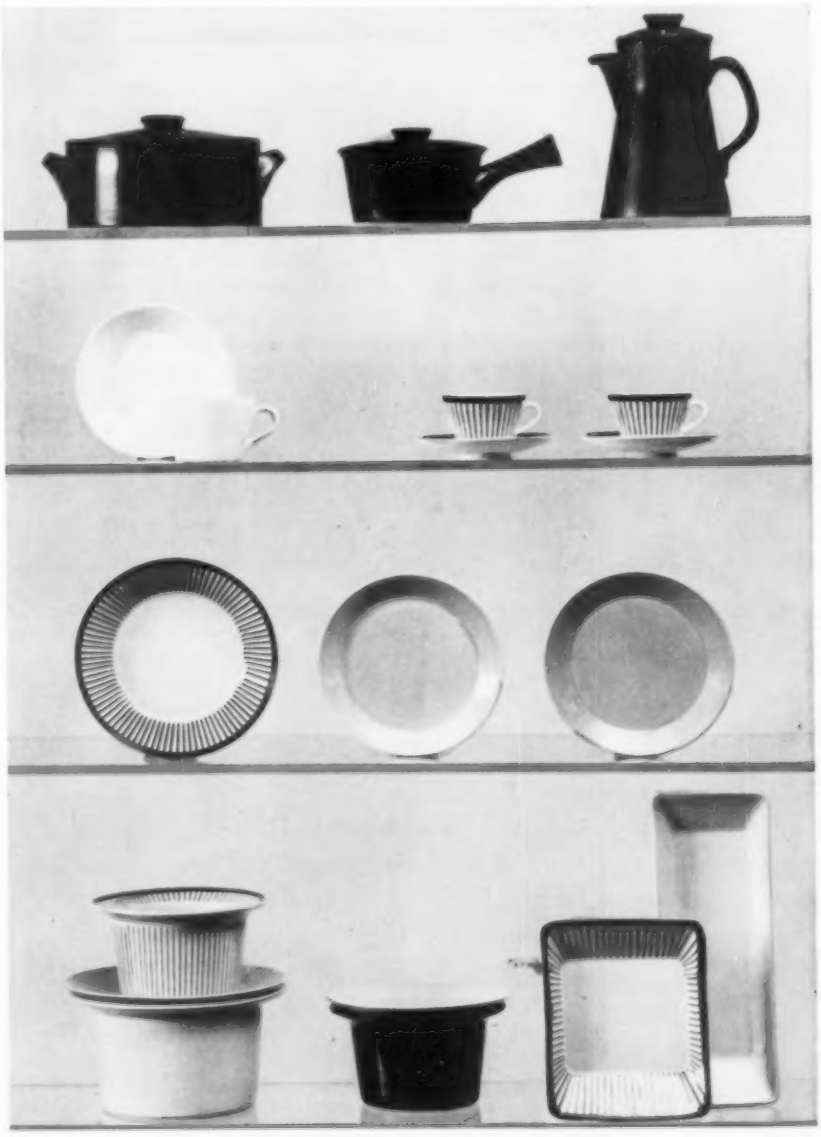


6 *Embossed .003 small Thinplate Dimensional adds decoration to Schick package.*

DESIGN REVIEW

Cookware designed for serving is by now universal — but its expressions in Europe and America, as shown here, reveal characteristic differences. The Scandinavians, for instance, discover contemporary applications of traditional materials, while American makers use newer materials like stainless steel in a manner that recalls an earlier elegance. U. S. design also strives for a further union of cooking and serving, with table appliances that range from casseroles to indoor barbecues.

↑ **Danish "Voss"** cookware uses cast-iron for even flow and distribution of heat while cooking, longer heat retention afterwards. Enamel (in red, royal blue or turquoise on outer surfaces) is applied by annealing for greater durability and resistance to thermal shock, and is carried through on rims as proof against chipping. Prices range from $2.25 to $9.95.



→ **"Terma - Spisa"** (Swedish for "heat" and "eat") is a new application of ceramics: dinnerware and cookware are related in design, but made of four different types of ceramic — earthenware for plates; bone china for cups; vitrified ovenproof ceramic for platters and deep dishes; and flame-proof Terma, for frying pans, casseroles, tea and coffee pots. $1.50-$12.50.

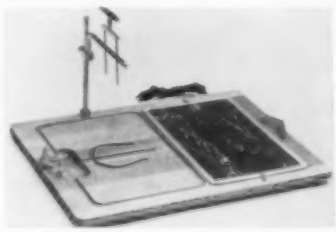
↓ **Revere's** new all-stainless cookware points to new and elegant uses of this popular metal, while evoking memories of a more formal age. Prices are $7.95 to $12.50. Meanwhile, Ekco introduces its line of stainless steel, copper-bottomed casseroles and skillets, notes it is first to copper-plate oval and shallow utensils.

↓ **Mirro's** electric Dutch oven manages with a minimum of "styling," to convey the impression of a table cooker. Its 5-qt. pan features a vapor-seal construction for waterless cooking, with steam vent in cover. Heat is regulated by thermostat in plug which (as is standard today) can be removed and used with other Mirro cookers. $19.95.

↓ **Thermo Buffet Set** designed by John Beinert consists of two parts: an electrically-heated tray (with thermostat) and an anodized aluminum server. Tray is $26.95, server $9.95.

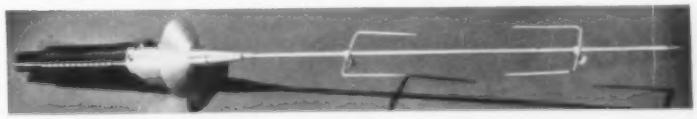
↓ **Meat keeps warm** on this birch carving board by means of same lightweight heating unit as in tray at left. Board, by Sydney Farber, comes without carving aid, $29.95; with it, $42.95.

↑ **"Party Chef"** is Cory's name for its gold-toned aluminum electric cooker, which bakes, fries, roasts and otherwise cooks 4½ qts. of food. Standard automatic features are thermostat and signal light. Comes in gift carton, price $25.



↓ **"Saber Que"** portable power rotisserie designed by Reinecke & Associates uses flashlight batteries to rotate spit. Unit includes legs that clamp to brazier or support spit in front of fireplace. Price, $19.95.

↑ **Portable broiler** by Stanthony gets barbecue effect from a combination of radiant electric heat and ceramic refractory coals which act like charcoal. Comes in brushed chrome or copper finish. $49.95.



Hand tools used in the kitchen and at the table are seen in new shapes—a rippled egg beater, an almost surgical-looking grapefruit knife, Ponti's angular flatware. Power kitchen devices combine many functions, and, in one case, reveal a new power source—water—for an old chore: peeling potatoes.

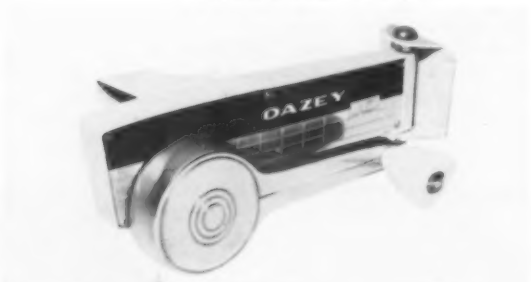
↑ **Bosch Kitchenmachine** shows a German approach to a problem which interests U. S. designers: the multi-purpose appliance based on a single power unit. Machine has bowl with mixer arm, blender with three pairs of blades, plus 17 attachments which — among other things—chop ice and peel potatoes. Basic machine costs $129.95; with all attachments, $160.00.

↓ **Potato peeler** by Rembrandt uses water power to whirl vegetables against abrasive sides of plastic bowl at rate of 2 pounds a minute, according to manufacturer. $9.95.

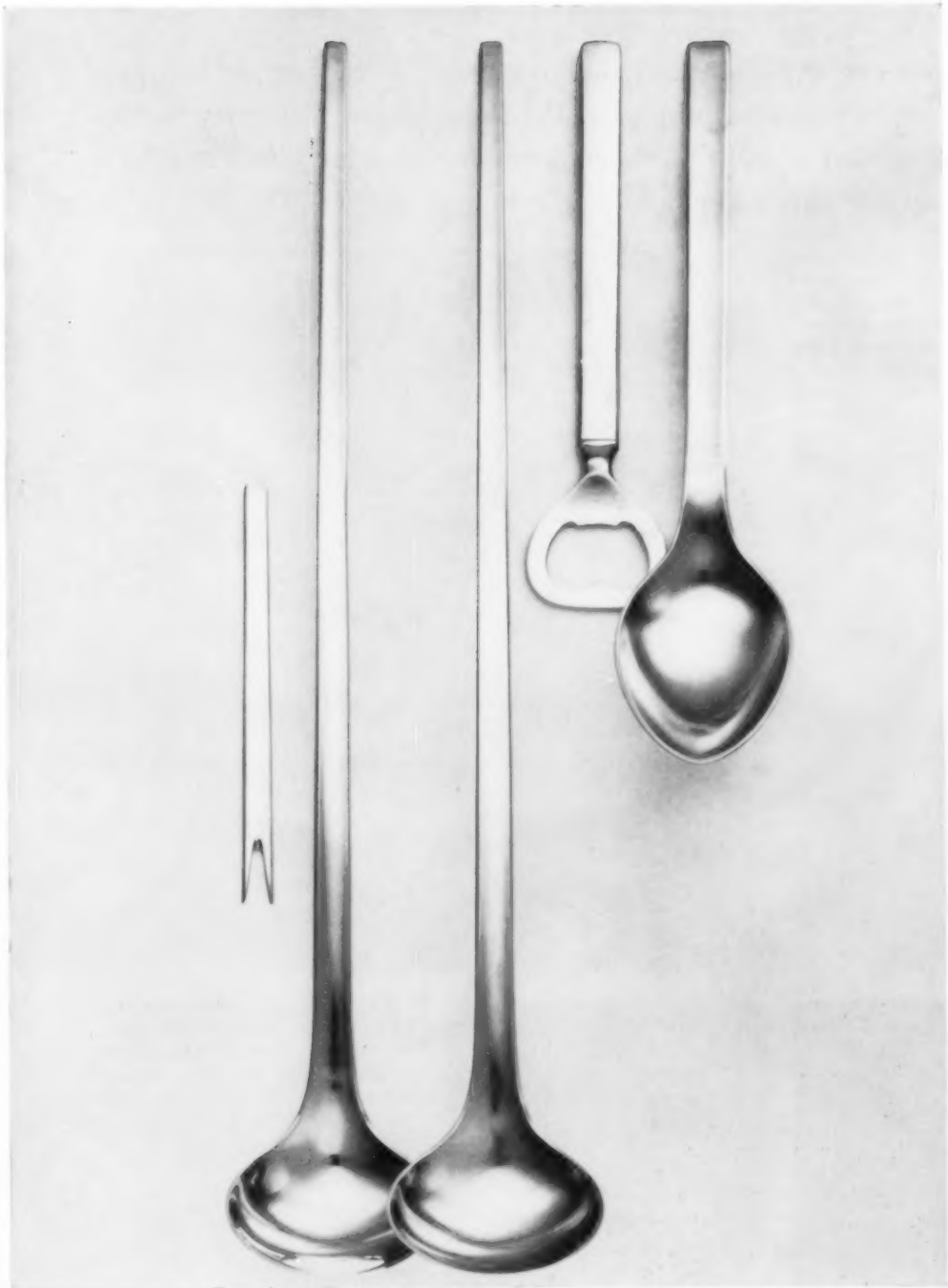
↑ **Grapefruit knife** is new member of Ekco's "Waverly edge" line of serrated knives. Curve of stainless steel blade is designed to fit shape of fruit, make neat segments. 98c.

↓ **Scalloped blades** of Ekco's new Flint egg beater are designed to produce a more rhythmical action, make beating (even of heavy batters) smoother and easier. $4.95.

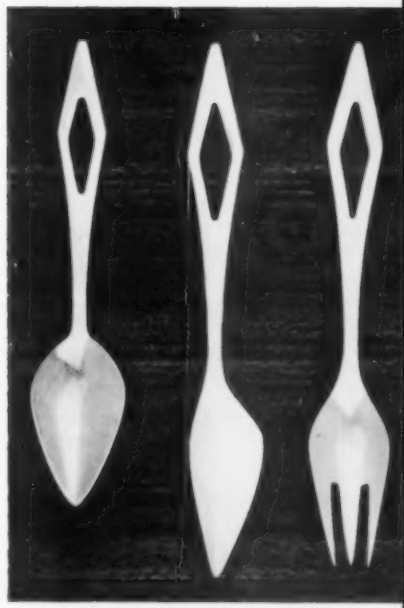
↓ **Dazey's** new Mark II automatic can opener features single-action: the handle both locks can in place and opens it. Designed by Sundberg-Ferar in choice of colors, copper or chrome trim. $6.95.



↓ **Electric** can opener and knife sharpener by Swing-a-way works automatically after switch is set. Sharpener is under ribbed gold-colored section of white housirg. Retails at $27.95.



↑ **"Tanaquil,"** a stainless flatware line from Georg Jensen, honors the American Ballet's Tanaquil LeClerc. Shaping of pieces shows trend toward treating handles and bowls as continuous shape (an approach seen in some recent German flatware, too). Prices range from $1.75 for the lemon pick to $14.50 for the large salad set.



↑ **Gio Ponti,** as one has come to expect, continues to do the unexpected —as in his new stainless flatware whose uncompromising angularity seems to challenge the flowing curves other makers strive for. Whether this represents a countertrend or merely Ponti's whim remains to be seen. 5-piece setting, with soup spoon, salad fork. $12.50.

Weight and compactness are important to today's housewife whether she is thinking of her own figure or her household equipment. On these pages there are examples of new equipment designed to help her keep her home in order with less effort, and two new scales to help her check her personal trimness.

↓ **Adjustable shower** by Webb Industries, Inc., Perma-Jet can be raised and lowered to suit tall fathers or short sisters. Device is made of stainless steel with nylon head designed to eliminate mist and stray sprays. Touch control changes the force of the spray without changing hot or cold valves. Shower head may be bought without flexible extension.

↑ **Strato-Flite** scale, designed for Borg-Erickson Corp. by Banka-Mango of Chicago, is all-metal construction and has a wide dial for easy reading. Wide rather than long, scale hugs wall, has ample foot room. Retails at $17.50.

↑ **Hair dryer,** a new Ronson Corp. product, features double-shell housing to prevent overheating and to concentrate hot air flow through dryer nozzle. In pink, blue, and yellow for $14.95.

← **Built-in scale** to keep the bath room floor uncluttered is made by NuTone, Inc. It weighs 28 lbs. and has a spring counterbalance for easy fold down and to prevent its slamming shut. It can be painted to match walls. Price $34.95.

↓ **Double-duty power source,** the Compact Cleaning Unit operates as a vacuum cleaner and will also drive the Polish-Aire Floor Polisher. When floor polisher is attached to the vacuum cleaner unit, air drives turbo blades that spin the brushes at 3,500 r.p.m.

← **Bissell Shampoo Master** enables housewives to stand up while they shampoo their rugs. The applicator is made of linear polyethylene and has a trigger in the handle to release cleaning liquid. $14.95, including a can of cleaner.

↓ **Swivel-top vacuum** by General Electric is designed to hug the floor to prevent tipping and for easy storage. It is 13 inches high and 13¼ inches wide. Model C-6 comes in pearl gray and coral, will retail for about $54.95.

↓ **Built-in vacuum system,** with conveniently located wall inlets, eliminates the chore of dragging a vacuum cleaner around the house. A flexible hose is plugged into an inlet, power is switched on, and dirt is sucked to a tank located away from the living area. Made by Vacu-Flo Division of H-P Products, Inc., installation for a three bedroom home starts at $220.00.

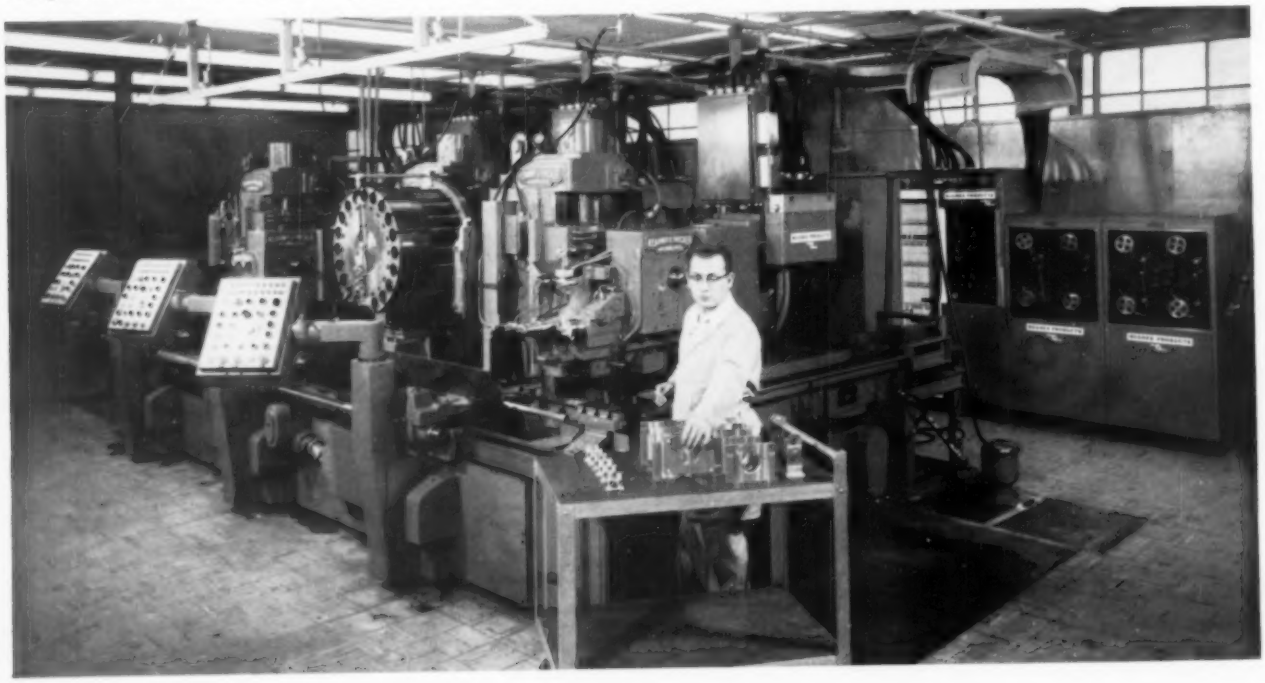
↑ **Bissell "Continental,"** designed by Harley Earl, Inc., is their de luxe model with adjustable brushes. It has a chrome finish and retails for $23.95, in gift box.

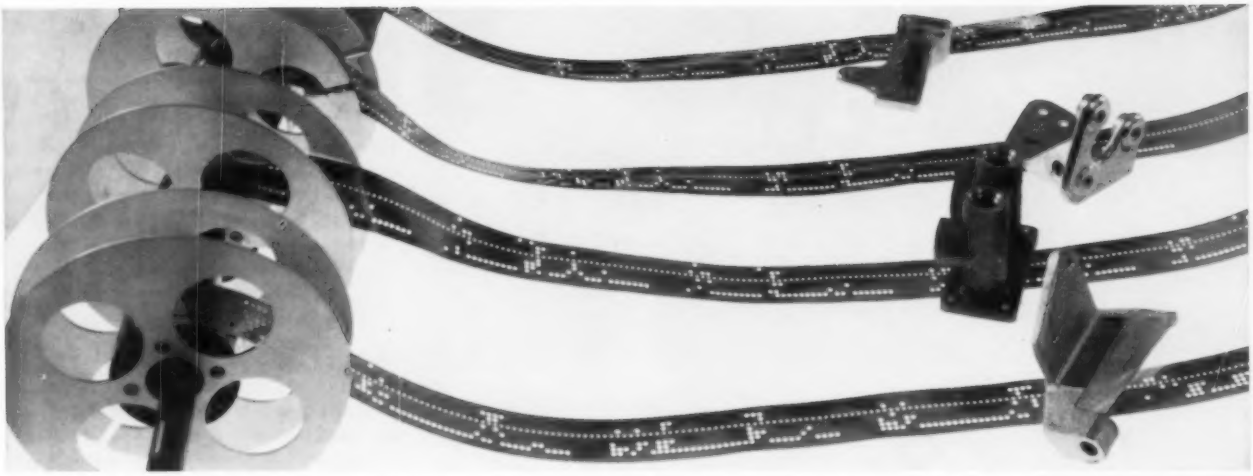
Trained typist transcribes engineering data from planning sheet to punched tape.

Auxiliary master control switch for automated line of machine tools is checked.

Technics: Factory automation becomes a fact at Hughes Aircraft

The milling, drilling, and boring machines in the foreground take their orders from the punched tapes seen on the control reels in the background. The technician has only to feed the casting to the line and remove the finished part when it has been machined.





The flexibility of the automated machine tool line is illustrated here. Machining data and sequence for each of the parts shown is punched on each individual tape. The line can simultaneously produce all of the above parts used in armament control systems.

At their El Segundo (Cal.) plant last month, Hughes Aircraft officials disclosed to the public their top-secret prototype of an electronically controlled line of machine tools. The line, operated from punched tapes and controlled by transistorized digital computers, is producing vital parts for the Hughes electronic armament control systems used in Air Force all-weather interceptor airplanes.

Rollin M. Russell, Hughes vice-president and chief executive of the Products Group, explained that the company's Digitape electronic controls had been linked to a milling machine, a drilling machine, and a boring machine. A single punched tape on which had been transcribed all the machining data controls the three-machine line. The result: mass production techniques are available for the first time in the area of small-lot production.

"We have here the nucleus of the nation's first electronically automated factory," Russell declared. He went on to state that the ability of the automated line to shorten the time between engineering release and the production of parts, plus its ability to make engineering changes without sacrifice of production rates, would be of substantial importance in crash development programs for defense planning.

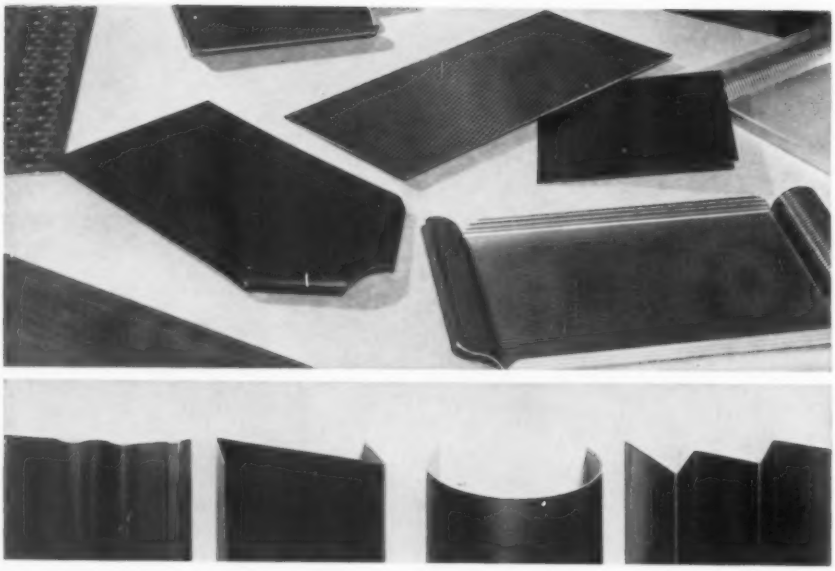
"Single machine tools have been electronically controlled in the past," Russell said, "but this is the first successful application of automatic electronic controls to a series of machine tools working on successive operations, and, in fact, making a variety of parts at the same time." Changes in operation may be introduced or production started on new parts simply by changing or adding punched tapes, without stopping the machines.

The prototype equipment was designed and produced on the "building block" principle by Kearney & Trecker Corporation of Milwaukee. Both machines and controls are constructed to be fitted together as blocks in any desired number, and arranged to provide the greatest production savings for the type of parts to be machined. The line may be added to and rearranged, yet still be capable of operation from a single tape for each type of part. Several unrelated parts may simultaneously be manufactured from different tapes operating from the master control.

Since the set-up time of the line is relatively short, a few parts can be run through, in any sequence, almost as inexpensively as several hundred parts. This virtually eliminates costly inventories, since spare parts and re-orders can be quickly and economically produced with the same quality and uniformity as the original from the storehouse of taped production information.

The economic feasibility of automation —still impractical with most industrial applications due to the necessity of large-scale production to offset equipment costs —is less of a factor in the area of national defense. Military requirements must stress performance and reliability, plus advanced design, regardless of cost. Defense officials have urged missile manufacturers to speed up their industrial transition from "the old-fashioned horse and buggy habit of long production runs" to a more modern mode of thinking. In an industry where production orders are geared to a specific number for each given application, such advice is well founded.

Production designs of controls and machines will be available during 1958.



New protective and decorative coating for metals

A new process that colors metals and gives them a highly protective coating has been introduced by Electro Metallurgical Company, a Division of Union Carbide Corporation. Known as Permyron, the new process can be used to cover steel (stainless or carbon), aluminum, titanium, magnesium, and any other metal. Although the specific ingredients used are still kept secret by Electromet, the process is a chemical reaction that takes place at elevated temperatures (slightly over 700°F.) After the reaction has occurred, the coating is virtually part of the material it covers.

Electromet engineers anticipate that Permyron will be available in a wide range of colors, but at this time, only black has been perfected. Efforts were concentrated on the development of black to coat the panels for the new Union Carbide Building that is being erected at 270 Park Avenue in New York City. The first application of Permyron was a joint project undertaken by Electromet with Atlas steel Ltd. to produce the curtain wall for Atlas Steel's new office building at Welland, Ontario. Although Electromet does not intend to produce coated metal parts on a permanent basis, they have equipped their plant at Niagara Falls with the necessary machinery to turn out the curtain walls for the Atlas building and the black stainless steel for the spandrel panels and column covers for the new Union Carbide building. In the future Electromet will license the process on a non-exclusive basis.

Permyron offers a combination of characteristics that makes it potentially attractive as a decorative and protective coating in a wide variety of applications. Laboratory tests conducted by Electromet show that it remains intact when bent 180° in tension around a radius approximately equal to sheet thickness, and that there is no visible effect on it under tensile tests where the specimen was elongated up to 50 per cent. Since the new coating is ductile, metal sheets can be formed by conventional methods of drawing, rolling, or bending after they have been coated. Electromet also reports that Permyron has good properties of chemical and humidity resistance and can withstand thermal shock well.

One of the most outstanding features is the light weight of Permyron. It is calculated that to coat the 300,000 square feet of stainless steel that will be used in the new Union Carbide Building, only 500 pounds of material will be required. Before it was finally decided to use Permyron for the new building, other coating processes were considered, including porcelain enamel and anodized aluminum. The new process proved to have the desired characteristics and was competitive in price with other methods.

Unlike porcelain enamel or anodized coatings, Permyron can be touched up in the field. Scratches and other mars inflicted to the coating during fabrication or construction can be remedied by applying the material and then heating the surface with lamps to cause the chemical reaction. For the production of metal sheets coated by the Permyron process, the pigmented vehicle can be applied by any standard method including spraying, dipping, or rolling.

In addition to construction and building, Electromet anticipated that the Permyron process will prove to be suitable and economically feasible in the production of automobiles, appliances, metal furniture, photographic equipment, sporting goods and toys, signs, aircraft, even barbed wire. Its use as a decorative coating will, of course, be greatly expanded when a range of colors has been developed. Manufacturer: Electro Metallurgical Company, Division of Union Carbide Corp., 30 East 42nd Street, New York 17, N. Y.

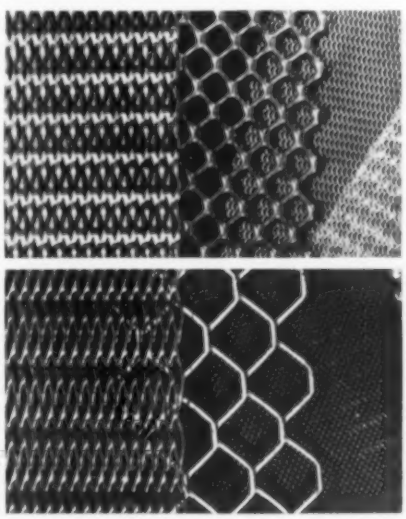
New Shock Steel

A shock steel with maximum toughness at high hardness levels has been developed by Crucible Steel for the tool and die industry. This low alloy steel is called LaBelle HT, and is suitable for applications requiring unusual resistance to shock or impact such as impact extrusion tools. Tests have proven LaBelle HT superior to other shock resisting steels. Manufacturer: Crucible Steel Company of America, Pittsburgh 22, Pa.

More expanded metal patterns

The increasing demand for expanded metals in a greater variety of patterns has prompted Designers Metal Corporation to develop new tool designs that make it possible for them to manufacture hundreds of patterns on a production basis. Openings in the pattern vary from 1/16 inch to $1\frac{1}{2}$ inches and the gage of the metal from .015 to as heavy as 12 gage. DEMCOR, because of the variety of the patterns they can produce, are able to offer large volume users patterns that are exclusive for a particular product or application.

By developing a method of manufacturing light gage meshes in coil form, DEMCOR has departed from the previously standard sheet production. These new methods make it possible to process these coils through slitter lines and automatic shears for mass production. Manufacturer: Designers Metal Corp., 577 East 159th Street, Harvey, Illinois.

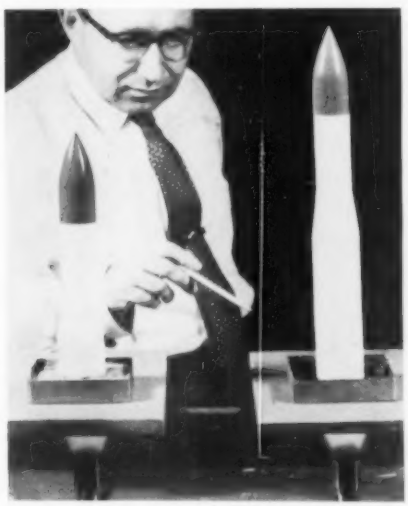


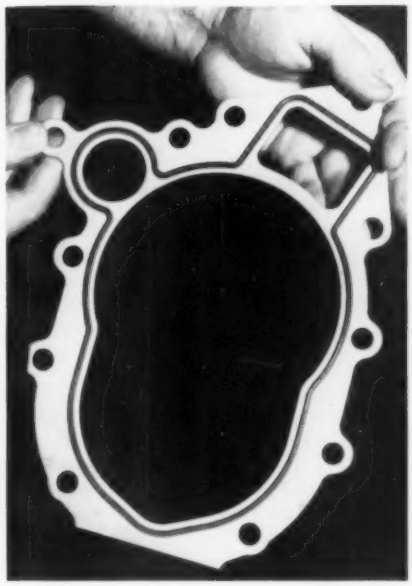
Greater insulation—less bulk

Scientists at Johns-Manville have developed a new type of aviation insulation which, it is claimed, may prove of vital importance to America's rocket and missile programs. Name "Min-K" because of its minimal conductivity, the new insulation insures greater accuracy for rockets and missiles by providing more effective protection to temperature sensitive instruments and controls. Min-K also has the ability to increase the range of missiles because it can perform the same job as conventional fibrous insulation, taking up to one-third the space, and making it possible to increase fuel capacity by as much as 20 per cent.

Another unique feature of Min-K, according to Johns-Manville, is the fact that its thermal conductivity decreases appreciably at lowered atmospheric pressure, and consequently, at higher altitudes. At an altitude of ten miles, for instance, the thermal conductivity may be decreased by as much as 50 per cent, with correspondingly larger reductions at higher altitudes. This characteristic is directly attributable to the extremely small pore size of Min-K insulation material.

Composition of the material is still a secret because of patent considerations and the highly classified nature of the entire missile program. Johns-Manville officials claim, however, that Min-K possesses lower conductivity than any other known insulation. The two missile models (below) are made of high melting synthetic wax and were identical when they were placed over the flames of blast gas burners. The temperatures of the burners is uniform, but the model on the left, placed over ½ inch of standard aviation insulation, melts quickly, while the model on the right, placed over ½ inch of Min-K insulation, does not melt at all. Manufacturer: Johns-Manville Corp. 22 E. 40th St., New York 16, N. Y.





High temperature synthetic rubber

A synthetic rubber that resists oils, fuels, and solvents at temperatures above 400°F will be produced in quantity by Du Pont as soon as they complete a new plant at Deepwater Point, New Jersey. The plant is being constructed to turn out "Viton," Du Pont's new fluorine-containing elastomer. The synthetic rubber, which is a linear co-polymer of vinylidene fluoride and hexafluoropropylene, has been produced in a pilot plant since 1956 for evaluation by rubber companies.

The need for an elastomer with heat and chemical resistance has become increasingly pressing with the advent of high-speed aircraft and guided missiles. Drawing on their experience in fluorine chemistry, which has resulted in the development of materials such as "Teflon" fluorocarbon resins, the first heat-and chemical-resistant organic polymers, Du Pont specialists found that copolymers of hexafluoropropylene and vinylidene fluoride were both rubbery and resistant to heat, oils, and solvents. The eventual result was small scale production of Viton synthetic rubber.

Although Viton is not in full production, it has found a variety of uses, particularly in aircraft and missile applications. It is being used for seals in hydraulic alternator drives installed in the B-58, Boeing 707, DC-8, and other airplanes; Ford's new heavy truck motors use Viton in their valve stem seals; Wayne Pump's new "Blend-O-Matic curb pump has seals of Viton in their meters. The new synthetic can also be spread or calandered onto fabric for use in bladder type fuel cells. To date, one manufacturer has made a cell which is operational at 450°F. and anticipates that Viton will make possible fuel cells qualified for Class E service, or at 500°F. The constantly increasing use of high energy fuels promises wider use of Viton which is resistant to them.

Hoses made of Viton should be useful to carry hydraulic fluid, steam, and chemicals. And since it can be readily dissolved in ketone type solvents, it may well be an important key in the development of high temperature, flexible paints for use on missiles and other equipment where temperature is a problem.

Viton's present price tag is $15.00 a pound, which is about forty times the cost of conventional elastomers. Expensive as it is, Du Pont asserts that Viton offers a unique combination of characteristics that is the key to the solution of many current problems and undoubtedly many that will be faced in the future. Du Pont supplies the raw polymer to rubber manufacturers, who process and fabricate it into finished products. Equipment used with elastomers is suitable for Viton.

Tests have shown that the new synthetic rubber has a tensile strength at room temperature ranging from 2000 to 3000 psi, and an ultimate elongation from 100 to 400 per cent depending on its hardness, which can be varied by vulcanization. Although Viton, like other elastomers, loses tensile strength and elongation at elevated temperatures, experiments show that it compares favorably in these characteristics with other elastomers, with the added bonus of chemical resistance.

Although the vast majority of applications of Viton at present are for military aircraft and missiles, Du Pont expects that commercial uses will eventually outstrip the military. Manufacturer: E. I. Du Pont de Nemours and Co., Wilmington 98, Del.

IRE annual: the stress was on design

The 1958 Institute of Radio Engineers' show, which pitched its 4-floor "tent" once again at the New York Coliseum last month continued to indicate a shift first revealed a year ago: the IRE annual is no longer so much a display-case for new inventions as a market for electronic wares already in production.

At one booth, a large humidity test chamber actually bore a piece of cardboard on which "sold" had been scribbled hurriedly but prominently. Whether this was a joke or fact, it was a clear indication of the show's intention and climate. Representatives of the industry were on the lookout for new products to manufacture (17,000 products were displayed in 956 booths, along a two-and-one-half mile walk); and they were also eager to investigate what competitors were doing to combat declining sales. Since the show followed hard on the heels of some troublesome cutbacks in military products and allied goods, a swing away from military equipment was not surprising. Viewers seemed to gravitate more toward booths showing some practical developments in the commercial field than to the more unusual displays.

Some highlights

Not that the show was devoid of some spectacular highlights. D. S. Kennedy dominated the second floor with its 28-foot revolving parabolic antenna; National Company displayed its Atomichron, a highly accurate timing device using a cesium atomic beam tube (see ID, December 1956); American Bosch Arma Corporation featured the inertial platform for the Air Force's Titan ICBM. But the products in the commercial field — developments that could find immediate and wide application — were the true and timely expression of this year's fair. This fact implied the hopeful view that a shock resulting from cutbacks can lead to an awakening, and that the focus of the engineer and scientist may return from fields far removed from daily needs to the interests of the consumer, from which it had certainly been absent for a long time.

That some vigorous strides are being made in this direction was expressed by a variety of developments. Among them is the Scanascope, a wide-screen tv on which the image can be made to expand or contract; a new contoured twin-panel tv tube by Corning Glass which eliminates the two reflective surfaces of standard tubes and cuts the tv chassis depth to 10 inches; developments in stereophonic recording; and rumors of a 130-degree tv tube by Sylvania. But in a more general sense, this shift of focal point was directly expressed by: design.

This was perhaps the show's most significant "breakthrough."

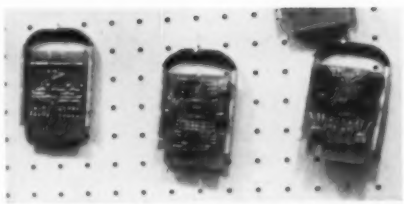
That the industry's representatives had become very much aware of the benefits of a good display for their wares was already evident last year. In fact, it was this attitude which then gave the show the quality of an electronics market for the first time. But this year, the emphasis was not only on well-designed displays (e.g. the Litton Industries' exhibits by Walter Dorwin Teague Assoc.; Sylvania by Design Built Studios) but on good design of what was being displayed. Without exception, the technical products offered — metering equipment for laboratory, production or field use — bore a new look; and it was a good one. The clumsiness and crude exterior of technical equipment still in use only a few years ago, have completely disappeared. In the meters shown by RCA, in the industrial tv and camera equipment of General Precision Labs, in the digital differential analyzer of Litton Industries, the design attention given the finished products was eminently clear. Enclosures, knobs, handles and dials were generally integrated in each product, at the same time remaining clearly defined themselves, so that the finished product has clarity and appeal. So widespread was the evidence of this trend that it is safe to assume that no manufacturer of technical equipment can afford to neglect giving his products this sort of design attention.

Other trends

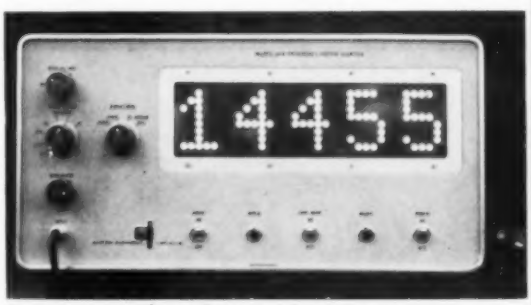
There were some other trends in product make-up and manufacture which, if not new, were much more prominent this year. With the development of the electronic read-out tube (Nixie, a product of the Burroughs Electronic Tube Division) which converts electronic signals directly into readable characters, *digital representation* of measured quantities is now not only possible with low frequency volt and ammeters but with high frequency measurements in a variety of applications (computer readout, industrial control and electronic instrumentation). This further emphasizes the need for, and the continued developments toward, achieving maximum clarity and impact in transferring technical data.

Another direction much in evidence was *modular assembly*. This varied from incremental units for computer "brain" assemblies to modules for laboratory equipment and test cells, and indicated another stress toward active simplification.

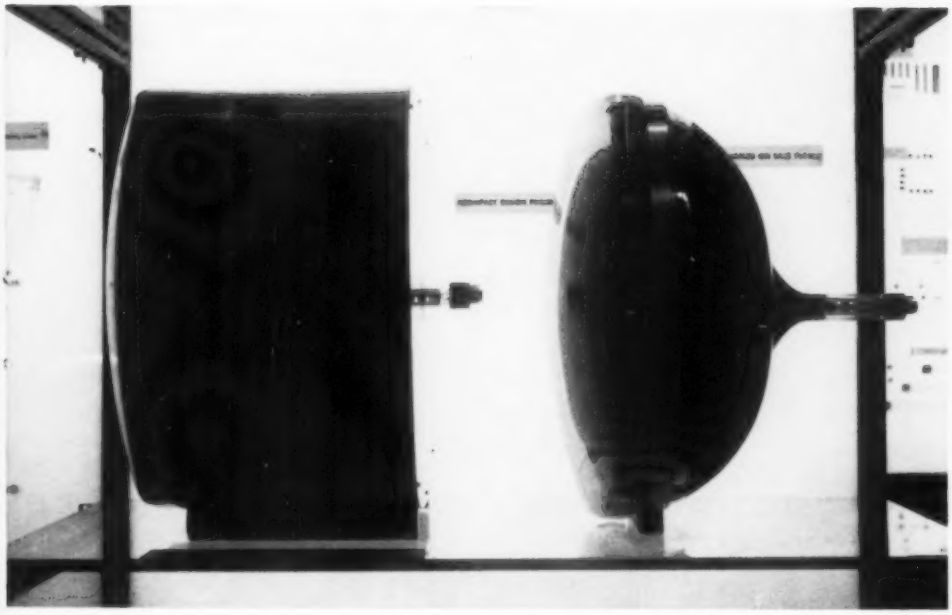
New faces appeared in a variety of *new tubes*. These are tubes not in appearance but by virtue of their function. The microwave tubes shown by Westinghouse look like a large cluster of magnets, although their duties in the high megacycle range are similar to those performed by the vacuum tube or the tiny transistor in the more standard frequency bands.



Transistorized modules that form digital incremental units for electronic "brain" assembly shown by Airborne Instruments.

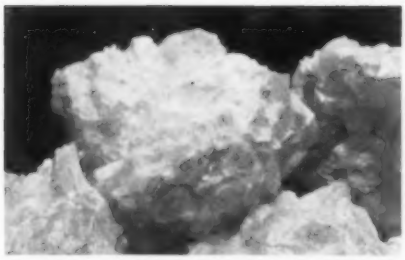


Large numerals reduce read-out errors on equipment by Computer-Measurements Corp.; below, digital read-out tubes.



Microwave tube of Westinghouse (above), is one of tube types that do not look like tubes used in very high frequency bands.

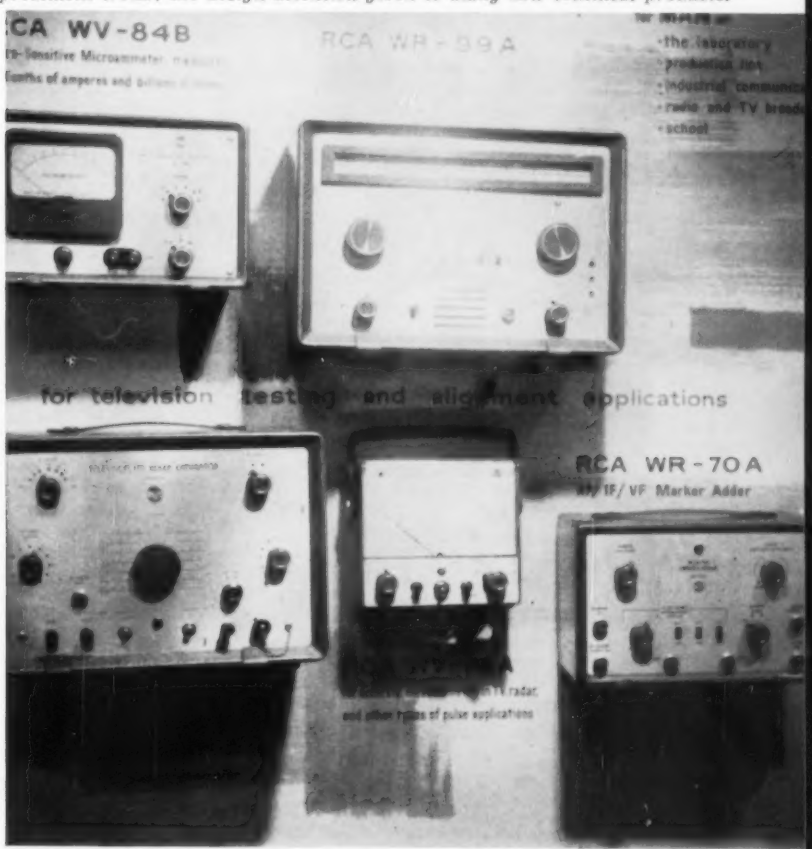
Corning Glass featured a curved glass face panel (left) that reduces tv chassis depth to 10 in., eliminates reflective surfaces.



The Mycalex Corporation of America displayed its newly developed synthetic mica.

The quartz crystal seen at the Bulova booth represents the main material in quartz crystal radio filters (ID Oct. '57).

The panel of test equipment at one of RCA's booths indicated the show's most prominent trend: the design attention given to many new technical products.



Manufacturers' Literature

Materials

Boron Nitride. The Carborundum Company, P.O. Box 337, Niagara Falls, New York. 4 pp., ill. Technical bulletin sets forth the properties, advantages and uses of boron nitride, a ceramic with electrical and corrosion-resistant properties that permits its use at temperatures up to 3000 deg. F.

Continuous-Cast Bearing Bronze. American Smelting and Refining Company, Perth Amboy Plant, Barber, N. J. 6 pp., ill. Folder lists size, metallurgical properties and physical characteristics of Asarcon 773, continuous-cast bearing bronze.

Cork Gasket Material. Armstrong Cork Company, Industrial Division, Lancaster, Pa., 14 pp., ill. Booklet describes Armstrong's new cork gasket material—Uniphase Cork, recommended for impermeability, conformability, and chemical inertness.

KT Silicon Carbide. The Carborundum Company, P.O. Box 337, Niagara Falls, New York. 4 pp., ill. Bulletin contains tabulations of mechanical strength, thermal expansion co-efficients, comparative thermal conductivity, resistance to corrosive liquids, of this recently-available self-bonded silicon carbide.

Maintenance Coating. West Chester Chemical Company, Box 39, West Chester, Pennsylvania. 8 pp., ill. Folder describes chemical combination, elasticity and uses of Maintz Maintenance coatings for protection against corrosion.

Polyurethane Foam. American Latex Products Corporation, 3341 West El Segundo Boulevard, Hawthorne, California. 12 pp., ill. Brochure on rigid, semi-rigid and flexible Stafoam polyurethanes used in the automotive, aviation, electronic, furniture, atomic energy, instrumentation, military, missile, packaging, and many other industries.

Silicon Rubber for Wire and Cable Insulation. Silicon Products Department, General Electric, Waterford, N. Y. 4 pp. Bulletin summarizes the electrical properties of Class 900 silicone rubber for wire and cable insulation, all electrical grade materials, and their physical properties.

Solid Film Lubricants. Electrofilm, Inc., P.O. Box 106, North Hollywood, California. 16 pp., ill. Catalog describes eight different solid film lubricants formulated to solve lubrication problems which arise under conditions of high temperature, low temperature, corrosion resistance, high loads, high speeds, etc.

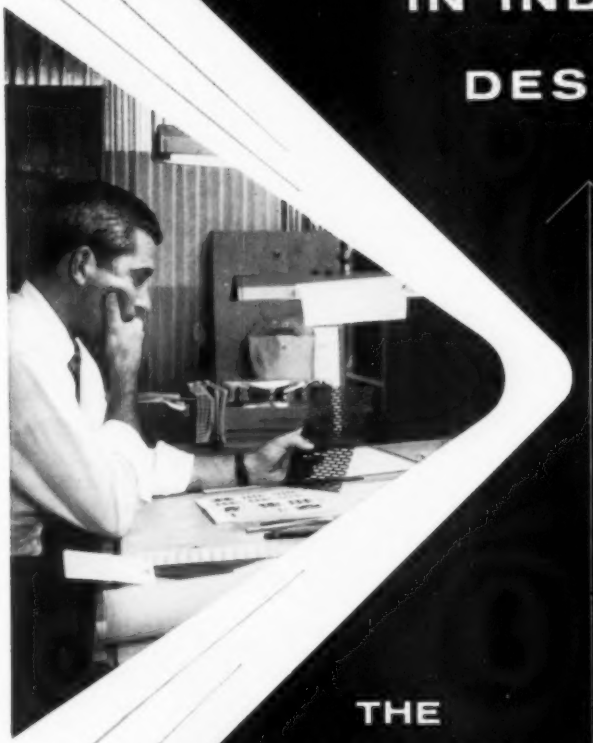
Steels for the Heavy Construction and Mining Industry. Crucible Steel Company of America, Oliver Building, Pittsburgh 22, Pa. 12 pp., ill. Various grades of alloy, carbon, drill, stainless and tool steels together with castings, welding electrodes, magnets, springs and tool bits are discussed in relation to the needs of the heavy construction and mining industries.

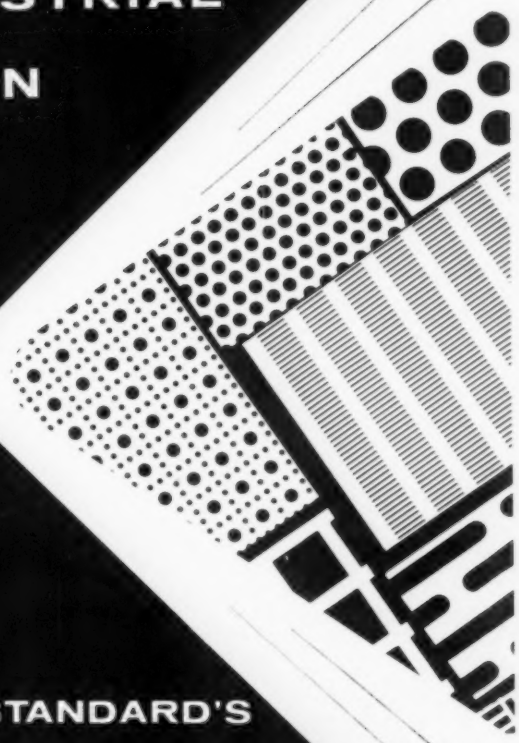
Tenite Polyethylene. Eastman Chemical Products, Inc., Subsidiary of Eastman Kodak Company, Kingsport, Tenn. 36 pp., ill. Book explains how this plastic can be used in the manufacture of a wide variety of products, and shows its use in housewares, toys, appliances, packaging, paper coating, insulation and pipe.

Tool Steels for Die Casting. Crucible Steel Company of America, Oliver Building, Pittsburgh 22, Pa. 16 pp., ill. The essential characteristics of die steels are itemized, and requirements for all die casting tools are analyzed; data on quenching, tempering, nitriding and the influence of lubrication are also given.

Tool Steels for Forging Operations. Crucible Steel Company of America, Oliver Building, Pittsburgh 22, Pa. 16 pp., ill. Brochure discusses the use of various grades of tool steels for the hot forging of steel. Data is given on heat treatment recommended for dies in drop forging.

2 VITAL FORCES IN INDUSTRIAL DESIGN





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Manufacturers' Literature *(Continued)*

Vinyl Fabrics. Terson Division of the Athol Manufacturing Company, Butner, N. C., 6 pp., ill. Catalog includes samples of a large variety of Terson vinyl fabrics in patterns and in solid color.

Zirconium and Hafnium. Mallory-Sharon Metals Corporation, Niles, Ohio. 16 pp., ill. Brochure lists technical and application data of zirconium and hafnium and reviews production steps from raw material to finished mill products. Several pages of charts show the mechanical and physical properties of zirconium, zirconium alloys and hafnium.

Mechanical, Electrical, Architectural Components

Ceiling Designs. The Celotex Corporation, 120 South Lasalle St., Chicago 3, Ill., 12 pp., ill. Brochure illustrates designs for banks, stores, offices, schools and public reception areas with Acousti-Lux panels. Design flexibility afforded by use of these panels is given for a variety of combinations with other Celotex acoustical products.

Cold Finished Bar Products. Union Drawn Division of Republic Steel Corporation, Massillon, Ohio. 30 pp., ill. Brochure offers technical data on carbon steels, free machining steels, stress relief annealed steels, leaded steels, and alloys and stainless steels.

Enclosed DC Motors. Allis-Chalmers Manufacturing Company, Milwaukee 1, Wisconsin. 4 pp., ill. Folder describes new fully enclosed dc motors with air-to-air heat exchangers for cool driving power in contaminated atmospheres.

High Speed Cutting Tools. Fastcut Tool Company, 7405 East Davison, Detroit 12, Michigan. 16 pp., ill. Catalog covers Fastcut's line of high speed cutting tools: end mills, keyseat cutters, combined drills and countersinks, center reamers, continuous pilot counterbores, etc.

Hydraulic Triplex Pumps. Kobe, Incorporated, 3040 E. Slauson Avenue, Huntington Park, California. 12 pp., ill. Booklet on Kobe Triplex Pumps, used in industrial plants where high pressure and high temperatures are required, lists their applications: operation of hydraulic test equipment, molding presses, lubricating systems, oilwell pumping and others.

Luminous Tube Transformers. General Electric, Schenectady 5, New York. 6 pp., ill. Bulletin covers complete line of luminous tube transformers for indoor and outdoor applications; transformer ratings are 5000/30 to 15000/120 ma.

Motors for Heating Equipment. General Electric, Schenectady 5, N. Y. 8 pp., ill. Publication covers line of fractional horsepower split-phase, capacitor-start, shaded-pole, and permanent-split capacitor motors for oil burners, belt-driven blower, and direct-driven blower applications.

Nameplates, Dials, Stampings and Textures. Northern Engraving and Manufacturing Company, La Crosse, Wisconsin. 6 pp., ill. Folder discusses techniques used to produce inexpensive nameplates, mass-produce large stampings and achieve the effect of textures on sheets of metal.

Semi-pneumatic and Solid Tires. Ohio Rubber Company, Willoughby, Ohio. 20 pp., ill. Booklet describes semi-pneumatic tires and solid molded tires and wheels. Features are outlined, tires are pictured, and considerations involved in selecting the proper tire for a given application are discussed. Included are also tables of sizes and cross-sections. Bulletin also covers Ohio Rubber compounding, production, and quality-control procedures, and the company's custom molding and extrusion services.

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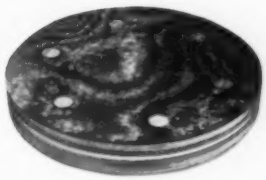

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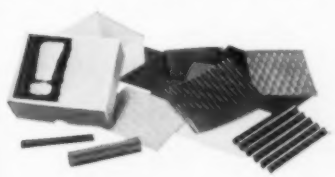

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In Canada:
NATIONAL FIBRE COMPANY OF CANADA, LTD., Toronto 3, Ontario

Manufacturers' Literature *(Continued)*

Stainless Steel Curtain Walls. School of Architecture, Princeton University, Princeton, N. J. This is a study of Princeton's School of Architecture commissioned by the Committee of Stainless Steel Producers, and American Iron and Steel Institute. A chart tabulates specifications for all buildings that use a good quantity of stainless steel. In addition to names of architect and fabricator, charts give dimensions, gage, steel type, number and finish of stainless steel components used. Photographs and architectural drawings illustrate curtain wall panel details, methods of attachment, insulation and weatherseal systems. The buildings investigated are: Inland Steel Building in Chicago, Allegheny-Ludlum Building in Minneapolis, Minn., Lincoln Tunnel Administration Building in Jersey City, N. J., the Socony-Mobil Building and Lever House in New York City.

Swiss Precision Machinery. Carl Hirschmann Company, Inc., 30 Park Avenue, Manhasset, N. Y. 8 pp., ill. Catalog describes the new DUBIED 514 & 515 copying lathes, the KUMMER semi-automatic lathe, toolmakers' lathes, automatics for tough alloys, jig borers, etc.

Temperature Controls. Fenwal Incorporated, Ashland, Mass. 4 pp., ill. Folder describes nine different types of temperature controls including Thermoswitch units for general industrial use, Midget and Miniature models for "tight-spot" applications, surface mounting and high current capacity designs, and Detect-a-Fire units for overheat or fire protection.

Tube Accessories. The Gustav Wiedeke Company, Dayton 1, Ohio. 32 pp., ill. Catalog lists company items offered for tube and piping accessories: tube expanders, tube cutters for fire tube boilers, water tube boilers, condensers-coolers, heat transfer units, refinery still tubes, and miscellaneous units.

You and Machines. John L. Strohm, Channing L. Bete Company, Inc., Greenfield, Mass. 16 pp., ill. Booklet presents the ABC of technological progress scriptographically. The progress from natural resources to energy, from energy to machines and products is expressed in cartoons.

Controls, Systems, Processes

Automatic Alarm and Scanning System. Moore Associates, Inc. 2600 Spring Street, Redwood City, California. 4 pp., ill. Bulletin describes new automatic alarm and control systems for gathering alarm and control data from remote stations in chemical and petroleum plants, steel mills, and public utilities.

Automatic Control of Liquids. Automatic Control Company, St. Paul 4, Minnesota. 64 pp., ill. This is a buyer's guide to the selection of the proper controls for automatically controlling liquids in domestic, municipal, industrial, or military applications. Listed are electrical control systems for starting, stopping, and alternating pumps, motors, and compressors either on-site or for remote reservoirs, elevated tanks, and tankless systems.

Tool Steels for Hot Extrusion Process. Crucible Steel Company of America, Oliver Building, Pittsburgh 22, Pa. 12 pp., ill. Brochure investigates improvements in extruding steel and other stronger and harder metals. Aluminum, magnesium, copper, copper alloys and steel extrusion processes are described together with the various grades of tool steels recommended for better results.

X-Ray Analysis. Philips Electronics, Inc., 750 South Fulton Avenue, Mount Vernon, New York. 12 pp., ill. Booklet on "X-ray Analysis Theory & Instrumentation" discusses: basic diffraction unit, Bragg's law, diffractometer, etc.; application in industry and user lists are also given.

Coming in the MAY issue . . .

Packaging—Part II: an analysis of special problems and techniques in the packaging of products for Supermarket sale.

Color Standards: a description of the major systems now in use by leading corporations to maintain color standards in product manufacture.

Designing for the Military: case studies of the unique problems (and their solutions) in designing products to meet armed services' requirements.

Plus: four other major editorial reports.

INDUSTRIAL DESIGN

Manufacturers' Literature *(Continued)*

Miscellaneous

Molded Cups. The Garlock Packaging Company, 423 Main Street, Palmyra, New York. 10 pp., ill. Bulletin describes new types of molded cups for pump pistons, hydraulic service and for pneumatic equipment. Bulletin also contains tables illustrating the most popular cups for recommended services on a wide variety of general applications.

Polyvinyl Chloride Sheet Linings. Kaykor Industries Inc., Division of Kaye-Tex Mfg. Corp., Yardville, New Jersey. 12 pp., ill. Handbook covers information on three types of polyvinyl chloride linings for corrosion protection.

Tube Mills Handbook. The Yoder Company, 5500 Walworth Avenue, Cleveland 2, Ohio. 64 pp., ill. Handbook on "Electric Resistance Weld Tube Mills" gives a step-by-step description of the electric-weld process from roll forming and shaping of the tube to the finished product. Photographs, drawings, and charts illustrate the operation, capacity and application of various sized electric-weld tube mills used in the manufacture of pipe and tube.

Turbonator. General Electric Company, Schenectady 5, New York. 8pp., ill. A technical report on the design and development of the turbonator—an air turbine driven AC electric power system for airborne applications; included is information on the concept, design configuration and development testing of this system.

Variable Transformer Catalog. The Superior Electric Company, Department P258G, Bristol, Connecticut. 100 pp., ill. A reference manual-catalog on Powerstat variable transformers giving product information, engineering data, outline drawings, connections, ratings, charts and illustrations on all standard 50/60 cycle Powerstats plus some special transformer types.

Classified Advertisements

Positions Wanted

INDUSTRIAL DESIGNER *with Creative Engineering and Styling, experience in the field of major appliances. Ability to set up and direct a product design program and instill creatively in others. Degree. Prefer Chicago area. Will reply to all inquiries. Willing to free lance. Box ID-170,* INDUSTRIAL DESIGN, *18 East 50th Street, New York 22.*

SALESMAN SEEKS CHALLENGING POSITION—*Creative—contemporary—design intelligence—desires to represent flexible packaging manufacturer. Excellent contacts in garment industry. Ability to carry project through complete sales development phases—References are the finest that good character and ability can command. Box ID-171,* INDUSTRIAL DESIGN, *18 East 50th Street, New York 22, New York.*

Help Wanted

HELEN HUTCHINS PERSONNEL AGENCY—*Specialist Professional, Sales, Administrative Personnel for Industrial, Architectural, Interior Designers; Home Furnishings Manufacturers, Distributors, Stores, Publications, etc. Helen Hutchins' long association with a leading industrial design organization insures intelligent screening. 767 Lexington Avenue, New York, TE 8-3070. By appointment.*

ARCHITECTURAL AND DESIGN PERSONNEL AGENCY—MURIEL FEDER—*A personalized placement service for top level architects, designers, engineers, draftsmen, interior decorators, and homefurnishing personnel. Selective contacts arranged in a confidential and professional manner. Interviews by appointment. 58 Park Avenue, New York. MU 3-2523.*

INDUSTRIAL DESIGNER *for Fall 1958 Semester of Ohio University to teach courses in general area of design, in lettering, and in industrial design proper. Prefer man with Master's degree and some teaching experience. Rank and salary determined according to candidate's background. Should be willing to begin with minimum of necessary equipment and to aim at professional work. Box ID-167,* INDUSTRIAL DESIGN, *18 East 50th Street, New York 22.*

EXPERIENCED, *creative product designer capable of project supervision and client contact. Possibility of associateship. All resumes confidential. Box ID-168,* INDUSTRIAL DESIGN, *18 East 50th Street, New York 22.*

DISPLAY DESIGNER WANTED *by established Pacific Northwest P.O.P. agency. Unlimited opportunity for experienced man with creative know-how in field of plastics, wood, metal, as well as paper. Salary and profit-sharing, plus living in the heart of the nation's finest fishing, hunting, boating and winter sports area. Send complete resume and salary requirements, plus samples of work, to Box ID-169,* INDUSTRIAL DESIGN, *18 East 50th Street, New York 22.*

Index to Advertisers

As the research scientist and the creative designer are inevitably drawn closer together in solving the product problems presented by automation and mass marketing, a new understanding of the contribution of each should emerge. With every scientific discovery, the designer's imagination will be increasingly called upon to translate the products of the laboratory into the popular idiom.

Harley Earl, President
Harley Earl, Inc.

For Your Calendar

April 19-June 22. "Living Today": exhibition of good U.S. design in architecture, interior decoration and furniture. Corcoran Gallery, Washington, D. C.

April 19. Opening of "Swedish Textiles Today" exhibition at the Smithsonian Institution, Washington, D. C.

April 19-27. International Home Show at the New York Coliseum.

April 21-23. The 7th annual meeting of the Building Research Institute at the Shoreham Hotel, Washington, D. C.

April 21-23. The American Management Association's seminar on "The Uses of Marketing Research in New Product Planning", at the Sheraton-Astor Hotel, New York.

April 25-June 1. A survey of decorative art and design by recipients of Fulbright grants, at the Museum of Contemporary Crafts, New York.

April 26. Type Directors' Club meeting on "The Art and Science of Typography," at the Silvermine (Conn.) Guild of Artists.

April 27-May 6. German Industries Fair, Hanover, Germany.

April 28-30. The 60th annual meeting of the Design Division of the American Ceramic Society at the Penn-Sheraton Hotel, Pittsburgh.

May 1-8. American Society of Tool Engineers' show and 26th annual convention at the Philadelphia Convention Center.

May 7-17. The United States World Trade Fair at the Coliseum in New York.

May 10. Package Designers Council meeting at the Silvermine (Conn.) Guild of Artists. Both design office heads and members of their staffs will participate in forum planned to orient young designers to working situation.

May 19-21. National Convention of the Sales Promotion Division of the National Retail Merchants Association at the Palmer House, Chicago.

May 21-23. The American Management Association's seminar on "The Product Planning Function in the Small Company" at the Sheraton-Astor Hotel, New York.

May 26-28. National Office Management Association's International Conference and National Office Show at the Conrad Hilton Hotel, Chicago.

May 26-30. American Management Association's 27th National Packaging Exposition at the New York Coliseum. The 27th National Packaging Conference May 26-28 at the Hotel Statler, New York.

June 9-12. American Society of Mechanical Engineers' national conference and exposition on materials handling at the Public Auditorium, Cleveland.

June 9-13. The 4th International Automation Exposition and Congress, New York Coliseum.

June 10-12. The 5th annual National Sales Aids Show at the Shelton Hotel, New York.

June 12-14. Manufacturing Chemists Association's 86th annual meeting at The Greenbrier, White Sulphur Springs, West Virginia.

June 22-25. Annual Conference of American Craftsmen, sponsored by the American Craftsmen's Council, at Lake Geneva, Wisconsin.

The IDI Design Award is a token of recognition bestowed on a designer or a team of designers for outstanding design of any product mass produced prior to May 12, 1958. The award is open to all designers, regardless of affiliation.

submissions Entries may be made either by the designer himself, or by anyone else on behalf of the designer. Copies of the submission form are obtainable from the address below. Forms must be returned postmarked not later than May 12, 1958.

presentation Announcement of the designers to be honored and presentation of the award medals will be made at a luncheon on June 26, 1958, at the Sarah Siddons Walk, Hotel Ambassador East, Chicago.

PAST RECIPIENTS OF IDI DESIGN AWARDS

1957 Arthur N. Becvar, ASID
and Robert W. Blee
Virgil M. Exner, IDI, and Henry T. King,
and H. T. Bannister, and C. C. Voss, and
Carl Reynolds, IDI, and Robert Bingman.
Carl W. Sundberg, IDI, and Montgomery Ferar,
IDI, and R. W. Figgins, and U. J. Pepin, IDI,
and H. F. Weber and Eliot Noyes, ASID.

1956 William E. Clements
Jon W. Hauser, ASID
George W. Walker and Elwood P. Engel, IDI,
and Joseph Oros, and Eugene Bordinat, jr.
IDI, and Herbert Tod, IDI, and Rulo N. Conrad,
IDI and John Najjar, IDI.

1955 James G. Balmer and Carl B. Denny
and Frederick W. Hertzler of Harley Earl, Inc.
Randall D. Faurot,
Richard Montmeat, IDI

1954 Dave Chapman, ASID
Franz Wagner, ASID and Richard Latham,
ASID and Don De Fano of Raymond Loewy
Associates.

1953 Donald Dailey, ASID
Carl Otto, ASID, IDI

1952 Henry P. Glass, IDI
Donald L. McFarland, ASID

1951 George Cushing and Thomas Nevall, IDI
Charles Eames
Carl Otto, ASID

the Industrial Designers' Institute announces

the 8th annual design award program

Request Forms From James L. Hvale, Chairman, c/o Ekco Products Company, 1949 N. Cicero Av., Chicago, 39

Jam-Packed with Flavor!

because it's packed in

MARLEX* 50

POLYETHYLENE

...the tempting tang can't escape!

Sterilizable MARLEX 50 *tubes* are a great new development in food packaging! No other type of material will do this job so well and so economically! Jams, syrups, sandwich spreads and other foods and drugs, formerly requiring the protection of expensive *coated* polyethylene, can now be packaged at less cost in *uncoated* sterilizable thin-wall tubes made of MARLEX 50 resin. Products have long shelf life in MARLEX 50 tubes because permeability is low at all temperatures.

"Heat'n serve" frozen food packaging is one of the most promising applications for film extruded from MARLEX 50. Flavor is sealed in, and the housewife has no pans to wash!

Chemicals, foods and drugs that would show extensive permeation with conventional polyethylene now can be economically shipped in drums or cartons lined with tougher, more impermeable MARLEX 50 polyethylene.

Marlex 50 food packaging has outstanding resistance to attack and permeation by moisture vapor, gases, chemicals and oils. Containers made of heat and cold-resistant MARLEX 50 can be steam-sterilized prior to filling...and frozen afterwards if required.

*MARLEX is a trademark for Phillips family of olefin polymers.

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