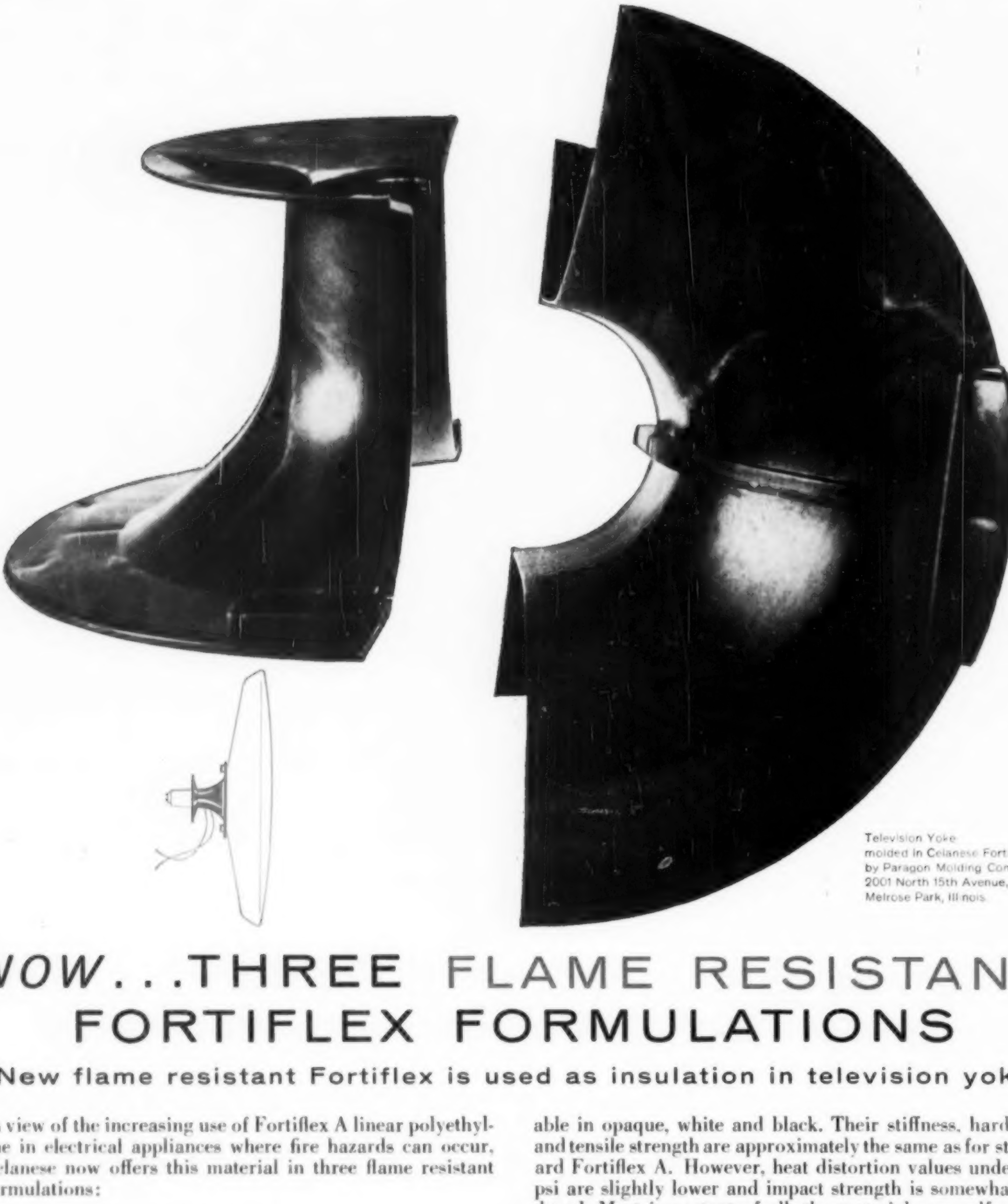
INDUSTRIAL DESIGN

1 *January 1960* *$1.50 per copy*

MECHANICAL FASTENING TECHNIQUES

PACKAGING FOR THE CORPORATION

DESIGN REVIEW: THE NEW CARS



Television Yoke
molded in Celanese Fortiflex
by Paragon Molding Company,
2001 North 15th Avenue,
Melrose Park, Illinois

NOW...THREE FLAME RESISTANT FORTIFLEX FORMULATIONS

New flame resistant Fortiflex is used as insulation in television yoke

In view of the increasing use of Fortiflex A linear polyethylene in electrical appliances where fire hazards can occur, Celanese now offers this material in three flame resistant formulations:

- **FORTIFLEX A-70-12**
- **FORTIFLEX A-250-12**
- **FORTIFLEX A-500-12**

These formulations provide a spread of melt indexes (0.7, 2.5 and 5.0 respectively), making it possible to mold a wide variety of flame resistant products. They are recommended for use in room air conditioners, refrigerators, electric motors, television sets, etc.

Flame resistant Fortiflex formulations are high density polyethylenes with a specific gravity of 1.04. They are available in opaque, white and black. Their stiffness, hardness and tensile strength are approximately the same as for standard Fortiflex A. However, heat distortion values under 66 psi are slightly lower and impact strength is somewhat reduced. Most important of all, the materials are self-extinguishing: burning rate or flammability is reduced to the point where they can be classified as non-burning materials under ASTM D-635-44.

Use Fortiflex flame resistant formulations wherever a self-extinguishing material is required.

More information is available. Write today for New Product Bulletin NP-35. Celanese Plastics Company, a Division of Celanese Corporation of America, Dept.116 / 744 Broad St., Newark 2, N. J.

Celanese® Fortiflex®

Canadian Affiliate: Canadian Chemical Company, Ltd., Montreal, Toronto, Vancouver. Export Sales: Amcel Co., Inc., and Pan Amcel Co., Inc., 180 Madison Ave., New York 16.

FORTIFLEX...a Celanese plastic

JANUARY, 1960 VOLUME 7 NUMBER

1

INDUSTRIAL DESIGN

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

CONTENTS

Coming

IN FEBRUARY—The Industrial House: a discussion of past, present and possible future developments in the design and production of the factory-made house.

IN MARCH—Contemporary European Design Thinking: a special report on the philosophy of design in Europe.

COVER: To dramatize this month's feature article on mechanical fasteners, the common open-end wrench gains enough scale to dwarf the already tiny, cast lead toy cars (source: Woolworth's) representing ID's review of the 1960 automobiles.

FRONTISPIECE: All materials age, but few do it with the grace of wood. Mei Lou Foo's photograph of a Connecticut barn door shows how wood creates its own shapes as it grows old.

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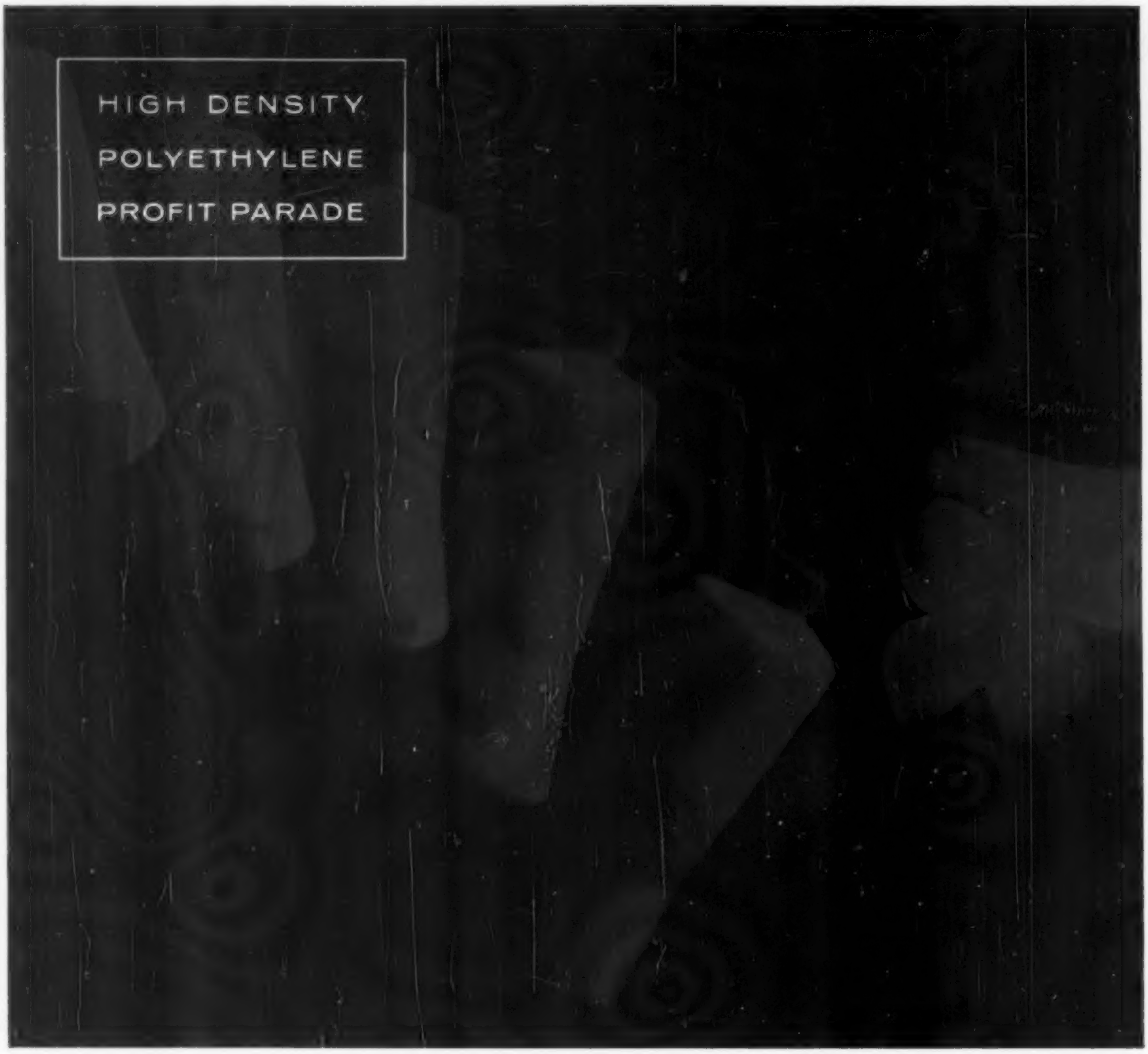

Plastics Development Pays Off for Hollow Products

If hollow products, parts or containers are important in your business you should know what blow molding and high density polyethylene from Grace have to offer. These dent-resistant, durable bottles by Owens-Illinois show a few of the benefits never before realized with other plastics and fabricating techniques.

High density polyethylene can be used to produce hollow objects such as these bottles that are featherweight yet remarkably rigid and strong, even in thin wall sections. Economies in production and raw materials naturally follow. In addition, these bottles are resistant to abrasion and virtually indestructible. They withstand refrigeration without cracking, autoclaving without distortion and exposure to most chemicals. Significantly, the Owens-Illinois no-drip bottles are comparable in cost with many of today's packages.

Blow molding also permits the use of Grex resins that result in superior strain-free characteristics, often difficult to achieve by other techniques.

Sound interesting in terms of the products you make? Then you'll also be pleased with the surprisingly low mold costs, too. For the full story on this versatile plastics development call in the high density polyethylene experts. Grace has the production facilities, technical service and experience to help put your product in the Grex profit parade. Everyone says we're easy to do business with.

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

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

Coming in the February 1960 *issue of*

INDUSTRIAL DESIGN

The Industrial House

For more than forty years great things have been responsibly predicted for the factory-made house and great experiments have taken place. But nothing much has come of it, and prefabricated housing as it exists today is only one step beyond the handcrafted product that has been around for centuries. Why has a realizable product—with so much to offer both business and consumer—failed to materialize? There are many reasons —ranging from business practices, to building codes, to confused concepts of what a house should be. ID examines them all in a special article, and in the process reviews the past, present and possible future of the industrially-produced house.

"Package Deal"

ID believes that consumers ought to be heard as well as sold, and occasionally discovers one who deserves to be. In a very funny article, with very serious implications, English professor Frederick L. Gwynn treats packaging problems from the standpoint of the man to whom the average package is neither a sales agent nor a corporate badge but a container that he wishes were more reasonably conceived.

Compasso d'Oro

La Rinascente, Milan's famous large department store, this year gives its golden compass for excellence in design to nearly a dozen Italian products including an electronic printing calculator and an automobile.

Essential Design

A design educator offers his view of the state of industrial design today, relates this to design education, and explains why he believes that the problems of design education are inseparable from the problems of all education, and the problems of design are inseparable from the question "What is man?"

Micro-Circuitry

A revolutionary development eliminates such "passive" circuit components as resistors and capacitors by replacing them with film collected from vaporized metals. The result will be an astounding reduction in the size of computers.

Design for Reservations

American Airlines gets ready to install a newly designed system of processing reservations and flight information faster and more efficiently than ever before.

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

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Whitney Publications, Inc.
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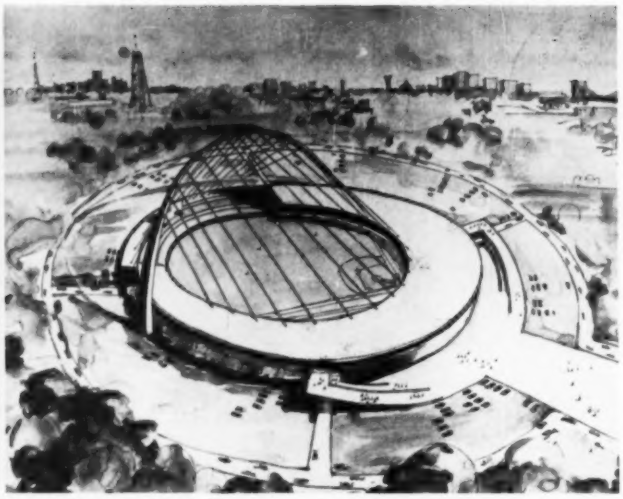
Dome within a dome for metal society's headquarters



Rendering of retractable roof for baseball stadium

Dome as architectural detail

Standing irrefragably rational amidst the profusion of natural forms in the rolling countryside of northern Ohio, the geodesic dome shown above has no sheltering function and is structurally independent of the buildings under it. Although it serves no practical purpose (an aloof roof, a hipster might call it), the dome does have a reason for being. Designed by R. Buckminster Fuller for the headquarters of the American Society for Metals at Novelty (*sic*), Ohio, it is simply a symbol intended, according to its builders, to dramatize "man's mastery of metals."

The dome, which is supported on five concrete- and steel-based pylons, has a diameter of 250 feet and rises 103 feet at the zenith. It is composed of 13 miles of (Kaiser) aluminum tubing and tension rods and weighs 83 tons. Stresses of 125,000 pounds developed by the outward thrust of the dome are resisted by a 272-foot-diameter tension ring sunk 18 feet into the ground. The contractor calculates that the supports will withstand an 8-inch coating of ice on each of the dome's 65,000 component parts.

To achieve a stabilized structure with a minimum number of members at each joint, there are actually two domes, one within the other. The twin domes are 30 inches apart and are linked by 4-inch tubing at the points of the hexagons, which, in turn, are "strutted" radially by the tension rods.

The dome is certainly a major engineering achievement; and in a society for which Utility is the criterion of Value, so spectacular a pure symbol merits attention. It may well be a sign that American business has grown wealthy enough, and foolish-wise enough, to order its buildings with a view to the creative exercise of imagination as well as to the usual utilitarian purposes for which buildings are raised.

Seminar on product symbolism

A 150-page report on "The Effectiveness of Advertising on Purchase Decisions," outlining what its authors call a new theory for measuring advertising effectiveness, was presented by the Center for Research in Marketing at a clients' seminar held in December in New York.

The study is based on 172 depth interviews and, according to Center President William Capitman, "is intended as a realistic appraisal of what advertising really does." The fundamental thesis of the report, which contains a set of heterodox hypotheses concerning the relationship of product, advertisement, and consumer, is that advertising is not a universe of facts and information but one of symbols and needs. One of the chief corollaries of this notion is that a consumer is not induced to purchase a product for the reasons advertisers think he is. That is, in direct contrast with commonly accepted advertising theory, an advertisement is effective not because it convincingly vaunts the superior qualities of the product (in fact, the study says, consumers are from Missouri with regard to such claims), but because it symbolically portrays or creates a need—a "tension," in the jargon of the report—which can be satisfied or resolved only by purchase of the particular brand of product advertised.

The seminar was attended by representatives of the following design firms: Alan Berni & Associates, Donald Deskey Associates, Frank Gianninoto & Associates, Raymond Loewy Associates, and Jim Nash Associates, all of New York City.

Retractable roof for baseball

For the proposed stadium in New York's Flushing Meadows, Mayor Robert F. Wagner's baseball committee is considering a design for a retractable roof submitted by Jim Nash Associates to sports impresario William A. Shea, committee chairman.

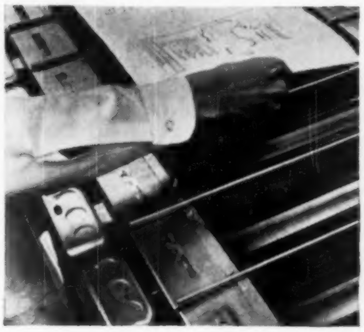
A speculative sketch of the skeleton of the roof (above) by Oscar Nitzchke, for the past year head of JNA's architectural services department, was given nationwide publicity on the sports pages of the New York Times recently.

Details of the roof-housing (when retracted) and of closure-retraction mechanism, not shown in the sketch, are being kept top secret at JNA. The roof would consist of accordion-pleated Plexiglass sections which would open and close along the ten permanent cables that link the 310-foot-high arch with the top deck of the stadium. Cost of the roof is estimated by Nash at $1,750,000, or about half that of any other retractable roof proposed so far.

THIS IS GLASS

A BULLETIN OF PRACTICAL NEW IDEAS FROM CORNING

HOW TO GET MORE USEFUL HEAT PER KW



It's not much to look at, but our new VYCOR Brand Radiant Heater is loaded with advantages for those involved with drying, baking, curing or pre-heating.

The basic appeal of this unit is the kind of heat it gives you—*long wave;* efficient because it's readily absorbed.

These long waves are emitted from wire coils enclosed in tubes of 96% silica glass. And the tubes (made from one of our rugged VYCOR brand glasses) resist heat, heat shock, and corrosion.

Long wave output is just one reason why your kilowatts will yield more useful heat. This heater also has a reflector *system* that includes a platinum strip bonded to one side of the tubing, and two layers of aluminized steel with Fiberglas insulation in the housing.

Result: Between 85 and 90% of the available radiation is directed to your work.

With VYCOR Brand Radiant Heaters mounted horizontally above or below your process line, you average 20 watts per square inch of working space and get full heating (800-850°F) in three minutes, so there's no costly warm-up delay. These units cool quickly, too, so you don't need complex equipment for diverting heat after shutting off the line.

Heating tubes come in 14″, 26″, 38″ and 54″ lengths, mounted in twos or fours. You get each unit complete with frame, reflector sheet, junction box, mounting hangers and leads.

More facts? Use the coupon.

NEW MATERIAL FOR MISSILE MAKERS AND OTHERS WITH HIGH-TEMPERATURE PROBLEMS

The biggest drawback to fused silica, despite its many desirable thermal and electrical properties, has been the limitation on sizes and shapes available.

No more. Now Corning comes up with Multiform Fused Silica—a combination of a unique process and a versatile material.

With Multiform Fused Silica you can put the useful properties of fused silica to work in shapes and sizes that previously were unattainable.

For example, you can now have cylinders, domes, crucibles, rods and slabs—in sizes equal to any achieved by conventional ceramic forming processes.

Corning's new Multiform Fused Silica offers the unique thermal and electrical properties of fused silica in shapes and sizes that up to now were considered impractical.

Softening point for this new material is 2880°F; you can design for *long-term* use at temperatures over 1770°F, intermittent up to 2250°F.

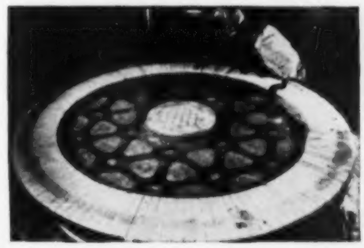
Resistance to thermal shock is high, since coefficient of expansion is 3×10^{-7} per degree F.

This new material also displays an extremely stable dielectric constant and a low loss tangent over a broad temperature range. Example: At a frequency of 8.6×10^{9} cps, the dielectric constant is 3.58 at 77°F and 3.57 at 750°F.

Through either slip-casting or dry pressing you end up with an object (a radome, perhaps?) that has an opaque, fine-grained structure machinable to tolerances of plus or minus .001 inch.

For samples of and/or detailed specs on new Multiform Fused Silica, mark the coupon and send it to our New Products Division.

A MIRROR FOR THE STARS



This is a glass telescope mirror blank that measures 84 inches across and weighs 4,000 lbs.

We made it. And we did it with a new process in which solid chunks of glass were placed in a mold and *sagged into a single piece* under intense heat.

Back in the thirties we also made some big mirrors. But then we ladled molten glass into molds and came up with a 200-inch disk for the Hale Observatory on Mt. Palomar and a 120-incher for the Lick Observatory.

Our new sagging approach improves quality. It also costs less and is less complicated.

Seven months the disk was annealed. Now at the Kitt Peak Observatory in Arizona, grinding and polishing will go on for an estimated 24 months. Final polishing will be done after the telescope is fixed on a star. Time for that? Another year.

Leading us to these facts: Patience is part of the art of the astronomer. And Corning can do almost anything with glass—be it a "one-shot," hand-tailored piece or *mass production of small items at a very rapid pace.*

Find out for yourself. The basic references are "This is Glass" and Bulletin IZ-1, "Designing with Glass for Industrial, Commercial and Consumer Applications."

Or outline your need in whatever detail seems feasible. Could be your star is just around the corner, with glass by Corning.

CORNING MEANS RESEARCH IN GLASS

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

Please send me: ☐ "Corning Industrial Heaters"; ☐ Information on Multiform Fused Silica; ☐ "This is Glass"; ☐ Bulletin IZ-1

Name .... Title ....

Company ....

Street ....

City .... Zone .... State ....

Russian consumer packages at PMMI show

Soft-pack and hard-pack cigarettes

Ready-mix dessert and candy ball packs

Iron Curtain packaging

Two recent packaging events—a meeting of the Western Packaging Association in Los Angeles and the New York show of the Packaging Machinery Manufacturers Institute (reported at right)—produced some glimpses of Russian packaging for consumer goods (above). At the PMMI show, Milprint, Inc. displayed a selection chosen primarily as examples of sophistication—or lack of it—in printing processes and materials. Those shown at the WPA meeting were collected by designer Walter Landor and were illustrative material for a talk he gave on Russian package design.

While the Soviet government is officially uninterested in anything beyond utility packaging, Mr. Landor noted that merchandising actually is a factor in Russian package design. "Shopping is a welcome diversion," he said, "because of cramped living quarters and lack of privacy at home, and so there is an attempt to glamorize 'public' life." An elaborately detailed ready-mix dessert package uses the Leningrad subway station for a motif, and the pack for an expensive cigarette uses a restrained Napoleonic emblem. Laika, the Sputnik dog, turns up on a popular-price cigarette pack, and whimsy—of a kind—appears on the peddler's-pack cellophane wrap for an orange flavored candy ball: the corners of the cellophane are printed with green leaves.

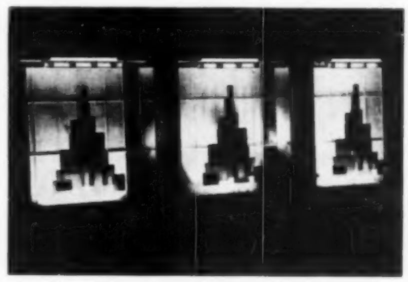
Packaging machinery show

Nearly 160 exhibitors were represented in the show of package machinery sponsored by the Packaging Machinery Manufacturers Institute, held at the New York Coliseum last month. The display included all kinds of packaging machinery to wrap, box and label various products. Among the machines was equipment for labeling and wrapping; can, bag, bottle, envelope and tube fillers; sealing machines, imprinting machines, carton formers, counting equipment, bottle cleaners; electronic controls, adhesives, scales, plastics, foils, papers and cardboard. According to results of a questionnaire circulated among the exhibitors, the largest future demands for equipment will come from the pharmaceutical industry, with frozen foods and cosmetic makers second. The emphasis in innovation will be in the direction of speed, the questionnaire indicated, with packaging machines becoming faster and more automated in the next few years. The next PMMI show will be held in Detroit in 1961.

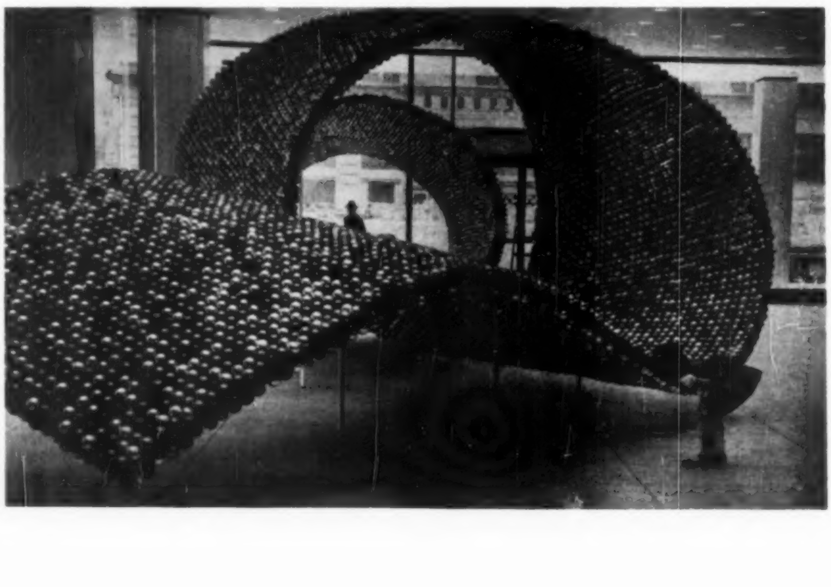
Christmas for unfinished business

Two of New York's unfinished office buildings got special displays (right and below) for the holiday season. Pepsi Cola's new tower by Skidmore, Owings & Merrill, completed as a structure but still being furnished and equipped inside, astonished passersby with a huge coiled "ribbon" of Christmas balls on its empty ground floor. The design, by Brownjohn, Chermayeff & Geismar, took six weeks from commission to completion and is composed of a 9 by 85 foot length of wire mesh coiled into a form 60 feet long, 12 feet high, and 20 feet wide, supported by an aluminum frame. Both surfaces are embedded with a total of 25,000 Christmas balls, brought from Germany for the job. It is lit by special floods at the base and by the building's general ceiling lighting. Displayers, Inc. of New York were the fabricators.

Several blocks across town the ground floor bays of the new Time & Life Building along Sixth Avenue were decorated for the season with a 16-feet high cubist Christmas trees made of red, blue, and green Plexiglas panels. Reflected light, bounced from white back walls, illuminated the trees after dark and made them glow like stained glass. Each tree was composed of 16 panels held in place by fine steel cables bolted under tension to the top and bottom of the windows. Norman Gardner, Director of Display at Rockefeller Center, designed the display. The Time & Life Building itself, also in the final stages of interior finishing, is by Harrison & Abramovitz.



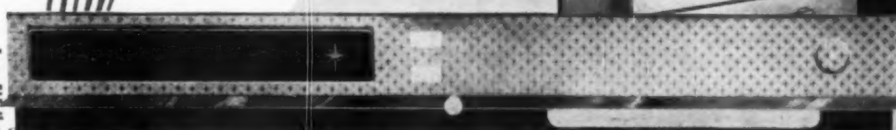
Time-Life Building Christmas trees of colored Plexiglas panels (above) are held in tension by steel wires between window bays. Pepsi Cola Building ground floor display (below) is a ribbon-coil of multi-colored Christmas balls.



CroRoto textured metal...

SPICE

FOR YOUR STOVES



CroRoto, stove makers have found, adds just the right amount of spice to their recipe for a cook-appealing range.

The custom textured splash panel, in a satin and bright starburst, makes every owner of a George D. Roper Corp. range feel like an "Epicure".

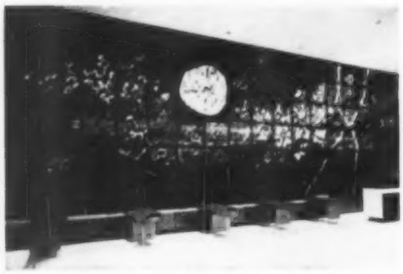
Spice-magic is yours in over 60 tantalizing CroRoto and RolDie patterns, richly fabricated and finished at Croname's huge, efficient new 8½ acre facility. Available in all standard anodized, lacquered, painted and plated finishes on any metal. Highly workable-easy to clean-scratch resistant.

Write for our new 65 page catalogue (ready Oct. 1) on your firm letterhead. Call your Croname representative for other decorative metal or glass recipes.

ROPER "EPICURE" RANGE
DESIGNED BY
JACK MORGAN ASSOCIATES
(ASID) CHICAGO

CroRoto Division
CRONAME INCORPORATED
6243 HOWARD STREET
CHICAGO 48, ILLINOIS

BOSTON CEDAR RAPIDS CINCINNATI CLEVELAND DETROIT INDIANAPOLIS
LOS ANGELES MINNEAPOLIS NEW YORK PHILADELPHIA ST. LOUIS SYRACUSE



Electronic mural in new KLM office

Events and Awards

Sundberg-Ferar, Inc. has announced an **international apprentice-designer program.** The first apprentice to participate in the new program is Bernard Guineau, a 24-year-old student, from Limoges, who is sponsored by the Société Franco-Americaine Atlantique.

An **electronic mural** (above) designed by **Gyorgy Kepes**, professor of visual design at Massachusetts Institute of Technology, has become the dominant decorative feature of the KLM Royal Dutch Airlines ticket office on Fifth Avenue. The mural, which serves as one wall of the office, is 51 feet long and 18 feet high. In its grey aluminum screen surface are about 60,000 random perforations, some with colored glass placed behind them. A bank of lights flicker behind the glass, creating the effect of a mobile mosaic and suggesting a cityscape at night.

The touring **Corning Glass Exhibit** now at New York's **Metropolitan Museum of Art** includes 300 pieces selected from 1814 submissions of manufacturers or free-lance glass designers in 23 countries. The judges were Leslie Cheek, Edgar Kaufmann, Jr., Russell Lynes, George Nakashima, and Gio Ponti.

The **Design Engineering Show**, the annual exposition devoted to the research and development of new products, will occupy all four floors of the New York Coliseum during a four-day run there, May 23 to 26. Over 400 exhibits will be shown.

Honorable Robert C. Watson, commissioner of patents and **Honorable Frederick H. Mueller**, secretary of commerce, greets **Mr. S. M. Weingast**, president of **Precision Apparatus Co., Inc.** (right), at the formal opening of the **Electronics Industry Patents Exhibition** in Washington, D. C. Devoted exclusively to the electronics industry, the exhibition featured live displays, products and case histories.

The **American Institute of Graphic Arts** is asking for entries to its annual two-part exhibition, **Design and Printing for Commerce/50 Advertisements of the Year.** Eligibility for Design and Printing for Commerce is open to all advertising pieces, other than space advertisements, produced in excess of 500 impressions in the U. S. or Canada between September 1, 1958 and September 1, 1959. Eligibility for 50 Advertisements of the Year is open to any advertisement that appeared in any regular published American or Canadian periodical between the same dates.
All entries to be addressed to Design and Printing for Commerce, The American Institute of Graphic Arts, 5 East 40th Street, New York 16, New York. Deadline is January 15, 1960.

Graphis Press, 45 Nuschelerstrasse, Zurich, Switzerland, is planning a new volume on window display. Designers are invited to send good photographs of their best work executed since 1951. Deadline for receipt of submissions is February 29, 1960.

People

APPOINTED: **William Blau** (below) and **C. Craig Paul** (below) as vice presidents of Harley Earl Associates. . . **William R. Brewer and Clair A. Samhammer** as staff designers for Melvin Best Associates . . . **Daniel D. Webb** (below) as staff product designer for Lawrence H. Wilson Associates . . . **Thomas Downey** and **Robert Sioss** as assistant design directors at Lippincott and Margulies . . . **William E. Balla** as executive designer with Merendino Greene and Associates, Inc. . . . **Alexander Forest** (below) as consultant on Mayor's Housing and Urban Renewal, N. Y. . . . **T. J. Lopatka** (below) as assistant to the president in charge of industrial relations for Consolidated Paper Company . . . **Robert B. Rockwood** as designer in the Light Military Electronics Dept. of General Electric Company . . . **Ralph F. Thompson, Jr.** (below) as manager for Reynolds Metals Company . . . **Eli Orshansky** and **Alexander V. Fioretta** as project engineers for Poly Industries, Inc. . . . **Dru Dunn** as creative head of Barclay Manufacturing Company.

ELECTED: **R. John Lowery** to Board of Trustees of the Parsons School of Design.

Bill Lam (below) discussed architectural lighting in talks given to architects and engineers in Orlando and Sarasota, Fla.

Company News

RETAINED: **Le Corbusier** to design the new Visual Arts Center for Harvard University . . . **Van Dyck Associates** by The Dictaphone Corporation . . . **Jaap Penraat Associates** by KLM, Barton's Candy Corporation, A.P.A. Lloyd, Pierce Industries, Inc., Popular Merchandising Corporation and Science Materials Center.

NEW OFFICES: **Robert Benham Becker** has opened a design office at 480 Lexington Avenue, New York . . . **Jaap Penraat Associates**, 315 Central Park West, New York, has formally announced its operation as a design office; members of the firm are Kees Van Dyk and Patrick Farrel, associate designers; Michael Beitler, draftsman-designer.

Erratum

In the November issue the typeface illustrated on p. 61 is Craw modern. The alphabet printed at the bottom of page 63 is an example of Fortune type.

Watson, Mueller, Weingast

Lopatka

Paul

Forest

Blau

Webb

Lam

Thompson

Student Louis Richards (background) and instructor Jay Doblin, of the Illinois Institute of Technology, examine the original working model of the "skeeter." Suggested uses include: sightseeing, factory personnel transport, mail delivery and travel to commuter stations.

LOUIS RICHARDS' PORTABLE ALUMINUM POWER SKATE has won an Alcoa Student Design Award for the Illinois Institute of Technology senior. This award, part of an integrated Alcoa program with leading design schools, is administered under the direction of the school faculty.

His award-winning project was selected by a faculty committee from a "minimum transportation" program assigned the class by instructor Jay Doblin. The challenge: design a transportation system to replace the automobile, yet depart completely from its basic engineering and design.

An aluminum platform 9½ in. wide and 18 in. long, the "skeeter" pivots on dual-wheel axles, front and back. Its rider steers by leaning in the direction he wants to go, can wheel the platform around in a 4-ft circle. The 9-lb power skate will run for 20 minutes on three ounces of gasoline and may be disassembled quickly and fitted into a handy carrying case.

Richards designed in aluminum, because only aluminum economically combines the required light weight with inherent resistance to corrosion. Anodizing gives aluminum gem-like hardness; can add the appeal of color at low cost, too. The Alcoa Student Award encourages and rewards college students who, like Louis Richards, already show great promise as designers.

ALUMINUM COMPANY OF AMERICA, PITTSBURGH 19, PENNSYLVANIA


For new design flexibility... beauty ... long life!
SPECIFY SHARON STAINLESS
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The Ground Floor

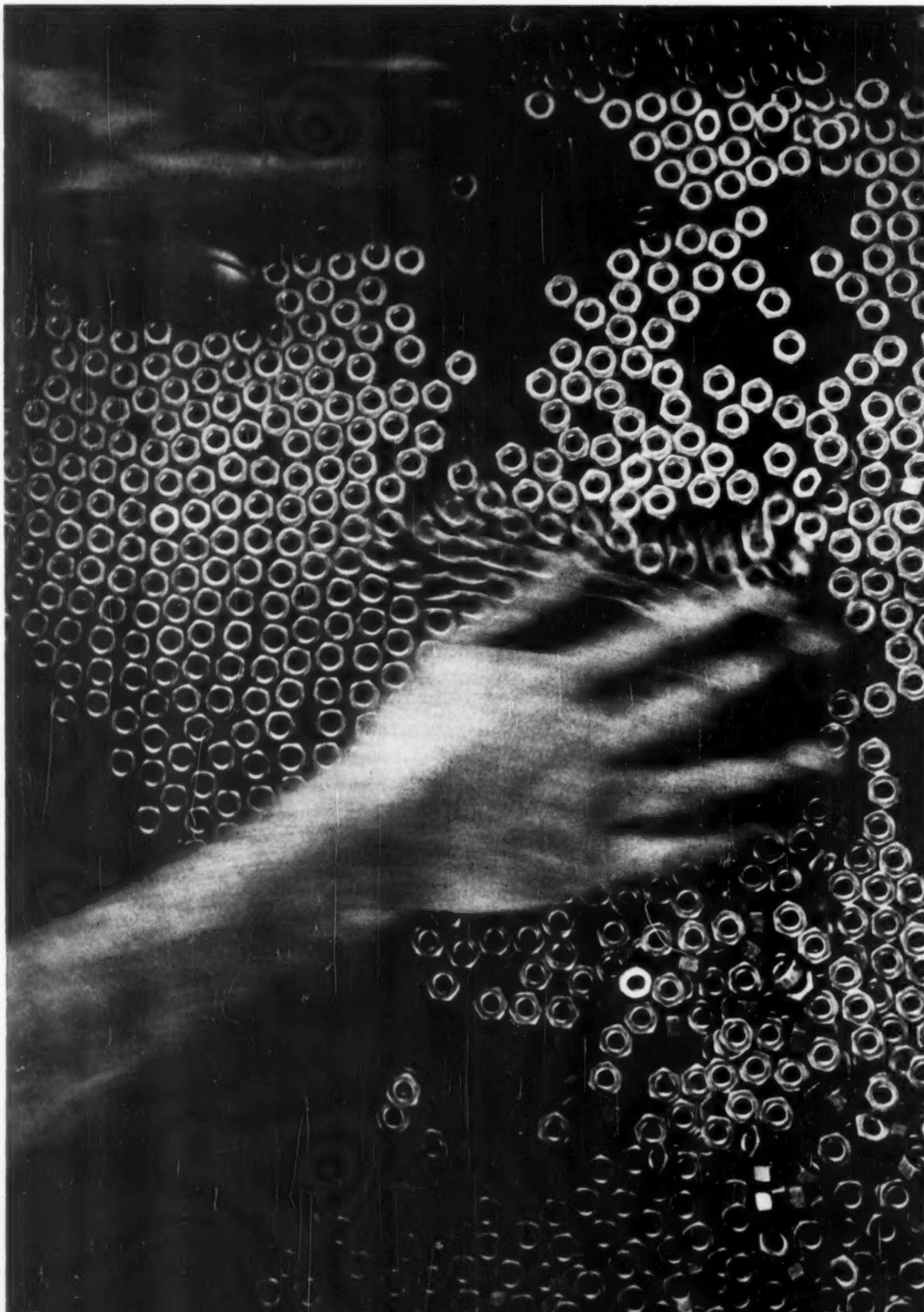
Everybody who reads has his own personal classic—a great book that no one else seems to have read, and that hardly anyone else seems even to have heard of. The dilemma in such cases is whether to keep the treasure to oneself, and finally pass it along privately like an heirloom, or to make the enthusiast's aggressive attempt to recruit the readers it deserves. In our case the book, a family legacy, is an American novel called *The Rise of David Levinsky,* written in 1917 by Abraham Cahan. It is an unfavorable, but sympathetic, study of a business leader's opportunistic career. We have been reading it, off and on, since the thirties, without ever feeling impelled to breathe a word about it, and the reason for breaking silence now is the realization, during a recent re-reading, that the book makes an important (and more valid than ever) point about the place of design in industry.

Cahan's novel deals with immigrant life in America, and incidentally traces the growth of the garment industry as it progressed from craft to mass-production. In ethnic terms this marked the transition of cloak manufacturing from a German-Jewish enterprise to a Russian-Jewish enterprise. As a fact of American mercantile history, this transition is not noteworthy here, but the reason Cahan gives to explain it has profound revelance to all mass-production manufacturing. Since ". . . the German-American cloak manufacturer was primarily a merchant . . ." Levinsky explains, ". . . he was compelled to leave things to his designer and a foreman." His experience and his talents had to do with the distribution of products, rather than with their creation. "Our people, on the other hand, were mostly tailors or cloak operators who had learned the mechanical part of the industry, and they were introducing a thousand innovations into it, perfecting, revolutionizing it. We brought to our work a knowledge, a taste, and an ardor which the men of the old firms did not possess."

What transformed and enlarged the industry, Cahan is saying, was the appearance of firms that *began* with form and technique, firms in which marketing was integral to design and production technology because it followed them naturally. This was possible because although management was distinct from design and production (as the labor problems of the period attest), the men in charge of selling goods understood fully, and pretty much at first hand, the process of making goods. Thus manufacturing was integrated not by a devised "integrated program," but automatically; and any automatic process is the result of first things coming first.

In an economy so complex that management itself has become a specialty, however, integration no longer happens automatically; in 1960, first things have to be *made* to happen first. This is where the industrial designer comes in: at the beginning, as part of the making process. And any management that regards the design of products as just a marketing tool is a throwback to the 19th century cloak merchant who disappeared because he was cut off from the creative function, and subordinated it to merchandising.

There is of course nothing new in arguing that the designer should be included in the initial stages of product development. This is most often presented as "essential to marketing strategy" by those who believe design should be "in on the ground floor." But in a sanely conceived production structure—whether of summer frocks or tractors—there can't be any ground floor without design. That is the significance of consulting a designer at a product's inception: he can bring to all industry a knowledge, a taste, and an ardor which few other industrial professionals possess.—*R.S.C.*



Courtesy Russell, Burdsall & Ward

MECHANICAL FASTENERS: TINY PRODUCTS, MAJOR INDUSTRY

An industry that plays a significant behind-the-scene role in product design has introduced innovations in the "behavior" of nuts, screws, rivets, and other fasteners, and new materials are being used to meet the demands of advancing technology. The second installment in a series on fasteners and fastening techniques.

by Arthur Gregor

It may sound pretentious to attribute modesty to merchandise but the fact is that mechanical fasteners are industry's most "modest" products. There is something so obviously fundamental, so clearly basic about the expression "a nut and a bolt" that it almost carries with it an air of condescension, and yet these trifling little parts which many purchasing agents and engineers would like to forget about, literally hold together the "backbone" of product design—as essential to product manufacture and to product use as the very materials which these little workers, the coolies of western industries, bring together in a workable bond. Their importance to the overall industrial picture is no doubt best illustrated by the fact that American industry spends about a billion dollars a year on them, and that some companies buy one million dollars' worth per year. The services these tiny essentials perform are about as obvious as the parts themselves, and as diverse. Few are the products—if any—in which they are not to be found. For they fasten, join, lock, attach, seal—permanently or provisionally—not only parts but parts of parts, and unify them into a single product.

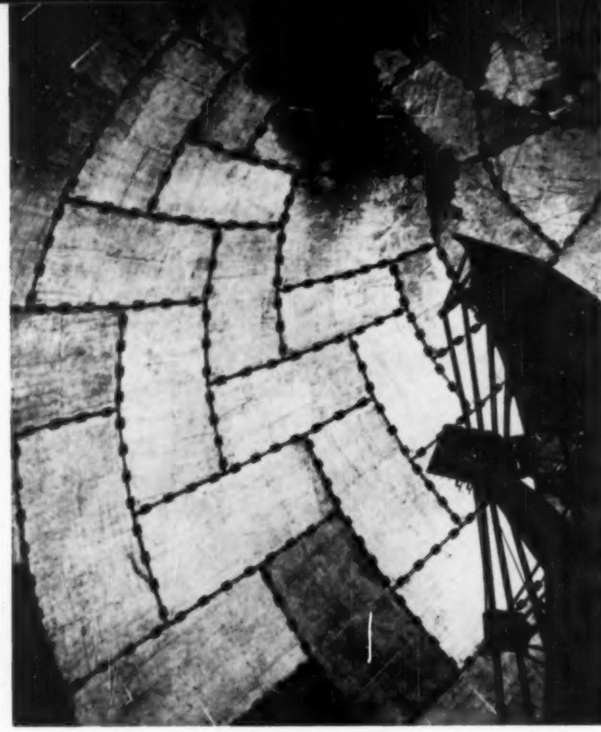
To the product user, their existence is so obvious that he ignores it. For he either does not see them at all, or identifies them with a product's function and is hardly conscious of them as entities in themselves. The rivets inside a metal container which turn material into a container by joining its sections, and which give strength to its structure, are of course not seen by the user. The lock he opens to use the container is in his mind simply part of the container. Yet these little devices, so apparently modest in the way they "merge" into the function they perform, do make demands of their own, exist in an unbelievable variety, and deserve consideration equal to that given other components in product design and product manufacture.

The engineer's approach

Unlike welding (see ID June 1959 for first article in this series) "the science of nuts and bolts" is not a significant branch of engineering. Fastener types are generally divided into two major categories: *standard* fasteners, and *special* types. A fastener is classified as standard if recognized as such by the American Standards Association. Standard types are usually those needed for medium-sized products and up (appliances, cars, trucks, boats, machinery, pumps, heavy industrial equipment, and nearly all building construction work). Special types, although they may be in standard use, have not been formally classified; they are generally the self-locking, self-cutting types used extensively for light weight assemblies of electronic products.

For engineers there are a number of handbooks (*Handbook of Fastening and Joining of Metal Parts* by V. H. Laughner, A. D. Hargan, McGraw-Hill; *Fasteners Handbook* by J. Soled, Reinhold; and others) which serve as guides to specifying the exact type of bolt and thread for the best possible jobs. These books indicate how to determine correct fastener dimensions and values (hole size before threading, screw threads, clearances, holding force, etc.) and list the dimensions and mechanical properties of

Fasteners are used prominently where they are part of a product's function as in this container; Simmons' LINE-LOCK.



These fasteners used to join radome fiberglass panels also contribute pattern; Simmons' DUAL-LOCK.

DESIGNERS CAN CONCEAL FASTENERS, OR INTEGRATE THEM INTO TOTAL DESIGN MOTIF

most standard fastener types. Special fastening problems will of course require appropriate handling, but generally it is safe to say that an engineer or anyone wishing to specify a standard nut and threaded bolt needs to follow these three basic steps:

1) determine the holding force in pounds required of the fastener;

2) select the correct *material* and diameter of the fastener to obtain the calculated holding force;

3) determine the tightening torque which will yield the necessary holding force.

Selecting the correct material for the fastener is obviously a very important aspect of fastener specification and in determining the best material for a threaded part one must consider:

1) corrosion resistance (stainless steel, aluminum, copper alloys);

2) temperature (high special alloys);

3) weight (aluminum is the lightest of standard fastener metals);

4) galvanic action which might occur between fasteners and products in which they are used.

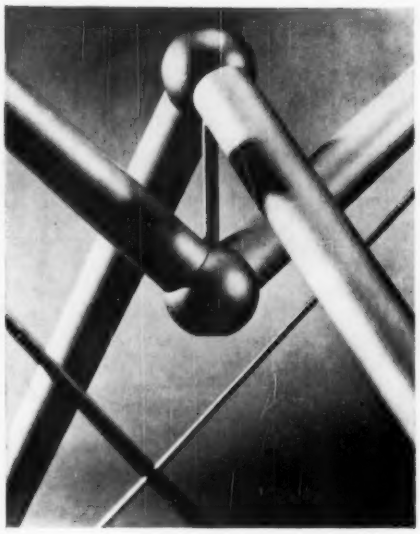
The designer's approach

The designer will specify a mechanical fastener rather than a welded joint in cases where disassembly is essential and where a riveted joint is strong enough; on mass-produced items, riveting is cheaper than spot-welding.

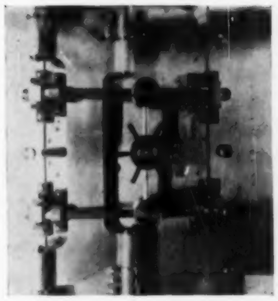
But the "old-fashioned" nut-and-bolt assembly is often a headache to the designer. More often than not, it is essential in the growth, the assembly of a product rather than its function, performance and/or manipulation. The designer generally likes to work in extremes vis-a-vis this necessary "evil": he wants either to *hide* it or *highlight* it. Where it is of no use to the user (in those cases where it is only of importance in an assembly in a structural sense) the designer is happiest to "bury" it inside the product; and where it is of use to the user (with containers, air-conditioners with lift-up front panels), he wants to accentuate it to direct the user's attention to it. In these cases the fastener becomes identified with the product itself and may become in fact the product's design motif (see the container, above, left). In other cases where the busy surface of a product is in itself complex (a computer console for example), fasteners must be taken out of view as far as possible in order to prevent the operator from confusing screw and bolt heads with the essential buttons and switches of the console. In this connection, the redesign by Henry Dreyfuss of the Mosler safe (top right) serves as a good example of design simplification by leaving on the product's surface only those parts that are essential to its function and operation.

The "nut-and-bolt" industry

The industry which turns out fasteners is a major one. There are hundreds of manufacturers, many of them with thousands of products in their roster of manufactured parts. Standard types are, of course, just that and not much change



Integral part of structure is this aircraft bolt used by Buckminster Fuller in Tensegrity Tower; bolt by Standard Pressed Steel Company.

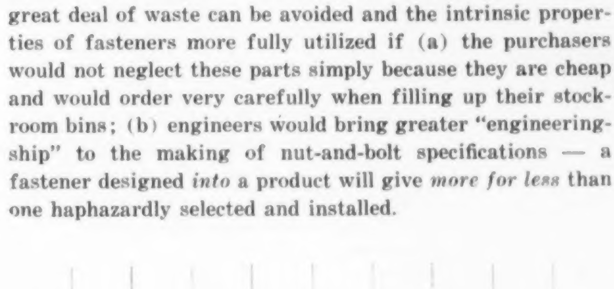


Where fasteners tend to confuse a product's function, designers like to take them out of view as in this redesign (right) of the Mosler vault by Henry Dreyfuss. "Old" design is seen above.

Greater care in selecting fasteners results in "more for less." Of five tapping screws above, only one is right choice for given job.

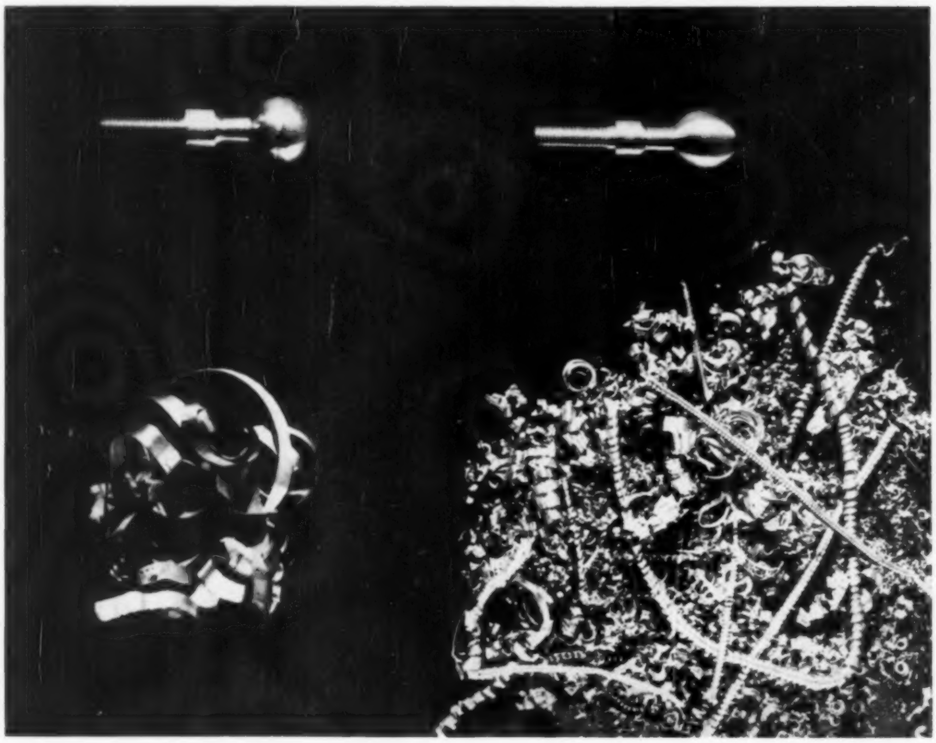
is indicated there. But in the overall movement of the industry and in the characteristics of the newer, the special, parts, a common aim emerges, and that is *simplification*. It is evident in three areas of the industry: fastener manufacture, design, and installation. The heading manufacturing process (see page 22) is a high-speed production method of fastener parts which eliminates metal waste. The design of new fasteners (see pages 23, 24) is generally geared to make fasteners "self-reliant," and make possible quick, easy locking action. To keep up with high-speed production and assembly methods of consumer and industrial products, the fastener industry has devised various types of machinery (see pages 25, 26) which can be integrated in the overall production cycle without slowing down the process. There are other new things in the industry, odds-and-ends (see pages 27, 28) designed for special applications (quick locks for flanged panel construction, self-locking nylon strips, plastic extrusions performing the work of zippers, etc.). There are new materials used for old fastener types (pages 29, 30) notably nylon, high-strength, lightweight alloys for high temperature use of fasteners, and—most recently—Delrin, which is dimensionally stable, does not absorb moisture, and can be used with standard metal parts as a self-locking nut. These and many other significant developments in these and other areas of the nut-and-bolt industry follow on the next ten pages.

In conclusion, there is a word of advice which the spokesmen for this industry would like to have passed on to the users of their myriad parts. It is simply this: *take greater care in selectivity*. The industry leaders feel sure that a great deal of waste can be avoided and the intrinsic properties of fasteners more fully utilized if (a) the purchasers would not neglect these parts simply because they are cheap and would order very carefully when filling up their stockroom bins; (b) engineers would bring greater "engineeringship" to the making of nut-and-bolt specifications — a fastener designed *into* a product will give *more for less* than one haphazardly selected and installed.



Improved selectivity cuts down cost. For a safe load of 20,000 lbs. a 5/8" or 3/4" diameter bolt can be used. The smaller bolt should be selected; it is stronger, costs less, and in installation smaller holes take a good deal less time to drill.

SIMPLIFIED PRODUCTION MEANS HIGH SPEED, LESS WASTE



The amount of metal saved by cold-heading this threaded bolt (left) indicated by comparison with same part machined (right). Russell Burdsall & Ward Bolt and Nut Company, Port Chester, N. Y.

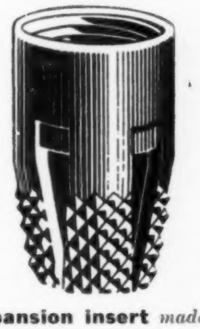
This flanged, high-tension locking fastener consists of locking screw and nut cold-headed as one piece by Russell, Burdsall & Ward, Port Chester, N. Y.

The manufacturing method that clearly describes the fastener industry's general trend toward simplification is the *heading* process, which includes *cold-heading* and *hot-heading*. In this process special machines called "headers" deliver blows at very fast rates to pieces of metal fed to them in rolls or coils. For cold-heading the material enters the machine at room temperature; for hot-heading the metal is heated to improve its malleability and to expand the limits of the work that can be done upon it. In both cases the metal is made to flow while the headers deliver their blows; dies are used to hold and shape the metal. The heading method offers two distinct advantages: high speed and a reduction of scrap loss. Since the process replaces machining of a multitude of threaded and unthreaded parts —standard bolts, screws, rivets, nuts, nails, and similar items — practically no material is wasted in the manufacture of headed parts except in cases where some threading is necessary. The method also permits the forming of a wide variety of shapes.

Cold-heading is a process adaptable to a wide variety of product shapes as seen here in this selection of parts by Russell, Burdsall & Ward Bolt and Nut Company.

SPECIAL FASTENERS ARE "EASY AND SELF-RELIANT"

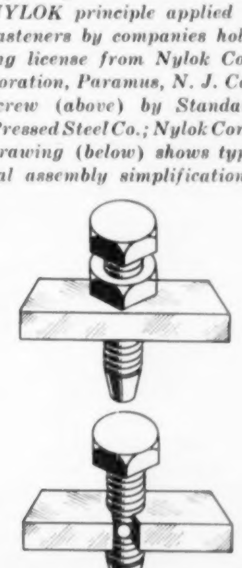
Improved economy—doing more with less—is behind most of the special fastener types, and they are well applied in those small and medium sized products where this principle can express itself. Greater performance versatility usually eliminates parts from special fasteners, makes them self-locking, self-expanding, self-cutting, etc.

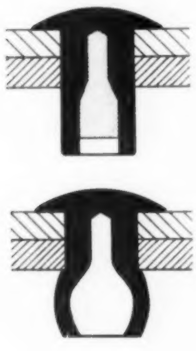


Expansion insert *made of brass has own locking feature; used in prepared holes in die castings and plastic parts after molding. The insert's expansion spreader quickly locks it in place. Called DODGE inserts; the Phelps Manufacturing Co., Westport, Conn.*

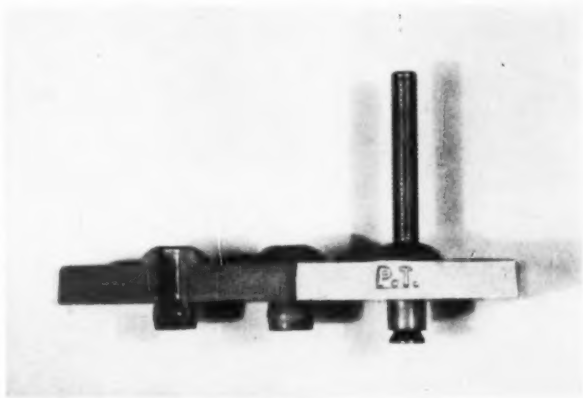
Spring pin *locks into place by its own spring action when driven into drilled hole. Used here as axle in pulley assembly; holds wheel in place, eliminates riveting. Steel spring good with metal, nylon, Bakelite, rubber. SEL-LOK; Standard Pressed Steel Co., Jenkintown, Pa.*

Self-locking screw *has imbedded nylon pellet, compressed when parts engage. Nylon "grows" into threads. NYLOK principle applied to fasteners by companies holding license from Nylok Corporation, Paramus, N. J. Cap screw (above) by Standard Pressed Steel Co.; Nylok Corp. drawing (below) shows typical assembly simplification.*

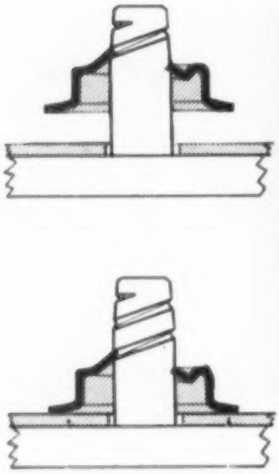




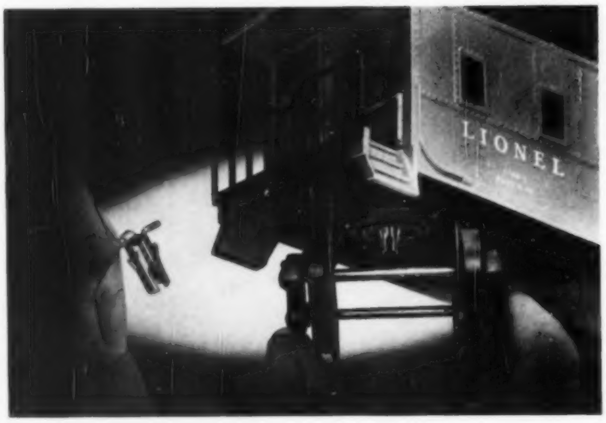
Blind expansion rivet *locks in place due to slight explosive action. A small chemical charge located in cavity of rivet shank expands the shank when heat is applied to rivet head. This aluminum rivet is used in aircraft assemblies. AIRCRAFT BLIND EXPANSION RIVET; E. I. DuPont deNemours, Wilmington, Del.*



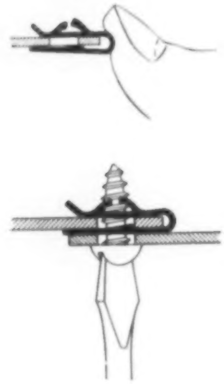
Blind rivets *are used when one side of an assembly is inaccessible. The rivets shown here are two-part pre-assembled rivets. The PT PULL-THRU rivet (right) is used to attach hollow tubing to fabricated parts and electronic parts to chassis in difficult locations. Up to 1000 per hour. Huck Manufacturing Co., Detroit 7.*



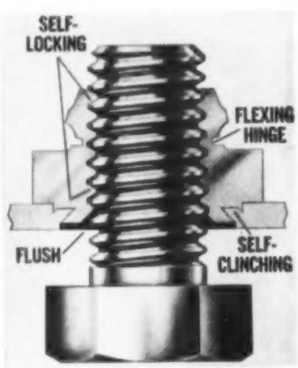
Self-threading nut *cuts threads of mating member—rod, wire, shaft, tube, etc.—to which it is applied, makes for quick assembly in all except heavy construction applications. Used widely with appliances and electronic products. The mating member can be of any malleable material as well as plastic. The Palnut Company, Mountainside, N. J.*



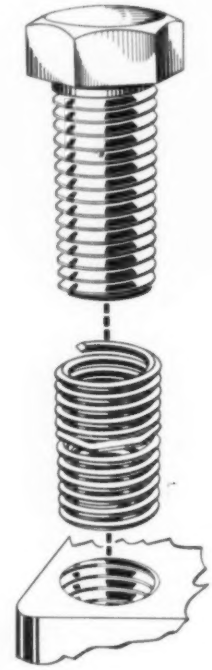
Speed clip *shown here was developed especially for Lionel toy trains. It fastens car trucks to car bodies and replaces a grooved screw-machine part and retainer ring. Clip snapped through punched holes; spring steel fingers compress, then spring apart, thus making the truck-to-body attachment. Tinnerman Products, Inc., Cleveland.*



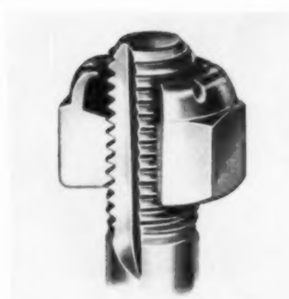
Speed nut *provides both thread-lock and spring-lock when used to fasten sections of products in almost all categories except heavy construction. Quickly assembled, eliminates lock washers. Typical application of "U" TYPE shown here is to attach refrigerator breaker frames to food compartment liners. Tinnerman Products, Inc.*



Self - clinching fastener *provides load-bearing threads in sheet metal too thin to thread. The round body of this one-piece, all-metal clinch nut has a reverse tapered protruding shank. Metal extruded against the shank locks the nut in place as pressure is applied. Called PEM fasteners; Penn Engineering & Mfg. Corp., Philadelphia.*



Self-locking insert *develops a strong locking force on threads of cap screw, bolt or set screw, which is produced by multi-sided thread in center of coil. Eliminates need for lock nut or lock wiring. Resists loosening due to vibration. Made of corrosion resistant steel with high tensile strength. Called HELI-COIL; Heli-Coil Corporation, Danbury, Conn.*

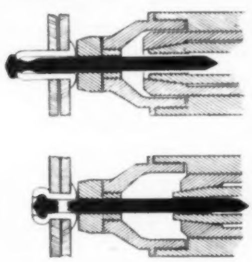


Elastic stop nut *has a plastic ring built inside the top; its inside diameter is smaller than the major diameter of the bolt with which the nut is used, and the bolt threads impress themselves into the plastic insert thereby locking the nut in place. Very widely used in electronic products. Elastic Stop Nut Corp. of America, Union, N. J.*

Metal locking nut *has self-locking action due to cylinder shape offset on one axis; threads below locking device are undistorted and carry bolt thread load. Variation of this type is a tapered, beam-type device designed specifically for high-strength aircraft applications. Also for temperatures above those for plastics. Elastic Stop Nut, Union, N. J.*

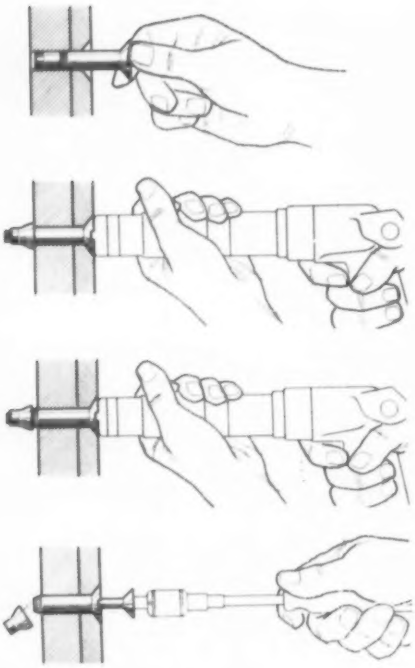
TOOLS ARE UP-TO-DATE FOR UP-TO-DATE ASSEMBLIES

Recent methods of assembly make rivet, stud, or insert installation a simplified step in construction and high-speed product production. Inserts are fed into parts in automatic or semi- automatic processes; riveted joints, made rapidly by multi-headed machines, are less expensive than spot-welds for light joints; powerful hand-operated "guns" drive studs into concrete on construction jobs.

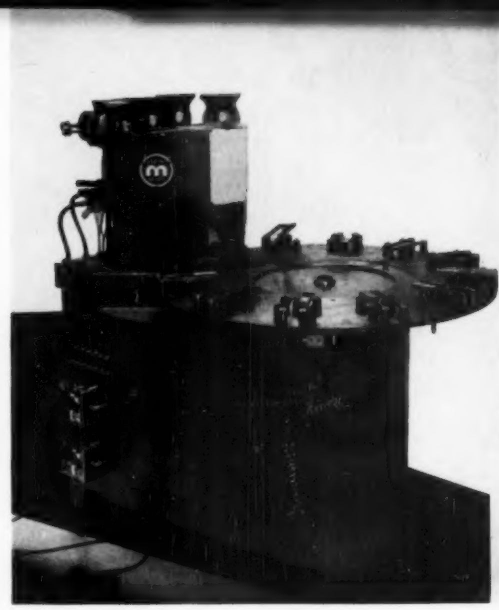


Rivet Insertion *can be a simple manual operation at point-of-use, or a multiple, automatic process on the assembly line (see next page). Rivets are very widely used in the metal fabrication industries; and for certain sheetmetal construction work, joints are made one-at-a-time by an operator using a gun-like tool. The photo above shows a ventilating flue being "sealed" by an operator inserting "POP" rivets, a blind rivet type. A variety of hand or power tools can be used—pneumatic or hydraulic power types, or the simple plier-like hand-tools which function much like staplers. The "POP" rivets (left) are inserted with a mandrel that fits into the nose of the hand-tool. "POP" Rivet Division, United Shoe Machinery Corp., Shelton, Conn.*

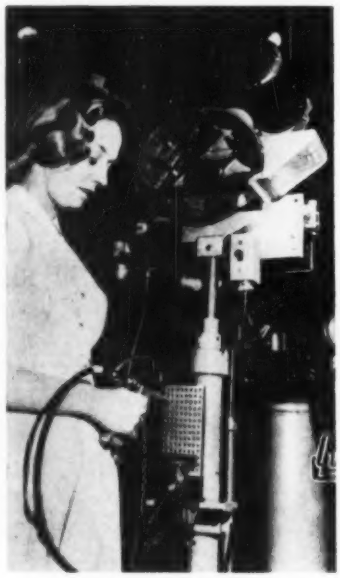
Stud Insertion, *like rivet, is done by a single operator at a construction site or by complex machinery on a mass production line. The Remington POWER-MATE shown in use here is a versatile manual tool for one-at-a-time insertion. The tool can be adapted to handle the variety of stud types and sizes included in the Remington Stud Driver Kit. Operating somewhat like a gun, the tool opens only when depressed against the work and unloads when pressure is released. Light, medium, and heavy-duty anchoring in steel and concrete can be done with the stud driver at a rate of six studs per minute. Changes from one type of stud to another can be made quickly at the construction site. Remington Arms Company, Inc., Bridgeport 2, Conn.*



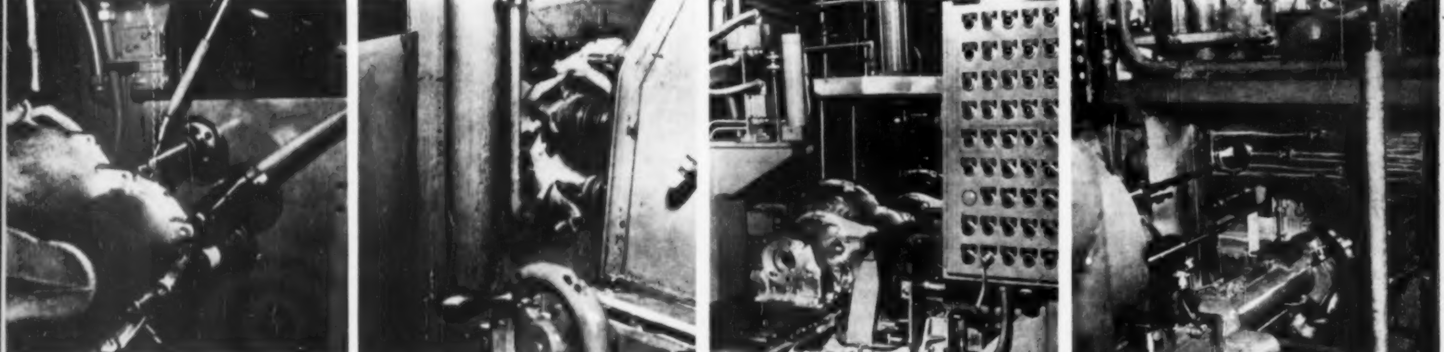
Blind fastener insertion *of SLEEVE-LOCK type begins with 1) insertion of pre-assembled unit; followed by: 2) turning core bolt, drawing nut over end of sleeve; 3) breaking lock and back from nut; 4) removing core bolt; nut drops inside assembly. Standard Pressed Steel Co., Jenkintown, Pa.*



Multiple riveting *on automobile and other assembly lines is possible with specially developed machines. This five-headed pneumatic machine is used to rivet the control damper for an automotive heater. Run by three operators, machine makes 5 joints in one operation, 1000 parts per hour. Machine by The Milford Rivet & Machine Co., Milford, Conn.*



High - speed production tool *for installation of wire thread inserts can drive up to 1200 inserts per hour. Gun can be remotely operated up to 8 feet away from hopper feed; a foot-actuated switch ejects an insert from the hopper to the inserting tool tip. Driving mandrel stops automatically when insert is installed. Machine by Heli-Coil Corporation, Danbury, Conn.*

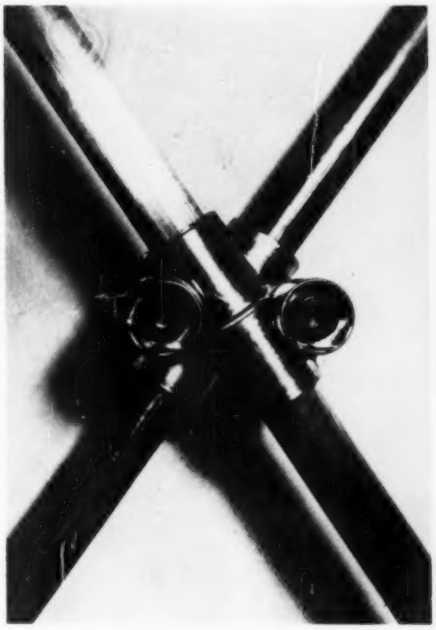


Automatic inserting equipment *was developed for Ford Motor Company to install wire thread HELI-COIL inserts in transmission converter housing. 1) Multiple head spindle drill holes; 2) holes are tapped; 3) each step is controlled by pushbuttons; 4) inserts are screwed into parts. Heli-Coil Corporation, Danbury, Conn.*

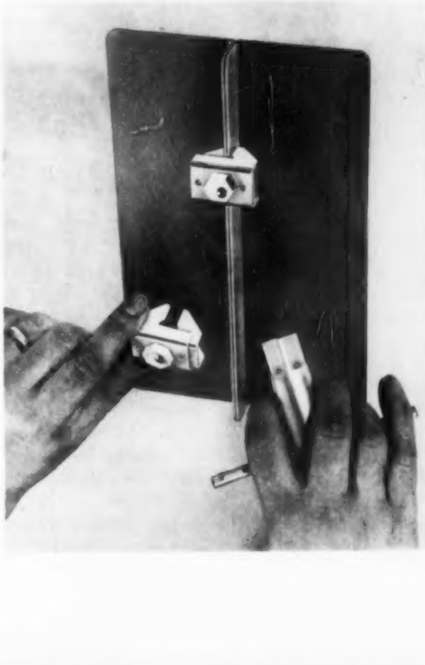
UNUSUAL FASTENERS PERFORM UNCOMMON FUNCTIONS

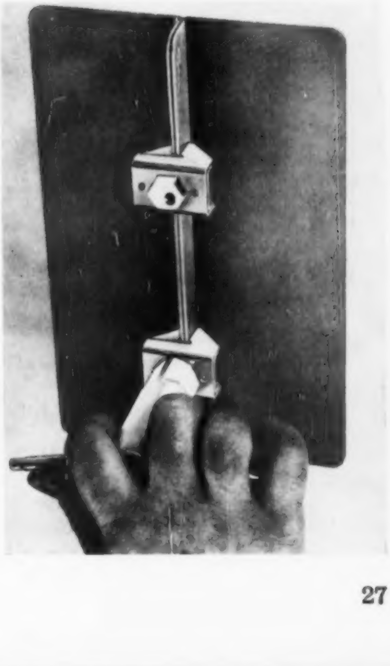
Special fasteners are generally variations of standard types. But there are other recent fastening devices which fall in neither category. They are clever locking arrangements, zipperless "zippers" made of plastic extrusions, belts with "invisible" hooks which guarantee safe closure and are easy to open. In most cases, these devices are functional components that can influence a design motif.

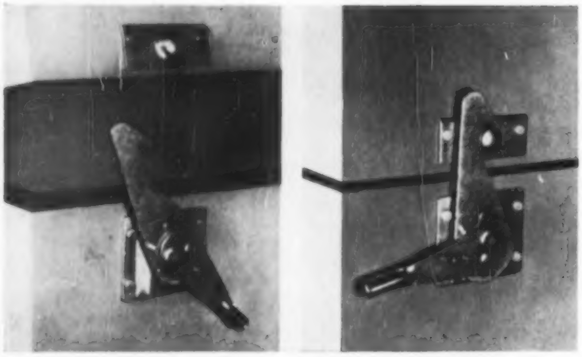
Versatile locking *arrangement consists of mounting angle and a clamp. Called VERSA-LOC, this unique connecting and locking system can be used for permanent installations with structural members in a large variety of applications; in industrial laboratories, on assembly lines, for mock-ups, etc. The angle of VERSA-LOC has three mounting surfaces two of which are pretapped to take micro-type swtiches, and predrilled for 10 mounting screws; the third surface is left blank. Clamp units are available for different diameters of rod or tubing, pipe and connecting cable. The device also includes a surface of locking teeth for perpendicular or parallel relationships between parts. Versa-Loc Corporation, Chatham, N. J.*



Fastening flanged-panels *is done simply with a locking device called CLAMP-LOCK. It has fastening jaws to fit panels of any thickness and lends itself not only to quick assembly but also disassembly of flanged partitions for temporary rooms and other similar constructions. The lock is clamped or opened by a half-turn with a ⅝" hex wrench, has a closing pressure of 400 lbs., and a tensile strength of 700 lbs. CLAMP-LOCK is reusable and its fastening range of .025" provides clamping efficiency which makes possible smooth clamping in spite of inaccuracy in material thicknesses. Lock is by Simmons Fastener Corporation, Albany, N. Y.*

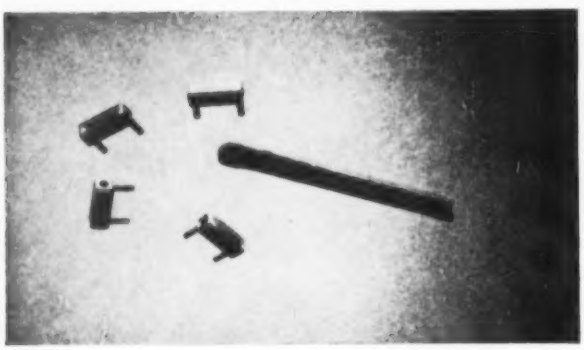




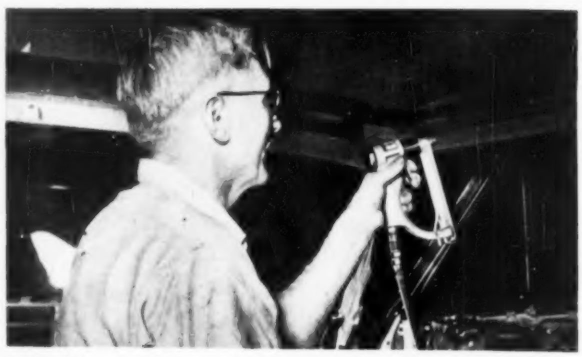


Latching device *is well suited to commercial containers and military transit cases. Lock lies flat against mounting surface whether in open or closed position. Springless device gives high closing pressure and has high load-carrying capacity. Called HOOK-LOCK; Simmons Fastener Corp., Albany, N. Y.*

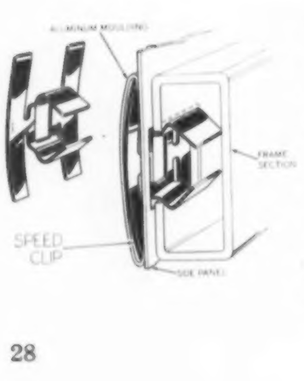
Zipperless "Zipper" *consists of two pieces of extruded plastic whose formed surfaces "lock" when pressed together. To open the seal the flange along the fastener is lifted; used for sealing plastic bags, FLEXITE containers are easily reuseable. Made of polyethylene and vinyl; Flexigrip, Inc., New York.*



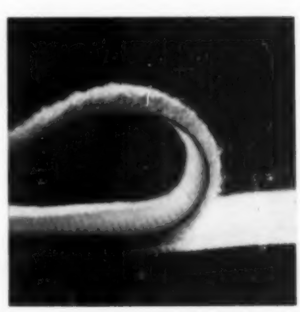
Tiny connecting device *is a zinc die-cast part used to fasten computer assembly (in Goodyear Aircraft Division's GEDA computer). Rivet lugs permit parts to be mounted without additional fasteners. Gries Reproducer Corp., New Rochelle, N. Y.*



Stapling *of light construction materials is possible with powerful gun tackers which drive strong staples into the material and also cause them to clinch on the other side without the use of anvil. Called DUO-FAST; Fastener Corp., Franklin Park, Ill.*



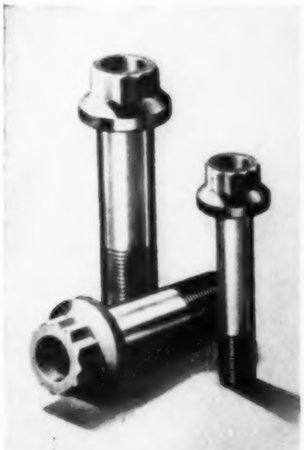
Speed clip *fastens trim like aluminum moulding to truck and coach bodies. Made of spring steel, the clips are designed for a moulding about three inches wide; they grip the panel on which the moulding is mounted by expanding on the underside. The clip can also be used with inspection plates and trim on metal furniture. Tinnerman Products, Inc., Cleveland.*



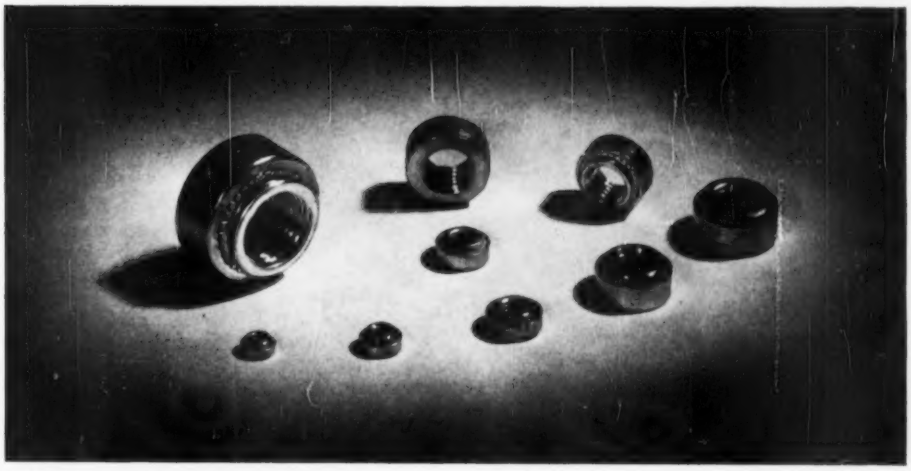
Self-fastening *nylon acts like a "magic" belt; consists of two strips of nylon tape. One strip is covered with tiny filament hooks, the other with tiny loops; two tapes stick to each other when pressed together. Already used in a wide range of industrial and commercial applications; supplied in ribbons of varying width. VELCRO; Velcro Sales Corp., New York, N. Y.*

NEW MATERIALS ARE USED FOR FRONTIER APPLICATIONS

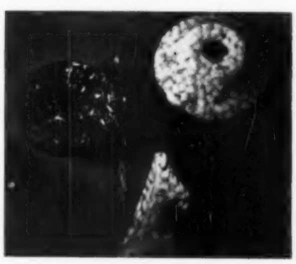
Changes in technology make increasingly stringent demands on mechanical fasteners, and these are met by metallurgical refinements resulting in greater strength-to-weight ratios and permitting use at high temperatures. Synthetics are becoming popular as a "nut and bolt" material in applications where high electrical insulation is essential. A combination of materials often makes for unique properties.



High temperature *use of fasteners requires special materials that retain properties at high temperatures. These fasteners used in aircraft construction were made from high strength alloys which permit operation up to 1600°F. Standard Pressed Steel Co., Jenkintown, Pa.*

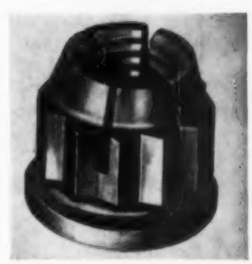


High strength swage nuts *can be used with metal sections 40 per cent thinner than metal needs to be when standard nuts are used. Installation pressures are 50 per cent lower. Hard metal nuts will not fail when breaking 160,000 psi bolts. Standard Pressed Steel Co., Jenkintown, Pa.*

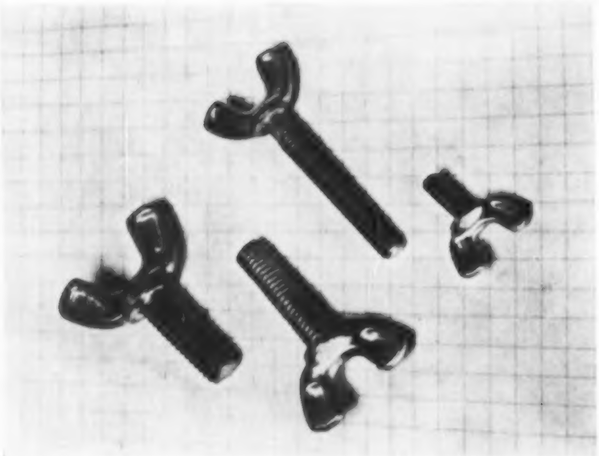


Materials are mixed *in this plastic furniture knob in which a die-cast zinc-threaded insert is installed. The insert becomes part of the knob by placing it into a cavity prior to the molding of the knob (by Miracle Plastic Mfg. Co., New York). Insert is product of Gries Reproducer Corp., New Rochelle, N. Y.*

Exotic metals *like beryllium have properties specially useful for missiles and satellites but are difficult to shape. Beryllium bolts are made in this enclosed grinder to shield metal from contamination and prevent ill effects of dust. Standard Pressed Steel Co., Jenkintown, Pa.*

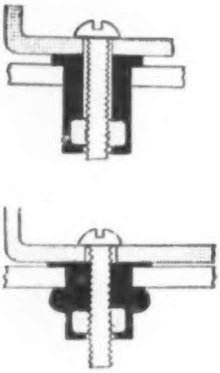


Construction *of fastener can also result in better high-temperature performance. The tapered form of this nut yields improved load distribution along the entire threaded area of nut used in applications such as aircraft engines where maximum strength is required. Elastic Stop Nut Corp., Union, N. J.*



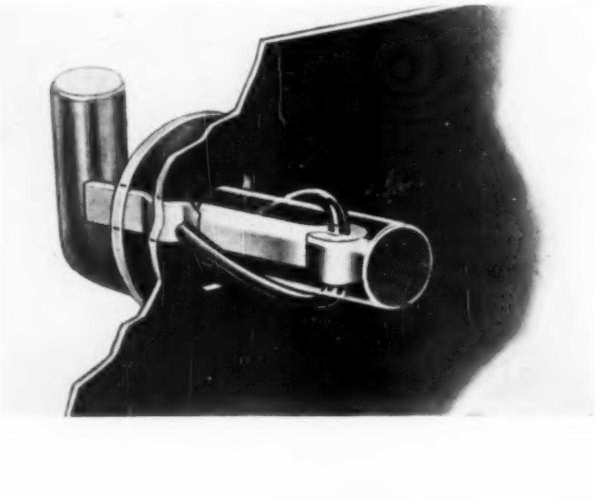
Zinc *is used in an automatic die-casting process to produce small wing screws, wing nuts and other devices; these are generally small and good with lightweight assemblies. The wing screws shown here can be used as hold-downs, clamps, or set screws with outdoor furniture, test tube holders, awning hardware or any light unit which must be assembled and taken apart repeatedly. The screws are also available as two-piece assemblies for higher torque applications. Zinc has good corrosion resistance, finishes can be applied. Gries Reproducer Corp., New Rochelle, N. Y.*

Plastic supports *for shelves and trays are made as one-piece parts containing pin, shank, and prongs. Well suited for holding separate parts in refrigerators, freezers, etc., the fasteners are easily inserted and have own locking action. They are noncorrosive and are supplied in various colors. Called PLASTI-SUPPORTS; Fastex, division Illinois Tool Works, Des Plaines, Ill.*



Neoprene *is the main material of this bushing used to prevent leaks and resist vibration. A threaded brass nut is part of the bushing; turning the screw in the nut causes the neoprene to be drawn tightly against the material. Fastener is useful for making watertight attachments to sandwich panels with reinforced plastic faces. WELL-NUT; Rockwell Products Corp., Newark, N. J.*

Plastic and steel *make up this spring-lock shelf support molded in a great variety of shapes and applied extensively in refrigerator construction. The main body of the support is made of plastic; it is given greater structural strength by use of a steel insert which is also an important aspect of the support's locking action. Called SPRING-LOCK; Simmons Fastener Corp., Albany, N. Y.*



Nylon *screws, nuts, washers, etc. are used in applications where bolting strength is not the main requirement, and where high resistance to abrasion, corrosion, and good electrical insulation are essential. These miniature molded screws are for use in electronic assemblies, business machines, computers, etc. Gries Reproducer Corporation, New Rochelle, N. Y.*

Delrin *is the latest plastic to be applied to fastener manufacture. Delrin fasteners are stronger than any plastic nuts, bolts, etc. made so far; they have high "creep" resistance, which means use at higher temperatures is possible, and also resist solvents and corrosion. These tiny Delrin nuts manufactured by Russell, Burdsall & Ward, Port Chester, N. Y.*

In March ID presents the third and final installment in this series on fasteners, which will treat the latest category in fastening techniques: chemical fasteners—the use of adhesives and various bonding agents to join material surfaces.

GALLERY 2

Eliot Noyes

Bringing Bauhaus to big business, an architect-industrial designer, specifies for a complete design program and illustrates one method for The Compleat Designer

by Ursula McHugh

Trying to describe the private satisfaction that his professional life has brought him, Eliot Noyes sees it as a matter of control: "I've built my own house and I've created my own environment. There isn't much room for chance in my life." Noyes has built his career as lucidly as his house, and the public image he has made for himself is as coherent and distinguished as the one he has made for IBM, his principal client. More than most people, he gives the impression of seeing his world whole and simple, and unlike many designers he is free of the facets and eccentricities that, notoriously, distinguish the creative temperament. In a profession celebrated for its flamboyance, Noyes' New England reserve and distaste for exhibitionism contribute to an impression of normality and stability that has earned him the confidence of an unusually wide variety of people—people who, although acquainted with him as both person and designer, are curiously unable to describe concretely either the design, or the personality.

Perhaps the personality is elusive simply because there are no extremes to describe, and it is precisely this balance that has enabled Noyes to act as a bridge between extremes—between, for example, modern design and the more cautious members of the IBM management, who trust him because, as one of them explained, "He's solid and conservative, like IBM. And he's a good salesman." But IBM's president says that Noyes, for all his solidity, will occasionally appear in his office to take him off to, say, an exhibit of Japanese sculpture he feels Watson ought to see: "And I always try to go."

The singularity of the authority which Noyes enjoys in industrial design is emphasized by the fact that he grew up in architecture and still feels more at home in its language and its tradition. In return, Noyes is accepted by some designers with reserve. At a recent meeting where Noyes—as he often does—was assailing the state of industrial design and industrial designers, Mrs. Noyes, sitting in the audience, heard an indignant whisper behind her: "Architect-trained—why, *he* isn't an industrial designer!" And he is frank about his belief that architecture is the nobler profession: "I just don't see many noblemen in design."

Despite Noyes' own twenty years in design, few of his products are well known. This is the more remarkable in view of the widespread admiration of him as a designer. One of Noyes' associates came to him from the Henry Dreyfuss office when he heard Dreyfuss speak of Noyes as the designer who had contributed the most to the profession. But very few designers can name three products—even two products—that he has designed. The one they do name is, of course, the IBM typewriter, and they are apt to add vaguely, ". . . . oh, well, but he's done *lots* of other things."

Noyes has, in fact, done lots of other things, although his life has been unusually direct in its course towards its present character. He was born in 1910 in Boston; his father taught English at Harvard. After Andover, which he remembers with affection (although he sends his own children

Mei Lou Foo

The artist in Persia, and his earliest architectural style.

to Putney, a considerably more avant-garde institution), he went to Harvard, where he majored in Greek and Latin, "because I liked it." He took time out, however, to write and draw for the *Lampoon.* Summers he spent in France, at the art school in Fontainebleau, painting thousands of watercolors which his friends remember as straightforward representational landscapes. Although he was very eager at one point to be a painter, he found he was more interested in what other painters did than in what he did himself. Then, one afternoon, in the middle of Massachusetts Avenue, a vision came to him. "I'll be an architect," he said to himself (he says), and bounced on with a lighter step, a happier sophomore for having decided his life work.

In 1932, when he entered the Harvard School of Architecture, it was still burdened down by the Beaux-Arts tradition. His first assignment was to design a Doric gateway (he put over it the inscription *Ad Absurdum*), his second assignment was "an Ionic temple to a great French actress," and he rebelled when it came time for his third and Corinthian assignment. (He designed something Byzantine.) Then, one day, he heard about the Bauhaus, which was a revelation: a twentieth-century architecture that addressed itself to twentieth-century problems. He sent for catalogs, got a friend to translate the German for him, and was preparing to depart for Dessau when he discovered that the Nazis had marched in and the glory of the Bauhaus had departed. Thrown back again on his own resources, he began a laborious process of self-education, using as texts the few books of modern architecture that were in the school library. While his course work concerned itself with such timely problems as "Design a palace for an exiled European monarch," Noyes in after-hours discovered Corbusier. For want of any other guide, he turned himself into a stern functionalist, since that seemed to him and his groping contemporaries the best available clue for finding the new forms they all felt should be found.

It was at this point, toward the end of the second year of his course, that a member of an archeological expedition to Persia came to Harvard looking for a young architect to replace a sudden defection. They needed someone to do the drawings of the finds, and Noyes at this point never went anywhere without a sketchbook. "You, Noyes," said the archeologist, "come to Persia on Monday." Noyes went home and talked to his family, and sailed for Persia on Monday. It wasn't as whimsical a thing to do as it sounds, he recalls; it was a chance to see a part of the world he'd never get to otherwise, and to see it under the best possible auspices (the expedition was sponsored by the Oriental Institute of the University of Chicago). Even archeologists don't often get an invitation to help dig up Persepolis.

Persia turned out to be very gay; most of the other expedition members were young and adventurous. (One of them, the pilot of the expedition's airplane, taught Noyes to fly a glider.) The expedition was housed in the restored harem of Darius, which was well provided with guestrooms, and the archeologists were delighted to put up their frequent visitors, especially when they arrived, as one diplomat did, in fleets of Cadillacs carrying champagne and gin. After moonlight dances on the terrace, Noyes would gulp down Eno's Fruit Salts, put on his blackest dark glasses, and dash over to the mound to wait for the native workmen as they came streaming across the plain at dawn.

His two years in Persia were well-timed, since by the time Noyes got back to Harvard, Gropius and Breuer were there—the Bauhaus had come to him. He remembers Breuer as the best teacher he ever had: "When he explained a solution, all the parts fell into place obviously and logically; things became what they ought to become. He taught me that within the statement of the problem lies the solution." (These are almost exactly the same words with which the people to whom Noyes has taught design, formally or informally, describe his own teaching method.)

After school, he worked briefly in the Gropius/Breuer office until his marriage to Mary Weed, a Boston girl studying at the Smith Graduate School of Architecture, then attached to Harvard. He tried life in one of the big architectural offices, but after two months of it came back to Gropius and Breuer begging for asylum—"It was just too awful." His teachers took him back in, and shortly thereafter he was awarded the Wheelwright Traveling Fellowship, which architects before Noyes had used to go to Europe to study Baroque palaces. Noyes, however, used it to travel around the United States and Mexico, looking at as much Frank Lloyd Wright as he could find.

Soon after he returned to Cambridge, Wallace Harrison appeared, on a mission from the New York Museum of Modern Art to find a director for the museum's department of design. Gropius recommended Noyes, advising him: "First make sure you really want it, and then sell yourself dear." (Young architects were not overpaid in those days, and Noyes had by this time worked his way up to $25 a week.) Noyes had no doubts about his ability to handle the job; Gropius had indoctrinated his students with his own theories of total design, and all the Harvard architects believed themselves perfectly capable of doing industrial design if only they were invited. While awaiting the invitation, they turned themselves into ruthless critics of consumer goods: they would buy silverware in the five-and-ten-cent store and sternly file the rosebuds off to make it fit to eat with. A Harvard friend remembers Noyes and his fiancee ushering him up to Mrs. Noyes' mother's attic and proudly displaying a few treasured pieces of modern furniture the couple had managed to secure in order to start their married life right. Noyes, then, came to New York feeling that he "knew damn well what was good industrial design and what wasn't."

The museum, for its part, did not even consider an industrial designer to head its design department—as far as it was concerned, says a survivor of those days, industrial designers, with their talk of streamlining and sales curves, were hostile Indians. In fact, Alfred Barr, who hired Noyes, says, puzzled by the distinction, "But he *was* a designer—he was an architect." The museum had since its founding been influenced by the Corbusier and Bauhaus school of "pure design", and the directors found in Noyes someone completely sympathetic to their own views, and who was in addition enthusiastic and articulate about those views.

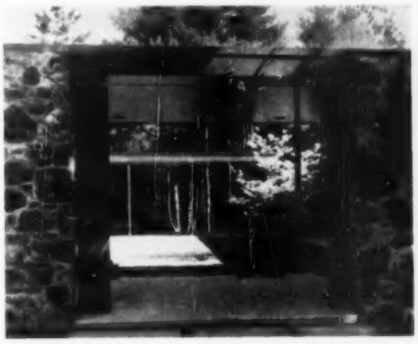
Noyes' first project at the museum was the organization of the Organic Design competition—the competition which produced, among other things, the Eames and Saarinen chairs. Noyes says it was luck that the competition produced so much good design; other observers say that without Noyes' perception of movement beneath the surface much of this new design might never have been brought to light. By the terms of the competition, the museum had obligated itself to try to get the winning furniture into production and onto the market. The responsibility for this was Noyes', and it was not an easy one. Some of the designs involved untried techniques, and Noyes, working with the factories, found that they had to invent new processes and new tools.

In 1942, Noyes went into the service when the pilot of the Persian expedition asked him to help organize the Air Force's glider unit. The hardest part of this job proved to be in getting the upper echelons to pay any attention to gliders. Noyes noticed that every Air Force colonel in the Pentagon started his day by reading Milton Caniff's *Terry and the Pirates*. He wrote to Caniff, enclosing piles of glider data, and shortly thereafter Flip Corkin turned up in Burma, commanding a glider unit. The colonels decided that if Flip believed in gliders there must be something to them after all, and Noyes received a grateful letter from Caniff, thanking him for the authentic information.

One afternoon an Air Force captain, who had noticed the glider wings on Noyes' uniform, asked him for some lessons, and Noyes and the captain, whose name was Thomas J. Watson, Jr., spent a Sunday afternoon in a glider together. Neither knew the other's peacetime occupation, and they did not renew their acquaintance until after the war.

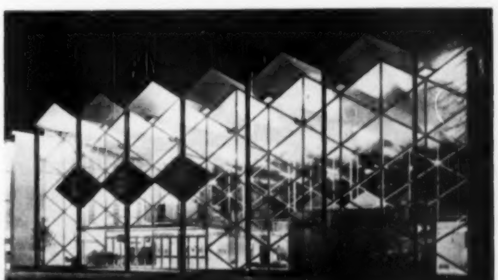
In 1945, Noyes returned briefly to the Museum of Modern Art, and then, because he was anxious to get into active designing, went into the Norman Bel Geddes office. (He considered architecture, but there seemed to be more going on in industrial design.) Bel Geddes and Noyes could not have been more dissimilar as designers and as people. Noyes has never admired the techniques of the salesman or the showman even when they are raised to an art, and his grave New England moral sense was outraged by Bel Geddes' disregard of the feelings of others. He was not too outraged to see the funny side of the situation, however, or to profit from the practical experience in design and in dealing with clients. One of those clients was IBM, which had retained the Bel Geddes office to design, among other things, its electric typewriter. Noyes was in charge of this project, and the model he produced, in 1947, was an almost exact

Same form, different construction, produced the Florida bubble at top and the GE experiment beneath it.



In Noyes' own house in New Canaan, two wings of glass and stone enclose a courtyard, which opens through barn doors at either end to the woods.

Noyes' IBM Pavilion for the 1958 Brussels Fair.



foreshadowing of the famous Model A. Before IBM could take any action on it, however, the Bel Geddes office, which had been ailing for some time, collapsed.

Noyes set up a brief partnership with Breuer, going to night school at the same time to renew his architecture. The partnership didn't last—"maybe we were too good friends; probably we each needed to have our own office." In any case, Noyes began to take steps toward his own office, and one of the strongest boosts toward independence was an offer from IBM of a monthly retainer to act as one of their design consultants. Watson, who hadn't remembered that his old glider instructor was a designer, had asked Bel Geddes for the name of the designer behind the typewriter project, and Noyes' first assignment as consultant was to complete the project.

His practice, first in Stamford and then in New Canaan, was at this time chiefly architectural; IBM was thus far his only industrial design client, and in the beginning they had no idea that Noyes was also an architect. Gradually, Noyes began to take on more and more of IBM's design: Watson remembers the New York showroom as the most impressive of Noyes' early work. The bright red wall behind the computer was a daring step for a conservative company that was only just discarding the stiff collar, but its enthusiastic public reception persuaded the company that there might be more to design than met the shocked eye.

As IBM began to display increased confidence in Noyes, he began to press for a coherent company design program. No one has ever described his tactics as Machiavellian, in this instance he simply told Watson that IBM's showrooms looked like hell and that the company had "damn well better stop looking like a musty museum." As reinforcements, he produced Olivetti catalogs to illustrate consistent corporate design, and at the beginning of 1956 his persistence paid off with the establishment of IBM's Corporate Design Program, which he has directed since its beginning.

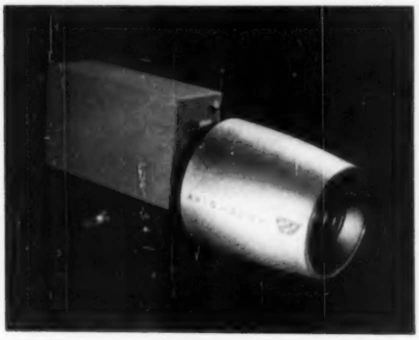
His formula for the program consists of three parts: outside consultants for freshness, company departments for soundness, and himself for control—translated through the company design manager, Robert Monahon. Despite his early ambition to be a painter, Noyes is not a graphic designer, and this part of the program is largely supervised by Paul Rand, who acts as an outside consultant to the company's graphics departments. Architecture, on the other hand, is almost wholly the work of outside offices, and Noyes' control function here is exercised in the selection of the architect: "I find the best man I can and I trust him. I don't try to explain modern architecture to Saarinen." Occasionally, Noyes' own office acts as the outside architect, but this is admittedly a delicate situation—Noyes is in the awkward position of recommending himself—and the proportion of IBM architecture which has been handled by the Noyes office has been, both parties estimate, very small. It is in product design that Noyes' control is most apparent. IBM has lately given very little product work to outside designers because Noyes feels that the technical problems of the machines are too complicated to be undertaken by anyone but

The classic IBM typewriter, Model B

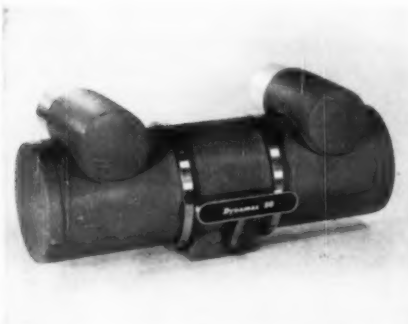
IBM's own specialists. A certain amount of the product design — Noyes estimates it at five per cent — is done in Noyes' own office. This is largely a matter of his own decision: he may want to work on the preliminary designs of one of the big machines, or a stubborn detail may be giving a company design department trouble. Occasionally his own office will do all the design work where the problem is unusual enough; the work on IBM's new line of dictation machines, for instance, is being done in New Canaan.

Noyes' contract commits three-quarters of his own time to IBM. While he will not estimate the proportion of his office's work accounted for by IBM, informed guesses place it at well over half. The architectural side of his office is particularly dependent on IBM; an imbalance that Noyes is trying to redress. Since so much of his time is spent traveling, he has come to rely increasingly on his associates: Ernest Bevilacqua in industrial design, Arthur DeSalvo in architecture, and Hugh and Kathryn Smallen in interior design. His office has gradually infiltrated a number of upper stories on Main Street in New Canaan, in buildings that have maintained their old-fashioned small-town quality in spite of New Canaan's increasing size, prosperity, and sophistication. His staff of fifteen is fairly evenly divided between architects and designers; although Noyes' practice is built around the principle of total design, he is the only one in the office who exercises this comprehensive function, and his control over the activities of his associates and juniors is, he feels, unusually strict. Although two designers who have worked under Noyes, and liked it, say that they believe the Noyes office gives a young designer great freedom, Noyes comments drily that this freedom is largely illusory.

Noyes speaks of his clients with a shade of wistfulness, as if regretting that they cannot be controlled as absolutely as his own designers. Although his plans for his office include a modest expansion, Noyes says he will wait for clients who will let him design the way he wants to and that this attitude is, furthermore, for the client's own good: "The client buys the designer for his vision," a sentiment hastily tempered by the qualification: "But we've got to be reasonable, not mad geniuses." And Noyes is, above all, reasonable. The kind of compromise he regards as necessary seems to be made for the sake of technical specifications or for economy in manufacture, not for the sake of the merchandising expert or the sales manager (or, "all that witchcraft", as he is more likely to call it). This, however, limits his prospective clients to manufacturers who also think of merchandising as witchcraft or who don't have to worry about merchandising in the consumer market. Noyes, in fact, says flatly that he will not design for an annual product change—a limitation that eliminates a sizable chunk of clients.



One of Noyes' earliest non-IBM products was the Auto-Zoom tv lens for Perkin-Elmer.



The Dynamax "50", rotating anode X-ray tube; a project for Machlett Laboratories.

Model of the 729 Magnetic Tape Unit for IBM uses mechanism as element of design.

But even with clients who approach an ideal of malleability there are disagreements, and it is here that Noyes' essentially moral view of design shows most clearly. Watson, who obviously admires Noyes as much for his guts as for his design, says that he's never seen him back down in a fight. Not that Noyes wins them all; when Watson came back to his redecorated office he had all the modern paintings taken down and pictures of IBM machines put up: ". . . after all, the place should look as if I worked for a living."

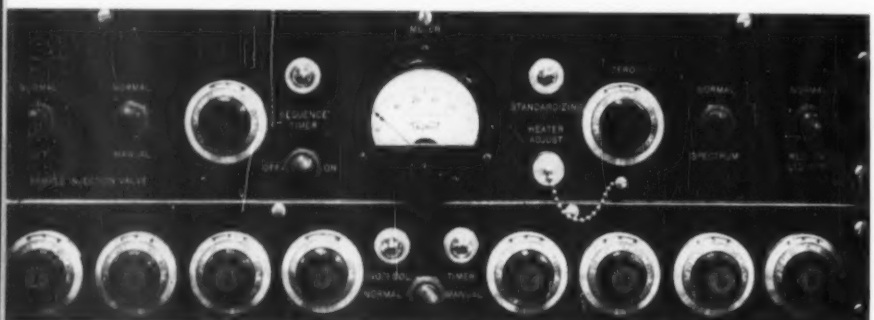
In any case, when Noyes fights, he fights by the rules. His stern sense of business morality is legendary among his employees, and the only anger any of them can remember seeing him display has been generated by what he considered bad professional ethics but what they considered simply good business. More than most, he is a *principled* designer. (His principles, however, have to do with the process of buying and selling design; once a design has been completed, he can discuss the esthetic principles it embodies, but he is unable or reluctant to formulate any general design rules.)

As a result, in the process of creating a pattern for himself, he has created a pattern for how a designer should behave. He has acted as a guide by precept as well as by example; a good portion of Noyes' life has been specifically educational in its nature. Two of the most significant periods in it are the years at the Museum of Modern Art and now his work with IBM. Both of these have been jobs for a teacher; one who can not only explain design to a lay audience, whether the public or a client, but can communicate his own enthusiasm to that audience. Both of them have demanded a man with great powers of persuasion, who can show his own creativity by directing creativity in others.

As might be expected, Noyes has no regrets for the choices he has made and he sees no reason to break with the pattern now. The good taste and attention to detail which characterize his designs characterize his career: even the unorthodox periods display a basic logic, and he has chosen to do nothing which would not contribute to the orderly progression of that career and to which he could not himself contribute. A distinguished colleague says, "How could you disagree with him? He's always on the side of the angels." Perhaps he is; but he picks his angels and he chooses his battles. As someone has pointed out, the very fact that all his battles have been won and that he shows no signs of engaging in new ones means that there is no longer any suspense in his story. When he started at the Museum of Modern Art twenty years ago, he had against him the consumer who thought that modern design was stark nonsense and the designer who said that modern design didn't pay. Now modern design is fashionable, even respectable; and designers, at least in their public utterances, will refer piously to their esthetic responsibilities. Because Noyes has given more than lip-service to these responsibilities, because he has allowed no distractions from them, he has made himself into a model for what one design critic says he likes to think of in his optimistic moments as "the designer of tomorrow." Noyes' own plans for tomorrow? "More of the same."

Logic and Simplicity Mark Design Of Chemical Analysis Instrument

Controller unit for Beckman's industrial gas chromatograph is human-engineered for easy and accurate operation of a highly technical instrument by relatively inexperienced personnel



Control panel of original instrument. Operators frequently made errors reading indicator lights and using controls, whose numbering was more hindrance than help.

Controller redesigned. Four quadrants logically group visual readings (north), manual controls (south), programming/testing (west), and process checking (east).

Among all those who are talking about human engineering, there are a few who are trying to do something about it. One of these is David J. Malk, staff designer for Beckman Instruments, Inc., Fullerton, California, whose redesign of his company's industrial gas chromatograph is human engineered as fully as possible within the limits imposed by such considerations as appearance, budget, engineering problems, and customer's insistence on "function first."

The Beckman industrial gas chromatograph—a chemical analysis instrument used primarily in the chemical and refining industries — consists of three units: the Analyzer, which, by a process similar to extractive distillation, separates and measures the chemical components of the material to be analyzed; the Controller, which handles all sampling programs and control functions; and the Recorder, which displays the results of the analysis in the form of a bar graph or chromatograph.

The original instrument had been designed for multiple-stream use, offering analysis of one, two, or three streams. Customer demands, together with the availability of new instrumentation techniques, decided Beckman in favor of building a single-stream instrument that would include all the features of the original unit. Dr. Ken Halvorsen, acting manager of engineering for Beckman's Scientific and Process Instruments division, was the key man behind the development of the new gas chromatograph, which, outselling all competing products, is the standard of the industry.

Faced with the problem of redesigning the jacketing of the Controller unit, Malk tried, without forgetting other design and engineering factors, to keep "the most important thing of all foremost in mind — the operator: how he uses the instrument and how it helps him." The control panel of the original model of the gas chromatograph (top, left) was not much help.

This original panel had not been designed, but simply assembled. By asking operators of the old instrument questions about the facility of its operation, Malk found that one in four made errors in reading indicator lights and in using the potentiometer knobs, whose number sequence (7-5-3-1-2-4-6-8) was a continual source of confusion. He also discovered that some of the controls and indicators were not necessary in normal operation. Moreover, in most plants the instrument was often operated by relatively untrained personnel.

Malk's problem, then, was to design a control unit that almost anyone could operate with accuracy and ease. In the picturesque argot current in some design circles, the control panel had to be "idiot-proof." Beckman engineering furnished Malk with the control requirements for the new instrument. Employing W. E. Woodson's *Human Engineering Guide for Equipment Designers,* he tested the final prototype by using some Beckman employees as hypothetical operators of the instrument.

The chief point of interest in the final design (opposite, bottom; above, right) is its division into four functional quadrants. All visual indicators are above the horizontal line and all manually-operated controls below it. Sampling-program and testing readings and controls are to the left of the vertical line; while to the right are all indicators and controls pertaining more directly to stream control. Since the chromatograph gain control was more frequently used than the other knobs, Malk placed it in the lower right-hand corner, the most convenient location for right-handed persons. And since the controls do not have to be used once the instrument is "on-stream," they can be closed off by a door which prevents accidental re-setting of controls while still allowing the operator to read the indicator lights through a glass window.

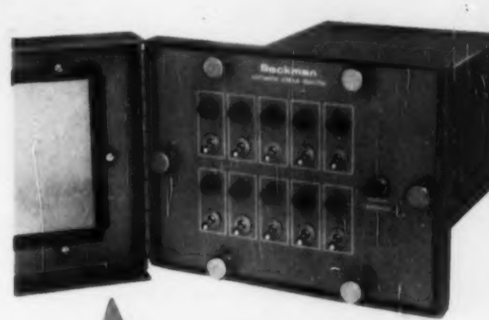
Selection of colors for the indicator lights was as logical as the functional arrangement of the controls. "Sample Inject"—indicating that a sample of the material to be analyzed is being injected into the analyzer—is white, in order to distinguish it completely from the other colors, which are (by analogy with traffic signals): red for "Analysis OFF," green for "Analysis ON," and yellow to warn the operator that the instrument is zeroing itself automatically.

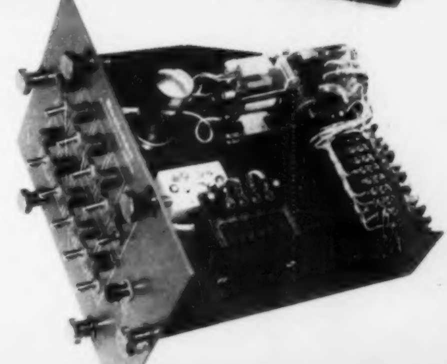
A companion unit to the chromatograph is the Automatic Stream Selector (right, bottom), whose design is also operator-oriented. Status of the toggle-switches (on or off), in conjunction with their matching indicator lights, provides a check for proper functioning of instrument. The lights themselves indicate which streams are to be selected for analysis (at which point they glow at 5% brightness) and which stream is in process of being analyzed (glowing at 100% brightness).

Logic and simplicity were Malk's design objectives, and he seems to have achieved them.—*R. M.*

Door prevents accidental re-setting of controls once instrument is "on-stream," allows operator to view lights through window.

Companion unit for Beckman instrument is Automatic Stream Selector, which allows use of multiple streams with chromatograph. Toggle-switches are used because position indicates on-or-off status, which, with lights, provides check for proper functioning of instrument. Lights indicate which streams are to be analyzed (5% brightness), and which one is being analyzed (100%).





Packaging for Corporations

When a representative of one of the nation's largest food companies asked ID some months ago how *other* big companies got their packaging done, we were surprised that he didn't know all about it. Then we realized that we didn't know much about it either. An initial investigation revealed that no two large concerns achieved the packaging function in the same way, and that nobody seemed to know much about how other companies did it. In the coming year ID will describe how various companies established their packaging programs and how they solved the difficult problems of corporate package design.

In this initial story we have turned to the currently controversial drug industry to discuss CIBA, a giant international chemical house which has been cited by the Art Director's Club and AIGA for excellent design and questioned by Senator Kefauver in his investigation of drug marketing. In package design CIBA's approach combines outstanding free lance talent with a highly qualified company design staff. The result has been top package design used to support what is really a very hard, though very sophisticated, sell.

C I B A

A package design staff organizes to get what it wants from free lancers, and from itself

by Ann Ferebee

If Pavlov had punched a button marked "CIBA," the design-wise dog might have barked: "ethical drugs and advanced design." His conditioning would be pretty certain since CIBA does own one of the world's great drug companies, and its packages have won top design awards. But CIBA is much, much more than this, and how its name became associated with good design as well as good business is a complicated story with many corporate turns in the telling.

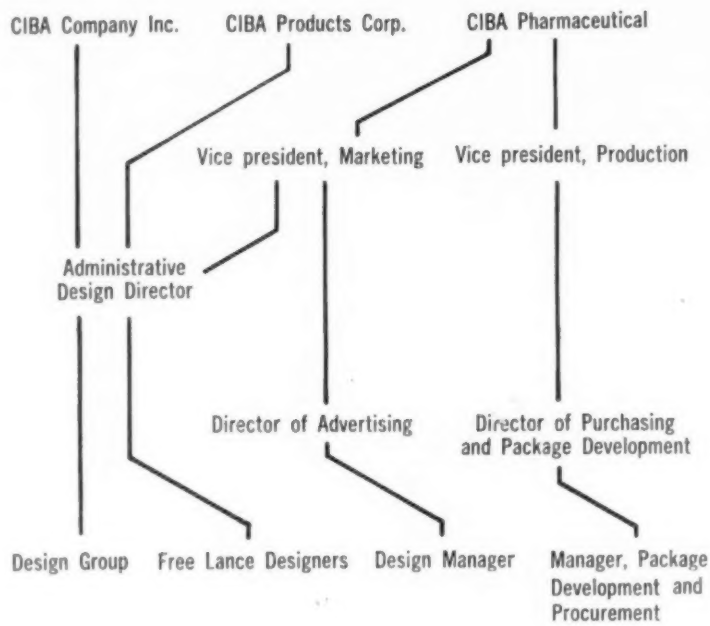
CIBA is not just an ethical drug house. It is an international chemical combine whose sale of dyes, plastics and cosmetics—as well as pharmaceuticals—shot up over $200 million in 1958. Design at CIBA is not accomplished simply. Contributing to it are two separate design groups and a package engineering group within the organization, and a variety of independent designers and materials consultants on the outside. Since it's hard to tell the players in this story without a program, the chart (overleaf) shows who does what and where each fits into the corporate structure.

Within such an extensive organization, packaging, of course, has always been a big job backed by a big budget, and until this fall it was handled separately by the individual companies. But a movement, stretching over more than half a dozen years, to unify the corporate [illegible] and avoid duplication of effort within the individual companies just this fall resulted in the formation of the Promotion Coordination Committee by CIBA States Ltd., a reorganization of Advertising, Sales and Production Departments in

Package design at CIBA depends on two skilled design groups, technical specialists, consultants

In an era of corporate complexity—when a bank, for instance, can start with an almost pastoral name like Corn Exchange, evolve to Chemical Corn and end up hopelessly as the Chemical Bank New York Trust Company—CIBA's complexity is notorious. The company started simply enough just 75 years ago in Basle, Switzerland with the manufacture of one of the first coal-tar dyes. From its dyestuff research, it branched into pharmaceuticals in the late 1880's and since then has spread into 23 countries, divided into 43 CIBA companies which employ over 20,000 people. CIBA came to the United States in 1920 with a dyestuff plant in Cincinnati. Today its American companies market pharmaceuticals (CIBA Pharmaceutical Products), dyes (CIBA Company, Inc.), plastics (CIBA Products). Even as this chart was being prepared, a fourth company (Eidophor, Inc.) was incorporated to market a new kind of color television. All four companies are in turn directed by a company called CIBA States Ltd.; their joint communications problems are dealt with in a CIBA States unit called the Promotion Coordination Committee. Formed only a couple of years ago, it has helped make each member more aware of the communications problems facing the other companies. Among the committee's duties is the supervision of CIBA's new overall corporate image program, and the Administrative Design Director, James Fogleman, reports directly to them about it.

Within the four American companies Fogleman's Design Group has paramount graphic design responsibility (a counterpart to Fogleman's group, under the direction of Max Wagner, operates in Switzerland). Since the reorganization of Advertising and Sales (now called Marketing Department), a second design group, under the direction of John Marmaras, also operates within CIBA Pharmaceutical. By handling this department's extensive promotional packaging and other promotional material, they leave Fogleman's group free to service the other companies and handle the corporate image program. Development of package shape and structure at CIBA Pharmaceutical is the responsibility of the Director of Purchasing and Package Procurement, Lawrence Zahn, in the Production Department.



As Administrative Design Director, James Fogleman has a key position in the CIBA design picture. He directs design for CIBA's corporate identity program and his group is available to all four CIBA companies in the U. S. Another important figure is John Marmaras, who manages design for CIBA Pharmaceutical's Marketing Department.

Group run by James Fogleman (left with assistant Jack Hough) works mainly within CIBA Pharmaceutical (they designed the non-prescription line and the new prescription line); their service is also "available" to CIBA's other companies in North America and they have already designed a trademark for Eidophor.

CIBA Pharmaceutical. In terms of graphic design, the man most responsible for executing the packaging aspects of the program is James K. Fogleman.

CIBA hires a designer

Fogleman, who now heads both the Administrative Design Group at CIBA Pharmaceutical and a corporate identity program for CIBA in North America, looks like the hard working young executive he is (he is 40), concealing his vocation behind a quiet regimental tie and an Indiana accent. (Before joining CIBA he had been a design consultant for Chance Vought Aircraft. Before that he studied aircraft engineering at Purdue and Alabama, served as a bomber pilot during World War II, then took a B.F.A. degree at Yale.) Although he still sits at the drawing board occasionally (as for a Serpasil promotion package on page 48), his most common role is that of design executive.

When Fogleman came to CIBA's sprawling, 80-acre Summit, New Jersey plant nine years ago as Art Director, he was the first staff designer the company had ever hired. Since then, his work with top independent designers has produced exciting results (page 44) and he has built up a Design Group that is in the front ranks of company graphic design departments. Fogleman realized of course that packaging would make a stronger impact if it was coordinated with other visual aspects of CIBA as a corporation. In this idea he was backed by such company men as Paul Roder, CIBA Pharmaceutical Vice President of Marketing (who talked up the design idea among division managers), and encouraged by Dr. Paul Erni, representing the Swiss parent office. "The Swiss," says Fogleman, "are not ones to ram an idea through," and the ultimate reorganization plan simmered for many years before it went into effect. Even now CIBA operates with no iron-bound set of directives which each department and each company must follow to maintain a "corporate image." Nevertheless, most CIBA people are aware of the value of a group which neither compounds drugs nor sells medicine, but which does transform the spirit of this important chemical house into powerful graphic images.

The corporate image

In November, 1958 before the formation of the Marketing Department, CIBA Pharmaceutical changed Fogleman's title to Administrative Design Director, rewrote his job specification to cover: "Design consultation and design services to promote standard design of format and typography of packaging, advertising, publications, exhibits, general graphics material, plant facilities and equipment, architecture, etc." Fogleman translates this sweeping directive with the blunt statement: "What we are trying to control is design in every aspect." But he objects strongly to labeling the CIBA approach as a "corporate identity" program. "The job is much too complex to attempt labeling," he states. He does agree that popularization of the corporate identity idea has alerted companies to the importance of the visual impression they make. "A company will make an impression whether it is intended or not," he says.

But plain speaking isn't enough; CIBA's own young program has some hard work ahead. Most obviously, its planners must decide if they want to tell the public what its name means (and how to pronounce it) and what work it does. Probably few readers know, for instance, that the CIBA letters stand for the Society of Chemical Industry in Basle; even fewer realize that CIBA in North America has huge plastics and dye interests as well as pharmaceutical interests.

Fogleman describes the CIBA image as that "of a pioneering chemical company steeped in the tradition of research and as a manufacturer of quality products." Although its diversified activities cause special problems in making a coherent image, he shies away from creating a strait-jacket format which must be rigidly applied to everything (CIBA's only standard graphic element is its trademark, used throughout the world). "In the first place," he says, "CIBA is engaged in too many diverse fields and equally diverse markets to subscribe to such a synthetic expression of itself." Instead, Fogleman tries to assert a common set of values and a high design standard which will itself create a subtle uniformity. Some critics feel that this approach may associate CIBA packaging more strongly with other high-standard pharmaceutical packaging than with the diverse packaging of CIBA's own far-flung interests.

The Design Group

Because the work load for the Design Group depends on new package design requirements, advertising schedules, and the like, it fluctuates widely, and Fogleman has found that this makes staff size a problem. To level out peaks and valleys of the work schedule, Fogleman plans projects so that a certain amount of work can be done free lance, keeps actual Design Group staff down to four—Jack Hough, his assistant, Irving Springer, Allen Davis and himself. Within the newly redesigned ethical packaging line (page 44), for instance, designs for 500 different items must be seen through the works in the next two years. Since the basic design has been established, Fogleman has retained two free lancers to do the mechanicals. This operating method means good pay for the free lancers, but in the long run, it also means better economy for CIBA. Beyond this, the Design Group uses free lance help of another kind: original design services for packaging and for its far-reaching graphics program.

In this kind of free lance situation, Fogleman operates somewhat differently. When the project problem (which may originate with the Promotion Coordination Committee at CIBA States, or, more frequently, with a CIBA department) gets the green light, Fogleman may go to many different design firms for possible solutions. After outlining the problem,

All photos this spread: Sam Kimura

CIBA's non-prescription line uses red, white and blue color scheme reminiscent of Johnson & Johnson. Face based on old Swiss wood type.

Family likeness in CIBA's pharmaceuticals?

Flip-top box for throat lozenges, one of many structural innovations, reminds purchasers of "cigarette throat" product supposedly relieves.

In developing both CIBA's non-prescription line (left) and its new prescription line (right), Fogleman used a complex combination of outside design help and his own group. As soon as he got his non-prescription line assignment, he began working on over half a dozen design ideas, each emphasizing a different element. A number of these ideas were then sent to such outside design firms as Harry Lapow and Harry and Marion Zelenko for development. Elements from several of the resulting proposals were utilized by the Design Group in the final version of the package, and the ultimate red, white and blue design, with its heavy type face, achieved the desired sharp distinction from the old, delicately lettered green and buff package which CIBA had been using.

Fogleman makes very clear that he considers any consultant who works for CIBA on the same basis as a staff man—that is, Fogleman is free to present the assignment in as much or little detail as he wishes and to adopt from the design only elements he likes and wants to use. Thus, on nearly all designs Fogleman credits his own staff as well as the consultant, insisting that "the creative emphasis comes from here." And it is true that Fogleman often has solved a particular problem—or at least has the outlines of it clear—before he ever calls in a consultant. Usually, in fact, the consultant will be selected specifically because of his ability to work on a particular kind of design.

Some time after the non-prescription line was introduced four years ago, CIBA's Swiss parent firm developed a new package design for its line of ethical drugs (right, below). Although designers at CIBA like to talk about family resemblance, the resulting European packages, with their slender, rather old fashioned typeface (developed by Jacques Nathan of Paris) bear practically no similarity to the American non-prescription line. However, when the decision came to redesign packaging for CIBA's American prescription line (right), the Design Group did seriously consider adopting this European design wholesale. Although such unity in packaging would have added impact to CIBA's pharmaceutical products throughout the world, the Design Group rejected this idea. For one thing, drug packages in the United States must meet more rigid labeling requirements, and need a more flexible format to allow for it.

A current problem before the Design Group is whether or not to adopt the European-designed packaging for CIBA's new veterinary line of drugs (bottom, right). If they do, this striking, olive-green package, with its own distinct insignia, will conflict with current American packages, again throw the concept of family resemblance out the window — where, perhaps, it belongs.

Ethical line uses four different shades in combination with buff to signify various drug lines.

Typeface on European prescription line resembles American, but format is different.

Like packages above, veterinary line was designed by European Group under Max Wagner.

CGOSW
DPRBU
MHINQ
LZEFTJ
KVAYX

Tom Geismar collaborated with Design Group on special prescription line face.

Administrative Design Group branches into many areas to heighten corporate impact of CIBA

The work of Fogleman's Administrative Design Group extends far beyond responsibility for the design of packages in CIBA Pharmaceutical's prescription and non-prescription lines. In addition, they design packages for CIBA's other companies and carry out projects for the new corporate identity program.

1. *Corporate exhibit at Newark airport.*
2. *Trademark for Eidophor, CIBA's new company for closed circuit television.*
3. *Packaging line for CIBA Products Corporation's plastics.*
4. *Brochures for CIBA publications.*
5. *Corporate advertisement in Time.*
6. *Graphic design for Eidophor trucks.*

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Sam Kimura

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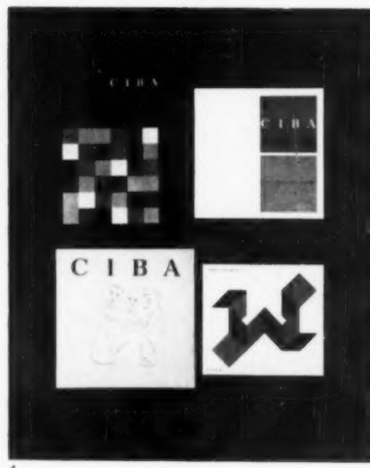

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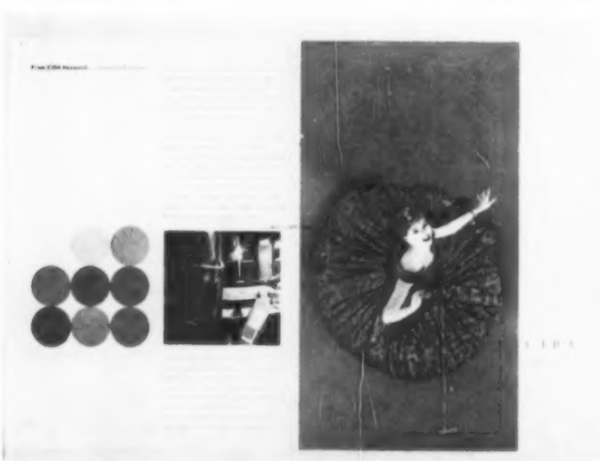

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he tends to leave the designer free to work up a solution in his own way. Elements from any one of the approaches may ultimately find their way into the final design (see page 45). Operating on this staff-free lance basis, says Fogleman, "we can accomplish almost twice as much as if we had a regular staff of equivalent size working full time for CIBA."

Mostly, the Design Group's packaging work has been on CIBA Pharmaceutical's ethical (prescription) and over-the-counter (non-prescription) lines. In each case the problem and the solution have been quite different, but then, the problem of pharmaceutical package design is somewhat different from that in other fields. The current boom in medical research has sent an avalanche of new drugs on the market—a new one nearly every day—and brought record profits to most drug companies. But to reap the profits, they have adopted what is really a very hard, if sophisticated, sell. For CIBA this has meant quite a change from the days when it rang up sales almost automatically from its reputation for quality. The growing number of firms expanding into prescription drugs gives CIBA the kind of hard competition it has not had to consider until recently. It was to meet this new situation that CIBA reorganized both its Marketing and Production departments this Fall, giving graphic design a new place of importance within the whole CIBA complex.

"To succeed in this highly competitive environment would seem to mean to abandon the old rules," remarked Fogleman recently. "But we believe the problem can be solved without sacrificing the restraint, dignity or conservatism which must be synonymous with the pharmaceutical industry."

Package Design

Among the Design Group's first packaging jobs was CIBA Pharmaceutical's over-the-counter line (page 44), which they redesigned four years ago. They wanted a package clearly distinct from the ethical line—one that would compete successfully in a merchandising environment yet still convey the dignity of CIBA as an ethical house. In developing CIBA's new ethical line (page 45), the Design Group tried to embody the flavor of the already established European package (page 45), and at the same time establish a family resemblance with the over-the-counter line. They also had to meet rigid U. S. government requirements for drug labeling; these do not exist in Europe.

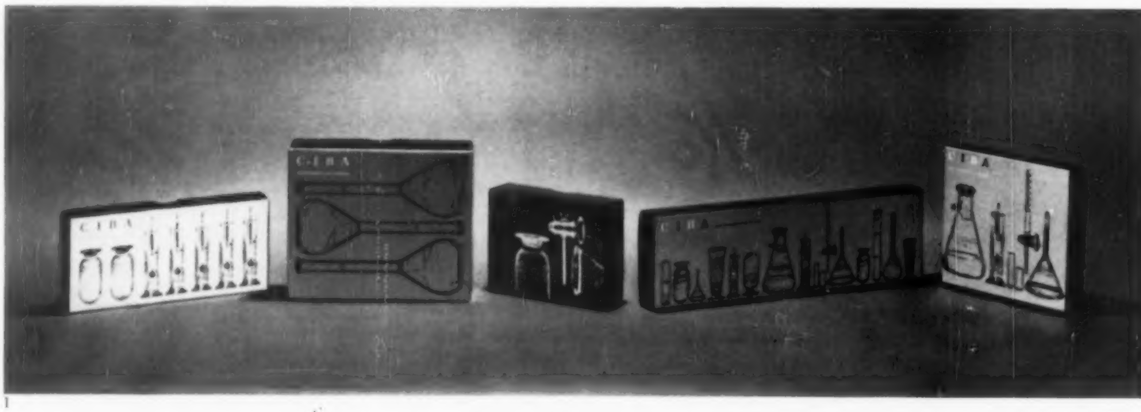
Under the present system of corporate organization, the Design Group is also "available" to other CIBA companies, and they have recently lent their package design services to the plastics company, CIBA Products Corporation. The new red and blue label (opposite) began to go on company packages just this fall. The Group is presently studying packaging for CIBA Company Inc.'s entire line of dyes.

Now that the Design Group has completed the regular lines of pharmaceutical packaging and the epoxy label for CIBA's plastics company, most of its work will be outside the field of package design. A recent job has been the creation of a trademark (left) for CIBA's newest company, Eidophor (from a Greek word meaning "image bearer"), which markets a closed circuit television projector said to produce a large, sharp image of extreme color accuracy. (See ID, August '59, page 90.) They have also completed graphic designs for Eidophor's big trucks (opposite). But most of the Design Group's work from this point will involve developing CIBA's corporate program. A start on the program was made last year with an exhibit (left) at nearby Newark airport explaining the work of CIBA in all corporate aspects. For *Time* magazine, last year, they also designed a series of six corporate ads (left) each introducing the work of a different CIBA company. A major corporate project now in progress is an elaborate book (in lieu of an annual report, which is not required of a European firm) which will explain the operations and interests of CIBA in the United States.

Design for Promotion

A second design group (see chart, page 42), similar to Fogleman's, works within CIBA Pharmaceutical, but serves only the design needs of the Marketing Department. Since this department sends out CIBA's varied promotional samples, it means that there is actually a bigger packaging job to be done here. And the lack of merchandising and government restrictions on promotional packaging gives these designers much greater freedom. Until the departmental reorganization this Fall, this work too was under Fogleman's direction. Now John Marmaras, of the original group, manages the new group and reports directly to the Director of Advertising. Although Marmaras works with Fogleman only on problems of CIBA's overall corporate image, both his approach and operating method are similar. Besides supervising promotional package design, he controls the physical appearance—format, illustrations, typography and layout—of all other promotional material too. His responsibilities in the Marketing Department include such new areas as sales promotion, veterinary products, feed additives, and commercial and scientific exhibits, and such well-known company publications as *The Clinical Symposia* and *Medical News*. Working with the Creative Director (in charge of copy) and the Planning Director (in charge of budget), Marmaras establishes the design treatment. Like Fogleman, he spends only a moderate portion of his time on packaging; the majority is spent on direct mail brochures, advertisements, and the like. Also like Fogleman, he works with a small group which includes only three people besides himself—Myrtle Johnson (design coordinator), Philip Smith, (designer), Stewart Creischer (junior designer)—but he calls on such agencies as Hazard; William Douglas McAdams; and Sudler and Hennessey; and such designers as Harry and Marion Zelenko; and Brownjohn, Chermayeff, and Geismar for additional help. Asked how he manages to achieve a family relationship among promotion packages designed by different firms, he explains that he tries to establish a CIBA design point of view rather

CIBA Pharmaceutical's Marketing Department has its own independent design staff.



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Sam Kimura

Because the Marketing Department at CIBA Pharmaceutical requires such a large volume of promotional material, including specialty packaging for doctors' samples, a separate design staff to service its needs was set up this fall when Sales and Advertising merged to form the new Department. This second Design Group, under John Marmaras' direction, produces many designs completely on its own, but it turns to outside consultants frequently too. The graphic design firm of Brownjohn, Chermayeff, and Geismar, for instance, played a major role in developing the specialty line (above) as well as both the designs on the page opposite. But both Marmaras and Fogleman feel that the essential quality of all designs in which outsiders participate comes from the collaboration between the CIBA staff and the outside consultant.

1. Specialty packaging line for 1958.

2. Interior of specialty package for Doriden.

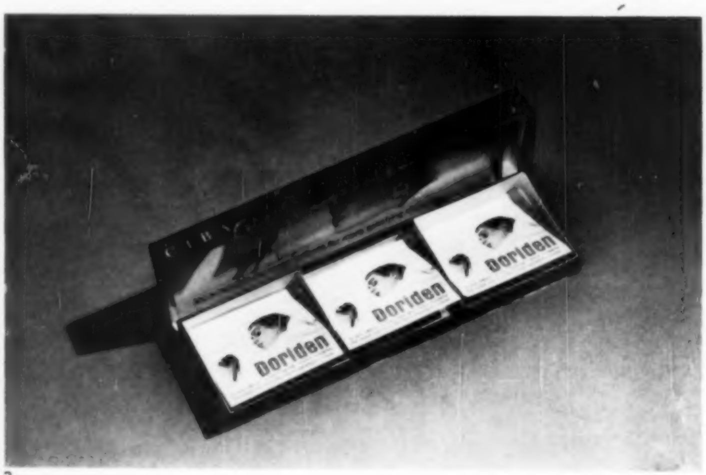
3. Serpasil sample package.

4. Serpasil-Apresoline sample package.

5. Direct mail package with samples for treatment of three types of allergies.

6. Advertisement for new veterinary line.

7. Sample containing four varieties of an anti-hypertensive drug.



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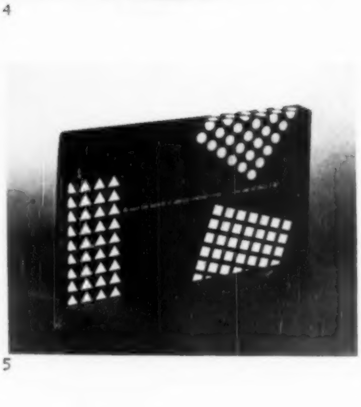

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than insist upon a rigid packaging format. Tom Geismar, probably more closely associated with CIBA than any other outside designer, says that working with a corporate representative who is himself a designer is a pleasant change. Discussing the familiar sample mailer (opposite) which he designed for CIBA last year, Geismar says, "Marmaras discussed the one used the year before, but after that we were given a free hand to work out the entire new line." Geismar feels that this kind of freedom makes the work easier and helps keep the design quality high. Harry Zelenko, who also has worked frequently for CIBA over the past half a dozen years, says emphatically, "It is a pleasure not to have to educate the client. CIBA wants and requires good work." Although someone has called the Summit operation a "hinterland Yale alumni club" (Marmaras, Jack Hough, and Geismar, as well as Fogleman all come from there), Marmaras actually selects his designers from many sources. Often he calls for a specific designer because he knows he can do a certain type of job, but he searches for fresh thinking constantly, he says. Right now he is studying the problem of giving a separate identity to overlapping products (CIBA produces a variety of similar anti-hypertensive drugs, for instance), and he hopes to begin work soon on redesign of dispensing units and point-of-sale material.

Technical Packaging

CIBA Pharmaceutical doesn't limit package design to graphics alone. Because of special problems in drug packaging, this CIBA company maintains a whole department whose work is devoted to package production and technology. The Production Department, which actually manufactures medicinals as well as packages them, decides on materials and construction for the package and determines its feasibility for the product. Is the product chemically compatible with the package material? Will it permit packaging in such "new" materials as aluminum and plastic? Will permeation be a problem? Must the product be protected from light? These are the questions that come up, and tests in the analytical laboratories of CIBA's Research Department end many bright packaging ideas right here. But the person who finally turns the answers over to the Marketing Department is Lawrence H. Zahn, Director of Purchasing and Package Development within the reorganized Production Department (see chart, page 42).

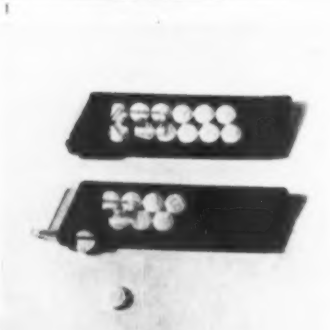
Purchasing Materials

Working under Zahn, Paul Schultz, Manager of the Package Development and Procurement Section, acts as liaison between the Marketing and Production departments, sitting in on meetings of the sales committee when packaging for a new product first comes up. Under the new organization, both the development of the package form — what Zahn calls its "structure and mechanics"—and the purchase of packaging materials have become his responsibility. Zahn believes that this arrangement will greatly reduce work by consolidat-

Structural innovations spark sales

Often in the past the Production Department has introduced structural changes which boosted CIBA's competitive position. It was first to use a polyethylene dispenser (top) for medicinals, and both the cartridge-like dispenser (center) and the spool dispenser for Doriden (bottom) were in the Museum of Modern Art's recent packaging show.

1



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3

ing the entire development of a package from the idea stage to the placement of orders. At the same time it will centralize contacts with suppliers within one division and improve communications with such other areas as Quality Control, Clinical Investigation, Advertising, and the Design Groups. After the type of material has been agreed upon, Zahn encourages competitive bidding by setting up specifications which more than one supplier can meet (Paul Schultz actually specifies the materials that will ultimately be used).

CIBA Firsts

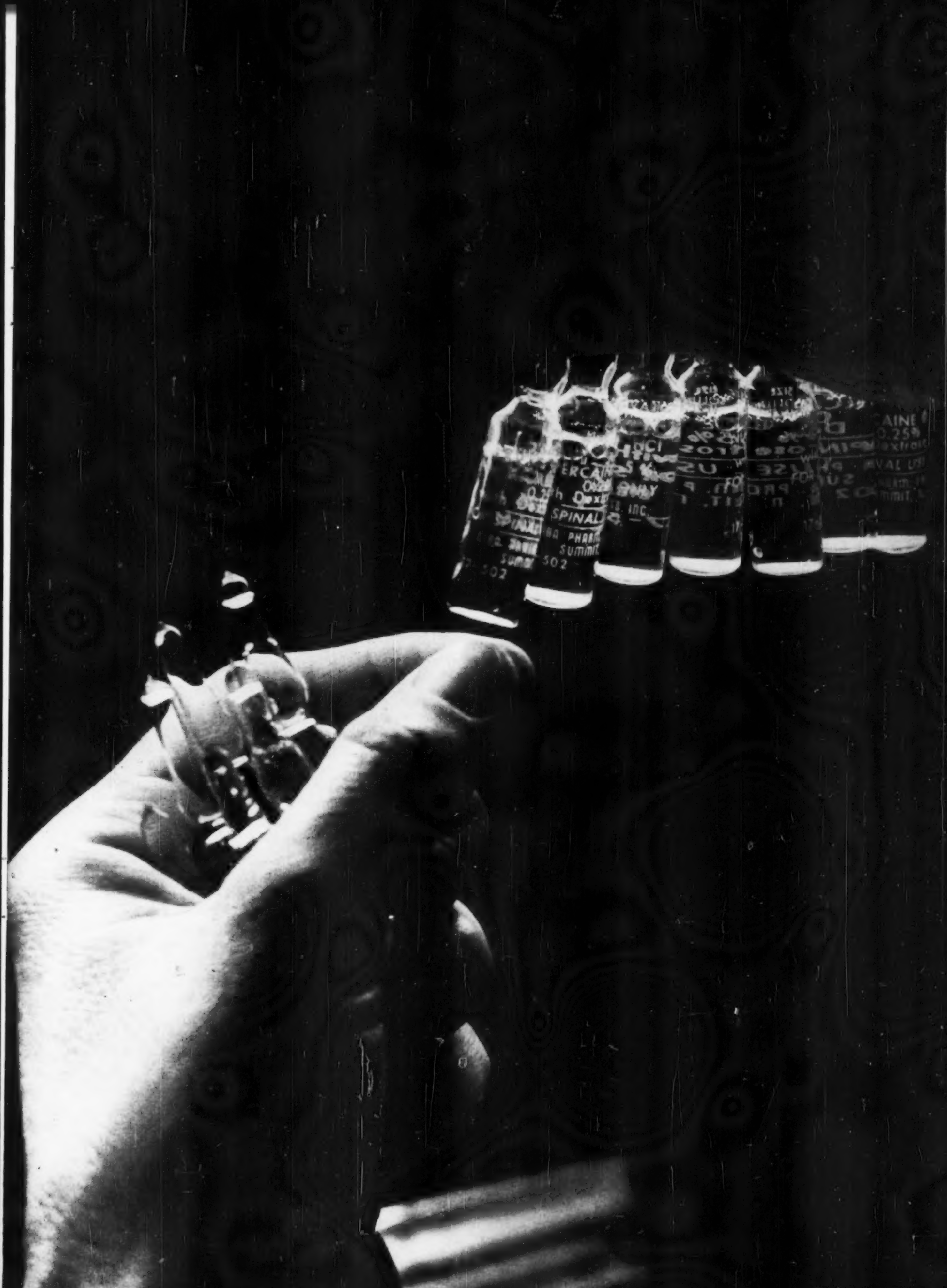
From the design standpoint, Zahn's division often does much more than simply procure packaging: it introduces completely new kinds of packaging to the pharmaceutical market. CIBA, for instance, was the first to put "nose drops" in a polyethylene dispenser (at left). This package, developed for CIBA by the Boonton Molding Company of Boonton, New Jersey, has since been adopted by practically every drug company in the industry. The invention of the flip top box, of course, belongs to the cigarette industry, but, again, CIBA was first to use it (page 44) for a pharmaceutical product. Because this kind of convenience packaging has significantly boosted CIBA sales, Zahn encourages suppliers to come in with similar new ideas. To protect the supplier, Zahn always purchases at least his first materials order from the company who worked out the new idea. After that, he says, they are on their own, and must keep their prices in line with those of competitors if they want to keep the business. (Since CIBA spends thousands of dollars on such packaging materials as glass, polyethylene, aluminum, cellophane and pasteboard, the suppliers usually want to.) Zahn studies all new materials very closely, even when there's no immediate prospect for their use. This helps him build up a background of information on materials which he may later use, and it gives him "trading" information when he meets with his associates. (He is a vice president and board member of the Packaging Institute, a member of the Pharmaceutical Manufacturers Association and a member of the Advisory Committee of the Michigan University School of Packaging.)

Putting the pill in the package

While the packages themselves usually are not fabricated at Summit, the drugs which go into them are, and the big job of getting the product into the package goes to the Pharmaceutical Manufacturing Division of the Production Department. Often their suggestion for a slight modification in structural design means that a new package can be run off on existing machinery. And by proposing minor changes in the prospective design, such as the size of the bottle mouth, they may be able to effectively speed up the rate at which the product will be packaged.

The life cycle of the CIBA package is not complete until the customer purchases it, uses its contents, and throws it away. Although he may do the latter with relief, the designers, marketing men, and technicians who started the whole process will have done all they can to make him remember the package as well as the pill, the company which sold it as well as the reason he bought it.

Keturah Blakely


SPINAL

PLANNING BY DESIGN

in a world of product change

Initiating a new format for the professional meeting, the American Society of Industrial Designers turned over the platform of its 15th Annual Conference this fall to experts on technology, marketing and planning, and opened its doors to businessmen, students and designers alike. More than 400 conferees assembled in New York for three November days to hear over a dozen talks on major topics. In this 16-page review, ID presents excerpts from the diverse views of those distinguished speakers, all of whom addressed themselves to the underlying theme: How can industry plan for a future in the shadow of dynamic changes generated by economic, scientific and human research?

PARTICIPANTS:

Alfred C. Neal, *Committee for Economic Development*
THE U.S.S.R. CHALLENGE TO OUR ECONOMIC GROWTH

R. Harvey Whidden, *Bulova Watch Company*
THE THREAT OF FOREIGN COMPETITION

Renato Contini, *New York University*
HUMAN FACTORS ENGINEERING IN PRODUCT DEVELOPMENT

Myron S. Curtis, *Warner & Swasey*
DESIGN IN INDUSTRIAL EQUIPMENT

Conrad Jones, *Booz, Allen & Hamilton*
RE-EVALUATING PRODUCT PLANNING

Henry C. Bonfig, *Columbia Broadcasting System*
INTERPRETING TASTES INTO SUCCESSFUL PRODUCTS

Dr. Alfred Oxenfeldt, *Columbia University*
PRICING IMPLICATIONS OF BETTER PRODUCT FEATURES

Carl L. Bixby, Jr., *Hotpoint Division, GE*
THE PAYOFF IN DESIGNING ADVANCED PRODUCT LINES

R. L. Monahon, *IBM*
DEVELOPING CORPORATE DESIGN CONSCIOUSNESS

Lee S. Bickmore, *National Biscuit Company*
SALE IMPACT OF A CORPORATE IMAGE PROGRAM

Dr. D. B. Thomas, *Batelle Memorial Institute*
IMPACT OF TECHNOLOGY ON FUTURE PRODUCTS

Bay Estes, *U. S. Steel*
THE SHAPE OF THINGS TO COME

Walter Dorwin Teague
THE EFFECT OF CHANGING HABITS ON NEW PRODUCTS

Raymond Loewy
REFLECTIONS ON THE DESIGN CONDITION TODAY

The U.S.S.R. challenge to our economic growth

Alfred C. Neal, President
Committee for Economic Development

Now that progress in the arts of destruction has made it impossible for us to achieve national security by military defense alone, we see that there are only two power blocs in the world, and that the power of each is the power to destroy the other. If we assume, as appears reasonable, that our own capacity to develop weapons systems will remain equal to, or in any event not far behind, that of the Russians, then we shall have to look to means other than military weapons for our future security.

The Russians are using production as a weapon of war. They are already trumpeting to the underdeveloped countries of the world—to the billion poverty-stricken people who live in these countries—that the Soviet Union has perfected a new form of economic development, a form which has moved a great nation from serfdom to industrialization within a period of 40 years. It is faster and surer, they claim. They neglect to say, of course, that they have built upon the achievements of the West which required 150 years of trial and error. Nor do they admit that parts of our own country and other countries of the Free World have achieved similarly rapid development.

In the war of production, we start with a great lead. We have only eight per cent of the world's population, but we produce at least 35 per cent of its goods and services and more than half of its industrial and mineral products. We have achieved the world's highest per capita production, and its highest standard of living.

We have done all this in an economy which is on the whole little understood by the people who operate it and enjoy its benefits. Probably not more than one person in 20 who goes through high school and one in five who goes through college receives *any* training at all in the economics of our system. You can be sure that all who go through the Soviet schools and colleges are not only trained but indoctrinated in *their* economics.

Ours is, of course, an extremely complicated economic system. The way that production is adjusted to demand is through the market—the so-called self-equilibrating process—and it is hard to understand. Obviously, the majority of the Congress did not understand this process when they refused to lift the 4¼% ceiling on the rate which the Treasury could pay on its bonds. So let's start with first principles.

The first principle of our economic system, distinguished from that of the USSR, is to permit each individual free choice to develop his fullest capacity. This is a goal which is shared by people everywhere. We are now learning, however, that we cannot develop fully ourselves if the means of development are denied to others. Only when we more readily do the things that permit the full self-development of these people, as a condition for our own continued freedom to pursue the better life, shall we see the full meaning of Toynbee's prediction that "The Twentieth Century will be remembered as the first age in history in which people have thought it practical to make the benefits of civilization available to the whole human race."

To sustain our way of life both at home and abroad, we must also have the means and ability to produce all the things and services that we want to continue to enjoy. This is a large order. To do all this, we need a higher rate of economic growth.

Growth is usually measured by the total sum of the goods and services which the economy produces in a given period—the so-called Gross National Product, or GNP.

The Soviet rate of growth is probably seven per cent per year. Our own is a little more than three. With the Soviet GNP about 40 per cent of ours, if growth rates continue the same, the USSR will match us in total GNP in 25 to 30 years. If they do this, they and their system will become formidable competitors indeed. They will expect the uncommitted countries to drop into their lap. So, if we are interested in winning the war of production, we had better learn the answers to this question:

How, in our type of economy, has growth been achieved? It would be difficult to improve upon the following conclusion from a statement by the Committee for Economic Development:

"The universal drive to expansion in search of profit, animating each one of millions of economic teams, has undoubtedly been the great generating force for the cumulative economic growth that has taken place in our whole society."

Supporting this growth has been a system of decentralized economic initiative that has permitted new enterprises to be formed and existing enterprises to grow, and which has weeded out the socially useless or non-competitive operations. Supporting it also has been a phenomenal increase in the amount of capital goods assisting each worker—approximately 10 horsepower now compared with 1¼ eighty years ago. Net investment in structures, equipment and inventories in manufacturing is now equal to about $9,000 for each manufacturing employee. But behind all of this have been people—the management and labor—with all of their education, skills and abilities. It is they who have cooperated and controlled the other elements in the process to bring about the aggregate growth measured by the 3 to 3½ per cent per year. They have profited from the ingenuity and devotion of scientists and inventors who have constantly changed product, tools, and organization in the direction of higher productivity. Indeed, about half of our rate of growth has been dependent upon *improvement in productivity* rather than upon the increase in the amount of labor and capital employed. It is in this field that the industrial designer has contributed much in the past, and will need to do even more in the future.

Now if there is one thing that economists know, it is that we must increase capital investment in order to increase growth. Even the Russians know this. They are devoting about 30 per cent of their Gross National Product to capital investment, compared to our 17 to 20 per cent.

If we are really serious about increasing our rate of growth, we must increase our rate of investment, and to do this without inflating the money supply by an undue expansion of commercial bank lending, we shall have to increase the rate of saving in the economy. Our major source of new capital investment is the retained earnings of businesses. One of the fastest ways to increase the rate of savings is to permit businesses to retain and to invest in new plant and equipment more of their earnings. Our tax laws should be altered to encourage this.

We can achieve still more growth by making everyone's work more effective. This we do in large part when we make investments in new plant and equipment which add to output per manhour. At the same time, we may be pursuing policies which reduce man's output per manhour below what it might otherwise be. We do this every time we insist upon denying people the right to buy where they can buy cheapest or to work with the tools which make them the most productive. Barriers to trade, deliberate restriction of high productivity on farms, and, of course, the traditional feather-bedding practiced on the railroads and in many other places, all reduce the product per manhour of labor. We need to remember that our economic history is one of displacement—and displacement happens automatically with competition. New England was displaced as a farm center by the midwest, just as many parts of the north are being displaced in manufacturing by the south. If such displacement is artificially prevented by barriers to trade, we only hamper our own progress.

We can have an increased rate of growth in the United States if we want it. People need only to be informed and to make the right decisions in order to get it. In all that we do, I hope that we do not lose sight of the fact that our economic system is designed to give people what they want. And we should remember that improving our rate of growth is not an end in itself. Not only in the United States, but in the uncommitted areas of the world, and indeed in the Soviet Union itself, it may well be that people would prefer to have more freedom rather than more growth. In making our choices about what we do to improve our rate of growth, we should always remember that only under a system of freedom can we realize the inherent capabilities of man. Indeed, nothing will do so much to aid our growth rate as elimination of the restraints on productivity now imposed by unions, by government, and often by business itself.

The threat of foreign competition
R. Harvey Whidden
Vice President, Bulova Watch Co.

The best way American industry can meet the challenge of foreign competition is to go back to work. . . . Perhaps the American manufacturer is not quite so good as he thinks he is: there is too much fiddling around, and too much of what might be called narcissism on the part of the U. S. manufacturer. What has happened to the urge to compete, and the willingness to get down to work? They seem to have given way to "the age of the goof-off."

. . . Design must be coupled with an aggressive attitude on the part of the other components of American industry—and this includes management. After all, we in management are paid good money to make good judgments, with respect to design and markets.

. . . The European consumer, while not having the purchasing power—at least not yet—of his American counterpart, has nevertheless achieved truly middle class status, and now is ready to buy. When consumer credit and installment buying take greater hold abroad, the challenge of foreign competition for the American manufacturer will become even greater. But more sobering to contemplate is competition from a third area—the rest of the world, where we Americans must compete with European producers for the buying power of millions of people.

Raymond Loewy (in keynote address): A forceful well-planned effort is being made abroad not only to penetrate our home markets but to dislodge us from Latin America and Africa. Do you not find it significant that in four years, U. S. auto exports were cut down 50%, with imports up 12 times? I do. . . . Designers abroad are forced to substitute intelligence and design shrewdness for our type of lavishness. Our state of plenty is nerve dulling. There is growing need for design service that combines American techniques with the qualities of toughness displayed by European designers. This happy land is not the safe continental pasture it once was. . . .

Whidden

Contini

Human factors engineering in product development

Renato Contini
Senior Research Scientist, Research Division
College of Engineering, New York University

Human Factors Engineering is not a new concept, but one that is being better understood and therefore receiving greater attention. It is being practiced under many names: we are known as Human Engineers, Bio-technologists, Engineering Psychologists, Ergonomists and Work Physiologists. But basically we are all concerned with that area associated with design *that takes into consideration the attributes and capacities of man* and applies this knowledge to the design of things for his use. These things may be products, tools and devices, combinations of these into systems, or even the environment which surrounds man and the tools and system with which he works.

Human Factors Engineering is not a separate branch of knowledge. I insist that it draws from many disciplines, engineering, psychology, physiology, anthropometry and sociology. Each of these contributes some information about man, or about those factors external to him, that influence his performance and his well being.

The designer cannot modify man. He can, however, in a large measure, control many of the factors external to him. This permits the designer to adapt or modify the product for the most effective combinations with the user, the system with the operator, or the environment for the population that will inhabit it.

The most primitive cultures were vaguely aware of relationships between man, his tools and his environment. Rudimentary applications of human factors considerations were developed. These usually were based on imperfect anthropometric information. Rudolfs Drillis, in Latvia, collected many such examples used by the peasants of the Baltic countries. Farm implements such as the scythe were proportioned according to the man who was to use them. Not only the handle length, or the distance between grips, but also the blade was related to the man. (Sketch 1, overleaf)

These same folk norms were applied to the design of furniture, chairs and tables. In both instances some human dimension—the span of the hand, the width of the fist, the distance from the elbow to the finger-tips—was used as a measure. (Sketch 2)

Even in architecture many such examples exist. The Gothic spire, it has been said, was in some fashion proportioned after man's index finger. The dimensions of stair treads and risers were proportioned to the length of the step. The length of the tread, plus twice the height of the riser was equated to the length of the step, measured from the point of heel contact to the next point of heel contact. This ratio was based on the assumption that the energy required to rise vertically was twice that required to move horizontally—an elementary application of a physiological consideration.

It was World War II that brought about the formalization of the human factors concept. There was developed equipment of all sorts that taxed the capacities of the human operators. It was then that the sciences concerned with man — physiology, psychology, anthropology and sociology — were enlisted.

The data available at that time, amplified and expanded by continuing research and design experience, are the bases of Human Factors Engineering.

What are some of the factors that should be considered?

The most obvious of them perhaps is *the use of a proper system of human dimensions.* Much anthropometric data has been collected for a variety of purposes, so that now it is possible to design properly for the appropriate population sample. Design charts are available from a number of sources. In the face of this, care should be taken to avoid the temptation to design for the "average man." Correct design requires a knowledge of the limits of the size of the population involved.

There is an apocryphal story of the designer whose task was to design a console at which the operator was to be seated—and over which he was to observe other operators. He designed carefully for the "average man," allowing minimal margins. As a result, operators larger than the average could not sit with their knees under the console, and operators smaller than the average could not see over it. Thus, using the average, he had designed out the entire real population. (Sketch 3)

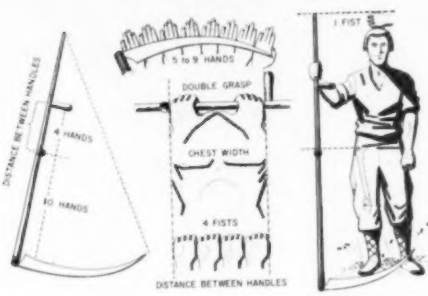
A second category of anthropometric factors *is that which defines the limits within which a man in a given position can perform effective work.*

Data such as those collected for the military by Wilfred Dempster show the maximum reach that a seated man can achieve, as well as the more limited area in which he can exert any reasonable effort. Bio-mechanical information, the pattern of a movement, and the space-time-force relationship during a movement, are often of great value to the designer.

Psycho-physiological factors must also be understood. These play a very important role in the acceptance of a product by the consumer or in the operator's performance with a device.

An important channel of communication is through our visual sense. More complete knowledge of light, form and color and their psychological impact on man permit more careful manipulation of these variables. The same may be accomplished with the aural sense. The ear can sense sound from that of very low frequency and intensity to that which is painful. Within this range is a smaller area in which adequate communication may be achieved.

Man bases his judgments on cues received through other



1 AFTER R. DRILLIS

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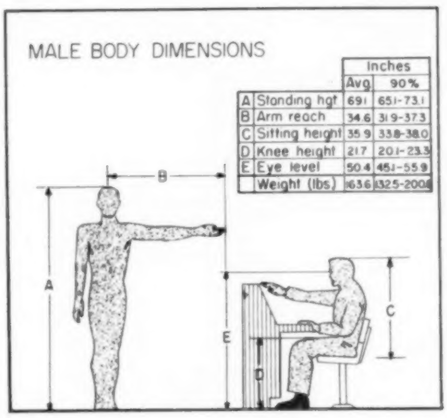

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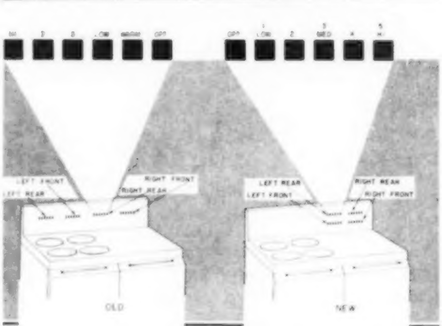
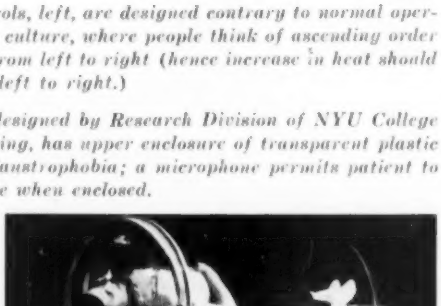


Range controls, left, are designed contrary to normal operation in our culture, where people think of ascending order as moving from left to right (hence increase in heat should move from left to right.)

Iron lung, designed by Research Division of NYU College of Engineering, has upper enclosure of transparent plastic to reduce claustrophobia; a microphone permits patient to communicate when enclosed.



sensors. Through the skin he may feel pain or pressure, heat or cold or sense surface texture. Through the proprioceptors located at the muscle connections and the mechano-receptors in the head and stomach he can sense position or movement. A knowledge of what limits of movement, acceleration or vibration is tolerable is of great use to the designer.

Physiological data are sometimes very valuable. In the '30's German research scientists, for example, performed a study of the energy expended in climbing stairs of varying pitch. Contrast this approach with that which Drillis described earlier. With such data, the designer is given the limits within which he must operate and has an opportunity to plan the work to result in minimum energy cost for the operator.

What criteria may be used in determining when human factors are a consideration in a design?

It is safe to assume that anything that is designed will in some way be associated with man. Even when the association appears remote as in some completely automatic systems, man must at some time control or maintain the system. It is important therefore that every design be studied for possible human factors consideration.

How do you identify the human variables which must be considered in the development of a product?

This is difficult to answer. There are no apt formulae. At the very start of a design, it is necessary to define carefully the goals to be achieved with the product and the steps to be taken in accomplishing these goals. At a number of points along this process, man will in some way be related to the product under consideration; in its fabrication, its operation or its maintenance. If it is a consumer product it must also appeal to him. For these reasons the human factors specialist should be consulted early in the design process.

An analysis must be made of the way the product relates to man. How does it impinge upon his senses? Does it impose physical, physiological or psychological stress? What population will use it, and what are the characteristics of this population?

Can the product be considered independently as it relates to man, or is it best to consider it in the context of a system or an environment? And how does man enter into this larger context?

When the human variables are identified, the appropriate human factors data are applied and their effect on the design is evaluated. Compromises undoubtedly will have to be made between the human needs and all the other factors which control the design.

We have come a long way from the days prior to World War II in our understanding of the needs of the user or operator. This knowledge is being successfully applied in the development of military equipment. It is to be hoped considerations as careful of these human factors will be applied in all industrial designs.

Design in industrial equipment
Myron S. Curtis, Vice President Engineering, Warner & Swasey Co.

Curtis

Jones

The purchaser of industrial equipment is profit-minded; his prime consideration is that the equipment be functionally sound. Design and improvement of the mechanical function, the "guts" of the product, is the job of the engineer, but unless he is an exceptional man, he stops there. Neither by training nor experience is he familiar with the fine points of human function, operator efficiency, fatigue, etc. Here's where the industrial designer comes in. His is the job of human function—of the working relationship, both physical and psychological, between the product and the human being.

. . . True enough, the operator does not buy the tool, but his efficiency, his ability to do more work can be directly influenced by those charactertistics of the machine that make it a more workable, attractive tool to him. And though he does not pay the designer's fee on the tool, his employer does pay a small part of it. That expense is returned in the effect of the machine on his workmen, and in the end result of more and better products at a higher profit for him. In our business, we must also remember that, though the operator does not buy the tool, he often has a great deal to say about what equipment shall be purchased.

. . . You cannot successfully sell a machine in competition with one that functions better, no matter what the appearance of your product; yet neither can you successfully compete against a better-looking machine if it functions as well as yours does. Certainly in the long run, eye appeal does have an effect on sales of industrial goods.

. . . We firmly believe that the integrated design (including appearance) of a complete line of industrial equipment helps products sell each other. We try to build in recognition features that will identify our products as members of the same family. It is also axiomatic that "family resemblance" has great functional advantage. If you can operate one product in the line, you will be able to operate the others, since all our controls have similar organization and color schemes.

Re-evaluating product planning in industry
Conrad Jones, Partner
Booz, Allen & Hamilton

There are 12 basic principles which our firm feels have stood the test of time and will continue to serve well in guiding management in the new product years ahead:

1. *Business strategy is expressed in products and product programs, which are the foundation of forward company planning.*

New products have been basic in the historical development of the world. In recent years the explosion of scientific know-how, the creation of mass distribution and communication media plus the up-grading of human wants through higher education and income has brought a growing wave of new products. In the next three years alone the sales of new products should account for most, if not all, of the increase that is expected in industrial production and sales.

2. *The new product program is a top management responsibility.*

The selecting of a company's product line is a fundamental top management decision. Management can not delegate this responsibility completely without abandoning, in effect, the leadership of the company. The relative prosperity today of a great many companies in the United States can be explained by top management's willingness to pursue this responsibility and its ability to muster company resources for the decisions and actions required to achieve new product success. In a sample of nearly 100 companies selected for interest in new products, Booz, Allen & Hamilton found that in well over 90 per cent, top management approves product development projects *before* they are undertaken.

3. *Planning products should be organized as a top executive staff function, headed by a manager of stature adequate for coordination of vice presidents.*

In only the past five years the creation of a product planning department has become almost universal among the best known U. S. companies. The number of such new departments has approximately doubled each year. Yet the simple creation of such departments has not been a cure-all for new product problems. Their effect has rarely been neutral—results either substantially improved or else got substantially worse. The single most common weakness has been a failure to plan thoroughly how the department is going to operate before it gets in trouble. The second most common failing has been a result of understaffing the top position: a man of inadequate background or inadequate prestige does not gain the cooperation essential to the success of a new and untried department.

4. *Organization and control should fit the stages of new product evolution.*

The evolution of new products is a management activity that can be defined in any company through careful analysis. The basic stages are: (1) exploration (idea seeking); (2) screening (a quick but independent sorting of the relatively few good ideas); (3) business specifications (analysis to determine the product features and its program); (4) development (the turning of the idea into a tangible form in line with agreed upon specifications); (5) testing (the conduct of commercial experiments to validate earlier findings); (6) commercialization (all-out launching of the product backed by the company's full reputation and resources). Planning and control for this process is possible and has repeatedly been effective when done in the right way.

5. *Coordinated new product effort is best achieved through representative interdepartmental product teams.*

Despite the inherent problems of team approach in a company of complex organization, there is no substitute for identifying the responsibility and providing a focus for enthusiasm and cooperation. This product concept has been a difficult one to implement, but well worth trying. The specific project team methods to be used must be truly designed to the business and human environment of each company. Where this is done well, the project team approach to creating and exploiting new products is a powerful and essential tool.

6. *A definitive program—carefully planned and closely managed—significantly improves new product results.*

Conscious invention is the rule rather than the exception in industrial business today. Although accidents and inspiration have their place in the history of development of many new products, the luckiest breaks seems to come to those who have *planned* to be lucky. Management guidance, evaluation and control of new product programs, intelligently applied, have not stifled creativity. On the contrary, creativity blossoms where management can show its creative people the specific nature of its product needs.

7. *New idea creation can be directed and controlled to achieve improved pertinence and quality of products.*

There is no shortage of ideas in the world and never has been. The creation of ideas is no mystery—they arise from real people worrying about real problems. When management can outline the company's problems and opportunities and get people worrying about these, the new product ideas needed eventually appear. Left to their own devices with their own problems, the same people will generate ideas (because creative people can't help but create ideas). But, it is then only a matter of coincidence if their solutions happen to fit the realities of the company.

8. *New product selection is accomplished by evaluation in all stages—no single screening is adequate.*

We look at new product selection as a poker hand developed one card at a time. Each round of cards and bets is a new proposition that must be rejudged in light of the then known facts and probabilities. All too often the effort to collect the pertinent information that underlay these progressive decisions is neglected. This can be remedied only by an iron determination to do so—and the willingness to spend time and money to save time and money.

9. *Selection standards for new products should be upgraded persistently to increase the yield from available manpower and resources.*

In a special study to quantify the wasted effort against unsuccessful new products, we estimate that even among the leading industrial firms in the United States, about 80 per cent of the money for new products is expended on products that never become commercial successes. In the development stage expenses—where scientific and engineering resources are the greatest part—not much over 10 per cent goes into projects that will become successful commercial products. This implies that the majority of our scarce technical talent in industrial laboratories is being wasted.

10. *Product planning requires specifications and a program for each product prior to laboratory project.*

Many new products misfire because the original product concept lacked strong selling features. The principal ingredient of a new product success is the product itself. It is not wise to take the risks unless the proposed product truly has strong features for customer appeal. The economics of the proposed new business venture should be examined to determine what the effect of this product will be in development, testing and commercialization. By laying out a plan for evolving the product through these stages—even if in crude form—management can at least try to know whether or not the product makes good sense from a business point of view, before testing its technical feasibility.

11. *Market requirements and opportunities are the primary consideration in product planning.*

Only a few years ago it was often assumed that the job of new product development was to make the product and then see if it could be sold. Industrial designers have been demonstrating successfully to industrial management the importance of shaping the product's function as well as its appearance to meet the human needs of human beings who rule in our competitive markets. Many of the men who are credited as our great inventors were not, in fact, the first originators of these ideas. Many of our great American enterprises today were founded by men who put the final commercial twist on ideas and then carried the now-salable product to a receptive market.

12. *Company acquisition should be integrated with internal development to achieve a balanced new product program.*

The acquisition of companies is an alternate route for management in securing new products. Neither excludes the other. Although acquisition at first seems to have little bearing on industrial design, improvement or further innovation around acquired products, in fact, represents new opportunities for industrial companies—endeavors to which industrial designers can contribute.

Interpreting tastes in products
Henry C. Bonfig, Vice President
Columbia Broadcasting System

. . . Good salable products can be evolved only through a small group of competent individuals working together in harmony: Marketing, Design, and Engineering. The problem before them is, "How can the company remain sensitive to public taste, and design products that will be far enough ahead to be different and salable, but not so far as to be considered odd?" They must ask themselves a) Who is our potential customer; b) What segment of the market are we after? c) Are we a mass-producer or a customer producer? These points are important because there exists variety in public taste, and even geographical segmentation that affect public desires.

There are many ways to determine what the public wants, but I believe the most important method is for the marketing group to study objectively what is going on; and at the same time to draw heavily on the imagination of all members of the group, relating this composite knowledge to the particular industry involved. This is a two-way street. It is one thing for a designer to come up with his interpretation of the marketing director's request; it is equally important that the latter know whether his request has been filled . . . Design relates to function, need, and value. All of these must be appraised by the marketing group to determine whether these points have been merged into something salable. Frequently the consumer will forget what he thought he wanted if, in the final product, what he said he wanted does not represent real value to him.

In my experience with radio, tv and phonographs, pre-testing was never done in a given market — because it would alert our competitors to changes or innovations and spoil the element of surprise. Testing was done in the homes of executives and employees and information gathered informally — a method that proved effective in that field.


Bonfig


Oxenfeldt

The pricing implications of better product features
Dr. Alfred R. Oxenfeldt
Professor of Marketing, Graduate School of Business
Columbia University

I find that most designers don't take pricing too seriously. They prefer to get off the price hook by either ignoring it, or letting someone else fix it for them. Here are the two extreme attitudes to which I would like to direct my remarks:

1. "Design the best product you can (the designer knows what is best!) and then set the best price you can get for it." Or,
2. "Let the sales manager tell you the price at which he wants or needs an item and then produce the best item you can for sale at that price."

Both of these views are unfounded. There is virtually no market for the very best product that money can buy and not all features justify their cost. Quality and design represent compromises with expediency. You must always have some price limitations in mind. There is virtually never a market situation in which price is fixed and unalterable—if it is possible to alter the design and quality of the product. The problem of design and pricing then boils down to doing the following:

1. Being clear and consistent about whom you are trying to sell—in particular. That is, your central market targets.
   —Do not make the mistake of trying to sell to everybody.
   —You can "get rich" by selling something that most people dislike but that a staunch minority favors over all competitors.
   —It is essential that the designer and the sales force have the same market targets in mind.
2. Get a clear idea of the extent to which price variations affect sales. Find out whether it is an item on which modest price differences have big effects on unit sales.
3. Find out whether little differences in quality have a major effect on sales. This, and the foregoing, involve the concept of *elasticity*. You must consider which—price or quality—has greater effect on sales.
4. Allow elasticity impressions to dictate your policy. Perhaps it is wise to conceive of the designer's job as finding a rate of exchange between price and quality that determines what he should do. For example:
   —You can pay a high price for an improvement in quality where quality exerts a strong effect on sales. You can afford to make the item high in cost under such circumstances.
   —In some situations, you can add to cost and price only if you make a very substantial improvement

in quality, because customers are very sensitive to modest differences in price.

—Where customers are very sensitive to price differences, the designer still has the chance to reduce costs on some parts of the product to increase what is put into the product in other respects.

5. Test your views about the elasticity of price and quality before you carry them very far; also test your particular applications of price and quality estimation before going to market.

These general propositions do not give specific answers to concrete problems. They do suggest the kind of information you need. This leaves us with the problem of how to get it.

How can the industrial designer obtain the necessary information about price and quality elasticity to guide him in decisions he must make? Specifically:

1. How much should you be willing to give up in the way of quality in order to effect a given saving in costs?
2. Which elements of product quality are most expendable and which are inviolable?

You must break product quality down into its essential elements. (We shall include in quality here only the matters over which the industrial designer exerts control.)

1. Style—and appearance characteristics in general.
2. Performance characteristics.
   —Immediately recognizable and non-controversial features.
   —Subjective, non-demonstrable, features.
3. Durability.
4. Ease and cost of service and repair.

The foregoing categories are broad—and intended to apply to most products. In any specific case, you would draw up a much more detailed and specialized set of categories—like: 1. Length; 2. Width; 3. Depth; 4. Weight; 5. Color; 6. Ease of operating dials; etc.

General propositions on research methods are these:

1. Beware of a technique that requires you to worry about what *everyone* thinks; try to break-out that group to whom you are trying to appeal particularly.
2. Beware of the naive viewpoint that you can "just go out and ask people what they think." Design problems almost always involve something that is new and unfamiliar; something that, in time, might make a very different impression than it does at the start.
   —It is essential to make a vivid representation of what you have in mind. (cont. on facing page)

The payoff in "advanced" products

Carl L. Bixby, Jr.
Manager of Marketing
Kitchen Appliance Department
Hotpoint Division, G.E.

Looking around today, it might appear that we are saturated in almost everything. But closer inspection shows a real opportunity to obsolete existing products with new designs providing greater customer values. However, our customer's votes—for or against us—will depend not on our appraisal of the value of our offerings to him, but on HIS appraisal.

Therefore, we at Hotpoint feel that our greatest need and opportunity is to know quickly, and constantly, what our customers are thinking. To do this, to help accelerate the process of obsolescence, and to reduce the chance of costly misfires, Hotpoint developed two years ago a special line of products that could incorporate features of rather extreme and advanced design. We called this line "Custom Trend." From the ideas sparked by these advanced models, and the careful evaluation of consumer reaction, we have extracted many practical "pre-tested" items that have been successfully employed in marketed product lines.

Our objective with Custom Trend was to explore innovation in four general areas:

1. **Merchandisable features**
2. **Functional performance**
3. **Design and style**
4. **Product quality**

There have been useful results, which might be summarized thus:

1. **To get more accurate market information.**
2. **To develop applications of new technologies.**
3. **To help stimulate the public desire for new products, and break down resistance to radical change.**
4. **To stimulate the Hotpoint team, and build morale.**
5. **To promote advanced thinking as an asset.**

The features, designs, and plans developed in each of the areas mentioned above were, and, are tested against:

1. **Our customers' needs**
2. **The market we serve**
3. **Our competitors' actions and reactions**
4. **Entrepreneurial risk-taking**

In January 1958, we introduced our first set of Custom Trend products at the Chicago Furniture Market. They included a built-in water heater, an electric baseboard heater, a bathroom laundry center (to bring laundry facilities nearer to soiled clothes), built-in refreshment center (for family or rumpus room),

countertop oven and surface sections (for minimum installation expense), and Tempatron (water, heater, air conditioner and food chiller all in one unit). We also showed various range and kitchen designs to save space and increase automatic operation.

In January of 1959 we followed with our second set of Custom Trend innovations. These included a gourmet barbecue center (to prepare all barbecue foods electrically), a 12-foot kitchen appliance wall, a new approach to the free-standing refrigerator, several unique ranges and an electronic oven. But to present these product innovations was not enough. We needed sound answers to a number of questions, and to get them we retained Dr. Ernst Dichter. The questions:

1. To what extent do the Custom Trend Appliances reflect positively or negatively on the Hotpoint image?
2. To what extent do dealers and builders feel their customers are ready to accept these new concepts?
3. To what degree do Custom Trend appliances represent revolutionary concepts, or to what degree are they seen only as insignificant modifications of existing appliances?
4. What are the specific features of each appliance that evoke positive or enthusiastic comment from dealers and builders? What features were subject to criticism?
5. How can the findings of this study be most successfully employed in the future?

In brief, our findings showed the following:

1. Hotpoint's intentions were welcomed.
2. Our public image was conservative.
3. Hotpoint was seen as sincerely trying to meet new concepts of the American dream home.
4. Criticism had to do with human engineering.
5. The new image was positive.
6. The Custom Trend name was good.

How has it paid off? In addition to the points above, it has already produced numerous additions to our line. Among the Custom Trend ideas put into limited production are the electric baseboard heater, an electronic oven, the Singulaire countertop cooking center, Solitaire refreshment center, a new built-in oven with mirror window, a deluxe stack-on surface section, and a modular kitchen. We feel the "Custom Trend" method of research has helped us get a line on what our customers are thinking, and has given us many pre-tested items for our existing line—as well as many more planned for the future.

—General preferences for style over price, or vice-versa, do not help in appraising a particular style or design.

—Try to get the consumer to "see" the product as he would in the welter of similar products carried by a retailer.

—It is important to get his "pre-purchase" as well as his "post-purchase" reaction. Don't ask questions—let him talk about what's on his mind, for at best you can only get a general notion of how he will behave.

3. When can you rely on "taste" experts—those who allegedly can predict how consumers will respond?
   —There is possible reliability in a strong concensus.
   —There is manifest unreliability in a strongly divided opinion.
4. It is absolutely essential to have humility and awareness of self-involvement in one's own creations.
   —There is always a tendency to consider completely obvious what is anything but so.
   —There is a parallel tendency to mis-perceive the reactions of others—we see what we want to see.

What can the designer do for the pricer?

1. Incorporate features for which the pricer might charge much more than cost.
2. Select the best combination of features that could be offered at a given cost to the consumer.
3. Segment the market for the pricer.
   —Offer something "special" for the buyer who is extremely price-conscious.
   —*Repel* the person who can afford to pay a fairly high price from the lowest-priced items so that he will buy something offering a higher margin. The talent for purposeful repelling is much underdeveloped in our time. In selling—just as in daily life—we are all so concerned that everyone should love us; we forget that often the best way to judge a man is by those who dislike him. So to with products: both design and pricing should calculatedly set out to express a character that will attract some and repel others.
   —Attract the attention of those people to whom your sales people are trying particularly to sell.
4. Get the brand to "stand out" especially where the product is sold with self-service.
5. Add the "expensive look" to the product. Here the designer can be especially useful in providing clues to what represents quality to the consumer.

Monahon

Developing corporate design consciousness

R. L. Monahon
Manager of Corporate Design, IBM

In 1955, IBM was 41 years old. It had expanded its activities in the business machine field and was in the process of developing new facilities throughout the industry. It was also on the threshold of a new technology—electronics. It became evident to management at this time that, in the light of future plans, its business intent was hiding under an old suit of clothes. And there was great fear of further dissipating this personality through lack of appearance continuity or consistency. IBM defined its problem quite simply: it needed not only a new suit of clothes, but one appropriately tailored to its complex personality. Mr. Thomas J. Watson, Jr. requested the inauguration of a program.

At the request of the company, Eliot Noyes started early in 1956 as Consultant Director of Design, concentrating on the architectural and product design aspects, and calling on Paul Rand to handle the graphic arts area—to develop a new symbol and help establish some basic though flexible disciplines for all graphic work. Graphics, incidentally, is a good place to start the development of an overall program: one can experiment at a reasonable low cost, and the speed of production and the quantity and completeness of distribution make it easy to call attention to the fact that something new is happening in the company.

As Mr. Noyes focused on the arduous and detailed problems of product design, he worked with designers in the company (and there had been staff designers for many years) to help establish a kind of disciplined approach, rather than a fixed set of design criteria. Basically, our objectives were to reflect the precision inherent in the equipment, and seek a design quality that would be valid for many products over a considerable length of time. As IBM decentralized, a third objective became product compatibility among divisions. This does not mean that all products must look alike. They obviously can't. But they need the thread of design quality to tie them together.

The decentralization that occurred in the first 3 years of the program could have destroyed the program's intent, and our visual image might have reverted to chaos. The answer was the establishment of a coordinating office in the corporate area. Our office assists in administrative details of the design program, offers advice to the divisions, and maintains an exchange of design information through seminars and conferences. We also work with Mr. Noyes and our other special consultants in developing yearly and long-range plans.

The age-old problem of art is to communicate its illusive qualities. How do you get separate groups of designers and engineers working within the same philosophy? Today we feel that most people in IBM are design conscious, but this is no guarantee that the consciousness will take the same route in all of the firm's locations. We have, therefore, developed a series of communicating devices that aid us in getting across our design point of view, and thereby hope to achieve consistency of work. One such device is a travelling display, which has toured major plants and laboratories during the past year in an attempt to create an awareness of, and appreciation for, the work of design people in each location. We have made movies reviewing our work in product design and graphics. These movies are sent to design groups in plants and laboratories, for showing to their clients as well as local management.

Still, there is no substitute for direct design consultation. We in the coordinating group are fairly well organized now to make regular visits to plants and laboratories, to work directly with designers on product, interior, packaging and graphic problems. This gives us a chance to understand local problems and, by attacking them on the spot, to understand ways similar problems can be solved elsewhere.

On a regular basis we invite our design people to New York City for two or three day seminars. Here they exchange information among themselves on specific problems, and are brought up to date on overall company affairs. At such seminars we usually include men outside of design activities —from marketing, production, etc.—to discuss their work and its effect on design, or vice versa.

To sum up our precise objectives is impossible. Design has no grammar. One cannot take form and color, texture and space, and wrap them up in neat definitive sentences. It is equally impossible to legislate design through company directives. To make a design point, we generally find it necessary to communicate in non-design terms, i.e., cost, maintenance, access, transportability, function, etc. This generally keeps the communication within the framework of the recipients, who usually accept esthetic ideas through more tangible attributes.

As a general reference guide, we are developing a Design File, to contain examples of work done in all areas of IBM's business, as well as discussions of approaches to specific problems. We hope it will assist our designers in making points to the clients and, conversely, assist our clients within the company to see their design problem as part of the overall company design picture. Each year, we plan management presentations in such specific areas as graphic or product design. This is a kind of feed-back system that assures us that we are continually interpreting the company personality in the proper design terms. What are the results of all this? Ours was never intended to be a luxury program, and we have found that through the mere act of tying up loose ends the program generally pays for itself. It has made good business sense to support our position in the marketplace with a first-rate appearance. And though the design program is still young, we are delighted to find that this newcomer to the organization chart is beginning to make a visible contribution to IBM's affairs.

Sales impact of a corporate image
Lee S. Bickmore, Vice President
National Biscuit Co.

Every company has an image. It may not be the one it would like to have, but it has an image that is made up of many factors. In many companies the three most important ingredients are: 1) products; 2) advertising; 3) employees.

In light of the changing business atmosphere, many intelligent companies are now taking a long look at themselves, to determine where they are headed—each one trying to decide what share of the market it wants, what channels of distribution it needs, what ratio of profits to sales and investments it should strive for. Should it be a high-priced, medium-priced or low-priced house? Should it sell everywhere or have exclusive outlets?

I believe the time has come for every company to put its objectives in writing. This requires long-range planning—5, 10 and 15-year planning—and when it is undertaken, an image begins to form. The listing of objectives and spelling out how to achieve them through products, people, advertising, almost becomes a description of the corporate image. It is also a big step toward efficient operation. And as competition grows, companies that don't know who they are and where they are going won't be going anywhere, except broke. Even in this day of deadly sameness in products, in display fixtures and store layouts, and even advertisements, there are many ways a company can bring uniqueness to its image—the kind of uniqueness that customers respond to and advertising men exploit to the fullest. It can be done in the product, the package, the name of the product, and in sales, advertising and merchandising techniques. We have done it with Ritz crackers since 1934 through a continuing series of refinements, improvements, and image-creating campaigns to boost its prestige and reputation for quality. (In some foreign countries, a box of Ritz is presented to a girl friend much as Americans present a box of candy.)

. . . You can tell when the initial uniqueness of a product wears off. The first indication is that it moves slower, and if a competitor has made a major improvement on your identifying uniqueness, you'd better move fast. Products that depend on a unique personality are much like those based on style and fashion—obsolescence sets in rapidly. To prevent this you have to keep constantly alert, detecting shifts in your image and continually revising and invigorating it.

Thomas

The impact of technology on future products
Dr. B. D. Thomas
President, Batelle Memorial Institute

In studying the effects of technological advances on industrial products and production, it is necessary to approach the subject from the standpoint of the designer. He is of course always limited by the physical characteristics of the medium with which he works, but the improvement of that medium enables him to achieve results that were once impossible. For existing materials, the improvements may be gradual and the changes in the use patterns correspondingly gradual. But occasionally we have a dramatic change, and a new field of product exploitation may be opened up.

Technological advance, viewed in this way, can be categorized in several ways:

1. Improvements in existing materials
2. New materials
3. Improved processes
4. New processes
5. New and improved gadgetry

1—**Improvement of existing materials.** In the field of high-strength structures, some significant developments are taking place. Within the past three years, *steels* originally developed for making hot forging dies have been converted to sheet form and used successfully as aircraft structural materials. Steels of this type with an ultimate tensile strength of 300,000 psi are now being considered, and the development of steel with a strength of 400,000 psi should not be considered impossible. Such fantastically high-strength steels will demand the best in the way of design talent, since they are highly sensitive to notches and fabrication damage and defects, to hydrogen embrittlement during pickling, cleaning, or plating, and to surface decarburization. They are also difficult to weld, machine, or form so that even though the designer will have an exceptional material to work with, he may be hard-pressed to control its temperamental behavior.

The improvement of existing metals and the effect on design is further exemplified by the research and development work going on at present on *aluminum alloys*. Consider the design problems in light-weight engines. The aluminum engine block, because of its light weight and high thermal conductivity, has been talked about for years. Now aluminum alloys are being developed that may make this dream a reality. Leading manufacturers of automobiles have developed one or more working models of an aluminum block engine. The problems are simple to state, but difficult to solve. Conventional alloys do not have the wear and corrosion resistance to withstand long use. Some high-silicon alloys, however, appear to have promise and these may affect radically the design of the automobile engines of the future. The field of aluminum alloys and light-weight alloys in general is an extremely active one and may be expected to have profound effects on the design of products in the next several years.

The improvement of old materials is also shown dramatically in *plastics*, where the continual improvements make it possible to choose a material for a specific use with much greater certainty of the result than was true a few years ago. The designer is becoming more familiar with the virtues and limitations of the materials, and he gains freedom as his knowledge improves.

Even so classical a material as *glass*—which, incidentally, may be considered as one of the oldest thermoplastics—can be transformed and the transformation opens up new uses. In fiber form, combined with plastics, it opens up new possibilities in design: fishing rods, window draperies, insulation, boats and structural materials. The artist grows with the medium in which he works.

2—**New materials.** The first materials that come to mind are the new *high-strength plastics*. DuPont's Delrin has great industrial interest at the moment. It is the first plastic with strength properties that approach those of metals. Many of its uses are expected to be those which have traditionally been supplied by metals such as zinc, brass, aluminum, and even steel. Markets are anticipated in the automobile industry, in industrial machinery, business machines, plumbing fixtures, toys, etc. It can be fabricated with conventional processing equipment. It has a relatively low decomposition temperature.

Research continues to push up the temperatures at which synthetic plastics can be used and some of the conditions under which molecules which are essentially organic are used today would have been considered impossible a few years ago. In fact, so much is happening in plastics that only the plastics specialists can keep up. There is rapid progress in understanding the relationship between molecular structure and properties, and some plastics chemists believe that the time may come when they will be able to "design" plastic molecules to meet the engineer's *a priori* specifications. If this does come about, industrial designers will acquire a new freedom in relation to plastics. You will be able to proceed with your creations, specify the properties you want in a material—within limits, and it will be up to the chemists to produce it. This will be an exception to the proposition stated earlier that materials determine the characteristics of industrial design.

Brand new materials do not come along very often and when they do their applications do not immediately accompany them. An example of this is *metal fiber*. Metallurgists have discovered recently that some pure metals in the form of single crystal fibers have unbelievable tensile strengths. The mass production of such fibers and the development of processes to put them into usable form may revolutionize some of the strength factors in design. Textiles from metal fibers are a possibility. The felting of such fibers and their subsequent sintering into intricate shapes suggests future fabrication processes that may have quite revolutionary design considerations.

Lead-cemented alloys are another relatively new development. On the structural side, new methods of fabrication have been developed for the production of *metal honeycomb structures* that have tremendous strength-weight ratios. These structures are of great interest in the aircraft industry naturally, but will undoubtedly find application elsewhere.

3—**Improved processes:** Most examples are in the field of *metallurgy*. It has been found possible to increase the strength of ordinary steels by using a little more intelligence in the way we handle them in the forming operations. One process known as "warm working" will increase the strength of low-alloy steels by as much as 35 per cent with little change in ductility. Another method, called "Ausforming" by the Ford Motor Company, permits an increase in the tensile strength of commercial SAE 4340 from 235,000 psi to 280,000 psi or even more.

Numerous improvements in *casting techniques* will permit the designer to rely more completely on the manufacturer's ability to meet dimensional specifications. Cold-crucible induction melting and vacuum casting techniques may make some of the wonder metals such as titanium and zirconium more accessible to designers than they have proven to be in the past.

4—**New processes:** A surprising number of new developments represent radical departures from conventional methods. Among these is *explosive forming*. Investigators claim that at extremely high deformation rates, metals act much like fluids. At "explosive rates" it is believed that less total energy and lower loads are required to effect a given amount of deformation. Many hard, strong materials that have been difficult or impossible to form by other means have been successfully formed by explosive processes. Another advantage is that only a female die is required. The metal is forced into the die cavity by explosive pressure, usually hydrostatic pressure generated by detonating the explosive in or above a liquid.

A series of *electrochemical processes* now under development—frequently referred to as electromachining, electrocutting, electrogrinding, and chemical milling—suggest that designers of the future will be able to call for about any shape they want in high-alloy steels, the refractory metals, and even the carbides of refractory metals. These electrolytic methods are based on the selective removal of metallic ions, and it is almost as easy to remove a tungsten or tantalum ion as it is an ion of magnesium or aluminum. Shaped electrodes enable the "milling" of complex shapes—even as complex as screw threads. In our development work at Battelle, we have been able to cut, grind, drill, sharpen, and shape extremely hard materials at much faster rates than can be done mechanically.

5—**Gadgetry:** Here the designer's imagination finds its greatest freedom. What is a "design?" When considered statically, it is an arrangement of matter to satisfy a human need; and, when considered dynamically, to transform energy or matter to satisfy a human need. This definition may not be the one you are accustomed to hearing, but it has the tremendous advantage of serving my purpose. The design engineer will utilize the new and improved materials and processes I have been describing to develop new and improved designs, or arrangements of matter to satisfy human needs. This recognition that designs have a *purpose* opens up the tremendous field that is made possible by gadgetry—exemplified by modern electronics. Gadgets do things for people. They have memories; they may not think in the abstract but they can obviate the need for thinking. They accomplish in some ingenious way what would take a great deal of mental and physical effort on the part of the user.

The development of the *transistor* and its continued improvement, in its physical characteristics and its reliability, means that electronic gadgetry will continue to grow as an important element in design. Particularly the possibilities of *miniaturization* will have a great effect. Memory devices and specialized computers will become commonplace attachments to numerous products that we have thought of in the past as being operator dependent. These attachments are going to characterize more and more the familiar products around our homes.

To summarize: The overall effects of current technological change on product design will be those resulting from the availability of improved materials. Products will be smaller, more compact, and more reliable. They will be more ingenious. Mechanical devices will be lighter and smaller, and they will do more things in easier ways. With better materials to work with, designers will be able to handle safety factors with greater assurance. In this connection it is worth noting that there is growing up a new branch of the profession called "reliability engineering." It is going to have an important effect on design methods.

There are other developments going on in the world that are going to change the day-to-day problems of design. I refer to the missile, rocketry, and space programs of research. Regardless of what you may think of the relative merits of investigating the bottom of the sea as against the backside of the moon, the vigorous attempts being made to reach the latter are producing as a by-product some new materials, processes, and gadgetry concepts that will have their inevitable effects on design. Many of these we can only guess at. We may be sure that the economic and social status of the design engineer—already of great significance to our way of life—will become even more important and significant.

Estes

The shape of things to come

Bay Estes, Vice President, Marketing
United States Steel Corporation

You might think a steel company making sheets, plates and girders would be immune to the diverse tastes and buying decisions of individuals — but we are not, any longer. For many years, steel was the only material available for many uses. We had no worries about industrial designers thinking about other materials. Our job was to keep in touch with steel users and get our share of orders. But the day came when new materials began to appear. So we had to go beyond the purchasing agent in our selling. Today we are spending millions to cultivate markets.

. . . The STEELMARK program grew out of a survey undertaken to find out what individuals thought of steel and steel products. We found they associated steel with heavy products—buildings, bridges, machinery—and considered it strong and reliable. That's good; but we found that there was little recognition of the lightness, color and style found in today's steel products, and that often people did not recognize steel products at all. We developed a symbol to identify and enhance the appreciation of all steelmakers' products. We created a theme and a series of ads, too. The symbol, like the products we show, is a good example of contemporary design, intended to reflect steel's strength and reliability as well as style and modernity.

. . . As a result of many influences, let's say the buyer decides to purchase the article made of steel. The decision may have been influenced by an architect, engineer, a production man, or by salesmanship and advertising. But more and more this decision is influenced by the creative contribution of the industrial designer. In recent years we have increasingly appreciated the major part design plays in influencing the use of steel. Good design expands markets by providing new and better products. It adds value. It awakens the public. It changes the character of the market, molds it, expands it. Our job as a materials producer is to see that better steels are available to the designer, and that he is adequately informed about them. Without the designer, we are stopped cold in our progress. If we have a secret weapon to unleash on the stagnant, drab faceless society that worships massism—it is the ability to change. For change is the bulwark of individual democracy and the lifeblood of the designer, who would surely wither away without it.

Teague

The effect of changing habits on new products

Walter Dorwin Teague, President
Walter Dorwin Teague Associates

Mr. Teague expressed his reluctance to prophesy future style trends affecting new products except for short terms, and then only on the basis of major influences which may be expected to continue and grow stronger. Among these powerful influences he listed are increased life expectancy and growing vigor throughout life; increasing speed of air travel throughout the world; instantaneous communication by means of television, radio, telephone, and other expanding systems; the fantastic power of nuclear energy, just beginning to be employed for human benefit; a balanced diet throughout the year available to practically all; the multitude of synthetic fibers, plastics and alloys, continually increasing through research; electronics, which will free man from repetitious, non-creative labor and scientists from routine, time-consuming calculations; new structural techniques; automobiles and our growing highway systems, distribution systems, and the multitudinous array of household appliances. He then proceeded to analyze the way these modern factors affect living habits and product designs.

What does all this ferment of scientific and technological creativity mean? It means that we are swiftly advancing the construction of a completely artificial environment, closing a machine-made world around us more perfectly with each passing day. There is nothing new in the effort itself; we've always had to build an artificial environment to live in: as Nature made us we never could have survived in the world of Nature. But until now it has been a makeshift job, imperfect, uncomfortable and limited. Now we can foresee its completion, with all chinks caulked against drafts, with fatigue and discomfort banished utterly, and a lot of free time on our hands. Barring a major triumph of aboriginal human stupidity, we are rapidly advancing into a kind of Elysian Fields, man-made to meet man's needs.

Does this mean the triumph of materialism, as a tiresome platitude has it? I disagree utterly. I have lived without any of these material advantages, and it was life in an invisible cell, a life of handicaps, frustrations and infinite boredom. I've seen whole peoples even today living in such prisons of want. I believe modern science and technology are freeing us from servitude to material things, destroying ancient limitations, granting us opportunities and freedoms men never had before.

The growing artificiality of environmental equipment is one of *two* major trends to be considered by all who develop or design products in the years ahead. Moving with this current, whatever reduces another limitation can be successful in the markets. Whatever increases our comfort or well-being, enlarges our leisure, simplifies an operation, will be welcomed if properly presented. Look at the enthusiastic approval that has been given to such peripheral benefits as the acoustical treatment of interiors, better flooring, easier cleaning of dishes, floors, clothes, the painless duplication of business papers, better lighting of rooms and of cigarettes, improved writing tools—the list is gigantic but it is still far from complete. As my wife says, "And still they haven't invented a damn thing to make beds!" You can look around you and tot up your own list of unfinished business. Each item will mean an opportunity so long as it contributes to ironing out a wrinkle in this artificial environment of ours.

This is *one* major, all-embracing trend. But it has a corollary. In society as in physics, a force generates an equal and opposite force—the principle of the jet engine. Our speed of progress toward a completely comfortable man-made world, free of drudgery and furnished with all the facilities for good living, has generated its own powerful reaction. We feel an equal, over-riding impulse to escape to primitive simplicities and the life of nature! We do it not of necessity but for fun. You can pick up a very good frozen dinner in the supermarket, but gourmet cooking has never been such a popular hobby as it is today. Millions of Dads who have given their wives push-button kitchens insist on burning the steaks over an open fire outdoors. I'll wager that there are more hand looms spinning knobbly cloth in American homes today than at any time in the past century and a half. The allegedly dormant crafts have been revived as an immense "do-it-yourself" movement, and it's a poor home that doesn't have an expensively equipped shop in the basement. Boating has become a major industry, streams are crowded with fishermen, and camping out lures whole populations from their Beauty-Rest mattresses. We are reverting to life in the open, but take note that it is a well upholstered and completely equipped life.

Here is the contrapuntal response to a mechanized world: man who lives in a mechanical cocoon is still ambitious to be man in contest with nature. He wins exuberantly because today he brings to his sports and his recreations a host of facilities that are also given him by the machine age. So he goes out to pit his strength and skill against the forces of nature armed with all sorts of advantages that primitive man didn't possess. And he is rewarded with a sense of mastery of the world of nature as complete as his mastery of the man-made world.

These two trends are, in my firm opinion, dominant in the world of today, complementing each other and together fulfilling the destiny of man. With expanding leisure and prosperity, the second trend wields increasing influence on life and habits—and on the development and design of the things we make. The end results that conform to both trends have much in common. In the first place, they must be sleek and simple. No matter how complex a mechanical marvel may be — such as a television set or an electronic computer — it still must be simple to look at and simple to operate. A television set is evolving into a mere two-dimensional area on a wall; and the most intricate computer is housed in a cabinet simpler in mass but far gayer in textures and color than the wooden cupboard in my mother's kitchen.

The public is acquiring sound judgment in respect to machine-made things. They have turned their thumbs down on the hideous, vulgar, impractical and expensive gimcrackery of motor cars; and the same tendencies in power boats are diverting more and more people to the lovely hulls and graceful rigging of sloops and yawls and schooners.

Simplicity doesn't mean sterility: its proper expression is not to be found in some of the new midtown skyscrapers that were obviously designed by a ten-key adding machine. Nor is it in the late unlamented "Good Design Shows" in which it seemed that no one had the courage to venture beyond a flat dinner plate or a cubical cigarette box. "Variety in unity" is still an ultimate objective of design, which accounts in part for the superb beauty of modern jet planes. Their infinitely subtle lines and forms are bound together in a complete harmony of purpose, the achievement of speed and safety in flight. And Ed Stone's fairy-tale palace at Brussels last year had an inexhaustible variety but a unifying simplicity compounded of harmony, lightness and gaiety. The control panels of our most superhuman electronic instruments are pyrotechnic displays of lights and colors.

Gaiety—another key word, a major objective of design for this age. You find it in our domestic building and in our domestic furnishings, combined again with lightness and color. On a drive to lower Manhattan recently I passed south of Washington Square, and bright color and varied design struck me like a burst of sunlight through the taxicab window: it was a block-long series of apartment houses, where the designer had varied his facades with skill and grace, and used color with a courage seldom shown by city architects.

Let me sum up briefly. Scientists, technologists, designers, industrialists, are working tirelessly to supplement our human shortcomings, both physical and mental; to remove handicaps, destroy barriers of all kinds, eliminate tiresome and tiring labor, expand our leisure, complete a mechanized environment. At the same time men and women so liberated are turning to free exercise of the mind and body, recovering the exhilaration of life amid forests, fields, streams, lakes and seas, in or under the open sky, on the open road. Together these two trends enrich our lives with a fresh appreciation of color, gaiety, beauty in all their millions of manifestations.

I see no early change in our direction of movement and whoever wants to help furnish us with the countless things we need along the way to serve our ideal of serene liberation, had better cultivate a free and serene spirit himself, and embody it in the things he creates.

Loewy

The company design office
Raymond Loewy, Head
Raymond Loewy Associates

At Raymond Loewy Associates we feel strongly that problems can't be solved by design alone: it must be design in terms of distribution. Also, whether we call it "blue sky" or "free wheeling", the true measure of an industrial designer lies in his creative ability. I can almost hear you sigh and say, "he's off on that again". But this time I want you to take it to heart, particularly because changing economic business conditions are forcing changes on our design profession and, in the process, on ourselves.

All design offices have added services that are now a part of the total design service, and these new services tend to change our opinions of what we do and who we are. Add to these two essentials another. I think it kills effective design talent to limit its scope.

This is an age of specialization, we know. And the development of a specialty helps to pay the weekly bills—as serious a problem for the little office as for the big. But when a designer begins to make a specialty of packaging or of transportation interiors or business offices he is on the road to cutting himself away from the essential professional activity of total industrial design.

To me there is no comparison between the designer who knows all about air-conditioners and the market for them, and the designer who, in addition, knows what automobile interiors are being planned, what a supermarket in Palm Springs will be, what new designs are being readied for hardware, what new salad dressing is about to be introduced, and what Christian Dior is planning for next summer. The second designer is involved in trends affecting total living. He is the kind of designer I believe big business wants.

Loss of independence is an even more stultifying influence on the designer's creative growth. A cell of designers inside a huge organization must fight constantly against being reabsorbed into the engineering or marketing or other divisions of that organization. I know I am talking to some of you tonight who do not feel at all "digested" by the corporations of which you are a part. None of the corporate enzymes or executive gastric juices are reducing you to organic pulp, I am sure. At present

you are making brilliant careers of directing company design groups. But, I must argue, yours must be a major battle from day to day to keep the "cotton-picking" corporate hands off your creative enclave.

Design does not fit conveniently into corporate structure. We must make an exception of the way General Electric has worked its design division into its charts. It seems to "wag" the company, in fact. Corporate strategists have a heck of a time, generally speaking, fitting design into one of the empty boxes they draw around divisions. You know these charts. Everything balances. There is a long, black bar: that is the executive group. Everything dangling underneath balances perfectly. The chart looks stable; therefore, the company must be stable. Companies like stability.

Then, way off the edge of the paper, dangling like a frail mobile on a blue dotted line, is that odd-ball division the company picked up somewhere when, darn it, the president got sold a bill of goods that didn't go through channels! What is the silly thing? It's called the "design group". Who does it work for? Who gets billed for it? Who in the heck does it report to? (Who, by the way, has time to be reported to any more?) Why can't we just stick it inside "engineering" or "marketing" or some sensible, solid box that knows its place and doesn't cause trouble because everybody knows what it can do and does?

So, very often, that is exactly what a company does to a design division. When this happens, the very nature of the designer changes. The office of Presidency of the United States has made many Presidents. This is a good thing. But is it good for a designer to be made an engineer because he functions inside the office of engineering? This does happen; I am not playing with words.

Designers without freedom can become engineering minded or marketing minded or sales promotion minded to the extent that they cease to be design minded.

Maybe I'm touchy on this subject. For that matter, I've never met an un-touchy designer on any subject. But if designers get reabsorbed, ingested, digested, mutated or reoriented by the action on them of non-designing forces or executive enzymes, there will be no industrial design profession and I base all this on the assumption that it is important that there be an industrial design profession.

Donald McFarland, *retiring ASID president, made the following remarks about "Total Integrated Service" to members and guests of an informal dinner meeting.*

There are times when I feel we are doing our level best to obscure the fact that we are designers. When the design activity is down-graded or tacked on to a series of other functions, we run the risk of being absorbed *by* that function—rather than absorbing it. Many of you have seen evidence that advertising agencies are offering design services. And if they haven't already, I would expect that management consultants and market research consultants will begin to offer design as an auxiliary to their services. And why not? Aren't many of *us* glibly preaching to our clients and employers that the *real* problem lies in the consumer's Freudian super-ego and that once it is unlocked by our special service, the design problem is really very simple? Aren't we being opportunists, or at least allowing ourselves to be swept along by the myths and false aims of an unstable market?

I want to talk about "total service", a subject surrounded by emotional connotations that obscure its real meaning.

Let's examine what is meant by the term "total service." The word "total" is actually a misnomer, since only a completely integrated manufacturer has a total service. The most avid advocate of "total service" does not literally mean to include engineering, manufacturing, finance, legal advice and employee relations services. When pinned down, this camp explains that they really mean a "total marketing service." But what do they *mean* by marketing? What every major company in the United States means by the word is somewhat different from the designer's loose usage:

Marketing is a broad term to cover all aspects of determining who the customer is, what he wants, how to attract his attention, and how to get the product to him in the most efficient manner. Its various functions, in *industry's* usage, are these: 1. Marketing research; 2. Product planning; 3. Production scheduling and inventory control; 4. Sales and sales planning; 5. Product service; 6. Advertising and sales promotion.

Suppose an industrial design office tells a prospective client that he can handle all his marketing problems including the product design work. The client then asks:

> "You mean that you people can call on our customers and sell our products for us?" . . . "*Well, no—we don't perform the sales function.*"
>
> "You mean that you can buy space in national magazines, select tv shows for us to sponsor, organize and run dealer trips to Nassau, and, in general, plan our overall advertising and sales promotion strategy?" . . . "*Well, no—you need an advertising agency for that.*"

Banquet speaker Raymond Loewy is flanked by past ASID presidents, president-elect Latham (right) next to retiring McFarland.

"Well then, do you mean that you can take our product service headaches off our hands by setting up service centers and contracting with independent service shops to do our work?" . . . "*Well, no, we're not in that field either.*"

Well, I think I have carried this interview far enough.

It is not my purpose to disparage the "total service" idea—but rather to place it in its proper perspective. I believe many of us think of marketing only in terms of those functions which assist in the process of product development. If our fictitious client had asked if we designers conduct consumer research studies, the answer, in many cases, would be *yes*. Also to a limited extent we do product planning. Beyond these two areas of marketing, we can hardly stake valid claims. Thus, we do not offer a *complete* marketing service. What then *do* we mean by a "total integrated service?"

To establish the broader concept of industrial design, we must first assess the talents, abilities and responsibilities of all the functions in industry that are involved in the product development process. They can be singled out rather quickly—namely, engineering, product planning, consumer research, and of course industrial design.

None of us can doubt that engineering is a vital and creative contributor to the product; yet none of us claim that the vast and long established profession of engineering is *part* of industrial design.

Nor do product planners plan products. Their function is to schedule and coordinate the efforts of the many kinds of people involved in the entire process. They are the keepers of the short and long range plan—but their work shouldn't be confused with the *creative* work of developing products to put into the plan. Product planning is *not* a *creative* function! In most industries, it is not even a decision-making activity, since it has no responsibility for any of the *doing* functions. Can industrial designers *do* product planning work? The answer is yes and no. It is "no" to the extent that we shouldn't attempt the coordinating work, although in many cases it might advance our cause. But the answer is "yes"—and very importantly "yes" —that industrial designers do *plan products!* In fact, *who else* plans products *but* engineers and industrial designers?

Do market researchers plan products? Heavens no! They are *not* a creative function in that they are not responsible nor trained to design products or even to *make* decisions with respect to them. They *do* fulfill a very important role in gathering factual data with respect to the customer and the product, which is vital to both the engineer and the designer in the creative process of developing a product. Is *this* industrial design work? Again, yes and no. The designer *is* in the best position to know *what* information is needed to begin the design process. He should then formulate the questions to be answered. But should he do the actual research as well? Certainly there's nothing to stop us from answering our own questions by conducting the research ourselves. But we all know that industry has recognized market research as a separate kind of work, and I wonder if knowing intimately several *good* market research consultants to recommend to clients isn't better than doing it ourselves?

Since this eliminates all functions excepting engineering and industrial design from the role of a creative contributor, let us now consider engineering's position in this *marketing* oriented world. There was a day when *technical innovation* was enough to sell a product to a "have not" consumer. We all know that competition and a sophisticated consumer has forced industry to crank *more* into the product. General managers are no longer always ex-engineers, and marketing managers have no technical training. Consequently, the decision-making people today are unable to *visualize* what a product might be from word descriptions—or from engineering prototypes. Furthermore, the engineer is not trained to understand consumer psychology and does not always appreciate what makes a product sell, and his "bread board" models require liberal doses of imagination to visualize the product the way the customer will see it and experience it. So there exists a large gap in industry's structure to be filled specifically by the industrial designer.

Now we have the broad function of the industrial designer. He is not a product planner—but he does plan products. He is not a market researcher—but he does at least outline the problem and request answers to his questions. He is not a marketing manager but he does apply the total knowledge of the marketing functions, *and* the engineering function, to *create a visual representation* of the total concept.

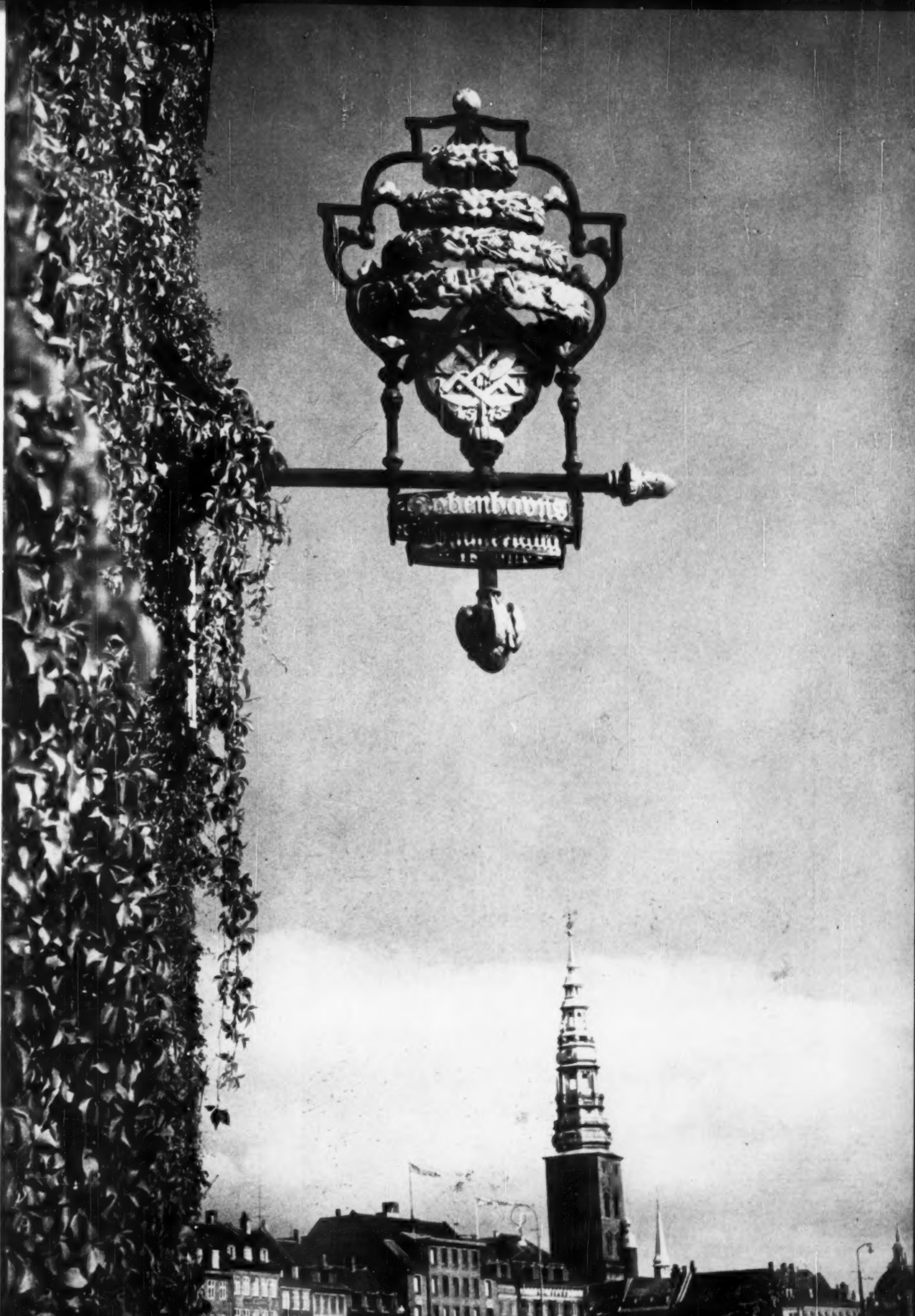
I can summarize it this way. The nature of our profession will be determined largely by the *needs* of industry—despite all our wishes to the contrary. Our future will be guided by the fact that we have a unique service to perform, as consultants or corporate employees, which fulfills a worthwhile function *not otherwise obtainable*. As long as industry recognizes engineering and marketing as distinct kinds of work—and it does—our profession will find it difficult to stake any valid claim which maintains that all or part of these activities are industrial design work. This should not prevent any designer from thinking broadly and appreciating all aspects of product creation. This does not prevent any office, large or small, corporate or consulting, from offering services of *any* kind *as long as they are not confused with industrial design*. Should we fail to identify ourselves clearly as a unique, necessary and understood kind of work, we run the very real risk of expanding ourselves into obscurity.

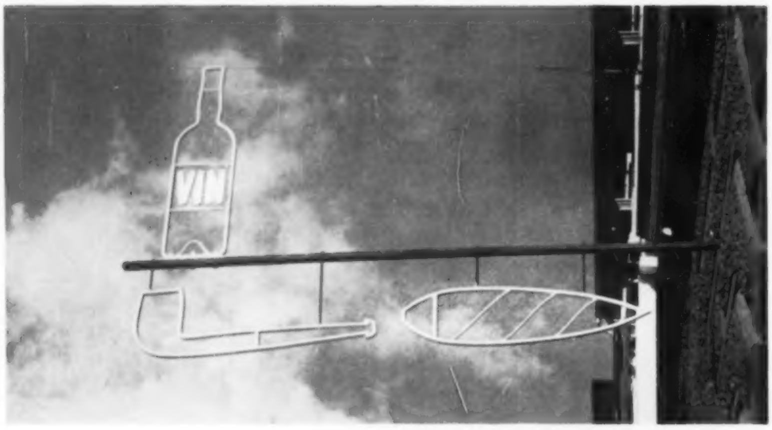
DOWN ALL THEIR STREETS

The shops of Copenhagen are identified by an attractive variety of signs and symbols of craft and trade

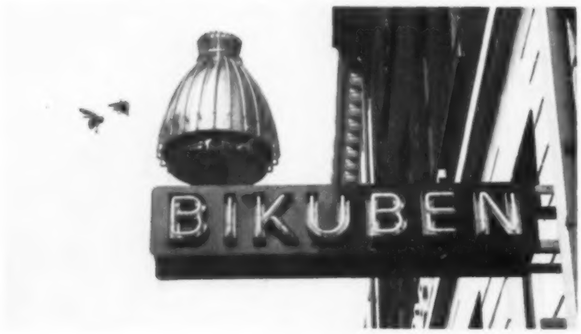
Bicycle repair shop and locksmith

When Boris Leven spent some time in Copenhagen recently he was attracted and charmed by the richness of the signs that advertised shops, wares, and services throughout the city. Fortunately Mr. Leven, who is a motion picture art director, is a sensitive photographer as well, and the pictures on these two spreads are a photographic record of the signs he admired. What he found in Denmark was graphic evidence of a deeply rooted sense of craft that persists proudly in even the most modern establishments: the barber's basin on page 72 and the glove on page 73 are traditional craft signs, and are standard equipment. (Although the striped pole common in England and America is sometimes displayed in addition to the basin.) The grain-encrusted form on the facing page marks the headquarters of the Baker's Guild. Mr. Leven's photographs remind us of the grace and dignity that even the most common shop signs *can* have, and they stand as a sort of graphic postscript to ID's recent (November, '59) discussion of the design and selection of street furniture.

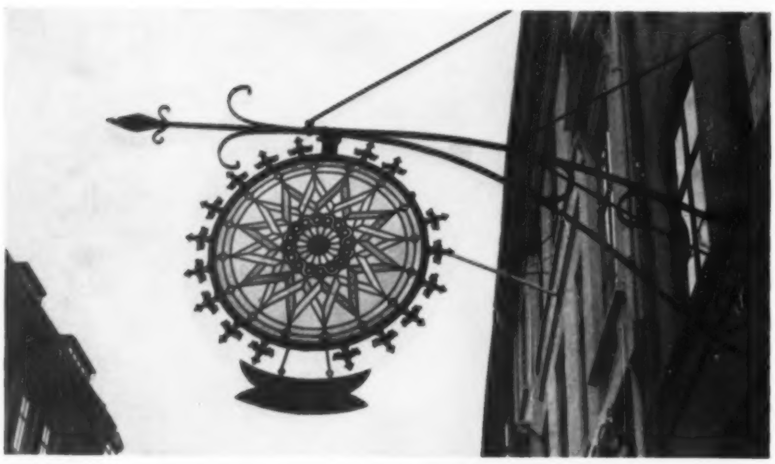




Liquor and tobacco shop

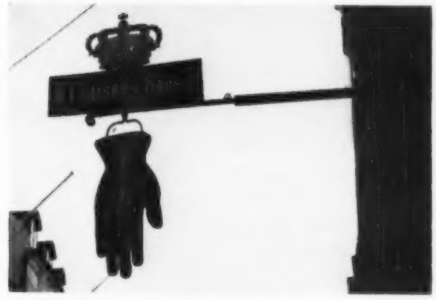


Bee hive and bees suggest thrift in sign for chain of savings banks.



Glazier

Barber shop



Glover to the Danish Court

Address scroll

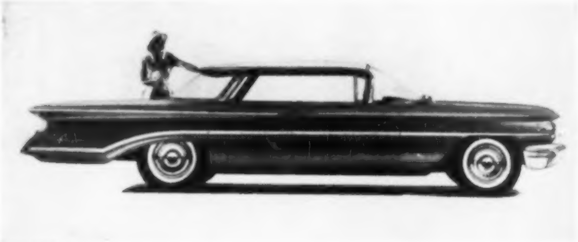
Fish market

English silver is prominently distinguished from Danish silver in shop sign

CARS: 1960

What has been called our "most designed product," and what certainly is our most widely observed, awaited, and (recently) attacked product, is also unusually reliable: each year it comes to market in a variety of new lines, looks, and names. This year another "new" has been added: a new size. But as the author of this review points out, the size is new only to those who don't remember the thirties.


Cadillac


Oldsmobile


Studebaker Hawk


Studebaker Lark


Rambler


Rambler American


Buick


Pontiac


Chevrolet


Corvair

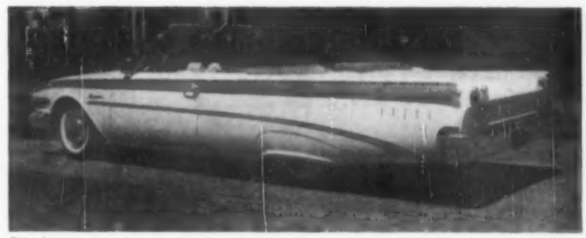
Imperial

Lincoln

Chrysler

For a closer look at the Detroit product for 1960 and an evaluation of it, just follow the arrow

De Soto

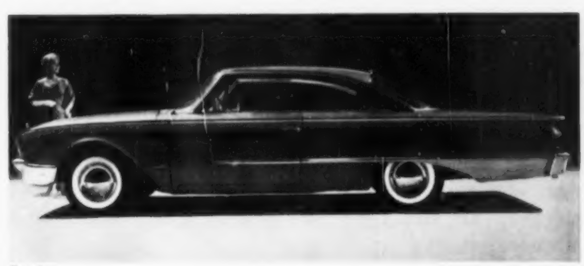


Edsel

Dodge

Mercury

Plymouth



Ford

Valiant

Falcon

IMPROVEMENT IN THIS YEAR'S AUTOMOBILES COMES FROM A LITTLE LESS DESIGN

by Robert Cumberford

As design moves into the '60's, a startling and welcome trend is becoming apparent: the products of the American automobile industry are improving. This is not, as might have been hoped, through more attention to design, but rather through less. The best of the 1960 cars, the Falcon, the Corvair, and the Rambler American, are totally "undesigned," if judged by the still-prevailing standards of Detroit. These cars are almost completely free of the superfluous trim which has characterized Detroit design for more than two decades.

Unfortunately, even the best of the new cars are not really outstanding. There are no significant developments in the total conception of this year's cars. Some models are smaller, one has its motive power in the "wrong end", but there is no evidence of any serious thinking about what the function of the automobile is, or should be, or could be. In every make of car we are faced with the same limited selection of body types, the same inadequate interior space in relation to exterior dimension, the same aerodynamically inefficient profiles that we have been offered before. There are no true utility vehicles, unless one looks to the offerings of truck manufacturers. Despite the availability of the widely publicized findings of the Cornell crash safety group, there is still no truly safe car. Most important to many would-be purchasers, there is not one really inexpensive car on the American market.

At least some of the responsibility for this situation rests with the designers. In many cases, they appear to be simply unaware that all is not well with the industry. In other instances, designers who know better seem to forget the whole in their passion for lavishing attention on every minor part. They are unwilling or unable to eliminate elements of a car when there is no longer any functional requirement for them. Thus there are still a few cars with hood ornaments, which are nothing more than vestigial outside radiator caps. However beautifully sculptured, they are no more appropriate on a modern car than a carriage return lever on an electric typewriter.

A close study of the profiles assembled on the preceding pages is particularly revealing in this respect. Almost all the difference between one make and another is in ornamentation which is completely gratuitous, functionally unjustifiable, esthetically invalid.

This point has been made by innumerable critics of Detroit in the recent past, particularly in the popular press. But these critics, many of whom are sociologically oriented, have often failed to recognize the extremely high level of technique applied to the cars. The professional competence of most automobile designers is at least as high as that of their colleagues who work with less dramatic products. As problems in formal technique, there is little difference in developing the surface of the most monstrous tailfin and the most subtle teapot; between handling the reflective material of a horn ring or a table knife; between shaping the pushbuttons of an automatic transmission and those of an electric stove. The real failure of the automobile designer has been his insensitivity to composition.

In attempting to prove that commentaries of the many critics of Detroit have been unreasonable, much has been made of the new "compact" cars. They have been widely hailed as "a real breakthrough in concept" for Detroit. It should be noted, however, that these cars represent in fact nothing more than a return to the dimensions that were accepted as standard ten years ago. The manufacturers have made no attempt to deny this; on the contrary, one of the first press releases from General Motors on the Corvair showed the new car's outline superimposed on a photograph of a 1936 Chevrolet sedan. There is very little difference in the dimensions of the two cars except in height. The possible limits of sheer size having been reached, it has become a commercial necessity for cars to be made smaller so that there may be some size *change* to be talked about. In the next few months several other smaller, but not small, cars are due as the industry recasts its production to a new scale. Ford will attempt to regain the prestige lost with the now-defunct Edsel with an elongated Falcon to be sold under the name *Comet*. Each of General Motor's three middle-class divisions, Buick, Oldsmobile, and Pontiac, is preparing smaller cars for early introduction. These are intended only to supplement, not to replace, the big cars which account for the major portion of sales today.

Whatever improvements have been made, and whatever changes can be expected in the future, the 1960 cars are typical products of Detroit design as it has existed for years. Perhaps their design can be most accurately characterized as "dull". One question, of course, remains open: Is this the fault of these over-designed products, or of the eye of the observer, dulled beyond all hope of recovery by the over-stimulation of the past few years?

STUDEBAKER-PACKARD AND AMERICAN MOTORS

The strong market position of the independents was won by design, not achieved by accident. The smaller, more rational, and more useful cars made by Studebaker-Packard and American Motors have demonstrated genuine superiority in the hands of owners and professional testers.

Neither the Lark nor the Rambler has been changed for 1960. Both have had new body styles added to their lines; a four-door station wagon and a convertible for the Lark, a four-door sedan for the American.

American Motors has made a serious effort to eliminate points previously criticized in the "big" Ramblers. The fins and wraparound windshield have been modified so that the car has a certain amount of visual unity.

Studebaker — *The Hawk sports model (top) and the compact Lark have a strong family resemblance in grilles.*

Rambler — *A program of subtle refinement has paid off for American Motors. The 1960 Rambler is better looking and more useful than previous versions. The windshield pillars have been sloped forward for better entrance conditions, the roof raised at the rear for better headroom. The unnecessary rear fins are subdued.*

Rambler American—*Utility overrides beauty. New model for the small Rambler was achieved by forcing four doors into former 2-door structure.*

Imperial—*The dramatic V-front design of the Imperial sets the theme for all 1960 Chrysler products. Unfortunately, it does not work on this formal vehicle.*

De Soto—*Fussy wheel covers and an enormous but rather simple grille mark the '60 De Soto. Except for some minor trim, it is otherwise identical with Chrysler.*

CHRYSLER CORPORATION

Chrysler has achieved the almost impossible feat of making a larger line of cars with fewer parts. The compact Valiant, although a new car in every respect, shares its six-cylinder engine tooling with Plymouth and Dodge. The new Dodge Dart "economy" cars are basically Plymouths with exterior trim fitted from larger Dodge models. This sort of thing has been done by the Corporation for many years in its Canadian and European operations, but never in the U. S. To cut costs at the top, where the profit is always lower, the Chrysler and De Soto share all of their structure and exterior sheet metal; only the chrome trim is different. The Imperial continues to be a separate model, using its own separate chassis and 1957 body. Other Chrysler cars are sharing a new body-chassis unit which is much stronger than the old body and frame combination. To insure rigidity in the new shell, window area has been sharply reduced. This is far more noticeable in four-door sedans than on most of the other models. Chrysler station wagons are worth looking at for the nicely handled hardware and roof shape.

Dodge—*Confusion by design: with its horizontals, verticals, and diagonals, the Dodge grille is complex and characterless.*

Plymouth—*The front end of the 1960 Plymouth is said to have been designed and aero-dynamically verified in a research wind tunnel.*

Valiant—*The most interesting single aspect of the Valiant front is astonishing resemblance to Lark.*

Thunderbird—*Thunderbird is "improved" for '60 by the addition of an extra pair of tail lamps (total: 6), and a second grille superimposed upon the original one.*

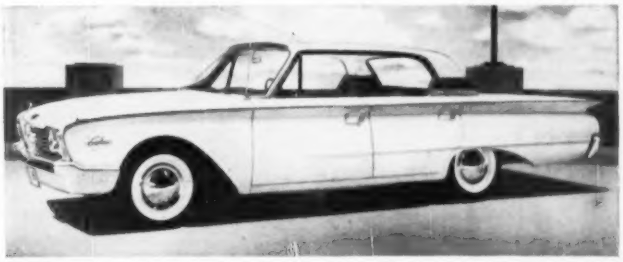
FORD MOTOR COMPANY

Unlike the other manufacturers, Ford does not offer a strong family line this year; each make has a strong character of its own. There is some relationship between the big Ford and the Falcon, but not as much as there is between the Falcon and the Ford of ten years ago. The Falcon is surprisingly self-effacing, and surprisingly good to look at. Fords are best in profile; the station wagons, in particular, are actually exciting. The strong downward slope of the front end is a new approach for the company, thought by some to portend the look of all-new front-drive cars in the near future. Mercury has far more in common with GM's middle-priced cars than with other members of the Ford family. The hood and front fenders are almost identical to the Oldsmobile's, as is the spacing of the headlamps. The overall effect is commendably simple, but it reflects little credit on Mercury's "designers." Edsel of course has been dropped. Thunderbird and Lincoln continue virtually unchanged.

Lincoln—*The 1960 Lincoln, basically the 1958 car, has been revised to include the flat, squared roof typical of the Ford and Thunderbird.*

Mercury—*The overall effect of the Mercury is commendably simple, but there is an obvious similarity to forms created by GM.*

Falcon—*With a simple body form derived from the 1949 Ford, the restrained and conventional Falcon is unexciting but practical.*



Ford—*The 1960 Ford Galaxie sedan is an arresting study in geometry: a strong elongated ellipse supports rectangular top.*

Chevrolet—*The front end is truck-like, with a coarseness of detail that seems out of place on a high-style passenger car. The parking lamps are excessively low.*

GENERAL MOTORS

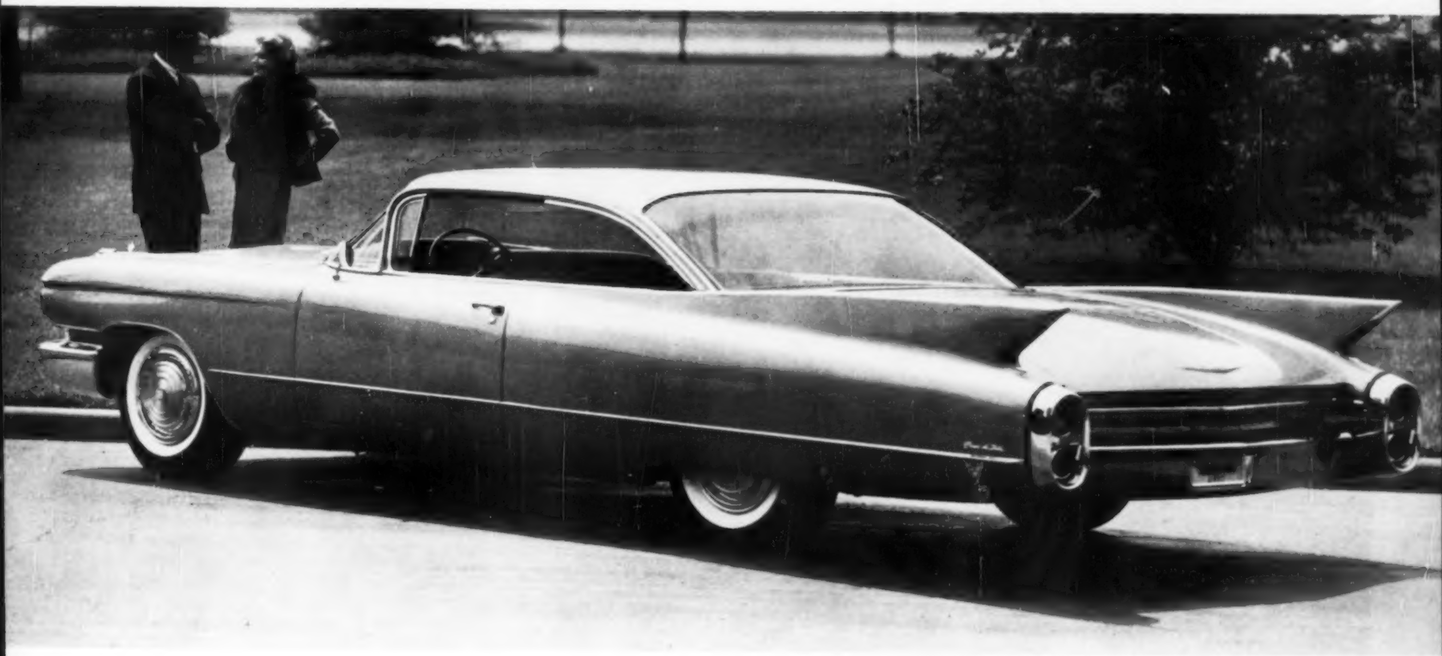
GM holds strongly to the concept of "corporate identity" in styling its various lines. Thus the all-new Corvair resembles the face-lifted '60 Oldsmobile as much as it does its parent Chevrolet. Part of the similarity comes from the use of a single body structure for all five of the big GM cars, a technique pioneered by Fisher body. Despite the use of identical windshields and roofs, the cars do have some distinct characteristics of their own. The Chevrolet is blocked out with a heavy hand, and *looks* the least expensive of the line. Pontiac, razor sharp in detail, has a pointed prow to denote aggressive performance. Oldsmobile is subdued, if massive, in front, but flares back into a pair of horizontal wings in back. Buick is carefully overdone to cater to the tastes of former customers who were unimpressed by the clean lines and taut forms of the '59. And the Cadillac, with its elegantly detailed bright metal parts, is restrained and expensive looking.

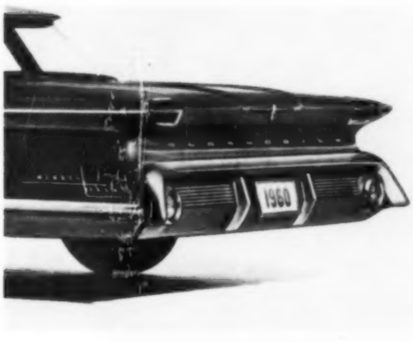
Buick—*A return to the full, fat forms that characterized all Buicks from 1929 to 1958 marks the '60 model. Headlamps are housed in "simulated jet-pods."*

Pontiac—*A rear view of the Pontiac reveals as many layers as a wedding cake. Strong horizontal motifs are too numerous. Effect is similar to Oldsmobile's.*

Corvair—*The total form of the Corvair is well-proportioned. The dipped hood line is distracting, but does not spoil the simplicity which gives the car charm.*

Cadillac — *Cadillac recaptures some of the elegance which has been lost in recent years. Careful tightening of forms at rear accounts for much of the improvement.*





Oldsmobile—*The impression of extreme width given by the pointed horizontal fins of the Oldsmobile is attractive on a really big car. Fussiness spoils the effect.*

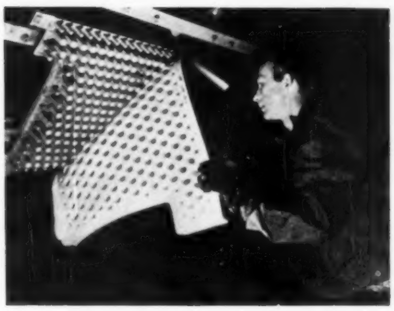
Electronic security police

A new, comprehensive monitoring system which uses closed-circuit tv and numerous other electronic devices now makes it possible for a single guard to protect a whole factory, or similar large building, against fire or burglary. The system has been developed by Minneapolis-Honeywell Regulator Company, and is said to perform its function more effectively than a staff of men on constant patrol. While some of the devices have been marketed before, this is the first time the firm has offered them in a single, coordinated system. It consists of tv cameras and electronic detectors of noise and motion which feed into a central control panel at which the guard sits and watches and listens, and from which he can activate mechanisms to unlock doors, set off fire extinguishers, alert other guards—in short, to perform whatever protective duties may be required. Among the detection devices is an electronic fence which will sound an alarm when touched, although it cannot be activated by chance contacts such as newspaper blown against it. The system can also include a device to notify police in the event something happens to the guard. It may also be adapted to control one or another kind of detection device predominantly: for example, a network of fire detectors in a factory where fire is a particular hazard, or a number of tv cameras for surveillance of a multi-entrance building. The only constant unit is the tv screen in the console (left) designed by Henry Dreyfuss.

The system will be marketed on a rental basis with option to buy. Cost will range from $1,000 to $200,000, depending on the extent of protection desired and on the nature of the facilities to be protected. Such systems are now in use at the Brown Instrument Division of Minneapolis-Honeywell, in Philadelphia, and at the Chicago Art Institute. Manufacturer: Minneapolis-Honeywell Regulator Company, Minneapolis 8, Minnesota.

Synthetic latex

A new latex — called Pliolite 5352 — will soon be marketed to replace natural latex in foam rubber. According to the fabrica-

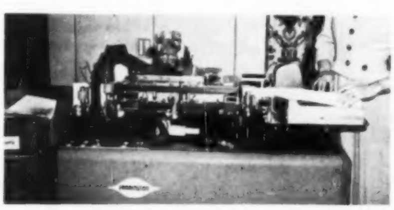


tors, the new latex will make a lighter, whiter rubber foam, with better aging properties than foams made from natural latex. The new latex is said to produce foam that can compress well, and has good resilience and durability, and its use is anticipated in foam rubber cushions (above) for furniture and automobile interiors.

The chief advantage of the new latex is that it is much less expensive; it will be marketed to foam manufacturers at 20 to 30 per cent under the natural latex price. Manufacturer: Goodyear Tire and Rubber Company, Akron 16, Ohio.

Automatic address reader

An optical scanning device which can distinguish typed or printed characters, and sort them into more than forty different

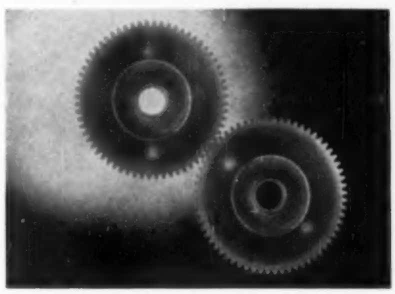


classes is being used by the U. S. Post Office and several large commercial firms. The Farrington Automatic Address Reader (above) can automatically sort out printed addresses, translate what it has read into electronic impulses, and convert the impulses into punched cards or magnetic tape information. It can do this far faster, it is said, than a clerk can.

The machine can also be used with credit cards and billing. Printed numbers are "read," and translated into data to be stored for future reference. The machine which is used by the Post Office sorts the addresses it "reads" and separates the letters according to their destination. Manufacturer: Farrington Manufacturing Company, Needham Heights, Massachusetts.

Plastic gears

Plastic gears (below) and other microwave components custom-machined to tolerances as close as .0005 inch are now being marketed. The parts are made of Rexolite No. 1422, a plastic material comparable in machining properties to free-turning brass. The parts made from this material are said



to offer low dielectric constants, and a dissipation factor at microwave frequencies. They do not show cold flow and have high tensile strength. Prototype gears have already been used in airborne electronic instruments. Manufacturer: The Rex Corporation, West Acton, Massachusetts.

Safety glass for factories

A safety glass similar to that used in automobiles has been developed by Monsanto Chemical Company and is being considered for production as window glass for factories and other structures exposed to the hazards of explosion. When broken, this new safety glass does not shatter but instead becomes limp and sags. Since this seems to occur at a pressure just below that at which structural failure begins, the new glass may act as a kind of safety valve. It is made by sandwiching a layer of tough, resilient plastic film between two sheets of glass. Source: Monsanto Chemical Company, St. Louis, Mo.

Zone melting of boron

A method of obtaining crystals of boron for research has been devised by scientists at the Bell Telephone Laboratories. Boron crystals have been difficult to produce in the past, and the new method utilizes a way of pressing boron into bars, then heating it to a state where it sublimes into crystal form.

The boron powder is placed in a boiling boric acid solution, and the mixture boiled to dryness; this coats the boron granules with boric acid, and the powder can be then pressed into bars without breaking. Then the boron bars are passed through a high-frequency induction coil, being pushed up slowly while the melted boron "freezes," or crystalizes just above the coil. The boron oxide binder sublimes before the melting point of the boron itself, and crystals as large as 0.1 inch are left. This method of melting is called floating zone melting, and until a way was found to form the naturally crumbling powder into rods, it was impossible to use it to make boron crystals.

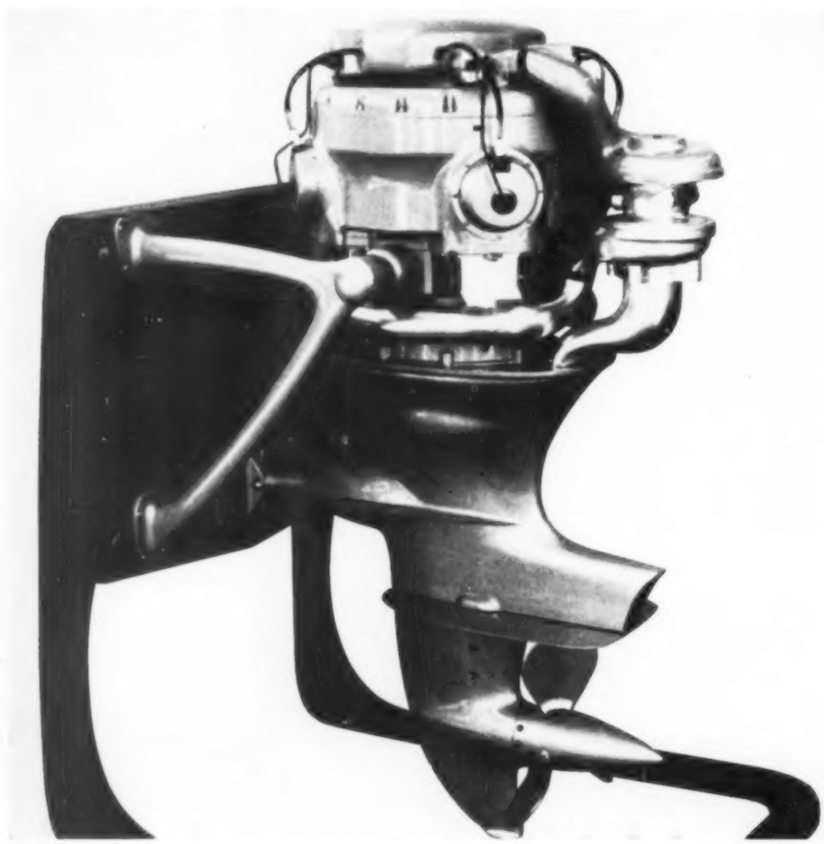
The apparatus used in the floating zone refining is similar to that used in the treatment of other materials, except that the rod of boron is enclosed within two concentric transparent quartz tubes.

The boron bar is held in graphite cups during the heating, and the crystals collected after the bar has been entirely melted. Source: Bell Telephone Laboratories, New York 14, N. Y.

Experimental outboard engine

A small-boat engine incorporating some of the latest advances in engine design has been built by the McCulloch Corporation of Minneapolis. Although many automobile companies have built experimental motors, experimental outboard engines are rare. This one, called the Scott R-120 (below), is not intended for production, although its manufacturer hopes that some of its features will find their way into the standard engines made by the company. The unit weighs 260 pounds and is rated at 125 BHP from a 90 cubic-inch displacement. The manufacturer describes its specifications as follows:

It is a four-cylinder radial of segmented construction that is perfectly balanced and has uniform firing pulses.



It has a direct cylinder fuel injection that gives a specific fuel consumption of .055 Lb./BHP/Hr.

The engine has an oil lubricated crankcase, permitting the use of straight gasoline (instead of mixing it with oil) and reduced oil consumption.

The engine is mounted so the axis of swing-up is through the center of gravity. This results in a minimum of shock if an underwater obstruction is encountered.

Thrust vector steering is accomplished without turning the entire engine. Only the portion of the outboard that is in the water turns.

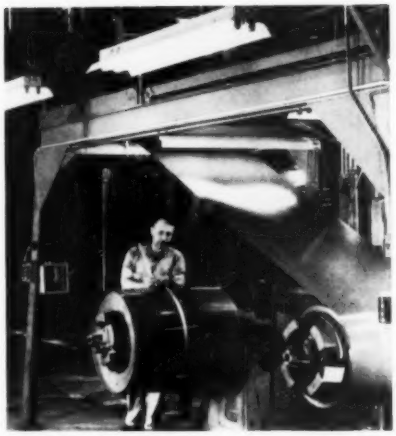
A variable pitch propeller permits reverse and troll.

The size of the engine is smaller in every dimension than current outboards of half the power, and control of the engine and its features is done electrically, resulting in a clean installation. Manufacturer: McCulloch Corporation, Marine Products Division, Minneapolis 13, Minnesota.

Conditioner for fiber

A new conditioner is being used in the manufacture of vulcanized fiber which is said to give it a high degree of formability and flexibility. The machine pre-dries the fiber in sheet form, after it leaves a puring bath and before it is carried to dry completely in calendering rolls. The conditioner is said to provide close control of temperature and to be the first which controls humidity also. Tension on the web is held to a minimum to allow the relaxation of individual fibers as the material dries. Vulcanized materials dried with this conditioner are said to be more malleable than those dried by other means.

Manufacturer: Taylor Fibre Company, Norristown, Pennsylvania.

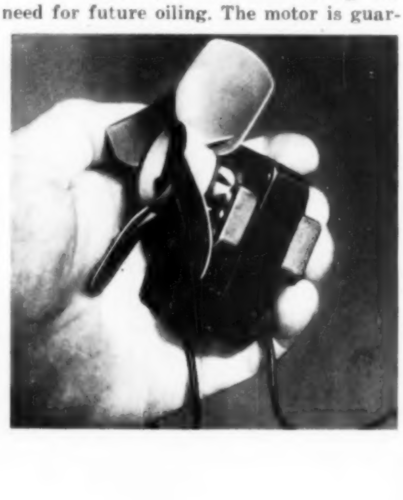


Coated steels

Pre-enameled coated steels, first used several years ago in the manufacture of venetian blinds, are now being used for applications ranging from ash trays to pipe thread protectors. Pre-enameling is a coating process used to protect steel plate, and to decorate it. The enameling paint is rolled onto sheet steel and a good combination of steel and paint allows the pre-enameled strip to undergo severe forming operations in which the paint stretches along with the steel. The end products can be used in all kinds of consumer products, and now enameled steel is being used in the manufacture of flashlight batteries, bottle-caps, toys, curtain rods, and hardware. Source: Jones & Laughlin Steel Corporation, Pittsburgh 30, Pennsylvania.

Electric motor needs no lubrication

An electric motor that can run for years without oil has now been produced. The motor, which has a sealed-in lubrication unit, has been designed for industrial or domestic uses such as circulating air inside home and display freezers, cooling electronic equipment, and operating liquid circulation pumps in machines. When the motor is built, the lubricating oil is sealed inside the turning rotor, a patented feature, cutting down oil oxidation and eliminating the need for future oiling. The motor is guar-



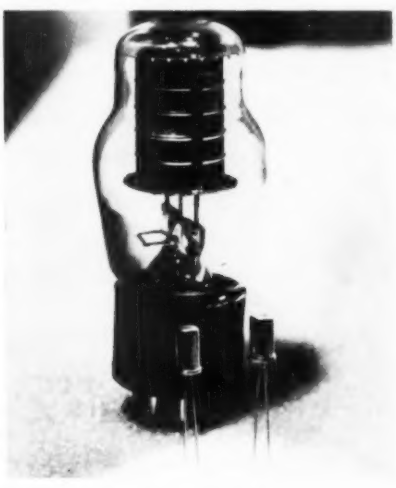
anteed to run for five years without oiling, and company tests indicate that it could run twice as long without attention. The motor can be wound for 110 or 220 50/60 cycle voltage, and can operate in temperatures ranging from —10° to 250°F. Manufacturer: Howard Industries, 1760 State Street, Racine, Wisconsin.

Insulation Material

A new inorganic insulation material is being marketed in three forms: solid, block powder, and sheet. The block can be used as low-density thermal insulation, the powder can be used as a filler, and the sheet as a fire resistant document and insulation paper. Manufacturer: Minnesota Mining and Manufacturing Company, St. Paul, Minnesota.

Big lens tissue

A specially large lens gauze (7" x 11") is being made by Bebell & Bebell Color Laboratories of New York. This large lens tissue will be of particular interest to photographers, projectionists, and movie cameramen, who often find standard sizes too small. Manufacturer: Bebell & Bebell Color Laboratories, New York 11, N. Y.



Small voltage regulator

A silicone voltage regulator that sells for under $1.00 is now on the market. The manufacturers developed the regulator to provide low-voltage regulation equipment at lower cost and smaller size than heretofore available. Two types are being offered, the RS-6 single anode unit, and the twin anode unit, RT-6. The RS-6 has a reverse breakdown voltage of 6 volts plus or minus one volt, and a maximum dynamic impedance of 15 ohms, while the RT-6 has 20 ohms of maximum dynamic impedance at the same reverse breakdown voltage. Both tubes are said to exhibit good temperature stability and are hermetically sealed. In the photograph (left, below) two new regulators are shown next to a standard-size regulator tube. Manufacturer: Hoffman Electronics Corporation, Los Angeles, Cal.

Magnetic tape tensiometer

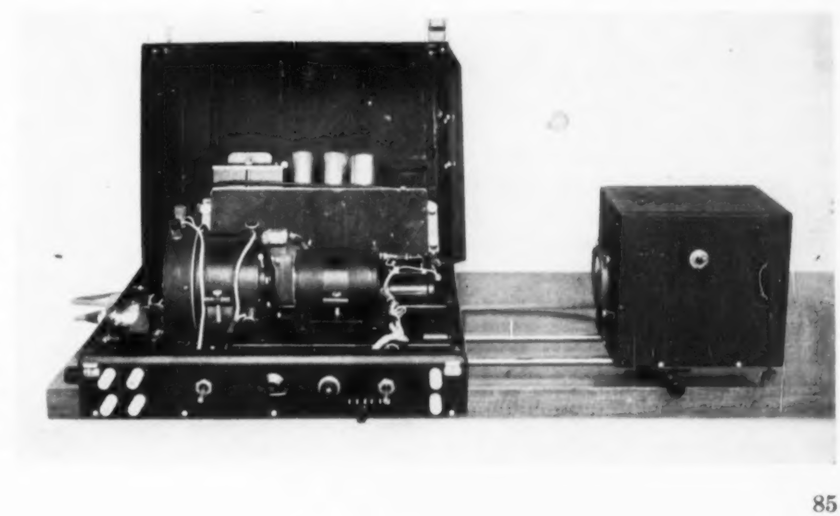
The Model K-44 Magnetic Tape Tensiometer features a balanced transformer system, which permits the smooth handling of tape, in which the core is a ferromagnetic element whose permeability is a function of mechanical stress. Application of tension to magnetic tape threaded through the instrument varies the stress in this

core material and causes an unbalance of the transformer to produce an output which varies linearly with tension. Thus the tape is drawn through regularly with no sudden jerks. Manufacturer: General Kinetics Incorporated, Arlington 2, Va.

Air-cooled hydrogen lamp

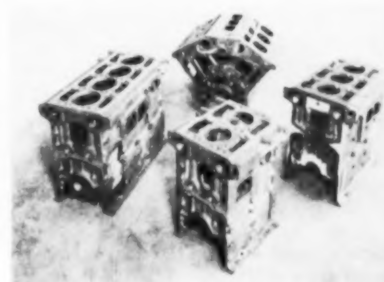
An air-cooled hydrogen lamp has been devised to replace heavier, more costly water cooled lamps in illuminating equipment. The hydrogen arc lamp was designed specifically for use with several models of the Bausch & Lomb Monochromator, whenever a high, intense source of continuous illumination is required in the ultraviolet region of the spectrum. The lamp can also be used as an ultra-violet source, and as an illuminator in equipment designed to study fluorescence, phosphorescence, and various kinds of reflectance.

The light may be used with a power supply which converts the alternating current line voltage into direct current. This conversion results in a valuable increase in light output and steady direct current source for use with rotating sectors without the introduction of stroboscopic effects that sometimes occur when tuned ac amplifiers are used. Manufacturer: Sylvania Electric Products, New York 17.



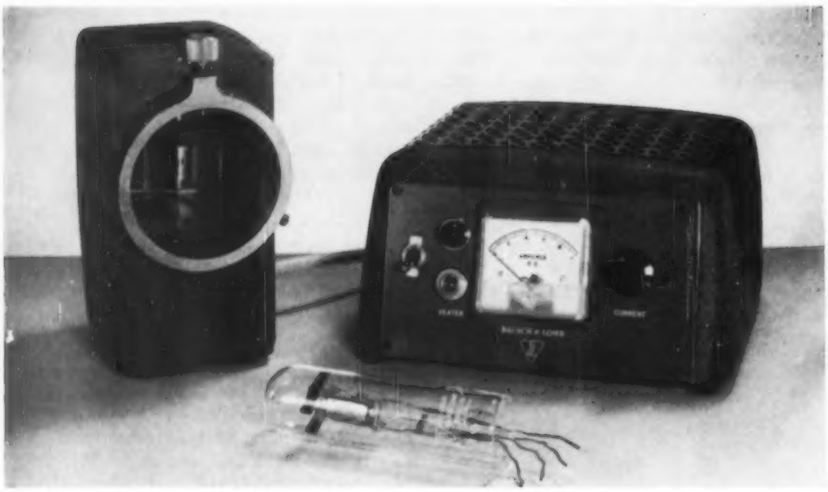
New equipment machines diesels

New equipment for machining engine blocks for diesel engines has been purchased by General Motors because, according to the machines' manufacturer, they can work interchangeably on many different models in GM's 20 to 1650 horsepower diesel line, and thus result in cost savings. The machines are used on engine blocks in a series of small diesels of two-, three- and



four-cylinder "in-line" models, and a six-cylinder "V" unit. The machines will drill, rouch bore, ream, chamfer and counterbore the external faces of both "in-line" and "V" blocks of cast iron and aluminum.

According to the manufacturer, the versatility of these machines is due to a modular design. Manufacturer: National Automatic Tool Company, Richmond, Indiana.



Electronic color monitor

A controlling device has been introduced which can detect changes in intensity of hue as well as color, operating on the principle known as chromatic aberration, or the characteristic of a lens which focuses colors at different lengths from the focal plane.

The machine is called a Sens-OAR-Chrome and weighs, with its light source, 40 pounds. The entire instrument is enclosed in a metal case and operates on standard 60-cycle current. It is used for controlling color, such as in the production of paper, textiles, paints, or any process where color, in hue or intensity, must be scientifically corrected.

The heart of the process is the physical property of a lens in relation to color. Since different colors are transmitted at different wave lengths, a lens which collects them will focus them at different distances from its focal point. Thus a sensitive plate put at a certain distance from the lens, could single one color out from an entire spectrum as to hue and intensity. This is what the Sens-OAR-chrome instrument does. An optical process spreads received light into a vibrating sensor, composed of several light-sensitive elements, samples the light and distinguishes it. The information is translated into electronic impulse, and the machine can be connected to a device to correct the combination of hue and brightness in the received transmission. Manufacturer: Compaco Incorporated, Encino, California.

Space commuting service

A commuter express for spacemen meant to shuttle men and materials between earth and sites for space stations is being designed by Lockheed and Hughes Aircraft companies. The space ferry would be equipped with electronic guiding systems to calculate the directions the vehicle must take to reach its destination, a complicated problem when it must intersect another space station in its orbit.

Although it is mainly designed as a carrier of equipment which could be assembled to construct a station in space, the Lockheed-Hughes craft might be used as a tracker and inspector of unidentified objects in space, a "space-sweeper," to remove derelicts from space lanes, and as a mobile laboratory. Source: Hughes Aircraft Company, Culver City, California.

Thickness gage

A compact, portable ultrasonic thickness gage that weighs only ten pounds is being marketed. The new gage can be used for measuring thickness and inspecting corrosion in pipes, storage vessels, hull plates, and other applications.

The gage uses transistors and low-voltage batteries and may be strapped on the operator's back and carried into confined areas. Because of its portability it can be used on welded sections to check against welding of laminated plate, or plate containing excessive stringers. The manufacturers say the gage is able to resist injury caused by shocks or explosions.

The measurements can be read on a directly calibrated meter which eliminates the necessity, as with comparable equipment, of interpreting them through an oscilloscope. Thus the gage can be operated by a man with little experience. Alarm lamps can be provided to set thickness limits.

The ultrasonic thickness gage uses the pulse-echo method of detecting changes in metal thickness. This inspection method can detect flaws and discontinuities in metals and other materials as well as thickness. Unlike resonance gages, the pulse-echo type can measure thickness where the surfaces are not parallel, or are pitted or rough. It is practical to measure the distance from an outside surface to the thinnest spot, such as a corrosion pit.

A dial is provided to compensate for distortion caused by differing materials. The operator must adjust the dial and then he can read directly in inches the thickness of materials such as aluminum, steel, lead, lucite, nylon, brass, copper, or liquids. In the photograph (below, left) an operator is shown measuring the extent of corrosion of metal pipes. Manufacturer: Sperry Products, Inc., Danbury, Connecticut.

Direct Recording Oscillograph

A direct recording oscillograph which is said to be the lowest in cost-per-channel of comparable machines has been introduced by the Heiland Company. The model is designed to allow high-speed recording of up to 24 channels of scientific and test

data simultaneously. The chart speeds—which are adjustable in 15 variations from .05 to 80 inches per second—are pushbutton selected. The light source is a high pressure mercury vapor lamp with maximum output in the ultraviolet region. This, combined with a specially designed optical system and record paper, produces immediately readable records, according to the company. The machine is called the 1108 Visicorder, and is the latest model of several Visicorder data-recording machines. Maximum recording capacity of the two earlier Visicorders is 14 and 36 channels. Manufacturer: Heiland Division of the Minneapolis-Honeywell Regulator Company, Denver 22, Colorado.

Manufacturers' Literature Supplement

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

Materials — Metals

1. **Rolling Steel Doors.** Building Products Division, R. C. Mahon Company. 16 pp. Catalog G-60 describes fourteen types of rolling steel doors, detailing features and engineering specifications of standard hand, mechanically and power-operated doors.

2. **Strip and Materials Handling Equipment.** Fried Steel Equipment Manufacturing Corporation. Catalog describes liftveyor, stripveyor, strip stacker, scrap eliminator.

3. **Alply Panel.** Aluminum Company of America. 22 pp. Booklet describes integrated insulating lightweight panel, its physical properties and its advantages. Samples available.

4. **Tool Steel.** Uddeholm Company of America. 8 pp. Pamphlet describes a steel used for producing molds for plastics, and die-casting dies for zinc and other metals with low melting points.

Materials — Plastics

5. **Plastic Moldings.** Continental-Diamond Fibre Corporation. 12 pp. Booklet discusses compression, transfer and injection molding processes and lists materials and sizes of parts available for each process.

6. **Plastic Laminate.** Equipment Sales Division, Raybestos-Manhattan Corporation. 12 pp. Bulletin describes physical properties and application of asbestos-reinforced, thermosetting phenolic resin plastic, Pyrotex, recommended for bushings and bearings.

7. **Rigid Polyvinyl Chloride.** Kaykor Industries, Inc., Division of Kaye-Tex Mfg. Corporation. 23 pp. Catalog describes the properties and applications of rigid polyvinyl chloride products, for example: plate, dining accessories, extrusions, bolts and nuts, and calendered sheeting.

8. **Molded Plastics.** The Richardson Company. 4 pp. Catalog describes line of molded products including a spotnailer, automobile timing gear, switch base and navy slipper.

9. **Resorcinol-based Resin.** Koppers Company, Inc. 20 pp. Bulletin summarizes chemical and physical properties of the new resin and gives related information.

Methods

10. **Control and Measurement Components.** Minatron Corporation. 8 pp. Bulletin contains semi-technical notes on basic design of control systems, with topics covering simple circuits, mountings, shielding, etc. Price and specification sheet are included.

11. **Automatic Spectrum Analyzers.** Panoramic Radio Products, Inc. 12 pp. Catalog describes complete line of automatic spectrum analyzers with 0.5 cps-44 kmc range, response curve tracers, and new instrumentation systems.

12. **Fabrication of Vulvanized Fiber.** Continental-Diamond Fibre Corporation, Subsidiary of Budd Company. 4 pp. Article reprinted from *Iron Age* tells how to fabricate vulcanized fiber and discusses various fabrication operations.

13. **Alkyd Resin Systems.** Hooker Chemical Corporation. 4 pp. Bulletin describes alkyd resin system utilizing trichlorofluoromethane for rigid fire-resistant polyurethane foams, covers essential safety precautions, and sizes and weights of shipping containers available.

14. **Dynamic Strain Measurements.** B & K Instruments, Inc. 24 pp. "Technical Review" describes industrial dynamic strain measurement techniques and procedures for analyzing the spectrum of complex strain signals.

15. **Ground Support Equipment Systems.** Lear, Inc. 4 pp. Brochure describes ground support equipment systems, components and capabilities for aircraft and missiles.

16. **Packaged Cooling.** Sunroc Corporation. Literature describes new types of water coolers with a different refrigeration principle known as packaged cooling.

17. **Hand and Machine Engraving.** Lambert Engraving Company, Inc. Brochure describes and illustrates finishes and sculptured effects achieved by cutting into metal.

Miscellaneous

18. **Re-usable Primary Batteries.** Yardney Electric Corporation. 6 pp. Bulletin describes a new silver-zinc battery system, which combines features of both primary and secondary battery types. Graphs and charts included.

19. **High Fidelity Equipment.** Altec Lansing Corporation. Booklet reviews all Altec high fidelity equipment and has illustrations of custom mono and stereo installations.

20. **Pulse Width Discriminator Filter.** Mini-Rad, Inc. 6 pp. Brochure describes pulse width discriminator; where it may be used; how it may be implemented; and electrical, mechanical, and environmental features.

21. **Radar Beacon.** General Electric Company. 8 pp. Publication describes C-band radar beacon and gives development history and specification.

22. **Joints and Drives.** Neapco Products, Inc. 16 pp. Bulletin describes three series of joints and drives: light duty slow speed, medium and heavy duty hand operated joints, farm tractor power take-off drives. Includes lists.

23. **Temperature Controls.** Fenwal Inc. 2 pp. Catalog describes surface mounting temperature controls, gives specifications and provides details on modifications.

24. **Electronic Connectors.** H. H. Buggie Division, Burndy Corporation. Catalog insert features miniature electronic connectors, gives complete specifications, and illustrates and lists BT Series insert contact arrangements.

25. **Flakeboard.** Weyerhaeuser Company. Brochure describes Versaflake, a board of processed homogeneous wood flakes. Samples are available.

26. **High-accuracy Detector.** General Electric Company. 12 pp. Bulletin describes operating principles, features and application data of detector for locating leaks in vacuum and pressure systems.

27. **Control Transformer.** Acme Electric Corporation. Bulletin features chart for load determination and gives detailed information covering construction of three designs.

28. **Hydraulic Cylinders.** S-P Manufacturing Corporation. 12 pp. Catalog-engineering guide features fold-out arrangement of mounting diagrams with dimension charts, ordering information and parts list.

29. **Vibrating Conveyors.** Syntron Company. 4 pp. Illustrated catalog presents complete descriptions, data and specifications for seven standard mechanical vibrating conveyors — four light-tonnage models and three heavy-tonnage models.

30. **Numerical Control Conveyor.** Rapids-Standard Company, Inc. 4 pp. Folder describes means of achieving numerical control of materials in a flow system. Application features, accessories and specifications of conveyor.

31. **Standard Gate Valves.** Whittaker Controls, Division of Telecomputing Corporation. 4 pp. Brochure describes standard gate valves and contains special tracing templates of the valves. Includes specification tables, dimension tables and actuator configuration tables.

32. **Spectrophotofluorometer.** American Instrument Company, Inc. 8 pp. Bulletin describes an instrument designed to permit continuous activation of compounds and to measure the resulting fluorescence throughout the ultraviolet, visible, and infrared regions.

33. **Pneumatics System Controls.** Whittaker Controls, Division of Telecomputing Corporation. Bulletin shows twenty diverse motor, solenoid, pressure and manually-actuated units.

34. **Reinforced Tape and Card Stock.** The Dobeckmun Company, Division of The Dow Chemical Company. Brochure describes reinforced tapes and punch card stock for numerical control, integrated data processing, automatic testing and checkout, automatic processing control and other uses.

35. **Valves and Fittings.** American Instrument Company, Inc. 12 pp. Bulletin describes new line of high-pressure pipe-size valves and fittings, joints; and lists line of lens-ring gasket valves, connectors, elbows, tees, and cross-type fittings; and special purpose fittings and socket weld fittings.

36. **Plasma Arc Service.** Linde Company, Division of Union Carbide Corporation. 8 pp. Booklet describes plasma arc service for coating or fabricating parts with refractory and other metals.

37. **Reactors.** The Pfaudler Company, Division of Pfaudler Permutit, Inc. 12 pp. Bulletin describes "E" Series reactors and recent major improvement in their construction. Includes photographs and line drawings.

38. **Tube Fittings.** Lenz Company. 20 pp. Catalog shows tube fittings in 150 photographs and drawings. Lists of distributors included.

39. **Bracket Mounted Sockets.** Leecraft Manufacturing Company, Inc. 4 pp. Brochure describes and illustrates various types of sockets for small lamps together with the appropriate lamps for which the units are designed.

40. **Transducer.** Associated Control Equipment, Inc. Bulletin explains the principle of operation, and outlines the transducer's pneumatic and electrical rating specifications, and performance data.

41. **Solenoid Valves.** Valcor Engineering Corporation. 8 pp. Booklet includes sections on solenoid valve nomenclature, a description of various types of valve sealing, and a discussion of mechanical specification criteria. Drawings, schematics and charts.

42. **Cryogenerators.** Cryogenics Division, North American Philips Company, Inc. Folder describes operating principle and lists applications. Curves and drawings are included.

43. **Safety Cup Wheels.** The Carborundum Company. Folder describes safety cup wheels for portable grinding in steel mills, foundries and welding shops.

44. **Steel Fasteners.** Hardware Specialty Company, Inc. 4 pp. Catalog describes company's inventory of Grade 8 Alloy Steel Fasteners. Reference chart is included.

45. **Overload Detector.** Wintriss, Inc. 4 pp. Bulletin details each phase of operation of the Master Mark III overload detector.

46. **Exploding Bridgewire System.** Librascope, Inc. 6 pp. Brochure presents operating principles of the Exploding Bridgewire System for initiating missile and space vehicle ordnance functions.

47. **Hazard Warning and Portable Lighting.** R. E. Dietz Company. 20 pp. Catalog No. 55 describes the Dietz line of flashers, lanterns and torches. Includes new price sheet, individual product specifications, plus usage and maintenance tips.

48. **Rechargeable Silver-Zinc Batteries.** Cook Batteries, Subsidiary of Telecomputing Corporation. 4 pp. Brochure explains the performance features of secondary silver-zinc batteries for electronic equipment, underwater apparatus, industrial communications systems, etc.

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Manufacturers' Literature *(Continued)*

45. **Drafting Machine.** Glideline Corporation. 4 pp. Bulletin describes in detail the design modification of the Glideline drafting machine. One page of detailed specifications of all components of the unit.

46. **Grinding Machine.** Heald Machine Company. 8 pp. Brochure describes design features, applications, specifications and accessories of the Model 273A Universal internal grinding machine.

47. **Solderless Wiring Devices,** Etc., Inc. Brochure shows how to choose the best kind of terminal for particular wiring application. Performance of five barrel styles are compared.

48. **Nuclear Reactor Control Rod Drives.** General Electric, 4 pp. Brochure describes control rod drives for all reactor applications. Illustrated.

49. **Casters and Wheels.** Rapids-Standard Company, Inc., 40 pp. Catalog shows complete line of casters and wheels. Two-page index included.

50. **Eliminating Explosions.** Clark Bros. Company, Bulletin presents latest findings on the mechanism of explosions in pipelines and compressor starting air lines.

51. **Precision Metering Pump.** Mechanical Products Corporation. Catalog describing Maisch stainless steel metering pumps contains details on pump selection and application for a wide variety of uses.

52. **Retaining Rings.** Ramsey Corporation. 40 pp. Engineering specification manual covers about 80 per cent of the known retaining ring applications. It contains information on the selection of materials and finishes, design factors, charts on rotative speeds and thrust loads and typical layouts for both internal and external ring applications.

53. **Sling Chain Safety.** The McKay Company. 6-part kit. Guide is comprised of 5 folders, each dealing with a different aspect of chain safety.

54. **Tubular Parts Production.** Superior Tube Company. 8 pp. How to save money in the production of tubular parts is discussed in an article reprinted from *American Machinist*. Tables are included.

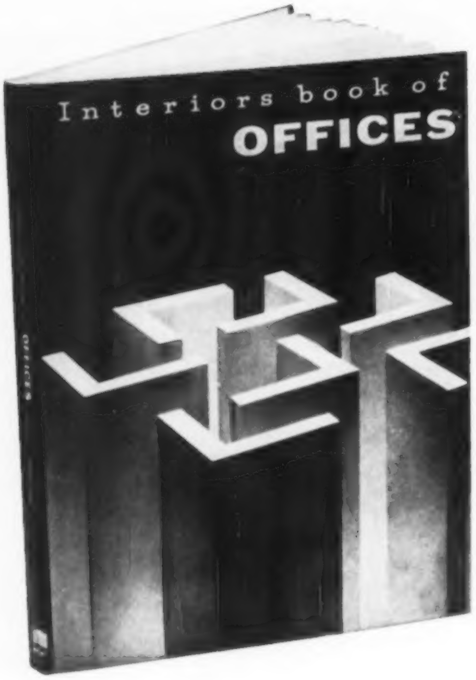
55. **Test Systems.** California Technical Industries. 12 pp. Catalog covers automatic testing, microwave and antenna test instrumentation, radome testing systems, flight simulation and describes the entire product line.

56. **Missile Regulators.** Linde Company, Div. of Union Carbide Corporation. Data sheet describes new line of lightweight missile regulators which feature an automatic feed-back system.

57. **Automatic Oven Controls.** General Electric Company. 2 pp. Bulletin describes AST-3 and AST-4 series for gas and electric ovens, timed outlets, and electric ranges. Performance characteristics, dimensions, operating instructions and design features are given for the two series.

58. **Automatic Spectrum Analyzers.** Panoramic Radio Products Inc. 12 pp. Catalog digest describes complete line of automatic spectrum analyzers with 0.5 cps-44 kmc range, response curve tracers, and new instrumentation systems.

59. **Platinum Products.** J. Bishop & Co. 20 pp. Catalog includes complete standard line of platinum products, chemicals, recovery and refining facilities of this company, as well as information on clads and composites of platinum group metals.



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For Your Calendar

January 10-14. Forty-ninth annual convention of the National Retail Merchants Association. Statler Hilton Hotel, New York.

January 12-16. Sixteenth annual technical conference of the Society of Plastics Engineers. Conrad Hilton Hotel, Chicago.

January 13-24. National Motorboat Show. Jan. 13-15, trade only; Jan. 15-24, public. New York Coliseum, New York.

Beginning January 15. "Festival of France." Exhibition at the Trade and Convention Center, Philadelphia.

January 17-20. Annual Canners Association convention and show. Americana Hotel. Bal Harbour, Florida.

January 22-February 14. "Architectural Photography." Smithsonian Institution Traveling Exhibition. Georgia Institute of Technology, Atlanta.

January 22-27. East Side Settlement House Winter Antiques Show. 7th Regiment Armory, New York.

January 24-29. San Francisco Winter Market. Western Merchandise Mart, San Francisco, California.

January 25-28. Eleventh Plant Maintenance and Engineering conference and show. 43 discussion sessions, exhibit of products and services demonstrated under simulated factory conditions. Convention Hall, Philadelphia.

January 27-29. Twelfth Annual College-Industry conference. Topic: "The Young Professional Engineer—our mutual responsibility." The Engineering School of Washington University will be host to the Relations with Industry Division of the American Society for Engineering Education. Washington University, St. Louis, Missouri.

January 28-30. College Art Association of America conference. Sheraton Atlantic Hotel, New York.

February 1-4. Annual national conference of the American Society of Heating, Refrigeration and Air-Condition-Engineers. February 1, Symposium on Plastics in Domestic Refrigeration presented by the Society of Plastic Engineers. Baker Hotel, Dallas.

February 1-4. Instrument-automation conferences and exhibits sponsored by the Instrument Society of America. Conference, Rice Hotel. Exhibit, Houston Coliseum, Houston, Texas.

February 1-5. National Notions and Novelty Exhibit. New Yorker Hotel, New York.

February 1-5. American Society for Testing Materials committee week. Hotel Sherman, Chicago, Illinois.

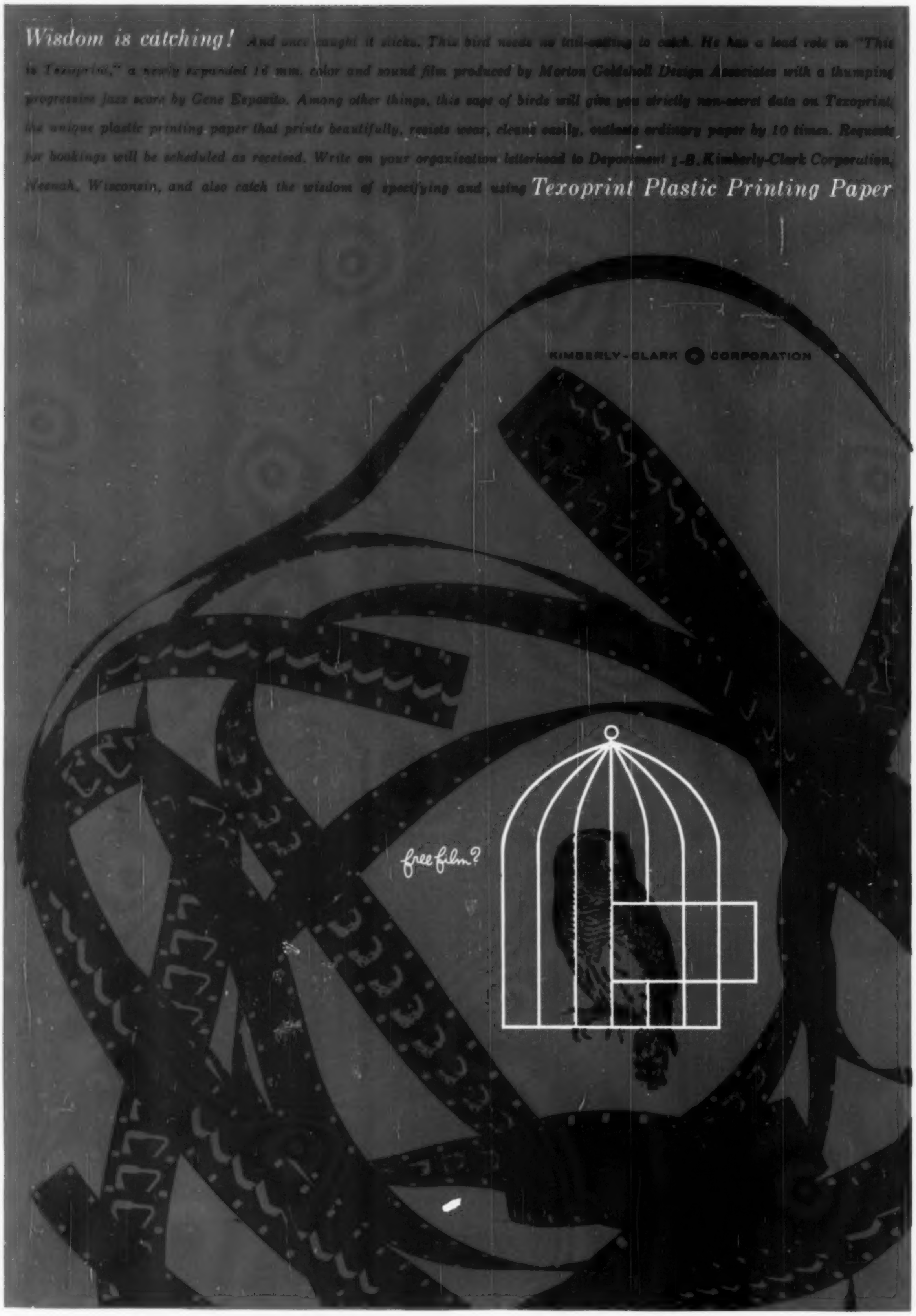
February 5-7. Fourth annual Home Improvements Products show. Navy Pier, Chicago, Illinois.

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

February 17-April 10. Photography Exhibition selected by Edward Steichen. Museum of Modern Art, New York.

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

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