INDUSTRIAL DESIGN

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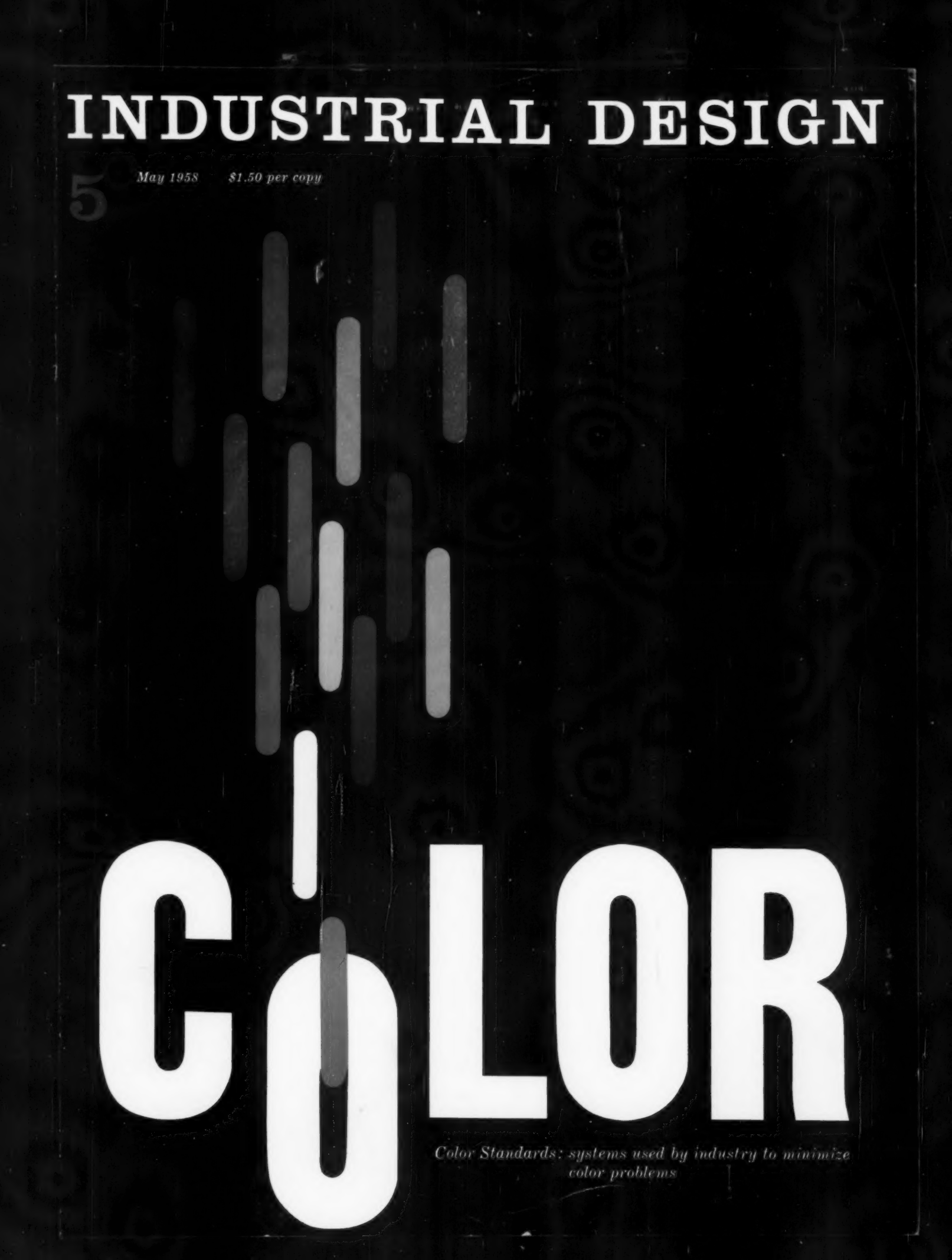

COLOR

Color Standards: systems used by industry to minimize color problems

Molded PLEXIGLAS plaque

Plexiglas ...hardworking and handsome

Molded PLEXIGLAS tuner magnifier panel

It resists weather, discoloration, impact, heat, most chemicals, dimensional change . . . it's *hardworking*.

It has brilliant, gleaming color, or water-white clarity that gives depth and sparkle to back surface paints and metallized coatings . . . it's *handsome*.

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MAY, 1958 VOLUME 5 NUMBER 5

INDUSTRIAL DESIGN

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

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In JULY—First of two reports on the Brussels Fair: the fair as a whole.
In AUGUST—Second Report on the Brussels Fair: the American Pavilion.

COVER: Jim Ward's abstraction is a graphic interpretation of one of industry's most recurring problems—color standards. Systems used to maintain color consistencies are discussed on pages 30-43.

FRONTISPIECE: The translucent meshwork shown here in chiaroscuro is an oblique view of stacked glass tubes at the Corning Works.

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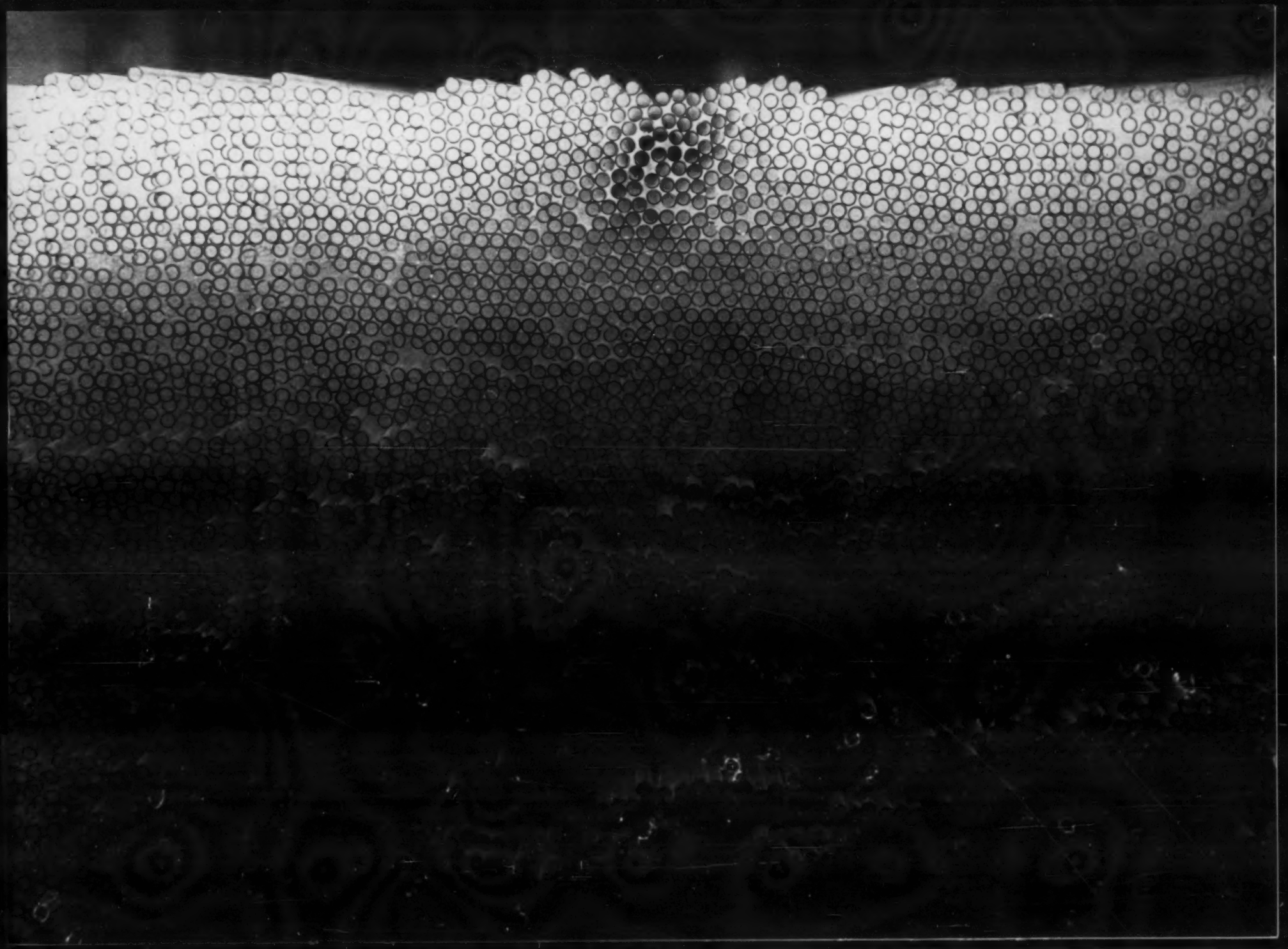


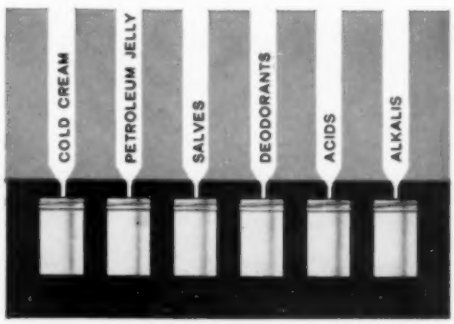
CELANESE FORTIFLEX MAKES POSSIBLE A

A Word About Celanese Fortiflex . . .

Fortiflex is a linear type polyolefin with a specific gravity less than water. Its rigidity combined with toughness makes possible a host of packaging applications—from thinwall blown bottles and injection molded jars to transparent film for bags and wraps. Its heat resistance and resistance to chemical attack mean that Fortiflex containers can be subjected to post-packaging sterilization, and can be used for packaging many chemically reactive liquids, semi-solids and solids. Fortiflex has the sanction of the Food and Drug Administration.

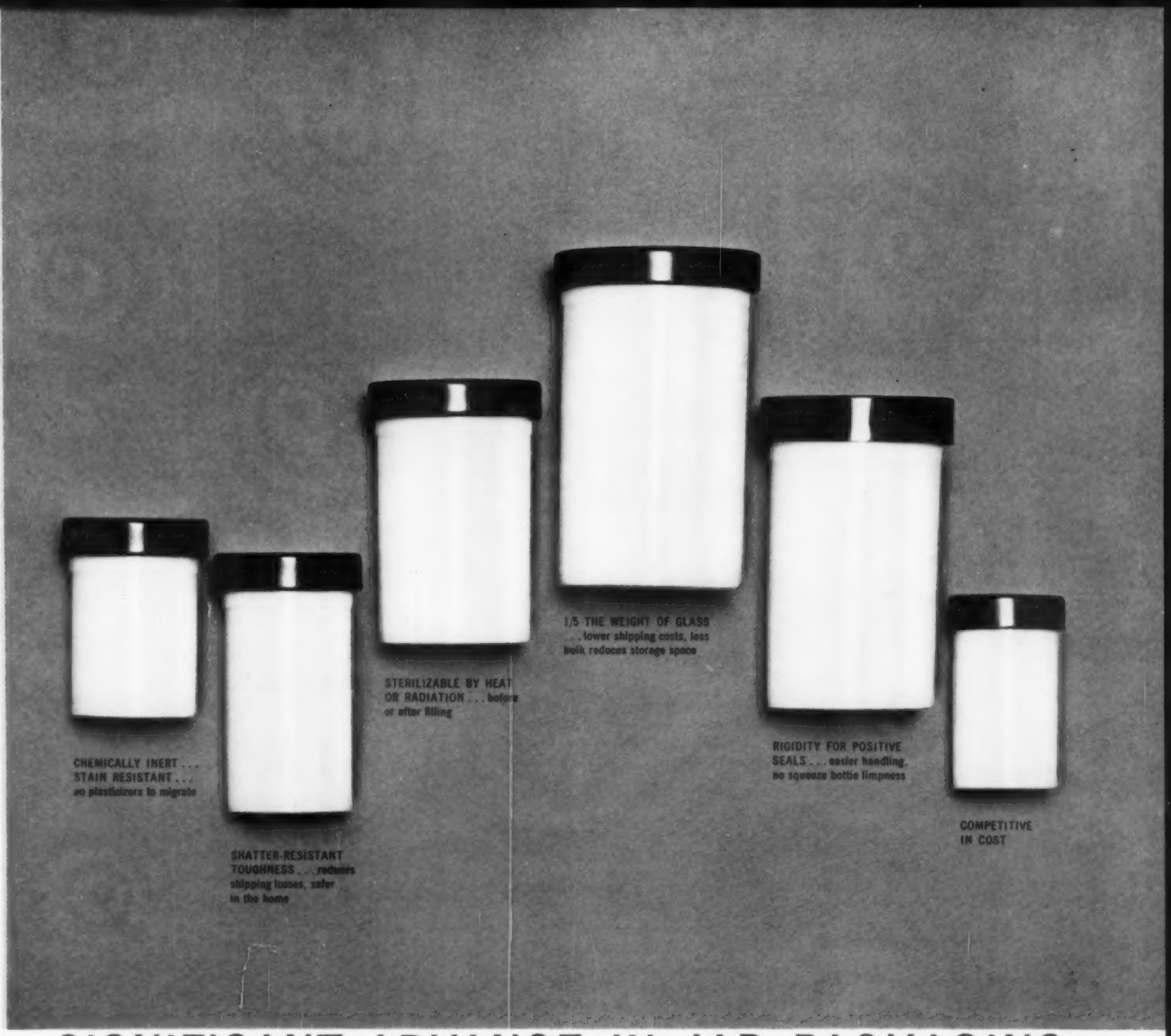
If you have a packaging problem that calls for something special in a packaging material, write to: Celanese Corporation of America, Plastics Division, Dept. 152-E. 744 Broad Street, Newark 2, N. J. Canadian Affiliate: Canadian Chemical Co., Limited, Montreal, Toronto, Vancouver. Export Sales: Amcel Co., Inc., and Pan Amcel Co., Inc., 180 Madison Avenue, New York 16, N. Y.

Celanese® Fortiflex®



A THOUSAND PACKAGING POSSIBILITIES

Celanese Fortiflex is basically a simple polymer of ethylene. However, its ordered molecular arrangement provides the combination of rigidity, toughness, and chemical and heat resistance needed for almost any type of container packaging.



SIGNIFICANT ADVANCE IN JAR PACKAGING

Lermer Plastics, Incorporated offers immediate shipment on a complete line of Poly-Opal drug, cosmetic and ointment jars in the popular slim line shape

Taking advantage of the unique properties of Celanese Fortiflex, Lermer Plastics, Incorporated have developed a line of rigid-type containers that promise to revolutionize the packaging of drugs, cosmetics, chemical specialties and other products. Called Poly-Opal, the jars now in production are made in six sizes—from ½ oz. to 4 oz. They are designed for standard threaded closures, and can be hermetically sealed with cellulose type seals.

Poly-Opal jars are also available in a full range of colors. Other special shapes, sizes and colors can be created for exclusive use of industrial users.

For more information about Poly-Opal Fortiflex plastic jars, you are invited to get in touch with Lermer Plastics, Incorporated, Garwood, N. J. Address your inquiry to Dept. CF500 for prompt response.

Fortiflex...a Celanese linear polyolefin

CLIPS AND QUOTES

Max Lerner, *in his recent book*: **America as a Civilization,** *pages* 866-867.

"Americans have rediscovered the effectiveness with which the early settlers fashioned articles of daily use, giving them a simplicity later lost in the decades of the 'American Provincial.' Writing with a passion for what he calls the 'vernacular' as against the cultivated tradition, John A. Kouwenhoven sang the praises of the Revolutionary rifle, the lowly manure fork, the plow, the railroad locomotive, the sewing machine, the clipper ship, the machine tool, the Model T Ford. Certainly Americans have been at their best at industrial design when they have been least self-conscious and least 'arty.'

Although skilled with their hands, their genius does not lie — as it did for the Renaissance craftsmen or for the artisans in rural and still primitive communities— in the laborious handicraft which is transmitted from generation to generation. The Americans achieve their effects by making machines which in turn produce standardized products that, at their best, have precision and cleanness of design and utility for their purpose. There is no longer any need to refute the argument that what is machine-made is inferior in either use or beauty, and what is turned out for a mass market loses the distinctiveness it would have if only one example of it were available.

The illustrations of this thesis surround American life everywhere: among the lasting contributions of American domestic architecture are the bathroom and the kitchen. Both express the American belief in sanitation and in utility. Similarly, a new profession has arisen — that of the 'industrial designer,' whose function is to give attractiveness of outline and packaging to the mass produced commodities."

CONSUMER reports

Consumer Reports, *April,* 1958, *page* 218.

"Consumers who have wondered why car prices are rising steadily may find at least some explanation in recently released figures on current automobile advertising expenditures

An industry-wide survey, which appeared in the trade publication *Advertising Age*, indicates that from 1950 to 1956 advertising expenditures per car tripled in most instances, and multiplied almost six-fold in others. A comparison of 1950 figures with those for 1956 uncovers these specific increases in per-car advertising costs: *Chevrolet*, from $6.12 to $19.40; *Ford*, from $8.07 to $21.62; *Buick*, from $18.45 to $34.78; *Plymouth*, from $13.34 to $80.22; *Lincoln*, from $57.14 to $143.85, and *Packard*, from $28.41 to $132.83. Fascinating as these figures seem, they are dwarfed by advertising costs on the Ford Motor Company's *Continental*. For each Continental sold in 1956, Ford spent a tidy $709.09 in advertising."

Henry Dreyfuss

Henry Dreyfuss *in a talk to the Thirteenth Annual Conference, Reinforced Plastics Division,* **Society of the Plastics Industry,** *February 6,* 1958.

"Despite the successful use of planned obsolescence by America's largest single industry, I'm going to go on record with a *no*. I oppose planned obsolescence because I'm convinced it's unsound in dollars-and-cents terms.

Under the pressure of planned obsolescence the customer comes to feel that he doesn't know what to buy He's increasingly tempted to wait for next year's 'improved' product. In other words, he's tempted not to buy at all. The manufacturer who tries to delude the public with the veneer of obsolescence, ends up deluding himself. If he can get away with putting a new jacket on an old product, why improve the product? But while one manufacturer is using 'artificial obsolescence' as a convenient way of maintaining the status quo, another manufacturer is capitalizing on 'genuine obsolescence.' The realistic manufacturer is working toward a fundamental improvement in his product, an improvement that will give the consumer a really convincing reason for trading in the old model.

There may be other realistic ways of maintaining market turnover. One is disposability. Can we make really inexpensive housewares and clothes that go into the incinerator rather than into the washing machine? Another alternative is renting products rather than buying them. Why shouldn't we rent a washing machine, then trade it in and rent a new one, when the manufacturer has a better one? Hopefully, this would give housewives consistent improvement in their appliances, while it gives the manufacturer a market that keeps renewing itself.

A final alternative is the development of accessories for a product that's already sold. To appliance manufacturers' dismay, many housewives just can't be talked into chucking old refrigerators. But these same housewives might be delighted to buy a really improved shelving arrangement to install in the old model.

In our fast-changing world, nothing seems so obsolete as the idea of 'planned obsolescence.' We're going to see products become *functionally* obsolete so fast that it will seem absurd to think up ways of making them *stylistically* obsolete."

THE NATION

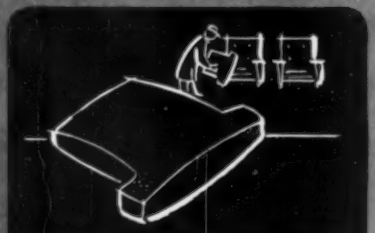
Milton Moskowitz *in his report, "Revenge of the Car-Owner," for* **The Nation,** *March* 8, 1958.

"Evidence is mounting that more and more Amercian drivers are fed up with their cars. You have, for example, the Mayor of the nation's largest city asking the auto makers to consider the production of smaller cars to alleviate metropolitan traffic paralysis. You have the heads of the major auto companies brought before a Congressional committee and questioned rather sharply on how they know so far in advance that the public wants a big car. You have finally, in the face of declining car sales, a sensational increase in the sale of foreign-made automobiles.

The real measure of Detroit's marketing problem today can be taken in the steady stream of gripes that punctuate the day-to-day conversations of American automobile owners. Talk to a car owner and you strike an artesian well of grumbling. He is unhappy because his car is a gasoline hog. He is unhappy because something is always going wrong with his car. He is unhappy because 'you can't find a service station you can trust.' He is unhappy over his not inconsiderable bills for repairs, insurance and servicing. He is unhappy because, after four years, his car is worth less than a fifth of what he paid for it.

Automobile values depreciate so rapidly these days that the owner is more like a renter than an owner. Except, there is this difference: when you rent an apartment the landlord provides free servicing; in the automobile business, you 'rent' the car and pay the service charges as well."

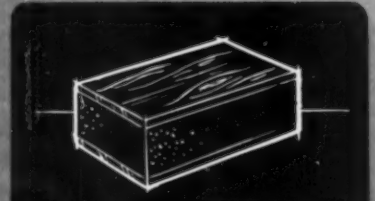
Begin with slab stock. Flexible foams can be cut, sliced, die-cut, sewn, quilted, draped, nailed, hog-ringed. Rigids can be fabricated with woodworking tools.



Or . . . use pre-molded shapes, ready to set in place.

Or . . . foam-in-place by spraying urethanes to adhere to vertical, even overhead planes.

Or . . . pour foam-in-place urethanes to fill voids or encapsulate difficult shapes. Use them in potting or deep casting.



Or . . . use urethanes in strength-with-lightweight sandwich constructions.

No other material solves so many problems so simply as URETHANES!

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National Aniline's NACCONATES®

Their amazing versatility of form and wide range of usefulness are well matched by the many labor-saving ways urethanes can be fabricated. Only a few of the possibilities are shown here!

However you use them you'll find urethanes easy to handle, economical and full of new design ideas in cushioning, packaging, vibration isolation, shock absorption or insulation against heat, sound and electrical loss.

As suppliers of NACCONATE® Diisocyanates, basic urethane components, our application laboratory has developed much valuable information which is yours for the asking. A brief note, on your company letterhead, outlining your particular interest will enable us to be specific in reply.

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CHALLENGE TO INDUSTRIAL DESIGN: *Create a spectacularly modern shape in luggage and give it the weightlessness of magnesium plus the handsome finish of fine leather.*

Samsonite vacuum-laminates Colovin vinyl to magnesium for new luggage line

In developing a new line of luggage that would be "as important a part of one's travel appearance as his wardrobe," Shwayder Bros. gave the designer free reign with but two conditions.

1. The luggage must be extremely light without sacrificing durability.
2. It must be covered in exceptionally high style material without sacrificing resistance to abuse.

Magnesium, lightest of structural metals, ideally met the first requirement. Thorough testing proved Colovin vinyl the stand-out choice for covering.

Working with these materials, Robert Fujioka of Melvin Best, product stylists, created a case that happily combines the functional with the aesthetic. The trim, uncluttered lines achieved by recessing all hardware and the clean, contrasting color scheme of pewter against the leather-like finish quite naturally gave birth to the name "Silhouette."

In manufacture, flat sheets of magnesium are lubricated, then drawn on pre-heated dies to form identical shells for either side of the case. After an adhesive spraying, Colovin vinyl is laminated to the shells by vacuum.

The laminated shells are punched and riveted to the shaped extrusions which carry the hardware (see photo) with the same precision as metal alone. Perforations are clean-edged. Riveting damages neither the Colovin film nor the bond.

The Colovin surface of Silhouette luggage has the appearance and feel of top-grain leather. But it has far greater resistance to abuse. Colovin laminate is water-proof, chip-, scratch-, and stain-resistant. And it can be wiped clean with a damp cloth.

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

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

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

COLUMBUS COATED FABRICS CORPORATION, COLUMBUS 16, OHIO

Samsonite "Silhouette"—clean-lined as its name. Note the smooth tailoring of the rounded corners without distortion of the Colovin vinyl film. Adding to the trim, uncluttered appearance, all hardware is recessed. Designer: Robert Fujioka, Melvin Best Associates, Pasadena. Hardware: Shwayder Bros., Inc. staff design.

"Silhouette" two-suiter ready for assembly. The shells have been vinyl-laminated and punched for riveting. Note sharp, clean edges of the perforations. The two magnesium extrusions containing the recessed hardware are riveted to the shells. All exterior rivet heads are concealed beneath vinyl trim strips adhered to grooves in the extrusions.

BOOKS

International architecture review

ZODIAC. *International Magazine of Contemporary Architecture. Vol. 1 (January, 1958). George Wittenborn Inc., New York, American publisher. $9 per single volume, $16 per year (two volumes).*

Reviewed by Paul Mitarachi

The first volume of *Zodiac*, a new architectural publication, has been out since January and Volume 2 is promised for May. It will appear twice a year for those architects who believe that a picture is not always worth a thousand words.

Zodiac is published under the auspices of the "Association pour la Diffusion Artistique et Culturelle" in Brussels, and the well-known Ing. C. Olivetti and Co. of Ivrea in Italy. In format and quality of printing it matches its sister modern art publication, *Quadrum*. The masthead shows a general committee of directors in Italy and an international editorial committee spread over Belgium, France, Germany, Great Britain, Italy, Holland, Switzerland and the U. S. The text appears in the writer's language, but all articles are translated into English.

The present volume contains an introduction by Adriano Olivetti. Touching on what he calls the present crisis in the cultural values of architecture, due to the transitional period in which it exists, Signor Olivetti turns to the "need for taking root, for finding again in the earth, in the landscape, in traditions, architectural forms, the love of men for their community, the whole and natural feeling for place." But this process of taking root is one with "the birth of the new community, through which spiritual world and material world are reconciled as a unity, and to which the architect is called to create its new, unmistakable physiognomy."

This general thesis is pursued in three articles: Walter Gropius' "Apollo in the Democracy," dealing with the position of art in evolving society; Sigfried Giedion's "History and the Architect," and Ernesto Rogers' "Tradition and Modern Design." All three, like Argan's "Architecture and Ideology," are concerned with the mental process of creating an architecture.

Peter Blake, Arthur Drexler, Victor Gruen and Gropius represent the U. S. contribution to the issue. Peter Blake's "The Vanishing American House" should give us something to ponder. His article (as well as Drexler's on the recent Museum of Modern Art exhibit: "Buildings for Business and Government in America," and Gruen's "The Planned Shopping Centers in America") is well planned for an international readership and will no doubt be revealing to architects abroad who have only the piecemeal viewpoint acquired from the occasional isolated American building presented in their architectural press. As a matter of fact, the reverse also holds. The reports on architecture in Italy, Germany, Holland and Great Britain are welcome here.

This new publication will appeal to many architects not only because of the editorial point of view as summarized by Signor Olivetti but also because it treats architecture not as a trade, a profession, or even a skill but as a creative process. This is a view occasionally discussed by historians but too seldom taken by the practicing architect or the press devised to serve him. This may be the book we have been looking for; it may end up by boasting the smallest roster of advertisers and the smallest readership. Truly, not a trade "sheet."

Automation and the designer

AUTOMATION IN PRACTICE. *By S. E. Rusinoff. American Technical Society, Chicago: 1957. 261 pp. $6.50.*

Reviewed by William C. Renwick

Curiously enough, this book will be of value to the industrial designer partly because it doesn't confine itself to automation. Mr. Rusinoff is concerned with the social and economic implications of automation and the problems of design and production rising from it. He discusses automatic controls in terms which will make clear a great deal of fundamental communications theory which has escaped the understanding of non-professional cyberneticists. Finally, in illustration, he examines the mass-production metal-working processes. This last section is not in most cases essentially related to automation, and therein lies its value to the young designer: he can get a very clear idea of how things are done in advanced industrial plants without having the icing of automatism cover up the nourishing cake.

Designers have long wondered whether machining and transporting the work piece from one operation to another automatically, instead of by hand, really makes any difference as far as the design approach is concerned. The answer seems to be that it does not. The cutting tools are the same; the limitations of processes remain. Furthermore, the real meaning of automation is not its effect on work operations. It is rather, as Mr. Rusinoff repeatedly stresses, in the region of materials handling that automation plays a significant role. And neither the loading nor the control function of automatic processes has any obvious effect on the form or the materials which the designer specifies (except in such special cases as the "Tinker-toy" electronic components system).

One very real concern for designers is the effect the large investment in tools, machines, controls and time has on the attitude of a company. The fear of gambling on market acceptibility can paralyze the company's capacity to innovate. While Mr. Rusinoff says that automation makes possible a more flexible product line, he is speaking partly of general-purpose machines (lathes, screw machines, millers) controlled by punch cards, tape or computers. You can't make a fender on a lathe, of course. Automatic assembling machines, however, do give promise of flexibility of product and provide the designer with an opportunity to devise product lines based on the concept that real mass production implies a wide variety of products assembled from a very few different parts.

But this promise is for the future; so far, the selective assembly machine is neither large enough nor in widespread enough use to permit the manufacturer with large commitments to say, "I like it. Let's put it in production and see if we can sell it."

This is a stimulating book. Though it is not written specifically for the industrial designer, it is not super-technical. Mr. Rusinoff doesn't use jargon. He must be a very good teacher.

Books received

CREATIVITY — A COMPREHENSIVE BIBLIOGRAPHY ON CREATIVITY IN ENGINEERING, SCIENCE, BUSINESS AND THE ARTS. *Prepared by Deutsch and Shea, Inc. 16 pages. Industrial Relations News, New York. $2.00.*

DESIGNING FOR PEOPLE. *By Henry Dreyfuss. 240 pages. Illustrated. Simon and Schuster, New York. $1.95.*
A paperback reprint of the book originally published in 1955.

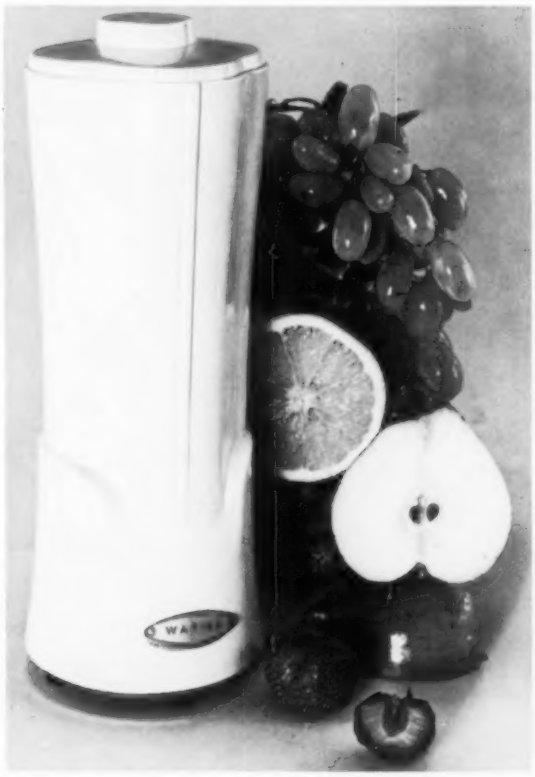
EPOXY RESINS. *By Harry Lee and Kris Neville. 305 pages. Illustrated, charts and graphs. McGraw-Hill Book Company, Inc., New York. $8.00.* Emphasis is on the engineering versatility, range and potential of the epoxies.

GUIDE TO WESTERN ARCHITECTURE. *By John Gloag. 407 pages. Illustrated. The Macmillan Company, New York. $12.50.*

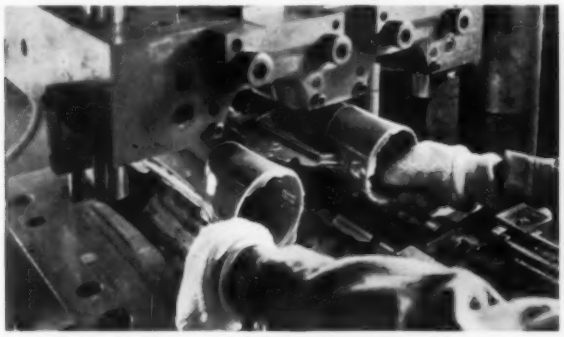
CYANAMID

PLASTICS IN ELECTRICAL DESIGN

Drink Mixer and Server... One Graceful Molding of CYMEL®



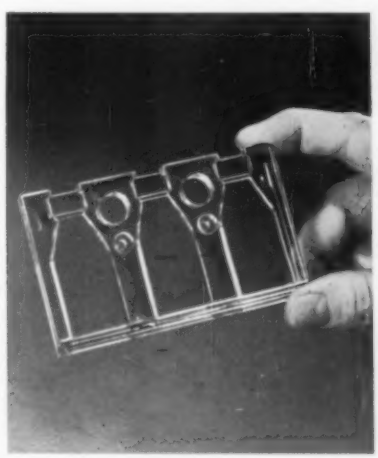
Conceived as both mixer and server of beverages and sauces, the new Waring Drink Mixer serves graciously anywhere in the home. In accord with the need for style, portability and economy, the mixing cavity, motor housing, handle and pouring spout are molded in one unit of CYMEL 1077 melamine molding compound—familiar to consumers in popular MELMAC® dinnerware. This styling in CYMEL keeps down size, weight, and cost. CYMEL provides insulation, strength, resistance to heat and staining, excellent stability, low moisture absorption, permanent rich molded-in color and hard surface.



Two complete one-piece mixer bodies are molded of CYMEL in each cycle. Mixing cavities and motor housings are formed by cores. Here, mold is open, motor housing cores have been automatically retracted, and the two mixers are being manually removed from top-cavity cores. Molder is Shaw Insulator Company.

CYMAC® Window on Circuit Breaker Contacts

A removable transparent cover through which contacts are clearly visible is the outstanding feature of a new circuit breaker recently introduced by Standard Control Division of Westinghouse Electric Company. The cover of the Saf-T-Vue circuit breaker, which reveals at a glance whether contacts are open or closed, is molded of CYMAC 201 methylstyrene acrylonitrile copolymer, which provides necessary transparency, heat and break resistance, and surface hardness at comparatively low cost.



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Those
jets up there love me, sa

, says Theodora

The seats and carpets are made of tycora

Leave it to a lady. She may not be able to tell a Turbo from a turban, but she does know when an interior is superior. When the new jets fly she'll sit on seats upholstered with fabrics made of Tycora, and walk on carpets made of it too.

Many were studied, Tycora was taken. It passed every test and the requirements were mighty stiff. To please the eye it had to be cool and lovely, practically tranquilizing—give people a pleasurable sense of resting cozy on a cloud. To fill the bill it had to have ferocious stamina and resilience.

Tycora came through like a breeze. For it does have all this sky-high splendor, with granite-like strength and an angelic disposition towards maintenance.

Up there in the air Tycora's doing fine—sound-absorbent, lush and light. Wherever it goes it can be any weight or any way it needs to be. That's the versatility of Tycora. It's the costliest yarn man can make and it makes the miracles happen.

Credit goes to COLLINS & AIKMAN who took Tycora yarn and made this aeronautic-approved fabric and carpeting. American, Delta, Pan-American and Trans-Canada specified it for the new jets—the Boeing 707, the Douglas DC-8 and the Lockheed Electra.

This is another example of Tycora yarn engineered for a specific end use. There's a Tycora yarn for every commercial and consumer need.

Consult Tycora engineers: Textured Yarn Co., 40 East 34th Street, New York 16.

Reg. U.S. Pat. Off.

NEWS

Edgar Kaufmann, Jr., (above, left) chats with Sen. Fulbright before the work of Burton Kramer. Tapestries are by Alice Adams and stoneware by Georgianna Fulkerson, Wilma Corsaw (left). Stained glass window, "The Vertebrae," is by Robert Sowers. Laverne Design Group chair is by Douglas Kelley, one of a three-man team. Fish is by Harry Waggott.

New exhibition surveys work of designers and craftsmen who have held Fulbright grants in past 10 years

Senator J. William Fulbright regarded with satisfaction the leather chairs, fabrics, graphic designs and bright stained glass windows–the work of 32 American students who have studied and created under the grants that bear his name. The occasion was the opening, on April 25, of the "Fulbright Designers" exhibition at the Museum of Contemporary Crafts, New York. The show includes approximately 200 items selected from the work of the 77 design and crafts students who have studied in India, Japan, the Philippines, and nine European countries on Fulbright grants since the program began ten years ago. Guest director for the show was Edgar Kaufmann, Jr., design critic and former director of the Museum of Modern Art's "Good Design" exhibitions.

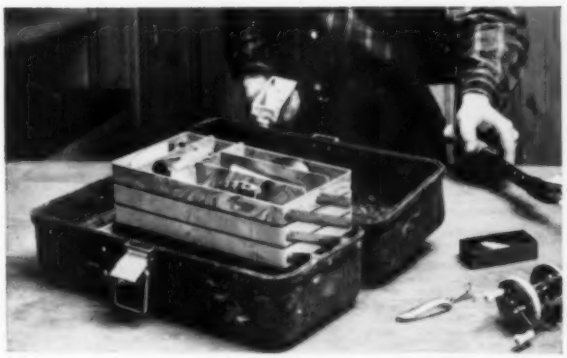
"The chief importance of the program is intangible," said Senator Fulbright in commenting on its significance at the opening of the show. He added that designers, because their work itself overcomes the language barrier in foreign countries, are especially good at creating an understanding atmosphere in the countries in which they work. Looking forward to the expansion of the program–even to including the Soviet Union–the Senator commented, "I am not particularly optimistic that the human race can survive, but if anything can assure its survival, programs like this may possibly do it. I can't think of a better way."

Robert Sowers, a former Fulbright scholar whose stained glass (above) is being shown at the exhibition, described the benefits of the program in more practical terms. In his own field he said it was absolutely essential to study in Europe, the source of the stained glass technique. "In general," Mr. Sowers said, "design schools in this country begin by teaching students how to make abstract patterns, removed from the medium in which the pattern will be used. The resulting work is usually a cliche. In Europe, with its tradition of craftsmanship, students really learn to work within their media."

After June 1, "Fulbright Designers" will tour major U. S. museums. It was organized by the Smithsonian Institution Traveling Exhibition Service in cooperation with the Institute of International Education.

THE PUNISHMENT OF WASH DAY. The exceptional moldability and high gloss of Styron® 440M make it a natural for this water conditioner dispenser for automatic washing machines. This Dow high-impact polystyrene provides extra strength for a long, rugged service life, outstanding heat resistance to cope with washing machine temperatures and excellent resistance to chemical attack by laundry detergents. Styron 440M is available in a wide range of sales-stimulating colors—built-in colors that can't chip, fade or wash away.

Designed to take punishment . . . hi-impact Styron



PUNISHMENT FROM THE ELEMENTS. This attractive, rust-proof tackle box is molded of Styron 480, a super tough Dow polystyrene. A unique green and white marbleized effect gives added sales appeal to the high-gloss finish. A clever tongue-in-groove design seals out water when the box is closed, allowing it to float. This complicated mold problem was easily solved by the excellent molding characteristics of Styron 480. The latch is made of nylon and the remaining hardware is brass.

The versatility of Styron and other Dow plastics helps designers meet the challenge of creating new products and techniques. Dow plastics provide many characteristics that lead to economy and practicability. And Dow researchers are continually working on new, improved formulations that will allow even greater design flexibility. Keep in touch with these advances . . . keep in touch with your Dow man. THE DOW CHEMICAL COMPANY, *Midland, Mich., Plastics Sales Dept. 1513C.*

YOU CAN DEPEND ON DOW

Walter Daran

Designer Leo Leonni

Controversial Brussels show incorporates unusual exhibit methods

What the *Saturday Evening Post* describes as the "bombshell" among U. S. exhibits at the Brussels World's Fair has now been completed. (Its assembly was held up for several weeks by Southern Congressmen who were offended by its controversial subject matter.) Designed by art director Leo Leonni for *Fortune* magazine, and part of the official U. S. exhibit, it describes "Pieces of America's Unfinished Business"—in race relations, urbanization and housing, and conservation of natural resources. It attempts to convey failures and triumphs in the American's dealing with his fellow man, with the natural world, and with the man-made environment.

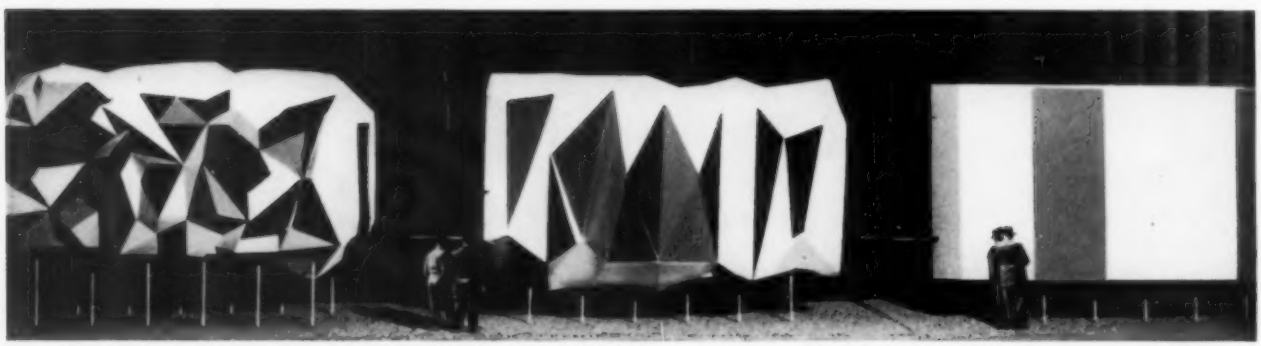
The intention of its creators has been to substitute for the frequent image of a "boastful America" a picture of a "dynamic, restless people with problems." With this innovation in propaganda technique in mind, the *Post* predicted that this is "the section of the show most likely to blow up in our planners' faces, as visiting Americans themselves may not see eye to eye on all the answers."

The three sections of the exhibition, each 20′ x 12′ x 12′, are similar in size and layout to railroad cars. Raised off the ground on stilts, each section is joined to the others by a continuous runway which begins and ends in a ramp. All three problem areas are taken up in each section, but the emphasis progresses from bad to good to ideal.

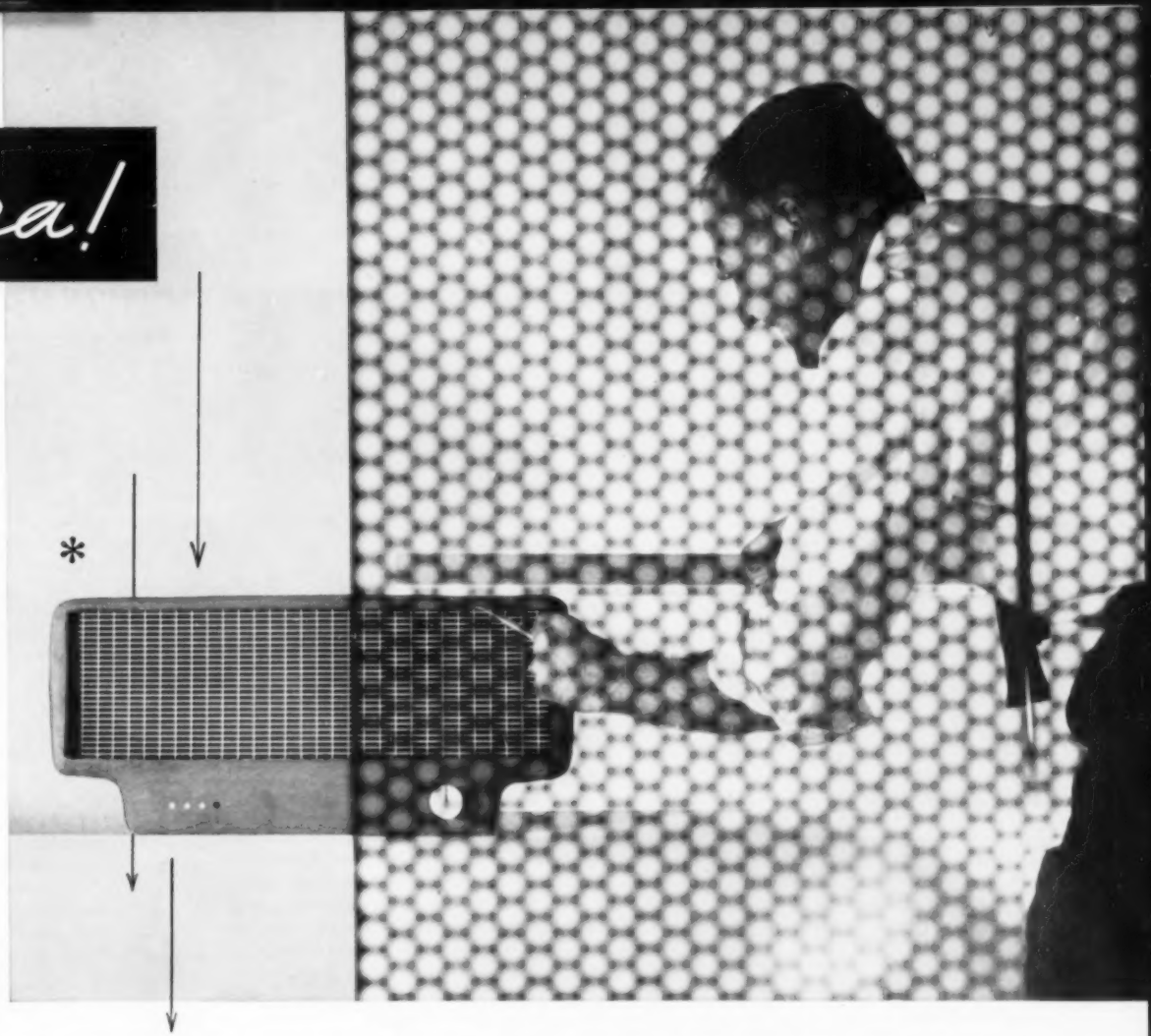
The theme of the exhibit is stated in the first section with a quotation from Jefferson: "The qualifications of self-government in society are not innate. They are the result of habit and long training, and for these they will require time and probably much suffering." The first section contains the bad news Americans have had to read about themselves lately: newspaper headlines describe outstanding failures in the three problem areas. To underline the atmosphere of failure, the first section is constructed to resemble a chaotic crystal (below). Intricate outer facets are painted black, brown, and white. The faceted inner walls contain nothing but the enlarged, distressing newspaper clips. The walls are painted black (although white in the model photograph shown below, left) and the room is dimly lighted from below the ramp.

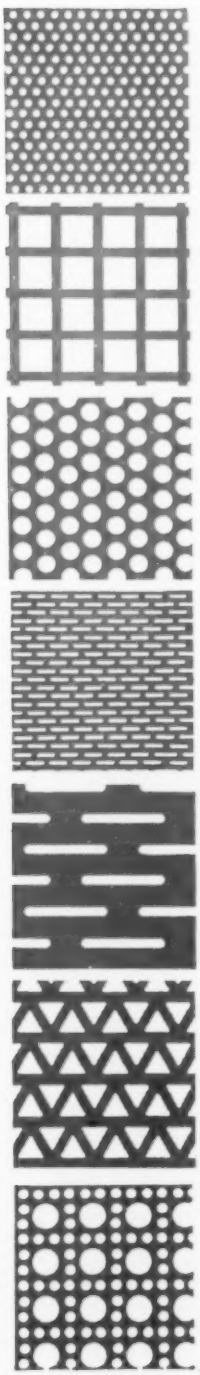
In the second section of the exhibit the crystal form of the structure has become less chaotic. It is a simple polyhedron. The few large facets are painted clear, bright colors on both interior and exterior. Inside the second section bright lights focus on a long panel of charts and photographs illustrating progress in the three problem areas.

The walls of the third section of the exhibit have become simple rectangles of blue and white. Inside there are only three large photo-enlargements (below, right) suggesting ultimate or partial solutions, to the problems of race relations, conservation and housing which exhibit considers.



Idea!





A few of the many H & K Patterns available.

mock-up projects design with H&K perforated metals

Here you see an actual H & K perforated metal grille utilized in a mock-up of a record player. This greatly helps the Industrial Designer project his concepts as H & K perforated metal is now in its proper element for consideration of use and selection of pattern.

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New developments in Ford tractors

The Ford Motor Company has recently announced two new machines in its tractor division. One is a driverless tractor to be used in its Farm Machinery and Research Engineering Center at Birmingham, Michigan. The other is a relatively inexpensive diesel engine which will for the first time, its producers say, bring the economies of diesel operation within the reach of a substantially wider range of tractor users.

Ford's driverless tractor (above) takes the strain off test drivers who heretofore had to run their equipment over an endurance test track and several obstacle courses where bumps simulate the worst conditions of actual farm fields. The new system substitutes for the quickly fatigued test driver a tireless electronic guidance system. A sensing antenna (see picture, above), mechanically linked with the front wheels, picks up signals from a low frequency current sent over an underground guide wire. If the tractor moves off the guide wire a voltage increase actuates an electronic circuit which controls a servo motor belt linked to the tractor's steering wheel, and the motor turns the tractor back to the center of the wire.

Ford's new diesel tractors, selling at about $400 above gasoline tractor prices (compared with the usual differential of $600 to $800), will emphasize economy. Basis of the decrease in price differential is the redesign of several components in the four-cylinder gasoline tractor engine so that many of its parts can now be used in the diesel engine also. A saving of 40% to 50% in the tractor's fuel bill is made possible, says the Ford Company, by the engine's 16 to 1 compression ratio, direct fuel injection system, and lower fuel cost. The economy of interchangeable parts makes this the lowest priced diesel tractor in the field, according to its makers.

Craftsmen to discuss design

Dimension of Design will be the theme of the Second Annual Conference of American Craftsmen to be held June 23-26 at Lake Geneva, Wisconsin. Fifty-five persons will assist in conducting the meetings. Following the keynote speeches on the 23rd, the conference will break into separate seminars for talks and guided discussion. All sessions will be recorded and complete proceedings of the conference will be published later. The American Craftsmen's Council hopes that the record of these annual meetings will offer a picture of the development of craftsmanship in the United States and its relation to our society.

Keynoting the theme of the conference will be George Culler, a director of The Art Institute of Chicago; Joseph Albers, of the design department at Yale; Dave Chapman, president of Dave Chapman Industrial Design; Gyorgy Kepes, a professor at M.I.T.; William Kolodney, a consultant at Metropolitan Museum of Art.

Co-chairmen of the conference are Aileen O. Webb and David Campbell. Those wishing to attend should write to American Craftsmen's Council, 29 West 53 Street, New York City.

Young designers show in New York

An exhibit of the work of young American designers will open at the Museum of Contemporary Crafts on June 13 and will run through September 14. The exhibition will be limited to the work of craftsmen 30 years old or younger in the fields of ceramics, metal textiles, wood and enamels.

The jury for the show will include Bartlett Hayes, Dorothy Liebes, Margret Craver, Daniel Rhodes, and Wharton Esherick. Eight cash awards of $110 will be given for distinguished work. The exhibit will be circulated for a year by the American Federation of Arts.

Supermarket emphasizes luxury

A comprehensive supermarket design program involving unified trade mark, letter heads, bags, containers and interior (below) and exterior furnishings has just been completed by Creative Designs International, New York design firm. The $2,000,000 King Cole supermarket in Bridgeport, Connecticut, covers 60,000 square feet and has a parking area for 500 cars.

Commenting on the design program, Herbert Ross, executive vice president and design chief of C.D.I., said, "The King Cole name obviously suggested the Merrie Olde Soul, but to have exploited this theme would have been too obvious, too 'cute' and possibly a community eyesore. Instead, by use of such devices as a crown trade mark, we tried to make the King Cole theme as subtle as possible and give an overall impression of reserved sophistication. Our aim was to please women shoppers with a decor of warm colors and interesting textures—coffee-colored walls, cork floors, Colonial planked walnut and pecky cypress. In the gourmet department we used vari-colored flagstones for the floor. The fish department wall is slate set on edge. The barbecue pit wall is antique brick, with concealed red floodlighting."

To give the whole supermarket a sense of unity C.D.I. devised crown-like insignia for all uses—outdoor identification, letterheads, uniforms, labels, bags, and coffee containers. Colors for most graphic work are olive green, mustard, brown, black and orange.

ARTIST'S INTERPRETATION

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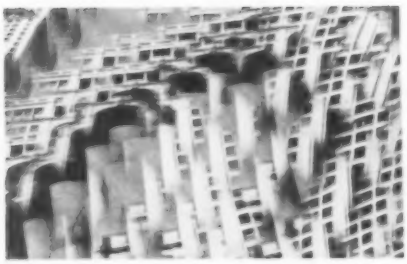


"N. Y., N. Y." new experimental film

An unusual experiment in abstract cinema, Francis Thompson's *N. Y., N. Y.*, was presented to audiences at the Museum of Modern Art in New York for the first time last month. This 15-minute color film is a carefully organized and integrated visual experience in which camera distortion is used to create an unfolding series of "cubist" images (above). Gene Forrell's musical score is a witty commentary on the constantly weaving and blending visual distortions. All effects are achieved through camera techniques especially developed by Mr. Thompson and do not depend on montages, collages, or film processing methods.

The film has been submitted to the International Experimental Film Competition in Brussels, and negotiations are now underway to have it shown in theatres across the country.

Cincinnati industry donates to show

Citizens of Cincinnati flocked to their Cincinnati Art Museum in record numbers during March to discover that there *can* be a relation between industrial products and art. The exhibition which drew them, "Made in Cincinnati," encompassed all types of well-designed industrial and consumer products. The exhibit, according to curator Allen T. Schoener who designed it, points up the diversity of products made in this area and introduces the concept that good design can be created in any type of product. To bring these ideas home, Mr. Schoener's selection ranged from a bright red cuspidor to stainless steel valves to the nose cone of the Explorer space satellite.

In the opening address, designer George Nelson suggested to his audience that "raw" industrial products, such as centrifugal pumps or valves, are better-designed in their simple functionalism than some consumer goods which have been loaded down with gimmicks.

The exhibition included 150 items selected from about 75 Cincinnati manufacturers.

Creative Engineering at Stanford

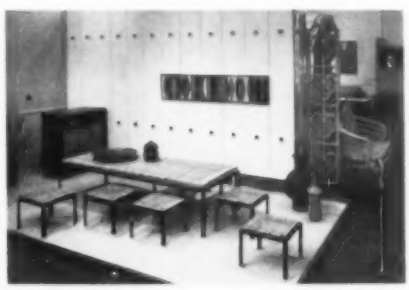
A course in creative engineering and comprehensive design will be offered by Stanford University this summer. Directed by John E. Arnold, who, until recently, taught a similar course at M.I.T., the course will run from June 23 to July 3. It is intended primarily for experienced men in industry who want to increase their understanding of the creative process and to help others in their organizations realize their full creative potential.

Because of the program's emphasis on group discussion and on faculty-student exchange of ideas, all participants will be required to live at Roble Hall on the Stanford campus. Other accommodations will be made for wives and children either on or off the campus. The $400 fee includes tuition, room and board, and books. Applications may be obtained from Professor John E. Arnold, Department of Mechanical Engineering, Stanford University, Stanford, California. Completed applications must be received before May 30.

Slide rule gives body dimensions

The anatometer is a new pocket-sized designer's aid, which contains 750 essential body dimensions for male and female adults and children. With this slide rule the designer can quickly find the full range of body dimensions for any measurement illustrated.

The anatometer was developed by Anatometric Associates, a consultant organization made up of former members of the United States Air Force Aero Medical Laboratory. It sells for $2.00 and may be purchased from Anatometric Associates, Box 204, Rochester 10, New York.



Pasadena exhibits design work

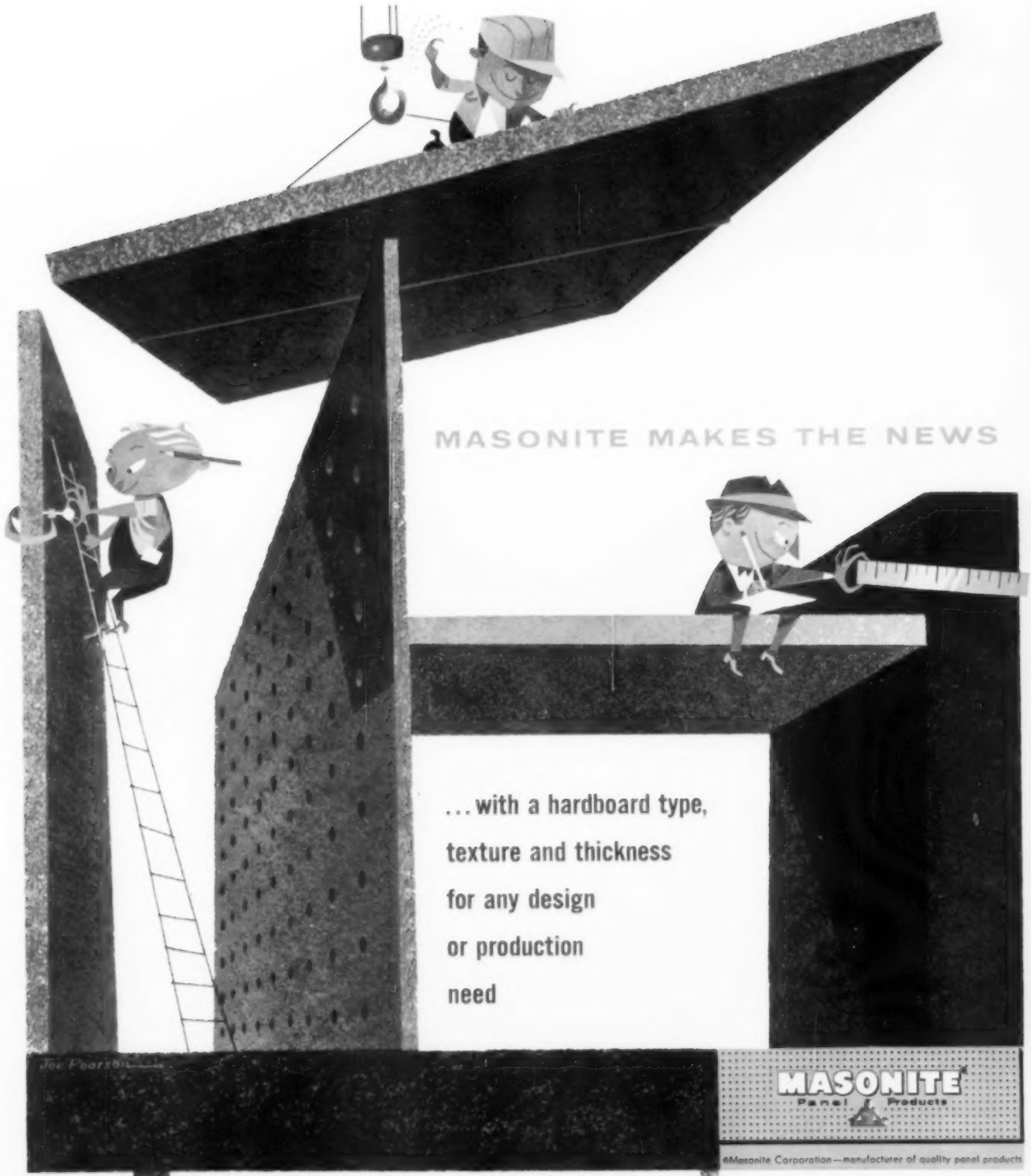
The work of Southern California's designers and craftsmen was shown last month by the Pasadena Art Museum in an exhibition called "California Design 4." The show, under the supervision of Director Clifford Nelson, included sound equipment and television, furniture, ceramics, fabrics, wallpapers, floor coverings, and appliances.

In conjunction with the exhibition, the Industrial Designers' Institute co-sponsored a designers' roundtable which discussed current design in Northern and Southern California.

Dates and panelists for Aspen

June 22 to 28 will be the dates for this year's Aspen Conference on "The City, Its Basic Elements, Its Connective Tissues."

Panelists this year have been selected to represent the fields of design, architecture, sculpture, landscape architecture, city planning and design education. They are: Alberto T. Arai, Mexico City architect; Ed Williams, landscape architect in the San Francisco office of Eckbo, Royston and Williams; Oliver Lundquist, industrial designer of Von Der Lanken and Lundquist, New York City; Christopher Tunnard, director of the graduate program in city planning at Yale University; Claire Falkenstein, San Francisco sculptor now living in Paris. For registration write to H. Hunter Middleton, 2032 North Clybourn, Chicago, Ill.



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Company news

Morris Ketchum, Jr., and **J. Stanley Sharp** (above) announce that their firm, formerly Ketchum, Gina' and Sharp, is now operating under the name of **Ketchum and Sharp, Architects.** Offices continue at the same New York address.
Fibreboard Paper Products Corporation announces the creation of the Packaging Group, a new operating division to coordinate the corporation's three West Coast packaging divisions. Included in the new division is Fibreboard's Creative Design Center.
Maria Bergson Associates are design consultants for the projected Union Bank Building in Beverly Hills. **Sidney Eisenshtat and Associates** are the architects.

Going places

Frank Gianninoto and Associates, New York, have opened a West Coast office at 9046 Sunset Boulevard, Los Angeles, under the management of vice president **Mary B. Sheridan** (above).
William H. Ducker heads the newly-formed **Ducker-Singer Company,** 312 E. Brown, Birmingham, Michigan. The new company will manufacture automatic materials handling equipment and systems, and will offer a consulting service in product research and development.
The **New York Chapter, American Institute of Decorators,** has moved to permanent quarters at 231 East 51st Street, New York.
Waldheim-Koepke Associates are now at 1806 North Farwell Avenue, Milwaukee 2.

Competitions and awards

The **Weatherhead Company,** Fort Wayne Division, is offering $15,000 in prizes for case histories of Ermeto flareless tube fitting applications. The contest, which closes September 30, is open to anyone actively associated with the design, maintenance or operation of equipment in any field of commerce or industry. Entries should be mailed to "Win with Ermeto" Contest, P. O. Box 2457, Fort Wayne.
Robert P. Pechnick, architecture senior at the University of Illinois, has won the first prize of $500 in an architecture competition sponsored by the Indiana Limestone Institute, Bedford, Indiana.
Awards in the 1968 **Hess Brothers Versatility in Design and Use Contest** were distributed April 8 at the Waldorf Astoria, New York. Prizes and citations went to 38 manufacturers and designers in eight fields.
Paul Rudolf will receive the $1,000 Brunner Memorial Prize in Architecture of the National Institute of Arts and Letters.

Figures

AUTOMOTIVE: General Motors produced 246,948 passenger cars and trucks in the United States and Canada during March of this year, as compared with 314,757 during March, 1957. The number of Mercedes-Benz cars sold by Studebaker-Packard dealers increased by 61% from November to March: 415 in November, 665 in February.
PLASTICS: The Society of the Plastics Industry, Inc., reports a 7% increase in the production of plastics and resins materials during 1957. Dollar value was approximately $2,100,000,000.
FOREIGN TRADE: Japanese industry last year paid $42,778,000 in royalties for foreign technical and patent rights, the result of 1,412 contracts Japanese firms have signed, mostly with American companies.

People

Consulting editor **Jane Fiske McCullough** is now in Brussels covering the Fair for ID. Her reports will appear in July and August.
Tomi Ungerer's new book *Crictor* has won the prize for the best picture book for children in the Herald Tribune's Spring Book Festival. His product interpretations appeared in last month's ID (pages 58-62).
Jean Reinecke spent four weeks this spring, as a guest of the National Industrial Arts Institute of Japan, talking to industrial design groups and visiting Japanese industries.
Louis Kahn, Professor of Architecture at Yale and the University of Pennsylvania, will deliver a paper on "Order, Space and Design in Architecture" at the first World Assembly of Engineers and Architects, Friends of Israel, to be held in Israel from May 29 to June 9.
James McDonnell, designer for Northern Engraving and Manufacturing Company, La Crosse, Wis., was guest speaker at a recent meeting of the Chicago chapter of IDI. He explained new manufacturing techniques developed by company president **Charles Gelatt.**

APPOINTED: **John F. Adamson** (above) to assistant chief engineer of the Automotive Division of American Motors Corporation... **Richard Pelzman** (above) to chief of the marketing department of Donald Deskey Associates, New York... **Moto Shimano** (above) as a partner in Zierhut Associates, Van Nuys, California ... **James S. Moore** and **Jack L. Campbell** as vice presidents of Pereira and Luckman, architectural-engineering firm of New York and Los Angeles... **John M. Thomas** (above) as head of New Product Planning and Development of Hoskins Manufacturing Company, Detroit... **Alan W. Furber, Jr.** to the package design staff of Ken White Associates, Westwood, N. J. ... **P. L. Griffith** as an associate of Kelly and Gruzen, New York architects and engineers... **Raymond Stevens** and **Allen Latham, Jr.** as chief executive officer and director, respectively, of Arthur D. Little, Inc., industrial research company of Cambridge, Mass.... **William Schlackman** as director of the Package Research Division of the Institute for Motivational Research, Croton-on-Hudson, New York.

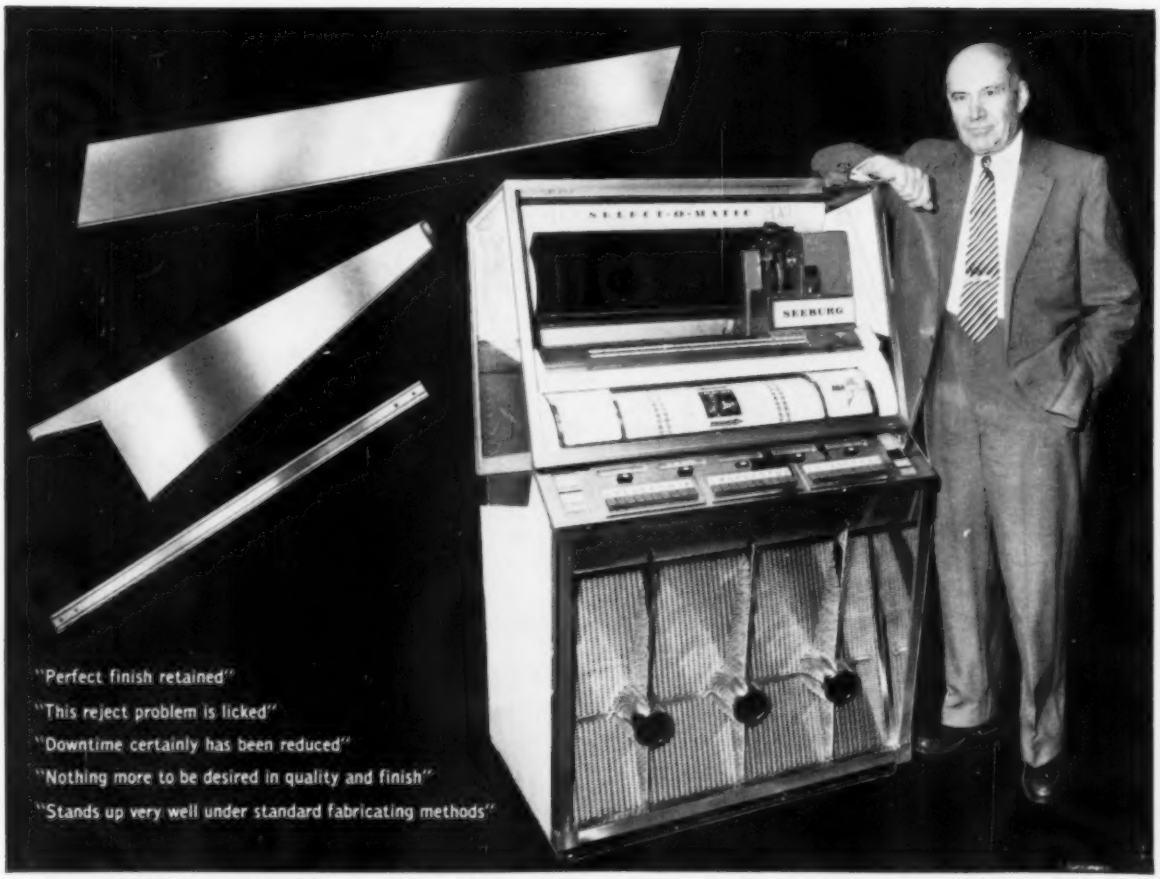
ELECTED: **Martin Schnur** as a member of the Package Designers Council... **Morris Ketchum, Jr.** as president of the Architectural League of New York, together with six vice presidents: **Francis Scott Bradford** (painting), **Frank Eliscu** (sculpture), **Janet Darling** (landscape architecture), **Dan Cooper** (design and craftsmanship), **C. Mortimer Throop** (engineering), **Jose A. Fernandez** (architecture).

Postponement

The design show planned for New York's Museum of Modern Art this June has been postponed indefinitely because of the recent fire.

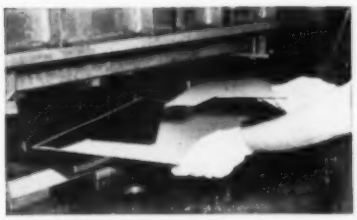
Erratum

On the chart on page 46 of the April issue of ID, third column heading should read "% ZINC" instead of "% LEAD."



K. R. Craft, Vice President, The Seeburg Corp., Chicago, with one of the company's famous juke boxes. The brilliant reflectivity and durability of Nickeloid pre-plated metals is an important factor in the product's eye-catching good looks.

NICKELOID METALS SAVE 4 PRODUCTION STEPS— REDUCE REJECTS FOR THE SEEBURG CORPORATION



Standard fabricating methods are used to stamp and form juke box trim. Nickeloid Metals eliminate machinery tie-up; rejects are less than 1%.

Stamping Nickeloid chrome steel, protected with Mar-Not adhesive-backed paper which is easily peeled off. Finished part will need no polishing.

Pre-Finished Design Material is Easily Worked With Standard Fabricating Methods

The Seeburg Corporation uses Nickeloid *pre-plated* chrome steel to achieve functional beauty and attention-value . . . economically. Before switching to Nickeloid, the company did its own cleaning, plating and buffing. The job required four — sometimes five more operations than are now necessary. According to Mr. Craft, "The tremendous cost of plating and buffing was not only more expensive and much more time consuming, but the finished product had to be inspected, and the rejections on plated and buffed metals was very much higher than it is with Nickeloid. Economically, the Nickeloid Metals have proved themselves in production."

Using standard fabricating methods, Nickeloid Metals need only be stamped and formed — then assembled. By capitalizing on this pre finished *method* of production, this leading manufacturer has eliminated the machinery formerly required for plating, polishing and buffing — saved four or five production steps, and is producing a better end product *with less manpower*. Can you use these advantages in *your* operation?

At the Design Engineering Show — See Nickeloid Metals, Booth 103-A

WRITE TODAY FOR FREE LITERATURE

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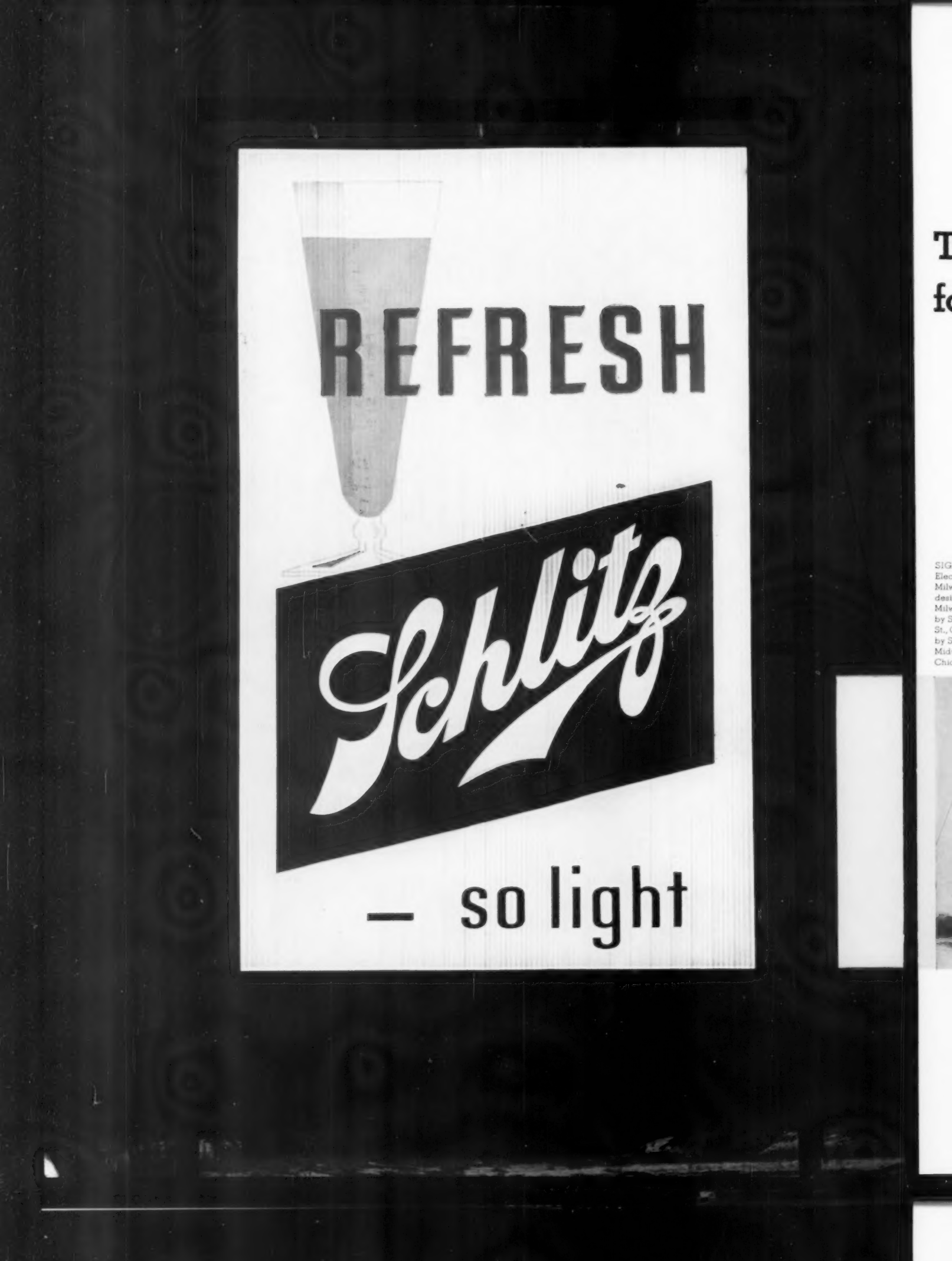
AMERICAN NICKELOID COMPANY

PERU 7, ILLINOIS


REFRESH
Schlitz
— so light

The bigger the sign, the greater the need for a tough plastic like Tenite Butyrate

Giant plastic sign is 40 feet high, 25 feet wide and contains 3000 pounds of Butyrate plastic

Remember this use of Tenite Butyrate, the next time you're looking for a tough plastic that must endure outdoor exposure.

Reputedly the largest plastic-faced structure in the world, this illuminated sign measures 25 by 40 feet and is mounted on a steel structure 52 feet high. The plastic alone weighs 3000 pounds. It's truly a giant, but there's more of a story here than mere size.

To protect the investment needed to build such a sign, the designers had to choose a plastic that was tough enough to survive handling and erection hazards, sturdy enough to endure whatever impacts would be encountered, rigid enough to resist any buckling throughout its 40-foot length, resilient enough to absorb the twisting effect of strong winds...and weather-resistant enough to take the rigors offered by Midwest summers and winters.

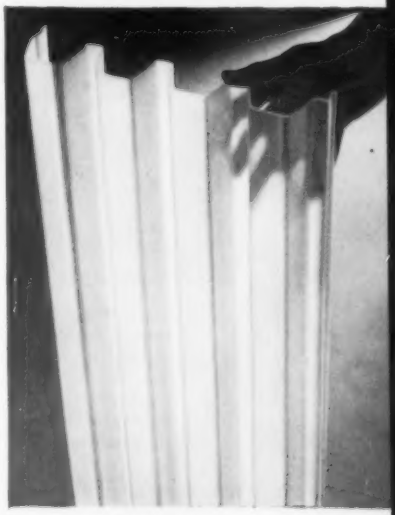
In Tenite Butyrate, the designers found a plastic that could meet their performance requirements. For many years this Eastman plastic has been proving its toughness and weather durability in hundreds of outdoor applications.

Another advantage of Tenite Butyrate was its good working properties and the ease with which it could be extruded into the necessary corrugated form shown at the right. For this sign was not made by piecing together short panels of plastic; instead, the sign was fabricated by interlocking 40-foot lengths of corrugated extrusions, each one foot wide. All decorating on the white sign face was done by overlaying sheets of Tenite Butyrate in various colors. These can be changed at will to vary the advertising message.

What jobs do you have for so versatile a plastic as Tenite Butyrate? Its mechanical properties, its outdoor durability, its easy workability, and its availability in any color in clear, opaque or variegated forms result in uses ranging from the popular new color telephones to pipe for carrying corrosive fluids. To discuss any use you might have for Tenite Butyrate, write EASTMAN CHEMICAL PRODUCTS, INC., subsidiary of Eastman Kodak Company, KINGSPORT, TENNESSEE.

SIGN DETAILS: Sign constructed by Everbrite Electric Signs, Inc., 1440 N. Fourth St., Milwaukee 12, Wisc. Unit conceived and designed by Jos. Schlitz Brewing Company, Milwaukee 1, Wisc. Corrugated sheet extruded by Southern Plastics Company, 408 Pendleton St., Columbia, S. C. Overlay sheets extruded by Southern Plastics Company and by Midwest Plastic Products Company, 1801 Chicago Rd., Chicago Heights, Ill.

CLOSE-UP shows extruded construction of sign face. Sign is so bright, a newspaper can be read by its light 3 blocks away. Development of giant sign took years of planning.



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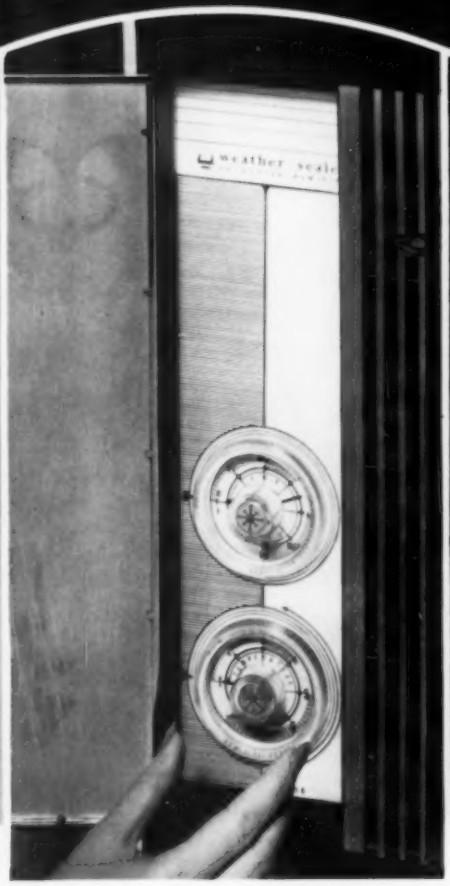
BUTYRATE
an Eastman plastic

new sales appeal

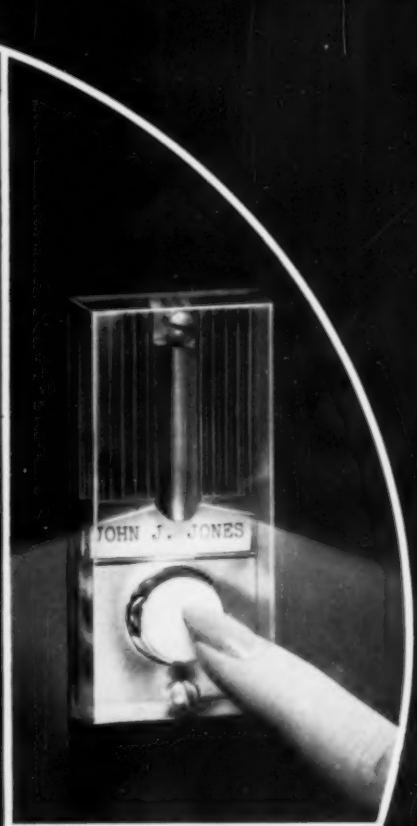
with Du Pont LUCITE®
acrylic resin

You can achieve exciting optical effects with smooth, ribbed, or pebbled surfaces of LUCITE acrylic resin, molded in curved or flat sections. Lightweight and shatter-resistant, LUCITE is easily colored, formed and machined, and can be extruded in any desired length. It also has high tensile strength and stiffness. Let us show you how this versatile acrylic resin makes possible new freedom in design. Write to: E. I. du Pont de Nemours & Co. (Inc.), Polychemicals Department, Room 215, Wilmington 98, Delaware. In Canada: Du Pont Company of Canada (1956) Limited, P.O. Box 660, Montreal, Quebec.

STEAM-GUARD FRONT COVER PLATE for hot and cold water dispenser is molded of LUCITE for sparkling beauty that lasts. LUCITE can be kept sanitary with soap and warm water. (Molded for Temprite Products Corporation, Birmingham, Mich., by Hughes Plastics Inc., St. Joseph, Mich.)



COLORFUL CONTROL PANEL is made of lightweight and durable LUCITE. It is back-painted in gold, blue, red and black, with easy-to-read directions for operating the new Imperial room air-conditioner. (Molded for Whirlpool Corporation, St. Joseph, Mich., by Kent Plastics Corp., Evansville, Ind.)



PUSHBUTTON DOOR CHIME HOUSING with nameplate is molded of LUCITE because of its excellent optical effect when back-lighted, its durability, and resistance to weathering. (Molded for NuTone, Inc., Cincinnati, O., by The Yardley Molded Plastics Corporation, Columbus, O.)

DU PONT
REG. U. S. PAT. OFF.
BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

Don't spread it on too thick

Recently, when ordering a chocolate milk shake in a turnpike diner we were reminded of a poem by A. A. Milne in his classic "When We Were Very Young." Our request for a milk shake with one scoop of ice cream provoked the waitress' announcement that we could only have one made in a certain way with ice cream from an evil-looking machine that gushed forth an equally evil-looking thick, soft substance. We asked whether they had regular ice cream. Yes, they did. We requested that they put one scoop of regular ice cream into a container, add a little milk and mix. No, they couldn't. Why? They were promoting "super-thick" milk shakes, they said, and weren't allowed to serve any other kind. We settled for a little chocolate syrup in a glass of milk mixed by us with a fork. The more we thought about it, the more we felt that this was no way to promote a super-thick milk shake. Then we remembered that others had faced this sort of problem before us.

Recall, if you will, Milne's courageous monarch who stood by his guns in the face of the most forceful of all opposition—public preference, real or rationalized. It all started when the King asked for some butter for his breakfast bread. He asked the Queen, who asked the Dairymaid, who asked the Alderney, who said ("sleepily")

"That many people nowadays
Like marmalade
Instead."

Now, there's an unfortunate attitude right at the beginning. Certainly she had the butter. She had the market sewn up, so why bother producing it right then? Anyway, she had a fine go-between in the Dairymaid who went to the Queen and in her rather shallow, charming manner, curtsying, and blushing, added her own bit of sales promotion,

". . . marmalade is tasty, if
It's very
Thickly
Spread."

The Queen was a little taken aback ("Oh!") but fell for the idea and went to the King, and said,

"Many people
Think that
Marmalade
Is nicer.
Would you like to try a little
Marmalade
Instead?"

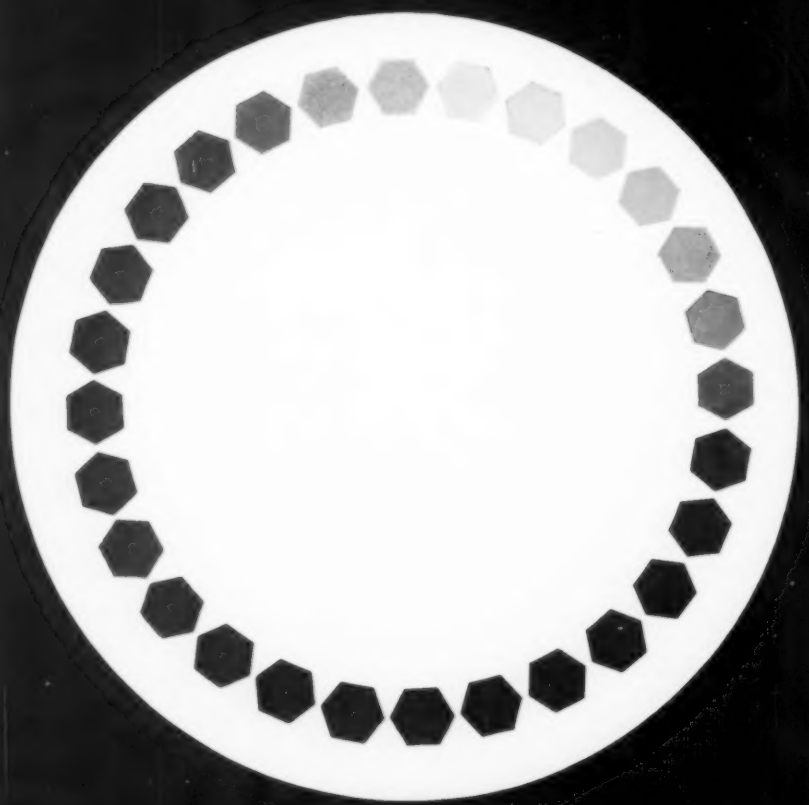
And she was mightily surprised when the King said,

" 'Bother!'
And then he said,
'Oh, deary me!'
The King sobbed, 'Oh, deary me!'
And went back to bed.
'Nobody,'
He whimpered,
'Could call me
A fussy man;
I *only* want
A little bit
Of butter for
My bread.' "

Well, we certainly don't think he was a fussy man, but we wish we had his courage and would "go back to bed" a little more often when we are offered an alternative we really don't want.

In the case of Milne's King, everything turned out all right. The Alderney repented and gave him his butter and a bonus—"milk for his porringer." We don't think very many people want a bonus; they simply want what they want. Of course, there's always the question of what might have happened to the Alderney if the King had taken marmalade with his bread and liked it better than butter.

But that's no way to sell someone on a new concept. The old adage, "The customer is king" (in Milne's case "the king was customer") shouldn't be ignored—no matter who the customer might be: consumer, client, or King. If you have marmalade to sell and you are convinced it's good, sell it, by all means. But don't expect immediate acceptance from butter-lovers. *D. G. M.*



COLOR STANDARDS

As more and more color is used in and on products, both consumer and manufacturer are becoming increasingly aware of the importance of color consistency and the maintenance of color standards. This places new demands on every industry; and these demands are being met by the development of new color systems, new measuring instruments, and more universally accepted terms for communication.

by DOUGLAS G. MELDRUM

The twenty-eight colors in the hue circle on the left are systematically arranged to represent the full spectrum, ranging from violet, which has a wavelength of 400 millimicrons, to red at 700 millimicrons. There are an infinite number of colors within the visible spectrum and, for all practical purposes, there is no limit to the number of colors that can be produced in any medium, be it paint, dyes, or plastics. Obtaining a color for a specific purpose in a specific material is not always easy (see Color Problems; ID February, April, June, August, October, 1956; March, 1957). But it is only part of a much larger problem. Once a color has been decided upon—whether by a designer working on a new line of plastic housewares, a farmer determining by their color the most profitable time to pick his apples, or the American Standards Association establishing gray finishes for industrial apparatus and equipment—a standard has been set; and, if it is to serve any useful purpose, this standard must be maintained. In this article, some of the basic concepts for establishing and maintaining color standards will be discussed, with an examination of various types of systems, how they are used, and their relationships to color problems in industry.

Whether color is an esthetic consideration or serves a purely practical purpose, color standards, and consequently color consistency, are a primary factor. It is just as important that a manufacturer of melamine dinnerware keep his colors in a certain line consistent (so that a housewife can add or replace pieces and be assured that the new will match the old) as it is essential that color codes for electronic circuitry or railroad signals be the same universally. Many methods and systems have been developed to establish and maintain color standards. Some are simple, others very complex, but most, if they are used properly, serve a purpose that is important to industry.

Material standards

The most basic types of systems are known as material standards. These are, as their name implies, collections of actual material samples, chosen and established as standards and arranged in an orderly manner for easy comparison with other samples of the same material to determine whether or not standards are being met. For years the cotton industry has relied on such a collection to set the standards for grading its product. A variation is to separate the color from the actual product and make up cards, charts, or books of color chips. The National Retail Dry Goods Association established a system like this with the National Bureau of Standards for kitchen and bathroom accessories. Similarly, NBS worked with the Plastic Materials Manufacturing Association to establish standard colors for molded urea and styrene and the Textile Color Card Association dyed swatches of fabric to make their standards easy to use. Everyone who has redecorated an apartment, reupholstered a chair, or bought stationery is familiar with some of the myriad other systems available in hardware, department, or other stores to help select and match colors of paint, leather, textiles, paper, and so forth. Useful and essential as these systems are, they invariably suffer from one great inadequacy—lack of flexibility. They represent, usually quite accurately, colors in a specific material, but rarely can they be usefully applied to other materials.

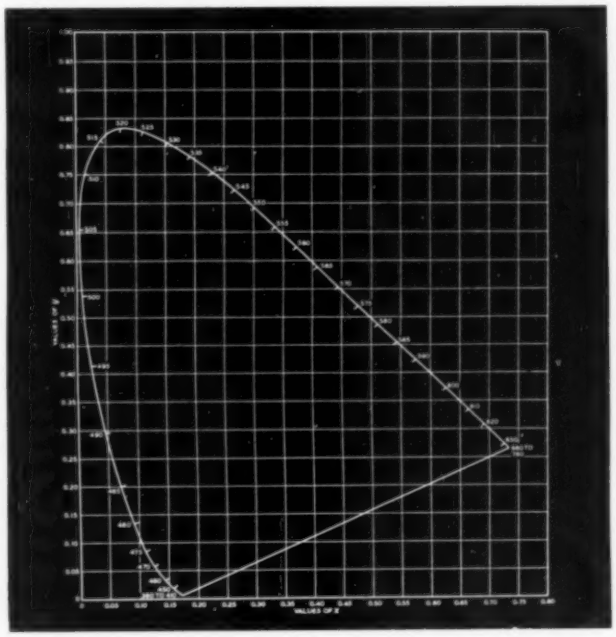
Going a step further, other systems have been ad-

vanced that have no relationship to a specific type of material. They consist of systematically arranged colors reproduced on charts under highly controlled conditions of lithography, silk screen or other processes. Many widely-used systems, like those discussed on pages 34 and 35, frequently use standards and samples on different materials. This requires their being supported by scientific measurement methods that minimize the human element of matching by eye, which, even under carefully controlled lighting conditions, is fallible.

Consider the problem faced by the American Standards Association when they established colors for the Safety Color Code. They said that red shall be the basic color for the identification of fire protection equipment and apparatus, danger, and "stop"; orange shall be used to mark dangerous parts of machines; yellow shall designate caution and mark physical hazards; green shall be for safety; blue for caution; purple for radiation; black and white, combinations thereof, for traffic and housekeeping markings. Obviously, the standards could not be referred to simply by the names of the colors—red, blue, purple, etc.—since they cover the entire spectrum and include any of the ten million colors the human eye is capable of discerning. ASA did amplify the verbal description of the colors by referring to them as vivid red, vivid orange, vivid yellow, brilliant green, strong blue, vivid reddish purple, white, and black. But they were still far from solving their problem, which was further complicated because they had to communicate with producers working in every medium and using every material from paint on wood, to porcelain enamel on steel, to plastics with integral color. The answer lay in using a system that was advanced in 1931 by the International Commission on Illumination (ICI) and known as the Standard Observer and Coordinate System for Colorimetry. This system was renamed in 1951 and is now known as the CIE system, after the Commission Internationale de L'Éclairage.

The Standard Observer and Coordinate System

Based on spectrophotometric readings that represent the breakdown of a color into its spectral components, the CIE system is, according to the American Optical Society, an interpretation of psychophysical concepts and relationships. "Psychophysical methods," they state, "give results that are related in a reasonable manner to the sensations experienced by representative observers under representative conditions of observation . . . Standardization of the conditions of measurement is necessary for the establishment of any practically useful measurement technique and for the unambiguous definition of the quantities measured . . . [The results] are characteristics of stimuli as evaluated in terms of sensory response." To specify a color by the CIE method, Tristimulus values (the magnitudes of the three standard stimuli, designated X for red, Y for green, Z for blue) are measured on a spectrophotometer and chromaticity coordinates (x and y), are drawn on a chart such as the one below, using the fraction $x = \frac{X}{X+Y+Z}$ for the horizontal coordinate and the fraction $y = \frac{Y}{X+Y+Z}$ for the vertical coordinate. By using this system, dominant wavelength and purity of a color are directly related to the location of the point on the chromaticity diagram. This simplified explanation of the Standard Observer and Coordinate System demonstrates how



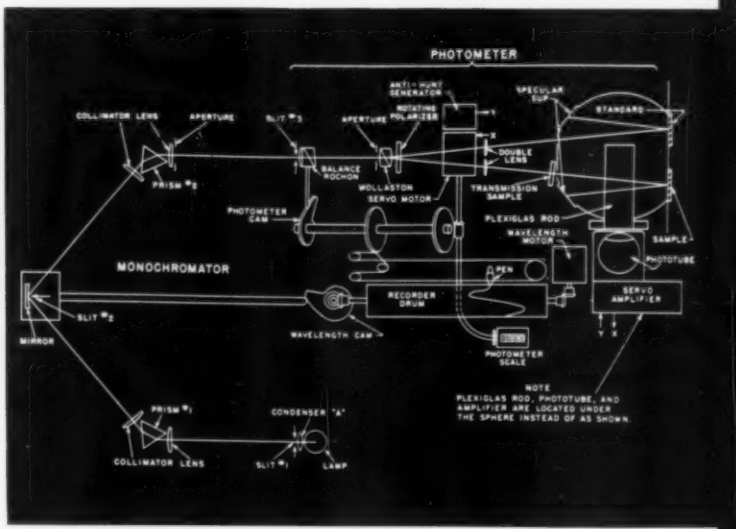
ASA CHROMATICITY DIAGRAM

The diagram above is constructed by plotting the values of x horizontally and the values of y vertically. Every visible color in the spectrum falls within the boundaries of this shape. The boundary itself represents fully saturated colors, starting with blue in the lower left hand corner, to red on the right, going up the curve through orange, yellow, yellow green, to green at the apex. Illuminant C, or white, falls in about the center. The use of this diagram gives a precise method of color determination.

the American Standards Association, by publishing CIE Chromaticity Coordinates and Reflectance Limits, can numerically specify a color standard that can be matched exactly, without actually using a sample. And, more important, the standard is the same regardless of the material being used.

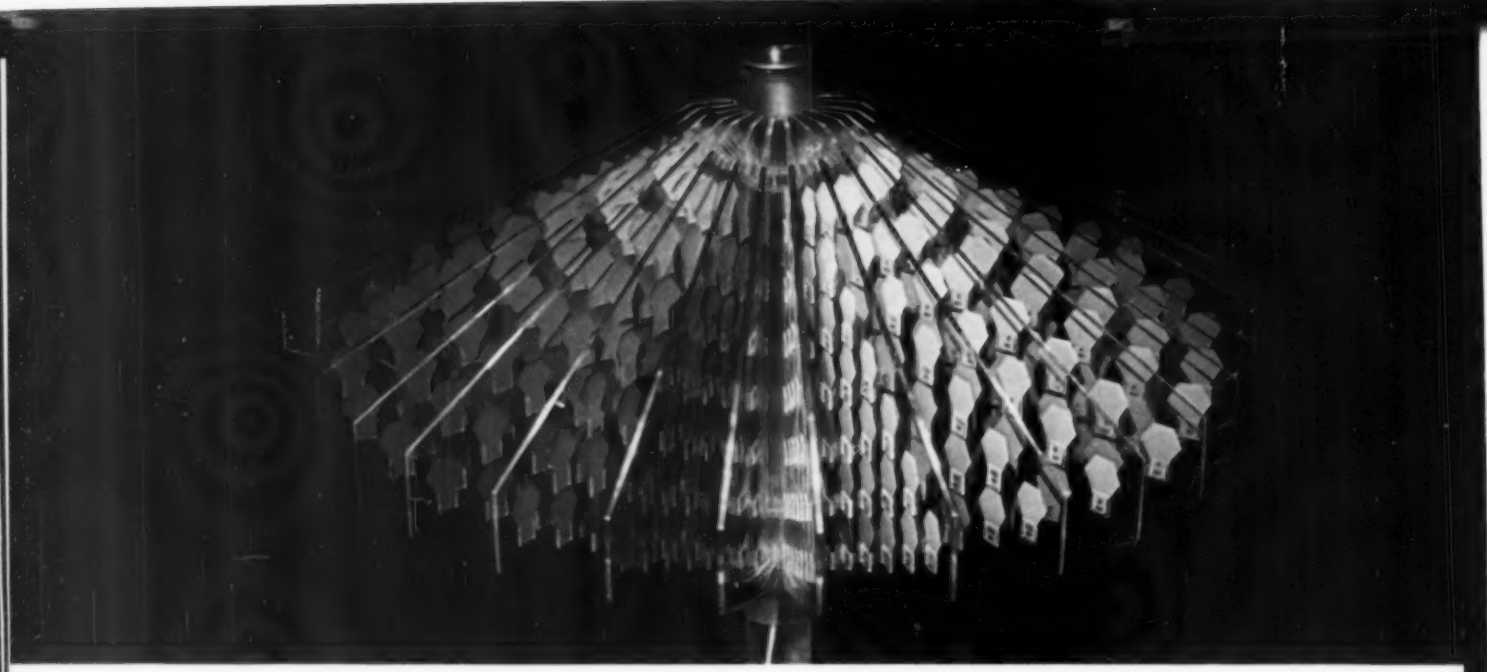
The International Commission on Illumination performed another important service to industry when they established standards for light sources with which to view color samples. Their three basic sources, known logically as Source A, Source B, and Source C, are special lighting arrangements that correspond respectively to gas-filled incandescent lamps, noon sunlight, and average daylight or the light from an overcast sky. If the proper lamps are used by two or more manufacturers who are attempting to reach a color match, they can be sure that their samples will be viewed under identical lighting conditions. Source A is representative of a gas-filled incandescent lamp; Source B compares to sunlight at noon and is obtained by using the same kind of incandescent lamp as for Source A, but with a liquid filter added; Source C gives the effect of normal daylight, or the light from a completely overcast sky, and it too is obtained from an incandescent lamp, but with a different filter. Color specifications invariably include the light source used.

Many systems, developed before the science of spectrophotometry was known, have been analyzed and given CIE notations. The aim, of course, is to establish better color communication among people who have a similiar problem — color — but who are using different ingredients. And some of these systems, like the now classic Ostwald and Munsell systems described on the following four pages are a definite aid to industry in establishing color combinations and color harmonies.



G.E. RECORDING SPECTROPHOTOMETER

The recently redesigned model shown on the left is a basic instrument for setting color standards and controlling the color of dyes, glass, inks, textiles, plastics. It consists of three main units: the monochromator, the photometer, and the recorder (see diagram, above). The monochrometer system breaks up white light into the spectrum colors, each at a band width of 10 millimicrons. The photometer illustrates the sample by either transmission or reflection, to furnish a measurement signal to the recorder. The recorder has a drum which holds file-size recording paper. Normal recording is 54 seconds, or 2½ minutes when the automatic tristimulus integrator is used. Primary applications of the recording spectrophotometer are color control and color standardization. It provides a permanent record of any color in quantitative terms of fundamental physical units.



The Ostwald system: a color organization for standards and harmony

The color chips in the three-dimensional color solid above represent but a smattering of the millions of possible colors. Its systematic arrangement, however, makes it or adaptations of it an exceedingly valuable and useful tool in color matching and in color communication. This color organization is the result of the pioneering efforts of Dr. Wilhelm Ostwald, whose work in physical chemistry won him a Nobel Prize in 1909. In his aim to create a color system that would make understandable the interrelationships of colors that are pleasing when used together, Dr. Ostwald reasoned that color is a sensation, divided into two basic groups, the *achromatic* (white and black), and the *chromatic* (yellow, red, blue, green). He organized these sensations with the achromatics as a pole in the center, ranging from white at the top to black at the bottom with six steps of gray between. The chromatic colors branch out from the central pole in the form of triangles with a pure hue circle making up the equator of the solid. The colors between the gray scale and the full colors at the equator make up a series of twenty-four monochromatic triangles. Dr. Ostwald called the upper portions of the triangles the "light clear colors," and the bottom portions the "dark clear colors." By systematically lettering or coding each chip, Dr. Ostwald's system of communication is easy to use and a key to color harmonies.

A Chicago Art Institute student uses the Color Harmony Manual to study color relationships.

A number of widely used color systems are based on the Ostwald theory, perhaps the most familiar being the Color Harmony Manual, published by the Color Standards Department of the Container Corporation of America. The manual is now in its Fourth Edition and has been expanded to contain 949 standards. Each color chip, which is die cut from cellulose acetate and sprayed with a matte finish on one side and glossy finish on the other, is notated according to the Ostwald theory. Colorimetric specification from spectrophotometric curves for both sides have been computed to give tristimulus values X, Y, Z, chromaticity coordinates x, y, dominant wavelength, purity, and Munsell renotations in terms of the CIE standard observer with illuminant C. The manual is designed not only as an aid in choosing colors and establishing color harmonies, but also to serve as a standard to help in the specification of color when physical samples are not available. The Container Corporation Manual is recognized as one of the best tools for the selection of harmonious colors.

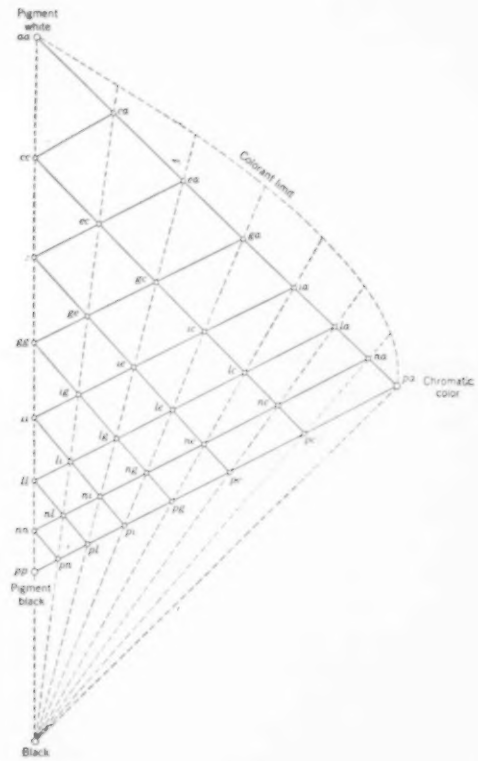
Ostwald's notations are a simple combination of numbers and letters. He lettered the gray scale from "a" to "p," white to black, using alternate letters a,c,e,g,i,l,n,p. Since there are twenty-four hues in the system, he simply numbered them from one to twenty-four around the spectrum. Each Ostwald notation includes one number and two letters, with the first letter representing the whiteness of the color and the second the blackness. A typical triangle is:

a
ca
c *ea*
ec *ga*
e *gc* *ia*
ge *ic* *la*
g *ie* *lc* *na*
ig *le* *nc* *pa*
i *lg* *ne* *pc*
li *ng* *pe*
l *ni* *pg*
nl *pi*
n *pl*
pn
p

14 pa, for instance, would be a pure blue. Similarly 18 lc would be a turquoise. To emphasize the confusion that can arise from using names only, it might be pointed out that in the Container Corporation's Descriptive Color Names Dictionary there are four chips for "turquoise blue": 17 ic, 17 lc, 17 ia, 17 nc. In addition, there are many other turquoises, dusty turquoise blue, medium turquoise blue, brite turquoise blue, and so on. However, there can be little room for doubt if the full notation is given.

Some of the more basic rules to follow in specifying harmonious colors with the Ostwald system are to choose colors from the same vertical series (5ga, 5le, 5pi); or those that have the same first letter (5ga, 5gc, 5ge); or those with the same second letter; those with the same two letters; any combination where the first letter of one is the same as the second letter of another; or those combinations where the first letter of one is the same as the second letter of the other, or vice versa.

Dr. Ostwald summed up his undertaking when he wrote, "It is one thing to measure a given color, but quite another to produce a specific color, a color standard. The difference is similar to that between measuring a length with a standard scale, and making a standard scale of exact length. And since colors depend upon three elements, the difficulty here was much greater than with a ruler which has only one variable —length. I was, in fact, confronted by a problem which had hitherto never been assigned, and hence had never been solved: that of producing numerically predetermined colors."



ORGANIZATION FOR ONE HUE

In the diagram above, straight solid lines represent one of Ostwald's dominant wavelengths. The curved, dotted line indicates how the gamut has been extended to higher purities for the Color Harmony Manual.

The Munsell System — widely used for color specification and education

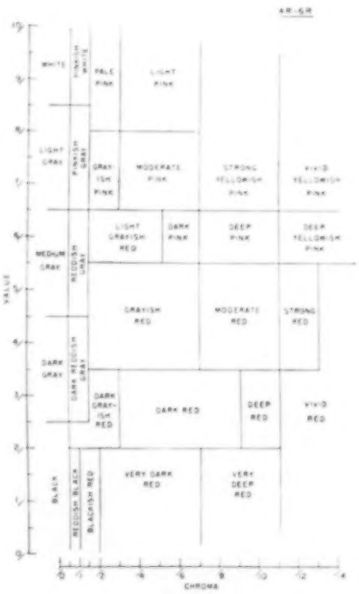
Albert H. Munsell, whose name is at least as familiar as Dr. Ostwald's as a pioneer in the development of color systems, based his color notations on the three qualities of hue, value, and chroma. These terms correspond to hue, lightness, and saturation. Munsell sought to express and organize color as a psychological experience as opposed to Ostwald's theory that color is a sensation. Munsell's hue circuit is arranged with five principle hues (red, yellow, green, blue and purple) spaced equidistantly in a circle. Between the principles he placed five intermediate hues (yellow red, green yellow, blue green, purple blue, red purple) dividing the whole circuit into ten segments. This was again divided by ten second intermediate hues, then by eighty special intermediate hues, resulting in a 100-hue circuit. The value scale is divided into segments from 0 for black to 10 for white. The scale is sub-divided into three major sections of "dark values" (0 to 3), "middle values" (4 to 6), and "light values" (7 to 10). Munsell logically maintained that a color such as yellow has its strongest chroma (strength or intensity) in the light values, at the eighth value, to be precise. On the other hand, darker colors, such as red or purple, have their strongest chromas in the area of the dark values. Thus, he organized his system by using the value or black to white scale as an axis, with the light values at the top and the dark at the bottom. Hues are placed around the neutral axis, having the same value at any given level, and as their distance outward from the axis increases, so their chroma or intensity increases.

In describing a color using the Munsell notation in its simplest form, one letter and two numbers are involved—the letter specifies the hue, the first number the value, and the second number the chroma. The specification G8/1 would be a green with a value of 8 and a chroma of 1, or a light dull green. Intermediate hues can be designated by letter (R for red, yR for yellow-red, etc.), by letter and number (5R for red, 7.5R for yellow-red), or by number alone (5 for red, 7.5 for yellow-red). The following chart gives some of the relationships between the methods of notation:

Letter	RP	rRP	RP-R	pR	R	yR	R-YR	rYR	YR
Letter & Number	5RP	7.5RP	10RP	2.5R	5R	7.5R	10R	2.5Y	5YR
Number	95	97.5	100	2.5	5	7.5	10	12.5	15

Advocates of the Munsell system claim that it is a very specific method for giving notations to colors, that it is simple to use for visual comparison, that it facilitates writing specifications, and that it is highly flexible and readily expanded by the addition of colorants of a stronger chroma. It is used widely for color specification in many fields and can offer almost as precise a notation as that obtained from chromaticity coordinates and luminous reflectance.

Both the Munsell and Ostwald systems present color as a three-dimensional concept with the white-through-gray-to-black scale as an axis and pure hues as an equator. The difference is that in the Munsell system colors that have strong saturation (*chroma* in Munsell's terminology), such as red, are nearer the black area, while yellows are nearer white.



DESIGNATION WITH THE MUNSELL SYSTEM

The chart above shows a color designation method worked out by the Inter-Society Color Council in collaboration with the National Bureau of Standards and based on the Munsell system. Known as the ISCC-NBS method, it makes possible the designation of color, its value and chroma in understandable terms. The color names indicated in the chart are widely accepted in industry and serve to supplement more specific designations by number and letter.

Color systems in action involve many steps and many experts

To understand what is involved when a manufacturer matches a color to meet a standard, a step-by-step description of the operation in a specific company clarifies the procedure. At Eastman Chemical Products, Inc., Kingsport, Tennessee, they have two basic problems: one is to maintain color control of their own products, and the other is to match their materials to color samples sent to them by fabricators. On the left, below, are the steps that Eastman color experts go through to match their Tenite plastic to a submitted color sample (which is frequently on an entirely different type of material) ; on the right is the procedure for color control of Chromspun and Estron acetate yarns. One thing becomes evident: no one instrument or system is the complete answer. Eastman uses a combination of techniques and instruments, frequently to double check their findings.

Although color measuring instruments do a great deal of the work at Eastman, they do not entirely replace the human eye. In matching Tenite, for instance, submitted samples are frequently not suitable for spectrophotometer use. In these cases, a visual comparison in color files is made and the closest match selected. The formula must then be adjusted to refine the match. A great deal of the success (and the simplicity) of color matching depends on the kind of sample that a material manufacturer is asked to match. Ideally, samples should be made of the same material, but if this is impossible — and it frequently is — the material of the sample should be similar, particularly as far as surface is concerned. A match in plastic may be perfect spectrophotometrically, but if the sample was a piece of dyed fabric, the chances are it won't look the same, particularly if the surface is not the same.

Color matching Tenite

If submitted sample is suitable for spectrophotometer analysis:

1. *Spectrophotometer curve is run.*
2. *Tristimulus values X, Y and Z are obtained.*
3. *These factors are compared with established data of color standards on IBM cards.*
4. *A match or close lead for color, density and opacity is selected from color file.*
5. *Color matcher, from experience, adjusts formula.*
6. *Small trial batch of Tenite is compounded.*
7. *Batch is milled for uniform color dispersion.*
8. *Sample is pressed for comparison.*
9. *When sample matches, color number is assigned, standard is set up in files according to tristimulus values for future comparison.*

Color Control of acetate yarns

This procedure begins with the raw cellulose which is:

1. *Evaluated for whiteness, both before and after acetylation, using G.E. recording spectrophotometer, with the Librascope integrator.*
2. *Further color evaluation is made after dissolving cellulose acetate in acetone, using Beckman DU spectrophotometer.*
3. *Raw pigments are tested for chromaticity and strength with spectrophotometer and integrator.*
4. *Pigments again checked after dispersion in thin dope by means of optical density curves.*
5. *Pigment dispersions added to the dope and mix is adjusted until it falls within specifications.*
6. *Lubricant, applied to yarn during spinning process, is evaluated for color in terms of dominant wavelength, purity and brightness.*
7. *After spinning, yarn is again sampled and chromaticity coordinates plotted.*

Colors can be organized in many ways for special or general use

Color systems, some broadly recognized and others too specialized to ever see wide application, include the red, white and blue that have been approved and specified by the Government for the Stars and Stripes; accepted colors for Army medal and decoration ribbons; a collection of 219 soil colors for use by geologists, archaeologists, and soil experts; nine specified colors for the Army Engineers, sixteen for the Navy, and nineteen for use by both the Army and Navy: all for camouflage. But, whether they are for highly restrictive purposes or for broader use, color systems fall into two basic groups: *colorant-mixture systems* and *color-mixture systems*. The difference is that a colorant mixture system is one that shows what color possibilities there are from a systematic mixing of basic colorants, while color mixture systems are based on spectrophotometric curves.

Colorant-mixture systems

A familiar colorant-mixture system is the Nu-Hue System, prepared by the Martin Senour Company. Presented in the form of charts and on cards and containing some 1,000 paint colors, the Nu-Hue System has been formulated to match the *Color Harmony Manual*. It differs from the Ostwald and Munsell systems in that the color charts are horizontal cross-sections showing all the hue and chroma variants at nine different value levels. To visualize the solid for the Martin Senour system, charts must be organized in a series of horizontal planes arranged one above the other, to form a cone. Arranged in a variety of ways, the Nu-Hue System is packaged differently for use by homemakers, interior designers, and architects.

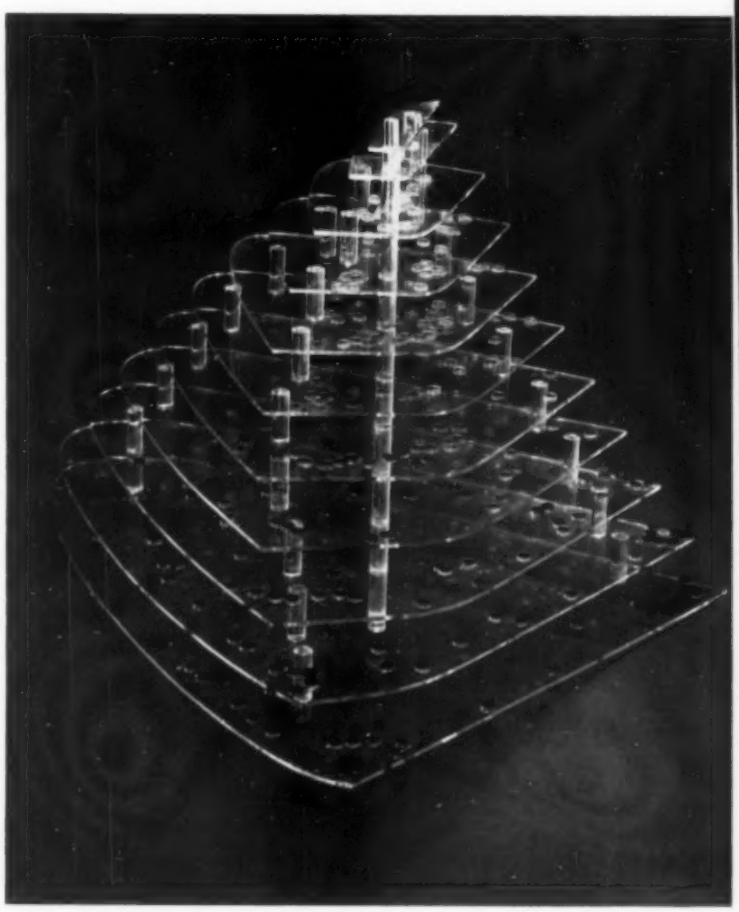
In 1948, Gladys and Gustave Plochere published a book of color standards consisting of 1,248 spray painted samples, each with a descriptive name suitable for use in promotion and advertising. This color system is also available on three by five inch cards. More than 1,000 standards are available in the Colorizer System, another colorant-mixture system specifically designed for paint. The chips are spray painted with a matte finish and mounted on strips for easy comparison.

Color-Mixture Systems

Almost fifty years ago, Robert Ridgway set the pace for many color-mixture systems with his *Color Standards and Color Nomenclature*. This work contained 1,000 samples painted on paper with a matte surface. Color names were given for each sample—names that have proven useful to naturalists for color specification of birds, plants, rocks, and so forth. Container Corporation of America's *Color Harmony Manual*, discussed on pages 36 and 37 is of course another example of a color mixture system.

A highly authoritative work by A. Maerz and M. Rea Paul, known as *A Dictionary of Color*, uses a printing process to reproduce colors systematically. This dictionary, which contains more than 7,000 colors, was produced using eight chromatic and seven gray inks. The combination of the variety of inks and half tone screens, and a high degree of printing control, enabled them to present an excellent group of color standards. Maerz and Paul also did a unique job of researching past and present color names, making their dictionary the outstanding available source for descriptive names.

In addition to the foregoing two basic types of color systems, others, based on different principles, are also valuable and useful. Screens used in printing can be



accurately varied and closely controlled by percentages, making possible a wide variety of different color intensities at definite intervals.

A widely respected collection of color samples comes from South America — the Villalobos *Colour Atlas.* Using a process similar to the Maerz and Paul *Dictionary of Color;* multiple half-tone plates, this system contains over 7,000 samples produced by using 38 chromatic inks.

Regardless of the method of organization, every color system has its uses and its shortcomings. It has been pointed out that a system that works excellently for one purpose may not work at all for another. Deane Judd, the great color authority with the National Bureau of Standards, compared a number of color systems used by American industry and stated that the principle defects of the following were: Munsell—many of the strongest colors not shown; Color Harmony Manual—Ostwald notation used not adapted to convenient interpolation or to easy visualization of the color; Nu-Hue Custom Color—restricted gamut in red-purple to blue hues; Colorizer—system rather complicated; Plochere—nonstandardization of paint components; Maerz and Paul—no light, saturated, or near-black colors; Villalobos—small size of chips; Ridgway—no near-black or near-white colors.

Many color systems frequently are not used to their fullest advantage. This is sometimes the fault of the system itself—many are too complex for use by people other than color experts. A single color system that can be used for all color problems has not, of course, been developed, and it unlikely that one will be. However, those systems that are available are vitally important industrial tools when they are used properly. And new color systems are being developed constantly, or familiar ones revised, to cope with new color problems.

The Martin Senour Nu-Hue color system, right, is produced in a number of forms for use by interior designers, architects, and home owners. It is based on the Ostwald system of color organization and has been formulated to correspond to Container Corporation's Color Harmony Manual. *The color solid, left, is a series of ellipsoids that visually present limits of chromaticity and brightness.*

Color measuring instruments are more compact for wider application

The Inter-Society Color Council lists some thirty instruments that are used for color measurement and accepted for establishing and maintaining color standards. They range from brightness testers to spectrophotometers in their function and from $100 to more than $13,000 in their price. Many have highly specialized applications, such as a color grader that tells a honey producer whether his honey meets color specifications or a chormometer for comparing the color of variable depths of refined oils against glass color standards. But many are workhorse instruments that are essential in many laboratories and on many production lines. And, while some of the instruments shown on these pages require highly skilled technicians to operate them, others are designed for fast and accurate color readings by inexperienced personnel.

Instruments for the measurement of color have developed enormously in recently years. One of the reasons for this development has been the need for closer and more refined color standards. The advent of recording instruments in the 1930's was one of the most important developments both in making it possible to speed up the ponderous task of taking meticulous instrument readings, and also in increasing their accuracy.

The need for accurate methods to measure colors and color differences has been felt for many years, and sometimes the development of measuring instruments has been accomplished for unexpected reasons. Today, for example, beer commercials on radio and television frequently feature the color of the brew. This is far from a new idea. Back in 1869, an English brewer named Joseph Lovibond started to experiment with the idea of controlling the quality of his beer by its color. Although Lovibond's purpose was to brew better beer on the basis of color (and he was successful in this effort), his contribution to the science of colorimetry was more important than to the quality of beer.

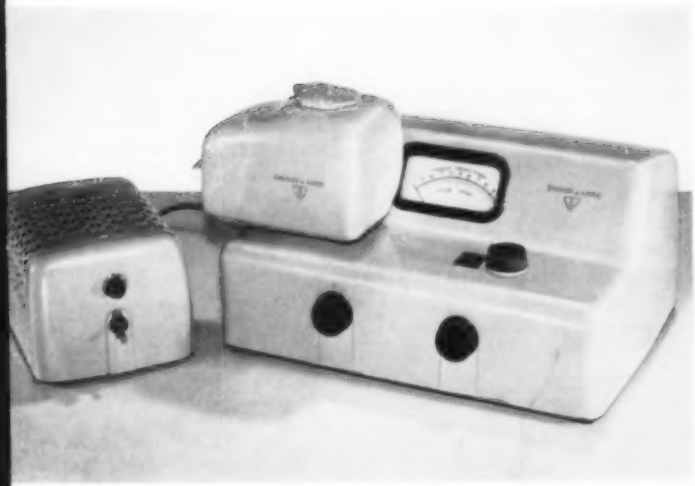
With close color tolerances becoming more important to more manufacturers every day, makers of color measuring instruments have worked toward the simplification of their machines without sacrificing their accuracy. Many instruments have become more automatic than they were previously, enabling more people to use them without extensive training. Compactness, too, is an important trend that is placing highly accurate color instruments where they are needed for quick but sure readings to keep production lines running without costly delays while samples are sent to a central laboratory for analysis.

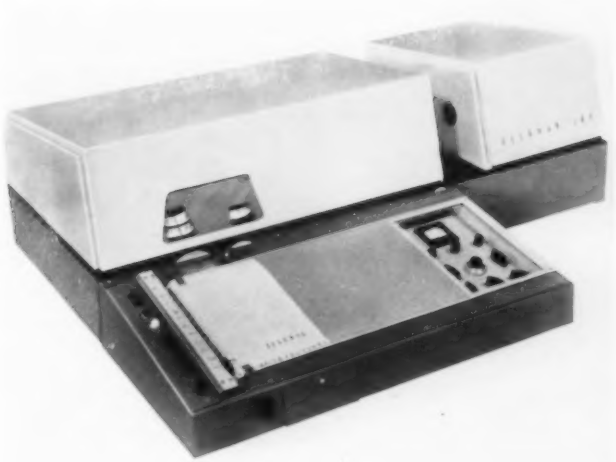
SPECTRONIC COLOR ANALYZER

Bausch & Lomb's new color analyzer (right), is designed as a comparatively low-cost, easy to operate but highly accurate instrument that provides reflectance readings of paint, textiles, plastics, inks, dyes, glass, tile, and a variety of other materials. It can handle samples that are both small and large, in solid, liquid or powder. A specially designed chart permits quick, simple conversion of the reflectance readings to standard CIE trichromatic values. One of this instrument's great advantages is that, although it is sufficiently accurate for laboratory use, it is compact and light enough to be easily carried between shop and lab. Beckman photoelectric spectrophotometer *(far right) covers the wavelength range from 210 to 1,000 millimicrons.*

ELECTRONIC DENSITOMETER

The Macbeth-Ansco densitometer (right) is an accurate instrument for the measurement of the transmission density of black, white, and color film; the reflection density of black and white printing papers and color prints; brightness and opacity measurement of paper; ink film thickness; transmission density measurements of glass, transparent films, and liquids; atmosphere and haze measurements; measurements of the thickness of coatings, including metallic, by transmitted light; and transmission measurements of tissue stains in the medical field.





BECKMAN CHROMATOGRAPH

The instrument on the right is one of many color measuring instruments produced by Beckman Instrument, Inc. The chromatograph is used to measure color intensity and is designed for use by relatively inexperienced personnel. It gives fast and accurate readings for rapid interpretation for the adjustment of color formulae.

PORTABLE TINTOMETER

The gun-like instrument on the left is a portable Lovibond Tintometer. It uses glass standards to help describe what a color looks like in precise terms or to record a color so it can be recovered at any time for comparison with other or the same samples. The Tintometer can be used to test the color of liquids or medium opaque samples, and is particularly effective for dyes, paints, cosmetics, and printing inks. There are many types of tintometers, but this one, like so many other color measuring instruments has been designed for on-the-job testing and recording. It is simple to use, and requires no special scientific knowledge for operation. Solid samples are viewed by reflected light; liquids are placed in cells and viewed by transmitted light against white.

COLORIMETER FOR LIQUIDS

The instrument below that resembles a microscope is a colorimeter that matches the density of two liquid columns by varying the thickness of one column. It is made by the Instrument Division of the American Optical Company.

POCKET METER

The pH meter, above, is designed for on-the-spot measurements. Made by Beckman Instrument, Inc., it is another indication of the trend toward more portable and easy-to-use instruments. Highly portable, this instrument can be taken "on location" for necessary measurements with a minimum of production time lost.

The acute color consciousness of industry today is prompting better methods for the maintenance of color standards and more widely acceptable methods for color communication. While color problems increase, greater efforts are being directed toward their solution, promising a colorful future with control and consistency.

If you walk down 46th Street between Fifth and Sixth Avenues in New York City sometime around noon on a sunny day you will see many groups of men minutely inspecting little slips of white paper. If you look closely you will see that these slips of paper contain diamonds. These men are diamond experts who take their possible purchases into natural light to inspect them for color and clarity. This may seem like a very crude way to judge so small an object worth so many thousands of dollars. But, in spite of all the methods for judging color that have been developed, no better way has been found for the diamond. The wine expert, before sipping a drop of a classic Chateau Neuf du Pape vintage, holds his glass to the light and looks at the color and the clarity of the wine. His judgment depends upon this test as much as the reaction of his nose and his taste buds. The consumer has become almost as sensitive (and almost as much of an expert) to color as the diamond or wine dealer. Whether he (or she) is buying a new pair of colored nylons, an automobile, a slip cover, or a lawn mower, color is a basic consideration. There are no spectrophotometers in department stores, no brightness meters in the local lingerie shop. But, the consumer, although he might not know it, has the assurance that the color of the product he is considering has been given every necessary test to be sure it is correct and will live up to expectations. The spectrophotometers, the brightness meters, the complex color systems employed by most industries are utilized to bring a product to its final testing ground—the eye of the consumer. And this eye, although it may be a highly opinionated one, can be condeming.

Color standards have become an essential part of today's industry; pink, blue, red, yellow, any color is no longer something that is added after a product has been designed—an afterthought that might give something a little more sales appeal. Color must be part of the most preliminary planning operations. Color problems still exist, and they will probably be a major headache for a long time to come. Industries, within a large company, or among separate companies, have communication difficulties. Many of these barriers have been broken down by the systems and methods of color standardization shown in this article. But, there is still a need for a greater understanding of what is involved in the specification of colors and how these specifications can be upheld. New color standard systems and new equipment for measuring colors scientifically are making this job easier. And the awareness that present methods are not adequate is a healthy dissatisfaction—it promises better solutions in the future.

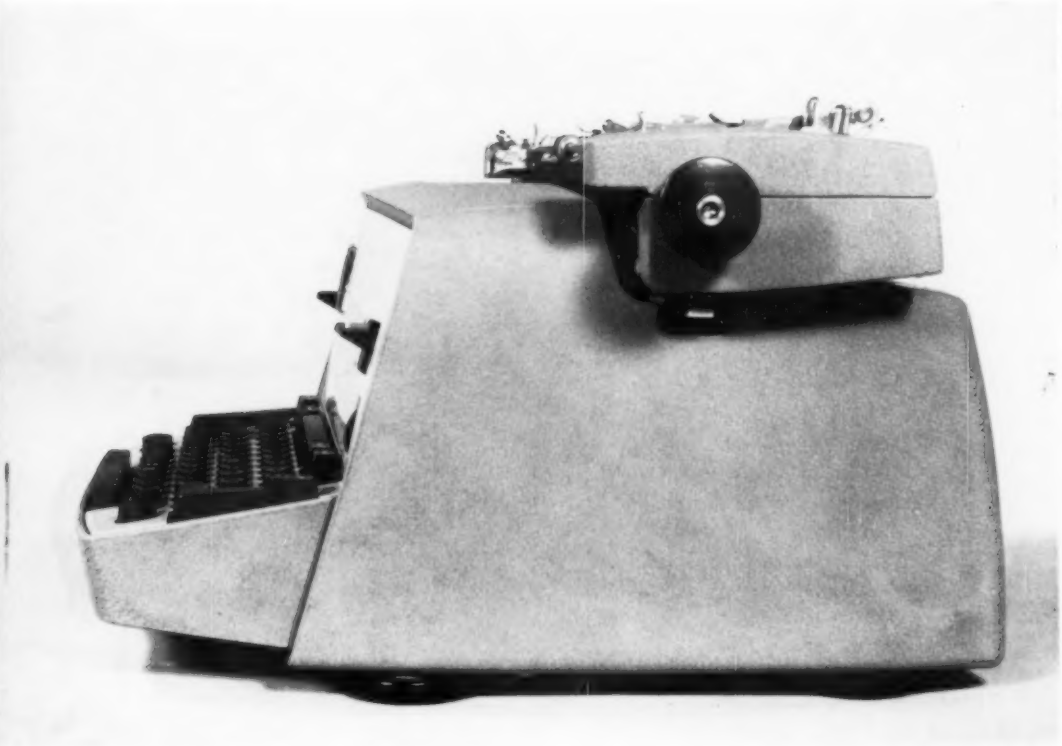
The U in Underwood

The old electric typewriter: undistinctive and — to secretaries — "grandfatherly."

There were no complaints about the old machine: it was mechanically excellent. There *were* complaints about its appearance: it looked "grandfatherly." The Underwood Corporation found this out when its advertising agency, the William Esty Company, took a survey among secretaries to determine why Underwood's sales in electric typewriters were lagging behind its competitors'. But the electric typewriter was only one machine among many, and what they found out about *it* led to a discovery about the total visual image of the corporation, namely that it had become unattractive and ancient, and therefore inconsistent with the corporation's progressive new planning.

This was how the situation stood two years and two managements ago. The problem—to create a contemporary, consistent image and do it immediately. The strategy—to begin at the consumer level for quick, tangible results. The decision—to redesign the corporate image by redesigning the electric typewriter as exemplifying the new image.

Raymond Spilman takes a dissenting view of typewriter design and comes up with a new Underwood electric to demonstrate his point



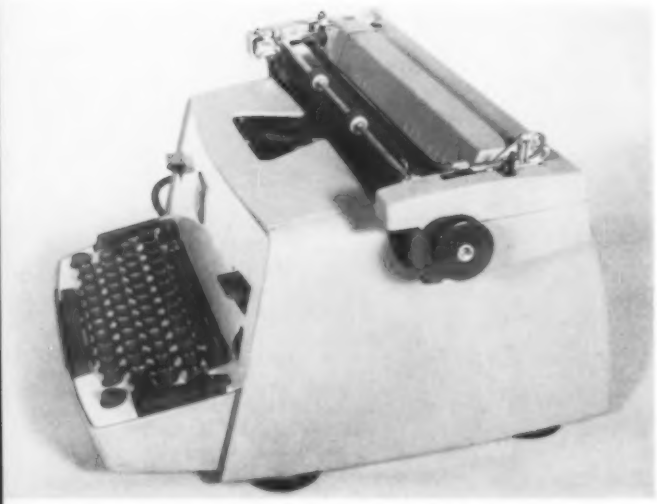
Spilman's design: the body as an adjunct of the keyboard. Removable keyboard panel comes in eight colors, body mass is warm gray. Keyboard slope was changed from 19° to new standard 11°. Because basic structure was not changed, "The Documentor" sits high, takes little room.

Entity and identity

Because this was an 18-month crash program, designer Raymond Spilman had to work within an unenviable limitation: he could not redesign the typewriter but had to work with it as an already manufactured product. No structural change was permitted. The only changes in mechanical parts allowed him were the shortening of the key levers (in order to low-slope the keyboard panel from a 19°- to the now more standard 11°-angle) and the addition of a forty-fourth key (an exclamation point and a degree symbol). Therefore, he could attack the problem only visually: the form of the typewriter was to be clean and simple, and there was to be a separation between the keyboard and the body of the machine.

The first idea, of course, was not new—except to Underwood: the crisp, uncluttered shape with its compact mass suggesting ease and efficiency has come to be regarded as an essential in office equipment and a cardinal principle in its design. The second idea, however, is Spilman's innovation, and one that he attaches importance to.

Hitherto, most designers have thought of the typewriter as having one sculpturally indivisible form. Spilman, however, felt that the typewriter is composed of two formal elements: the keyboard and, almost as an adjunct to it from the point of view of the typist, the body. His design was predicated on the idea that the keyboard is an entity visually and operationally distinct from the body mass. Therefore, he redesigned the Underwood to emphasize that separation: through form, by "slicing off" the keyboard; and through color, by using it only in the front panel (removable to permit changes to suit office decor) and keeping the body warm gray. There was, aside from purposes of separation, a secondary, esthetic reason for this color division. On the one hand, an office-ful of brightly colored typewriters would be optically disturbing and nervously fatiguing, and, on the other, a plain, overall gray typewriter would dissatisfy the contemporary secretary,



"The Documentor," the hypocycloidic square and "u": the designer writes a theme

who has grown accustomed to having her office equipment look as light and cheerful as her summer dresses.

Spilman felt too that there might someday be an actual physical separation of the keyboard from the body of the machine—perhaps in an electronic typewriter, with the typist sitting in one room and the machine typing in another. In an era when change occurs all the more swiftly because foreseen and expected, this disconnection now, the designer felt, might foreshadow the design of such a machine.

One of the incidental effects of this split is that the body mass seems visually more stable. The large mass with its trim, box-like shape looks as though it were resting more squarely than usual on its four legs, with no organically attached keyboard "lip" to give the impression that the machine would tip up if one were to lean on its keyboard.

Spilman's assignment then was chiefly a matter of style of the housing. Since "The Documentor" was intended to act as a kind of advance guard in Underwood's projected program of total corporate redesign, he hewed close to a forthright look whose bare simplic-

ity could be applied to all Underwood equipment whose visual characteristics should be compatible with those of "The Documentor"; a look which would not become outmoded ten or twenty years from now; and one which would not imitate others but be uniquely—and recognizably—Underwood.

From crash design to flash image

When Raymond Spilman contracted to redesign Underwood's corporate image along with its new electric typewriter, he was faced with a motley array of thirty different trademarks and labels accreted through the decades, and whose family resemblance seemed at times to be at third or fourth cousin remove. The basic trademark—a winged globe encircled by a motto, and with the company name on a superimposed typewriter space-bar—dates back to late post-World War I era. As an image it has that yesteryear quaintness with which time imbues most invented things. This anti-

From left: the old logotype; the new; its application. New trademark was manufactured by Kent Plastics Corp., Evansville, Ind., and is made of methyl methacrylate. Above, one of many uses of symbol. Others are: packing cases, business cards, stationery, office forms, advertising. Size varies with function, as does the juxtaposition of the "u" and the "underwood".

quated logotype combines three elements: a slogan, a design, and a name. Separately, none of the three stands up by itself with impressive success. The slogan is impersonal and vague in a business world which has come to value the personal and specific. The design has no particular connotation for Underwood—it could be applied to any world-wide corporation—and is in its cumbersome and heavy-handed graphic quality a visual contradiction of the high-speed machines now produced by Underwood. The type-face used in the name might once have been acceptably attractive, but it has lost that attractiveness for us and looks outmoded, and the space-bar on which it rests seems to restrict Underwood to the manufacture only of typewriters. And if the three elements no longer have either meaning or verve when used separately, neither do they have them in combination. Either way, with its elements separated or combined, the symbol lacks the primary requisite of a trademark—the ability to be immediately seized, and retained, by the mind's eye. Although it is an easily recognized image, it is still a long way from being a flash image. Spilman had the choice of either updating it, which is what Underwood wanted, or scrapping it, which is what he wanted. To update the old design is sometimes to prolong the visual agony. In the end, the designer prevailed: the flash image, "u," was accepted —and then liked.

The symbol as a theme with variations

The "u" placed in the hypocycloidic square is the basic element of the new logotype. The geometric shape of the background is taken from the "all clear" symbol on Underwood's adding machine. However, the strict severity of the original hypocycloidic shape of the symbol has been attenuated by filling out the square and by rounding out its corners.

The "u" and the "underwood" are hand-lettered and either or both can be adapted to any scale and to any context. Unlike the elements of the old logotype, these are designed to have the strength of a flash image, and they are intended, separately or together, for the greatest flexible use. Thus, the "u" can be used alone with no loss of meaning, and the company name, of course, can as always be used alone. The two can be used together in vertical composition, as on "The Documentor's" trademark, shown in enlargement on the opposite page, or they can sit side by side in horizontal composition, as on stationery, or along the edge of a file cabinet. The symbol's application is unlimited. It lends itself to all media and to any color without distortion of either its form or its identity. In short, within its hypocycloidic square or outside it—with "underwood" next to it or not—"u" is Underwood's baby now.

1925

1933

1958

Designing for the supermarket

Radical changes in the way food and allied consumer goods are sold place equally radical (and occasionally controversial) emphasis on the package designer

by RALPH CAPLAN

The literature of economics can hardly be described as romantic. Yet throughout that copious and prosaic literature there is one institution so rich in the essential oils of civilization that it has always been recognized in song, legend and nursery rhyme as a romantic concept. It is the market.

In a country in which the smallest tube of toothpaste one can buy is likely to be called "large," it was perhaps inevitable that the market would one day be designated "super"—an adjective snatched by Madison Avenue from the vocabulary of Andy Hardy. What was not inevitable, and what is truly astonishing, is that the American market has in fact *become* super—one of the few contemporary instances in which the facts of life have grown equal to the hired sanguineness of the copywriters. For the supermarket of today (like the state university of today) is a giant cafeteria at which, for a price, the consumer may help herself to as many as 15,000 items, brands, and sizes. American supermarkets grossed more than $30 billion a year, or 67% of the year's grocery bill; and despite what one bewildered statesman referred to recently as a "repression," supermarket returns in recent months have run about 8% over those of last year.

Quite simply there has been a revolution in retail marketing, and it has taken place right before the consumer's can-dazzled eyes. The photographs at the left describe graphically how the retail food store was transformed from a clerked to a self-service operation. Together, the pictures make up a sort of evolutionary shell game in which the observer's problem is to find the salesman. In the top picture it is easy: he is the self-assured young man at stage center. In the middle picture he is harder to find, but can be seen behind the counter assisting his customers in a partially self-service operation. The bottom picture shows no salesman at all in the 1925 sense, but one is present in each of the myriad cans and bags and boxes and sleeves so calculatedly stacked. They are inanimate (although often not much more so than the live salesmen they have replaced), and it is the package designer's professional responsibility to give them life. It is not always intended to be a very long life.

The change in marketing has given the package designer a new importance and an old prestige—the kind of desperation prestige so familiar to industrial designers in the thirties. Manufacturers with no one else to comfort them tend to run to the package designer as if he were a magician capable of gazing onto a crystal drawing board and seeing a tall dark profit in their future. All too often the designer, rather than refuting this impression, fortifies it with trick cameras, incantations, high school Freud, secret formulae—all the equipment of black magic except hex dolls for the competition. "Unfortunately," a member of the profession says, "designers do not always accept victory gracefully." By way of example he referred to a colleague who recently lamented the shortsightedness of a manufacturer who was "spending far too much on the quality of the product rather than on the package itself." The fact that such a phrase as "the package itself" can arise in this context almost thirty years short of 1984 gives one pause.

The package designer's rise to glory in the marketplace has not been greeted with universal hallelujahs. *America's Textile Reporter* in February raged at paying "high fees to packaging consultants whose knowledge of packaging is generally limited to what information they can 'chisel' from package and container manufacturers."

However unreasonable statements like the above may be, skepticism is fairly widespread and has not been limited to the trade press; consumer publications have cast cold editorial eyes at the pseudo-science of many designers, at the extravagant claims, and at the amount of the food dollar apportioned for packaging costs. Still, in the latest popular assault, *The Reporter* magazine after estimating the packaging industry's

Death of a salesman: the vanishing retail store clerk and why he went

take to be equal to one-sixth the yearly national budget, grudgingly concludes that much of this "is the inescapable consequence of a marketing system that depends more and more on self-service. Thanks to the supermarket and its like, the burden of selling and waiting on customers has fallen increasingly upon the package itself."

The retail food store clerk is gone, and the reasons for his going are equal to the reasons for his being so little missed. For one thing, his cost has become prohibitive in an industry that prospers on volume with a margin of profit so small as to be scarcely discernible. The bright young grocery clerk of American legend has gone the way of all bright young legends: up. In an age of opportunity, he knows that even in the realm of "kid jobs" he can find employment that offers more status or more money or both. And who replaces the bright young man? Generally the less bright young man, which means an inferior salesman at a forbidding price.

The chief reason the clerk has been permitted to leave the retail scene with so patent an attitude of sorry-you-have-to-go-here's-your-hat, is that he was usually a pretty ineffective salesman anyway, and has steadily gotten worse. When in 1949 *Fortune* appraised the state of retail salesmanship, it "seemed impossible that salespeople could do a worse job." Yet when they attempted a more comprehensive survey three years later they found that the impossible had been accomplished. Clerks were utterly passive; they did not uptrade purchases, suggest companions or specials, or make any effort to appeal to customer desires. If a customer evinced an interest in a counter display, the clerk would (with varying degrees of patience) simply wait until the interest was dissipated. An informal survey of our own does not indicate improvement—at least not in food stores.

Perhaps the most interesting finding of the *Fortune* survey is expressed in William H. Whyte, Jr.'s disclosure that retail clerks were not only failing to sell, they were "actually discouraging customers from buying." That this condition obtains today can be verified by a shopping trip to almost any American drugstore, where one is permitted to buy if he knows exactly what he wants and can say it fast.

This failure to sell is not exclusively attributable to the ineptness of personnel. The so-called "selling situation" itself seems actually to be—where the purchase of food and drugs is concerned—an anti-selling situation. There are too many products and brands for the clerk really to have mastered much pertinent information about each of them, so he is not likely to be of much help in an informative way. Furthermore, even if he knows the manufacturer's pitch, he is usually in no position to pitch it. The impersonality, the remoteness so often deplored by critics of self-service selling, is often a virtue in advertising. Social critics sometimes wonder why the public is not insulted by the level of appeal on which many ads are based. Part of the explanation seems to be that the insults are "impersonally personal." They are not said face to face. "You are getting fat," the ads say, "you look tired," "you act irritable," "you're in danger of losing your husband, your job, your peace of mind, your energy, your virility." These are, alas, some of the published and televised suggestions that sell the world's goods, but no clerk could advance them without getting his face slapped.

Clerk and counter stand between the product and the consumer.

But the clerk's inability to talk selling is more than matched by the customer's inability to talk buying. It is reported that 70% of all supermarket sales are impulse-based. An impulse sale is by definition one in which the customer sees what she likes and buys it without having planned to, without going home to ask somebody whether she ought to, without even telling anybody until after the fact. But without self-service, she has to tell someone: the clerk. It isn't easy. Does she decide on the spur of the moment to buy a box of chocolates? (*Do I dare ask for it? He can see how fat I'm getting.*) Should she ask for a jar of wheat germ? (*Maybe he'll think I'm a health fanatic.*) Shall she order the cheapest cut of meat available? (*He'll put two and two together and realize that John has been laid off.*)

To pick what you want off a shelf is one thing; to articulate the wish is another. It is not just the clerk's opinion of the customer that is restraining; it is her opinion of herself. She may, sub-vocally, rationalize buying cream when she knows she can only afford milk, but saying it out loud is much harder—especially in a store full of people. It is a fact that the class of meat known in the grocery trade as "offal" sells hardly at all except when there is self-service. The price is tempting, but no saving is worth the embarrassment of admitting to other shoppers that you live low on the hog.

The counter itself (ironically the classic symbol of doing business) is an inhibiting device, for both psychologically and physically it stands between product and consumer. It is a bar before which the consumer is required to justify her self-indulgences. She may feel that what she buys is none of the clerk's business, and to the extent that he usually doesn't help her much anyway, she may be right. Not long ago a supermarket consultant did a study of a store that prided itself on "service." His recommendation was that the store institute self service because "to let her pick the package up herself is the greater service."

"It's true," he went on, "that in poll after poll women say they prefer service. Yet when the alternative is open to them, they invariably choose self service. The reason is that when they ask for service they are (forgetting the inhibiting factors) thinking of service as they would like it, rather than service as they get it, which is often pretty shoddy. Every woman wants to be 'a friend of the butcher.' But the plain fact is that the butcher has to sell all of his cuts, not just the best ones. As far as shoppers are concerned, the butcher is likely to be friendless."

The most frustrating aspect of the retail salesperson's incompetence has been the lack of support he has customarily given the manufacturer: "We spend millions to advertise and promote it. But once it gets into the store it's out of our hands." It is a common complaint, and to find out why manufacturers are uneasy does not require any high-powered research techniques. Recently we went into a large metropolitan drugstore, made a small purchase, and asked tentatively about "that new sort of liquid toothpaste that comes in a plastic container." It may seem incredible that the clerk didn't know what we meant; but it is credible, and he didn't. When we pretended to remember the name ("I think it's Ipana!") he reached behind him, tossed a bottle on the counter and said, "Want to see what it looks like?" "Nice looking package," we said aloud to no one in particular, "but what's the point of it?" The salesman shrugged. Finally we decided not to take it, and he cheerfully replaced it. Multiply his shrug by a few hundred thousand and you get some idea of how often the manufacturer is sold short at the point of sale. If the Ipana Plus package was, as designer Egmont Arens says, "a brilliant brainstorm fashioned into reality by blood, sweat, tears, research and sheer genius," it is clear that Bristol-Myers may still have cause for tears.

Traditionally, once a product enters a store the manufacturer loses control over it. But obviously he cannot afford to lose interest in it, and there have always been attempts by the maker to help push his goods that final step across the counter. To this end he has employed a number of devices. They include manufacturer's representatives who try to stimulate clerks and teach them to sell, special awards for outstandings clerks, and downright bribes for product pushers. With large, high-profit products it has been feasible to set up elaborate training courses to teach sales personnel, but in food and variety stores there has necessarily been a different emphasis: the clerk is in a sense by-passed by special display material that has been designed to do the selling job for him. But this is usually cumbersome, and—what is more important—space wasting. Most of the promotional material sent to dealers is never used

With self-service there is no one on the spot to answer the consumer's questions about the product. The designer can help her.

at all, at least not in the way the manufacturer intended. Consequently the answer seems more and more to consist in putting the sales message on the package, and letting the consumer reach for the one that entices her most.

The responsibility this places on the designer is impressive: more than anyone else he can see to it that the big guns of product promotion are actually fired at the point of sale. With intelligent, imaginative packaging the manufacturer can exercise the factory-to-consumer control he has always had to sacrifice in the past. Further, in the supermarkets he may have to substitute package for personal representation to retailers because the premium on space is such that no personal representative can make much difference. The product either sells itself or it doesn't sell.

Whatever his drawbacks, the retail store clerk could not have retreated to the extent that he has were it not

"It's marvelous! All you do is add water."

Drawing by Chas. Addams

The package of convenience, like the marriage of convenience, raises problems

for the development of food processing and storage and packaging methods that made store-wide self-service feasible. A consumer could neither be expected nor trusted to cut off the required amount of meat himself, but when the bacon is put up like Morrell's (page 53) he can bring it home without benefit of clerk. And the housewife can do much more than that in the way of unattended food buying, which means of course that she has to do much less than that in the way of food preparing ready-to-serve is a commonplace.

There are a number of sociological reasons for the emergence of the convenience food product: more wives working and therefore needing to prepare meals in a hurry, smaller families, a generally higher standard of living with a consequent demand for such luxuries as fruits out of season, the wide distribution of automobiles (making it possible to shop much less frequently if there were foods that would "keep"). It got most of its energy from World War II, when this nation's theme was "nothing's too good for our boys." This included food. Thus the military overseas created a demand for reasonably edible processed foods that could be shipped long distances, and stored in climates ranging from New Guinea to Iceland. After the war the technological advancement continued until now there is a whole generation of Americans to whom the phrase "home cooked meal" is attractive not because it reminds them of an experience but because it has the quaintness of historical reference. Many of them have never tasted one. It is not likely that they ever will.

The trend was spotted by artists long ago. "Land above all of Just Add Hot Water and Serve" was the splendid satirical cry of poet E. E. Cummings in 1926. And the brilliant Charles Addams cartoon above was drawn in 1942, when the convenience package was old enough for its implications to be sensed, but new enough to allow room for satire. Although still funny, it is not nearly as pointed today, for if ready-mixed witches' brew is not available at your nearest supermarket, it is only because motivation researchers have thus far found the market limited. Give them time.

Packaging innovations have changed the way Americans go about shaving, brushing teeth, setting hair, shining shoes, removing spots from clothing or from each other—but the most dramatic changes are in the food business. Technological developments continue to make food more convenient to prepare and often more interesting to eat. Gourmet foods that most Americans knew about only from books and movies have begun to appear on supermarket shelves, many of their labels bearing the names of some of the world's distinguished restaurants — Luchow's, The Chambord, Gloria's, Maxim's. Convenience foods transcend cultural and physical boundaries. The Indiana housewife need no longer dream of Boston and shore dinners. She can buy a packet of carefully selected foil-packaged flash-frozen shrimp, toss it into a pot of boiling water, add a sauce of her own making (or anyone else's) and produce a meal. She can, without so much as leaving Crawfordsville or Kokomo or Brown County, buy frozen pizza, won ton soup, crepe suzettes, gefilte fish, or Luchow's Swedish meat balls. Furthermore — unlike the pro-

Design by Jim Nash Associates for Shore-Line Enterprises of America shrimp line uses lighthouse image, initials pun SEA.

Mylar film pouch contains pre-cooked single portion of Luchow's gourmet specialties. Design by Lippincott & Margulies.

New packages were designed by Dickens, Inc. for all Morrell top-grade products.

Pre-packaging of produce is part of food-sales revolution. Design by Lippincott & Margulies for Elm Farm Foods, Boston.

Tubed foods, popular in Europe, are now sold here by H. V. DeVinney Co.

cessed food of the forties—the precooked specialties are likely to taste good.

And is the housewife happy? Well, yes, but. . . . Our earliest source of marketing information asserts that the consumer does not live by bread alone, not even if it's brown 'n' serve. Convenience food products may satisfy her schedule and her palate without satisfying her deep need to be a reasonably creative human being, capable of making her own decisions and her own Swedish meatballs. By hitting her at her weakest point —self-indulgence—and taking great graphic pains to assure her that she needn't feel guilty about it, isn't the purveyor of convenience actually doing the consumer a serious disservice?

Of course not, Dr. Ernest Dichter seems to say. In a speech attacking "the current philosophy of scapegoatism, by which the automobile industry is accused of failing the public . . ." Dichter asserts that "Ever since Eve tempted Adam to bite into the apple, the sinner has been blaming the seductress. It is not a new approach, nor is it any more effective today than it was in the Garden of Eden."

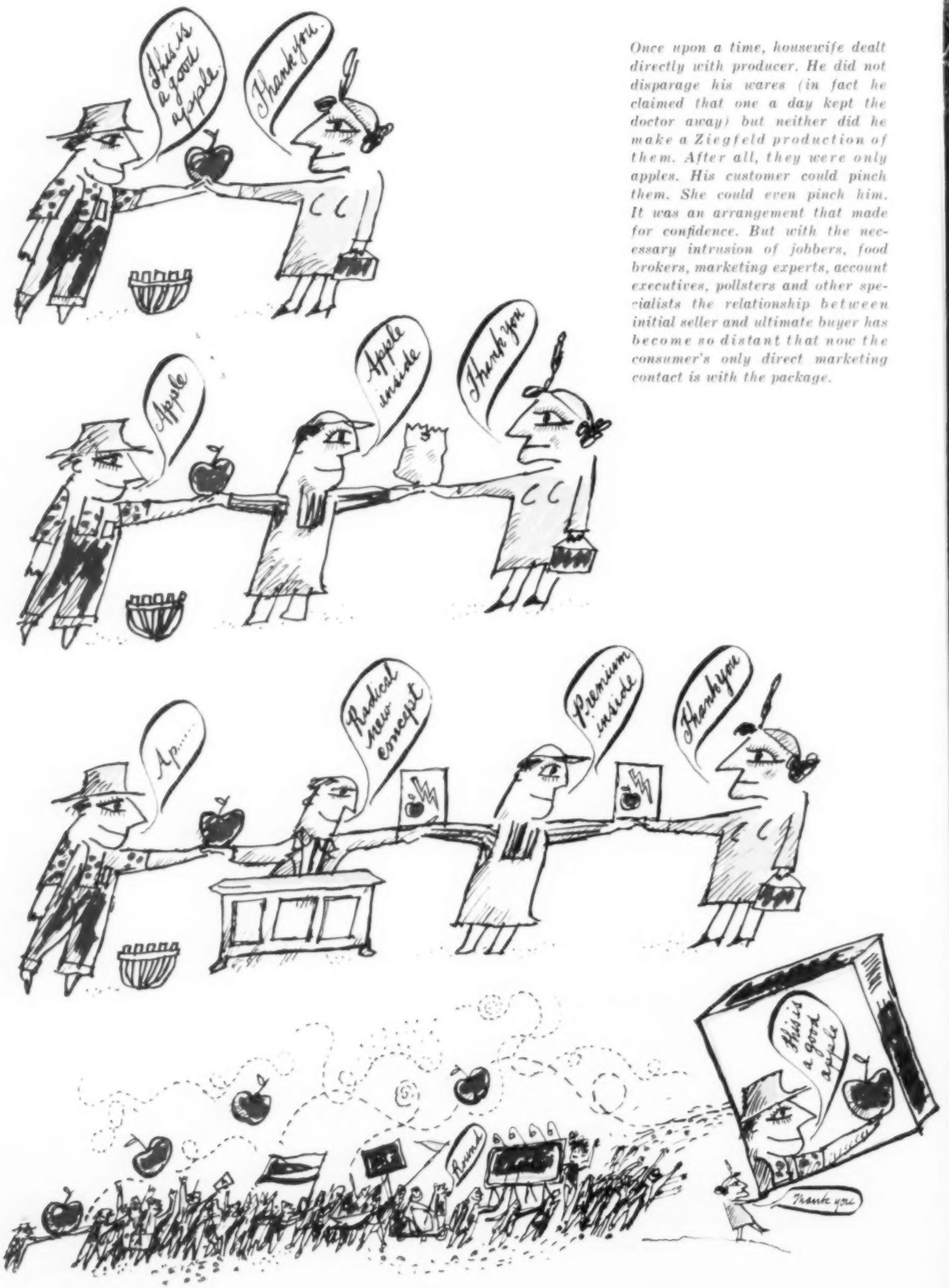
Maybe it isn't. But the analogy is hardly a happy one. What *was* effective in Eden was the seduction, and the weight of theological opinion from Milton to Billy Graham suggests that the guilt was mutual.

Nothing could be less fair than to blame the designer for the weaknesses of civilization. He did not create them (after all, he does not yet design people), he is powerless to stop them, and one may assume that if he is responsibly professional he will not exploit them. But in the supermarket he is the most direct link between buyer and seller; and good package designers, in the solitude of their ateliers, have been known to ask themselves how they can adequately serve two masters. The answer is that since their service is a kind of communication, they interpret producer and consumer to each other. The good designer packages a product of whose quality he is convinced, and seeks to express this quality on the manufacturer's behalf. To do this successfully he has to understand the consumer, and thus be able to convey *her* wishes to the client.

He can help her in other ways as well. As one unusually sensitive suburban housewife put it, "A woman used to have certain consumer skills that she learned from her mother—you know, such things as pinching the fruit to test for ripeness, knowing which cut of meat to ask for, and even how to bargain. She can't learn these things any more and wouldn't have much chance to use them if she could. Now she has to develop a whole new set of consumer skills that will get her through those bewilderingly neat aisles. She has to master a system of geometric coordinates, matching letters with numbers and plotting a curve past thousands of packages that all look alike. And this kind of skill can't be passed on, the requirements change too fast. My daughter will be just as confused as I am."

Perhaps the designer can see to it that she isn't. Lippincott and Margulies agree that supermarkets are "still the same dreary old barns with the same monotonous lines of aisles and the same garish displays," but find that there are some improvements emerging,

The tree of marketing bears a strange fruit, but the package makes it familiar



Once upon a time, housewife dealt directly with producer. He did not disparage his wares (in fact he claimed that one a day kept the doctor away) but neither did he make a Ziegfeld production of them. After all, they were only apples. His customer could pinch them. She could even pinch him. It was an arrangement that made for confidence. But with the necessary intrusion of jobbers, food brokers, marketing experts, account executives, pollsters and other specialists the relationship between initial seller and ultimate buyer has become so distant that now the consumer's only direct marketing contact is with the package.

and that at the moment the chief of these is clear departmentalization, mostly through the judicious use of color and through signage.

Designers believe, furthermore, that design—of both packages and supermarkets themselves—can help overcome the large-market impersonality that plagues many customers who used to know their grocers. ("There's no one left to complain to!" a housewife complained recently.)

Supermarket owners and managers are themselves trying to restore warmth to merchandising by encouraging housewives to conceive of the supermarket as a social center. Many markets feature music and bulletin boards announce church socials, band concerts and local movies. The very standardization of chain stores, one chain man advises, makes for at-homeness. "It means that a woman can walk into one of our supermarkets anywhere in the country and have no trouble at all finding her way around. She approaches it with the assurance of a Marine boarding a Liberty ship. It may be new to him, but he knows just where the galley is."

As the designed package tends increasingly to take on the selling function, the designer finds himself in a competitive situation almost unrivalled in intensity. The number of items and brands increases at a rate far too great to ever be matched by increases in supermarket shelf space, and the market manager finds himself in the real estate business. He has space available and will assign it, rent free, to any tenant that proves profitable. But he knows that he cannot possibly accommodate all the brands that apply; he can only afford to house the *most* profitable. He knows generally which these are, and as time goes on he will know much more specifically. Grocers today measure shelf space in terms of gross per linear foot. *Progressive Grocer* has just completed a study of sales and margins per linear foot of display, designed largely as a guide to space allocation to product groups. Although they report by departments rather than by items or brands, they strongly recommend an item-by-item analysis for store managers. "Brand sales analysis," the editors say, "will not only indicate the amount of space needed to maintain adequate shelf stocks of fast moving items, but will also provide the detailed facts needed to improve weekly ordering techniques."

Associate Editor Cal Hahn of *Chain Store Age* Grocery Editions says that "each year the average chain is offered 6,000 new items, brands, and sizes. Of these, 500 are selected, and in order to make room for them about 250 items are dropped from stock." This means that 250 items are taken in each year without being "paid for" in space. It is clear that larger supermarkets cannot be the whole answer.

"The explosive growth of the supermarket and self-service shopping have brought the designer out of the studio and into the harsh glare of 'hard-sell' merchandising," declares designer Robert Sinclair. "And before a package receives exposure to the flow of supermarket traffic, it has a difficult obstacle to overcome: it must be accepted for display by the buyer or merchandising committee.

"The designer of packages and displays meets his first challenge at this point. There is nothing he can do for a product which is completely unsuitable for self-service merchandising, but a well designed package or a clever display can sometimes overcome buyer objections when the item is new and untried or when it must compete with similar products which have already been accepted."

The designer of a new package, then, is in somewhat the same position as a playwright: he has got to get his work produced on the board before public acceptance can even become an issue. This means of course that he must know the physical properties of the store just as the playwright must know what a stage is like. "Any designer who does not take into consideration the prevailing standards and specifications in supermarket fixtures is shortchanging his client" Alan Berni noted recently.

"The designer can make life easier for the dealer," says Walter Landor, and "the shipping case is gaining increasing consideration as a tool for doing this. Faster visual identification of brand and product type expedites handling in the warehouse and on the floor. All this adds up to savings—the cost of labor often spelling the difference between profit and loss."

One strategy that will help both to get the client's package on the shelf, and to see that it prospers there, is for the designer to anticipate as concretely as possi-

The designer's best efforts may be subverted by space limitations that require distorted stacking, as in the shelf arrangement at left. Since many supermarket products are displayed in cabinets or cases below eye level, special attention must be given to top view. At right: three-color milk cartons designed for Lehigh Valley by Mel Richman Associates, Albert Storz, design director.

The battle of the shelves: design for the supermarket is fiercely competitive

ble the situation in which it will operate. To this end the Jim Nash organization has a full set of supermarket fixtures with which the designers and their clients can "play store."

"When a manufacturer brings his package design problem to us," says Executive Vice President Eric H. A. Teran, "it is given the same type of 'physical' that a new Army inductee receives—figuratively, from head to toe." In the Nash "supermarket," packages are displayed and evaluated on stocked supermarket gondolas. Whenever possible, they are examined under the lighting situations that prevail in the particular markets where the packages will be sold. All preliminary color sketch packages are tested under these simulated market conditions. Equipment includes a deep freeze unit, display shelves, and even a checkout counter for testing items that are likely to be displayed near the cash register.

Where can research go from there? "We keep tabs on the package while it's on the shelf and being sold, of course," says Teran, "and in many instances we even follow the package from the supermarket right into the consumer's home."

The packages on this spread show some problems in support of Eric Teran's statement that "Nowhere is competition more self-evident than on the shelves of today's supermarkets." Rows of packages containing products that are similar, and similarly advertised, compete in what may literally be a battle of product life and death. Early in the game the strategy was to use primary colors that would stand out and draw attention away from competitors. The result is that now, as a number of designers have pointed out, package designs cancel each other out. Too much strength has become a weakness. L & M and Landor, among others, prophesy a reversal of direction toward an understated package that will stand out by contrast, and certainly steps in that direction can be noted now. Yet one wonders how the "quiet" packages will be kept from cancelling each other out once the shelves are loaded with *them*. The solution, it would seem, lies not in any color trend, but in how the skillful designer uses his skill and his understanding.

He has to be aware, for example, of all the design implications in the fact that while the shopper used to face a package headlong, she now sees it at an angle; while she used to stand still before it, she now passes it at a fairly good clip. These things sound obvious, and they are; but evidence of how often they are forgotten can be seen in abundance on any supermarket shelf.

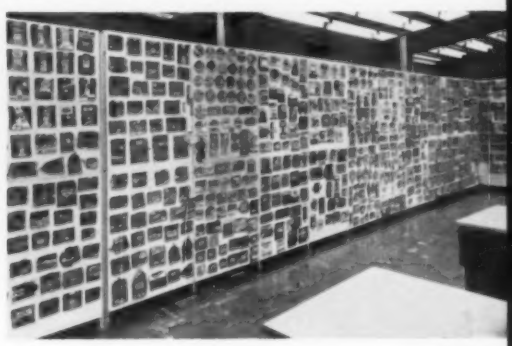
The alert designer will take into account such display variations as the deep freeze cabinet, particularly since frozen foods accounted for a sales volume of $700 million in 1957. Here the package is not displayed on a shelf like bric-a-brac; the consumer peers down at it, and anyone designing a milk or juice carton today has to bear in mind that they too are encountered below eye level, and that the top is therefore an extremely important spot. Package designers have also to contend with the stockboy—a civilian counterpart of the famous gremlins of World War II. As the picture in the

Supermarket candy boxes designed for Schrafft's by Container Corporation of America incorporate ocular research.

Because sugar packets may be stacked at any or all angles, Walter Landor designers provided all sides of Spreckels bag with hour-glass and double "S" brand symbols.

Windowed bread wraps designed by Lorain Fawcett of Allcolor Co. for Loblaw, Inc. feature both color and product exposure.

Display of 500 competitive meat items set up by Dickens Inc. to study competition before redesigning Morrell packages.



upper left hand corner on page 56 indicates, the best plans of contemporary designers gang aft a-gley, and the stockboy is often at fault. Packages designed for horizontal exposure are often displayed vertically because space limitations usually require that the package be displayed in its narrowest dimension. Designers will take care to do whatever they can to see that packages are stacked properly so that they read as designed. (The coffee cake and corn bread mixes displayed on their side, however, do not appear to suffer from obscurity.) But there is always a certain element of chance in shelving; a customer removes the package for examination, then replaces it upside down. At the moment there is no way to escape this, and probably few designers stay up nights worrying about it, although one irritated innovator claims to have nearly perfected an anti-gravity device that will automatically return a wrongly stacked package to legibility.

As for outwitting the stockboy, befriending him is a better idea; and there are certain ways of doing this. One way is to realize that since products cost money there must be a conspicuous place somewhere on the package to say *how much* money; the package that is designed and packed for rapid clear pricing is likely to win the stockboy's gratitude and perhaps even inspire his care. It is useful too for the designer to understand store traffic patterns—at least to the extent of knowing what kind of displays hinder them. And, when the designer has a say in such matters, he can make the backstage workers happy by such considerate measures as shaping the cases for interlocking stacks (by making them rectangular and not square) and providing tear-strip case openings. In other words, the package designer, like the industrial designer, must take human factors into consideration.

Because preparing for the competition means, first of all, knowing who they are, research like that shown at right above is sometimes helpful to designers. The sectioned panel is hung with more than 500 brands found by Dickens Incorporated researchers to be in actual competition with the meat products of John Morrell & Co. over a 28-state area. By displaying competitive wrappers Dickens designers were able to get a visual idea of design requirements and more easily explain them to the client.

Another kind of research resulted in the Schrafft's candy boxes above, which were designed specifically for supermarket sales. An ocular camera was used to photograph consumer eye movements, and graphic patterns were planned accordingly. A poll indicated that the most flattering way to present the candy was to *illustrate* the soft candy (at right) because it would look messy in summer if a window carton were used) but to *expose* the hard candy (at left.)

An effective compromise between exposure and concealment is used in the bread wraps above. Essentially it was desirable to show the bread in see-through fashion, but the two types—Vienna and rye—looked very much alike. So they were wrapped in distinguishing colors, and equipped with windows.

What all this packaging energy adds up to has been put very well by Donald Deskey: "This may be an age

Brave shopper at left is faced with chaos characteristic of neglected housewares departments in most American supermarkets today.

Rubbermaid sink mat was repackaged by Alan Berni & Associates to get it on same shelves as other kitchen products. New, left; old, right.

Hosiery fixture holds package at 45° angle for quick visibility. Fixture and package designed for Stop & Shop by Lorain Fawcett of Allcolor Co.

There is a job to be done in non-food merchandising; the designer can help do it

of impulse buying, but that is all the more reason why it cannot be a time for impulse selling. The full use of all the selling tools available to management is marketing maturity. A sales campaign which does not use all these skills is impulse selling."

Because such skills are not always used, the shopper pictured above is in danger. If he pulls out the gadget he is reaching for (how he ever found it in the first place remains a mystery) the entire structure may come rattling down. This scene was photographed not inside Fibber McGee's world-famous closet but in a very large, modern supermarket in a prosperous eastern suburb, and it makes an interesting point: non-foods have moved into food stores faster than their manufacturers have assimilated supermarket merchandising techniques.

Today's supermarkets sell an impressive variety of non-edibles including books, magazines, phonograph records, greeting cards, diamonds, dresses, topcoats, yarn and knitting needles, furniture, anti-freeze, snow shovels, securities and hockey equipment.

Particularly in the housewares field have non-foods taken giant steps into supermarkets. In 1951 supermarkets in the United States sold $16.5 million worth of housewares; by 1957 the gross had risen to $360 million. For 1958 the American Rack Merchandiser's Institute anticipates a gross of $385 million! These figures are good news for the package designer, who sees a vast category of goods that is, generally speaking, badly in need of intelligent packaging. Most of the housewares shown above are packaged, carded, or tagged for flat table top display, and they will have to be repackaged for survival in the supermarket age.

The hosiery rack by Allcolor strives for self-service effectivenesses by holding packages at a 45° angle, exposing about 1/3 of the package. Therefore the chief visual appeal plus all explanatory text had to be concentrated in the visible third. The solution was to make a die cut through which the hose could be viewed, and to make of the rack itself a sort of miniature market: by coordinates of size, gage, and color the shopper mentally finds her way to what she wants.

The Rubbermaid redesign by Alan Berni & Associates also indicates the kind of thing that can be done to enhance the display of non-foods. The sink mat was formerly mounted flat on a corrugated board, labeled, and over-wrapped with clear cellophane (right view). Because of its bulk and size the product was displayed on the lowest shelves, where there was not much overhead light. Furthermore it was stacked flat down lengthwise. Design objectives were to package it in a way that would justify its inclusion on higher shelves with related kitchen products, and to make use of the fact that it was displayed lengthwise. The answer was a folding carton that is neatly stackable and exploits the end panels for copy. Although it exposes the mat for color and texture, the package represents the designer's conviction that (especially since this is a new product) it is more to the point to illustrate what the mat is like in use than simply to expose all of it.

Berni finds that the difficult-to-merchandise, oddly shaped, and oddly sized products in the housewares field present some of the most challenging problems for packaging and product presentation ingenuity.

"When I went into a supermarket," said a returning Korean veteran, "I knew I was really back in the States." His experience is credible enough: it would be hard to find an institution more fully charged with the feeling of contemporary America. Abundance, competition, technological mastery, bigness, and a prodigious background of energy and work—all of these are dramatized in the formidable maze of compelling colors and conflicting claims pictured below. The abundance makes the designer's job possible; the competition makes it necessary. And the fact that the result is a multifariously furnished maze makes his job potentially significant: much of the designer's contribution to merchandising, or to anything else, is the creative imposition of order. The package designer's influence today extends far beyond the design of any single package. Ultimately he is responsible for the geography of the marketplace.

Attending an early meeting of the American Designers' Institute in 1941 are (left to right): Alfons Bach, Leo Jiranek, Harvey Stevenson, Scott Wilson, Morris Sanders, Belle Kogan, Dr. James F. Bogardus, Ben Nash, John Vassos, T. F. Joyce, Lawrence Whiting, Alfred Auerbach, Jan Juta, Tom Lamb, (last man unidentified).

Chicago '38 to Detroit '58: IDI celebrates twenty years

The banquet table at the 1958 IDI Conference included (left to right): Mr. and Mrs. Elwood Engel, Mr. and Mrs. Kenneth Hopkins, Dorothy Fontan, Carl Reynolds, Dr. Ralph Girard (addressing the group) Mr. and Mrs. H. Creston Doner, Mr. and Mrs. Larry Wilson, Mr. and Mrs. Aarre Lahti, Ladd Orr.

1 9 5 8

In 1935—a time when the importance of industrial design was just beginning to be understood in business and industry—a group of designers met in Chicago to discuss their mutual problems and aims. Much of the thought and work that went into this meeting—and others that followed in the next two years—was that of three men, none of whom were designers: Lawrence Whiting, then head of the American Furniture Mart; Alfred Auerbach, at that time editor of *Retailing Daily;* and Richard F. Bach, from the staff of New York's Metropolitan Museum of Art. At the third exploratory meeting, in 1937, designer John Vassos proposed the creation of a formal organization for designers. And in 1938, with about 45 members, a new organization calling itself the American Designers' Institute was formed with Vassos as its first president.

An important purpose of the new group was to define the responsibilities of the members of America's "youngest profession." As New York designer Scott Wilson has said, they wanted to bring recognition to a new type of designer, "a man with a creative imagination who has been trained both in the arts and in mechanical skills." The new group also wanted to differentiate the craftsman from the *industrial* designer, emphasizing the latter's contribution to industry and to a mass market. To bring out this point the organization changed its name in 1951 to the Industrial Designers' Institute and at the same time exchanged the original logo (above, left) for the now familiar IDI symbol (above, right). Other programs which this constantly growing group (by 1951 they had about 200 members) has promoted are more adequate copyright protection, traveling exhibitions to teach the public about the profession, a yearly award for the best design of the year, an educational study which has resulted in a carefully drawn up design school curriculum, creation of IDI student chapters.

The Industrial Designers' Institute now has twenty rewarding years behind it, and a total membership of 687, with chapters in Chicago, New York, Philadelphia, Southern New England, Syracuse, Detroit, Florida, Los Angeles, San Francisco, and the Ohio Valley. At this year's Twentieth Anniversary Meeting in Detroit former president George Beck suggested that "the time has come to settle down seriously and work out a method of achieving one united organization among the industrial designers of this country and Canada." "I am proposing," said Mr. Beck, "the complete integration of our two groups [the ASID and the IDI] so that we may have a single leadership and a single set of aims. With a combined membership, and therefore a combined budget, we can carry out a number of projects which are needed but cannot be paid for under our two separate budgets."

High points of the National Meeting were a Product Information Show, in which 18 manufacturers* introduced visitors to the latest materials and processes available to the industrial designer, and the three addresses reproduced in part on this and the following pages.

**Alcoa, Committee of Stainless Steel Producers, Creative Industries of Detroit, Croname, Inc., Dryden Rubber Div. of Sheller Mfg. Corp., duPont, Etched Products Corp., Fromson Orban, GE, Kent Plastics, Libbey-Owens-Ford, Molded Fiber Glass Body Co., Park Nameplate, Polyplastex United, Pyramid Mouldings, Rigidized Metals Corp., J. P. Stevens and Co., and United States Rubber Co.*

Dr. Ralph W. Gerard is a professor of Neurophysiology at the Mental Health Research Institute, University of Michigan.

Imagination and creativity

I would like to divide the question of imagination and creativity into two aspects: the arrival of the novel or new, and the survival of the novel. The new idea comes without preamble, not gradually but suddenly, fully formed, an entire entity. The essential notion is unity in variety.

As an example of how the imagination works, I offer you a puzzle in which you take six matches and try to make four equilateral triangles out of them. Only if you think of a solid figure—a tetrahedron with six sides—do you get four equilateral triangles, one on the table and three coming to the apex. All the reason in the world won't give you this answer—you just have to make the imaginative jump.

An act of imaginative creation is not a unique event which occurs once and for all in the mind of the imaginer. It has to occur equally in the mind of the receiver. There is no unifying likeness until we, too, have seized it, we too, have made it for ourselves.

The creative act also carries with it a remarkable sense of conviction. When this right solution comes, one almost invariably recognizes that this is it. It is sometimes extremely difficult to make others aware of it; it is sometimes perfectly clear. The creative act is charged with a tremendous emotional intensity, a sense of beauty which, I assure you, is just as real and impelling in science as in art.

The last point in connection with this creative act is that if it is really important, the very nature of our universe is changed as a result of it. About 30 years ago Sir Norman Lockwood said, "Science, too, has its dreamers and their dreams come true. They dream and messages flash across the empty ocean. They dream again and a new world springs into being."

The arrival of the new idea involves observation and demands not merely observing things, but paying attention to them. Aside from the observation of objects, ideas have to be put in order, given some kind of unity. People always think that Newton discovered gravity. He did no such thing. Gravity had been understood already in the sense that there was some force that made things fall to earth. What Newton did was look at the moon and look at the apple and say, "It's the same kind of thing that's happening."

In addition to observation, the person must have concern. Unless one is interested in the phenomenon, the mind does not work on it all the way from attention to interest to devotion to passion.

The survival rate of new ideas is very small indeed. Of necessity, the bulk of them are no good. Only the rare one is going to be a little bit better —and not merely *different*—from what we have. There is a great deal more effort, time, and agony spent in working through what is novel than in getting the idea in the first place.

The final element in the survival of ideas is courage. The really new sculpturing of the universe that occurs to someone in his creative moment is so out of place in the ways of thought of himself and of others in the past that it nearly always seems bizarre, ridiculous, impossible. But one must have the kind of courage Galileo had when he said the earth is the thing that is moving around the sun, not the sun around the earth.

In spite of all the talk about automation and the giant calculators that will replace human brains, I don't think we're going to be technologically unemployed for quite a while. Electronic brains can be made to work very hard, can be made to solve logical problems. They cannot be taught to imagine the new, nor can they have the courage to pursue the deviant.

Dr. Donald Schon is a member of the operational creativity group at Arthur D. Little.

Selectics: a way of group creativity

An important need today is for groups to handle problems of a complex or technical nature. A second need is for invention. For our nation this expresses itself as a need to compete in technological innovation and in research with our international rivals. In industry it expresses itself as a need for new products.

I'd like to talk to you about the nature and development of a group who believes it can—as a group—handle complex problems and create. The word "operational creativity" has been used to describe the technique of this group. We found this term so misused that we've thrown it away. We now have another word to describe what we do—"selectics." The advantage of this word is that nobody knows what it means. Selectics comes from the Greek, naturally, and it means working together, creating together, fighting together. Several operating selectics groups now exist in organizations like Arthur D. Little, the Rockefeller Foundation, and Kimberly-Clark. Arthur D. Little's parent group—consisting of nine members who aim to provide their clients with a concept in the form of a working model—is under the direction of W. J. J. Gordon. It has been in existence for about seven years. It began as a kind of theoretical, academically oriented group interested in finding out whether any advances into the theory of the creative process could in fact be made. Could a group operate effectively on a problem which requires invention for its solution? Could it do so without becoming a mere committee of experts? Could it do so without suppressing the individuality of its members? They also wanted to know whether there are techniques of invention at all, or whether it is, as the romantic myth pictures, simply an accidental, divinely inspired act.

The groups chose industry as their laboratory because in industry you get an immediate pay-off, a way of finding out whether the processes of invention that you've been using are effective or not. As a result they produced a variety of commercially used inventions such as a paint that refurbishes itself with use, a radically new can opener, a new safety closure for clothing, an innovation in feminine hygiene, a new paper packaging device, a radically different dispenser for liquids and semi-solids, and a really efficient lifting mechanism. Some have questioned the value in time spent on such projects. My own feeling is that group time is well spent only if the problem you want to solve is a crucial one and one in which traditional methods of solution have failed.

In order to find out whether the techniques of invention could be learned, the group decided to find a man who could give an operational knowledge of the creative process. It was agreed that his techniques would have to be subjective and introspective. And he would have to be considering his own processes of invention as he was inventing. In psychoanalysis, especially in the later stages, a person tends to develop a kind of objective attitude toward himself. He is able to operate and at the same time observe himself operating. It was decided, then, that this test individual ought, also, to be in psychoanalysis. Since it is generally held that introspection tends to destroy the impulse being inspected, this individual had to be willing to sacrifice whatever creative potential he had. Such a man was found. He was a working engineer and he was engaged in a military problem.

What this inventor noticed in the course of investigating himself was, that while he had produced a solution that was pretty well off the beaten track, he had begun, nevertheless, by taking something familiar and putting it in a new context. He had made it quite strange. Now this is quite different from the approach that an expert would have taken to the problem. Rather than trying to make the familiar strange, the expert would have attempted to make the strange familiar. If something unfamiliar came up, he would try to put it into a structure that already existed in his technology. If he couldn't do that, the chances are he would ignore it.

Something else that the inventor noticed in studying his creative process was the tendency to twist out of phase some of the accepted laws of invention and science. Now this is something that many experts find extremely difficult to do. I think the reason is that the expert is identified emotionally with the laws and conventions of his technology. When he introduces himself to people he says, for instance, "I am a polymer chemist." Polymer chemistry is his way of making himself acceptable, and he uses it in order to achieve emotional security. The laws and conventions of polymer chemistry are part of his own emotional makeup. To threaten those laws may seem to him to be threatening himself. He will find it extremely painful emotionally to think of even twisting a law. The difficulty is that if you accept the laws and conventions of society and of one's technology, you invent nothing.

Our test subject began to realize, too, that he had put off leaping to a solution. Instead he spent his time storing up metaphors, storing up different points of view, storing up ways of thinking that would in turn lead to a solution. If, instead of this, you begin by taking the first specific solution that suggests itself and follow it to its logical conclusion, you may have an idea that won't work. Then you've reached a dead end, and you have nowhere else to go. This becomes quite an emotional drain. Your energy, a weapon with which you can attack a problem, tends to decrease. Deferment, however, is by no means an easy technique. In fact the ability to resist immediate satisfaction (in this case a solution to a problem) is an index of emotional maturity. Deferment seems to increase the chances of getting a good solution. Of course, if the decision that you first arrive at seems to be the best, you can always go back to it.

Using their inventor as a test case, the group finally came up with five elements in the creative process. First, deferment, which means looking first for a viewpoint rather than an immediate solution. Second, autonomy of object, which means letting the problem take on a life of its own. Third, the use of the commonplace as a spring board. Fourth, involvement, or oscillation between involvement and detachment. Last, use of metaphor—which consists of taking things that are apparently accidental or irrelevant and treating them as new viewpoints or analogies. Used in a "selectics" group, these techniques help solve difficult problems that may finally become pieces of hardware.

Bernard J. Meldrum is a member of the Missile Division of Chrysler Corporation.

Missiles and astronautics

For the missile industry, much of what is significant started in Germany at the close of World War I. Under the terms of the Treaty of Versailles, Germany had been rigorously controlled in the development of standard or conventional weapons. The German military were, therefore, keenly interested in the development of any novel weapons system that had not been forbidden under the terms of that treaty.

In the late '30's the German military put these young men, among them Werner von Braun, to work developing a long range artillery weapon, later known as the V-2. The V-2 weapon that resulted from this work was a magnificent technical accomplishment, and a complete military failure. But though the allies had complete command of the air, no one was able to stop the German army from launching a single V-2. And even more to the point, once a V-2 had been launched no power on earth, friendly or enemy could stop it.

When World War II ended and a study was made of the possibilities of marrying the atomic bomb to the uninterceptible ballistic missile, it was apparent that a brand new dimension of warfare was available.

What about the physical principles behind missiles and rockets? A rocket is a device which carries within itself a combustible propellant in the form of very cold liquid oxygen (colder than 200 degrees Fahrenheit) which, when ignited, ejects heated gas from the stern and is thus propelled forward. There can be and there are missiles that are not rocket propelled. The so-called pilot-less bombers, such as the Snark, are truly missiles but not rockets since they employ air breathing engines. They use the oxygen of the atmosphere to complete the combustion process. Similarly there can be and are rockets that are not missiles. The research rocket, the Aero B, is used to collect information about the upper atmosphere. Nevertheless, today, most missiles are rocket powered.

It is essential in a rocket that material weighing something as mass be thrown out of the stern. In most rockets the material is extremely hot gas. The higher the velocity of the ethyl-exciting gases the greater the thrust. The rocket doesn't depend on the air to push against, its performance improves as it runs into thinner and thinner atmosphere. Large ballistic rockets today burn their propellants from about two to three minutes, and then they coast along their projectories for an additional four to ten minutes.

How do we guide a guided missile? The most popular system today is called a pure inertial guided system. On the missile, we set up a stable platform, a small platform which is kept level by means of gyroscopes no matter how the missile twists and turns. On this platform we also mount excellerometers, actually smaller gyroscopes that feel the forces acting on the missile. When the missile blasts off these excellerometers feel the forces, and then miniature computers, with electronic brains, take this information and calculate from it the missile's velocity and its position from instant to instant.

We also carry on the missile a program device which looks like a high-class tape recorder. The tape carries on its surface information on what the missile's velocity and position ought to be from instant to instant. Other electronic computers compare what the missile is doing with what it ought to be doing. If there is a discrepancy the computers, acting faster than a thousandth of a second, decide what should be done about it.

The relationship between rocketry and satellites is intimate. There is no means by which a satellite can be placed in orbit without using rocket power. The satellite must first be lifted to an altitude high enough so that air friction will be negligible. Second, the satellite must be driven to a sufficient velocity at right angles to the direction of gravity so that the resultant ballistic projectory will have a curvature no steeper than the curvature of the earth. The speed required to do this at the earth's surface is about five miles a second, or about 18,000 miles an hour.

Does the satellite have any military significance? The successful launching of Sputnik I by the Russians had a tremendous effect on the entire world, though the satellite itself was not militarily significant. The nation that had, however, developed rocket engine power plants capable of lifting the satellite into orbiting altitudes and had further developed the guidance systems capable of directing the maneuvers required to obtain a satisfactory orbit was well along in the technology required to produce an effective I.C.B.M.

Scientifically, of course, the launching of the satellites was of much greater significance. Since the dawn of history, man has been the prisoner of the belt of air that surrounds him. Now for the first time it has become possible to instrument the satellite, place it well outside the limits of the atmosphere and to see, as St. Paul once put it, not through a glass darkly, but clearly.

IDI officers elected for 1958 *are (left to right) H. Creston Doner, secretary; Carl Bjorncrantz, vice president; Robert E. Redmann, president; Leon Gordon Miller, treasurer; George Beck, former president, who is now Chairman of the Board.*

REdesign

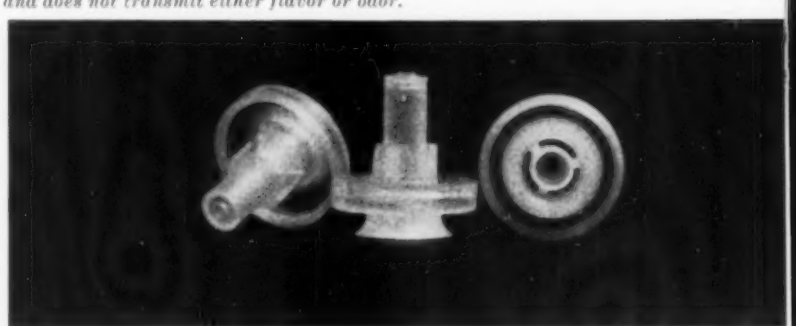
WORCESTERSHIRE SAUCE: FLOW CONTROL FROM A DENTAL DRILL

The incongruous combination of a dental drill and the physics of pouring is responsible for the "new look" of one of America's oldest packaged goods, Lea & Perrins' Worcestershire sauce bottle. An ingenious polyethylene fitment, designed by Dr. Samuel Kirschenbaum, a Brooklyn dentist who has devoted twenty years to an intensive extra-curricular study of how liquids react when poured from a bottle, has replaced the traditional glass stopper used by Lea & Perrins for 125 years. The fitment controls the flow of sauce from the bottle and eliminates the possibility of dripping down the side. When the bottle is tilted at a slight angle, the sauce drips out drop-by-drop; an increased angle promotes a steady flow.

Dr. Kirschenbaum's career as an expert in the pouring field began in 1938, when, admittedly unstimulated by dentistry, he began to tinker with an idea for a comb which would automatically dispense hair oil. This and other experiments led to the formulation of a scientific theory called "The Organized Flow of Liquids From Containers Controlled by Natural Forces." Lea & Perrins' old bottle was a natural for the dentist. Its flow was regulated by the user, who manipulated a glass stopper against a cork sleeve to get the proper amount of sauce. The new fitment affords far better dispensing and flow control.

Basically the plastic device is composed of two concentric polyethylene tubes molded into one insert. The length of the inner tube controls the flow of the sauce, while the outer tube is beveled at the top and notched four times at the bottom to permit uniform and unclogged drip and flow. The sauce is poured out between the two tubes over the beveled edge of the outer tube, and is displaced in the bottle by air which enters through the center hole of the longer inner tube. The length of the air pipe and the shape of the bevel were critical problems which Dr. Kirschenbaum solved only after trying out some 2,500 forms and models, all made by hand with a dental drill. He brought his invention unsolicited to Lea & Perrins, who are now distributing the new package internationally.

The notched and beveled outer tube and the air pipe control dripping and flowing action. Fitment is made of flexible polyethylene because it is impervious to the product and does not transmit either flavor or odor.



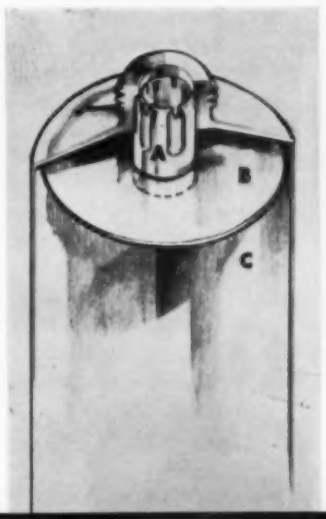
All photos: J. S. Ward

STRIPE TOOTHPASTE: CANDY STRIPES FROM A BASEMENT WORKSHOP

Youngsters are hard put to avoid usually dreaded tooth brushing chores these days because of their fascination with an ingenious new striped dentifice. And parents are equally hard pressed to answer the insistent questions on how Lever Brothers managed to fit the stripes into its new Stripe toothpaste tube. When Lever officials are asked, they reply with admirable discretion, "It wasn't easy." The answer lies with a persistent Mount Vernon, N. Y. printer, Leonard Marraffino, who, after four years trial and error in his basement workshop, finally designed a slotted urea plastic insert which would fit securely in the mouth of an ordinary tube of toothpaste. Each hollow plastic fitting contains five tiny grooves, and extends down through a polyethylene collar in the neck of the tube. The collar completely separates the white paste in the main body of the tube from a small amount of red toothpaste which is contained in the canted neck.

By applying normal manual pressure on the tube, the user pushes out a stream of white paste through the center hole of the insert. The pressure of the white paste against the polyethylene collar forces the red paste out through the five slotted grooves at the top of the fitting. As the white paste passes these grooves, red stripes are etched on the strip which goes on the tooth brush.

Mr. Marraffino brought his invention to Lever Brothers, who greeted it with enthusiasm. Production machinery was so speeded up that the dentifrice, now named "Stripe", was marketed in January of this year.



Red paste is contained between the polyethylene collar (B) and the metal neck of the tube. As a ribbon of white paste (C) is squeezed out center hole of insert (A) which extends down through the collar, the bulk of the white paste is pushed against the collar. This pressure forces the red paste out through the five tiny grooves, etching stripes on the white paste as it passes out through the mouth of the tube.

Staff Design Departments **2**

In a small company, the problems facing the staff designer are restricted in scope, but their onus is directly borne; the designer's concerns are varied, but his ultimate purpose is a single product. Because a small company is not a memo-ridden, sprawling bureaucracy, the staff designer is a master-of-diversified-trades as well as a specialist in his field. Here is a profile of the method and duties of the staff designer in one small company.

Robeson Cutlery: variety from informality

Project Conference. Left to right: Head Designer Jerome Moberg; Sales Vice President Milton Zelter; President Emerson E. Case.

Design at a small company is shirt-sleeves work

Staff members do not write each other memos at Robeson Cutlery, and if the secretaries are busy, the Head Designer will jot off a business letter in longhand. "All I know," the president is apt to say, "is I've decided to go into the kitchen tool business—let's see some sketches," and if he approves two cutlery designs he will allow his designer to choose the one to go into production. These facts, combined with a willingness on the part of each of these men to admit his errors, express a modesty and quiet expediency somewhat rare among staff designers and company presidents.

President Emerson E. Case of the Robeson Cutlery Company is, however, an unusual president. When he hired his Head designer, Jerome E. Moberg, he said to him with characteristic frankness: "I don't have any idea what you're going to do. Of course the only thing is you answer to me." And since decisive President Case is not averse to delegating responsibility, his judgment in selecting a designer was sound because, as it turned out, Moberg *knew* what he was going to do and has gone ahead to do it.

Although the Robeson Company was founded in 1879 (in Elmira, before moving to Perry, New York), the company had no design department as such until Moberg joined it in 1947. Mr. Case was aware of the importance of design in the making of cutlery, but he had until then only occasionally enlisted the services of designers, and then on a free-lance basis. When he hired Moberg, he got not only a designer but one whose ideas were infectious. By 1952 he had established him as the company's first full-time in-plant designer with a department and a staff to go along with his new title – Head of the Design Department.

Designer's varied background

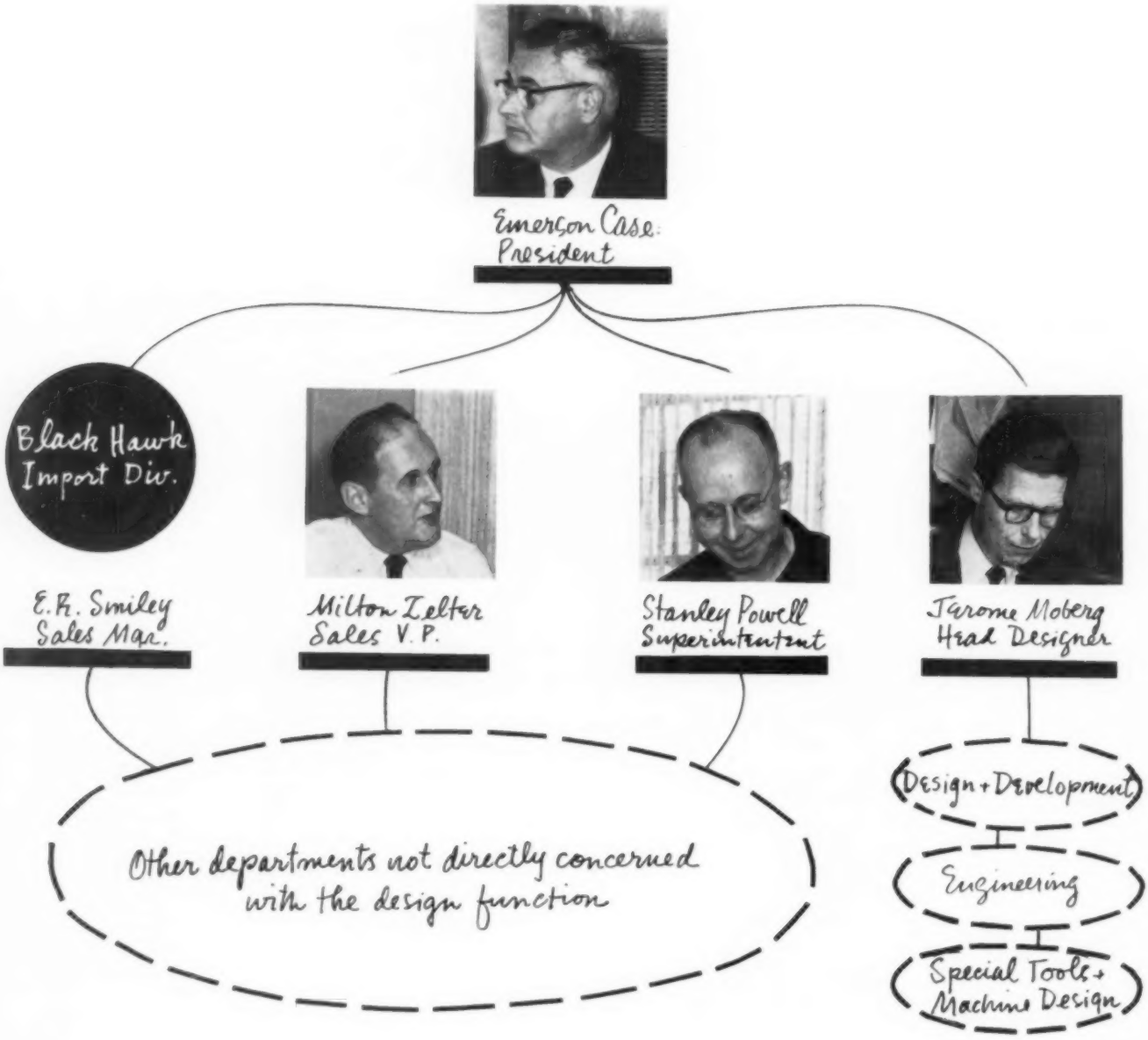
Like that of many an industrial designer, Moberg's background reads like a directory of occupations. It is a longer directory than most. He was at one time or another a student of law, medicine, science, and theology; production engineer, general designer, typographer, book designer at the University of Chicago, designer for Eureka Vacuum, production and cost analyst for the Murray Corporation of America, owner of a furniture plant, printing broker, art director, assistant general manager, aeronautical engineer, and sign-letterer. This last profession he practiced in a shop he set up when he was a freshman in college and in which he had eight people working under him by the time he graduated. As a result of this multifaceted experience, he is familiar both with front-office policy-making and with the requirements of all the departments in his plant. Neither his curiosity nor his drive has diminished since he became Head Designer: right now, for example, he is working on a history of the Robeson Company in which he intends to "show that more progress and new developments have been made in cutlery these last 15 years than in the previous thousand."

Design department

At Robeson the Design Department is a semi-autonomous one answering only to the president. The department's breakdown is: Head Designer, Jerome E. Moberg; Designer, J. N. White; Display Specialists, Clifford Elliott and (for the Black Hawk Division—a branch of Robeson in Germany) Richard Shepard; and Model Maker, Alfred Wardle, a silversmith retained by Robeson.

Because of the relatively small size of the company (total employees: 225), the Design Department is closely integrated with the other departments. The small staff has an intimate relationship which President Case studies to maintain. When Moberg first joined the company, some of the men in the shop resisted both him and the introduction of his new designs, but Case squarely solved the problem in the time-hallowed manner: he sent Moberg back among the machines and had him "get his hands dirty" to show that a design he had made could be practically achieved. The Design Department works in close conjunction with the sales force, with the latter acting as the company's informal market and design research. The sales force criticizes new models from the consumer's point of view, compares competition, senses the market as a whole, decides on the needs for volume items, determines which items are pace-setters and which are trend items. Thanks to his varied background, Moberg is qualified to evaluate the judgment of the sales force, and President Case supports him in recognizing his market sense. In brief, at Robeson, contact is verbal and intimate, and the industrial designer, while still a specialist in his field, is more than usually familiar with the problems of departments other than those he is in direct contact with.

How the design department fits into the company structure



One of the functions of Head Designer Moberg is to call the company's attention to new ideas, new products, new processes and materials, and to sense changing trends in the market. Design planning, however, is a committee function–the committee consisting of the president, two sales managers, the plant superintendent, and the head designer. Periodic meetings of the committee establish a program of projects–a kind of file of ideas–most of which are not specifically scheduled and may take years to nurture and develop. The limits of capital expenditure for a given program are set up by the president, who (with the board of directors) determines the overall policy–which must inevitably affect the plant, production, and market expansion. Within these limits the design program is then developed.

Cutlery is in some degree an impulse item, and because quality cutlery cannot enter into price competition, the demand for it is stimulated by constantly bringing its design up to date. In fact, in cutlery the design *is* the competitive element. One does not buy a new butter knife because the knives at home cannot spread butter any more; one usually buys a new one because he likes its design and has become tired of the old.

In search of a theme—the left field approach

To arrive at his designs, Moberg uses what he calls "the left field approach". By this he means starting from the unknown (abstract) and working towards the known (the utensil), rather than the reverse. He begins by looking for what he considers a good design. At this initial stage it doesn't matter how unusual, radical or un-utilitarian the design may be, or whether or not it is saleable or even feasible. These considerations come later. First he wants something that just *looks good*. Once he has a visual "theme", he adapts it to its purpose. This adaptation or refinement begins when he asks himself: what kind of cutlery will it be–barbecue, kitchenware, or what? who will use it–men, women, or both? on what occasions will it be used, and where? By the time these considerations have been attended to, the design as originally conceived has begun to leave left field, so to speak, headed for the batter's box–the specific design of specific cutlery.

The inception of a knife design: styling procedures. Head designer Moberg (seated) and designer White study early sketches.

Design case study

We can perhaps best follow the functioning of the Design Department at Robeson by studying in detail the production of a new line–in this case, their new "900" line. There are three general conferences, of which the first is a Project Conference. This is attended by President Case, Head Designer Moberg, Vice-President-in-Charge-of-Sales Zelter, and Superintendent Powell. The object of this conference is to develop a new line of household cutlery, the determining factors of its design being uniqueness and untraditional appearance, compactness of line, prestige quality, and high price. The line, it is then decided, will consist of the fewest possible pieces and yet be a complete service; the costs will be commensurate with a high-priced line; new tooling will be permitted if needed; and there will be a tie-in with all phases of merchandising—display, packaging, printed matter, and so on.

Following this general study is the more detailed one involving the kind of blade edge to be used: serrated, hollow ground, sabre ground, Christy (or scalloped) edge, or the new Emerson Edge; the number of tines on the fork; and such considerations as which pieces are susceptible of combination (possibly the carver, the slicer, and the bread knife can be made into one utensil). The desire is expressed to make this new line lighter in weight and with small handles—so that it will fit more comfortably in a woman's hand and be more feminine in its look and feel. After this discussion, the specifications are laid aside and forgotten, and preliminary sketches are made whose sole objective is beauty of line. No particular knife or fork is in mind and no particular size. The only considerations at this point are shape, form, and feeling–and that the design should be a closed one, which is to say, at rest within itself, with all its lines resolved. Next, the handles are sketched, the emphasis again being purely on appearance.

When the project has reached this stage, a second general conference is held with the president, vice president, superintendent, and designer. This conference takes the form of a critique, and for the first time production problems are

Production problems are considered. Left to right: V. P. Zelter, Pres. Case, designers Moberg and White, plant supt. Powell.

Blanking die–check. Designer Moberg with assistant superintendent MacQuarrie and heat treatment & press room foreman Scott.

A knife is more than just a piece of sharpened steel

Edge-setting the "900" line. As foreman Gustaf Cyran grinds the final edge, supt. MacQuarrie inspects a finished blade.

Packaging and displays are reviewed by foreman Elliott and designers Moberg and White. Next: merchandising the new line.

The styling of the sheath. Designer White considers what kind would best be suited to the new Emerson Edge "900" line.

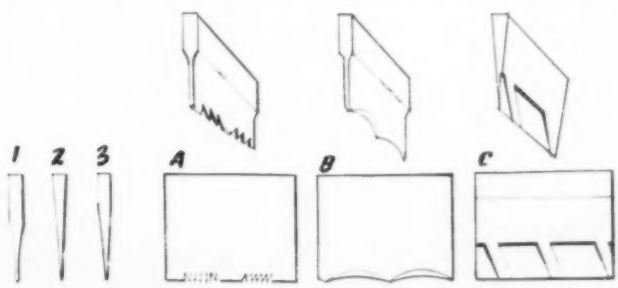
considered. A thorough analysis of what would be involved in making the cutlery is checked against current equipment and its limitations. All production problems affecting design are noted. Some of these problems may involve a design change; some a change in plant layout, or new equipment, or alteration of existing equipment. In this area, all final decisions rest with the president.

Next, sales needs are considered. For example, should the line include a grapefruit knife, a steak knife, a spatula, and a hooked peeling knife? The spatula-as-spatula is discarded in favor of a combination cake-knife-and-server which, with its new triangular shape and greater flexibility, could act as a spatula.

Then there is the matter of edge treatment. The scalloped and the sabre ground edge are both rejected for this line, the former because of its resharpening problems and the latter because it leaves a two-color finish, which is not in keeping with the desired look of the "900" line. It is decided rather to edge-grind the "900". (Edgegrinding is the process of grinding both sides of a blade in a straight line from the maximum width of the back to the centerline of the cutting edge.) In the meanwhile, Robeson's experiments with the new Emerson Edge have shown promise, and to make a broad practical use of this edge is now only a matter of a complete tooling job and the working out of proper controls to attain the desirable constant standards. In the Emerson Edge the blade is ground as thin as possible without drawing the temper of the edge, and then the edge is made still thinner by removing another 40% of material from it by electric photo-engraving. The Emerson Edge, aside from being carefully proportioned, is etched in a decorative pattern of ribbing in order to preserve edge strength and at the same time to form sharp chisel-like corners which function much the same way as a serrated edge (see sketch, below). The pattern of the ribbing is designed and constructed to preclude teeth-breaking, to avoid recesses that would harbor decayed food, and to be sufficiently smooth as not to catch on towels while being dried. And, equally important, this edge can be resharpened in the customary manner.

The Design Department, at this juncture, expressed a preference for a blade *without* the Emerson Edge, feeling that

Edge data: 1. *hollow ground.* 2. *edge ground.* 3. *sabre ground.* *A. serrated edge. B. Christy (or scalloped) C. Emerson edge.*



The staff designer identifies more fully with his company

The end of one line of cutlery is the beginning of the next. The design committee reviews recent sets, accumulates ideas for its future lines.

this edge spoils the line of the knife. The Sales Department, however, feels that the edge should be retained because it makes a *visible* sales feature. Compromise is necessary, and in this instance the Design Department cedes to the Sales Department: the Emerson Edge is adopted.

Complete detail drawings are now made, a model is constructed, and the final edge of the knife is finished by the Design Department. The last general conference is held, this one concerned with the gages of steel, color, production, purchasing, boxes—in short, the program in toto—and from here the matter passes largely into the hands of the Production Department.

This, however, does not mean that the Design Department is finished with the product. There is still the design of the packaging to be done, the design of the sheath, block sets, display signs, and pertinent printed matter—all of them interrelated in appearance. These jobs are handled by designer J. N. White. Further, the Design Department as a whole maintains a check on public reaction as it is reflected in sales or returned stock. A constant effort is made to judge consumer acceptance, and a strong reaction or a repeated one can cause a utensil to be redesigned. In one case, for example, some consumers felt that a particular knife had been ground too thin and was therefore too flexible. Since there was no special reason for this flexibility, the blade was redesigned.

For impulse sales, it is important to have a conspicuous point-of-purchase display, and to this end Robeson, through Moberg, offers a free design service to help create and develop cutlery departments for any store desiring one. For those stores not large enough to have a special cutlery department, Robeson custom-designs special cases and display stands. These special services are done at cost, with no charge for the design. Concerning these extra designing duties Moberg's cheerful comment is: "The more I can handle, the more I get."

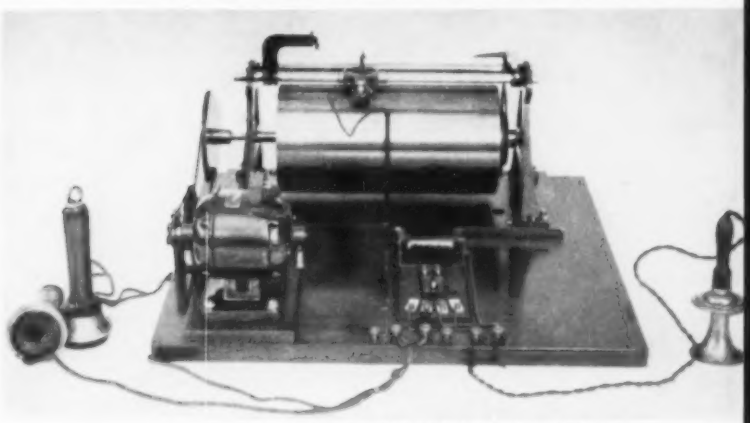
Since the advent of Moberg and the establishment of a Design Department, Robeson's product development program has become more informed and more ambitious. Through this new program, the Design Department has pioneered in, among other things, Formica handles, black plastic-impregnated wood ("Shurwood"), gift-packaged cutlery, the Emerson Edge, and "Frozen Heat" (a process developed by Emerson Case for speeding the "aging" of steel from the Austenitic to the Martinsite stage by super-cooling it at 100°F below zero after high-temperature heating).

Design and increased responsibility

In Moberg's opinion, the industrial designer today, with his increasingly overlapping duties and responsibilities, has achieved an organizational status and importance equal to that of a corporation lawyer. And although the function of a designer has already been combined with that of an executive, Moberg would now like to see him go one step further and assume the still more responsible position of member of the board of directors. With the designer's present varied activities touching on so much of the company's policy and planning and embracing so many of the different functions of the different departments, there is a stronger than ever tendency towards this move. More and more, it is considered desirable to raise the designer to the level where he is not just *in touch* with policy-planning but is in a position to help *shape* that basic policy. Like other industrial designers, Moberg, with some measure of hope, anticipates such a step in the not too distant future.

The first wire recorder, the Telegraphone, invented by Valdemar Poulsen, was awarded Grand Prix at Paris Exposition in 1900.

From the early dictating machine at right, to stereosound and large scale data processing, myriad messages have been transferred by magnetic recordings. What are these transcriptions, and how are the messages retained? On the next 9 pages is an analysis of the versatility, theory and production methods of this widely used energy retention medium.



Courtesy: Minnesota Mining and Manufacturing Company

Magnetic Tape In Action

BY ARTHUR GREGOR

The picture on the left is not a close-up of a swatch of new fabric, but a magnified view of the tracks on a piece of magnetic tape, used to transmit digital data from one computer to another. Tape's vast popularity is, of course, due to its use in the tape recorder, where it retains and reproduces sound. The fidelity of tape recordings has been improved to such an extent that it has become impossible to hear the difference between a recording and the real thing. About two years ago, during a performance of "The Marriage Of Figaro" overture in San Francisco, the musicians stopped playing in the middle of the piece. To everyone's astonishment the music went on, and no difference in sound quality could be detected. The trick was that the orchestra had cooperated with a tape recorder manufacturer (Ampex Corporation) and had taped the overture during rehearsal to illustrate dramatically the life-like sound reproduction possible with stereophonic tape.

Another recent, widely publicized use of tape indicates the changes it is causing in daily communication. When Queen Elizabeth visited the United States and Canada some months ago, her royal letters to Prince Charles consisted of her own messages transcribed permanently on reels of magnetic tape.

But the use of tape in other, less well known applications is equally spectacular and frequently more complex. Military and geophysical outposts rely on it to make available data gathered in outer space or deep underground; automated factories and computers are instructed and fed information by magnetic tape, and today visual data is being taped in much the same way as sound. This is an area that holds great promise for the future.

The indications are, from what tape experts have said recently, that the magnetic medium will introduce products into the home that will make a sharp change in our daily living habits. It will be simple, say the forecasters, to keep an up-to-date tape library of family events which will be recaptured in sight as well as sound. Instead of newspapers, tapes will be delivered every day; tapes will activate electronic homes by telling the transistorized circuits (see ID August 1957) what to do, where and when; tapes will see to it that any store-chain is kept up-to-date on inventory and finance (see Dataphone, page 80) and generally the use of tape will be extended to record and preserve any desired expression that can be translated into electrical impulses (all information to be inscribed in tape's magnetic surface must be transformed into, and transmitted as, voltages.) These predictions might at first glance appear to be extravagant. But in view of what has already been accomplished with tape, they are not of a science-fiction character. All of them are realizable, though at the moment, not yet technically or economically feasible. In all applications, tape performs a similar function whether it is designed to retain sound, sight or digital information: it is used to *activate* electronic products and devices which control systems and operations. Its general characteristic remains the same regardless of specific use: it is an effective, and in many ways economic medium for bringing a measure of permanence to the otherwise transitory.

Like any major development, the advent of magnetic tape was the result of practical as well as theoretical expediency. By the end of the war, a *storing* element—a "gadget with a memory"—was badly needed: the military found itself swamped with data vital for emergencies and the solution of immediate problems. Accessibility and economy of space were important considerations in the evolution of a system for remem-

Professional tape editing is a separate operation requiring special equipment. On this editing console, controls are recessed below table to prevent interfering with the tape while handling and slicing.

bering data. But as yet no such method had been found.

In terms of technology, magnetic tape was also a "natural." For tape functions mainly on the basis of two fundamental principles known long before tape came along: a) magnetism, a quality inherent in a material; b) electromagnetism, a magnetic field set up by electric currents. The discovery in physics that sound travelled in waves which could be picked up as electric impulses led to the prospect of inscribing and storing them in a permanently magnetic pattern by virtue of electromagnetism. What was needed were the appropriate materials, operating methods and manufacturing techniques to translate some basic theories into direct audio-visual experience.

That these have been found is attested by today's status of the magnetic tape industry. (Minnesota Mining and Manufacturing Company leads it, with Audio Devices, Reeves Soundcraft and Orradio Industries accounting for most of the rest of tape in use today.) In a recent article in the New York Times, Mr. William C. Speeds, president of Audio Devices, had this to say:

"I am confident that we will see the year not too long from now in which the industry makes and sells $100,000,000 worth of tape. One reason is . . . that we will have to depend more and more on our magnetic tape 'memory' to store and process our ever-growing mountains of information erupting from giant computers.

"Another reason is that the magnetic tape furnishes both 'memory' and 'will' for the mechanical servants that are taking over menial tasks in the automated factory. I believe that our magnetic tape 'memory' will be one of the most widely used devices in the mid-Twentieth Century."

Tape's significance as a miniaturization component is strongly evident in data processing equipment. The reel of magnetic tape shown here is capable of holding the information stored on 28,000 punched cards. In addition to saving space, tape also reduces maintenance.

From wire to tape

The principle of retaining sound by magnetic transcription was first introduced into a mechanism by the Danish inventor Valdemar Poulsen, who used wire as the retaining medium. Due to the lack of suitable amplifiers, his "Telegraphone" (see page 73), patented in 1898, was weak on recording and weaker on playback —but it worked, and was used in Europe as a dictation machine. It wasn't until some thirty years later, however, that magnetic recording reached a level of sound reproduction and a range and flexibility in performance that indicated its full potential as a retention and activation medium. The vacuum tube brought about the amplifier, and in Germany work was being done to replace steel wire — most readily obtainable magnetic material—with a tape coated with powdered metal.

The advantages of tape over wire are, of course, apparent in an application where ease of manipulation is a major factor in determining its popularity. Tape is as easily lifted out as it is fed into the machines; one of the major advantages of tape is its editability, and editing (see following page for console), is not feasible with wire, which cannot be cut and resoldered without distorting its surface. Because of its width, tape can handle more information per unit length than wire (today, approximately 330 ten digit numbers can be stored on 1" of ¼" tape); and from the standpoint of action versatility, tape can be adapted to a variety of performance conditions by altering its composition. German engineers were, no doubt, aware of tape's potential, and around 1940 the Berlin radio stations began to tape-record broadcasts. By the time Allied troops swarmed across Germany a few years later, army technicians found the Magnetophone, a highly developed tape recording machine far superior to the wire recorders used by the Allied field armies. With the home-

Basic recording tools are few and simple

coming of the troops, the Magnetophone also made its way across the Atlantic, and by 1946 the first playbacks using magnetic tape were being made and marketed in this country by the Ampex Corporation. The price was still high: $4500 per set.

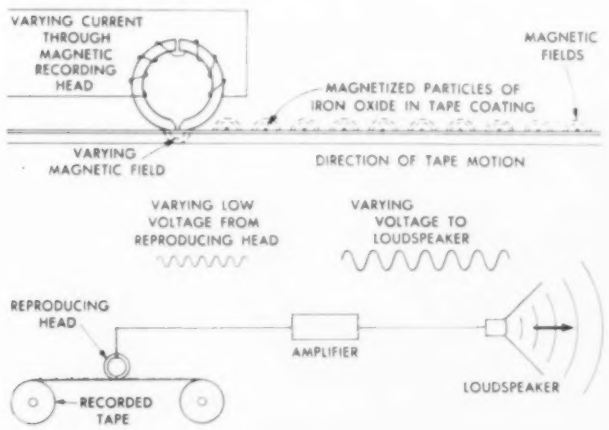
What followed was exactly what could have been expected of a product with as much appeal as the tape recorder: performance was improved, production increased vastly, and the selling price dropped considerably. And no sooner was the use of tape for sound retention on its way, when its application for sight retention began to be pursued seriously. After ten years of development and production, the manufacture of tape and other recording components was sufficiently advanced to perfect the recording of sound, and another taping method—magnetic photography—was born.

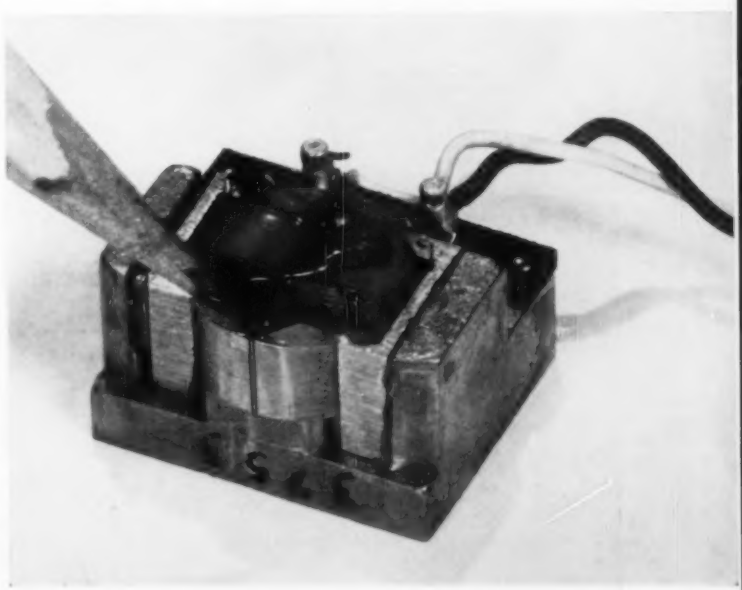
From signal input to output

Essentially there are four elements in signal (sound and sight) recording, each of which varies with application. They are: a) the receiving element—the microphone, the camera, the amplifier or any number of circuits, called transducers, which transform the input into electric voltages; b) the recording head (see picture at right)—an iron core with coil of wire to which the voltages are fed; c) the recording medium—the magnetic tape; d) the reproducing element — loudspeaker, earphones, screen, and circuits that transform the voltages back into the original sound or sight of the input signal.

The recording and reproducing process between the signal input and output is the same since the signal, whether sound or sight, is received, stored and reproduced as voltages. Within this input-output process any information can therefore be recorded once transformed into voltages, which means that literally anything that is energy can be retained in this method.

It was pointed out earlier that electromagnetism and magnetism are the principles upon which tape functions. This needs some elaboration. Here is how the signal is transferred onto the tape by electromagnetism: As the input intensity varies, the voltage varies. This in turn induces a varying degree of magnetization around the recording head; the magnetized head attracts the magnetic particles on the tape's surface in much the same way that a simple magnet attracts iron filings. In this manner the pattern of the changing signal is inscribed onto the magnetic surface of the tape,





Heart of recording process is the recording head at right, an iron core with coil of wire to which the incoming messages are fed. Transformed to voltages, these set up a magnetic field around the head, which magnetizes the tape moving past it. Messages are retained in tape due to the magnetic quality of tape's surface. Top schematic indicates this principle of magnetic transcription, bottom shows basic steps of reproduction.

Main challenge in manufacture of tape is meeting critical tolerances

which retains the patterns by virtue of magnetism (see top diagram on preceding page).

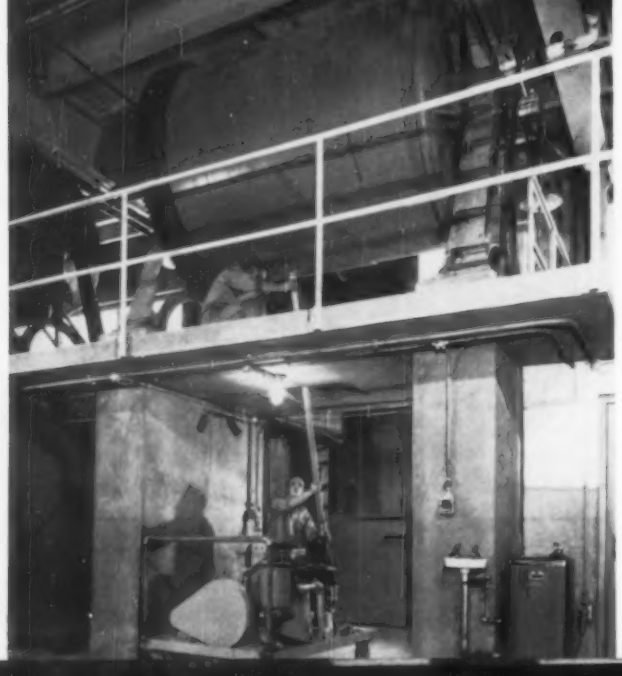
The reverse process occurs in playback (see bottom diagram). The magnetic pattern in the tape induces a magnetic action in the reproducing head (the same head is used in home equipment for both recording and reproducing, but separate heads are used in professional equipment). The head transmits the signal through an amplifier or other transducer to the reproducing element where it is transformed to sound or sight, or in the case of computers and telemetry applications (the transmission of measurements) into coded messages.

All sorts of reproduction refinements are possible within this input-output process. By a magnetic action, the pattern can be erased with the machine's erase head, tape can be cut and reassembled, and a high fidelity reproduction can be achieved by employing appropriate components.

The degree of fidelity is chiefly determined by speed, tape width, and complexity of data to be recorded.

The amount of information that can be stored per unit length of tape, depends on the width of the tape and the number of tracks on which the data is inscribed, but the amount of data that can be inscribed per unit of time depends upon the speed. Most home equipment uses a ¼" tape with a single track, but more than one track is often employed on professional equipment. On multi-track tapes, information can be picked up from various sources and recorded simultaneously —this is how multi-dimensional effects are obtained with stereophonic recordings. The speed at which tape moves past the recording head in home machines is generally 7½ or 3¾ in/sec., though 1⅞ in/sec. is also used for dictation purposes in office machines. Lower speeds are more economical since less tape is used, but the response is poor. The fidelity at 7½ in/sec. is far better than at the lower speeds, primarily because more tape is available to pick up a given amount of information per unit time. This means that a direct relationship exists between frequency response — catching the higher and lower frequencies—and tape speed. Consequently, 15 in/sec. is the standard speed used in most commercial recording studios, while with computer and telemetry applications (where signals that lie in the low and very high frequency ranges must be caught and recorded) speeds are often as high as 100 in/sec.

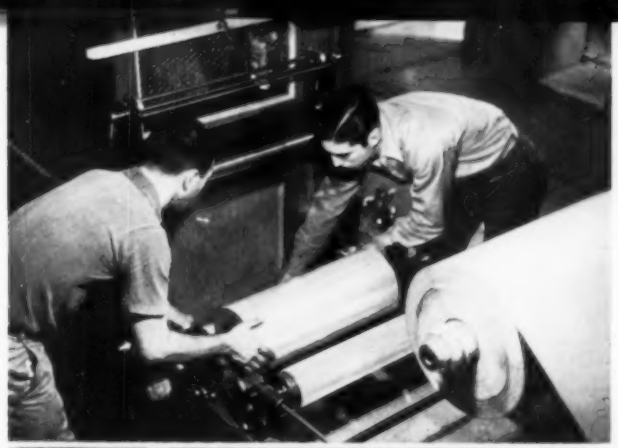
First step in the manufacture of magnetic tape is mixing treated iron oxide and a liquid binding agent. As the drum of the ball mill shown here rotates, thousands of tiny steel balls pulverize the oxide. At Minnesota Mining and Manufacturing Company.



Another factor that determines the amount of information that can be stored over a given tape length per unit time, is of course, the width of the tape. Most computer tapes range from ¼" to 1" in width, while video tapes are 2" wide; they have to record signals in frequencies up to four megacycles. The extreme fidelity demanded of video tape is, of course, the major bottleneck in the production of tape for tv recording. Studios have been using video-tape for about a year, but the rejection rate in manufacture, once inordinately high, is only now beginning to improve. In early production, 80 out of 100 rolls of video tape were rejected, and of the 20 submitted to the tv networks, only three proved to be satisfactory.

Problems in tape manufacture

All tape consists of a non-magnetic base which supplies mechanical strength, the iron-oxide coating which is the magnetic surface, and a binder by which the iron oxide adheres to the base. The thickness of the base material varies from .0005 to .0015 inches, which means it must be of considerable strength or it would support no stress at all. In most cases, the base is a plastic—cellulose acetate or Mylar—but for inexpensive applications a special kraft paper base is also used;



Next, the liquid coating is spread onto a flexible base of acetate or a polyester material (Mylar) in sheets from one and a half to two and a half feet wide. The air in the coating cabinet must be thoroughly filtered to remove dirt particles; coating thickness must be held to extremely close tolerances to avoid sound distortion. At Audio Devices, Incorporated.

Large rolls are tested for distortion before they are stored and kept ready for slitting, winding and packaging. At Minnesota Mining and Manufacturing Company's magnetic tape plant.

this yields poor reproduction of the higher frequencies, generally has much surface noise and distortion, and cannot be used if professional quality is expected. The smooth surface and relatively uniform thickness of plastic make it a better reproducing medium, and the greater mechanical strength of Mylar and its resistance to high temperatures and high humidity make it the better material for most commercial and almost all instrumentation applications.

The basic manufacturing steps in the production of tape shown on these pages are by now straightforward. The iron oxide combined with the binder is applied to the base on precision equipment; the coated base is dried, slit into the desired widths, and wound on reels (from 3″ to 14″ in diameter.) But because of the tolerances needed for high-precision tapes, the manufacturer faces problems and a high reject rate. Video tape must be produced to accept ten times more information per unit area than audio tape. The wave lengths of some of the signals in the video range are only .0003 inches, and any dust particle in the tape coating even one-tenth that long will cause distortion—signal drop-outs—in the reproduction. Even with the less critical audio tapes the variation in iron oxide thickness must

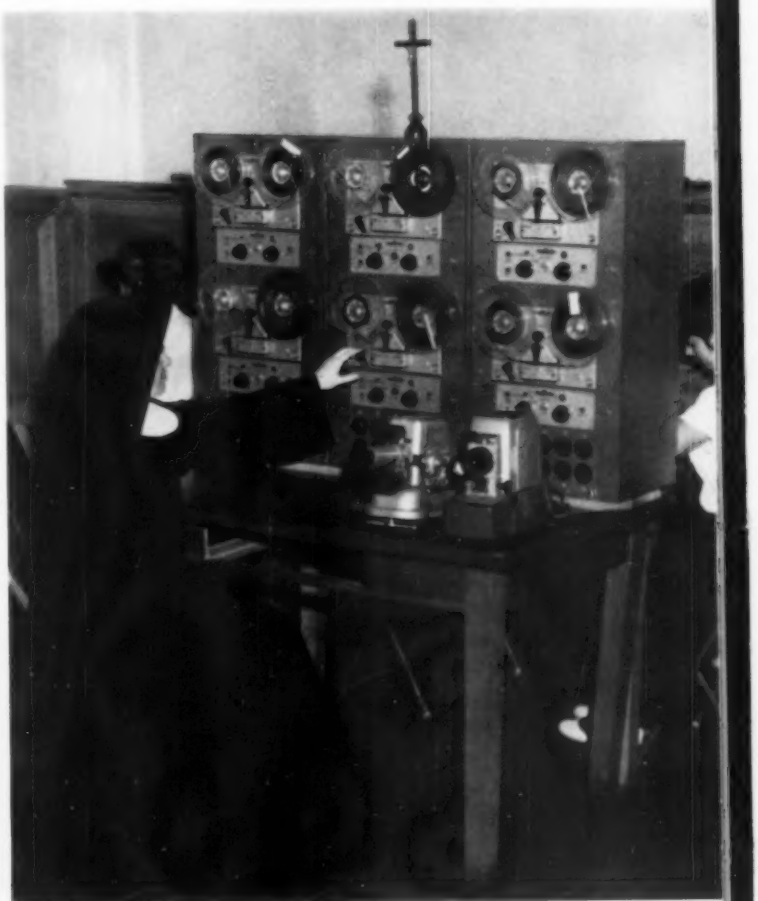
The coated tape is slit into ribbons to a width required by the intended application. Very high precision is required here to avoid variations in the width that could cause physical as well as performance difficulties when tape is used; for example, stresses on the cut edge can make the tape curl. At Orradio Industries, Inc.

Before and after tape is slit and wound unto reels, it is passed through highly accurate quality control before being packaged. During this testing process, tape gets magnetized. Above is shown a demagnetizing set-up for erasing all magnetism from the reels. At Minnesota Mining and Manufacturing Company.

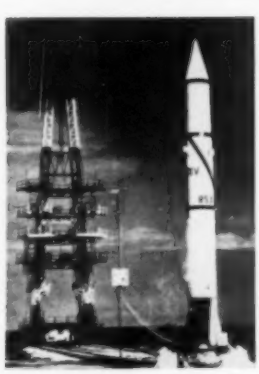
Products designed around tape are base

Retention for convenience is best demonstrated by tape's oldest product: the office dictating/transcribing machine. Latest in this category is Norelco's "35" tape recorder. Main features are size (10" x 7¼" x 4"), weight (8 lbs.) and tape cartridge.

In education, tape can bring lessons and talks of top scientists and educators to the classroom, and can help alleviate teacher shortage. Provided with earphones, students can study lessons independently. At right, part of electronic teaching system at St. Scholastica Academy, Covington, Louisiana.

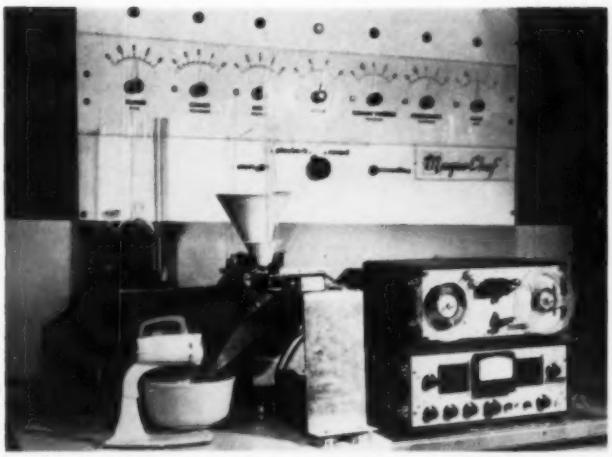


High fidelity reproduction and ease of editing have made tape the exclusive medium for master recordings from which discs are made. During a recording at Columbia Records, man in center controls volume from each of the microphones in the studio.



Test data is radioed to earth from outer space and deep underground and is retained by tape for laboratory analysis. The truck at left, above, drops a heavy weight to create "earthquake;" tremors are recorded on tape and studied for possible oil deposits. Data from Redstone missile at right, will be analyzed in laboratory — and flight simulated — from recordings taken during flight.

on its power to retain data and to activate electronic systems



Information retained by tape is used to activate and instruct automated operations. In the automated Magnecord cake baker above, impulses recorded on tape measure and mix the various baking ingredients, start and stop each process at right time.

In data processing equipment such as the IBM 705, tape, used to process a company's payroll, provides the data storage and also the procedure—the "program"—which the computer is to follow in its calculations up to printing of employee's paycheck.

be less than 5/100,000 of an inch, the coating must be painstakingly inspected for consistency, and uniformity must be maintained when the coated rolls are slit into ribbons. With video tape, control of these operations is infinitely more complex. But the research departments at Minnesota Mining and Manufacturing Company (the largest manufacturers of video tape) are meeting them one by one, and the company is now supplying tv studios with tape reels, 2″ wide and 4800′ long, that have a useful life of more than 200 playbacks.

Tape action at present and in future

The majority of consumer and industrial products designed around the action ability of tape—retention and activation—have so far been in audio categories (tape recorders for home, office, studios, schools, etc.), in telemetry (geophysical and military recording systems), and in instrumentation (data processing equipment and factory automation.) Its use will continue, in all these categories and will expand in some. Because of purity of reproduction and the ease with which tape is edited, record studios have for some time been taping the master recordings from which they make their discs. Tape is also employed exclusively now for recording the sound of movie pictures. And as soon as the cost of tape is reduced, music enthusiasts will certainly prefer it to LPs with inferior surface reproduction.

The action of tape in data processing equipment, where it links computers and also man to his "giant brain," is startling. Receiving messages as impulses, a tape can flash instructions into an IBM 705, for example, at a rate of 15,000 letters or numbers a second. In automated factory installations, the job to be carried out is transcribed on tape which instructs and guides the automatic equipment to perform the operation exactly as prescribed—the motion of the machinist's hands doing the job to be duplicated is inscribed in the tape by electric impulses. In guided missiles, tape directs the missile to its destination, and records atmospheric information picked up in the flight; similarly, in the satellites, tape records the readings of the instruments which are transmitted to the ground as the spheres pass over the geophysical stations.

The immediate, and most portentous, outlook for tape's future is in video recording. Ampex and RCA video recorders are already in use at broadcast studios to accept and transmit color and black-and-white tv (see picture on next page), and RCA has employed the principles of tv tape recording in the development of a home tv "hear-see" player. The first working model

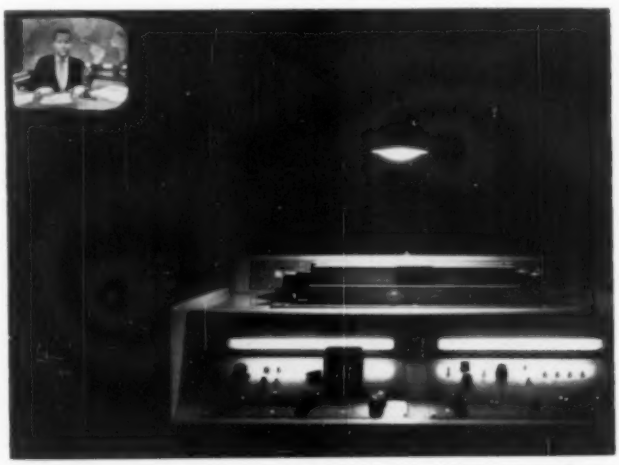
Video storage is tape's new product field

Retaining sight in much the same way as sound, video playbacks attached to standard tv set, will permit viewing of audio-video reels. Experimental model of RCA's "hear-see" tape player is shown here at the David Sarnoff Research Center.

was demonstrated late in 1956, and since then work has been continued to perfect it and make it available for commercial use (top picture.) So far, the home player can reproduce over a standard tv set selections transcribed by video broadcast recorders. But when tv cameras are sufficiently reduced in size and cost it will be possible to keep a sight-and-sound account of any event. The tape equipment for such a sound-sight private library is almost at hand, but the appropriate tv camera has not yet been developed. Should it ever reach the consumer market, it is likely to replace the movie camera—which would revolutionize the entire fields of movie making and photography.

But the indications are that tape may in future cause other drastic changes in daily living habits. Beyond the arrival of new products (for example, the Dictet by Dictaphone, a portable voice recorder 2″ x 4½″ x 6 5/16″ and weighing only 2 lbs., or Bell's receiving-and-answering telephone box) tape will control the electronic home of the future. It will perform the same type of action it is now responsible for in offices and factory use when it instructs the electronic home system when to start breakfast, when to open or shut the bedroom windows, what parts of the home are to be vacuumed, and which section of the tape to select to tell the children what to do when they come home from school. A small reel of tape fed to the system at night will tell it what to do the next day.

That tape will be instrumental in causing changes in the future home is indicated not only by its versatile performance in industry but by a recent experiment in conducting school classes electronically. In an experimental unit of St. Scholastica Academy in Covington, Louisiana (see page 78), the desks of teachers and pupils are wired for sound. The teacher communicates with any one of her students by pulling a lever or pressing a button. Each student has a set of earphones attached to the desk, and can listen to tape recordings of lessons. The teacher's desk consists of a number of tape recorders, levers, and buttons, and looks more like a console used in industry than a desk from which a class room is conducted. Officials in the school feel thaat this method of instruction has unprecedented advantages for both teacher and students: since each student can listen to a tape recording independently, he can be given the lessons he most needs (these need not be supplied by the school's staff, but can come from



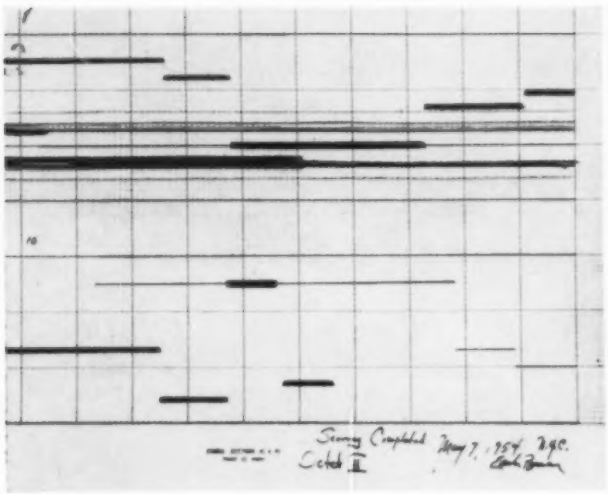
Video tape recorders have been used for about a year by tv studios to record test commercials, test programs and special events in their entirety. Above is the Ampex VR-1000, sight and sound recorder; machine uses 2″ tape at a speed of 15 in/sec.

New tape product is Dataphone, below, a system permitting data transmission over telephone lines. Dataphone converts data into tones which are sent over the line, received by another Dataphone which changes the tones back into original messages.

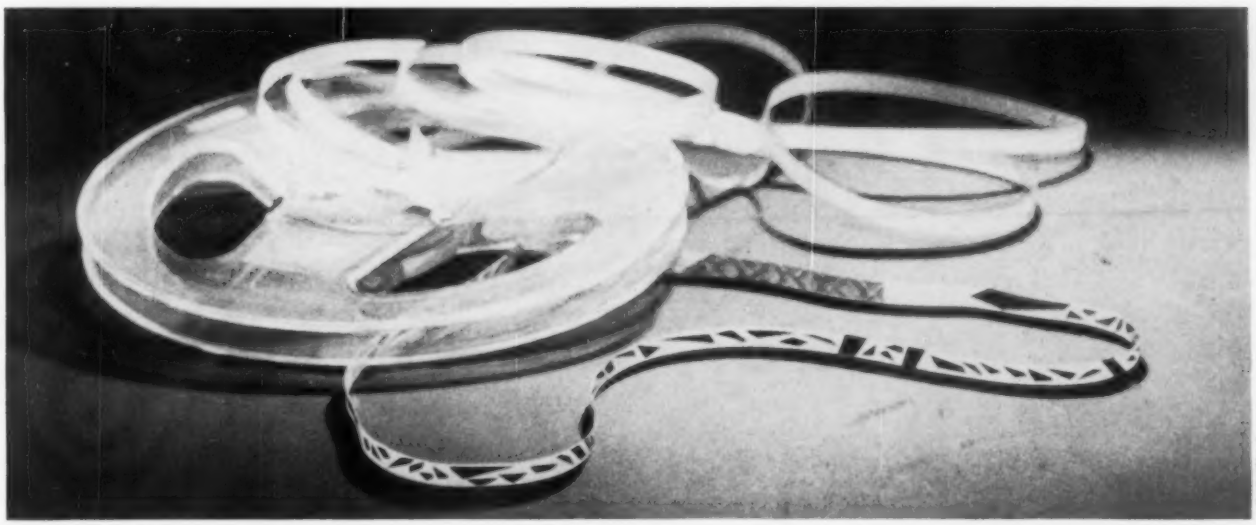
Tape incorporated in art creates unique expression of contemporary life

top educators or scientists in a particular field), and the teacher can be relieved of much of the drudgery of teaching (lessons need not be repeated but can be taped and used again and again.) This method has altered the basic procedures in an old system, and tape will do the same in other fields as well.

As a medium of retention and an implement of enormous scope, closely interlinked with our contemporary sense of living, tape will unquestionably be employed further as a means of expression to break down barriers not only in technology, but also in art. In Europe as well as in America, composers are utilizing the new technological device by composing directly for magnetic tape. Their basic units are not musical notes but sound —electronic sounds, street noises, voices, bits of radio music etc.; their orchestra is not made up of instruments but of striations imbedded in a magnetic surface run through machines, several at a time, and projected over loudspeakers located in a variety of arrangements. The performance, unprecedented in character and extensive in dimension, certainly indicates the extreme versatility of a contemporary medium capable of retaining all that is said and done.



Magnetic medium has made available a tonal versatility that has been responsible for new concepts in composition. Scores are noted with types of sounds—street noises, static—instead of usual notes. In America, composers John Cage and Earle Brown have pioneered composing for magnetic tape. Above is a section of such a score by Earle Brown; the dark areas in the tape below are taped sounds, bits of spliced tape that make up composition.



J. S. Ward

DESIGN REVIEW: *Plastics at home*

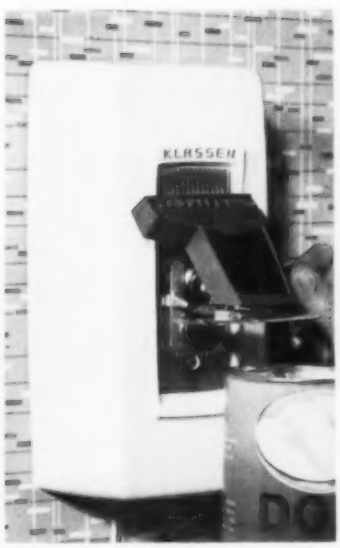
Shaped to perform new functions, or to perform old ones better, the two workhorses of the plastics industry—styrene and polyethylene—continue their beneficent invasion of the home. Already abundantly versatile, they have recently developed in new ways that promise new uses to the designer, as the products shown on these pages suggest.

A

B

C

D



E

F

G

The diverse objects shown here are alike in one respect: all are made of styrene. Its unexpected presence in items like dinnerware that can stand up to automatic washings, or a watering can that won't break or chip, suggests the changes that have been wrought: to its native advantage as a cheap and lightweight, and brilliantly-colorable material have been added new strengths. Most styrene is now impact-proof, and, when combined with other resins, it becomes highly resistant to heat and staining.

A case in point is Tyril, Dow's new dinnerware material. This styrene-acrylonitrile thermoplastic is claimed to be stronger, more heat-and-stain resistant than conventional plastic dinnerware. And —because it's injection-molded— it's cheaper. "Town and Terrace" by Gitsware (C) sells for $12.95.

The Cymac tumblers by Jaydon (A) show a styling departure which expresses the flow of plastic in a contemporary design idiom. Like the Tyril ware, they can be safely boiled, and fruit acids won't stain or mar them. Set of six, $2.98.

Cheapness and heat resistance are virtues of the disposable cups by Federal Tool. (B). Ingenious handle folds to lock into grooves in side of cup. Price: 29¢ for 15 cups.

E-Z Bath by Toidey (G) is molded with a padded incline that keeps baby's head above the water. Tub weighs under 3 pounds, comes in pastels with contrasting urethane foam pad. $6.98.

"Canolectric," designed by Melvin Best Associates (D), lightens housewife's task in more ways than one. Works automatically, by push-button, and, since it's made of a styrene that resists food stains and abrasion, it's easy to maintain. Button is shaped to look like part of flip-up lid, which presents flush surface when not in use, protecting cutting apparatus. Made by Robbins & Myers under Klassen name, $29.95.

Chop-o-matic (F), claimed by its maker to be the world's largest and fastest food chopper, will mince three onions in seven seconds. A six-blade spring plunger does the work; clear — and odorless — styrene gives visibility. By Popeil Brothers, $2.98.

A range of vivid colors is one feature of the watering can from Earl Fisher Plastics (E). Another is its shape, designed to hold three quarts of water and still fit safely on narrow window sills. Price: $1.98.

A

B

C

Plastics now account for 10% of all housewares sold, a fact for which polyethylene is largely responsible. The current crop includes such refinements as a double bucket and a watering can with a removable sprinkling head—but the real excitement is in products made of new **rigid** polyethylene. Much stronger than the conventional formula, it has good chemical resistance and—importantly—can be sterilized. Termed linear or high density polyethylene (because of its molecular structure), the new material even has a new surface—hard and glossy.

The Hi-Fax fountain jar **(A)**, though not a housewares item, suggests the kind of household roles this lightweight, stain-proof and sterilizable material can play. (Testifying to this is Ideal Toy Corp.'s entry into the field, with a line of housewares designed by Harry Preble, and tableware by Russel Wright, all in Fortiflex, a rigid polyethylene.)

The Hankscraft vaporizer-humidifier **(C)**, designed by Dave Chapman, Inc., suggests further and quite different possibilities. Built to vaporize a gallon and a half of water over a twelve-hour period, unit weighs just three pounds—and even the inner tube, where the water is boiled, is made of the new plastic. Trim turquoise housing introduces a new "housewares" look in an area dominated by rather formidable cannister types of equipment. $9.95.

Rigidity was built into slide file **(F)** of conventional polyethylene by designers Leotta & Parcher, *via* ribs in lid, overlapping (instead of butted) joints. Case was designed to appeal to women as well as men—hence colors like white, yellow, coral, as well as blue and brown. From Optics Mfg. Co., $2.95.

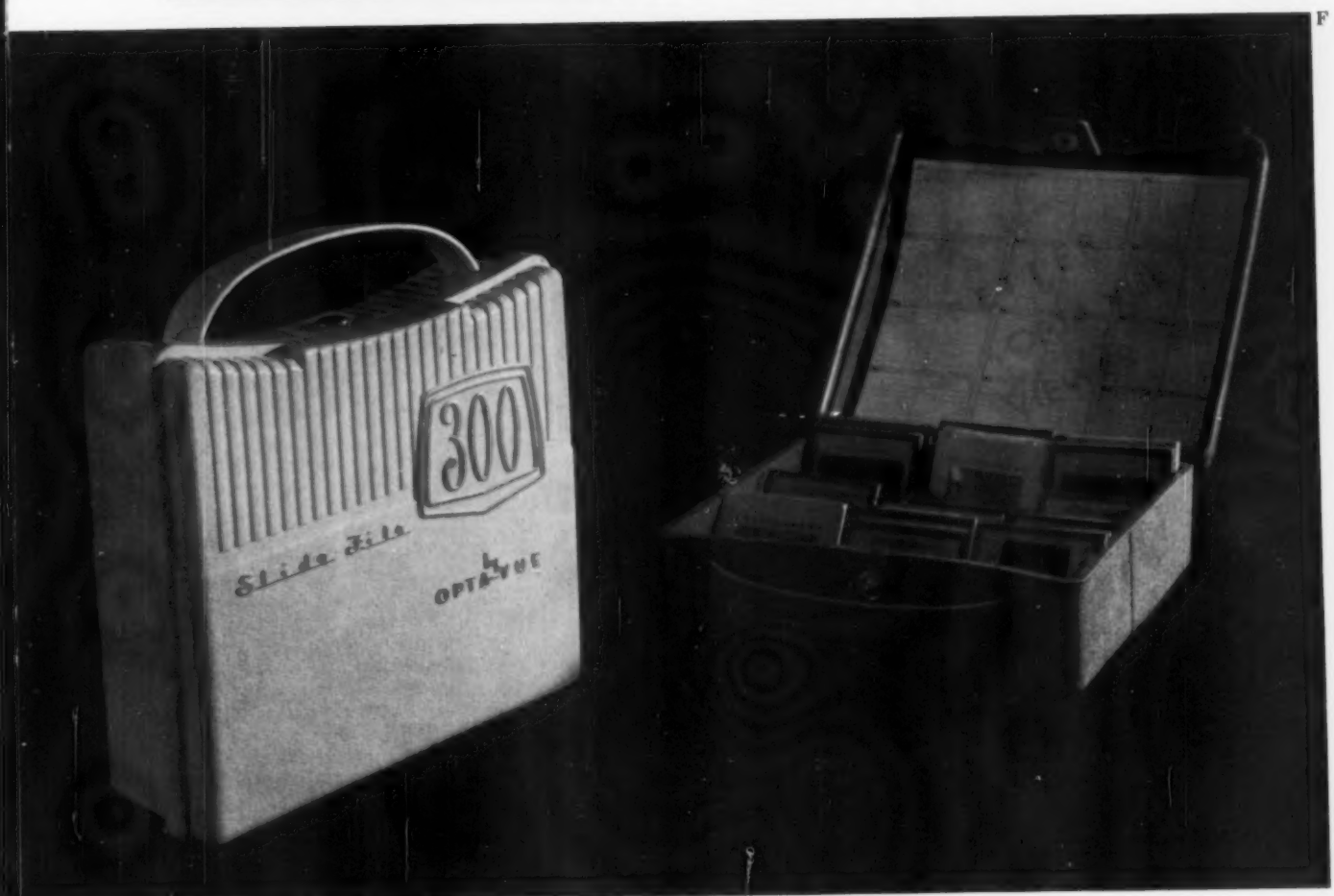
Reasons for the popularity of conventional polyethylene are apparent in the watering can **(D)** and double bucket **(B)** from Federal Tool. Light, noiseless and cheap ($3.98 each) both are designed to simplify domestic tasks. "Rainmaster" has sprinkling head that pulls off for fast pouring of its 8-quart contents; "Wash 'n Rinse" bucket will accomodate the biggest of sponge mops in each 7-quart section, can serve more pleasurable purposes (as picnic hamper, bottle toter, etc.) as well. Its over-all capacity is 17 quarts. Both designed by Reinecke and Associates.

Plastic has uses on suburban facades, as well as in backyards, as the mail box **(E)** by Plastic Products Corp. indicates. Kingsize (16½" x 7½" x4½") box is made of glass fiber-reinforced Plaskon (a polyester) to be weather proof, rust-proof. $8.95.

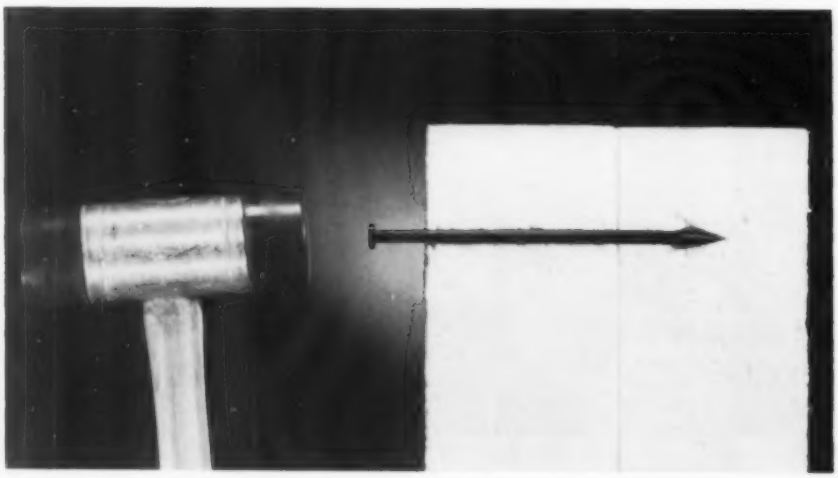
D

E

F



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



Insulating skewer

A durable polystyrene plastic skewer has been developed by the Armstrong Cork Company for close bonding foam insulating surfaces. An oversize conical tip and a large flat head give the skewer great holding power by providing a bearing surface that pulls and holds each layer of insulation tight against the preceding layer. The plastic skewers are odorless and will not rot or deteriorate in service. They can be driven into place with any light-weight plastic hammer, and are available in 3½, 4½, and 5½ inch lengths. Manufacturer: Armstrong Cork Company, Lancaster, Pennsylvania.

Plastic automotive filter

An automotive filter, which is said to be the first successful plastic filter produced in the United States, is claimed by its manufacturers to offer users substantial advantages in both design and material. Called the Mor-Flo, the filter capitalizes on the residual static electricity of its butyrate plastic body and element retainer as an added means of retaining fine settlings and preventing their recirculation in the engine. Metal bodies previously used lacked this feature. The Mor-Flo unit offers multiple filter traps and three settling areas in less space than is usually required. Used in conjunction with a steel adaptor, the Mor-Flo can be used in many makes of automobiles, trucks, and gas engines. This adaptability is an asset to the service station operator, who now has a chance to eliminate a wide range of specialized filters from his stock, thus cutting his inventory. Manufacturer: Acme Plastics Company, Pine Bluff, Arkansas.

Medication atomizer

A new type of stainless steel bottle is believed to be the first to dispense internal medication by the aerosol process. Three medical preparations are now being packaged in the bottle, which Riker Laboratories calls the Medihaler. Previous fabrication of the bottle was not possible because of the difficulties encountered in stretching the metal to form the body. But by the use of stainless steel (from Allegheny Ludlum Steel Corporation) which is free of any foreign inclusions, the bottles can now be fabricated without pits, holes, or cracks of any kind. Stainless is used because of its corrosion resistance and ease of cleaning. The bottles are made of a 3" steel blank, .010 gage; the part is formed in six draws on a transfer press. The work is done on an eleven-stage press, which curls the edges and prepares the bottles for the cap. After the Medihaler is assembled, a slight pressure on its top will spray out a measured amount of medication; dosage does not depend upon force exerted by the finger. Sources: Riker Laboratories, Los Angeles, Cal.; Allegheny Ludlum Steel Corporation, Pittsburgh, Pennsylvania.

Stainless steel rocket plane

North American Aviation's new X-15 rocket aircraft is constructed of stainless steel to combat high-temperature conditions. Designed to take man to outer space and back, this half plane, half missile is capable of speeds exceeding Mach 5. (Mach 5 is five times the speed of sound at sea level. However, the variable conditions of the atmosphere increase mph at higher altitudes.) There has previously been no manned plane built that can withstand "thermal thicket" temperatures and bring its pilot and resultant test data back to earth. The X-15 is expected to do just this.

At Mach 4 (2,720 mph above 35,000 feet), skin temperatures reach approximately 1,000 degrees F. At this temperature, conventional aircraft materials lose most of their vital strength. Although the X-15 is designed to fly over Mach 5, it will reach this speed above the earth's atmosphere where air friction is only slight. During reentry, aerodynamic heating will pose its most acute problem. To cope with this buildup in temperature, stainless steel alloys were selected for the entire airframe and skin of the plane. (Above picture shows spherical stainless steel fuel tank.) This iron, nickel, and chromium alloy, with its characteristic high strength-to-weight ratio, retains rigidity under fatigue conditions encountered in hyper-sonic flight, maintains its aerodynamic properties under high temperature, and is corrosion and oxidation resistant when exposed to the blast of super-heated air and exhaust gases.

Exact design details of the X-15 are still classified. The aircraft will be flight tested in 1959. Manufacturer: North American Aviation, Inc., Los Angeles, Cal.

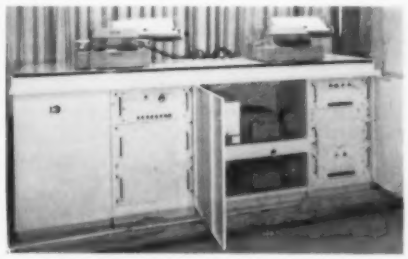
Production monitor cuts costs

Production paperwork is said to be almost completely eliminated with the installation of a Hancock Telecontrol—an electro-mechanical production control system which links all production equipment to a central dispatch room. Each production machine or

sub-assembly station in a Telecontrolled shop holds a small box which contains a red and green light, a toggle switch for operator use, and a phone jack and key-operated electrical switch for foreman use. Low voltage wires connect each machine to the dispatch room. In the control area, the machines are represented on the display panel by lights identical to the machine lights, plus four electromechanical registers. These registers automatically indicate the number of pieces produced by the machine, total operating time, and pieces required to complete any given production order. The stop and go lights are used to signal the production supervisor that a machine is operating normally, needs attention, or is standing by at downtime. The standard package Telecontrol consists of one monitor and ten control cabinets. One control cabinet serves up to 20 machine, while a monitor is required for every ten control cabinets. Manufacturer: Control Systems, A Division of Hancock Industries, Inc., Jackson, Michigan.

Computer for the power industry

The first general purpose digital computer for computing and data handling in the power industry has been delivered by Daystrom Systems of La Jolla, Cal. Based largely on a housing design by Jon Hauser, the unit will be operated by the Louisiana Power and Light Company's new Steam and Electric Power Generator Station near Monroe, La. The prime design consideration in the development of the computer was the establishment of increased standards of reliability compatible with the requirements of a power station. As a result of this design criterion, plug-in connectors were eliminated from all circuit boards, a random access magnetic core memory storage system replaced the conventional magnetic rotating drum, and transistorized circuitry did away with the necessity of vacuum tubes anywhere



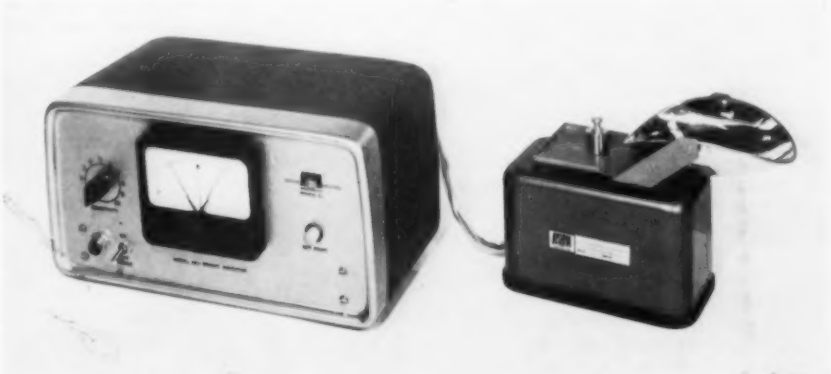
in the system. Operating information is now continuously available, and this information, plus improved alarm concepts, will allow power stations to function under more favorable conditions. Further advantages to be derived from this equipment are the improved accuracy of flow measurements by the computation of variable coefficients (e.g. pressure, temperature, specific gravity), and an ability to alter individual alarm limits automatically on the basis of other monitored information reflecting plant conditions such as plant load.

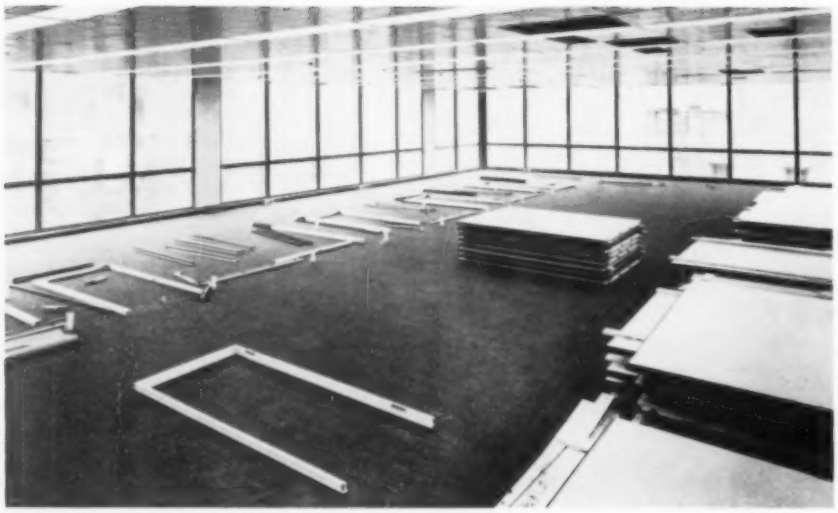
The computer was originally designed for industrial control application. While no control has been programmmed by Louisiana Power and Light, their computer is directly adaptable with the addition of a small amount of peripheral equipment. Manufacturer: Daystrom Systems, Division of Daystrom, Inc., La Jolla, California.

Small parts counted by weight

An electronic indicator is now being produced by the Avion division of ACF Industries, Incorporated, which counts small parts by weight and gives a visual indication when a predetermined package or batch weight has been reached. The 13″ x 8″ x 7¼″ unit was designed to facilitate packaging of small parts and for manual checkweighing, trimming or filling operations. It is so sensitive that 1/250th of an ounce will produce a quarter inch pointer deflection. Special performance features include rapid indication resulting from almost instantaneous response, variable sensitivity, variable set point, and a physically separate indicator unit.

In general operations, the weight indicator is used by placing the weight or number of pieces to be counted on the weighing platform. The set point is then adjusted until the pointer is centered, and the sensitivity adjusted for degree of pointer movement desired. Visual limit markers are set manually to indicate the tolerance desired. When used for counting by weight, the unit gives an exact count because its sensitivity allows for a large deflection of each piece counted. For checkweighing operations, the indicator and the visual tolerance limits are adjusted once to the desired weight. The instrument requires no further attention until the weight to be checked is changed. Manufacturer: Avion Division, ACF Industries, Incorporated.





"Totally useful" building

Clear span floors of 10,000 square feet each are the unique design feature of the recently completed Inland Steel Building in Chicago. Exterior steel columns that carry the weight of the structure, and a separate exterior shaft that houses elevators, fire stairs and water risers, and power and heat facilities, give the building a totally useful interior with the largest unobstructed floor space of any skyscraper yet built.

Modular construction techniques permit the division of each floor into offices of the exact size needed for the activities to be conducted in them. The floors are being partitioned entirely with flexible, modern movable walls utilizing extruded aluminum posts and panels of baked enamel steel alternating with panels of unpolished plate glass. This interior partition system, manufactured by the E. F. Hauserman Company, Cleveland, integrates perfectly with the hung ceiling and the cellular steel floor, as well as the exterior curtain wall structure. All components, interior and exterior, were pre-built to fit perfectly together.

During construction, each floor was assembled as a unit. First, the hung acoustical steel ceiling was installed. Then the carpeting was laid across the entire floor area. Finally the offices themselves were constructed off-the-ceiling (open at the top) to lend a feeling of openness to the wide floor areas, at the same time giving ample privacy. In use, it will be possible to make extensive changes in office space over a weekend without disturbing the normal business routine. Architects: Skidmore, Owings, and Merrill. Manufacturer: E. F. Hauserman Company, Cleveland, Ohio.

Modular industrial storage system

A radically improved and unique equipment system, designed to ease the critical storage problems of manufacturers forced to maintain large inventories of tool parts and components, has been developed by Vidmar, Inc., a division of Volkert Stampings, Inc. The system has its basis in a line of engineered metal storage cabinets built on the modular principle, which can increase storage efficiency and capacity up to 50% over present arrangements. It is now possible to store up to 24,000 pounds of materials in as little as 25 square feet of floor space. Cabinets will be made in a variety of heights and drawer sizes to provide complete flexibility of industrial needs. The complete interchangeability of the component units affords an infinite variety of interior layouts to take advantage of existing floor plans. Each cabinet has a carrying capacity of 400 pounds per drawer, thereby offering greater storage capacity on less floor space than any other known storage system.

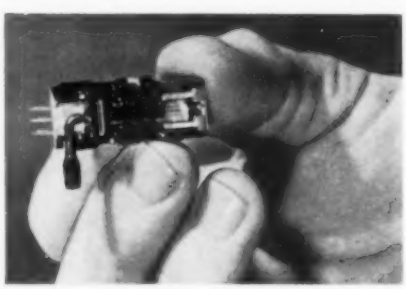
The Vidmar system supplies custom tailored space for a high concentration of many different parts; equipment is stored so as to provide complete visual inventory control at all times and to make every item immediately available. A single locking device handles every drawer in a bank of cabinets, thus diminishing the incidence of pilferage.

A new plant is being erected in Williamsport, Pa., to start volume production of the line in early summer. Manufacturer: Vidmar Inc. Division, Volkert Stampings, Inc., Queens Village, Long Island, N. Y.

Stereophonic phonograph cartridge

A ceramic phonograph cartridge that plays the new stereophonic records as well as all conventional recordings has been developed by the Sonotone Corporation. The new cartridge is only 1½" long, and by a simple adjustment will play discs at 16, 33, 45, or 78 rpm.

Stereophonic sound is the latest development in the record industry. A stereophonic record carries two completely separate sound tracks created in the original recording by two or more microphones. These dual tracks are cut in the same single groove on the record. The stereo cartridge picks up both tracks and separates them, recreating the two original recording signals; they are then reproduced for the listener through two independent amplifier and speaker systems. The effect of the sound issuing from the two speakers is claimed to be the same as if the listener were sitting in front of a symphony orchestra, hearing the selection spread out in direction and depth. The ability of the cartridge, which is low-priced for consumer use, to play both stereo and normal records with the same high fidelity will prevent the obsolescence of millions of records now in use. Manufacturer: Sonotone Corporation, Elmsford, New York.



Space-saving ball bearings

Precision ball bearings, designed with extremely thin cross-section dimensions to help bridge the gap between miniature bearings and conventional inch series instrument bearings, have been developed by Split Ballbearing Division of MPB, Inc., of Lebanon, New Hampshire. The primary advantage of the bearings, called the Midget T Series, is space saving: the manufacturers say that some sizes require less than 15% of the volume required by counterpart bore sizes in regular ball bearings—a boon for instrument

designers, whose bearing problem is space availability rather than load capacity. Each bearing has a maximum complement of balls with minimal space for ball retainers. By fracturing the outer ring to allow introduction of extra balls (which could not be inserted by conventional ring displacement assembly methods), maximum ball allotment can be maintained without loading notches. It is claimed that thousands of successful applications prove that the outer ring fracture in no way impairs the function of the bearing. Manufacturer: Split Ballbearing Division, of MPB, Inc., Lebanon, N. H.

Water-based latex paint

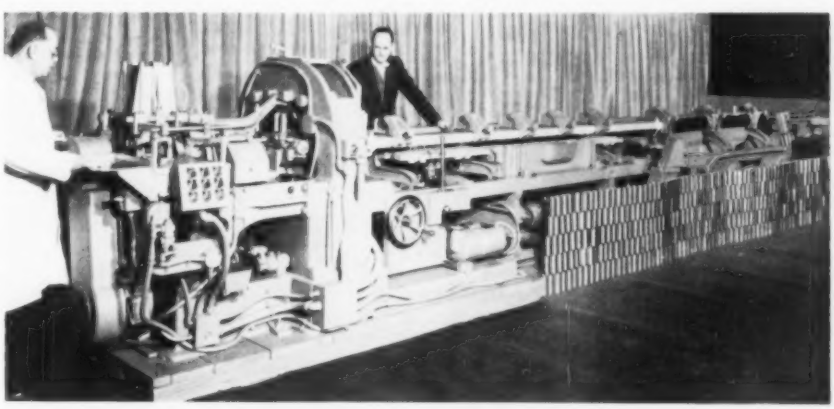
A long-range test of water-based vinyl latex paints for outdoor use is being conducted by Bakelite Company on over twenty homes and commercial buildings across the country. The purpose is to determine how various formulations stand up under a variety of climatic conditions. According to the manufacturer these paints have offered excellent resistance to moisture and to alkali often found in masonry surfaces, and are fireproof and odorless. They can be applied easily with brush, spray, or roller. The first test buildings were painted three years ago, and although final evaluations will not be made for several years, preliminary reports indicate that the coatings show weathering results equal to or better than those of conventional paints. One test house was blasted by a hurricane with winds over 140 miles per hour the day after the new paint had been brushed on, but withstood the driving sand, wind, and rain. Bakelite reports that the house still looked like new a year after the storm. Manufacturer: Bakelite Company, Division of Union Carbide, New York, N. Y.

Silicone rubber

Dow Corning Corporation has announced the availability of a new series of silicone rubbers for which they claim greater resistance to compression set at high temperatures. Developed to meet the need for more reliable oil seals and gasketing materials in automotive, appliance, and aircraft applications, these new rubber stocks have been tested extensively in conditions involving extra high temperatures and high or constant pressures. Test results show outstanding resistance to compression set at service temperatures in the range of 300 to 500°F, good resistance to commonly used lubricating oils, and uniform low shrinkage. Currently three different stocks are being produced in pilot plant quantities; all three have a serviceable temperature range from —70 to 500°F. Manufacturer: Dow Corning Corporation, Midland, Michigan.

High-temperature rivets

High-strength rivets which provide positive locking at sustained temperatures up to 800°F have been announced by the Deutsch Fastener Corporation, Los Angeles. Silver plated and made of stainless steel, the new drive-pin rivets have a minimum guaranteed shear strength of 95,000 psi, and an ultimate tensile strength in excess of 50% of AN bolts. According to the manufacturer, these time-saving blind rivets eliminate inner spot facing, solve access problems, and are ideal for use in buried hole installations. The high temperature, high strength rivets are made to close tolerance NAS 1059 diameters, and are available in two different head types—flush head and protruding head, capable of solving a variety of fastening problems. Manufacturer: Deutsch Fastener Corporation, Los Angeles, California.



Bodymaker sets production record

Tin cans are now being produced at a record rate by a high speed bodymaker designed by Hamilton Division, Baldwin-Lima-Hamilton Corporation. Volume production exceeds 500 cans per minute, and is expected to be upped to 600-per-minute in newer models. Except for the cam-actuated body clamp, all motion is crank-actuated from a centrally located crankshaft. This crank actuation system provides for precise synchronization of all motions, high speed and extreme accuracy, and easy maintenance and operator training. By redesigning the flexer, Hamilton made it possible for the machine to produce higher quality cans; flexer roll sizes were changed, anti-friction sealed bearings added, and breaker steels upgraded to improve flexing and durability. The new bodymaker is now the fastest on the market for commercial production of the billions of cans made in this country each year. Manufacturer: Hamilton Division, Baldwin-Lima-Hamilton Corporation.

Urethane unsinkability

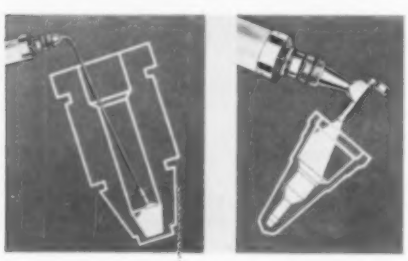
Lightweight dinghies and floating docks, with double hulls of glass-reinforced polyester, are claimed to be unsinkable by their manufacturer, Riverside Plastics Company, Mystic, Conn. The double hulls of both craft are automatically bonded together by pouring a buoyant material of urethane foam into the void between them. Besides providing buoyancy, the foam's semi-rigidity adds compressive and structural strength to both dinghy and dock. If the outer hull of either were punctured, the foam would still remain buoyant and able to support its accustomed loads.

The dinghy is a 53 lb., 7½′ boat, capable of carrying three people. It can be rowed or powered by a small outboard motor. Its maneuverability and shallow draft make it ideal for shallow streams, while its unsinkability allows it to be used on larger bodies of water. The dock is 8′ x 4′ and weighs only 125 pounds. It can transport loads of up to 1800 pounds. Manufacturer: Riverside Plastics Co., Mystic, Connecticut.

Automatic labeler

An automatic labeler which applies pressure-sensitive labels of any size or shape in exact register has been developed by the Avery Adhesive Label Corporation. With this machine, both hard and package goods may be processed at assembly line speed. Operation is simple and foolproof. Labels, die-cut and printed to specification, are furnished in rolls of various quantities up to 20,000. They are fed to an impressor which applies them individually to a specific position on the product to be labeled. At the split second that the impressor removes the label from the peeling edge, a dispensing

switch provides another label and the backing tape is carried away by the automatic re-wind unit. The unit may be mounted at any angle or used with a second machine to apply labels to two sides of a package simultaneously. Manufacturer: The Avery Adhesive Label Corp., Monrovia, California.



Industrial inspection lights

Drawing from the design of surgical flashlights, a new group of industrial inspection lights are now being manufactured which produce an unusually clear, sharp beam of light, free from filament shadows and other faults found in lights using ordinary flashlight lamps. Small shaft and lamp diameters permit these lights to be used in cavities which could not otherwise be inspected visually. Additional features are the availability of spot or diffused beam and extension shafts with or without rotatable mirrors, magnifying lenses, and directional caps. A sensitive rheostat provides for varying light intensity. Manufacturer: Welch Allyn, Inc., Skaneateles Falls, N. Y.

Rotating radio dial scale

G.E. engineers, in conjunction with the Anchor Plastics Company, have come up with a solution to the problem of decoding the mixed markings on radio dial scales. Since many twin speaker hi-fi table radios incorporate AM, FM, FM-AFC (automatic frequency control) and phonograph bands on a single flat dial scale, it is necessary for the listener to closely scrutinize the small print markings in order to make the proper selections. The use of an extruded plastic tube as the scale, with each band printed at a 90° interval, makes it possible for the individual bands to be seen and read easily.

The tube is geared to a plain knob on the front of the set; when this knob is turned, the printed cylinder is rotated 90° and automatically registered into position under the dial window. Markings can be read at a glance and station selection is facilitated. Manufacturer: Anchor Plastics Company, Inc., Long Island City 6, N. Y.

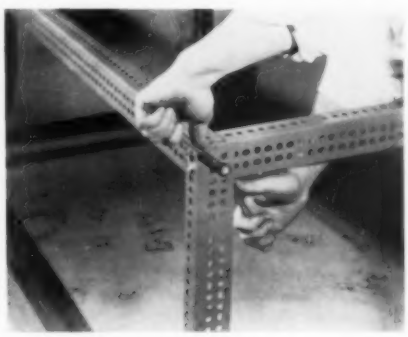
New wood finish

A new machine process that imparts a smooth, glossy, mar-resistant finish to any type of wood at a rate of 90 to 120 linear feet per minute has been licensed to wood products manufacturers. The new technique eliminates hand sanding and sealer and second coats, thereby cutting as much as 75% the cost of finishing doors, furniture, architectural panels and other wood products. The process, called "Super Microseal", was developed by Satin Surfaces, Inc., a subsidiary of General Plywood Corp.; Reichhold Chemicals, Inc. produced the synthetic resin involved.

The surfacing is done on a production line of several machines linked by a power roller and belt conveyors. Pressure and friction create heat which melts the lignin, a natural plastic in the wood's surface. This is blended with the synthetic resin, and the two form a dense, smooth, water-spot-resistant surface about 1/24" deep. It is not a film or overlay, but actually a part of the wood. Since stain can be introduced into the wood surface during the process, a final finish with the appropriate coloring can be produced for many applications. Cost runs less than one-half cent per square foot. Manufacturer: Satin Surfaces, Inc., A Subsidiary of General Plywood Corp., and Reichhold Chemicals, Inc.

All-steel framework

A wide variety of industrial frameworks, from storage racks strong enough to support heavy loads to shed-type buildings, may be assembled quickly and at low cost with Republic Steel Corporation's Bild-A-Flex steel framing. Pre-punched with a pattern of slots for easy assembly, and formed with a right angle bend along its



length for greater rigidity, the framing comes in packages containing ten sections of 10′ or 12′ sizes, and 75 sets of matched nuts and bolts. To construct a Bild-A-Flex framework, a worker need only cut appropriate lengths and bolt them together through the slots. When an original assembly has served its purpose, it can be unbolted and the individual pieces used over again. Scrap loss is practically eliminated since short and leftover lengths can be joined together or used as braces and cleats.

The short slots punched into both surfaces of the angled framing are both longitudinal and transverse. This system of slotting enables insertion of sufficient bolts at each corner of the framework to eliminate failure under load. Joint strength exceeds beam capacity in all cases. Additional beam capacity to support heavier loads can be achieved by combining lengths of Bild-A-Flex into I, T, U, or other rectilinear shapes. Both the .080 and .104 gage steel framing are interchangeable. Manufacturer: Republic Steel Corporation, Berger Division, Canton, Ohio.

Textured-finish aluminum sheet

Reynolds Metals Company has announced the availability of Reytex textured aluminum sheet which is expected to find many applications in automobile trim and decorative materials. Reytex gives a uniform mat surface, and its textured surface makes surface abrasions far less noticeable. Manufacturer: Reynolds Metals, Company, Louisville, Ky.

NO BLUE SMOKE HERE

When the Channing Corporation required new offices at 85 Broad Street, New York, they handed designers L. G. Sherburne Associates a tough problem; bringing a structure built in 1920 completely up to date. These pictures are ample evidence that the designers more than licked the problem. Here Channing's main Conference Room is bathed in an abundance of glare-free light from recessed ceiling fixtures, shielded to very low surface brightness with Honeylite by Hexcel Products Inc. A single switch closes the curtain across the glass wall, boosts illumination and starts an exhaust blower which draws air at low velocity through panels of Honeylite, finest lighting ever, without a shadow of a doubt.

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NO "FIXED" LIGHTING HERE

In Channing's Sales Management offices flush ceiling lighting is shielded with panels of Honeylite aluminum honeycomb in 2 x 4 foot modules, dropped in the ceiling grid of exposed tee rails on 2 foot centers. Just as the office partitions can be demounted and relocated, lighting units can also be easily shifted. Lighting is both flexible and free from surface glare.

NO HARSH GLARE HERE

Lighting was the result of extensive research to achieve a high quality of illumination, not merely high intensity light. It was particularly desired to avoid the harsh, unhealthy glare so easily produced with high-output lamps in "efficient" fixtures. The designers selected the extremely low angular brightness of Honeylite aluminum honeycomb panels with their highly desirable downward transmission.

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Manufacturers' Literature

The Atom, Magnetrol, and You. Magnetrol, Inc., 2110 South Marshall Boulevard, Chicago 23, Ill. 10 pp., ill., Bulletin EBWR-1. Bulletin outlines in detail the complete story of how Magnetrols are employed as major safety instruments for nuclear reactors at Argonne National Laboratory, Lemont, Ill.

Ballast Cross-reference Chart. General Electric Company, Schenectady, N.Y. Bulletin GEL-1310. Guide for selection of GE ballasts for fluorescent lamps, also lists corresponding GE units for five competitive offerings.

Bonded Rubber Meter Mounting. Lord Manufacturing Company, Erie, Pa. 4 pp., ill., Bulletin No. 601. Describes in detail a patented low-cost, bonded rubber Meter Mounting for protecting sensitive instruments against shock and vibration.

Chemical Milling and Metal Finishing. Anadite, Inc., South Gate, California. 30 pp., ill. Brochure describes the advantages and engineering applications of chemical milling, a new process which is replacing many conventional machining operations.

Ductile Iron Bulletin. T. B. Wood's Sons Co., Chambersburg, Pa. 12 pp., ill. Bulletin shows progressively how patterns and molds are made, how the foundry charges and pours the metal, how castings are machined and finished, and some end products.

Dual Manifold Filtration. Industrial Filtration Co., Dept. DMB-556, Lebanon, Indiana. 4 pp., ill. Bulletin describes the operating principles, filtering efficiency, and applications of the Delpark Dual Manifold Filter-Matic Filter.

Epoxy Resins, Marblette Corporation, 37-31 Thirtieth St., Long Island City 1, N.Y. 8 pp., ill. Brochure is a comprehensive summary of the uses of epoxy resins in various industries. Publication has three major divisions, covering plastic tooling, potting and impregnating, and coating and adhesion.

Flow Rack Brochure. The Rapid Standards Company, Inc., 342 Rapistan Building, Grand Rapids 2, Mich. Ill. Brochure describes applications for every storage requirement.

Fluorosint TFE. The Polymer Corporation of Pennsylvania, Reading, Pa. 4 pp., ill. Describes a polytetrafluorethylene base composition. Contains charts and tables comparing the properties of the new material to Teflon.

Fused Magnesium Oxide. Norton Company, Worcester 6, Mass. Publication details the technical properties of electrical grade Magnorite fused magnesium oxide This material in grain form is widely used in kitchen range surface units, immersion heaters, etc., because of its unusual properties of excellent electrical resistance and high heat conductivity.

Guided Missile Data Sheet. La Salle Steel Company, P.O. Box 6800-A, Chicago 80, Ill. 8 pp. Lists all missiles for the Air Force, Army, and Navy by name and purpose, and gives the names and addresses of the prime contractors and component sub-contractors.

Manufacturers' Literature

High Temperature Rivets. Deutsch Fastener Corporation, P.O. Box 61072, Los Angeles 61, California. 8 pp., ill. Catalog illustrates uses of Deutsch's high temperature, high strength, drive-pin blind rivets. Catalog includes specifications and application notes.

Industrial Roll Catalog. Rodney Hunt Machine Co., 50 Maple Street, Orange, Massachusetts. Catalog No. 180. Buying guide furnishes detailed information about the engineering construction, and application of all types of wood, rubber, metal and plastic rolls.

Industrial Television Equipment. General Precision Laboratory, 63 Bedford Road, Pleasantville, N.Y. 8 pp., ill. Brochure covers the most complete line of industrial tv equipment now available for business and industry. It shows various types of cameras, control units, monitors, accessories, and projection systems.

Jewel Bearing Stock List. Swiss American Jewel Bearings Co., 32-30 58th Street, Woodside 77, N.Y. A list of jewel bearings available from stock. Included are more than 30 sizes and types. Unlisted sizes or special jewel bearings will be made to order.

Molykote Bonded Coatings. The Alpha-Molykote Corporation, 65 Harvard Avenue, Stamford, Conn. Bulletin No. 115, 24 pp. Manual covers in detail the preparation of metal surfaces for the proper application of Molykote resin bonded lubricant coatings.

Pipe Lock Couplings. The Kuhn Brothers Company, 1800 McCall Street, Dayton, O. 4 pp., ill. Catalog describes the "K" series of ductile iron pipe lock couplings. Brochure PL-1 lists the specific cost-saving advantages of the fittings, the pressure ratings for various sizes, and illustrations on how to install the fittings.

Plastic Materials for Industry. Delta Products, 1400 Henderson, P. O. Box 1440, Ft. Worth 1, Texas. 144 pp., ill. Gives specifications and prices of most plastics in production today. Sheets, rods, film, tubing, and specialized plastics are covered.

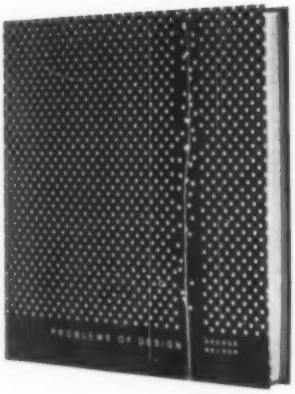
Prospectus of Society of Plastics Engineers. Society of Plastics Engineers, 34 East Putnam Avenue, Greenwich, Conn. 16 pp., ill. Summarizes activities and benefits of SPE.

The Quantovac. Applied Research Laboratories, 3717 Park Place, Glendale, California. 4 pp., ill. Brochure describes ARL's optical emission vacuum Quantometer.

Reactor Control-Rod Drive Mechanism. ALCO Products, Inc., Schenectady 5, N. Y. 12 pp., ill. This brochure presents in question-and-answer form details of the design, application, and operating experience of the mechanisms used to control the rate of heat generation in a nuclear reactor.

Thermosetting Plastic Knobs. Waterbury Companies, Inc., Waterbury 20, Conn. 8 pp., ill. This catalog contains complete diagrams, dimensions, and specifications of a representative selection of Waterbury's many plastic knobs.

Versatile Hydraulic Multipress. Denison Engineering Division, American Brake Shoe Company, Columbus, O. 28 pp., ill. Shows how a variety of problems can be solved by Denison's new hydraulic multipress.



PROBLEMS OF DESIGN

by George Nelson

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Miscellaneous

COMMUNICATIONS FOR DESIGNERS—*a program of advanced studies in design, organized by the Center for Design Studies, division, Institute of Contemporary Art, Boston, July 12-27. Communication methods studied through lectures, seminars and workshops. For designers, engineers, educators, etc. Faculty members: Stewart Walker Holmes, Gyorgy Kepes, George F. F. Lombard, Ed W. Molloy, Gordon Smith, John S. Woodford. Academic Director, James R. Shipley. Inquire: Theodore S. Jones, Director, Center for Design Studies, 230 The Fenway, Boston 15, Massachusetts.*

INDUSTRIAL DESIGNER, FIFTEEN YEAR RECORD OF SUCCESS *in Good Design giftwares. Emphasis on three-dimensional model approach to design. Most materials and techniques—turned and shaped wood, ceramics, plastics, all metals, (Including Sterling and plated holloware) bent, spun, deep drawn, soldered, welded. Project, retainer. Prefers year-round, design conscious clients in metropolitan New York Area. Write Box ID-172,* INDUSTRIAL DESIGN, *18 East 50th Street, New York 22, New York.*

FRESH IDEAS IN TOY DESIGN NEEDED *by a leading manufacturer of educational toys. Large eastern firm, marketing a prestige line, interested in any new marketable toy idea. Excellent royalty and fixed fee arrangement along with necessary facilities to promote and advertise any item in production. All ideas will be given personal and prompt attention. Wonderful opportunity; replies kept confidential. Write for details: Box ID-175,* INDUSTRIAL DESIGN, *18 East 50th Street, New York 22, New York.*

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NUMBER THIRTY THREE IN A SERIES: CONTEMPORARY THINKING ON DESIGN

A distinguished Industrial Designer interprets the expanding role of design in industry . . . how form, technique, and appearance have emerged as major factors in volume manufacturing and marketing.

"Instilling a desired corporate image in the public mind is a responsibility that the industrial designer shares with management. The designer must: 1) *create visual devices which correctly interpret management's objectives; and* 2) *apply a continuing, integrated identity program that projects the corporate image wherever the corporation presents its name and personality to the public. The impact of this image is reflected in public acceptance of the company and its products."*

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WHITNEY PUBLICATIONS, INC. 18 EAST 50 STREET, NEW YORK 22, N. Y.

For Your Calendar

Through June 1. The 10th annual design exhibition of the State University of Iowa's Department of Art. Student projects based on the theme: "Time Focus."

Through June 1. Exhibition of post-war Danish architecture and interiors at the Octagon, Washington, D. C.

May 18-21. American Institute of Decorators' 27th Annual Conference, Sheraton-Plaza Hotel, Boston.

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

May 21-22. Powder Metallurgy Parts Manufacturers Association meeting at the Greater Pittsburgh Airport Hotel, Pittsburgh, Pa.

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

May 21-23. Power Division of the Instrument Society of America's conference on "Energy Instrumentation Today and Tomorrow," at the Henry Hudson Hotel, New York.

May 25-June 22. "Swedish Textiles Today." Smithsonian Institution Traveling Exhibition. J. B. Speed Art Museum, Louisville, Kentucky.

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

May 26-30. American Management Association's 27th National Packaging Exposition at the New York Coliseum. The 27th National Packaging Conference May 26-28 at the Hotel Statler, New York. Package Designers Council dinner meeting May 28 at the Lotus Club, New York. Topic: "Significant trends and future developments in package design."

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

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

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

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

June 13-September 14. Exhibit of the work of young American designers at the Museum of Contemporary Crafts, New York.

June 15-19. Semi-annual meeting of the American Society of Mechanical Engineers at the Statler-Hilton Hotel in Detroit.

June 16-27. International Home Furnishings Market. Merchandise Mart and American Furniture Mart, Chicago.

June 19. IDI's 8th annual Design Awards luncheon at the Ambassador East Hotel, Chicago.

June 22-28. Aspen Conference on "The City, Its Basic Elements, Its Connective Tissues." Aspen, Colorado.

June 23-25. The 4th annual Creative Problem-Solving Institute at the University of Buffalo.

June 26-27. Midwest Section Conference of the Society of the Plastics Industry, Inc. French Lick-Sheraton Hotel, French Lick, Indiana.

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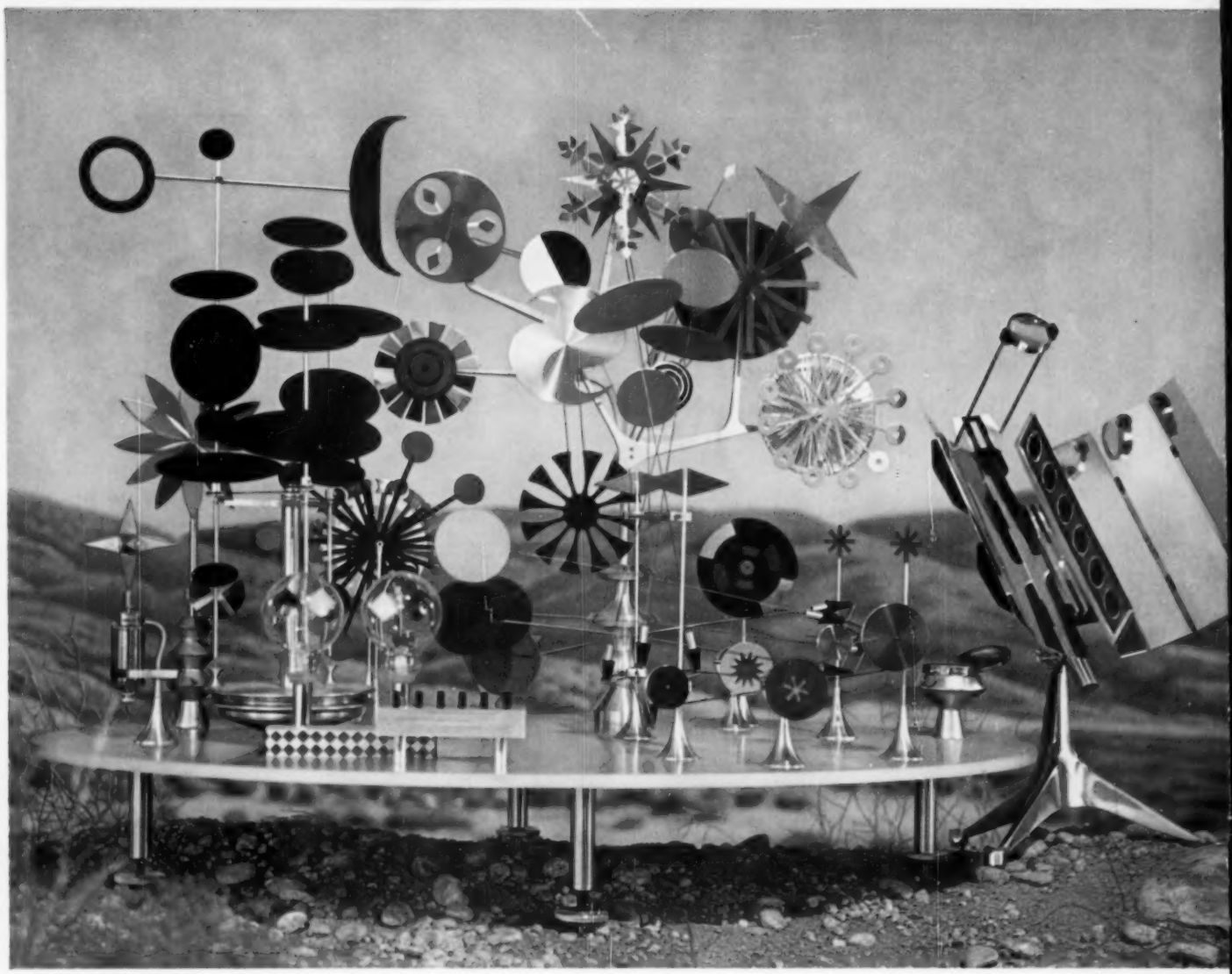

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