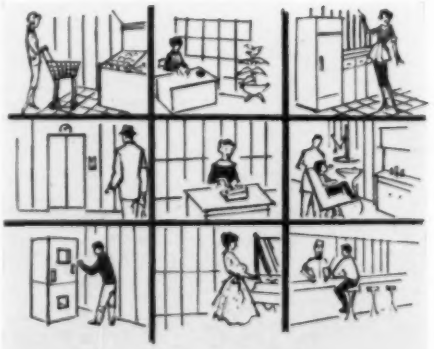
INDUSTRIAL DESIGN

REDESIGN AT PAN AMERICAN · SPECIAL METALS · 59 APPLIANCE REVIEW

AllianceWall
porcelain-on-steel
in coils, sheets
laminated panels

your choice of 3 easy-to-use forms of porcelain on steel!

28 glass-hard, non-fade colors for your selection. Now AllianceWall porcelain-on-steel is available in three easier-to-use, easier to *sell* forms. Order color-fast, stain-resistant AllianceWall in coils up to several hundred feet in length . . . in 4′ x 12′ sheets . . . or the material of your choice in laminated panels up to and including 4′ x 12′! Important, too, AllianceWall porcelain enamel on steel in *any* form offers complete flexibility . . . lets you saw, trim or drill on *your* production line. Send for full information today!



AllianceWall

ALLIANCEWALL DIVISION • ALLIANCEWARE, INC. • ALLIANCE, OHIO

an amp subsidiary

ARCH, 1959 VOLUME 6 NUMBER

3

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

Letters 6

Clips and Quotes 8

News 12

Editorial 29

Pan American's corporate identity 30
An airline gets a new look for a new age

Ribbon ties show together 42
Will Burtin designs USIA exhibit at Berlin Industrial Fair

Special packaging 46
Ingenuity and technology solve unusual packaging problems

Rollers in the street: a sequel 52
Painter Sari Dienes finds meaning in Manhattan's manhole covers

A quiet Dane's heresies 56
Edgar Kaufmann discusses the work of Hans Wegner

Exotic metals 60
Part VI in a series on industrial fabrication techniques

PDC holds design education conference 70
Designers and educators exchange views on package training

Student project 74
An angry young instructor attacks teaching practices

Design review 78
Major appliances, 1959

Technics 86

Manufacturers' literature 91

Calendar 100

Coming

APRIL — Helicopters and other unusual flying machines; the designer manufactures, a case history

MAY—Museum exhibit design

COVER: This month's cover focuses on a geographic world projection [illegible] Pan American as a background for the company's graphic redesign.

FRONTISPIECE: A book of early British machinery furnishes this [illegible] of a bevel gear.

PUBLISHER *Charles E. Whitney*

Directing Editors

EDITOR-IN-CHIEF *Ralph S. Caplan*

ART DIRECTOR *James S. Ward*

CONSULTING EDITOR *Jane Fiske McCullough*

TECHNICAL EDITOR *Arthur Gregor*

COPY EDITOR *Betsy Darrach*

ASSOCIATE EDITORS *Gregory Dunne*
Ann E. Forebee
Ursula McHugh

ASSISTANT EDITOR *William Henry*

ASSISTANT ART DIRECTOR *Matilde Lourie*

EDITORIAL ASSISTANT *Ursula Townley*

BUSINESS MANAGER *Alec E. Oakes*

ADVERTISING DIRECTOR *Paul R. Kane*

SUBSCRIPTION MANAGER *Judith Paul*

ASSISTANT TO THE PUBLISHER *Sven K. Martinsen*

PRODUCTION *George V. Rickel*

PUBLICATION OFFICES Whitney Publications, Inc.
18 East 50th St., New York 22, N.Y.
Charles E. Whitney, President and T[illegible]
Jean McClellan Whitney, Vice-Presi[illegible]
Alec E. Oakes, Vice-President
Paul R. Kane, Vice-President

ADVERTISING OFFICES

New York 18 East 50th Street
New York 22
Telephone PLaza 1-3626

Chicago Archer A. King & Company
410 North Michigan Avenue
Chicago 11, Illinois

Boston M. S. Beggs Company
462 Boylston Street
Boston 16, Massachusetts

Atlanta Blanchard-Nichols-Osborn
75 8th Street North East
Atlanta 5, Georgia

Los Angeles The Maurice A. Kimball Co., Inc.
2550 Beverly Boulevard
Los Angeles 57, California

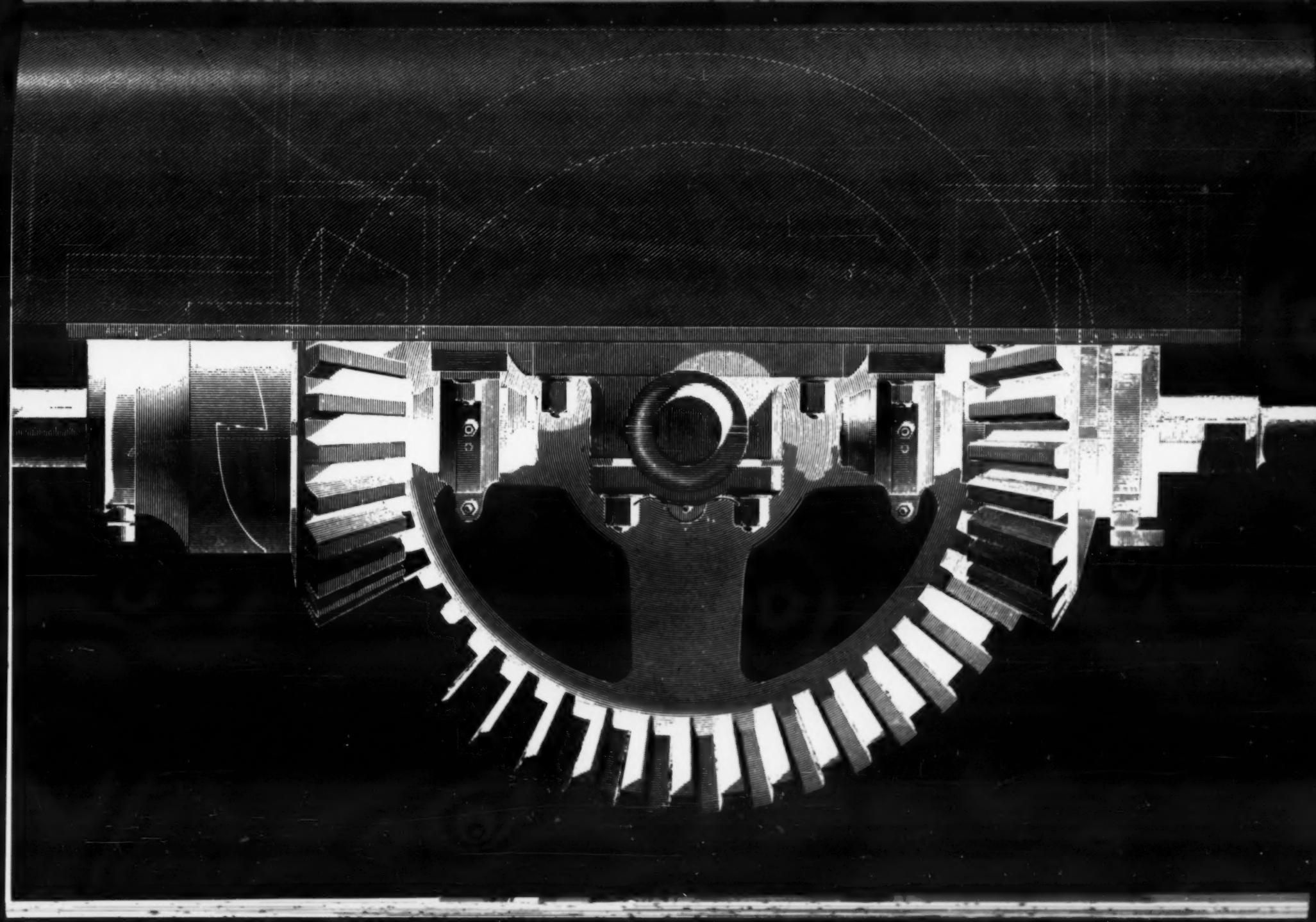
San Francisco The Maurice A. Kimball Co., Inc.
681 Market Street
San Francisco 5, California

Tyler, Texas Weaver, Incorporated
P. O. Box 3142
Tyler, Texas

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

Member of the Audit Bureau of C[illegible]

Member of the Associated Business P[illegible]



LETTERS

"Potent tonic" praised

Sirs:
C. Wright Mills' article, "The Man in the Middle," in the November issue of ID, was a potent tonic for the designing profession.

ID is to be congratulated for publishing this article. It is indicative of the constructive efforts of your magazine to help forward cultural gains.
James D. Mason
Memphis, Tennessee

American design at first sight

Sirs:
As a British designer, I thought you might perhaps be interested in some of the things that strike a foreign observer on a first visit.

Idlewild, where I arrived, sums up for me all that I like best in America. It is crisp, young, gay, smart, rich, and stimulating. But in Manhattan I was alternately shocked and surprised; on the one hand there were many buildings quite without architectural merit, and on the other hand there was the architectural beauty and perfection of detailing in new buildings such as the Seagram block. Although this contrast of standards is characteristic of New York, there is at the same time a desire for uniformity. The entrance lobbies of offices are extremely impressive, but all designed to a formula of marble, steel and glass.

During my talks with a number of New York designers, I found that relations between them and their clients are much the same as in London. In both cities one has to preach and sell design. I noticed one marked difference, however, in the role that the advertising agency plays in the design picture. In England the association between client and agency tends to grow closer. This is not altogether a good thing, for it is apt to cause a complacency which reflects adversely in creative terms. In New York the agency starts worrying about losing its client the day after the account is secured. This difficult relationship, however, produces an atmosphere where new ideas are constantly sought by the agent and accepted by the client.

The excellent display in shops delighted me. In England, it will be some time before it is looked upon as a sales aid which must be afforded.

I did not find the standard of package design high. Too many packages relied on vulgarity and crudeness of design. The few exceptions were nearly always the work of one of the well-known designers. On the constructional side, however, America is well ahead of us. With such considerable technological advantages, it is a pity that design standards are not higher. That they could be higher without loss of marketing effectiveness is seen in the work of the best American designers.
John Tandy
THM Industrial Design Organization
London

Collaboration overlooked

Sirs:
In your news column on Leo Lionni in the January issue I believe you have overlooked the fact that Olivetti's San Francisco showroom was done in collaboration with and in the office of Giorgio Cavaglieri, a New York architect, who received the gold medal of the Architectural League of New York for this work in 1956.
Ira Marder
Matson Manufacturing Co., Inc.
Long Island City, N. Y.

Their cup of tea

Sirs:
I was most interested in your article in the November issue on the design thesis done by a Japanese student in relation to melamine dinnerware.

Similar problems have come our way in designing melamine tableware. We differ where our basic assumptions have followed different lines. For instance, I could see no great advantage in a drinking lip of only 1" to 1¾" radius. In fact a considerably larger radius seemed to be more useful. Also a circular form, which is easier to machine when toolmaking and which presents no special positioning problems, was used in preference to a square or oval or triangle.

A shallower cup of larger diameter than the normal English type does not lose heat in the same way that a china cup does and can have advantages for stacking, packaging and production, provided that the handle can be made to sprout from the top rim. In designing this cup we found that the best grip was afforded by using the *second* forefinger under the handle in order to push the lower finger away from the bowl of the cup. A thumb depression on the top not only indicates the thumb position and provides a useful leverage action but at the same time lightens the appearance in plan view. In designing the saucer we felt it essential to allow the cup to be located in *any* radial position providing it was roughly centered by the user.
Ronald E. Brookes
Director of Design
Brookes and Adams, Limited
Birmingham, England

Range logic questioned

Sirs:
The December 1958 issue, in dealing with various items of "Building and Home", on page 43 illustrates an RCA Whirlpool Range, the caption at the top of the page stating, "Clarity and Logic emerge in shape and operation," and in the text alongside the illustration you state that "the controls are placed to give a graphic representation of the arrangement of the burners."

Whilst not disagreeing with the statement of graphical representation, I would disagree very much with the caption, and I doubt whether any logical thought has been given to the "operation" of the controls of this range.

I would doubt whether the designer responsible for this particular article of kitchen equipment has ever operated a range in his life. Had he done so, he would immediately have realized that placing the controls in the back panel is about the worst possible place from the housewife's angle, if she is to be able to switch off a unit with the four hot plates covered by kettles, saucepans, or other cooking utensils, some of which may be emitting steam, whilst others are probably hot to the touch. The average housewife does not wear asbestos sleeves when cooking, and the thought of bare arms stretched over some twenty inches of warm, if not very hot, utensils, does not indicate that very much logical thought has been given to the operation of the range.

There is much to be said for the old-fashioned "soldiers-in-a-row alignment" of controls, as with the controls so positioned the individual heated areas can be switched off without any danger of burns or scalds.

It is in small points of this nature that the industrial designer who bases designs merely on aesthetic appeal, or some novelty of shape, fails.
George R. Cooper
Hertford
England

design flexibility in glass

Lancaster glass spells appliance magic

For appliance manufacturers, Lancaster glass parts offer a bright new world of opportunity. Whatever your product or problem, Lancaster can provide functional and decorative glass components custom-made to your exact specifications. Let us show you how Lancaster craftsmanship can give your appliance extra beauty and utility that will play off in extra sales. Send blueprints, or write to Lancaster Glass Corporation, Lancaster 5, Ohio. Telephone OLive 3-0311.

Lancaster glass

to brighten your product's future

CLIPS AND QUOTES

Harrison E. Salisbury, The New York Times, *March* 2, 3, 1959.

"Population specialists estimate that population in the United States will expand about 56,000,000 in the next twenty years — some twenty per cent. The number of automobiles is increasing more than twice as fast. It will rise by about 50,000,000 in the same period, or about 90 per cent.

It is from Los Angeles that the most anguished cries are heard for rescue from the rubber-tired incubi. It is Los Angeles that sends its officials to plead with the grand viziers of Detroit not to put longer fins on the cars, not to widen the machines because there is just not room on the streets or in the parking places. It is in Los Angeles that serious officials say that the system is exhausting the elements necessary for human life — land, air, and water." ❞

Harper's MAGAZINE

John A. Kouwenhoven, *Waste Not, Have Not,* **Harper's Magazine,** March 1959.

"Some Americans are beginning to feel that it is cruelly wasteful, if not socially dangerous, to educate everybody (as the principle of democracy requires us to do) without determining in advance whether there will be jobs available in which they can use their education. The social waste resulting from this sort of thing seems, to some of those who believe themselves 'qualified' to judge, too great for our civilization to bear. From this point of view status now appears to be something which society must assure, in order to relieve the tensions of insecurity. Hence the emphasis personnel officers of large corporations place on giving employees a sense of membership in a permanent organization.

It is axiomatic [however] that security of status, accompanied by abundance, tends to be relaxing. Those who possess it easily succumb to the illusion of permanence. They find it soothing to believe that change, instead of meaning a continuous process of development (and concomitant waste), means only five nickels for a quarter—which is still twenty-five cents." ❞

Newsweek
THE MAGAZINE OF NEWS SIGNIFICANCE

Benjamin Sonnenberg, *chairman, Publicity Consultants, Inc., on public relations strategy, in* **Newsweek,** *March* 2, 1959.

"Shoot first, and then draw the target around the bullet hole.

People used to send their idiot sons to Wall Street. Now they go into public-relations firms." ❞

Stephen Spender *on Thoughts on Design in Everyday Life; the* 1958 *Design Oration of the* **SIA.**

"Functionalism is inadequate as an esthetic creed. It may be true that rockets and aircraft are beautiful, but if one considers them as works of art, they do not seem to fulfill the simple criteria which give art its function. They do not stay still, they cannot be put in a museum or gallery or even on a pedestal (or if there, they cease to have function and become something else). What I do feel is that we have had too much design which is thought of in terms of function. It is high time that designers, happy to have conquered the kitchens of the world, turned their attention to the non-functional living and drawing rooms.

I have spoken so much about functionalism because when I go to an exhibition, I have the impression that what I call the two extremes of utilitarianism functionalism—the airplane on one flank and the kitchen utensil on the other — have exercised a kind of pincer movement to include many other things within the spirit of function. In some cases—as in the design of wireless or television sets, the aim seems to be to *look* functional, rather, perhaps, than to be it. The concept of function translates itself into bareness, simplicity, squareness or roundness solidity, seriousness. Above all, everything is impersonal. The desire to fuse two quite different concepts—the beautiful and the useful—within the same object has gone out of our civilization. It is for this reason that we pretend that the useful is the beautiful—and hope for the best, leaving it at that. But to say that the functional is beautiful is really sleight of hand, a play on the word beautiful.

I know the objection to my way of thinking. It is that designers are designing today for socialized welfare state man, leading him down the Welwyn Garden City garden path, educating him gently with discourses piped from the Third Programme. None must talk too loud, no one must flash a light too brightly in his eyes, there must be no violent splashes of color, he must be anesthetised with good taste, and who but the British, with the British Council, the Arts Council, the Third Programme, the Design Centre, panethol, chlorophyl, Dettol, know most about disinfectants and anesthetics.

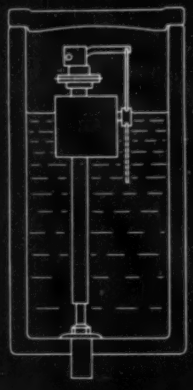
We must think more of people with bodies and souls and less of bundles of conceptualized needs. We must put individual man at the center of our designing and creating." ❞

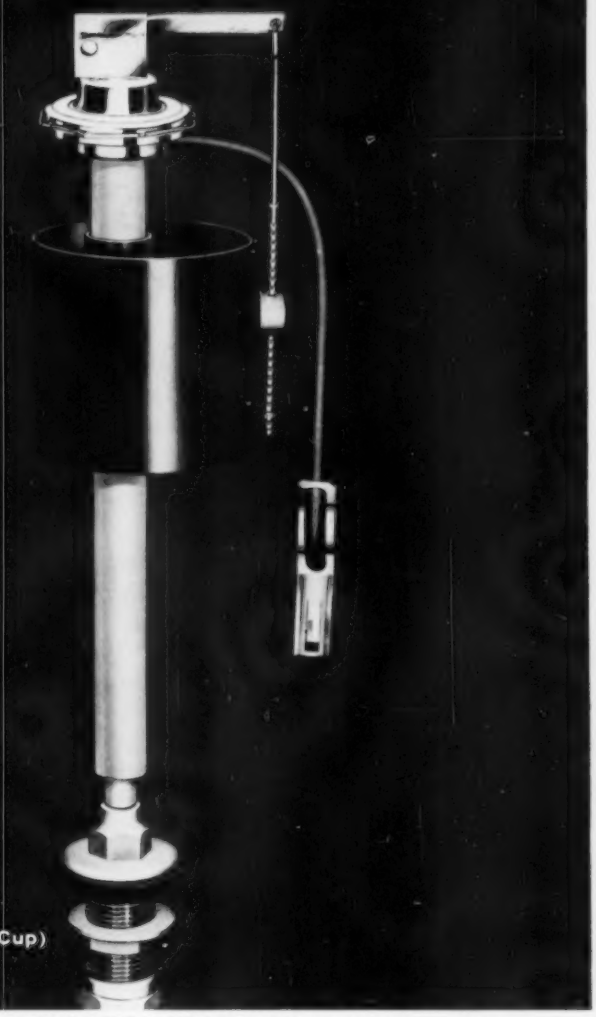
THE NATION

Ella Winter, *Notes on a China Journey,* **The Nation,** *March* 7.

"Reporting China for the United States presents the particular difficulty that Americans have been kept in ignorance of developments for a decade. You still see the old poverty, the scabrous alleys, clothing often ragged and few ties and collars. You see many goods — but on the level of Woolworth's, not Saks Fifth Avenue. There is no glue on stamps or envelope flaps, and no detergents and no bathmats (though plenty of towels embroidered with flowers and animals). Yet the cities and the factories and the news hum with cyclotrons and atomic reactors, Chinese-made, and I saw exhibits of farm machinery invented by peasants, illiterate till yesterday, that ploughed by electric cable, removed potato eyes, threshed grain and refined sugar. I saw it and did not believe it." ❞

DESIGNED IN CELANESE FORTIFLEX...





BALL COCK (Toilet Float Cup)

MOLDED IN FORTIFLEX FOR FLUIDMASTER, INC., ANAHEIM, CALIFORNIA, BY B. W. MOLDED PLASTICS, PASADENA, CAL.

Toilet float cup of Fortiflex is a radical design departure

Toughness, rigidity, resistance to corrosion, light weight—all of these were essential in the material to be selected for the float cup in Fluidmaster's unusual new and improved toilet ball cock. Fluidmaster decided that Fortiflex met all their specifications—and then some. Design of the new ball cock required an especially intricate molding of the float cup. Fortiflex molds easily in intricate shapes, and here it is molded all in one piece, including the runners that insure smooth riding up and down the shaft, thus also providing production economies. Yet the complicated float cup design contributes to an overall operating simplicity that is the crux of this ball cock's superiority.

Fortiflex "A" is presently available in four melt indexes developed to accommodate a wide range of conditions and applications of interest to designers and manufacturers. For more information and/or test quantities, just use the handy coupon.

Celanese® Fortiflex®

Fortiflex...a Celanese plastic

Canadian Affiliate: Canadian Chemical Company Limited, Montreal, Toronto, Vancouver.
Export Sales: Amcel Co., Inc., and Pan Amcel Co., Inc., 180 Madison Avenue, N. Y. 16

TYPICAL PHYSICAL AND CHEMICAL PROPERTIES OF FORTIFLEX

Properties of Fortiflex "A" Related to Melt Index

PHYSICAL PROPERTIES	ASTM METHOD	UNITS	FORTIFLEX RESINS A-20	A-70	A-250	A-500
Melt Index	D-1238-52T	—	0.2	0.7	2.5	5.0
Heat Distortion Temp. (66 psi)	D-648-45T	°F.	185	185	180	180
Brittleness Temp.	D-764-52T	°F.	—200	—180	—160	—100
Impact Strength, izod (½" x ½" injection-molded bars)	D-256-54T	ft. lb./in. notch	23	18	13	3
Tensile Strength, Max., 0.2 in./min.	D-638-52T	psi.	3700	3600	3500	3300
Elongation, First Tensile Yield Point	D-638-52T	%	25	25	25	25

Properties of Fortiflex "A" Not Affected by Melt Index

PHYSICAL PROPERTIES	ASTM METHOD	UNITS	VALUE
Density		g/cc.	0.96
Refractive Index	D-542-50	n_D^{25}	1.54
Hardness, Shore D	D-676-49T		65
Stiffness	D-747-50	psi.	150,000
Water Absorption (½" specimen, 24 hr. immersion @ room temp.)	D-570-54T	% wgt. gain	<0.01
Flammability	D-635-44	in./min.	1.0
*Mold Shrinkage, length		in./in.	0.03 to 0.05
width		in./in.	0.02 to 0.04

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

Celanese Corporation of America, Plastics Division,
Dept. 116-C, 744 Broad Street, Newark 2, N. J.

Please send: ☐ more information on, ☐ test quantities of Fortiflex.

Name _____ Title _____

Company _____

Address _____

City _____ State _____

CHALLENGE TO INDUSTRIAL DESIGN: *Repackage an essentially utilitarian piece of equipment in a cabinet handsome enough for the "show" rooms of a home without sacrificing the durability of metal and without raising costs.*

Ebco high-styles Oasis Dehumidifier with tweed-finish vinyl-on-steel laminate

When the basement is used merely for storage, a dehumidifier need be no more glamorous than a furnace or water heater. But when families by the thousands transform the nether regions into recreation areas, then the styling of moisture control equipment becomes as important to sales as its function.

Ebco Manufacturing of Columbus, Ohio, makers of Oasis dehumidifiers and water coolers, took the styling step-up in stride. For the cabinet of their top dehumidifier line they switched from painted metal to a tweedy Colovin vinyl laminated to steel.

In appearance, the transformation is complete — and exciting. In production, the only change is toward a simpler operation. Finishing and painting are eliminated.

The Colovin laminate is pierced, notched, drawn, formed and folded on the same production-line equipment by the same personnel using the same procedures as with metal alone. Rejects due to chipping or scratching are virtually nil.

Designers in many fields have discovered that Colovin laminate provides the perfect answer to both the artistic aspirations of Styling and the practical requirements of Engineering.

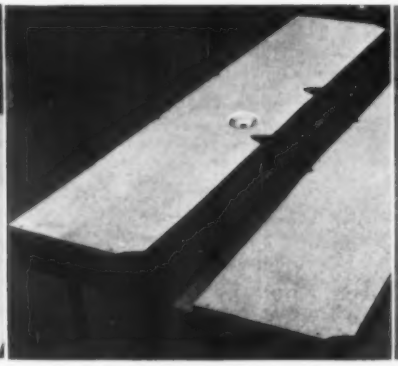
It offers unlimited opportunities for color, texture and dimensional effects. It tailors smoothly around contours without distortion. It can be machined as precisely as metal alone. And it has greater resistance to corrosion, rust and day-to-day abuse.

Write us for more detailed information. We'll include our brochure, "Colovin Meets Metal," showing colors and textures, test specifications, industrial applications, a technical report on Colovin vinyl-on-metal laminate, and a 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

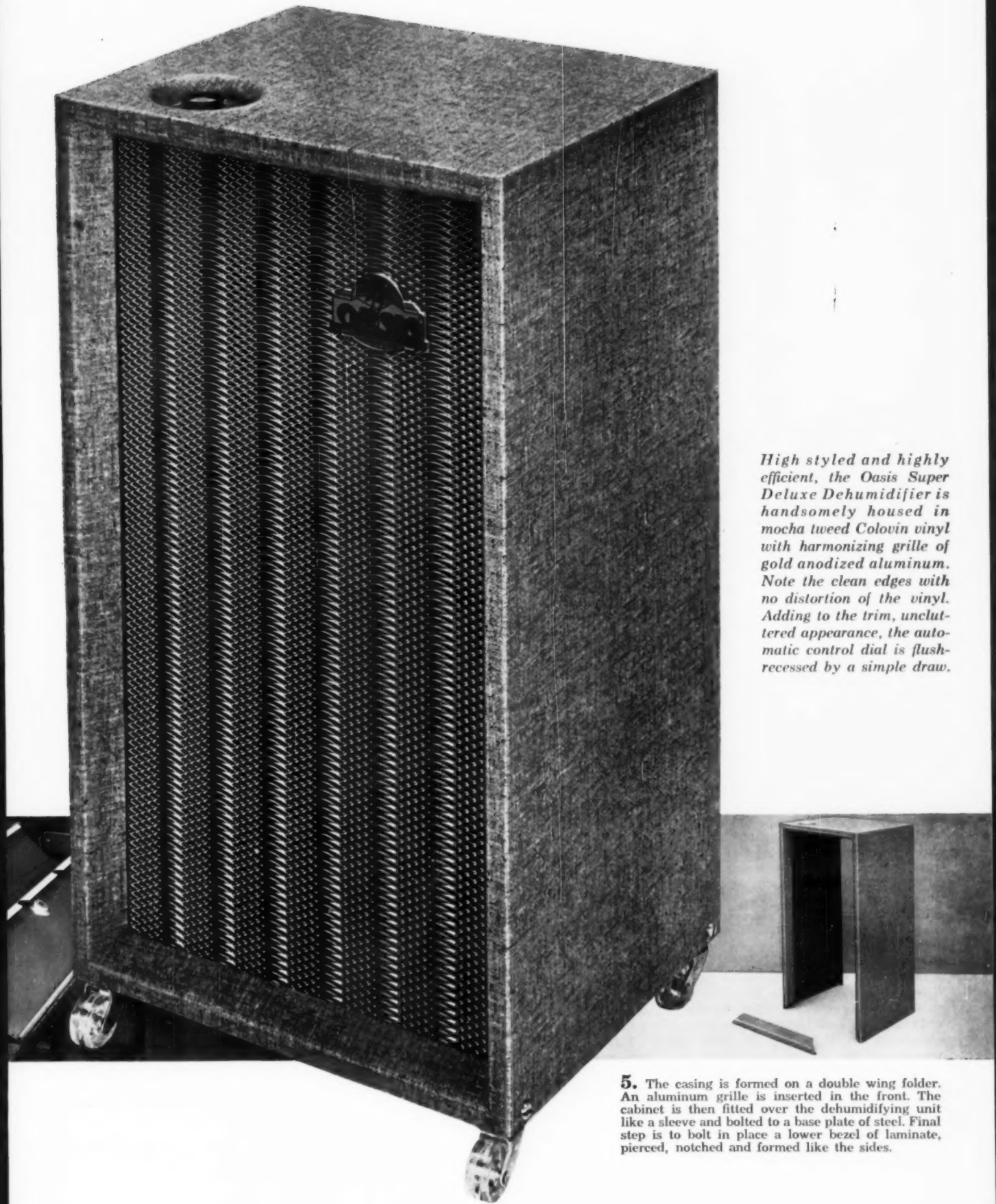
1. Ebco's laminate — .012 Colovin vinyl bonded to 22 gauge steel — is shipped in 12 1/16" x 55" blanks from the laminator. Metal side is lacquered. Vinyl surface provides its own protection.



2. On a standard press using the same dye as for metal alone, the laminate is pierced, notched and drawn (to form recess for control) with a single hit. Note clean edges of perforations.

3. Above is shown the first form of the front bezel. Close examination of the bent edges reveals no stretching or distortion of the tweed finish of the Colovin surface.

4. Here is the second form of the front bezel. The exposed metal edge is turned under. Repeated tests have shown that bond of vinyl and metal is so close as to eliminate rust creepage.



High styled and highly efficient, the Oasis Super Deluxe Dehumidifier is handsomely housed in mocha tweed Colovin vinyl with harmonizing grille of gold anodized aluminum. Note the clean edges with no distortion of the vinyl. Adding to the trim, uncluttered appearance, the automatic control dial is flush-recessed by a simple draw.

5. The casing is formed on a double wing folder. An aluminum grille is inserted in the front. The cabinet is then fitted over the dehumidifying unit like a sleeve and bolted to a base plate of steel. Final step is to bolt in place a lower bezel of laminate, pierced, notched and formed like the sides.

NEWS

Pontiac and Olds join small-car rush

Pontiac (above) and Oldsmobile, GM's "middle price" makes, will be producing small cars along with Chevrolet, according to the most recent unofficial reports (ID, February, page 78). All GM divisions except Cadillac will probably offer small cars by the summer of 1960. By using a single body shell for all divisions (as in its larger makes), GM hopes to sell up to two million small units a year, enough to warrant a model change every year or two. The new shell will be flexible enough to accommodate either the small Chevrolet's air-cooled, rear engine or a new front-mounted, aluminum V-8 engine to be used in the other small models. While this would be impossible in such rear-engine cars as the Volkswagen, the GM body, as indicated in current Chevrolet and Pontiac sketches, has been intentionally designed to take either a rear engine or a very short front engine. The little aluminum V-8 is just that.

While the general layout of the V-8 is conventional — wedge-type combustion chambers, five main bearings — it will weigh only 290 pounds, 240 pounds less than the current Chevrolet V-8, which is the smallest, lightest V-8 in the industry. Overall length of the new engine is only 23 inches, about six inches shorter than the Chevrolet V-8.

The new Pontiac should be out by March

of 1960. So far, no information is available on Buick's small car. Ford's recent announcement of a small car marked the first official statement from the Big Three.

Russia exports first cars to West

The Moskvich and the Volga, two of Russia's most popular cars, will be exported to West Germany, under a new agreement reached last month between the German and Russian governments. The 1,000 cars stipulated in the agreement will be the first ones sold in the home market of a major auto-producing country of the West.

The two-tone Moskvich, a four-cylinder, four-passenger car which will retail for about $1,200, follows Western styling and looks something like the English Hillman (ID, June, p. 38). The slightly larger Volga will sell for about $1,900. Only one per cent of West Germany's foreign trade is with the Soviet Union.

Art directors to focus on symbology

"Symbology—the Use of Symbols in Visual Communications," will be the theme of the Fourth Annual Visual Communications Conference, sponsored by the Art Directors Club of New York. The conference will be devoted to "the simplest and most difficult objective of our time: to find the universal language, a single world-system of symbols, to bring people and nations together after long millennia of separation, suspicion and distrust," says Elwood Whitney, conference program director and vice-president of Foote, Cone and Belding.

Among the dozen speakers will be Rudolf Modley, "The Challenge of Symbology;" Dino Olivetti, "Symbology in International Industry"; James A. Maxwell, "Hobo Symbology;" William G. Eliot, "Symbology on the World's Highways;" Fairfax M. Cone, "Symbology in Advertising;" Dr. Frank C. Laubach, "Symbology versus Illiteracy;" Domenic Mortellito, "Symbology and the Corporate Image;" "A Designer Scans the World of Images;" Dr. Irving A. Taylor, "Psychological Aspects of Symbology;" Rev. Marvin Halverson, "Symbology in Religion;" Dr. Felix Marti-Ibanez, "Symbology in Medicine;" and Frank Stanton, "Symbology and Television."

The conference will be held April 1 and 2 at the Waldorf Astoria. Registration, $50 per person, should be made through the club, of 115 East 40 Street, New York 16.

Poznan Fair to open in June

Exhibits in the U.S. Pavilion and grounds at the Poznan Fair will be designed this year by Latham, Tyler, Jensen in collaboration with the U.S. Office of International Trade. The exhibit theme, "Industry in the Service of the Consumer," will be carried out in five areas, illustrating how the consumer is served by efficient design of production machinery, products, packages, organization and merchandising facilities. The outdoor areas surrounding the pavilion will be devoted to an American-style garden and nursery and a fully equipped dairy operation with mechanized feeding, milking and milk-handling.

The pavilion itself, with its nine typical American retail shops, was designed last year by Reino Aarnio as a permanent exhibit building. The fair opens June 8.

*Write your own Specs for your Perfect Drawing Pencil

When you send out bids for a bridge, a power station or a consumer product, you demand rigid adherence to your specifications. Why not with your drawing pencil, the most important working tool of your profession? Here is *our* set of specs — you may have your own ideas. See if we agree.

1. **SMOOTHNESS**—The pencil lead must be absolutely free of grit and hard spots. It must glide across the paper like an Olympic skater on ice.

2. **STRENGTH**—The pencil lead must be strong, without brittleness or splintering, and able to take needle-point sharpness in all drafting degrees, yet withstand firm drawing pressure.

3. **UNIFORMITY**—The pencil lead must have a steadfast consistency of hardness in each degree, pencil after pencil, lead after lead—dependable grading in a full range of 20 degrees, 8B to 10H.

4. **BLACKNESS**—The pencil lead must have pure graphite-saturated consistency, assuring positive opacity. It must not be treated with foreign oily substances to give the illusion of black. Natural graphite blackness eliminates greasiness and reduces stains and smudges to the absolute minimum. Erasing must be quick and easy, and leave no ghosts.

5. **DENSITY**—The pencil lead must lay down solid opaque graphite-packed non-feathering lines in every degree, from the softest to the hardest drafting grades, providing maximum adhesion to give long-lasting age-resisting originals.

6. **REPRODUCTION**—The pencil drawing or tracing must produce clear, sharp reproductions, even after hundreds of trips through the reproduction machine.

Professional designers, engineers, architects and draftsmen by the tens of thousands, in every country on earth, will instantly recognize these specs as a description of A.W.Faber Castell — the pencil with Black Gold graphite — *natural* graphite that tests out at more than 99% pure carbon. The inference is plain. Call your Dealer today.

Castell Leads and Pencils draw on all surfaces, including Mylar-based Polyester drafting films. Gives perfect lines, easy to erase — excellent reproduction.

PRODUCT OF NEARLY 200 YEARS OF UNINTERRUPTED EXPERIENCE.

Choose from:

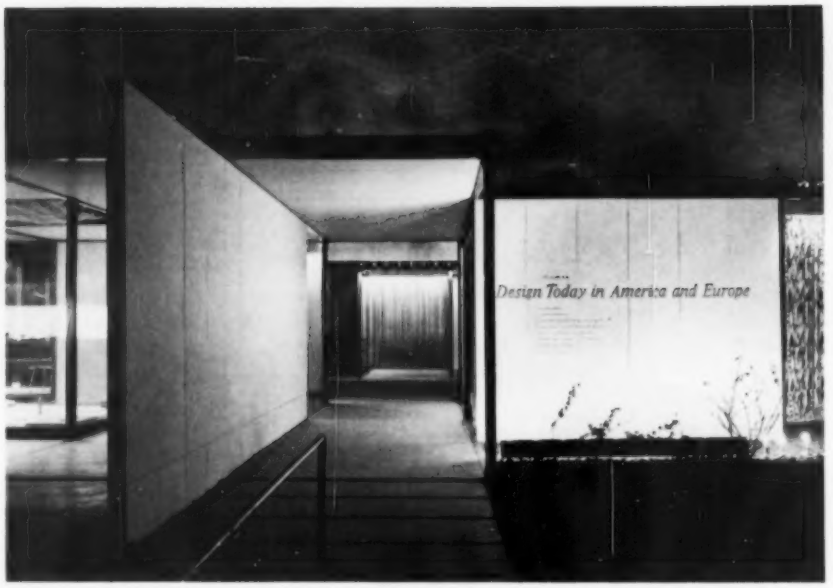
- # **9000** CASTELL Pencil
- # **9007** CASTELL with Eraser
- # **9800SG** LOCKTITE TEL-A-GRADE Holder with new functional spiral grip and degree indicating device.
- # **9030** CASTELL Refill Lead matching #9000 pencil in quality and grading, packed in reusable plastic tube with gold cap.

Other styles and colors of pencils, holders and refill leads.

FABER-CASTELL

A.W.FABER-CASTELL Pencil Co., Inc.
Newark 3, N. J.

Sally Senior and Gordon Chadwick tour design exhibit with Dr. F. Radhakrishnan, India's vice president, and Manubhai Shah, Indian Minister of Industry.



Architect Chadwick creates uncluttered background for exhibit of Western design

Design show opens in India

In India, where hand-turned brass cooking utensils are rapidly giving way to mass-produced stainless steel vessels, native craftsmen and visitors are discovering in a recently opened design exhibit how the West has retained high design standards within its technological society. The show, "Design Today in America and Europe," opened last month in New Delhi under the direction of the Museum of Modern Art, in cooperation with the Ford Foundation and India's National Small Industries Corporation.

The exhibit presents "solutions that the West has evolved to the challenge of the machine, the new materials and energy potentials which scientific research has made available and the new consumer demands that have arisen in the last fifty years," as an exhibit release explains. However, the release also stresses that the spirit of the exhibit will be misunderstood if Indian designers merely imitate the outer form of the objects shown. Rather, the show focuses the visitor's attention on the place of materials, tools, and function in the creation of objects for daily use.

Gordon Chadwick, who designed the exhibit for the George Nelson Company, has created a setting which emphasizes the objects themselves. With the exception of bright orange lettering at the entrance (above) and the many growing plants, there are neutral colors throughout — brown-stained deodar beams, white plywood panels, and natural cocoa matting. The monochromatic quality of most of the objects on display was consciously emphasized to contrast with the vivid colors common to Indian textiles and other objects. Within an easily portable geodesic dome, the plywood-paneled exhibit is divided into four areas which face into a brick-floored courtyard.

The show, which contains nearly 400 items, many the same as those shown in the Museum of Modern Art's recent design exhibit in New York, will travel in India for two years before going on permanent display at the projected design center in New Delhi. The objects were selected by curator Greta Daniel, and the catalog was written by Arthur Drexler, director of the museum's architecture and design department. Sally Senior, associate director of the museum's international program, supervised exhibit activities in India.

Plastic design winners announced

Three industrial designers acted as judges for a contest of well designed plastic goods sponsored by the Reinforced Plastics Division of the Society of the Plastics Industry. The judges — Dave Chapman, Jon W. Hauser, and John M. Sherrer—awarded special merit citations to seven products during SPI's 14th annual exhibit and conference at Chicago's Edgewater Beach Hotel on February 3. It was the SPI's first design competition.

The seven winning products were: high-impact hammers by Plumb Chemical Company, company design; trays and tote boxes by Molded Fiber Glass Tray Company, A. W. Levenhagen, designer; military pressure sphere by Apex Reinforced Plastics Division of White Sewing Machine Corporation, Arthur J. Wiltshire, designer; gear block and rack assembly by Wallace and Tiernan, Inc., W. C. Conkling, designer; bow and arrow by Parallel Plastics, Leonard Meyer, designer; truck cab by White Truck Company, company design, fabricated by Molded Fiber Glass Body Company; fog horn by Wallace and Tiernan, Inc., C. F. Wallace, designer.

From the seven winners, the judges cited the White truck cab for a grand merit award, and gave a special designers award to an IBM Time-Data Punch machine fabricated, like the truck cab, by Molded Fiber Glass Body Company.

Chapman, Sherrer and Hauser give merit award to Molded Fiber Glass's truck cab.

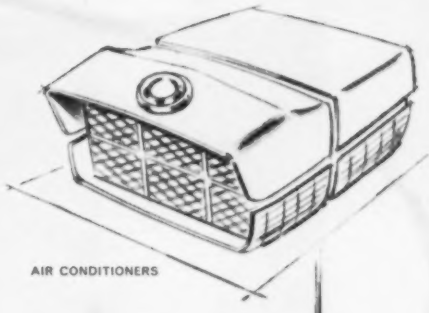
Design Center to add visual file

New York's Design Center for Interiors, which opened in November, plans to add a visual index file of designers, decorators, architects, craftsmen, and industrial designers to its library facilities this month. The new file will contain photographs of product design and room settings, and will include biographical information. The photographs will give the public an immediate impression of the type of work done by each designer.

Each photo space will be rented on an annual basis: six to 12 photos, $9 each; 14 to 20 photos, $8.40; 22 to 30 photos, $7.80. Those interested in being included in the new file should get in touch with the Design Center, 415 East 53rd Street, New York 22, New York.

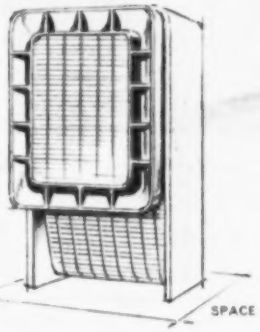
Idea! ...a world of inspiration with H&K perforated metals

TAPE RECORDERS



AIR CONDITIONERS

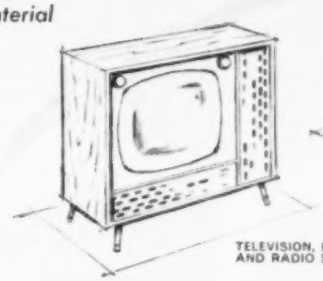
LIGHTING FIXTURES



SPACE HEATERS

FURNITURE

Harrington & King can perforate the proper design, pattern and open area in practically any material available in coils, sheets or plates . . . from foil-thin to 1" thick.

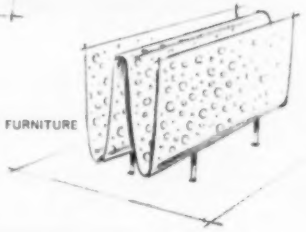


TELEVISION, HI-FI AND RADIO SETS

Metallic materials include steel, aluminum, stainless steel, brass, copper, monel, zinc, bronze, etc.

OFFICE FURNITURE AND EQUIPMENT

Non-Metallic materials include plastic, wood, composition, paper, cloth, etc.



NOVELTY FURNITURE

For more than 75 years, Harrington & King has helped to broaden the horizons of industrial design through the imaginative creation of exciting perforated patterns in both metallic and non-metallic materials.

Whether for functional or decorative use—or both! — the appropriate motif for almost every application is available from our vast selection of existing dies . . . at no charge for tooling. Or, if necessary, tools for special designs will be made to order.

H & K sales engineers will be pleased to work with you on your perforating requirements.

Mail coupon to nearest H & K office—today!

Just a few of the many H&K patterns are illustrated—in reduced size.

THE **Harrington & King** PERFORATING CO. INC.

Chicago Office and Warehouse
5664 Fillmore St. • Chicago 44

New York Office and Warehouse
108 Liberty St. • New York 6

Please send me—

☐ GENERAL CATALOG No. 75
☐ STOCK LIST of Perforated Steel Sheets

NAME _____

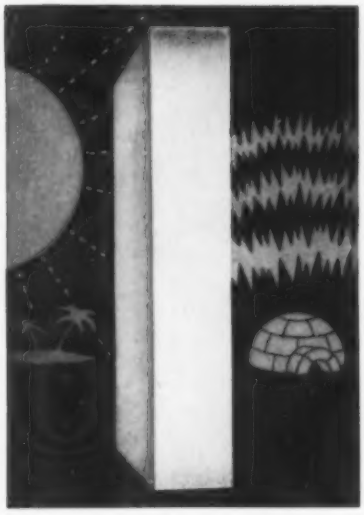
TITLE _____

COMPANY _____

STREET _____

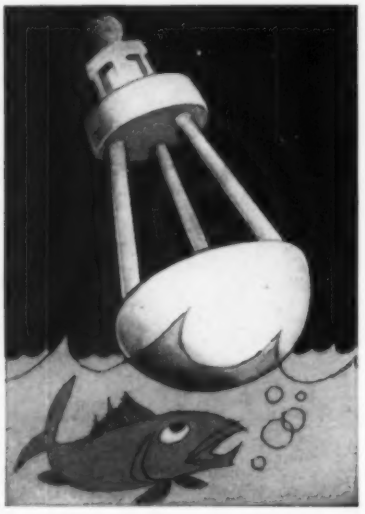
CITY _____ ZONE ____ STATE _____

FIVE REASONS WHY
IS THE BEST ANSWER



DYLITE IS AN INSULATOR

The Thermal Conductivity (K Factor) of DYLITE is 0.242 at a 75°F. mean temperature at 2 lb./cu. ft. density. DYLITE is highly resistant to the passage of heat and is unaffected by moisture condensate. DYLITE is easily molded to fit the contours of component parts of refrigerators, air conditioners and freezer cabinets.

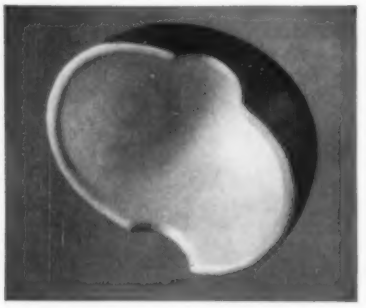


DYLITE IS WATERPROOF

At 2 lb./cu. ft. density, DYLITE's rate of Water Vapor Transmission is 1 18 perms., and its rate of Water Absorption is 0.54 lbs./cu. ft. after 48 hrs. immersion. DYLITE is ideal for boats, rafts, buoys and other types of buoyant marine equipment. DYLITE remains in the water indefinitely without becoming waterlogged, and it is mildew-proof.

DYLITE IS SHOCK-RESISTANT

DYLITE possesses an Energy Absorption ratio (Maximum Load) of 56.74 in. lbs./cu. in. at a density of 2 lb./cu. ft. For example, police safety helmets with shock-absorbent DYLITE liners are now used extensively—a result of performance tests in which DYLITE was proved superior to other materials for this job.



Typical Properties of DYLITE—Density 2 Lb./Cu. Ft.

- Compressive Strength—30 Psi
- Tensile Strength—55 Psi
- Water Vapor Transmission—1.18 Perms.
- Water Absorption—0.54 Lbs./Cu. Ft. After 48 Hrs. Immersion
- Thermal Conductivity (K Factor)—0.242 at a 75°F. Mean Temperature
- Energy Absorption (Maximum Load)—56.74 In. Lbs./Cu. In.

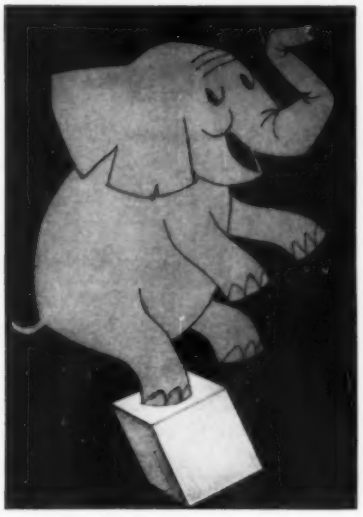
DYLITE is a registered trademark of Koppers Company, Inc.

STREET

CITY ZONE STATE

DYLITE

TO YOUR DESIGN PROBLEMS

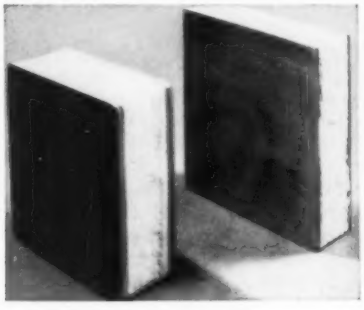


DYLITE IS LIGHTWEIGHT

DYLITE is lighter than cork—it can be molded in densities of 1 to 10 lb./cu. ft. The advantages of light weight are obvious. In packaging, DYLITE helps reduce shipping costs and makes handling easier. In the construction field, where DYLITE is used as an insulator, its light weight means fast and easy installation.

DYLITE IS STRONG

DYLITE has a Compressive Strength of 30 psi and a Tensile Strength of 55 psi at a 2 lb./cu. ft. density. DYLITE can be used to great advantage in a wide variety of industrial design problems. For instance, sandwich structures that employ DYLITE as the core material offer high strength without sacrificing light weight.



KOPPERS

Offices in Principal Cities: In Canada: Dominion Anilines and Chemicals Ltd., Toronto, Ontario

KOPPERS PLASTICS

DYLITE

Koppers Company, Inc.
Plastics Division
Dept. ID-39
Pittsburgh 19, Pennsylvania

☐ Please send me more information on DYLITE expandable polystyrene.

☐ Please have Koppers representative call.

☐ I'd like more information on DYLITE concerning possible application in_____

Name

Firm

Address

City

State

Friedman selects items for gallery exhibit.

Albright sponsors design show

"Twentieth Century Design: U.S.A.," a major design show of over 1000 items, will open at Buffalo's Albright Art Gallery on May 3. In addition to showing much present-day design, the exhibit will "review critically the creative productivity of the past half-century in American design and focus attention on 'classics' of the period," according to the gallery.

Most of the items in the show are still in production, but many articles not now in production will be shown "because they are important prototypes or landmarks in the historical process." In addition many hand-made objects will be included because of their historical relevance to the 20th century American tradition. The photograph (above) shows a cup and saucer (1937) by Russel Wright, a carbine rifle (1894) by John M. Browning, and a portable calculator by Sundberg-Ferar which will appear in the exhibition.

To organize the exhibition, the Albright Gallery has appointed William Friedman (above) as visiting curator of design for one year. Until recently Mr. Friedman was professor of design at Indiana University. He has also served as associate director of Walker Art Center in Chicago, and as consultant for the Chicago Art Institute.

After closing in Buffalo on June 14, the show will travel to the Cleveland Museum of Art. It will then be shown at the City Art Museum of St. Louis, the Minneapolis Institute of Arts, San Francisco Museum of Art, Dallas Museum of Fine Arts, Portland Art Museum, and the Dayton Art Institute.

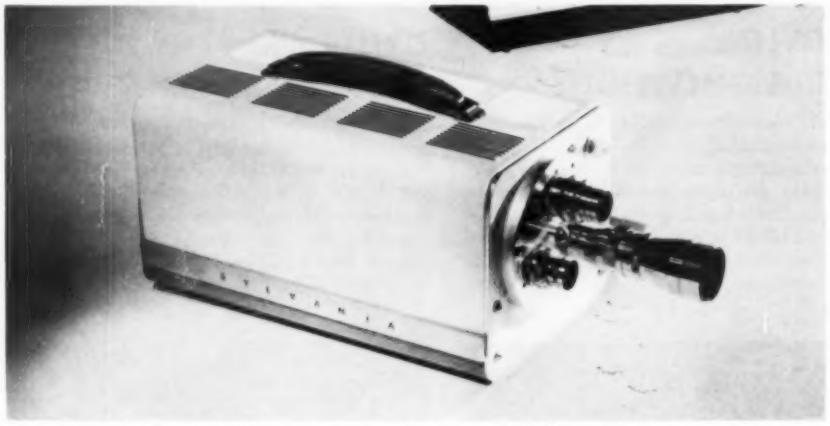
Design piracy discussed in NewYork

On March 4th designer John Pile and lawyer Barbara Ringer discussed, from their respective professional viewpoints, the proposed Willis Bill to prevent design piracy. The discussion took place at a meeting sponsored by the New York Patent Law Association's Committee on Copyrights and Designs.

Mr. Pile, an associate at George Nelson and Company, explained, with the help of slides, how design piracy harms the manufacturer and consumer as well as the designer. The designer loses, said Mr. Pile, when the producer can "satisfy his need for new designs entirely through piracy." As an example of how the consumer loses, Mr. Pile remarked that "the automobile industry, with its generally similar products, gives little choice to the buyer. Any legislation that will discourage the most direct copying of designs will protect industry and the consumer against the kind of decline we are witnessing in the auto industry."

Miss Ringer, an attorney for the Copyright Office, described the unsuccessful history of design patent legislation in the United States since the 19th century. The current Willis Bill, Miss Ringer explained, was introduced in the House in July, 1957, and fills the gap in present copyright and patent laws by protecting the designs of useful articles.

At present IDI's Design Protection Committee is raising $10,000 to support the Patent Law Association's committee on the Bill. The ASID has not committed itself to a full endorsement of the committee.



Turret mount of new vidicon-type camera by Sylvania takes three different lenses.

Growth by product improvement

Speaking on March 19 at an American Marketing Association meeting in New York, Donald McFarland, president of the ASID and manager of industrial design in GE's housewares and radio receiver divsion, said that there was more than one way in which a new product could achieve success. Discussing "The Life Cycle of Electric Housewares," McFarland stressed the inevitable sameness in price and styling of different manufacturers' products: as soon as one manufacturer hits on a successful version of a new idea, others abandon their version and copy him. This sameness, said McFarland, leads to futile consumer research and superficial changes in styling, which the customer ignores. Only a really worthwhile new idea can change this situation, according to McFarland, who said:

"Gradually more intrepid competitors swing round to this approach, and fundamental variations are offered in the race to find the norm which will satisfy the mass market. National advertising campaigns and baker's dozen deals are important, but they are merely the mechanism to sell the product."

Sylvania to offer low-priced t.v.

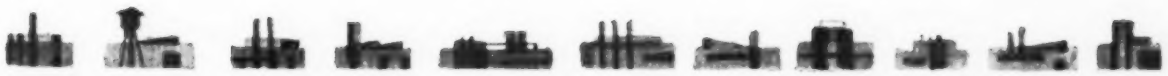
Sylvania Electric Products will soon offer a new closed-circuit tv system at well below $800. The price of comparable systems is $1000 up. The camera in the system (below) goes into pilot production on March 23; it is a vidicon-type weighing 15 lb. It will require no special lighting and will transmit an image on channels 2 through 6 to any standard, home-type receiver. The camera's turret mount will take three different lenses, but may be sold with one, two, or three lenses, as required.

Marion Pettegrew, vice president of Sylvania Home Electronics, says that the system is not designed for special applications requiring custom installations, but for that element of the market—perhaps 85 per cent—which can be satisfied by standard equipment, mass-produced and moderately priced.

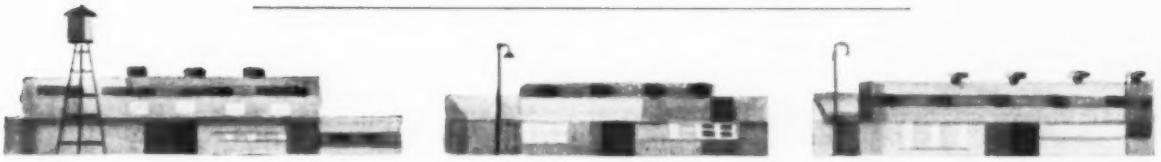
U.S. World Trade Fair to open May 8

Over 3,000 manufacturers and importers are expected to exhibit at the third annual U. S. World Trade Fair, May 8-19, at the New York Coliseum. The nine product classifications include radio and television equipment, furniture and sewing machines, hardware and home electric appliances, boats and sports marine equipment, precision tools, electronic equipment, scientific instruments and building materials.

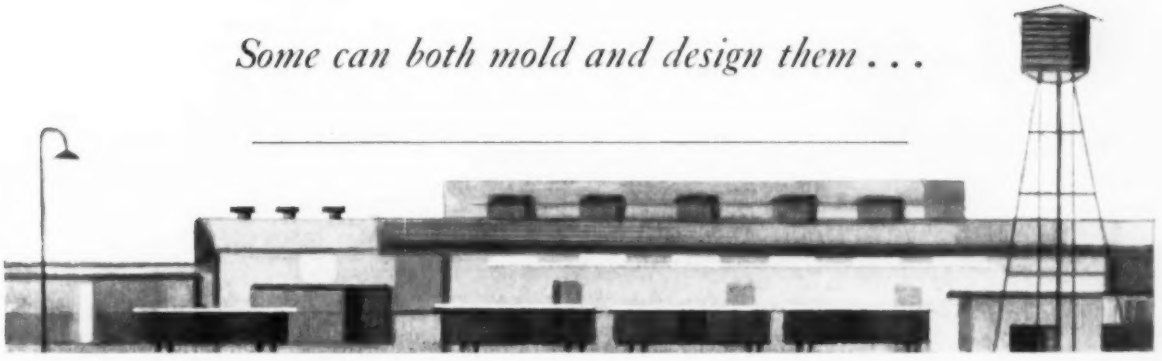
Further information may be obtained from the trade fair office, 331 Madison Avenue, New York 17.



Hundreds of companies can mold plastics . . .



Some can both mold and design them . . .



But **only one** *puts the world's most complete production and design facilities at your disposal!*

GENERAL AMERICAN

Plastics Division

General American's Plastics Division offers you advantages that no other molder in the world can match!

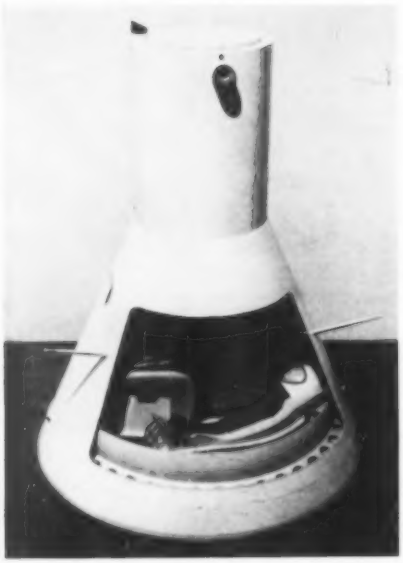
- The largest and most varied molding facilities in the industry, with compression presses up to 2000 tons for regular and reinforced plastics in simple and complex shapes, injection presses up to 300 ounces, and large extruding and vacuum-forming machines.
- An experienced staff of research and development specialists, and a complete engineering department.
- Modern tool and die shops.
- A continuing advisory service, including a Customer Service Manager assigned to live with your job through every step of production.

These are some of the reasons why General American is the nation's leading custom molder of plastics. Let us study your products to help you determine whether the use of custom molded plastics will improve them. You'll find . . . *it pays to plan with General American.*

Plastics Division

GENERAL AMERICAN TRANSPORTATION CORPORATION

135 South LaSalle Street, Chicago 90, Illinois



Project Mercury

The National Aeronautics and Space Administration has selected McDonnell Aircraft to design, develop, and construct a capsule (above) capable of carrying man into orbit around the earth. At the same time the process of choosing our first space traveler has already begun. The total cost of the satellite capsule and its subsystems is expected to exceed $15 million. The entire development program has been given the name "Project Mercury."

The space capsule, serving as the payload of a powerful booster, will carry a human passenger through the atmosphere into orbital flight, and safely back to earth again. Such a satellite system will provide a means of studying the psychological and physiological effects of space flight on man. The research will include man's reaction to weightlessness during orbital flight, high acceleration during launching, and high deceleration during re-entry into the atmosphere.

By late March it is expected that the twelve volunteers for Project Mercury will have been selected. Each will be a college graduate with a degree in engineering or the physical sciences, and will in addition have graduated from one of the military flight schools with a minimum of 1500 hours of flight time in his log book. He must be under 40, and not taller than 5'11". The early testing periods will involve balloon flights in Mercury capsules to familiarize the volunteers—one of whom will be chosen for the actual flight—with some of the environmental conditions with which they will have to cope.

The manned capsule will have high aerodynamic drag, and will be statically stable over the Mach number range corresponding to flight within the atmosphere. A nearly circular orbit will be established at an altitude of roughly 100 to 150 statute miles, to permit a 24-hour satellite lifetime. Descent from orbit will be initiated by the application of retro-thrust rockets incorporated in the capsule system. As the vehicle slows to approximately the speed of sound, a drogue parachute will open to stabilize the capsule. At this time radar chaff will be released to pinpoint the capsule's location. When its velocity decreases to a predetermined rate, a landing parachute will open at a high enough altitude to permit safe landing on land or water.

Army teletype writes 3,000 w.p.m.

The U.S. Army Signal Research and Development Laboratory, Fort Monmouth, N.J., and the Burroughs Corporation recently announced that in a joint development program they had devised a 3,000 word-per-minute teletypewriter. The machine is said to print 50 times faster than a wire service teletype. With further development the top speed of its all-electronic page-printing system could reach 500,000 words a minute. Operating at a lower speed of 750 words a minute for Army Signal Corps requirements, the electronic messenger will do the work of eight military printers, resulting in substantial savings in personnel and equipment. Civilian weather-forecasting networks, stock exchanges, and news services are said to be examining the system.

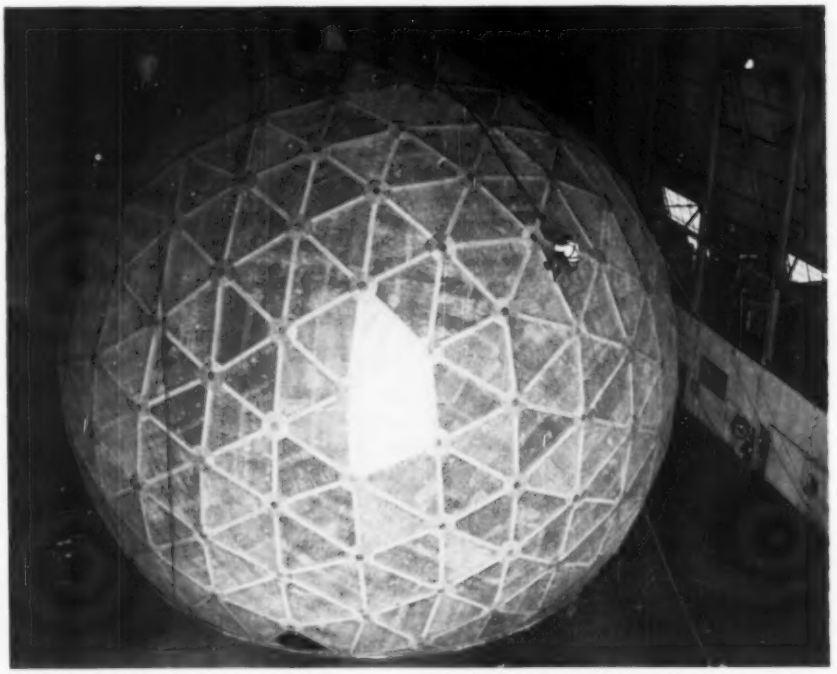
Letters are shot at the paper electronically by a bank of electrode guns. Each aims its beam at a corresponding spot on the paper, and can fire any letter or number. After the volley of letters, each line of text passes rapidly over powdered ink and a heated roller, and appears a split second later as readable text.

ICA will discuss corporate identity

Practical aspects of integrated design for corporate identification will be the subject of the conference sponsored by the Institute of Contemporary Arts, on March 23 in Boston. Budgetary implications, influence on advertising programs, sales volume and public relations will be discussed. Tickets ($20) are available from the Center for Design Studies, 230 The Fenway, Boston.

Design Engineering Show in May

The Design Engineering Show will be held in Philadelphia, concurrently with the annual conference of the American Society of Mechanical Engineers. Chief topics of the conference will be choice of materials, mechanical aspects, and power and control, all from the design point of view. Tickets, for the show ($2) and the conference ($5) are available from Clapp & Poliak, 341 Madison Avenue, New York.



A GIANT RADOME, 68 feet high, has been produced by Goodyear Aircraft for GE's Heavy Military Electronics Department. A six-man crew can erect it in approximately 80 hours, by bolting together hundreds of reinforced fiberglass panels into a few basic panel groups. The seven-story structure will have a 150 m.p.h. wind-resistance.

protection is stainless steel

Summer or winter the car with plenty of Stainless Steel
is easy to clean and keeps its good looks
under the roughest conditions of driving and weather.

No other metal offers the freedom of design and fabrication,
economy of care and the durable beauty that serves
and sells like Stainless Steel.

McLOUTH STEEL CORPORATION, Detroit 17, Michigan

specify

McLOUTH STAINLESS STEEL

HIGH QUALITY SHEET AND STRIP

for automobiles

Trademark for U.S. Industries, Inc.

Company News

RETAINED: **Marion Weeber** to design lamps for Excelsior Studios, N. Y. C. . . . **Melvin Best Associates** by Samsonite Folding Furniture, Detroit . . . **Stowe Myers** by the U. S. Office of International Trade Fairs, for U. S. A. exhibit at Casablanca this April . . . **Bruce Kamp Associates** by the C. V. Hill Company, Trenton . . . **Leon Gordon Miller** of Cleveland by Vanderbilt University Medical Center, Nashville, to develop a space utilization program . . . **Gould K. Hulse, Jr.,** and **Carolyn Kandler,** by United Printers and Publishers, as consultant designers.

COMPLETED: by **Gerald Stahl Associates,** the new corporate identification plan for U. S. Industries, Inc. (see trademark, above).

NEW FIRM: **Aaron Donner** (below) **Associates,** 1245 North State Parkway, Chicago.

CHANGE OF ADDRESS: **Becker & Becker Associates** to 375 Park Avenue, N. Y. C. . . . **Smith, Scherr & McDermott** to 39 South Miller Road, Akron 13, Ohio (new headquarters, above right) . . . **Peter Quay Yang Associates** to 114 East 40th Street, N. Y. C. . . . **Hydel, Inc.,** to 223 Crescent Street, Waltham 54, Mass. . . . **Brooks Stevens Associates** to 4001 North Wilson Drive, Milwaukee.

Philco Corporation has agreed to license **Thorn, Ltd.** of London to manufacture its products in Britain. Thorn will now produce radio and tv sets under the Philco label. . . **Atkins & Merrill, Inc.,** Mass., model builders, has been acquired by **Roxbury Carpet Company.**

Events

AWARDS: The **"Design in Hardwoods"** contest, sponsored by the Fine Hardwoods Association, includes Paul W. McCobb (modular built-in components for kitchen, bath, or dressing room), Claude Best (walnut and rosewood buffet, above, right), W. C. Muchow, Hans Krieks, David C. Lefebvre, and Tony Paul, among the winners.

MEETINGS: The **Building Research Institute's** annual meeting, April 6-8, will have Burnham Kelly announcing the outcome of MIT studies conducted for ACTION; research representatives from Alcoa, U. S. Steel, and Westinghouse will discuss the impact of research plans for the '60's on 1970's buildings; architect Vincent G. Kling will predict, as a designer, the form of buildings in the '60's . . . The **Annual Appliance Technical Conference,** sponsored by the AIEE Sub-Committee on Domestic Appliances, on May 18-19, includes a paper on "Applying Computer Techniques to Appliances"; the conference program covers engineering aspects of all major segments of the appliance industry . . . **Plastics in the Automotive Industry** will be discussed on June 19 by the Detroit section of the **Society of Plastics Engineers.**

EXHIBITS: Now on view through May 9, an **African exhibit** at the Museum of Primitive Art, New York.

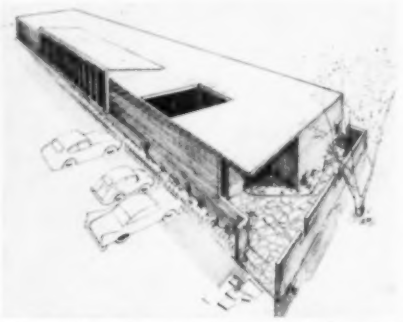
NEW ORGANIZATION: The **American Society for Testing Materials** is organizing a new division on Materials Sciences, to "coordinate and intensify the development of knowledge of the fundamentals of materials."

Award-winning buffet by Claude Best

People

APPOINTED: **Dr. Myron J. Helfgott** as vice president of Lippincott and Margulies; he will continue as president of L&M's Package Research Institute . . . **John S. Marmaras** as advertising design director, and **Myrtle Johnson** as design coordinator, at CIBA . . . **William J. Harrison** (below) as senior project director at Jim Nash Associates . . . **Pierre Armand Kleykamp** as associate professor, and chairman of the division of industrial production, at Rhode Island School of Design . . . **David R. Miller** as director of marketing, and **Mark Harris II** (succeeding him) as manager of the Computer Systems Division, at Colorado Research Corporation . . . **Frank J. MacRae** as manager of plastics technical service for the Dow Chemical Co. . . . **H. J. Siekmann** as manager, market development and research, at the metallurgical products dept. of GE, Detroit . . . **Jerome T. Coe** as general manager of GE's silicone products department at Waterford, N. Y. . . . **Robert A. Manogue** as product manager, pumps and controls division, at Denison engineering division, American Brake

Harrison *Stanton* *Donner*



New office of Smith, Scherr & McDermott

Shoe . . . **Harrison F. Edwards** as chief engineer, product engineering, at Simmonds Aerocessories . . . **Theodore D. Ernst** as product manager, and **John J. Cullen** as assistant product manager, at U. S. Rubber . . . **Carl I. Gochenour** as general manager of product development at Hooker Chemical Corp. . . . **William R. Fraser** as consulting engineer-product design, at GE's technical products department, Syracuse . . . **Nicholas Kay** as division vice president of Koppers Company . . . **Dr. Walter F. Leverton** as assistant manager in the research division of Raytheon . . . **Donald E. Smiley** as president of Pico Precision Products Co. . . . **Tage Falk** as manager of product research at Smith Welding Equipment Corp. . . . **William M. Stanton** (below) as product planner at the Ekco-Autoyre division of Ekco Products . . . **R. Allan Hunt** as technical director, and **Francis J. Keryk** as systems analyst, at Malt and Ness Design and Engineering Consultants . . . **Leon Wirch** as manager of design, and **Roland Johnson** as package design coordinator at Monte L. Levin.

HONORED: **Edward L. Barnes,** (who with Henry Dreyfuss designed the aluminum prefabricated house for Vultee Aircraft) and **Norman S. Ives,** (who has designed graphics for the Museum of Modern Art and the Museum of Primitive Art); presented with Medals for Distinction in the Arts, by Yale University.

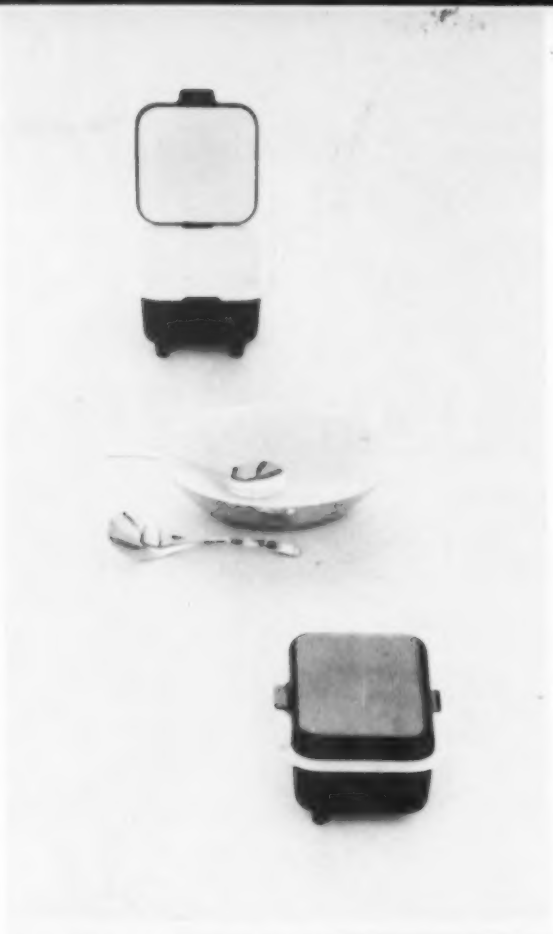
RETIRED: **Sir Gordon Russell** from the directorship of the Council of Industrial Design, London. He is succeeded by **Paul Reilly.**

RE-ELECTED: **Bice A. Roth,** (vice president of Amos-Thompson Corp.) as president of the Fine Hardwoods Association.

VISITING: **Giulio Castelli,** design engineer and president of Italy's industrial design organization; **Pier Giacaolomo Castiglioni,** architect; **Robert Menghi,** architect; and **Gio Ponti,** design engineer and architect; all at the Institute of Design, IIT, on March 13.

ALUMINUM IS COLOR

ALCOA IS ALUMINUM



"e.g., PORCELAIN-ENAMELED ALUMINUM IN (VIRTUALLY) ANY COLOR YOU WANT!"

. . . S. L. Fahnestock, Chief Designer, Alcoa

You—Sam, I already know about anodizing aluminum, painting it, chemical finishes, and so forth. Now tell me the latest on porcelain enameling on aluminum.

Fahnestock—Gladly. First, it comes in practically any color you want. Reds, greens, blues, purple—you name it.

You—What can you porcelain enamel?

Fahnestock—Sheet or plate in any form—in fact, since porcelain on aluminum even sticks to sharp edges, it can be applied to patterned, perforated or expanded sheet.

You—Do any other forms of aluminum take porcelain?

Fahnestock—Castings—permanent mold, plaster or sand castings like the casserole and salad bowl above, designed by Don Wallance for the Forecast collection.

You—Is the process expensive?

Fahnestock—No sir. Often cheaper than porcelain on conventional materials.

You—Why?

Fahnestock—First, with aluminum, thinner sections of the base metal are possible. Second, no undercoatings are needed, hence fewer firings. Third, thinner porcelain coatings are required.

You—Which, I presume, also means less spalling?

Fahnestock—Indeed! It also means you can do mild forming after firing.

You—Well, could I use this for plumbing fixtures . . . builders' hardware . . . cookware . . . architectural panels . . . office partitions . . . kitchen cabinets . . . appliances . . . decorative tiles . . .?

Fahnestock—Yes, and more. Alcoa research developed it. You think up applications.

You—If I need information for a specific project, where can I get it?

Fahnestock—Call your Alcoa sales office, or call me in Pittsburgh, ATlantic 1-4545. Our address: Aluminum Company of America, 1971-C Alcoa Building, Pittsburgh 19, Pa.

ALCOA IS ALUMINUM

THIS IS GLASS

A BULLETIN OF PRACTICAL NEW IDEAS FROM CORNING

HOW TO TAKE A SNAPSHOT OF A SATELLITE IN FLIGHT

If snapshooting satellites is on your agenda, contact either Boller & Chivens/-Joseph Nunn, South Pasadena, California, or the Perkin-Elmer Corporation, Norwalk, Connecticut.

In collaboration, these two firms make just what space photographers need. It's called the IGY Satellite Tracking Camera. And, of necessity, it's somewhat larger than the cameras most of you are accustomed to using. Like this.

Twelve of these cameras are now in use around the world. Each is designed to, first, take a picture when fixed on and following the *satellite*. This renders the subjects as a point against a background of streaks from the brightest stars. Then a second exposure is taken with the camera fixed on and moving with the *stars*. This provides the reference for determining the satellite's location.

And us? We provide the mirror blanks for Perkin-Elmer, who in turn handle the complete optical system. (The West Coast firm provides mechanical components and does the assembling.) The blanks we furnish are 31¾″ in diameter and 7″ thick. They are made from glass No. 7160, the very same glass used in casting the now-famous, 20-ton, 200″ disc for the Mt. Palomar Observatory.

The big advantage in using this particular glass is its very low linear coefficient of expansion—23 x 10^{-7} per ° C. Low expansion means a minimum of distortion, a much-appreciated contribution in the complex optics called for in taking pictures of satellites.

These king-sized mirrors lead us quite naturally to remind you that *Corning can do almost anything with glass*. Find out for yourself. Get a copy of "This Is Glass." Use the coupon for quick service.

NEW GIANT GLASS FLASK FOR THE IN-BETWEEN TASK

What intrigues the man in the picture is the *size* of the crystal clear vessel he is examining.

His interest is justified because as far as we know this is the *biggest* all-glass reaction flask on the market. It's new; it measures 18 inches in OD and stands 26 inches high. Capacity is 20 gallons.

We provide this size—along with 5 and 10-gallon versions—for people (maybe you) who need to fill the gap between lab and pilot plant.

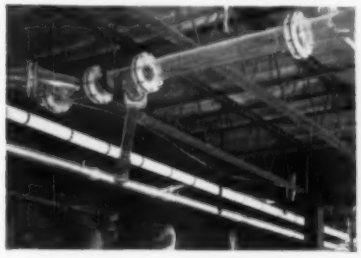
You also can get all the trimmings. Like the five-opening all-glass cover that's visible behind the flask. Such covers can be had with pipe flanges, ₮, or socket joints. Accessories include inlet tubes, condensers, blind caps, clamps and thermometer wells. Need one? Just write for details.

This outsized glassware is all made from PYREX brand glass No. 7740—a glass that performs admirably because of the virtues detailed elsewhere on this page.

Which brings us to this diminutive and relatively intricate container known as a Warburg flask. It's quite commonplace to biochemists who use it for measurement of cell respiration and tissue metabolism. It's also a stock item with us.

We call the big ones and the little ones *both* to your attention because it points up the fact that size or shape is a consideration—*not* a limitation—to the skilled glassworkers at Corning.

Investigate by tossing us any one of your tough problems. We'll look for a glass answer and let you know soon what we can do.



PLUMBING FOR POSTERITY

An increasingly popular fixture in labs, hospitals, schools, chem plants, and photoengraving shops is the glass drainline.

With good reason. Glass drainlines are fashioned from PYREX brand glass No. 7740.

This is the glass that ends your worries about corrosion. For example, if you were disposing of waste hot hydrochloric acid, your PYREX pipe would still be around at the end of 200 years.

And glass is smooth; very little chance for block-up in the pipe. If such does occur, however, you can spot the exact point and take corrective action, without having to take down the whole system.

In fact, almost anything made from PYREX brand glass No. 7740 will be around for quite a while because this glass is able to cope with thermal shock and physical knocks, too.

Available in many forms—tubing, rod, pipe, plate, and all kinds of shapes.

Fill in the gaps in your files with these basic references: PE-30, all about glass drainlines; IZ-1, design considerations in glass. Any or all, free. Use the coupon.

CORNING MEANS RESEARCH IN GLASS

CORNING GLASS WORKS 54 Crystal Street, Corning, N.Y.

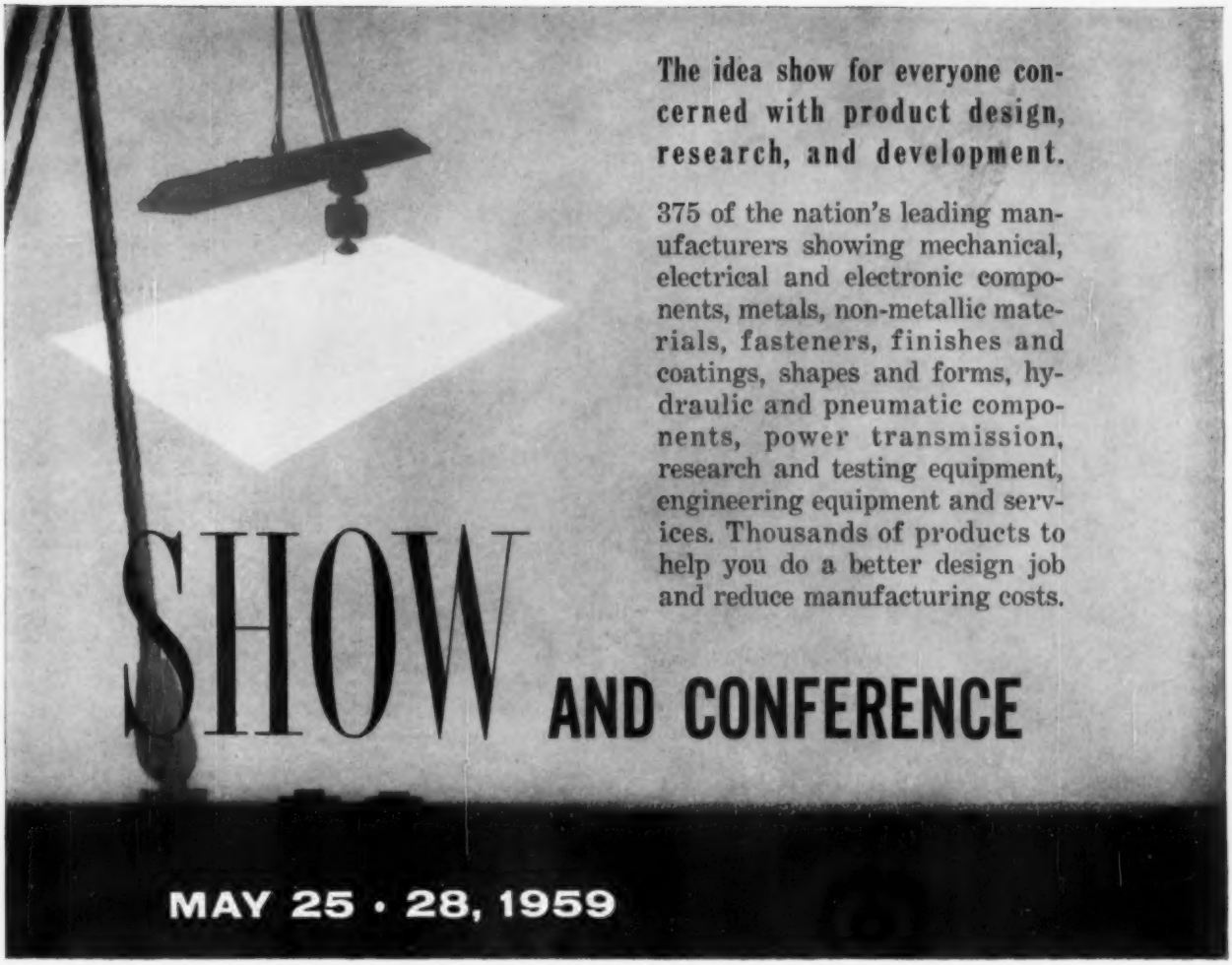
Please send me: ☐ "This Is Glass"; ☐ Drainline Manual, PE-30; ☐ Design Manual IZ-1; ☐ Info on Reaction Flasks

Name_____ Title_____

Company_____

Street_____

City_____ Zone____ State_____



ACTION DEMONSTRATIONS
Exhibits feature working models, cut-aways, technical illustrations—to bring you as close as possible to the product story.

ENGINEERING PERSONNEL
Bring your blueprints. Exhibitors staff their booths with engineers. They can help engineer your problems on the spot.

PERFORMANCE TESTING
Wherever possible, products will be subjected to performance tests to prove to you, in person, their capabilities.

CATALOGUES AND TECHNICAL LITERATURE
Hard to obtain technical data is available at the source. Exhibitors make available to you their published data in one place—at one time.

PRODUCT APPLICATIONS
Exhibitors in this show concentrate on displaying imaginative applications of their products to suggest design solutions.

NEW SOURCES
Within the ranks of some 375 exhibitors, you'll find new sources of supply for materials, products, components, and services you require.

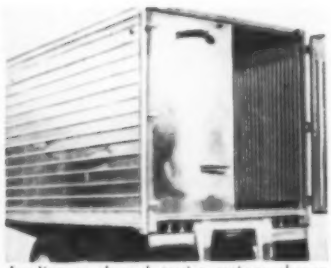
PRODUCT COMPARISON
Check competitive claims immediately by going from one booth to another.

SAMPLES
Take home for trial and test actual samples of products you're interested in. Most often they're available in exhibitors' booths.

IDEAS
Your eyes will be opened to thousands of applications, suggestions, demonstrations, that can spark new thinking—speed your designs to a successful conclusion.

HOW ROYALITE SOLVES 3 BASIC DESIGN PROBLEMS:

TOUGHNESS ✻ BEAUTY ✻ ECONOMY



Leading truck and trailer makers choose damage-free Royalite refrigeration panels that are easy to keep kitchen-clean . . . maintain stable temperature . . . keep weight at a minimum . . . and reduce cooling costs.

Royalite, most versatile of thermoplastic sheet materials, has proven itself time and again to scores of manufacturers . . . in hundreds of varied applications. **Toughness:** Tote boxes of Royalite have built-in resistance to hard knocks. Seamless, easily cleaned, no sharp edges to snag or splinter, quiet, impervious to oils, grease and most chemicals, really lasts. **Beauty:** luggage of Royalite allows modern concepts in molded designs . . . lightweight, pleasing textures, wide range of built-in colors, impact, scuff, and dent resistant, easily cleaned, lasts longer in travel. **Economy:** picnic cooler with pure white Royalite liner provides a non-conductor material with built-in thermal breaker at no extra cost . . . seamless, easily cleaned, odorless, can't rust, deep drawn, modest equipment and labor costs, fabricating techniques permit use on popular priced items. Find out how you can benefit from U.S. Royalite. Let one of our plastics engineers call on you. There is no obligation. Write for information.

Tote boxes by United States Rubber, *Luggage* courtesy of Crown Luggage Co., *Picnic Cooler* courtesy of Coleman Co. Inc., *Refrigeration Panels* courtesy of Trailmobile, Inc.

US Royalite® A.B.S. THERMOPLASTIC SHEET

US RUBBER **United States Rubber**

2676 North Pulaski Road, Chicago 39, Illinois

The dreams that stuff is made on

"I never was a radical when I was young, for fear of becoming a conservative when I grew older." In 1936, when Robert Frost said that, it sounded like very bad advice, and none of the young were having any. But, true to the implied prophesy, a good many radicals of the thirties have swung between extremes like Frost's famous birches, until all the spring has left them and they lean limp and cold and defeated, with no sap running. (While they swayed, Frost stood in place and grew—up.)

His advice today is as obsolete as the 49-star U. S. flag: no one would ever dream of being a radical when young, not out of the fear of achieving conservatism, but out of the fear of leaving it. Not long ago we talked with two groups of students who had been brought by the curricula of their respective design schools to the brink of what used to be known on campus as "The World." They were bright, and very likely talented; and they had of course A Problem. But the problem was no longer the gloriously reckless one of how to live in the world while redesigning it; the problem was deciding where—in this mammoth adjustment test called career—to find the slickest hole to fit into. The question was not even: Where can I make the most money? (not always an ignoble query). The question was: Does professional security come soonest and safest in the corporation or in the consultant office?

This concern is neither unintelligent nor irrelevant, but it hardly betokens flaming youth. The gift of Prometheus has been supplanted by the electric blanket; and while industrial leaders still go through the motions of pleading with college seniors to keep their feet on the ground, they are often discouraged to find them already down on all fours, a position that makes it anatomically impossible to look up.

The result is that the radical elders have, by default, continued to dominate the world of creative experiment. The term "grand old man" used to mean a lovable has-been who, having done something significant, congenially receives the homage of young admirers. But the most stunning work today is done largely by old men whose grandeur is not honorary but continually earned. Frank Lloyd Wright is an old story of course, but his counterparts shine everywhere. William Carlos Williams, at 76, is experimenting with *new* theatre, while youth has its fling of clichés in "The World of Suzie Wong." Picasso, at 77, tries *new* sculpture, while the abstract expressionists work in that safest of all forms, the inner circle. And although Charles Eames is not old, he is a grandfather exploring *new* film techniques, while Dore Schary—who is not young, but who is at least young enough to know better—limits his exploration to discovering new places to misapply the same old happy ending.

All of these men have made things out of visions, but this is not a process that makes for security, nor does it depend on technique. In the blunt words of Bloody Mary, "You can't make a dream come true unless you got one."—*R.S.C.*

PAN AMERICAN

EXPRESSES A NEW PERSONALITY FOR A NEW KIND OF TRAVEL

An airline's desire to be identified with the jet age has led to a complete overhaul of its corporate face by a designer whose forte is architecture but who found himself involved with graphics and product design

The big jet coming in for a landing in the photograph above is one of Pan American World Airway's new fleet of Boeing 707's. Inside and out it shows off Pan American's new look for the jet age, the most immediately noticeable features of which are the airline's re-designed corporate identity markings.Pan Am contracted for the new look, but it did not foresee that the new markings would prove to be the genesis of a complete re-design program. If that statement suggests a somewhat unusual designer/client relation, the impression is entirely correct — and therein lies a story. Back in December 1954, Pan Am's management began to mull over the matter of a visual environment to go with its then on-order jet planes (Douglas's DC-8 as well as the Boeing). By the spring of 1955, when it retained Edward Larrabee Barnes as consultant designer, it had concluded that the new look should pervade all its planes, new and old, all its ticket offices, and all the public areas of its terminal facilities. But precisely what that look should be, and how it should be accomplished, it did not know. It specified only that the design should concur with Pan Am's traditional emphasis on maintainability, and it inferred that the job should begin in a small way with the refurbishing of existing ticket offices and planes, and roll into high gear when the jets were delivered. The terms of the contract, however, were non-specific. Significantly, Pan Am accompanied this legal latitude with a broad-minded proposal that Barnes take a preliminary few months' tour of its facilities here and abroad in order to familiarize himself with the airline's existing personality. The outcome of this trip was a counter-proposal from Barnes. Along with the initial refurbishing assignments, he wanted to do a complete study of all of Pan Am's visual reference design, graphic as well as architectural. Pan Am agreed to this on an open-end, "within-reason" basis. Six months later Barnes came back with the documented findings of the study—and with a proposal for re-design of Pan Am's graphic identity: a new recognition color, a new logotype based on a new lettering, and a new company insignia. Although the program never went through the usual formalities of acceptance, the Pan American passenger today will find the new graphics on his ticket case, his baggage tag, on the ground equipment around the plane and on the plane itself. Here is how it happened.—*B.D.*

Preface to presentation book is a photographic essay on a Pan Am customer's visual impressions of old markings. At left, he selects timetable from rack. Further photographs show him at a ticket counter, at a baggage check-out, dashing to waiting plane. Accompanying text asks pertinent questions: Is ticket office stimulating? Is identification clear? Do markings suggest reliability? Is impression consistent?

A concept of unified design is grounded by existing unrelated graphics

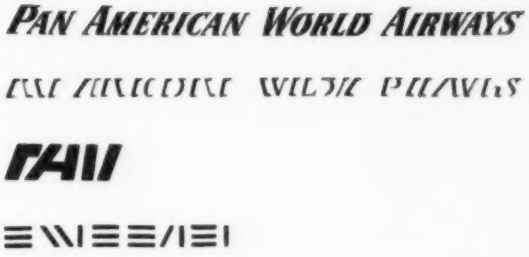
When Pan American retained Edward Barnes to update its personality it got a designer who turned out to be appropriate in more ways than one. The airline wanted to key its corporate face to the jet age, but it preferred to put the entire problem in the hands of a designer—and Barnes likes nothing better than to think and work in terms of a total image. By professional definition he is an architect, but as a matter of artistic conviction he thinks that really responsible design involves the designer—whatever his professional designation—in every aspect of a job from concept to final detail. To this he adds a second standard, equally demanding: For any design problem, a given designer has a single best possible solution, and this is the one he should find, present to the client, and ultimately defend. Barnes believes this may sound arrogant, but he says in explanation, "A designer has to prove his potentialities. His clients hire him to tell them what to do, and this is the designer's job. If the clients knew what to do, they would not need a designer."

It is very likely that Pan Am found in this attitude the alter ego it needed, but Barnes's practical qualifications also fitted the picture. Straight out of Harvard's Graduate School of Architecture, at the close of World War II, he joined the West Coast staff of Henry Dreyfuss to work on Consolidated Vultee's prefabricated aluminum house and on its aircraft. A year later, in 1948, he decided to concentrate on architecture and came east to New York to open his own one-man office. Today Edward Larrabee Barnes Associates generally consists of a staff of four or five designers. During the period of the Pan Am job the five key people in the office have been Noel Yauch, Donald Davidson, Joseph Merz, Mary Barnes (Mrs. Barnes)—and Charles Forberg. Forberg is Barnes's associate and joined him to work on the Pan Am graphic program which became the pivotal element of the job. He, too, is a practicing architect, also Harvard-trained. But just prior to joining Barnes he had been teaching basic design and product design as associate professor at Chicago's Institute of Design, and so had been involved at first hand in graphic and product design problems.

Forberg became Barnes's associate in the summer of '55, three months after the firm had been retained by Pan Am. In those three months Barnes had completed his shakedown tour of Pan Am's facilities and had begun to work, as the airline had suggested, on refurbishing certain of its ticket offices and some of the old planes. He had also begun in a tentative way his survey of Pan Am's entire visual reference design. In authorizing this corollary activity the airline had set him no time limit, but Barnes had his own increasingly urgent reasons for wanting to do something about it. Even on the early refurbishing jobs he found himself repeatedly stumbling over Pan Am's existing corporate identity, a sentimental collection of holdovers from previous Pan Am design epochs which did not lend themselves to any of his ideas for a jet-age image or atmosphere. Pan Am's blue globe sprouting wings dated back to the pioneer days of air transport, when a symbol served as corporate talisman rather than corporate identity. Its windswept lettering and nautical blue were part of a promotional program surrounding the flying boat Clippers.

Graphics becomes a team job

But Barnes had another reason for wanting a complete re-design of Pan Am's graphics. With his natural interest in total design, he was well aware of what, for example, Herbert Matter's graphic identification program had done for the New Haven Railroad, and he was convinced that graphics, rather than interior design or architecture, was the nucleus out of which all other design elements grew. Also he was convinced that it was graphics that registered first on the public consciousness. It was at this point that he found Charles Forberg—informally, at a party in Chicago—and knowing that he himself knew little about the intricacies of this aspect of design, formally asked Forberg to work with him on the Pan Am job. With Forberg's appearance on the scene the Barnes team began to devote their major



Pan Am's traditional symbol is criticized, in designer's presentation, for lack of clarity at extended distances (left), and for its intricacy of detailing which does not survive reduction for small-scale applications. Airline's windswept lettering (above) with secondary strokes dropped out, is compared with letters of two other airlines, TWA and Swissair.

effort to solving what had become their major problem. But it was six months and hundreds of pet theories later before they were able to go to Pan Am's board of directors with a clear, concise presentation book which ticked off, item by item, what was wrong with Pan Am's existing corporate identity and what was needed to change it.

In those six months there were only a few of Pan Am's markings that remained inviolate. "We saved the globe", says Forberg, "because it seemed a good idea, it *is* a global airline. And we never discarded the blue. But we lightened it almost immediately and at one point we had it combined with green—the earth-sky idea. When we tested it, though, it turned out to be too subtle. We put it on a timetable and a ramp, and it wasn't bold enough, it wasn't legible. One thing we did throw out right away, and never take back, was the wing motif. But although at one point we also discarded the flying serifs on the lettering, we later took them back. We played around a lot with the linear business—the lines on the globe, the thick-and-thin lettering. There were an awful lot of preliminaries and most of them were unsatisfactory, too weak. We were groping for a positive design." The "we" is literal. Through all of the first stage the Barnes staff worked in full rapport and this was deliberate. Barnes wanted this stage to be a common undertaking so that later, when the job broke down into individual assignments, "they wouldn't go wandering off into private visions that had no relevance to a central theme."

Map grids supply the key

The first major break-through came with the adoption of the map grid as a visual and mnemonic device. "It signified what we were after", says Barnes, "the idea of space and speed and air and precision, particularly precision". The map idea is of course not new; no respectable airline office would be without one. But most of them pay homage to geography—to land masses, place names, national boundaries—and it was this that Barnes's office purposely played down. They abstracted from the map its technical process, the accurate mathematical markings that make it a navigational tool, and found themselves with the pure geometry of the cartographer's highly formal art, the linear projections that order and re-order space/time relationships to suit the needs of man. At first they applied it only to the familiar parallels of Mercator and the polyconic's open orange peel, but enthusiasm for the idea rapidly led to a library of grids, ancient and modern. Some of them, particularly the polar projections used for trans-polar flights, they eventually lifted and used in careful facsimile on Pan Am material. But the primary contribution of the grids was to inspire and channel the direction of the re-designed markings for Pan Am's corporate identity.

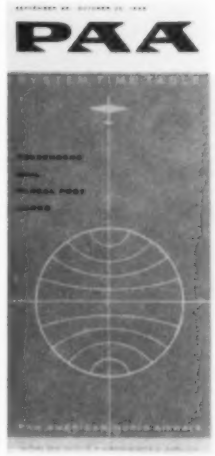
Old Pan Am plane markings (below) were partly inherited from airline's beginnings (note tiny symbol on tail), partly from days of flying boats. Designers felt they lacked dignity and restraint which belonged to an airline that had become an institution.

The new Pan Am graphics do everything that the old graphics did not. They are an integral part of the jet age image, their visual impact is sharp and immediate, and so far they have adapted well to every application for which the Barnes office has specified them. This is no accident. During the six months of work on the new markings, Barnes and Forberg also assembled a dossier on the old markings and carefully analyzed what was wrong with them, in appearance and in performance. Some of the items in the dossier are in the form of actual material—literature and printed matter, for instance. The evidence on the larger applications—signs, plane markings, etc.—is photographic. Much of this material was eventually used in the presentation book, but in the developmental stages of the new graphic program the Barnes staff used it as checkpoints. What happens to a symbol, for instance, if you print it on a paper napkin, etch it on a drinking glass, stamp it on a pilot's lapel button? In answering such questions the designers defined the faults of the existing graphics and clarified the re-design problem.

The first of the criticisms and the first of the problems was, according to Barnes and Forberg, Pan Am's color. The deep blue, they felt, lacked vitality, had nothing to do with lightness and air, and was hardly distinguishable from the blues of many other airlines. In addition, it had no constancy; sometimes it appeared as royal blue, sometimes as navy, depending on the demands of a particular application. The new blue is light, fresh, atmospheric. At one point it was even lighter, but that blue repeated in inverse order the faults of the original: its delicacy robbed it of vitality

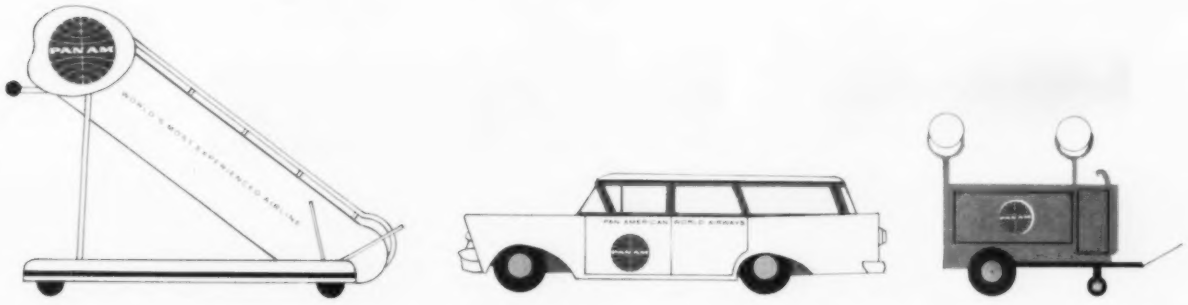
PAN AM
CLIPPER
CARGO
AUTHORIZED AGENT

Business-like cargo symbol used for trucks (see above) and freight offices is an abstract box in blue, black, and white with a plane silhouette in center of white section. Circular ground is half black, half blue. At right, new version of timetable.



New plane markings consist of a broad band of blue across windows, dividing white top from aluminum base. Except for small American flag, huge tail fin is marked only by new symbol blown up to proportionate size (for comparison, see old tail markings, preceding page). Cowling under cockpit is black, so is nose cone.

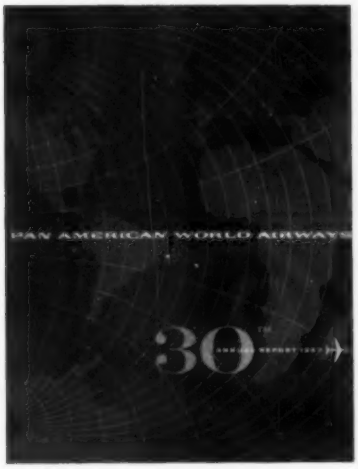
Ground equipment is gray on soil-prone parts, white everywhere else. New globe adapts easily to all of it—service gear, ramp, station wagon, searchlight—and is crisp and emphatic in every situation. Occasionally it is accompanied by airline's name or motto. Cargo truck is marked with special symbol (see below).



and limited its use. The final blue is strong enough to stand alone with white, the combination in which it is most often used, but it can also be used with black, for emphasis, and with almost any other color for use in interiors.

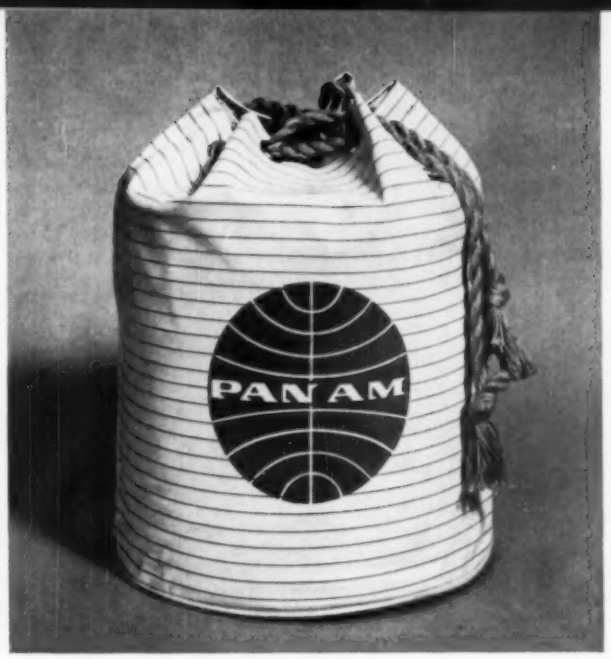
Their second criticism was leveled at Pan Am's windswept lettering. They felt it was difficult to read at a distance, at an angle, or against a busy background—as the public normally saw it. Forberg also thought that its slanting letters lacked the dignity of the classic vertical type faces. His re-design reverted to Roman, but out of deference to the original, retained the slightly extended form and the distinctive flying serifs. Both Barnes and Forberg also felt that the airline should adopt for its abbreviated logo the nickname the public had given it, *Pan Am*. Besides being pronounceable (which PAA wasn't) it was more personal, and it set the airline apart from hundreds of other initialed companies.

Finally they took on the symbol, the blue globe with wings. But not without misgivings. As Barnes says, lettering and color are one thing, but a symbol is a holy-of-holies. Besides the deterrent of sentiment there was the equally formidable obstacle of economics. Pan Am's symbol pervades its system. It does everything from ride the tail of 141 planes to decorate the corners of hundreds of thousands of paper cocktail napkins. Nevertheless they went ahead and re-designed it, too: a clean globe in the new Pan Am blue minus wings and land-mass markings, ruled off in a simplified white grid with the new logo in white in the center. The evidence in its favor, shown here, gradually overcame the objections of conservative elements within Pan Am.



Design for stationery (left and below) has not yet been adopted. Stockholders' report (far left) uses polar map projection across front and back covers. Grids are blue, land masses are gray against black background. Lettering in white follows line of equator.

On gray-blue blanket (below) symbol's usual color is reversed; grid and logo appear in black against a bisecting band of white. Bag for lady passengers (right) is striped canvas with a pattern interval proportionately related to interval of lines on symbol.



The program is implemented by an item-by-item application to passenger material

In the fall of 1955, Barnes and Forberg went to Pan Am's board of directors with the presentation book in which they had marshalled, item by item, all their objections to the airline's old graphics—color, lettering, logo, symbol. It is prefaced with a candid-camera essay which states the whole problem by illustrating an average Pan Am customer's contact with the old markings. The specific arguments follow, and at the conclusion of each section the designer's present their solution. It was the first concrete evidence Pan Am had seen of the comprehensive survey authorized six months earlier. Naturally Barnes and Forberg were somewhat uneasy about the possible reception. Although they themselves were convinced of its rightness, they also knew it constituted *lèse majesté*—particularly since the airline had no inkling of what was coming (of this, Barnes says—typically—"We wanted to be able to go to them and say, 'Here's what's wrong, here's what you should do' ").

Pan Am's reaction to the presentation was mixed. Understandably there were many in the company who questioned any abandonment of the old traditional elements. But there were also some executives who liked the new design. One of them, Willis Lipscomb, vice-president in charge of traffic and sales, headed the department that would have most to do with the use of corporate identity material. At his suggestion a plane was lent to be re-painted in the new markings. This prototype brought a few more followers to the designers' side, but again there were hold-outs. The markings, however, with a few minor revisions, are those used —or to be used— on all Pan Am planes. The top of the plane is painted white, a standard Pan Am practice dating from pre-air-conditioning days on its tropical service. The bottom is left in its natural aluminum, partly for maintenance reasons, and partly because the paint used on a plane is a significant addition to its weight. The cowling under the cockpit is painted black to cut down sun glare, and the radar nose cone is also black—but eventually it will be replaced with a white rubber nose cone, now being developed. Pan Am's new blue bands the fuselage, connecting all the windows, and the new symbol stands out clear and sharp on the high tail fin.

Barnes and Forberg expected after this to get a formal yes or no to their program, and in the event of acceptance to get a carefully worked out schedule for changeover. But this never happened, largely because of the nature of Pan Am's corporate structure. The airline has three distinct divisions, and each functions autonomously. This democratic set-up results from the very different character of the service on each of the three—Atlantic, Pacific, Latin American —each of which presents very different operational problems. The Latin American division, for instance, island-hops informally across the Caribbean and down South America's East coast, but the Atlantic division is sleek and sophisticated and puts a premium on efficiency. Central headquarters oversees all three, but does not dictate. On the matter of the corporate identity change, it judged but did not execute.

Application by slow degrees

The execution, in the end, came on Lipscomb's authority. Barnes says Lipscomb had immediately, "seen the significance of the new marking program", and advised him to go ahead and re-design applications for its use. While the program was not yet approved by the company as a whole, the designers were encouraged to make proposals for redesign wherever it seemed most needed. Lipscomb gave them the best possible support and encouraged them to show initiative. Adoption and detailed application by Pan Am as a whole, however, was far from sudden. In working with the various departments the designers tried to listen to all the criticisms and arguments, to be patient and at the same time convincing. Gradually the new look was accepted from top to bottom. To date the new graphics have been applied

New three-dimensional lettering on facade of new Toronto ticket office (left) contrasts with old lettering on ticket office (above) in Rockefeller Center. Toronto sign stands out in relief against a blue porcelain-enameled steel map grid.

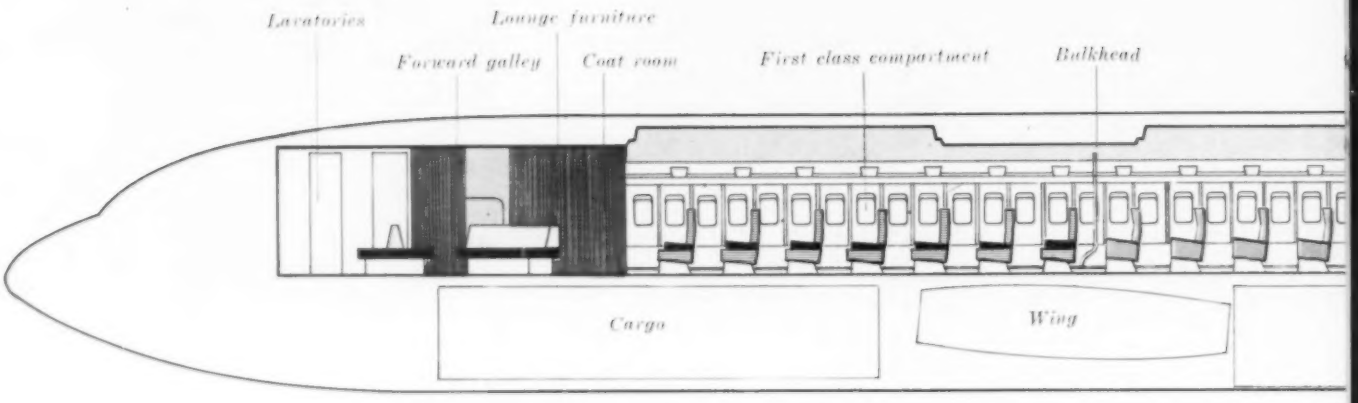
to timetables, passenger literature, the annual report, baggage tags, flight bags, ticket office signs, and, on a gradual changeover, to all planes and group equipment.

At the same time that the new corporate identity was being established, the Barnes office was also at work on ticket offices and on the jets which had precipitated Pan Am's desire for a new look. The first of the ticket offices was Chicago (guinea pig for the new look); to date eleven others have been completed. A twelfth, Cleveland, is now on the boards. Of the jets, only the Boeing is completed and in service, although the design for the Douglas, to follow later this year, is finished except for minor details. Both planes are similar, and in fact, planes and ticket offices together mirror the total image of lightness, air, space, speed, precision. In the planes this image has resulted in a slightly heretical interior design. Judging from most aircraft interiors, the common assumption seems to be that passenger's anxieties will be eased by an environment similar to the one they left on the ground. The Pan Am jet interiors, however, will not be mistaken for a living room, or a cocktail lounge, or in fact for anything but what they are — the interiors of a finely tooled machine. Barnes has made the jets almost spartan in their simplicity.

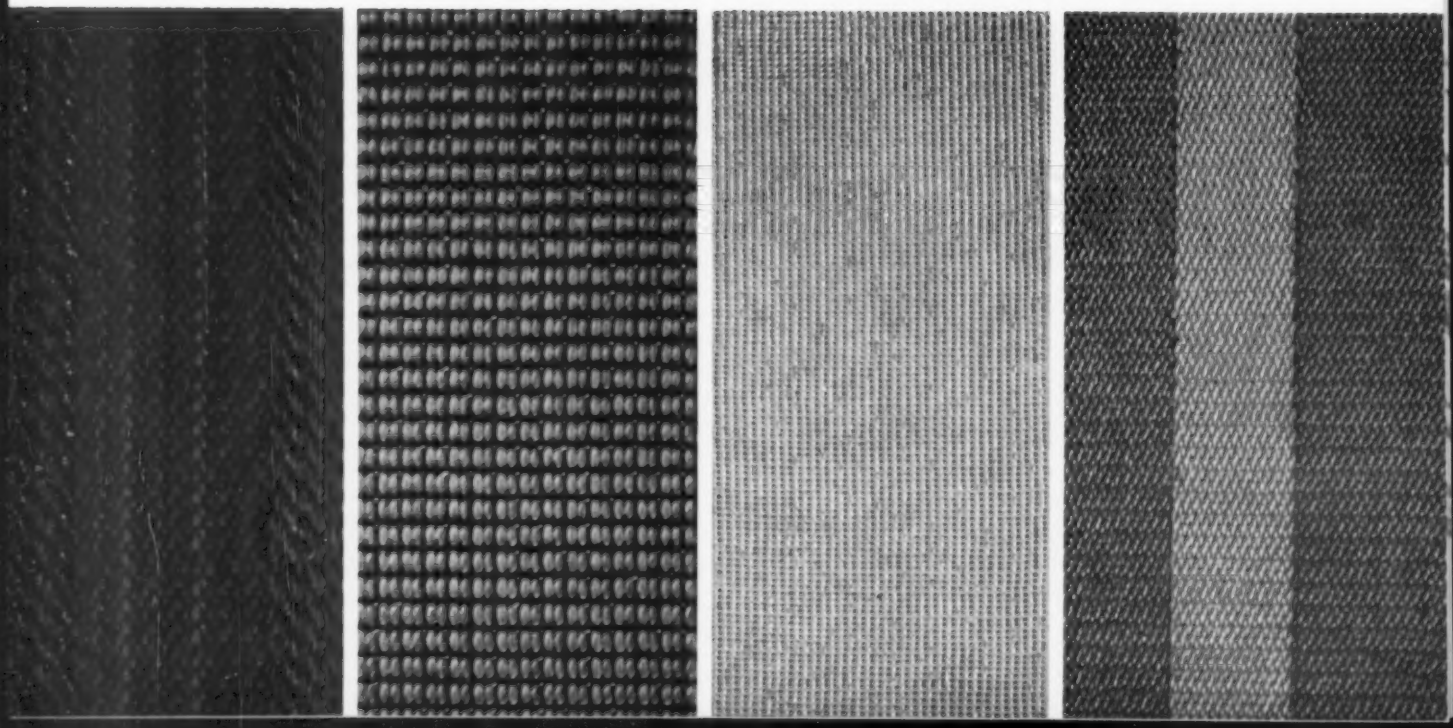
In the Boeing plane the bulkheads are white, the ceiling is Pan Am's new blue. The Douglas plane will have a white ceiling because it must serve as reflecting surface for the general lighting. Both planes have specially woven fabrics. The designers wanted them to be emphatic elements of the total image, not just decorative after-thoughts, and in order to explore the possible ways in which a fabric could project this idea they went to a custom textile designer instead of a commercial fabric house. The designer was Jack Lenor Larsen. Larsen worked with the Barnes office on the problem, under stood what they were after, and struck off for them a series of quietly authoritative fabrics in which the pattern is an integral part of the weave. The fabrics' colors are predominately Pan Am blue, white, black, and gray, with green for accent. Similarly, more than the usual attention was given to the plane's seating. Although an aircraft interior designer is almost always required by contract to work directly with the seat manufacturer on fabric and color and styling, the designers made it their business to investigate an aircraft seats' structure: why it has to look the way it does. They got Aerotherm Seating's engineers to explain all the structural principles which, directly or indirectly, dictate the final silhouette. As a result they understand such complex concepts as the safe-fail feature: the predetermined time-to-collapse of a seat frame's various parts which depends on the energy-absorption factor of the various materials in the frame (safe-fail gives the passenger, on crash-impact, a few extra moments for deceleration).

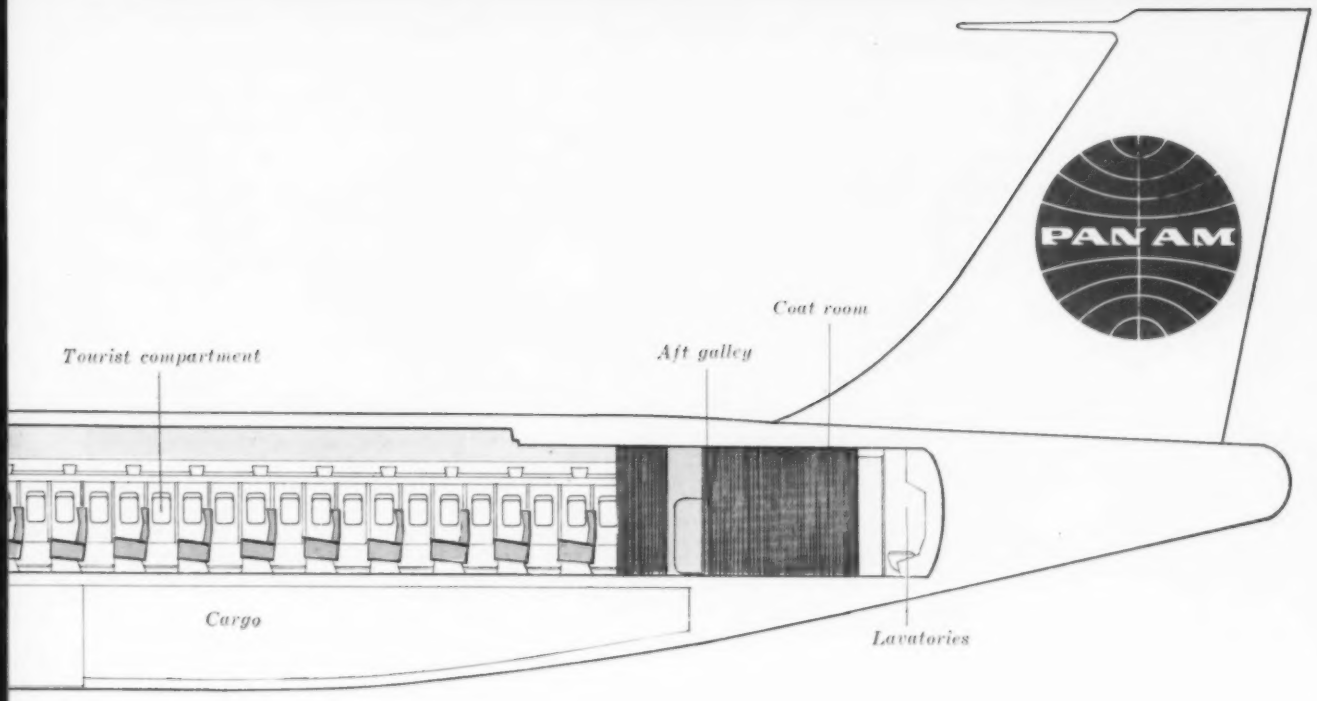
Seat profile is refined

The designer's understanding of such things as safe-fail is perhaps not so important to the final design as an understanding of upholstery techniques, but it did contribute to a familiarity with aircraft seating problems which permitted them to suggest peripheral changes that add up to a cleaner looking seat. They specified, for instance, different densities of foam rubber in the headrest to minimize the lumpy contouring. They substituted a separate triangular foot bolster for the traditional bar footrest (and the seating engineers accepted it gladly since the bolster weighs less than the bar and its bracket assembly). And they were responsible for the hard-form plastic seat back with its attached tray. For the rest they simply added refinements— slight changes in the seat buckle, in the ash-tray, and in the arm rest, and a new napkin for the headrest. Barnes's total design, in the last analysis, is patient attention to endless small details. For a preview of a slightly different detail, one that indicates a possible new direction for the Pan Am program, see overleaf.



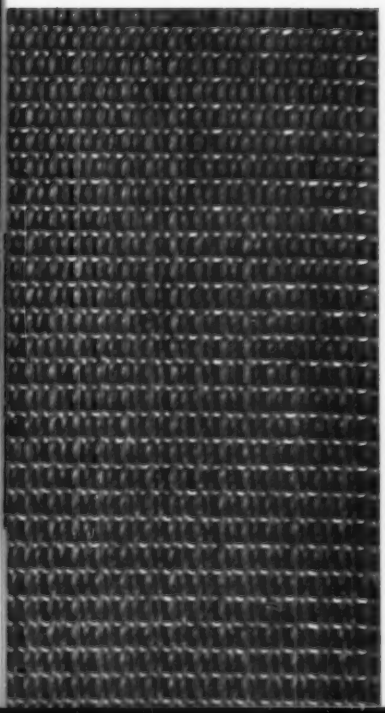
Inside the jets the new look is one of crisply-placed color planes and

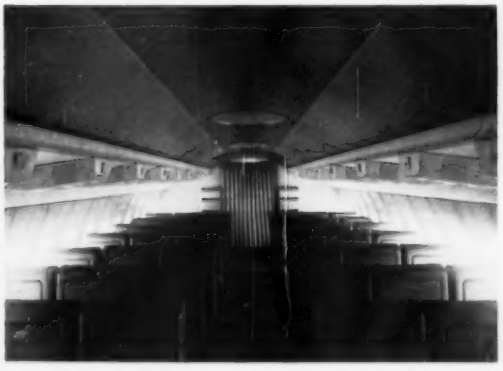




precise details

Both of Pan Am's new jets—Boeing 707 (above) and Douglas DC-8—will have similar interiors. Differences are seat conformation, window treatment, ceiling treatment. Douglas plane will have its own seat; Boeing leaves seat to customer's choice. Douglas plane will use conventional window curtains; Boeing has a built-in blind that slides up behind bulkhead. Douglas ceiling will be white since this is reflecting surface for general lighting; Boeing ceiling is blue. Fabrics developed for Barnes by Jack Lenor Larsen are, left to right below: galley curtain, both planes; first-class upholstery, both planes; silver window curtain, DC-8 lounge; cabin window curtain, DC-8; tourist class upholstery, both planes. At present Pan Am is offering two-class accommodations with four-abreast and six-abreast seating. Eventually it may add a five-abreast seating.

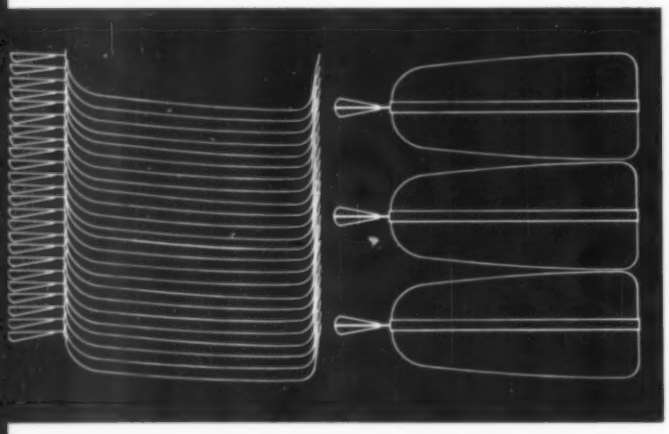




Cabin of Boeing 707 (above) has blue-gray carpeting, white plastic or reinforced vinyl-covered bulkheads, blue vinyl-covered ceiling. Seating (right) in first class compartment is black-and-white tweed with natural leather arms; tourist seating is blue tweed with gunmetal vinyl arms.

Pan Am's new flight bag of Marlex polyethylene plastic, molded on forms made by Standard Tool, is in airline's new blue with symbol hot-stamped in white on the side. Production is being held up temporarily to solve photogenic problem: Pan Am wants the symbol to register more sharply in news photographs.

For jet travelers: A plastic case in place of a canvas duffel bag



Barnes and Forberg's latest project for Pan Am, on the threshold of production, is a plastic flight bag with an ingenious snap-together assembly. The bag is injection molded in two identical, nesting shells with an integral handle formed in two half-rounds. Its hinge is an inter-locking jigged edge; its lock is a stainless steel clasp that snaps over the bag's raised lip. Forberg, who is chiefly responsible for it, worked out his idea in cardboard, then went to Plastic Engineering Sales for advice on fabricating techniques. He had some difficulty, however, in finding a fabricator. Injection molding of such large forms (the bag's overall dimensions are 11 by 15 by 5½ inches) is still very much in experimental phase. The first few firms he approached told him that his bag would require so thick a wall that production costs would be prohibitively high and the bag itself too heavy (Forberg wanted it to be comparable in weight to the canvas version). Finally he went to Penn Plastic; Penn agreed to work with him, using a high-density polyethylene plastic which, theoretically, could be formed into a thin-walled shell. In the earlier models they encountered some trouble with warping and buckling, but this has been solved by feeding the plastic into the mold from three injection points (originally they had used two, then one). The bag, in production, is expected to be comparable in cost to the canvas model—and to please the Pan Am passengers.

As corporate identity programs go, Pan Am's goes further than most.
Not only does it cover more actual territory—ticket offices,
plane interiors, ground equipment, and all passenger paraphernalia—
but it attempts to infuse all these things with a single image.
Sometimes the image, the new idea, is projected directly.
The symbol does this, and so does the obvious stylishness of a little
plastic suitcase. But designers Barnes and Forberg have also
tried to project it—as an abstraction, as a spirit—in the interior design
of the planes and the ticket offices and terminal facilities
through which the public will pass on its way to a new kind of travel.
Pan Am itself is somewhat responsible for this all-encompassing new look.
It wanted something it could not clearly articulate—an omnipresent
sense of a new age. It did not talk about things, about areas,
or even about specific elements of design. It talked about an idea.
For the designers, this was enough. Design offices faced with a job
of this magnitude might normally prefer to farm out the elements for which
their own staff is inadequate—to sub-contract, and retain only a supervisory role.
Barnes and Forberg were unorthodox. Refusing to believe that
the sign on the door and the diploma on the wall necessarily limited
their function, they felt that to be involved in design was to be involved
in all of it. In creating a corporate identity for Pan Am they have tried for a
cumulative idea that will continue to be applicable whenever and wherever needed.

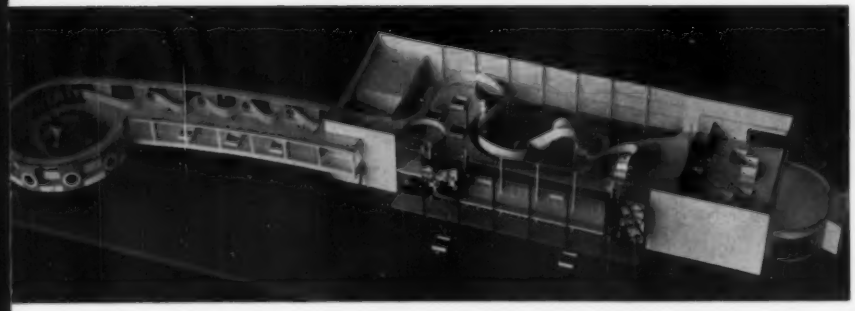
Above: aluminum ribbon hung before opening of exhibition. At right: model, showing ribbon mounted in Marshall house.

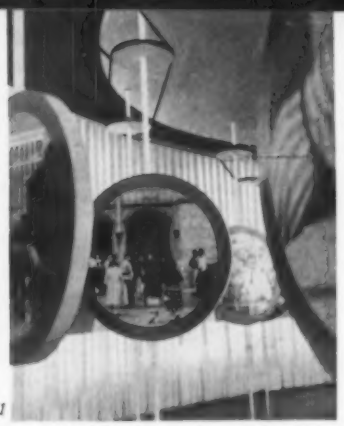
RIBBON TIES SHOW TOGETHER

One of the most satisfying ways for exhibition designers to integrate form and content in a show is to use some of the subject matter as the vehicle for its own presentation. Graphics designer Will Burtin, in "Life and Work in Kalamazoo, U. S. A.," the U. S. Information Agency's 1958 show at the West Berlin Industrial Fair, has done it by using a ribbon of aluminum that looks like an unrolled roll of newsprint. The device has a dual function: it serves as a symbol of papermaking (Kalamazoo's biggest industry), and it gives unity and form to an awkward space.

George C. Marshall House, where the exhibition was held (see model photograph below), consists of a long, curved corridor and a two-story rectangular room with a balcony around it, the corridor being attached to one of the narrow ends of the rectangle, and debouching into the balcony. As it runs along the corridor, the aluminum ribbon looks much like a conventional display panel, but when the corridor joins the main part of the building, the ribbon turns on its side and loops and swirls through the high room. Visitors walk along the balcony to a staircase, where they descend to the main floor.

Life stories of three typical Kalamazoo workers unfold in sequence on the ribbon, guiding visitors along predetermined paths that tend to keep traffic jams at a minimum. With 40,000 visitors a day, however, it was inevitable some jams would occur. When they did, guitar players demonstrating Gibson guitars (another Kalamazoo industry) would station themselves farther along the path and draw visitors onward in Pied Piper fashion.





1

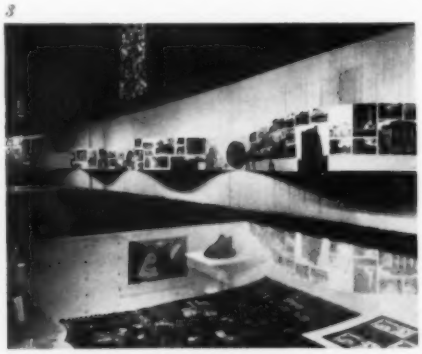
The entrance exhibit is 12 interconnected, revolving discs **1** *showing the activities of an average resident of Kalamazoo at each hour of the day. From there visitors pass to a series of 24 photo sequences* **2** *about individuals, showing who and what they are, where they live, their families, their hobbies, and their ambitions. The exhibition becomes more general* **3**, *where the aluminum ribbon starts. Groups of photographs show community activities.* **4** *looks toward the corridor, showing cylinders from which the ribbon develops and its transition (center background) from display panel to "Paper Snake" (as visitors called it). The only graphs Burtin used* **5** *showed how income was spent (left) and how much time is required to earn various common articles.* **6** *gives a general idea of how Burtin's exhibits of local industries work into the scheme dictated by the arrangement of the room.*

The exhibition, part of U.S.I.A.'s world-wide program to acquaint people with life in America, was scheduled to run for two weeks at the Berlin fair, but was held over for an additional week in September, and given another run during October. After its final closing it was rebuilt into a traveling exhibition and is now being shown at various America Houses in West Germany.

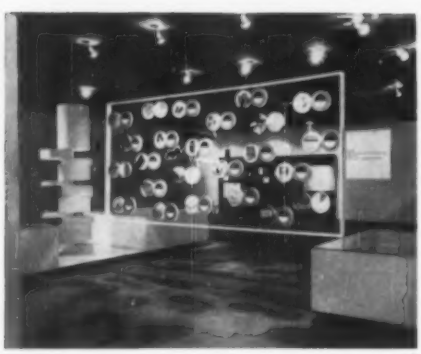
Although the ribbon display was not planned for this purpose, it is well adapted to the needs of a traveling show: it rolls up on three reels for transportation, and can be mounted in any space. When it travels it is hung according to the dictates of the available space, with no representative of Burtin to direct installation, and the individual displays arranged where they will fit; but since these were set in conventional fashion around the periphery of the high room in Marshall House, they are easy to arrange anywhere. The ribbon may be deprived of some of its power as a space-maker, but it is still effective as a display technique.

2

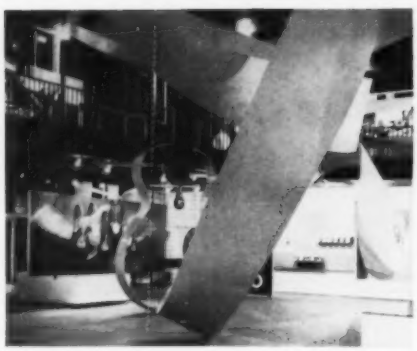
3



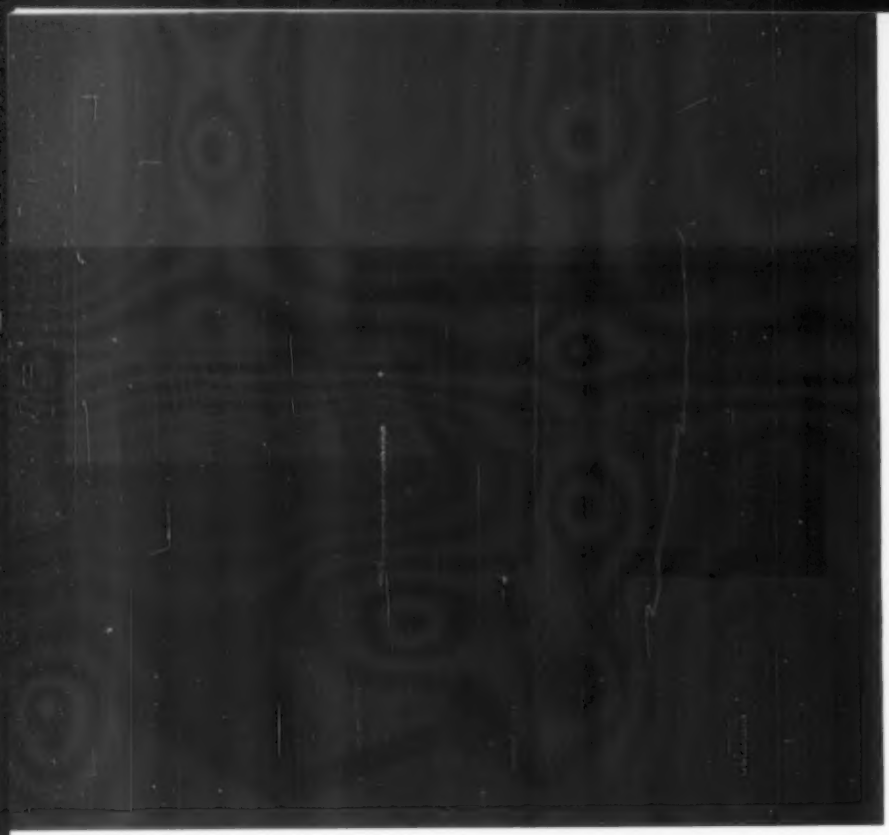
4



5



6



Shipping case made by Industria Cassa Smontabili, in Milan, is made of double-layer boards, is entirely demountable; has no hinges, hoops, or bolts. Sides and ends have beechwood exterior panels; bottoms and tops are reinforced with angle irons. This case is called "X," with atypical Latin restraint. X marks the spot where sound packaging begins.

Special Packaging

Technology and ingenuity solve various kinds of packaging problems

In package design—as in any other field old enough to have developed cliches, but too young to have forged a new vocabulary—there are some things that can be taken for granted. It may be assumed, for example, that a new package ought to be a better merchandising tool than the old one. One can assume with equal confidence that, in a self-service situation, the package functions as a salesman; that on many occasions it works as an advertisement; and that, where competitive products are the same, the package is to a large extent what the consumer is actually buying.

These things were not always obvious, but they are now. As objectives they can be lumped together for conversational purposes, but must be carefully interpreted and balanced when applied to any given project. In this sense, all packaging problems are special packaging problems. But some are more special than others. What makes them so?

The packages in this collection tend to be special in one or more of three ways. They are new answers to old mechanical problems; they are new answers to unusual merchandising problems; or they are designed for products that are themselves so far out of the ordinary that they require a vastly original solution.

Solutions to special problems are often structural rather than graphic, (as in the demountable shipping case above), but not necessarily. The surface design itself may be the problem-solving device, as in the vending-machine supply cans on page 49. Or, like the insulin boxes page 50, the package may meet special needs by both surface and mechanical improvement. Nor is the point always to discover something new. The deodorant box on page 49 is special in its awareness that a solution may consist in knowing when it is strategic to return to an abandoned form.

Device patented by Omus in Piacenza, Italy, is designed to take maximum advantage of can's weakest point. Relatively slight tearing stress opens can without endangering tender consumer fingers. The opener is attached to the can, thus eliminating the annoyance of not being able to find an opener when you want one.

The often messy job of pouring oil from a flat-topped can has been simplified by Wesson Oil with the addition of a retractable, plastic spout to its one gallon cans. Opposite the spout a circular plastic disc rotates to uncover a vent hole, which relieves the can's natural vacuum. Developed by American Can Company.

Quaker Oats has replaced the friction-fit collar can with a lock-tight, key-opened can for its export trade. Five lugs extend from the inside of the recessed top and fit into small depressions in the collar of the can. When the lid is pressed onto the top of the can and given a twist, the lugs are forced into the collar for tight reclosure.

Photo courtesy Modern Packaging

A package of 14 serums used to type blood uses a modular system of single-unit or multi-unit packages. The injection-molded, polyethylene base of each unit has tracks which engage with the opposing grooves of the next package. Because of polyethylene's great flexibility an indefinite number of rejoinings are possible. Principle used for this package may be adapted to food, cosmetic and other packaging where multi-unit goods are popular. Developed by Guild Molders and Ortho Pharmaceutical Corp., the package above may be broken at any of six points.

PACKAGES MOVE GOODS

The packing case in the corner of the opposite page is not, in the customary jargon, a package at all: it bears no product image; it does not scream "buy me"; and it is designed to move goods in a literal, rather than a merchandising, sense. For all that, it is really the quintessential package, for there is no chance of confusing what it does with what advertising and promotion do: what it does is to hold something and protect it in storage and transit. All other packs are variations on this theme, but those shown on this spread vary less than most new designs: they have been designed to serve old needs better than ever, in material and mechanical ways. The new spout for Wesson Oil facilitates pouring, eliminates spilling. And although tight closure problems have been licked for some time, the Quaker Oats Company's can for export now features a top that permits tight reclosure. It may be worth noting that for export trade, the package carries a Quaker who is sober from head to foot, instead of the truncated smiling one used domestically.

If the package on page 46 can be described as quintessential because it is nothing more than an excellent container, a lot of other packages can be described as peripheral because they are something less than excellent containers. None of those appear here. But the packages that do are distinguished more for their contribution to such peripheral concerns as merchandising than for any unusual ability to hold the product. They are shaped not so much by what a box is for as by what the economy is like. They are solutions to *special* problems in selling, rather than conventional ones like getting adequate shelf exposure.

For the luxury, collector, and hobbyist trades the earthenware barrels at right are sold full (half bottle) of either port or sherry. They are small-scale replicas of 19th century earthen barrels, and — after the manner of American whiskey decanters — can be either refilled or converted into pub-redolent table lamps. Also from England is the elegant salad-server gift pack in the upper right hand corner of the opposite page.

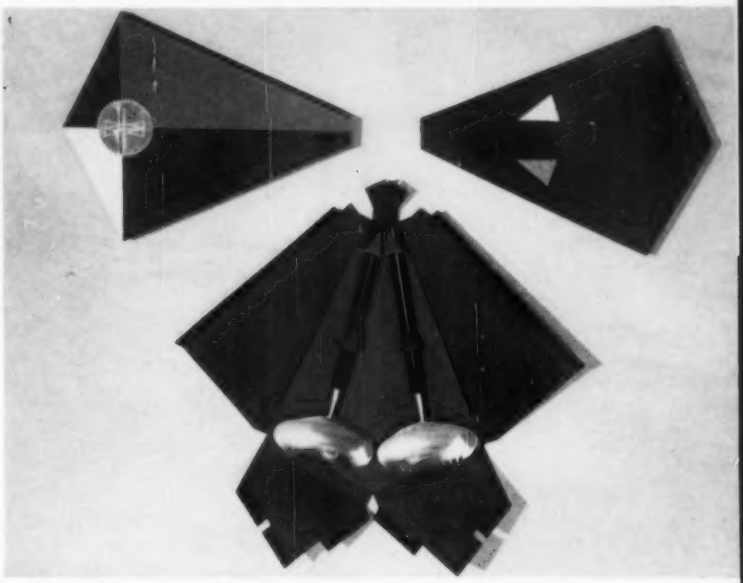
The garment bag at right is an interesting example of a compromise solution. A few years ago, when plastic clothing bags became practical for retail dry-cleaning establishments to use, the public demanded, and got, them. The big advantage to both retailer and consumer was that the contents could be seen at once; also the plastic bags could easily be made air-tight for storage. But retailers soon noticed that the blessings of technology were mixed: static electricity caused dust to adhere to the surface of the bag; also the dry cleaning people complained that the new bags were harder to handle than the old ones, and impossible to mark. Furthermore, dry cleaners found that paper was more effective in retaining garment shape. A retreat to unglamorous brown paper was called for, but there was one obstacle: consumers *wanted* plastic, wanted to see what they were getting back. The solution was to make a paper bag with a full-length polyethelene see-through strip down the center, satisfying the demands of both distributor and consumer.

At a time when phrases like "package design as a merchandising tool" are, if not on everyone's lips, at least in every prospective client's daily mail, the packages on this spread remind us that a merchandising tool, like a carpenter's tool, does a *particular* job.

England's W. & A. Gilbey Limited sells port and sherry in replicas of 19th century earthenware barrels. The white, glazed earthenware is decorated with gilt and colored bands, has plastic tap, wood and cork bung at the top. May be refilled or converted into lamps. Graphics by the Design Research Unit. Barrels manufactured by Royal Victoria Pottery.

Garment bag combines paper form for shape-retaining and dust-rejecting features with full-length polyethylene strip for visibility. Bags by Cade Paper Co.

A good merchandising device is Squibb's Engran Term-Pak, which contains the right number of vitamin capsules for a full term of pregnancy, and eliminates the need to re-purchase during full nine months. As an additional incentive, Engran offers as part of the package a purse dispenser (foreground) which releases a single capsule with a turn of the cap. The jar, like many others, is designed to look at home on the breakfast table, rather than in the medicine cabinet. Both jar and purse dispenser are reusable.

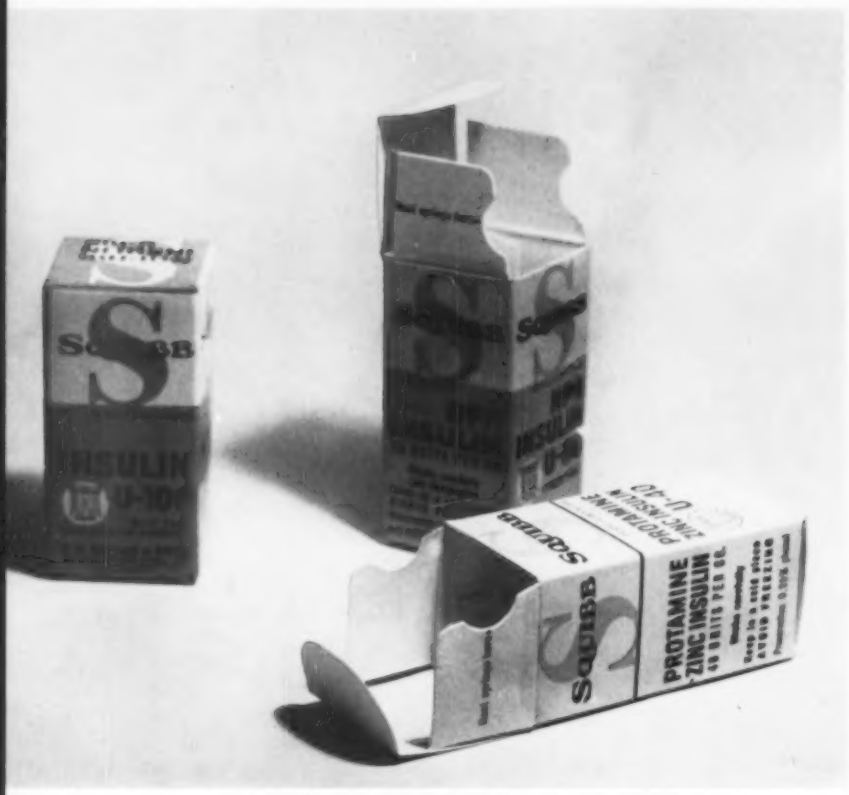


Gift pack designed by William and Veronica de Majo for Liberty's (London) Italian salad servers is produced from textured green board, screen printed in white and red. Platform under servers is covered in red flock paper; flap device holds the servers and locks platform and package.

For Fearn Laboratories, producers of food for automatic dispensing equipment, Dickens Incorporated has created a family of labels carefully color coded to help avoid common error: putting wrong concentrate in dispensing equipment. For brand identification, a black Chinese oval symbol and bold F are used, with secondary color on cross bar and balance of label used to designate the particular type of concentrate.

When Ban deodorant was first marketed, it was displayed in an open boot so that the unusual product, a roll-on deodorant, could be displayed. This presented a pilferage problem, so designer Egmont Arens created two other designs to deal with it. Package below is made possible by the fact that roll-on applicator is no longer new, and product can now be understood and merchandised from illustration.

FOR UNUSUAL PRODUCTS, UNUSUAL CARTONS, WRAPS, AND POUCHES ARE DEVISED



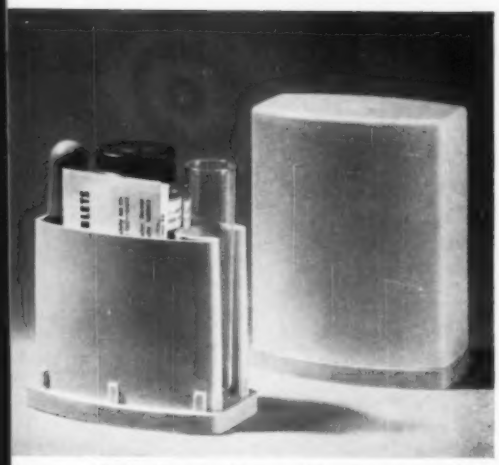
Insulin packages designed for Squibb by Francis Blod Associates uses Government prescribed colors in non-official-looking graphic treatment. Carton is constructed with a die-cut curve for resting hypodermic needle away from non-sterile surface.

Sometimes the package designer's ingenuity is most interestingly taxed by the product itself. Not only are startlingly new products devised and put into production almost daily, but old products that have never been packaged before appear on the market; in this self-service age, they can't appear until they have something to appear in.

Here is a collection of packages that have special design features because the product they hold is a very special one. At immediate left and right are two packages specifically designed to appeal to the diabetic and to meet his serious peculiar needs. Both the insulin package at left and the diabetic test kit at right attempt to establish a cheerful approach — the test kit by using a two-tone (but gray) color scheme, the insulin package by replacing the conventional "clinical" labels with a less sober graphic treatment that nevertheless uses the government-prescribed color codes for type and strength of insulin. The designer has also included in the lid a die-cut curve, so that the user can set down a hypodermic needle free of any non-sterile surfaces it might otherwise touch.

The distribution of Christmas trees has been so sharp a headache that two years ago one West Coast designer created a plastic tree assembly kit. From the east coast, where tradition doesn't die so willingly, however, another kind of answer has come: the tree packaged for easy shipping.

Medical supply case made for Eli Lilly Pharmaceutical Company by Farrington Manufacturing Company applies the appeal of reusable packaging — heretofore limited pretty much to consumer items — to professional merchandising. Attractive case can be re-used by physician, who can stock it according to specific needs.

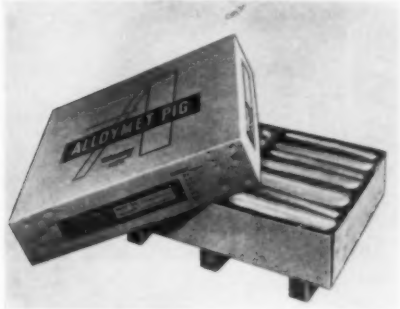


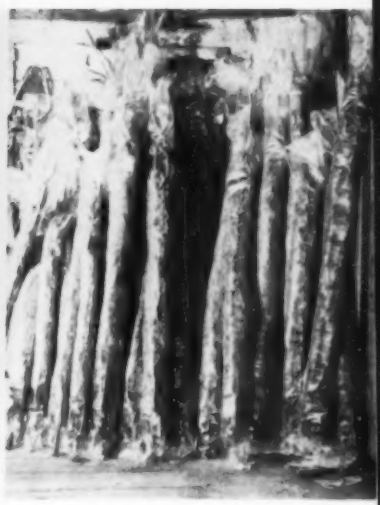
Diabetic test kit provides in one package all equipment necessary to perform blood sugar test for diabetics. The pleasant-looking, two-tone gray kit is housed in molded cellulose propionate plastic. Base of kit has been molded to provide built-in holder for test tube and medicine dropper. Designed by Henry Keck Associates, produced by Ames Co., Elkhart, Indiana.

Photo courtesy Modern Packaging

Putnam brand fabric dyes are packaged in water-soluble polyvinyl alcohol film designed to do disappearing act when dropped in cold water. Picture at left shows pouch being immersed. At right, a few minutes later, pouch is stirred into nothingness.

Heavy-duty corrugated container for nickel alloy pigs effects savings in handling costs. Steel drums and wooden pallets formerly used necessitated individual handling of pigs. New cartons can be fed as unit, directly into electric furnace. Carton produced by Container Corporation for Alloy Metal Products, Inc.





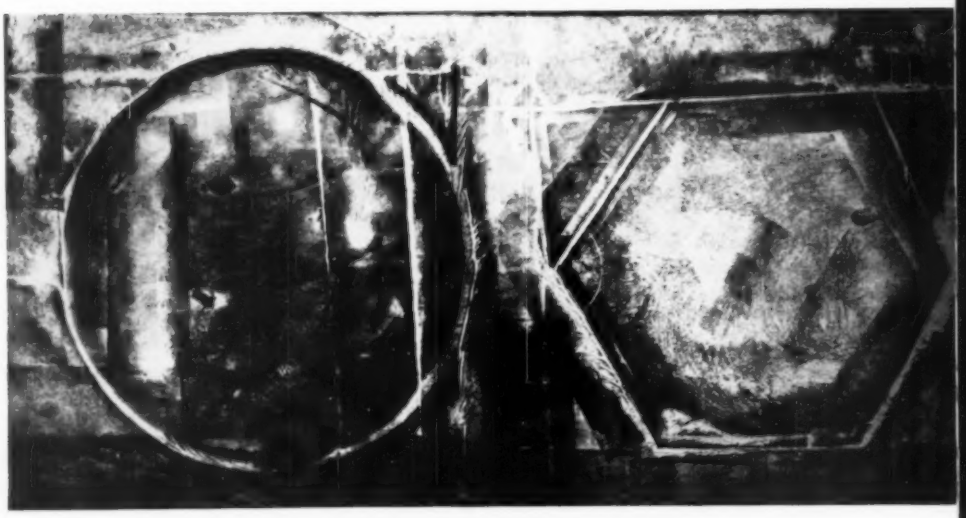
Because of a new packaging technique, fresh Christmas trees may now be shipped to any part of the country, and stored without shedding. Polyethylene sleeve retains the tree's moisture, reduces fire hazard, and cuts shipping space in half. Using funnel-shaped device which guides trees in sleeves, two men can package over 500 trees a day. Designed by E. B. Robbins.

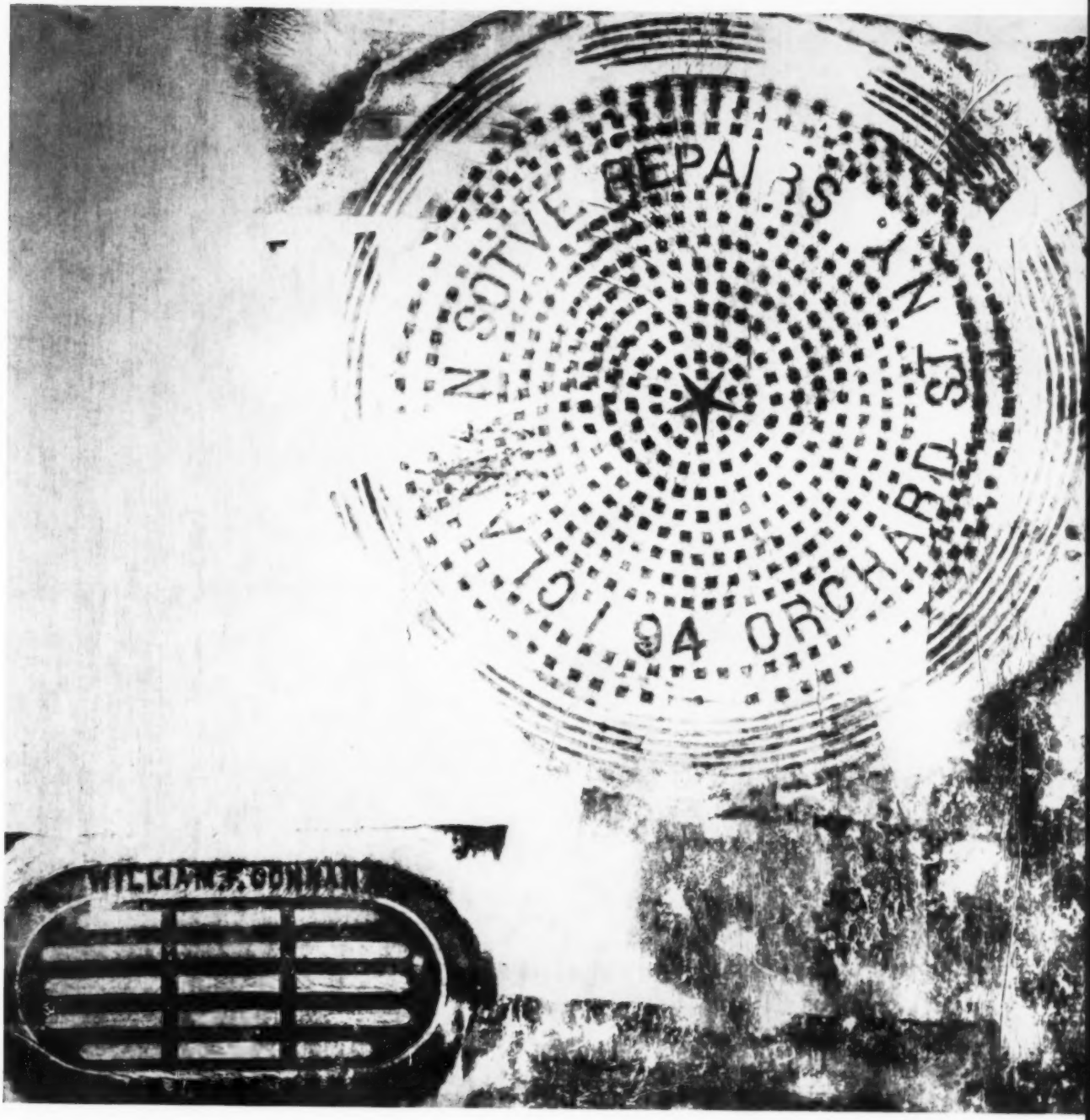
In June of 1954 ID presented Roberto Mango's photographic impressions of New York's manhole covers in an article called "Roses in the Street." Mango pointed out vividly that "the man who walks with his eyes on the stars may miss the stars at his feet". The painter Sari Dienes discovers meaning in the same found objects; instead of a camera she uses roller and ink. Her rubbings reveal the "mysteries" of common things. On the next four pages are some "painting-rubbings" she has taken of man-hole covers in New York.

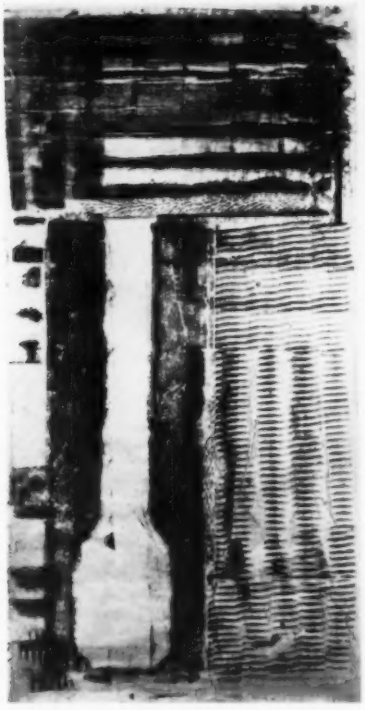
Rollers in the street: a sequel

To free each thing from the obstructions of
the mind; to look upon each thing as if
it were the first one looked upon, waking
from dream; to feel the nature of each thing
caught in its own irresolution, its moment of
submission just when a sight of trees is freed
from fog, just when an incredible light holds
a flower's head outside a city window:
to receive the shapes pure vision brings
is to sense the true intelligence in things.

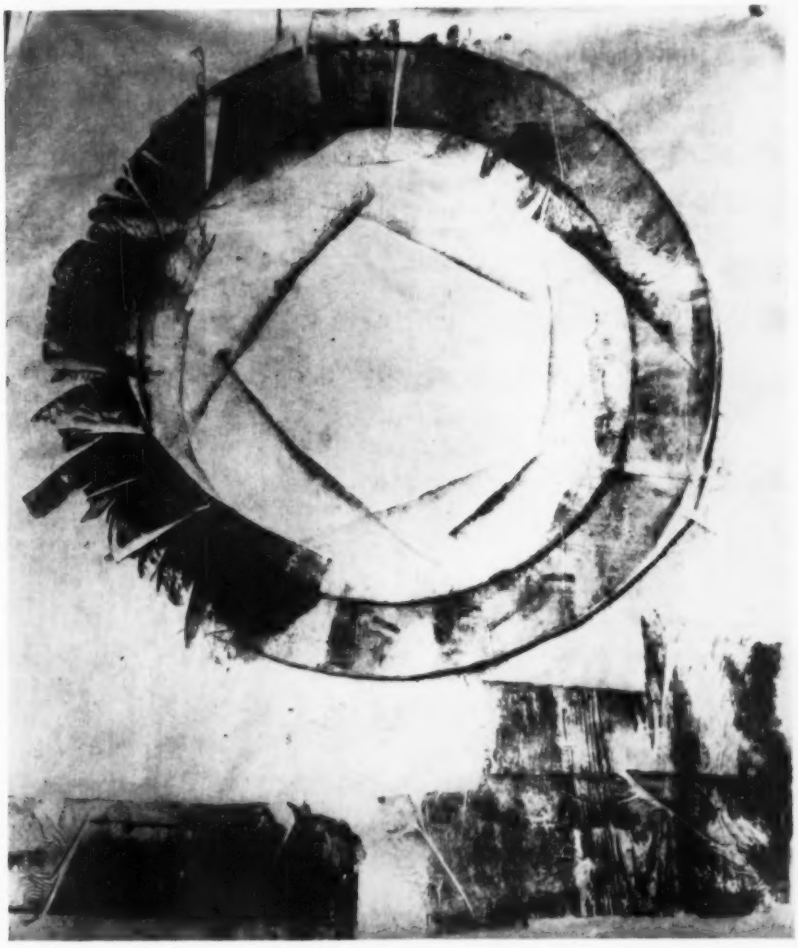
Arthur Gregor

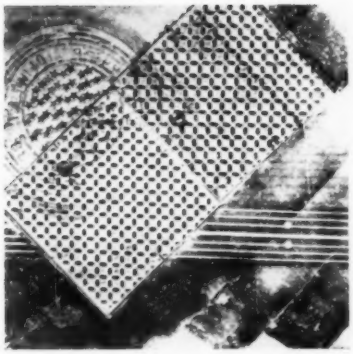



REPAIRS
94 ORCHARD ST



The eagle in the print on page (52) is the emblem on a Central Park manhole cover. Sari Dienes reproduced it by imprinting the pattern on thick paper with rollers and ink. The other prints seen here were made on Webril—a synthetic material used for making tea bags. Miss Dienes has devised various methods for turning her "found" object into a black-and-white print. To get the effect on the opposite page she applied ink to the area inside the circle, got an impression of it by placing Webril over it, and achieved the design quality and intensity she wanted by using an inked roller on the other sections of the cover. The manhole covers are all part of Manhattan's street surface, some uptown in and around Central Park, others in the Wall Street area. The paintings of Sari Dienes have been shown in many group and one-man shows here and abroad. The contemporaries, a New York gallery, are showing her "roller-rubbings" in a one-man exhibit starting March 23.





HANS WEGNER

THE HERESIES OF A QUIET DANE

For two weeks during late January and early February, Georg Jensen, Inc., a New York homefurnishings store, turned over its entire third floor furniture department to a retrospective exhibition of the work of Hans Wegner, the Danish furniture designer. The show itself was installed by Wegner, and the pieces in it represented his entire career, from the early designs for hand craftsmen, to the latest — some of which were designed for cabinetmakers, some for furniture factories. Wegner is one of the seminal spirits in modern furniture design. His classic chair, or endless facsimiles of it, turns up just about everywhere that people sit down, and is perhaps more universally admired than any other chair of our time. It is not, of course, a mass-produced chair, but the fact of its mass-appeal is significant. Wegner's importance stems not just from his sensitive and poetic handling of wood, but also from the ingenuity with which he solves design problems and from the ease with which he translates his ideas into the methods of the hand or machine. As Edgar Kaufmann says, "the needs of mass production and mass distribution are treated with the same careful freedom" as the needs of the hand-craftsman. Wegner works in two worlds with equal ease, and with uncommon unity of design statement.—*B. D.*

Hans Wegner's classic chair

by EDGAR KAUFMANN

Hans Wegner belongs to that top level of designers who create works impressive by their unity. Fascinating as his details often are, they are details that grow out of the nature of the whole, out of his love for solid, quiet shapes. This power of integration easily distinguishes him from a throng of followers, as well as from his professional peers, at home and abroad, most of whom incline toward swift, nervy effects. Wegner's patient improvement of designs over a sequence of seasons, and in full view of the world, also sets him apart from those concerned only with consummate masterpieces and those — all too numerous in the United States — who are forbidden to tamper with a design while it sells, or to bother when it does not.

In what climate did Wegner's design grow?

Today a Danish furniture designer may work with either handcraft or machine production in mind. But in the days of Wegner's youth the Danish furniture industry had pushed Danish cabinetmaking to the verge of extinction. These cabinet shops made to order pieces that had been designed, not as here, for a single customer, but as stock models for the shop. To check this sharp decline of their trade, the Cabinet Makers' Guild offered prizes for new designs that would particularly appeal to a discriminating public and that would display the virtuosity of the ancient craft. From this evolved two seasonal reviews that have lifted Danish furniture design to its present world-wide distribution and esteem: a design competition each spring, an exhibition of furniture each fall.

Among the reasons for the phenomenal success of this program, first place belongs to the artistic talents of a small group of freelance designers, of which Wegner was one of the leaders. This group cooperated eagerly with the cabinetmakers who, in their economic extremity, proved more open to new ideas than the furniture manufacturers. As the tide turned and the new designs won recognition, manufacturers looked enviously on the young designers and began to offer tempting fees. Before long, mass-produced furniture included at least some modern forms with good proportions and appropriate detailing, conceived by the same talented minds that were at work for the cabinet shops. The rigid division between the two types of production began to lose its cultural overtones. It was no longer true in Denmark that mass production was a mere cheapening and vulgarization of what a specially gifted few had designed, recently or a century or two earlier, for an elite patronage.

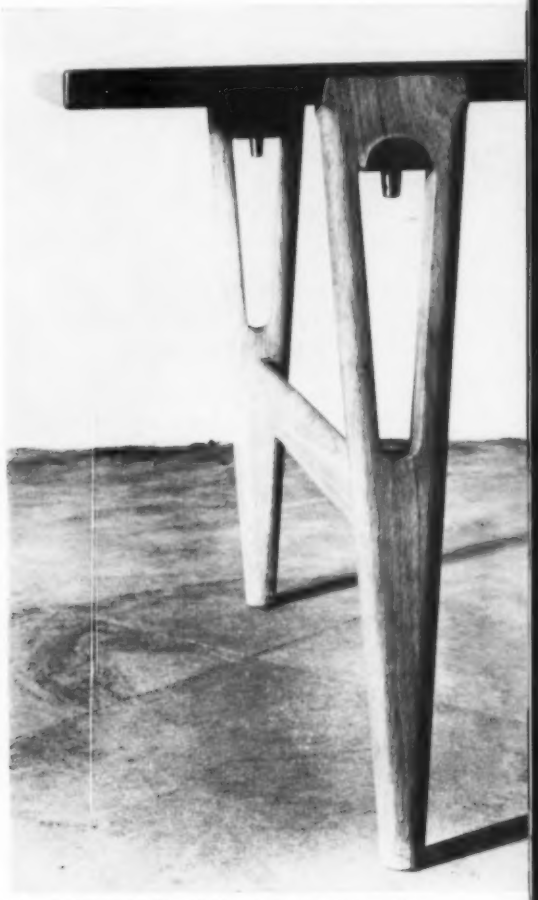
Hans Wegner's quietly influential role in this revitalizing of Danish furniture design is a projection of his training. Like his colleagues he had absorbed as a student a strict, discriminating veneration of late 18th Century English cabinetwork in its simpler forms. Also among the great exemplars were related Chinese, Egyptian and Shaker chairs, tables and chests. In Wegner's case this education was given a particular character by the expert shop training he underwent. But despite his indoctrination in a special, authoritative taste, Wegner has not stuck close to it, nor even to its spirit. For example he is one of the few modern masters of oak, bluntly rounded or used in flat planks that indicate an inspiration derived from the northern Gothicism of simple peasant pieces. Other woods, of course, and more elaborate shapes and joints often appear in his work: surfaces of teak, legs amply turned in beechwood, intricate dowelings, inventive interlockings, carved forms slowly rotating from one plane to another that suggest, in their placid surfaces, objects moving under water. At the same time he has been more liberal than those around him in combining metal and wood in intimate structure. The results are naturally unacceptable to purists, whether of tradition or modern. Yet out of his singleness of approach, out of his distrust of preconceived or abstract standards,

Teak seat is "pinned" to front leg of stacking dining chair; desk chair, not yet in production, has splice-joined ox-yoke back.

Wegner succeeds in making his quiet heterodoxy enormously compelling.

To see Wegner thus, against a background of tradition, reveals certain strengths and traits that are part of his working equipment. But what if we observe the same talent against the horizon that separates present and future? Does the picture change? One has only to think of him side by side with other contemporary originals — Juhl or Jacobsen, Aalto or Mathsson, Eames or Wormley. The fact is, nothing is different. The characteristic outlines of Wegner's work remain constant no matter how it is considered or compared. This is his singleness and his excellence — the excellence of the thing well-built. He bypasses the inspirational spurt, the entertaining twist, the forced performance, and proceeds solidly, free from the prejudice of custom, toward the invention and gradual perfection of strong, harmonious forms that reveal a consideration of men, methods, and materials which is the very roots of craftsmanship.

Wegner is an artist who has completely accepted professional responsibility. The needs of mass production and mass distribution are treated in his work with the same careful freedom that makes his designs for cabinetwork eligible for the name "classic". It is the classicism of the fully developed man.



Knock-down table states the nature and facts of its joinery with visible hardware.

Compartmentalized teak wine cabinet on steel legs has flip-top serving counter.

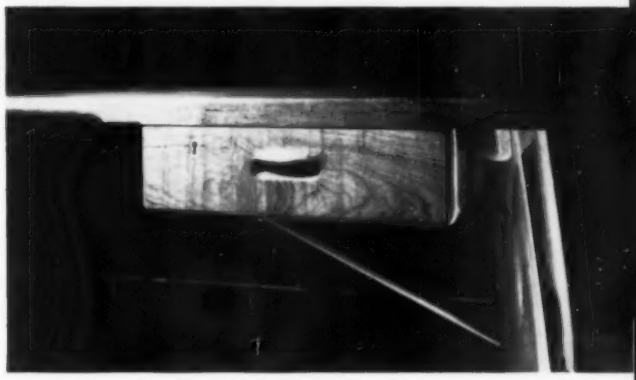
Steel runners support loose extension leaf which lifts and is laid athwart them.

George Barrows

Legs, arm, and back of armchair interlock in intricate joinery; arms of Windsor chair lap around rods of back.

Desk with suspended drawer has recessed sculptured pull and an off-center keyhole that suggests surrealism.

George Barrows



Mass-produced, factory-made table has a wooden peg release for mechanism that unlocks leaf extensions.

Part six in a series on industrial materials and fabrication processes dwells on the future. Space travel, nuclear power, and other sophisticated areas of technology demand the unusual from materials. To fill these needs, metallurgists are busy at research and producers are turning minerals, ores, and black sand into

EXOTIC METALS

by ARTHUR GREGOR

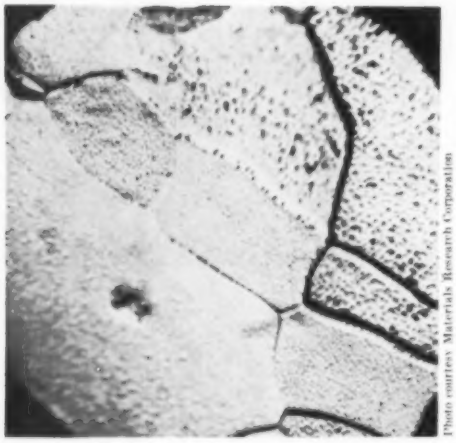
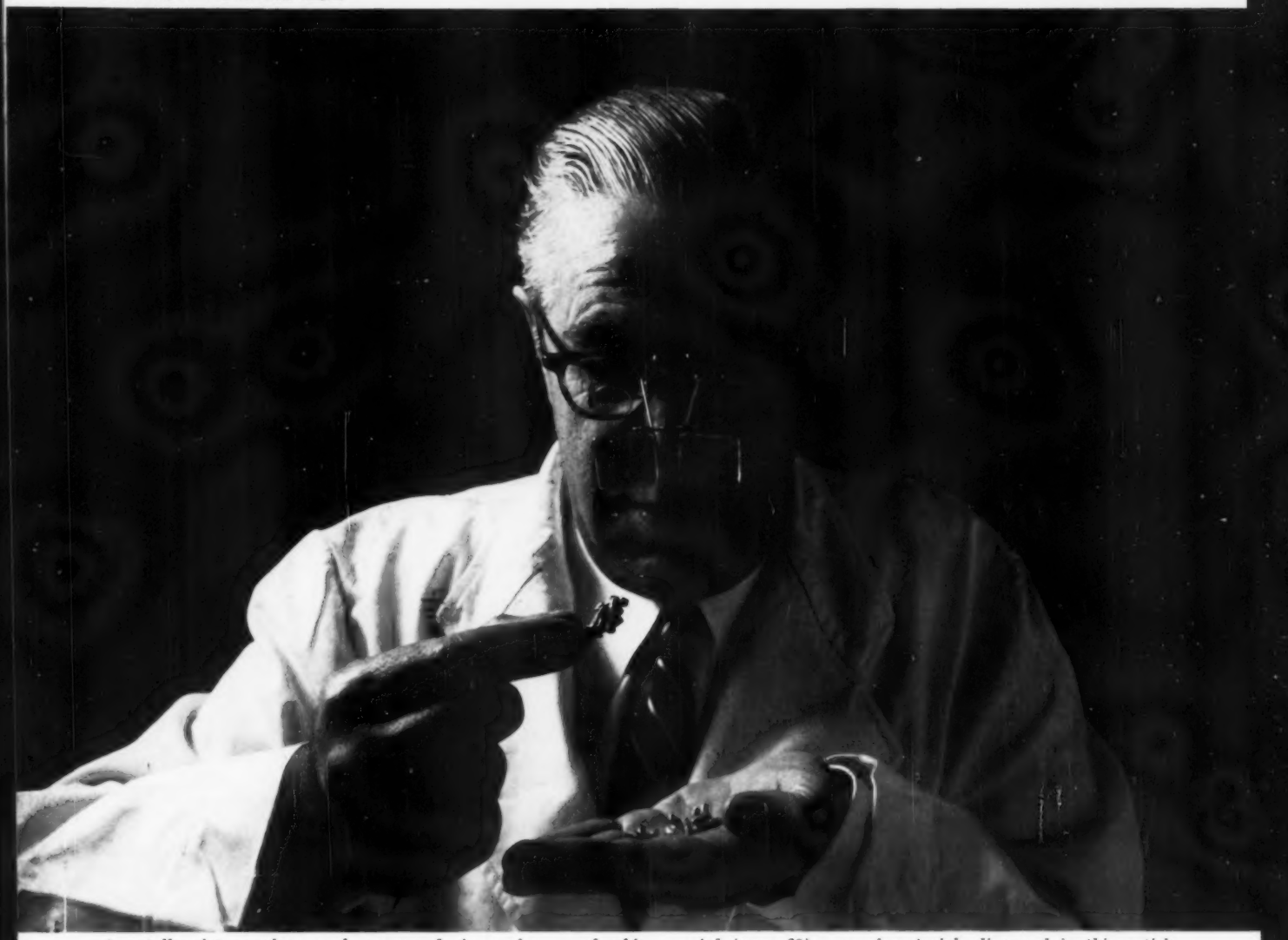


Photo courtesy Materials Research Corporation

The picture at left is a photomicrograph of a piece of molybdenum under test in a metallurgical laboratory. If there is something slightly eerie, oddly scientific or "futuristic" about the pattern, there is good reason: it represents the space age. The 1:1500 magnification of this piece of special metal substructed by the Materials Research Corporation (Yonkers, N. Y.) for improved properties at high temperature does, in fact, suggest what is in the minds of metallurgists, aeronautical engineers and metal suppliers: to kick "the bug" out of some special metals and to give them increased strength at elevated temperatures for space flights and nuclear reaction operation.

Changing technology is, of course, constantly imposing new requirements for components and materials. As more gets done with less, as time shrinks in proportion to distance and power supplies last infinitely longer, the design factors necessary to yield this superior performance are, if not conceptually new, at least drastically altered. Before the advent of high speed flights and nuclear reaction, the maximum temperature requirements usually encountered for structural purposes was about 2000°F. This specification in the case of space vehicles has been more than doubled, although it is speculated that for near-absolute safety an object shot into space should be able to withstand temperatures well above 10,000°F for short periods of time. It is clear that properties as special as these must be looked for in special places. Where are these materials to be found? The highest melting point of any substance now known is about 7000°F, and not many materials exist in this category. Nor is resistance to great heat the only "must" demanded from materials of the future. Obviously they are not to turn into a molten mass as they pass in and out of atmospheres. But materials that lose their strength at high temperatures, or corrode when in the vicinity of unwelcome elements, would be just as disastrous. What is absolutely required from this new class of *exotic metals* are these *special properties*: *resistance to high temperature and corrosion, high strength, low weight, high strength retention,* and—for those materials that are to be used with nuclear reactors which may power space vehicles—an ability to survive the effects of radia-

Photo courtesy Union Carbide Metals Company



A metallurgist examines newly recovered pieces of pure columbium metal (page 68), one of materials discussed in this article.

tion: *neutron absorption or rejection.*

There is another aspect of particular concern to the designer in which these materials must function reasonably well: formability. The metals *must* be *ductile, should* lend themselves to the standard methods of *forming* and *machining*, and *must not* turn *brittle* whatever the temperature environment. To expect all this from a single material is, of course, to expect the ideal; but it is precisely the ideal metal which is needed, and which metallurgists have aimed for from the very beginning of the "space boom."

It's not been an easy target. The curve of success has jumped from high to low. Nevertheless research in the new metals (sponsored largely and in handsome terms by the government) soon developed into a sizeable industry thriving, to some extent, on hopes for the future. For, in spite of the down-to-earth activities of large corporations—the Titanium Metals Corporation of America, the Wah Chang Corporation, the Beryllium Corp. of America, Vanadium Corporation of America, Electro Metallurgical Company (Division of Union Carbide), Climax Molybdenum Company, among others—the "state of the art" of the special metals is still largely in research gear. Among the more popular of the uncommon metals —titanium, molybdenum, beryllium, zirconium, tungsten, tantalum, etc.—not a single one is effective enough under all conditions to make the ideal metal for high-speed and space flight. All of them are still infested with some sort of "bug"—reaction to elements, oxidation at high temperatures, loss of strength and poor heat dissipation at high temperatures — which keeps them from reaching the ideal mark and confines them at present to the research and development level.

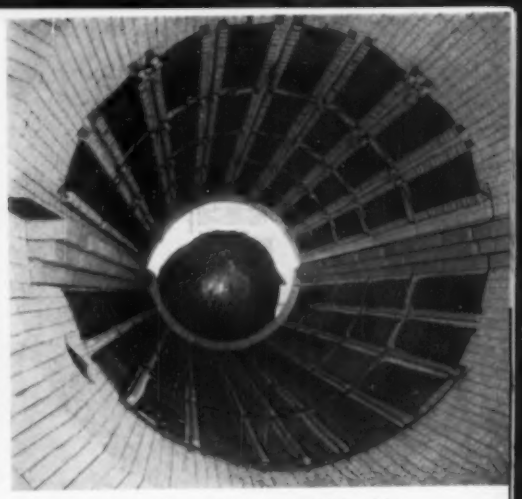
The case of a designer called upon to bring to life a high-speed car for the electronic highway, or a rocket ship for a spaceway to the moon, must at this

Photo courtesy Wah Chang Corporation

Changing the form of an element into metal involves a series of reduction steps. Here tungstic oxide is placed into furnace, where it is reduced to pure tungsten.

Photo courtesy Union Carbide Metals Company

Some refractory metals, like tantalum, are produced by electrolytically reducing the pure salt of the metal. Here pure tantalum has formed on the cathode of a cell.



To keep impurities out, some metals, like titanium, are heat treated in a vacuum furnace. Ingot will be treated at 2100° F. before being turned into shapes.

time be hypothetical or, at best, an isolated instance (models or experimental vehicles). But this will no doubt be his role once these sophisticated realms of technology make space design practical. Certainly millions of dollars are now being spent to ready the materials for just these prospects. What are these materials? Where do they come from? What *are* their "bugs" and how are they being cured? These are some of the questions taken up in this "forecast" installment of our series on metals and other basic materials fabrication.

What are these special metals?

If the special metals are referred to as new, it is only in the sense that their adaptability to structural uses is new. Some of them (titanium, molybdenum, tungsten, zirconium, vanadium, and others) are now being made available in sheet metal, rod or bar-stock for standard machine-shop and fabrication processes (often under adjusted environments to keep out impurities). Their availability for parts manufacture is recent in most cases, but the fact that these metals existed in ores, in black sand or other forms in the earth's crust has, of course, been known, and their chemistry taught, for some time. (Tungsten, for example, was found in medieval Damascus swords; zirconium in lumps of earth from Ceylon in 1789; titanium in bits of black sand in Cornwall in 1791, etc.) With the expansion of the industrial economy, their use was limited to a few applications where materials of their hardness and melting points were needed. Since these applications were not only scarce but required the metals in very small quantities, extraction and reduction processes by which the metal was obtained from the ore were crude, and the metal itself (tantalum and tungsten for example) very expensive. And little was known about their fabrication technology. What was common knowledge to metallurgists was the existence of a group of heat-resistant, refractory metals—molybdenum, tungsten, tantalum, columbium— whose melting points were all above 3600°F; that there were other metals—titanium, vanadium, beryllium —that looked impressive on the properties chart for their low atomic weight (light weight) and high strength; and that all of these were used as alloys to impart a base metal with their special characteristics. They lay virtually undeveloped as workable metals until about ten years ago when their properties were no longer too good to be useful, but were just what was needed for avant-garde technology.

A sensitive group of metals

Converting the raw material to a useable metal brought a series of tough problems. The metals proved extremely sensitive to the least trace of defilement by foreign elements. Being chemically active, they combine with other elements too readily, which means that refining them is not only hard, but costly. The extraction and reduction of vanadium, for example, is an elaborate process: the ore in which it is found (carnotite ore) is crushed, roasted with sodium chloride to form a vanadium compound which is treated with acids to cause precipitation of a changed compound containing the desired vanadium. The precipitate of this compound (called red cake) then contains the desired vanadium pentoxide, which is then reduced by one of several methods to ductile vanadium.

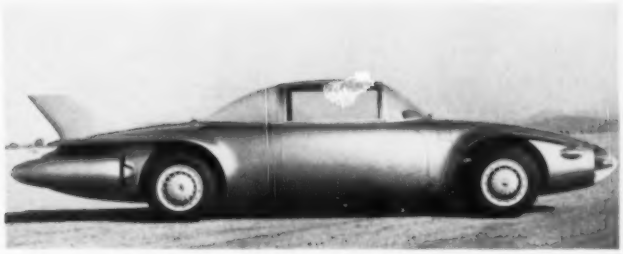
Different methods are used for other metals, but in all cases the extraction from the ore and elimination of impurities is equally complex and tricky. Absorption of the faintest trace of an unwelcome element may mean disintegration of the metal when it is actually incorporated in a product or a servicing mechanism. Titanium, for example, created a metallurgical mystery a few years ago when the metal—having been made ductile by vacuum melting—turned brittle in service and cracked. The titanium experts were stunned. It had taken a lot of ingenious thinking to make the metal ductile, and now it was turning brittle again. What "bug" had gotten into it this time? The cause turned out to be hydrogen absorbed by the metal while it was being processed. To rule out the possibility of hydrogen absorption, the metallurgists then devised a method of annealing the metal in vacuum before it is shipped and fabricated into parts. But it took a "disaster" to make them aware the metal was overly sensitive to this "fouling" ingredient.

The problem of oxidation

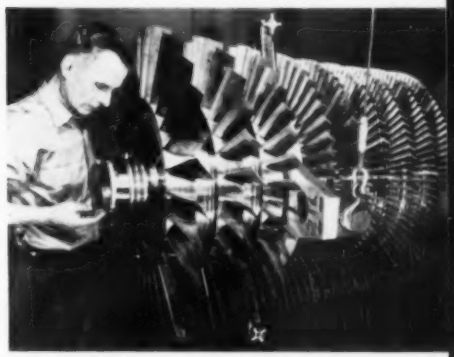
Other defects are more commonly known. Generally, these are being dealt with; but instances that have been fully licked are rare. Molybdenum, for example, might well be the ideal metal were it not for one major ill: oxidation. The effect of oxygen contamination on the metal is disastrous, for it literally evaporates at high temperatures. To varying degrees, the same is true of the other refractory metals, all of which suffer from corrosion by air. This of course makes them hard to fabricate by ordinary techniques. Various precautions have been taken (a room filled with inert argon gas, for example), and metallurgists are busy in developing corrosion-resistant alloys, hopeful that a protective coating will be found.

Aiming for purity

To establish with certainty that these metals will behave as they are expected to under the rigors of extreme environ-



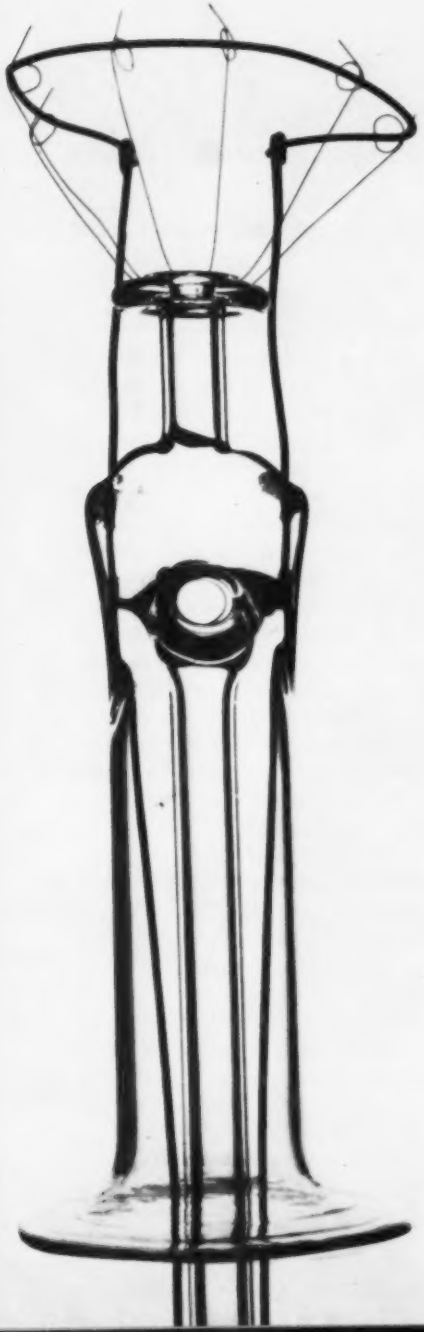
The body of GM's experimental car Firebird II was made of titanium, whose light weight, high strength mean longer life, less fuel.



Titanium's strong resistance to impact damage is important for wheels, blades, spacers of jet engine rotor assembly made of titanium-base alloy.

One of important metals of atomic age is zirconium. Zirconium tubes (cross-section shown here) are used in reactors.

A classic use for tungsten has been as filaments and other parts in electric lamps. Its high melting point and high resistivity have made it a good material for this use; new areas of high-temperature application are being investigated.



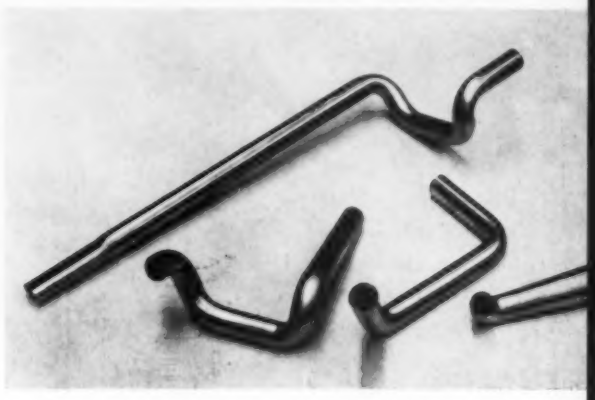
ments, metallurgists and space flight engineers have tested them under simulated conditions and found that, although the general perimeters of the metals are known, their intrinsic properties cannot be firmly established unless they are examined in a state of near-absolute purity. By learning exactly how metals behave when they are pure, metallurgists hope to discover the exact effect impurities have on them.

In the less extreme areas of technology, these very special metals have proven sturdy contributors even in their present state of development. GM's experimental car (top of this page) was housed in a body of titanium to give the high-speed car light weight and a strength approximately that of steel. Lamp manufacturers like General Electric have used molybdenum for many years as a mandrel in winding tungsten coils for lamps, as support wire in lamps and tubes, as grid wire in tubes, and for various fabricated parts.

On the next six pages, nine of the special metals: *titanium, molybdenum, beryllium, tantalum, tungsten, zirconium, columbium, vanadium* and *rhenium* are taken up. In each case, their design properties are listed along with their present and anticipated uses, fabrication techniques, present drawbacks and advantages. There are more than nine metals in this category of "exotic" materials which are only now beginning to be exploited. One group alone, the *rare earths*, comprises more than a dozen different materials. But their potential as design materials is not yet evident. The predominant use of most of them is as special ingredients with other alloys. The nine metals discussed are those that have already been applied in some form as workable metals, and are important among the "promised" design materials for products in technology's avant-garde.

Acknowledgment is made to these companies and individuals for the data and help they supplied:
Dr. Sheldon Weinig, Materials Research Corporation
Electro Metallurgical Company, Division of Union Carbide Corp.
Westinghouse Electric Corporation
General Electric Company
Wah Chang Corporation
Titanium Metals Corporation of America
The Beryllium Corporation
Climax Molybdenum Company
Vanadium Corporation of America
Chase Brass & Copper Company

Titanium's ductility and its ability to be produced in all standard forms is indicated by a new mill product. The 0.000125 in. "thick" foil (at left) was developed for use as aircraft honeycomb-core structural material. The formability of titanium tubing is seen in the jet aircraft parts (below) bent to 90-degree angles with small radii.



TITANIUM: *A strong metal that suffers from poor heat dissipation, and costly fabrication*

Melting point, °F	3130
Atomic weight	47.90
Strength-to-weight ratio	Good
Retention of strength at high temp.	Poor
Ductility	Good
Neutron absorption	Medium

Titanium is used primarily for its light weight, high strength, high impact and corrosion resistance, and good strength retention in a range from -300°F to +1000°F. Above this limit it does not dissipate heat properly, but tends to absorb it in spots. This means the metal is probably not a good candidate for space vehicle bodies. But it is being applied widely in manned aircraft as well as missile components.

In its short history, the titanium industry has enjoyed a boom, suffered a steep decline, and is now attempting a come-back. In 1948 the metal (dormant since 1791 when an English clergymen, the Reverend William Gregor, first separated it from black sand) had a total commercial production of titanium sponge—its form before it is turned into mill products—that amounted to three tons. By 1957, the figure had risen to 17,500 tons, but it dropped to 4,500 tons the following year. Similarly, titanium mill product production (sheet, strip, plate, bar, billet, wire) jumped from 85 tons in 1951 to 5,600 tons in 1957 and dropped to 2,600 tons last year. The reason for this steep rise and decline lay in the specialized use to which the metal was being put. Its properties were especially advantageous in aircraft engine and structural parts (for fuel economies and increased payload) and about 90 per cent of the metal was being used in this capacity for military aircraft applications. When a shift in emphasis from manned airplanes to missiles was followed by severe defense cutbacks about two years ago, the entire titanium industry was threatened with extinction. Two companies went out of titanium production, but the major producers (Titanium Corporation of America, E. I. du Pont de Nemours & Co., Union Carbide Corporation's Electro Metallurgical Company) went ahead to explore new markets, improve fabrication and reduce cost.

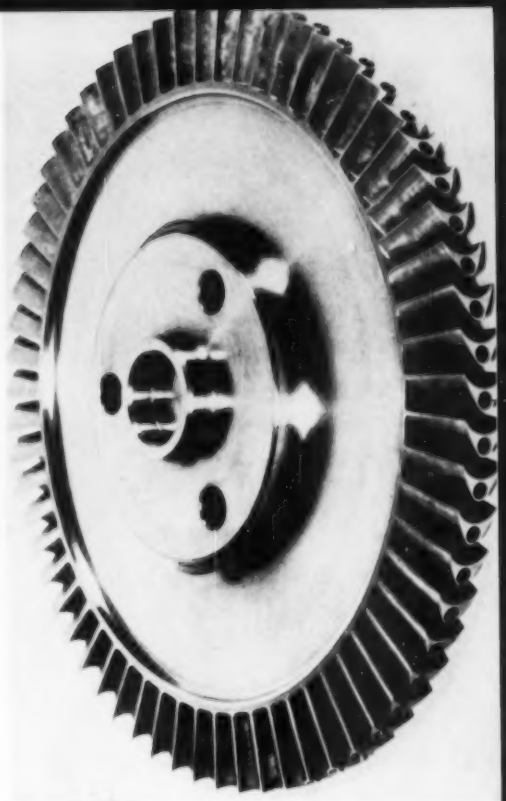
They proved that the metal could play a significant role in commerical aircraft design. Convinced of its superior performance in withstanding impact damage and corrosion, Douglas, Convair, Lockheed and other commercial aircraft manufacturers began ordering titanium in sizeable quantities. And the missile market also contributed to relieve the plight of the hard-hit industry. Titanium's ability to retain its strength at very low temperatures makes it highly suitable for the bottles which contain helium in the power supply of the Atlas.

In fabricating the mill products, the problem of welding has been a major bottleneck. Spot-welding the metal requires no special precautions, but it is still very difficult to weld titanium to other metals (the welds are very brittle). Machining techniques do not differ from those used in working with standard materials, except that sharp tools, rigid set-ups, heavy feeds and slow speeds should be used.

The cost of the metal has decreased as production has increased and processing problems have been licked. Still, it is expensive. In January of this year, the price for mill products was $7.59 per pound. The high cost is off-set appreciably by the metal's light weight, which reduces its pound requirement to 50 per cent in some cases. But reusing titanium waste and scraps is still a problem (it is difficult to cast). When the scrap metal can be turned into a machineable form, the use of titanium will become a good deal more economical.

The molybdenum rivets at left were produced by Westinghouse from molybdenum wire, and are applied where high temperature resistance and strength are important material requirements (in electron tubes or molybdenum radiation shield furnaces).

The turbine wheel at right was machined from a rough-machined molybdenum forging 9 inches in diameter and 2 inches thick. The very good frictional characteristics of the metal are significant attributes for this and similar applications.



MOLYBDENUM: *A refractory metal with a severe oxidation problem at high temperatures*

Melting point, F	4730
Atomic weight	95.95
Strength-to-weight ratio	GOOD
Retention of strength at high temp.	GOOD
Ductility	GOOD
Neutron absorption	MEDIUM

Molybdenum's main attribute is its strength at high temperature: high thermal and electrical conductivity, low expansivity. Because of this strength, the metal's strength-to-weight ratio is good, although its actual weight is about twice that of titanium (half the weight of tantalum and tungsten). In combination with a small per cent of alloys (2% tungsten, or 1% vanadium, or 0.5% titanium, or 0.3% columbium) the metal's properties are "unsurpassed by any other material evaluated thus far. In several instances, they are the only things now available which can even approach the increasingly severe requirements of advanced military weapons and equipment" (J. J. Harwood, Office of Naval Research). The metal is now used in both unalloyed and alloyed form. Hot working tools and dies, accessories for glass melting furnaces, gas turbine buckets and guide vanes are among the products requiring high strength at high temperature that are made of alloyed molybdenum. Hardness (good frictional characteristics), low expansivity, good thermal conductivity and retention of stiffness at high temperatures under load are characteristic of unalloyed molybdenum (or "moly" as it is popularly known); and they account for its use in such standard moly items as: boring bars, electric furnace parts, diamond wheels, heat exchangers. But before moly's properties can be effectively utilized in component and structural parts for space vehicles and other very high-temperature use (jet engines, supersonic planes, missiles, atomic reactors), metallurgists will have to do something to kick out moly's one outstanding weakness: oxidation at high temperature.

Moly was known mostly during the years following World War I as an alloying element. In those years the refractory metal was recovered mostly —and in very small quantities—by powder metal techniques, but by 1950 one of the major producers of the metal, Climax Molybdenum Company, was able to shape 400-lb forging ingots by consumable-arc melting in a vacuum. (General Electric now also turns out large pieces by the powder metallurgy method; ingots shaped by this method for mill product manufacture can weigh about 230 pounds.)

Fabricating the mill shapes into parts presents no major problems. Except for extremely fine wire and sheet, a moderate amount of heating is recommended for all forming operations. For machining, high speed steel or sintered carbide tools should be employed, with tool angles and rakes about the same as those used for cast iron. Tools should be kept sharp and cool in drilling operations. Arc-cast moly is more readily welded than parts made of its powder-metallurgy "twin". The most satisfactory welds in heavy shields and parts are made by the inert-gas shielded arc process.

To deal with the problem of catastrophic oxidation above temperatures of 1000°F, metallurgists have been experimenting with a variety of coatings for surface protection. Many different types of metallic and ceramic coatings have been investigated, and some have proven successful on a laboratory scale. The three most promising methods are cladding, electroplating, spray coating. But not a single coating has been found that can guarantee oxidation prevention without affecting ductility.

Beryllium bar and rod stock can be fabricated by extrusion and can be machined like the pieces (at left) produced by the Beryllium Corporation. While machining, extreme cleanliness is one of a great many precautions which must be taken.

BERYLLIUM: *A light, strong metal that remains "tough" in nuclear atmospheres but is not yet ductile*

Melting point, F	2345
Atomic weight	9.02
Strength-to-weight ratio	VERY GOOD
Retention of strength at high temp.	GOOD
Ductility	VERY POOR
Neutron absorption	VERY LOW

Beryllium — at first glance — would appear to qualify as the wonder metal that space-ship designers will need, and material suppliers are so eager to discover. It is one of the lightest metals, has good corrosion resistance to water and air, and has a very high strength-to-weight ratio. But it has two significant limitations. The first—lack of ductility — is still extremely serious; the second — toxicity — is very dangerous. Producers of the metal feel that the toxic effects can be pretty well eliminated by proper control and safe handling while preparing the metal. But they have found no way of making the metal ductile, although they hope to develop methods for changing its brittleness. In spite of its many problems, beryllium looms large as a metal with an important industrial future in the aircraft and space-ship construction category. And when the technological breakthrough is made and the metal can be made ductile, its cost—now very high —will, no doubt, be reduced sharply. In the late forties it sold for $100 to $150 a pound; as the demand for nuclear use increased, prices fell to $47 a pound for billets and $65 to $80 a pound for hot-pressed and rough machined-block.

Beryllium rod and bar stock can be fabricated by extrusion, and the producers are aiming for greater use of the metal as parts for X-ray and high-speed cameras, aircraft brake parts, gas turbine engine parts, aircraft instruments, etc. Beryllium's main market at the moment is in nuclear power applications, where it is used mostly as a reflector or moderator—it does not capture neutrons but slows them down or bounces them back to help the fission process. Also the material is expected to have wide use as a cladding material for the fuel elements and as a reflecting material for nuclear reactors. So good are its properties and so promising the prospect of perfecting them that the Air Force has appropriated several million dollars for research and development programs to study the effects of additives to beryllium, and to investigate its brittleness and sheet rolling possibilities.

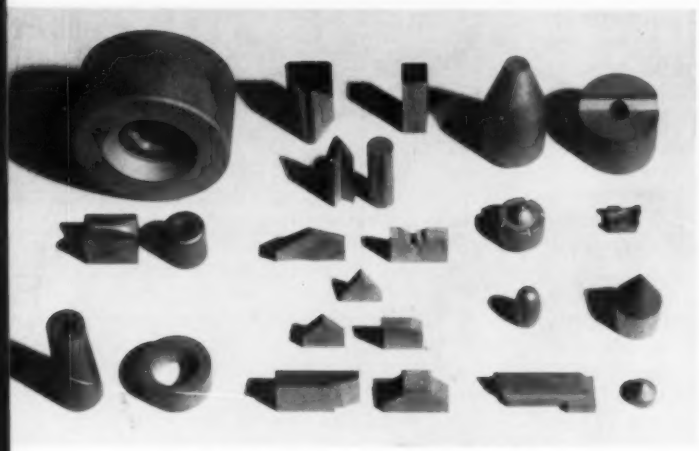
The fabrication aspects of the metal are at the moment problem-ridden. When ordinary forging or rolling techniques are used, immediate cracking almost always results. When machining the bar stock, extreme care must be taken to maintain cleanliness; and if beryllium is threaded on a lathe, a single point tool is recommended in preference to dies or chasers.

As with most metals in this category of "exotic" materials, welding techniques for beryllium leave a lot to be desired. And it has another poor property which makes joining difficult: it oxidizes at welding temperatures. This, combined with its low ductility, makes certain stringent precautions necessary. But even with those, beryllium cannot be fusion-welded because of the high heat of fusion. Self-welding seems to be the best way for joining beryllium to itself. Pieces of the metal held in close contact at temperatures below the melting point will join and form good welds.

Until the recent use of this specia metal in atomic reactors, beryllium has been available and in use for the past twenty-five years as an alloying element. In beryllium copper alloys the metal serves to harden the copper; the metal's oxide—beryllium oxide—is a very important ceramic whose melting point is twice that of the pure metal. The oxide also has a high thermal conductivity and good high frequency insulating properties; these make beryllium oxide a desirable material in many electric and electronic applications.

TUNGSTEN: *Tough, reactive metal too heavy for structural use*

Melting point, °F	6116
Atomic weight	183.92
Strength-to-weight ratio	POOR
Retention of strength at high temp.	GOOD
Ductility	GOOD
Neutron absorption	LOW



Tungsten and carbon make carbide parts.

Tungsten is another metal whose very attractive high-temperature properties have provoked metallurgists to investigate the exact nature of its behavior. About four to five thousand tons of tungsten are consumed each year, and a good part of it goes to the lamp industry. About one third of tungsten production is combined with carbon to form carbides (above) for hard cutting tools and other applications where abrasion is of great importance. A good percentage of the metal is used as a major alloying element in steel and other high-temperature non-ferrous alloys. The metal is attractive for structural uses in high-speed flight equipment because of its toughness at high temperatures, but its density is an obstacle in applications where light weight means less fuel consumption. Attempts are made to decrease density by combining the metal with porous materials. At temperatures above 1800°F tungsten oxidizes severely. To prevent oxidation, metallurgists are experimenting with a variety of surface coatings. Another problem that limits the use of the metal at this time is that of fabrication. Until recently small tungsten parts were made from powder by sintering and forging, but ingots up to three inches in diameter have been made and studies are under way to determine how these can be enlarged.

TANTALUM: *Sheets of this tough, reactive metal line reactor vessels*

Melting point, °F	5430
Atomic weight	180.95
Strength-to-weight ratio	POOR
Retention of strength at high temp.	GOOD
Ductility	GOOD
Neutron absorption	LOW

Tantalum is another in the group of refractory metals whose one or two poor characteristics have limited their use in applications which their good properties are capable of handling. Its poor thermal expansion and high density limit its use as a structural metal in aircraft equipment although it has good ductility, a high melting point, and high strength. It is, however, used in components for electronic aircraft and missile equipment. In fact, its largest and most important use so far is as the metallic element in electrolytic capacitors. The efficiency of high-purity tantalum allows the production of tiny high-capacitance components and, consequently, the metal makes for smaller electronic circuits. But, as of late, the tantalum market has been extended and now includes the nuclear field. It is being used to line the inner chamber of a reactor vessel. The material's resistance to corrosion from most common acids makes it suitable for this application. Another reason for the extension of the material into this field is in its recently improved mill products. The metal is now being shaped into good-sized sheets, foil and wire from larger ingots (below) than were formerly produced.

Tantalum is turned to sheets from ingots.

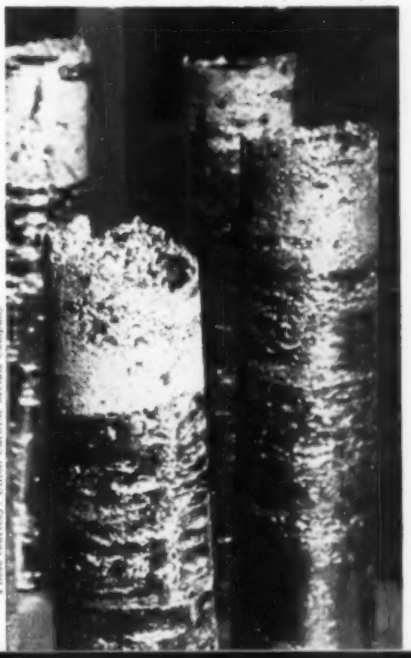


Photo courtesy Union Carbide Metals Company

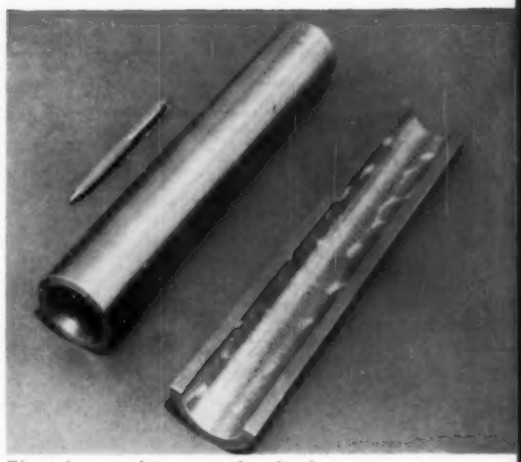
ZIRCONIUM: *A structural material for reactor components*

Melting point, F	3330
Atomic weight	91.22
Strength-to-weight ratio	GOOD
Retention of strength at high temp.	GOOD
Ductility	GOOD
Neutron absorption	LOW

Zirconium, like the rest of the metals discussed here, lacks some properties valuable for high temperature operation but is well suited to structural use at lower temperatures. The metal is ductile and malleable but combines rapidly with oxygen at high temperatures. It has good physical properties and high resistance to corrosion by hot water up to 700°F. For this reason, and also because zirconium behaves as a low neutron absorption barrier (it reacts well under nuclear reaction), the metal is used almost exclusively as a structural component in atomic reactors. In the form of Zircaloy-2—a zirconium alloy containing 1.5% tin and small quantities of iron, chromium, and nickel — it is used to clad uranium fuel elements, as pressure tube in nuclear reactors, fuel rods, etc. Most of the atomic submarines now in operation contain the metal in considerable quantities, and it is reasonable to assume that it will be used similarly in atomic planes.

Like titanium, zirconium must be protected from oxygen and hydrogen absorption while it is being shaped into mill products: strips, sheets, extruded rods and tubing. For welding, the metal must be protected from oxidation, and helium or argon is often used. When the metal is ground, slow speeds must be employed to avoid burning the surface. Although easily machinable, the metal requires sharp tools and low operating speeds because it is tough.

Zirconium's resistance to corrosion by most chemicals, its ductility and its strength under pressure make it a good material for chemical plant equipment, and it has been employed so far in the fabrication of heat exchangers, valves, etc. The metal will eventually be used much as tantalum is now used in electrolytic capacitors and rectifiers.



Zirconium resists corrosion by hot water up to 700°F. Spun cast tubing (above) and other zirconium mill shapes are machined into fuel rods, pressure tubes and other similar nuclear reactor components.

COLUMBIUM: *Fabrication is easy but oxidation rapid*

Melting point, F	4380
Atomic weight	41
Strength-to-weight ratio	GOOD
Retention of strength at high temp.	GOOD
Ductility	GOOD
Neutron absorption	MEDIUM

Columbium must be protected against contamination, and is expensive as a result. Mill shapes can be rolled or drawn, and cost approximately $90 per pound.

Columbium, also known as *niobium*, is one of the latest materials in the metallurgists' roster of "hopeful" metals—those for which the demands of future technology promise more application. The English chemist Hatchett discovered columbium in 1801 in a sample of black rock found in Connecticut. The following year it was also extracted from unknown minerals in Finland and Sweden, and it appeared that the new element occurred in presence of another element, which the discoverers named tantalum. It wasn't until 1930 that considerable attention was given columbium and metallurgists began to investigate it as a potential material. They found that the metal exhibits excellent properties at high temperature operation, has strength at 2200°F comparable to that of pure molybdenum, is ductile, can easily be fabricated but has one drawback—a high oxidation rate in air. This means it must be protected against contamination, and the problem is how to protect it without having the protection method — alloying or coating — ruin the metal's very good fabrication features (it can be cast as any ordinary metal, can be rolled, drawn, forged, etc. In this it is superior to such metals as tungsten and molybdenum, which are still largely processed from powder form).

In its present state of development, the metal is well suited to various nuclear applications. Its neutron absorption quality is fairly good, which means it is not seriously affected by nuclear reaction and can serve as a barrier between materials that are. (Although it is good, this nuclear characteristic is not as strong as that of beryllium or zirconium.) The metal is resistant to acid corrosion and it is being employed as the canning material for fuels in experimental nuclear reactors. But its widest commercial application to date is as an alloying agent. It is likely the metal will find use in electrolytic capacitors and in electronic components for computer applications.

Most of the procedures for working and shaping columbium are conventional. To avoid embrittlement from reaction with gases at high temperatures, the metal should be shaped at room temperature. Columbium can be welded to itself by resistance welding and inert-arc welding; properly made welds are ductile. Tubes can be shaped by forming and welding strip stock.

VANADIUM: *Ductile but not yet rid of oxide-forming habit*

Melting point, °F	3452
Atomic weight	50.95
Strength-to-weight ratio	GOOD
Retention of strength at high temp.	GOOD
Ductility	GOOD
Neutron absorption	MEDIUM

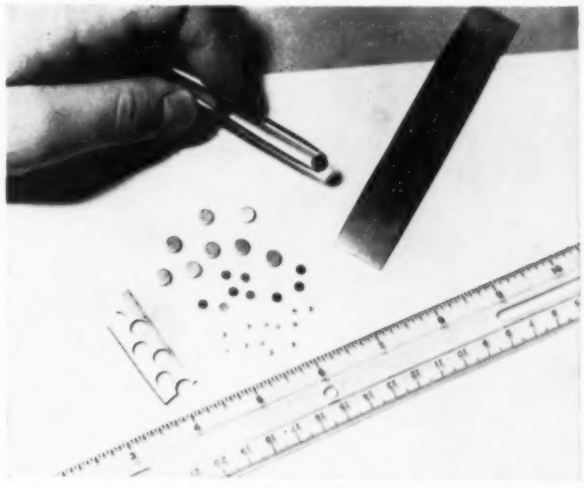
Vanadium is a high-temperature, high-strength, corrosion-resistant metal. It retains its strength up to 1650°F but suffers from what appears to be the inevitable weak spot for this group of metals: oxidation. The metal has recently been made ductile. It can be shaped from ingots into the standard mill products, but no cure has been found that can prevent the metal from forming its oxide above about 1300°F at a rate that is rapid enough to "consume" the entire metal. Alloying the metal with titanium and other elements has helped somewhat, but it has not licked the problem. This appears to be the standard malady at this point. The question of which oxidation-inflicted metal will become the ideal material for space vehicles seems to depend almost entirely on which is cured first and most effectively. Vanadium appears as promising for nuclear construction, aircraft and missile parts application as most of the other special metals. Vanadium can now be turned into standard mill shapes from ingots of high purity, whose oxygen content is reduced during the consumable-arc method used to process the metal into ingots.

Appropriate processing techniques can now turn high-purity vanadium into a ductile material available in the standard mill shapes made from ingots.

RHENIUM: *A new metal for electronic control equipment*

Melting point, °F	5750
Atomic weight	186.31
Strength-to-weight ratio	POOR
Retention of strength at high temp.	GOOD
Ductility	GOOD
Neutron absorption	LOW

The production of rhenium does not — and probably will not — come close to the production quantities of most metals discussed here. The metal has a high melting point, but its high density precludes its popularity as a structural material. Its application potential lies mostly in highly critical measurement and control apparatuses of high temperature technology. Thermocouples of rhenium and tungsten, for example, make possible measurement and control of temperatures up to 4500°F; this is probably far beyond the temperatures achieved by more conventional metals. It is believed that many of the rocket and missile failures have been due to inadequate electronic and electrical equipment. Electrical contacts made of rhenium supposedly have a life expectancy up to twenty times greater than that of most materials currently used in rocket and missile components. When used as relay contacts, the metal has very high wear and corrosion resistance. The metal's high-temperature strength and ductility make it a good material for filaments and structural components of electronics tubes.



Electrical contact discs for missile and rocket components are blanked from strips of rhenium, a new high-density metal.

Photos by Nat Messik

pdc

PDC considers the future of package design education

Professional designers and educators exchange views on the needs of the student and the needs of the design office and discuss opportunities and problems for the young designer

At the Museum of Modern Art's austerely handsome Guest House in New York last month, some 30 educators and package designers got together to discuss the direction of package design education in relation to the needs of the student and the design office. The two-day conference, sponsored by the Package Designers Council and chaired by Francis Blod, indicated the package designer's willingness to assume some of the responsibility for training in his field. It also served the very practical purpose of getting professionals and educators acquainted with one another.

The educators came down hard for practicality (said William Longyear of Pratt: "We teach students that a fraction of a cent often determines whether a job is acceptable or not."), and the professionals spoke fervently of creativity ("We are after our share of the market in creative talent," said chairman Blod). Nevertheless, the conference did raise the question of whether the needs of the student and the needs of the design office were the same, or even reconcilable. When one professional asked for youngsters who could keep time sheets as well as create unique packages, an educator countered with a proposal that students be trained to think of design as a way of life, not just as a set of technical skills. At the end of the first morning's session, by way of reconciling the two approaches, Arthur Pulos, of Syracuse University, suggested that an apprentice program for young package designers would combine practical experience with classroom "theory."

In the afternoon session conferees reached the hard question of money. Robert Zeidman returned to the apprenticeship idea by suggesting that educators interest young designers in going through "a period of a year or more at a lower salary," emphasizing that they could learn more from a small, diversified office than from a big one. "If you had five independent design organizations offering graduates $90 a week and five big corporations offering them $125 a week," he asked, "what would you, as educators, advise them?" Answered Bridgeport's Robert Redmann: "When a boy has comparative offers, I try not to advise him; I point out the advantages and disadvantages of each group. Every one of you want the very elusive thing called creativity. If that isn't worth $90 a week or any other figure, then I am not sure that you understand what a creative beginner is worth, or that you are willing to pay him what he is worth. I do not think we are being unrealistic as educators in telling boys what other graduates have gotten."

The conference moved into an open meeting at Donnell Library on Friday evening. Here educators, professionals, and young designers discussed job opportunities, working conditions and the use they had made of their academic training.

Controversial highlight of the Saturday session was the presentation of Art Center School student packaging work by Mary Sheridan, Frank Gianninoto vice president and instructor at the school (see comments pages 72-73). Participants followed their hot discussion on Art Center's approach to education with an evaluation of the conference's findings and a set of proposals. A woman had at least the next to last word of the conference: Margery Markley urged educators to encourage girls to enter packaging. Last word was uttered by PDC president Karl Fink, who proposed an education committee to service all future communications between educators and packagers. For more words from package designers and educators, see overleaf. *A. F.*

PDC Conference Panelists
February 6, morning session

Egmont Arens
Francis Blod
Frank Gianninoto
Harry Lapow
Donald Deskey

February 6, afternoon session
Designers

Ernst Ehrman
Robert Neubauer
Martin Prehn
Robert Zeidman

Educators

John Alcott, Rhode Island School of Design
William Longyear Pratt Institute
Robert Redmann, University of Bridgeport

February 7
Designers

Lester Beall
Karl Fink
Martin Prehn
Martin Schnur

Educators

Edward Adams, Art Center School
Alvin Eisenman, Yale University
Arthur Pulos, Syracuse University

Francis Blod, former PDC president, acts as moderator for the conference

Designers predict an expanding profession, look for versatile job aspirants

Frank Gianninoto

We do have a problem showing boys the relation between time and money. We try not to restrict them, and because we are dedicated to our profession we sometimes lose money on a job. You cannot stop creativity and I would be the last one to try. Another problem is that because of the scope of our work today, a lot of the designer's time is not spent on actual design. I broke it down something like this: 70 per cent of the time in finding out the what, where, when and who; only 15 per cent on the drawing board—a pathetically small percentage (but a creative designer is actually designing all the time); the other 15 per cent in selling top management on a good idea. When you list all these services you become aware of the difficulty of finding all these abilities in one person. We need people trained in awareness of these needs.

Robert Zeidman

Financial responsibility is not the most important thing to teach beginning designers, even though the problem very frankly is that young industrial designers just out of school are being offered salaries of $125 and $130 by the large corporations, and for perhaps $5 or $10 more we can get very talented people. However, we are not General Motors, and we cannot train these people until they can carry their own weight. When we have asked educators to give a little more emphasis to the problems of packaging, we have been told, 'We try to give a well-rounded design course. We don't teach designers to be any one thing.' As educators who insist on a wide background in creative design, how can you send these boys off to the big companies who buy their services just as they pick up a dozen engineers? Isn't this a period of apprenticeship when they should not be specializing, when they should be getting a variety of work, the kind they can get in a design organization?

Lester Beall

Seeing the display of Art Center packages frightens me. I don't think this type of student would be good for me simply because he is too far gone. He has been crystallized. The technical ability seemed to be of a very high order, but I think we need more people coming out of the schools who have the soil for growing and groping and coming up with ideas that are not just the same ideas that we see around us today. We are after creative talent, and I think the potentials in our field compare favorably with other design fields. I don't think any school produces a designer. A man becomes a designer only after he has had experience in many areas. Too often schools put young people out with the notion that they are finished designers. I have two people who have been with me three years. They are beginning to be designers now; they have been exposed to experience, to clients, to crises, to developing an idea. They have had the wonderful experience of making mistakes.

Donald Deskey

I believe there is an analogy between the modern industrial design organization—with packaging as an important function—and the advertising agency. I believe that packaging is going to become more and more complex, much broader in its scope of activities, and industry will depend more and more upon larger organizations for the solution of the problems in this area. Of course, no student can have more than a passing knowledge of all the activities that take place in a well-equipped organization. The majority of our office's assignments are in research and development—in materials and processes, motivational and marketing research, distribution. The creative package designer is thinking in terms of the ultimate solution, trying to preempt something that doesn't exist, that will give his client competitive advantage. This may lead you into the area of composite structure or things that have never been done. And this is why the top package designer is inventive.

Some educators emphasize responsibility to students, see design as way of life

Edward Adams, *Art Center School*

Many of the young people going into automotive design are starry-eyed. They have some very forward-looking ideas, but no person, no group of people can revolutionize the largest single industry in this country. One of the main problems that confront us is getting the student conscious of time as dollars. How do you show him the connection between time on a job against dollars of pay, against dollars you are getting? We do it by having teams keep a time tab of the hours spent on a job, and how long it takes always amazes them. It seems to me that design education should train the boy to have his head in the clouds and his feet on the ground. Students should know what time means in terms of dollars. This won't hurt a creative man at all. We want to know how to teach the professional youngster the responsibility he has, after leaving school, to make money for his firm.

Raymond Baxter Dowden, *The Cooper Union*

Educators are interested in their responsibility to the student only, not to any design group. After the Industrial Revolution manufacturers got together and started technical colleges. These were built to service the manufacturer, produce a certain kind of robot to fit into this manufacturing operation. Some of the discussion here is in the same direction. You want a certain kind of student who understands a certain type of time schedule, money schedule, operation schedule. I don't believe any school of design at the present time is going to do that. Any school of design worth its salt is involved in design as a way of life, as something which is going to fit into the kind of society we are trying to develop. Package design isn't just a dollars and cents operation. We might train a person today to do the kind of thing that you want and find later that your whole technique has changed. But if we train students to be committed to design as a way of life, then you have something.

Alexander Nesbitt, *Rhode Island School of Design*

I felt that the student packaging slides from the Art Center school were superficial. The very first things were corporate identification marks that look precisely like all the corporate identification marks we all know. I don't believe this is the way to teach design. A great deal more exploratory work must be done. At our school we feel that the student in the first year must unlearn all the stuff he has been seeing around him. He must get back to his own point of view about environment, about what he wants to do with his own ability. Mr. Adams's statement, 'This is what Detroit wants and we are going to train people for them,' is the most damaging statement that could be made by a school of design. This describes a trade school. It steals what Detroit has, gives people a little bit of technique. First-year students should go into the exploration of fundamentals. What is a surface? What is paper? Do they know anything about color? Do they know about shape?

Joseph Carreiro, *Philadelphia Museum School*

We have all used the word *creativity* here. We talked about exploration and discovery and invention—but real exploration, real invention, real discovery is a matter of groping in the dark. You don't know where you are. You wouldn't like it if you saw it because you never saw anything like it before. We must discover and encourage the inner discipline of a boy who is searching and is discovering himself and the uniqueness of himself. When you are talking about creativity you are not talking about making minor Lester Bealls and imitation Alvin Lustigs and Paul Rands. You are talking about the people who are going to be the Alvin Lustigs, Paul Rands and Lester Bealls. I came here with my guns loaded because I felt that possibly here was another pressure from industry to produce what you already have. All leaders are self-made men. We are just producing people. They become leaders on their own. And they don't do it by becoming second-hand copies.

Student Project

AN ANGRY YOUNG INSTRUCTOR ATTACKS TEACHING PRACTICES AND PROBLEMS

School: *Ontario College of Art*
Instructor: *Victor J. Papanek*
Participants: *third-year students in the creative engineering seminar*

One of the most difficult and most important educational tasks is teaching what can't be taught. How can the instructor ask students to produce answers he hasn't given them? How can he devise a method for arriving at a goal he can't describe, one that doesn't exist until it's reached? Design teachers are not the only educators to be concerned with the problem of originality, but as members of a profession that depends for its existence on new answers they are perhaps more likely to protest methods of education that seem to perpetuate the old answers.

Victor J. Papanek, whose angry concern took the form of the article which begins on this page, is a member of the industrial design department at the Ontario College of Art in Toronto. The College was established in 1879, but its industrial design department is only ten years old, and gives the only four-year ID course in Canada, graduating from six to nine students a year. Papanek is himself an American, a product of Cooper Union and M.I.T. He teaches a first-year design course required of all students at the college, and a course in "creative engineering" for industrial design students. His article is in part the result of a talk on the same subject he gave at Aspen several summers ago. The projects which appear here—all the work of his third-year students—are, in Papanek's view, illustrative of ways in which design education may find new ways to produce new answers.

Creativity vs. Conformity

by Victor J. Papanek

During the last three decades the field of design education has been broadened and enriched through additional knowledge and new points of view. But the product of this educational process, the graduate industrial designer, has become narrower and less inventive, less aware of esthetic values in his approach.

Moholy-Nagy and the Bauhaus, Gestalt psychology, human engineering, Ittelson's and Ames' perception tests, motivation research, Osborn's "brainstorming," semantics and cybernetics—all this, together with excursions into such disciplines as sociology, automation, bio-economics and configurational anthropology, has been presented to the designer/teacher as "the truth." Now no one would wish to quarrel with the precept that the learning process needs broadening, nor detract from the genuine and often timeless contributions of all these various disciplines and theories. The quarrel lies rather with the manner in which so many of us in the industrial design and/or teaching field have wholeheartedly embraced *one* of these faiths, or several in turn. For it goes without saying that truth must lie in a synthesis of all and more of these disciplines. More disquieting is the manner in which all too many design instructors have blindly accepted the obvious clichés of some new approach, mechanically substituting them for some other (temporarily) unfashionable method. Thus the romantic trappings of the Beaux Arts are quickly chrome-plated when the Bauhaus trend arrives, only to be bedecked with weathered redwood and the verdancy of philodendron plants for the "honest naturalism" of the mid-fifties.

This teaching of fashionable dogma, clichés, rules and regulations—without any real insight into the creative process itself—has given us a neat, pre-packaged graduate, possessed of high technical skill but totally incapable of any true creative thinking, any basic original insight. True, depending on the school the man graduated from, one can

1

These typing instruments represent three answers to the project statement: "Re-examine keyboard controls in relation to human hand and fatigue factors. Design a new control board which need not necessarily incorporate the typewriter mechanism itself." The students were attempting to correct some of the faults of the present keyboard: the fact that the (weaker) left hand must do more than its share of the work, that less than a third of the keystrokes are made on the row the hand naturally touches, and that conventional hand positions are considerably more tiring than alternating hands would be.

Solution **1,** *by Douglas Crowe, represents a literal about-face of the normal typing position. The operator reaches around to the keyboard and plays it like an accordion. (Inevitably, like the other solutions, this would involve completely retraining the typists.) The keyboard is connected with the machine itself by an extruded plastic pipe with printed wiring diagrammed on its interior. Typewriter* **3,** *by J. R. Caister, is intended for one-hand operation. The keys are separated by color into small groups. Like a linotype machine, one line at a time is set and appears in the window before the "print" key prints the whole line and advances the paper. In the simplest solution,* **2,** *by J. Boxstrom, which might be used as a toy or for industrial marking, the thumb dial is turned until the right letter is indicated in the window. Then the whole mechanism is pressed down on its spring-loaded legs until the typewheel touches the paper.*

2

3

choose between worshippers at the shrine of "style," "function," "technique" or a conveniently hazy sort of artsy-craftsy approach. His sense of esthetics (if any) will be totally subjective and primitive: "Looks pretty good to me!" Today's industrial design graduate performs splendidly as long as all the rules are laid down for him; but remove the restrictions, force him into a position where he has to think along totally new lines, and the result is chaos.

The need for true creativity, however, has never been greater. Whether, with Santayana, we feel that "a new age of fundamentals has begun"; or merely realize that our problems have become too complex to be solved by remedies of a purely additive nature, the need for creative preoccupation with fundamentals must be apparent. To "improve" design by addition can only bring about more 25-million-dollar bombers that crash because a half-cent transistor has failed; more automatic dishwashers that entail more work by the housewife than hand washing. The recent fountain pen which fills itself through capillary attraction, and Victor Gruen and Associates' total re-structuring of downtown areas, are, on the other hand, genuinely new concepts. More and more large industrial design organizations find themselves in need of *basic* design re-thinking.

Unfortunately, however, our whole social pattern, other-directed and motivated to the conformist, "adjusted" *Massenmensch* works against that kind of thinking. The fact that conformity and lack of creative insight work counter to the very survival potential of the human race is obvious. Extensive psychological tests have shown that this mysterious latent quality "creative imagination" exists in almost all children to a high degree up to the age of five or six. Only with the beginning of school are the last buckles on the strait-jacket of conformity "adjusted." The constant noise level of restrictions and prohibitions narrows down to a mere trickle the number of us who still retain any original insight and have the courage to voice it. Beset by associational, cultural and emotional blocks, the individual's opportunity for autonomous thought processes all but vanish.

Chad Oliver in his novel *Shadows in the Sun*, says: "... he had to figure it out for himself. That sounds easy enough, being one of the familiar figures of speech of the English language, but Paul Ellery knew that it was not so simple. Most people live and die without ever having to solve a totally new problem. Do you wonder how to make the bicycle stay up? Daddy will show you. Do you wonder how to put the plumbing in your new house? The plumber will show you ...
But—how do you deal with a Whumpf in the butter?
What do you do about Grlzeads on the stairs?
How much should you pay for a new Lttangnuffel?
Is it okay to abnakave with a prwaatz?
Why, how silly! I never heard of such things. I have enough problems of my own without bothering my head about such goings on.
A Whumpf in the butter! I declare.
A situation completely outside human experience. ..."

By repeatedly facing design students with problems far enough removed from everyday reality so as to *force* them into entirely new thinking patterns, new cortical associations (both feet firmly planted on a pink cloud), by constantly pointing out to them the nature of their emotional, cultural and associational blocks, it is possible to raise their creative design potential in all their other work as well. There have been a number of steps in this direction. Professor John Arnold has, with his famous Arcturus IV project, reached good results with engineering classes at M.I.T. The Harvard Graduate School of Business has also added to this experiment through its study "Creative Imagination—Undeveloped Resource."

Industrial designers occupy a position shared only with architects and city planners in designing directly for the physical environment of the human species. Automation and mass production give the product of the industrial designer a mass impact comparable only to that of film and television.

All animals save man are *autoplastic* in relation to their environment: they change themselves (by growing winter fur, mutating into hardier types, etc.) in response to their surroundings. Only man is *alloplastic*, i.e.: changes the environment to fit himself. This basically is the job of the industrial designer. Therefore truly original and highly creative solutions are of prime importance in this field.

What has the function of the school been in regard to this problem? It has preserved the cultural status quo of its time by dispensing whatever mass of data is currently accepted as "truth." It has never concerned itself with the *individual* human brain; rather, the tremendous variation in human minds has been taken into account only as something to be flattened out, so that the particular curriculum or theory in vogue can be "sold" with minimum effort. We have failed to recognize that discovery, invention, original thought are culture-smashing activities (remember $E = mc^2$?) whereas so-called education is a culture-preserving mechanism. By its very nature, then, education at present cannot sponsor any vital, new departures in any facet of our culture. It can only *appear to do so* to preserve the sustaining illusion of progress.

A number of the experimental problems used in my creative engineering seminar illustrate some of the practical educational disciplines developed out of this reappraisal of design education. It should be remarked that these projects are carefully correlated with lectures, experiments and tests, all of them designed to break through some of the blocking defenses of the students. Each project is selected to involve either a basic natural principle that has not yet found design application, or else a combination of requirements which are totally unrelated to the students' previous experience. The students are encouraged to start out thinking as wildly as they wish, but are informed that their final answer must be immediately applicable. It should be pointed out, in conclusion, that this seminar is not "the truth" in design education either. But it may be part of it.

Another of the student projects dealt with writing instruments: in this case, with portable Braille writers. Ordinary Braille writers are very bulky; the only portable writer now available forces the blind to write backwards. The project statement read: "Design an instrument that can be conveniently carried in one's pocket, possesses no more than three basic controls, raises the dots up from the paper surface, clutches the paper securely, and moves itself vertically and horizontally across the paper surface without any 'sighted' control."

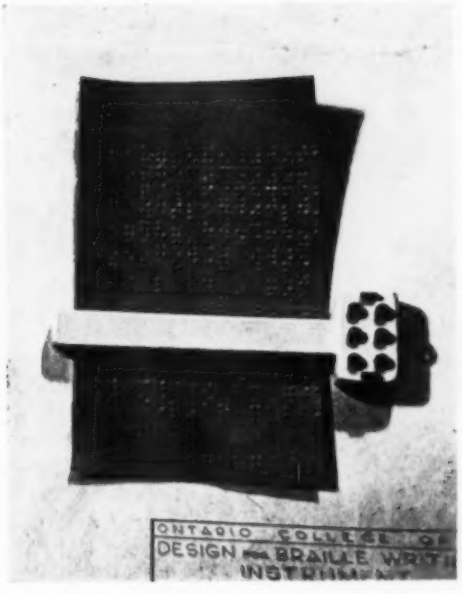
One instrument **3**, *by Lauric Plaskan, consists of a finger-fitting sculptured control which moves freely on rails through which the paper itself moves. The six buttons control pads that press the paper down over bosses on the rail bottom.*

A different solution **2** *is powered by a hearing-aid battery (not shown). The six buttons activate the letterforming; small bars control vertical and horizontal spacing. This instrument, by George Filipowski, is being considered for production by the Canadian National Institute for the Blind.*

The third student project on this page **1** *performs a quite different function: a hand sculpture combined with steel springs, it is supposed to serve as a projection mechanism for women in labor. The student-designer was Susie Takahashi. (One difficulty with this assignment was the trouble the students had in getting their products tested by actual use.)*

1

2

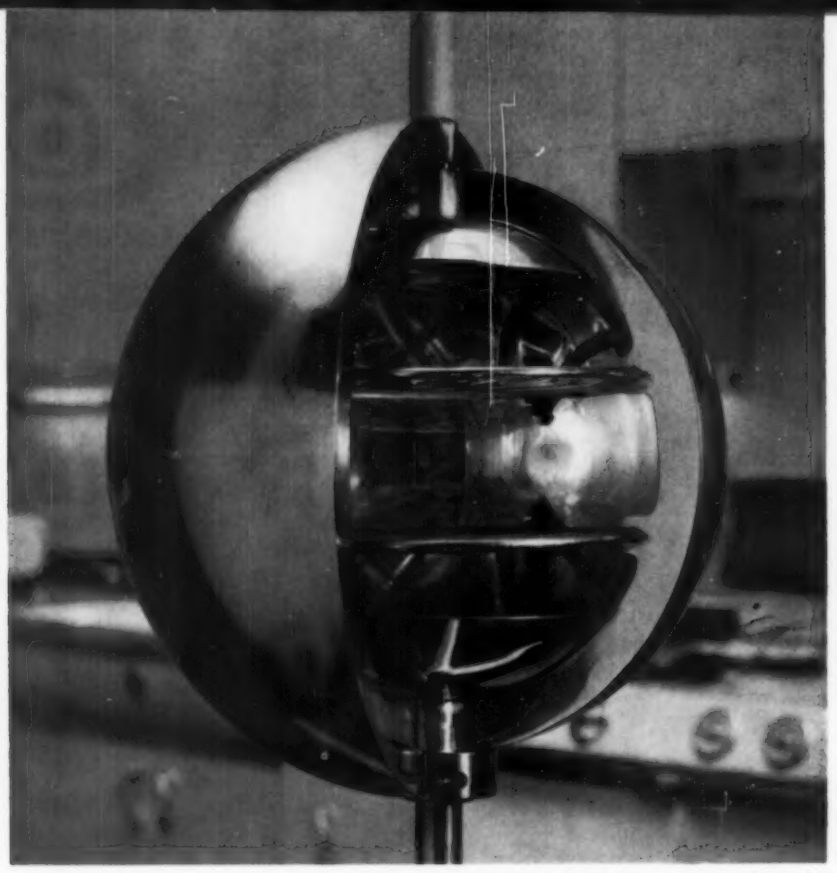


3


DESIGN FUNDAMENTALS
PROBLEM NUMBAR FOUR

BRAILLE

Design an instrument that is portable, and is able to form one letter at a time while writing from left to right.



Spherical oven, designed by Greta Magnusson Grossman for Alcoa, is composed of aluminum hemispheres mounted on pole. To open, one hemisphere slides over the other.

Design review: Major appliances '59

Furniture for the kitchen

The experimental products on these two pages illustrate the changing form of the kitchen. Most obviously (and literally) a crystal-ball design is the somewhat whimsical oven above, the most recent presentation in Alcoa's Forecast program. But reflected in it is the form of this year's kitchen, a form which might be described as the appliance in the round.

For some time, the kitchen has been disappearing, but until now it has tended to vanish into the walls. This year, however, having had its back to the wall for so long, it often breaks completely free and moves out onto the floor, disguised as furniture. Appliances this year may look more like breakfronts or hi-fi cabinets than ranges or refrigerators. (There have of course been foreshadowings of this in the wood graining, bright colors and interchangeable panels that are now a common-place of appliance design.)

In some cases an important technical advance has helped liberate the appliance from the wall and has been the excuse for a startling new shape, as in the Westinghouse thermoelectric refrigerator opposite. Neither the spherical oven nor the breakfront-refrigerator may seem immediately practicable, but they are indicative of the general determination to make kitchen appliances fit gracefully into other rooms of the house.

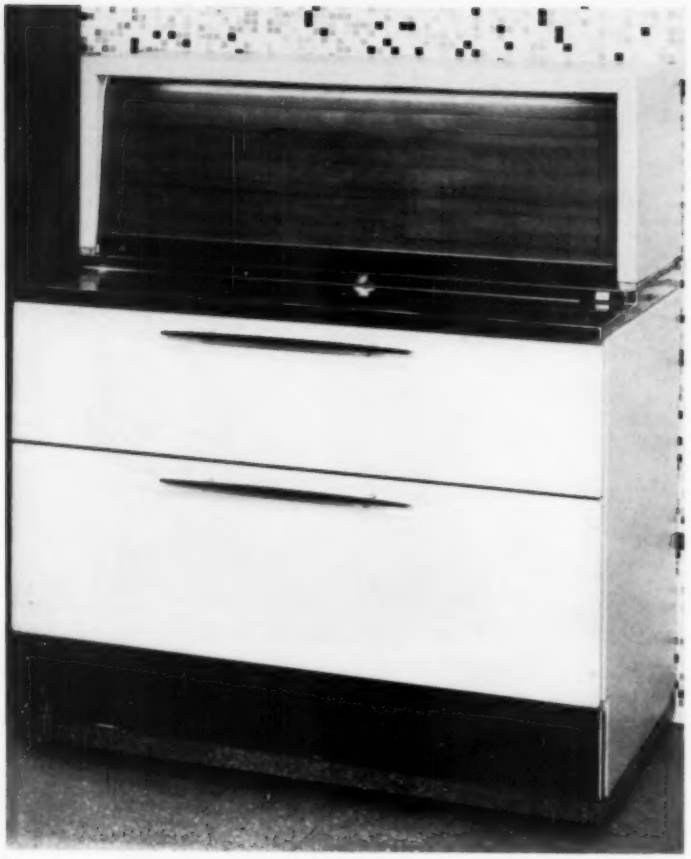
Experimental models can, on the other hand, be as close to realization as the two members of Hotpoint's Custom Trend series shown at the top of the page opposite. If they pass the market research tests they are now undergoing, they will be put into production with whatever modifications are indicated.

Kitchen appliances not only break away from the wall this year, they also break into fractions. Burners are spotted here and there in the kitchen and, with the appearance of thermoelectric refrigeration and the consequent elimination of bulky coils, freezer and refrigerator drawers can be installed wherever they are handiest. Hotpoint's appliance wall (or, rather room-divider—even the walls are free-standing) divides into three separate units which can be installed separately.

Hotpoint's appliance wall, left, made up of standard Hotpoint units, is divided into separate areas for refrigeration, washing, cooking, with storage space at top. Each area can be installed separately. Range and ovens can be activated by programmed cooking card. The new electronic multiple oven, at right, installed at most convenient height, contains three chambers with three different energy inputs for different kinds of food. Single powerpack, below, supplies ovens.

Westinghouse's thermoelectric refrigerator cools by passing an electric current through the junction of two dissimilar metals. Cooling elements are located behind drawers for freezer and meat in base. Fan at top pulls cold up through shelf compartment.

A



B

Refrigerators

The refrigerator takes its turn as a room-divider in the two experimental models on this page. For years, starting with the wall-hung refrigerator, GE has been working on the idea of locating refrigerator shelves within increasingly easy reach. This year the solution is a shelf compartment concealed behind freezer drawers (B). A push-button raises the shelves to the most convenient level (A). Westinghouse's two-faced refrigerator (C) channels the cold from a central element into each separate compartment, so that other sections can be added as needed.

Many standard refrigerators are now designed to look like built-ins without requiring special installations. Coldspot's freezer and refrigerator twins (E) are simple boxes that can be set on almost any cabinet base. The same versatility appears in a Westinghouse refrigerator (D) which, in addition, incorporates an important technical advance: constructed of polystyrene insulation laminated between two sheets of aluminum, it is much lighter than a conventional model. Like a number of other makers, Westinghouse has perfected a hinge which permits installation flat against a wall (F).

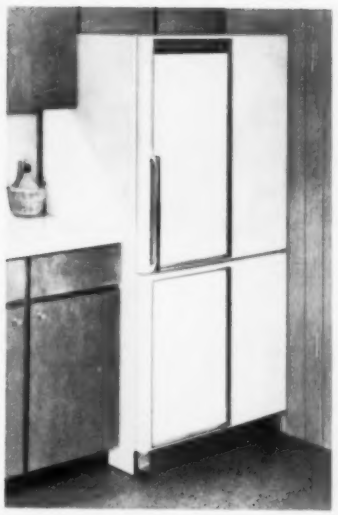
Frigidaire has painted the lily this year by imposing an aluminum filigree on its sheer look (H). Westinghouse lets the buyer decide on the amount of decoration by providing space for an optional colored panel (G).

Obviously not intended for use in the kitchen, GE's experimental refreshment center cased in wood and plastic (I and J) makes ice, ice water, and refrigerator space available anywhere in the house.

C

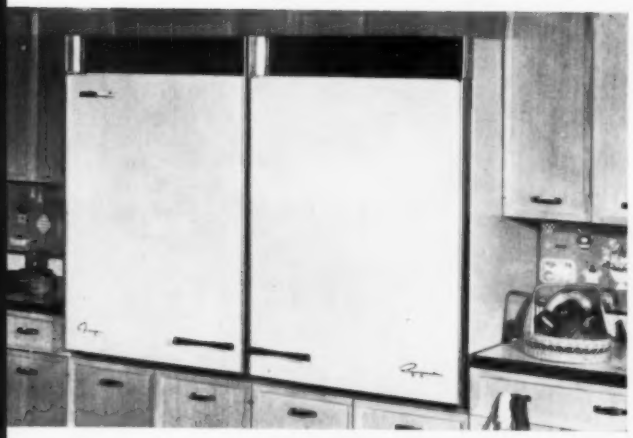
F

D

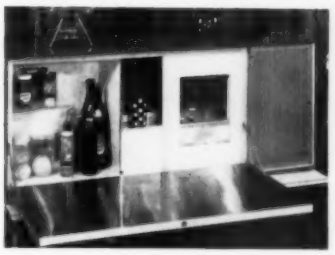


G

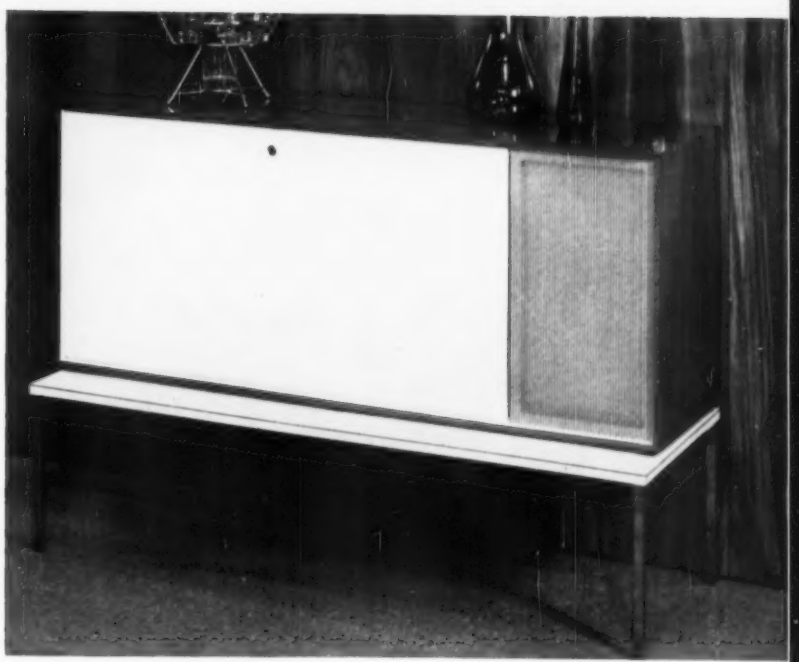
E



H



I



J

A

B

C

D

Ranges and Ovens

Electronic ranges still reach a rather limited market; for one thing, they are still prohibitively expensive. Manufacturers have tried a number of ways to bring down the price; Westinghouse, for instance, has experimentally adapted its regular model to electric/electronic use (C). The larger of the two ovens contains a magnetron for microwave cooking as well as standard electric elements. (This modification entails the elimination of two of the top burners.) Hotpoint's electronic model (B) this year contains one instead of two ovens, and is considerably less expensive. Like the new Westinghouse standard oven (E) it can be installed on top of a cabinet or built into a wall.

Hotpoint's indoor barbecue (A), one of its five new Custom Trend experiments, makes the best of both worlds. It offers, besides protection from the elements, a Calrod unit that heats 30 times as fast as charcoal and a small atomizer to give the meat an "authentic" hickory-smoked flavor. Another Hotpoint experimental model is the "Swedish modern" range finished in walnut (D).

There are signs that oven and burners are approaching a final parting of the ways. Hotpoint (G), GE (J), Frigidaire (K), Whirlpool (L), and Norge (M) offer separate burner units — all of them aiming at minimal depth. Norge, for example, is only 3" deep in both gas and electric versions.

GE (F and J) places its controls high on the wall, and, like Kelvinator (I) and Kenmore (H) persists in offering pushbutton temperature controls, which can be a constant source of irritation to a housewife in a hurry. The Kelvinator oven contains a replaceable foil lining for easier cleaning.

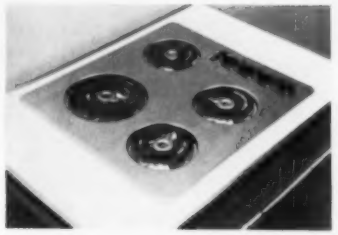
H

E

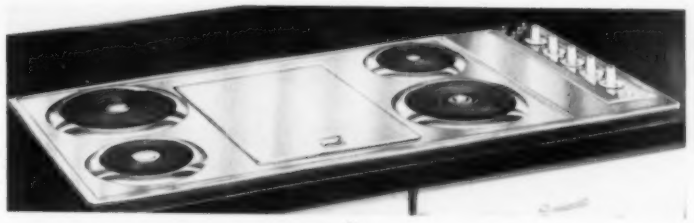
F

I

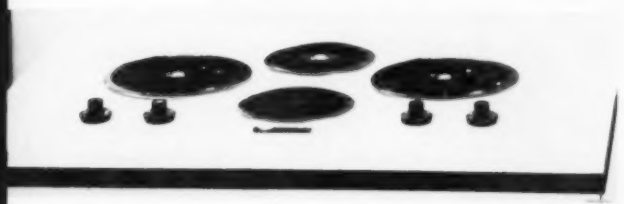
J



K

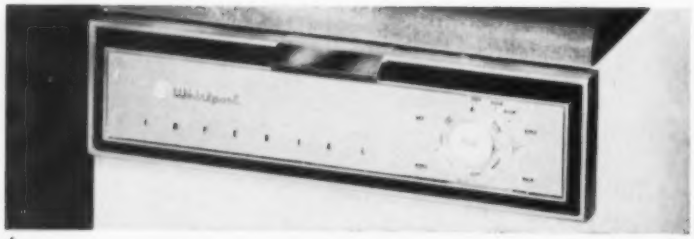


L

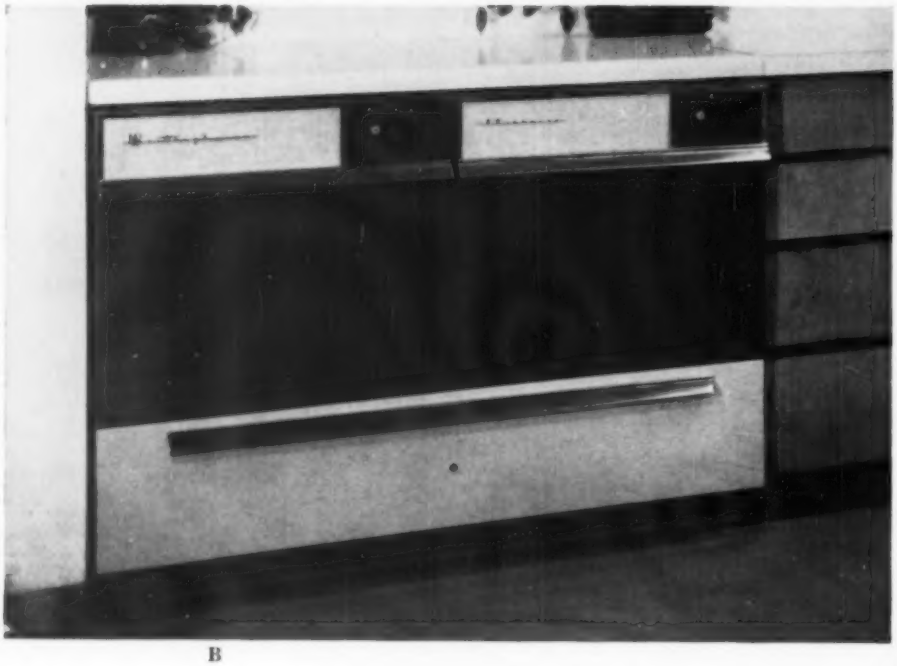


G

M



A



B

Washers

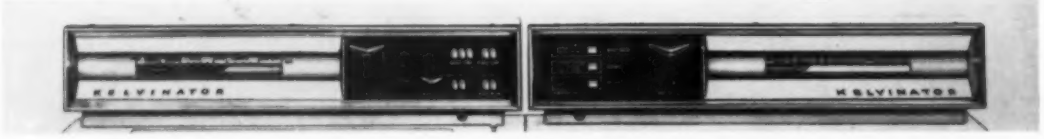
Still too expensive to be priced competitively on the market, Westinghouse's supersonic dishwasher (B) is nevertheless closer to being a production model than the futuristic versions that have appeared in a number of dream kitchens in the past couple of years. Smaller, quieter, and faster than conventional models, the dishwasher is actually two units, each in a drawer 15" deep; one is for pans and the other for dishes. Household current, stepped up to 20,000 cycles, activates a transducer (the only moving part), which in turn agitates the water. Westinghouse predicts subsequent application of the principle to clothes washers.

Washers are frequently accused — often unfairly — of sprouting controls of increasingly baffling complexity. Their complexity is most often an indication of the increasing refinement of the machine; even a dishwasher will offer a number of possible cycles depending on the dirtiness of the dishes, as in the case of the Whirlpool undercounter model (A). The telephone-dial controls are a feature of all the Whirlpool washers this year. Westinghouse, deploring the "push-button trend", has confined the controls on its combination washer-

E

C

D



dryer (E) to two dials, but before turning them the housewife must read the "program center" at the left rear, which offers her 11 choices. Norge (C) makes no bones about its complexity, and displays, in addition, four bins, to dispense detergent, bleach, starch, etc., at various points in the washing operation. Kelvinator (D) devotes the larger part of its control panel to rotary dials which revolve slowly throughout the washing and drying cycles, indicating what stage in the process has been reached — a case, it might seem, of complexity for its own sake.

F

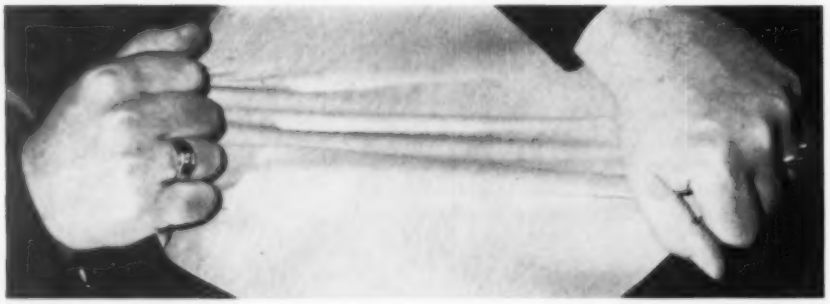
Westinghouse's laundry twins (F) hide their controls (or "program computer," as the manufacturer prefers to call it) behind a fabric panel and add a second panel of walnut, on the theory, apparently, that a touch of walnut can't hurt anything this year. Philco has scaled down its combination washer-dryer to a width of less than 27" in both the electric (G) and gas (H) models, and offers remote controls for the wall and a replaceable front panel to make the machine as unobstrusive as possible. Chambers (I) has added a dishwasher to its built-in kitchen, demonstrating, incidentally, that an integrated series can be achieved with the simplest of forms.

G

H

I

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



Intricate shapes possible with new formable plastics-paper combination

Objects of complex shape, such as the dish shown above, can be made from a newly introduced combination of paper and plastic, using conventional heat- and pressure-forming processes. A creped form of kraft paper, bonded to plastic sheets, gives the combination the rigidity and strength of the plastic and the body of the thick paper. The paper, X-Crepe, a development of Cincinnati Industries Incorporated, is capable of stretching to 160 per cent of its original size; this means it can conform to intricate shapes without tearing. The stiff plastic contributes to shape retention.

The material can be made in thicknesses ranging from a few thousandths of an inch for a single-ply coated paper to over a quarter of an inch for laminates with thermoplastic resins. Most of the work on the product up to now has been done with high-impact polystyrene, which can stretch about as much as X-Crepe, but a number of other thermoplastics are being evaluated.

Available machinery limits the size of objects made from the new combination, but there is no reason why presses cannot be made to form objects the size of automobile body tops. The manufacturer envisions stamping entire automobile instrument panels, or door panels, complete with armrest, from one piece of the new material.

The idea of laminating paper and plastic is by no means new, but the relative inelasticity of paper has prevented the forming of complex shapes from the combination. Machine-creped kraft paper, and extensible kraft, have helped, but they reach the limit of their stretch too soon to be used for anything but shallow dishes. X-Crepe, on the other hand — since it can stretch as much as the plastics used with it — retains its integrity as long as the plastic does.

The development work indicates that forming may be done on mechanical, hydraulic or air-pressure presses, using male, female or matched dies. Most of the work up to now has been done with female molds on an air-pressure machine, blowing the material like a balloon, into the mold, at 350 psi. In the development work molds of machined steel and cast epoxy have been used. The mold chosen depends on the kind of piece and the number wanted. Multiple cavity molds are possible.

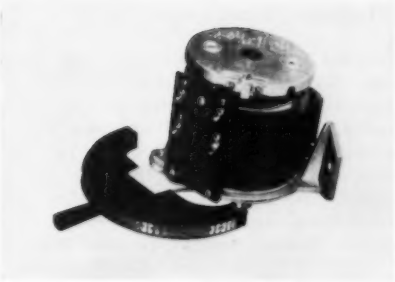
Decoratively printed paper can be used as well as plain brown kraft. Manufacturer: Cincinnati Industries, Inc., Cincinnati, Ohio.

Double-spray booth

A double spraying booth for low-cost production painting allows one operator to double production on jobs that used to require two hand-sprayers. A sprayer mounted on a traveler may be adjusted to spray at any angle, while a shaft in the booth alternately raises and lowers the part being painted. The operator can load and unload one station while the sprayer works in the other, eliminating lost time, and making the equipment good for use with a fast conveyor. If desired, small areas may be painted at one station and large areas at the other, or the sprayers may be loaded with a different color in each section. Manufacturer: Conforming Matrix Corp., Toledo 2, Ohio.

Ultra-sensitive mercury switch

A new, low-angle mercury switch has been designed to meet the precise requirements of vertical gyros, stable platforms, and rocket guidance systems. The switch weighs 3.8 grams, and trips when tilted 0.15 degrees, It is hermetically sealed to prevent dirt and corrosive vapors from fouling the contacts. The contact arrangement is single pole-double throw; ratings: 0.255 amp., 30 volts ac, 400 cycles per second. Manufacturer: Micro Switch, Freeport, Ill.



Lamp dimmers

Dimmers for installations requiring the simplest form of control can be used on small stages and in display areas, dining rooms, reception rooms and entrance halls. They are designed for incandescent and fluorescent lamps, and range in size from 1200 to 24,000 watts. Manufacturer: Ward Leonard Electric Co., Mount Vernon, N.Y.

Light-weight thermal insulation

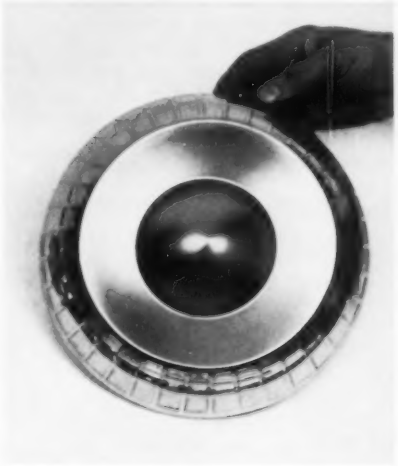
DuPont has recently developed a light-weight thermal insulation called fibrous potassium titanate. According to tests it is about twice as effective as any known insulator from 1300 F. to 2100 F. Manufacturer: E. I. DuPont de Nemours and Company, Incorporated, Wilmington, Del.

70 mm roll film developing tank

The Gilco 70 mm developing tank is said to provide fast, accurate processing of 100-foot reels of black-and-white or color film. Large stainless steel reels transport the film from reel to reel in less than 30 seconds; at all times 48 feet of film are exposed to agitated chemicals. The tank may be used without a darkroom if necessary; the reel assembly is equipped with legs to allow operation out of the tank for color-film processing. Manufacturer: Charles A. Hulcher Co., Inc., Hampton, Va.

Anti-rattle window seal

Polyethylene channel weatherstripping allows aluminum storm windows to slide freely and prevents metal-to-metal contact between window panel and frame. It holds firmly in extruded aluminum stock, gives a good weather seal, and does not flatten out with use. It is superior to wool (usually used in these applications) because it does not absorb water, which freezes and stops movement. Manufacturer: Dumont Plastics Co., Raritan, N. J.



"Frosted" finish on stainless steel

A kind of "semi-blasting" process gives stainless steel a frosted look without affecting its wearing and weathering qualities. The process does not penetrate the surface. So far, most of the work with the new process has been done on the steel used for trim and moldings on automobiles, but the developers expect that it is applicable to any type of stainless steel. Manufacturer: Stamping Service, Inc., Detroit, Michigan.

Plastics for large castings

Two new two-step molding compounds designed primarily for large castings have been developed by Rogers Corporation. They can be preformed and molded with conventional equipment. They are available in nodular form. Manufacturer: Roger Corporation, Rogers, Conn.

Electric eyelet machine

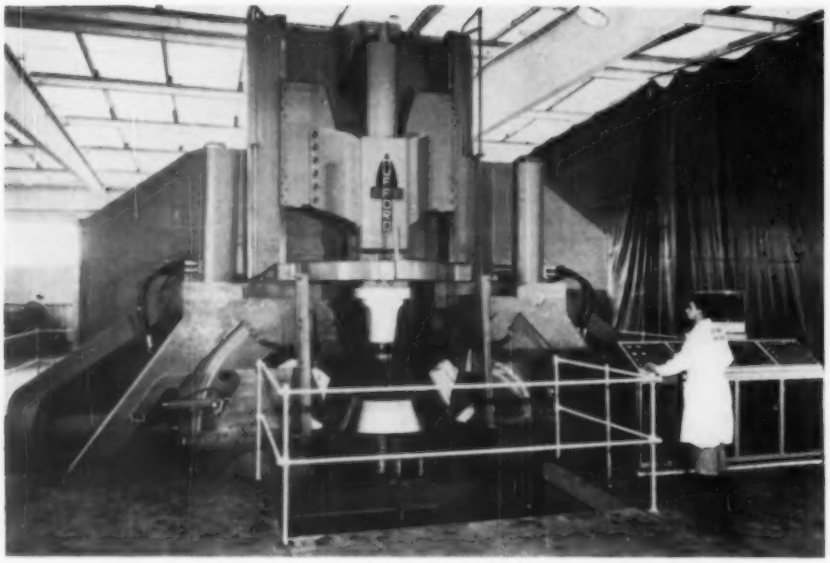
A new automatic, electrically operated eyelet machine can be used for fastening a wide variety of products, including electronic components and many kinds of fabrics, paper and leathers. It will set over 30 eyelets per minute. Manufacturer: Eyelet Tool Co., Incorporated, Cambridge, Massachusetts.

All-in-one scribing tool

Hammer, center-punch, magnifier and scriber are available in one new tool called the Centa-Scribe. A center can be located with the magnifier, the tool placed on it, and the built-in hammer dropped to mark it. A carbide-tipped scriber can be easily attached for scribing on glass, ceramics, hardened steel and other materials. Manufacturer: Langley Corp., San Diego, Cal.

Plastic oil can

A "squeeze-bottle" oil can has been made available. It comes in 4- or 8-ounce sizes and has no moving parts. A screw cap on the nozzle, which may be either straight or angled, makes it leak-proof, and the transparent plastic gives the user visual control of the contents. Manufacturer: Hunter Tools, Whittier, Cal.



"Potter's wheel" shapes metals

A happy combination of the principle of the potter's wheel and the fact that metals melt for an instant when subjected to high pressures makes possible the construction of evenly stressed surfaces of revolution (tubular and conical shapes, such as jet-engine casings and pressure vessels). Usually such a shape is made by wrapping a sheet of metal around a form and welding the edges together. This produces weak spots on either side of the weld, and makes a multiplicity of operations necessary—grinding down the weld, tempering the entire shape, for example.

The Hufford Spin Forge works on the principle of the potter's wheel: a doughnut-shaped piece of metal is placed on a mandrel (a form shaped like the inside of the part to be made) and rotated at speeds up to 400 rpm. Two rollers at either side of a turntable (see photo above) move in to squeeze the metal into shape. It can be formed in this way because under the pressure of the rollers it melts for an instant and flows, a principle known theoretically for years, but only recently made practicable by new developments in machine construction. This also causes the grain alignment to be changed in such a way that grain conditions of forging are obtained with close tolerances that eliminate the need for finishing. A part that takes four hours to make by conventional means — wrapping, welding, tempering, etc. — takes about an hour on the Spin Forge.

The shaping process is controlled by an electronic tracing system that works like a hardware-store key grinder. A stylus moves along a template. Its movements are converted into electrical impulses which cause a hydraulic system to operate the rollers. The Spin Forge can handle parts up to five feet in diameter and 10 feet in height. The machine itself stands 24 feet high, 25 feet wide and about 12 feet deep. It weighs 225 tons. Manufacturer: Hufford Corp., El Segundo, Cal.

Automatic overload protector

An overload protector, MP-1620, introduced by Mechanical Products, Inc., shuts off small electric motors in response to excessive motor temperatures and heavy current draw, and turns them back on when the disturbing condition is removed. The thermal element in the switch can be adjusted to open the circuit at any stage in temperature or current rise, and as often as desired. Manufacturer: Mechanical Products, Inc., Jackson, Mich.

Deep-throated C-clamps

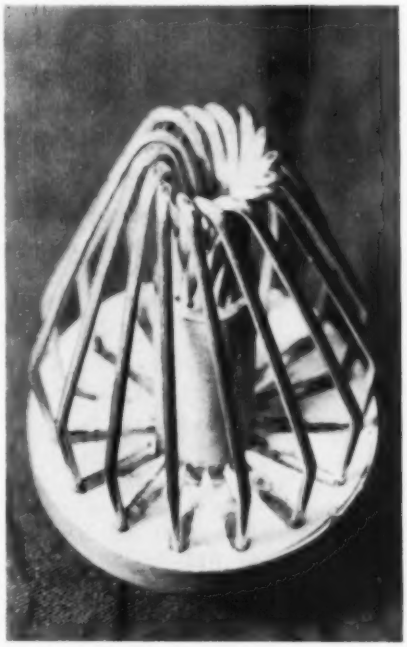
A new line of C-clamps is available in 2-, 3-, 4-, 6-, 8-, 10-, and 12-inch capacities, with extra-deep throats and a swivel pad that is guaranteed never to come off. They will not break under forces of 2,700 to 8,000 pounds, depending on the size. Manufacturer: Proto Tool Co., Los Angeles, California.

Oriented nylon strip

The first domestically produced oriented nylon stripping is now available. It is used, when laminated with leather or rubber, to give strength to power transmission and conveyor belts. The new material is available in thicknesses up to ⅛ inch, widths to 3 inches. Manufacturer: Reeves Brothers, Inc., 1071 Sixth Avenue, New York 18, N. Y.

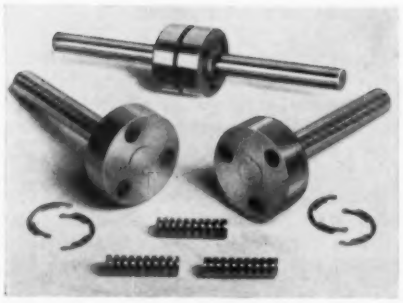
Electronic X-ray gage

General Electric has developed an X-ray gage for measurement of low-density materials such as paper, fabrics, and sheet and films. The gage uses very soft X-rays whose source may be turned on and off; this makes the constant precautions required with gages using radioactive isotopes unnecessary. No AEC license for its use is needed. Source: General Electric Co., X-ray Department, 4855 West Electric Avenue, Milwaukee, Wis.



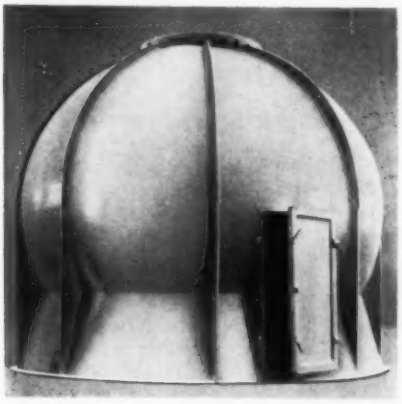
Connector for lightning arrester

A bronze "expanding spring" fastener provides a quick, positive connection, both mechanical and electrical, between tubular aircraft antennae and lightning arresters. Fifteen phosphor bronze spring elements fit into an aluminum tube to make both electrical and mechanical connections. A fiber disc, with slots in it for the spring elements, insulates the connector housing from the tube while allowing the connector to be moved. Source: Joslyn Manufacturing and Supply Co., Chicago, Ill.



Free-aligning coupling

A new coupling transmits torque through helical springs held in place by snap or split rings. It rotates in either direction and can be installed vertically or horizontally. According to the manufacturer, the coupling acts as a shock absorber and can be used under conditions of maximum misalignment, because it transmits torque without end-thrust even under heavy loads. Shaft sizes up to 12 inches are available, and larger sizes can be ordered specially. Manufacturer: Atomatic Manufacturing Co., East Pittsburgh, Pa.



Weatherproof dome

A dome made of polyester resin reinforced with Fiberglas is being used to protect operators and equipment for monitoring Weather Bureau balloons. The dome is 14 feet 10 inches high, and 14 feet 8 inches in diameter. It is made in eight sections, the resin being sprayed on wooden molds and coated with Fiberglas mats. Joints are sealed with sponge rubber gaskets and attached to each other with brass and glass fiber bolts. Manufacturer: Carl N. Beetle Plastics Corp., Fall River, Mass.

Light-weight firebrick

Foamsil, a material composed of 99 per cent pure fused silica foam, can be used, according to the Pittsburgh Corning Corporation, as a substitute for refractory brick in furnace linings, etc. The material functions well within the range from minus 450 F. to 2200 F. Source: Pittsburgh Corning Corporation, 1 Gateway Center, Pittsburgh 22, Pa.

Transparent skin for documents

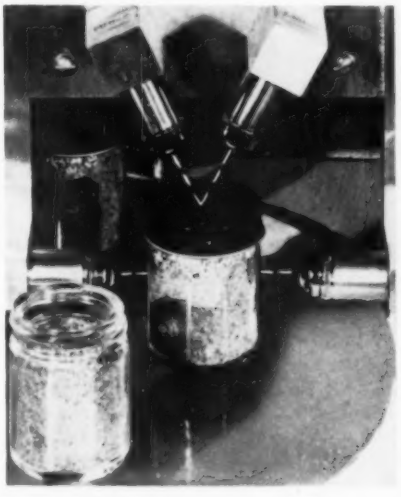
Papers and small packages—even sharp-cornered objects—can be sealed in a transparent plastic skin by the Skin-Pak, a machine recently introduced by the Print-A-Tube Company. A combination of heat- and vacuum-sealing applies a covering in about 10 seconds that can be marked with crayon and grease pencils. Desk models as well as larger production models are available. Manufacturer: Print-A-Tube Co., Rochelle Park, N. J.

High speed nail machine

A new, high-speed nail machine doubles output by making as many as 750 nails per hour. Because the distance between cutters and grippers is constant, nail length is always the same; and since cutter and gripper die movements never touch each other, long-wearing carbide tools can be used. Wire from 6 to 14 gage can be used to make nails up to 3½ inches long. A simple adjustment makes it possible to vary the size of the head. Manufacturer: E. W. Bliss Co., Canton, O.

Electric eyes for quality control

Dual miniature electric-eye setups can replace mechanical timers and contacts formerly used to monitor objects moving at varying speeds. If necessary, more light beams may be used. The photo below shows inspection for the presence of bottle caps. A timing beam is cut off by the bottle, a reflecting beam inspects for the cap. Assemblies are small and can be fitted into difficult spots. Manufacturer: Photomation, Inc., Bergenfield, N. J.



Very soft synthetic sponge rubber

Three new, extremely soft neoprene compounds have been developed by Mechanical Rubber Products Company. They are capable of elongation up to 800 per cent of their original lengths, and possess excellent tensile strength in spite of their softness, according to the manufacturer. All oil, weather and resistance characteristics of neoprene are maintained. Manufacturer: Mechanical Rubber Products Company, Warwick, N. Y.

Synthetic polyisoprene rubber

For the first time an exact chemical duplicate of tree-grown rubber is available in commercial quantities. Polyisoprene is more uniform in quality than natural rubber and is expected to take over a substantial portion of the market in, for example, heavy-duty tires and fine footwear, where natural rubber has up to now been supreme. The commercial availability of polyisoprene is expected to free the United States from its dependence on foreign sources of natural rubber. Source: Shell Chemical Corp., Rockefeller Center, New York, N. Y.

Lexan in milled shapes

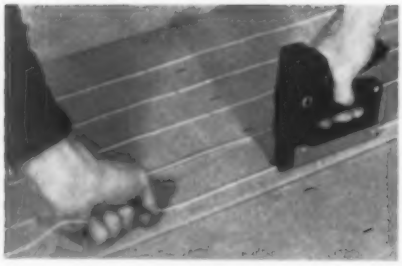
Polypenco, trade name of Lexan, a new polycarbonate resin developed by General Electric (See ID, Dec. 1958), is available as rod, tubing, plates and discs. According to the manufacturer, the new thermoplastic has high impact strength and heat resistance, will not lose its shape, and has good electrical properties. Sizes of available shapes are: Rod, ½-inch to 4-inch diameter; discs, 6-inch to 18-inch diameter, ¼-inch to 2 inches thick; plate, ¼-inch to 1½-inches thick. Manufacturer: The Polymer Corp. of Pennsylvania, 2140 Fairmount Ave., Reading, Pa.

Drafting stools with rubber seat

Metal, fixed-height stools, with plastic foot glides now available; rubber seat, optional adjustable backrest. Manufacturer: Ajusto Co., Bowling Green, Ohio.

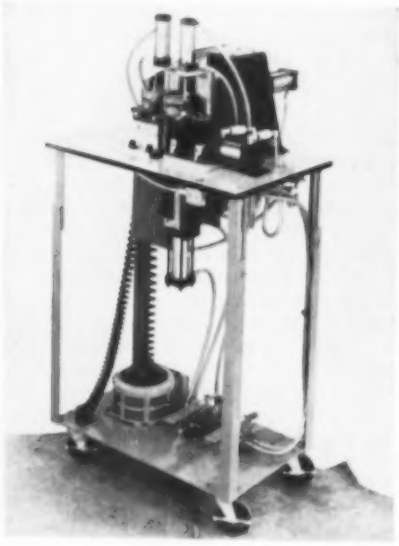
Reinforced polyethylene film

A polyethylene film — FRF — reinforced with Fiberglas, is said to provide greater strength than plain film for the same thickness, and to eliminate stretching, bagging and billowing. Qualities of polyethylene film-like efficiency as moisture and dust barrier are retained. It can be used for weather and dust barriers for construction, low-cost bulk packaging for foods, as swimming pool and greenhouse covers. Source: Owens-Corning Fiberglas Corp., 16 East 56th Street, New York 22, N. Y.



Stapler tacks wires and small cables

Bostitch has introduced a staple tacker (model T5-8W) designed specially for holding down wires and small, low-voltage electrical cables. A crown in the middle of each staple fits over the wire without damaging the insulation, and a guide on the tacker insures correct placement of the staple. Manufacturer: Bostitch, East Greenwich, R. I.



Splicer for vinyl extrusions

An air-operated machine makes butt and 90 degree mitre joints in rigid vinyl extrusions. It operates on 115-volt ac and uses a 60- to 80-psi air source. Extrusions up to 2 by 1½ inches can be joined. Manufacturer: Kel-Min Co., Middlefield, Ohio.

Plastic molds for metal parts

Epoxy resin molds reinforced with metal or glass fibers permit runs of up to 150,000 stampings where low-gage soft metals are used. The technique is applicable to prototype and development metal-forming dies, secondary operation dies, hydroform and rubber pad forming dies, stretch dies and fixtures.

According to the manufacturer, 35 Epoxy-Alloy dies were recently built for a military project in 15 weeks at a cost of $250,000; conventional metal tools would have taken 18 months and cost $2,000,000. Manufacturer: Bakelite Co., Division of Union Carbide Corp., 260 Madison Avenue, New York 16, N. Y.

Teflon-glass laminate

A laminate of glass cloth impregnated with Teflon resin is designed for use as gaskets and seals in places where corrosion is a danger. The new grade of laminate, called Dilecto GB-108TED, is also useful as flexible electrical insulation, in such applications as radar windows, printed circuits and tape cable. Manufacturer: Continental-Diamond Fibre Corp., Newark 107, Delaware.

Insulated terminals

Two new classes of insulated electronic terminals have been recently developed: a series of melamine-insulated feed-through terminals with outside threads that can be fitted into a tapped hole; and a series of diall phthalate insulated terminals with tapped inserts and metal flanges for spot welding to metal shells; also, half hard brass printed circuit receptacles. Manufacturer: Larco Electronics, Inc., Burbank, California.

Flame-resistant laminate

Hetron, a polyester resin, when used in polyply laminate with woven fiber glass mats, is said to impart fire-resistance to the laminate without sacrificing other important requirements such as strength and electrical properties. The fire-resistance reduces substantially the danger of fire from arcing, etc., in electrical installations. Source: Durez Plastics Division, Hooker Chemical Corporation, North Tonawanda, N. Y.

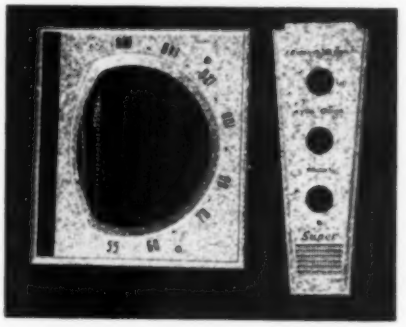
Insulating double skylight

The Consolite Double Dome Skylight provides as much thermal insulation as a 2½-inch gypsum roof, and comes in green, yellow, pink, blue and white. The manufacturer says that it transforms glaring sunlight into pleasing, diffused interior light, and can, in fact, create a specific mood.

The fiber glass-reinforced dome is composed of two layers of plastic separated by a dead-air space, which gives it its insulating qualities. The double thickness of reinforced plastic cannot be shattered by hailstorms, rocks, shocks or vibration, according to the manufacturer. It is much tougher than either the glass or plastic used in conventional skylights. Manufacturer: Consolidated General Products, Inc., Houston, Texas.

Decorative aluminum finish

In contrast to the usual fine-grained finish of a lustrous aluminum alloy, Spangle Sheet makes a virtue out of necessity by exaggerating the normal grain structure into visibility, producing millions of shiny and dull facets with the appearance of sequins on the surface of the metal. The alloy was announced by Alcoa as long



ago as 1956, but has only recently been made commercially available.

Such diverse decorative uses as in jewelry, wall panels, automobile interiors, radio and television control panels, and small appliances, are foreseen for the new finish. Manufacturer: Croname, Inc., 6201 West Howard Street, Chicago, Ill.

Softening brittle photographic film

Photographic film that has become brittle and shrunken from age can be reconditioned by a recently patented method. Rolled-up film, placed in a specially constructed vacuum chamber, is rehumidified and the lost plasticizers are replaced by molecules of glycerin and terpene. The glycerine and terpene are introduced in a two part solution: mixture A consists of 5 grams of camphor dissolved in 5 oz. of alcohol at 78°F, to which is then added 5 oz. of eucalyptus oil; mixture B consists of four parts of glycerin which is added to six parts of distilled water at 95°F. The solution is passed into the vacuum chamber through thermostatically controlled pipes.

The film is subjected to the vaporized solutions in the vacuum chamber at temperatures of from 90° to 100°F. for about three hours. At lower temperatures the process takes a proportionately longer time.

The method is claimed to be the first one in which film does not have to be uncoiled (which often causes additional cracking and breaking) before treatment. Film reconditioned by this treatment is ready for use immediately on being taken out of the vacuum chamber, and is unmarred by streaks that would occur if the solution were applied in liquid form. Source: Glycerin Producers' Association. 295 Madison Avenue, New York 17. N. Y.

Manufacturers' Literature Supplement

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

MATERIALS—METALS

1. **Cold-Finished Steel Bars.** LaSalle Steel Company. 5 pp., ill. Chart lists all AISI grades of cold-finished steel bars (241 in number) and their chemical analyses. Tables of weights of round, square and hex bars of thicknesses or diameters from 1/32 inch to 6 inches.

2. **Corrosion Resistance of Haynes Alloys.** Haynes Stellite Company. 40 pp. Charts and graphs showing penetration rates in the alloys for 250 corrosives.

3. **Handy Selector Guide for Metal Melting.** General Electric Company. Tells how to select cast-in immersion heaters, controls and melting pots for soft-metal melting; also, table for determining current needed for melting solder, tin and lead. Prices.

4. **Lo-Air Tool and Die Steel.** Universal-Cyclops Steel Corporation. 12 pp. Complete technical data on machining, heat treatment, mechanical and fatigue properties of Lo-Air steel.

5. **Metal Fabricating Facilities.** United States Chemical Milling Corporation. 8 pp., ill. Describes company's many-faceted metal-working operations: hydro spinning, 3-D machining, profiling, skin milling, forming, stamping, welding and precision assembly.

6. **Porcelain Enamel.** Erie Ceramic Arts Company. 4 pp., ill. Functional and decorative applications, and physical properties of small porcelain-enameled metal parts. Details concerning mechanical, electrical, chemical, thermal and sanitary applications.

7. **Reynolds Aluminum Mill Products.** Reynolds Metals Company. 18 pp., ill. Complete specifications for and descriptions of alloys and forms of aluminum available from Reynolds. Includes alloy and temper designations; fatigue and shearing strengths; various alloys available in foil, sheet and plate, wire, rod and bar, tubing and pipe, and extruded and structural shapes. Fabricating and finishing techniques. Bibliography.

8. **Report on Titanium.** Harvey Aluminum. 36 pp., ill. Booklet covers refining, advantages, strength and weight, performance, etc. Describes mill products, machining and joining.

9. **Stainless Steel Buyers' Guide.** American Iron and Steel Institute. 159 pp. Lists about 3000 firms that make stainless steel products or offer services in connection with stainless steel.

10. **Wallace Cut Machining.** Wallace Supplies Manufacturing Company. 36 pp., ill. catalog describes wide range of cutting machines and accessories.

MATERIALS—PLASTICS

11. **Zinc Die Castings.** The New Jersey Zinc Company. 64 pp., ill. Describes and illustrates uses and applications, new and old, of zinc die castings. Composition of alloys.

12. **Fiber Glass Reinforced Plastic Parts.** Warminster Fiberglass Company. 2 pp. Outlines advantages of fiber glass reinforced plastic parts, describes company facilities.

13. **Geon Plastics.** B. F. Goodrich Chemical Company. Rigid Extrusion and Molding Compounds. Domestic Price Schedule.

14. **Glass-Supported Teflon.** Continental-Diamond Fibre Corporation. 8 pp. Describes glass-supported Teflon tapes, laminates, diaphragm stock and gasket stock; Teflon for flexible printed circuits. Lists properties and typical applications.

15. **High Temperature Wire Catalog.** American Super-Temperature Wires, Inc. 64 pp. Contains engineering information and prices on high-temperature magnet wire, lead wire, cables, tubing, and Teflon tape. Information on the products is cataloged.

16. **K-Lite prismatic lens panels.** KSH Plastics, Inc. Leaflet describing use in fluorescent lighting of prismatic lens panels.

17. **Magnetic Stirring Bars.** Arthur S. La Pine and Company. Describes Teflon-covered stirring bars used in magnetic stirring of liquids.

18. **Plastic Molding.** Rostone Corporation. 8 pp. Cold- and hot-molded plastic parts for electrical insulation.

19. **Room Temperature Vulcanizing.** General Electric Company. Includes product and application data for three new RTV compounds, available in several viscosities, pourable or spreadable.

20. **Sorbtex.** Preformed Pad Division, Voss Belting and Specialty Company. Describes use of Sorbtex for shock-dampening and vibration-isolation.

21. **Urethane Reference Guide.** National Aniline Division, Allied Chemical Corporation. New research material which includes calculations needed in urethane technology and which will serve as reference matter. Explains technical terms used in the formulation of a urethane foam, coating, and adhesive; provides information on equivalent weights of reactants. Explains significance of terms such as "acid number," "hydroxyl number," "reactive number," "molecular weight," and "per cent free isocyanate."

22. **Vinyl Epoxy Plasticizers.** Becco Chemical Division, Food Machinery and Chemical Corporation. 6 pp. Preparation techniques, analytical data, compatibility ratings, and performance characteristics such as elasticity, tensile strength and permanence of material that protects polyvinyl chloride against degradation caused by heat and light.

23. **Vinylfoam.** Union Carbide Plastics Company. Description of and specifications for vinylfoam cushions, etc.

METHODS

24. **Centrifugal Casting.** Centrifugal Casting Company. 8 pp. Shows advantages of centrifugal casting. Illustrations help describe production and new applications. New metals and alloys are listed, and various sizes and shapes that can be centrifugally cast are shown.

25. **Color Coding System.** Crown Industrial Products Company. Kit containing materials for designing or revising color code systems, including charts for listing parts and their colors, and color samples.

26. **Fabrication of Hastelloy Alloys.** Haynes Stellite Company. 36 pp., ill. Covers procedures for welding, forming, forging, machining, grinding, pickling, etc., of various alloys. Photographs, charts, graphs.

27. **59 Ideas for Modernization in '59.** Allis-Chalmers Manufacturing Company. 20 pp., ill. Exactly what the title says, with emphasis on proper equipment for the job it has to do; covers a range from heavy duty rotary switches for large machinery to betatrons for inspecting steel castings.

28. **How to Appraise Sonic Energy Cleaning.** Pioneer-Central Division, Bendix Aviation Corporation. Discusses applications of sonic energy cleaning to industrial operations. Five main subjects are considered: what sonic energy is, how it cleans, how its efficiency can be evaluated, an analysis of a new concept in sonic energy applications, and an outline of how Pioneer-Central can help prospective users to judge whether sonic energy is the answer to their problems.

29. **How to Make your own Machine and Repair Parts Quicker and Easier.** W. E. Schneider, La Salle Steel Company. 24 pp., ill. Shows uses to which La Salle's Stressproof all-purpose steel can be put in the way of making parts. Hints on machining it, and on taking care of equipment. Tables: drill hole tolerances and grinding limits.

30. **How to Use Printing on Corrugated Paper.** LPL No. 8. Hinde and Dauch. This addition to the Little Packaging Library (LPL No. 8) contains information for helping in the planning of printing on corrugated boxes and displays.

31. **Large Area Stamping and Assemblies.** Bettcher Manufacturing Corporation. 4 pp., ill. Outlines Bettcher's services as contract manufacturer of stampings and stamped assemblies, including engineering help.

32. **Materials Handling.** Raymond Corporation. User Report #21, 4 pp. Report on a case involving handling of long dies and fixtures. Details of operation, photographs, prices, are included.

33. **Modern Force Measurement.** Baldwin-Lima-Hamilton, Electronics and Instrumentation Division. 20 pp., ill. Semi-technical booklet describes modern industrial techniques for measuring weight, force, pressure, etc. Electronic measurement is defined and described. Typical systems are shown and discussed.

34. **Motor Freight Accounting.** Remington Rand Univac Division, Sperry Rand Corporation. Bulletins U-1532 and U-1555 describe how medium-sized Univac File-Computer helps in preparation of operating statistics and processing of accounting records. Also, information on Univac 60 and 120 punched-card computers, designed for small companies.

35. **Precision Rubber Molding.** Ohio Rubber Company. 4 pp. Explains how Ohio Rubber's automated processes keep prices low in this normally high-cost operation. Advantages and drawbacks and quantity requirements are discussed; design recommendations are made. Parts already made by the process are illustrated and described.

36. **Steel Uses.** Acme Steel Company. This external publication describes, among other things, the use of steel straps in loading metals, the use of wire stitching in the toy industry, and a new framing angle.

37. **Temperature-Millivolt Conversion Table for Thermocouples.** Thermo Electric Company, Incorporated. Chart showing conversion of fahrenheit and centigrade temperatures in 5-degree increments to millivolt values for eight thermocouple calibrations. Values are based on reference junction temperatures of 75°F and 25°C, though conversion factors for other reference temperatures are included. Temperatures from minus 320°F to plus 3270°F, and minus 200°C to plus 1800°C are covered.

38. **Ultrasonic Fluxless Soldering** Bulletin SB-5. Aeroprojects. 8 pp. Includes descriptions of soldering equipment and discussion of special uses, particularly soldering of silicon, germanium, aluminum, magnesium, etc.

39. **Wood Treatment.** Building Products Division, L. Sonneborn Sons, Incorporated. 4 pp. Describes Lignophol Interior Quick-Drying Penetrating, and Gym Finishes, telling how they protect wood from damage due to traffic, heat, moisture, fungus attack, etc.

PARTS AND COMPONENTS

40. **Aviation Clamps.** Wittek Manufacturing Company. 4 pp. Bulletin illustrating and describing various stainless steel clamps for aviation hose and duct connections.

41. **Battery and Power Plugs,** GB-7-2958. Cannon Electric Company. The catalog describes all the Cannon Plugs designed for high-current and battery disconnect applications. Photographs and dimensioned drawings are included.

42. **Electron Optics,** RC 178A. Instruments Division Philips Electronics. 16 pp., ill. Four Norelco products are discussed in this booklet: EM-100B and EM-75B electron microscopes, PMR X-ray microscope, and CMR contact microradiographic unit. Photograph, diagrams, etc., show details of construction, accessories and applications.

43. **High Voltage Control,** EN-162. Cutler-Hammer Incorporated. 16 pp., ill. The booklet discusses general features of a new line of high-voltage control as well as individual characteristics of various items in the line.

44. **Logic Modules.** Hoffman Electronics Corporation. 8 pp., ill. Logic modules are combinations of Zener diodes and magnetic amplifiers, contained in cases that can be plugged into 7-pin tube sockets. There are three modules made. They are designed to free the logic engineer from involving himself with the minutiae of circuit design and to allow him to concentrate on logic configuration. The brochure

describes 12 applications for the modules, giving logic diagrams, circuit diagrams and recommended power supply wiring.

45. **Military and Commercial Transformers.** Chicago Standard Transformer Corporation. CT8-58 is a catalogue giving electrical and physical specifications for hermetically sealed transformers, including some built according to MIL-T-27A. In addition power and audion transformers are described.

46. **Power Supplies.** Opad Electric Company. 2 pp., ill. The sheet illustrates and describes a line of 32-volt dc power supplies. They all work off 115-volt, 60 cycle, ac, single-phase power. Electrical and physical characteristics are described.

47. **Pressure Gages, Spec Sheets 11-1451P-1 to 5.** Fischer and Porter Company. Five pressure gages of various types, all enclosed in corrosion resistant fiber glass cases, are described. They can be used for indicating, recording, controlling, and transmitting. Construction materials, design features, performance, operational limits, etc., are given.

48. **Pumps.** Continental Pump Company. 8 pp., ill. Descriptions and specifications of a great variety of helical-screw pumps are included. They can be used for pumping almost any fluid, and come with aluminum, steel or bakelite bodies.

49. **Replacement Vibrator Catalogue.** James Vibrapowr Company. This sheet lists complete specifications for the eight standard James vibrators which will replace those installed in most automobile radios.

50. **Top Holding Tube and Component Retainers,** 2-TT. Birtcher Corporation. 12 pp., ill. Three types of clamps to hold tubes and components in place on chassis are shown: Top Tainers, Type 2 Tube Clamps and Type 2 Crystal Clips. These come in assorted sizes. Photographs and dimensioned drawings are included.

MISCELLANEOUS

51. **A-C Crane Control.** Electric Controller & Manufacturing Company, Division of Square D Company. Bulletin 6431 describes in detail the components, available enclosures, and applications of Type "VL" crane control for light industrial a-c cab or floor-operated cranes (NEMA Service II classification).

52. **Butyl Rubbers.** Thiokol Chemical Corporation. Two bulletins. Bulletin 105-1 reports the results of a study of a number of antiozonants, antioxidants, sunproofing waxes, and other materials suggested as additives for further improving Butyl's ozone resistance. In most instances the tables of data show test results for both mold- and steam-cured compounds. Bulletin 102-1 demonstrates the resistance of Butyl rubber to a number of commercial fire-resistant hydraulic fluids. Tables and graphs are included, illustrating the effects of immersion temperature on the volume swell and physical properties of Butyl rubber. Also compares resistance of Butyl compounds cured with a typical sulphur system and a dimethylol phenol resin system.

53. **Carbon-Graphite Brochure.** Ohio Carbon Company, 8 pp. Charts and tables give data on qualities of sceleroscope hardness, density, transverse and compressive strength, oxidizing temperature limitations, performance in sliding contact with various modern bearing metals, tensile strength-to-specific gravity, and thermal conductivity.

54. **Decimal Equivalent Chart.** Ohio Seamless Tube Division, Copperweld Steel Company. Chart measures 8½" x 11" and is punched for wall hanging. Shows fractions and decimal equivalents for values from 1/64" to 1".

55. **Die-cast Washer-base Cap Nuts:** standard specification sheets. Gries Reproducer Corporation. Complete details of blank sizes, thread sizes, principal dimensions and approximate shipping weights.

56. **Dust Control: Flexaust Hose and Portovent Duct.** Flexaust Company. Bulletin 82 illustrates solutions to industrial dust-control problems of all kinds, and offers information on selection and pricing of the above-mentioned hose and duct.

57. **Fiber Research Bibliography.** Instruments Division, Philips Electronics, Inc. Two literature lists on fiber research, one on electron microscope work and the other on X-ray diffraction investigations, include 137 articles which have appeared in domestic and foreign publications.

58. **Fir Plywood for Product Design.** Douglas Fir Plywood Association. 8-page pamphlet includes data on bending radii, deflection, acoustical properties and other physical characteristics of fir plywood; also a chart of the characteristics and proper use of various grades of plywood, and recommendations for cutting, drilling, fastening, gluing, nailing, and finishing.

59. **Fluorescent Lighting Systems.** Smithcraft Lighting. 4-page catalog gives condensed data on Smithcraft commercial and industrial units, recessed troffers and ceiling systems.

60. **Flow-control Servo Valves.** Moog Valve Company, Inc. 6 pp. Detailed information on valves available at maximum rated flows to 10 gpm at 1000 psi valve drop with operating supply pressures from 500-4500 psi. Also a series of curves on normal flow gain tolerance, load flow-pressure characteristics, typical frequency response and tolerance and nominal coil characteristics. Glossary included of pertinent servo-valve terms.

61. **Image Converter Camera.** Librascope, Inc. Bulletin gives details of an ultra-high-speed image converter camera designed around a newly developed image converter tube, electrostatically focused and deflected; it is intended for the study and photographic recording of transient phenomena in the microsecond range.

62. **Industrial Television System.** Kin Tel. 2-page bulletin describes a television system with automatic built-in light-control capable of compensating for light-level variations of up to 1000:1. A white-clipper circuit minimizes the effect of extremely bright objects in the viewing field.

63. **Instrument Cases.** Zero Manufacturing Company. 12 pp., ill. Catalog "D" lists standard lengths and widths of military transit, combination, and instrument cases, plus the maximum and minimum heights of each. Cases are designed to protect contents from moisture, fungus, mildew, corrosion and other environmental conditions while providing an attractive enclosure.

64. **Laboratory Instruments and Apparatus.** Labline, Inc. 175-page catalog illustrates and describes such items as constant temperature baths; drying ovens; environmental units for humidity, altitude and low temperatures; and extensive line of petroleum testing equipment; sectional laboratory furniture; bench and floor model centrifuges; alumaloy clamps; walk-in ovens; reach-in ovens to 1000°F; incubators; incubating rooms; refrigerated baths; constant temperature cabinets; serological baths; meters; humidity indicators; and other useful apparatus for the laboratory and plant.

65. **Laminated Panels.** Haskelite Manufacturing Corp. 8 pp., ill. Includes facts about Haskelite building panels, which are available with a variety of weatherproof faces; Plymetl, a metal-faced laminated material with a plywood core; Hasko-Preg, a dimensionally stable material for construction of die models and patterns; marine panels, and quality doors.

66. **Molded-Case Breakers and Enclosures.** I-T-E Circuit Breaker Company. Bulletin 5004-1A presents construction and performance features, ratings and details of I-T-E breakers with ratings of 10 through 800 amperes and of enclosures for these breakers with NEMA 1 through NEMA 12 classifications.

67. **Motor Catalog.** Carter Motor Co. Catalog M159 shows about a dozen small motors, ranging from 1/1000 to 1/3 h.p., including Universal, DC, AC and permanent magnet types, induction, gear motors, governor and brake motors. Illustrations and dimensional diagrams, with complete specifications.

68. **Omniguard: Low-cost temperature detection.** Catalog 30360, Instrument Division, Thomas A. Edison Industries, McGraw-Edison Company. 30 pp. Describes Model 310 Monitor Unit and Model 311 Indicator, including details of operation, specifications, connections, installation, and other information; also complete information about Edison Resistance Temperature Detectors, including operation, construction, specifications, accessories, and a table on Temperature/Resistance characteristics.

69. **Precision Welding Equipment.** Vacuum Tube Products Company. 4 pp., ill. Catalog describes electronic welding equipment designed to join light-gage materials ranging from .0003 to .080 inches, which are now used in the construction of electronic components, light-weight honeycomb panels for aircraft, and similar precision products.

70. **Reusable Primary Battery.** Yardney Electric Corporation. Illustrated brochure discusses applications, electrical characteristics (energy, power discharge rates), construction, charging, fast activation, wet stand, recycling, soaking time and other technical data of the PM Silvercel battery.

71. **Sanitary-Type Vari-Speed Motodrive.** Reeves Pulley Company, Reliance Electric and Engineering Company. 8 pp. Bulletin M-588 explains how the design features of the "Sanitary-Type" Motodrive fulfill the sanitary requirements of food and allied industries, and includes condensed drive specifications, assemblies and dimensions.

72. **Sealer with High Freeze-Thaw Resistance: WAT-R-BAR.** Presstite-Keystone Engineering Products Company. Description of physical and chemical characteristics of a new material for use in areas exposed to repeated freezing and thawing, or which deteriorate with aging. Used in curtain-wall construction, sash work, and expansion joints; also in refrigeration and air-conditioning to seal parts exposed to high humidities, high-frequency freeze-thaw cycling, and complete immersion in water.

73. **Slide Rule Selection.** Keuffel & Esser Company. "Slide Rule? May I Help . . ." is a guide for the student or professional about to buy a rule. Pamphlet describes slide rule scale designs and arrangements, materials used in rule construction, and teaching aids and accessories for the slide rule. Also describes a wide variety of K&E rules.

74. **Tool & Die Fixtures.** Jergens Tool Specialty Company. 84 pp. Catalog gives specifications and data on over 2,000 standard parts, including chuck jaw blanks, handles, knobs, wheels, strap clamp assemblies, forged items, and other jig and fixture components. Gives detailed specifications and engineering drawings with tracing templates available.

75. **Tubing Chart.** No. 3. Frasse and Company. Data Chart Sec. B. Explains method for calculating the tube size required to machine to a finished dimension. It gives typical examples to follow and clearly explains differences in O.D. and I.D. chucking. It also illustrates, from a machining point of view, the dimensional variations in tubular sections.

76. **Vertical Conveying Systems:** Combing Vertical Conveyors. Lamson Corporation. 4-page bulletin (#205) describes conveyor which connects horizontal floor conveyors in multi-floor buildings into an integrated system.

77. **Bushings, Bearings, Couplings, Sleeves.** Clevite Harris Products, Inc., 12 pp., ill. Rubber and metal parts. Characteristics of chemically and mechanically bonded products are described; formulas for determining loading are furnished. Also, compounding, molding and bonding services offered by the firm.

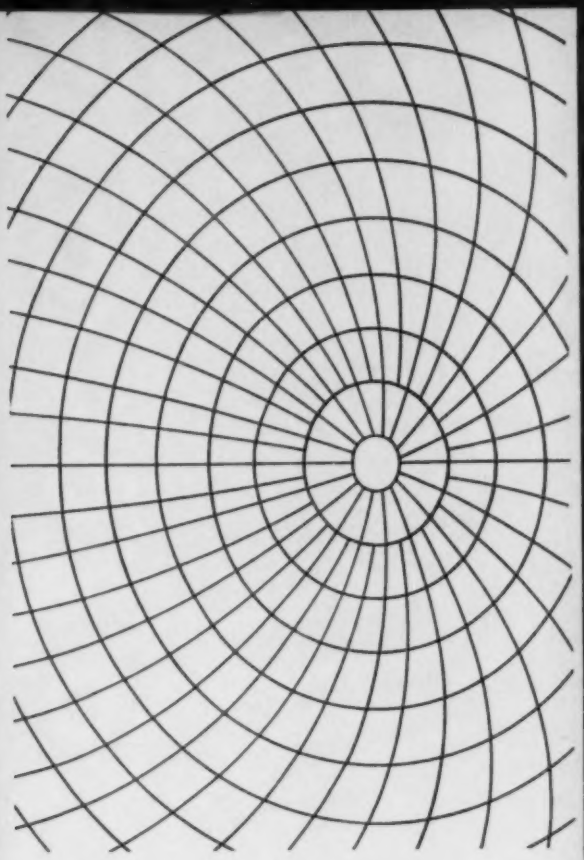
78. **Thermowell Material Guide.** Thermo Electric Co., Inc. Chart showing proper thermowell material to select for given applications and operating conditions. Recommendations take into consideration such factors as temperature, contamination, electrolysis, catalytic reaction, solution concentration, etc.

79. **Machine tool controls.** Farrand Controls, Inc., 32 pp., ill. ER-312/I describes principles and applications of the Inductosyn, an automatic machine tool control system for micro positioning. It uses inductive coupling between conductors separated by an air space to measure and control angles and distances.

80. **Variable Speed Pulleys.** T. B. Wood's Sons, Inc., 12 pp., ill. Includes technical data on five "MS" sheaves, rated at 2, 3, 5, 10, and 15 horsepower.

81. **Packaged Control Systems.** Protection Controls, Inc., 4 pp., ill. Bulletin No. 159 illustrates control panels that combine a number of supervising, indicating, sequencing and power controls for industrial processes, etc. Also gives advantages of centralized control systems.

82. **Testing Laboratory.** New York Testing Laboratories, 6 pp., ill. Describes the facilities of the laboratory, including electronic and environmental testing, materials evaluation, a metallurgy lab, radiography and non-destructive X-ray testing, and a chemical lab.



MANUFACTURERS' LITERATURE

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

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

INDUSTRIAL DESIGN

please enter my subscription

☐ 3 years for $24.00 ☐ 2 years for $18.00 ☐ 1 year for $10.00

name .....

title or position.....

firm .....

address .....

☐ Check enclosed ☐ Bill me ☐ Bill my firm

The above rates apply only to subscriptions in the U.S.A., Possessions and Canada. Add $2.00 *per year* for subscriptions addressed to countries of the Pan-American Union. Add $4.00 *per year* for subscriptions to all other countries.

INDUSTRIAL DESIGN

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51
52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68
69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85
86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102
103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119
120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136

Please send the items circled above.

name .....

title or position.....

firm .....

address .....

INDUSTRIAL DESIGN

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51
52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68
69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85
86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102
103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119
120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136

Please send the items circled above.

name .....

title or position.....

firm .....

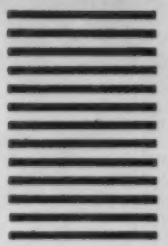
address .....

FIRST CLASS
Permit No. 38538
NEW YORK, N. Y.

BUSINESS REPLY MAIL
NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

Postage Will Be Paid by

INDUSTRIAL DESIGN
18 East 50th Street
New York 22, N. Y.



FIRST CLASS
Permit No. 38538
NEW YORK, N. Y.

BUSINESS REPLY MAIL
NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

Postage Will Be Paid by

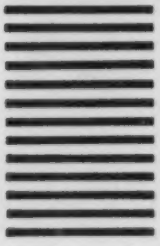
INDUSTRIAL DESIGN
18 East 50th Street
New York 22, N. Y.

FIRST CLASS
Permit No. 38538
NEW YORK, N. Y.

BUSINESS REPLY MAIL
NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

Postage Will Be Paid by

INDUSTRIAL DESIGN
18 East 50th Street
New York 22, N. Y.



address .....

THE U.S. TREASURY SALUTES THE AUTO INDUSTRY

—and its thousands of employees who help strengthen America's Peace Power by buying U.S. Savings Bonds

The huge team that plans, builds and markets the cars America drives is making another great contribution to our national security. Thousands upon thousands of auto industry employees are buying U. S. Savings Bonds, regularly, through the Payroll Savings Plan.

Regular purchase of Shares in America helps these forward-looking people set up their own reserves for home building, for education and for greater security after retirement. The Payroll Savings Plan provides a sound, automatic way to practice thrift.

If your company has not yet put in a Payroll Savings Plan, start now. It's easy! Just telephone your State Savings Bond Director for the help he is eager to give you. Or write to Savings Bond Division, U. S. Treasury Department, Washington, D. C.

Henry V. Pogorzelski, pictured at work in one of America's great automobile plants, is typical of the thousands of skilled employees in this field who are buying U.S. Savings Bonds regularly. Mr. Pogorzelski uses his company Payroll Savings Plan to make his contribution to the Peace Power of his country.

INDUSTRIAL DESIGN

THE U. S. GOVERNMENT DOES NOT PAY FOR THIS ADVERTISEMENT. THE TREASURY DEPARTMENT THANKS, FOR THEIR PATRIOTISM, THE ADVERTISING COUNCIL AND THE DONOR ABOVE.

Classified Advertisements

15¢ A WORD PER INSERTION, $5.00 MINIMUM PAYABLE IN ADVANCE. BOX ADDRESS COUNTS FIVE WORDS.

Positions Wanted

CREATIVE INDUSTRIAL DESIGNER *responsible for many nationally known, high sales value products, twenty years experience knowledge of engineering, production and mechanics, fifty design and mechanism patents. Box ID-219,* INDUSTRIAL DESIGN, *18 East 50th Street, New York 22, New York.*

INDUSTRIAL DESIGNER. *Inventive, practical "idea man." Excellent record of successful accomplishments in designing and developing mass produced, nationally known, consumer products. Diversified background in engineering, production, marketing, sales and advertising. Desires to relocate with progressive manufacturer. Chicago vicinity. Box ID-222,* INDUSTRIAL DESIGN, *18 East 50th Street, New York 22, New York.*

DRAFTSMAN—*imaginative young evening design student (New York City area), seeks position with design office or manufacturer. Plant experience with manufacturer of consumer products. Art and engineering background. Industrious veteran. Box ID-223,* INDUSTRIAL DESIGN, *18 East 50th Street, New York 22, New York.*

Help Wanted

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

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.*

DESIGNER: *Industrial exhibits and display, experience in trade show and display design preferred. Must be capable of problem evaluation, preparation of preliminary roughs and presentations. Gardner, Robinson, Stierheim & Weis, Inc., 5875 Centre Ave., Pittsburgh 6, Pa. Phone: EMerson 2-1400.*

DESIGN AND DEVELOPMENT RESEARCH AND MARKETING. MAJOR HOUSEWARES: MANUFACTURER *has exceptional opportunity for qualified individual with design and styling background to assume full responsibility for coordinating development work on new products. Must be capable of aggressive follow-through including feasibility studies and marketing. Attractive compensation plan. Consulting engineering experience helpful. Our staff knows of this opening. All replies strictly confidential. Please give full information about yourself, including education, present earnings, specific accomplishments, etc. Write Box ID-215,* INDUSTRIAL DESIGN, *18 East 50th Street, New York 22, New York.*

WANTED MODERN FURNITURE DESIGNER TO HEAD FURNITURE DESIGN DIVISION OF LEADING INDUSTRIAL DESIGN ORGANIZATION. *Minimum 5, preferably 10 years experience in design, detailing, construction (Including supervision or case goods and seating in both wood and metal.) Must be able to meet with clients and supervise accounts. Salary and participation plan will be made attractive to an outstanding designer. Location, New York City. Send complete information including salary requirements to Box ID-218,* INDUSTRIAL DESIGN, *18 East 50th Street, New York 22, New York.*

PACKAGE DESIGN ENGINEER. *Exciting opportunity for creative engineer with broad technological background in functional package and packaging machinery design. You will serve as consultant in all packaging areas of Eastern ethical pharmaceutical manufacturer. Salary open. Write full personal particulars in complete confidence to Box ID-220,* INDUSTRIAL DESIGN, *18 East 50th Street, New York 22, N. Y. Interviews will be arranged in Chicago during National Packaging Show.*

INDUSTRIAL DESIGNER—*major manufacturer of electro-mechanical consumer products has a career opportunity for a creative industrial designer able to participate in and contribute to top management new product conception conferences. Further, he must coordinate activities of independent design firms in the esthetic development of product and packaging. Background should include a minimum of 4 years of varied product design at a responsible level in an industrial design organization. Degree in Industrial Design desirable. This is a management position requiring artistic, creative and administrative skills. It offers excellent salary and benefits as well as progress to the right man. Send resume to Box ID-221,* INDUSTRIAL DESIGN, *18 E. 50 St., N.Y. 22, N.Y.*

Index to Advertisers

Alliance, Incorporated (Alliancewall) ..... **Inside Front Cover**
Agency—Waldie and Briggs, Inc.

Aluminum Company of America (Corporate Division) ..... **Back Cover**
Agency—Ketchum, MacLeod & Grove, Inc.

Aluminum Company of America (Industrial Design) . 23, 24
Agency—Fuller & Smith & Ross, Inc.

Apex Coated Fabrics Co., Inc. 98
Agency—Robert Marks & Co., Inc.

Celanese Corp. of America 9
Agency—Ellington & Co., Inc.

Clapp & Poliak, Inc 26, 27
Agency—James R. Flanagan Advertising Agency

Columbus Coated Fabrics Corp. 10, 11
Agency—Mumm, Mullay & Nichols, Inc.

Corning Glass Works 25
Agency—Charles L. Rumrill & Co., Inc.

A. W. Faber-Castell Pencil Co. 13
Agency—J. M. Kesslinger & Assoc.

General American Transportation Corp. 19
Agency—Edward H. Weiss & Co.

Harrington & King Perforating Co., Inc. 15
Agency—Marvin E. Tench Advertising Agency

Koppers Company, Inc. (Chemical Division) 16, 17
Agency—Batten, Barton, Durstine & Osborn, Inc.

Lancaster Glass Corp. 7
Agency—Howard Swink Advertising Agency, Inc.

McLouth Steel Corporation 21
Agency—Denman & Baker, Inc.

Meyercord Co., The (Nameplate Division) 98
Agency—John D. Morgan, Inc.

United States Rubber Co. (Footwear Div.—Royalite) .. 28
Agency—Fletcher D. Richards, Inc.

Wah Chang Corporation 99
Agency—Kelly, Nason, Inc.

For Your Calendar

Through March 31. European glass design. Commercial Museum, Philadelphia.

Through April 19. "Architecture and Imagery—Four New Buildings." Exhibit of models and photographs at the Museum of Modern Art, New York.

March 23. Annual conference of the Institute of Contemporary Arts. "Integrated Design for Corporate Identification." At the Center for Design Studies, Boston.

March 23-26. Institute of Radio Engineers' national convention and radio engineering show. New York Coliseum.

March 26. Fourth packaging and materials handling conference, sponsored by the Society of Packaging and Handling Engineers and the American Materials Handling Society. Stanford University, Palo Alto, California.

March 30-April 1. Advertising Essentials and National Sales Aids Show. Biltmore Hotel, New York.

March 31-April 1. 28th annual meeting of the Inter-Society Color Council. Statler-Hilton Hotel, New York.

April 1-2. "Symbology — the Use of Symbols in Visual Communication." Fourth annual visual communications conference of the Art Directors Club of New York. Waldorf-Astoria, New York.

April 4-12. International Automobile Show, New York Coliseum.

April 5-26. Smithsonian Institution, traveling exhibits. "Twelve Scandinavian Designers." Fort Wayne, Indiana. "Fulbright Designers." Pittsburgh, Pennsylvania. "Designed in Holland." Jacksonville, Illinois.

April 6-8. Building Research Institute's eighth annual meeting. Penn-Sheraton Hotel, Pittsburgh.

April 6-10. Atom Fair and Nuclear Congress, sponsored by Atomic Industrial Forum, Inc. Public Auditorium, Cleveland, Ohio.

April 13-17. American Management Association's national packaging exposition and conference. International Amphitheater and Palmer House, Chicago.

April 18-22. American Society of Tool Engineers' annual meeting. Hotel Schroeder, Milwaukee.

April 26-30. American Institute of Decorators' national conference. Plaza Hotel, New York.

April 29-30. Symposium on packaging and transportation of chemical products, sponsored by the Manufacturing Chemists' Association's packaging committee. Engineering and Scientific Center, Cleveland, Ohio.

May 3-June 14. "20th Century Design, U.S.A." Exhibition at the Albright Art Gallery, Buffalo, N. Y.

May 8-19. Third Annual U. S. World Trade Fair. New York Coliseum.

May 11-13. Joint Automation Conference, sponsored by the American Society of Mechanical Engineers, the American Institute of Electrical Engineers, and the Institute of Radio Engineers. Pike Congress Hotel, Chicago.

May 18-19. "Appliance Technical Conference" of the AIEE domestic appliances committee. Cleveland, Ohio.

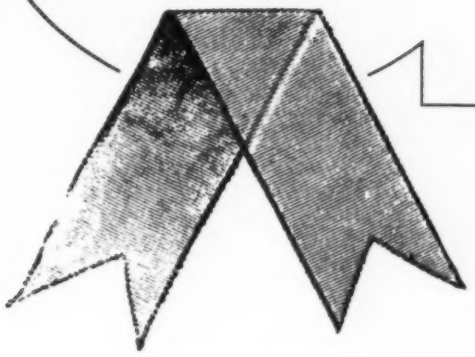
May 20-21. Building Research Institute conference on building illumination. Statler-Hilton Hotel, Cleveland.

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

the Industrial Designers' Institute announces

idi

the 9th annual design award program



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 4, 1959. 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 4, 1959.

presentation Announcement of the designers to be honored and presentation of the award medals will be made at a luncheon on June 18, 1959, at the Hotel Ambassador, Chicago.

Request Forms From Carl G. Bjorncrantz, Chairman, 2212 Pioneer Road, Evanston, Illinois.

FORECAST *There's a world of aluminum in the wonderful world of tomorrow* . . . where rugs of aluminum yarn, strong and whisper soft . . . will warm your feet . . . and bring to your floors, year after year, the fabulous colors of sunlight falling through a window of stained glass.

ALUMINUM COMPANY OF AMERICA • Pittsburgh

ALCOA ALUMINUM

Rug designed in aluminum yarns for the Alcoa collection by Marianne Strengell. Photographed by Leslie Gill.