INDUSTRIAL DESIGN

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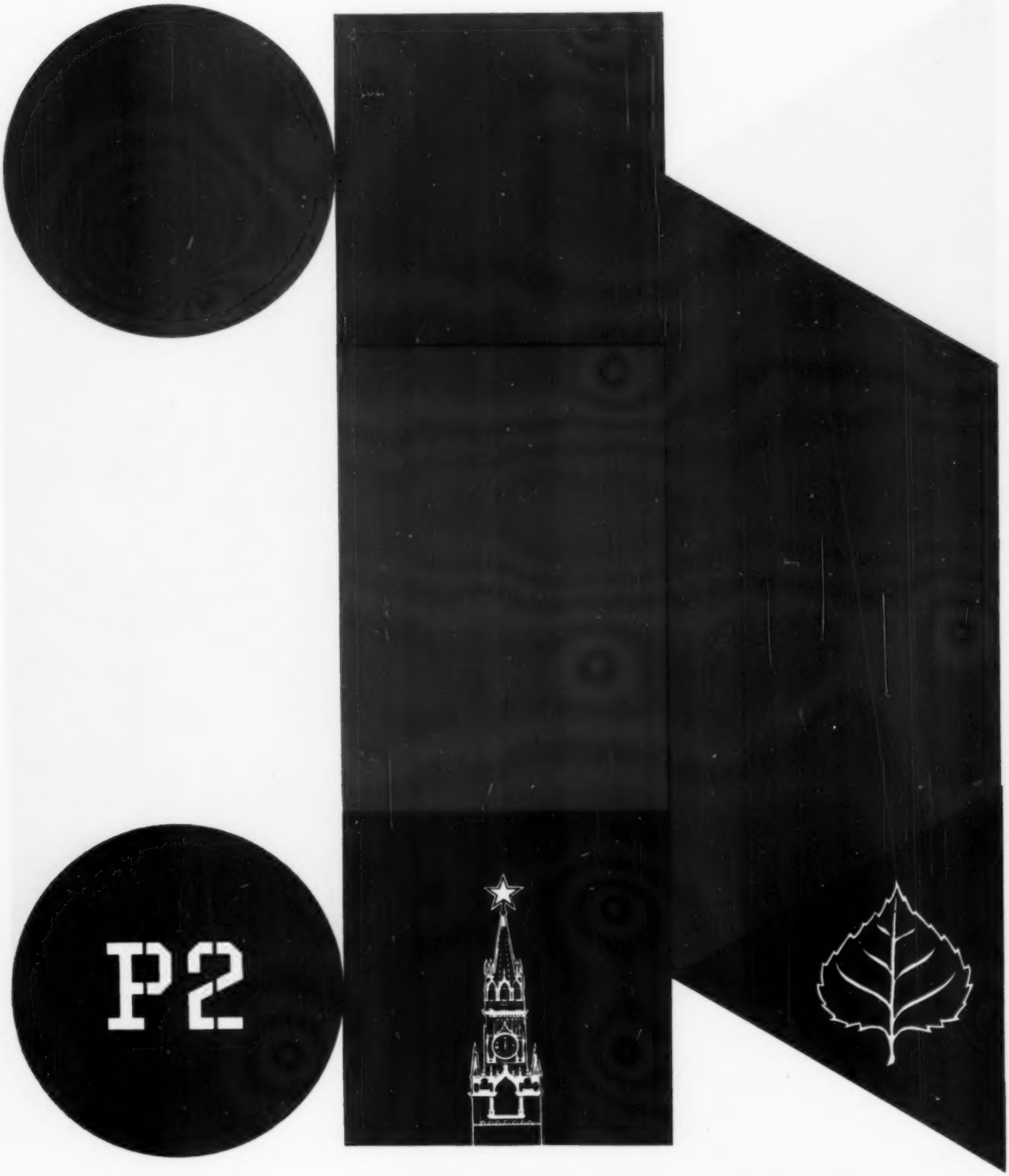

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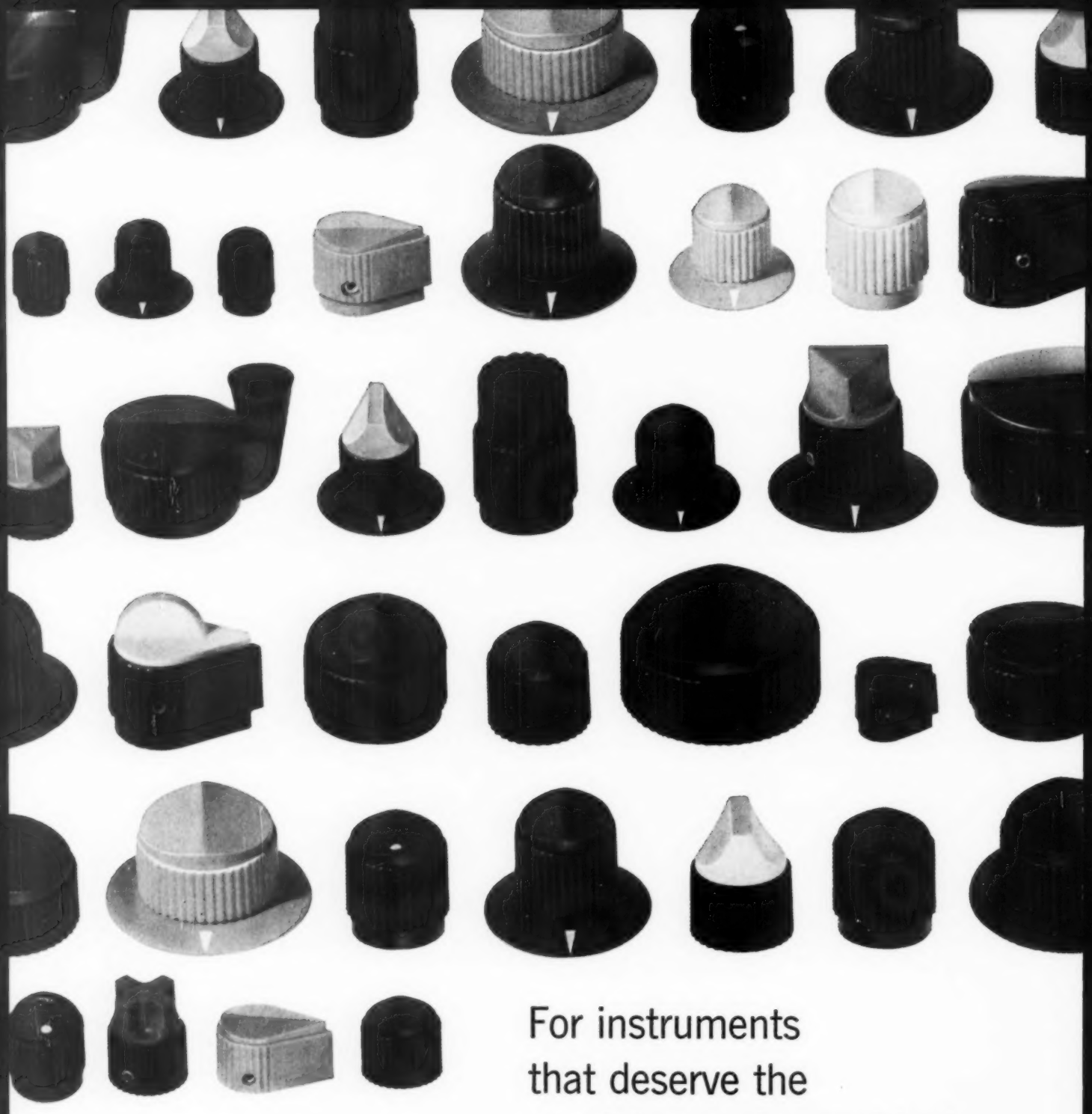

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AUGUST, 1959 VOLUME 6 NUMBER 8

INDUSTRIAL DESIGN

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

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Coming

IN SEPTEMBER — Controls, American exhibition in Moscow, and the first in a series of profiles of major figures in design.

IN OCTOBER — Design as a career.

COVER: James Ward has combined three basic design shapes with the three primary colors to serve as a background for three features in this issue: a review of the Russian Exhibition in New York, Report from Aspen, and the second installment on plastics.

FRONTISPIECE: In an unusual photographic experiment, photographer Ruth Velissaratos softens the emulsion on sheet film as subject matter for photogram printing.

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in this issue...

Abend

Miller

Judith Ransom Miller has degrees in English and art from the University of California's Berkeley and Los Angeles branches respectively. She has been "arts coordinator" at East Los Angeles Junior College, and now teaches part-time at U.C.L.A. Once when asked "What do you do?" Mrs. Miller replied: "I talk." The remark was received as a joke, but Mrs. Miller explains: "It was particularly funny because it is true—I *do* talk. Now I am trying to set down on paper many years of talking, in the hope of publication." At Aspen this year others talked while Mrs. Miller listened. What she heard them say can be read on pages 74-83.

Chester Joshua Abend whose unusual approach to the problem of educating consumer taste is described on pages 84-89, came to this country from Austria when he was four. After graduating from high school in New York, he worked for Norman Bel Geddes, then studied architecture at Cooper Union and industrial design at Stanford. He saw service at GM before opening his own office in New York in 1954. Next year he will initiate a design program for a company engaged in human engineering research.

Hansen

Ursula Townley Hansen, a name that has grown (through marriage) on our masthead, is about to disappear. Mrs. Hansen, whose pleasantly formidable British accent was likely to greet you if you phoned our offices this year, is winding up a tour of duty as ID's editorial assistant, in which capacity she has been typing correspondence, ordering coffee, losing manuscripts, and thinking. When some of her thinking appeared in an inter-office memo one day, the highly personal article on "Taking America Straight" (page 66) was born. Mrs. Hansen and her husband, an American Air Force officer, prowled the Orange County, N.Y. and San Joaquin Valley, California countrysides taking pictures and bickering about water towers, barns, tailfins, and the American character. Although she insists that all she knows about design comes from reading ID and talking to her landlady, Mrs. Hansen has studied architecture at the London Polytechnic (to which she is returning on a scholarship next month) and worked for two years at London's Victoria and Albert Museum (where she broke a jade plaque worth $270.00). During her stay in the United States she looked at whatever could be seen, liked a lot of it, and gives her reasons in what we think is one of the freshest descriptions of Americans since Mrs. Trollope took her innocence abroad in 1832.

To the Executive concerned with
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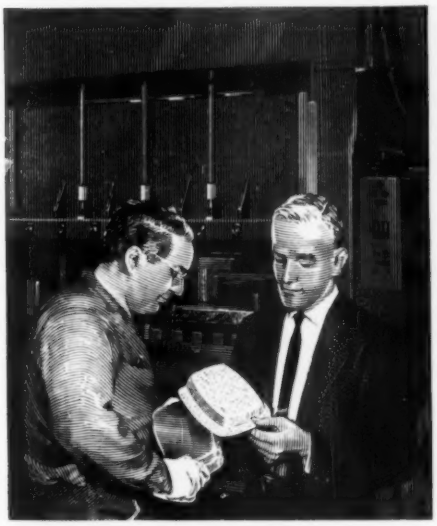

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1-A

LETTERS

Plaudits for Plastics

Sirs:
We have just seen the July issue of *Industrial Design*, and would like to add our plaudits to the many you must be receiving for your series on "Plastics for the Designer". Judging by Part I, this looks like very impressive coverage, and we feel that the articles will be very valuable as reference.
Stanley Ferber
Maclean Associates.
New York.

The Sad Sack

Sirs:
As an ardent reader of your publication, may I offer some ideas on human engineering that are based on years of commuting by bus from Outer Suburbia. A long period of acute agony has led me to the *sack theory of bodily deconfinement.*

The need of the human frame for space is not confined to its mere outer dimensions. It has certain requirements which, if projected, would make the outer periphery of a model look more like an overstuffed sack with bulges than a well-filled epidermis. The human being is given to rotation, translation, oscillation, restlessness, bad posture, slumping, leaning, and other extra-dimensional behaviour. Moreover, this poorly-designed object is full of negative responses, such as backache, cricks in the neck, weariness. In the past, bus seats have been designed using seated dummies, stuffed with sawdust and strapped to eliminate erratic motion. The resulting designs are highly efficient, with minimum wasted space, and a high payload-to-volume ratio. But with the new sack model, another dimension may be added—the comfort dimension.

For example, present bus seats are designed variously with hard plastic backs, or metal backs, or corrugated backs. Should they not rather be padded, in view of the well known tendency of the human being to sag, thus bringing a pair of bony knees up against the back of the chair in front? And the seated human being, unlike the dummy, has a tendency to come apart at the knees: when the side of the leg impinges forcibly against a decorative bead, this hurts. Again, a footrest is often placed under the seat ahead, but the underside of that seat is often jagged, and comes against the shinbone, a sensitive structure. When there is a provision for the back of the seat to angle backward, the human model is found lying in the lap of the passenger behind him, impinging on the latter's "sack space". Finally, armrests are normally designed so that the sawdust dummy will not be flung into the aisle during a turn: the sack theory presupposes that the human passenger will actually want to lean out of the dummy position, in order to use the armrest.

I suggest that extensive fields are open for advanced designs wherever humans accumulate, such as in subways, stadiums, theatres, etc. Further investigation of "sack" specifications may inspire engineering which is not only human but humane.
Andrew Certner
Ellington & Company
New York

Alice scorned and praised

Sirs:
Your interpretation of children's reactions to Jose de Creeft's "Alice in Wonderland" play sculptures in Central Park (July ID) is rather negated by the photographs and the accompanying children's comments.

These comments do not necessarily endorse the realism of the sculptures; rather, they punctuate the fact that realism and detail can give the child a handhold to reach the top, and a ledge from which to look down upon foolish adults who spend fabulous sums for hot-in-the-summer bronze versions of simple climbing pieces. The need to climb can be even more attractively satisfied by an abstract fantasy wall in concrete, at a fraction of the price of the de Creeft realistic sculptures. It is not the Jonah and the Whale, the Old Lady in the Shoe, nor Alice in Wonderland as such, in the fairyland parks of today that attract children. Rather, it is the adventuresome darkness of the cave of Jonah's mouth, the helical slide in the Old Lady's shoe, and the incidental stepping stones to the top of the de Creeft's sculptures that endear them to children. The fact that children play on statues of Shakespeare in Chicago, or on Kossuth's statue on Riverside Drive, or in an ash or rubble heap in a dump, does not prove the thesis that realism has more play value.

Many conservative park commissioners who have experimented with the realism of discarded Navy planes, Mickey Mouses, dragons, fairyland characters, etc., have seen children's active interest in them wane so much that they have begun to replace them with our type of abstract functional play sculptures. Ask the pioneers in the field—like the park commissioners of Oakland, Colorado Springs, St. Louis and Philadelphia—who have experimented with both, as to which has the greatest staying and playing power; which harmonizes best with the nature setting; which costs least in the long run?

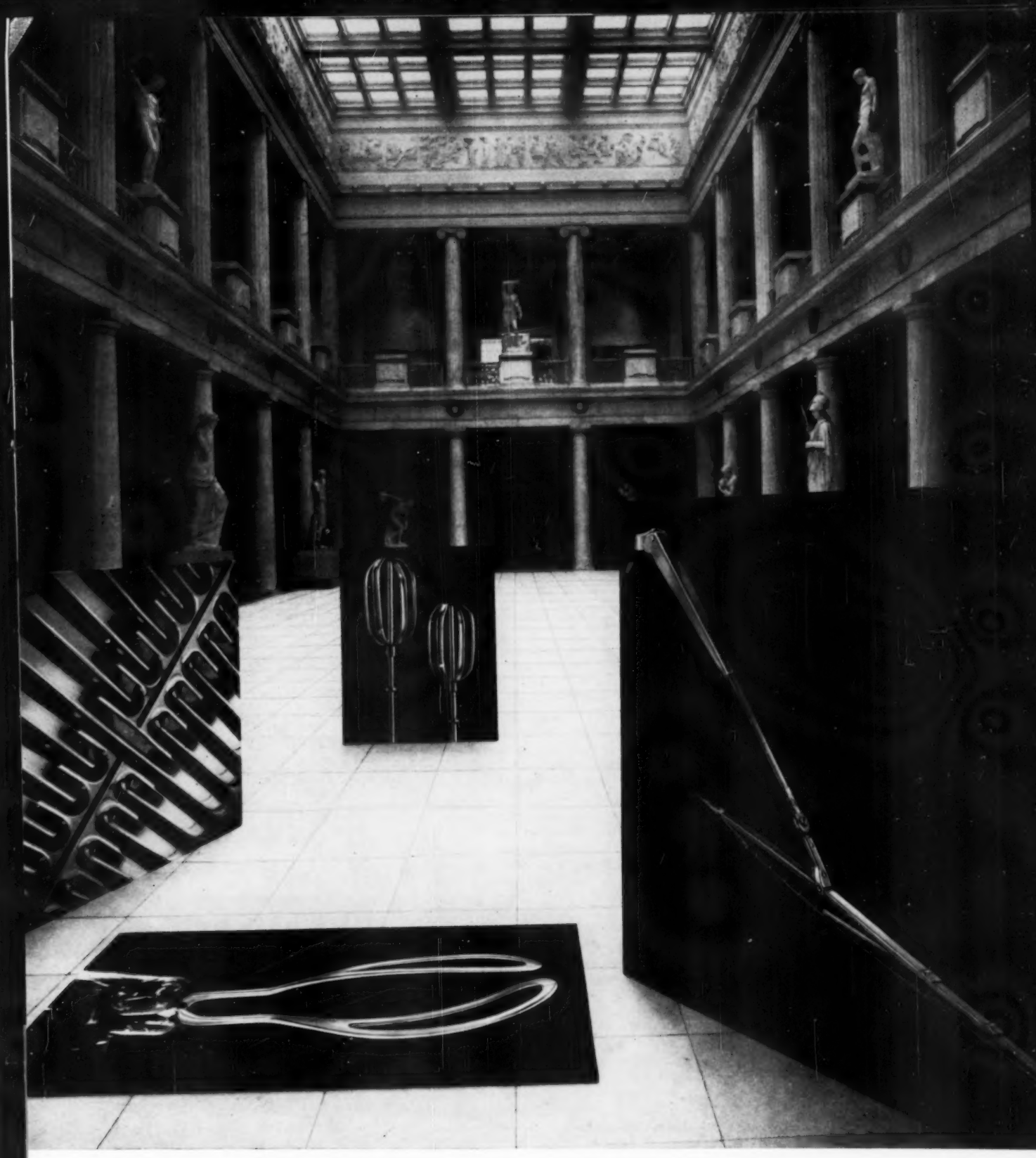
Let the Finch College students go back to Alice after her novelty has worn off, say in a few months, and observe again the use to which the same children put her. They will be more likely to find the youngsters climbing on nature's abstractions in the park: the rocks, caves, trees, hills.

Please do not be a party to New York Parks Commissioner Moses' condemnation of abstract play sculpture because it is not "his" type of sculpture. Remember that the world of tomorrow for today's children will be full of the type of abstract design about which you preach in your pages. Henry Moore's "Reclining Figure" (page 70 of the same issue) and Max Bill's "Rhythm in Space" have the quality of design that play sculptures require for the greatest amount of dramatic play value.
Frank Caplan, President
Play Sculptures, Inc.
New York.

Sirs:
"Statue for Playing on up in Central Park" is a breath of fresh air. There is always that paradoxical duality that enables a child, while playing house with a packing crate, to stop and with a degree of impatience answer an adult question, "Of course, it's only a box." Perhaps the faceless doll thwarts that buoyant versatility. The imagination must have the stuff to change, or it feeds vacuously on itself.
Christopher S. Carver
Industrial Design
General Electric Company
Bridgeport, Conn.

Erratum

On page 87 of the July issue the design of the container for Avon Product's Vita-Moist cream was credited to Donald Deskey Associates. Credit for the entire package should have been given to Max Rogers, Avon's director of package design.



Strange setting for Stainless Steel? True, it might startle a gallery-goer. But our madness has method. By displaying Stainless Steel amidst ancient art, we draw your attention to this fact: beauty never changes—materials do. Today, when form and line are as vital to industrial products as they were to the arts of antiquity, one material stands out for the designer's consideration —Stainless Steel. Easily fabricated, Stainless answers the demands of classic design. It can be sculptured to taste. Stainless Steel's superior strength qualifies it for *permanent* beauty more than any other decorative metal . . . and strength eliminates the need to overdesign for durability. Its luster is as deep as the steel is thick—it won't peel, chip or fade. It resists corrosion. It resists scratching because it is harder than other materials. And when it comes right down to the store counter in our commercial world, there is no more effective selling phrase for a metal product than "Made of Stainless Steel."

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CLIPS AND QUOTES

N. S. Khrushchev *in a speech at Katowice, Poland, July 16, 1959.*

"Communism means plenty of foodstuffs and consumer commodities. But communism is not only that. Communism is the most progressive and most highly organized society this planet has ever known. It is a society with the highest level of production and no tiresome manual labor. Under communism, work processes will be fully mechanized. Human labor will consist in the ability to run machinery. It is this that is implied in the elimination of the differences between mental and manual labor under communism. Machines will be created and run by people having the same high standard of technical knowledge and mental development. Under communism, man will be able to fully display his great creative ability. He will indeed be Man with a capital "m" (sic), as Gorky said."

FORTUNE

Gilbert Burck, *"How American Taste Is Changing,"* **Fortune,** *July 1959.*

"Although the American urge for self-expression and self-betterment is as strong as ever, its manifestation in the form of status seeking actually may be declining. Sociologist Nelson Foote suggests that even occupational and educational differences in the future will carry less and less weight, and people will bother less with proclaiming status. Foote reasons that rising discretionary income will force people to differentiate as well as emulate. Ordinary Americans who suddenly find themselves with more money to spend will become more discriminating about the way they spend it. They will tend to expand their individuality, says Foote and will begin to regard life as a 'pursuit of meaning.' The theory seems fortified by group income trends: the disposable incomes of the lower income groups is rising faster than that of upper income groups, and the lower income groups may be confronted with so many more opportunities for emulating the upper groups that emulation itself will become pointless. To put it another way, people will achieve status by being different—or by being themselves."

Jack Lenor Larsen *in a speech to the Artist-Craftsmen of New York.*

"Industry does need the craftsman's approach, his ability to abstract, his sympathy to materials and techniques. A few of these technically or business-trained people have a similar ability, but most of them do not have what the craftsman has in being able to look at something, to feel it, have a creative, sympathetic approach to it—being able to see what it can do, how far it can go, what might happen to it. I think that the industrial designer, as he exists so far, is not so fine. His approach is not so intrinsic as the architect's or craftsman's — more one of packaging, beautifying, making saleable. The real need is for the craftsman's approach."

Herald Tribune

John Crosby, *New York Herald Tribune.*

"The latest form of capitalist slavery, according to the announcer on the Dinah Shore show who sells Chevrolets, is 'one car captivity' — a lovely phrase. You're chained to the land like serfs in the middle ages, you peasants who own only one car. That's the latest brand mark of the underprivileged — one car. Lord, I remember way back when Will Rogers was making Depression jokes about riding to the poorhouse in an automobile. The next Depression we'll be riding to it in two automobiles—one for the teenagers in the family. What scares me about that Chevrolet battlecry—two cars in every garage —is that it sounds so much like two chickens in every pot, which has a depression smell to it."

DU PONT

Henry B. du Pont, *of E. I. du Pont de Nemours and Company at the 1959 Edward G. Budd Lecture.*

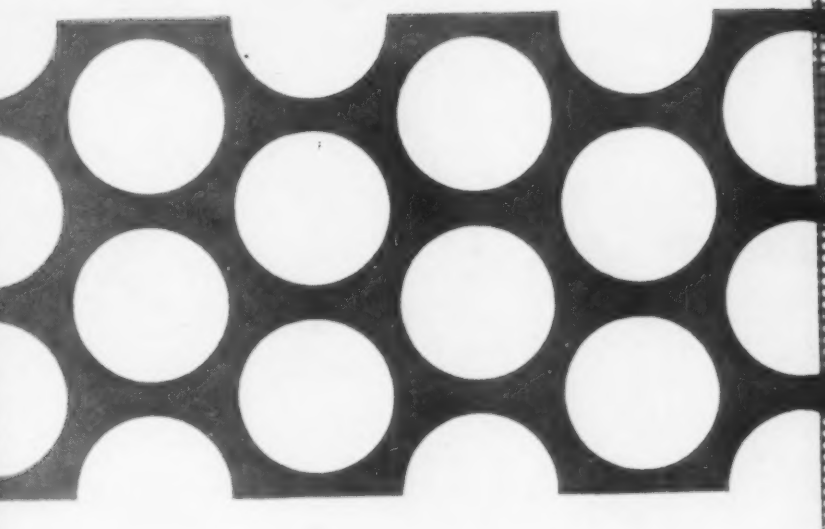
"I think that in any list of inventions, we should include one which, strictly speaking, is not an invention at all, but a legal fiction. Yet it seems to me to equal in importance any specific invention in history. This is the development of the modern corporation. The industrial corporation is a creature of technology just as certainly as the flying machine or the cotton gin, and it has proved the most effective device for extending technology which man has ever known. When the history of our era is written, the birth and development of the modern corporation must be recorded as a vital factor in our technological progress. Indeed, the corporation may well prove the greatest invention of them all."

THE NATION

Leslie Katz, *"Obituary for a Building,"* **The Nation,** *July 18, 1959.*

"We live, it would seem, in a time of rapacious and calloused introversion. In fashionable art, as in hard commerce, self-concern is dominant, egotism sacrosanct. The concepts that began as a revolution of functionalism have become puritanical romanticism, like the fin fenders on autos, the photo-electric cell cameras to take snapshots, miraculous television, a medium dedicated to the sale of toilet tissue. The terms in which we define irreducible necessity become the terms of our ideals. The 'lonely crowd' is actually a complacent mob. The spirit of liberation from old restraints, the enlightened freedom of the modern, has become in its stylish aspects, the freedom to be trivial, to be inane or nasty, to grab at betterment, exploit your neighbor, and live by rote, in the name of self-expression and the latest thing."

H&K



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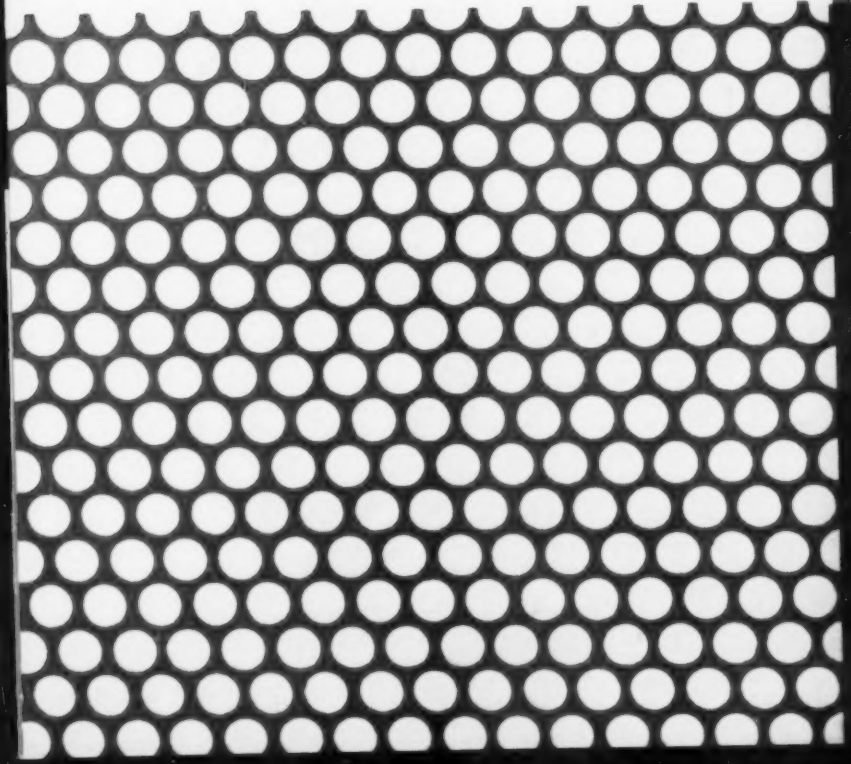

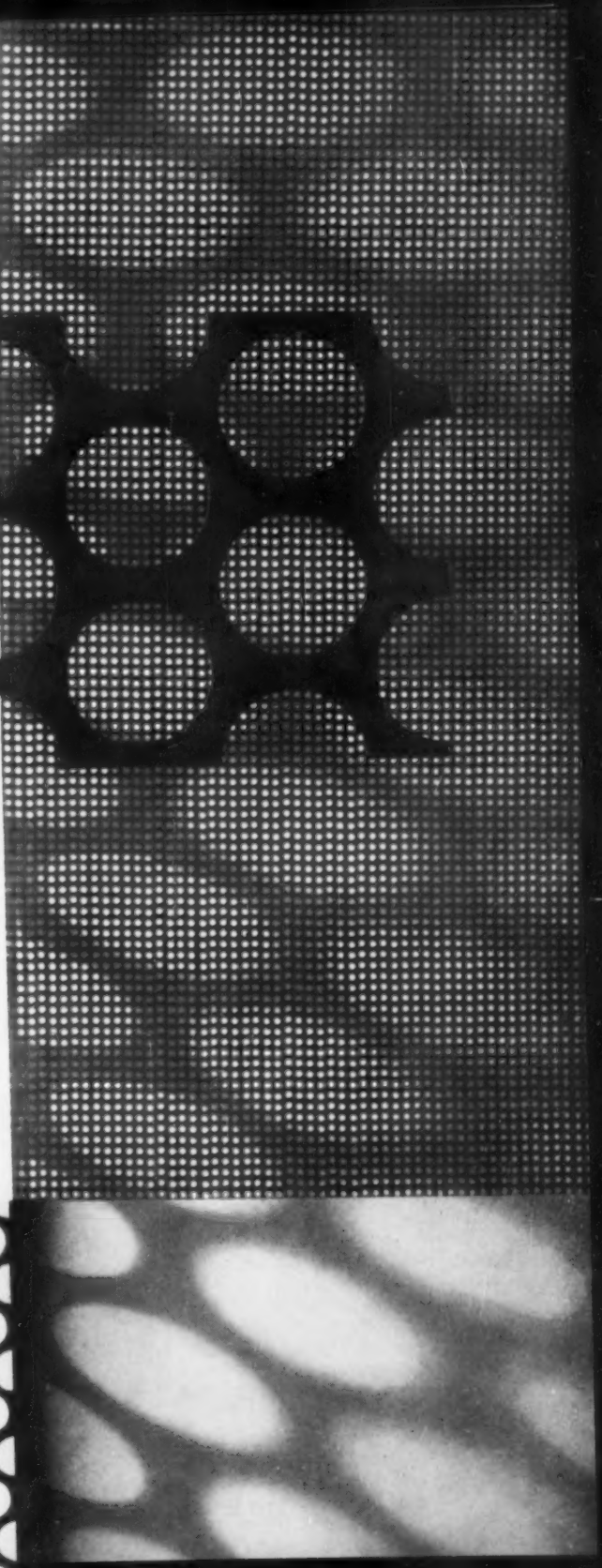

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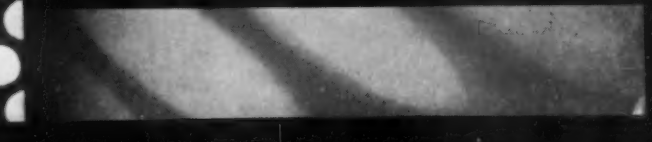
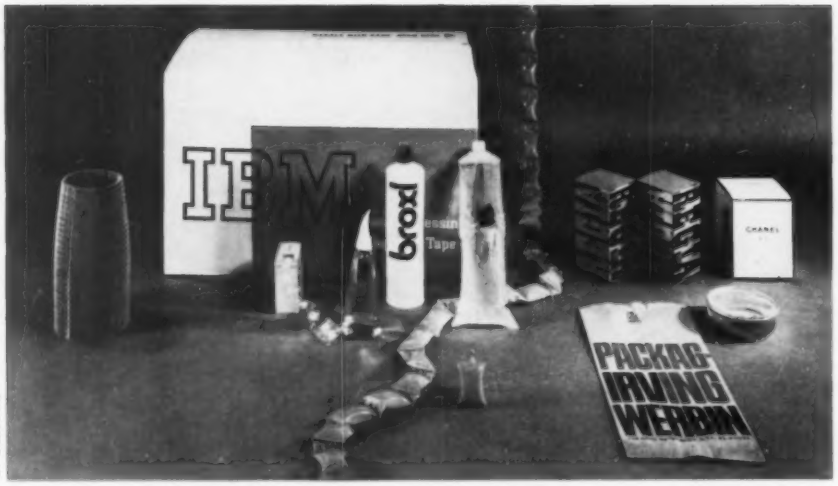


NEWS



G. Barrows

Sampling of packaging types to be seen at the museum's show run from the cardboard sleeve, left, to the new plastic pillows, center, to the classic paper bag, right.

MMA holds 1st packaging show

Because packaging "has become a major design and manufacturing activity in America," New York's Museum of Modern Art will hold its first exhibition devoted solely to packaging from September 9 to November 9. "The variety of products manufactured today and the methods by which they are distributed have presented many new problems to package designers. In recognition of these problems, the exhibition is intended to re-examine and broaden the concept of the package," explains Mildred Constantine, Associate Curator, who, with Arthur Drexler, Director of the museum's Department of Architecture and Design, will assemble and design the show.

Not simply graphic design, but the actual structure of the package will be stressed. There will be examples (such as those above) of folding cardboard cartons; collapsible tubes; spun foam cocoons; metal, plastic and glass boxes; and cloth and paper bags. Experimental and industrial packaging as well as packages from the retail store shelf will be included. All told there will be more than 200 packages from ten countries.

Container Corporation of America, Reynolds Metals Company, and the National Distiller and Chemical Corporation will co-sponsor the exhibition. An illustrated catalog will accompany the show.

IDI plans national meeting

Conference Chairman Henry P. Glass has announced a partial schedule of events for IDI's national meeting, which this year will be held October 23-26 in Chicago.

To coincide with the opening of the Fall Furniture Market, the IDI members' exhibit will open in the main lobby of the American Furniture Mart on October 18, the Sunday before the national meeting. On October 23 a private cocktail meeting for founding members of IDI will be held at the American Furniture Mart. Registration for all members will open on noon of that day at the Lake Towers Motel, Ohio and Lake Shore Drive, with dinner at 7:30 that evening.

Saturday's program will include tours of the Chicago Lighting Institute, the Electronics Center at Great Lakes, and Paul MacAlister's Americana Hayloft. Henry Glass will be host for lunch at his home, and in the evening there will be a dinner, followed by a dance, at the Great Lakes Officers' Club.

The Sunday program will begin with an inspection and discussion of Chicago's central area urban renewal plan. Ira Bach, Chicago's city planning commissioner, will be the luncheon speaker. In the afternoon there will be tours of several industrial design studios in the neighborhood of the conference headquarters.

At the Monday morning session three students representing the Illinois Institute of Technology, the Art Institute, and the University of Illinois will discuss their expectations in design and compare notes with practicing designers. The afternoon program will include a tour of the Art Institute. A reception for speakers in the evening will be followed by dinner at the Lake Towers Motel and presentation of new national officers.

James L. Hvale will be in charge of registration and Howard H. Sersen will be chairman of the committee on the members' exhibit. C. E. Waltman and Paul R. MacAlister will act as general advisors for the conference. Further details on conference program and speakers will be announced later.

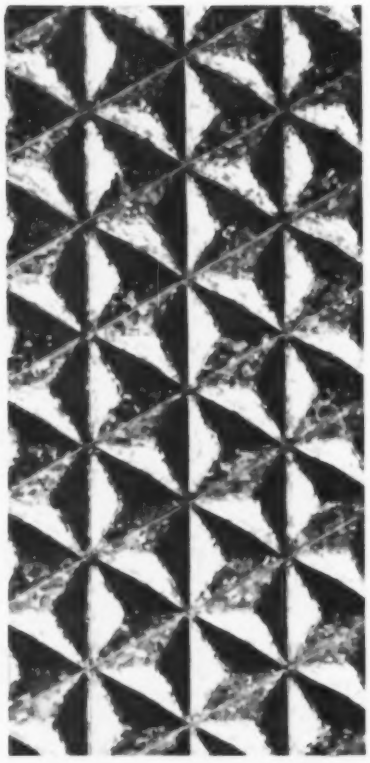
Government may support Triennale

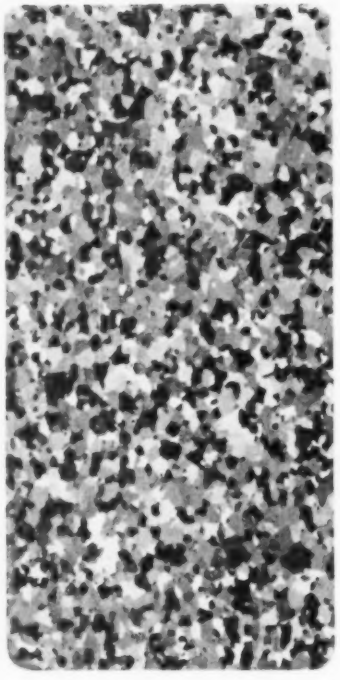
If present unofficial hopes are realized, America can expect to be represented at the 12th Triennale in Milan next summer by a $100,000 United States government-sponsored exhibit. For the last Triennale, largely through the efforts of Walter Dorwin Teague, the government agreed for the first time to give official support to an American exhibit. This support consisted of a $25,000 appropriation from the U.S.I.A. and another appropriation for the same amount from the Department of Commerce. With the great interest aroused in the previous U.S. exhibit, it is hoped that the government will double its support this time.

The theme for the coming Triennale will be based on the school and the home, and there will be efforts to include such societies as the AID and the AIA in plans for the U. S. part in the exhibition.

Symbol for 12th Triennale


ALUMINUM
IS
ALCOA
TEXTURE
IS
ALUMINUM





NEW ALCOA SPANGLE SHEET HAS THE TEXTURE BUILT IN, METALLURGICALLY!

S. L. Fahnestock, Alcoa's Chief Designer

You—You mean, Sam, that the texture is not applied to spangle sheet . . . that it's **in the metal?**

Fahnestock—Precisely. Spangle sheet is aluminum with special **oversized** grains. Then we etch it to make each grain stand out (as in the actual size photo above right).

You—I see. Each grain reflects the light differently . . .

Fahnestock—Yes . . . that's because the mirror-like facet of each grain is on a different plane. Thus with the different angles of reflection the surface sparkles and shimmers with highlights as the viewer's eyes move over it.

You—How about colors?

Fahnestock—Well we can anodize it any color you want, or you can have it in natural aluminum color, just like regular anodized sheet.

You—Could I have part of the surface in spangle sheet, part in plain aluminum?

Fahnestock—Indeed. By a simple stop-off in the etching. You can also have a multicolor effect by stop-off in the anodizing, as with regular sheet.

You—How about forming spangle sheet?

Fahnestock—Good point. You can stamp it . . . in effect put texture on texture! That is, apply a mechanical texture over the built-in metallurgical texture (as in photo above left).

You—Well let's see, where can I use spangle sheet?

Fahnestock—The possibilities are limitless. For all kinds of products like radios, automobile and appliance trim, hardware, decorative screens and panels, furnishings and so forth.

You—You've got my imagination working overtime. Where do I get specific information when I need it?

Fahnestock—Just call your Alcoa sales office or write me at Aluminum Company of America, 1971-G Alcoa Building, Pittsburgh 19, Pennsylvania.

ALCOA IS ALUMINUM

Trademark for traveling science displays

Designs for the science class

An unusual combination of design and education forces have united in a new organization called Science and Technology, Inc. which, through the financial support of industry, will develop a series of graphic displays describing scientific principles to school audiences. The interchangeable exhibits will be rotated without cost to schools and colleges on planned national circuits.

Concepts from such difficult fields as Boolean algebra, masers, fluid mechanics and probability will be tackled. By using the most advanced graphic and design ideas, the planners hope to make complex ideas from these fields quickly and clearly understandable.

The company will be headed by exhibit designer Winni Thrupp. Herbert Rosenthal, who designed the firm's trademark (above), will act as art director and Lee Drechsler will be in charge of design coordination. The panels will be reviewed for accuracy by science experts, and will also be passed upon by a group of design experts. The first exhibits will be sent on a ten-school circuit this fall in specially equipped trucks manned by a driver and exhibit technician.

Cost of the program to the firms who support it will vary according to the number of panels ordered. Minimum charge for one exhibit panel going to ten schools for two weeks each will be $5,000. Companies may invest in more than one panel at a somewhat lower rate.

Whitney adds book division

Charles E. Whitney, president of Whitney Publications, Inc. and publisher of INDUSTRIAL DESIGN magazine, has announced the formation of a division to expand the publication of the Whitney Library of Design Books.

William Wilson Atkin has been appointed vice president in charge of the new division and will act as editor-sales manager. Mr. Atkin previously edited architectural and design books for Reinhold Publishing Corporation where he was also consultant editor for *Progressive Architecture*. The division will continue to publish books in the fields covered by the company's other magazine, *Interiors*, but will branch into other fields, particularly those covered by INDUSTRIAL DESIGN.

Teague to design Dutch show

The two-acre U.S. exhibit at the 1960 Rotterdam Floriade, an international horticultural exposition to commemorate the 400th anniversary of the introduction of the tulip into Western Europe, will be designed by Walter Dorwin Teague Associates. This year marks a quarter century of exhibit design for the company, whose first major work of this kind was done in 1933 at the Century of Progress Exposition in Chicago.

Spread over 125 acres the Floriade will feature a $750,000 tower 350 feet high which will dominate the flat Dutch landscape for miles around. The tower, to be called Euromast, will be topped by a restaurant.

Billboards get designer's touch

The billboard, for years condemned as an eyesore, went high fashion last month in a series of Alcoa ads designed by Harley Earl Associates for the Detroit and Chicago areas. The 30 foot high signs, part of a program to increase use of aluminum on the highway, are made of aluminum with graphics silkscreened on Scotchlite sheeting which picks up night light.

Graphics have been kept unusually simple and direct to make a fresh impact on the billboard-weary traveler. Strong poster colors with subtle shading help make the signs readable by day and night. Copy is limited to six words per sign and aims at getting across only two ideas: basic characteristics of aluminum (one per sign), and association with the name Alcoa. "There are a number of reasons which impelled us to use abstract symbols instead of realistic images," comments Craig Paul, who is in charge of the project at Harley Earl. He explains that Alcoa has traditionally been associated with advanced design, and that symbols make a quicker impression with less irritation to motorists.

Harley Earl Associates employ simplicity and symbolism in Alcoa's billboard series.

Packaging course opens in fall

The Third Annual Package Design Workshop will begin at Pratt Institute on Tuesday evening, September 22 and continue for fifteen consecutive Tuesday evenings. Package designer Robert Goldberg will conduct the workshop again this year.

At each session a guest speaker will discuss such topics as the history of packaging, creative design in packaging, marketing, trade marks, color, production, materials, and research methods. Registration for the course may be made at Pratt during the week of September 7.

Americans report on Moscow show

Designers were literally working around the clock during the last days before the American show opened in Moscow to an audience wide-eyed even beyond expectations. Now returning to this country, the refreshed and pleased members of the 14-man George Nelson design team say that only the utmost effort enabled them to complete the product-packed interior of the "glass box" in the short three weeks alloted them (Russian workers held up the laying of the concrete floor for six weeks until they could have complete plans of the buildings; the Americans, consequently, had to do their job in less than half the anticipated time). The designers report that they were also held up by not being able to obtain such basic items as screws and sledge hammers in Moscow.

Although troubles plagued the show even after it opened (the surface of concrete floor began to powder, and eddied over visitors and displays so badly that a Russian team had to work nights to lay an asphalt floor over it), visitors are continuing to mob the show daily.

Russians swarm around IBM's popular question-answering device at Moscow show.

now the prints you need, when you need them!

No longer need you wait a day, or even hours, for prints that you're in a hurry to get to customers.

Now, Bruning's unique Copyflex Model 300 brings the advantages of inside reproduction within the means of the smallest firm or department. Right in your own offices, you make sharp, black-on-white prints in seconds of a drawing or tracing up to 30 inches wide by any length. With intermediates, you make design changes without reworking originals; you make composite prints, color overlays, and sharp prints from weak originals. You add new dimensions in convenience, speed, and efficiency to your entire operation. All at the surprisingly low cost of the Model 300!

And anyone can operate the Model 300. It needs only a 115-volt AC connection . . . is clean, quiet, odorless. An 8½ x 11" print costs less than a penny for materials. The money and time you now spend for outside prints will pay for your new Model 300 in short order. Why not investigate?

BRUNING *Copyflex*

Low-cost Diazo Reproduction at Its Best!

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Please send me my free booklet on the low-cost Copyflex Model 300.

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Ideas old and new for sale

A bull market in ideas may be in sight with the formation of two unusual new companies. One will specialize in converting neglected and unused patents into profitable goods, the other will utilize ideas developed by engineers and scientists as by-products of their work in defense programs.

The National Patent Development Corporation, with offices in Washington, D.C. and New York, will represent firms owning unused patents and try to find other concerns ready to develop and manufacture them. The company hopes to make hundreds of the valuable patents, processes and ideas that firms have stored away available for profitable development. A company survey indicates that patents available for such belated exploitation represent several hundred million dollars in research and development.

Jess Larson, former Federal Works Administrator and Chief of the War Assets Administration, will be chairman of the company's board of directors.

With the slogan, "sell your brainpower's by-products," the Business Incubation Laboratory has been created as a new division of the Wirth Management Company in Wilton, Connecticut. The division will specialize in converting the ideas developed by individuals involved in defense work into salable commercial items. Calling itself a "nursery for new products," it offers facilities for product design, commercial engineering, market research, sales promotion, and cost reduction control.

John C. J. Wirth, head of the parent company, notes that a number of defense contractors are considering the use of commercial development services as a way of helping them generate additional working capital in order to finance their expanding operations.

Twenty "Houses of the Year"

A variety of styles are represented in "Record Houses of 1959," the selection of 20 architecturally outstanding houses made by Herbert L. Smith for *Architectural Record*. The houses range from $16,000 up, represent a number of geographical regions and varied architectural viewpoints, and frequently suggest new applications for materials.

Architects represented in the selection are: Jose Luis Sert; Paul Rudolph; Bolton and Barnstone; Victor A. Lundy; Richard L. Dorman and Associates; William J. Conklin and Davis, Brody & Wisniewski; A. L. Aydelott and Associates; Eliot Noyes and Associates; Robert Billsbrough Price; Gyo Obata; Goetz and Hansen; Edward Larrabee Barnes; Curtis & Davis and Associated Architects and Engineers; Brider and La Marche; Ulrich Franzen; Joseph N. Smith; Craig Ellwood; Hugh Stubbins & Associates; Ralph Rapson with Douglas Baird; The Architects Collaborative. A sampling is shown at right.

Checker cab markets passenger car

The Superba, a 200-inch-long, four-door passenger sedan, was introduced last month by Checker Motors, well-known manufacturer of taxi cabs. The new car, whose introduction has been postponed a number of times this past year, will be offered to the public through Checker cab outlets in major cities. Later it will be offered through truck and imported-car dealers.

While the Superba's 120-inch wheelbase is two inches longer than most medium-priced cars, its overall length of 200 inches is eight to eleven inches shorter. A tall 61 inches, it will be quite high by present standards, and it will have a flat floor with no hump in the center. At present it is available at $2,541 f.o.b. Kalamazoo.

Checker Motors' new private passenger car bears close resemblance to its famous taxis. With 6 cylinder engine, it will emphasize economy, compete with small cars of Big Three.

Sert's house for himself, Cambridge.

Barnes' house for the Millers, Chappaqua.

Stubbins' house in Rhode Island.

World study of consumer attitudes

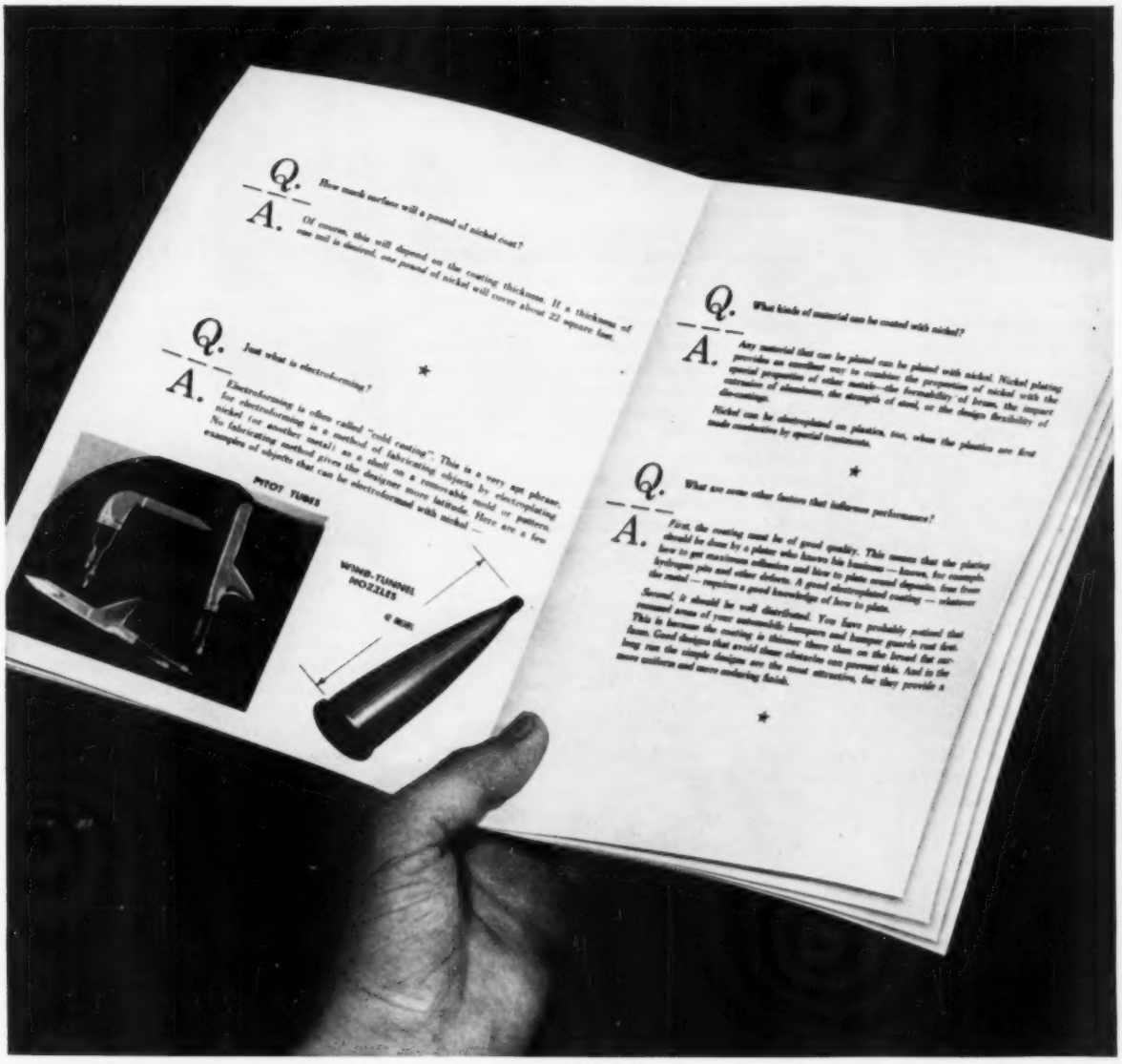
A network of professional psychologists has recently been organized in 26 countries around the world by the Psychometrics Division of the United States Testing Company.

The group has been formed because of studies which show that important differences exist between solutions to marketing problems abroad and those obtained by research in this country. The group will conduct brand preferences studies, package design, and corporate image studies. They will also study the attitudes of local groups toward international financial institutions. All contributors to U. S. Testing's new service hold advanced degrees in the behavioral sciences and all are citizens of the country on which they will report. They will use conventional testing techniques.

Fulbright awards open to designers

The Institute of International Education, which administers Fulbright scholarships for study abroad, announces that young designers may receive grants for work in any of 45 foreign countries during 1960-1961. Applications for the awards, which cover tuition, maintenance, and travel to and from the country of choice, will be accepted until November 1, 1959.

Requirements for the award are U.S. citizenship, a Bachelor's degree or the equivelant of four years professional training, language ability sufficient to carry on the proposed study, and good health. Those interested should write to the Institute of International Education, 1 East 67 Street, New York 21, before October 15.



New booklet reveals...

eye-opening facts on Nickel plating

Just leaf through two or three pages and right off you'll realize that this new booklet on Nickel plating fills a long-felt need.

It's not a how-to-do-it manual. Not a technical paper on processes. Not a sales blurb. **It's an idea generator!**

It contains 40 eye-opening facts that cover every important phase of Nickel plating – facts that may give you an entirely fresh viewpoint on this useful process.

For example, it discusses how manufacturers may cut fabrication costs by using sheet, strip—even pipe and tubing—that has been preplated with Nickel...how plated surfaces can be "made-to-order" because Nickel can be plated as thin as a breath or as thick as you would want . . .

What's more, it illustrates many of the parts that can be formed at less cost by electroforming or "cold casting"...how Nickel can be plated even on many non-metals...how more uniform coatings on complicated shapes can often be achieved by the new electroless processes.

Tips on designing for better plating are also packed into this easy-to-read, 24-page booklet. Called "Practical Answers to 40 Practical Questions about Nickel Plating," it's yours for the asking. Just drop us a postcard for your free copy.

The INTERNATIONAL NICKEL COMPANY, Inc.
67 Wall Street New York 5, N. Y.

Inco Nickel

makes plating perform better, longer

Events and Awards

The Design Center for Interiors will change its name to the **National Design Center** beginning September 20. It has also announced the following Advisory Council members: **Raymond Loewy, George Nelson, Pierre Bedard, Yale Burge, Robert Carson, Willella De Campi, Dorothy Draper, Louis Goodenough, Michael Greer, Melanie Kahane, L. Bancel La Farge, Dorothy Liebes, Carl Mitnick,** and **William O'Shea.**

Buckminster Fuller's "space frame"

Structures by Buckminster Fuller will be on view in the garden of the Museum of Modern Art beginning late in August. Included will be a translucent plastic geodesic dome and a 100-foot long "space frame" octet truss (model above) of gold anodized aluminum tubes.

James Forsberg's print, Flower Image

An exhibition of original prints, **"American Prints Today — 1959,"** will be shown in eight cities simultaneously beginning September 15. Sponsored by the Print Council of America, the show will include prize winning work by Carol Summers, Antonio Frasconi, Edmond Cassarella, and Misch Kohn. The show will first open at Baltimore Museum of Art, Boston's Museum of Fine Arts, Cincinnati Art Museum, Los Angeles County Museum of Art, San Francisco's Achenbach Foundation for Graphic Art, and Washington's National Gallery.

Columbia University's School of Architecture has awarded the $3,600 McKim Traveling Scholarship to **Perry E. Borchers** for a project which he calls "three dimensional recording of architecture in space."

The National Institute for Architectural Education has awarded scholarships of $500 each to **J. S. Daley** and **M. E. Gerardy** for their solutions to an urban blight problem in the Institute's annual design competition.

Palma-Knapp has awarded a year's tuition scholarship to **Joseph A. Burlini** for the study of industrial design at the Art Institute of Chicago.

People

APPOINTED: **Robert K. Stortz** (below) as product stylist for C. M. Hall Lamp Company. . . . **F. L. Green** (below) as chief product design engineer for Prescolite Manufacturing Company. . . . **Arthur T. Safford** (below) as divisional vice president for marketing, Packaging Division, Olin Mathieson Chemical Corporation. . . . **Herbert H. Fink** (below) as vice president-development of B. F. Goodrich Industrial Products Company. . . . **Albro F. Downe** as vice president in charge of creative design for package planning and **Robert G. Smith** as director of product design and development at Lippincott and Margulies. . . . **Robert Cappel** as manager of consumer styling at Columbus Coated Fabrics Corporation. . . . **Joan A. Beatty, Marie E. Miller** and **Salvador Duke** as staff designers at Inspiré Design Studios. . . . **Cyron Snyder** as director of all design laboratories on the West Coast for the Container Corporation of America. . . . **Will Burtin** as head of the new Department of Visual Communications and **Harold Leeds** as chairman of the Interior Design Department at Pratt Institute. . . . **George W. Holt** as manager of new product development, packaging group, for Fibreboard Paper Products Corporation. . . . **Armin E. Muller,** Swiss packaging designer, to the staff of Mel Richman Design Associates. . . . **Grace M. Mayer** as special assistant to the director of the department of Photography at the Museum of Modern Art. . . . **Barnett Pomerantz** as project engineer at Bulova Research and Development Laboratories. . . . **Carlisle M. Thacker** as technical director at Taylor Fibre Company. . . . **Rudy Koepf** as manager of industrial design, IBM Advanced Systems Development Division. . . . **Riley Quarles** (above) and **Fred Adickes** (above) as associates and **Homer C. LaGassey** (above) and **Richard A. Teague** (above) as executive stylists at William M. Schmidt Associates.

LaGassey

Quarles

Teague

Adickes

Company News

RETAINED: **Lippincott and Margulies** to design a new chain saw for the Homelite Corporation. . . . **Sundberg-Ferar** as consultants to the line of outboard motors produced by the Marine Products Division of McCulloch Corporation. . . . **Walter Landor and Associates** to design the format for a new packaging magazine, *Food and Drug Packaging*. . . . **Reinecke & Associates** by the Burlington Basket Company and the Westclox division of General Time Corporation. . . . **Good Design Associates** by the Delta Electric Company. . . . **Raymond Loewy Associates** by Rexall Drug Company, American Hardware Corporation, and National Brush Company.

GOING PLACES: **Quentin Fiore,** 598 Madison Avenue, New York 22. . . . **Graphics Institute,** The Penthouse, 42 West 39 Street, New York 18. . . . **Cawley-Neff Associates,** No. 2 Penn Center Plaza, Philadelphia. . . . **Zierhut Associates** has changed its name to **Zierhut, Vedder, Shimano.** It is located at 16120 Sherman Way, Van Nuys, Cal.

Stortz

Safford

Green

Fink

CAMPCO PROGRESS

latest developments in plastic sheet film fabrication

New Thermoplastic resists heat, chemicals, electricity

Campco Polypropylene

A new wide area of product fabrication from thermoplastics is now possible with recently introduced Campco Polypropylene sheet. Because of an unusual combination of dielectric, chemical and heat resistant properties . . . the material is especially useful for electric appliance parts, chemical vats, ducts and fittings, and items requiring sterilization.

Compounded by stereospecific polymerization of low cost propylene gas, the new plastic is highly impervious to stress cracking and can withstand temperatures to 240° F. under average load service conditions. This makes it ideal for food service and hospital items that must be boiled or autoclaved.

The plating tank illustrated below takes advantage of these same properties and also the material's fine behavior under chemical attack. It can be custom fabricated to size with a fuel hood and connection for exhausting vent heat.

Campco Polypropylene has good rigidity and strength in thin sections . . . and has the lowest specific gravity of any plastic material (0.91). Thus, more products can be produced per unit weight of Polypropylene than from any other formable sheet material. In gauges .010″ to .025″, widths to 40″, wide range of colors.

Deep draw, multi-curved dish cover and tote box of Polypropylene.

Plating tank of Polypropylene by American Agile Corp., Bedford, Ohio.

Puts "Boys" On Wheels

Campco Tripolymer Styrene Sheet

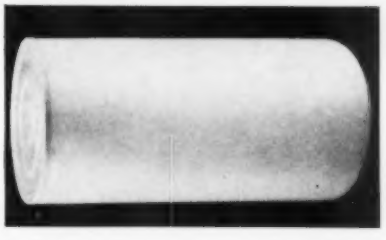
. . . for toy automobiles and the real thing, Campco Tripolymer Styrene Sheet has become a logical choice of leading manufacturers. Its high impact strength at extremely low temperatures and high rigidity make it a *natural* for many automotive applications. For the toy car it serves as a durable "boy-resistant" body that lasts longer than metal. And for Dad's car has many uses as headliners, scuff boards, center post covers, interior door panels and seat backs.

Campcolite has excellent chemical resistance, low moisture absorption, exceptional dimensional stability. Of special note is its high tensile and flexural strength. It machines readily too, and can be rapidly die-cut to accurate size and shape. Sheets can be bonded together by using commercially available cements, or welded with heat and pressure.

These properties and a relatively low cost, together with a full range of colors and the fact it lends itself to all conventional forming techniques . . . recommend Campcolite for many jobs now using more costly materials.

Available in smooth or Haircell grain embossed finish. Special effects can be had by incorporating grain in forming dies. Gauges .020″ to .125″.

New Linear Polyethylene Tank of Campco Sheet



This all-plastic tank is a product of Premier Plastics Co., Milwaukee, and is one of the many commercial products now being formed from Campco Linear Polyethylene. The material's unusual combination of rigidity, heat and chemical resistance make possible many distinctive applications. It withstands a variety of chemicals including even some acids which attack glass . . . is exceptionally rigid and tough with good dielectric properties. Easily forms, machines. Recommended for both industrial and consumer products—housewares, containers, electrical products, toys. Gauges .020″ to .125″, custom sheet and rolls.

One Reliable Source

Now you can fill all your requirements for thermoplastic sheet and film from one reliable source. Campco now offers Butyrate, Acetate, Styrenes, Polypropylene, Nylon—in sheets or rolls depending on gauge . . . cut to size if desired . . . clear or colored transparent . . . translucent or opaque.

Received Your Campco Personal File? This data-packed reference file on thermo-plastic sheet and film is yours on request—just send name and address on Company letterhead to Campco, 2709 Normandy Avenue, Chicago 35, Illinois.

CAMPCO Sheet and Film, **a Division of Chicago Molded Products Corp.**

Coming in the Sept. 1959 *issue of*

INDUSTRIAL DESIGN

Controls

In September, ID will investigate the controls which constitute the "nervous systems" of products and industrial devices. This article will show the practical meaning of controls, what they have made possible, what they control and how. We will examine the use of controls with appliances, environmental controls, controls in the office, automatic control systems on factory assembly lines, and remote controls in missiles and rockets.

Plastics III

Robert Rockwood concludes his comprehensive guide to plastics for the designer with a report on the plastics manufacturers, the technical design service they furnish, and the executive personnel of these companies to whom interested parties can address inquiries. He will also list the various kinds of plastics that each large plastic manufacturer supplies, and their trade names.

Report from Moscow

Former ID staffer Irma Weinig reports from Moscow on the Russian reaction to the U.S. exhibition, and on the problems of setting up a display for over 10,000 *products in three weeks time in a foreign country whose language, construction techniques, and ideological beliefs raised very special barriers.*

Gallery

ID opens its gallery of portraits of major figures in the design profession. This new series of close-ups will focus on the personal and professional influences that shaped the lives of selected designers. Our first subject is the managing partner of a leading consultant office as well as a "compleat" man in a specialized world.

Each issue of **INDUSTRIAL DESIGN**
delivers to the desks of designers and executives a definitive review of contemporary design ideas and techniques

INDUSTRIAL DESIGN
is published monthly.
Subscription rates: $10.00 *for one year*
$18.00 *for two years*
$24.00 *for three years.*

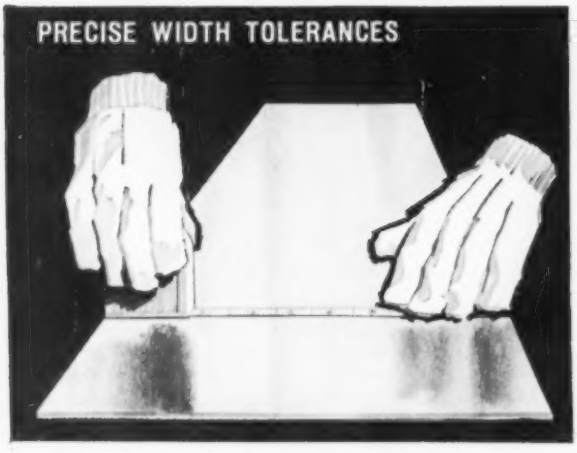
Whitney Publications, Inc.
18 East 50th Street, New York 22, N. Y.

Where precision is important...

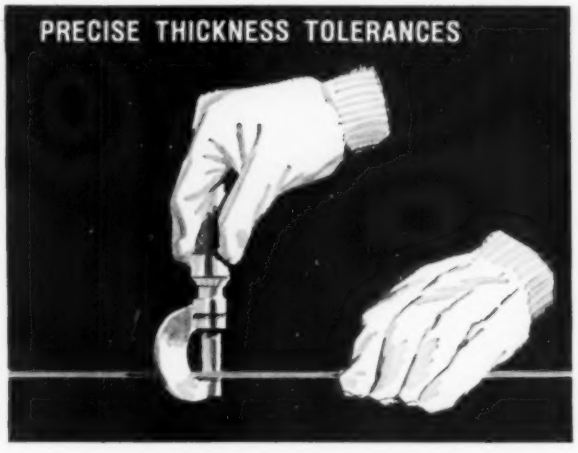
use USS Amerstrip, the "quality-

USS Amerstrip is a specialty product, rolled in quantities that permits production on precision machines, tailored to the customer's product specifications. When you use USS Amerstrip you get seven important "quality controls" not obtainable with other manufacturing methods.

The finish you get on your Amerstrip order has been specially prepared to meet *your* product's needs.



If your fabricating machines require a special width strip that's just what you'll get with Amerstrip. USS Amerstrip can be produced in any width under 24 inches . . . well within exacting tolerance limits.

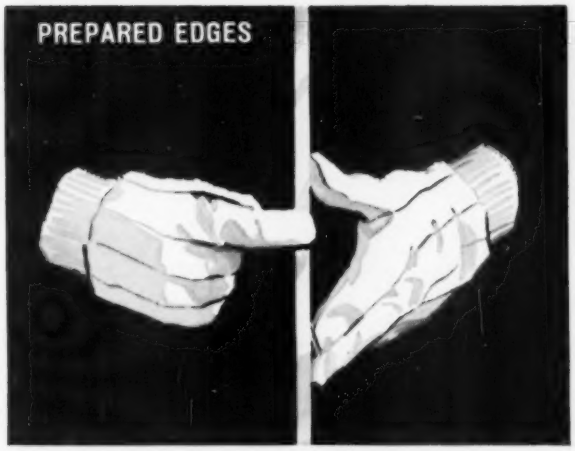


USS Amerstrip can be supplied in the thickness your machines demand. USS Amerstrip is fabricated on large production runs down to thickness tolerances as close as plus or minus .0005 inches.

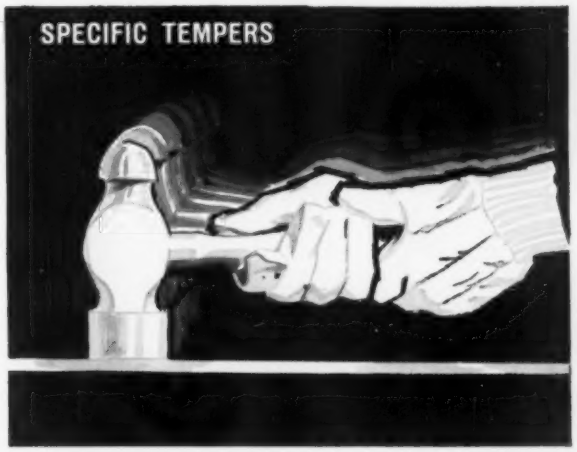
American Steel & Wire representatives are experts in the fabrication and application of USS Amerstrip Cold Rolled Strip. Whenever you have a need or problem involving cold roll let these experts show you how USS Amerstrip can do it better. Get in touch with our nearest representative or write to American Steel & Wire, Dept. 9174, 614 Superior Ave., N.W., Cleveland 13, Ohio.

USS and Amerstrip are registered trademarks

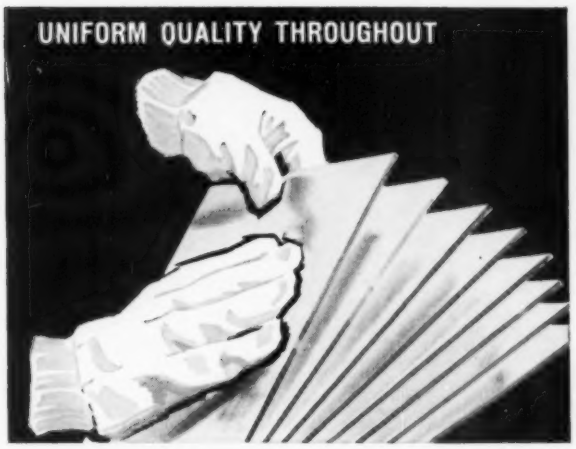
controlled" cold rolled strip steel



Because USS Amerstrip is produced in precision, order-size quantities, it can be supplied with the edge finish you need . . . square, standard, round, full round or bevel.



Whether your product must undergo a deep draw or other severe forming operation or require a special temper for rigidity, you'll get the exact temper you need when you order USS Amerstrip.



Whatever the size of your order . . . very large or very small, every coil of USS Amerstrip will be uniform in finish, in temper, in width and thickness. The use of USS Amerstrip will assure continuous production and high yields.

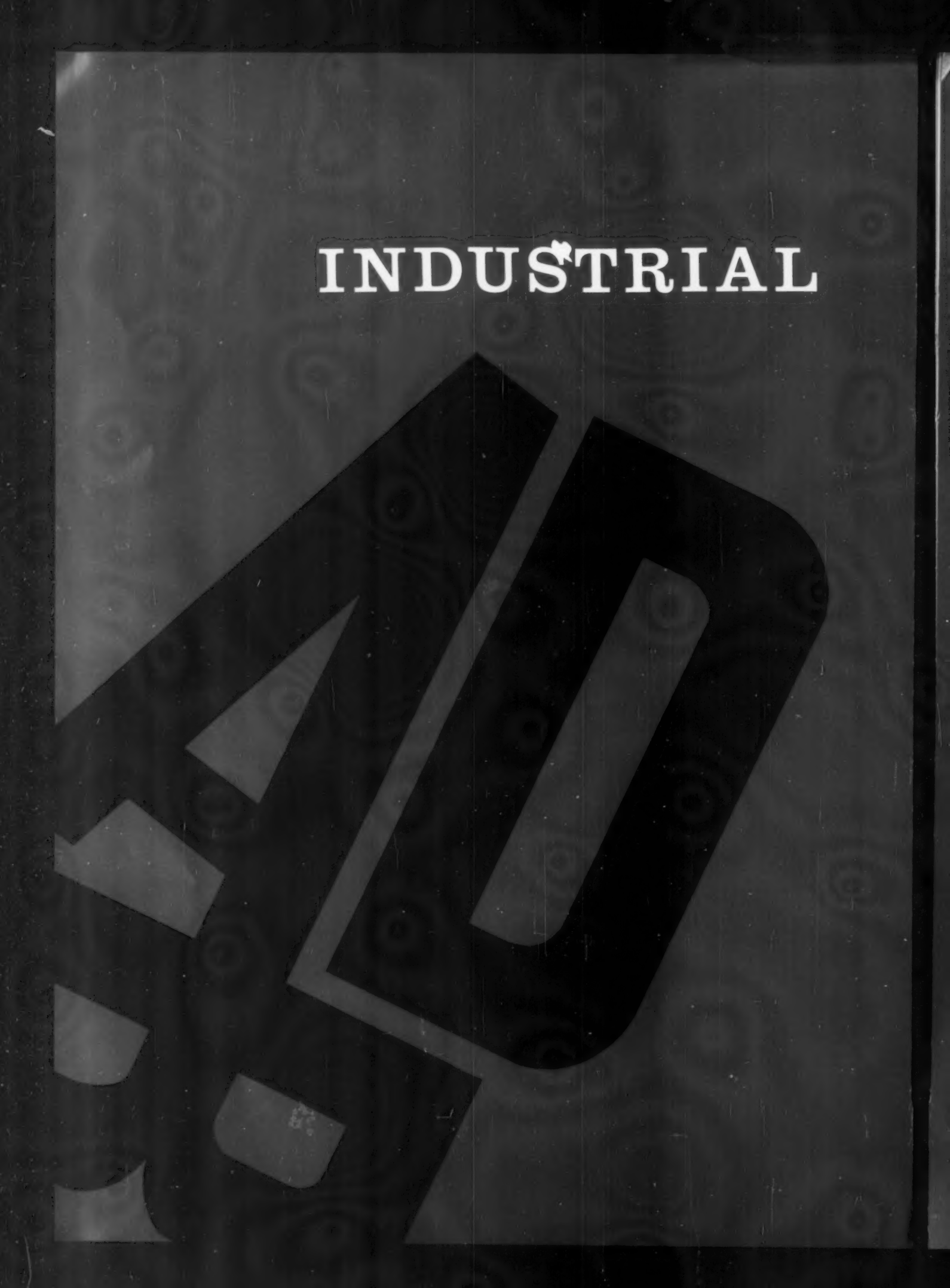
DESIGNED FOR END USE

This is really the sum total of all these other advantages. Because USS Amerstrip is "Quality-Controlled," because it is engineered to meet your needs, it assures you smoother, faster operation; a better, more salable finished product.

American Steel & Wire Division of United States Steel

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
Tennessee Coal & Iron Division, Fairfield, Ala., Southern Distributors
United States Steel Export Company, New York

INDUSTRIAL



DESIGN *announces its*

6TH ANNUAL DESIGN REVIEW

which will appear in the December 1959 issue

A major feature in each December issue of INDUSTRIAL DESIGN, the sixth Annual Design Review will be a portfolio of the year's major innovations in industrial design. It will also help forecast the effect of these advances and developments in the designs of the coming year.

What Will Be Included?

The Review will cover every facet of industrial design: new and redesigned products, packaging, materials, professional and industrial equipment, as well as appliances, housewares, and other consumer products. A comprehensive review of this scope, highlighting the ideas and accomplishments of an entire year, provides a valuable permanent reference for designers and manufacturers alike.

How Do You Participate?

From designs placed on the market since September, 1958, choose those which you believe represent the most significant work of your firm or design office. Send us one or more unretouched reproduction photos of each product, labeling each photograph clearly with the names of the product, the designer, staff member, or department in charge, and the manufacturer and suppliers. *On the same label please include a brief note stating where we can see the product you selected, what you consider is unique and distinguished about it, and in what respects the use of materials, components and manufacturing techniques was unusual.*

The following categories, though not in any way definitive, may give you some ideas for evaluating your products:

1. inventive designs: solutions based on new practical improvements in function and operation
2. notable solutions to familiar problems and established product types
3. designs without prototypes; that is, designs for objects never manufactured before, which embody new approaches to unfamiliar problems
4. engineering developments
5. apt and unusual use of materials, components, finishes
6. packaging design
7. new ideas for merchandising products
8. designs that had unexpected or outstanding consumer acceptance (with brief sales story)

There is no restriction on the number of photographs or designs submitted. *Closing date for contributions has been extended to September 21st, 1959.*

INDUSTRIAL DESIGN

Whitney Publications, Inc. 18 East 50th Street, N.Y. 22, N.Y.

NEW! FIRE-

PROPERTIES OF PLASKON FIRE-RESISTANT UREA UFR-28:

MOLDING PROPERTIES	ASTM TEST METHOD	FIRE-RESISTANT UREA
Bulk Factor	D392-38	2.4-3.0
Preformability		Good
Temperature, F		275-325
Pressure		2,000-8,000
Mold Shrinkage, in/in		0.006-0.014

PROPERTIES MOLDED	ASTM TEST METHOD	FIRE-RESISTANT UREA
Electrical		
Arc Resistance, sec.	D495-58T	110-130
Dielectric Strength, v/mil	D149-55T	
Short time, ⅛ inch		300-400
Step-by-step, ⅛ inch		200-300

PHYSICAL	ASTM TEST METHOD	FIRE-RESISTANT UREA
Specific Gravity	D792-50	1.47-1.52
Coefficient of Linear Thermal Expansion/deg C, max.	D696-44	2.7×10^{5}
Thermal Conductivity, g-cal/(sec) (cm^2) (deg C/cm)		7.8×10^{4}
Heat Resistance, F, max.		170
Deflection Temperature under Load (Heat distortion), 264 psi, F	D648-56	245
Water Absorption, per cent, 24 hr @ 25 C	D570-42	0.5-0.7

RESISTANT UREA

PHOTO COURTESY OF UNDERWRITERS' LABORATORIES INC.

A.S.T.M. Test D635-56T
RATING: NON-BURNING

MECHANICAL	ASTM TEST METHOD	FIRE-RESISTANT UREA
Impact Strength		
Izod ft-lb/in. of notch	D256-56	0.25-0.35
Flexural Strength, psi	D790-58T	10,000-16,000
Tensile Strength, psi	D638-58T	5,000-10,000
Rockwell Hardness	D785-51	M116-M120

Plaskon Today, more and more emphasis is being placed on plastic material possessing high fire retardant characteristics. In response to this critical need, ALLIED CHEMICAL has developed a truly *FIRE-RESISTANT* Urea UFR-28. Where other white and pastel compounds may blister, crack, drip, sag, or readily contribute to flame spread—PLASKON Fire-Resistant Urea effectively meets stringent Underwriters' Laboratories requirements.

In products made of low fire retardant materials, the possibility of "hot spots" arising from overload, long use or any malfunction presents serious fire hazards. PLASKON Fire-Resistant Urea will combat such hazards. Fire-Resistant Urea continues to pass test after test requiring maximum safety. Whether it be a structural or non-structural component for today's products, look to ALLIED CHEMICAL for the thoroughly qualified fire-resistant thermoset compound—Fire-Resistant PLASKON Urea UFR-28 Molding Compound.

AND LOOK AT UFR-28's OTHER IMPORTANT PROPERTIES:

- High dielectric strength
- Non-static dust attraction
- Resistance to detergents
- Photometrically controlled color
- Self-supporting rigidity
- Ease of cleaning
- Hard surface, non-abrasion.

PLASKON Engineering know-how is at your service with technical assistance and experience acquired through years of problem solving. A phone call or letter is all it takes . . . do it TODAY!

PLASTICS AND COAL CHEMICALS DIVISION
40 Rector Street, New York 6, N. Y.
BASIC TO AMERICA'S PROGRESS

Allied Chemical

As Maine Goes . . .

A few months ago we were having lunch across from, and at the expense of, a man whose daily work (and therefore, in a world of the business lunch, his daily bread) is partly in advertising and partly in industrial design. We had just ordered—a long, tedious process, since all of his dishes had to be custom-made to eliminate irritants—and he set a bottle of pills on the table. "I come by my ulcer honestly," he said. "Advertising might not do it alone, but combined with design it's a sure thing." It seemed pretty funny at the time. As if on cue, a man at the next table set out *his* bottle of pills and we wondered whether, in his case, advertising had done it alone, without benefit of design thinking.

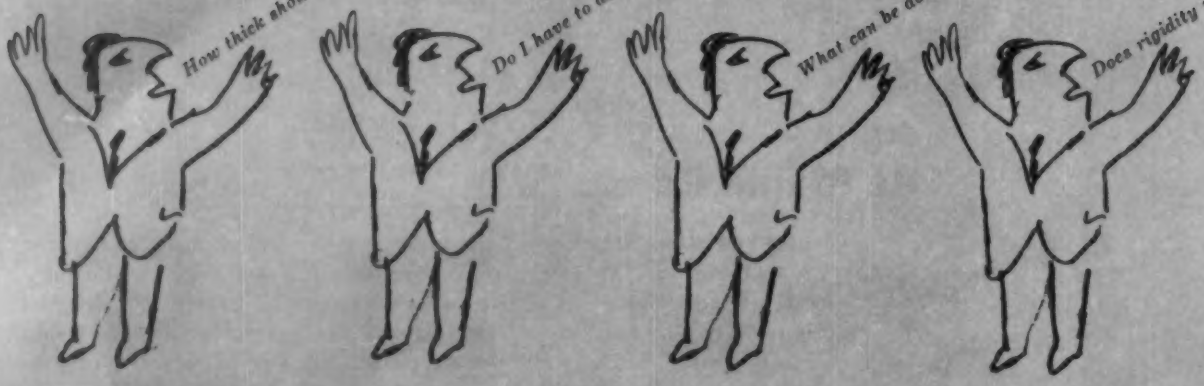
The scene came to mind recently when we were vacationing in a fishing village on the Maine Coast. We had risen at dawn and gone down to the pier to watch the lobster boats go out. The small harbor was lovely with the sun feeling its way down to the sea, and the effect was enhanced by the quiet vigor of life everywhere around. The men worked smoothly, without the jars and shocks that begin days in the city. Each lobsterman eased his boat to the pier, rolled two or three monogrammed bait barrels out of the shed, hooked and lowered them assisted by a middle-aged salt who looked as if he'd been borrowed for the occasion from a William McFee novel. Offshore, some cormorants and a tern picked their way along an island's edge. A few seals stared rudely, then dove to more familiar chambers. A gull cried sharp and lonely protest and, spreading its black mantle, twilted away. We have never seen anything more peaceful.

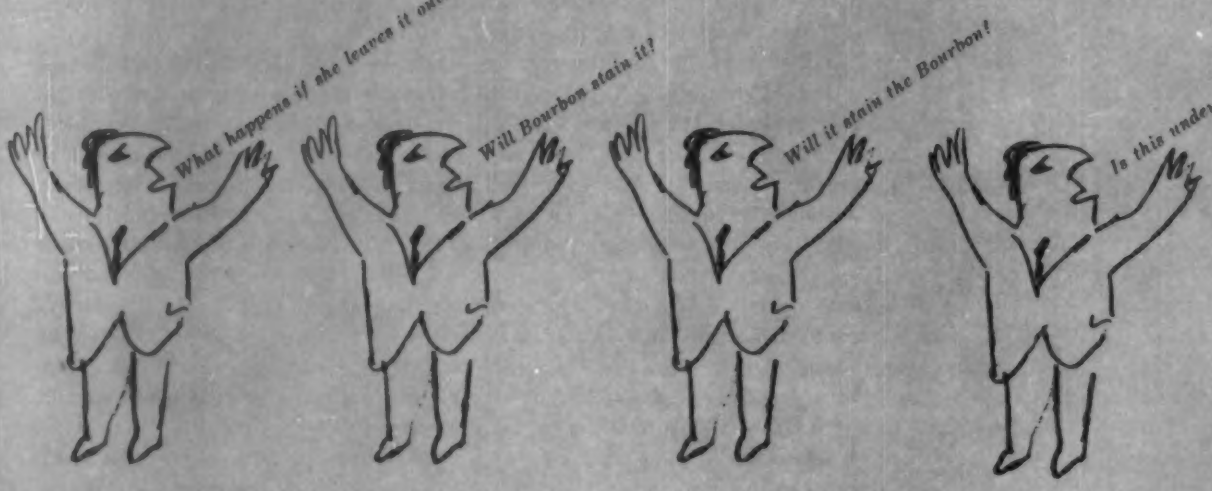
When the boats were gone, the man who had helped load the bait stood alone at the pier and lit a cigarette, unfiltered despite his tattoo. We struck up the usual tourist-to-native conversation, and he spoke so intimately about the trap runs that we asked why he wasn't out on a boat himself.

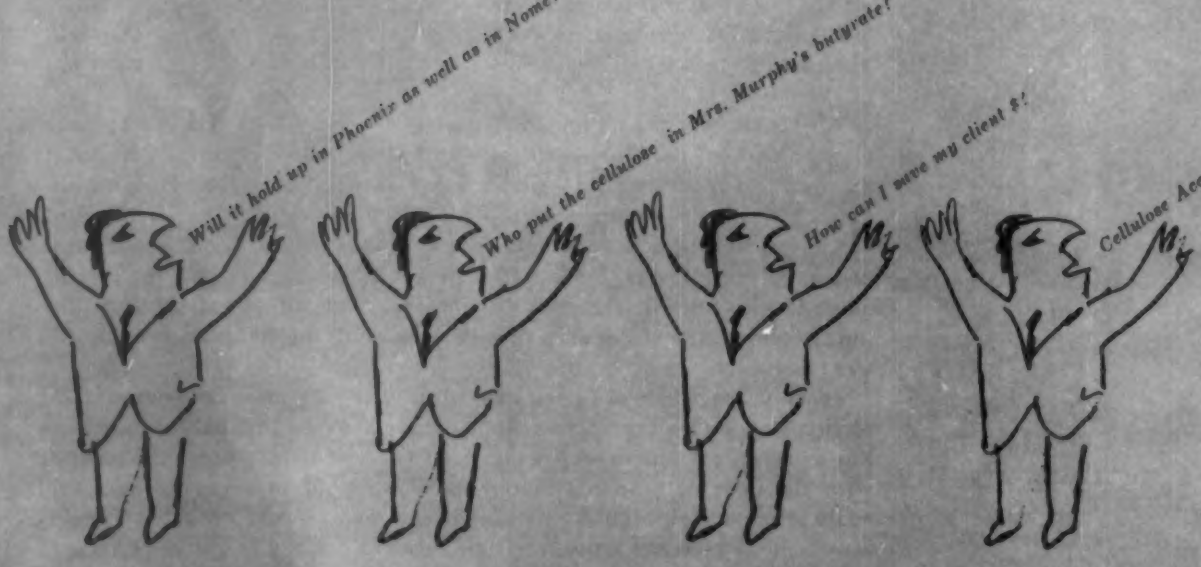
"I used to be a lobsterman," he said. "But I've been sick. I just got out of the hospital."

We couldn't help thinking in romantic terms of what he might have gone to the hospital for—sharkbite, crushing his head against the mast during a storm, the Enoch Arden syndrome—until he volunteered his ailment: "Ulcer," he said rather proudly. "The doctor says I've got one of the worst cases of nerves he's ever seen." He tapped a bottle in his trouser pocket. "Tranquilizers. Pressure," he sighed, muttering about the cost of lobster traps, the mortgaged boats, the dangers of storm damage, the unfair competition from skin divers. Apparently he too had come by his ulcer honestly.

Perhaps too much has been said about the "pressure industries," and too little about pressure-prone people; there are men in dories who behave like harried account executives and men in client meetings who behave with the calm of a second mate. The tensions of modern business are, sadly, not confined to a few thousand cases quarantined on a few famous streets in some large cities, and an ulcer can be a gift not only from a client but from the sea.—*R.S.C.*


How thick should the wall be?
Do I have to design the holes too?
What can be done about warpage?
Does rigidity mean strength?


What happens if she leaves it outdoors?
Will Bourbon stain it?
Will it stain the Bourbon?
Is this undercut necessary?


Will it hold up in Phoenix as well as in Nome?
Who put the cellulose in Mrs. Murphy's butyrate?
How can I save my client $!
Cellulose Acetate Beautywhat?

P2

Plastics for the Designer, Part II

PICKING THE RIGHT PLASTIC FOR THE JOB

Plastics are more adaptable than most materials but not every plastic will meet every condition of use, and there are some design configurations which the molding process cannot handle

by Robert Rockwood

In spite of the fact that plastics seem able to assume any shape and any physical attribute, they are not a cure-all for every design problem: they will not do everything equally well. This is true of plastics as a whole, and of particular plastics. Certain configurations are not economically or technically feasible in any of the plastic molding processes; certain others may be feasible in one process and not in another. Similarly the plastics themselves have individual limitations and potentials — nylon, for instance, is not the same as phenolic, nor is polystyrene the same as polyethylene. It is very important to understand what the molding process can and cannot do. And it is very important to select the right plastic for the specific job-in-hand. In most cases the final, definite selection of plastic will have to be checked out with a plastic specialist. But the designer who can make the preliminary selection—narrowing down the choice to the three or four which seem most suitable to his product—will understand his product better, and will be in a better position to make intelligent use of the specialist's knowledge. This second part of this three-part guide will be devoted to helping you make this preliminary selection. The third and final part, next month, will deal with the plastic specialists: the firms who supply plastics, the nature of the technical help they provide, the generic and trade names of their products.

The place to start in determining what material will do the necessary job—i.e. will have all the qualifications necessary to make a satisfactory end-product—is with the end-product itself. This is not news to any designer, but many times it is news to the plastic supplier's sales representative. Plastic suppliers are apt to say that they can make anything, that their resins can be "tailored" to meet special requirements. And this of course is true. But just as there are times when a ready-made suit is adequate—and a lot cheaper—so there are times when the right ready-made plastic will do. A little prudent investigation will usually turn up a commercially available material that will satisfy the requirements of a commercial product. But it is also true that while more than one plastic may do a particular job passably, there is usually one specific plastic that will supply more properties to a given end product within a given cost, or will furnish some extra property at very little additional cost. A material supplier cannot point out all these factors, nor should he be expected to do so. He can only be responsible for telling all the facts—good and bad—about his own materials. And naturally he is more likely to talk of the good ones than the bad. This is not because he is dishonest but because as a salesman, he wants to present his material in a positive manner. And in any case it is impossible to list the "good" and "bad" points of any plastic as absolutes. A property which may be a serious limitation to one product may, in another product, be the very property that warrants its selection. It is the designer's job to be familiar enough with the conditions his product will encounter in use to ask the questions that will disclose the limitations of a material as they apply to his product. It is also the job of the designer—with his client — to determine the relative importance of desired

END-PRODUCT CONSIDERATIONS: A LIST OF THE SPECIFIC

properties, and to list the end-product considerations in their order of importance. If compromise is necessary, he can then compromise on those properties which least affect the purpose of his product.

The second general area with which the designer should be familiar before approaching suppliers or fabricators is one that I have already touched on in Part I (July)—the molding processes. Theoretically plastics can take any shape you ask of them, but in practice this is not true. The design of the mold to receive—and release—the plastic, the way in which the plastic is introduced to the mold, and its flow patterns through the mold, and the process by which the plastic cures, or hardens—all these are limiting factors on the profile of your product. To some extent they are problems similar to those encountered in the casting of metals, but there are problems of shrinkage, warping, internal stress, and external structural features which are peculiar to plastics. The section on design considerations, which follows the one on end-product considerations, is intended to help you shape your product to conform with these requirements. As with properties, fabricators can of course tailor a mold design or the molding process to meet all sorts of special configurations, but a multi-part mold with many inserts will naturally raise tooling costs and production time. And the design elements which demand them may not actually be necessary to the appearance or function of your product.

The designer who has taken these two basic steps—evaluating the material as it relates to the end-use of his product, and adapting his design to the requirements of the forming process—will be much better prepared to seek and use the technical advice from the plastic specialist. But on this score I would like to raise two cautionary, and in a way contradictory, points. First, the designer must realize that his decisions are only preliminary, that the expert may discover important considerations that the designer has overlooked and may therefore recommend materials that the designer eliminated. It follows, of course, that if the designer is thoroughly familiar with the requirements of his product, he will be able to accept this reversal of decision—if it is valid. My second warning is that you do not accept the advice of one expert alone. Each supplier will be versed in all the virtues of his particular material, but may not be equally well informed about the material of a competitor. No supplier wants you to use his material unwisely, but only you can decide which of two competing materials is best for your product. Just as the knowledgable bargain-hunter shops both sides of the street before making a purchase, so the designer shopping for a plastic should check the competition —if only to convince himself that he does not want the competitor's product. Beginning on the facing page are detailed discussions of the preliminary steps that should be taken before you begin to talk to competing plastic suppliers about their materials.

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PROPERTIES YOUR PRODUCT MUST HAVE IS THE FIRST STEP IN NARROWING THE FIELD

COST: *Not always of paramount importance, cost-to-produce is nevertheless almost always an item to consider. The plastic that costs least per pound is not necessarily the cheapest per cubic inch.*

WEATHERABILITY: *Outdoor use can include a balloon in the arctic or a gas pump plaque in the desert. The conditions under which a product will be used determines what to look for in weatherability.*

TEMPERATURE: *Temperature resistance is different from weatherability. There are plastics that will withstand the boiling water of a surgical sterilizer but that will not survive summer-long use on a sunny patio.*

STRENGTH: *Flexibility can be strength, but so too can rigidity—it all depends on the particular application. Structural strength can also be designed into a product by altering its profile configuration.*

STAINS: *Certain plastics, like almost all natural materials, are susceptible to staining, but, unlike natural materials, some plastic formulations are resistant to one or another of the common staining agents.*

FIRE RESISTANCE AND BURNS: *Plastics have come a long way from the days of the celluloid collar. Some are not affected at all by flame; others will char; still others will burn—but go out when removed from the flame.*

SCRATCHES: *Wood and marble are not considered faulty materials because they scratch; plastic products that will take abuse should be given a satin-finish or a textured surface to make the scratches less evident.*

In the eyes of the consumer a product frequently is only as good as the part of it he sees: he is apt to judge it largely — sometimes even wholly — by the appearance and performance of its external materials (a stove whose enamel chips is a "bad" stove even though its engineering is good). Appearance and performance of materials is therefore even more important to any product than might be supposed. But it is particularly important to plastic products, for in many cases the plastic *is* the product. To help you determine which plastic to select I have drawn up a list of properties to consider with reference to a product's ultimate use; in other words, "end-product considerations"—where a material will be used, how it will be used, under what conditions it will be used. It is only a suggested list. Some of the considerations will have no bearing on certain products; and for other products you may have to consider special properties which I have not included. Every designer should, in any case, draw up a list of his own, itemizing only those considerations that are pertinent to the sale or performance of a particular product. A premium or give-away item, for instance, will not need to have the same attributes as a product intended for many years of use.

Besides helping you determine what properties are important, such a list will also help you decide upon their order of importance. For some products, cost may be the first consideration — as in the give-away item mentioned above — while in others it may be a property having to do with performance; for instance, outdoor aging. Be sure that your required properties really are required, that they really will contribute to the better design or function of the product. Sometimes you may find that if you can do without a particular property, you may be able to use a material which gives you more design latitude, or lower raw material costs, or faster — hence less expensive — fabrication. I think that the use of this list will quickly exclude many materials from consideration, and will make the matter of materials selection that much easier. It should of course be used in evaluating materials other than plastic which might be suitable for the job.

The properties chart (see gatefold) has been developed to help you assemble your list and make many of these basic decisions more easily. This chart deals only with commercially available materials. In cases where there are many different resin combinations in a given category, each offering some specific property (such as heat-resistance or superior impact-strength), only the "general purpose" type has been included on the chart, unless noted. Even though these special resins may be readily and commercially available, they are not always available on an off-the-shelf basis: sometimes they are supplied by the basic material manufacturer, sometimes they are compounded by the fabricator.

This chart is not intended to be the "last word." It is meant to be used as a quick reference, and has been developed for that purpose, using common terms — rather than

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chemical terms — to describe each material. Although there is very complete information available from many sources dealing with specific materials and their properties, this information is almost always written from the viewpoint of material characteristics rather than end-product characteristics, and is written in language and terms more technical than the designer requires.

Cost: Although cost plays an important, and often a decisive, role in the selection of a material, it is almost impossible for a designer to obtain meaningful cost comparisons between the different materials being considered for a product. The reason of course is that material cost is only one element of total cost. Tooling cost and fabricating cost must also be taken into account, and it is almost impossible to make definite statements about either. Tooling costs vary considerably. Not only do they vary from one toolmaker to another, but also from one geographical area to another. Fabricating costs also depend upon the individual fabricator, and again there are no hard-and-fast figures. Some suppliers have personnel who can make pretty accurate guesses based on broad experience, and almost all fabricators can give rule-of-thumb estimates based on experience with similar products.

I have however drawn up two charts which should be of considerable help to designers in understanding the differences in cost between various materials: one compares their cost per cubic inch; the other, their weight/volume ratio (that is, the number of cubic inches that a pound of each will fill). Although you buy materials on a cost-per-pound basis, you don't design that way: you can only compare costs of raw materials by comparing the cost per cubic inch of the material needed to make a given object. One thing to keep in mind, however, in using this cost-per-cubic-inch chart, is that this factor is only completely valid as a comparison between plastics. It does not quite apply in comparing plastics with, for instance, metals. Although the raw material cost of the plastic may be higher than that of the metal, the plastic part is ready for use when it comes from the mold — deburring, engraving, painting, and similar finishing operations are generally unnecessary. In other words, you may save in processing costs what you spend in specifying a more expensive raw material.

The weight/volume chart also proves that the price of material on a per-pound basis does not mean much unless you know how much you get for a pound. If you change the old joke about which weighs more, a pound of feathers or a pound of lead, to make it ask which *gives you* more, I think you will see the importance of the volume/weight chart. For example, nylon is about one-eighth the weight of brass, two-fifths the weight of aluminum. Thus more parts may be made from a pound of nylon than from the same weight of either of the others. But comparison of these materials on the volume/weight chart shows that while the non-plastic materials may cost appreciably less on a weight basis, they might actually cost more on a volume basis.

Again, it is important to stress that these charts are not the last word on costs; they are only an indication of the comparative costs of the raw materials — or more accurately, the unmolded resins. A true cost picture would also have to include fabrication time, tool costs and quantity of parts to be made from the tools, and finishing and assembly costs. In general the total cost of the finished molded plastic, as purchased from the fabricator, will fall in the range of one and two-thirds to three times the cost of the material. But undoubtedly products requiring special considerations will fall outside even this rough estimate.

Weatherability: If your product is to be used outdoors all or part of the time, it must be made from materials which exhibit good weathering characteristics. One of the most important of these is light stability, i.e. the material's resistance to fading or discoloring when exposed to ultraviolet light. Another important consideration is erosion or crazing from the effects of rain, snow, wind, and the foreign matter carried by the wind. Still another is temperature, and although this is not a condition of weather alone (see below) a product may have to withstand the outdoor heat of a desert climate (or its equivalent: the heat inside an automobile on a hot summer day) as well as the below-freezing temperatures of winter.

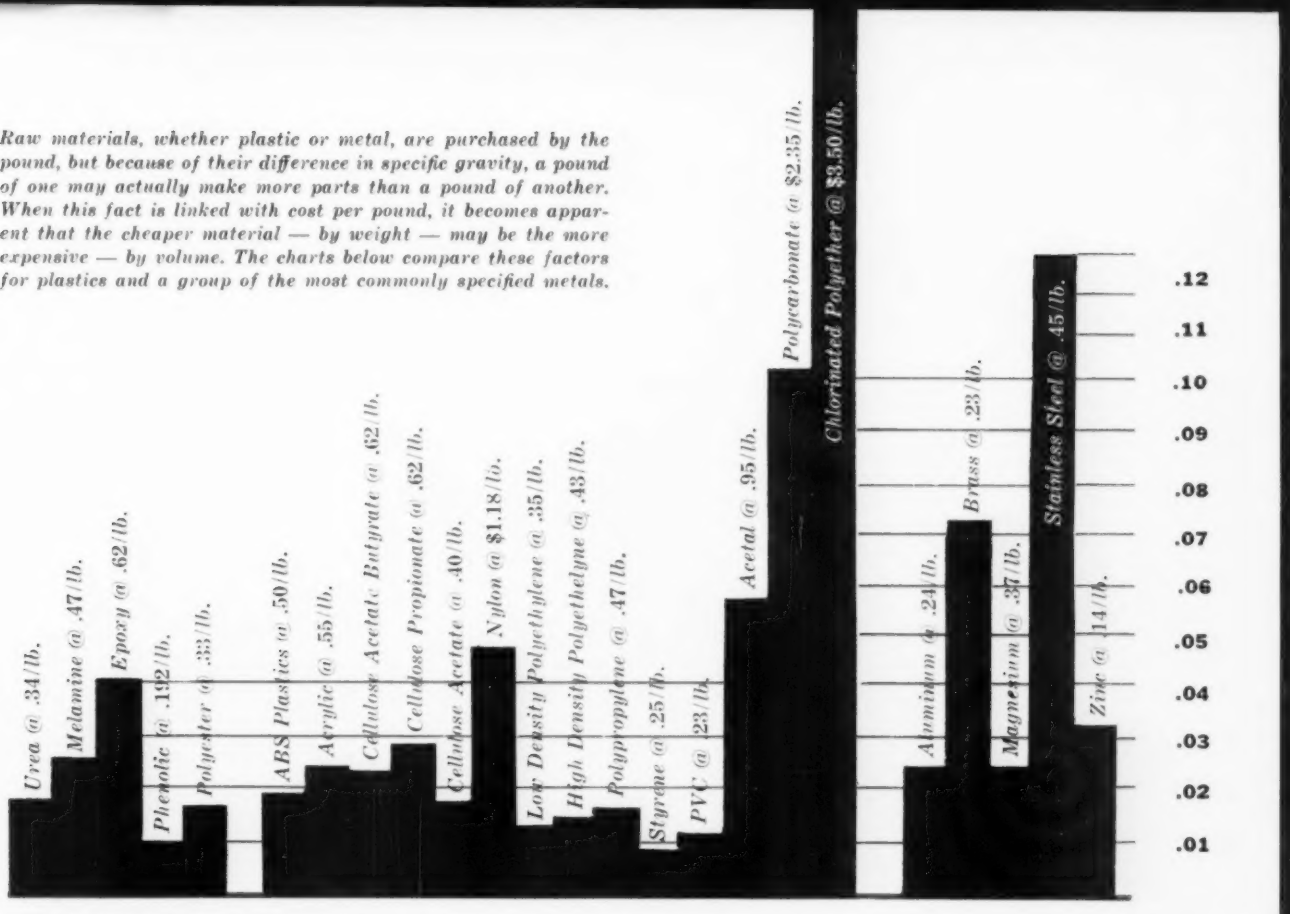
Temperature: Many plastic materials exhibit good stability at extremes of temperature without necessarily exhibiting good resistance to outdoor exposure. In considering temperatures, therefore, be sure to distinguish between indoor and outdoor use — i.e. a plastic with good resistance to the steam and boiling water of kitchen-use will not necessarily withstand high heat in combination with the other factors that constitute weatherability.

Strength: When you consider the strength of a material as it relates to the particular product with which you are concerned, be sure to distinguish carefully between the terms used to describe strength: hard, rigid, resilient, impact strength, etc. To be rigid and hard may not mean strength as far as your product is concerned; materials that are rigid without any flexibility may have very poor resistance to sudden blows. Remember, too, that shape or configuration will have much to do with determining the strength of a product.

Stains: In considering the circumstances under which your product will be used, remember to take into account any conditions which might cause staining or discoloration. Among the most common agencies which can cause staining are nail polish, nail polish remover, gasoline, alcohol, household solvents, cleaning fluids, citrus juices, iodine, and beet juice.

Fire resistance and burns: The effects of exposure to direct heat can vary from no effect whatsoever to charring, or even to bursting into flame. The term self-extinguishing

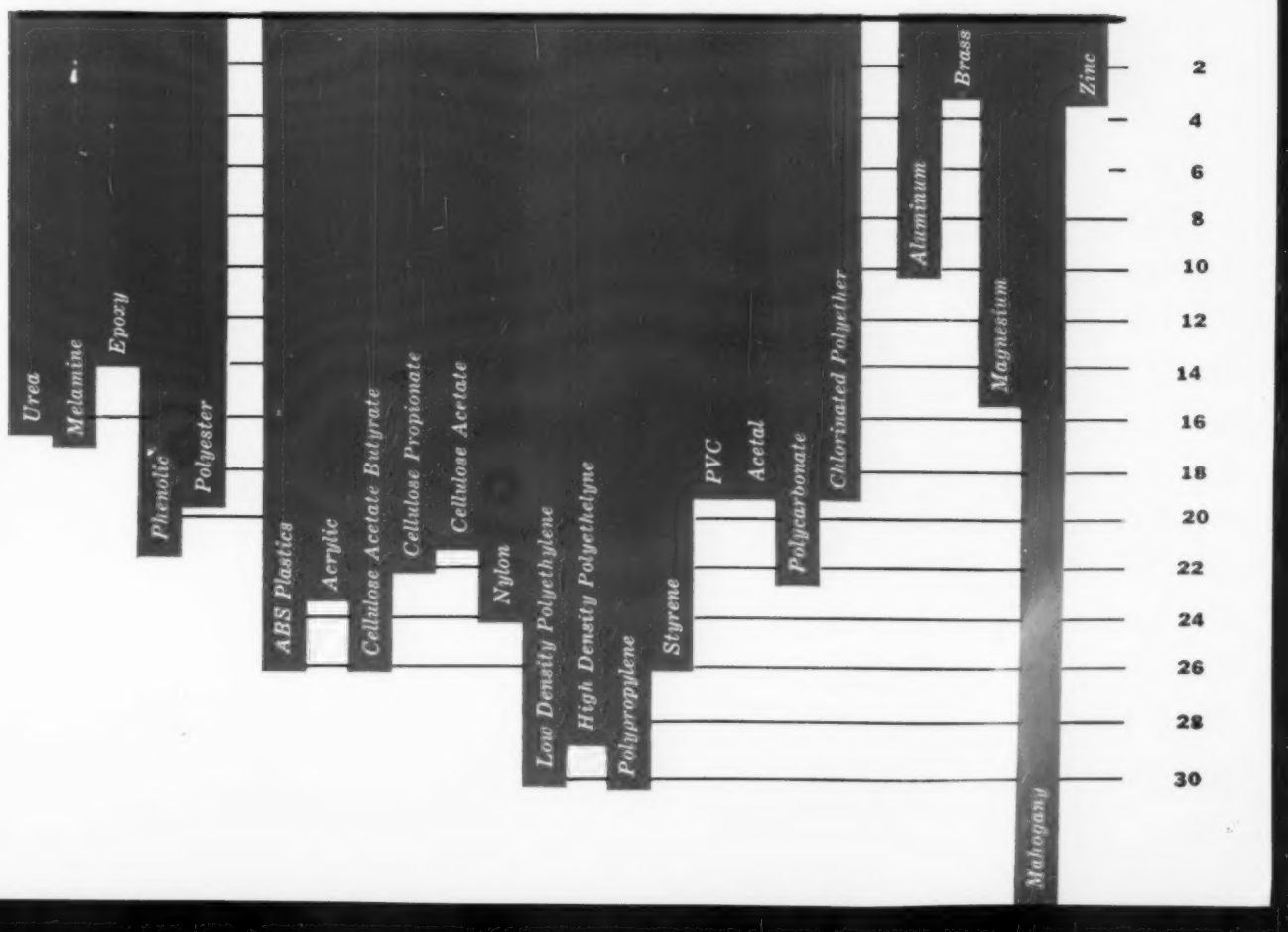
Raw materials, whether plastic or metal, are purchased by the pound, but because of their difference in specific gravity, a pound of one may actually make more parts than a pound of another. When this fact is linked with cost per pound, it becomes apparent that the cheaper material — by weight — may be the more expensive — by volume. The charts below compare these factors for plastics and a group of the most commonly specified metals.



APPROXIMATE PRICES *(Cost per cubic inch) Each bar equals one cubic inch.* **CENTS/CU. IN.**

THERMOSETS **THERMOPLASTICS** **MATERIALS**

APPROXIMATE VOLUMES *(Cubic inches per pound) Each bar equals one pound* **CU. IN./LB.**

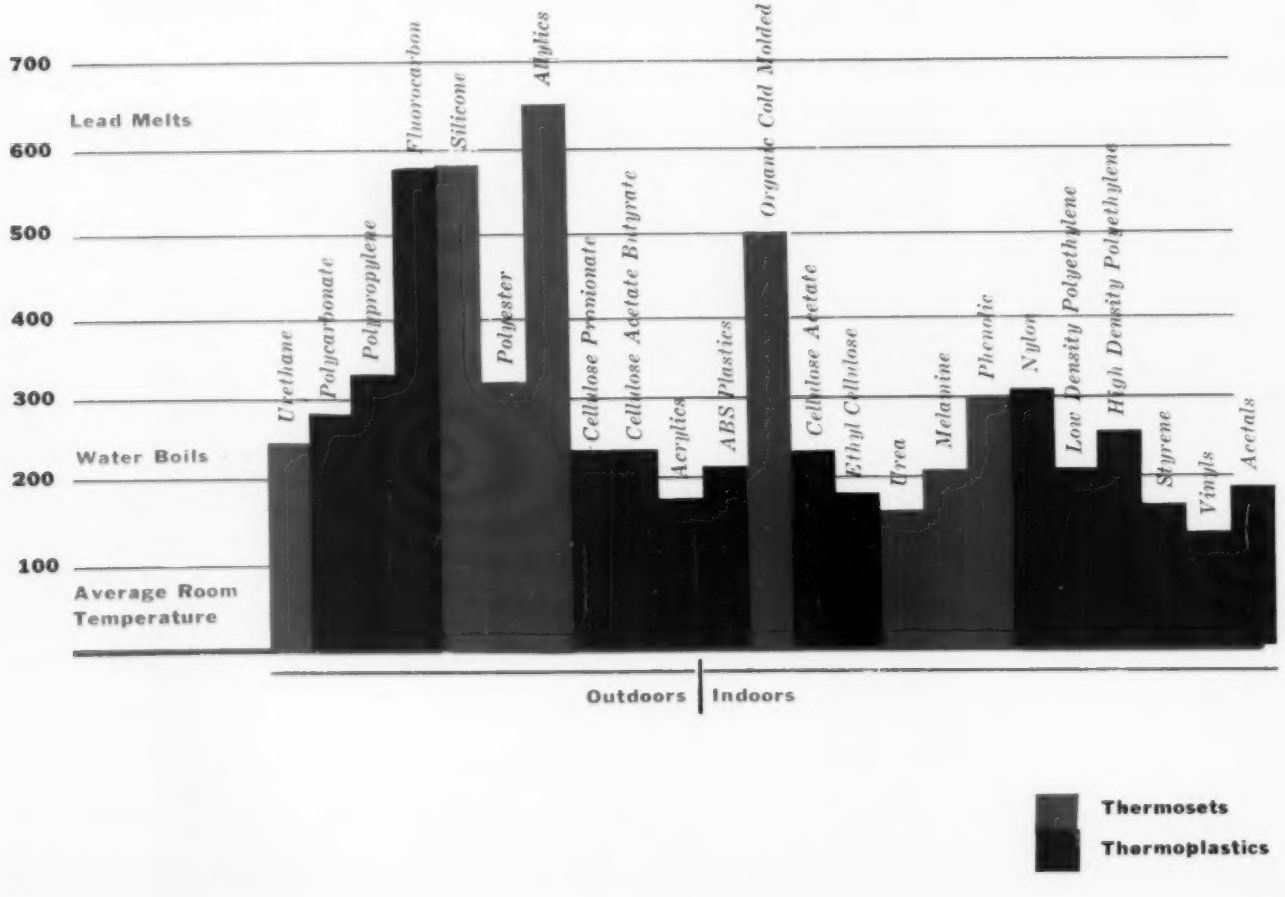


means that the material burns only when in contact with flame and will not continue to support combustion when removed from the flame.

Scratches: Almost every material will scratch or show the effects of abrasion, so the consideration is usually a matter of how many scratches a material shows in a given period of time. Surface hardness should therefore be evaluated against expected use, or abuse. If a product will be exposed to very little of the latter, a softer, less expensive material may be used. Keep in mind too that wear can be hidden by textured surface or decorative effects.

After making your list you should reconsider each item on it, asking yourself whether the properties you are calling for are necessary to the function or effectiveness of your product, for in plastics as in everything else, you get what you pay for — and you might be asking for more than you need. If you demand the ultimate in performance from your plastics, you will undoubtedly pay a higher price somewhere along the line—in the raw material itself, in the tooling, or in the fabrication costs.

TOP TEMPERATURE LIMITS



Properties charts *for thermosetting plastics (this side of gatefold) and thermoplastics fold) provide a quick guide to general information for purpose of making between various plastics which are under consideration for a product. Besid on physical characteristics (strength, heat-resistance, burning rate, specific the charts also indicate the reaction of the plastics to various common materi product might be exposed in the course of use. Except where indicated the p those of the general-purpose plastics, not special formulations. The charts a non-technical terms; for very specific information designers should refer to m data sheets.*

THE THERMOSETS

	Strength	Temperature Minimum/Maximum	Burning Rate	Electrical Characteristics	Color	Scratches, Etc.	Acids	Animal or Mineral Oil	Food	Detergents or Soap Solutions
Alkyds	Hard rigid tough good impact	400	Self extinguishing	Excellent dielectric strength & arc resist.	Limited opaque	Good resistance	Resistant	Generally resistant	Generally resistant	Generally resistant
Allylics	Hard rigid	350	Self extinguishing	High dielectric strength excellent insulation	Good stability, widerange	Good resistance	Resistant	No effect	No effect	No effect
Urea	Hard rigid	+170 - 70	Self extinguishing	Good	Full range translucent to opaque light fast	Hard and resistant	Fair resistance to weak attacked by strong	No effect	No effect except stain	No effect except chlorinated types
Melamine	Hard rigid	+210 - 70	Self extinguishing	Good	Full range translucent to opaque light fast	Hard and resistant	Melamine better than urea	No effect	No effect except stain	No effect except chlorinated types
Epoxy	Good flexibility tough	Stable to high temp.	Medium	Good	Limited	Hard and resistant	Resistant	No effect	No effect	No effect
Phenolic	Hard rigid	+300 can be frozen	does not burn	Excellent insulator, good dielectric	Opaque, generally black or brown	Good resistance	No effect by weak	No effect	No effect	No effect
Polyester	Tough	+325 no effect at low temperatures	Slow to self extinguishing	High dielectric qualities	Varied translucent to opaque	Good resistance	Good resistance	No effect	Some are O.K. may affect taste	No effect except strong alkaline
Silicone		+350 - 590	None to slow	Good dielectric, low power factor						
Urethane	Tough, shock resistant	+250 poor steam resistance -40 may stuffen	Will not support combustion	Excellent insulator	Various colors available	High abrasion resistance	No effect by weak	No effect		No effect

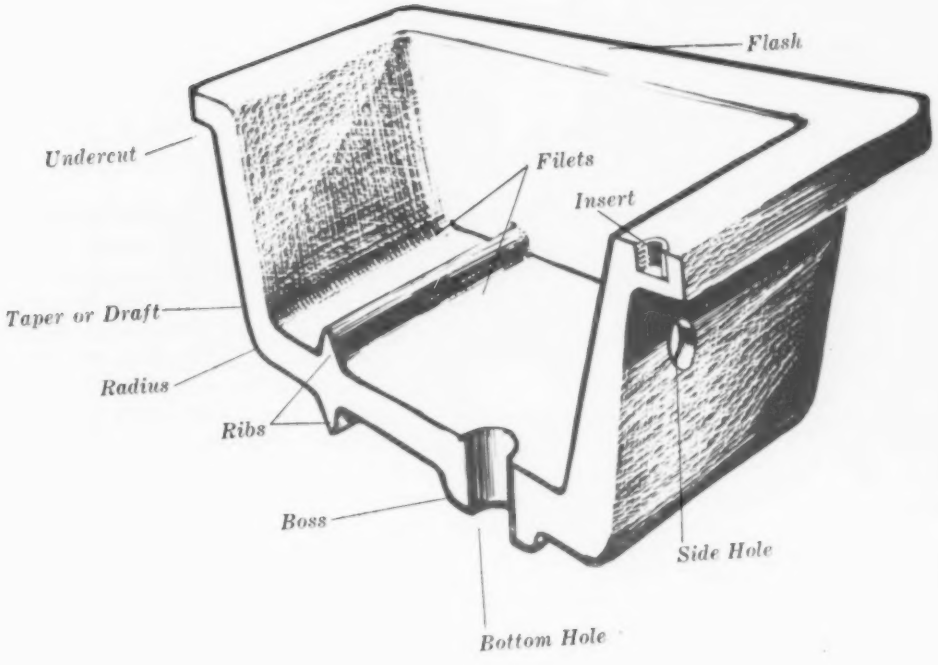
astics (inside gate-
nking comparisons
Besides usual data
cific gravity, etc.)
aterials to which a
the properties are
rts are couched in
to manufacturers'

Soap Solutions	Gasoline	Carbontetra-Chloride	Nail Polish	Nail Polish Remover	Alcohol	Acetone	Weatherability	Specific Gravity
erally istant	Resistant	Resistant	Resistant	Resistant	Resistant	Slight attack	Fair	2.16 2.24
effect	No effect	No effect	No effect	No effect	No effect	No effect	Superior resistance	1.3 1.4
effect ept rinated es	No effect	No effect	No to slight effect	No to slight effect	No effect	No effect	No	1.47 1.52
effect ept rinated es	No effect	No effect	No effect	No effect	No effect	No effect	No	1.47 1.52
effect	No effect	No effect	No effect	No effect	No effect	No effect	Very good	1.8
effect					No effect		Not recommended	1.25 1.30
effect ept ng aline	No effect	No effect	No effect to slightly attacked	No effect to slightly attacked	No effect	Attacked	Good resistance	1.35 2.3
							Resistant	1.6 2.0
effect					No effect		Sun has bad effect	

THE THERMOPLASTICS

	Strength	Temperature Minimum/Maximum	Burning Rate	Electrical Characteristics	Color	Scratches, Etc.	Acids	Animal or Mineral Oil	Food
ABS Plastics	Tough, withstands sharp blows	−60 to +175-212	Slow	Good	Wide range, opaque	Fair to excellent	Resistant to most	No effect	General no effec
Acrylics	Rigid, hard	+185 cannot be boiled	Slow	Insulator	Wide range clear, translucent or opaque	Avoid abrasives	Resists weak acids	No effect effect	Resistan
Cellulose Acetate	Tough	+140 to 220 can be used below freezing	Slow to self extinguishing	Good	Wide range translucent or opaque	Avoid abrasives	Attacked	Resistant	Some composi F.D.A. accepte
Acetate Cellulose Butyrate	Tough	+140 - 220 can beused below freezing	Slow	Insulators	Wide range translucent or opaque	Avoid abrasives	Attacked	Resistant	
Cellulose Propionate	Tough	+155 - 220 Can be used below freezing	Slow	Insulators	Wide range translucent or opaque	Avoid abrasives	Attacked	Resistant	Some composi F.D.A. accepte
Ethyl Cellulose	Maintains toughness at low temperatures	+115 - 185	Slow		Wide range translucent or opaque	Avoid abrasives		Attacked	
Fluorocarbon T F E	Tough, maintains toughness at low temperatures	+500 −450	Non-flammable	High dielectric strength & low electrical loss	Wide range clear, translucent or opaque	Avoid abrasives	No effect	No effect	No effect
Nylon	Tough, strong resists sharp blows	+175 - 300 safely boiled may get brit. at freezing	Self extinguishing	Good	Translucent or opaque wide range	Avoid abrasives	Attacked by some weak and all strong	No effect	Colored foods stain
Polyethylene Low Density	Tough flexible	+220 - 250 −100 does not get brittle	Slow	Excellent	Wide range clear, translucent or opaque	Avoid abrasives	Unaffected by most	Very poor, permeate	No effect
Polyethylene Medium	Tough flexible	+220 - 250 −100 does not get brittle	Slow	Excellent	Wide range, clear, translucent or opaque	Avoid abrasives	Unaffected by most	Resistant	No effect
Polyethylene High Density	Rigid tough	+250 −100 does not get brittle	Slow	Excellent	Wide range	Avoid abrasives	Unaffected by most	Poor, permeable	No effe
Polypropylene	Rigid, hard	+275 - 320 brittle when cold can be sterilized	Slow	High resistance	Wide range clear, translucent or opaque	Good resistance	Attacked	Resistant	No effe
Polystyrene	Rigid, hard	+150 - 170 cannot be boiled	Slow in direct flame	Good dielectric	Wide range clear, translucent or opaque	Avoid abrasives		No effect	No effe
Polyvinyl Chloride	Flexible	+130 keep away from direct heat satis. to +320	Slow or self extinguish-	High dielectric strength	Wide range clear, translucent or opaque	Avoid abrasives	Resistant	Resistant	No effe
Polyvinyl Chloride Acetate	Rigid or flexible	+130 keep away from direct heat OK to 32°	Slow or self extinguishing	High dielectric strength	Wide range clear, translucent or opaque	Avoid abrasives	Resistant	Resistant	No effe
Acetal	Rigid tough	+185	Slow	Excellent dielectric strength	Wide range color	Avoid abrasives	Limited service in dilute solutions	No effect	Some wi stain wi hot
Polycarbonate		+250 to 275		Good	Light amber, grey, black or red				
Chlorinated Polyether	Hard, rigid	+250 down to 10° or -20	Self extinguishing	Good	Opaque only	Excellent abrasion resistance	No effect	No effect	No effe

Food	Detergents or Soap Solutions	Gasoline	Carbontetra-Chloride	Nail Polish	Nail Polish Remover	Alcohol	Acetone	Weatherability	Specific Gravity
Generally no effect	No effect	No effect	Partly soluble or swells	Attacked *	May be attacked	Generally no effect	Soluble	Fair to excellent *	1.01 1.10
Resistant	No effect	Crazed by some high octanes	Attacked	Attacked	Attacked	Attacked	Attacked	Excellent	1.19
Some compositions F.D.A. accepted	Resistant	Resistant	No effect	No effect	Attacked	Attacked	Attacked	Not recommended	1.24 1.34
	Resistant	No effect	Attacked	No effect	Attacked	Attacked	Attacked	Good	1.15 1.22
Some compositions F.D.A. accepted	Resistant	No effect	Attacked	No effect	Attacked	Attacked	Attacked		1.18 1.24
				Attacked	Attacked	Attacked		Not recommended	1.09 1.17
No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	2.13 2.22
Colored foods stain	No effect	No effect	No effect	No effect	No effect	Will permeate	No effect	Only with special compositions	1.04 1.14
No effect	Resistant compositions available	Generally not resistant	Attacked	No effect at low temperatures	No effect at low temperatures	No effect	Attacked at high temperatures	Only with special compositions	0.910 0.925
No effect	Resistant, compositions available	Generally not resistant	Attacked	No effect at low temperatures	No effect at low temperatures	No effect	Attacked at high temperatures	Only with special compositions	0.926 0.94
No effect	No effect	No effect	Insoluble	No effect at low temperatures	No effect at low temperatures	Affects taste of alcohol beverage	No effect	Only with special compositions	0.941 0.965
No effect	No effect	No effect	Partly soluble or swells	No effect	No effect	No effect	No effect	Only with special compositions	0.90 0.91
No effect	Resistant, compositions	Soluble	Attacked soluble	Attacked	Attacked	No effect	Partly soluble or swells	Not good for continual use	1.04 1.065
No effect	No effect	No effect	Insoluble	Attacked	Attacked	Resistant	No effect	Usually not recommended	1.425
No effect	No effect	No effect	Soluble	Attacked	Attacked			Usually not recommended	1.18 1.2
Some will stain when hot	No effect	No effect	No effect	No effect	No effect	No effect	Partly soluble or swells	Good	1.425 1.2
	No effect	No effect	Partly soluble or swells	Partly soluble or swells					
No effect	No effect	No effect	No effect at room temperatures	No effect	No effect		No effect at room temperature	No	1.4



DESIGN CONSIDERATIONS:

The action of the plastic within the mold, as well as the design of the mold itself, dictate certain rules-of-profile that are necessary to the creation and manufacture of a well-designed plastic article.

In plastics, as in other materials, the forming process itself is intrinsic to the design, and may be exploited to enhance both structural and appearance aspects of a product by a designer who understands how the molding process works and what features it imparts to the product. Even apart from the question of taste, since the technique for molding is very unlike that of wood turning, or the machining of metal, it is undesirable when designing a plastic part to attempt to simulate the appearance of a part fabricated by a method other than molding. (And perhaps this isn't really very far from the question of taste at all.) Good design in plastics is largely a matter of good molding practice. The main objective, whether you are specifying thermosetting or thermoplastic materials, is to design a form that will permit the plastic to flow easily and swiftly through the mold cavity so that the cavity is completely filled before the curing, or hardening, action begins. The quicker this can be accomplished, the shorter the molding cycle — and the less likelihood there is that you will get internal flaws or imperfections.

In the discussion that follows I have included design considerations that have to do not only with profile, but also with such things as holes, inserts, and bosses. Improper placement of these can result in stresses, strains, voids, and structural weakness. While it is true that a great deal of the responsibility for these matters rests with the mold designer, he must work within the limits set by the form which the industrial designer creates. These discussions are meant to help you create a part that will be easily and economically molded, and that will furnish an end product that is more satisfactory in general.

Flash lines: When a compression mold closes (see illustration, Plastics I; July ID) the telescoping of the two parts results in a flow of plastic material into the opening, or clearance, between the two parts. This "overflow" is called flash, and its subsequent removal leaves a flash line which is unavoidable and generally unsightly. As far as possible, flash lines should be located where they will be least visible in the finished product, but they must also be located so they will be easily accessible for removal of the flash. Improperly located flash lines can result in marring of the plastic article during its removal from the mold, or later, during the finishing operation. In injection or transfer molding, the problem of flash is not so great because the mold is already locked in position before the plastic enters it.

Undercuts: Undercuts should always be avoided in the design of the profile for a plastic part unless mechanical construction or function of the part makes such a profile absolutely necessary. Because of the flow pattern of the plastic through the mold, an undercut section may be improperly filled. Also, an undercut violates one of the elementary rules of molding: a plastic part should be easy to remove from the mold. An undercut can make it impossible to eject a part in a single operation. If such a profile is essential, then split-molds or removable mold sections are required — and

P2 *Plastics for the Designer, Part II*

Suggested Wall Thicknesses of Molded Articles (in inches)

	Minimum For Any Article	For Small Articles	Average For Most Articles	Large to Maximum Articles
THERMOSETTING				
Phenolics				
General-purpose & Flock-filled	0.050	0.062	0.125	0.187 to 1.000
Fabric-filled	0.062	0.125	0.187	0.187 to 0.375
Mineral-filled	0.125	0.125	0.187	0.200 to 1.000
Alkyd				
Glass-filled	0.040	0.093	0.125	0.187 to 0.500
Mineral-filled	0.040	0.125	0.187	0.187 to 0.375
Ureas and Melamines				
Cellulose-filled	0.035	0.062	0.100	0.125 to 0.187
Fabric-filled	0.050	0.125	0.125	0.125 to 0.187
Mineral-filled	0.040	0.093	0.187	0.187 to 0.375
THERMOPLASTIC				
Acrylics	0.025	0.035	0.093	0.125 to 0.250
Cellulose Acetate	0.025	0.050	0.075	0.125 to 0.187
Cellulose Acetate Butyrate	0.025	0.050	0.075	0.125 to 0.187
Ethyl Cellulose	0.035	0.050	0.062	0.093 to 0.125
Nylon	0.015	0.025	0.060	0.093 to 0.125
Polyethylene	0.035	0.050	0.062	0.093 to 0.125
Polystyrene	0.030	0.050	0.062	0.125 to 0.250
Polyvinyls	0.093	0.062	0.093	0.125 to 0.250

Wall thickness *is one of the most important design considerations in the preliminary planning stages on a plastic article. A wall that is too thin will shatter or tear; one that is too thick will tend to "cure" improperly, weakening the article internally or causing external imperfections. The table above reprinted from the Plastics Engineering Handbook published by the Society of the Plastic Industry, lists the minimum wall thicknesses for the various plastics, and the suggested wall thicknesses for small, average, and large-size articles.*

these increase the cost of the molds, and of the molded article.

Thickness of sections: Ideally, the design of a plastic article should use a uniform wall thickness throughout, but since this is rarely possible, certain problems arise. In order to understand what these are, and how they should be handled, it might be well to recapitulate the information given in Plastics I (July ID) on how plastics set. For either thermoplastic or thermosetting materials, the process of setting is one of heat transfer. In thermoplastics the plastic is set by cooling the mold; in thermosets, the combination of heat and pressure which softens the plastic also causes the chemical change which hardens and cures it. In other words, thermoplastics remain soft until an external cooling agent is applied, whereas thermosetting materials are set by the heat within the mold. When a plastic article has one or two areas that are considerably thicker in cross-section than the rest, the length of time required for these thicker sections to set (either under heating or cooling) tends to produce unbalanced shrinkage, which causes internal stresses, which in turn cause warping and concave depressions known as "sink marks." There are various ways of counteracting these effects. One of the methods most frequently used, where it is feasible, is coring, i.e. designing a thick section as two thin sections with a hollow center. When this is impossible, and two wall sections of unequal thickness must join each other, the mold conformation should be rounded from one into the other (this is called a fillet) so that the change in thickness will not be abrupt. Still another method of minimizing warp is by the use of supporting ribs; these are particularly applicable to large flat sections. For best results the ribs should be placed on both sides of the wall section, thus overcoming concave warping which might occur on the unsupported side (this is especially true if ribs are relatively thin).

In transfer and injection molding, and to a lesser extent in compression molding, areas of reduced wall thickness constitute obstructions to the flow of the plastic; wall sections should therefore become progressively thinner in the direction of the flow. Also, shrinkage in heavy sections of injection-molded plastics poses the additional problems of internal voids and surface imperfections. The former can be avoided by designing thinner wall sections and obtaining the necessary stiffness with ribs; the latter can be obscured, particularly on large, flat surfaces, by making the surface slightly convex. Flow marks can also be hidden by engraved or embossed effects.

Apart from the problem of variation in wall thickness it is necessary to determine how thick or thin the walls can be. This will depend on two factors: the structural features embodied in your design, and the structural strength of the particular plastic you wish to use. The structural features in your design will of course make certain wall thicknesses mandatory and these, in turn, will determine the size and shape of every other section of the article. The structural strength of the different plastics creates different maximum and minimum wall thickness requirements (see table, left). Wall thickness is particularly important in thermo-

Continued on page 48

		Radii and Fillets	Holes	Walls	Joining	Fastening Mechanical	Surface Finish	Decorative Possibilities	Machinability	Inserts
	ABS Plastics	Min. 1/64"r. avoid sharp corners	Space one dia. apart	Recommend uniform	Easily cemented	Self tap and machine screws	Hard glossy	Paint metalized sand blast	Good to excellent	Molded in or insert after molding
	Acrylics	Min. 1/64"r. avoid sharp corners	Space one dia. apart. away from edges		Easily cemented	Thread cutting all right	Hard glossy	Paint metalized stained colored	Readily	Molded in depth to dia = 2 to 1
Cellulosics	Cellulose Acetate	Min. 1/64"r.	No problem	Varying thickness can be handled	Easily cemented and heat sealed	Self tap rivets staples	Reflects mold finish exact	Paint print lacquer	Readily	Molded in
Cellulosics	Cellulose Acetate Butyrate	Avoid sharp internal corners	No problem		Easily cemented	Self tap rivets staples	Lustrous	Paint, lacquer, silk screen	Readily	Molded in
Cellulosics	Cellulose Propionate	Min. 1/64"r.	No problem	Varying thickness can be handled	Easily cemented and heat sealed	Self tap rivets staples	Reflects mold finish exact	Paint print lacquer	Readily	Molded in
Cellulosics	Ethyl Cellulose	Min. 1/64"r. avoid sharp corners and notches	Easily mold. or drilled away from edges		Requires surface treatment	Self tap and machine screws	Smooth hard	Can be colored	Easily	Not often practical during molding
	Fluorocarbons T F E	Min. 1/64"r. avoid sharp corners	Space one dia. apart	Recommend uniform	Spin welded or cemented	Self tap, machine screws and rivet	Smooth, hard, lustrous or textured	Paint, metalized, stained colored	Excellent	Molded in
	Nylon	Min. 1/64"r. avoid sharp corners	Space one dia. apart	Recommend uniform	Cement, heat seal or Spin weld.	Self tap, machine screw and rivet			Readily	Yes
Polyethylene	Low Density	Min. 1/64"r. avoid sharp corners	Space one dia. apart	Recommend uniform	Cement, heat seal or spin weld	Self tap, machine screw and rivet	Hard lustrous	Lacquerd, sant blast engraved, electro plate	Readily	Yes
Polyethylene	High Density	Min. 1/64"r. avoid sharp corners	Space one dia. apart	Recommend uniform	Heat seal, and spin weld	Self tap, machine screw and rivet			Readily	
	Polypropylene	Min. 1/64"r.	Most often punched	Varying thickness can be handled	Many cements all right	Not self tapping	Reflects mold finish exact	Paint lacquer metalized	Not recommended except for impact types	Molded in
	Styrene	Elastomeric can be sharp, rigid corners	Depends on formulation and stifness		Heat seal		Matte to glossy	Printed	Not recommended except for impact types	Molded in
	P V C	Min. 1/64"r. avoid sharp corners	Easily mold. or drilled space one dia. apart.	Recommend uniform avoid thick sect.	Heat seal or spin weld	Nail, rivet or machine screws	Smooth, hard, lustrous, textured	Paint colored, stained, metalized	Excellent	Molded in
	Acetal	Min. 1/64" r. avoid notches	Drilled or molded space one dia. apart.		Heat seal	Self tap all right	Reflect mold finish exact	Limited	Readily	Molded in
	Polycarbonate	Min. 1/32"r.	Best at bottom of molding		With epoxies	Expansion type inserts	Smooth lustrous, translucent or opaque	Good	OK - use carbide tipped tools	Molded in or inserted in
Aminos	Urea	Min. 1/32"r.	Can be drilled		With epoxies	Expansion type inserts		Good		
Aminos	Melamine	Min. 1/64"r.	Molded or drilled		Can be banded		Smooth, satin or textured	Limited colors paint, epoxy coat	Drilled sawed threaded	Possible mold in, best avoid
	Polyester (Reinforced)	Min. 1/32"r.	Possible		Bonded with polyester or epoxy	Self tap	Smooth, matte or glossy or textured	Paint colored	Readily, similar to wood	Yes

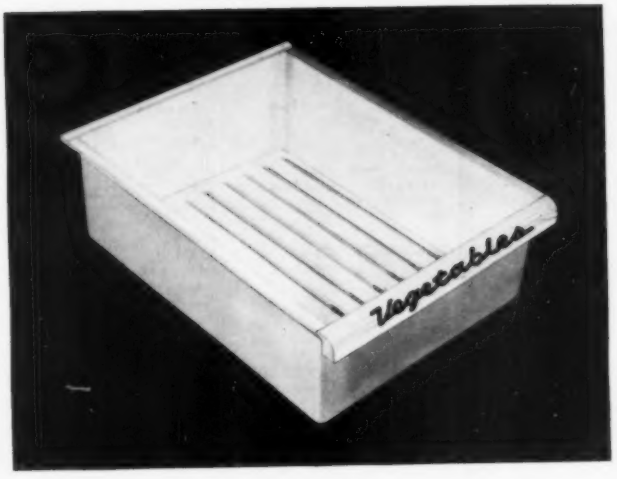
CASE STUDY: A STORAGE BOX IS MODIFIED TO MEET STRUCTURAL REQUIREMENTS

The rules for good design in any mass-produced product lead always to the same result: the creation of a design that is attractive, durable, and economical to make. But each material and each forming process imposes its own disciplines on the designer's "ideal" concept, modifying it to meet the physical limitations inherent in the function of the machine and the characteristics of the material. The illustrations here are of a hypothetical design, set up by the Hercules Powder Company, a major plastic supplier, to show how a designer's original concept would be subtly altered by plastic engineers to make the article more suitable for production molding in a particular plastic. The before and after renderings and the corrected detail drawing embody many of the points brought out in the Design Considerations section of this article.

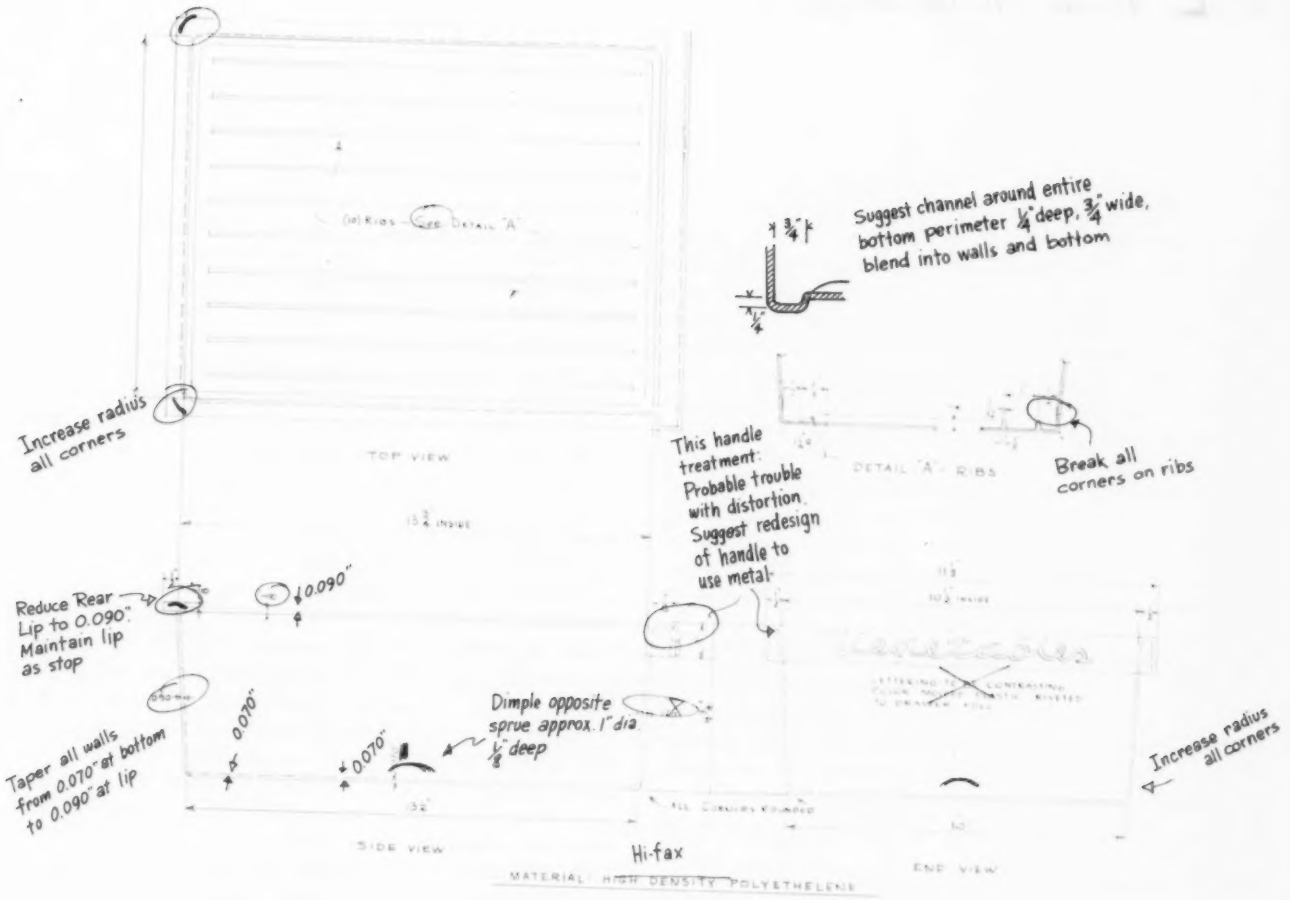
The product, a refrigerator storage box, is typical of many large, square shapes encountered in the design of housewares, appliances, business machine housings, and industrial moldings. The designer's original sketch calls for a one-piece molding with crisp lines, almost square corners, and a drawer-pull that is an integral part of the unit. This concept, as translated into a detail drawing, is shown on the facing page, with inked-in changes and notations indicating the Hercules engineers' suggestions for adapting the design to make the best use of the characteristics of the chosen plastic and the molding process.

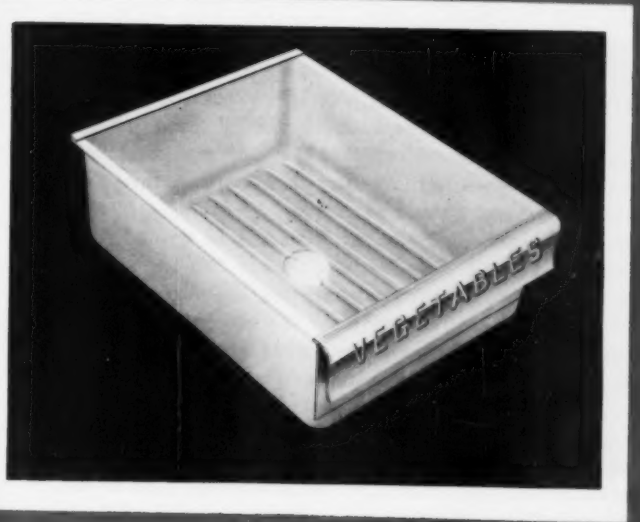
A rendering of the model (bottom of opposite page) incorporating these changes indicates that the product remains visually much the same; the most obvious difference is the substitution of a metal pull for the integral plastic one originally specified. As the engineers' notes show, this element represented a possible trouble spot in the molding cycle, but the substituted metal part will, in addition, add strength to the structure. The remaining changes have to do with the rounding of corners, tapering of walls, and addition of bottom channel to provide rigidity.

In practice, such a model would actually be constructed in any material convenient to the model builder and suitable to the use to be made of the model. Precision-built models, conforming to all the engineering modifications recommended in a detail drawing, can be used to gage wall thicknesses, determine weight (and thus accurately predict material costs), and in some instances may actually serve as a pattern when mold construction starts.



Refrigerator storage box *as sketched by designer calls for an integral drawer-pull and almost-square sides, both of which would be likely to cause trouble in molding (see drawing, right).*





Rendering of model *of storage box, incorporating changes indicated in drawing (above), would have rounder corners, separate metal drawer-pull.*

setting materials because these materials begin to harden as they form. A wall thickness of less than 0.062 inches is rarely successful in thermosetting materials except for very small, slightly stressed articles; a thickness of 0.125 is usually considered a more reliable minimum. Thicknesses greater than 5/16-inch are seldom practicable, and are not economical because of the long time required to transfer the heat necessary to set them. Also, the material may begin to harden, or cure, before the mold cavity has been completely filled—resulting in a faulty product; or the heat may penetrate the material unevenly and the cure, in consequence, will be irregular or incomplete. This will create variations in density, thus causing internal stresses—although these can sometimes be distributed evenly by adjusting the contour of the wall.

Taper or draft: Walls should be provided with a taper or draft, both inside and out. In deep-drawn articles, converging tapers assist the molding process by creating a wedging or compressing action; in compression molding of thermosetting materials, tapers increase the density of the plastic in the upper sections. There are no precise calculations or formulae for taper; the amount required will vary with the depth of draw.

Radii or fillets: Fillets, as I have mentioned before, are the rounding of wall profile at the juncture of two wall sections of different thicknesses. Their principal function is to distribute stress, but they also facilitate the flow of plastic through the cavity and simplify the ejection of the molded article. Whenever the flow of plastic is checked by such abrupt shapes as sharp corners, the material may circle back upon itself, creating a condition of turbulence which forms stress patterns that weaken the plastic structure. Concentration of stress builds up very rapidly whenever the radius of a fillet is less than one-quarter the thickness of the wall; but there is very little benefit from the use of a radius greater than three-quarters of the wall thickness. The elimination of sharp corners permits uniform, unretarded flow of the plastic into all sections of the mold, and will result in a more uniform density throughout the molded article. Fillets also reduce the danger of cracking as a result of notch-sensitivity, and they increase the overall resistance to sudden shock or impact.

Ribs: The function of ribs, as indicated in the discussion on wall thicknesses, is to increase the rigidity and strength of a molded article without increasing wall thickness, and to prevent warpage. The width of the base of a rib should be less than the thickness of the wall to which it is attached. If this width is reduced to one-half the wall thickness, the increase in thickness at the junction will be slight enough to make sink marks improbable. It is better to use two or more ribs than to increase the height of a single rib.

Bosses: Bosses are protruding studs or pads used to reinforce areas around holes or to provide heavier areas for mounting an assembly. The same general precautions which apply to ribs also apply to bosses. They should be located in corners wherever possible, and should be small: their height should not be more than twice their diameter. Also, they should be provided with sufficient draft to insure easy removal of the article from the mold. When bosses are to be used for mounting one part against another it is usually necessary to grind their top surfaces flat in order to achieve perfect alignment, and since it is easier to align three points than four, it is recommended that bosses for this purpose be limited to three. In designing plastic parts meant to fit on flat surfaces, it is best to avoid the use of high bosses. Ribs may be used along the side of a boss to facilitate the flow of the plastic. It is very important to use fillets at the junction of boss and wall section.

Holes: A distance equivalent to the diameter of the hole should be provided between a series of holes, or between a hole and the side wall. It is always wise to provide as thick a wall section as possible. The problem of design is more complicated when a threaded hole must be used because the concentration of stress immediately around a hole causes notch-sensitivity. The distance between the edge of a threaded hole and the edge of the article should be three times the diameter of the hole.

Through holes: Through holes are usually more useful for assembly, and also they are easier to produce. In molding, they are preferred whenever possible because the mold pins which form the hole can be supported from both sides of the mold.

Drilled holes: It is often less expensive to drill holes after molding than it is to attempt to mold them, particularly when they must be deep in proportion to their diameter.

Side holes: Side holes are difficult to produce, and present problems which are not easily solved because they create undercuts. Holes which must be molded at right angles to each other necessitate split molds and therefore are costly, particularly in compression molding. This problem is less serious in transfer or injection molding, but there remains the necessity of withdrawing the core pins from the molded piece prior to removing it from the mold.

Surface treatment: Plastics lend themselves to many different kinds of surface treatment. The possibilities range from mirror-like sheen to dull satin finish, and include such textured effects as fluting, reeding, stippling, striae, diamond-knurl cut, and leather graining. All of them are helpful in concealing blemishes which might be objectionable on a highly lustrous surface. One of the most difficult problems encountered by the molder is, in fact, the production of large flat surfaces with a high-luster finish free of flow lines and other imperfections. He must invariably resort to special molding techniques to get this effect, and these are both time-consuming and costly. The design of a plastic article in which cost is crucial should be modified to specify one of the above surface treatments, or should substitute wide, sweeping curves, or domed surfaces, for flat ones.

POSTSCRIPT AND PREVIEW

It is not by chance that the word considerations *appears in the headings of both parts of this second installment of Plastics for the Designer: "End-Product Considerations", "Design Considerations" — these terms were calculated. Picking the right plastic for a particular product cannot be reduced to a simple 1-2-3 listing of which plastic to use where. The range of available materials is far too large, and while no two are the same, very few are unique — the field as a whole trades and borrows properties back and forth in a way that makes clear-cut distinctions impossible. To complicate matters further there are no generic traits for plastics beyond their moldability. Woods or metals, for instance, have recognizable family characteristics; a design meant for one wood can usually be transposed into another without difficulty. But plastics can look and behave like rubber or, as in several of the newest compounds, compete with metal in rigidity. The process of selecting becomes therefore the process of* considering*: of lining up all the properties that a product must have, of evaluating their relative importance, of taking into account what the material and the molding process can and cannot do (the great danger in plastics lies in their magic-wand appeal, their seeming ability to do or be anything the designer desires). The end result of this* considering *is actually only a midway step. Just as a scientist postulates a theory, establishes the questions that have to be answered, and frames his field of inquiry, so the designer sets up his problem, his questions, and his possible area of solution. With these, he will go to the plastic expert, the design engineer of the plastic supplier whose material seems best suited to his product. This final step will be the subject of the final installment of this guide: who these suppliers are, what specific materials they make and in what form they supply them, what kind of design aid they make available, and where to apply. Part III will conclude with a glossary of plastic terms compiled specifically to help designers talk to plastic engineers in the latter's own language.*

Albrecht Graf Goertz muses over a plaster model of his BMW 507 in his New York office.

Albrecht Graf Goertz has redirected John Babsone Lane Soule's admonition, "Go west, young man," and founded a flourishing consultant practice in Europe. Four times a year on rigid schedule, Goertz planes from New York to another office in Munich to handle a network of clients that has spread from his native Germany into Switzerland and recently into Italy. Though the majority of his work is done on the Continent, Goertz endures the life of a transatlantic commuter because his American base of operation enables him to have the best of two worlds. European industry is well aware that American design is in some ways further advanced than the domestic variety and that the American designer offers a broader platform of experience for the successful styling of products. Conversely, the designer finds in Europe a richer frontier of design possibility, particularly in the field of entrepreneurial service. Goertz—much to his satisfaction—finds himself engaged in the kind of across-the-board design that is seldom opened to any but the largest and best established offices in this country.

For the ambitious smaller office, the European market would seem to promise mammoth potential. But Goertz is first to acknowledge that there is a kicker in his situation. Because of his unique credentials, he is not willing to call himself an object lesson for young designers who wish to scale the professional ladder several rungs at a time. He lived in Germany for 22 years prior to coming to the United States in 1937. Not only does he speak the language—a prerequisite for working abroad—but he possesses a natural insight into the workings of the German mind that he calls the secret of his success. Such intuition is normally lacking in the American abroad; Goertz can list a number of American designers who have scoured Europe unsuccessfully in an attempt to trap clients. Furthermore, Goertz has one more subtle advantage. "Graf" is not a given name, but the family title, Count; it is an impressive passport into the inner councils of German industry.

On his four month-long trips abroad, Goertz manages to see each of his clients though he may not at the time be doing work for all of them. And on each trip he normally arranges his schedule of appointments for the next trip so that his clients will know, to the day and hour, when to expect him again. Working in Europe, however, has liabilities over and above separation from home and family. The freedom and scope of activity that Goertz enjoys in Europe spoils him for the kind of assignment he could get in this country. American companies are not likely to grant such powers to a small office without a major reputation unless it can present a portfolio of success. Thus as he takes on new clients similar in size, but as widely dissimilar in products as BMW and Agfa, Goertz hopes to enrich his portfolio by adding whole chapters to it.

A second son makes his way

Goertz came to the United States because traditionally in Europe it is the lot of the second son to strike out on his own. Settling on the West Coast, he worked for a time in an airplane factory, then set up an auto body shop in Los An-

Albrecht Graf Goertz commutes to Europe from his New York office to design for continental clients who believe that

DISTANCE MAKES THE DIFFERENCE

Goertz designed the sports car below at his custom body shop in Los Angeles in 1938. It was shown at the San Francisco World's Fair in 1929; after the war, it helped him to get a job designing for Raymond Loewy.

geles where he customized cars. In 1938, he designed an automobile that subsequently was the only car displayed at the San Francisco world exhibition on Treasure Island the next year. When the war came, he stored the car and went into the army, spending five years as an infantry soldier. Tired of the Coast after the war, he drove his car to New York to look for work. On the day he arrived, he parked in front of the Waldorf "behind another freak car" whose owner was intrigued by the Buck Rogers design of Goertz' automobile. The man was Raymond Loewy. Three months later, he hired Goertz (whose only design schooling was at Pratt during the interim) to work on the Studebaker project at South Bend. Goertz left Loewy in 1950, and put in subsequent tours of duty with Carl Otto and Norman Bel Geddes, where he was "fired fifty-eight times in eight months."

In 1952, having decided that he knew "all the crazy people in the business," Goertz established an office of his own. He did a number of small jobs for toy and plastic companies as well the decor for several auto shows. Some months after Goertz started, Max Hoffman, an importer of foreign cars, mentioned to him that he had taken on BMW as a new client, but that the car as then designed wouldn't sell in this country. He suggested that Goertz draw up sketches for a new BMW and send them to the auto company's management in Munich. The designs were accepted, and Goertz had his first major European client.

Goertz worked for BMW for two and a half years, and designed both the 507 and 503 models which were introduced in 1955. He also created a Cadillac chassis for the Fratelli Motto of Turin. His automotive experience started a parade of clients to the small office he maintained in Munich. Invariably Goertz found that he was their first experience with a designer. This situation enabled him to work directly with presidents and chief engineers without having to ford his way through echelons of management. Generally, Goertz claims, the heads of European concerns know more about their products than the professional managers of American corporations. But this personal relationship works both ways; it is written into all his contracts that Goertz himself must be the contact with his clients, who are wary lest he send them someone who does not speak German.

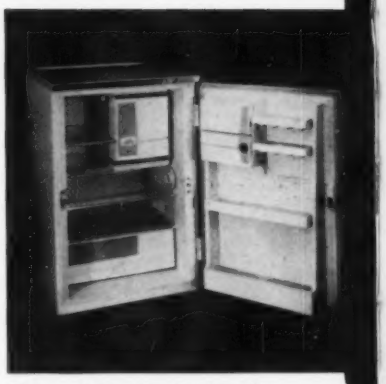
Transatlantic brood time

Besides automobiles, Goertz has designed a line of cameras and slide projectors for Agfa, cigarette lighters for Rowenta Metallwarenfabrik, and three stylized clocks for Kienzle. He did a stove for Neff Werke, but gave up this client when a competitor, Gesellschaft für Linde's Eismaschinen AG, asked him to design a series of commercial and household refrigerators which were marketed for the first time at the 1958 Cologne Fair. At present Goertz has two secret projects, a new automobile account, and a complete line of radio, television, and record changing equipment for a client who wishes to introduce all the new products at one time in early 1961.

Goertz has found that his quarterly trips to Europe keep his thinking fresh. He has three months brood-time between

Electric range designed for Neff-Werke, Bretten, Germany. The lid folds into back panel.

A 35mm slide projector, model CP 35 that Goertz designed for Aga. He also did line of cameras.



This refrigerator designed for Linde has a capacity of 135 liters and an interior color scheme of white and turquoise and chrome.

"Most American designers go to Europe to look around and pick up ideas," says Goertz. "I just reverse the process."

A clay model of the BMW 507. Goertz' success in automobile design has recently won him another major European car account.

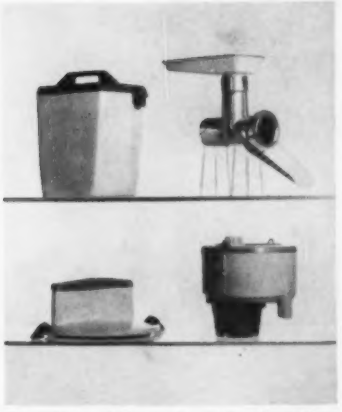
The finished BMW 507 sports touring car. The car was introduced in 1955, has a top speed of 125 mph, costs $9,000.

visits to his clients, which he says gives an objectivity to his designs that would be lacking if he were confronted with the problem daily. It makes him less apt to become passionately attached to a design nuance that he might regret in the finished product. Also it conditions his clients by giving them time to find his suggestions more palatable, a device that Goertz has found most useful. To illustrate this point, he takes the electric blender, Starmix, that he redesigned for Electrostar GMBH.

Softsell

Starmix executives approached him in 1957 to restyle their mixer whose sales had decreased in the face of competition from the newly-redesigned Braun mixer. They gave Goertz minimum specifications and some of the standard parts and attachments. He returned to this country, made his sketches, and mailed his renderings to Germany three weeks ahead of his next trip abroad. Goertz usually sends his clients five or six models or sketches, and always packs them so that the first one that they see is the one that most closely resembles the current product. The bottom, most radical, design is the one that he himself favors. The three week delay between receipt of the packet and his call normally finds the client switching his regard from sketch No. 1 to one in the middle of the pack. Once he arrives on the scene, Goertz claims that it is not too difficult to lead the client all the way down to the one at the bottom.

In the case of the Starmix, Electrostar selected sketches



The Star Mix mixer-blender that Goertz designed for Electrostar GmbH has a number of accessories.

The mixer can be placed either vertically or horizontally depending on the accessory in use at the moment.

At far left is ice cream freezer attachment; left top, meat grinder in which machine is turned on side; left bottom, combination electric mixer and blender. Above top, are all attachments including a vegetable shredder.

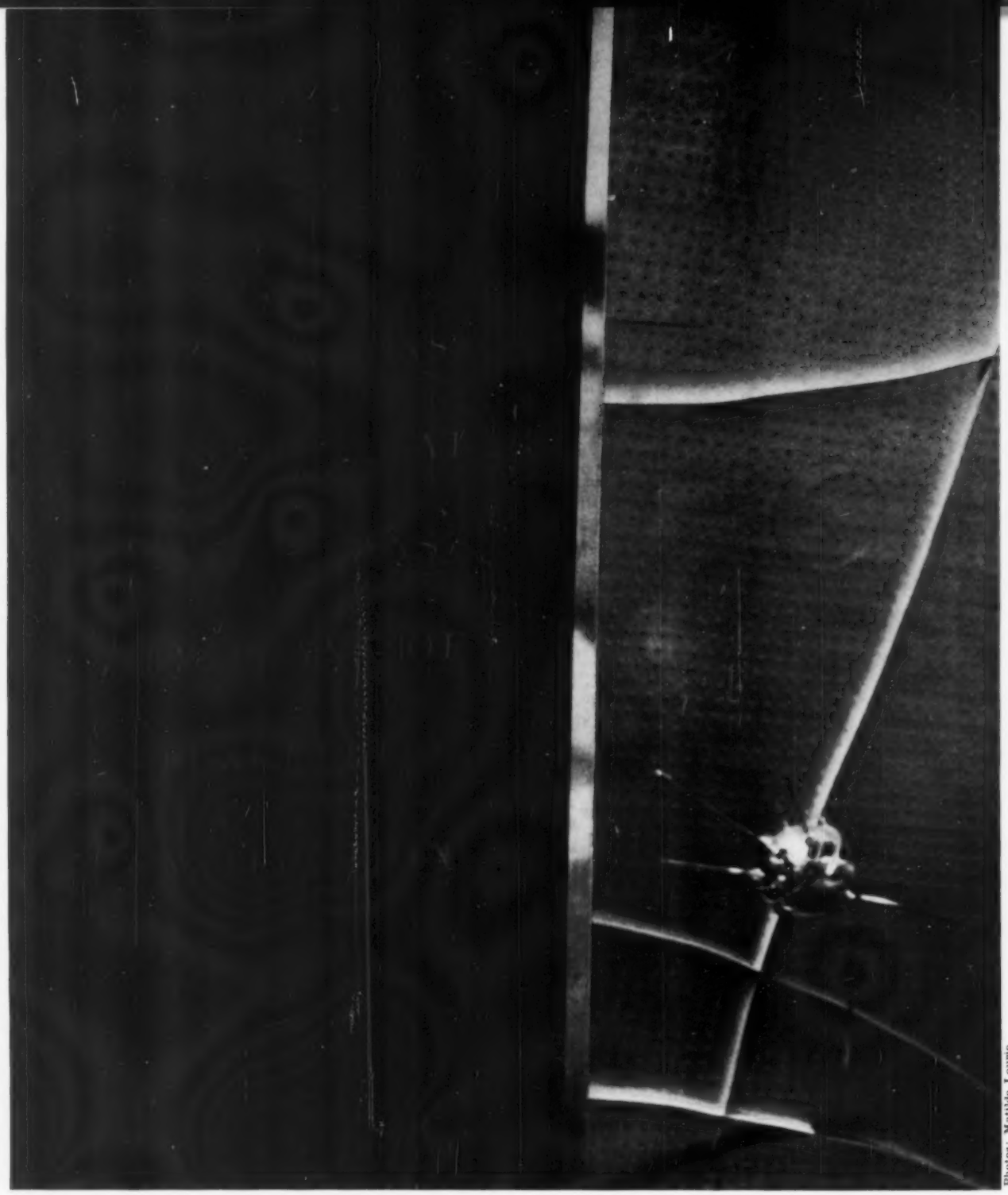
No. 4 and No. 5 for mockup models, finally chose the design that Goertz had preferred all along. On a subsequent trip to Germany, Goertz made slight changes on the prototype, and presented his designs for the accessories. The German firm bought the whole package, only making changes where they would facilitate production. So delighted was Electrostar at the success of the new blender that they gave Goertz a three year contract to work on other products in their line which includes vacuum cleaners and floor polishing machines. Furthermore, they use his name in all their advertisements promoting the mixer. This is not unusual in Europe, and for the non-resident designer greatly eases the problem of soliciting new prospects.

The ocean between fees

Goertz says that the lack of pressure in the European market makes it possible for the designer to strive for a level of quality not always attainable here. Time is not as urgent a problem because there is no compulsive annual model change. There is also less committee design, and hence less compromise. The one major drawback is the eternal problem of fees. By European standards, Goertz is expensive. In many cases, he draws more than the director of the company by whom he is retained. He is normally paid a flat fee because the ocean that literally exists between client and designer makes it impossible to check hourly rates. Most European designers work on a royalty basis, a system Goertz refuses because he wants the freedom to design for competitors. But in spite of his relative expense, Goertz has discovered that to realize an income comparable to American standards it is necessary to take on a proportionately greater volume of work than designers in this country.

Will Mahomet go to the mountain?

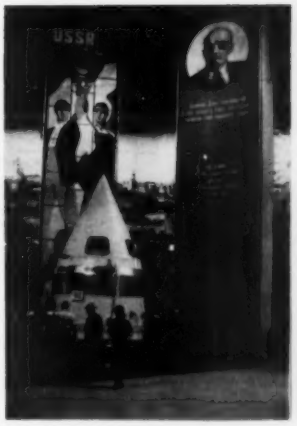
Recently Goertz has opened another office in Zurich whose primary function, like the one in Munich, is to keep his schedule in order and, as he says, to "plug" for him. He has also made preliminary explorations into Italy "mainly out of curiosity," because of the esteem that Italian design enjoys in this country. By crossing national frontiers he hopes to absorb the best of the local design temperaments to give added breadth to his work. Despite his expansion, however, Goertz does not want to become a large organization. He wishes to keep his hand on everything that comes into and goes out of his office. There is, perhaps, another reason for Goertz' desire to curb his size. He is tired of traveling, and would like to obtain American clients for whom he could use the lessons he has learned in Europe. Therein lies his dilemma. Goertz has established a pattern of operation and terms for dealing with clients that are extremely pleasant. Because he is a success in Europe, he is understandably reluctant to sacrifice these broad benefits in order to get American clients who would not give him the same latitude. By stretching a point, one can say that Goertz is in a position similar to Mahomet and the mountain. But perhaps in this day and age, even the mountains of industry can be met half way.—G. D.

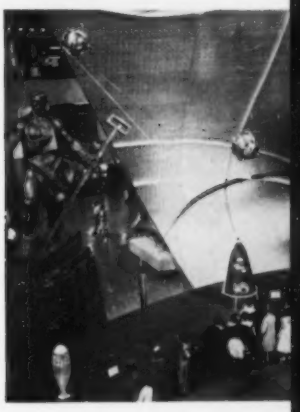


Photos: Matilde Lourie

Juxtaposition of space-age sputnik with statement on "peaceful intentions" sets tone for entire exposition. Russian ambiguity makes it difficult to tell precisely what effect was calculated.

Impressive exposition proclaims Russia's technological advances—and probable superiority in cosmic aeronautics—— but devitalized and unimaginative design, architecture, and art create a vision of the future that is already obsolete.





THE RUSSIAN PROFILE: 1959

The Soviet Exhibition of Science, Technology and Culture *poured out $12 million and utilized over 10,000 objects in creating a profile that would impress, beguile, and enlighten its American audience. In spite of this, those who wanted a genuine sense of the quality of Russian life found it frustratingly difficult to "strike through the mask." The two-floor, six-acre show put the emphasis on Russia's youthful, muscle-flexing technology. One whole floor, or 50 per cent of the exhibit space at New York's Coliseum was given over to diverse accomplishments in agriculture and industry, science and technology, radio and electronics, atomic energy, optics, and transportation. Awesome and impressive, they dazzled without being necessarily intelligible to the one million curious Americans who swarmed into the show, buttonholed some 50 polite, English-speaking, American-dressed Russian guides, and registered their pithy reactions in guest books scattered throughout both floors. All other aspects of Russian life had to be described in the remaining half of the space, where, jammed into the Coliseum's third floor, exhibits covered education, health, sports, construction, the arts, and social welfare. To dramatize the development of their country in the 40 years since the Revolution, the Russians proudly presented autos and combines, electron microscopes and books, nuclear reactors and rockets, a piano, an underwater tv camera, a model apartment, and a fashion show. Scores of carefully designed models showed huge installations like the Stalingrad hydroelectric plant, an iron and steel mill, and a synthetic rubber factory. TV screens supplemented exhibits with films on technological developments and unsurprisingly idyllic impressions of Soviet life. The exhibition was arranged in accordance with a reciprocal agreement between the Soviet government and the U.S., and marked the first time the Russians had played to American audiences since their exhibition at the 1939 World's Fair. (The U. S. Exhibition, which has created a storm in Moscow since it opened last month, will be fully reviewed in ID's September issue.) Before the news-making opening, Director Alexei Manzhulo announced that the purpose of the exhibition was "to show Americans how the Soviet people live and work, and to acquaint American businessmen with the fact that we manufacture many items that could make for mutually profitable trade." For an interpretation of why the Russians fell short of their intentions, see overleaf.*

Russia's show smiles without being friendly, blurs line between hopes and realities of Soviet life

The monumental bust of Professor A. S. Popov (right) which confronted exhibition visitors in the midst of the radio display, bears a single, simple legend: "A Great Russian Scientist. Inventor of the Radio." The reaction of visitors to this bald claim sums up the difficulties of communication between two peoples with two different frames of reference. Actually, Professor Popov is not a figment of Russian imagination. Westerners familiar with the history of radio have said that Popov did indeed develop an early type. But his work had little direct influence on that of Western inventors, and most reference books, such as the *Encyclopedia Britannica*, neglect to mention him. Yet the Russians, who have been well aware of this, simply plopped Popov in the main path of visitors with no placard to defend their claim or explain the confusion—with the result that Americans were either perplexed or annoyed. This kind of failure to estimate their audience and to place ideas in meaningful context was a major shortcoming of the Russian show.

The exhibition also fell short in the relatively simpler area of exhibition technique. For one thing, it was not well edited. By placing equal emphasis on many elements, it created no proper sense of scale between the more and the less important. In addition, it was difficult to tell where one subject area ended and another began. Color was seldom used as a design aid, and graphic design was chaotic. The dozens of printed brochures seemed to have no relation to one another, nor to the exhibit itself (apparently many had been printed for other occasions before doing duty in New York). Most labels were one-and-two-line affairs in a flavorless type face often too small for even the seriously interested to read. A predilection for repetition cropped up in many displays. Could a hardened New York exhibition audience spend more than 20 seconds on, not a select few, but a whole case-full of—to them—prosaic wrist watches and alarm clocks? But with this said, it is important to remember that poor exhibit technique registered more sharply on the informed designer than on the average visitor. The general public may have come away with a confused notion of what the Russians were trying to say, but they also reacted to an impressive technological parade and to a mass of exotic images. Indeed, in this case, unvarnished technique did not add up to a boring show: though seldom appealing, it was fascinating.

Fact vs. Fiction

Perhaps the most annoying thing about the exhibition was the blurred demarcation between what actually exists and what is projected for the future. The text on a huge table-top model of a Russian airport for instance, nowhere actually *said* that it already exists, but by neglecting to mention that it does not, misled most visitors. The auto display, with its model of the latest Zil—produced in limited quantities for official use only— did not *say* that this was so; there was simply no statement about the car. Under the circumstances, at least some uninformed Americans probably assumed that there is a Zil in every Russian garage. Yet, like the American exhibitors at Moscow, the Russians were obviously concerned with the problem of credibility; with how they could convince Americans of the truth about their country. Unfortunately, their tired solution was one they've been using in publicity since the Revolution: statistics. Next to models, beneath pictures, stretching up on giant, two-story exhibit panels were facts and figures, figures and facts. Russian designers failed to realize that, in the West at least, there is a low saturation point for the kind of statistics and slogans they have been hammering out for forty years. Yet in spite of their abundance, statistics were frequently missing when they might have been most interesting—the actual number of certain industrial and consumer items produced. And visitors were especially dismayed that few consumer goods were price-tagged. On the whole, the much vaunted Communist persuasion technique was unsuccessful with Americans. In fact, if Russia wishes to retain her reputation in the art of mass persuasion she might think of sending members of Agitprop to the U. S. A. for a year's sabbatical on Madison Avenue.

Few "decisive moments"

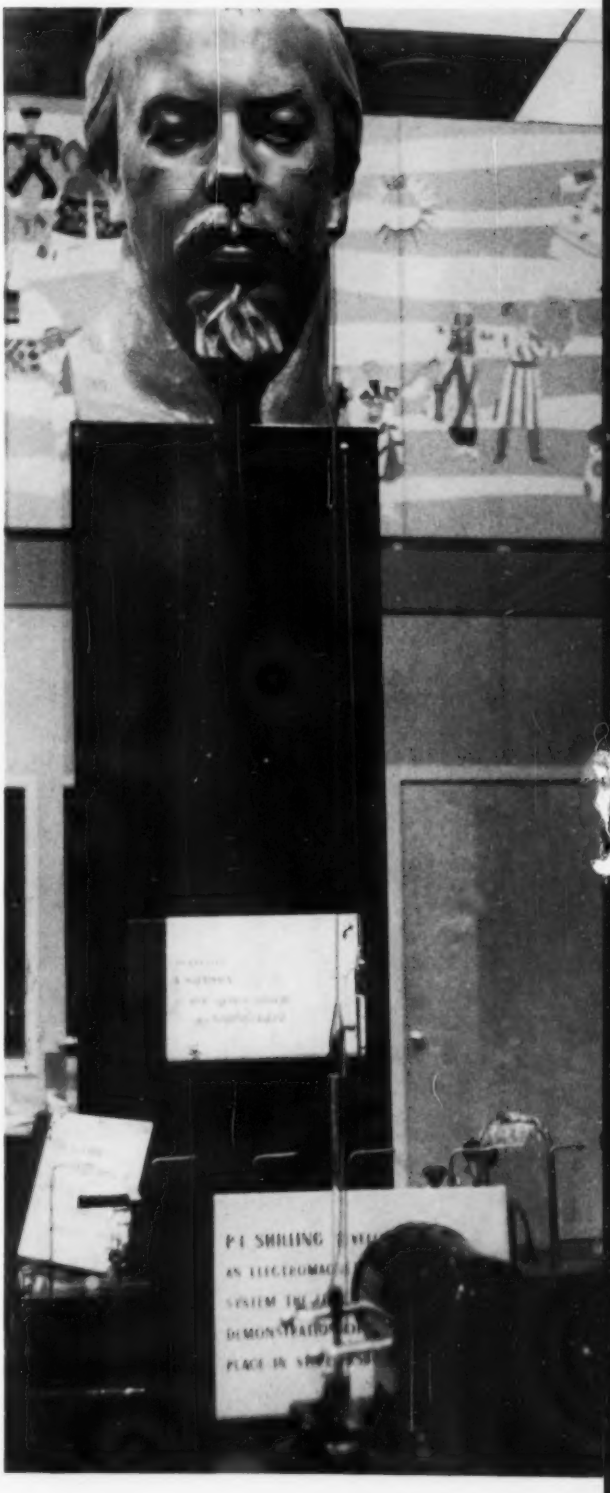
A curious effect of the Soviet exposition was that, despite the facts and statistics, one had a recurring sense that something was phony, that somehow the picture of Russian life was not authentic, and that the smiling worker behind the machine had in turn a machine behind him. Part of the sense of the unauthentic derived from a constant pictorial and verbal emphasis on the general rather than the particular. Instead of specific individuals in reasonably convincing situations, photos tended to show *groups* of happy farmers, or happy school children, or happy cancer patients. Always groups. Always a uniform reaction. There was little allowance for the off-beat, the unique, the precious individual; and Russian photographers have not discovered Cartier-Bresson's "decisive moment." Only when politically expedient, as in the case of using Van Cliburn's face on a piano-shaped box of candy, were individuals singled out. One monumental blow-up depicted an obscure collective farm director and "hero mother" complete with bemedaled chest. The photographer's chilling disregard for the woman's individuality contradicts any intended impression of the good life in Soviet Russia. In fact, it was not a warm, friendly exhibition, and this reporter was unable to find the exhibit an especially attractive or pleasant one. Yet a simple statement of what the nation faced in 1918 and a description of the staggering obstacles she has since overcome would have readily gained the sympathy of the visitor where other means failed.

On the top floor of the exhibition the consumer goods were arrayed in considerable variety. But there were few appliances, only one refrigerator, no stoves, irons, fans, flashlights, washing machines, air conditioners, lawn mowers or girdles. (Ironically the Russians still fall short in the realm of producing material goods—the very realm which Marx always emphasized.) For the most part the goods that were shown looked dull and indicated what can happen to styling when design is divorced from the necessity to sell products in competition. The clothes, for instance, conveyed no sense of the fun and excitement which even an Ohrbach's number often has in America. As anticipated, many of the consumer goods, especially autos, were scrambled imitations of American models of a few years ago, and the high-shine, rounded tv sets and radios had a strong German flavor. It is not particularly surprising that Russia, zealous to get ahead, should borrow design ideas—most countries have done so in the early years of their technological development. But in avidly swallowing all that Western design and technology has to offer, the Russians are swallowing the mistakes —right down to Detroit tail fins—along with the achievements. Rather than developing new solutions of their own, the Russians are assimilating with astonishing speed all the problems and deadends with which Western designers are familiar. Because of this their vision of the future seems already obsolete.

If the top floor of the exhibition tended to present a picture of what Russia *hopes* to achieve in the way of the good life, the main floor, with its profusion of impressive scientific equipment, showed something of what Russia has actually achieved in her technology. Though the designer could discover few new ideas here (the many handsome models omitted important details), he could see where Russia stands in many fields—if not all. There was a model of a rubber factory, for instance, but the infant plastics industry was scarcely represented.

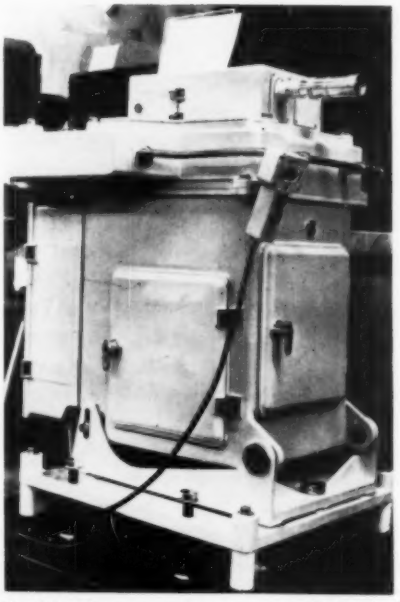
Besides presenting a profile for Americans to see, the Russian exhibition was also part of a drive to do business with this country. The visits of Frol Kozlov, Russia's First Deputy Premier and Khrushchev's most likely successor, as well as Foreign Trade Minister Mikhail R. Kuzmin, were incidental to this. Despite such publicized deals as the one involving purchase of unusual Russian suturing devices, the Russians did not do too well. But this is at least an opening wedge, and Russian may very well modify her designs to gain new markets. This will be a development for American designers to follow, and the picture of Russian design at the Coliseum was an excellent introduction. For the public at large, however, Russia's zeal in presenting the show was somewhat misdirected. With better understanding of the audience and a more consciously "designed" exhibition, Russia could have helped Americans understand the country that remains an enigma.—*A.F.*

Imposing bust of Popov credits him with invention of radio in a single, brief caption, but fails to give background necessary to support the claim. Reaction of most visitors was amused disbelief. Throughout most of the exposition, as here, Russia's celebrated skill at persuasion was seldom evident.



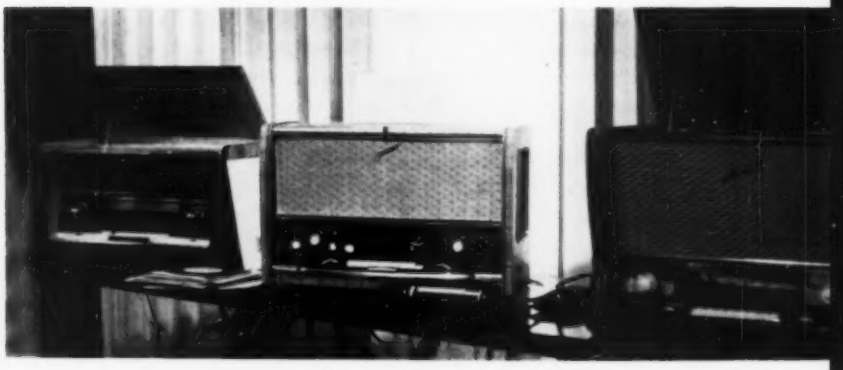
The design of Russian products shows an unevenness not surprising in a rapidly industrializing nation

Many of Russia's scientific instruments and industrial equipment, such as her huge tractors and cranes, have the rugged good looks that come from a direct approach to design problems. The medical equipment was especially notable for its strong forms and ingenious design solutions. But Russians themselves agree that they have not yet had time to develop an original approach to the styling of consumer goods. Yet wholesale borrowing, down to even the emblem on the Cadillac, indicates more than a lack of time. It suggests a complete absence of originality and of the self confidence necessary to utilize it in most non-technological fields. Reports of attractive wooden restaurants just completed in Sokoluiki park may indicate that, at least in architecture, the Russians are headed for a new attitude toward design.



Machine for measuring superspeed physical processes with bright luminescense takes from 2 to 33 million photos per second.

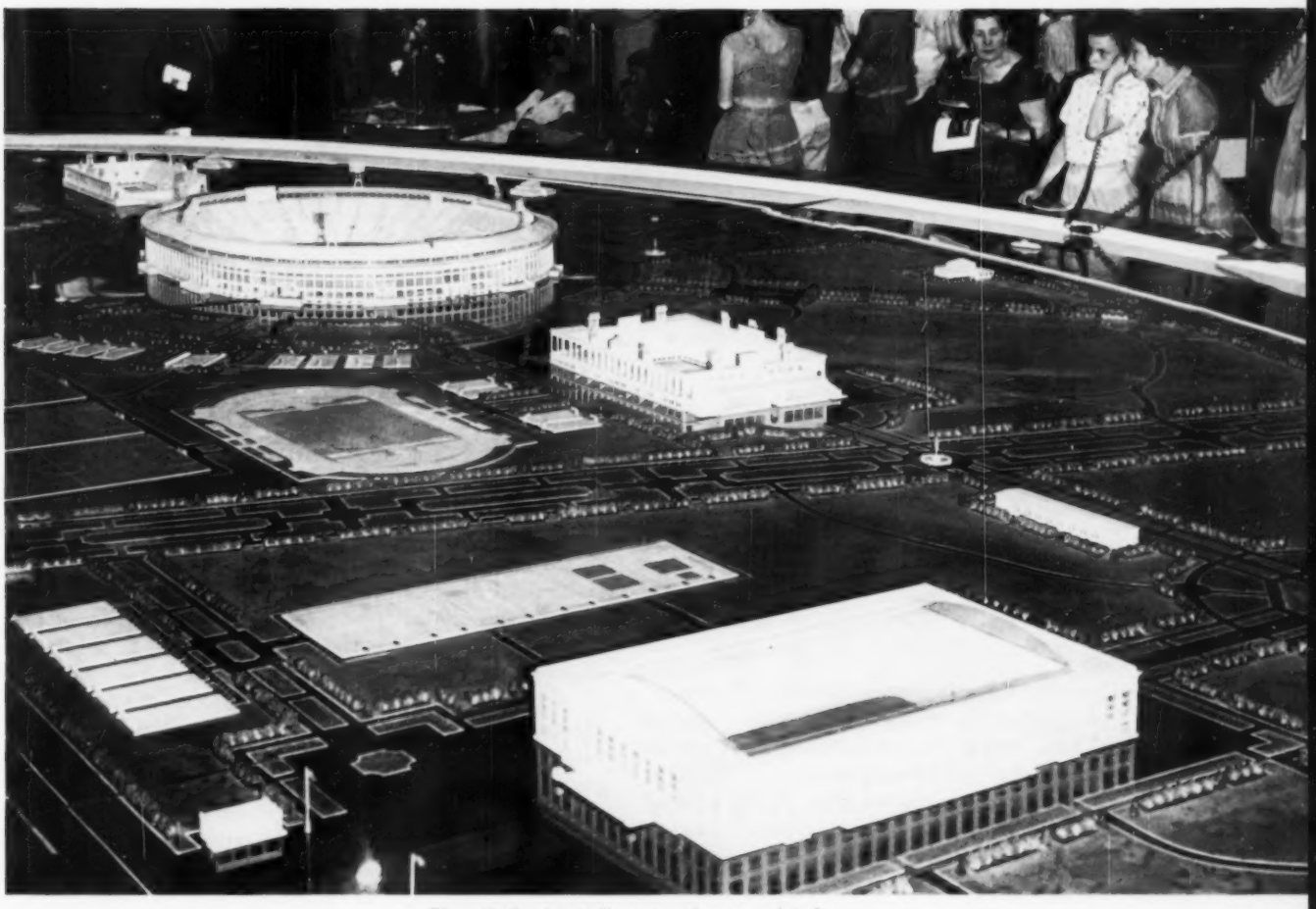
Russian radios, hi-fi and tv equipment were among few consumer goods shown, indicate strong German design influence.



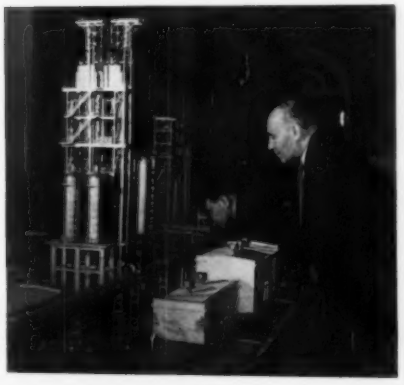
Tall visitor stands before Korin's tall figure of Maxim Gorky done in 1928. Portraits, poster art, and heroic sculpture predominated.

Bottom three photos: Matilde Lourie

Cadillac V has been appropriated by the Zil-IH Russia's luxury car. Has powerful 220 hp, V-8 engine.



Gigantic Lenin stadium complex, completed in 1956, stands just outside Moscow. It retains strong neo-classic elements.



Butane dehydration installation was part of elaborate model of plant which produces butadiene from butane.

Three rooms of the model apartment are small but comfortably furnished. Handsome rug is most attractive touch.

Matilde Lourie

In spite of generally poor graphics, message frequently got through, as here, that such things as medicine are free in Soviet Union.

Exhibition's design director speaks his mind: on this show, on Brussels, on Russian design

Konstantine Rozhdestvensky

Mr. Rozhdestvensky, with whom did you work in developing concepts for the exhibition, and when did you begin?

As early as December I was here to look over the Coliseum. After that, a group of designers and architects composed of Boris Rodinov, Ivan Leonidov, Nikolai Grishin and myself worked out a general design for the exhibition. At the same time a group of methodists began working over the list of exhibits and developing texts. In Russia, methodists, in cooperation with artists and designers, work out the theme of an exposition.

What ideas were you trying to get across?

We wanted, of course, to do more than simply create a series of interesting exhibits; we wanted to create an atmosphere, a sort of program music, which would express a certain quality. Since the first impression of an exhibition frequently determines the success of the whole show, we concentrated on the central exhibit, which included our sputnik against a giant sheet-aluminum backdrop. This nonrepresentational central exhibit is intended to convey a certain feeling—one which combines a sense of the tremendous growth of Russia with a sense of cosmic space.

I believe you also designed the Russian pavilion at the Brussels Fair. What impressed you most about that fair?

I particularly admired the Swiss and Czech pavilions, the introduction to the British exhibition and the architecture of the French pavilion. And the Finnish and Mexican pavilions were good in expressing the quality of their countries very well. In this sense, I think the American pavilion was less successful. Its architecture was excellent, splendid. And the grand scale of the interior proportions corresponded to the scale of America herself. But the interior design did not adapt itself to the architectural space. In fact, the interior was cluttered and obscured to the extent that the original sense of space and freedom was spoiled, I think. The drawback in our present show is that there are too many exhibits. Ultimately, it seems to me that the most valuable exhibit is always open space—something that most exhibitions lack.

How did you happen to become an exhibition designer, and what was your preparation for the field?

I studied at a school in Leningrad which used to be called the Institute of Artistic Culture, and my first interest was painting, but the curriculum also included architecture, stage design, and product design, along with general academic subjects. The philosophy of the school at that time was that one must do more than paint; one must be able to design chairs, decorate interiors, make posters. This kind of all-around education gave me the background I needed for exhibition design. The head of the school was Malevitch, the Suprematist, who was one of the first artists ever to create complete abstractions based on geometric designs. Some years later, in 1935, I was with Malevitch when he died of cancer in his Leningrad apartment. Russian art of the 1920's, of course, has had much influence on what is being done now in the West, and most of the art and design which I see here is simply a repetition of what was done then. However, I think that an awful tragedy has occurred in Western painting. Painters have turned from a devotion to the logic of plastic forms to a devotion to expressing their own psychological feelings. The result is that the meaning of the painting is clear only to the artist, and art becomes a trifle with no social function.

There is a feeling among American designers that Russian products which emphasize engineering qualities, such as airplanes and tractors, are more successful in a design sense than such consumer goods as cars, radios, refrigerators. Do you agree?

It is true, for instance, that the speed of an aircraft to some extent determines its form. Our fast modern jets look much different from the slower planes of the '20's. In such a field you might say that technology determines form. In other fields we tend to design products to make them look "artistic." The task of the real designer, of course, is to oppose this trend, and in Russia we are trying to improve the appearance of many objects by making them simpler. You must remember that our country is vast and that there are design departments spread all across it. You have the impression that everything is organized and done by command in Russia, but in the design departments they do what they feel like! The result can be a tremendous variation in the quality of the design work produced.

How do these design departments function?

Design departments operate within many factories, especially in such fields as ceramics and textiles, where a number of designers will have their own office within the factory organization. In such industries as automotive and machine tool, most of the designing is still carried out by engineers. But my impression is that even here one engineer will assume the role of designer. Immediately after the war there was a strong tendency toward ornamentation in design, but we have now abandoned this trend in favor of a greater emphasis on simplicity and pure form.

LETTER FROM MOSCOW

While the Soviet exhibition was in full swing in New York, former ID editor Irma Weinig was busy in Moscow preparing for the American show there. Mrs. Weinig, who operated as a sort of Yankee version of the "methodists" whom Mr. Rozhdestvensky describes, helped the George Nelson Company gather the thousands of products which jammed the "glass box" at Sokolniki Park. After they were shipped off to Moscow, she went there herself to make sure that each item found its proper place in the elaborate "jungle gym" (below) designed for the purpose. Her letter was written during the desperate rush to get the show open on time. A detailed report on the design aspects of the exhibition and the Russian response will appear in September.

Fascinated Russian workers study a "jungle gym" model during construction of the American exhibition in Moscow.

America is on exhibit here already, although formal opening of the "Vuistavka" is a little less than three weeks away. Every day, including Saturday and Sunday, two Fords and one Mercury station wagon shuttle exhibit personnel from their hotels to Sokolniki Park. All eyes are on them as they drive down the Moscow boulevard.

Sokolniki Park has some amusements and formal flower beds, but is generally overgrown and more like a wood than an American park. The central mall of the park leads directly to the geodesic dome, which has weathered to a pleasant golden tone. The Russians asked for this building, and it is obvious why. Its method of construction is a marvel here, where they build brick upon brick, depending on man and woman power, and golden domes are an acceptable part of the Russian landscape, where they're not the least bit garish.

Russian women have finished putting concrete on the floor of both exhibition buildings and are plastering the brick walls of the exhibition office. They are generally young girls, wearing one-piece blue coveralls, old shoes that get plenty muddy, and shapeless cotton work-mittens. If you walk around in heels and fine clothes, as we did our first day, you can sense some resentment—compounded of embarrassment because they know how Americans feel about women doing hard labor and pride because they can do the job and suspect you can't. Now that we all slosh around in sneakers, jeans and shirts, we are more readily accepted. The Russians work with great vigor, not always with the proper tools, but their determination overcomes all obstacles. If they have no cutting tool at hand, they won't wait, but just bang away until the metal or twine tears.

The plastic parasols are also a Russian favorite. The umbrellas have weathered to various shades of yellow and green and now look like some wondrous plants mushrooming out of the earth. The "Stiklan Pavilion," as the glass box comes out in Russian, is just beginning to come to life. At first the ultra-clean glass and aluminum structure was too cold for Russian tastes. Now that the colorful pressed wood panels are installed in the individual cubes of the exhibition structure, it is taking on the bazaar look which its designers intended it to have.

As the packing cases are being opened, and American goods pile up ready for the designers, the Russian workers gather to see what we have brought. They mask their eager interest, however, and the customs official who must be present whenever anything is opened, cannot be impressed. When we are not looking, the workers—and the customs official — scoop up descriptive literature and even the newspapers which were used for packing, and pour over them.

A few blocks from the Park at the Mijkovo freight depot all the exhibition items have been stored in two warehouses. The young Soviet student who acts as transport manager and interpreter, has painted a sign in Russian and English which has been hung up over the warehouse, "Long live friendship between the people of the USSR and USA!" No argument here.—*I.W.*

U. S. SENDS FIRST NUCLEAR MERCHANT SHIP TO SEA

The $41 million, 22,000 ton N. S. Savannah will be tested in action to establish data for future nuclear ship design, before it is chartered to a private operating company for commercial service.

The launching on July 21st of the passenger-cargo ship N. S. Savannah shown here was a significant event on a number of counts. It marked the beginning of the use of atomic energy as a ship-propelling force along the trade routes of the world; it promised a new source of important data for nuclear travel; and it resurrected the name of a ship once prominent as an earlier "first of a kind." The 320-ton S. S. Savannah that crossed the Atlantic in 29 days in the year 1819 was the first vessel to do so under steam. The original Savannah extended to ocean travel a power source new in its day; one hundred and forty years later, its namesake is bringing to ship propellers and ship design the fuel characteristic of this age.

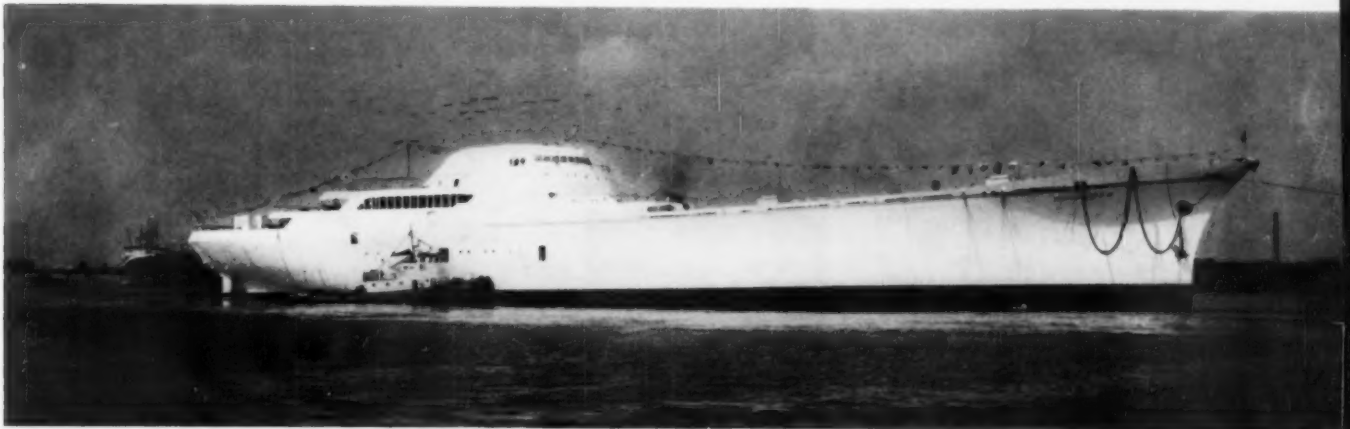
The N. S. (nuclear ship) Savannah uses a nuclear reactor (the same type that powers the U. S. S. Nautilus) and the nature of this power source is responsible for two distinctive features in the appearance and operation of the ship: it needs no smokestack, and it requires refueling only once every 3½ years. The Savannah's other vital statistics: passenger accommodations for 60; cargo capacity of 10,000 tons; normal cruising speed of 21 knots; normal cruising range of 300,000 miles; length, 587 feet; beam, 78 feet.

Experimental mission

The Savannah's main purpose will be to operate as a test ship. Designed by George G. Sharp, Inc. and constructed at the New York Shipbuilding Corporation at Camden, New Jersey, the development of the ship is the joint responsibility of the Maritime Administration of the U. S. Dpartment of Commerce and the U. S. Atomic Energy Commission. It is fully equipped to transport cargo and accommodate passengers and it will function in these capacities although not, initially, on a competitive basis. The plan is to use this merchant vessel to develop a practical construction and operating technology, and to employ this information in the design of future nuclear ships.

The Savannah will be operated, and the tests conducted, by a specially trained crew and a group of nuclear scientists. Sixteen licensed engineering officers are being instructed in reactor theory, engineering, and operation, under a contract with Babcock and Wilcox Company, developers and fabricators of the nuclear propulsion system. When these men begin to operate the ship sometime next year their task will also serve to allay public fears about the dependability and safety of nuclear-operated vessels and equipment. The tests and trials will be lengthy—they will last from six months to a year—but are hoped to prove conclusive. After that the ship will be put into limited commercial operation, will carry passengers (mostly scientists who will make further reactor studies) and cargo for about 18 months. At the end of that time the Savannah will be chartered to a private operating company for normal commercial service.

The prefix of the recently launched Savannah distinguishes the old from the new. A discussion of what the N. S. stands for, in terms of performance and inside structure of the ship, follows overleaf.



Christened by Mrs. Eisenhower, the yacht-like nuclear ship Savannah rides down Delaware River after launching ceremony last July 21.

The Savannah exhibits not only advanced technology but also new materials and products

The fact that the Savannah is driven by nuclear power shows up more in her sleek, stack-less, teardrop-shaped exterior than in her interior layout. The nuclear power arrangement consists of a reactor unit (see opposite page) and a propulsion system which form an integrated unit and differ from conventional ships only in that the reactor replaces the ordinary oil-fired boiler (the propulsion system consisting of main turbines and reduction gears, feed water system, turbine generators etc., is located in the ship's machinery department adjoining the reactor space).

All of the equipment in the reactor system (pressurized water reactor, pressurized vessel, coolant loops) is housed within a steel containment vessel (at right, opposite page) in the reactor space, which is located midship (see below) because of the weight of the reactor vessel and its lead and concrete shielding. The containment vessel is made up of a 35-foot cylindrical section and has an overall length of 50 feet. The 14-foot diameter cupola on top of the cylindrical section houses the control rod drives mounted on the reactor vessel head.

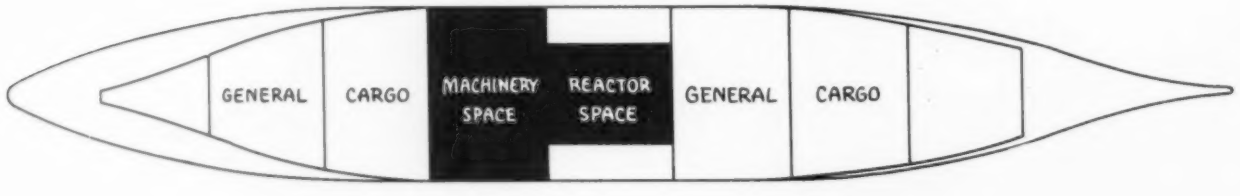
The long life-span of reactor operation is, of course, of principal importance and distinguishes the avant-garde ship from its predecessors. A loading of uranium oxide fuel —of about 4.4 percent enrichment in uranium 235—clad in stainless steel rods, will provide average operating power for 1,230 days. Refueling once every three and one-half years also cuts down maintenance to a minimum and gives a clean, laboratory look to the generally oily and messy boiler room.

Elaborate precaution systems are being incorporated in the ship's controls to ensure reactor safety, to avoid the least possibility of nuclear contamination, and to handle the disposal of nuclear wastes. Also part of the ship's operating equipment are two auxiliary diesel generators which will serve as standbys and are strong enough to power the ship into port should trouble develop in the reactor system.

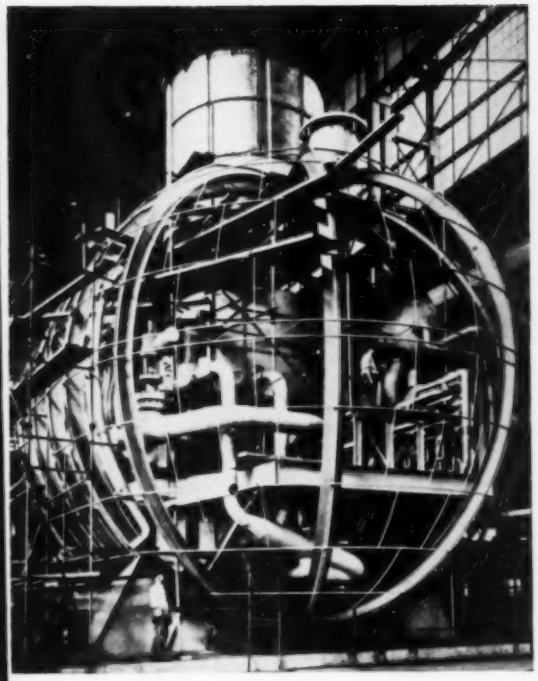
Shipshape, nuclear style

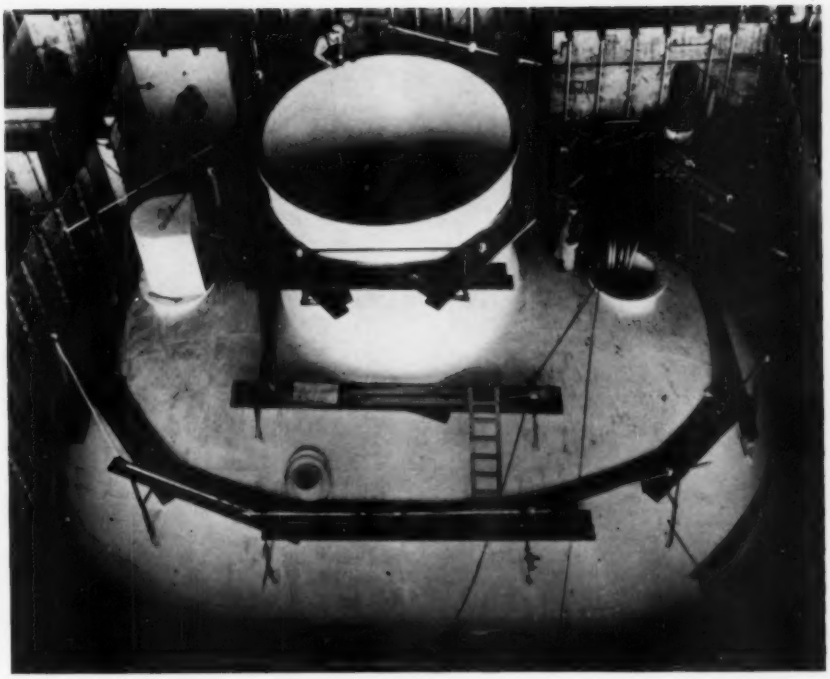
The contemporary quality of the ship's design is indicated not only by its white, yachtlike exterior, but by its interior as well. The ship's revolutionary "innards" can be viewed from a glass-enclosed gallery around the plant and through closed-circuit tv. The latest in materials and products are being used by the design firm responsible for the ship's interior, Jack Heaney and Associates of Wilton, Connecticut, to cover interior walls and outside public areas. Textured vinyl film has been selected to cover passenger staterooms, lounges, etc. Senior officers' quarters and bathrooms will be finished with melamine laminates. Patterned, color anodized aluminum will be veneered to bulkheads enclosing the main stair. To meet the requirements of the U.S. Coast Guard, furniture will be of incombustible materials: steel, aluminum, plastic. Carpets, draperies, upholstery will be made of such plastics as saran, nylon, dynel. The diagrammatic line drawings of the ship's nuclear propulsion system to be displayed along the walls of the viewing gallery will be encased in plastic laminated bulkhead panels. Table tops on the promenade deck, as well as the dials of six clocks showing the time in various cities around the world, will be illuminated by electroluminescent panels. The staterooms will each have a private bath and will accommodate one, two, or three passengers.

The N. S. Savannah will be a travelling display case not only for the most advanced American products, materials and technological developments, but will also bring to distant harbors exhibits of American art. The main lounge will house a show of paintings which will be on loan from various collections, and will be changed each time the ship returns to her home port.

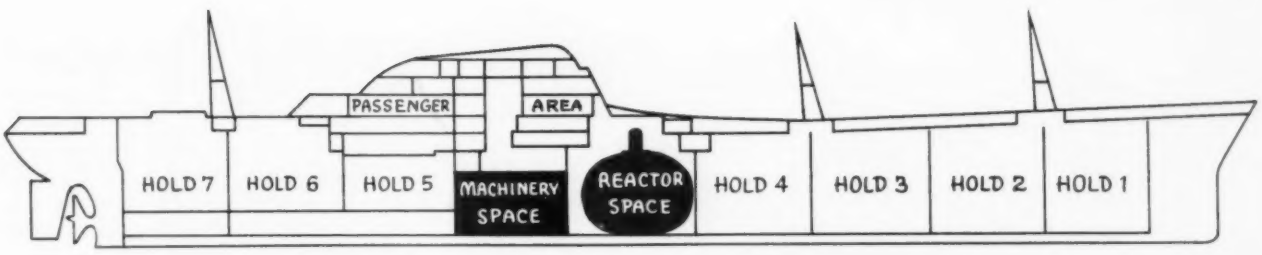


All equipment of the ship's plant is located in the reactor space and machinery space. Reactor replaces oil-fired boiler.

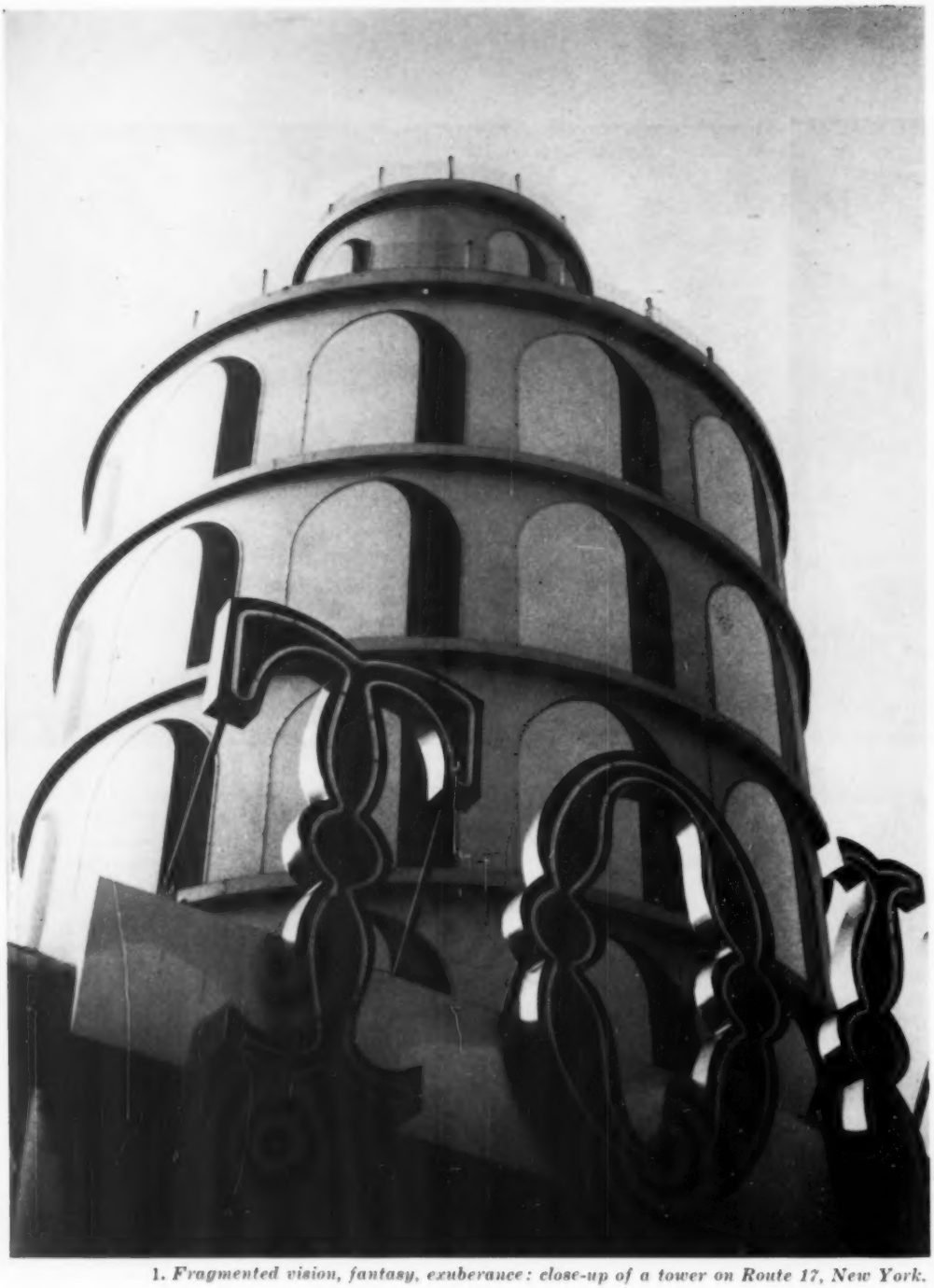




Interior and exterior views of the Savannah's nuclear power plant located in the ship's reactor space: at left is a mock up of the plant; the containment vessel at right houses the entire reactor plant and primary cooling system. The vessel is actually a safety precaution. It is intended to contain all the water and steam released in the event of a mechanical failure; it also supports the lead and polyethylene shielding, and is 35 feet in diameter and 50.5 feet long. The reactor is operated with uranium oxide fuel which is clad in stainless steel. A single loading will provide operating power for about 3½ years. Reactor was designed and manufactured by Babcock and Wilcox.



Plan outlines location of passenger area and cargo space. A gallery allows passengers view of propulsion plant and control room.



Lawrence Hansen

1. *Fragmented vision, fantasy, exuberance: close-up of a tower on Route 17, New York.*

TAKING AMERICA STRAIGHT

An English view, with affection rather than alarm, recognizes three ways to account for how Americans create and respond to their visual environment.

by URSULA TOWNLEY HANSEN

It is an American habit of mind to contemplate, to enjoy, and especially to create, the marvelous. There is a historic tradition behind this, (see **2** how the Romans indulged their architectural fancies) but the peculiar American quality is the *purely marvelous*, not associated — as it is in the European tradition—with the glorification of any particular person or ideal: thus, an American can enjoy the Grand Canyon or the Hoover Dam in the same way that he enjoys the Capitol in Washington. The view of skyscrapers and behive-like water towers **3** indicates that in America even the everyday is marvelous, and often next door to the fantastic. This atmosphere of fantasy suggests to me three notions that I hope I can illustrate: one concerns the sort of product that appeals to the American consumer and also, (whether he admits it or not), to the American designer; the second is a personal interpretation of how the American — even the so-called "visually insensitive" American — looks at the worlds in which he has his being; and the third is a guess at how one quality of American design now held much in contempt — not least by Americans themselves — might one day take a respectable place in the history of shapes and ideas.

Fototeca, Rome

2. *Fantastic columns: wall painting, Pompeii.*

Matilde Lourie

3. *"Collage" of towers from entrance to Lincoln Tunnel, New York.*

The Amazing Products

American designers, and many American consumers, are eager to let Form Follow Function, and to make Less not merely More but positively the Mostest. However, no one — designer or consumer — is really much worried about the fine line (so easily crossed) between shapes that are legitimately daring and those that are unseemly. At its best, this feeling produces a Saarinen chair **4**, a marvelous departure from the essence of "chairishness" apparent, for example, in Van Gogh's chair: here is proof that though we may delight in the four-legged quality of a chair, a lovely chair is not necessarily a four-legged thing. But it is this very aspect of amazement that is particularly relished by both consumer and designer, and so, at its worst, this feeling produces an exuberance and fanciful elaboration on all scales which distresses many thoughtful Americans. The architect Minoru Yamasaki, for example, considers that the necessarily restless, over-excited life of most Americans requires from responsible American designers a background of tranquil, calming loveliness; many designers practice as he preaches, and so does he, **5.**

4. *Chairs: Saarinen and Van Gogh.*

Baltazar Korab

5. *McGregor Memorial, by Yamasaki.*

Yet one can find something pleasant even in the habit of going too far; impeccable taste and quiet restraint everywhere is a horrid prospect. And in exuberant design it is often not only hard but also irrelevant to draw a line between what is admissible (as in a Bernini fountain) and what is preposterous, since the former required the presence of the latter in order to appear at all: the first Thunderbird could not have emerged from a cautious, circumspect atmosphere of "refined" car-design. Therefore I find something delectable even within the vulgarity of the highway phenomenon shown here, **1** and **6.**

Lawrence Hansen

6. *Wayside restaurant.*

7. *"Special" Cadillac for Royal Tour.*

8. *American razor: gold-plated "Gem".*

9. *British razor: nothing special.*

10. *Refinement: garlic dispenser.*

11. *Refinement: experimental telephone.*

12. *Grim, cruel exit gates: New York subway.*

Lawrence Hansen

So it seems a paradox that Americans pursue refinement, visual and mechanical. In Europe the feeling holds that there is sometimes a place for *extraordinary* refinement, such as the use of rich material in a context where normally a cheaper or more easily worked material would have been more suitable. This is usually justified by association with aristocracy, privilege, or religious ritual (see the Queen's Cadillac **7**), especially in contemplating the lovely artifacts of the past: one does not protest at the gold trappings on Tutankhamen's little cart. Here in America such extravagance is democratic. It is so successful with the consumer that in some designs, such as the "Gem" razor **8**, there is the appearance (without the actuality) of mechanical refinement and rarity: both the "Gem" and the British razor **9** are comfortable to hold, and use the same principle to grip and release the blade, but the mechanism of the gold-plated "Gem" (retailing at $1.00) seems more mysteriously complicated. (Similarly, in the attenuated columns of the Roman painting on the previous page the semblance of astonishing refinement is evoked.) It is a fantastic achievement, and perhaps the only valid objection to it is its use as an advertising gimmick. And this is valid even when we are given the real extravagance, not just its appearance: the Seagram building owes its bronze I-beams—less rational than steel—not only to the genius of Mies van der Rohe but also to the fact that it is part of an overpowering whiskey ad.

If it is possible to distinguish the cool, rational mind that investigates phenomena from the innocent, marveling mind whose chief delight is to be amazed, then one can say that Americans are well supplied with the second kind. Even the initiated inventors or manipulators of wonders are not embarrassed to marvel at what they create. Many new products, such as **10** and **11**, are offered to the consumer as superconveniences; but often they merely feed his appetite for marvels without increasing the graceful function of his life. Indeed, like the heavy, crude old exit gates **12** that survive on the New York Subway, they often debase our human gestures, especially the skillful gestures of the hand: I am loth to leave such rituals as cutting up a clove of garlic with a good sharp knife, for all the deodorized refinement of a Roll-On Garlic Oil Applicator, and I am dismayed by the advertisements which have tried to make a hallowed human gesture of the business of pushing a control button. If *Americans* are not dismayed, it is partly, I think, because they are preoccupied with magic, the border country between the possible and the impossible, reality and dreams.

An old man sweeps the subway steps, and on his shoulder hangs a transistor radio. It would be hard to say where, precisely, his spirit is, at the ball-game or here on the steps, and equally hard to say which came first, this atmosphere of fantasy or the products which cater to it. Some clue may perhaps be found by examining the worlds of visual reality in which Americans live.

The Mind's Eye of Americans

Ruskin drew a line between building and architecture, dismissing those works of men that are lovely by accident. But in America there is evidence that those beautiful things

that are produced without conscious effort at effect are somehow more cherished for this very reason. Barns are beautiful in this way **13.** Similarly, old examples of assembled beauty, such as New England country towns, are never orderly. Sometimes a church or courthouse effectively dominates an agglomeration of buildings, but without giving them cohesion and articulation. Entering the Vermont town of Manchester, one waits in vain for the countryside to give way absolutely to the presence of the town; leaving the California town of Merced, one waits in vain for the "townscape" to disappear. The ideal of a complex of truly organized, beautiful suburbia (as, for example, around Zurich in Switzerland) has replaced nostalgic visions of tight little towns surrounded by countryside; nevertheless, the absence in America of a tradition of landscape sharply defined from townscape—which did not matter when all towns were small and lovely like Manchester today — has helped to allow, if not to create, chaos.

There are admirable efforts over here to establish town planning as a vocation and an urgent duty. But on reading, for example, the recently published proposals for the improvement of the center of Fresno, California (*Progressive Architecture*, June 1959), one is stuck by the emphasis on the present economic waste of space: better car parks are promised, and uncongested pedestrian walkways, but there is no suggestion of the desirable *seemliness* of an ordered cityscape. To reach the trim vineyards, the alfalfa fields, the avenues of tall palms that lead to farm buildings surrounded by eucalyptus and ilex, you have to brave the subcity around central Fresno: the report overlooks this, for the good reason that the subcity offers few parking or circulation problems. "Action," the private national organization for "the creation and maintenance of a good environment" in urban America, urges seemliness as desirable, not as an end in itself, but as something that sustains real estate values and educational opportunities.

In short, not even professional aesthetes seem as horrified by this ugliness and literal pointlessness as are visitors like Sir Hugh Casson, who went back to England in 1957 with terrible warnings that this was where the hideous English "subtopia" was heading too. How, then, do Americans endure — even draw visual inspiration from — this chaos?

It seems to me that Americans, more than prosaic Europeans, see the world in what I can only call photographic terms. That is, their visual needs are satisfied as much by the photographs they see, as by what they perceive directly — sometimes far more so. Thus they can ignore the actual ugliness around them because they are contemplating or remembering some other vision, or because, even as they look at some dreary view **14**, they are subconsciously remembering a better, less chaotic version of the same or a similar thing, enjoyed in a photograph **15**.

More important, they tend to see the "real" world with a selective, romantic, fragmented, or abstracting eye —or all of these combined. This amounts to a habit of framing the real world up in pictures, photographic pictures, such as **16** and **17**.

Lawrence Hansen

13. *Beauty, accidental, yet somehow devised: New York barns.*

14. *Chaotic view: shopping center, New York.*


Michael Honos

15. *Ordered view: shopping center, Detroit, by Victor Gruen Associates.*


Lawrence Hansen

16 *and* 17. *Manhattan: cardump and chimneys.*


Lawrence Hansen

18. *Watertower: isolated object, reiterated delight.*

19. *Zurbaran: Still Life. Collection of the City Art Museum, St. Louis.*

20. *Napkins, dishcloth, watercan: lunchcounter arrangement.*

This habit is encouraged by a passionate delight in things, and an ability to isolate them from their context. Most American versions of three common highway objects — modern streetlights, intersection lights, watertowers ancient **18** and modern — have a refinement that would make them extraordinary in England. One must suppose that they *cater* to someone's taste, as well as expressing someone else's. They are often found in a chaotic context: one must abstract them from their surroundings, in the same way that 17th century genre painters made "fortuitous" abstractions (not compositions) of common-or-garden objects **19**. A similar device inspires the arrangement of things in most quick-lunch eating places **20**: the object is isolated on its own little shelf. This is mainly for convenience, but just as the designer of the barns on the preceding page must have made some aesthetic decisions (however unconscious), so here the visual pleasure of isolation and definition supplements the utilitarian motive — all around is bustle, down there are the quiet objects, worthy of contemplation.

When Americans do choose to see things in context, it is often in a way characteristic of modern photography. Mood is emphasized, at the expense of clarity or even recognition — the mood either of the scene or of the man looking at it. Hiroshige's glimpse of a bridge in rain **21** suggests that this can happen without looking at photographs, yet I suspect that it is the photographs in *Life* and *Look*, for example, and in advertisements, that help Americans to cherish many views most of all as a *moment of time arrested*: pigeons flutter across Saint Patrick's Cathedral, a girl walks past an old man in the street. The delighted observer is not concerned with a critical look at Saint Patrick's, or with the ugly chaos of the street.

21. *Hiroshige: Bridge in Rain.*

People selling products are aware that Americans not only tend to acquire the appearance and characteristics attributed to them in photographs celebrating the American scene, **22** but also derive great satisfaction, if not solace, from photographs that assure them that *this is the way things are*, this is the way they ought to look. It is no revelation that one often sells a product by selling a picture of the consumer in the desirable role of the product-user; but it is worth emphasizing that even to the non-smoker an advertisement with a photograph of a man smoking has a force of visual reality, and is a source of visual nourishment, as strong as — perhaps stronger than — what he "really" sees around him.

22. *Regular guys: policemen (above) and real life bus drivers (right).*

A Forecast

From time to time, Americans are called on to do penance for their bad taste, their indifference to the way things ought (according to their critics) to look. It is not merely this photographic habit of looking at the world, or the habit of seeing all things as marvels beyond criticism, that, as I have tried to show, exonerates them somewhat. Some time hence, a Henry-Russell Hitchcock will, I think, say something more sanguine about the historic place of the American design legacy. By this time, the perniciousness of designed obsolescence, and the motives of the men who conceived it, will still be of interest to the social historian. But to the historian of

the shape of things, this will all seem as irrelevant as the means and the motives of the Greeks who raised money to rebuild Athens after Salamis, as irrelevant as the dark corners of the mind of the prince who commissioned the Palazzo Doria-Pamphili **24.** And terms like "beauty, function, efficiency, and economy," although such a historian will continue to use them when he wants to indicate *extra* merit in some shape that takes his fancy,—such terms will have an added irrelevance in the study of American design of our period. "Beauty," as a quality evoking in the beholder (or the listener) a sense of soothed or exalted pleasure, has already disappeared as a necessary ingredient in the fine arts, and it seems likely that our artifacts too will shortly be designed to inspire delicious intellectual discomfort, and that the taste thus created will also turn to objects which achieve this end only accidentally. "Function, efficiency, and economy" are already strictly irrelevant (however desirable) to American design, because it is design for a rich world and a dream world. And so the historian of the shape of things may, in a sense, find more "honesty," more "significance," in those shapes which most offend us now **25.** He will be more concerned to ask how much these shapes reflected the ideals and obsessions of a truly fantastic age, when the conquest of space in all its aspects seemed important, and mice and men whirled in orbit round the earth. But most important of all, he will be ready to detect in the "American" shapes of car rear-ends and juke boxes and non-sheer-line refrigerators a quality that ranks in his eyes even above beauty, function, efficiency and economy: an enthusiasm for *invention.* He will admit that this was not always accompanied by an equal *capacity* for invention, but he will rejoice that the two came together often enough.

23. *Greek invention: stone curled, with stone straight and sharp.*

24. *Baroque invention: springing double curve of stone, exuberant break with classic style.*

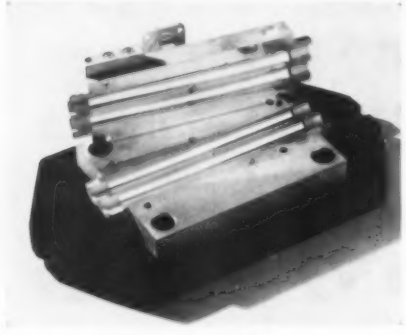
"The emigrants, uprooting themselves, could take with them neither the ancient shrines and oracles of their tribal and earthbound gods, nor the tombs and holy bones of their ancestors. . . . A people who had never, even in Greece, been heavily shackled by priestly authority, found themselves in a new country free of all superstitious sanctions, and able to indulge in the most precious thing in the world—fearless freedom of thought. . . . On the technical and artistic side, this condition caused celators and painters to abandon any thought of pious adherence to paternal tradition and to seek eagerly for novelty and experiment."*

Charles Seltman, in "An Approach to Greek Art." London, 1948.

* Celators did skilfull decorative work such as embossing, engraving, and chasing, on precious stones and, more particularly, on metal.

25. *Detroit invention: fluid metallic curves and straight lines.*

Display shows satellite-borne clock sending radio waves to the ground where time is compared to another clock on earth. Both clocks include maser cavity (below) made of very low-temperature-expansion alloy which amplifies "ticking" ammonia molecules, the timing element of the clock.



ATOMIC CLOCK IN ORBIT WILL PROVIDE DATA ON TIME AND SPACE

Hughes Aircraft is building a "Bird of Space-Time" for the National Aeronautics and Space Administration that will check Einstein's general theory of relativity.

In an age of technology when diversity is continuously multiplied, we largely lose sight of the fact that science is motivated by a drive toward a single point of reference from which it will be possible to view the variety in existence as a perfect whole in which all is logic and reason. The aim of science is, of course, not to confuse but to clarify; scientific analysis, like philosophic inquiry, is essential only when it makes synthesis possible. The method of science is to simplify by taking into account all that is complex—a process that is apparent in the work of all great scientists who have postulated fundamental theories. To further this aim of science, a recent technological development will soon be employed to check Einstein's theory of general relativity, one of the two all-embracing general theories of physics and the universe. The other is quantum mechanics. Although these deal with a single universe, the two theories are not yet fully combined. Hughes Aircraft has recently received a $200,000 contract from the National Aeronautics and Space Administration to develop an atomic clock which will be orbited in space as a satellite for the purpose of collecting data on time and space that could not be obtained otherwise. The clock will have an accuracy of three seconds in 100 billion seconds, which means an error of no more than three seconds in 3,171 years, and will make possible the determination of properties of space which, it is hoped, will provide accurate and complete foundations for future theoretical work in the study of time and space.

The atomic "bird" in space

The heart of the earth-circling atomic clock is the tubular part held at right by Dr. Harold Lyons, inventor of the world's first atomic clock and physicist in charge of the Hughes program. This tubular heart will house the stream of ammonia molecules that generate a highly stable current and "tick" at the rate of 24 billion times per second. (All atomic clocks use a vibrating atom or molecule to give the constant ticking of the clock which is counted electronically). In the Hughes clock the ammonia molecules travel down an evacuated tube where they enter the "maser" (Microwave Amplification by Stimulated Emission of Radiation) metal cavity seen at left, above, and emit radio waves which can be picked up by radio and compared with the time of a similar clock on earth (see diagram at left, above).

The satellite clock's primary purpose will be to check Einstein's proposition that a clock running in a different gravitational field above the earth would run faster relative to a clock on the ground. Before launching, the atomic clock will therefore be synchronized with another maser clock on the ground. At a speed of 18,000 miles per hour and a distance of 8,000 miles the time difference between the satellite and the earth clock is about one second in 60 years. It is expected that accurate measurements can be made within a satellite flight of three weeks, and the Hughes clock is being built with an operational lifespan of 500 hours. When the clock is put in orbit around the earth it will provide the following specific data for future theoretical studies: it will a) recheck Einstein's special law of relativity which sets forth the "twin paradox" (the orbited clock would return "younger" than its counterpart on earth); b) precisely measure the geometric shape of the earth; c) investigate whether space is the same in all directions; d) measure the velocity of light or radio waves.—*A. G.*

ASPEN

The ninth annual international design conference inquired into the nature of the image of 20th century man and his works as it is projected by the printed page, the film, and the industrial product, and considered more urgently than ever before, the symbol as the most powerful means of communication

with sketches by Ted Rand

Reported by Judith Ransom Miller, *this year's Aspen design conference represents Mrs. Miller's fourth year at the conference and her second appearance as a contributor to ID ("The History of Boys' Socks," June, 1958). Mrs. Miller (who teaches art part-time at UCLA) and her husband (who is chairman of the art department at Long Beach City College) camped out at Aspen with gear that included a hot shower—"very simply achieved"—attended all the sessions and seminars, interviewed conferees in the moments between, and took voluminous notes from which the commentary on the following pages is drawn.*

The Aspen International Design Conference habitually takes it upon itself to investigate the knottiest problems of the times. This year was no exception. From June 21st to 27th, registrants from 32 states, the District of Columbia, and four foreign countries gathered under the familiar white tent in the rarified air of the Rockies to consider together the knottiest of them all: the art of communication. The program followed the usual format and, under the guidance of chairman Morton Goldsholl, subdivided the general theme, Communication: The Image Speaks, into three cycles. Cycle I concerned itself with The Image Evolves; Cycle II, with The Printed Image; Cycle II, with The Film Image. In the general sessions and seminars that rounded out each cycle, ideas sometimes went off on tangents. But just as often they converged—if not on a central point, at least on a common area of agreement.

As always, at Aspen, the target was the universal THEY, the enemy, the threat. And, as always, each speaker had his own personal identification of THEM. Abram Games, while he protested that he was not afraid, indicated that THEY are the Market Researcher and his handmaiden, the Machine. For James Real, they are Apathy and Management. For William Golden, the house-proud Talking Designer. Thomas Folds chooses Art Supervisors — among others. Lancelot Hogben dislikes and mistrusts the Spoken Word and John Dewey. And Bruce MacKenzie, who must come fairly close to understanding the machine, does not fear it but fears THOSE who are IN CHARGE.

Three men on the platform, none of them designers exactly, *seemed* not to be afraid. Norman McLaren, who wears the protective coat of innocence—but a very perceptive innocence—is like the child who can swim because he has not yet forgotten how. Roman Vishniac, who has already realized and surmounted personal fears, is involved in the giant world of the microcosm. For him the story of mankind is reduced to the proportions of the myth and the fable, and the moral is clear: "It is the heart that speaks; it is with the heart that we understand." And Lancelot Whyte finds freedom within an immense circle of knowledge which, coupled with acute perceptive powers, permits him to look at the particular—a helical shell or half-knot, for instance; see the general—the principle of chirality*; and set the two logically in the context of the matter under discussion.

Throughout the conference the same warnings occurred and reoccurred—with the unequivocal urgency of roadside religious tracts. Specialization is the greatest danger of our time. Fear not the machine, but those who control it. Mistakes are costly, but they must be made; infallibility leads to the dictatorship complex. The more you rely on calculating machines, market research, and statistics, the more you limit the freedom and function of the artist, and the more barren your culture will become. Man's culture is man's image, and we have today no adequate conception of an image of man that the parent, the teacher, or the priest can hand down to the child.

The warnings led to a possible route out of the dilemma: universality. We need a universal visual language, less noise and more communication, greater common effort, elimination of non-essentials and trivia, simplification and generalization of the image. The problem today is the hardening of the division between different kinds of people. If we will simplify and make more pure *what* we say as well as how we say it, we will advance communication between ourselves and other countries—particularly underdeveloped countries. The designer needs to acquire a more objective view of society, needs to learn how to translate into design terms what the scientist, for instance, has to say; he must understand both the scientist and the human being he is addressing. It is within his capacity to convey in shorter time, and to the many, what is now absorbed only by the talented few. The discipline imposed by working out these problems cannot help but improve the result.

The recommendations that grew out of the conference were in a sense a follow-through, a ways and means, to universality. The central one concerned language. If governments would adopt a common second language, every citizen of the world would have what every child in Wales, according to Mr. Hogben, already enjoys by birthright: the use of a home language for love-making, religon, and other inexact topics, with the privilege of a second language for discussing atomic physics or the gold standard.

On the following pages excerpts from some of the panelist's papers, and from the discussions they provoked, enlarge on these subjects and communicate the distinctive flavor of the ninth design conference at Aspen.—Judith Ransom Miller.

* chirality: the phenomenon of mirror-image forms in nature, e.g. the human hand

DESIGN AND SCIENCE: THE MAN ON THE MOON IS STILL A MAN

Abram Games

With returning prosperity in Britain and other countries the accent in selling is being directed at the younger generation. It has greater earning capacity than ever before, and free money in its pocket. This is the postwar generation, the "beat" generation, television, jive, rock 'n' roll, delinquents, teddy boys, and every other label we elders have affixed to it. Interesting statistics are coming to light regarding this generation. Market research has influenced the methods of addressing and selling to it, and now motivation research is digging down into its subconscious.

There are dangers here for the designer. There will be a tendency for him to be directed in the character of his approach by the theories of motivation research. There might be an inclination to gratify the instincts of this generation still further by providing it with thinly disguised symbols which would accomplish that end but are not wholesome. I don't suggest that the M. R. people are unscrupulous—they are not; but they have a great responsibility. If they succeed in attaching the designer to themselves as a willing tool subservient to their theories, then it will be the designer's duty to take his stand on that score and actively resist being used in this way. The day the designer loses his initiative and power to originate his thoughts and express his personal convictions will see the end of truly creative design and its calculated good. He will in fact have become the peddler in commodities—much worse, the peddler's dog, led by a fancy lead.

Young people to-day are no worse than those of any other generation. That they attract more publicity is not so much their fault as that of their elders. Brought up in the precarious post-war years, surely the chaotic years, they are the scapegoats of this era, the excuse for our failure to provide them with a cleaner world. Instead we have provided them with a cleaner bomb. Should any damn fool press the wrong button they (and we) will be extinguished without the opportunity of having lived their lives. It is not to be wondered at that their natural spirits are overlaid with a cynicism which rings strangely in our ears. If they are angry, then they have just cause. It will be their task to clear up the mess which our brilliance has produced for them. This is no light task. They have a much harder job than we had, and they know it. I have the instinctive feeling that when they grow up they will be more mature and civilized than their parents were before them, better able to measure the good and bad of life and with more honesty of purpose. The big question in my mind is whether my particular generation, designers or otherwise, is the right one to address them, to sermonize, to preach, to lead them. It seems to me that only the younger generation of designers, their own contemporaries, can speak to them in a language completely understood and acceptable to them. This is the task of our younger designers. Their influence must be even more marked than ours has been in our own generation.

Not for nothing has the broad grin become advertising's universal symbol in post-war years. Most international posters have in one way or another provided this circus atmosphere, reflecting the constant and wild search for entertainment to escape from the realities of our lives. Whether the grin has outlived its purpose remains to be seen. Perhaps the world is now turning to face its problems far more seriously. The impact of abstract painting, the tachists, of scientific development is beginning to make itself felt more obviously in applied design. The flowing frivolities of the grin period may be superseded by the pretty patterns of tachism or more formalized and frigid abstractions. Whether these will be more acceptable as a true expression of the times I don't know. The very arrival at spatial solutions in design, the attempt at a new dimension, is suggestive of the close link between scientific knowledge and design. Nevertheless the two extremes in design are now clearly marked; the ideal may be somewhere in between.

The more gigantic the conception of the universe in terms of newly explored outer space, you may feel, the less important in significance and by comparison man becomes. Quite the contrary. The further we go from our base, Earth, the more important become the elemental things connected with mankind. I have always felt that with all our knowledge, science and technical achievements, man's true relationships are to be seen at the humble railway station—friend greeting friend, relative greeting relative, loved one bidding farewell to loved one, is one of the most important and cherished moments of our lives. If the designer, no matter what his design technique, can somehow reflect this humanity, this living quality in his work, then it doesn't matter that the man flying around the moon in rocket and space suit is far removed from our world, for he remains essentially the same man as he is amongst his own family. Man is continuously aspiring and has achieved great things. He searches for new conquests of knowledge, of territory, of space. Is he really searching for his own happiness and fulfillment, or is he following, slavelike, an inexorable force which must lead him to his own destruction? If there is a Divine Pattern in these things, then surely in our time it is beginning to work itself out. The choice of the world is simple: either a new man or no man at all. Against this background the designer must find his place, must exert his influence for good and prove his usefulness. He must become a creative force, speaking to millions for their ultimate good—not only with the voice of others but with his voice too.

COMMENTS FROM OTHER PANELISTS *on the influence of science and technology upon the attitudes of the designer — and ultimately upon what he produces — indicated that the abstractions derived from investigation, and the abstractions that spring from intuition, may be very different*

Mr. Real *The human race is subjected to a progressively more and more orderly investigation by the psychological, medical, and sociological professions. Pure science ultimately becomes nylon stockings, phenolic mouse traps, intercontinental ballistic missiles. Ultimately this probing becomes sinister.*

Mr. Capitman *The designer's function is not to produce for the approval of other designers. He must understand how the human being behaves and responds, to understand how visual symbols and objects communicate. People do not interpret design; they respond to it. The designer's intention is not the concern of researchers; our concern is for the objective effect of the design.*

Mr. Real *Designers have always known that red is a more emotional color than blue. Scientists ask by how much, and how do you know? At this point the designer is stopped. We should understand what the scientists are up to, lest we erode our position further.*

Mr. Capitman *All research in color reveals nothing of specific application to a design problem; color must be examined in context.*

Mr. Real *The pitch of American industry to the designer is: "If they can make it, you had better get out and sell it." America's brightest minds are addressing themselves to an industrial projection. Then management says: "The status quo is returning at 14 per cent and we don't dare move!" The annual report is a continuing crisis of the president of the company. He cannot make heroic corrections—the deep ossification of the modern management system works against itself.*

Mr. Capitman *Research is not concerned with maintaining the status quo. We must be at least a step, the right step, ahead. The management consultant is a perceptive human being who is not operating as a designer. Our job is to provide management with data upon which they can make decisions and minimize risks.*

Mr. Games *An Englishman as agile as I cannot get into one of your expensively researched and designed cars wihout barking his shin bone.*

Mr. Hogben *Reality is the situation in which the commercial artist works. The American system of cut-throat competition produces articles so much alike that the experts are lured to tell lies. The rationalization is: "I can't change the world. If I can't see the Kingdom of Heaven, I will at least be paid for it." Is such a production a way to a good life? Does this satisfy man's spiritual longing? How does this freedom to produce appeal to the poverty-stricken, as yet uncommitted, countries in Africa?*

Lancelot Hogben

Roman Vishniac

Mr. Vishniac *Man cannot live by soap alone.*

THE CORPORATE IMAGE: MORE ACTED UPON THAN ACTING, IT CAN BE CHANGED

William Capitman

Can the communicated image — the objective corporate image—be changed? Of course. There are two ways in which this can occur. It can occur either accidentally or deliberately. Accidental changes are equally likely to be negative or positive. Deliberate changes must be based upon factual information. A deliberate change not based on factual information can have dire results.

We have had many examples, during the past years, of the deliberate corporate change which has been effective. For instance, though Marlboro is a brand name of the Philip Morris Company, to the consumer it is a Marlboro cigarette, and Marlboro is an identity in itself. A brilliant job, based upon factual information as to the needs of the market, tested to determine whether it communicated what it was intended to communicate, has transformed what was a few years ago a highly feminine, ladies' cigarette into a strongly masculine product. Most examples are not as dramatic as this. The changes that take place are not always quite so obvious. Change, as we have mentioned earlier, is endemic in our society, everyone expects it. Change takes place whether you want it or not. It is best to operate with change, and make it part of your planning. To summarize, the corporate symbol is not an immutable object, which communicates on the basis of its intrinsic qualities, as part of a "universal" language of symbolism. Rather, the corporate symbol is part of a whole host of communications in which the corporation takes part, and should not be regarded as the end, or expected to accomplish the entire job for the company. A corporate symbol is more likely to be acted upon than be active. That is, the meaning of a corporate symbol is likely to be more influenced by the other things which a corporation does, than it is likely to influence them. The symbol is, in many ways, the least active aspect of the corporate communication structure.

THE CORPORATE IMAGE: SIMPLE AND NICE, AND SUITABLE FOR ANY OCCASION

James Real

The image-makers' sophism is the diminution of everything—the complex is always simple; the huge is really a lot of tiny, friendly units; the hard-eyed professional board of directors is composited as a clean-toothed kid at the gas pump. Everybody is innocent, warm and above all—*simple.*

Yet almost nobody who can read believes this. We may be uninterested and let it go for what it is—a facade; but it is a diversion rather than a believable proposition. For other aspects of the nature of the corporation are apparent. The internal struggles for power, the sporadic contests with government and labor, the international power involvements, the stock raids—all these great industrial activities are reported regularly by the press to a moderately literate people. By these means the public is daily absorbing and storing impressions and counter-images which are considerably more complicated than the direct proposition that "Mom loves Esso."

The image-maker's dilemma is that he has, of course, so many bases to cover. A modern industrial complex which houses the diverse functions of production, distribution, and retail marketing, requires several public faces; hopefully, none contradicts any other. An example of this is a modern oil company in the United States——involved in foreign relations on an almost ambassadorial level, conducting complex relationships with innumerable federal, state, and local governmental bodies, and, finally, running a vast public relations and retail marketing operation. There are pressing daily demands to represent many kinds of "good" at many levels. At one level the company may be negotiating a foreign concession at very considerable risk to the military position of the United States; at another, it may be openly lobbying for the preservation of its hard-won tax advantages, or may be involved in a power struggle for a tidelands concession; at still another, it may be attempting to sell a community

on the virtues of in-community slant drilling; and finally, it is busy at the retail level, pushing whatever consumer benefits are remotely consistent with its ability to deliver them.

The corporation has been led to believe over a long period of time that it could construct a composite image of itself suitable for any occasion. The one widely touted as the most effective and reasonable of achievement has been the "simple and nice" variety. But it should be apparent to the policy makers in business and industry that this is a concept cut out for a more innocent age than the one in which we are living and are going to live. It seems to me that there is a tenable argument for depositing a great deal more direct faith in the public itself. I would argue that the preservation of the private enterprise system is dependent upon a continuous presentation of a reasonably honest image of the responsibilities of a modern corporation and the *limits* of these responsibilities. It can come as no shock to the people to be told that the primary function of the modern business enterprise is to generate profit and that anything else that it does in response to demands of the society on its behavior is extraneous to the principal business of making money. I believe this sort of thing can be done with considerable grace, with the consequence of high acceptance, and that it can be achieved quite separately from the creation and maintenance of what I have called the "retail image."

We can foresee public troubles on the corporate horizon that simply cannot be covered by hiding under the "White Christmas" or any other slick and frivolous diversion. For as the new technological age advances, it will be accompanied by social and economic difficulties that will strain the relationships between the corporation and the public in ways which were not predicted by those who have been heralding the "new age of leisure." For instance, we can begin to see massive and complicated consequences of the accelerating change-overs to automation which suggest that the nineteenth century urban industrial city and those who live in it will suffer severe disorientation—that unemployment, relocation, and significant shifts in the nature of the labor market are but a few of the problems which the whole industrial community, the corporation, the people and their government will have to share. Questions and problems of this magnitude are not to be seriously affected by clean typography, neighborly-neighbor advertisements, Bauhaus factories or lemon yellow box-cars.

The language of vision, like any other language, can be lied in. As many frauds have been perpetrated in Bodoni as in Barnum. The central problem pressing upon the designer is the *nature* of the image. Is he helping construct an image with decent powers of reflection, or is he building masks, behind which the verities and strengths of the free society are slowly eroding away?

Mr. Whyte *Man is not the only symbol-forming creature. Austrian and Italian bees misunderstand each other, and cannot learn each other's language in the lifetime of a member of the hive . . . The image-forming process involves selection and ordering of elements of the environment. Ordering is achieved at a certain cost—to wit, distortion. The process of image-forming is largely unconscious and grows out of inherencies . . . Man's image of man is the twentieth century problem. This image is crucial. The human policy ought to aim to create an image of man as we need him for tomorrow. The designer must look forward to what should be needed . . . The essential issue is man's will, desires, needs, and how he uses the machine to attain these.*

Mr. Hogben *The anomaly of our time is that everybody on our globe can listen to the same human voice—the voice of the language vendor—but we have at present no global language . . . Today persons living as far apart as Melbourne, Minnesota, and Manchester can interpret rightly the same spoken message transmitted across continents in less than a second; but few people living in cities so near as Middlebrough, Marseilles, and Munich could do so. The printed page is from this viewpoint still one step ahead of electronics.*

Lancelot Law Whyte

Mr. Games *What we need is a sort of visual esperanto—a vehicle for conveying a universal moral idea.*

THE DESIGNER AND THE MACHINE: DOES HE CONCEAL PURPOSE OR REVEAL IT?

Bruce MacKenzie

ADVERTISEMENTS: From a recent NEW YORK TIMES.

> "Newly organized group has openings for people interested in Design, Research and consultation in the field of man-machine relationships. Projects include work in communications, human learning perception, operations analysis, psychometrics, information theory, visual and auditory displays and equipment design."

Are they looking for a designer? No. An engineering psychologist.

> "For optimum integration of man and machine. Design of control and displays to relate psychomotor behavioral characteristics to machines. Analysis of human requirements in machine systems."

Are they looking for a designer? No. A human factors engineer.

I suggest that this indicates somewhere, somehow, that the designer, as we know him, is being replaced by others bearing contrived titles that in many cases actually mean "designer." An age of the Specialized Specialist is upon us and the generalist, the philosopher, the artist, and the designer should take heed. It may be that the one century from 1860 to 1960 will be the only period in history when the designer existed as a unique, professional entity. Before, he almost inevitably was the doer and the creator all in one. A designer was not hired to design watches one day, furniture the next or carriages the next. Nor were there generally designers per se, retained by the carriagemaker, the furniture-maker or the watchmaker. Moreover, the person who designed prior to the 19th century was part of a much more limited physical world, revealed more or less clearly to him through his senses, his philosophy and often his religion. Today's designer is in quite another position as he faces an infinitely expanding, progressively less concrete, physical and psychical world. He is floating in fantastically accelerated currents of scientific and intellectual activity. He can never for a moment shut his mind to the revolutionary and constantly exploding results of research into the inner and outer universes. He can no more ignore the "disintegration" of the apparent solidity of nature than could Da Vinci have failed to be challenged by the countless mechanical and engineering problems of his day.

Today our society is in rapid transition from control by one group mainly concerned with political and economic activity to another profoundly devoted to the exploration and probing of microcosms and macrocosms—the group of men working in the physical, mathematical and behavioral sciences. Yet many designers, courting the recent past, still produce works that tend to conceal rather than reveal purpose, to repose rather than expose ideas and to confirm rather than affirm attitudes. Their design, I feel, will be as meaningless to coming generations as the gingerbread houses of the nineties and the pointless babble of much of today's popular tv, radio, film and advertising.

The designer as we know him is a true child of the Industrial Revolution, born of enormously expanded "thing" supply and demand following the mechanization of physical processes. But still he wanders uneasily through the intricate and massive industrial, scientific and technological cities created by this revolution, called in only to cover the native ugliness, the unavoidable scars left by the machine on our society.

How much more vital his role should be, and I am convinced *will be*, in all spheres of human activity. I see him in the future as a bridge firmly anchored on one side in art, esthetics, philosophy and the humanities and on the other equally attached to the even more powerful tools, physical and intellectual, that science and technology are devising.

Mr. MacKenzie *The unfrightened are imbeciles; from fright we take steps that lead to the solution of our problems. The machine threatens us only through our weakness — not through being more powerful. Air traffic, for instance, is controlled by a machine which is controlled, corrected, and chastised by a human being. But be frightened of men who control machines. I fear politicians. I fear "machineurs" in exactly the same way . . . I hope that people in the humanities will take over the machine.*

THE DESIGNER AND BUSINESS: DOES THE TELEPHONE HAVE A RIGHT TO TALK BACK?

William Golden

Much of the confusion that is generated in a discussion of the role of the advertising designer stems from the fact that Business regards him simply as a tool of communication, while the designer feels *he* has something to say.

He undoubtedly has. But it can be pretty irritating, for example, to pick up a telephone, only to discover that instead of transmitting your message, the damned thing is not only talking back to you, but is talking about something else. And this is what we seem to be doing most of the time in our conferences, and in the body of our graphic arts literature. It sometimes seems to me that this profession of ours has gotten out of hand. If an advertising designer does his work conscientiously enough, sooner or later he wins the requisite number of awards in one medium which, in some way that is incomprehensible to me, seems to make him eligible to express himself in another. What he says is frequently so abstruse that it is apparent he is using the wrong medium, for what he communicates through his work is usually perfectly clear to other designers.

The obvious function of a designer is to design. His principal talent is to make a simple order out of many elements. The very act of designing exposes elements that are inconsistent and must obviously be rejected. When he is in control of these elements he can usually produce an acceptable design. When someone else controls them the best he can produce is a counterfeit. This is why at some stage of his maturity he feels the need to have a voice in the content itself. If the advertising designer begins to "examine the purposes to which this vast communications machinery is put" (as a prospectus for this conference suggests), he can run headlong into his basic conflict with the business world —a dissatisfaction with the content he is asked to transmit.

For Business the question of content is very simple. Its objective is reflected in its most important single printed document—the Annual Report. This is the yardstick by which all its decisions are measured. If the Report is unfavorable for very long the business will cease to exist. Whatever contributes to its success is right. Whatever endangers the financial statement is wrong.

Thus the morality of Business is clear and reasonably defensible. The morality of the businessman may be something else again, but as Business gets bigger and bigger, his morality is less and less operative. The man himself tends to disappear, replaced by the Corporation Executive.

His first responsibility is to the Corporation and not to society. He would say that in our economy what is right for the corporation must inevitably be good for society, because the successful corporation provides more employment, more products and services, and higher tax payments which pay for still more social services. So without having to make a single social decision the corporation executive can tend strictly to business with the comforting assurance that no matter how it is conducted (short of public scandal), his energies will be socially useful—if the business is profitable.

The dilemma of the literate advertising designer is that emotionally he is part small businessman and part artist. He isn't strong enough to cut himself off from the world of business to make the personal statement of the artist. He isn't a pure enough businessman to turn his attention completely away from the arts.

He somehow wants the best of both worlds. He becomes a kind of soft-boiled businessman.

When he turns to Business he is told that the content of our time is The Fact. The Fact of Science. The Fact of Business. The Fact is beyond suspicion. It has no views on Art, Religion or Politics. It is not subject to anyone's opinion. It can be measured. It is non controversial.

In an era of mass-marketing, controversy is assumed to be bad for business, for no potential consumer must be offended. Though Business may have no legitimate interest in people, it has an abiding interest in consumers.

The designer for the most part would be willing, I think, to accept The Fact as the content for his work. But he soon discovers that despite the prattle of the Public Relations expert about "lean, hard facts," the designer is seldom called upon to work with them.

For Business wants him to help create an attitude about the facts, not to communicate them. And only about some of the facts. For facts too, in certain juxtapositions, can offend some portion of the market.

So he finds himself working with half-truths, and feels that he is not using all his talents. He finds that he is part of a gigantic merchandising apparatus in which the media of mass communication have reached a miraculous degree of technical perfection and are being operated at full speed to say as little as necessary in the most impressive way.

And this, too, is what the advertising designer is called upon to do. If he can adjust himself easily to this framework he can work very happily, and may even be handsomely rewarded for his efforts.

If he is reluctant to accept the role of a propagandist for business, but looks further for a deeper meaning for his work, he might find greater solace on the psychiatrist's couch than he will in Aspen.

IN OFF-PLATFORM INTERVIEWS *the participating speakers talked with more candor about themselves, their professions, and the problems raised by the conference; one non-panelist drew some comparisons between the position of the English and American designer.*

William and Barbara Capitman

At breakfast Mr. and Mrs. Capitman were irrefutably logical, direct, unassuming. Mr. Capitman acknowledged that many abuses had been perpetrated in the name of marketing research, many findings wrongly evaluated, and that there were of course answers it couldn't be expected to come up with. Nevertheless, he had impressive evidence that research could do an able service. He has considerably more faith than this reporter in the American housewife who, we maintained, wouldn't know a well-organized kitchen, or how to ask for one, or how to answer questions about one. "You don't ask the right questions," Mr. Capitman insisted. "She knows all right." He felt, with Mr. MacKenzie, that the real threat to a designer—if he is threatened— comes from within, from his technological limitations and an incomplete understanding of human beings.

Herbert Bayer

The American designer, Mr. Bayer said, is "overwhelmed with statistics, surveys, investigations, expositions." From this standpoint a position like that of Mr. Games is enviable because it is "not exacting." The scene is different: in America it is not possible to work with the freedom Mr. Games enjoys. Mr. Bayer feels that, in the final analysis, the American designer makes his decisions on the basis of intuition alone, right or wrong. The designer in the 20th century "has created a visual language that did not exist before."

William Golden

Late Saturday afternoon, the last day of the conference, we talked with William Golden. He was tired, let-down, honest—with no notions about himself or his trade. He objected firmly to designers' pretensions—felt that they had a tendency to try to dignify the trivial assignment which they feel is beneath them by approaching the job as ART. This effort, born of a form of false pride, tends to cloud the issue. "I don't call my work art. If some museum director wants to do so, that is all right with me, as long as he doesn't say it too loudly. It might confuse my client."

WHO'S WHO IN THIS REPORT

Abram Games, *O.B.E., F.S.I.A., British poster designer*

Bruce MacKenzie, *science editor and writer*

Lancelot Law Whyte, *M.C., British physicist, author*

William Capitman, *President, Center for Research in Marketing*

William Golden, *Director, Advertising & Sales Promotion, CBS television*

Lancelot Hogben, *F. R. S., geneticist; Head, Department of Medical Statistics. Birmingham University, England*

James Real, *graphic designer; Director, Popular Education, Fund for the Republic*

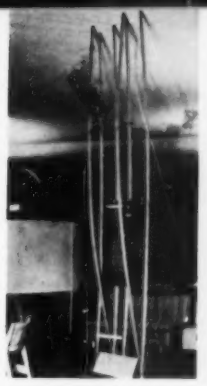
Roman Vishniac, *micro biologist and photographer, Fellow of the Biological Photographic Association and the N. Y. Microscopical Society*

The first day at Aspen brought forth the assertion, evidently shared, that the image lasts longer than the oldest member of the tribe, and that ideally it serves the visual needs of the whole people. If the conference ended in agreement, it was agreement that though the ideal had not been achieved, the means for achievement were available. "We have poverty among plenty," Mr. Capitman asserted; and no one present appeared unable to see either the poverty or the plenty. Could a conference like the one at Aspen contribute to the alleviation of the poverty and the exploitation of the plenty? This was by no means certain. There is always the danger of the discussion not as a preparation for action, but as a substitute for it, and one conferee described his disillusionment with the early *conference cycles: "I had come to hear a great deal that I didn't already know. Instead, here was a religious conference on moral rearmament—a fog of quiet-suffering, sin-stricken souls on a busman's holiday. I have a profound distrust of the spoken word, and a distaste for it. When the human voice continues more than five minutes I begin to think about something else and am completely unaware of what's going on." But the human voice continued at Aspen, with an awareness that it was not enough. Never have there been so many calls to* do *something, to implement practically the conclusions of the conference. William Golden said: "I read with interest the report of an earlier design conference — complaints about street markers, billboards, road hazards, etc. But a commercial traffic analysis company did the job that should have come from Aspen. You ought to take some leadership." Roman Vishniac struck another note: "The image doesn't speak; it is the heart that speaks. I came here a happy man, now I am a happier man." Holding his pencil aloft, he said: "I carry my computer with me!* La conférence est morte! Vive la nouvelle conférence."

DESIGN IN THE PUBLIC SCHOOLS

Future art and shop teachers become amateur industrial designers

Two months after being introduced to industrial design, these art students were casting models in plaster, as part of their assignment in a course required of all juniors. One student was so entranced with his clay model of a hand drill that he cast several, painted them in different colors, and used them as decoration.



At the end of the term, Abend delivered an all-day critique of the juniors' collaborative projects. Above, he is examining some of the designs produced in the camping project. At right is part of the industrial design exhibit held at year's end in the student lounge.

During the past school year, an industrial designer named Chester J. Abend was Visiting Professor at the State Teachers College in Buffalo New York at the invitation of the director of the Art Division, Dr. Stanley Czurles. His students there were not future industrial designers, but future art and shop teachers, and the courses he taught represent a unique attempt to teach industrial design not to the future industrial designer but to the future consumer. Designers have attempted to teach consumers before, but mostly by making speeches at them. This was an attempt to catch the consumer in the bud, or at least in the fourth grade, by educating student-teachers in the goals, the methods, and the criteria of good design.

Abend's year-end report to the state officials to whom he was responsible contains a statement of his reasons for teaching: "Designers are not hired to advance esthetics or quality but to advance sales, and if good design is to be achieved it will be because of the designer's moral responsibility to himself and to the public. Our competitive economy is based on the saying that the customer is always right. But what if the customer is trained to insist on nauseating design? I also question the belief that the world of art, design and architecture, so much concerned with fostering creative achievement, actually exercises any strong influence in this regard. For it does not—it depends for permission upon manufacturers, cost accountants, sales managers, engineers and advertising-pollsters. For the most part design decision depends on the people who buy the concrete for through-ways, who put up factories and bill-boards and place costly ads in magazines. If we wish to have some say in design we must build a bridge between their world and ours."

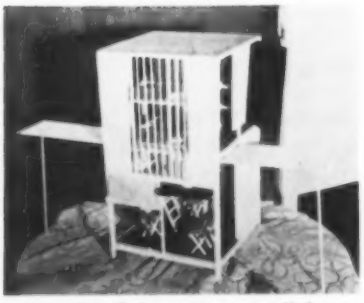
There could be no better bridge-builders than elementary and high school teachers, Abend felt, and no better way to teach them about design than to teach them to be, temporarily and in a small way, designers. In all, he taught four courses: three to the students in art, and one to the freshmen in industrial arts (shop). Two of the courses in the art department existed already: Design with Metal, required of the sophomores, and Studio in Product Design, an elective for juniors and seniors. A new prerequisite for this last was Advanced Design Studio, a half-year course required of the art juniors. This course was the real center of the program and the inspiration of the most ambitious design projects.

With all of industrial design to cram into one semester, Abend found himself speeding through processes and philosophies at an alarming rate. As a check on what was being absorbed, one student was detailed at each class meeting to record the proceedings. Where fog was apparent, Abend would review the material in a later lecture. Industrial films offered a quick packaged way to present some to the technical material and Abend showed 16 of these during the school year. His students made 12 field trips to factories in the Buffalo area—these more as an introduction to the industrial world than for any specific application to their own design problems.

It was these design problems that formed the real center of their course. In his first lecture Abend showed them two water pitchers: an old one of glass and a contemporary one of plastic. After brief discussion of the practical and psychological qualities of each material and shape, the students were given their first assignment: to sketch a water container suitable for refrigerator and dining table use, to be made out of any material desired. Abend found here, as in general, that the students' rendering technique was haphazard. He commented in his report: "The concept of premeditated design, carefully refined and developed on paper, comes as a relatively new idea. Even the use of scale drawings must be pushed as a superior system." A week later they participated in a critique of their water pitchers and—after an explanation of press brake and roll-forming pro-

Harris Dunlap's knapsack frame, produced as part of the camping project, is constructed of aluminum tubing is easily removable.

Another part of the camping project is John O'Neil's tent, designed to be erected on top of a car.



Beach house was a collaborative project of seniors in elective course.

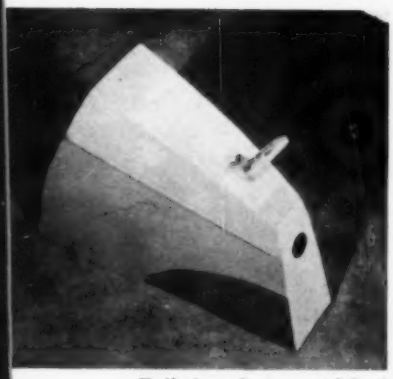
William Roth formed this chair from very light-gage steel tubing and rope.

End-of-the-year exhibit displayed student products

cesses—received a new assignment: to execute a cardboard full-scale model of a sheet metal light fixture or planter unit.

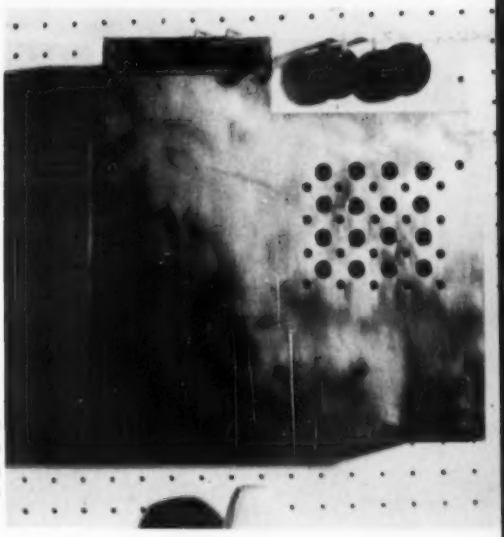
Toward the middle of the semester, the juniors received their most ambitious assignment: a "total design" project to be undertaken in collaboration with a group of their classmates. "It demonstrated on an obvious and understandable scale," Abend says, "that the student could not always work alone; that in fact he was often dependent upon others for both motivation and inspiration. The most direct benefit was the close exposure that members of the team had to the activities and results not only of their own team-mates but of other teams as well. This gave them the opportunity to get close to the full range of design activity in areas they could not possibly cover by themselves or within available class time." Groups were limited to five or six and were directed by a project coordinator—a student selected on the basis of design talent, leadership, and energy. Each team member participated in group decision but also had some special responsibility: graphics, modelmaking, research, photographs, or mechanical drawings. The coordinator evaluated and graded his team members' work; he himself was graded on the completed project.

Abend offered his students a choice of five projects: The Candy Store, The Playground, The Sculpture Classroom, The Camping Situation, and The Beauty Parlor. These projects were obviously very close to the students' own experience: they knew at first-hand the failings of the sculpture classroom, for example, where if the bad ventilation didn't get you a flying stone chip would. The candy store team visited stores, interviewed their proprietors, sent for equipment brochures, consuming a large number of ice cream cones in the course of their research. (Abend had suggested many of these research avenues, as well as indicating the directions in which they should concentrate their design efforts.) The students selected an appropriate site for their store, studied the ethnic makup and the special



Full-size plaster model of vacuum cleaner by Robert Fox has internal storage for accessories and hose.

Telephone by Emily Pattison slides on steel pole to adjust to height of caller.



Radio model by William Spearr is mounted like a drawer under low coffee table.

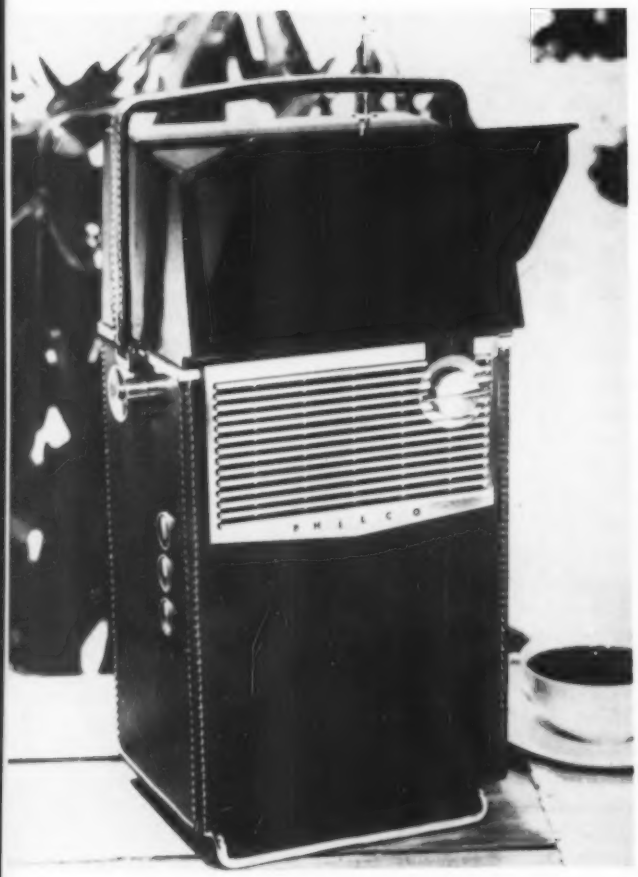
needs of the neighborhood they selected, estimated the cost of operating a profitable business and the number of employees it would require. They designed fountains that could fill several glasses at one time, take-out trays that would hold beverages and ice cream cones securely, and a counter stool that provided space for purses and coats. The terms of the assignment required them to submit a complete floor-plan, two large colored perspectives of the exterior and interior, a plaster mock-up of one of the smaller products (they chose the fountain dispenser) and a full size prototype of the counter stool. The presentation of the projects formed the finale of the course.

It is interesting that, according to Abend's report, the industrial design program was least enthusiastically received among the industrial arts students. Not only were they generally less capable of forming design concepts than were the art students; they were also, curiously, less adept at carrying them out. While the art students were eager to learn about new forming methods, the shop students were unwilling to learn about art, which many of them considered unmasculine as well as incomprehensible. In his report Abend pointed out what seemed to him the biggest difficulty in this course: "It is the opinion of the writer that by far the greatest handicap in reaching the I.A. student is the highly pragmatic orientation with which the freshman comes to us. His approach and expectations are usually so frozen or stereotyped that he is apt to take what he thinks is a 'no nonsense' attitude towards anything that tampers with or violates his previous convictions. Some students are so highly opinionated by the time they leave high school that they can almost be *admired* for the inferior design efforts they submit. They actually do it out of a courageous sense of principle: 'It's not that I didn't think of it, I just didn't see the sense for it.' In effect they say, 'It can hardly be expected that we, as students, could hope to better what we know has already been done.'"

At the end of the year, the student projects in industrial design formed an exhibit in the college lounge; an exhibit arranged to coincide with the Albright Art Gallery exhibit of "20th Century Design: U.S.A.." which took place across the street from the college. But these projects, Abend would be the first to point out, are an inadequate measure of the total value of the courses. No one concerned, least of all the students themselves, thought that these future teachers were qualified for either serious research or serious design. Their products cannot, therefore be appraised by the same standards that apply to design school students. Compared to professional industrial design courses, the "total design" projects were almost an elaborate game; the candy store team, for example, seemed much more interested in choosing a name for their store than in designing a stool for it. And in many places where they were most in earnest, the students demonstrated their preoccupation with their future not as artists but as teachers. Just as the professional designer must create with one eye on the sales department, they created with one conscientious eye on the sociology they learned in their education courses. (Will this playground equipment increase the four-year-old's awareness of the group?) But—as modern educational methods had shown them—in playing at industrial design they learned a great deal about its problems and its goals. Preliminary reports from their apprentice-teaching jobs indicate that they are enthusiastically communicating their knowledge to their fifth-graders (who often prove more adept than their teachers at solving elementary design problems.) Abend has evaluated the program in his report: "When I consider the wave effect that these future art teachers will have in shaping the design outlook of future generations, I feel I have helped advance design more than I might have done by any single product." The experiment at Buffalo will be repeated next year, with industrial designer Victor Papanek as instructor.—*U.McH.*

DESIGN REVIEW

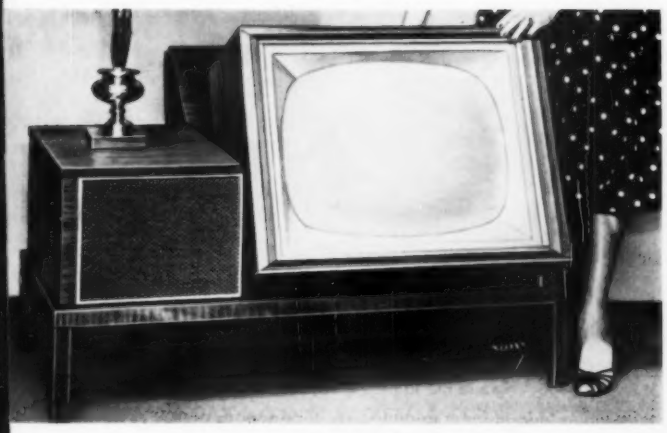
Television receivers this year foreshadow an era when the transistorized miniature may be nearly as ubiquitous as the pocket radio. Although several companies are developing them, only Philco so far has marketed one — and the set below, with a tiny picture tube, shows how the use of transistors can act as a spur to miniaturizing other parts as well. Another technical improvement in tv is the laminated glass front picture tube which eliminates the glass face in the cabinet and may one day turn the familiar television screen into a square.



← **Philco** Safari, the first battery-operated portable on the market, weighs, with batteries, 15 pounds, is 16⅝ inches high, 8⅝ inches wide, and 5⅝ inches deep, and employs 21 transistors. Reminiscent of the earliest tv sets, the picture is reflected from a mirror set into the back of the case. The image is received by a two-inch cathode ray picture tube in the bottom of the set and projected upwards, where it is caught and magnified by a beam splitter mirror, which in turn projects the image onto a curved mirror at the back wall of the set. (The beam splitter mirror is transparent, since it is installed at a 45-degree angle intersecting the line of vision.) The magnifying effect of the two mirrors gives the viewer an image approximately equivalent to that produced by a conventional 14-inch picture tube. The visor projecting from the front and the angle of refraction from the curved mirror prevent daylight from interfering with the image. The set also operates on house current. Herbert Gosweiler designed the case, and Howard Bonner was engineer in charge of the project.

↓ **General Electric** experimental transistor set weighs ten pounds, has an 8-inch screen and a vinyl-covered case. Company has not announced production date.

↑ **Sylvania** Dualette 17-inch portable weighs 33 pounds. Cabinet is injection molded polystyrene. Designed by Jon Hauser Associates.

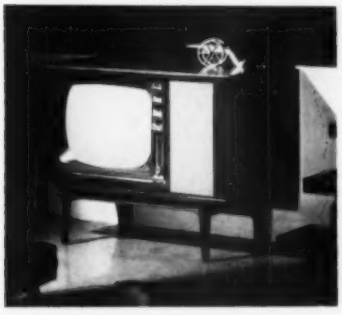


▲ **RCA Victor** Hillsborough, with 21-inch screen, is set into low table. In use, the table-top folds back and the set swings out and up.

▼ **RCA Victor** Programmer permits 12 hours of programming. Set turns itself on and off, changes channels at 30-minute intervals.

▲ **Philco** Predicta continues line of separate-screen tv introduced last year. Timer turns set on and off automatically. Stand is optional.

▼ **Motorola** Declaration console is part of Drexel Profile line, has stereo console twin. Staff design: Herbert Zeller, Director of Design.

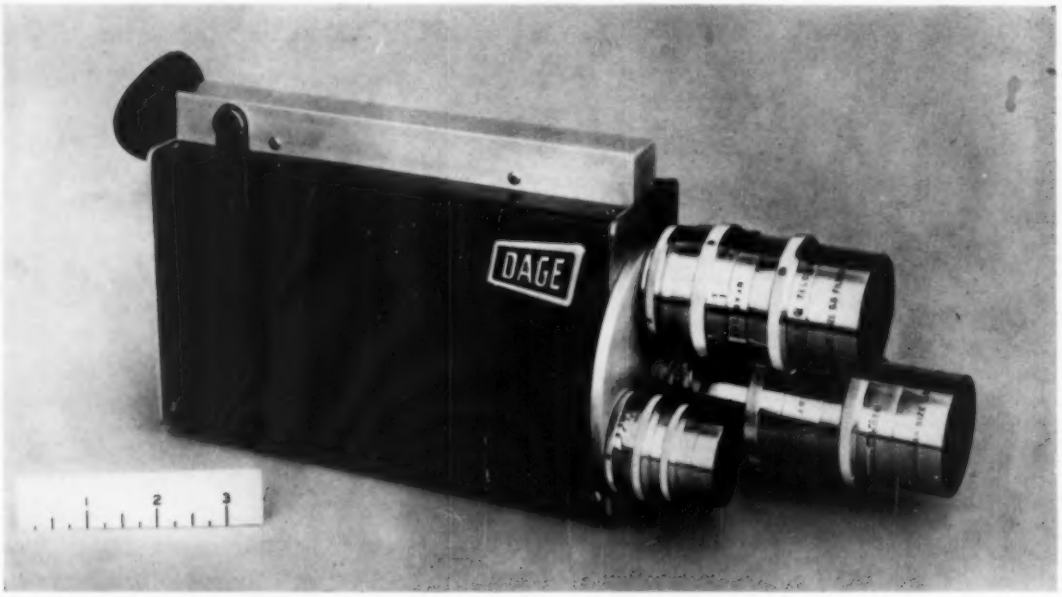


▲ **Westinghouse** American Contemporary incorporates remote control equipment into "Mondrian" panel design. Cy Silverman, Manager of Design; J. Gordon Perlmutter, consultant.

▼ **Packard-Bell** 21-inch Transportable, on teacart-like stand, flashes channel dialed in panel window. James W. Kelso, designer.

▲ **Sylvania** 23C18 employs new 23-inch picture tube for squared corners, flatter face. Tube developed in cooperation with Corning Glass.

Closed-circuit television is multiplying its uses, as equipment for it becomes less unwieldy and less expensive. Controls become less complicated and more susceptible of being operated by the layman; for military use, the television camera must even operate itself. For the television viewer, remote control units make life still more languid; for the stereo listener, remote controls make good sense, since he can adjust the volume from the point at which he hears the music.

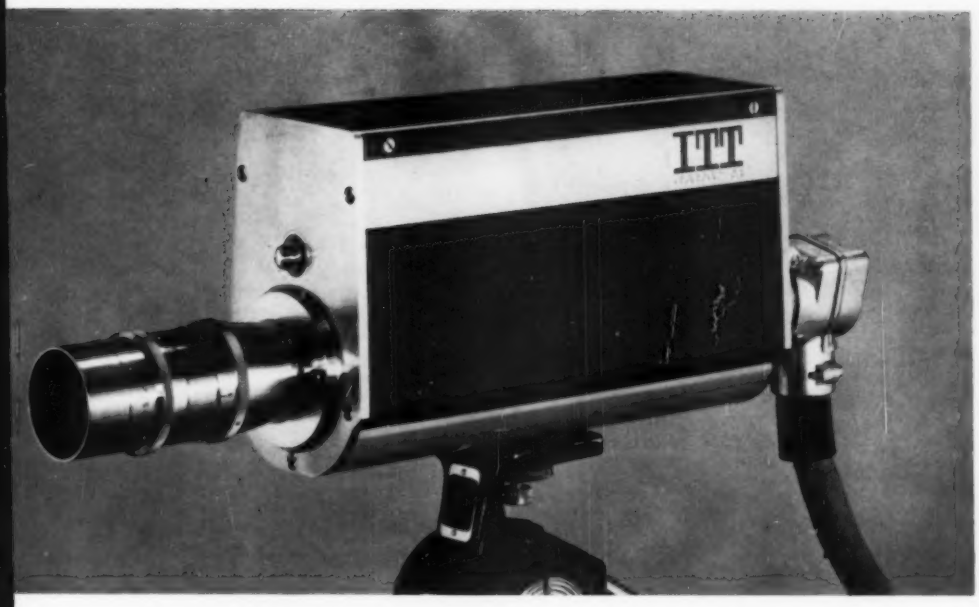


▲ **Dage** automatic tv camera uses transistors and printed circuits to achieve miniature size: 2⅜ by 5⅜ by 7¾ inches. Camera, for military use, has no operating controls.

▲ **CIBA** Eidophor, closed-circuit tv projector for theater viewing, can project an image 30 by 40 feet. Oil film on concave mirror is modified by electrical impulse from camera. Light passes through "wrinkles" in oil film and is projected onto screen.

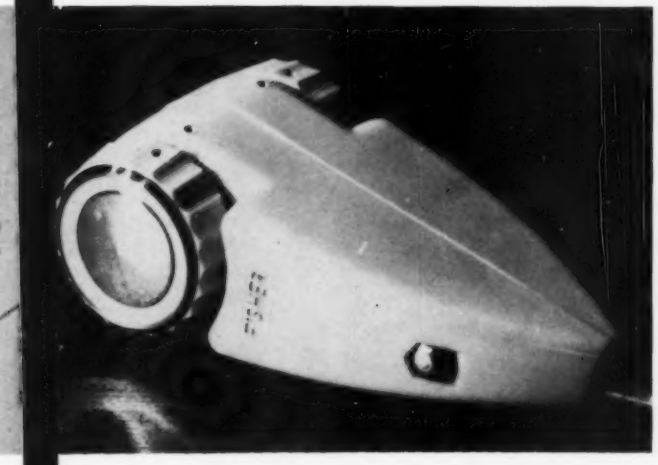
▼ **Zenith** Space Commander 400 tv remote control system is operated by ultrasonic impulses. System formed part of U.S. exhibit in Moscow.

▲ **Sylvania** closed-circuit tv camera weighs 15 pounds, is equipped with one, two, or three lenses. Vidicon-type camera is intended particularly for use in schools.



◄ **ITT** closed-circuit tv camera is completely enclosed, with no louvers or vents. Heat radiates from aluminum extrusion on which nameplate appears. Channing Gilson and William Brewer, designers.

▼ **Fisher** remote control unit for stereo speakers includes 30-foot cable and adapter plug. Knobs control left- and right-hand speakers.



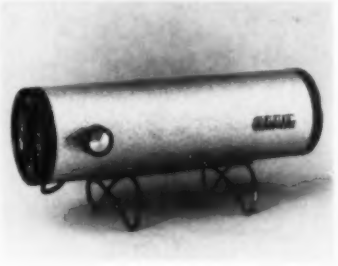
▼ **RCA Victor** tv remote control units operate by supersonic impulse. Larger units in series can perform more functions.

Stereophonic sound demands a multiplicity of elements, and the biggest design problem is imposing unity on a miscellaneous assortment of equipment, especially since stereo is outgrowing its rugged frontier days of naked tubes and wires. (In the case of portables, the unity must be an actual physical one.) For the speaker enclosure, a square box is the simplest solution, although a monotonous one. Rek-O-Kut has found one remedy for monotony in its molded grille cloth; the Orbit's space-age shape is another, and more exotic, solution.

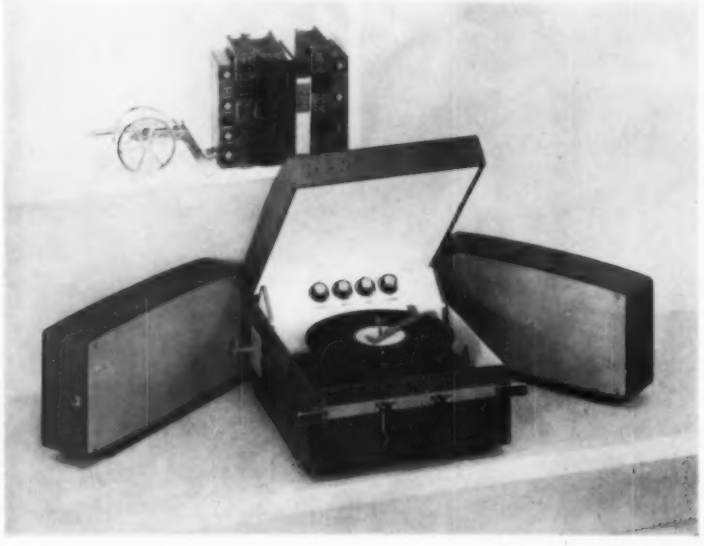
← **Steelman** Model 202 four-speed portable stereophonic phonograph is contained in typewriter-like case. Speakers have plastic grilles.

↓ **Orbit** Mark IV speaker is 14 inches long, 4 inches in diameter; emits sound from both ends. Finish is gold or silver Mylar.®

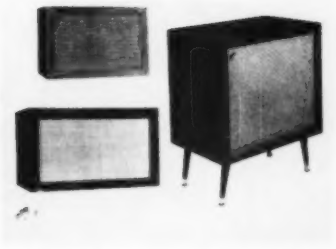
← **Arvin** Model 8091 stereophonic phonograph contains two speakers connected to amplifier output through hinges. Units can also be detached, are then connected with player by cables.



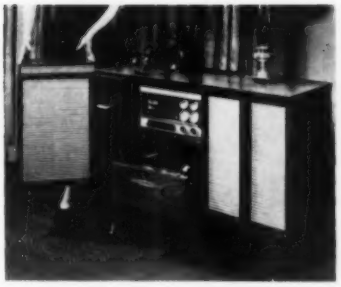
↓ **Motorola** portable stereophonic phonograph, with detachable speakers, is covered in vinyl. All controls are in center section. Staff designed by Herbert Zeller.



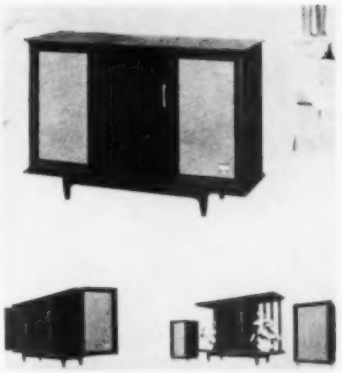
↑ **General Electric** speaker, Model G-501, incorporates woofer and tweeter, measures 22 by 13 by 9 inches. Series is available in several wood finishes.



↑ **Norelco** speaker enclosures Models III and II (upper and lower left) are for 8-inch speakers. Model I (right), for 12-inch speakers, will take two 8-inch speakers.



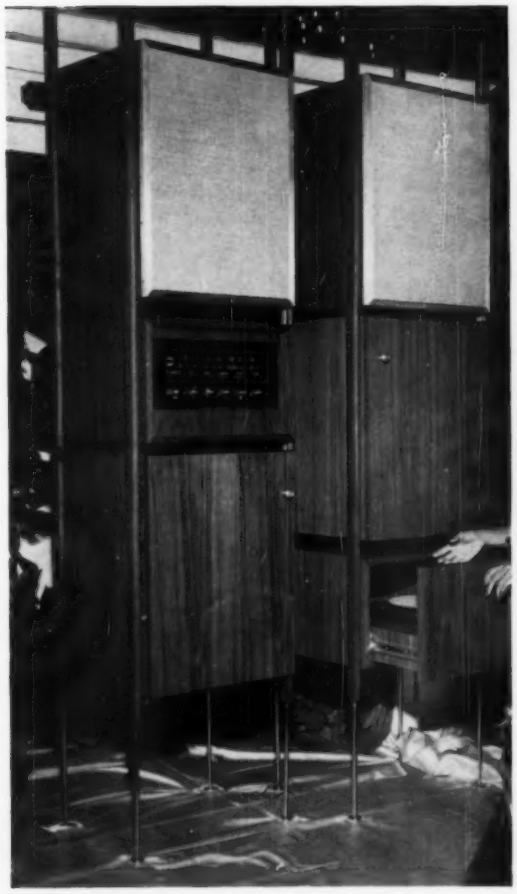
↑ **RCA Victor** Mark XIII stereophonic radio-phonograph has swing-out, speakers that can be completely detached, AM/FM tuning, jacks for auxiliary equipment.

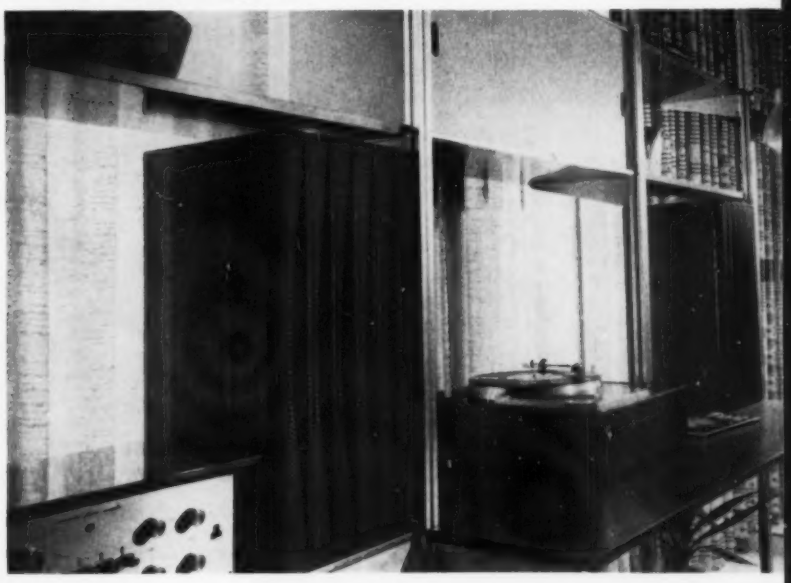


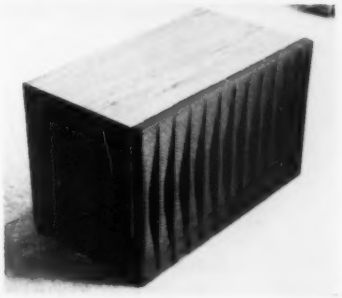
↑ **Admiral** Imperia stereophonic radio-phonograph contains swivelling end speakers which may be completely detached. L. H. Wilson Associates, designers.

↓ **Packard-Bell** modular stereo and tv system includes speakers, tuner, phonograph, and tv receiver. Cabinets are walnut with anodized aluminum trim. All units are 18 x 18 x 12 or 18 x 18 x 24 inches. James W. Kelso, designer.

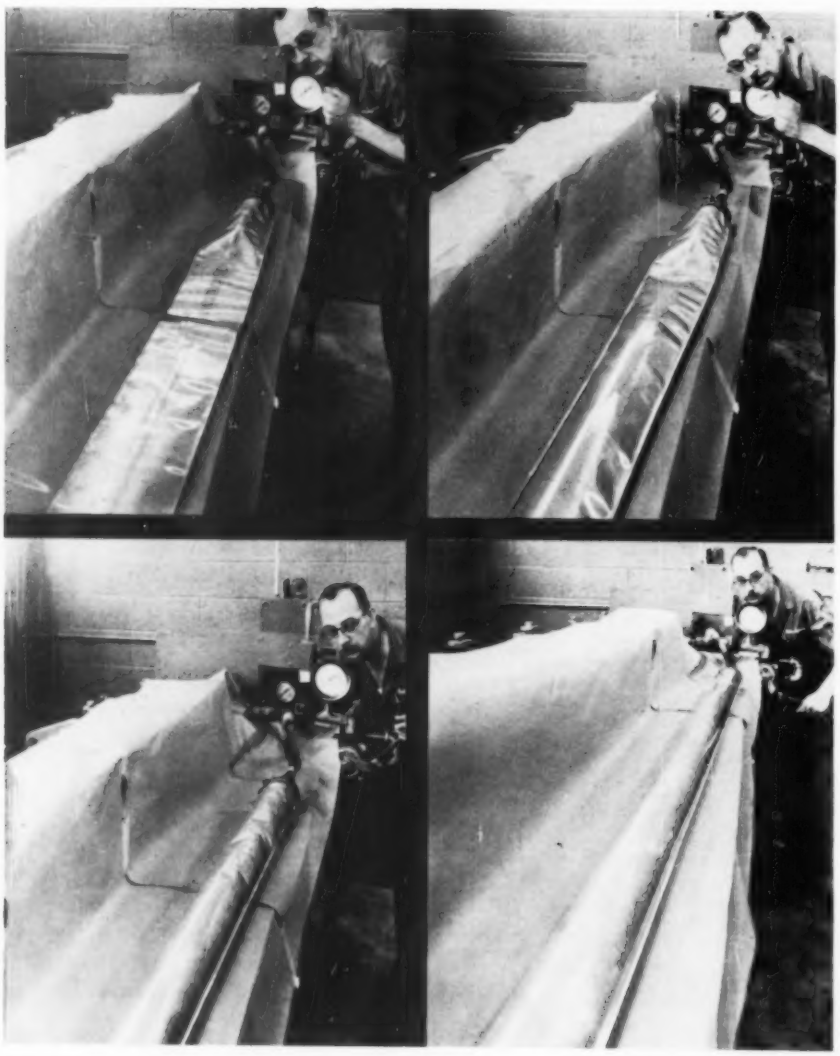
↓ **Rek-O-Kut** modular stereo system fronts speakers with vacuum-formed Dynel grille cloth (see ID, January, 1959). Forming is both horizontal and vertical, permitting flexible arrangement. George Nelson and Company, designers.







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



Strubing

The Wolverine Tube Division of Calumet & Hecla, Inc. will start experimental production this fall of a thin-wall seamless metal tubing that can be shipped in ribbon form and inflated at the point of use. The new material, known as Strubing (strip tubing), holds promise of major innovations in industries as diverse as construction, electric power distribution, communications, rockets and missiles, packaging, and general manufacture.

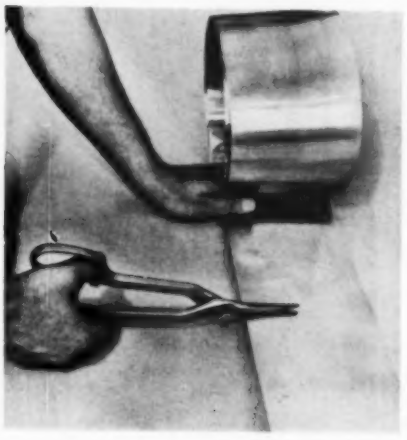
According to the manufacturers, Strubing offers two major advantages. First, point-of-use inflatability makes it possible to ship thin-wall tubing economically, since only the "walls" are shipped, and not the "hole." Secondly, the cold rolling process used to product Strubing provides a cheap means of producing thin-wall tubing of materials and thicknesses either unavailable or prohibitively costly.

Field inflatability might make it possible, for instance, to ship the entire ductwork for the heating system of a seven room house in a box the size of an orange crate instead of in trailer-truck loads. The ribbon might then be strung through the house and inflated in place for a major saving in time and effort over conventional methods for the installation of ductwork.

Strubing in metal foil thicknesses is said to hold promise as a packaging material for frozen foods, toothpaste, or as a covering for food reheating. It would be easier, company officials state, to insert a chicken in a length of Strubing and crimp the ends than it would be to wrap a foil sheet around it. Heavier-walled Strubing could be used by the canning industry. The advantage here is that the new tubing is seamless, whereas conventional cans have a seam down the sides. In addition, the long-length availability of the product is ideal for continuous canning lines.

The methods and equipment to be used for inflating the metal tubing will vary with the application of the material and its dimensions, say Calumet and Hecla engineers. To date, they have used hydraulic pressure, air pressure, and mechanical means to inflate Strubing. The thinner the wall thickness, the lower the pressure required for inflation. In some sizes, Strubing can be inflated simply by using tap water pressure.

Techniques involved in making Strubing are reported to be simple. The first step is to make a simple hollow shape by con-



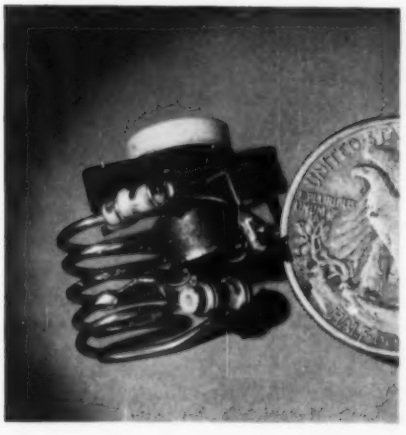
ventional methods. It is then passed through a rolling mill where it is flattened into a ribbon form. The rolling process elongates the original tube by making it thinner without changing the inside tube diameter. The more it passes through the rolls, the thinner the Strubing. The diameter of the Strubing is limited only by the size of the starting piece, and the size of the starting piece only by the capacity of the rolling mill used. Manufacturer: Wolverine Tube, Allen Park, Michigan.

Tunnel diode

General Electric Company revealed that it is conducting concentrated experiments with tunnel diodes, an electronic device that is a first cousin to the transistor but which offers advantages that the transistor does not. The tunnel diodes are still in the experimental stages and not yet commercially available. However, to spur progress in circuit design, GE's Semiconductor Products Department now has plans to offer limited quantities of samples for use within the next few months.

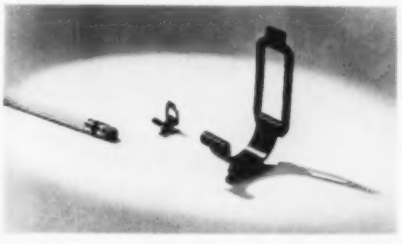
The tunnel diode takes its name from the physical phenomenon that makes it possible: "quantum-mechanical tunneling." The term is used to describe the manner in which the electrical charges move through the device. Such motion takes place with the speed of light, in contrast to the relatively slow motion of electrical charge carriers in transistors. The high speeds at which electrical charges travel in tunnel diodes make it possible for the device to operate at extremely high frequencies. Oscillation frequencies of 2000 megacycles have already been obtained, and frequencies of more than 10,000 megacycles are expected in the near future.

The tunnel diode is smaller than the transistor and, because of a simpler structure, ultimately will be a small fraction of its present size. It also is little affected by environmental conditions. Silicon tunnel diodes work at temperatures as high as 650°F; conventional silicon diodes will not operate above 400°F. The simplicity of this device makes possible the development of integrated circuits in which entire circuits for some applications may be formed on a single semiconductor structure. Manufacturer: General Electric Company, Schenectady, N. Y.



New fastener

A miniature version of the Insuloid Cradlelip system for securing or separating wire groups such as the kinds found in electrical harness or other wire and cable installations has just been announced by Electrovert, Inc. This new unit makes possible use of Insuloid systems in space and weight saving programs, in the production of miniaturized units or other components requiring very small holding devices. Pressure tubing for missiles, aircraft or control assemblies, and electrical components may be fastened with this unit. Electrovert officials say that over fourteen months of laboratory development, work and field trial tests, have proven this new device to be the most economical fastening method, due to reduced installation time costs.



The fastener is comprised of a U-shaped nylon cradle into which fits a bundle of wires or components, and an extensible Neoprene clip permanently hinged to the top of the cradle. The clip cinches across the opening and locks under an inverted lip on the other side of the cradle. Miniature cradlelip units will accommodate diameters from 5/32 to ¼-inches. Manufacturer: Electrovert, Inc., New York, N. Y.

Electronic circuit board

Plastic Associates of Laguna Beach, Cal., is now distributing a new quick-connect circuit board for industrial training courses. The board permits the rapid assembly and dis-assembly of electrical circuits using standard components without solder, clips, screw connections, or specialized breadboard connections. Though initially expensive, the board is expected to account for great savings in components which heretofore were easily damaged by repeated soldering and unsoldering. The versatility and design of the circuit board make it useful for teaching basic courses in electricity and electronics.

Key to the operation of the board is a conductive cell that permits two or more wires to be rapidly connected without the use of solder or any special type of connector. Each cell consists of a gold-plated eyelet through which protrudes an elastic rubber core. When the core is pulled upward, the rubber stretches, allowing wires to be easily slipped inside the eyelet. When released, the rubber core grips the wires, pressing them firmly against the inside surface of the eyelet. Manufacturer: Plastics Associates, Laguna Beach, Cal.

GE has new fuel cell

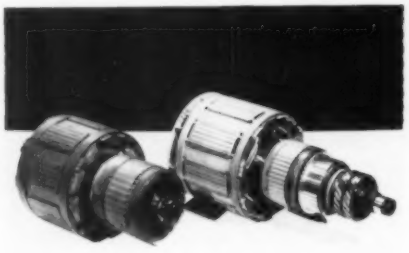
A new type of electricity generating device has been developed: a fuel cell in which hydrogen and oxygen produce an electric current. In the picture above, GE scientists watch as the electricity generated in the small plastic cell spins a miniature propeller. The fuel, contained in the balloon marked H_2, is hydrogen which reacts with the oxygen in the air, producing electricity and, as a by-product, water.

Fuel cells are not new. "For more than a century," said GE's Dr. Guy Suits, vice-president and director of research, "scientists have been trying to develop a successful 'fuel cell', as such. It has been a continuing challenge because it offers the possibility of generating electricity much more efficiently than by conventional methods . . . they are compact, light-weight power sources." The new GE model consists of a round plastic disk about one-half inch thick and three inches in diameter; its interior is divided into two chambers, one of which is filled with oxygen and the other with hydrogen. At one electrode inside the chamber, hydrogen molecules break up into electrons and positively-charged hydrogen; the electrons travel through an external circuit to another electrode, and thus an electric current is created. It is likely that the cell will be used for specialty applications, for military and space vehicles in which the reliability, simplicity, portability, light weight and small volume of the new GE cell have special significance. Manufacturer: General Electric Research Laboratory, Schenectady, N. Y.

Brushless generators

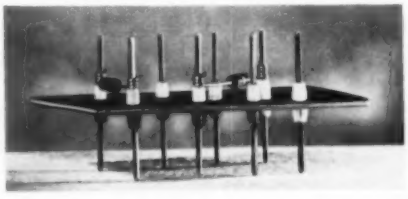
Westinghouse has devised a method for overcoming the dangers of brush-failure in aircraft generators by designing a brushless model. Generators in some new high-performance planes are required to operate at ambient temperatures of 300°F and above, at altitudes of 65,000 feet and above. Under these conditions the brushes used in conventional generators tend to break down. They have been eliminated in the new design by replacement: a three-phase bridge rectifier provides the necessary dc excitation previously supplied through the brushes; the rectifier is directly mounted on the rotor and draws its power from a three-phase ac exciter.

The use of silicon rectifiers (see ID, April 1959 for article on silicon rectifiers) makes for a number of improvements. The new generator is insensitive to altitude and atmospheric conditions, has no radio noise, and has long life. It is also lighter and much smaller than the standard brush-type generator (the difference between the



two types is seen in the comparison photograph above).

The new generators are offered in two basic types: oil-cooled, and air-cooled. Air-cooled types are available in ratings from 8 to 60 kva, oil-cooled, in ratings from 20 to 40 kva. Both types offer a low maintenance cost due to the elimination of the commutators, slip rings and brushes, all of which tend to deteriorate after much service. Manufacturer: Westinghouse Electric Corporation, Lima Plant, Lima, Ohio.



Self-locking feedthrough terminals

Installation costs of circuitry in aircraft, missile, marine, automation, and appliance applications can be cut down as a result of a newly marketed self-locking feedthrough terminal. The self-locking nylon body of "Pushlock" Wire Wrap Terminals permits one-step insertion, eliminating special fastening devices. The new terminal is made up of molded flutes which project from the molded nylon body. When the terminal is pressed into a mounting hole, the flutes deflect and their tendency to return to normal position creates a holding power around the inside circumference of the mounting hole. Since the flutes are molded from nylon, they will continue to exert this pressure under temperatures from —65° to +300°. Manufacturer: Whitso, Inc., 9330 Byron St., Schiller Park, Ill.

Leakproof, frictionless seal

A new device is on the market that acts as a combination bellows and diaphragm. Called the Bellofram, the component (above) is used in valves and regulators where it converts pressure into displacement, or prevents the leakage of liquid or gas across a moving piston or shaft. The inventor of the component, Mr. John F. Taplin, has explained the function of the Bellofram: "Machines have pistons . . . and a piston, or plunger, must work by sliding inside a tight-fitting cylinder. No matter how tightly it fits, however, the piston is inevitably going to permit some leakage between itself and the cylinder wall . . ." The Bellofram, he explained, is a leakproof, frictionless seal of rubberized fabric which moves back and forth with the piston. It acts much like a diaphragm, but it is deeper and permits a longer stroke.

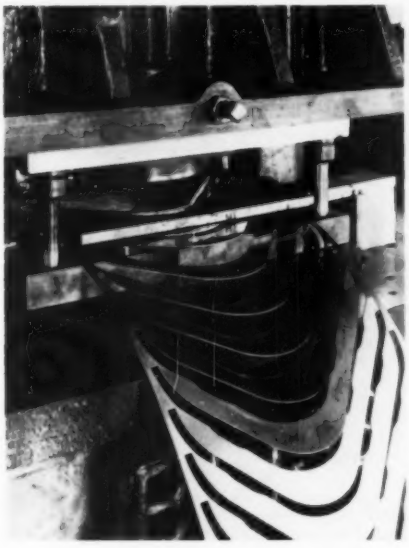
Belloframs are usually made of Dacron or other synthetics that have high tensile strength; they are impregnated with synthetic rubber, plastic, silicone compounds, and other materials which are developed for special applications. The new seal type can withstand pressure up to 500 lbs. per square inch; it requires no lubrication of any kind. The new seal cannot "freeze up," is self-centering and does not require any device to guide it in the cylinder. It is finding wide use in the aircraft and automotive industry and in many military applications. Manufacturer: Bellofram Corporation, Blanchard Road, Burlington, Massachusetts.

RCA's new tube on sampling basis

RCA's Nuvistor — the tiny signal triode tube seen at the last IRE show (see ID April '59)—is now available to electronic equipment manufacturers on a limited sampling basis. The tube, encased in a metal envelope, weighs 1/15 of an ounce, has an overall length of 0.79 inch and a diameter of 0.43 inch. Manufacturer: RCA Electron Tube Division, Harrison, N. J.

Stainless steel seals

Stainless steel window springs are used on the Boeing 707 jet airliners to seal the cabin windows; leaks which could lower cabin pressure when the craft is at altitudes of over 31,000 ft. at 605 mph are thereby prevented. The springs must be capable of standing up under compression under wide and rapid changes in temperature and environment. The seals are made of a grade steel that has a high strength-to-weight ratio and good corrosion resist-



ance. After installation, the window springs have a minimum tensile strength of 185,000 pounds per square inch. Compressed almost ¼ inch when installed, they exert a strong pressure on each face of the double window. The seal is essentially a series of ten double elliptical springs; segments are stamped and formed (above) from stainless steel strip 0.052 inches thick by 14½ inches wide. Manufacturer: Renton Coil Spring Company, Renton, Washington. Supplier: Jones & Laughlin Steel Corporation, Stainless and Strip Division, P.O. Box 4606, Detroit 36, Michigan.

High-ductility molybdenum sheet

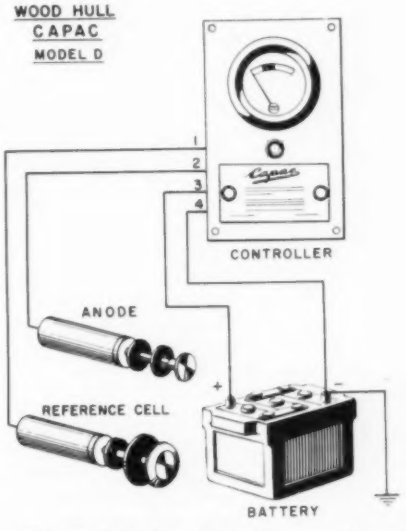
A new molybdenum sheet with high ductility will facilitate bending and forming operations when used with any of the large number of product applications for which the metal is suited. The new sheet reduces the need for heating while the metal is processed. Ordinary molybdenum sheet can be bent only to about 20 degree angles without breaking at room temperature and often requires heats as high as 1000°F for successful working. The new metal, type HD molybdenum sheet, of the same thickness can take a right-angle bend at room temperature without cracking. Benefits of the new product are of particular significance in thicknesses ranging from 0.025 to 0.125 inches; the new HD (for high-ductility) sheet is expected to find use in many defense and industrial applications, notably the production of electronic tubes, transistor diodes and rectifiers, high temperature strength parts. Manufacturer: General Electric, Nela Park, Cleveland 12, Ohio.

Tiny variable transformer

A new Powerstat variable transformer that operates at a 40 per cent increase without change in size has been put on the market. The variable power unit has a depth behind panel of only 2 1/16 inches, operates from a 120 volt, 60 cycle input, and has an output of 120 or 132 volts at 1.75 amperes. Two- and three-gang assemblies are available for increased ratings and 3-phase operation. Manufacturer: The Superior Electric Co., 83 Laurel St., Bristol, Connecticut.

New boat-protecting system

The possibility of eliminating corrosion and spoilage of underwater metal parts of boats has been improved as a result of some recent developments in this field. Charles Engelhard, Inc., has announced use of a platinum anode in its Capac electrical anti-corrosion equipment which forces electricity to enter all submerged metal parts thereby making them immune to corrosion.



The fact that underwater corrosion is caused by a flow of galvanic electricity acting destructively has been known for some time. In the past, zinc and magnesium metals have been attached to the hulls of craft to combat the destructive electric force. This system was not entirely satisfactory, and the new Engelhard development is said to overcome the system's deficiency.

Corrosion occurs at those areas where electricity leaves submerged metal, but does not take place at areas where electricity enters the metal. By using one or more platinum surfaced anodes which are energized by the electrical system of the boat, the new system forces electricity to enter all submerged metal parts, thus making them immune to corrosion.

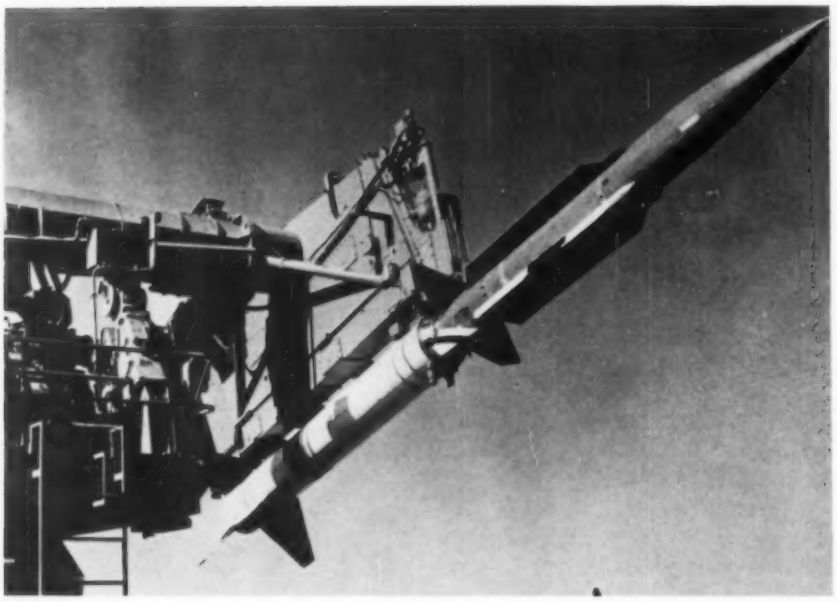
Different types of Capac units are available. For small wooden-hulled craft the unit need protect only such submerged parts as propellers, rudders, shafts, struts and grounding plates, and a simple Capac model retailing at $89.95 is adequate. For larger craft more complex adjustments are needed and the semi-automatic unit selling at $279.95 is a safer installment. Commercial ships, tankers, destroyers and submarines use the Capac system. Manufacturer: Charles Engelhard Inc., 113 Astor Street, Newark 2, N. J.

Ball-point pen/slide caliper

A ball-point pen combined with a slide caliper is offered as "a perfect measuring instrument for technicians and engineers, architects and building contractors, craftsmen and retailers." The Fend-Truxa III is calibrated in English and metric systems, has a push-button ejector for the pen, and a combination pocket clip-slider. It is chromium-plated, 5¾ inches long, and has a replaceable cartridge. Source: Designs Modern, 4082 El Bosque Drive, Pebble Beach, California.

Ceramic tile in sheets

A procedure has been developed for manufacturing ceramic tile in sheets. The process is not yet used for commercial production but when it is it will permit running off as much as 15 square feet of tile in one single piece. Ceramic tile has had to be set by hand individually throughout the long history of its production. But with the new process which has been described as "technically sound" at this point, a liquid epoxy resin is used in an assembly in which tiles are aligned and bonded edge to edge. The resulting tile sheet will be strong enough to permit sawing and drilling. The new method will of course simplify installation of tile. The sheet will still have to be bonded to floor or wall, but the space between the tiles will not have to be filled. Source: Tile Council of America, Inc., 800 Second Ave., New York 17.



Advanced Terrier supersonic missile is now being produced by Convair at Pomona, Cal.

New Terrier missile

The new advanced Terrier surface-to-air guided missile is scheduled as the primary anti-aircraft armament on at least 27 Navy warships, both nuclear and conventionally powered. Like the original Terrier, operational with the fleet units since 1956, the new rocket is a supersonic missile powered by two stages of solid fuel rockets. After fuel in booster is expended, the case falls away and the missile's second stage takes over to sustain the supersonic velocity. Manufacturer: Convair Division, General Dynamics Corporation, San Diego 12, Cal.

Large aerial camera windows

Supposedly the largest aerial camera windows ever produced—to be used with the Lockheed-Air Force RC-130 A planes—have been manufactured by Corning Glass Works for Thompson Optical Engineering Company, suppliers of the 42-inch diameter windows. The aerial camera windows will serve as "eyes" for re-mapping huge areas of the globe. Seventeen windows were produced of crown borosilicate glass, three inches thick and weighing three hundred pounds. Thompson ground and polished each window blank to produce optical quality; each window was measured to within millionths of an inch for surface flatness and freedom from distortion, to comply with military requirements.

In each plane that uses it, the window is located in the underside of the craft's fuselage. The size of the windows will permit simultaneous operation of two cameras which will provide greater accuracy for mapping and charting the many parts of the world scheduled to be re-mapped (many modern maps are based on observations of early explorers, and are, in many cases, not accurate enough). Two of the RC-130s, dubbed "See-130", are currently undergoing intensive flight testing to insure in-flight photographic accuracy. By late summer, 15 "See-130s" will be in use by the 1370th Photo Mapping Group, Air Photographic Charting Service. Manufacturer: Corning Glass Works, New York, for Thompson Optical Engineering Company, Los Angeles, Cal.

Ceramic capacitors

For electronic and electric circuit applications where size, weight and dimensional limitations exist, Centralab has developed a new group of high-voltage, high-current ceramic feed-thru capacitors which can be constructed by a method that permits flexibility in dimensions and a great variety of sizes and shapes. For example, a 20 kilovolt unit may be made either 3 inches in diameter and 6 inches long, or 5 inches in diameter and 4 inches long without changing the rating. Units of smaller or larger diameters or lengths can be designed for a wide range of voltages, up to 100 kilovolt, depending on the operating requirements. The new high voltage capacitors can be used to replace oil, mica or vacuum capacitors in radar, transmitters, R.F. heaters and many other applications. Manufacturer: Centralab, A Division of Globe-Union, Inc., 900 E. Keefe Avenue, Milwaukee 1, Wisconsin.

New tool for electric power lines

Alcoa is making available a new device important for electric utilities; given the unlikely name "clamp gripper tool for stick operation," the device can perform the task of hooking onto hot, energized power lines. Use of the tool makes it possible to apply the standard equipment used for this purpose—parallel groove clamps—to energized distribution or transmission lines. The tool itself is an assembly of components in a cast aluminum housing; it represents a joint development of Alcoa and Standard Coil Company, its manufacturer, and will be sold exclusively as a

Standard Coil product by Alcoa.

The company claims that the efficiency of a joint made by a parallel groove clamp installed with the aid of the new tool is electrically as well as mechanically equivalent to a joint made with the type of clamp the new tool replaces. Operation of the new Alcoa clamp gripper tool — gripping the line, positioning the clamp, making a tight connection, removing the tool — is illustrated by the four steps shown above. Manufacturer: Standard Coil Co., Pittsburgh, Pa., sold by: Aluminum Company of America, Pittsburgh, Pa.

Liquid dries out electrical parts

CRC Moisture Inhibitor is a new chemical liquid which draws out absorbed moisture in electrical equipment and prevents absorption. It is packaged in cans and aerosol bottles. Manufacturer: Corrosion Reaction Consultants, Inc., Phila. 6, Pa.

Manufacturers' Literature Supplement

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

MATERIALS-METALS

1. **Aluminum Grating.** Kerringan Iron Works. 8 pp., ill., charts. Detailed information on three types of aluminum grating, suitable for open flooring, treads, architectural grilles, etc. Light-weight, spark-proof, and non-corrosive.

2. **Chemical Milling of Steel and "Super" Alloys.** United States Chemical Milling Corporation. Design Bulletin No. 8 describes recent advances in chemically milled steel alloys, in any stage of fabrication: bar sheet, cast, extruded, forged, spun and stamped. Also gives information on the effects of heat treating, surface finishes and tolerances, effects on physical properties, and an up-to-date list of steel alloys and other super-hard metals that can now be chemically milled.

3. **Cold-Rolled High-Carbon Flat Spring Steel.** Athenia Steel Division, National-Standard Company. 28 pp., ill. Catalog 579 gives physical data for users of the above flat spring steels; includes consolidated conversion chart showing relationships between Rockwell, Rockwell Superficial, Tukon and other testers; weight calculation tables and nomographs; sheet metal gage comparison tables; edge specifications; and basic hardness definitions are included. Also illustrates manufacturing methods of Athenia Steel, and typical end products made from flat spring steel.

4. **Aluminum-Plastic Building Panel.** Aluminum Company of America. 24 pp., ill. Booklet describes Alply, a panel made of expanded plastic beads sandwiched between sheets of aluminum, suitable for appliances, building, trailers, etc. High weight-strength ratio, many designs, colors, finishes are described, and details are given on panel's thermal, acoustic, and corrosion-resistance characteristics, and on relevant joining and manufacturing standards.

5. **Four Types of Nickel Tubing.** Superior Tube Company. Folder CM-359 gives charts showing chemical composition, physical constants, and mechanical properties of seamless tubing made from "A" Nickel, Low Carbon Nickel, "D" Nickel, and Duranickel. Also includes general characteristics and typical uses, such as electronic applications, and processing equipment where contamination must be avoided.

6. **Steel Windows and Screens.** Ceco Steel Products Corporation. 48 pp., ill. Brochure #1001-0 gives complete line of steel windows, including intermediate, architecturally projected, industrial and residence casement windows. Details of construction and installation, with diagrams and tables, are listed as well as data on accompanying hardware, mechanical operators, casings, and trim. Also a special edition for Pacific Coast.

7. **Metallic Sparkle Product.** Dobeckmun Company. Folder shows sizes, shapes, colors and methods of application, of new metallic sparkle product for decorative surfacing; sample accompanies folder. Metalflake is currently used in floor coverings, ceiling tiles, wallpaper, gift wrappings, and many other end products of fabric, plastic, paper, and leather.

MATERIALS-PLASTICS

8. **Plastics Resin Guide & Catalog.** United States Rubber, Naugatuck Chemical Division. 10 pp., ill. 1958-59 issue of guide gives detailed charts on physical, chemical, and electrical characteristics, special features, and recommended product applications, of three plastics: Kralastic (resin-rubber compounds, thermoplastic), Vibrin (polyester resins, thermosetting), and Marvinol (polyvinyl chloride resins, thermoplastic).

9. **Stain-resistant Pearl Vinyls.** Claremont Pigment Dispersion Corporation. Technical Bulletin No. 50 describes two new stain-resistant pearl essences suitable for incorporation in vinyl compounds otherwise liable to staining after contact with sulfur-containing liquids or solids (e.g. hair wave preparations, cardboard, paper, and rubber). Essences come in paste form; chart gives prices, and details of tests of light stability, dynamic heat stability, and resistance to staining.

10. **Extruded and Coated Tubings.** William Brand and Company, Inc. Manual 59T, a 24 pp. ill. catalog, gives complete specifications and customer service information on Turbo extruded tubings, Turbo heat-treated glass sleeving, Turbo coated tubings, and Turbo identification markers. Also footage requirements for cut pieces.

11. **Expandable Polystyrene for Packaging.** Koppers Company, Inc. Bulletin C-9-270, 4 pp., ill. gives details of new lightweight foamed plastic material which is shock-absorbent, waterproof, and a good thermal insulator, and is suggested for packaging and display of such things as electric typewriters, clock radios, vaccines, drugs, and nitric acid. Other physical and chemical properties of Dylite are given.

12. **Injection-molding with Polyethylene.** Phillips Chemical Company. 8 pp., ill. Brochure gives detailed analysis of the possible causes and suggested solutions of the following problems arising from mismanaged injection molding of Marlex polyethylene: mold does not fill; poor surface; material flashes from the mold cavity; warpage of items with large flat sections; sink marks and voids; clear spots and black streaks in molded item; gate brittleness; poor weld line strength or appearance; and delamination or "skinning" of molded items.

13. **Industrial Coated Fabrics.** Vulcan Rubber Products Division, Reeves Brothers, Inc. Catalog of firm's fabrics includes cottons, nylon, silk, dacron, and fiberglass, coated with natural and synthetic rubbers. Main uses are as diaphragms for gas meters, regulators, controls, carburetors, fuel pumps, and vacuum pumps; also used for air seals, fuel containers, soundproofing, vapor barriers, welding curtains, etc.

14. **Nylon Typewriter Ribbon.** Remington Rand, Division of Sperry Rand Corporation. 4 pp., ill. Folder gives comparative analysis of "weardown" curves of Nylex nylon ribbon and other typewriter ribbons. Explains how new Ban-Lon "crimped weave" process makes Nylex much more absorbent during factory inking than regular nylon, and gives it 40 per cent longer use than other ribbons.

15. **Coated Nylon Covering.** Reeves Brothers, Inc. Sample book and catalog on neoprene- and Hypalon-coated nylon Coverlight materials which are used as protective covers for trucks, sports fields, machinery, open containers, and boats; also as wading pools, water tanks, fumigation shields and other industrial applications. Hypalon-coated Coverlight combines these properties: ability to take an unlimited range of light-stable colors, and a good resistance to weathering, chemicals, and high temperature.

METHODS

16. **Machines for Metal Surface Preparation.** Metal Processing Department, Pennsalt Chemicals Corporation. Folder MP-612 5M 459. 4 pp., ill. **Metal Preparation Service Plan.** Booklet MP-613 5M 559. 10 pp., ill. Folder and booklet describe, respectively, machines (standard and custom-designed) available for metal surface preparation (e.g. automatic spray coaters, power spray washers, automatic pickling machines, phosphatizing machines), and a new service of analysis, survey and supervision of processing materials and processing machines in individual plants, carried on by travelling Pennsalt servicemen from coast to coast.

17. **Germ-Free Packaging Material.** Packaging Division Blocksom & Company. 4 pp., ill. This and other literature describes how Paratex packaging material has been treated with a chemical bacteriostat, providing protection from mold, mildew, rot, and fungus growth. Paratex is a curled-hair packaging material, used to make Parametric Packaging, specially designed on a four-point engineering principle of weight, shape, characteristic, and destination; it assures perfect static balance in the package for delicate instruments like electronic computers and aerial cameras: each package is custom-shaped to the product, Paratex being supplied in sheets and rolls; it can be molded and die cut, and is reusable.

18. **Weighing System.** A.H. Emery Company. Bulletin #591. 8 pp., ill. "Plan-It Yourself" catalog describes the 5000 lb.-capacity Way-Pac weighing cells, and instrumentation that can be used with them. Five basic types of cell are pictured and diagrammed; component selection instruction and summary price sheet included.

19. **Propulsion Test Facilities.** Propulsion Test Facilities, Inc. 4 pp., ill. Booklet describes services offered by firm of custom producers of performance test equipment and complete systems for aircraft, missiles, and components. Includes description of new high-temperature jet fuel test facility designed and constructed for Chandler-Evans Corporation.

20. **Electric Log Stacker.** R.G. LeTourneau, Inc., Series F. Bulletin No. 105 A. 2 pp., ill. Describes construction and performance of improved 30-ton capacity log-stacker with all-wheel electric drive and wide-tired flotation. Charts.

21. **Glass-Jet Peening.** Perfecto-Peen, Division of Aero-Test Equipment Company. Technical review PPD-124. Describes new process of glass-jet peening, using pure minute glass beads in a slurry solution to increase fatigue life of metals.

22. **Modular Work Bench System.** Products for Industry, Inc. 6 pp., ill. Describes how the same telescopic members and modular elements (standard catalog parts) of Product-A-Flow modular assembly benches may be arranged and rearranged to incorporate any methods improvement without disturbing production line.

PARTS AND COMPONENTS

23. **Midget Screw Lampholders.** Drake Manufacturing Company. Illustrated data sheet gives full details about miniature lampholder for instrument dial and transistor radio scale lighting, toys, and novelties, etc. Availability of soldered terminals and wire leads, suggested brackets for specific uses, and lampholder dimensions are listed.

24. **Caster Catalog.** Payson-Harris & Reed, Inc. 60 pp., ill. Complete list of caster and wheel products, from office chair casters to heavy industrial models, with capacities of up to 15,000 lb. each. New items include nylon ball casters, complete series of spring-mounted casters, V-grooved wheels, pneumatic casters, etc.

25. **Bronze Grounding Bushings.** Spring City Electrical Mfg. Company. Ill. bulletin describes line of bronze bushings to join ground wire to conduit, for use with metallic protected cables and other grounding applications. Units available also in aluminum.

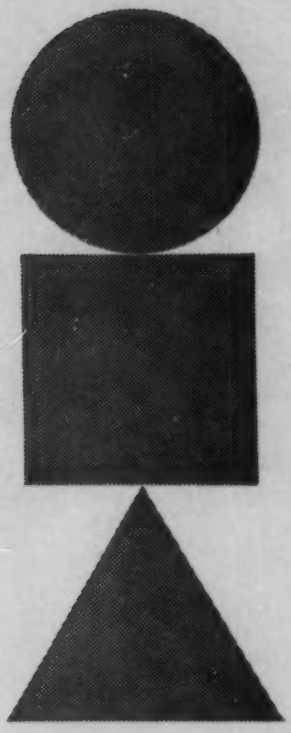
26. **High-Speed Synchronous Generators.** General Electric Company, 4 pp., ill. Describes design features, construction, and typical installations of the above, for use in airports, construction projects, factories, etc., requiring low-cost ac power source.

27. **Shear Fasteners.** Standard Pressed Steel Company. Two 4-page bulletins, ill., give complete technical data on new aircraft bolts and companion locknuts, up to 70 per cent stronger than present aircraft standards. Offered in two series, for applications to 550 degrees Fahrenheit, or to 900 degrees.

28. **Automatic, Adjustable Parts Escapement.** Syntron Company. Illustrated data sheet gives complete description, data and specifications on a new Parts Escapement Device, designed to effect automatically the timed release of parts being fed through chutes.

29. **Miniature Electrical Connectors.** Electronic Components Division, Deutsch Company. Catalog describes new Deutsch "DS" solderless line of miniature electrical connectors with snap-in contacts and crimp-type terminations. Special "DS" tools accompany the line.

30. **Precision Limit Switch.** R.B. Denison Manufacturing Company. 4 pp., ill. Brochure gives full descriptive details and engineering data on new Denison Loxswitch Model M switch, which can surpass 55,000,000 cycles under load; uses full, heavy duty latch mechanism, eliminating use of "over the center" snap springs.



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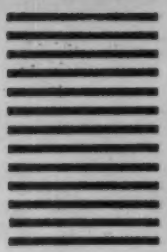

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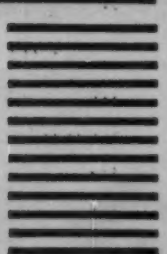

Manufacturers' Literature (*Continued*)

31. **Centrifugal and Rotary Pumps.** Pioneer Pumps, Detroit Harvester Company. 72 pp., ill. Catalog describes pumps for wide range of industrial uses, designed for special conditions of temperature, viscosity, specific gravity, lubricating characteristics, chemical properties, contaminants and abrasives. Includes descriptions and specifications of pump parts and accessories.

32. **Transistorized Power Supplies.** Valor Instruments. Information available on a new series of continuously variable regulated dc transistorized power supplies, with high transient response and excellent stability; weight 15 lb.; supply has coarse and fine controls, short circuit protection, and voltage and current metering.

33. **Floodlight Catalog.** Crouse-Hinds Company. Brochure #320 includes new sections on "How to Select Floodlights," "Mercury Vapor Floodlights," and "Hazardous Area Lighting."

34. **Coil for Heat Transmission.** Dean Thermo-Panel Coil Division, Dean Products, Inc. 4 pp., ill. Folder describes new coil made of wide variety of metals, which makes obsolete all old-fashioned pipe coils; new coil is cheaper, lighter, smaller, and more efficient in operation.

35. **Bantam Speed Changer Kit.** Metron Instrument Company. 2 pp., ill. Bulletin describes kit which permits rapid assembly of twenty-nine speed ratios from parts that may be used repeatedly in different combinations. For designers, laboratory technicians, etc., who need many ratios available. Ratios from 1:14 to 44:1.

36. **Low-Driving-Load Drive-Pin Blind Rivets.** Deutsch Fastener Corporation, 6 pp., ill. Bulletin describes new line of Blind Rivets (P.&F. series) from Deutsch, with special qualities of minimum weight, high shear strength, easy driving, automatic pin locking; points out suitability for fragile sections easily damaged by other types of rivet.

37. **Voltage Regulators.** General Electric, Voltage Regulator Product Section. 60 pp., ill. Booklet gives application, description, selection, weights, dimensions, etc., of redesigned dry-type and liquid-filled Inductrol voltage regulators (60 and 400 cycles). For such applications as radar systems, computers, rectifiers, and variable speed drives.

38. **Corrosion-Resistant Flow Tube.** Builders-Providence, Inc., Division of B-I-F Industries, Inc., 4 pp., ill. Bulletin No. 115.20-1 describes properties, performance, and applications, of DFT-P1 plastic-insert Dall Flow Tube. Charts show dimensions available, comparative pumping costs. Flow tube used for acids, alkalis, gases, and material such as salt water, trade waste, and sewage.

39. **Elastomer Wave Guide Seals.** R.F. Plastics, Inc. Illustrated information sheet describes new conductive o-rings to seal R.F. plumbing against moisture, corrosive vapors, and foreign matter which can render radar systems inoperative.

40. **Standardized Components for Modular Storage Battery.** Scranton Cellomatic Battery Corporation. 4 pp., ill. Folder describes new concept behind the three basic cells of Cellomatic batteries. Modular grouping allows flexibility for many applications, including switch gear, time recordings, alarm systems, materials handling equipment, etc.

Classified Advertisements

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

Positions Wanted

JUNIOR EXECUTIVE (33) SEEKS NEW POSITION *offering challenge and opportunity in design or related field. B. F. A. in Industrial Design. Nine years with present employer, experience in design, sales, consultation and field supervision for custom exhibit builder. Currently V. P. and Art Director with general administration, internal coordination and design supervision responsibilities. Box ID-246,* INDUSTRIAL DESIGN, *18 East 50th Street, New York 22, New York.*

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PACKAGE DESIGNER FOR LEADING MIDWEST INDUSTRIAL DESIGN OFFICE. *Must have outstanding qualifications in package graphics and corporate identity design. Position offers opportunity in project design supervision and top management level client contact. Box ID-245,* INDUSTRIAL DESIGN, *18 East 50th Street, New York 22, New York.*

INDUSTRIAL DESIGNER. EXPERIENCED PRODUCT DESIGNER NEEDED *by large Ohio manufacturer. This is new department manufacturing fiber products primarily for furniture, toys, specialized packaging and household appliances. Prefer a man with originality, broad experience and good academic background. If limited in experience, we will train promising candidate. Write stating age, experience and salary expected. Box ID-247,* INDUSTRIAL DESIGN, *18 East 50th Street, New York 22, New York.*

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For Your Calendar

Through September 5. American National Exhibition in Moscow. Moscow, U.S.S.R.

Through September 6. "The New American Painting." Museum of Modern Art, New York.

Through September 7. "Form-Givers at Mid-Century." Exhibition of architecture, sponsored by *Time* magazine and the American Federation of Arts. Metropolitan Museum of Art, New York.

Through September 15. "British Artist-Craftsmen." Jacksonville, Florida. (Smithsonian Institution, traveling exhibit.)

Through September 15. "Glass 1959." Exhibit at the Corning Museum of Glass, Corning, New York.

Late August to mid-September. Structures by Buckminster Fuller. Exhibition of actual structures. Museum of Modern Art, New York.

August 29-September 1. Fifth annual supply, equipment & fabric fair, sponsored by the National Association of Furniture Manufacturers. Conrad Hilton Hotel, Chicago.

September 1-22. National Ceramic Exhibition. Jacksonville, Florida. (Smithsonian Institution, traveling exhibit.)

September 6-16. Production Engineering Show. Navy Pier, Chicago.

September 6-16. Machine Tool Exposition. International Amphitheatre, Chicago.

September 8-18. Packaging Exhibition. Grand Hall of Olympia, London, England.

September 9-11. 1959 West Coast Conference of Applied Mechanics. American Society of Mechanical Engineers. Stanford University, Stanford, California.

September 9-12. Exhibit of the Electron Microscope Society of America. Ohio State University, Columbus, Ohio.

September 9-November 8. International Packaging Exhibition. Museum of Modern Art, New York.

September 16-18. First General Assembly of the International Council of the Societies of Industrial Designers. Stockholm, Sweden.

September 21-25. Instrument Society of America: 14th annual instrumentation and automation conference and exhibit. International Amphitheatre and Palmer House Hotel, Chicago.

September 21-25. Congress of the International Council for Building Research Studies and Documentation. Rotterdam, Holland.

October 5-6. Conference on packaging specifications. Purdue University, Lafayette, Indiana.

October 5-9. Eleventh annual convention and professional equipment exhibit of the Audio Engineering Society. Hotel New Yorker, New York.

October 7. Vinyl Plastics: regional technical conference of the Society of Plastics Engineers. Cleveland Engineering Society Building, Cleveland, Ohio.

October 7-9. National symposium on vacuum technology, sponsored by the American Vacuum Society. Sheraton Hotel, Philadelphia.

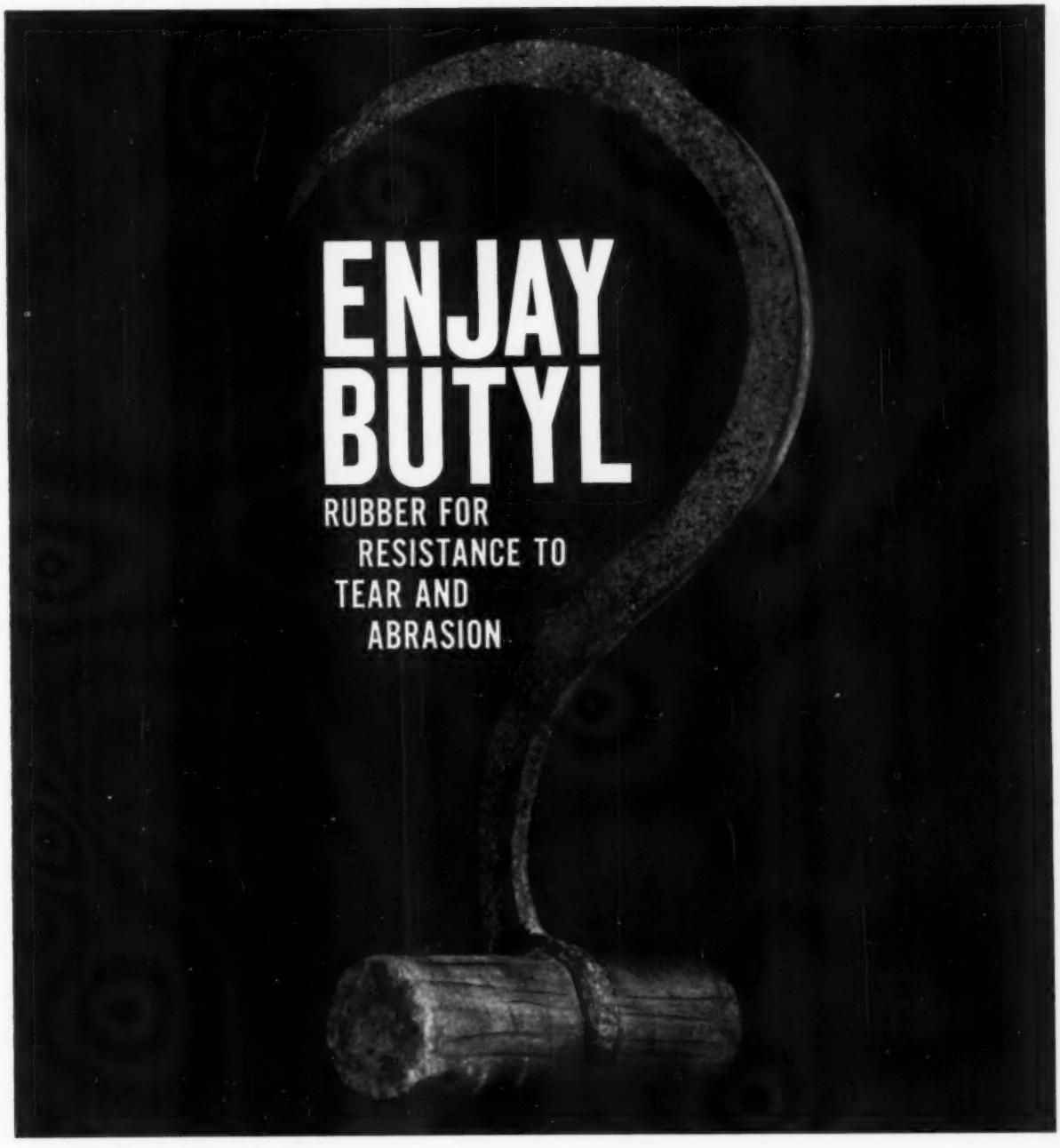
October 13-14. "Plastics Engineering — State of the Art Today." Technical conference of the Society of Plastics Engineers. Ambassador Hotel, Los Angeles.

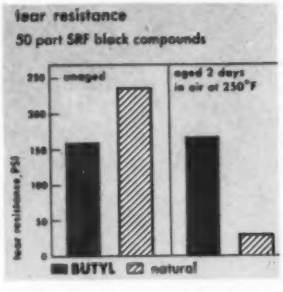
October 17-31. National Business Show. New York.

November 8-10. First Toy and Housewares Production Show. New York Trade Show Building, New York.

November 10-12. Tri-annual products of industry exhibit. Sponsored by the Milwaukee Association of Purchasing Agents. Milwaukee Auditorium, Milwaukee.

November 19. "Plastics in Packaging." Technical conference of the Society of Plastics Engineers. San Francisco, place to be announced.





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