INDUSTRIAL DESIGN

June 1955 two dollars a copy

3

How to make the most of die casting
Plastic coatings
Design education

EPON® RESIN does it!

WESTINGHOUSE Laundromat gets a tougher, more corrosion-resistant primer at much lower cost!

Laundromat has a baked Epon, flow-coated primer formulated by Pittsburgh Plate Glass Company. Film uniformity calls for only the briefest scuff sanding before application of the white enamel top-coat.

HERE'S HOW...

The protective finish on a washing machine is exposed to severe conditions during its service life. It must, for example, withstand abrasion, impact, attack from highly active alkalies and detergents.

Recently, Westinghouse engineers adopted a greatly improved finish for Laundromat components, using a new *primer* based on Epon resin. Applied by flow coating, the primer is only one-third the thickness of previously used primers. Tests have established a *three-fold* improvement in coating durability under severe conditions . . . and application costs have been materially reduced.

Laundromat components receiving the new Epon resin primer are: top, front, door, lower front panel, bracings, clamps and bottom pan. Some interior surfaces have *Epon primer as their only finish.*

If you need a protective finish like this in your paint program, ask your supplier for Epon resin-based paints and enamels. These formulations have excellent adhesion, high resistance to impact and abrasion; outstanding resistance to moisture, heat and corrosive atmospheres.

• • •

Write for the brochure "Planning to Paint a Pyramid?" on the variety of applications of Epon resins in surface coatings. You may call on our sales offices for names of manufacturers who sell Epon resin coatings.

SHELL CHEMICAL CORPORATION

Chemical Partner of Industry and Agriculture

380 Madison Avenue
New York 17, New York

Atlanta • Boston • Chicago
Cleveland • Detroit • Houston
Los Angeles • Newark • New York
San Francisco • St. Louis

IN CANADA:
Chemical Division, Shell Oil Company of Canada, Limited
Toronto • Montreal • Vancouver

VOLUME 2 : NUMBER 3

INDUSTRIAL DESIGN

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

CONTENTS FOR JUNE, 1955

Frontispiece: *This photogram of an air impellor is one of many abstract designs developed by Lester Beall to symbolize the products of The Torrington Mfg. Co. in catalogs and advertisements. The complete Torrington story is on pages 52-59.*

PUBLISHER	*Charles E. Whitney*
EDITOR	*Jane Fiske Mitarachi*
EDITORIAL CONSULTANT	*Deborah Allen*
ASSOCIATE EDITOR	*Suzanne Burrey*
TECHNICAL EDITOR	*William Massee*
EDITORIAL ASSISTANT	*Georgette Methot*
ART DIRECTOR	*Martin Rosenzweig*
BUSINESS MANAGER	*Alec E. Oakes*
ADVERTISING	*Alfred S. Reed*
CIRCULATION	*James F. Wells*
SALES PROMOTION	*Lawrence Terzian*
PRODUCTION	*Sven Martinsen*

PUBLICATION OFFICES

Whitney Publications, Inc., 18 East 50th St., New York 22, N. Y. Charles E. Whitney, President and Treasurer; Jean McClellan Whitney, Vice-President; Alec E. Oakes, Vice-President; Robert E. Connolly, Secretary.

ADVERTISING OFFICES

New York	18 East 50th Street New York 22 Telephone PLaza 1-2626
Chicago	Archer A. King & Company 410 North Michigan Avenue Chicago 11, Illinois
Atlanta	Blanchard-Nichols-Osborn 75 8th Street North East Atlanta 5, Georgia
Los Angeles	The Maurice A. Kimball Co., Inc. 2550 Beverly Boulevard Los Angeles 57, California
San Francisco	The Maurice A. Kimball Co., Inc. 681 Market Street San Francisco 5, California

INDUSTRIAL DESIGN *is published bi-monthly by Whitney Publications, Inc., 18 East 50th Street, New York 22, N. Y. Subscription price* $9.00 *for one year (six issues),* $16.00 *for two years in the United States, U. S. Possessions, Canada and countries of the Pan-American Union; rates to all other countries,* $11.00 *for one year,* $20.00 *for two years. Price per copy,* $2.00

Second-class mail privileges authorized at New York, New York

Member of the Audit Bureau of Circulations

Member of the Associated Business Publications

in this issue...

Kaufer

Beall

Grover

Gilbert

Stern

Hauser

Lester Beall, whose presentation of his own work appears on pages 52-59, opens our series of articles on —and designed by—leading graphic designers. A native of Kansas City, Mr. Beall studied in Chicago, where in 1927 he opened his own office; in 1935 he moved it to New York. His work for a long list of clients, including Ballantine & Sons, Calvert Distillers, Congoleum-Nairn, John LaBatt, Pond's Extract Co., Scott Paper, Simoniz Co., Ward Baking, W. T. Grant and U. S. Lines has been widely exhibited.

Elizabeth Kaufer, who prepared the survey of Plastic Finishes that begins on page 60, has made many special studies of materials for design and promotional purposes, and has been a contributor to several technical and trade publications — among them *Interiors,* of which she was once Technical Editor. Now a member of the faculty of New York University's School of Retailing, Miss Kaufer is a consultant on store interiors and coordination of merchandise for home furnishings chains; she also designs business and residential interiors.

Felix Gilbert, designer of the tripod on page 92, is a graduate of New York University's College of Engineering. In 1938 he started his own design office in New York City, listing among his clients ACF-Brill Motors, for whom he designed a fleet of super-buses, with built-in radios, lavatories and a soft drink bar. In 1949 he joined the architectural firm of Kahn and Jacobs, left in 1953 for a year in the Henry Dreyfuss office, and is now back with K. & J. as Industrial Project Manager.

Frederic S. Grover, designer of the Graphlex camera on page 93, is a native of Rochester, where he received his early education. He left to study at the New York School of Design, then worked with advertising firms in New York and Buffalo, before establishing the industrial design firm of Frederic S. Grover Associates in 1936, back in Rochester. Mr. Grover is a member of the S.I.D. and the National Art Directors Club.

Walter B. Stern, who reviews the 1955 Packaging Show on page 50, is well qualified to discuss any kind of a container. He has worked as a packaging engineer for Montgomery Ward and for Sears Roebuck; as Packaging Director for Barnes & Reinecke and Kraft Foods. He left Kraft to join Raymond Loewy Associates about 3 years ago, where he is now Technical Director of the Packaging and Graphics Division. He is the author of the Package Engineering Handbook; a member of the S.I.D. and Packaging & Materials Handling Engineers.

Jon W. Hauser, who is design consultant to the Hawley Products Company, (pages 94-98), appears here in character — with something hot out of a Hawley press mold. Before starting his own firm in St. Charles, Illinois, Mr. Hauser worked for Dave Chapman, Barnes & Reinecke, and Reinecke Associates. His background has also included a period as Director of Design for Sears Roebuck, and work for both General Motors and Chrysler Corp. The current Hauser client roster includes Philco and Diamond-T Trucks. He is an S.I.D. member.

LETTERS

Perspective

Sirs:
I have been following Mr. Doblin's articles on perspective drawing. One point which interests me particularly is his statement that "in a perfectly accurate perspective drawing, the only straight lines will be those that cross the observer's line of sight." This, of course, is in direct contradiction to any good optical system. The formula to which a lens is ground is determined by the fact that any straight line in space regardless of orientation must be recorded as a straight line in the picture plane. Fortunately, nature has endowed us with an optical system, the human eye, which performs this function fairly well.

. . . Since it is the purpose of perspective drawing to record what we see or what is photographed, the characteristics and mathematics of such optical systems must furnish us with the rules for perspective drawing. The phenomenon Mr. Doblin points out as occurring when an observer looks at a long low building at right angles to his line of sight so that it appears largest where it crosses his line of sight and appears to diminish at the ends, is due in part to the stereoscopic vision of the two eyes.

. . . In a grid, it is true that the further away from the center point a square is located, the more distorted it will seem to be. That is because it lies outside the normal cone of vision of the human eye. The cone of vision of the human eye is actually quite limited.
Leo J. Brandenburger
Philadelphia, Pa.

Mr. Doblin has provided the following answer to the comment above:
It is well to remember that the camera was developed some time after perspective, and both were preceded by the human eye, whose vision they try to reproduce. Neither perspective nor the camera can reproduce human vision perfectly because they are based on a flat picture plane, while the sensitive element of the human eye is curved. The eye also has a tremendously wide field of vision — up to 180°, which is far wider than most single lens systems. Immense perspective errors are compensated mentally. Photographs with such an immense cone of vision would be ridiculously distorted.

The distortion that inevitably appears in a perspective drawing of any scope must be controlled in the way that *looks* best. In one case this means limiting the cone of vision; in another it means moving the station point.

If enough readers express an interest, we will discuss this relationship between perspective and optics in an appendix to this series.—*J.D.*

Gathering rosebuds

Sirs:
Industrial Design has an agreeable way of getting onto my desk, and I've had time to worry about "Rosebuds on the Silverware" (February issue). Why this unbridgeable chasm between a conception of Good Design (which requires Good, i.e. Sophisticated Taste to be appreciated) and Popular Design or Design as Symbolism, embraced by our greatest consumer body, the blue-collar milieu? The designer need not feel either isolated or, if he designs rosebuds, compromised. Let's not think about lifting our millions up "the taste ladder." Let's meet them in the garden. Only when design (demanding integrity) and mass production (demanding saleability) meet in the garden will the rosebuds be cultivated.
T. C. Gross
Cambridge, Massachusetts

Sumptuous

Sirs:
"The El Comes Down" (April issue) was a joy to behold. Third Avenue will not be the same without this great ironwork structure, and an appraisal during the El's dying hours was very fitting. Written by an architect and published for designers, with a subject of such general interest, this article covers a bit of common ground where the architect, the designer, and the man-on-the-El can meet and be illuminated. Moreover, the dramatic visual quality of the El was effectively exploited by the sumptuous picture spread. Hope to see more subjects treated in *ID* that have a similar pictorial potentiality.
B. M. Battey
Washington, D. C.

Mournful

Sirs:
Thank you for the article "The El Comes Down" — and congratulations. Here is what I wrote about it to an associate in White Plains: "The article combines poetry, drama, and education. As an old dabbler in the New York scene, I was moved far beyond the usual interest in industrial trends. I mourn the old 3rd Avenue El, and my lashes splash tiny drops on the lens of my glasses."
Hugh F. Lyon
Forth Worth, Texas

Disappearing act

Sirs:
INDUSTRIAL DESIGN magazine is beginning to promote petty larceny in previously well-mannered design offices. My friends tell me that they have the same trouble: the magazines disappear after a day or two, always before everyone had had a chance to bone up on what's new in the field. Perhaps it's up to you to come up with a security device.
How about hard covers and a chain, like telephone books in bus stations? Or a string of bound-in bells?
Maria Fenyo
New York, N. Y.
The only security device we can suggest is a mailbox — at home, where only you have the key.—Ed.

Appreciates research

Sirs:
I took the last issue of INDUSTRIAL DESIGN home from the office because I couldn't resist showing the article on cooking utensils to my wife. She, as a wife, found it fascinating, and has been an expert on the subject of heat conductivity ever since. I, as a designer, will certainly keep the information hopefully on file. The careful and thorough research that goes into articles like these is obvious, and very much appreciated.
A. J. Biehl
New York City
Now, it would be very much appreciated if reader Biehl would return that copy to his office.—Ed.

High standard

Sirs:
. . . I have been particularly interested in your publication and I find that many on our creative staff are also intrigued with its contents. . . . May I congratulate you on the very high standard you are setting in the field of industrial design.
Robert A. Dearth, Vice-President
Ross Roy, Inc.
Detroit, Michigan

A water-resistant barrier safeguards its famous foaming action

AJAX is the *foaming cleanser*. This foaming action cuts grease fast; other ingredients then leave a bright polish on porcelain, glass, metal, linoleum and many other surfaces. In short, Ajax polishes as it cleans.

This performance is the result of both physical and chemical action by and in the product. To insure this performance, Ajax is delivered in perfect condition—to the user. The outside canister lining produces a water-resistant barrier protecting the contents.

The Ajax canister is a fine example of special design, modern packaging methods and machinery, and top quality adhesives. We are proud of the fact that Arabol Adhesives were specified for this difficult assignment.

Arabol is proud to serve Colgate-Palmolive Company at their well-known Jersey City plant. We are similarly privileged to serve the leaders in a hundred industries—with specification adhesives for a thousand end uses.

Somewhere in your business you use adhesives. Somewhere near your place of business there is one of Arabol's twelve plants and warehouses ready to serve you.

We invite the opportunity to submit samples for you to test in your own plant —under your particular working conditions —for your specific requirements, whatever their nature. That is the one kind of testing that assures you of satisfactory results. Your inquiry to Department 29 will bring a prompt response.

ADHESIVES ? ARABOL !

★ ADHESIVES ? ARABOL ! ★

70

YEARS OF PIONEERING IN THE MAKING OF ADHESIVES

ARABOL

★ ADHESIVES ? ARABOL ! ★

ADHESIVES ? ARABOL !

THE **ARABOL** MFG. CO.

. . . a nationwide organization serving major users of industrial adhesives

EXECUTIVE OFFICES: 110 E. 42nd ST., N. Y. 17, N. Y.
CHICAGO • SAN FRANCISCO • LOS ANGELES
ST. LOUIS • ATLANTA • PHILADELPHIA • BOSTON
PORTLAND, Ore. • ITASCA, Tex. • CINCINNATI
DENVER • LONDON, Eng.

NEWS

Executive committee of the newly chartered IDI Detroit chapter, left to right around table: Carl Sundberg, Edmund Anderson, H. C. Doner, David Wheeler, Walter B. Ford II, Virgil Exner.

Motor City Meeting

To whip up professional spirit in what is probably the country's most design-oriented city, the Detroit chapter of the Industrial Designers Institute sponsored a lively evening seminar on April 18; it pulled a healthy turnout of 165 visitors, among them many leaders in Detroit industry. The official occasion for the meeting was the presentation of a charter, by National IDI President Robert Gruen, to Carl Sundberg, chairman of the new chapter, who is shown above with his executive committee.

Since the topic of the evening was Detroit, the speakers quite appropriately devoted themselves to their views of the local design picture: William Bird, Vice President of Plymouth Sales, explained Sales' view about the success of the 1955 Chryslers; J. Harold Maloney, District Sales Manager of Frigidaire, followed with a personal account of design's part in boosting appliance sales today. Architect Minoru Yamasaki countered this with a plea for less sales appeal and more sensitivity, and showed slides of his firm's work which indicated that beauty can be a major contribution. Final comments about Detroit as a design center, with unique problems and opportunities as part of the American culture, were made by Jane Fiske Mitarachi, editor of INDUSTRIAL DESIGN.

The purpose of the rally was apparently well served: the chapter has now enrolled 40 members, who are making plans for a major exhibition of products of the 99 companies served by Detroit designers.

A laurel or two

ID came away with some accolades in Industrial Marketing's Annual Editorial Achievement Competition this year: a first award for graphic presentation (the December 1954 issue), (see plaque, below) and an award of merit for original research in the article, "What They Say About Plastic Tooling" by Jane Fiske Mitarachi in the October issue. Needless today, we were not displeased to find ourselves ranked editorially among the leading trade publications, in our first year of existence.

Criticism and Optimism

Apropos of design education (see page 27) the I.D.I. held a panel on the subject "Practicing What We Teach" at their meeting in New York on May 17. Pratt Institute graduates were guests and the first speaker, Robert Kölli, Chairman of the ID department, showed slides of work done in the school. George A. Beck, Design Manager of the GE Electronics Division was highly critical of recent design school graduates in two areas: their "deficiency in skill, the rudiments, the tools of the trade: sketching, rendering, perspective, model-making lettering etc." and their "lack of interest and awareness of other fields: marketing, economics, sociology, particularly the dynamics of change, the emergence of new patterns," and he added to that the inability "to creatively and imaginatively conceptualize this knowledge in terms of industrial design." Moderator Alfred Auerbach then introduced Carl Sundberg (at left) who described the work of his firm and told the students, "You couldn't have chosen a better profession, and you couldn't be graduating at a better time."

Designs of the Times: For the new crop of uranium prospectors in the east, Universal Atomics, New York City, now offers a handy Geiger counter, batteries, voltage regulator and meter, all in one.

Knoll-Drake builds new factory

Thirty-five pieces of furniture designed by Ladislav Rado, using Knoll fabrics in bright colors, are being mass produced by Austin Industries of Texas, a combination formed in 1953 by Hans G. Knoll, pioneer in modern home furnishings, and William S. Drake, Austin lumber company president. The Knoll-Drake idea is to use modern production techniques to make quality furniture on a volume basis. Rado is the first designer to be retained, and his designs, among them those shown below, will soon be available in retail stores.

CORNING GLASS BULLETIN

FOR PEOPLE WHO MAKE THINGS

Ingredients for light that's absolutely right . . .

Light that really meets the needs of surgeons must be glareless, shadowless, cool and color balanced.

That's the kind they get from the Wilmot Castle Company's surgical lights. Glare and shadows are disposed of by an ingenious metal reflector of Castle design.

Cooling and color balance are handled by a *special* glass we make—for use in Castle lights. Called AKLO, it blocks infrared waves emanating from an artificial light source by converting the infrared into molecular heat.

A piece of AKLO 4 mm. thick absorbs some 87% of the infrared waves. Result—after an hour of continuous exposure, for every 1,000 foot-candles of illumination, a thermometer 20 inches from the light source shows a rise of less than 3° F.

Light from AKLO is the right *hue*, too, since it eliminates the greenish cast normally associated with heat-filtering glasses. And, this light is as close to natural as it's possible to obtain from artificial sources. That's a vital point in proper diagnosing of pathology, and in observing a patient's coloring.

AKLO's light is also balanced in terms of temperature. It runs to about 4,000° K., just right for shooting accurately rendered color movies and telecasting operations in color.

AKLO is one example of Corning's several successful conquests of problems involving energy control.

Experience suggests that there's more than just an outside chance that any pressing energy control problem you may have can be effectively (and economically) coped with by a glass we already make.

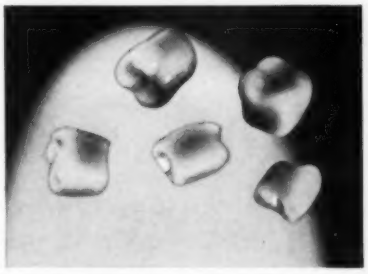
If you want to find out, drop us a note about your problem wave. We'll peer into our files and let you know *which* glass, if any, can do the job.

Denture adventure

A dental chap, we learn, is experimenting with glass for artificial teeth.

He's molding them from a mixture that's mainly ground-up VYCOR brand glass. Reason? Ordinary enamels don't stand up very well under the high heat needed to set the teeth in rubber. VYCOR brand glasses do. Result? Savings in breakage, annoyance, and time.

VYCOR brand glasses come in seven different forms. Basic characteristic of all is a very high percentage of silica—96%. It's the silica which makes the VYCOR brand glasses almost immune to temperatures up to 900° C. (higher under certain operating conditions) and endows them with unusual resistance to thermal shock.



The thermal properties of the VYCOR brand glasses make them useful in such products as calcining jars, thermocouple protector tubes, sight glasses for high heat furnaces. And ability to handle ultraviolet and infrared rays make them favored contenders for use in germicidal lamps, sun lamps, photochemical lamps and the like.

This is a far cry from our starting point on dentures, but, it may help you to see that the VYCOR brand glasses are both versatile and quite remarkable.

Bulletin B-91 details types, physical characteristics, and present uses of these glasses. Your name in the coupon will bring the literature to your desk.

Print it in glass!

These pictures tell the story much better than words.

Designs, name plate, dial face—they're all printed in glass. Not *on* glass, but *in* it!

The glass is called *Photolay*. One of the things that intrigues most people who see a picture printed *in* Photolay is its three-dimensional effect. It has depth. The image seems to float in the glass with all the attributes of reality. Even lettering, or a line drawing, acquires a special sort of difference.

Besides, an image in Photolay is permanent. It won't ever fade, get scratched off, or tarnish.

Photolay is one of several photosensitive glasses developed by Corning. They all have this in common: When exposed to ultraviolet light through a negative, a latent image forms right in the glass. Heat treatment develops this image.

What's it good for? Maybe *you* have some ideas a photosensitive glass might give a special twist to. So far, stove and appliance manufacturers have put it to use in name plates, escutcheons, dials and such. If your problems are similar, let us know.

If the items discussed here seem unrelated to your immediate interests, we still may have what you need at our fingertips. We'd count it a pleasure to hear from you.

Corning means research in Glass

CORNING GLASS WORKS

32-6 Crystal Street, Corning, N. Y.

Please send me Bulletin B-91 on the VYCOR brand glasses.

Name_____ Title_____

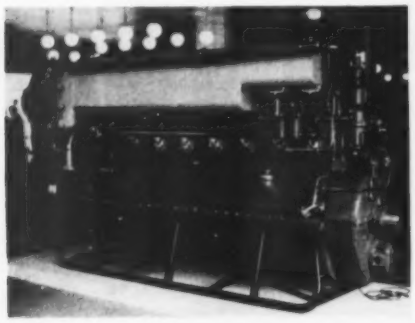
Company_____

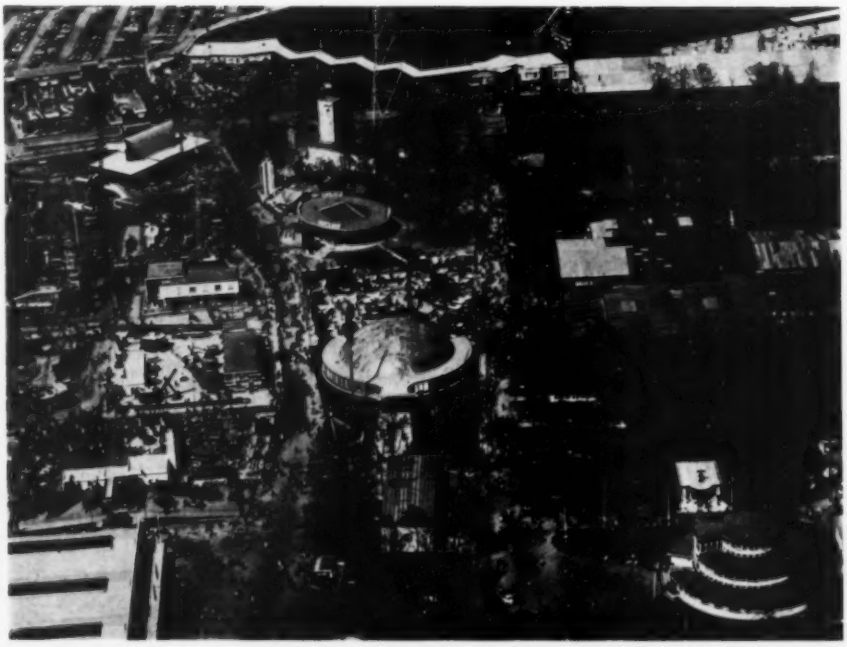
Address_____

City_____ Zone_____ State_____

The United States goes to market in trade fairs

Trade fairs blossomed all over the world this spring, in Liege, Milan, Hanover, Paris, Utrecht, Valencia, London — even in Tokyo; with Addis Ababa to follow in the fall. Canada held a big one from May 30 to June 10; an International Samples Fair is running in Barcelona, Spain, June 1-20, and the Norwegian National Industry Fair hopes to attract 200,000 visitors in July. The U. S. Industry-Government trade fair program set up a series of information centers to encourage demand for American products.





Running from April 24 to May 3, the German Industries Fair gave exhibition space to 4000 manufacturers — among them 40 from the U. S. Emphasis was on consumer products as light as the Loewy-designed porcelain (only available on continental markets) and machines as heavy as the MAN diesel engine. The main American exhibition, entitled "Industry for Peace and Human Well Being," covered new developments in electronics, rubber, and color television and was designed by Arthur D. Little, Inc.

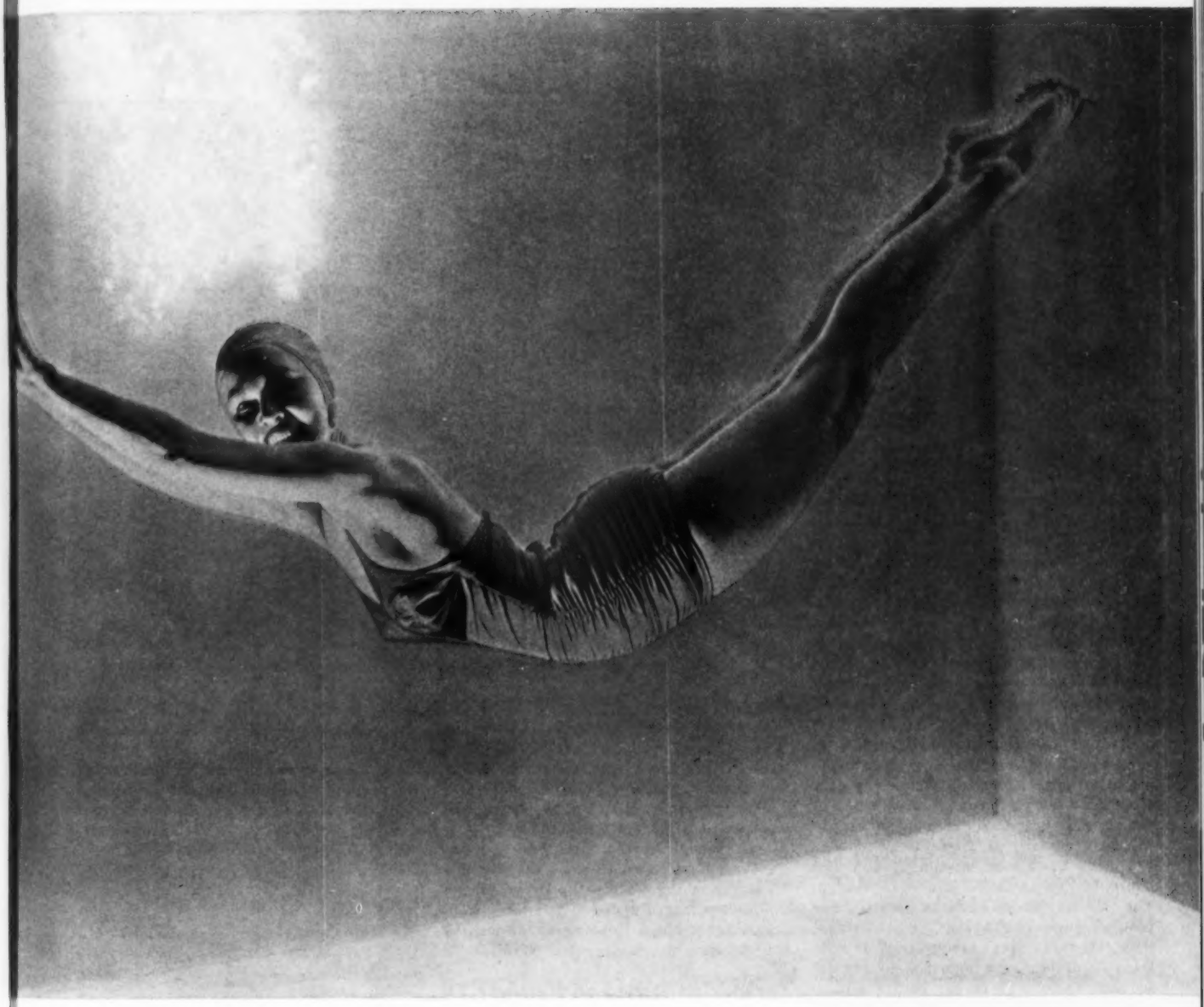
At the Liege Fair, the U. S. sponsored, for the first time, an exhibit of products to illustrate the teamwork of engineering and sales departments and industrial designers. The work of 25 members of the Society of Industrial Designers, every item was displayed as the solution of a specific design-to-consumer problem: the GE refrigerator with revolving shelves to bring articles into easy reach for the housewife; International Harvester's, with a changeable color panel; a toy jet plane made by the Murray Ohio Manufacturing Co.; and Brunswick-Balke-Collender's durable and colorful school furniture.

More than a million people in Paris and Milan saw examples of "Main Street—U. S. A." featuring full-scale models of an American kitchen, living room and dining room completely equipped. The Paris exhibit with its special pavilion designed by Peter Schladermundt, illustrating a new impetus on the part of American industry and government to stress good will and match the efforts of the Soviet orbit, will be covered in ID's August issue.

For further details about American participation, which will continue through the autumn, write to: Mr. Richard J. Theobald, Office of International Trade Fairs, United States Department of Commerce, Washington 25, D. C.

This fork truck with a 6,000 lb. capacity was one of the most successful items in the British Industries Fair, from May 2-13.

Soviet truck drew crowds at the Royal Netherlands Fair in March. U. S. showed "Peacetime Uses of Atomic Energy."



It's never too wet for Presdwood!

Douse it. Dunk it. Submerge it for years*. Masonite Tempered Presdwood® resists water indefinitely. Water won't dilute its advantages.

Unlike the wood from which it comes, Presdwood has no grain or knots to plague the production man. Never rots or corrodes, splits or cracks. Never deteriorates under severest climatic conditions—finishes stay new looking longer.

This stubborn stability is just one of the many reasons why Presdwood panels are so welcome a component in products. Too, they combine with wood, metal, plastics, fabrics—cutting production costs, increasing quality. At present there are 44 types and thicknesses of Presdwood products ready to serve you. For the aid of a Masonite sales engineer, write Masonite® Corporation, Dept. ID-6, Box 777, Chicago 90, Ill.

*Thousands of square feet of Masonite Tempered Presdwood went into a "sea wall" along Chicago's lake front. After nine icy winters and steaming summers, the panels showed no discernible change in size or shape.

Choose This Man  He Makes The Difference

MASONITE CORPORATION

MANUFACTURERS OF PRESDWOOD PANEL PRODUCTS

Leading manufacturers of prefabricated homes use Presdwood fo siding, gables, doors and walls.

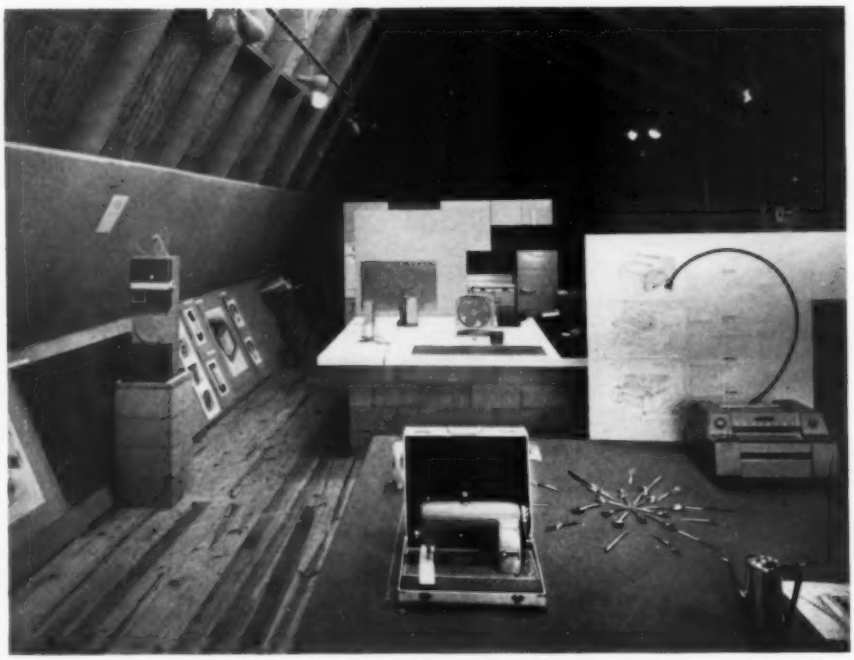
Juvenile furniture and toy manufacturers select Presdwood fo beds, chests, play pens, doll carriages, and toys of all kinds.

Bucky Fuller challenges designers

At the second annual conference of the Industrial Design Alumni and students of Syracuse University, Buckminster Fuller gave the key address on May 21, sounding a challenge to designers to do better than statesmen in securing man's successful survival: "I think it's extraordinary how little men realize that the real key to making better use of the earth's resources lies in the ability to comprehend the principles that operate in nature and discover ways to put the valves on them." He advised his audience to feel glad to be confronted with some real facts of life: "You as individuals must start educating yourselves very vigorously. You'll have to learn more of your chemistry; nobody is going to tell you to study chemistry. There is no college president, there is no advisory group that knows how to set up this course for design. The only way design has ever occurred has been through confronting the individual with the great facts themselves." Due to the resignation (see page 28) of the ID faculty, there will be no future alumni conferences of this series at Syracuse.

New Bauhaus, new building in Ulm

Max Bill's school of design in Ulm, Germany, founded in 1950, is now occupying a new building of his design (shown below while the students were helping to construct it). Bill regards the school as a continuation of the original Bauhaus, in a more comprehensive role: "My generation has brought out the type of designer for whom art is a necessity of living but to whom also, participation in the problems of society has become a matter to which their life is dedicated."



View of Houston exhibit: Sears Roebuck sewing machine; drawings along the wall.

Product design in Texas

A selection of works by S. I. D. members (taken from those exhibited in the Milan Triennale) introduced industrial design to the Southwest at the Contemporary Arts Museum in Houston, Texas. Shown for a month through April 4, there were 55 items (above). Large appliances — the portable Hoover washing machine by Dreyfuss, the Johnson outboard motor by Stevens—were assembled through local stores, as well as other designs previously reported in ID.

Ceramicists alerted on design

"Design in Industry" was the keynote of the American Ceramic Society's April convention in Cincinnati in the opening address by F. J. von Tury, chairman of the Design Division. An exhibition of terra cotta, pottery, porcelain, tiles and sanitary ware by the Corning Glass Works, the Crane Company and other industries, represented earlier at the 18th Ceramic National at the Syracuse Museum, related to the talks by design and museum directors. James S. Plaut, Director of the Institute of Contemporary Art in Boston, spoke of the rising level of consumer taste and the more enlightened role that the designer takes in company leadership, although 'there is a lag in the development of tools and research in design compared to those in technical research." Arthur BecVar of GE recommended that companies recognize the value of design research and try out different concepts in restricted areas in order to determine future directions in production.

Loewy on the high seas

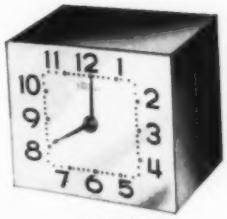
On May 25 the Navy commissioned the USS Carronade, a 245-foot Inshore Fire Vessel, the first ship to be designed by an outside agency. Raymond Loewy Associates departed from traditional patterns to provide better crew "habitability" — a factor which the Navy has been studying for some time.

Beginning in 1951, Loewy designers interchanged the functions of the hold and second deck to better relate berths, mess and sanitary facilities. Crew berthing was revised to give each man a privacy panel and facilities for lounging, writing letters and stowing possessions. Fluorescent lighting was introduced; colors chosen have middle values to lessen monotony. For improved furnishings, Operation Carronade may well pilot the way for future Navy plans.

MIRRO-BRITE METALIZED PLASTICS FOR

INDUSTRIAL APPLICATIONS

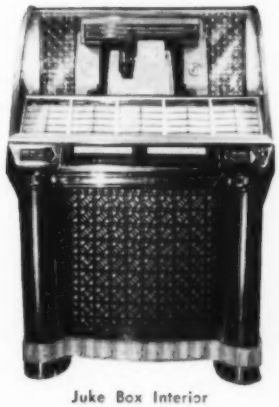
four types available



Clock Face

Shoe and Belt

Radio Dial



Juke Box Interior

MIRRO-BRITE

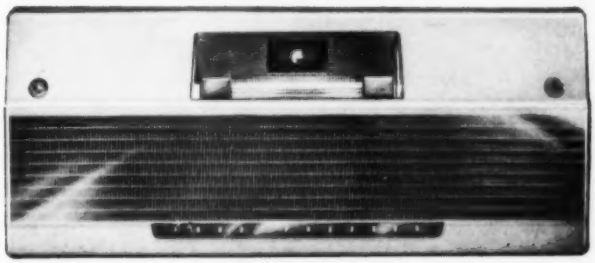
acetate
polystyrene
butyrate
mylar*

LOOKING for low cost replacements for costly and hard to process metals? Then look into the MIRRO-BRITE collection of colorful metallic finishes and types. Now being used for many industrial usages by leading manufacturers of appliances, radios and other electronic equipment, toys, novelties, other products. Send for free sample book and other helpful guides.

* Mylar is Du Pont's registered trade mark for its brand of polyester film.

COATING PRODUCTS

DEPT ID. 101 WEST FOREST AVENUE, ENGLEWOOD, N. J.



Refrigerator Panel and Nameplate

Mirro-Brite materials supplied for these products available in continuous rolls or cut-to-size sheets.

What Is Happening To America's Taste?

S. I. D. Presents Panel at Museum of Modern Art

Three designers, an economist, an editor and a retailer aired six entertaining courses of opinion on "American Taste" at a forum sponsored by the Society of Industrial Designers on April 22. Conclusion: It has its ups and downs but right now it's on the upgrade.

Perry Meyers set the stage with vital statistics on consumer income; the three designers, Dreyfuss, Loewy and Teague, showed slides with their talks (see illustrations); Harriet Morrison demonstrated the housewife's longing for nostalgia and frivolity by unfolding a new nylon tablecloth on the stage; to the designers, Dorothy Shaver of Lord & Taylor quoted some sage advice, paraphrasing Samuel Johnson, "to distinguish nature from custom," and Moderator Muller-Munk concluded that American taste was in good hands.

A few of the tidbits of the evening:

Moderator: **Peter Muller-Munk**, President of S. I. D.:
Taste, I think, is a selective faculty which makes us choose the forms and implements of our physical environment. When millions of individuals arrive at more or less the same choices, we can then begin to define the taste of a nation; and if we are in any way responsible for providing the things which meet with such acceptance, then we have succeeded, at least in part, in discharging our responsibility as designers or as merchants.

Perry Meyers, Specialist in Consumer Analysis and Marketing Research:
Much of the change in consumer taste can be related to certain broad changes in the American economic picture. First, and, I think, foremost, is the rise in real consumer income. Even after we allow for taxes and for inflation, real purchasing power today for every man, woman and child is about 50% higher—more than 50%—than it was in 1929 or 1939. A second change is what can almost be called a revolution in the distribution of income. In 1929 there were almost 50,000 families with incomes, after taxes, of over $100,000. Today there are only seven or eight such families.

On the other hand, the number of families with incomes between $10,000 and $25,000 has almost tripled since 1929. Today the top income group is pulled down; the bottom income groups have moved up. There is a great middle income market—its heart in the $5,000 to $7,000 income bracket, but with a great deal of purchasing power both above and below this range.

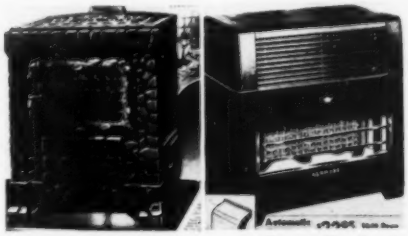
This change in income distribution probably represents an irreversible change in the character of the American taste . . . Here in America for the very first time in world history we have a situation where the majority of people can and do actively participate in setting standards of taste, and they do this with relative freedom from tradition. . .

Harriet Morrison, Home Fashions Editor, New York Herald Tribune:
We all know that efficiency and convenience at home are not enough. They do not spell taste. We also know women need a change of pace from efficiency. They love frivolity. Efficiency and convenience as a steady diet is boring. Don't you ever wish the electrical record player would run down just once and get squeaky?

Walter Dorwin Teague: Industrial Designer: It seems to me that one of the greatest things we can do for our clients is to build good will. Such things as refrigerators and ranges, for instance, are major investments in most families. They cost hundreds of dollars . . . In any permanent product of that kind, it is the designer's responsibility to make it continue to be good throughout its life, so that the buyer has her money's worth and she has confidence in the manufacturer; and when the time comes, ten years later, to go back and buy another, she will go to the same manufacturer. I don't believe in designing for obsolescence. I believe in designing for permanent satisfaction. And I think we ought to aim for that. . .

Courtesy Antiques

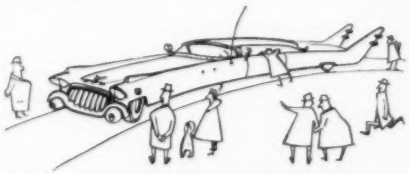
To illustrate his thesis that taste — from Egypt to Dagmars — has high points and low ones, Mr. Teague selected among others: the high level during the 18th century (above); the decline in the cluttered 19th; and contemporary furniture by Robsjohn-Gibbings (below) which recalls "the classic ability to survive."



Taking samples from the Sears-Roebuck catalogue of 1930 to compare with the current one (above), Henry Dreyfuss demonstrated that simple forms, clean lines and better taste, through better design for mass production, have been made available.

Henry Dreyfuss, Industrial Designer:
I think the greatest responsibility that the industrial designer has is to be the guardian of public taste, to keep it on the upgrade, to keep it going ahead, but not going so fast that the public can't keep up with it.

Working for large manufacturers, I believe the industrial designer has done one thing that I am very proud of as a designer, and that is to put good taste in quantity production.



Loewy influences management's taste by showing original cartoons: "This one is starting to follow the earth's curvature."

Raymond Loewy, Industrial Designer:
My business is to see to it that the manufacturer sells as many as possible, and employs as many people as possible, and is as successful as possible, and to contribute to the welfare of the whole nation. My role as a designer is to see to it that my client stays in business and we try to do it by giving him the product that will be in the best possible taste that is saleable at the moment. And that's my criterion.

Dorothy Shaver, President, Lord & Taylor:
Most Americans used to buy things only because they were the thing to buy, the things everyone else was buying. Yes, some Americans still do, but more and more people are joyfully buying things they like, things that express and fulfill themselves. But if this is a great tribute, it is an even greater challenge. Having helped to nurture good taste, we must now satisfy its growing demands.

ALUMINUM IS DIFFERENT

(Vive la différence!)

The designers in Reynolds Styling and Engineering departments know aluminum. And that's important, because aluminum is different.

These men know design. They know engineering. They know manufacturing. They know packaging. But most important of all, *they know aluminum.*

They know aluminum. They know well how to design in aluminum for greater sales appeal . . . for greater efficiency . . . for lower manufacturing cost. And since it's worth repeating . . . for greater sales appeal.

These men are working with many manufacturers, collaborating with their designers and with independent consultants *successfully.* If you'd like these men to work with you—on new products or on re-design—simply contact the Reynolds office near you, or write to Reynolds Metals Company, P. O. Box 1800-GV, Louisville 1, Kentucky.

REYNOLDS ALUMINUM

MODERN DESIGN HAS ALUMINUM IN MIND

Which of these will help you most?

A LIBRARY OF HANDBOOKS filled with important and useful information on aluminum design and fabrication. If your job is management, design or production, these books can be vital to you. Single copies of any or all of these are yours without cost when requested on your business letterhead.

ALUMINUM DATA BOOK—160 tables give complete physical, chemical and mechanical properties; availability data, tolerances, definitions, fabrication information . . . 220 pages.

DESIGNING WITH ALUMINUM EXTRUSIONS—Explains the basic principles for using extruded aluminum shapes most effectively . . . 138 pages.

ALUMINUM STRUCTURAL DESIGN—Shows how to design original structures with aluminum or convert present designs to aluminum . . . 130 pages.

FASTENING METHODS FOR ALUMINUM—Offers information on mechanical joining and fastening methods, and the advantages of each . . . 136 pages.

FINISHES FOR ALUMINUM—Gives basic data on application and uses for electroplated, mechanical, chemical and organic finishes . . . 124 pages.

ALUMINUM FORMING—Presents accepted practices for bending, forming and drawing aluminum . . . 152 pages.

MACHINING ALUMINUM ALLOYS—Covers aluminum machining including automatic screw machining . . . 124 pages.

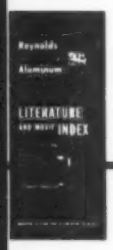
HEAT TREATING ALUMINUM ALLOYS—Explains the theory and procedures for heat treating aluminum alloys... 119 pages.

WELDING ALUMINUM—Gives complete data on the welding, brazing and soldering of aluminum . . . 186 pages.

ALUMINUM POWDERS AND PASTES—Describes types of powders and their uses in paints and coatings, pyrotechnics, processing, metallurgy and other applications . . . 84 pages.

16mm Sound-Color Films Available, too

1. **SHAPE OF THINGS TO COME** (extrusion design and application)
2. **TALE OF THE POWDERED PIG** (powders and pastes and their uses)
3. **PIGS AND PROGRESS** (aluminum from mine to finished products)



A COMPLETE INDEX

of all Reynolds Technical Literature and Films on aluminum design and fabrication is also available. Write to Reynolds Metals Company, P. O. Box 1800-GV, Louisville 1, Kentucky.

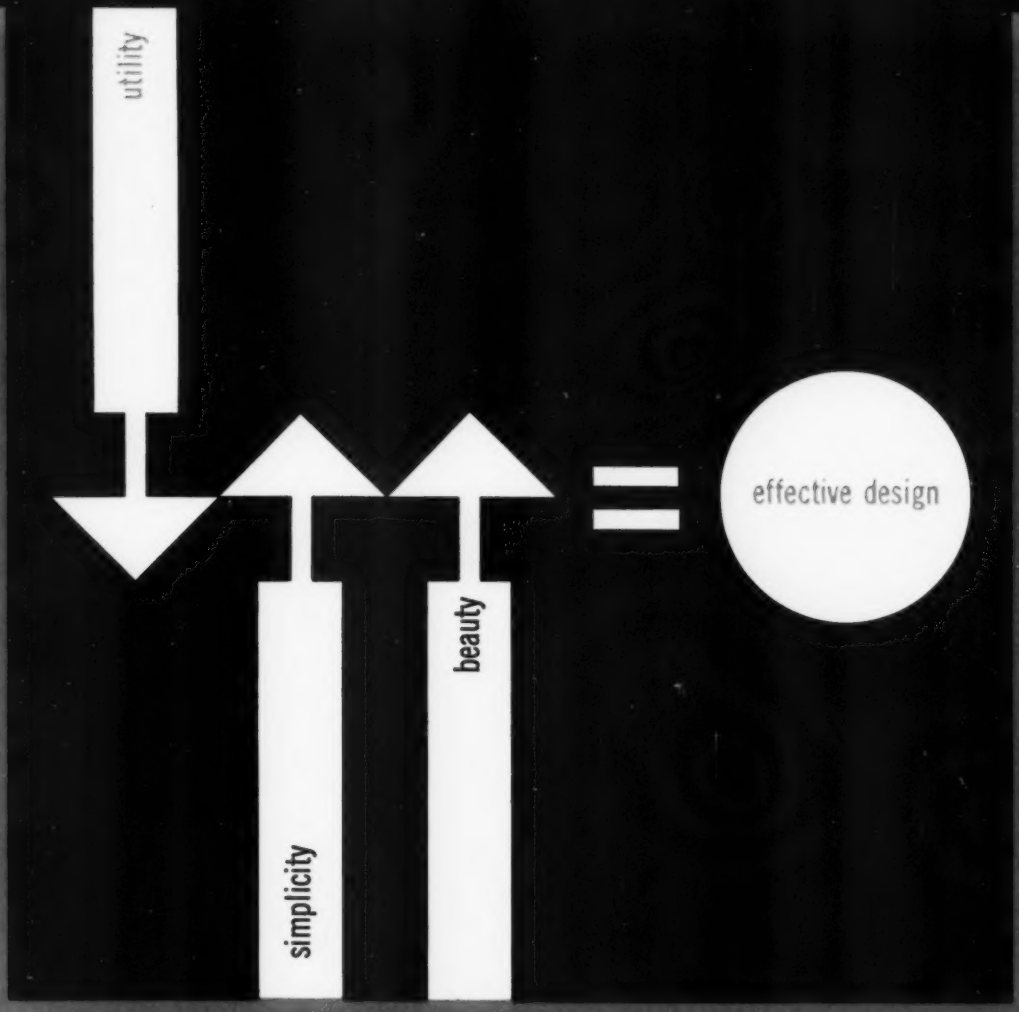
Instructors in technical schools are also invited to take advantage of these educational aids. Write for details.

See "Mister Peepers", starring Wally Cox, Sundays on NBC-TV

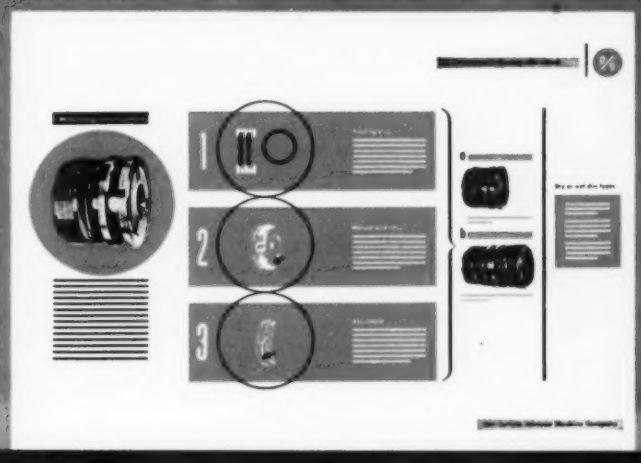
REYNOLDS

ALUMINUM

MODERN DESIGN HAS ALUMINUM IN MIND



Product information should be designed, subject to the usual standards—utility, simplicity, beauty. The catalog design shown below, though but one visual unit of many in a manufacturer's catalog, illustrates the application of design principles to product information. For fifty years, Sweet's has pioneered in the field of product information that best suits the needs of buyers and sellers in industry. Sweet's Product Design File is a system which gets product information into buyers' offices in convenient bound collections of catalogs. Sweet's Catalog Service– designers, producers and distributors of manufacturers' catalogs, 119 West 40 Street, New York. Offices in principal cities. [Division of F.W.Dodge Corporation]



PDC tests packages

To stimulate awareness of the relation of package design to sales, the Package Designer's Council held an Open Meeting on May 24 which included a game of criticism (members wrote on slips "best" and "worst" in seven different groups of packages). Conclusions were not counted, but a panel discussion brought out practical points: Robert Gage, Vice President of Doyle, Dane & Bernbach said, "A package must inform you of its contents." Irving Feldman, President of the Zelart Drug Co., challenged designers to package a pilferproof lipstick for super markets.

Research Institute Expands

The Midwest Research Institute, Kansas City, Missouri, is enlarging its activities with a new Industrial Economics Division. According to Dr. Charles N. Kimball-President, projects will be accepted in market research for industrial and consumer companies; industrial location surveys for companies, communities and areas; studies on the needs and growth of the American economy and input-output studies for industries and areas.

New Fastener put to the test

High strength bolts instead of rivets are being used in a new construction technique used by Anthony Campagna and Sons in the erection of an 18-story apartment building under the shadow of the Empire State Building. Not only is noise cut in half, but the two-man crew needs only a pneumatic impact wrench and holding wrench and no special scaffold.

People

William V. Judson, who has been in charge of designing General Electric clocks, has been appointed appearance design manager of the Clock and Timer Department, General Electric Company, Ashland, Massachusetts.

William M. Schmidt has been named vice president and director of the new styling division formed by the Studebaker-Packard Corporation. He had been chief stylist of Lincoln automobiles.

George W. Walker has been appointed vice president and Director of Styling at the Ford Motor Co. He had previously served Ford as an independent design consultant, in Detroit.

A. B. Kennison, formerly vice president and director of Ethicon, Inc., is now vice president of Servel, Inc., where he will serve as the company's coordinator of research and product development.

Charles V. Orr, who was in the Body Engineering Division of the Ford Motor Co., has joined Anders-Orr & Associates, Inc. in Detroit.

Frank M. Mansfield III, the Carboloy Department of GE in Detroit announces, has been appointed manager of product planning and marketing research.

Charles Butler Associates (formerly Butler and Zimmerman) announce that Christian Nordstrom, who worked for Raymond Loewy, and Paul D. Burian, who was at George Nelson's, have been added to the staff.

Samuel Ayres Jr. Associates have moved to new offices at 711 Boylston St., Boston; they are now affiliated with **Bernard Soap Associates,** who handle store planning and office design.

Thomas Hayes won first prize in the Design Student Award Competition, sponsored by the Midwest Chapter of Industrial Designers. Hayes is a senior at the University of Illinois.

ID Committee Roster

The Industrial Design Committee of the Los Angeles Chamber of Commerce (composed of a group of Southern California Industrial Designers) has published an illustrated booklet. It lists the designers practicing in the area and shows their outstanding work. For a free copy or information write: Franklyn B. Cole, Manager, Business Service Department, Los Angeles Chamber of Commerce, 1151 Broadway, Los Angeles 15, California.

Events

Exposition in Sweden: "H55" is the concise title of an important exposition of industrial design, architecture, home furnishings and crafts which opened in Halsingborg, Sweden on June 10 and continues until August 28. The exposition, under the joint auspices of the City of Halsingborg and the Swedish Society of Industrial Design, will be reported in the August ID.

Exhibition in Chicago: Midwest product designers will present the second Chicago Area Industrial Design exhibit, October 30 through November 11, at the Illinois Institute of Technology's new Architecture-Planning-Design building, which is scheduled for completion in early September. Examples of new mass-produced products, designed in Chicago, will be shown.

S.I.D. Conference: The 11th Annual Meeting and Design Conference of the Society of Industrial Designers is scheduled for October 6-8 in Washington, D. C., at the Woodner Hotel. Market research, automation, and the influence of industrial design on non-consumer and capital goods, are among the topics that will be featured.

Simultaneous Shows for Chicago: The National Machine Tool Show and the Production Engineering Show will be held simultaneously in Chicago from September 6-16th (plus one extra day for the Machine Tools). Shuttle busses and helicopters will carry visitors between the Navy Pier, where the Production Engineering Show will be held, and the International Amphitheatre, where the Machine Tool Show will be staged. The Production Engineering Show will display mechanism, instruments and equipment to supplement machine tools.

Harriman Design Conference: The Institute of Contemporary Art will sponsor the 29th Design Conference at Arden House, Harriman, New York, on October 5-7. Design case histories will be presented, and a group of designers and lawyers plan a heady discussion of the problems of design piracy.

Industrial Electronics Conference: Automation and new control-system applications will be discussed at a conference on industrial electronics, to be held in Detroit on September 28-29. The symposium is cosponsored by the American Institute of Electrical Engineers and the Professional Group on Industrial Electronics of the Institute of Radio Engineers.

Packaging & Handling Show: The Society of Industrial Packaging and Materials Handling Engineers will hold their annual Exposition at Kingsbridge Armory in New York City from September 20-22.

Aspen Again: The International Design Conference is about to go into session in Aspen as we go to press. The conference will be reported in the August issue.

Interior design improvements in late-model cars

made possible by NEW DU PONT MYLAR*

Style-conscious designers are achieving new beauty . . . new economies in auto-interior trim . . . with a new kind of decorative surfacing material made possible by Du Pont "Mylar" polyester film. This thin, tough, transparent film —which resists abrasion, oils, solvents, chemicals—can be metalized in a full range of subtle colors. Bonded to a backing, then embossed, metalized "Mylar" offers a rich-glinting variety of decorative side-door panel inserts, seat-welt trim, package-tray covers and kick panels. And designers estimate that the cost of these new and striking effects for auto interiors is 40% less than the material formerly used!

This new decorative surfacing material is highly resistant to abrasion. Oil and grease have no effect on it. It can be wiped clean without smearing. Other uses now in development include wall surfacings, leather goods, book covers, kitchen appliances.

Find out more about new materials made with "Mylar." Mail the coupon for new booklet and samples.

**Du Pont's registered trade-mark for its brand of polyester film.*

Du Pont
MYLAR®
polyester film

DU PONT

BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

E. I. du Pont de Nemours & Co. (Inc.)
Film Department, Room 1I, Nemours Bldg.
Wilmington 98, Del.

Please send me samples of Du Pont "Mylar" polyester film and further information.

*Name*_____ *Position*_____

*Firm Name*_____

*Street Address*_____

*City*_____ *State*_____

First Award — best graphic presentation — December 1954.

Award of Merit — outstanding original research — "Plastic Tooling," October 1954.

to **INDUSTRIAL DESIGN** *these editorial awards*

FIRST *honors in the FIRST year*

For editorial excellence during its first year of publication, INDUSTRIAL DESIGN has won two major awards in Industrial Marketing's Annual Editorial Achievement Competition: for *best graphic presentation* and *outstanding original research.*

These two areas of editorial service are of particular importance to the readers of INDUSTRIAL DESIGN — to the executives responsible for product planning and development.

The distinguished quality of INDUSTRIAL DESIGN'S editorial service engaged the prompt support of design and management executives throughout industry. They quickly recognized the timeliness and need for a business publication devoted exclusively to their interests and problems.

Thus, INDUSTRIAL DESIGN, a bi-monthly, within less than a year was qualified for membership in both the Audit Bureau of Circulations and the Associated Business Publications.

This record is a reliable measure of INDUSTRIAL DESIGN'S advertising value to manufacturers of materials, finishes, and components.

INDUSTRIAL DESIGN, *a bi-monthly*
Subscription rate, $9.00 *annually*
Whitney Publications, Inc.
18 *East* 50*th Street, New York* 22, *N. Y.*

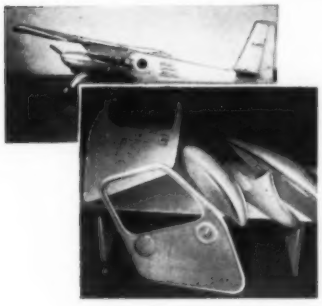
ID

talk about simplicity-

Sound Absorbing Telephone Booth
Molded by Protective Plastics Ltd., Toronto.
Designed and Distributed by Design Craft Ltd., Toronto, Ont.

Celanese* Marco* Resins make the big job easy

Compound curves, soundproofness, lightness, low cost—almost everything about this telephone booth could have been a complex construction problem. But it wasn't, because it was molded of reinforced plastics.



Today, all it takes to make an outsized product efficiently, economically and better, are simple, inexpensive dies and low-pressure speed-molding. A 35 lb. telephone booth or an airplane part, a truck-body or a yacht can be given higher strength and rigidity without added weight. Molded or fabricated with Marco Resins, they can resist weather, heat, cold, vibration, abrasion, high impact, stress. Linings, inserts, windows and ports can be incorporated. Color can be molded in. Maintenance is negligible.

Cabin Door, Wing Tips, Rudder and Elevator Tips, Tail Fillets for Helio "Courier" Manufactured by Fleet Manufacturing Ltd., Fort Erie, Ont. for Helio Aircraft Corp., Norwood, Mass.

If you want freedom of design and construction simplicity—on a small or grand scale—write for the latest information on reinforced plastic construction, to Celanese Corporation of America, Plastics Division, **Dept. 152-F, 290 Ferry Street, Newark 5, N. J.** Canadian affiliate, Canadian Chemical Company, Ltd., Montreal and Toronto.

*Reg. U. S. Pat. Off.

Celanese*

PLASTICS and RESINS

THOMAS J. WATSON, JR.

Portrait by Fabian Bachrach

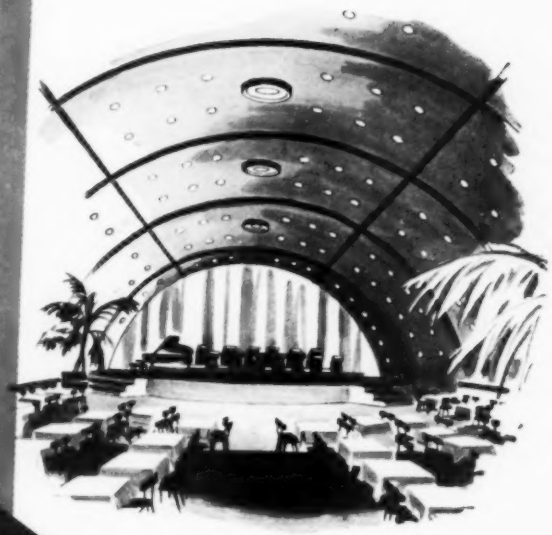
"IBM was one of the first companies to . . ."

"I have always been proud of the fact that IBM was one of the first companies to put into effect the Payroll Savings Plan for the purchase of United States Savings Bonds, and I am delighted to see this patriotic endeavor continuing year by year and increasing throughout our organization. Today thousands of IBM employees, through their participation in the Plan, are helping their country and providing for the future of their families and themselves." **THOMAS J. WATSON, JR.,** ***President International Business Machines Corporation***

If employee participation in *your* Payroll Savings Plan is less than 50% . . . or, if *your* employees do not now have the opportunity to build for their future through the systematic purchase of U.S. Savings Bonds . . . a letter to: Savings Bonds Division, U.S. Treasury Department, Washington, D. C., will bring prompt assistance from your State Director. He will be glad to help you put on a person-to-person canvass that will put an application blank in the hands of every employee. This is all you have to do. Your men and women will do the rest, because they will welcome the opportunity to build for personal and national security.

The United States Government does not pay for this advertising. The Treasury Department thanks, for their patriotic donation, the Advertising Council and

INDUSTRIAL DESIGN



When **curved surfaces** are in your design...

Each sheet of this homogeneous fiber board is individually molded. Solely by wetting, it can be curved on an 18" radius; with steam and molds — on a 4" radius. After being curved, it retains all its original qualities of great structural strength, insulation and sound-deadening values.

Homasote insulating-building board is available with a linen finish — in Big Sheets up to 8' x 14'. Striated Panels and Wood-textured Panels are available in 8' lengths and in 16", 32" and 48" widths.

In all three finishes, Homasote has found a wide range of uses for both interior and exterior finish. It is weatherproof and crackproof — works easier than wood — takes paint, stain, paper or any laminate glue can hold.

Let us send you samples and specification literature on Homasote in all its forms. Kindly address your inquiry to Department F-18.

HOMASOTE COMPANY

Trenton 3, New Jersey

SEE OUR CATALOG IN SWEET'S

Ten months' leave with pay

When 17 management men from a giant corporation are given ten months' leave with pay in order to go back to college, it is something to write about; E. D. Baltzell did write about it in the March issue of Harper's Magazine, and as a preface to our study of design schools the story certainly bears repeating. It seems that top management of the Bell Telephone System have been worried for some time about the "trained incapacity" of their future executives; they found that young men, often overspecialized by business and engineering training, lacked the imagination required to run a corporation, and that their interests became further narrowed by their jobs. "A well-trained man knows *how* to answer questions, they reasoned; an educated man knows *what* questions are worth asking. At the policy level, Bell wants more of the latter."

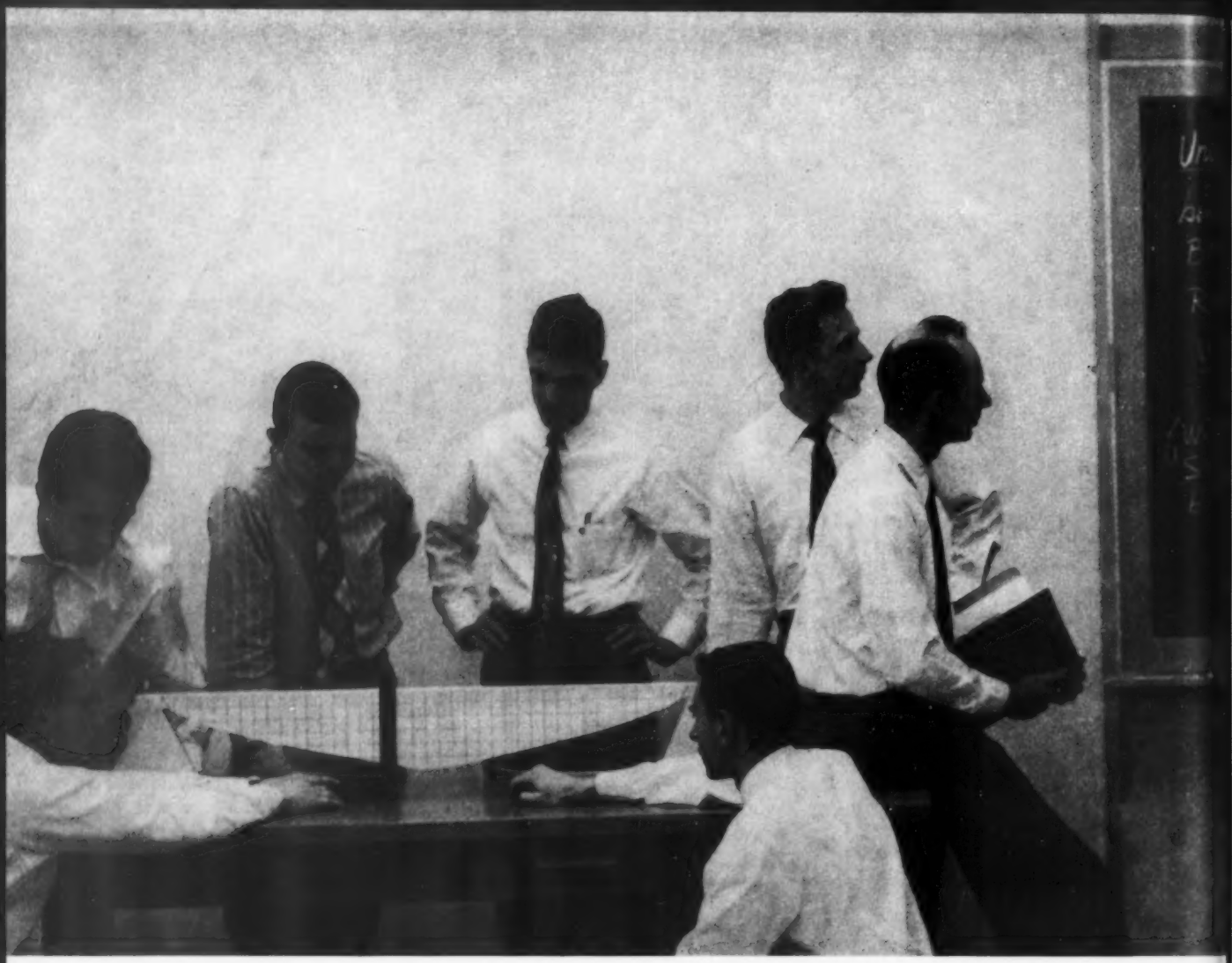
What Bell chose to do, to broaden the outlook of its future managers, was to eschew the usual executive "training" program, and give them limbering up exercises in liberal arts. Seventeen married men, between the ages of 30 and 48, were selected to spend an academic year at the University of Pennsylvania, where they were given large doses of Oriental art and history, James Joyce, systematic logic, and American Civilization; they attended art galleries, concerts and museums, read avidly, and then went back to their jobs.

Bell was not trying to polish up its executives until they shone with the high gloss of culture; it was trying to develop in them the methods of thought that would be demanded of management — the ability to make decisions, the power to see connections and impute value to isolated facts. If there were any surer and faster ways to develop these qualities, Bell didn't know them; the humanities were the only proven foundation for the kind of thinking they wanted.

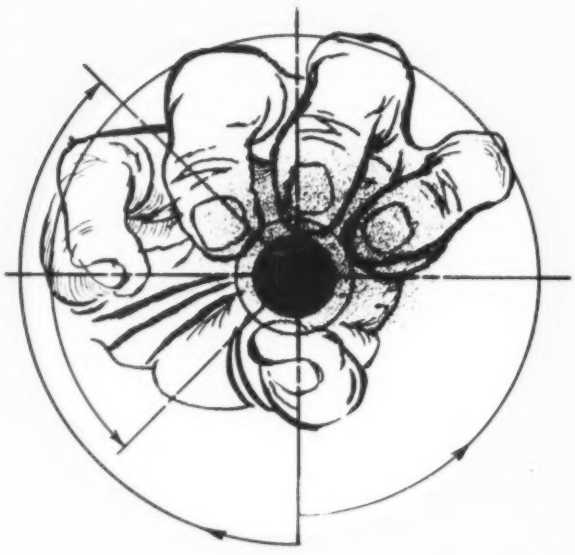
Bell's counter-know-how stand is probably just the beginning of a trend. For, as Peter Drucker points out in another Harper's article, in April, the automated world to which specialization is carrying us will be remarkably anti-specialization. Just to keep the machines geared to routine jobs will require more educated people than the world has ever produced. "Trained barbarians," with highly developed gadgeteering skill, will no longer do; there will have to be qualitatively educated people to manage machines, make decisions and take risks. And schools, under automation, "could do the student no greater disservice than to prepare him for his first job. If there is one thing certain under automation it is that the job — even the bottom job — will change radically and often."

Certainly, the problems of educating management and educating designers are similar, but we must not lump them indiscriminately. There is no doubt that industrial design today involves many duties, from the drafting room to the Board Room; it is becoming more deeply involved with management's problems all the time. Yet, as designers successfully climb the corporate ladder, there is a danger that this very success will reflect on education. If design schools start to worry about preparing a designer for his last job, and specialize in producing executives, it will be a disservice to their true contribution.

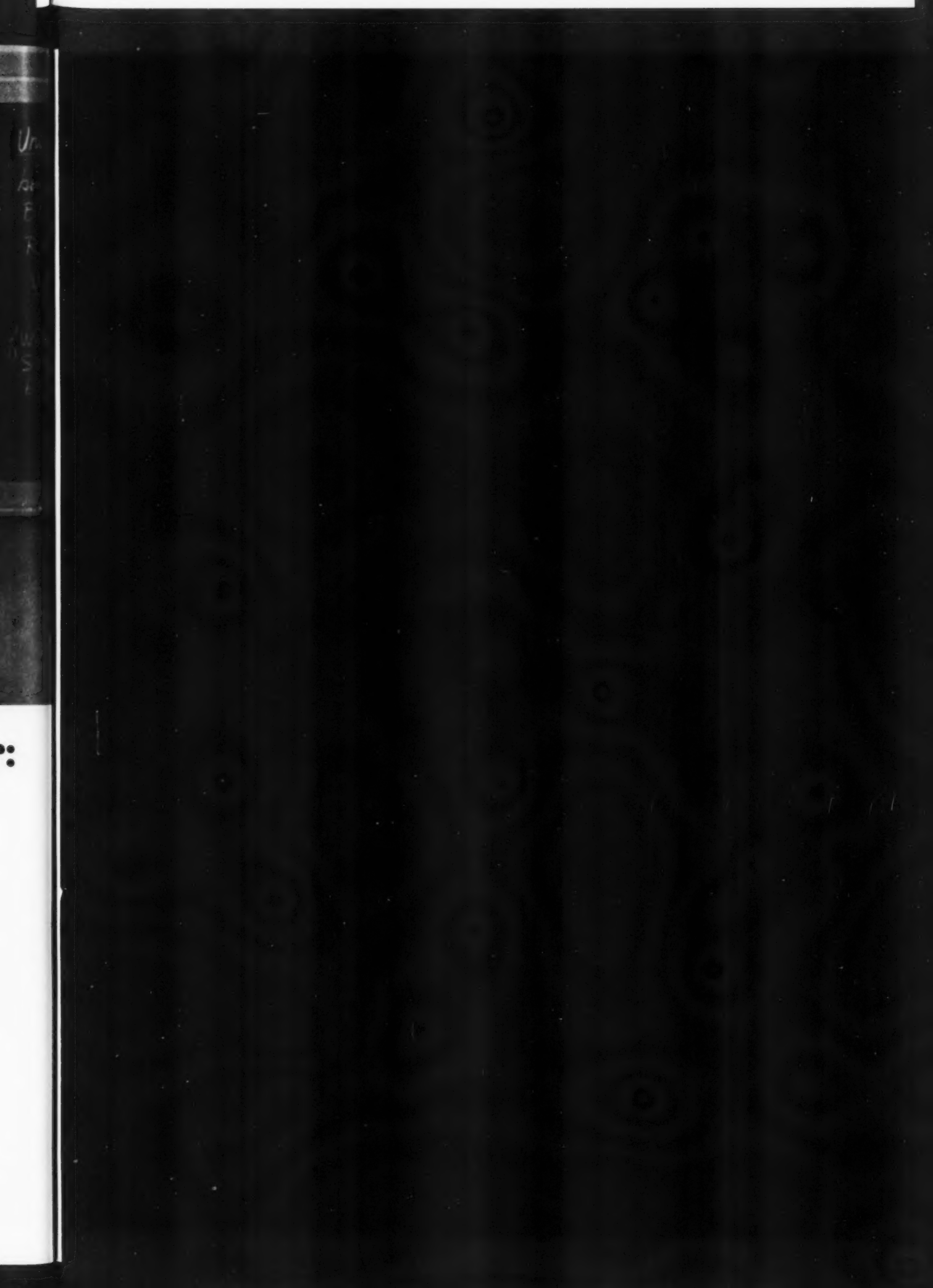
With Bell's hindsights and Drucker's foresights to bolster us, we suggest that the best education for a designer is a good education in design. It happens that this education, at its best, is not too different from liberal arts: the man who learns to grasp the essentials of each problem, and to solve it with freedom and realism and sensitivity, will not — 15 years from now — have to be sent back to school for ten months of Oriental history.—*j.f.m.*



the education of a designer:



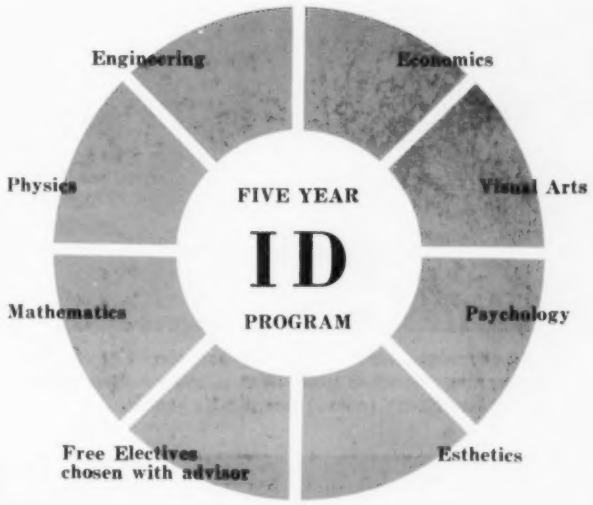
The craftsmanship that the Syracuse student learns with his own hands teaches him neatness and precision and makes him aware of parallels: how machines are the product of human hands and how the article made by the machine must, in turn, serve the hand in function, utility and comfort.



This month about 107 young designers are graduating from five major design schools, and 123 more are setting out with diplomas from the art and design departments of universities. Many of them have jobs waiting, for some firms, knowing there would be stiff competition to hire them, began interviewing students in the spring. In looking over each new graduate, each company or designer has had to decide, What kind of education has he received, and how well equipped is he for this job and this profession?

How *well* a student is trained is a very large question, and the two dozen schools with accredited design courses illustrate many views on what a designer is and what it takes to educate him. The idea of "educating" a designer systematically is actually quite new, for only since the 30's have formal design curricula existed at all. The men who lead the profession today came to it with varied backgrounds—stage design, display, engineering, architecture—because there was nothing else. Yet they all have decided views on how today's designer should be educated.

That is why we have made this survey now: not only to guide students and employers, but to air some of the issues surrounding the changing philosophies of design education. To introduce the issues we shall study one school, Syracuse, in detail, because 1) it represents a uniquely balanced 5-year program; 2) it was conceived by Antonin Heythum, one of the great design educators; 3) it is now the center of a controversy which represents a basic conflict between two of the many philosophies which have influenced all 1955 graduates.



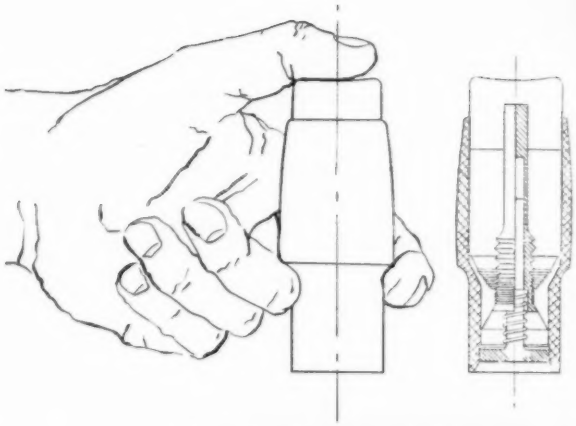
what is it? where is it going? how well does it serve industry?

The ID major at Syracuse discovers in his freshman year that his education is based just as much on the hand as on the mind. He learns how to manipulate hand tools and to process metal, wood, plaster and plastics; he takes a three-hour drawing course and another in art techniques. Introductory Math is no mere survey but a preliminary to geometry and calculus in his second year. His English course takes him to only one of the thirteen different departments (see diagram) which contribute to the "man is the measure" philosophy of the design department. In the course of five years he will enter these fields at the time they best relate to his development as a designer. For example, he takes General and Experimental Psychology, and learns how and why motor and sensory reactions must be taken into account, just as he is approaching his first simple product designs in the second year. A 3-year sequence of electives follows next, and the student is advised how to fill in gaps in his own background.

These first-year models of geometric shapes are made to an exact formula. The purpose of the exercise is to acquaint the student with a point of reference in three dimensions, mathematical conic sections of "pure shapes" and free variations.

To acquaint students with the characteristics of stainless steel in designing for mass production, flatware was hand-hammered in the shop. Spoon (above) has plastic handle.

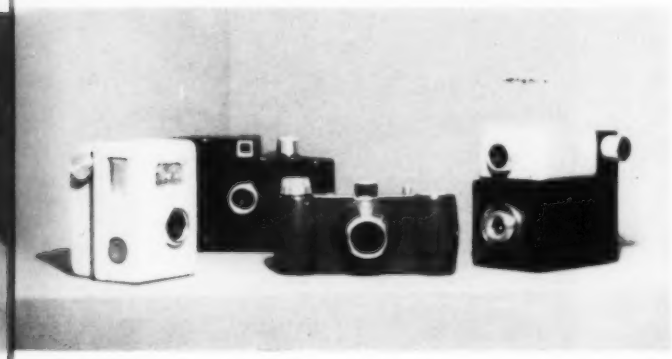
II



Utility and function are throu

The design course is planned as a progression from utilitarian hand articles, a spoon or a peppermill, to an item of simple visual function like a thermometer, working up to more and more complex problems. The student's first assignments train him in the procedure he will always follow. First, he analyzes human needs: How is this product used? How is it held or seen most comfortably? Analysis also involves technical research; then he makes sketches, drawings, blueprints and models to test his design and the selection of materials.

At Syracuse, designs are always carried out in full-scale models for discussion and criticism. For preliminary tests of appearance and ease of handling, students make several wooden versions (as in the problem of the cameras, below), but execute final models in actual materials whenever possible; the peppermill, for example, was made up as a working model with a steel cartridge and a removable plastic top. The shop represents a typical industrial machine shop and is equipped with four kinds of lathes, a drill press, crucible and welders. After a strong course in Engineering Graphics, the students are able to do complete mechanical working drawings of their designs.



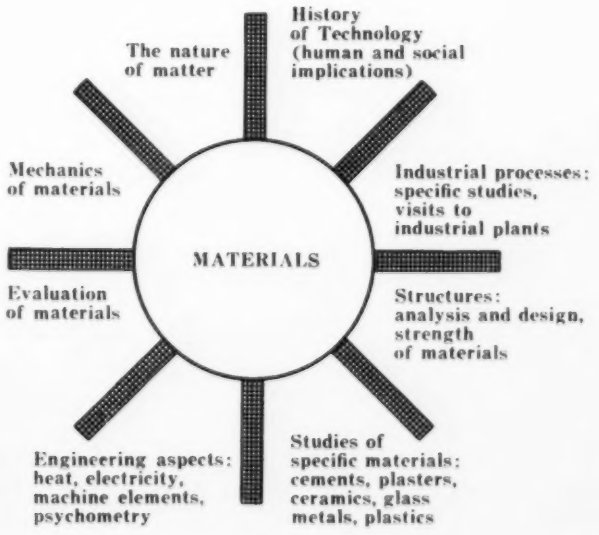
III

In one of the Development Laboratories, where finished work is done in plaster, wood and metals, Professor Richard Koontz (standing) is using a plaster slip model to teach the principles of casting.

e thgroundwork for a study of materials, technics and structure at Syracuse

Materials are the basis of a full course in themselves during the third and fourth year. Questions of structure and mechanics, trusses and stress come into Industrial Technics too. And, to build up a good working knowledge of his medium, the student takes General Physics and gets acquainted with actual production through field trips to industrial plants that are coordinated with his studies. Not to be too one-sided, he takes an elective in painting or art history and one in the social sciences.

IV

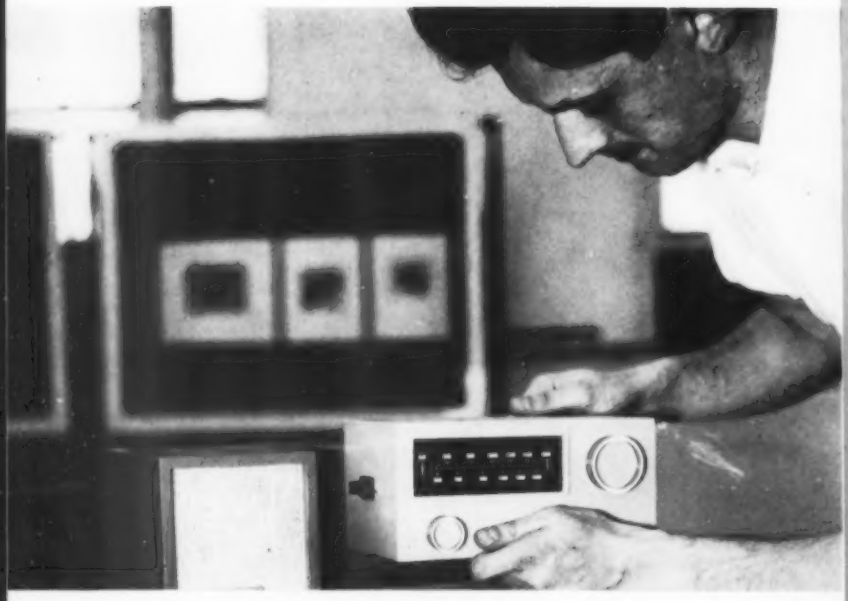


V

In his fifth year, the student should be able to take into account all the aspects—engineering, esthetic and economic—of a complicated product and apply some independent thinking. The feature of the television set, beyond its neat appearance, is that the mask can be formed from one piece of acrylic. The radios attempt to improve the frequency reception of the small table model: one, by putting an 8" speaker in a rigid, open-back case; another (below) by utilizing two independent 4" speakers in a separate unit on the theory that, operating at different lengths, they will complement each other and resonate at different harmonics.

Finally, the fifth-year student takes a course in Professional Practices prior to graduation. Like other Syracuse graduates of the last 8 years, who are now working in forty different areas of industry, he is ready to put his education to the test on any kind of design job.

One final project puts in practice 5 years of investigation



3 great educators have left their mark

The character of any curriculum is determined by more than its courses: by the thinking that lies behind them. Antonin Heythum, who founded the Syracuse curriculum, was one of three great educators who put into action three programs which represented their views on the best preparation for a designer. Though each had a distinctly personal approach, none of them thought of the designer as a renderer who is concerned only with a product's appearance. Nor did they picture him a mere craftsman for whom the machine is only a larger, more complicated tool. Here lies the heart of the present conflict at Syracuse, and here most of the misunderstandings have centered ever since the Bauhaus was driven out of Weimar in 1925.

The Bauhaus was the genesis of industrial design as we know it today: the first school that believed men must be prepared to design for a technological age by training both as creative artists and as fully-informed technicians. The teaching method combined a journeyman's training in tools and materials with an artist's study of design principles. Among the school's leaders who came to this country in the 30's was Laszlo Moholy-Nagy, who founded the School of Design in Chicago in 1937 in the Bauhaus tradition. To this approach, he added a personal vision of education through exercises in self-discovery. "Industrial design," like "architecture," was too narrow a concept for isolated study; it was taught only through experimentation in all the arts and in materials. For underlying Moholy's teaching was the idea that an artist who knew the all-pervading principles of design could later apply himself to any graphic, shelter or product problem.

Alexander Kostellow, who set up a unique program at Pratt Institute in 1947, drew on the Bauhaus tradition only in his belief in a foundation study of design elements. His teaching grew from a personal approach to design as "the art of merging ideas and feeling with concrete materials," and he concentrated on developing in his students an attitude toward solving problems this way. For practical training, he founded the Experimental Design Laboratories, where students could work out projects in the light of professional standards.

Heythum, a stage designer and architect, was influenced much more by the Bauhaus consciousness of function than by its actual teaching method. Taking as his thesis that the products of the machine must be adapted to human needs, he taught his Syracuse students to investigate the anatomical, physiological and psycological requirements of a spoon or chair, and stressed the technological resources which they needed to realize their ideas.

After Heythum's death in 1953, his sympathetic collaborator, Richard Koontz, continued the program, improving the sequence of courses. This year the new director of the School of Art, Dr. Lawrence Schmeckebier, suggested replacing some of the engineering courses with life drawing and silversmithing. On this fundamental disagreement about an art-craft versus engineering-oriented education, Koontz and three of his staff members resigned this month; the future of the Syracuse curriculum hangs by a question mark.

Moholy-Nagy

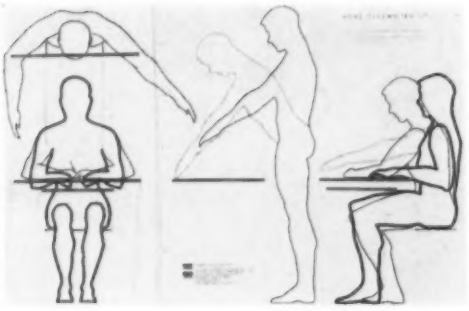
Kostellow

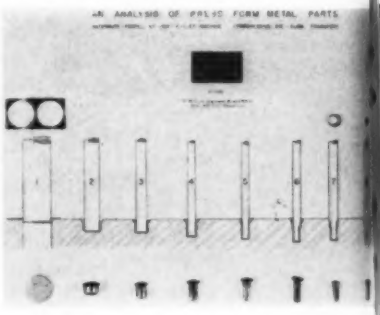
Heythum

Georgia Tech

Intensive training in object research characterizes the industrial design course at Georgia Tech. This is a recent (1952) curriculum, planned and directed by Hin Bredendeick, and added as an option in the School of Architecture. Outspokenly opposed to Moholy-Nagy's intuitive-individual approach, Bredendeick believes that design should be approached by a methodology. In both the Design and the Materials and Technique courses, the student is given six to eight problems, involving different materials and processes of manufacture. He compiles data, prepares charts of outer and inner constants, analyzes the production process, gathering as much research as possible before he begins to put any designs on paper.

Although the ID course has been in action just four years, Georgia is fully equipped in hand tools and shop.





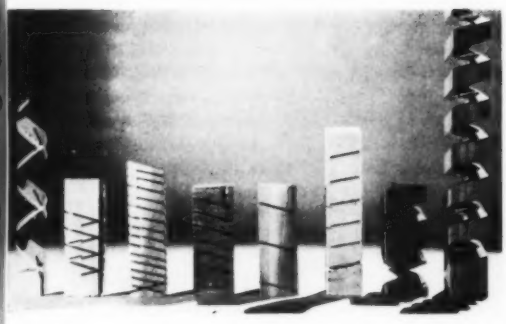
Other schools differ on a major educational issue: should a student be taught a me

Art Center School

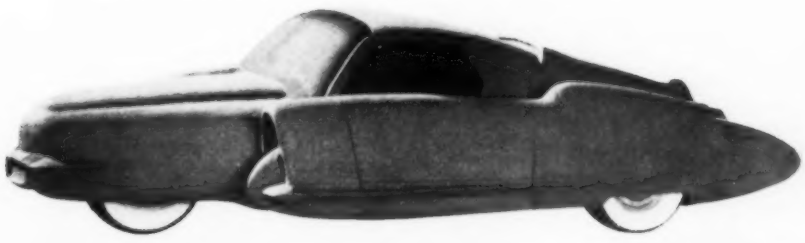
A student goes to Art Center, Los Angeles, to gain know-how, and down-to-earth preparation for the job he wants to do. He can major in Transportation (automobile design), Product Design, Specialized Structures or Packaging and Display. The aim of the 4-year curriculum, founded in 1930 by Edward A. Adams (above) is "to parallel professional practice." Books are never used, according to a recent article, because they are considered always outdated; a student learns the trade from practicing designers who lecture, criticize and guide him in graphic skills and modelmaking. By going summers, he can be ready all the faster for the job which, the school promises, is waiting for him (if grades qualify) at the other end of the director's telephone.

Carnegie Tech

Though its method is not so academic as Georgia's, Carnegie also bases its course on analysis. After two years of "foundation" shared with art students, the ID major concentrates on industrial processes and production under Professors Lepper and Felver. Students are urged to find individual expression rather than to emulate existing styles. At both Carnegie and Georgia, the faculty believes it is more of a service to train a student to think than to prime him for a job.

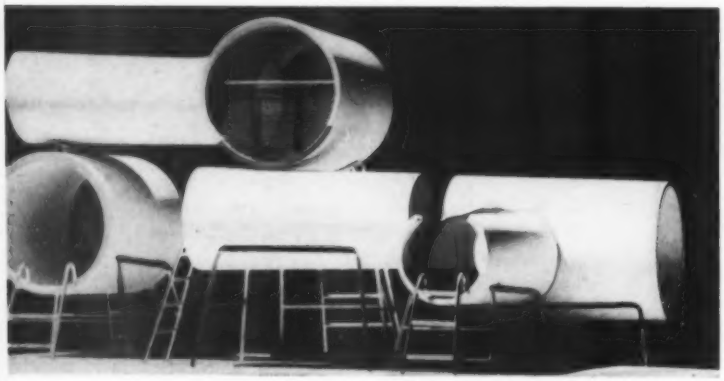


ht a method of approach, or be trained for his trade?



Pratt Institute

Kostellow's curriculum — a strong foundation course in esthetics and the humanities coupled with practical work in the Experimental Design Laboratories — is being continued under the direction of Robert A. Kölli. "Of course there can be a happy marriage between form and function," says Kölli, "but function can be overstressed. The designer's special contribution is to make things beautiful." Because of this background in esthetic and human factors, Lab work becomes a stimulating as well as practical phase of the Pratt student's training: advanced Lab projects, which are posed and later appraised by major companies, give him a chance to match his imagination against the practical demands of industry.



Pratt bases its laboratory on industry, Cranbrook on arts and crafts

Cranbrook

A student goes to Cranbrook to find an individual path in the broad field of design. With academic credits taken care of elsewhere, he is free to work in his own studio under the critical direction of Theodore Luderowski; the degree of practical orientation depends on the student. He begins with exploratory problems in line, pattern, structure, color and material, and in the second year he specializes in furniture, textile, interior or industrial design. The products of his independent program are judged on their directness in stating "the actual end or ultimate use of the object." A course in painting or sculpture, and one in crafts — metalsmithing, ceramics or weaving — is required, and all students are encouraged to exchange ideas, because the aim of Cranbrook's plan is "to indicate the principles common to all the arts."

		Psychology	Science	Electives	Total Academic Hours	Total Credits for Degree
Art Schools	Art Center	—	—	38	42	136
	Chicago Art	—	—	12	41	146
	Philadelphia	15	2.5	—	63.5	178
	Rhode Island	8	6	—	36	120
● ●	Cranbrook *Students from other institutions*					
Engineering Institutes	○ Alabama Poly (School of Art)	—	5	—	60	167
	Carnegie Inst (College of)	3	—	5	36	125
	○ Georgia Inst (School of)	6	35	21	137	211
○○	Illinois Inst (Institute of)	8	12	6	56	139
	Pratt Inst (Art School)	22	—	—	42	128
Universities	University	6	6	8	57	129
	University (College of)	—	9	—	68	203
	University (College of)	—	14	—	61	128
	University (School of)	—	—	12	67	124
● ● ●	University (College of)	10	—	28	65	128
	University (Department)	3	11	20	82	157
	University (School of)	4	23	9	68	118
	Syracuse U (Department)	6	12	2	39	150
○	University	3	20	—	80	175

● *California College of A... Dayton and Cleveland A... School of Design, give d... conjunction with acaden... other institutions.*

● ● *Cranbrook has no fixed c... work in private studios... guidance of an instruct... ready for a one-man sh...*

● ● ● *Michigan is contemplati... 5-year course.*

○ *Figures based on a 3-qu...*

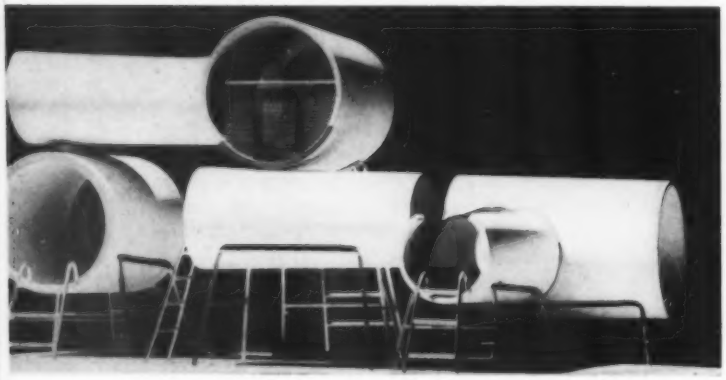
○○ *Though Massachusetts ... Technology does not ha... Industrial Design, produ... in Creative Engineering*

...ish, business English, com... ...eat books, public speaking, world history, American ... of art, history of painting contemporary art, arts and history of furniture, etc. **...ects:** marketing principles, in business and industry, etc. **Mathematics:** college ...ometry, analytic geometry, geometry, slide rule, inter... ...ra, introduction to mathematics, etc. **Psychology:** introductory psychology, applied psychology, general sociology, contemporary civilization, impact of science, human relations, foundation in social relations. **Science:** physics, chemistry, mechanics, applied mechanics, strength of materials.

The addresses of the above schools, and the person to write to for information about industrial design courses, may be found on page 127.

Pratt Institute

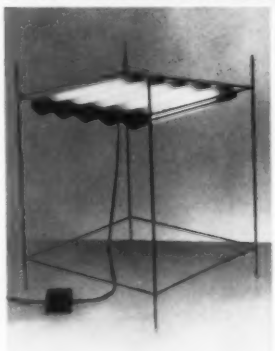
Kostellow's curriculum — a strong foundation course in esthetics and the humanities coupled with practical work in the Experimental Design Laboratories — is being continued under the direction of Robert A. Kölli. "Of course there can be a happy marriage between form and function," says Kölli, "but function can be overstressed. The designer's special contribution is to make things beautiful." Because of this background in esthetic and human factors, Lab work becomes a stimulating as well as practical phase of the Pratt student's training: advanced Lab projects, which are posed and later appraised by major companies, give him a chance to match his imagination against the practical demands of industry.



Pratt bases its laboratory on industry, Cranbrook on arts and crafts

Cranbrook

A student goes to Cranbrook to find an individual path in the broad field of design. With academic credits taken care of elsewhere, he is free to work in his own studio under the critical direction of Theodore Luderowski; the degree of practical orientation depends on the student. He begins with exploratory problems in line, pattern, structure, color and material, and in the second year he specializes in furniture, textile, interior or industrial design. The products of his independent program are judged on their directness in stating "the actual end or ultimate use of the object." A course in painting or sculpture, and one in crafts — metalsmithing, ceramics or weaving — is required, and all students are encouraged to exchange ideas, because the aim of Cranbrook's plan is "to indicate the principles common to all the arts."



		Degree	Years	Graduate Degree	2-Dim. Techniques	2-Dim. Design
Art Schools	Art Center School	B.Prof.A.	4	M.Prof.A.	37	12
	Chicago Art Institute	B.F.A.	4		51	36
●	Philadelphia Museum School	B.F.A.	4		44	20
	Rhode Island School of Design	B.F.A.	4		16	13
● ●	Cranbrook Academy of Art	B.F.A.	—	M.F.A.		*Op*
Engineering Institutes	O Alabama Polytechnical Institute (School of Arch. and the Arts)	B.Appl.A.	4	M.Appl.A.	49	10
	Carnegie Institute of Technology (College of Fine Arts)	B.F.A.	4		37	24
	O Georgia Institute of Technology (School of Architecture)	B.S.	4		9	1
OO	Illinois Institute of Technology (Institute of Design)	B.S.Prod.Des.	4	M.S.	9	9
	Pratt Institute (Art School)	B.Ind.Des.	4	M.Ind.Des.	20	10
Universities	University of Bridgeport	B.S.	4		16	12
	University of Cincinnati (College of Applied Arts)	B.S.	5	M.S.	39	21
	University of Illinois (College of Fine and Applied Arts)	B.F.A.	4		24	4
	University of Kansas (School of Fine Arts)	B.F.A.	4		22	18
● ● ●	University of Michigan (College of Architecture and Des.)	B.A., B.S.	4	M.Des.	20	14
	University of California (Department of Art)	B.A.	5		15	18
	University of Southern California (School of Architecture)	B.S.	4	M.S.	18	—
	Syracuse University (Department of Industrial Design)	B.Ind.Des.	5	M.Ind.Des.	29	9
	O University of Washington	B.A.	4		36	15

● *California College of Arts and Crafts, Dayton and Cleveland Art Schools, Parsons School of Design, give degrees in conjunction with academic credits from other institutions.*

● ● *Cranbrook has no fixed curriculum; students work in private studios under the guidance of an instructor until they are ready for a one-man show.*

● ● ● *Michigan is contemplating changing to 5-year course.*

O *Figures based on a 3-quarter year.*

OO *Though Massachusetts Institute of Technology does not have a course in Industrial Design, product design is a topic in Creative Engineering seminars.*

2-Dimensional Techniques: drawing, lettering, engineering drawing, figure drawing, freehand drawing, perspective, technical drawing, color, general design, psychology of color, creative drawing, art structure, illustration, graphics, drawing theory, aesthetics, principles of photography, etc.

3-Dimensional Techniques: contemporary interiors, advertising design, general design, textile design, graphic design, pattern design, packaging, basic design, visual fundamentals, design theory, etc.

2-Dim. Design	3-Dim. Shop	3-Dim. Design	Total Design Hours	English	History	Industrial	Mathematics	Psychology	Science	Electives	Total Academic Hours	Total Credits for Degree
12	11	34	84	—	4	—	—	—	—	38	42	136
36	6	12	105	15	8	—	6	—	—	12	41	146
20	20	30.5	114.5	13	25	8	—	15	2.5	—	63.5	178
13	4	51	84	8	10	4	—	8	6	—	36	120
Open					*Academic credits from other institutions*							
10	13	35	107	20	10	15	10	—	5	—	60	167
24	6	18	95	5	8	9	—	3	—	5	30	125
1	12	49	74	21	8	21	25	6	35	21	137	211
9	15	50	83	6	6	6	12	8	12	6	56	139
10	16	40	86	10	6	4	—	22	—	—	42	128
12	18	27	73	10	12	11	3	6	6	8	57	129
21	6	49	115	18	31	21	9	—	9	—	88	203
4	8	31	67	8	17	9	13	—	14	—	61	128
18	6	11	57	18	10	20	7	—	—	12	67	124
14	10	19	83	9	18	—	—	10	—	28	65	128
18	4	28	85	9	16	24	9	3	11	20	92	157
—	2	30	80	6	8	12	6	4	23	9	68	118
9	21	52	111	8	—	7	6	6	12	2	39	150
15	12	32	95	15	18	19	5	3	20	—	80	175

letter-
awing,
hnical
ychol-
struc-
heory,
y, etc.
porary
al de-
, pat-
lesign,
, etc.

3-Dimensional Shop: modeling, material and technique, model making, shop practices, ceramics, sculpture, machine shop, sheet metal shop, woodworking shop, materials—fabrication technique—engineering fundamentals, production methods, etc. **3-Dimensional Design:** package design, product design, introduction to specialized structures, introduction to transportation, equipment design, interior design, industrial design, etc. **English:** composition, literature, rhetoric, survey of humanities, technical English, business English, communications, great books, public speaking, etc. **History:** world history, American history, history of art, history of painting and sculpture, contemporary art, arts and architecture, history of furniture, etc. **Industrial Subjects:** marketing principles, economics, art in business and industry, social sciences, etc. **Mathematics:** college algebra, trigonometry, analytic geometry, calculus, solid geometry, slide rule, intermediate algebra, introduction to mathematics, etc. **Psychology:** introdu
chology, applied psychology
sociology, contemporary civiliz
pact of science, human relation
tion in social relations. **Scienc**
chemistry, mechanics, applied
strength of materials.

*The addresses of the above s
the person to write to for i
about industrial design cours
found on page* 127.

ology: introductory psy-
psychology, general
porary civilization, im-
uman relations, founda-
tions. **Science:** physics,
ics, applied mechanics,
als.

the above schools, and
rite to for information
design courses, may be
7.

What the design schools offer

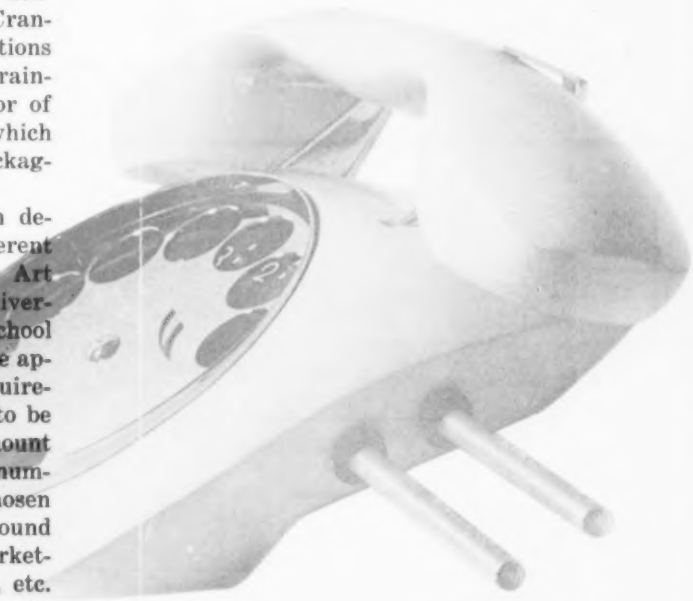
Nolan Rhoades (1941)
Institute of Design

The chart overleaf is based on a survey of design education conducted by Assistant Professor Hin Bredendeick of Georgia Institute of Technology, on the list of colleges in the Education Bulletin No. 1 (March 1955) of the Society of Industrial Designers, on school catalogues, and ID's correspondence with departments of Industrial Design.

Although many more schools offer courses in Industrial Design than are covered here —craft schools, for instance, and art schools giving diplomas, certificates or degrees in conjunction with universities — we have limited the chart to *independent* schools whose degrees conform to the New York State standard of at least 38 hours of academic subjects, with the exception of Cranbrook. We do not cover the institutions which offer only highly specialized training, such as Michigan State's Bachelor of Science in Packaging Technology, in which the student takes seven courses in packaging in his undergraduate years.

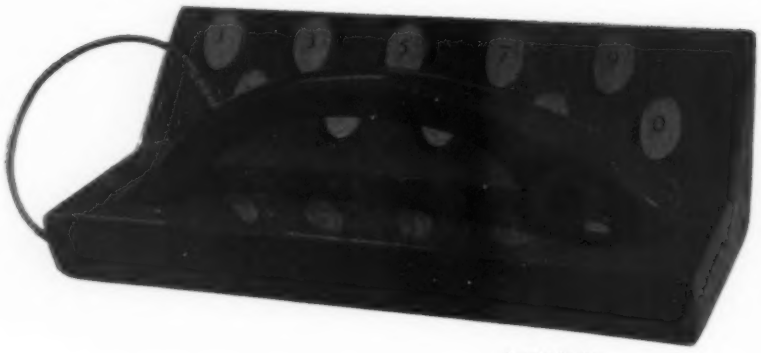
It is interesting to see that design departments have evolved in three different types of educational institutions: Art Schools, Engineering Institutes and Universities, and that the nature of the school seems to have a definite influence on the approach to design education. Their requirements for a full curriculum turn out to be correspondingly various: 1) in the amount of laboratory design courses 2) in the number and quality of academic subjects chosen to develop the student's cultural background 3) in "industrial" subjects such as marketing, economics, professional practices, etc.

The purpose of the chart is to describe in a general way a variety of curricula that ranges from *Introduction to the Air Brush I* to *Aerodynamics IV*. For the sake of conciseness, we have followed Professor Bredendeick's method of grouping a number of courses under a few descriptive headings. Though the terms used to describe the courses, especially those in design and technique, are not at all standardized, they follow a broadly similar pattern. On a chart such as this they cannot be evaluated but, by checking the number of hours spent in the design and academic areas, one can see roughly, at least, where in each school, the emphasis falls.



Marshall Myers
Pratt Institute

Joseph Maxwell
University of Illinois



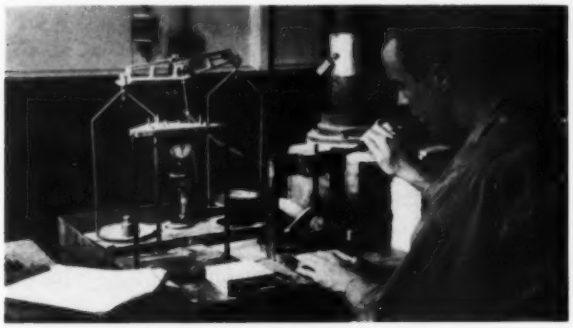
Donald Hooker
University of Illinois

Art Center School

Pierre Dalin
Pratt Institute

University of Cincinnati

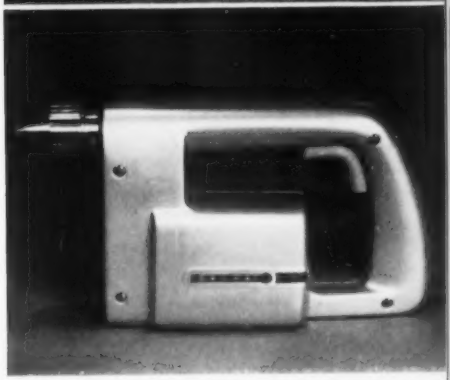
An established cooperative plan is the unique feature of the School of Applied Arts in Cincinnati, directed by Dean Ernest Pickering. Through a five-year course, the student alternates between training in school (strongly technical in graphic presentation, materials and production methods) and on-the-job training in industry in a two-month cycle after his first year. The sequence of jobs is intended to build up his experience in production, drafting, marketing, sales and design. About twenty industries and design firms participate in the program; employers grade the student and give full reports on his performance, while the student earns a salary and often a place for himself in industry by the time he graduates.

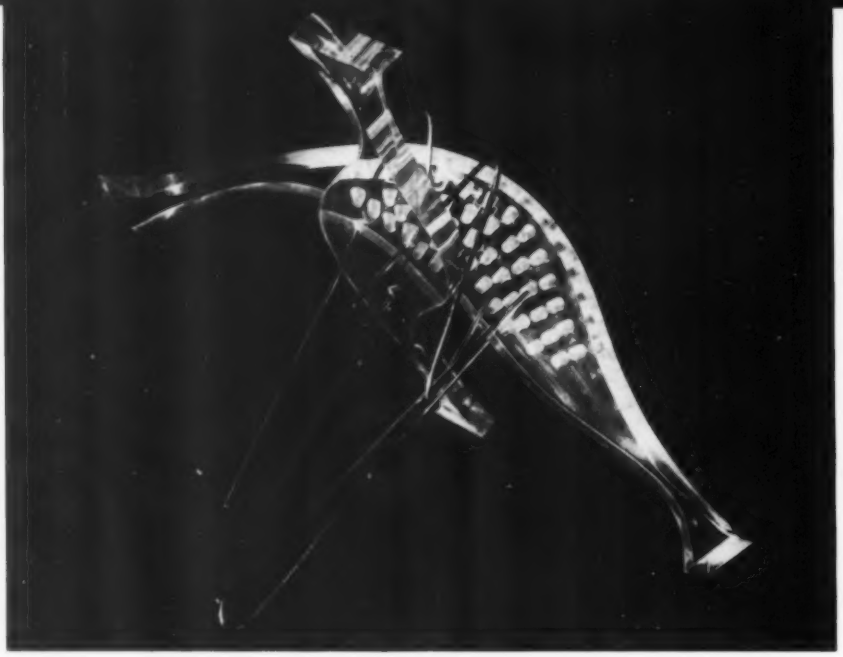


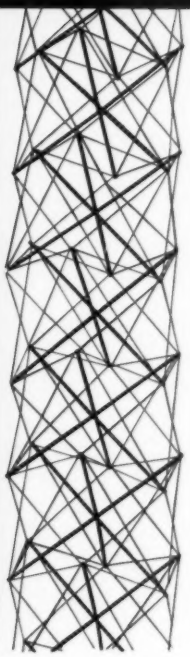
Cincinnati trains designers on-the-job, Illinois requires liberal arts

University of Illinois

Another way to teach industrial design — as a major in a liberal arts program — is exemplified by the University of Illinois, under the guidance of James C. Shipley. Students may transfer from art or engineering and balance out their program in either direction. They specialize in their junior year, taking a shop course and a drafting room course in which they design and produce products. The "kite derby" (right) was a sophomore problem, given serious research beforehand and trial models. Though the time actually spent on technical training is minimized because academic requirements continue through all four years, Professor Shipley believes that the level of performance is not ill-affected, and the liberal arts background helps the student's later development.







Space modulator by Moholy-Nagy; tension structure, ID.

The Bauhaus, in its American incarnation at the Institute of Design, trained a generation of designers to think in terms of a universal language of design which transcended immediate commercial demands. As more specialized schools sprang up, ID became a citadel where the last battle for the pure artist-designer was fought—and lost. After Moholy's death, it attracted fewer students and less support, and gradually declined until it was absorbed by IIT in 1952. Recently, IIT announced a reorganization of the design department, with Jay Doblin, of Raymond Loewy Associates, as director. Though his curriculum is not final, Doblin plans to preserve the ID foundation course in the arts, and augment it with studies in "imagination stimulation," and technical and professional skills. During the last term of senior year, practicing designers will conduct the design classes.

Other professionals are influencing the training of the designers they hire: Henry Dreyfuss, a professor at UCLA, has been instrumental in making design a five-year course leading to a BA. He, too, favors an apprenticeship system which would allow students to spend their last term in designers' offices.

Of all the new philosophies, the most advanced and most controversial comes from a school which does not have a design department: M.I.T. Professor John Arnold's Product Design seminars are a small part of an engineering curriculum, and he does not pretend to produce designers to fit today's accepted pattern. But his interest in integrating esthetics and engineering, as equal parts of a single creative act, has aroused interest in other schools and in industry.

New faces and new philosophies are replacing old ideals

The newest Mies Van der Rohe building at IIT, above, will house the new department of design directed by Jay Doblin. At the right, Henry Dreyfuss instructs a class at U.C.L.A.

Massachusetts Institute of Technology

What is the comprehensive designer, and how can he be created?

In 1949, Professor John Arnold of M.I.T.'s Mechanical Engineering Department decided to offer, on a trial basis, a seminar in product design for engineers. While teaching machine design, he had come to the conclusion that the "one right answer" approach of engineering design courses had to be changed — since there could be no one right answer when esthetics entered a problem — and he wanted to give students some experience with the non-analytical areas of product design. In his early seminars, questions of creativity and psychology kept coming up, and as Arnold attempted to answer them his course gradually became "creative engineering" with product design as a vehicle. Today Arnold holds informal seminars six hours a week for a dozen senior mechanical engineers; he assigns three major design projects a year, which are graded by guest juries on three points: method of presentation, quality and originality of the idea, and the engineering used to carry it out. Among these was the well-known transportation project for the imaginary planet Arcturus IV which produced the Eggomobiles — a serious problem based on mythical conditions that would force students to abandon old habits of thought and approach design creatively.

The following is a condensed statement of Arnold's views on the ultimate aims of design education.—Ed.

The industrial designer should be trained in engineering and fine arts and architecture—and it is especially important that there be no limits on the scientific side of his training.

Before we ask why a designer should be educated this way, we must ask, just what does the designer do? Industrial designers all say the designer applies art to industry. This seems to be the only point commonly agreed upon. And yet, in a group of industrial designers, the worst word that can be used is "style."

But in truth, the designer of a new vacuum cleaner does not *design* the vacuum cleaner. The designer often explains how he designed the instrument, yet the engineer who has seen the product grow from its original to its present state feels that the designer did not design the vacuum cleaner; he put a case on it.

Then why should the designer be completely familiar with scientific processes? Because designing (or redesigning) a product involves four areas: 1. Increased function; 2. Higher performance level; 3. Lower cost; 4. Increased saleability.

The first three are primarily the problem of the engineer, and the last area primarily the concern of the artist. Yet, in the development of a design today, the industrial designer is taking over more and more the areas of function, material choice, and manufacturing choice; he is challenged more and more to deal with the problem as a whole. Is he equipped to do it?

Two types of problems may be involved in any product: the analytical problem with one and only one right answer obtained either by mathematical deduction or experimentation; the creative problem with a multiplicity of answers and approaches. Both can be solved by the *organized approach*, or by the *inspired approach*. The organized approach can be taught, but the inspired approach is difficult to teach and to analyze. "Creative process" means combining past experience with present experience in order to arrive at a better solution for mankind.

The creative person must have the following:

1. Enthusiasm for work
2. Imagination
3. Judgment — new combinations must have meaning.
4. Education — information, facts to work with.

What is important for the creative person versus the analytical person? Professor J. P. Guilford of the University of California has indicated that the creative person has more ideas per minute than the noncreative; he has greater flexibility, can change his set quickly and is more original. All of us have the power to think creatively — to have extraordinary ideas and solutions — but in many people the power must be developed.

If a designer can be well grounded in factual and scientific matters *and* be trained to utilize this background creatively, he is ahead of the game. What is needed, however, is a new and even better-equipped type of person, the "comprehensive designer," and he is emerging in our time. The comprehensive designer is a synthesis of artist, inventor, mechanic, psychologist, and has five attributes:

1. He must be motivated by broad concepts of human activity, feelings, reactions, etc. — a world-wide designer rather than a local one.

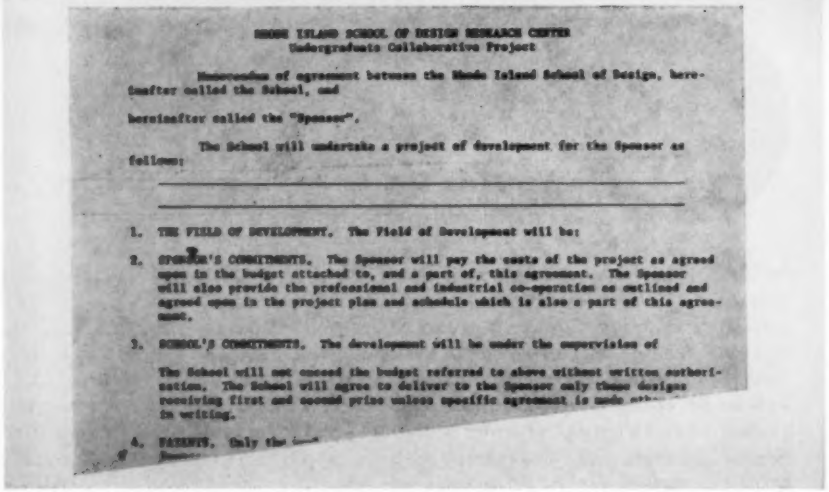
2. He should have a complete knowledge of the environment of those for whom he is designing, including the material and types of machines with which they are working. This means a knowledge of psychology, of physiology, of human beings.

3. The comprehensive designer must strike a balance between the ability to analyze, synthesize, and evaluate.

4. He should be articulate in all types of communication: (a) written word (b) symbolic logic (mathematics) and (c) the language of vision, communications between the brain and body, between man and another man, between man and machine and between machine and machine.

5. He must understand and be able to use the creative process. He must understand how the living man becomes creative, and how his own feelings and the culture around him can affect his creative ability.

The comprehensive designer is essential if design is to serve its purpose in our time; and if education is to produce comprehensive designers, it must produce people prepared to deal with the problems in all aspects. Art and science have different methods in their search for truth. Only when art is introduced to engineering, and engineering to art, will we have a strong lasting culture ahead of us.



RHODE ISLAND SCHOOL OF DESIGN RESEARCH CENTER
Undergraduate Collaborative Project

Memorandum of agreement between the Rhode Island School of Design, hereinafter called the School, and

hereinafter called the "Sponsor".

The School will undertake a project of development for the Sponsor as follows:

1. THE FIELD OF DEVELOPMENT. The Field of Development will be:

2. SPONSOR'S COMMITMENTS. The Sponsor will pay the costs of the project as agreed upon in the budget attached to, and a part of, this agreement. The Sponsor will also provide the professional and industrial co-operation as outlined and agreed upon in the project plan and schedule which is also a part of this agreement.

3. SCHOOL'S COMMITMENTS. The development will be under the supervision of

The School will not exceed the budget referred to above without written authorization. The School will agree to deliver to the Sponsor only those designs receiving first and second prize unless specific agreement is made otherwise in writing.

4. PATENTS. Only the Sponsor

Agreement between Rhode Island School of Design and sponsor protects the student as an independent contractor who accepts the prize money as a fee for his designs. On the left, staff member Ralph E. Kruck holds one of the unique perspective drawings on flat cardboard which are 3-dimensionally convincing from the front view. Students make these to save time and expense of full-size model. Director John E. Alcott is studying real model below.

The quandary of support: Will subsidies help to develop better designers

In this day of dwindling endowments, design schools find it necessary to turn to industry for financial support; and industry, aware that design schools are their talent source as well as their market, seems increasingly willing to put a well-heeled foot in the door. But subsidies imply an active relationship between industry and education, and raise this question: what kind of an alliance is beneficial to everyone, and when do gifts begin to backfire on the giver?

If industry measures education only in terms of a student's readiness to step into a given job, then it will naturally tend to support professional design schools, and to slight the less specialized liberal arts institutions. The subsidized schools will then try even harder to prove that they are meeting industry's practical standards. But, to judge what industry itself says on the next page, companies who ask that students be trained in their own image may inadvertently be undermining their own long-run interest in original thinking.

Can alliances be made without compromising education? Three schools, in particular, have made working arrangements which suggest ways it may be done: Pratt, Philadelphia Museum School of Art and Rhode Island School of Design. Rhode Island has a research center for industry-sponsored projects in products and materials, which are usually carried out as undergraduate collaborative assignments. During the last five years Westinghouse has been a regular sponsor, sending an engineer to brief the students as if it were a real job. Their fee covers costs and prize money; the company judges the completed work, but is entitled to hold patent rights on only those designs receiving first and second prizes.

Pratt goes even further in bringing industry on the campus as a part of the teaching staff. In the Experimental Design Laboratories, students work under company representatives, and their designs have already influenced future production in silver and plastics. It has been argued that this close arrangement competes with professional designers, and that students are placed under a commercial influence too early. Pratt maintains that the labs create a mutually beneficial exchange of services which supplements a broad education.

The Philadelphia Museum School of Art, with an active ID department directed by Joseph Carriero, has a vigorous program of seminars under visiting lecturers: Seymour Robins (right) discusses the Visual Perception Laboratory at Princeton and Abe Feder (below) lectures to a class on lighting. Last year Du Pont sent 100 personnel from the Division of Textile Fibers to attend a conference led by guest lecturers on fashions, textiles and home furnishings. Both students and sales force profited by the exchange of information, and the seminars point out how design schools can actually do an education job for industry very directly.

for industry, or is there a danger that they will defeat their own purpose?

About a dozen industries, including General Motors, Monsanto and Gorham Silver, have made working agreements with Pratt Institute. A large yearly fee from each provides scholarships and finances and equips a research laboratory (Monsanto, for instance, has provided a vacuum-molding machine), where the students experiment with new designs and possible future uses of materials. Projects range widely; a current problem is the use of plastic in the interiors of automobiles. Recently, Gorham Silver cast a set of Pratt-designed shapes for a public exhibition.

In the Monsanto Laboratory students have developed a line of plastic furniture which is well ahead of the market. Coffee tables, chests of drawers, a night table, like the piece shown above, are made of melamine-impregnated wood veneer and drawers vacuum-formed of styrene

What do you think the objectives of design education should be?

It seems the fundamental elements for students to develop in their educational process is creative, artistic thinking and that expression in form. I know of no school or university which has such a course. Obviously the designer needs training in both the language of engineering and that of marketing. He must be able to understand marketing and commercial specifications and objectives, and work with engineering drawings, materials, processes.

A. N. BecVar
Manager, Appearance Design
GE Major Appliance Division

A student should be given the manual and mental tools to work with, he should be trained to think and he should come out prepared to take on the emotional responsibilities of adulthood.

Dave Chapman

. . . The education of a designer, like that of any other professional, should acquaint him with the skills and foundations of his chosen future career; and, just as important, it should give him a comprehension and knowledge of the entire cultural background of history, so that he may become a balanced citizen in the society in which he lives.

Peter Muller-Munk
President,
Society of Industrial Designers

Judging by recent graduates,

I don't think the schools are measuring up at all. They produce black and white results in the students they turn out. Either the people have a good art and design background, in which case they are completely disdainful of group activity and the so-called commercial practices (the old attitude of the artist as a hero who works in Valhalla), or they are University products, who with degree in hand feel they have learned *it* and now they will practice it. The worst thing about the University Approach is that it teaches the arts and crafts completely academically and not as a real live thing. It fails to tell the students that there is a difference between an artist and a designer: a designer is a person who vows to apply art to the world as it operates, and is willing to face up to compromise for money, not necessarily for himself, but for his client, and is hired for this purpose.

Richard S. Latham
Latham, Tyler, Jensen

Too much of today's design student's shop work comes under the heading of handicraft, not industry. Another thing frequently encountered is a lack of good rendering skill — not elaborate airbrush drawings, just simple, effective sketches. Also, it's amazing the number of applicants who show up with old, dirty envelopes and dump a miscellaneous assortment of work on your desk, conveying, at least visually, no evidence of supposed ability as a designer to organize, coordinate and make effective presentations.

Jim Teague
Painter, Teague and Petertil

What kind of training can best prepare designers for industry?

I would prefer seeing students' training based on a background of liberal and fine arts. I would like to see him taught to recognize a problem and, through a logical sequence of steps, analyze and solve it. This analysis should include both the technical and aesthetic approach and the student should be able to apply any basic design feeling to a given problem without too much thought of specialization.

James Birnie
General Director, Styling and Design
Reynolds Metals Company

I have a great faith in a broad education in the humanities and architecture as opposed to straight "trade school" training.

John M. Gates
Vice President, Steuben Glass

The increasing amount of emphasis on the basic principles of design in place of techniques is very encouraging.

William A. Lang
Director, Design Research Department
Monsanto Chemical Company

Any course of Industrial Design should teach the student how to learn, how to understand the complexities and workings of a new field at a moment's notice — in other words, when he gets a new job. He must learn quickly what may have been the life work of another man, and provide ideas and solutions that make sense. The ability to *find out* may be more useful than the knowledge that he crams into his head but may not need or may forget.

Robert L. Gruen
President, Industrial Designers Institute

Sometimes too much emphasis is put on preparation for jobs. I should like to see the greatest emphasis placed on fundamentals. Schools can instruct students in drawing and design. They can learn the nature of materials and some of the techniques of mass production. Moreover, they can be shown how to analyze problems that require invention. Perhaps, that is, they can be taught to think.

Egbert Jacobson
Director, Department of Design
Container Corporation of America

do you think the schools are measuring up to the job?

. . . Schools would serve us better if they gave all students a good art and literary foundation *before* industrial design; in hiring, we like to draw from many buckets; but whether a designer is technically or artistically trained, he needs to be an educated person who can express himself.

G. T. Christiansen
Administrative Assistant
General Motors Styling Section

A man has to start earning his keep from the day he's hired. Theory doesn't mean a thing at first to an employer, although it may later. A general background is required as well as technical skills. Some students come out and can't even draw. On the other hand many renderers from art schools draw well, but don't have the required depth to be a designer.

The requirements for being a designer are much higher than they used to be. Many of the practicing designers wouldn't hire *themselves* today.

Ray A. Spilman

The average student product is lacking in technical proficiency, in breadth of outlook, and in imagination and venture.

George A. Beck
Manager, Industrial Design
G.E. Electronic Division

I have always been grateful for the kind of training I received because it pointed out that design is more than a trade, more than a matter of drawings, sketches and surface treatment. We were taught to understand design as a universal pattern for getting a product from the mind of the originator to the market and then to the consumer. This is a matter of method more than technique—of taking aim, then finding ways of surmounting the obstacles (technical, esthetic, or psychological) and achieving that aim. In this sense, we learned a design philosophy which can be applied to everything in life—a product, a job, and, most important, people.

David B. Wheeler, Pratt '50
General Motors Styling Section

Recent graduates reflect and recommend

On our "coop" jobs in industry we got the experience of seeing the problems that confront the manufacturer, and thus gained an awareness of how cost-reduction in manufacturing may be an additional selling point in design. I feel that the extra year of "cooping" put me much further ahead than a year's experience in a design office would have done.

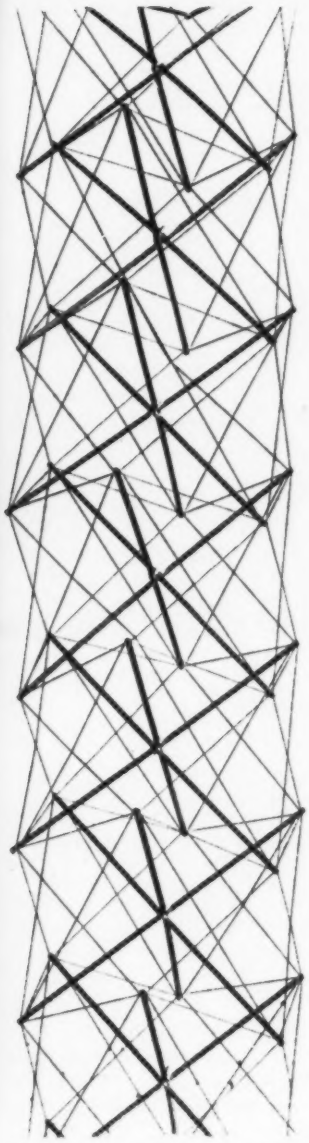
Dave Dabney, Cincinnati '51
Donald Deskey Associates

I am in favor of architectural training as a background for a designer. Every problem in architecture is more demanding, more rooted in functional and structural problems, and it is harder to isolate the design factor. The Industrial Designer is usually faced with the product already made and he is to put the design into it.

John Pile, Univ. of Pennsylvania '46
George Nelson Associates

I think a design curriculum should include a course that deals with the actual business organization of design studios, so that a student will be prepared to understand management's position and also to become an executive; they should be oriented toward the research they will have to do—even to how to find out a company's financial register. There should also be a course in which to explore the ethical and philosophical problems that exist in the business of design. For training, they might even be given problems in improving the environment, the installations of the classrooms, setting up glass doors, partitions, display cases, furniture, rearranging it, criticise it, redesign it.

Marion Costa, Carnegie Tech '45
Paxton and Kreuger



Although both Rhode Island School of Design and Cranbrook offer courses leading to a degree in industrial design, I must say their respective philosophies in teaching are in two extremes. From my own experience, I feel that I am very fortunate to have had the opportunity of attending both of them because I think what we need in industrial design education today will be found within the balance of these two extremes—a professional training on a senior college level combined with a creative approach based on individual expression.

Peter Quay Yang
R.I.S.D. '50, M. F. A. Cranbrook '51
W. B. Ford Design Corporation
Detroit, Michigan

There are few changes I would make in the Syracuse curriculum of 1955. The full advantages of that course may not be completely obvious at the present time. It was founded on the conviction that technology must be made to better serve man. Since we are continually extending ourselves, our powers, it will become more and more obvious that the industrial designer's role is to create a more acute and sympathetic relationship between the made-made industrial environment and man himself.

Nicholas T. Argiro, Syracuse '52
Designer, New York

Conclusions: What is competence?

The first thing each 1955 design school graduate will have to do, as he sets about the familiar June ritual of job hunting, is meet his progenitors—the men who built a profession for him, and now offer him a place in it. Unlike the first generation of individualists, who learned their profession by pioneering it, the 1955 grad will probably not strike out on his own. He will work his way into one of the organizations or departments they have built, where he will be expected to be a competent draftsman, to have a grasp of manufacturing business and to apply all of his talents gracefully to teamwork.

The student may have been prepared for all this in one of many ways: by liberal arts, analytical training, technical- or craft-oriented schooling. Is it possible to say that one of the schools could have given him the perfect training? Obviously not. It is not only common sense that tells us this, but the older generation of designers. They are critical of today's education, not only its subject matter but its spirit. They seem to miss the drive which used to be a designer's only pass-key to the profession. It is not surprising. Rational education produces a good average, but few peaks; it may beget less originality than competence of a sort.

This emphasis on a competent grasp of working tools was certainly necessary in setting up educational standards in a new field. But it should cease to be an issue—or an end in itself. If it were simply taken for granted that any design school graduate could draw, make models, understand the fundamentals of design, and the workings of machines, and conduct himself in a professional manner, then schools could go on to deal with the more profound problems of educating him to *real* competence.

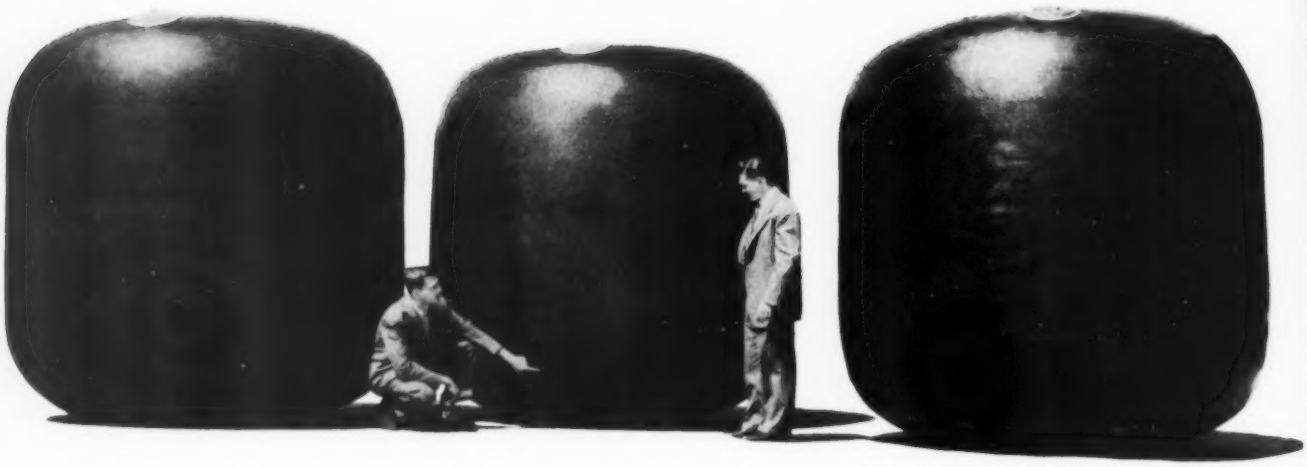
It matters fairly little that the schools are not yet perfect, for many of them are in a state of flux. What is of vital concern is the direction they chose for the future, for industry must decide which *approach* — rather than which school — it wishes to support and encourage.

In one sense, industry is already deciding this by its widespread fascination with creativity and by the new commercial value it puts on "blue-sky" thinking. When industry asks designers to dream up new problems so that they will, perforce, come up with a new-looking solution, it is certainly a stab at originality. But this blue-sky approach is often little more than a formula or style in itself; it may be a substitute for competence in the important area — design, which is the ability to grasp a problem and solve it without the help of formulas.

No school can teach everything, but any school, whatever its emphasis, must teach the student to be competent in this one area—design. The conviction of the pioneer designers was based on their realization that design is a profession in itself, not the same as engineering, sales, or production. Today we must realize that design is not drafting or styling or even blue-sky thinking. It is a harder discipline than any of these; it is the ability to solve each problem logically and beautifully, as though it had never been solved before. It requires education which stretches the imagination and develops courage. It is a discipline which applies equally well to a product problem and to any other problem which a designer may face, be it policy-making today or managing industry in an uncertain age of automation tomorrow. It is one discipline which industry must support in the schools, because chances are that the student will have no way to learn it when he gets on the job.

—The editors

United States Rubber Co.
Collapsible rubber containers



by Walter Stern

Packaging Show, '55

Foams, cushions, skins and balloons star in a major review of new techniques.

The 1955 National Packaging Exposition, held by the American Management Association in Chicago in April, proved to be one of the largest, most exciting and most dramatic shows of progress ever held in the packaging field. Six hours of continuous walking barely covered the exhibits; so many of them concerned themselves with comparatively virgin territory that this show may well herald a revolution in packaging techniques.

Two areas commanded an impressive array of speakers, space, and display: cushioning techniques, and formed plastic packaging.

Ambassador Plastics and Manufacturing Corp. demonstrated a water-resistant, extremely light-weight plastic foam package in various colors, which exactly fits the parts to be packaged (5). The foam block, which suggests cork in weight and texture, can be closed for mailing some of the most fragile items.

Sherman Paper Products Corporation's new "Carbion" development was shown. This is a flexible cushion wrap made from high-impact formed fibers, permanently crimped into "biondulations" which are said to show superior impact dispersion "never previously obtained in a single packaging material." Carbion was shown in rigid and flexible patterns, and in a variety of forms such as bottle sleeves (2), colored cellophanes, parchments, grease-proof glassines, and laminated foils.

In the same field there were the sheets, rolls, or diecut pads of rubberized cushioning material shown by the Queen City Tulatex Corp., rubberized curled hair pads ("Paratex" by Blockson and Co.), rubberized curled hair developed by Armour's Curled Hair Division, molded and embossed cellulose wadding pads printed and shaped by Celwa Products Co., an interior packing and blocking device developed from Celotex industrial cane fiber board, and others.

In the field of formed plastic packaging, commercial production of Blister Packs and Skin Packaging was for the first time demonstrated on a large scale. The most revolutionary was Abbott Plastic Machinery Corporation's new skin packaging method, in which a thermoplastic transparent film is tightly vacuum-drawn over the item to be displayed, and laminated against its display card in the same pass, so that any stapling or glueing, or any forms or molds, become unnecessary. While the plastic "skin" is drawn so tightly around the item (7) as to make the skin almost invisible, it provides a brilliant high gloss, mounts the item against a background without showing any visible means of support, and makes the package virtually pilferproof. Vacu-Form Corp. of America showed a variety of methods of fastening blisters to display cards; Vacuum Forming Corp. demonstrated vacuum forming of thermoplastic film and sheet packages and displays on a production vacuum forming press which is said to sell for less than $1000. Most thermal impact and vacuum forming companies, in fact, are now getting ready for skin packaging, and while its possibilities have hardly been tapped and certainly not been fully explored, this technique seems to furnish a real challenge to creative design development.

A recent development was the Gisholt Machine Company's "Sealamatic" automatic neck band applying machine, which applies pre-cut moist cellulose

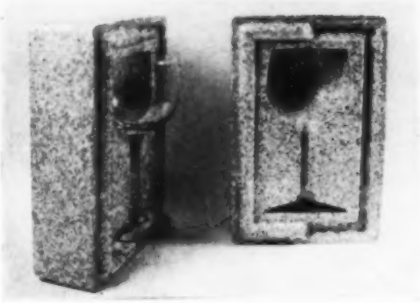
1. *folding set-up box*

2. *resilient cushioning*

3. *box and liner*

4. *single-use tubes*

7. *thermoplastic skin pack*



5. *foamed plastic package*

6. *plastic-lined seal*

neck-band seals to bottle goods at a speed of 50 to 150 bottles per minute.

"Unette," a diminutive transparent plastic tube produced by the Unette Corp., is heat sealed along the bottom and wax sealed along the top so that a squeeze motion will release its contents in a jet spray for single application of antiseptics, lotions, colognes, oils, etc. (4).

Dewey & Almy Chemical Co. demonstrated a new flowed-in plastic sealing compound ("Darex") to be used in bottle crowns, screw caps and vacuum caps. Said to provide tight seals at up to 300-per-minute capping speed, easy removal, and re-sealing without distortion, at a price equalling present pulp and plastic liner combinations, it will probably free cap manufacturers from dependence on imported cork (6).

United States Rubber Co. showed an enormous collapsible rubber container, (above, left) built with four plys of high-strength cord fabric and synthetic rubber molded into one piece, whose neoprene exterior is said to be highly resistant to ageing, ozone, weather, abrasion, gasoline, oils, greases, or temporary contact with corrosive materials. Available with various lining materials and fittings, the "U. S. Sealdbins" are available in gross capacities from 1,500 to 24,000 lbs., from 55 gallon sizes to 370 cubic foot sizes, and provide, among other things, a completely new basic system for bulk handling, shipping and storing of flowable solids and liquids. Pressurized with air or inert gases after filling, they are collapsed and folded for easy return, at space savings of 70 per cent to 80 per cent.

F. R. Hesser Maschinenfabrik A.G. of Germany, represented by Geveke & Co., Inc., demonstrated a fully-lined seal-end carton which was formed, lined, filled, closed and sealed in one continuous operation at a speed of approximately 80 packages per minute (3).

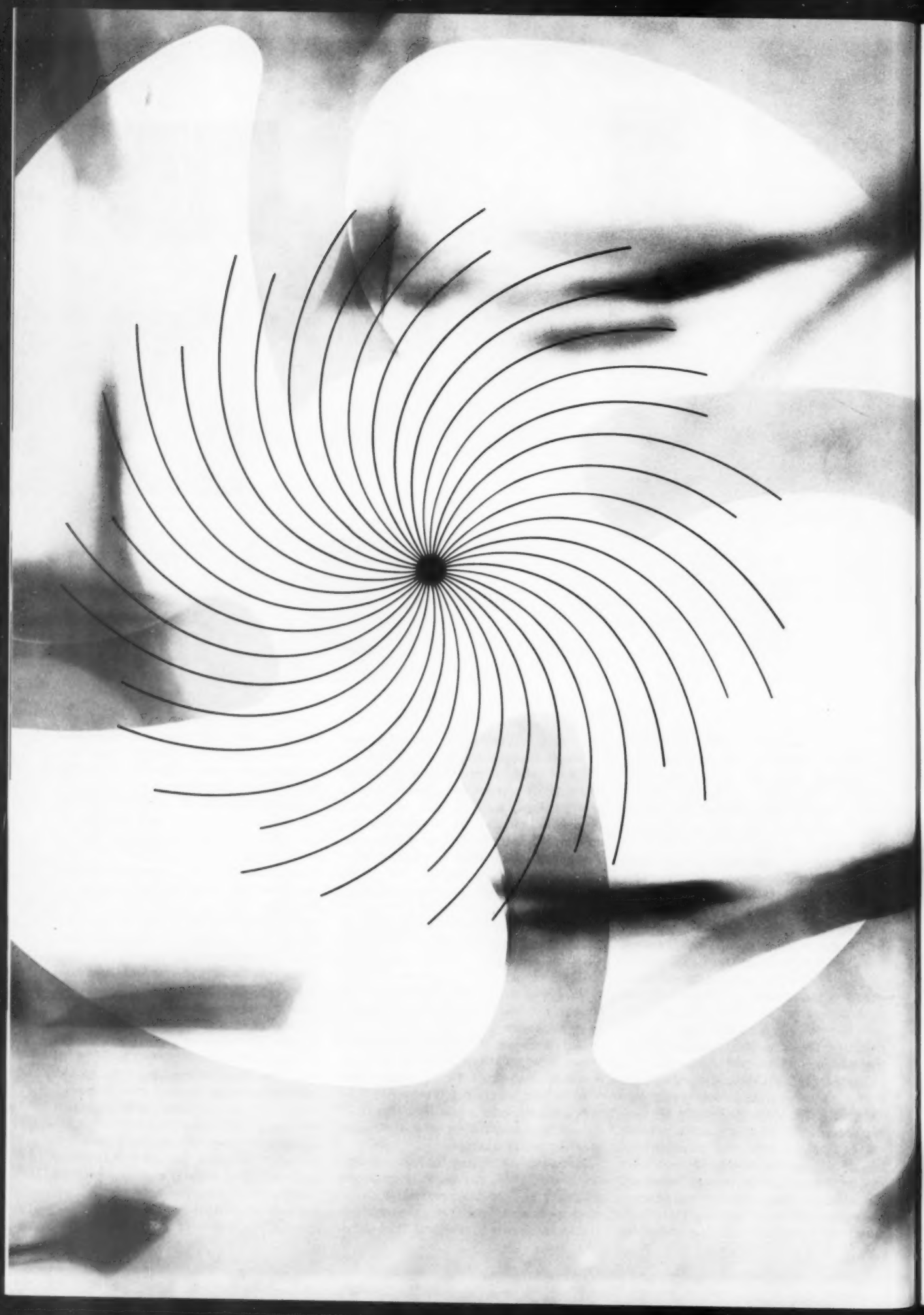
Morris Paper Mills illustrated ingenious new applications for latex pressure sensitive adhesives by showing their "TERaPAK," a rigid full telescope fiber board box end product, made in the form of a one-piece folding box with center tear perforation (1).

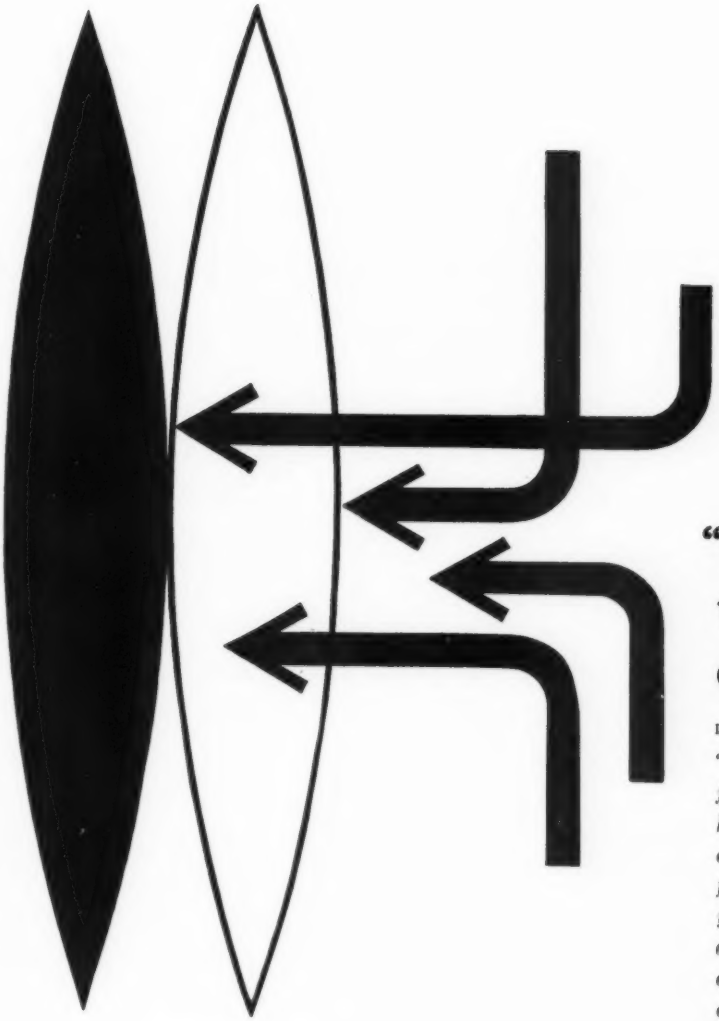
Not new, but for the first time extensively displayed, were plastic packages produced at a cost approximating that of paperboard, such as the various dishes and bowls by Federal Tool Corp. (starting at 1.25c) and the ingenious flexible Polystyrene transparent and colored trays and baskets shown by Gilbert Plastics Inc. (starting at 1.3c).

Plastic heat seal methods, which promise wider application of plastics that resist conventional thermal sealing methods as well as greater seal uniformity and reliability, seem to be drifting more and more to high frequency electronic welding, which frees the production process from sticking, seems to eliminate wrinkling in the welded material, controls the cooling of the weld while still under pressure, and increases speed and flexibility of welding. Among others, Electronic Processes Corp. showed their "Electrotherm" continuous bag-top welder, and Cargo Packers Special Products Co. showed their Thermotron sealing machine.

A remarkable display of automatic wrapping and twisting equipment for the candy and chocolate products packaging field was shown in a line of Italian equipment introduced in this country by Supermatic Packaging Corp.

Other developments too numerous to mention made this year's show an inexhaustible source of packaging ideas.





"It's got to be exciting"

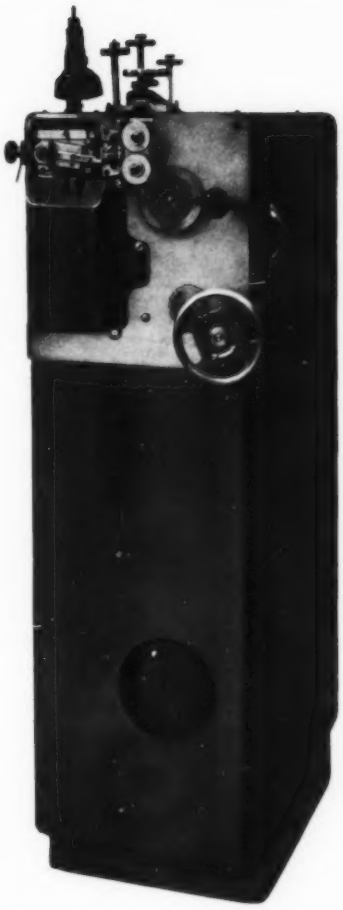
DIALOGS ON GRAPHIC DESIGN—I

"When a designer controls all aspects of a job, he's going to produce better work than he does when his work is watered down by everybody who has to OK it. When you have freedom to make the graphic decisions, what you do has to be exciting, or you're not doing a good job. And, of course, you get excited about the company that allows you such freedom, and that comes through."

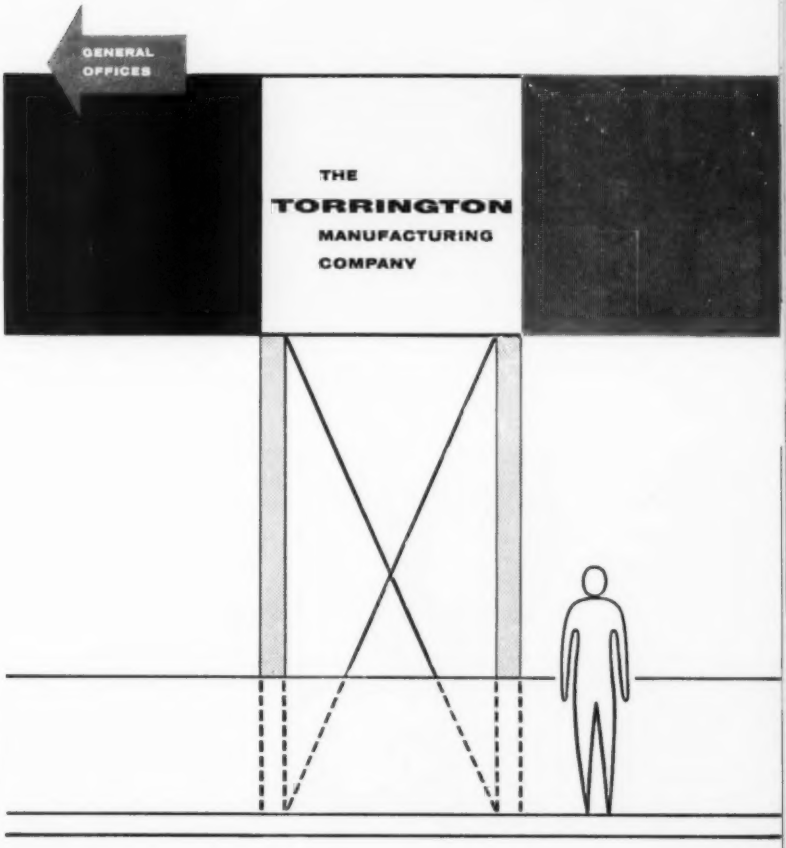
These were Lester Beall's opening comments about the graphic design program he has been developing over the past two years for a large industrial concern. Because graphic design is one of the commonest and most important forms of designing for industry, we decided to initiate a series of case histories of layouts as a way of showing how a designer communicates via the printed page. Asking Beall to present on our pages the work he did for the company, and then to explain why he designed the layouts as he did, seemed to make the integration complete. His explanations, in italics, accompany the story on the next six pages.

BEALL: *"Everybody gets excited when you begin on a design program—in a hurry to see things right away. There's danger of building up a situation you can't live with, of going down a dead end that permits no versatility in application. We needed design elements we could stick with—hang on to—the blue company color, blue and black squares, photograms, typography. This quartered spread is dominated by the lobby display because it contains all these graphic elements; the original sketch of the display was included to show how close we were able to come to our original intention, and the lobby picture shows its setting in relation to the rest of the room."*

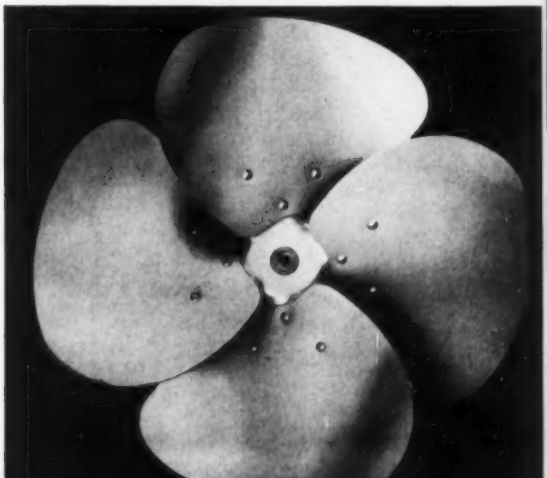
Two years ago, The Torrington Manufacturing Company was faced with a problem: reestablishing the identity of a firm whose divisions had grown fast and independently. Torrington is the largest manufacturer of air impellers used by the refrigeration, air conditioning, heating and automobile industries, and has a machine division that produces wire forming machinery and specialized mill equipment. "We had grown with the expanding industries we supply," says president Andrew Gargarin, "and we needed more plant and lab space. We worked out a growth plan, and felt it had to include provision for design that would reflect the fact that while we are an old, established New England company, we have modern facilities and methods." Torrington selected Carson and Lundin to remodel its Torrington plant and offices, Marcel Breuer designed a new Canadian plant, and Clifford Stubbs became consultant on machine design. Lester Beall was retained in 1953 to extend the unified visual personality to every other space, product, or scrap of paper that had Torrington's name on it.



"The company is introduced on this spread by those things you are first apt to see—the lobby and its display, a sign, the spring-maker, an air impeller. They were placed together to show the family resemblance which has been achieved with a heterogeneous group of objects."



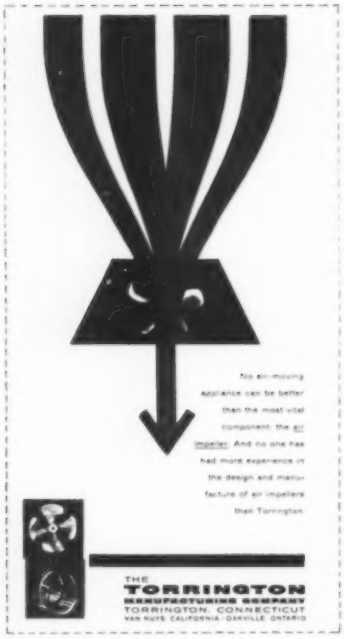
"The idea of this layout was to extract product pictures and actual parts from the lobby display. The air impeller is a company product that becomes its symbol. Its proportion reflects other squares — the basic module of the Torrington designs."



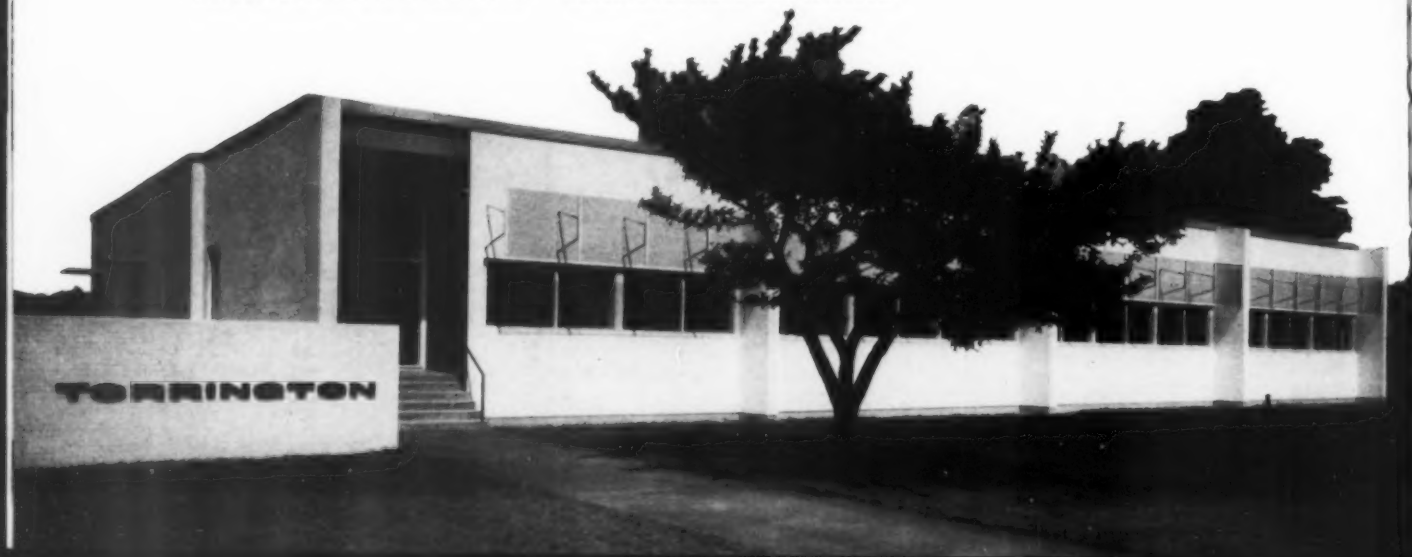
THE TORRINGTON MANUFACTURING COMPANY

1954

70th ANNUAL
REPORT
FOR THE YEAR
ENDING
DECEMBER 31, 1954
THE TORRINGTON
MANUFACTURING
COMPANY
TORRINGTON
CONNECTICUT
VAN NUYS, CALIFORNIA
OAKVILLE ONTARIO



BEALL: *"We want identity with economy of means, and we try to make everything clean and sharp, integrating everything as we go, carrying through the design elements without letting them get rigid. These pieces—related in the use of blue, the two squares, the photograms, the free use of flow arrows and symbols, and typography—are grouped together so that the flexibility of the design elements becomes apparent. The same lettering identifies the Canadian plant by Marcel Breuer and the remodeled Torrington plant by Carson and Lundin"* (opposite page).



Because Torrington's integrated graphic design program was included in the advertising budget, which is 1-1½% of gross sales, and averages about $150,000 a year, each unit designed had to have measurable impact. Beall's series of 2-color trade ads, for instance, do double duty by presenting both products and institutional copy in an economical 2-column format; the ad on the right won a certificate of merit from the New York Art Directors' Club. Beall works directly with the president and sales manager of the company on all his assignments; once a general theme is OK'ed, he works with the agency account executives and the head of Torrington's graphics production department, often checking details with the sales manager.

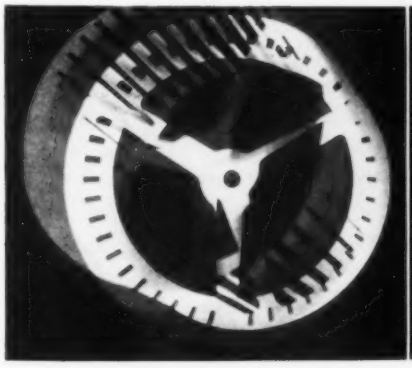
"The clean, sharp lines of the buildings indicate the character of the company, as do the graphic pieces. The reason for grouping architecture and graphics together on this spread is a matter of textures. The Canadian building is silhouetted, therefore giving it a different working form from the rectangle of the Torrington plant, and these varied half-tones are opposed to the solid textures set up in the graphic work. There is enough literal integration in the work itself to permit it. The interior was included because of its literal value—from an information standpoint—to show one phase of company production. Also, it is interesting to see what's inside of a building. Finally, what could be more boring than to put all graphic work together and all architectural work together. That wouldn't be any fun."

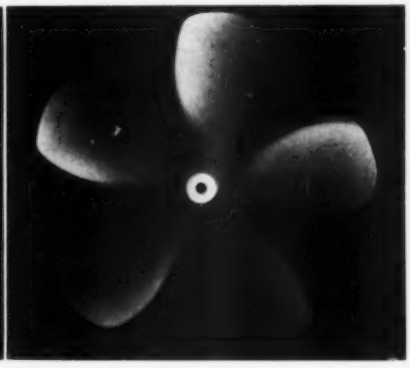
"Letter heads and forms carry identifying squares and typography, these nearly square elements balance elongated shapes opposite."

"The silhouetted roll of labels has a different working form and some warmth, compared to all the hard rectangles and angular shapes on the page."

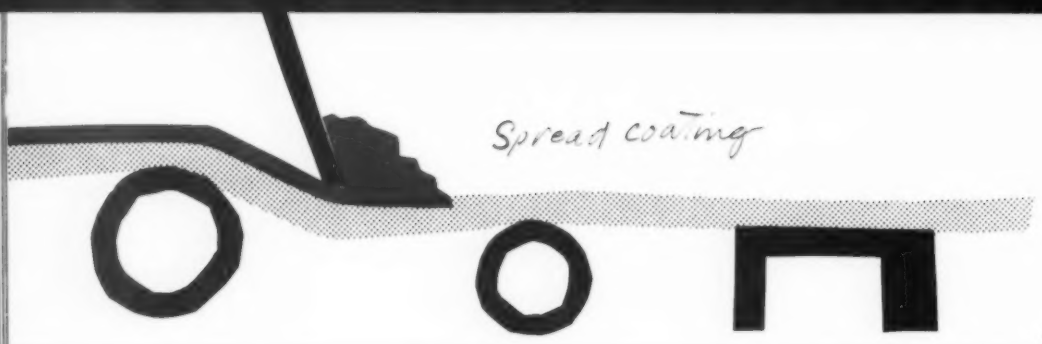
BEALL: *"Something we try to avoid in a design program, and in layout, is the injection of any design elements that are not in the problem itself. A design program is not a static problem, and extraneous graphic touches only confuse the developing program. The opening spread of this story showed the basic elements, and subsequent spreads show they are applied to specific problems, relying on the arrangement and emphasis of the material alone for graphic interest. Photograms and flow arrows are used on various pieces because they are symbolic of the company products, and have a decorative quality that can be put to work. Photograms on catalogues will not become dated, for instance, where modifications of details would soon outmode a photo of a particular air impeller. On this spread, as on the others, introducing elements like the rounded form of the labels has a tendency to make the layout more exciting. On all the spreads, dissimilar objects were grouped to indicate how they resemble each other graphically, and to show how all sorts of things became part of an overall program. We used flexible elements, like the basic module of the square, that can be applied in a varied, interesting, and logical manner to everything."*

Though the entire program was carried out economically because it had to be, Torrington can measure positive public relations values because everything bears the distinctive mark of the company's character. The Breuer plant cost 10% more to build than an ordinary design pulled out of a drawer, but this has been offset by greater flexibility of production space that can be doubled easily when needed. It has also become a 3-dimensional advertisement because people now make special trips to study and admire it. Torrington doesn't underestimate the value of its public personality, but the most beneficial results of the design program have been internal, according to Gagarin. When some new stationery was delivered, one of the secretaries commented, "Now we look like us." Staff members feel they have a better understanding of the company, because its character is visibly expressed. The design program is not static, but continues to develop. Everything the public sees—from spec sheets to packing cases—must be passed on by Beall to make sure it is integrated with the pattern he established.





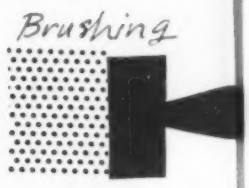
"Some people leaf through magazines quickly, and I wanted to get enough information into even a quick look to project the total story of an integrated design program, rather than to present an academic exercise of interest to the student of graphic techniques. What is placed on a page seems to get there through intuition, backed by experience and the technical information you absorb along the way. There is a definite and direct application of objects placed on a layout, which is not measured or considered in terms of little details. An emotional projection on paper, if you will — an experience you want somebody to react to. When it's done, you toss the layout on the floor. If it doesn't work, you ask why, and only then start measuring it by design principles. Perhaps it doesn't work because the text is wrong, or the color. The form may be too exciting for the page, so that the page flies apart. You check back, through the information you have absorbed, your experience, and your intuition. Visual feel is terribly important. If you arbitrarily select this, and this and this — you're dead. If it is not exciting by the nature of the layout itself, and not tricks, I feel I haven't projected myself into the layout well enough, and start back at the beginning."



by Elizabeth Kaufer

On the following 12 *pages, we present a pictorial survey of an expanding field for the designer and manufacturer:*

Plastic Coatings



Even to suggest that a survey of this field can be accomplished in so little space sounds presumptuous, for there has been such rapid development in plastics recently that the entire field of finishes has been revolutionized — and the result of this new knowledge has barely been assimilated, let alone applied. Yet, because plastic coatings promise to become an even more influential and integrated part of the design of products than they are at present, we shall try to suggest, by 26 case studies of existing applications, the range of possibilities to be explored in the future.

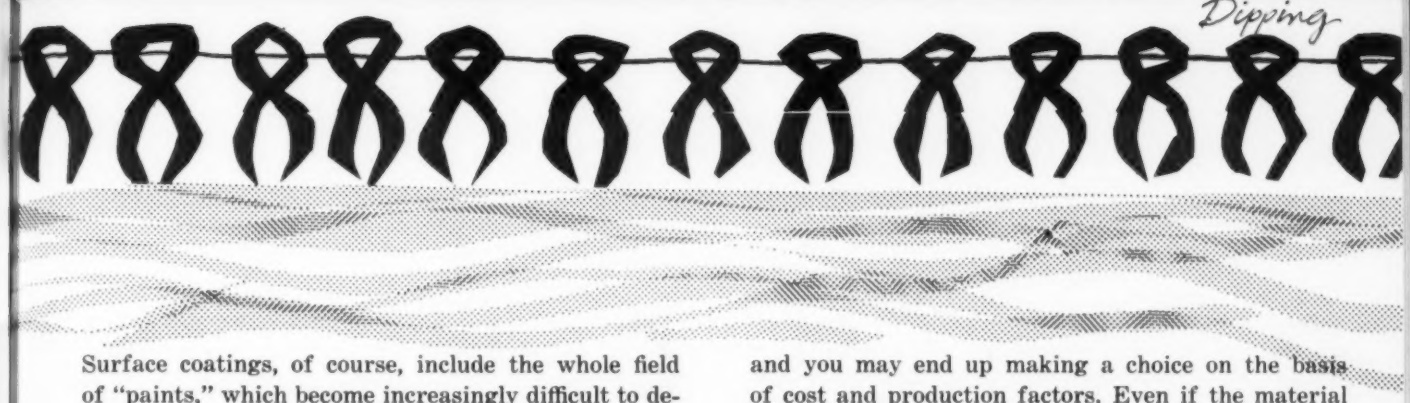
The first use of finishes — secondary materials used to perfect the appearance or complement the properties of a base material, is lost in time. But we do know that the use of synthetic resins called "plastics" for coatings got its first real impetus after World War I, when new uses were sought for large quantities of excess cellulose nitrate that had been developed for wartime explosives. Chemists found that lacquers based on cellulose nitrate (the first plastic, dating from 1860) were extremely fast-drying, which meant faster production than the older varnishes and enamels based on natural resins, and cellulose nitrate lacquers began to be used in large quantities. They offered a high, durable gloss which was, and still is, considered particularly desirable in the automotive and furniture industries. The lack of flexibility of pure cellulose nitrate formulations was a drawback at first, but has been overcome by new formulations, often based on the addition of alkyds.

At the same time that cellulose nitrate was being developed as a finish, another plastic, phenol (developed in 1903) was made available for coating purposes, and the chemical industry immediately began finding applications for it. Since then, the industry has continued to develop plastic materials and to find ways to tailor synthetic resin molecules to exacting performance and appearance requirements; in ever increasing numbers, they are being tried and used for coating other materials.

Definitions

"Plastics," by the ASTM definition, are any one of a large and varied group of materials that consist largely or wholly of an organic substance of large molecular weight; and that, while solid in the finished state, can be formed by a flow at some stage during manufacture — usually through the application of heat and/or pressure. Most plastic finishes, then, are derived almost entirely from organic minerals. The exception to this, among the plastics discussed in this article, are the silicones, which have an inorganic component — the mineral silicon — in conjunction with organic radicals.

The chemical industry uses the term "coating" in preference to the layman's "finishes." "Coating" can refer to one layer of hardened film, or multiple layers. The film is composed of molecular aggregates of various shapes, and this building structure, as well as the building material itself, gives the films their characteristics. Those films that cover a substitute in a layer of appreciable thickness are called surface coatings; intrasurface coatings are those which penetrate into surface cavities of porous or celuular subtrates.



Surface coatings, of course, include the whole field of "paints," which become increasingly difficult to define by themselves. We have not attempted to cover the developing chemistry of this area of plastic coatings, but have limited ourselves to instances in which a resin greatly increases the performance which is generally required of a paint.

Steps in planning and choosing a coating

While it is an exaggeration to say that the coating makes the product, it frequently affects its appearance and performance radically, and the more the selection of a finish can be controlled, the better the end result is likely to be. If you understand what elements will attack a product, and know the capacity of various coating materials to protect it, you can plan the coating as part of the basic design. Because new coatings widen the choice of substrate materials which will do a given job, and sometimes overcome limitations of size and form, they may open up radically different design possibilities.

The first step is to consider the performance offered by the coating material. Among the properties which may be altered by plastic coatings are toughness, durability, abrasion and chemical resistance, and flexibility. The possibilities offered by the flexibility of most plastic coatings, in production and in use, seem particularly interesting to the designer today.

The effect of the coating on the appearance of the product must be considered simultaneously. Almost all degrees of surface luster may be obtained by most of the plastics mentioned hereafter, from high hard gloss through low satiny values, to complete lack of luster. A variety of textural effects is also possible, and the degree of resiliency in soft coatings can often be controlled. The various formulations differ in their affinity for pigments, clarity and whiteness of initial color, and color retention. Although not all combinations are available in every material, the color, gloss and textural possibilities are generally very broad.

Once you have decided on the exact result you want, you will probably have several finishes to choose from, and you may end up making a choice on the basis of cost and production factors. Even if the material itself is relatively expensive, and it often is, it may offer economies in application. Brush, dip, spray and roll coating are all commonly used with plastics today, and many materials permit a choice of method to suit the particular product or factory facilities. Lamination of film sheets to subtrates is one of the newest methods of application, and vacuum impregnation, which was used for insulating the motor on page 65 represents another departure.

Drying methods affect cost, and today's coatings offer advantages in this area, too. Traditionally, finishes were either heat-hardened at high temperatures or air-dried, and both had their drawbacks. (Coatings on large structures and interiors could only be air-dried.) But new methods of applying heat (including electrostatic low-frequency induction, infrared baking and portable heaters) have improved the quality and speed of both kinds of finishes, and have extended their uses on both products and structures.

Reduction of labor costs, speed of production and economies in the amount of material used are among the other production factors which can affect cost. A coating which gives greater coverage with fewer coats or with a lower concentration of solids, or which permits the build-up or control of film thickness, is potentially a cost-saver. You may also find that new functions can be added to a product by the use of a certain coating; but in the end cost and performance should be balanced, for performance which exceeds the requirements is not justified if it costs more.

A complete study of the field of plastic finishes would require several volumes, and they would have to be under constant revision to keep up with the day-to-day discoveries. We have confined ourselves to 26 brief studies of recent uses, dealing largely with three groups of plastics. They are not intended to tell you everything you should know about plastic coatings — for it is assumed that you will work with suppliers to find new solutions; the studies merely outline some of the things you can expect, or ask for, when you set out to get the most suitable finish for your product.

Definitions

EPOXY resins, first made available for coatings in 1949, produce some of the most chemically resistant organic finishes. In special formulations, they withstand acids, lacquer solvents, concentrated liquid detergents, and even hot sodium hydroxide. Epoxy coatings form hard, tough films that will stick to every type of substrate, and they have a flexibility that allows the sheet material to be coated with them before it is formed into products. These characteristics make epoxy resin-based coatings particularly good for can and drum linings, process equipment lining, appliance and wire coatings, clear or pigmented coatings for metal furniture, and heavy-duty maintenance paints.

The Westinghouse laundromat (left), like many of the other machines on the market, uses an epoxy baking primer under an alkyd-amino resin finish. This primer gives excellent adhesion flexibility, impact strength and resistance to caustics, detergents and greases. On interior parts the epoxy primer needs no other coating over it. Sprayed, dipped, or brushed on, an epoxy coating must be baked to secure its maximum resistance to alkalies and other chemicals. If a small amount of amine is added just before application, the coatings may be cured at room temperature, with results which are comparable to baked alkyd enamel coatings in hardness, toughness, adhesion, and chemical resistance. Epoxies may be clear or pigmented; their color and color-retention properties are good; colors do not yellow with age as most phenolics do, although clear coatings will develop slight discoloration. Their initial color properties are not as good as alkyds, but their better chemical resistance often makes them preferable.

In a Diamond Alkali Company plant, for instance, Epon coatings on tanks, beams and stairs stood up for over a year against spillage of chlorinated hydrocarbons and benzene, and fumes of hydrogen chloride and sulfuric acid.

Epoxies are relatively odorless, and recent improvements in their solvents permit them to be used in odorless paints. The durability of epoxy resins is demonstrated by an application to blow-back areas on engine nacelles and wing surfaces of American Airlines' DC-7's. A coating based on Shell Chemical's Epon resin resists the corrosive residues from fuel exhaust, the cleaners used to remove the exhaust deposits, and synthetic lubricants and hydraulic fluids; it withstands wind and rain erosion on aircraft travelling up to 400 mph, and motor heat up to 300°F; one application is reported intact after 1000 hours of flight.

SILICONES currently are receiving a good deal of attention because of the unusual properties derived from their chemical structure: in all of them an inorganic backbone structure based on repeating silicon-oxygen atoms to which are linked various organic radicals — methyl, phenyl, vinyl or combinations of them. Silicone products come in many forms — rigid, rubbery, liquid, powder — all of them are manufactured from three basic types of silicones: fluid, elastomer and resin. The difference between these types is a matter of molecular structure. Fluid silicones are linear polymers, of relatively low molecular weight. The elastomers also are linear polymers but with some slight cross-linking so that they have higher molecular weights. Silicone resins are linear polymers which have been extensively cross-linked to form rigid, three-dimensional high molecular weight structures. The relative absence of cross-linking in the elastomers permits movement of the molecules, thereby imparting resiliency to the compound. Because the silicon network can be so varied, and can have such an assortment of attached groups, physical properties can be controlled over a wide range of usefulness. Heat stability is pre-eminent among characteristics imparted by the inorganic silicon-oxygen backbone; tests on various pigmented silicone finishes have subjected them to 500° F. for 1000 hours with little change, and as insulating materials they stand up well to oxidation, heat and moisture. Some silicone liquids have an unusual affinity for other substances, while others are used as non-stick agents. Coatings can be produced from the silicone materials which vary from soft flexible films to hard brittle ones, in a full range of colors that have excellent durability. They can be sprayed, dipped, brushed or flowed on, and in some applications gain acceptable hardness from air drying, which makes them usable for large structures. One side of brick building coated with a special silicone resin solution suffered little or no water absorption after four months, while an untreated portion of the same wall (above, right) showed efflorescence and rust stains, caused by brick salts which were dissolved and brought to the surface by the absorbed water. While furnishing a durable water-repellent coating, silicone resins do not interfere with the breathing of masonry surfaces.

VINYL resins in two forms — plastisols and organosols — are finding many new coating applications. These are fluid mixtures, which are easily applied. They extend the possibilities of vinyls for coatings while retaining the characteristics which have made vinyls prized members of the plastic family: flexibility, good chemical resistance, excellent adhesion and color properties.

ORGANOSOLS are fluid mixtures of vinyl dispersion resins in volatile organic liquids, with pigments, fillers, stabilizers and other ingredients added. The mixture is converted to a finished solid state by a short heat treatment at 350°F. during which the volatile components evaporate and the heat fuses the resin particles into a cohesive mass. Applied by spreading, roll-coating, dipping and spraying, organosols are used to coat a variety of surfaces — including cloth, paper and wire — when a tough surface which has good chemical resistance is desired. The degree of hardness is controlled by the formulation, and anything from a cushion-like coating to a reasonably hard surface with a high degree of abrasion resistance may be achieved; organosols are popular for coating wire products for the kitchen because they stand up under cleaners, grease and hot water.

PLASTISOLS are dispersions of vinyl resins in plasticizer, with pigments, fillers and stabilizers added. Unlike organosols, they are made without volatile constituents. They require the heat treatment to fuse them into a homogenous compound that is elastomeric; the degree of resilience, flexibility and rubbery texture can be determined by the percentage of plasticizer. They are excellent for dip-coating because the thickness of the coat can be controlled by the consistency of the plastisol coating material.

Texture is one of the big assets of organosols and plastisol coatings. They may be varied during curing to produce a range of effects — such as a coating for metal with an extremely durable surface which looks soft because of its textural depth. The same characteristic can also be achieved by vinyl sheet, which is also finding a number of new coating uses because of its flexibility. Lamination to a metal base before fabrication is one of the most interesting. IBM's Bank Proof machine housings (above) are fabricated from Goodrich Geon resin vinyl-covered sheet steel, which has a tough, pebble-grained surface, which is easy to maintain and which stands up under hard commercial wear. It is also possible to produce a foamed vinyl sheet which gives a deeper cushioning feel; to achieve a combination of toughness and cushioning, or an even tougher vinyl sheet with a foamed-in-place back.

These are some of the other resins being used in commercial coatings today.

ph PHENOLIC RESINS were introduced to the varnish industry in 1910. Faster drying than natural resins, with better water and alkali resistance, they made possible the "4-hour enamels." They cannot be used for color-stable white finishes, because they are somewhat dark and grow yellow with age, but retain luster, strength and durability under humid and tropical conditions.

ALKYD RESINS, and alkyd combinations with phenolics and aminos, form the largest commercial group of organic finishes. They have replaced varnishes for some purposes, since they are lighter in color and give tough films, but they are less resistant to water and alkali than vinyls and rubber resins, slightly less chemically resistant than epoxies.

AMINO RESINS are readily combined with many alkyd resins to produce baked coatings that can be almost colorless, offering maximum whiteness that will not change noticeably with age. They have excellent color and color-retention properties. **m** MELAMINE-FORMALDEHYDES are superior to urea-formaldehydes in chemical resistance, heat stability, and speed of baking. Melamine-alkyd coatings are as durable as straight alkyds and have the added advantage of hardness and chemical resistance. But amino resins are used to increase hardness, gloss and color retention in finishes on appliances and automobiles. In combinations with alkyds, they have sufficient flexibility to be roll-coated on tin-clad steel before it is die-punched into caps, toys, etc.

RUBBER RESINS in coatings are of two types: chlorinated rubber and high-styrene-butadiene. Both dry fast, spread easily, and have excellent chemical resistance. The chlorinated type may be blended with alkyds and other resins for finished metal work, for fire-retardant coatings on textiles and papers, and for marine enamels. High-styrene-butadiene resins produce clear oil-resistant films, free from taste or odor. They are also used in water-based latex paints for plaster and concrete surfaces.

CELLULOSIC POLYMERS form tough, flexible, fast-drying finishes for objects which must be air-dried, such as automobiles and furniture. Their adhesion and gloss can be improved by formulation with other resins and plasticizers. **c** CELLULOSE NITRATE films are affected by heat and ultraviolet rays; cellulose acetate is more heat stable and transmits ultraviolet freely, but absorbs moisture and is not compatible with some other resins. Ethyl cellulose resists heat, light and moisture, but its films are somewhat softer than nitrocellulose.

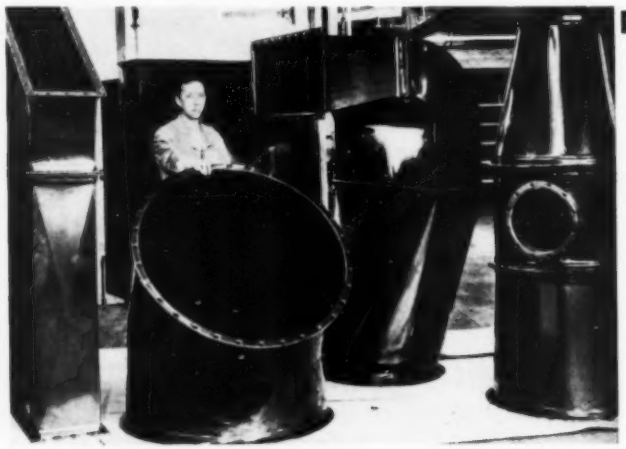
ACRYLIC ESTER resins have excellent transparency and are stable to light, which makes them reliable for clear finishes. One of their important coating uses is in formulations for base coats on fabrics and rubber. They have good heat and chemical resistance, and impart these characteristics when combined with cellulosic polymers and vinyl resins; they are frequently used with vinyls to produce white enamels of superior chemical resistance for appliances. **f** FLUOROCARBONS have extreme chemical and heat resistance, but at present they are difficult to apply and quite costly. The coating must be used at temperatures near 750°F — an indication of the difficulties of application as well as the unusual heat resistance of this resin group.

Plastics for protection

Generally speaking, coatings have two practical purposes—to protect a base material against the outside world or to protect the outside world from something in the base material. There are various reasons why a plastic may be best for this job of protection: many offer exceptional resistance and surface hardness; they are often easier to apply than their inorganic counterparts, and some have a special property that means economy or space saving.

Tough cushion: Tote baskets are often coated with a cushioning material, but ordinary plastisol tends to absorb trichlorethylene from a degreasing bath and to deteriorate slowly. A special plastisol that is slicker, harder and quick-draining, yet still cushions, has provided the necessary toughness for Utica Drop Forge & Tool Co.'s baskets. After two primer coats are baked; the basket is dipped and baked 30 minutes. Goodrich Geon paste resin formulated by Stanley Chemical Corporation.

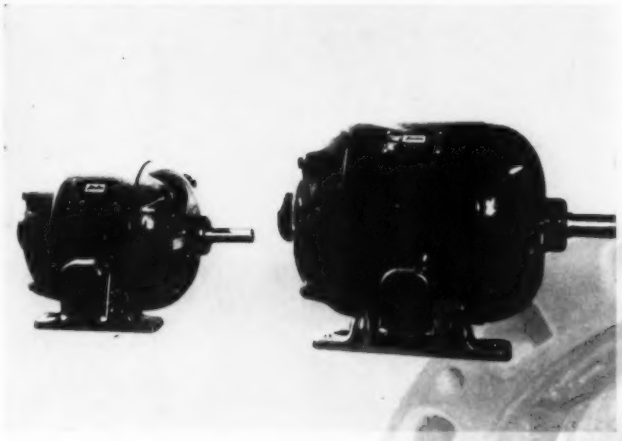
Plastic sheath: These large stacks are continuously exposed to corrosive fumes and heat. By a simple dipping and baking operation, they were given a plastisol sheath which not only protects them but covers seams and joints so well that they need not be cemented, welded or otherwise sealed. The coating inhibits rust, blistering and deterioration; it covers undercuts and crevices as well as flat surfaces. Thicknesses from 1/32" to 3/16" are possible. Bakelite plastisol used by Quelcor, Inc.



Cheaper and better: Daisy Manufacturing Co., which makes two million rifle barrels a year, used to make the steel rust-resistant by the chemical action of a bluing process, requiring costly handling and control of batch lots. They now use a transparent, electrostatically-applied epoxy-based baked enamel that resists chipping and corrosion, gives comparable texture and color, and good coverage even on sharp edges. Using a conveyorized dip and bake system, Daisy has cut labor costs four-fifths in the finishing operation. Epon resin from Shell Chemical Corporation.

Property booster: Organic coatings, which have long replaced the sanitary tin linings of "tin cans", have recently been improved by a new coating intermediate, based on phenol derivatives, which is mixed with other resins and solvents to improve their resistance to acids and alkalies, salts and corrosive chemicals which attack cans and drums. Added to epoxies, ureas, alkyds, phenols or melamines, it improves adhesion, toughness and flexibility, making it possible to coat spray, brush, dip or roll-coat a metal base before fabrication. R-108, produced by General Electric.

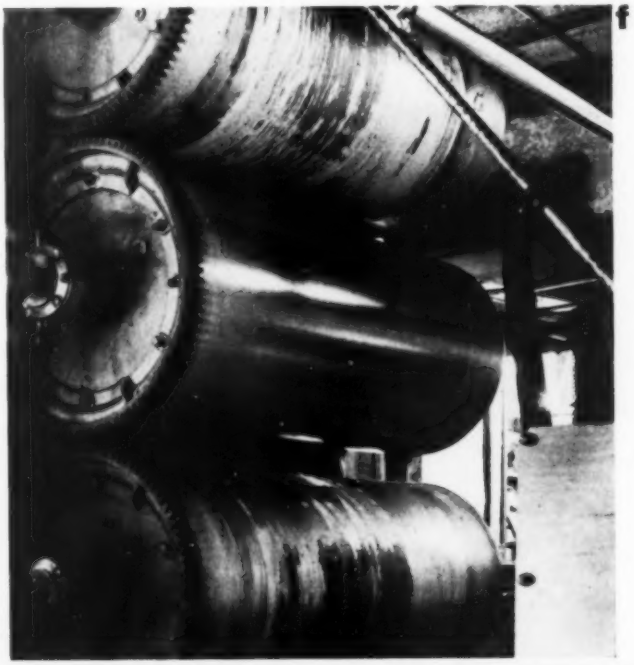
Better insulation in less space: The speed at which a motor revolves, hence its power output, is limited by the temperature at which the insulation around its coil and windings breaks down. Since silicone coatings can withstand high ambient temperatures, they allow small motors to turn fast enough to equal the power output ordinarily found in larger motors. The larger motor below, right, with ordinary insulation, generates 5HP with a class A rating (a motor operating with its hottest spot at 105°), while the silicone-insulated small motor at its left generates 5HP and has a class H rating (hotest spot at 180°). Silicone insulated windings in the larger 15 HP motors at the right remained in perfect condition under heat which was sufficient to melt the aluminum rotor when a bearing seized. Because of these properties, silicones may mean a tremendous saving in rewiring buildings. It has been estimated that four out of five buildings erected since the war are not able to carry the electrical loads now demanded of them, and to replace wiring in all U. S. buildings which now need it would be a $5 billion job. Silicone coatings can make possible increased loads without increased wire size—important where space is limited. Silicone coating from Dow-Corning.



Protection plus

In some cases a plastic coating offers something more than protection—some visible and practical advantage like a richer texture, a more lustrous surface, decorative quality, or new virtues for an inexpensive base material.

Glue-proof gluepot is produced by Teflon, a new resin in the fluorocarbon group with a remarkable distaste for other materials. Applied to the gluepot and baked, it becomes a release agent that keeps inside and outside absolutely clean and freeflowing — a use which could apply equally well to buckets, paint cans or any products that come in contact with adhesives, dyes or stains. In the textile industry, Teflon has been used on slasher cylinders, rolls and dry cans to prevent a build-up of sizing materials. A thin smooth coat of Teflon also makes heat transfer more uniform, so fabrics dry faster and with more even shrinkage. Teflon has excellent electrical and chemical resistance, can withstand temperature deformation indefinitely at 475°, and will adhere to most metals. No solvent is known. Teflon from Dupont. Processed by General Plastics Corporation.



f

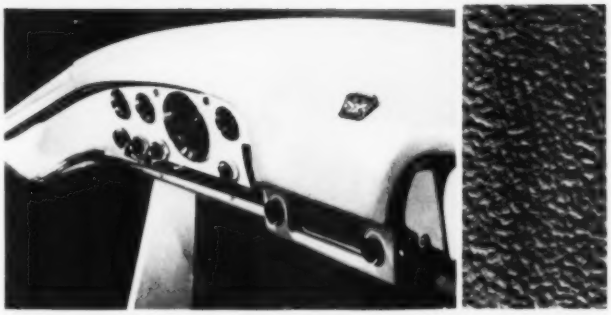
f

s

A slick surface for molded rubber is a desirable by-product of a silicone emulsion used as a mold release; a small amount transferred to the rubber during molding leaves a lustrous surface. Sprayed or wiped on the mold and baked, an application lasts through many molding operations. It speeds production and reduces tearing in release, and few materials will stick to it. Similar emulsions are widely used in bakeries to eliminate greasing pans; one application of a solvent, evaporated below 150°, and cured 1-2 hours at 480°, lasts 200 bakings. Silicones from Dow-Corning.

Gripping gloves are produced by a flexible plastisol coating which protects cotton work gloves from oils, grease and wear. The rough surface, with its rubbery no-slip texture, is produced by adding inert particles to a vinyl-dispersed resin-based solution, into which the gloves are dipped before being oven-cured. The resulting tough coating remains flexible at low temperatures, and gives the gloves good abrasion and chemical resistance and extremely long wear. Bakelite plastisol used by Plasticote Glove Company.

Heat-resistant paper, produced by a plastisol coating, makes disposable containers almost as versatile as permanent ones. Roll-coated with clear or colored plastisol, paper containers are taste-free, smooth, waterproof, and resistant to low temperatures. A special formulation of the coating actually permits them to be used in ovens for baking, and to become hot grease collectors for domestic reuse. Coating developed by Sealright Co., in cooperation with Bakelite.



Leather grain for metal is a plus of a plastisol formulation which gives auto instrument panels a durable, clean surface. Oil and grease, dirt and water wipe off without a trace because of the chemical resistance of vinyl resins on which the patented spray coat is based. During a 15-minute baking, the dispersed resin particles fuse into a hard continuous film, which is then wrinkled by a mist coat of solvent which shrinks the undercoat slightly. Tests by the manufacturer, J. L. Armitage, indicate wear-resistance ten times that of conventional alkyd resin-based wrinkle finishes. Bakelite plastisol is shown here on 1955 Dodge.

Shatter-safe glass, *the result of a tough yet soft-to-the-*touch coating of plastisol, makes glass containers safe for pressurized perfumes or other liquids. A thin film of plastisol, applied by dipping and baking, is sufficient to keep sharp fragments from scattering if the bottle explodes or is dropped. The film can be clear and almost invisible or translucent or opaque in a full range of colors. Printing with vinyl inks can be done on the coating or on the bottle itself. The coating is chemically resistant and not affected by essential oils or alcohols in cosmetics. Bottles produced by Wheaton Plastics with Bakelite plastisol.

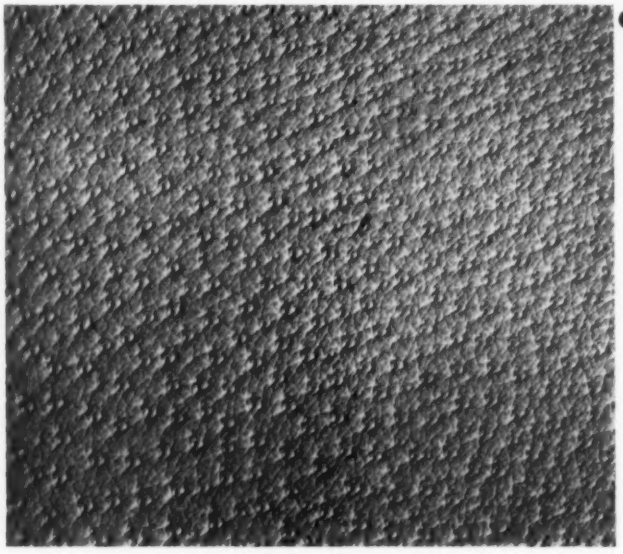
Plastic coatings for eternal youth

Mention traditional materials like wood and leather, and the words "mellow" and "patina" always crop up, implying that the wear and color change which come with age are attractive and desirable. But the time and care it takes to age these materials gracefully is alien to modern living, so we have revised our ideals to conform with convenience: we ask for brand-new materials that stay brand-new in the face of wear and age. Plastics have made this possible; they offer permanent, impermeable surfaces in place of the old depth and mellowness. Since we still like the satisfaction of real wood grain and rich soft leather, a good coating must be incorporated with the material; and since it will not improve with age, it must be sturdy enough to retain its youthful look for the life of the product.

Burnished copper: Some of our most decorative metals are unfortunately the hardest to keep clean. Copper, for instance, may be worth scouring on the bottom of a pan, but it is unlikely that Chambers could have sold many copper-finish ranges without a coating to keep it from tarnishing beyond the decorative point. The copper-plated panels of the range are oxydized and brushed to produce the desired antique effect, then sprayed with two coats of a clear epoxy formulation and baked after each; the 5-mil finish, which stands temperatures over 350° and is easily cleaned off with soap and water, preserves the ready-made patina forever. Epon resins from Shell Chemical Corporation.

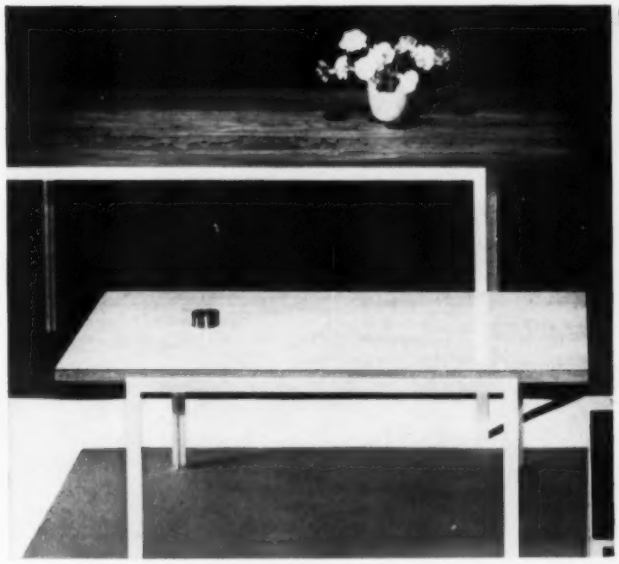
Ageless leather: Leather has many assets — grain, feel, durability — which are traditionally preserved by care and attention. To protect leather and make it more flexible and resistant to water and stains, synthetics are commonly used today, both in preparing and finishing skins. The richest finish, qualitatively speaking, is one that invisibly preserves the appearance and feel of top grain leather (dyed rather than pigmented), like the clear cellulose nitrate lacquer used by Herman Roser tanners on aniline-dyed pigskin, to protect wallets from handling and stains both on the sales counter and through many years of use. Rohm & Haas Orthoclear finish.

e



c

Stainless fabric: Protective coatings on fabric sometimes give a slick or non-porous surface which minimizes the decorative texture of the cloth. A new silicone coating covers each fiber individually without filling the interstices, making the fabric non-absorptive, resilient, and up to 25 per cent more durable without any affect on its porosity or appearance. The silicone, in a water emulsion, is applied as the final operation in wet-finishing piece goods; heat-setting forms a tough, resilient envelope around each fiber which withstands dry cleaning and washing in water under 120°. Sylmer coating from Dow-Corning, Boris Kroll fabric.

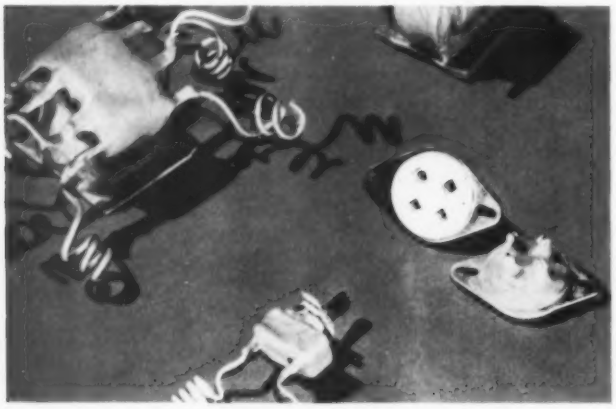


Fresh-cut wood: Though wood mellows beautifully with waxing, traditional wax and lacquer finishes have not been able to withstand stains and heat scars, and many old wood tables and tops survived only under a protective sheet of glass. But wood impregnated with melamine or urea before fabrication gains a glossy, waxy surface that requires no care and resists stains, markings, and moderate heat. Non-yellowing Melamine and urea have replaced phenol coatings for such uses because they may be used on light as well as dark woods, and offer light colors. Knoll tables, finished with Monsanto melamine.

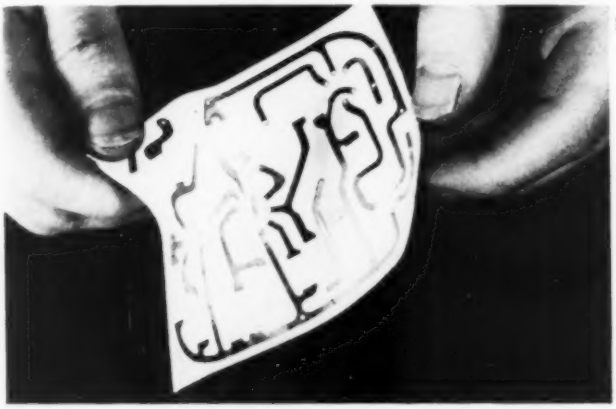
Dips, spread and laminates

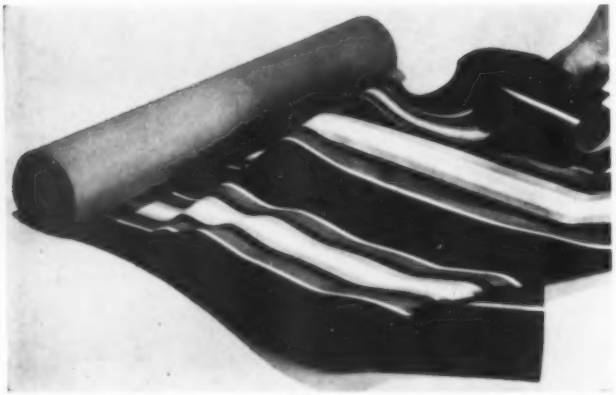
Among the interesting advantages of plastic coatings, we must number various unique methods of application and unusual combinations of materials which frequently give designers and manufacturers new freedom in the finishing of their products. In some instances the finish is a mass-produced material, applied before fabrication of the mass-produced object it covers.

Quick encapsulation: Electric and electronic parts need special protection from moisture, high temperatures and vibration; silicone rubber coatings offer this and so many new features—superb dielectric properties, arc resistance, high and low temperature resistance (700° to -100°) and good coverage—that they are now widely used. Although the material itself is expensive, some of the cost can be offset in application. Parts are dunked in a 50% solution, or spatula-coated as necessary. Dow-Corning Silastic.



Calendered circuit base: An etched circuit that is flexible can be crowded into smaller spaces in electrical equipment, but the flexible base must have body, insulating properties, and the ability to withstand etching acids. Silicone rubber calendered on glass cloth meets these demands: the elastomer contributes excellent dielectric properties and water-repellence, and the cloth provides body. On the circuit below, copper foil treated with a primer was press-molded to the coated cloth, then etched. Dow-Corning Silastic.

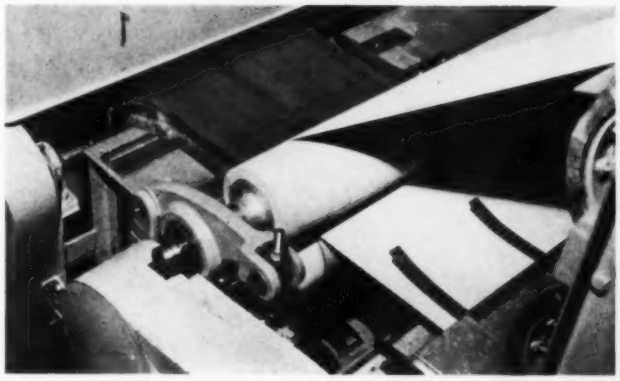


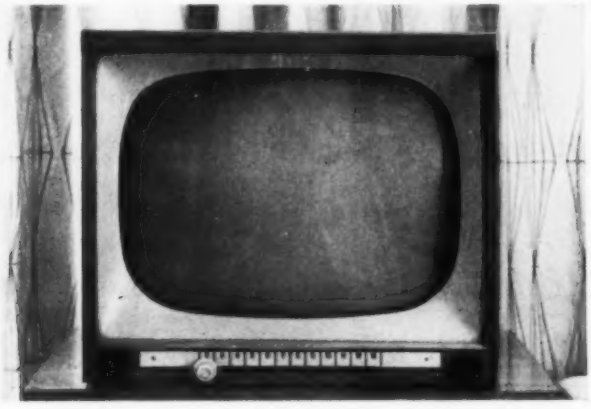


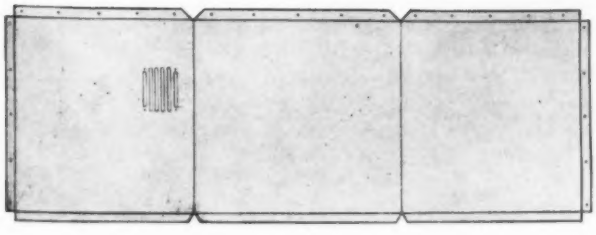
Roll-coated awnings: When weather-resistance is the main requirement for fabrics, plastisols and organosols are particularly good because of their inert nature, flexibility and durability; and they require little more than an open drum and simple mixer for compounding. Graniteville Manufacturing used a clear organosol roll-coating on its striped awning material, but a similar coating could be applied in color to reduce the number of fabric printing operations. Vinyl resins from Goodyear Tire and Rubber Company.

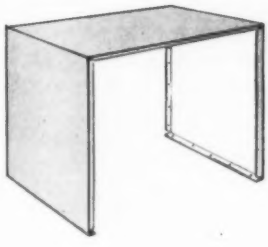
Dipped handles: Dip-coating is a simple and highly automatic process, and plastisols extend its uses because the coat thickness can be controlled by the consistency of the formulation, and resiliency can be controlled during curing. The resilient pads on these handles are actually a dip-coating of plastisol which provides a no-slip grip that reduces fatigue, prevents blistering, and is pleasant to the touch. The coating resists grease and most chemicals and insulates electricians' tools. Bakelite plastisol for H. K. Porter.

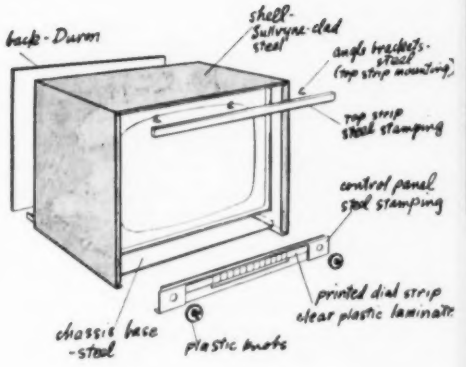
Laminated luggage: Before Schwayder Brothers began to design its line of Ultralite luggage, it made extensive tests of materials which would give the best combination of lightness and toughness. They chose a vinyl sheet bonded to magnesium base because the combination could withstand fracturing dents and gouges, and had a water-repellent surface with excellent abrasion resistance. Schwayder developed its own method of roll-bonding the base and an embossed semi-rigid vinyl sheet in a continuous strip, which is then sheared to size, punched, bent and assembled with end pieces. Dow magnesium, U. S. Rubber vinyl.









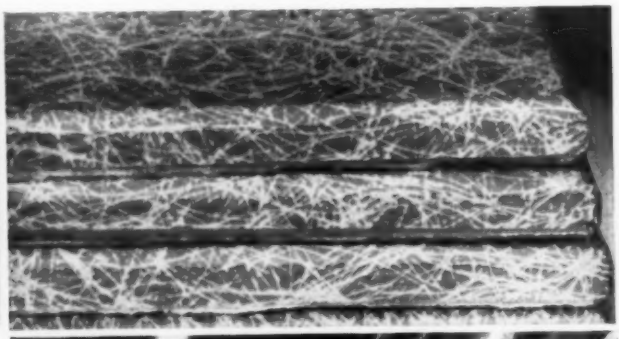


Pre-finished cabinet: The finish of this CBS television set is as well designed for modern production and assembly as the cabinet itself. O'Sullivan Rubber Company laminates sheets of steel and vinyl and supplies pre-finished blanks to CBS, who then die-cuts and blends them, and adds one strip mounting, a dial strip and a back piece to complete each housing. No edge finishing is needed. The vinyl's flexibility and abrasion resistance permit the forming, drawing or punching of precise openings and sharp radii without damage to the surface of the pre-finished sheet. The film is somewhat thicker than conventional coatings (.012" to .03") and has a slight resiliency. It will withstand corrosives and light, will not chip, crack, peel, or scratch. O'Sullivan supplies Sullvyne-clad steel, magnesium or aluminum sheet in a variety of grains, embossings and colors. CBS "Duraclad" cabinet designed by Paul McCobb.

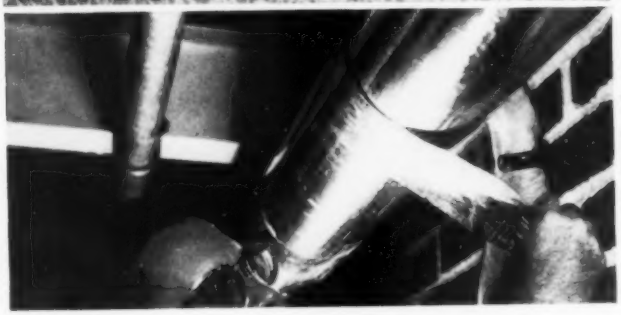
New Directions: Plastic coatings become products in their own right

The recent outcropping of strong, thin transparent films has added new dimension to the definition of "plastic coatings." Definitions, in fact, are almost worthless, for the films are being used not only as transparent protective finishes, but as printed and metalized surfaces which are used to decorate such diverse materials as leather, Fiberglas and fabric. Though the films have some similarities, each is unique in its combination of properties, and in the kind of performance it delivers at a given cost.

Metalized "Mylar" on plastic ↓ and leather ↑



Printed "Mylar"



"Mylar"-foil lamination

"MYLAR" polyester film, which looks like cellophane and has one-third the tensile strength of steel, offers unusual properties for special jobs:

Laminated to aluminum foil, Mylar makes an excellent insulation for floors, pipes and ceilings because it is moisture and vapor-proof. This flexible armor prevents the foil from tearing and keeps water from condensing on the inside of the insulating sandwich.

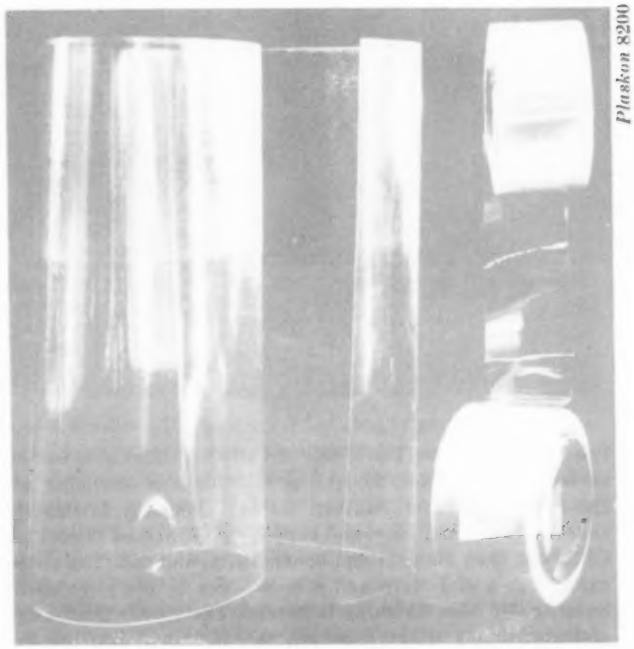
Printed Mylar makes a decorative covering for rough walls and acoustical tiles. Applied with adhesive, it makes Fiberglas tiles easy to clean, and colorful, and is said to improve acoustical qualities. (Owens-Corning.)

Vacuum-metalized, dyed, and bonded to leather, Mylar creates a permanent colored sheen which is so thin that the grain of the leather is preserved. It is untarnishing, tough, and may be spot-cleaned. (High Vacuum Metals.)

Reverse-printed before metalizing, then laminated to a base material, the Mylar bond may be embossed with any kind of decorative pattern. Its tough clear top surface protects ink and metal deposits permanently. (Dorrie Process Co.)

On top of all this, DuPont is now experimenting with methods of coating metals with Mylar, then drawing them into shape—a finish which would eliminate lacquering and plating. Inert and solvent-resistant, Mylar is sold in continuous rolls, ¼ mil to 7½ mils, for $4.00 to $2.50 a pound

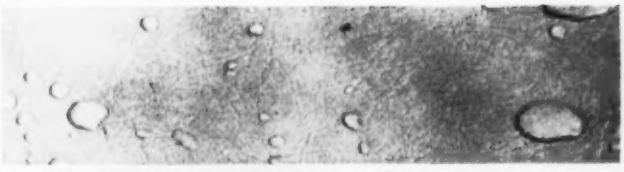
PLASKON 8200 nylon, recently introduced by Barrett Division of Allied Chemical and Dye, has just been put on the market in the form of extruded film—so its applications are still in the experimental stages. The unusually high impact strength and abrasion resistance of a thin film (½ to 1 mil) will be good for upgrading paper, vinyl, polyethelene and styrene when an especially tough, permeable, flexible surface is needed; it could also furnish an invincible armor on leather- or fabric-covered luggage. It can be made in any thickness, clear, opaque or colored. Oriented film has a tensile strength of 30,000 psi; unoriented film, at 12,000 psi, lends itself to vacuum-forming after lamination. Film manufacturers have not announced prices, but they are expected to be competitive with Mylar.



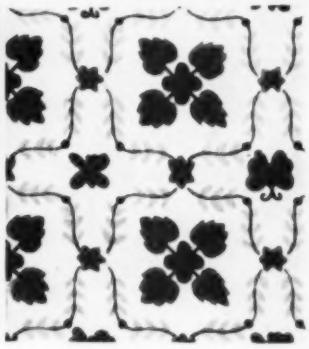
Plaskon 8200

KRENE vinyl film is now made by Bakelite in two forms: calendered film, which is slightly oriented and offers medium strength at low cost ($0.60 per pound of film); and a new unoriented film which is cast and cured on a stainless steel belt, which gives it high gloss, excellent clarity and abrasion resistance. (1 mil of cast film will perform as well as 4 mils of calendered Krene, costs about $1.00 a pound.) Calendered Krene, the only form which has been used commercially to date, is the basis of Kalistron, a tough, clear film with color fused to the underside and grain embossed on the topside. Because the colored surface is permanently protected it never shows gouges and is widely used for luggage and wall coverings. (U. S. Plywood)

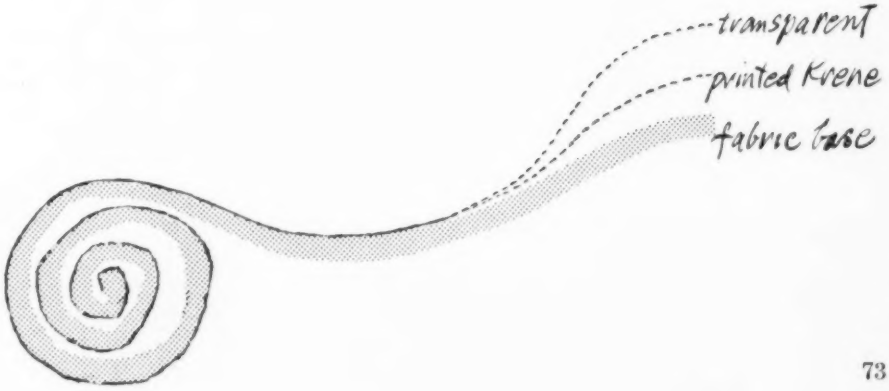
Krene lends itself to a variety of other uses on fabric and plastic bases. Handbag fabric sandwiched between two layers of Krene gets a sturdy, semi-stiff protective gloss. One fabric manufacturer uses Krene as a printing surface in a triple lamination: a thin film is printed, then sandwiched between a clear top film and any desired plain fabric base. Since both films are thin, they leave a dull sheen on the fabric — an easy way to give pattern and color to any cloth base. (Filmtex, by Toscony Fabrics.)



Kalistron

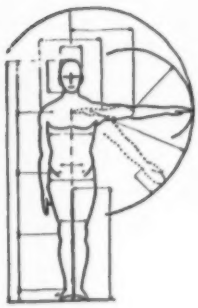


Filmtex

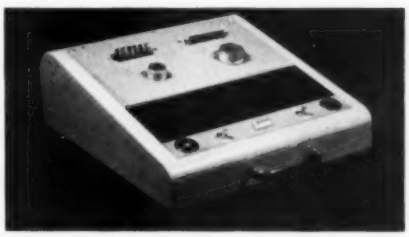


Design in unexpected places

"When we were called in by the Hyster Company to work on its famous line the temptation was to give the Hyster trucks a racy appearance, but, after study, we decided on a look of simple, rugged functionalism, with improved safety, visibility, and maintenance factors. After all, they are husky warehouse lift trucks needed to do a work-horse job, not nervous fillies out to break a track record."

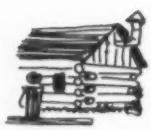


"The Link automatic cable checker is a unit designed to test the continuity and to find short circuits in the myriad wires in a modern electronic equipment cable. We designed the case of the unit with a hinge for easy access to its interior, and a carrying handle on the front."



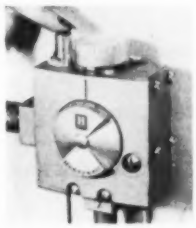
"The Warner & Swasey Company's single-spindle automatic metal-turning machine was designed to provide the utmost in operator accessibility to set-up controls and to the cutting tools to permit changing and resetting quickly and safely. Set-up adjustments are made at the rear of the machine and are fully accessible when the large protective cover is hinged open. Overhead accessibility is provided for chain hoisting over the stock."

"Another instance of design off the beaten path was our work on a spectacular display for the National Supply Company, manufacturers of equipment for the petroleum industry, for the mammoth Tulsa Oil Show. The design centered around the familiar oilwell derrick, surrounded with a doughnut-shaped glass building, which appeared to float ten feet off the ground. We reversed the usual procedure. The customer relaxed above in an air-conditioned showcase, looking out at merchandise that was displayed on the ground level."

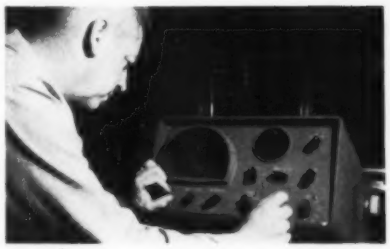


The bookjacket (designed by Henry Dreyfuss) of Henry Dreyfuss' *Designing for People* (Simon & Shuster, $5.00) carries a sketch of a many-armed Indian balanced on the inscription, "The industrial designer must be part engineer, part businessman, part salesman, part public relations man, artist, and almost, it seems at times, Indian chief." The Indian chief of a large and versatile tribe has written a chatty and informative account of his last 25 years—ever since the day, at the age of 23, that he turned down a 5-figure job with R. H. Macy and decided to become a designer. He picks up Joe and Josephine, a couple of humanized statistics who accompany him everywhere, and takes us all along on some first-hand "research," riding planes, destroyers, tractors, tramping through stores and trying out hearing aids. He shows us how a designer works, reviews his life with the telephone, and uncovers some of the remote corners (excerpted here) in which he has functioned. There is a chapter on the relationship of designer to client, and one on that sordid subject, money. The Indian chief doesn't mince words on public taste (it's rising), Detroit (it follows the leader) and mass-produced goods (a new American art form); he speaks in simple anecdotes that should help people understand the vast array of things he has designed for people. Incidentally, he designed the marginal sketches, too.

a leaf from the notebook of a peripatetic designer

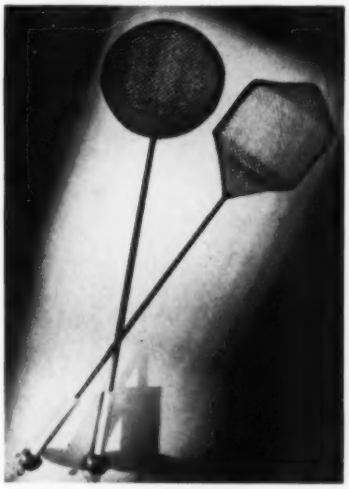


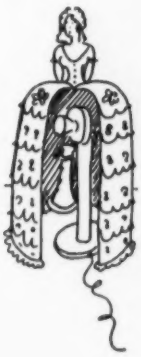
"The care given to the design of a thermostat for a residential dwelling is well understood, but Minneapolis-Honeywell is also concerned with the appearance of their less obvious products. This less glamorous member of the thermostat family also does its part in eliminating household drudgery by faithfully maintaining the family's hot-water supply at the temperature desired."

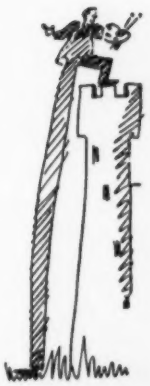


"Another unusual design assignment in an unexpected place was the sea scanner for Minneapolis-Honeywell. Mounted in the cabin of a boat, the device gives a visual record of any solid bodies within a diameter of 2400 feet. Sound impulses are reflected back on striking a solid object and can be observed on a radar screen. We suggested the use of a rugged cast-aluminum case for the recording instrument instead of sheet metal, arranging the control panels in a logical and functional order, and setting the scope so that a light shield was built in rather than outside."

"An amiable stranger came into our New York office one day, and we chatted about politics and the weather—then he said, 'I just wondered if you could design a fly swatter for me.' As we talked, I doodled a design. He thought it was fine and offered payment, after explaining that he was head of the United States Manufacturing Company of Decatur, Illinois, which made 20,000,000 fly swatters a year. I was amazed at the figure, and he explained that for some unknown reason people don't save fly swatters, but buy new ones each summer. He was certain the new design would increase that figure and departed, saying that I would hear from him. I thought nothing further of the incident until, months later, sizable royalty checks began to arrive."







DESIGNS FROM ABROAD

Kamekura of Tokyo gives a fresh look to familiar packages

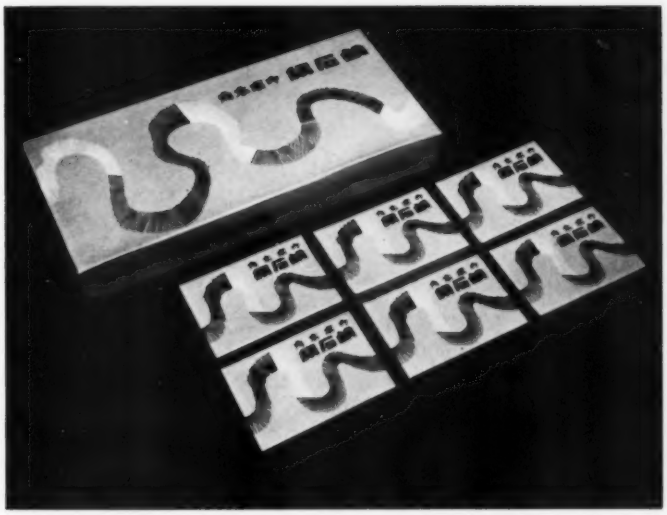
Yusaku Kamekura, born in the north of Japan in 1915, has a design office in Tokyo. He is art director for *Nippon* magazine, art advisor for the Society of International Cultural Relations, art director for trade journal, and does advertising for foreign publications as well as all manner of graphic designs. These samples of his packages for five different companies have in common a lively sparkle and simplicity. In contrast to the extreme realism of American package design, Kamekura uses a thematic abstraction of the product which is both highly decorative and quite explicit about what the package is for. Here are some fresh and decorative ways to package common things, an oriental way of making them pleasant company.

The simple and concise design for a carrier bag (left) accents not only the name of the product but the columnar height of the bag, as though Milliontex, in keeping with its name, goes on ad infinitum. The bands and the name are in green, the rest in cream. The repetition of the design also suggests a pattern for folding.

The carton for Ribbon Juice illustrates Kamekura's style in beverage packages. The typography is well integrated with the pictorial elements, but at the same time clear and readable. The colors are black, blue and white.

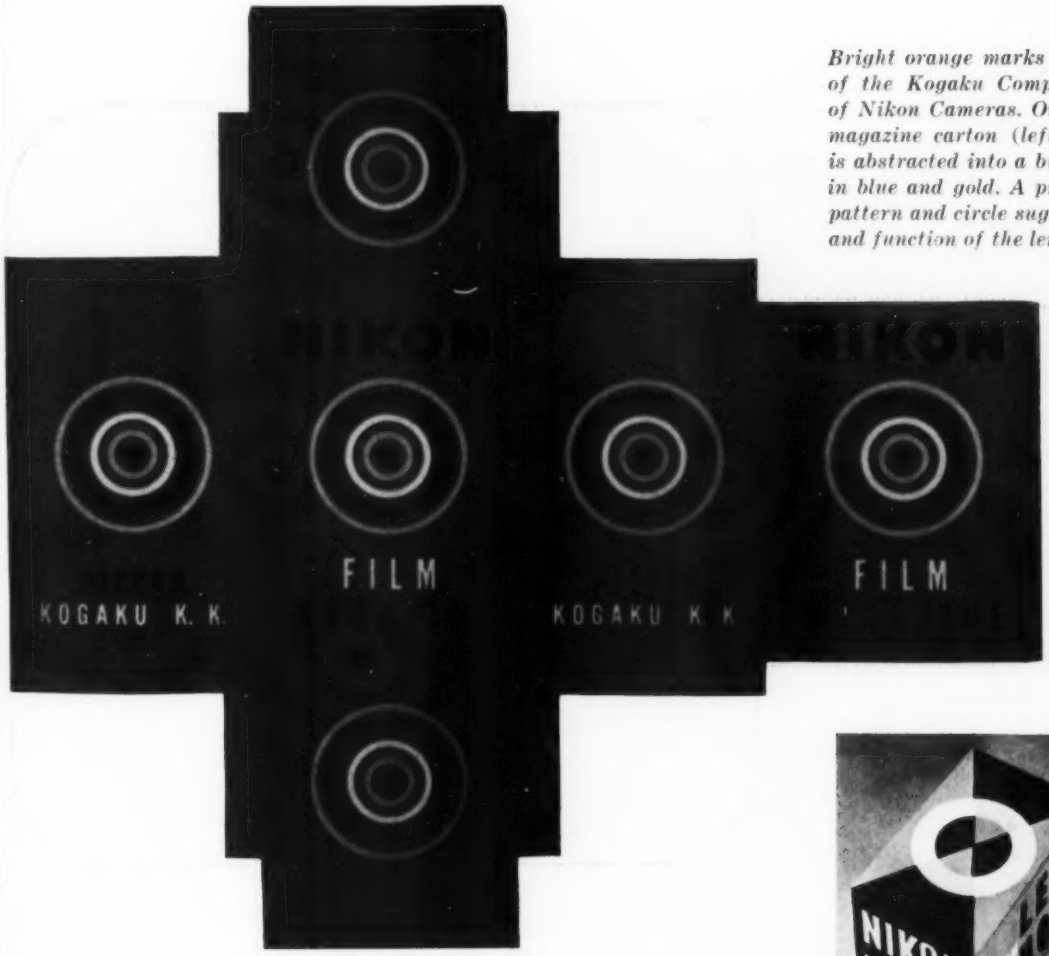
Shapes of fishes and the circle, which is a characteristic Kamekura touch, make a lively box in grey, blue, pink, yellow, black and white. These floating forms are arranged to focus attention on the name of the product.

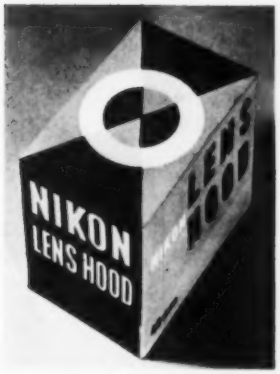
Beer, like the juice, is expressed in flat, abstracted silhouettes. The star is a repeated theme on the Nippon beer cartons. The scheme is a cheerful blend of elements from east and west.



A spiny, dragon-like pattern in three colors appears on Kamekura's soap packages (above), in this case as an abstract leitmotif purely for the sake of decoration.

Bright orange marks all the packages of the Kogaku Company, makers of Nikon Cameras. On the film magazine carton (left) wound film is abstracted into a bulls-eye pattern in blue and gold. A prism-like pattern and circle suggest the shape and function of the lens hood (below).





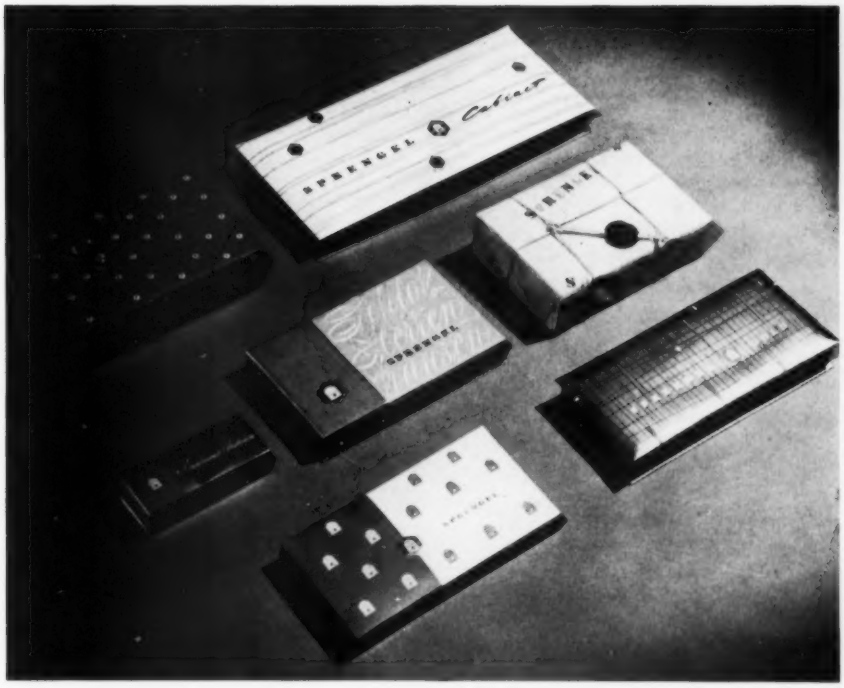
Foreign package designs attract notice in Chicago show

The foreign packages on this spread, among those exhibited by the Package Designers' Council at the recent AMA Packaging Exposition in Chicago attracted attention for their originality and simplicity of design.
A six-inch package with a handsome diamond design (left) won honorable mention for Holland in PDC's 1954 competition. Designer was Tom de Heus; the product, Dutch cocoa powder.

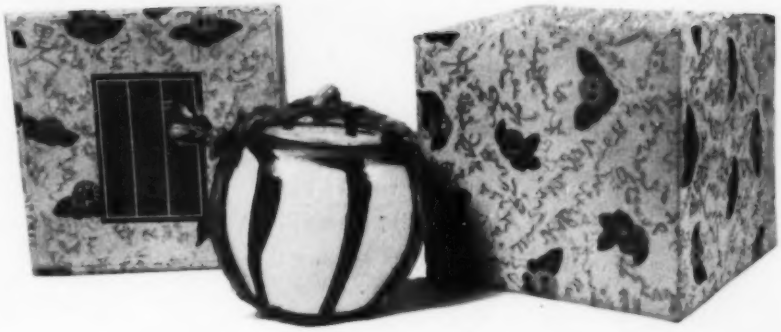
A light grey box was one of the entries from the Institut Francais de l'Emballage et du Conditionment. The Helios stocking line carries the sun symbol through three layers of tissue in neat repetition. On the outside, the rays are embossed in white and gold.

One of the traditional Japanese food packages is twelve inches in diameter, made of light, unfinished wood, reinforced by two copper bands, tied together with a straw rope. These simple, rustic materials are given a decorative touch with brightly colored bits of paper and string. The paper sticker that looks like a kite indicates that it is a gift. The name of the product is branded on the lid.

Another winner from Holland was J. Penraat's cheese package. Out of seven honorable mentions, the Dutch won two. Germany also won two; England, France and Switzerland, one each.



Heinrich Arthur Hoesh's design for Bentz-Papier stationery won one of the awards for Germany. The other (above) was Wolf D. Zimmerman's scheme for several kinds of Sprengel candy.



An especially lovely sample from Japan, also an old, traditional design, is this ceramic jar and its box. In transit, the lid of the jar is tied on with a piece of straw rope. The background on the box is taken from Japanese calligraphy, printed in gold on cream, with the butterfly shapes in dark red and green.

A Swiss design shows a compact method of drug packaging. Decoration is carried out strictly in color and typography, alternating green, blue, black and white. In order to seal in and protect the suppositories, the interior comes in two separate sections with generous flaps; the compartments are lined with aluminum foil.

Designing fo Di

10 case studies show designers and manufacturers how to make the most of a flexible production method

photograph: rosenzweig

Die Casting

From raw material to final part in one step is the keynote of the die-casting method of production. Although the automatic casting of light, strong metals has been in use since World War I, new ways of exploiting it are constantly being devised. It is a good time to review some recent uses that demonstrate the opportunities in die casting for designers, its speed and simplicity for manufacturers.

"Die casting is the process of producing accurately dimensioned, intricate, smooth-surfaced parts by forcing molten metal under pressure into locked dies," explains David Laine, Executive Secretary of the American Die Casting Institute. "As soon as the molten metal has solidified, forming the casting, it is ejected from the opened die, which is then closed and locked again for the next cycle."

Die casting is fast; the cycle usually lasts less than a minute and, for miniature parts, only a second. Production rates, though somewhat lower than with automatic screw machines or powder metal presses, are generally higher than any other casting process.

Zinc and aluminum are the most common die-casting metals, followed by magnesium and copper. There is no appreciable difference in their casting speed or hardening time. A die casting will harden in a few moments, the metal passing from liquid to solid almost at once, without artificial cooling methods. Because of their high melting points, ferrous metals cannot as yet be die cast, but the aircraft industry is experimenting with hard steels and combinations of ceramic and metal materials called "ceramets" in an effort to develop dies that will not crack, warp or produce imperfections when ferrous metals are cast.

Cost factors

Cost questions invariably arise when die casting is considered, for the die itself is a complicated thing to make, necessitating a fair amount of hand labor. As a rule, the expense of die casting is justified for products which will have long production runs, because the cost of the die can be amortized over many units. There are instances, to take the exception, when die cost has been covered by as few as 1500 units.

But the real cost advantages of die casting can be considered in other terms. For one thing, die casting can eliminate hand labor during production—often the largest cost in a manufactured product. A pin in the die itself, for example, will produce a hole in the casting, which eliminates the need for drilling a hole in each unit that comes off the production line. Assembly and machining operations may be similarly reduced by features incorporated in the casting. Because a die-casting machine is automatic and the die is permanent, shapes are reproduced exactly to precision tolerances; thus much of the measuring and checking normally done after fabrication can be dispensed with. Such economies frequently outweigh the original cost of making a die.

Die casting compared

Valid comparisons with other processes necessitate, of course, an examination of the nature and demands of the product to be made. Die casting is appreciably cheaper than stamping where complex curvatures and shapes, even thin sections, are required. A stamped housing can create difficulties in positioning motors and mechanical elements, while a die casting, with projections and supports cast in, will assure easy, accurate positioning. Stampings often present assembly problems; the die-casting process will frequently do away with assembly completely by permitting one-piece units. When split construction cannot be avoided, die casting can facilitate the perfect mating of parts: integral rivets can be fitted into holes cast in the matching part.

Greater strength and compactness is the principal advantage of metal die casting over plastic molding. In lightweight housings, for instance, die castings are superior in holding tolerances on mated parts and have greater shock resistance. Molded plastics may be made shock resistant by increasing wall thickness, but this often makes a unit too bulky for proper functioning or good appearance.

Today sand castings are frequently redesigned as die castings. Though the sand forms can be prepared in less time and with less labor, they deform easily and cannot be used under pressure, which means that less complexity is possible, and wall sections must be thicker. Because the sand molds will not conduct heat as fast as metal dies, the grain size of sand castings is larger, and the surfaces of sand castings rougher.

Designing for die casting

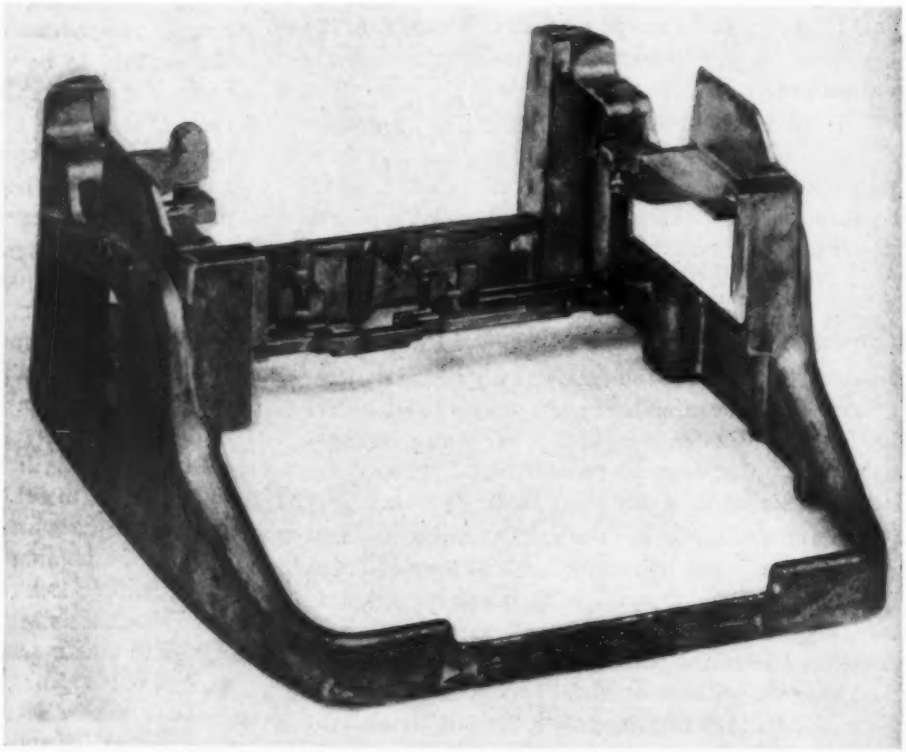
The design advantages of die casting are no less important than the cost advantages, although the two are hard to separate — for the method frees the designer from production limitations and allows him to do more with less. Curvatures, undercuts, blind holes and intricate shapes — which might be not only uneconomical but impossible by other methods — may be produced simply and accurately, and on long production runs, with die casting. And the smooth surface of the casting is suitable to any kind of finish.

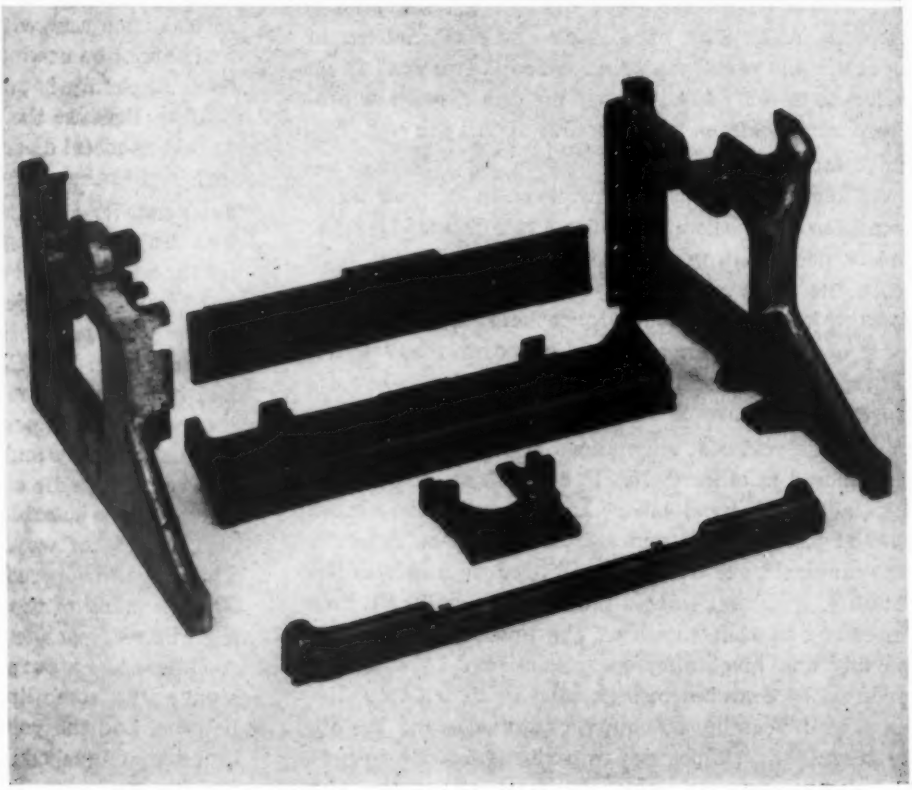
A variety of ways in which the process has been well used are presented on the following pages. Though many of the castings look like metalworkers' nightmares, each curve, projection and change of thickness has a purpose. Die casting presents the designer with some limitations: the kinds of metals to be used, and the volume of production; it also offers him the unique challenge of freedom, and he must find his own ways to use it to advantage.

photogram rosenzweig

ONE-PIECE frame, produced in one step, speeds production and simplifies assembly.

When the Underwood typewriter frame was redesigned from six iron sand castings (below right) to a single aluminum die casting, frame assembly and much machining were eliminated, because holes and bosses were cast in. The prime functional advantage of the design change was the increased rigidity of the frame; greater dimensional stability made it possible to design open ends and back, which further simplified assembly and service. The die caster, who was called in during the early design stages, suggested that the gate of the casting be retained to provide extra rigidity during fabrication and to simplify handling. Several fastener assemblies and small parts were integrated into the casting, yet total weight was cut 4½ pounds, which reduced shipping costs. The smooth, dense, non-porous surface cut out the need for a primer coat during the finishing operation.

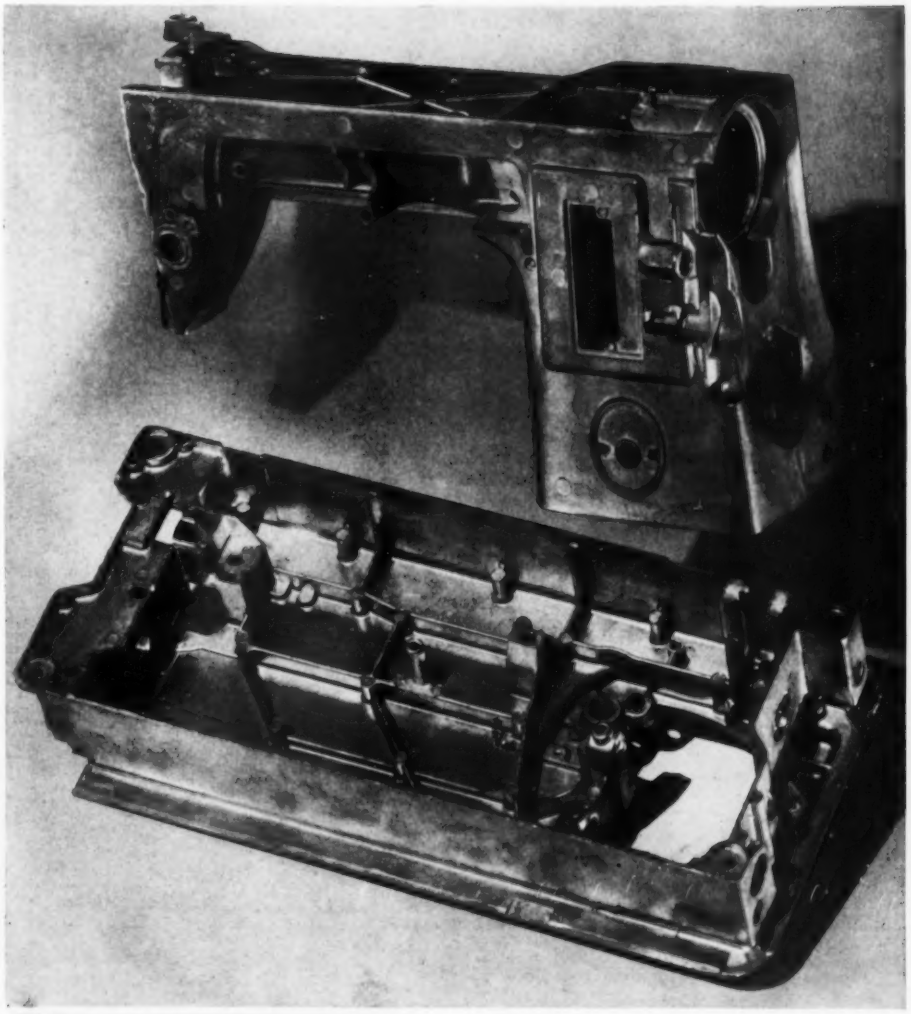


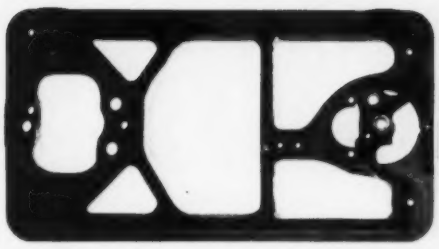


FRAME, housing, and support points for sub-assemblies may be combined for economy.

A sewing machine, because it is often run by an inexperienced operator, must be a rugged precision instrument, and a strong, light housing permits it to stand abuse. It took Singer Sewing Machine Company more than 15 years to develop this aluminum die casting which eliminates many parts, and makes servicing easier.

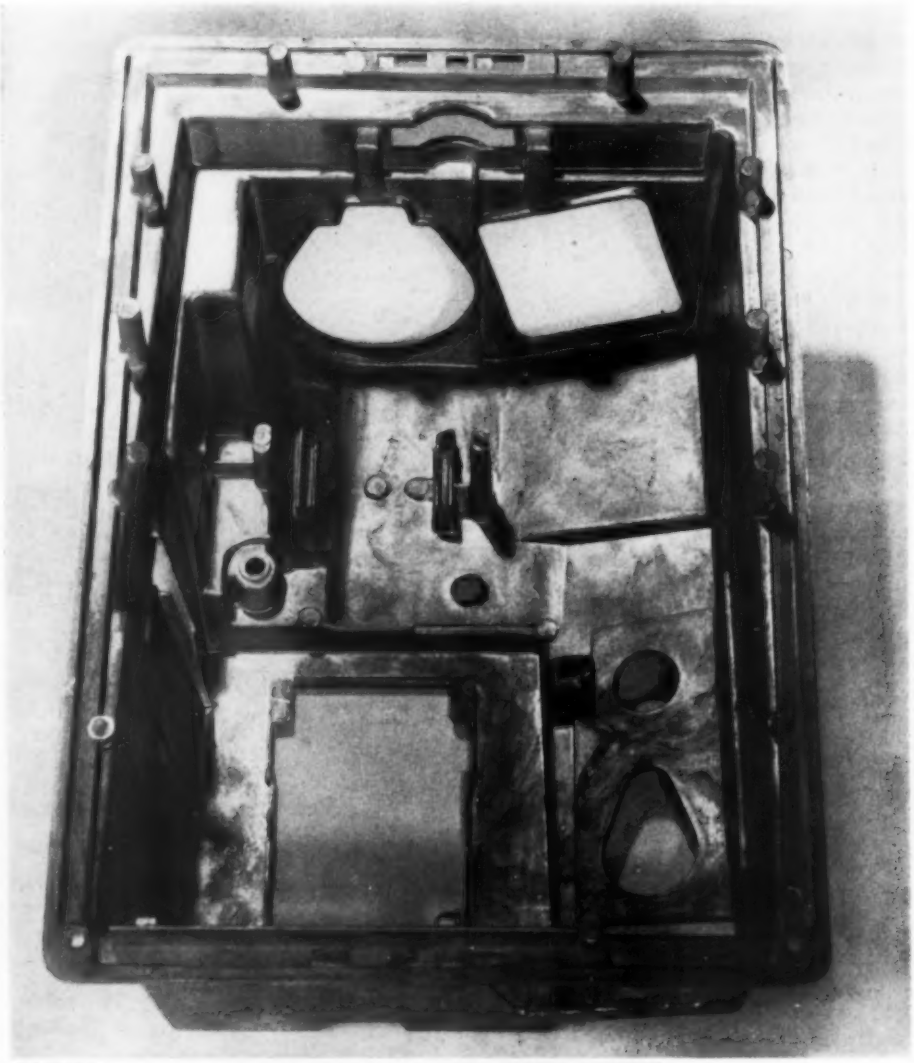
The two iron sand castings formerly used for the body required extensive machining for surface finishing, threads, and holes. Die casting permitted Singer to produce close tolerances, intricate cores, and a smooth surface that eliminated machining. All working parts are enclosed within the casting. The motor housing seat is cast-in to provide a precise internal location for the motor. End cavities guide the slanted needle, which makes threading and sewing easier.

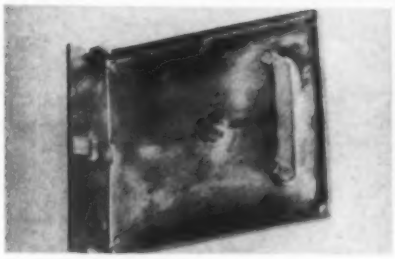


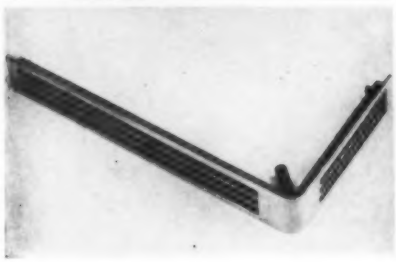


COMPLEX parts and functions may be cast into housings to simplify fabrication.

Revere Camera Company's new 888 slide projector, which shows up to 36 slides without an operator, is not only automatic but light, durable and reasonably priced because of diecasting. Had the housing been made in a series of stampings, assembly of the complex parts would have been a ticklish problem, but the aluminum housing could be die cast in one piece, with cast-in threads, blind holes, and projections that quickly locate and secure sub-assemblies. The production method also permitted the design of very thin walls rigid enough to resist buckling from bulb heat, a major factor in achieving light weight; the casting was precisely cored for the lens cavity, control knobs and slide magazine. The removable bulb cover, vented base grills and lens housings also match exactly projections in the large casting.



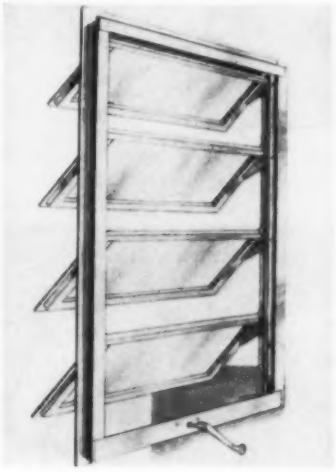


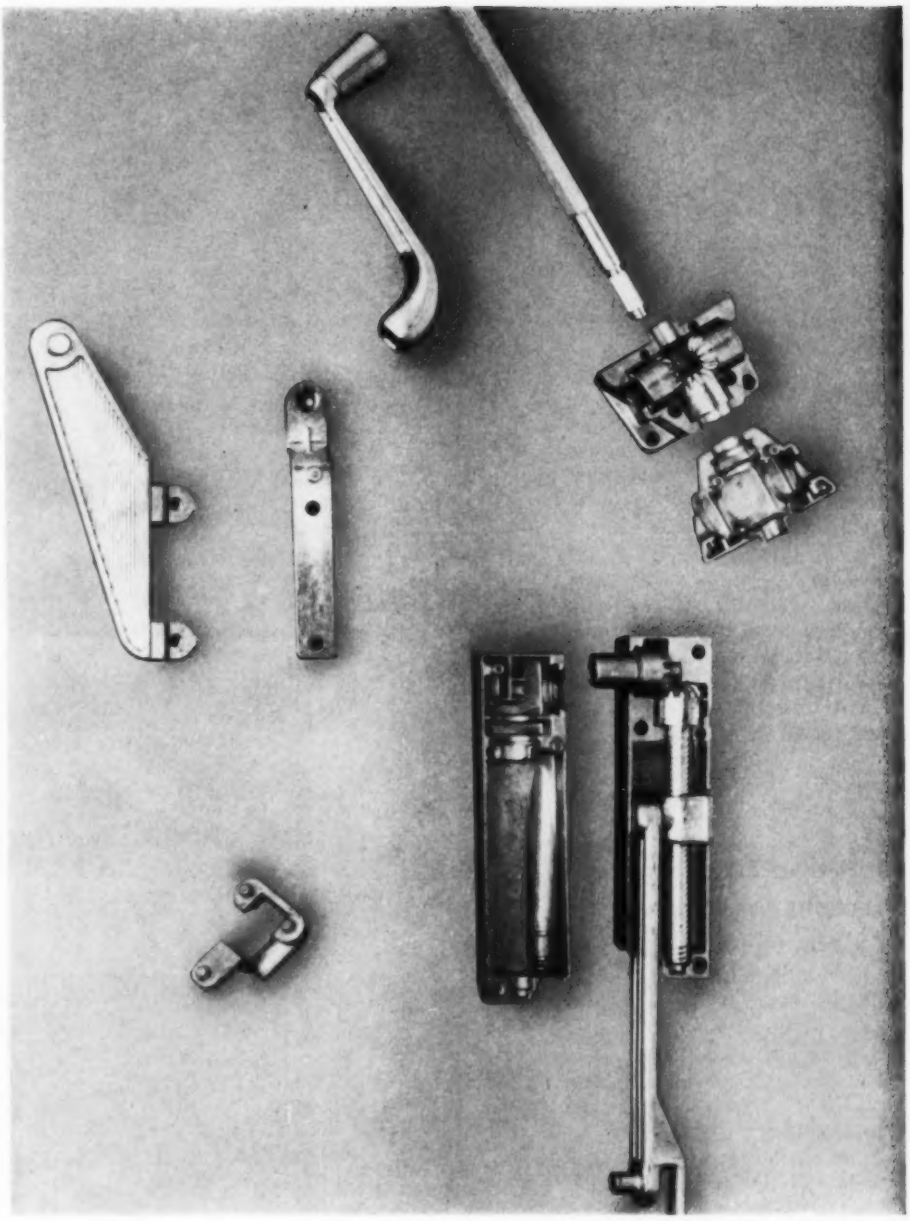


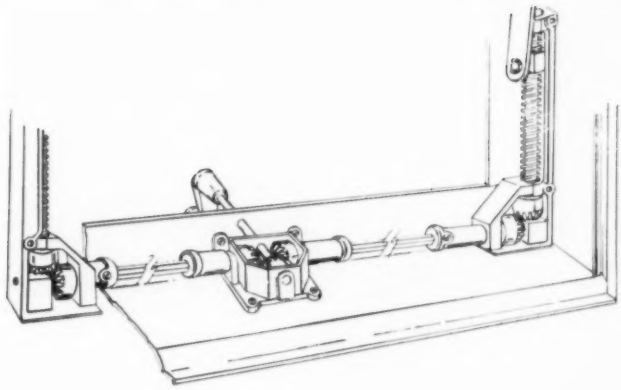
PRECISION is possible in mechanical parts that must have strength and durability.

When the Dennison Company went into production on their unique awning windows which pivot in unison from the top, it could have machined the gears and rods in the actuating mechanism to obtain the precision they needed. But they found that certified* zinc die castings provided all-around performance at much lower cost. Die-cast zinc gears hold close tolerances in the bearing recesses in spite of the corrosive action of the weather; they are strong enough to support the whole work load of opening and closing four panes simultaneously. The jack screw that works the window hinges is encased in a split housing whose halves are mated by means of cast-in rivets, so that they may be fastened tightly to shut out dust and grit. The inorganic finish resists corrosion.

** Parts produced by American Die Casting Institute members under a voluntary quality control system.*

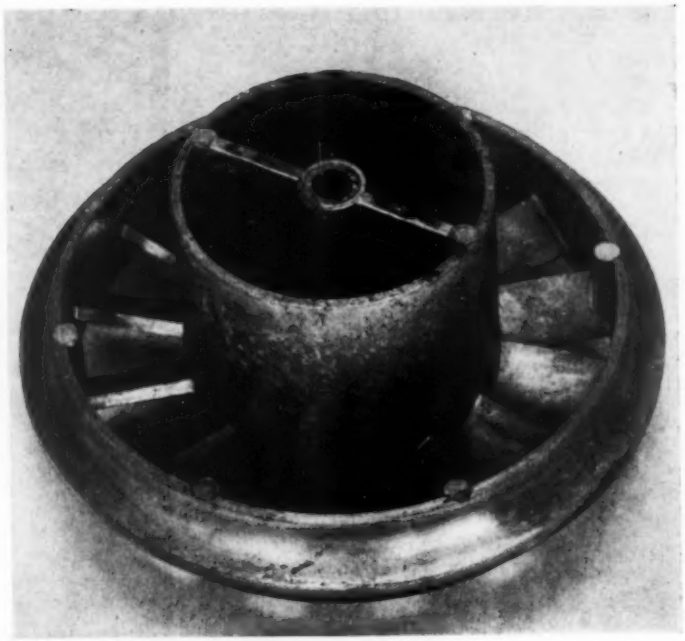


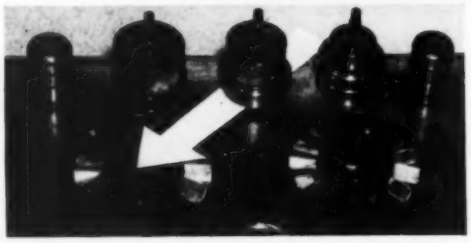




INTERCHANGEABLE CORES produce variable dimensions plus production economies.

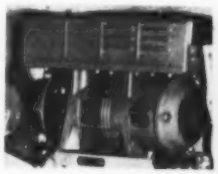
The Donaldson Company's air precleaners, used on trucks and tractors to remove excessive dirt loads from the air before it enters heavy duty air cleaners, had to be produced with three different bore diameters in the central shaft; the intake vanes had always been welded to that shaft after the parts were fabricated from sheet metal. When Donaldson tried to redesign the precleaner, the cost of welding and the problem of holding accurate pitch when the vanes were attached made the change unfeasible. Die casting looked like a possible answer, but there was some doubt about the economy of producing dies for the three bore diameters. The company found, however, that a single 4-cavity die could be designed with interchangeable cores, so that any combination of diameters could be produced. When production costs were tallied, die casting proved to be 33 per cent lower than the old welding method.

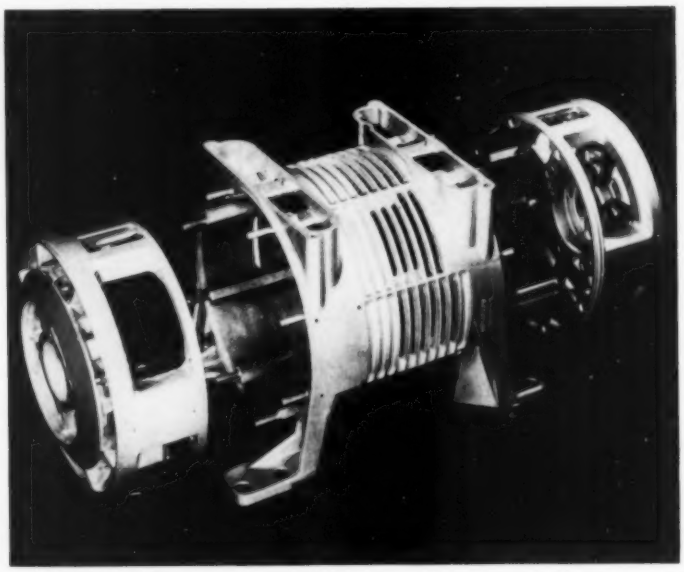




THIN-WALLED sections come out strong and light in weight in a magnesium die casting

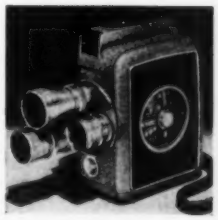
for an aircraft invertor housing made by Jack and Heintz. Used to switch direct current to the alternating current that is needed to run a plane's auxiliary-equipment, an inverter must be light, cool-running and easy to maintain. This new design for the housing, with a completely ribbed center section to cool the invertor, was made by die casting because it permitted intricate coring and close tolerances at a cost 54 per cent lower than the previous model; despite the precision, the cost of the die was amortized on 1800 pieces. Magnesium alloy was specified because it weighs 2/3 of aluminum, has a long fatigue life.



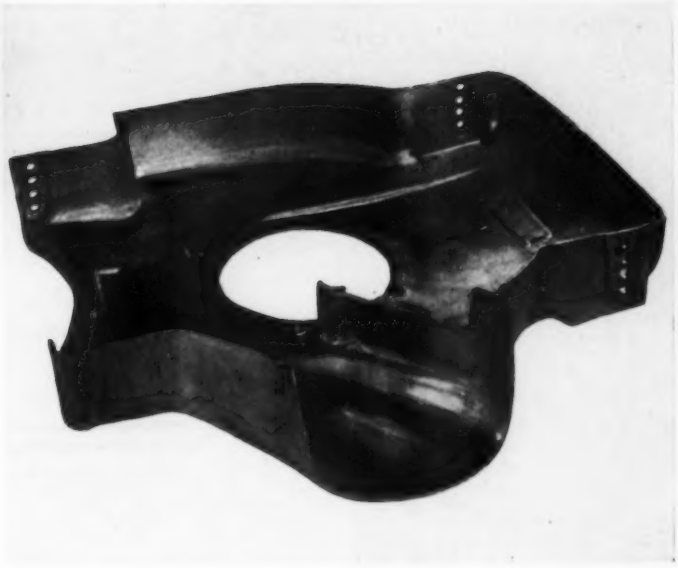


CAST-IN BOSSES and cutouts make compact mounting of attachments an easy matter.

In designing an 8mm movie camera incorporating a turret with three interchangeable lenses for DeJur Amsco Corporation, Monte Levin's problem was to concentrate a great deal of mechanism in a small, precise-looking package. By designing the aluminum housing for a three-piece die casting that incorporated bosses and cutouts, he simplified assembly and made it possible to mount the mechanical components compactly. A lens mounting plate is attached to the front "turret" casting, and an aperture plate behind is fastened to the body through four tapped holes in the main body. A thin groove cast around the perimeter of the side panel mates it with the contour-milled edge of the body casting, assuring a light-tight fit. All three pieces of the housing are cast simultaneously in one die.

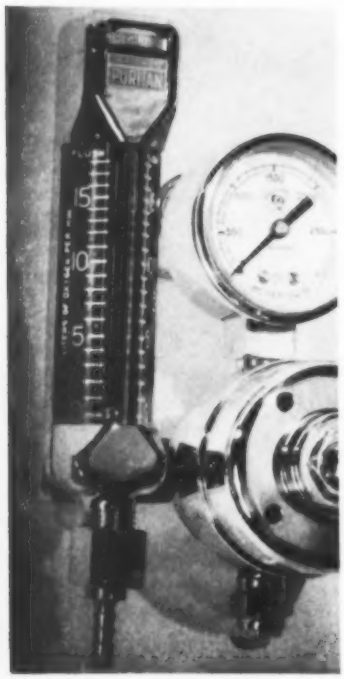


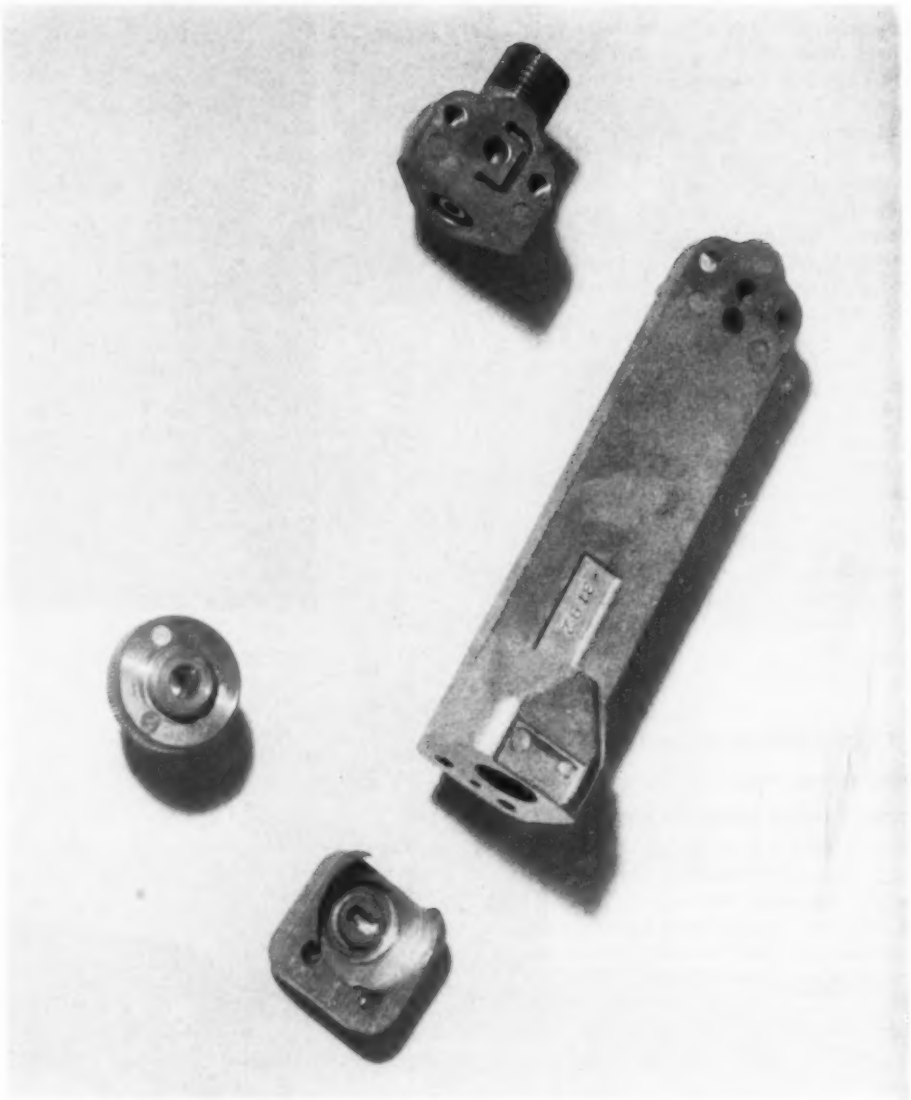
LARGE CONTOURS and complex curves may be designed with varying wall thickness to reinforce the points of stress in a thin, light housing. On the large aluminum casting of the "Craftsman" rotary lawn mower, produced by the Newark Stove Division of Sears Roebuck, the wall is thickened for rigidity beside the circular opening which supports the motor; this opening and holes for mounting wheels and accessories are formed by cores in the die. It was equally easy to incorporate an inset wheel for edge trimming and a large cut-grass discharge outlet in the die casting. Brand identification and safety instructions are cast in the housing as raised letters. The smooth finish of the casting requires only one coat of paint. The raised lettering is simply buffed.

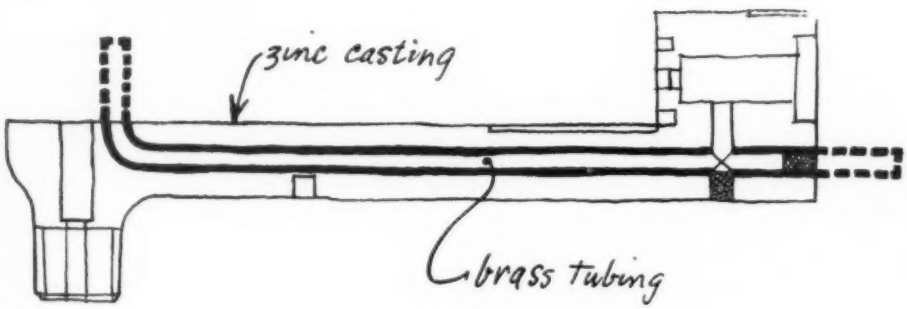


NEW FUNCTIONS may be cast into products to increase strength and efficiency.

The most critical factor in the administration of oxygen is maintaining a predetermined rate of flow. Simple flowmeters have been adequate for the job until recent years, when oxygen therapy has begun to involve higher pressures, medicines and new devices, many of which create back-pressures which disturb the even flow of the oxygen itself. The Puritan Compressed Gas Corporation, a meter manufacturer, designed a new pressure compensating flowmeter that required an integral flow channel for the compensating device; they found that the channel could not be produced by sand casting without excessive machining and drilling, but in a die casting, it could be introduced with very little difficulty: A brass insert tube is simply placed in the mold, and the main body of the meter cast around it; the tubing is then cut flush with the surface, and the meter body has a passage which can withstand back pressures of 150 psi. Four die castings are produced in a four-cavity mold in a single shot, and the finished meter is chrome-plated for corrosion resistance.



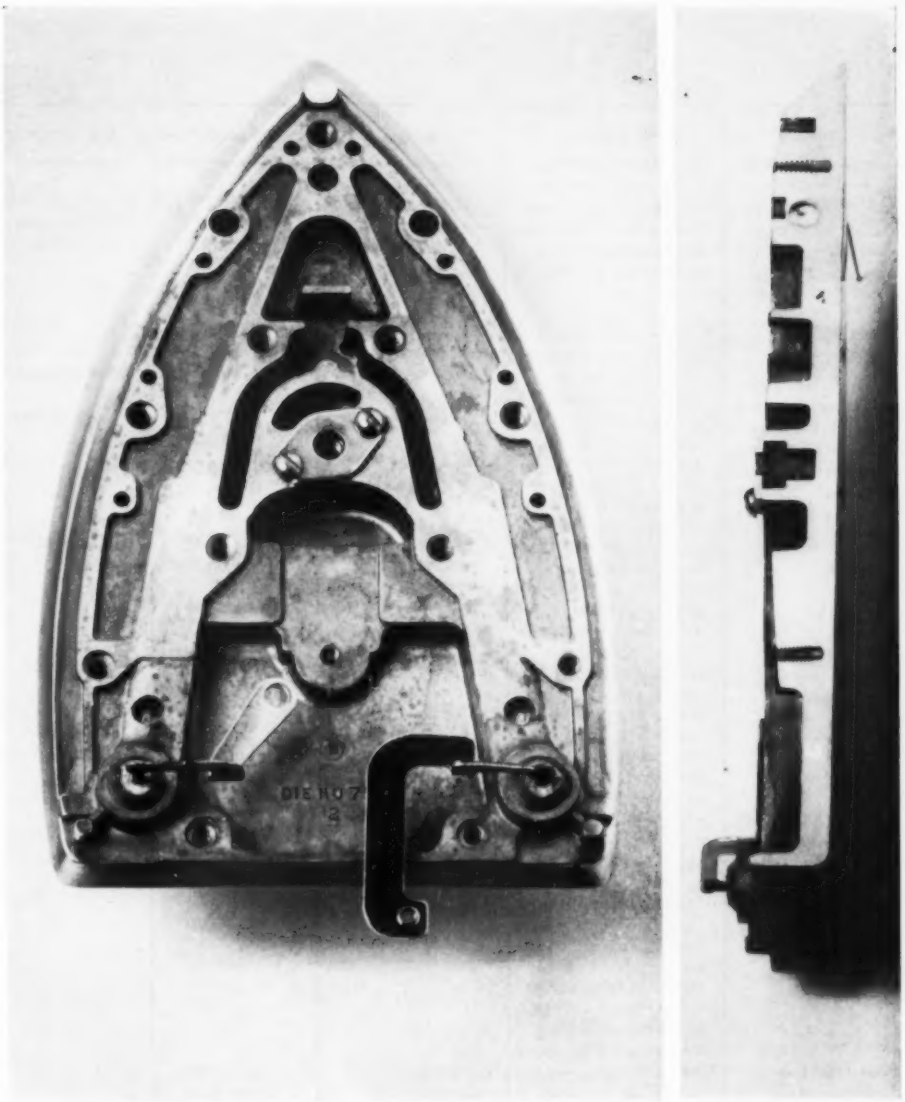


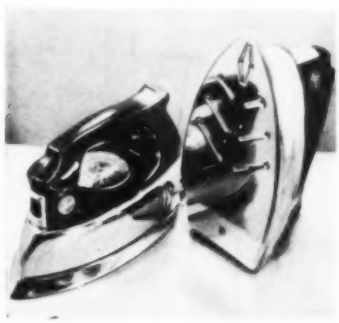


FINISH of stainless steel is bonded to aluminum base by unique new casting process.

A recent innovation by the Hoover Company indicates that die casting may become a truly one-step process, that will be able to turn out a product with inserts, integral parts and a finish too.

Polished aluminum soleplates are commonly used on irons because they are easily obtained by buffing an aluminum casting, and while they have the advantage of light weight, they have a tendency to scratch, burr and discolor. The use of a smoother stainless steel finish has never been practical because of bending and joining problems. These have been eliminated in the new line of Hoover irons by a new method of bonding a .012 stainless steel sheet to the aluminum sole plate during casting. Although Hoover will not reveal the details of its revolutionary process, it is probable that the steel sheet is pre-formed, fitted into the mold, and bonded to the aluminum when the heat of the casting metal acts on an applied bonding agent. The result is a soleplate which combines the good heat-transmission of aluminum, and the smooth hardness of a stainless ironing surface. Because the new iron will not be scratched by metal fasteners and the like, it will not pick up or snag fine threads in nylon, rayon, or silk. In addition to the improved surface, the soleplate has its heating element cast in as an insert — a combination of cast-in finish and cast-in parts which could not be gained economically by any other method of fabrication available today.





A table comparing die casting to other production methods, recently updated, may be found on the following pages.

Comparison of Die Casting with other production processes

Process	Process defined	Materials	Rate of production	Size and weight of parts	Strength of parts
Die casting	Castings made by forcing molten metal under external pressure into a metallic die or mold.	Lead, tin, zinc magnesium, aluminum, and copper alloys.	Very high. Up to 500 shots/hr possible with some parts.	No real size limitation. Size depends upon casting equipment available.	High unit strength.
Permanent-mold casting	Castings produced by pouring molten metal under a gravity head into metallic molds.	Iron, magnesium, aluminum, and copper alloys.	Relatively low. Not a high-production process.	Usually medium or large parts. Between die castings and sand castings.	High.
Sand casting	Castings made by pouring molten metal under a gravity head into molds prepared by packing molding sand around a suitable pattern.	Principally iron, magnesium, aluminum, and copper alloys.	Low. Not a high-production process.	Medium to very large.	Less than die castings or permanent-mold castings.
Plaster-mold casting	Castings made by pouring metal under a gravity head into molds made of gypsum with strengthening and setting agents added.	Any nonferrous material having a melting point of less than 2000°F, except magnesium in large sizes.	Low. Not a high-production process.	Relatively small.	Equal to sand castings.
Precision-investment casting	Castings made by pouring molten metal into refractory or ceramic molds formed around wax patterns. Patterns are removed by melting in the process of firing of the refractory.	Iron, zinc, magnesium, and copper alloys and especially high-alloy steels.	Usually lowest of all processes.	Small parts only. Max weight of part about 10 lb, or up to 20 lb by special techniques. Section size usually limited to 7 in. or less.	Equal to or better than permanent-mold castings.
Powder-metal pressing	Parts made by pressing metal powders in a mold or die to form a "green" briquette of a final shape and "sintering" the briquette to a service strength by a temperature somewhat below the melting point of the lowest melting constituent of the metal.	Mostly copper- and iron-base alloys.	Very high. Up to 1,200 parts/hr on small simple shapes.	Small parts only, except porous filters.	About equal to castings.
Plastic molding	Nonmetallic organic parts molded by injection or compression under heat and pressure in metallic dies.	Thermoplastic and thermosetting resins.	Very high, especially with thermoplastic resins. About equal to die casting.	Small to medium size.	Less than parts made by most other methods.
Stamping and drawing	Parts produced from solid metal by press-forming operations.	Steel, zinc, magnesium, aluminum, and copper alloys.	Very high for small parts made on automatic presses.	From small thin sections to large heavy parts.	Higher than die castings because hot and cold working breaks up cast structure.
Screw-machine production	Parts machined out of solid metal by turning, forming, facing, drilling, or threading on manual or automatic screw machines.	Free-machining compositions of iron, zinc, magnesium, aluminum, and copper alloys.	Very high.	Small parts only.	Slightly higher than die castings.
Drop forging and die pressing	Parts produced by working a billet of hot metal to approximately final form by repeated hammering or pressing while enclosed in a suitable die.	Steel, magnesium, aluminum, and copper alloys.	High.	Small to large.	Highest of all processes.

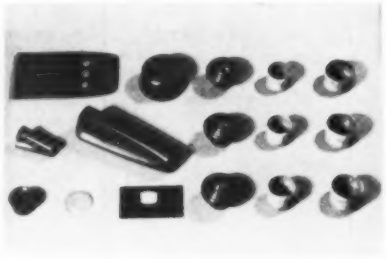
 Omitted from this table for space reasons is a column on use of inserts, which are practical in die and permanent-mold casting, powder-metal pressing, and plastic molding.

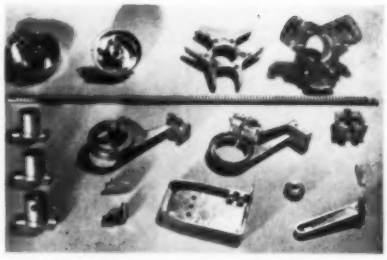
Wall thickness	Complexity	Appearance and finish	Cost	Applications
Very thin; up to 1 in. or more max.	From simple to very complex.	Excellent. Can be finished with variety of mechanical, plated, chemical, or organic finishes.	High equipment cost, high tool cost, and low labor cost. Low part cost on high-activity items. Machining, grinding, and other operations usually not necessary.	Structural parts, machine elements, and decorative members and parts for automotive, business machine, electrical appliance, and all other high-production industries making both industrial and consumer products.
Not so thin as die castings, but much heavier sections possible.	Usually not so complex as die castings.	Usually machined or ground but left with base-metal surface.	Medium equipment cost, high tool cost, high labor cost. Fairly high part cost.	For parts similar to sand castings but which must have superior surface finish, closer tolerances, and better strength in as-cast condition.
Must be heavier than die castings and permanent-mold castings. Can be cast in sections 1 ft or more.	Housings and hubs represent average degree of complexity.	Inferior to die or permanent-mold castings. Usually machined or ground but left with base-metal surface.	Low tool cost, high equipment cost, high labor cost. Part cost between those of die castings and precision castings.	Gears, framing members, housings, motor blocks, and structural members when cast structure having relatively low strength and resistance to impact is satisfactory. Usually limited to cast iron and cast steel for industrial equipment.
Not as thin as lead, tin, or zinc die castings, but sometimes equal to die castings of aluminum, magnesium, and brass.	Usually not so complex as die castings or permanent-mold castings.	Excellent.	Low tool cost, low equipment cost, high labor cost, fairly high part cost.	Various engineering parts, mostly of brass alloys.
0.040 in. min $\frac{1}{16}$ in. prescribed min. Tolerance on walls no less than 0.005 in. min.	Intricate shapes not readily made by machining, forging, or sand casting can be produced.	Equal to die castings, but usually left with base-metal surface.	Low equipment cost, low tooling cost, high labor cost, high part cost.	Small intricate parts made in limited quantities, usually from high-alloy metals such as stainless steel, Inconel, Hastelloy, etc.
Depends on design; sometimes thinner than die castings. Min about $\frac{1}{32}$ in.	Small gears represent about limit of complexity. Almost any shape in direction of press ram movement.	Good but porous. Usually left with base-metal surface. Difficult to plate.	Medium equipment and tooling cost, low labor cost, low unit cost when made in large quantities.	Small mechanical components, electrical parts and filters when low strength and resistance to impact is not detrimental. For parts, like bearings, when impregnation with lubricant is desirable.
Sometimes thinner than die castings, but such sections have little strength. From $\frac{1}{8}$ to $\frac{5}{16}$ in. preferred max thickness.	Equal to die casting.	Excellent. Can be molded in variety of colors and with excellent finish.	High equipment and tooling cost, low labor cost, low part cost on high-activity items. Machining, grinding, or subsequent operations usually not necessary.	Structural parts and housings especially in consumer products, toys, novelties. Usually used because of excellent appearance, good thermal and electrical insulating properties, and ability to be welded in complex shapes.
From thin gage sheet to plate 1 in. or more in thickness.	Simple shapes only.	Dependent almost entirely on finish of sheet or plate stock used.	High tooling and equipment cost, low or medium labor cost, low unit cost in large quantities.	Parts that can be punched, pierced, drawn, or formed from sheet metal or plate, especially for parts to be welded or brazed into assemblies.
Depends entirely on part design and stock used. Thinner than die castings in many instances if part is small.	Relatively complex shapes such as can be turned, drilled, and rolled.	Generally has some tool marks.	High component cost, low tool cost, low labor cost, low unit cost.	Small mechanical elements made from tubing or bar stock, small crank pins, screws, studs, parts for mechanical pencils, watches, etc.
Must be heavier than die castings.	Fairly complex.	Inferior to die castings. Usually left in base-metal state.	High tooling, equipment, and labor costs. Low unit cost on high-activity items.	For medium-sized and large parts that must have very high-impact tensile and compressive strength and excellent mechanical properties in general. Greatest production in ferrous alloys. Shafts, gear blanks, gas turbine impellers, sleeve bearings.

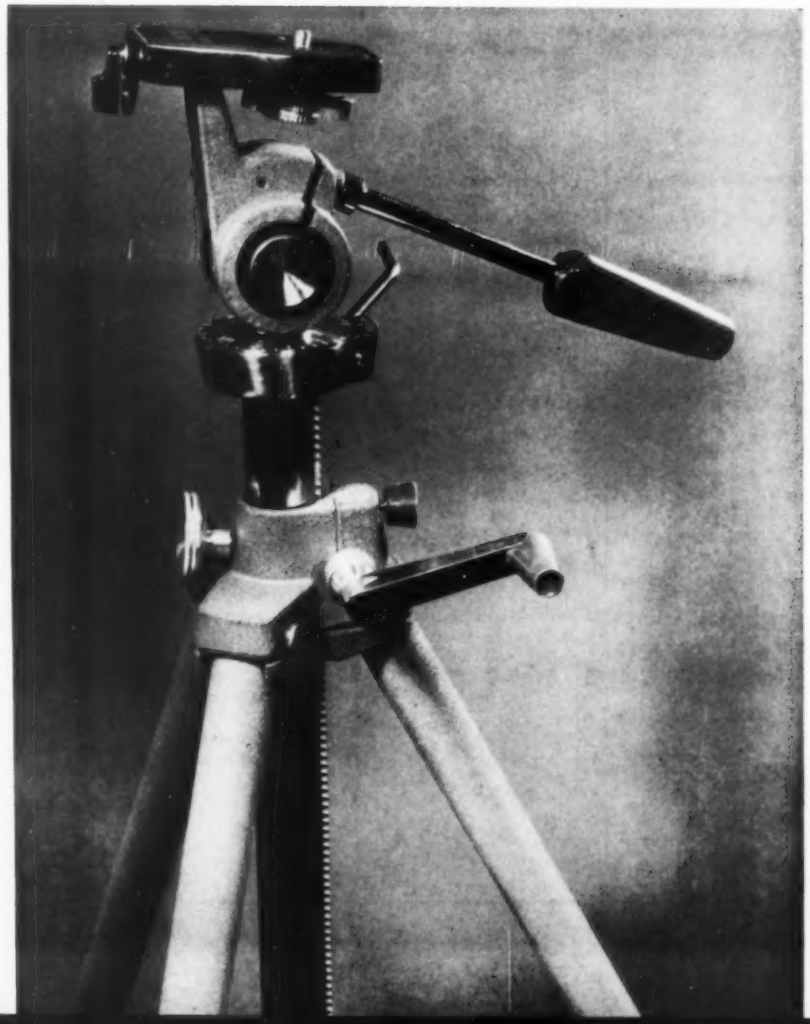
REdesign

Tripod with plastic parts combines versatility and low price

One tradition in tripods, as in many other products, is that the price goes up with each feature that is added to them. Recently, however, the Testrite Instrument Company of New York broke the rule by introducing a versatile tripod of deceptively simple appearance that offers many features not generally found in competitively priced models (list is $22.95): a crank-driven, horizontal, 360° panning and panorama gear with 10° indexing; 90° side-tilt to permit vertical and horizontal exposures without a remounting of the camera; elevation-angle calibrations on the sides of the tilt-top; a spring-loaded safety pawl which engages the elevating post rack. The price has been held down by an extensive use of self-finish plastic moldings and original die castings. There are 17 die castings in each assembly, made of high-tensile Zamak No. 5. Largest of them is the toothed post rack, which is 15″ long and gives the panhead a 12″ crank-elevator rise. Castings with integral pins and channels simplify the parts and their assembly, and make for economy. Each tripod has 16 plastic parts, utilizing five types of plastics: heat-formed, clear, rigid vinyl sheet; molded, elastomeric vinyl; molded nylon (worm gear); molded normal-grade polystyrene; and molded impact-grade polystyrene (Dow Styron 475). The small photos to the right show separately all of the plastic parts and all of the die castings that go into one tripod assembly (in addition to tubular aluminum and steel sections, rod stock, metal stampings, screw-machine parts and metal fasteners, which are not shown dissembled). The overall appearance of the tripod, in its various finishes, is clean. The legs are in three sections, and its weight is 5½ pounds, its height 77″ when fully extended, 30″ when closed. The designer was Felix Gilbert. Die casting by Adept Die Casting Corp., custom molding by Queen City Plastics.







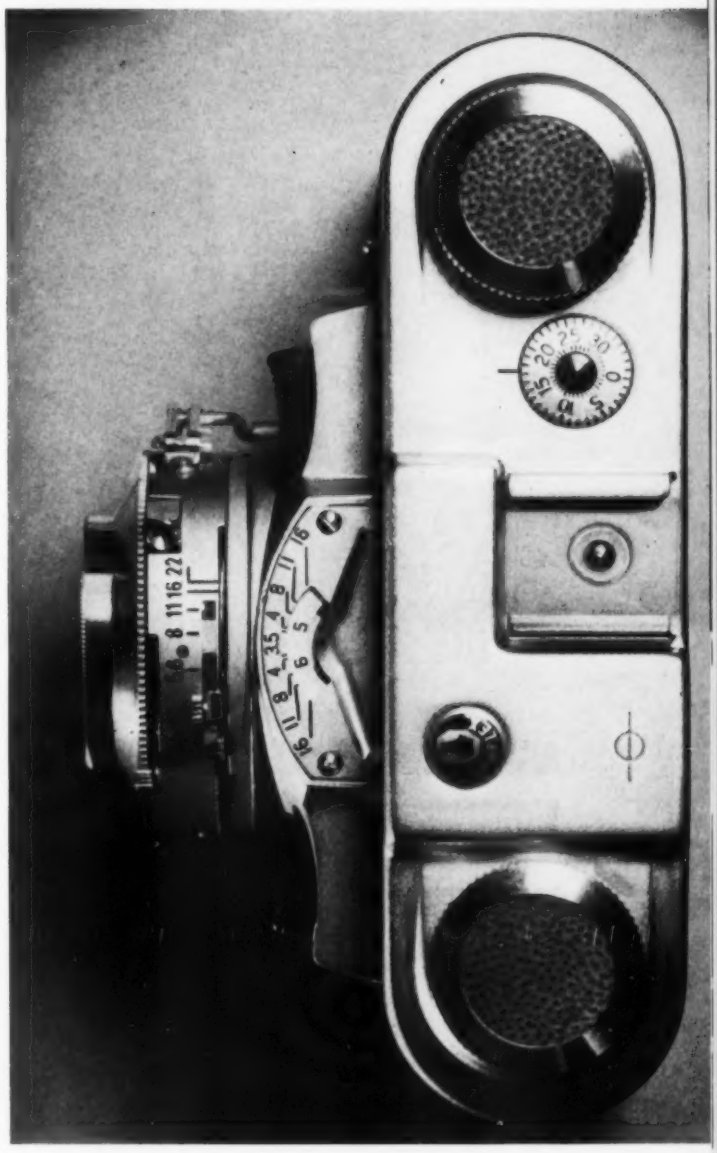
New 35mm. Graphlex can be focused with a flick of the finger

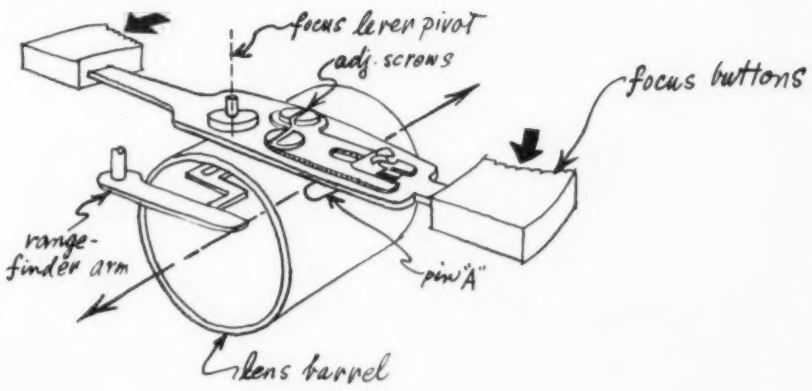
To minimize jiggling and hand movement while pictures are being taken, a new kind of push-button focusing is offered on the "Graphic 35," designed by Frederick S. Grover Associates in collaboration with Graphlex engineers.

The conventional focusing knob or dial on the side or top of the camera has been replaced, on the "35" by a pair of front focusing buttons that rock on an internally-situated pivot pin. When the photographer holds the camera in a normal viewing position, his right and left index fingers easily reach two buttons; by pressing one or the other, he extends or retracts the lens mount and brings the subject into focus. He does not have to move his hands at all to operate the shutter release, which is placed directly below the right focusing button.

This is a 35mm. camera of all-metal construction, with a satin chrome and black enamel finish and a covering of gray leather. It has a 50mm., f 3.5, color-corrected lens, shutter speeds from 1/300 to one second plus bulb and self-timer, and a lens-coupled, split-image range finder. There is automatic double-exposure prevention, with means provided for intentional multiple exposures. Integrated into the depth-of-field scale (located centrally on the camera in the photo) is a "spectramatic" color-coding system, which enables the photographer to make quick color-flash adjustments at a fixed shutter speed of 1/50, simply by matching the color indicated on the depth-of-field scale with an identical one located on the diaphragm beneath the aperture markings.

Camera, case and flashgun list at $89.50.



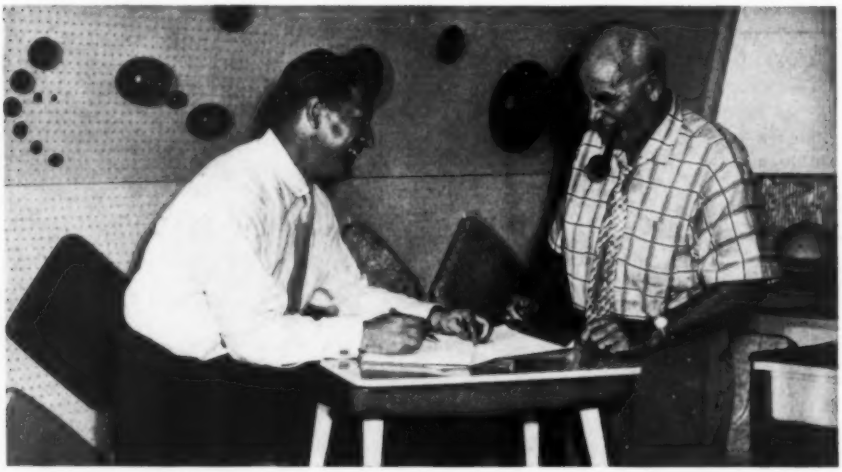


CASE NO. 1

The company *Hawley Products Company, St. Charles, Illinois*

Its specialty *Molding products from fibrous and other materials in shapes and contours which might be difficult with ordinary methods.*

The problem *Diversification: finding new product uses for low pressure pulp-molding equipment.*



President Don M. Hawley (right) and designer Jon W. Hauser.

Background

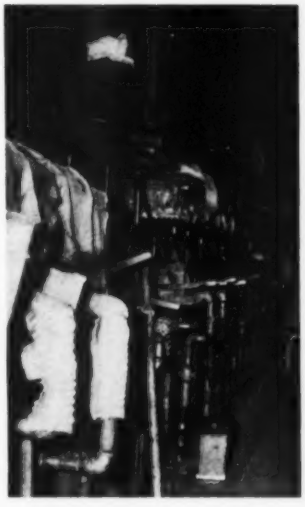
Hawley Products Company was born at the depth of the depression, on the hope of a new product and a new process: a one-piece speaker diaphragm molded of cellulose fiber. The company originally making one-piece cones collapsed in 1931, and the inventor, Jesse B. Hawley, picked up his patents and struck out on his own. His patents covered a low-pressure wet-molding process that resembled paper-making: fibers floating in vats of water and resin were vacuum-formed around cone-shaped perforated dies, then heat dried. Because the fiber cones had good acoustical qualities, Hawley managed to stay in business.

Diversification

In 1933, Hawley tried an imitation pith helmet of molded pulp. Not only was it a sensation at the World's Fair, but it led to a large contract for a sturdier pulp helmet for the Army.

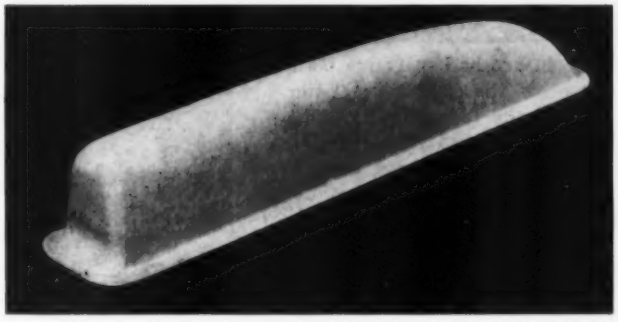
With the wartime shortage of materials, molded pulp became an ideal material for shell packing, rocket fairings and foot lockers, not to mention helmets. The firm spilled over into new plants, and made 4 million helmets by 1946.

Then business collapsed as dramatically as it had begun, and the founder's brother and successor, Don M. Hawley, faced a not uncommon plight: what could be done with all that equipment?



Exploration

Hawley's first postwar contract was a molded typewriter case for Royal, developed by the new Director of Research, Jack Williams. It was substantially lighter than the old wood cases, and easier to make because of the adaptability of the process to deep contoured shapes. When fiber glass was unveiled in 1948, Hawley tried making an aerator tube by "air felting," the only known method of preparing a cut glass preform for molding with resin. The experiment convinced them that glass and cellulose fibers combined would make lighter and stronger materials; but it couldn't be done by Hawley's existing wet-molding process, because the glass filaments tended to absorb water.



Development through design

After the success of the Royal case, Don Hawley felt ready to move on to bigger things. Sears Roebuck wanted a suitcase which would be both light and inexpensive, and Hawley prepared a model made of cellulose reinforced with sisal fibers and resins. It *did* prove that large shells could be molded, but when it was finished, the case weighed 13 pounds, 4 pounds too heavy for Sears, and cost 40 per cent more than the price goal. Sears dropped the idea.

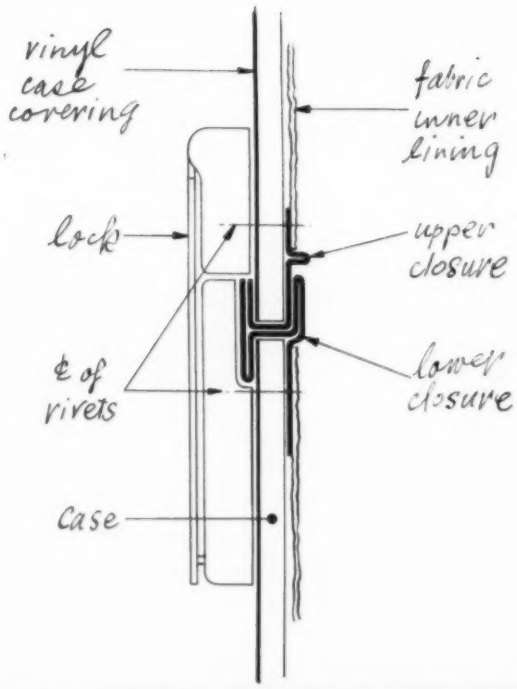
But Hawley continued to experiment and came up with a second design which indicated that cost and weight could be cut. So in 1952 when American Tourister luggage came to inquire about molding a line of luggage, Hawley was prepared to say it could be done.

Sears' model, 1949

American Tourister Tri-Taper, 1954

Shells

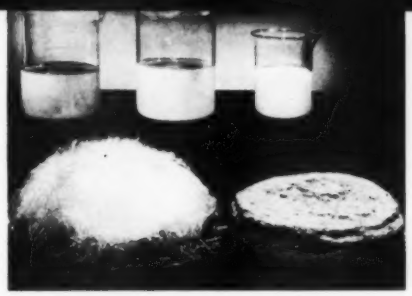
Designer Jon Hauser was called in to work with Tourister in developing this new kind of airweight luggage. His primary job was to eliminate weight through shape, by a basic design which would be suitable to matched pieces in nine sizes, and easy to mold and cover. It was this need for strength and lightness that gave a final push to William's fiber glass research: the Aqua-Glass process was finally perfected (see opposite), making possible the thinner sections which meant weight saving. The simple straightforward "Tri-Taper" shells which Hauser designed have walls 7 to 10 mils thick, with a 20 per cent increase at the corners. Except for one traincase with a shallow lid, all of the cases are made from two identical molded shells, simply by trimming them differently.



Closure

The closure had to frame both halves of the case, conceal the edge of the fabric lining, support the hardware, and resist salt, heat, and impact with a minimum of jamming or springing. After considering several materials, Hauser decided that the most practical choice for the complex frame section (see drawing) was brushed stainless steel.

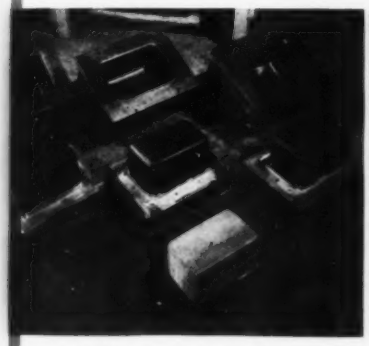
New hardware for Tri-Taper, by Hauser, 1955



Aqua-Glass Process

The patented Aqua-Glass process, by which glass fibers can be used to reinforced molded cellulose for the first time, involves coating each fiber so that it does not absorb water. Step by step, the luggage is molded this way:

1. A material is mixed in a vat: fibrous glass and cellulose fiber in the desired proportion, vinyl resin, synthetic latex emulsion, melamine and polyester resins. (A moderate proportion of fibrous glass doubles impact and flexual strength without increasing cost much.)
2. A perforated die rises in the vat, accumulating fibers as the water is vacuumed away. A greater number of holes draws more fibers to spots where thickness is desired. (A complete tooling for one shell includes one forming die and three sets of molding dies, costs about $12,000 in cast iron, lasts about ¼ million units.)
3. The wet preform, rigid enough to handle, is placed in a hot molding die; a small amount of resin is added, and mold is closed for 2-3 minutes.
4. The cured shell is machine coated with a printed or embossed vinyl film laminated to a cloth backing, then trimmed.

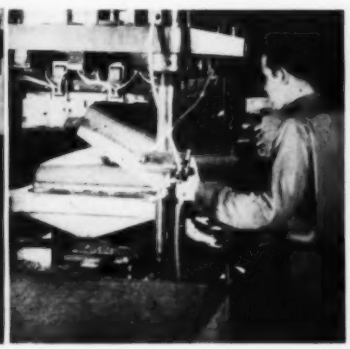


Tooling for one Tri-Taper shell: one perforated preform die, three sets of molds. The cut glass is mixed in a master vat with cellulose fiber and various resins.

Preform is molded with resin, then is given a vinyl covering.

Fed into molding vat, the liquid is vacuumed away as die rises and collects fibers. Wet preform is removed from preform die, which drops and repeats cycle.

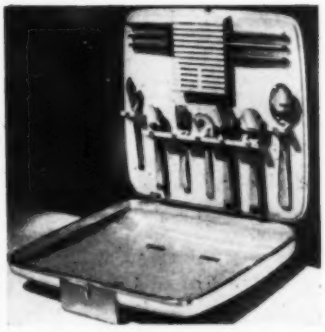
After shell is trimmed, hardware and lining are attached.

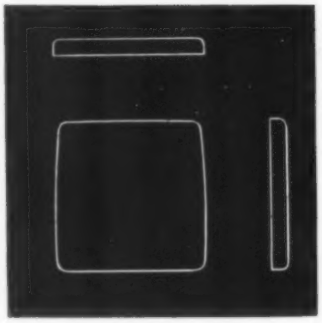


Continued diversification

through design is now a policy at Hawley Products, and for a good reason: it has a large investment not only in pulp molding equipment, but in special die forms which virtually never wear out. It occurred to Don Hawley not long ago that these forms might be turned into a variety of new products, and he has retained Jon Hauser to work out uses for these basic shapes. For example: a 24" world globe die has been used for a dog bed and a radio housing; from the original Royal typewriter case die, another portable radio and a silver storage case were developed; luggage forms have been transformed into such things as hampers, magazine racks and toy chests. Everybody at Hawley Products is a little bit of an inventor, and ideas for new molded items come from all sides — from the plant to the president—and Hawley's enterprising executive group work them out with Hauser. (Shown above, left to right: Mano McLaughlin, manager of the newly formed consumer products division; Don W. Hawley, assistant to the president, and A. P. Akerlund, vice president.) On a trial basis, Hawley will soon sell some of these products to stores in the Chicago area. But the design projects also serve another function, which is possibly more important in the long run: they stimulate other manufacturers' thinking about molded materials, and help overcome mental blocks about what fibrous material can do.

President Hawley's regards design as not only a normal but an essential part of the company's operation today. "A year ago we had a wonderful material and didn't know what to do with it; we needed designers to help us understand the possibilities and uses of the material, to help develop them properly — and still do." He seems convinced that he has a material and a process with a million sales possibilities — if they just keep dreaming them up.





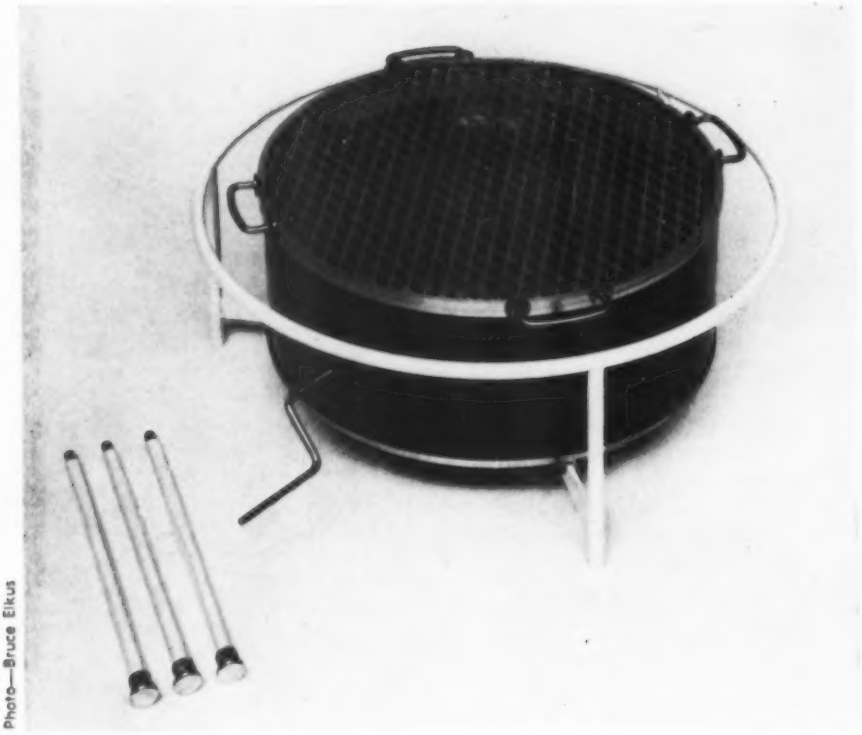
On the next 15 pages:

DESIGN REVIEW

At the midwinter housewares show there were enough barbecues to sink Navy Pier, and it seems that all of them have found their way into the stores—
—the biggest thing since Scrabble.
The problem of evaluating them does not rest alone on the dizzied consumer, who must decide which grill will do well by his steak and his reputation; it also rests with manufacturers who have to decide just what people want, and what works. Obviously, there's fun in outdoor cooking, but much of it is done for a tastier result—and the success of the cook-out can be built into the brazier. This business of cooking on an open fire wasn't such a mystery to the Indians, and though we have complicated it, most of the primitive rules still apply to grill design: First, heat must be controlled, by lowering the fire box or raising the grill. An alternate arrangement is a swing-around grill over a large fire bed, which permits moving food to a low-fire area. Also, ventilation is a major consideration in heat control. Too much draft, like a blacksmith's bellows, creates a fire too hot for cooking. Broiling above a fire, the usual outdoor method, has one major problem: fat drips into the fire, burns, and flavors the meat with a bitter taste. A layer of sand beneath the charcoal will absorb grease, but the problem is avoided by vertical broiling in front of a fire, because drippings fall into a pan beneath the food instead of into the fire. Besides eliminating the flare-up problem, this means that bastings and marinades can be applied, and all roasts, fowl and fish taste better if basted. Cooking on a rotisserie, or turning spit, creates self basting that causes juices to be re-absorbed instead of dripping into the fire. A shiny hood around the turning spit, or around skewers, holds and intensifies the heat. Smoke cooking imparts a wonderful flavor to foods, but it is not achieved by covering a fire with a lid, even a vented lid.
Good smoke cooking means slowly cooking food about 40″ above a hardwood fire.

DESIGN REVIEW: *Barbecue Equipment*

What does barbecue equipment look like this year? There are no rules — everything is being tried and apparently anything goes. One thing is sure: you can spend as much on a grill as on a range, and some manufacturers make an effort to deliver an appliance's value in terms of practical features that give better tasting results in virtually any kind of cooking. Since the ritual of cooking out sometimes seems more important than the practical challenges, some very elaborate devices have been constructed to make it painless. A whole kitchen on one portable grill, including electricity, is one trend — and if you can't carry it, it's got to have wheels.

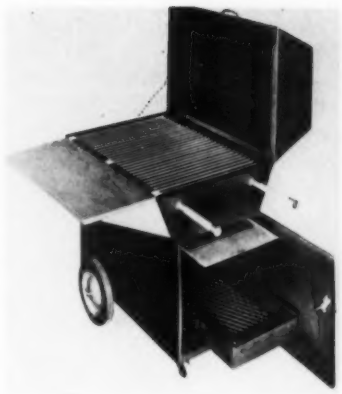


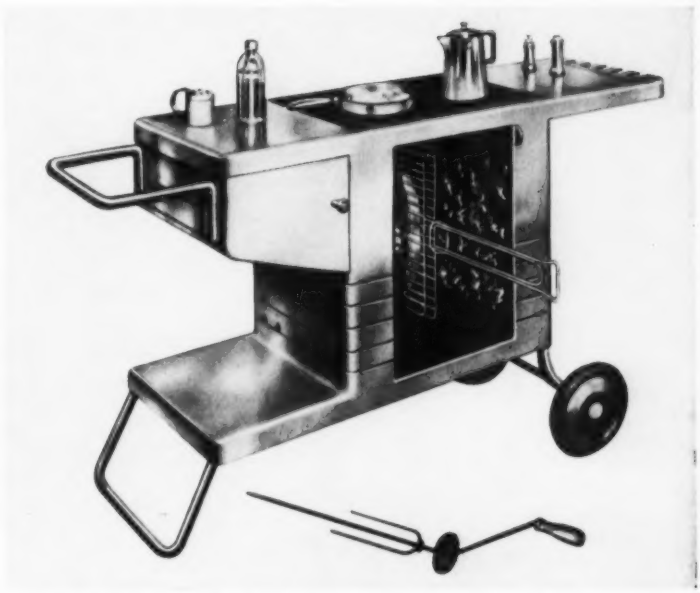
Photo—Bruce Ekus

Landscape Structures Inc. produce the most classic design of the season. The fire pan is a separate unit within the black band, which acts as a windbreak. A crank raises and lowers the fire. The grill is cast tempered aluminum, and all other parts of the unit are of the same material. The white legs and black frame are finished in several coats of baked enamel. Extension legs raise the grill from the ground. A self-leveling device on the legs balances the unit on uneven terain. Grill diameter is 23". $153.00.

Right column, top to bottom: **Meigs** Portable Kitchen is cast aluminum; when closed the unit is like a large roasting pan with a bottom vent. The extension shelf has a grease retaining edge, so it can be used on top of the fire as a utensil. The aluminum rack folds flat. $59.95. **Prizer-Painter Stove Works'** cast iron charcoal grill works like a miniature furnace. It has a rotating charcoal holder at its waist; a handle at the back shakes ashes down into the base where a damper door conceals and collects them. Legs are detachable. Grill top is cast iron enameled green, like their line of pots and pans. Larger size, 22" grill, $27.95. **Griswold** barbecue grill consists of three cast iron pieces: grate, grill and oven body. Diameter is 12", depth is 5". $8.95. A cast iron grill absorbs grease, so sticking is minimized. Cast iron also holds heat well. **Burr-Southem Corp.** solves the problem of a side fire with a vertical firebox. Coals are fed into the top, leaving food undisturbed. For small portion only one pan is used.

↓ **LeJohn Manufacturing Co.** Chuck Wagon grill is made of Redwood and square extruded aluminum tubing finished in baked enamel. It matches their line of patio furniture, designed by John Jenkins. Ice chest and grill are separate units; wagon alone costs $36.00. Grill is $18.00. **Landscape Structures**, manufacturers of the round grill on the opposite page, also produce this all-aluminum broiler cart. Framework has a baked enamel finish in black; the cylinder-frame for an inner-firebox has a red-orange enamel finish. Removable maple sideboards are mounted on pivots. Grill top is 30" square. $240.00. **Hasty-Bake** charcoal oven (*top, center*) is typical of the items in their line, which all feature a hood. Fire pan can be used in three positions. Black painted steel. $129.95.

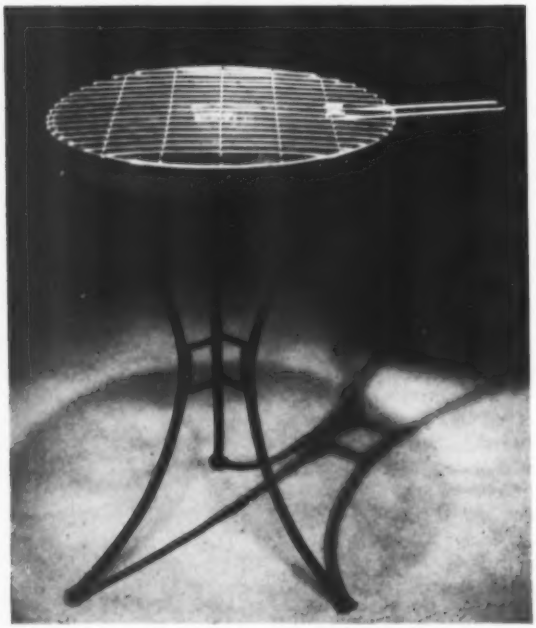




↑ → **Goodwin of California's** original line of plain round grills has been loaded with accessories. Brasier here (*top, right*) is hardly visible. The charcoal "miser," a bowl divider that permits building of a pie-slice of fire for a small steak, or two-temperature areas, is a Goodwin feature. The elaborate stainless steel hood can be used closed, or one half of it folds up so that the lower half-shell, which holds the skewers or spit, acts as a windbreak and heat reflector for the food. Grill-hood combination, $119.95. **Master Metal Products'** deluxe grill (*large picture*) has two vertical fire compartments, both adjustable. Heat is also utilized at the top, where food can cook on grillwork. Door at left opens warming oven. Two accessories fit between fires; a steak broiler and a revolving barbecue spit. Painted steel, green with red trim. $49.95. **Royal Chef** grill is aluminum trimmed with green and yellow. The firebox in the center of the body has a stair-step grid adjustment. Spit and spit support are included, and two aluminum pots fit into frame. $29.95.

Another trend within the trend is simplicity. Many manufacturers have perceived that it doesn't take a great deal to grill a frankfurter, if that's what you want, and the bulk of barbecue business seems to be in portable picnic grills. For this use the important considerations are that they be small, light and inexpensive. None of these units can supply vertical fires or rotisseries — and some have an Unadjustable Fire, the cardinal crime in higher-priced grill design.

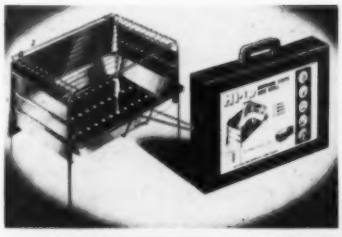
picnic grills



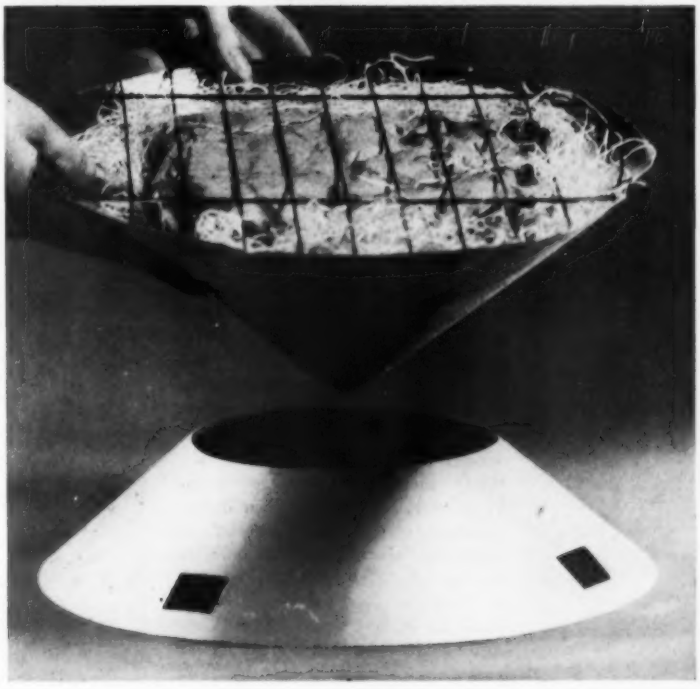
Titan picnic brazier (*above*) has a 19″ fire bed and detachable legs; packs into cardboard box for travel. Draft-check bottom controls flame once fire has started. Two-handled grill folds in half for turning steak. Pan is copper painted steel, legs are steel painted black. Design by Rudolph Boehme. $7.95. The round brazier (*below, left*) is typical of many on the market. This by **Leighton Products** has a damper control, an 18″ diameter and legs that detach and fold. Pan comes in red, green, yellow or black, with black legs. $5.98.

↓ The two pans directly below are the contributions of large canning companies. **National Can's** plaid picnic grills have baked-on finish; handy bail handle. Charcoal burns in an inner bucket. This is part of a line of matched picnicking equipment designed by Harry Prebble. $2.98. **Continental Can's** Sizzle Bucket has a cover that converts to a frying pan. Grill handles telescope, to fit under cover. Slits around body are for damper control. Heat-resistant enameled body. This is also recommended for use as a heater. $6.95. **Poloron** brazier has detachable legs that can be telescoped so that the bowl rests on top of a single tripod. All-steel construction, 18″ grill. $8.95.

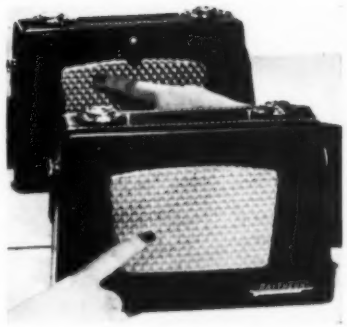
↑ ← **Hasty Bake** "Sportsman" model (*above*) is a neat box 17″ long and 11″ wide. When closed it looks like a piece of luggage, is equally ready to travel. $24.95. **Weber Brothers** grills are called Bar-B-Q Kettles. Like Hasty Bake, they also recommend use of a cover (and vents) for controlled roasting. This model is their portable; legs unscrew and fit inside the bowl for traveling. Grill is 14″; unit is finished in black silicone paint. $12.95. **Union Steel,** manufacturers of the shopping-cart-like grill on the extreme left, also produce the Hi-Lo Picnic Stove, which also has a 4-level heat range. Fire pan is simply raised to fit on another pair of grooves, like broiler in an oven. Parts are flat and few and fit into a compact case. $4.95.



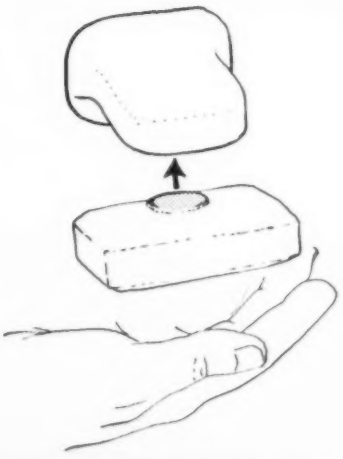
↓ **Union Steel's** grills are called the Hi-Lo line, because they all have adjustable fire pans. The model below has side grooves to hold the pan at different heights. The entire waist-high unit folds down to fit a storage carton 39″ x 16″ x 6″. Handles and legs are tubular steel finished with Kromolite, casters are lucite, sides are enameled. $10.50. **Winro, Inc.** manufactures the PDQ grill (*lower right*), a disposable barbecue, which pretty well sums up the casual picnicker's needs. A neat carrying case contains a cone made of asbestos with aluminum foil coating, packed with excelsior and charcoal — and topped with a metal grill. The vented cone fits into a collar—that was the cover. It burns for about an hour, then you throw it away with the trash. $.75.

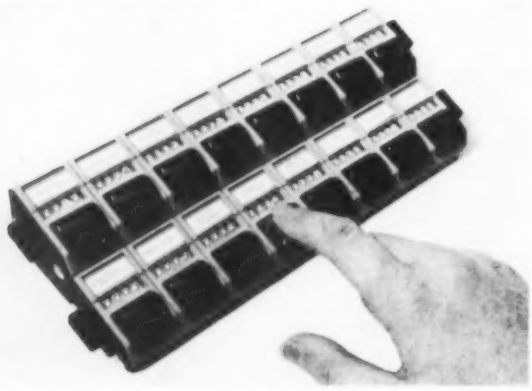


The collection of products on these pages have only one reason to be together: they are designs which grew out of an inventive idea in the way they were put together, or the way they work. Often these new avenues of approach affect the way other products will work and look in the future.

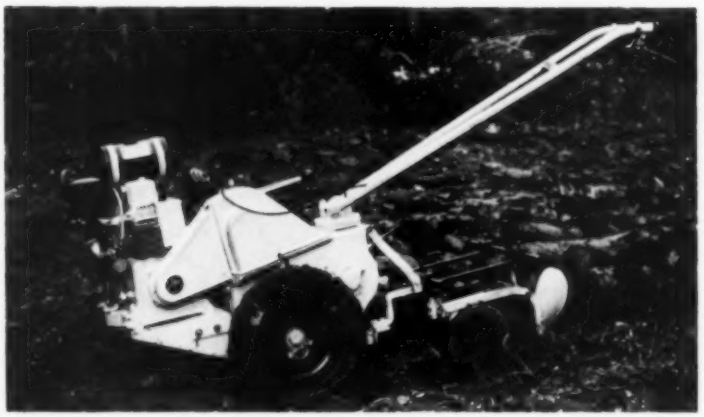


→ **Raytheon's** new portable transistorized radio has front and back speaker grilles. Back sound adds volume and tone usually lost in small radios. The wooden case is leather-covered. $79.95 for red or black, slightly more for natural tans or brown. **Automatic Electric Co.** telephone has been contoured so that a carelessly re-hung handset will settle into its cradle. The redesigned handpiece is shorter, lighter, and its earcap seals more effectively to the ear. The material is Tenite. Styling by Joseph A. Hill; mechanical design was developed in the company's laboratories. **Klik** is the name of a magnetic soap holder from Denmark. A permanent magnet is imbedded in a plastic wall mount and a small metal cap is pressed into the soap. — Voila! **Allen & Simmonds**, a British firm, offer a mechanical gardener that will plough, hoe and cut grass; and its power-take-off shaft will operate a hedge-cutter, edge trimmer, or pump — for spraying insecticides or irrigating. About $250.

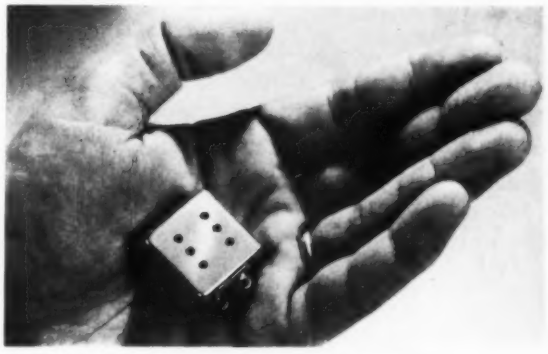


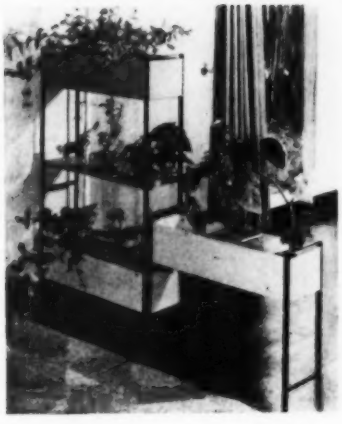


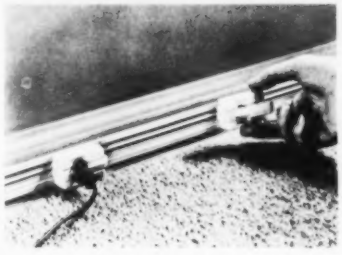
↑ **General Electric's** new portable budget television set encases a 14" picture tube in a unit that weighs only 32 pounds, and is only 17" deep. Enameled steel case is ivory with grey or terra cotta. Antenna is built-in. Two-tone models, $120; an all-brown case costs less. **Veeder-Root Inc.** manufactures a small multi-unit counter called Vary-Tally that is used to obtain numerical breakdowns of anything countable. Metal construction with plastic tabs. Design by Peter Muller-Munk & Associates. Sets are available in assemblies up to 6 tiers high and 12 units wide. Combination above, approximately $110.00.



↓ **Telex, Inc.** has developed a miniature speaker-microphone for use in dictating machines and similar instruments. It is smaller than a 1" cube and weighs less than 2 ounces. **Jefferson Electric Company's** little clock has an interesting mechanism. A motor in the base turns a gear which rotates the clear glass face. The hands are joined to the face, and as the glass turns it moves the minute hand — which in turn motivates the hour hand. Base and outer ring are gold plated, inner ring is chrome. $24.95. **Gottschalk Sales Co.** has introduced modular boxes for indoor plants that can be put together in many different arrangements. Frames of black strip steel have continuous perforations so that the planter boxes and shelves can be placed at any height. Colors are terra-cotta, grey and yellow-baked enamel on steel. Design by Don Wallance.

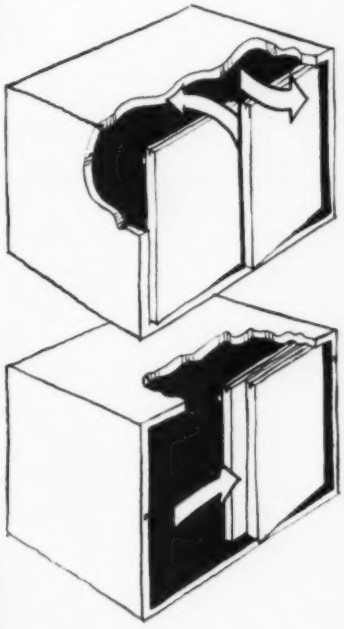




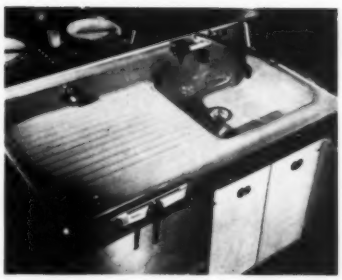


↑ **Fairchild Camera and Instrument Corp.** has developed a new photofluorographic camera. The unit is made of magnesium castings with a grey painted finish. **Bulldog Electric Products'** new product, Electrostrip, does away with the problem of badly located or inadequate wall plugs. Wiring is molded into a vinyl plastic strip that is fastened along the wall. Receptacle plugs can then be attached at any point along the strip. A lever locks the plug, or releases it for reuse at another location. Electrostrip is ivory; it can be painted. **Visi-Shelf** files store records in bookcase style. A labeled Guide-Pull slides each folder forward. Drop doors can be removed if files are used constantly.

↓ **Mulray Products, Inc.** presents hardware for installing sliding doors that are perfectly flush when closed and have no exposed hardware. Their equipment employs a simple control switch and two tracks which easily move off-center in unison. To operate, the door on either side is simply shunted back, which moves the track and directs it behind the other door, opening one half of the cabinet. Both doors may be easily removed for cleaning or storing large objects. Track is aluminum, anodized or unfinished, or can be especially ordered in other metals. Switching mechanism and parts are nickel-plated steel. Drawing below shows how left side is opened. (Panels need grooved finger slots, which aren't shown.) Picture shows double tracks and switch assembly. Complete hardware for a 36" opening is $4.35 in unanodized aluminum.

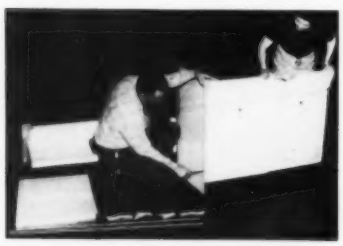


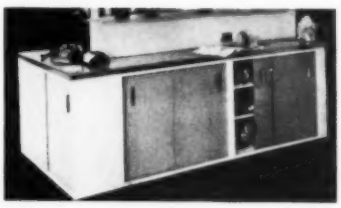
Our last issue's review of ranges, refrigerators and laundry equipment is supplemented here with the latest in sinks, dishwashers and a few minor major appliances. Many of them are consciously designed as companion pieces. The previously reviewed Hotpoint built-in refrigerator, oven and stove-top units, like the new dishwasher, are finished in satin chrome; General Electric and Frigidaire produce dishwashers and dishwasher-sinks in the 1955 G.E. and Frigidaire colors. Cabinets for kitchens, by firms like Cox, Youngstown and Tracy, are appearing with more and more useful innovations such as tray racks, towel racks and bread drawers, making the cabinet a new kind of appliance in its own right.



↑ **Dwyer Products** packages complete kitchen facilities, including lighting, in a black or beige enameled steel unit with a one-piece white sink-stove top. A 3.2 cu. ft. refrigerator fits below the burners, and storage space, including a cutlery drawer, is provided beneath the sink. $495.00.

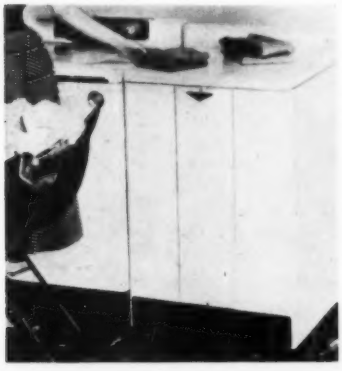
↓ **American Kitchens** is producing a knock-down sink for home assembly. Purchaser receives a packaged 42″ sink-drainboard of porcelain-enameled steel with a faucet and hardware kit, a cartonful of steel cabinet panels and a sheet of instructions. Simple tools and ten minutes are all the homeowner needs to assemble the sink and make the usual do-it-yourself saving. This model, and the birch-copper line, above, were designed by Mel Boldt with American's Engineers. $59.95.

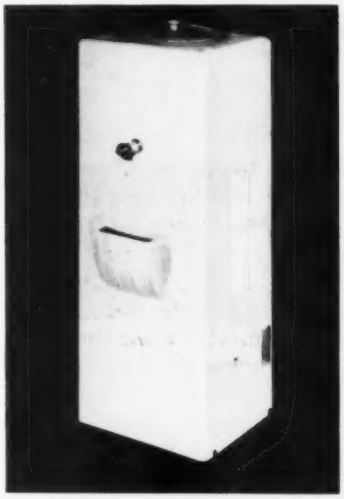


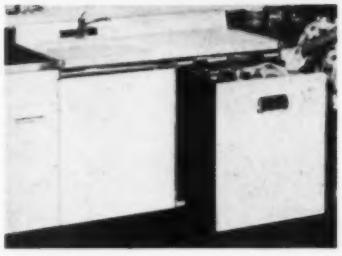


↑ *Reading from top to bottom:* **American Kitchens** has introduced a coppertone porcelain sink top to match their new line of steel cabinets with birch doors and copper-front drawers. Top pictured above is used with their copper-front dishwasher and wooden cabinet. $33.87 for 42″ top. **Elkay** stainless steel sink has a deep bowl for dishwashing and a shallow bowl for salad preparation and similar tasks. White enamel cabinetry underneath the sink is designed to permit comfortable sitting at the shallow work basin. $200 for 72″ sinktop. **Harrison** double-bowl, double drainboard porcelain steel cabinet-sink is a compact 60″, and provides the maximum of storage space. $124.50. **Tracy Kitchens** is marketing Pic-A-Dor cabinets. Steel-framed units are available with gliding doors in textured glass, perforated or solid hardboard.

↓ *Reading from top to bottom:* **General Electric** water heater has two sets of heating elements. An upper coil heats top water first, eliminating the need to wait for an entire tankful of water to heat before any can be used. A one-piece flat top and backsplash provides an extra work surface at G.E. appliance height. $118.95 for 30 gal. size. **Youngstown Kitchens** cutting board drawer replaces a top drawer in their cabinet sinks. When the frame assembly is pulled out, the drawer front tilts down, rotating the cutting board into a locked position at work height, sturdy enough to hold a grinder or a mixer. **Frigidaire** dishwasher-sink combination has practical front opening. Two roll-out racks are vinyl covered and match the appliance, which comes in yellow, green or white. $449.95.

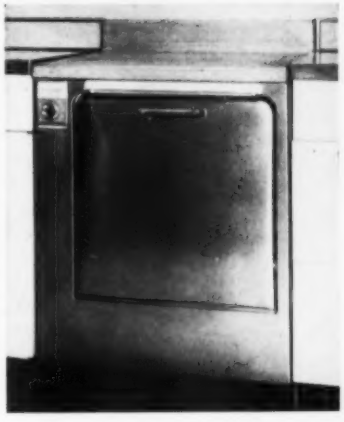




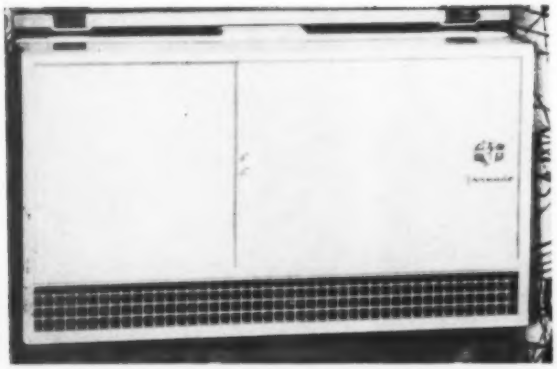


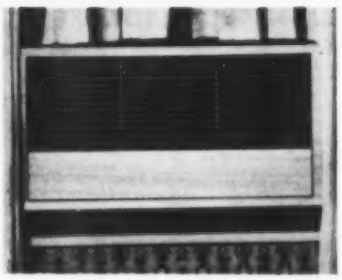
↑ *Reading from top to bottom:* **Westinghouse** offers a water cooler for home use that occupies little more than a square foot of floor space. The unit has a one-gallon reservoir and a waste water trap. A push button, at child height, operates the faucet. $149.95. **Caloric** automatic gas disposer burns all garbage and trash—first drying wet refuse. A foot pedal opens the large top loading door, and a slide-out drawer collects the ashes. White Nupon cabinet finish with black porcelain top. $129.50. **General Electric** dishwasher-sink has a large capacity pull-out dishwasher tub. The washing indicator may be set at "warm" to heat dishes before serving. $399.95.

↓ *Reading from top to bottom:* **Apex** dishwasher-sink combination utilized a third possibility in designing dishwasher access. Instead of an oven-door or filing cabinet front opening, the Apex washer's lid opens for top loading. The unit, designed by Dave Chapman, is white, sells for $449.95. **Westinghouse** dishwasher features a flexible washing cycle. Swing-up center sections of the top rack provide easy loading of the wash well. $329.95. **Hotpoint** dishwasher has a satin chrome exterior for installation with their other new built-in appliances, and can be purchased with a laminated maple top. Hotpoint's special feature is a dual detergent dispenser that releases fresh detergent for an automatic second wash. $374.95.



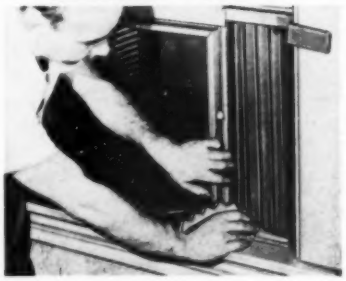
Now that engineers have done so much to cut down the noise, overcooling and plumbing problems of air conditioners, designers are concentrating on flush mounting, portability and even do-it-yourself installation, and it looks as if their approach will soon swing to in-the-wall designs. Manufacturers are beginning to offer conditioners that fit into a peripheral wall, flush on the inside and with little or no projection outside. Because the units are so shallow they cover large wall areas, but on the whole they are unobtrusive. Perhaps in anticipation, the standard window units this year are more conservatively housed too.

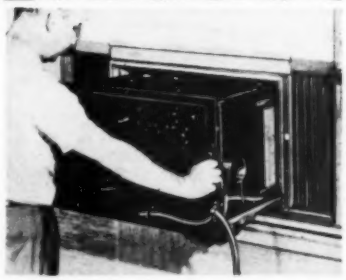


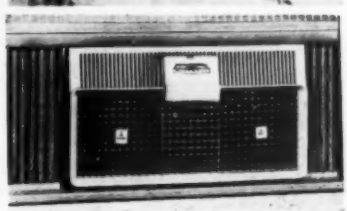


↑ **Vornado** (top) and **General Electric** (directly above) air conditioners have cabinet-like rather than car-like fronts. The Vornado facade is grey-green polystyrene trimmed with gold and red accents. A sliding panel closes the unit when not in use. ½ H.P., $289.95. G.E. unit can be recessed into the window until it is flush with the inside wall, or it can be installed to protrude into the room, in which case the flat top provides a shelf for plants. The grille is gold. The vertical panel beneath the grille folds down to reveal the controls. This appliance is available in mahogany-grain or blond-wood enameled steel, to blend with furniture. ½ H.P., $319.95.

↓ **Frigidaire** Super series conditioners (directly below) can be used in regular double-hung windows, but they are designed so that they can also fit casement or small windows. Controls are concealed behind a flip-open panel below the grille. All Frigidaire models are two-tones of beige and can be installed flush. ½ ton unit, $289.95. **Remington** air conditioner is light green plastic with gold trim. Exclusive feature is an odor-banishing system. 1½ H.P., $499.95.

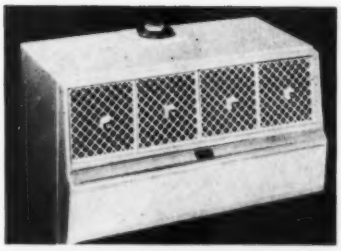


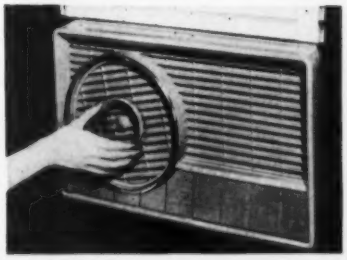




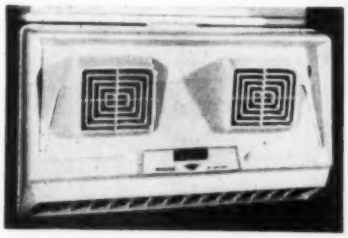
↑ **Mitchell** air conditioners are sold with a pair of accordion-pleated side panels that expand to the edges of the window frame so you can install a unit without a serviceman. Pictures above, top to bottom, show sealer strips being applied; rubber inserts placed in position to seal openings; chassis being inserted; plastic front placed on the unit and secured. This 2-horsepower air conditioner is the highest capacity window unit now in production. $599.95.

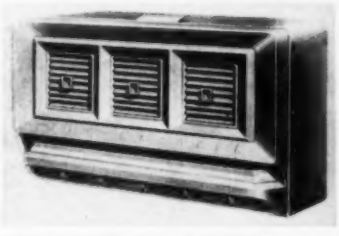
↓ Top to bottom: **Hotpoint** Deluxe air conditioner is powerful enough to cool a small house. Conveniences packed into this model include two-speed cooling, an automatic thermostat, dehumidifier, and a permanent filter that removes dust and pollen from the air. The case has a grey Neoprene finish. ¾ H.P., $399.95. **Deepfreeze** air conditioner is grey polystyrene. Controls, and permanently printed instructions, are concealed behind snap-up panel above grilles. ¾ ton unit, $349.95. **Westinghouse** air conditioner is controlled by a pushbutton control panel on the top of the cabinet. The three grilles can be individually adjusted to direct the flow of air. The case is gold trimmed grey plastic. ¾ H.P.. $399.95. **Emerson** low-operating-cost model is said to use much less current for operation than any other model on the market. The beige polystyrene cabinet is gold trimmed, looks like their new portable model. ½ H.P., $299.

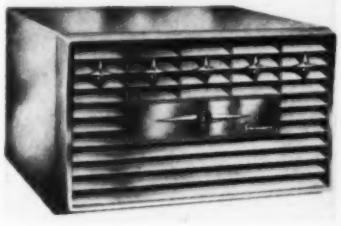


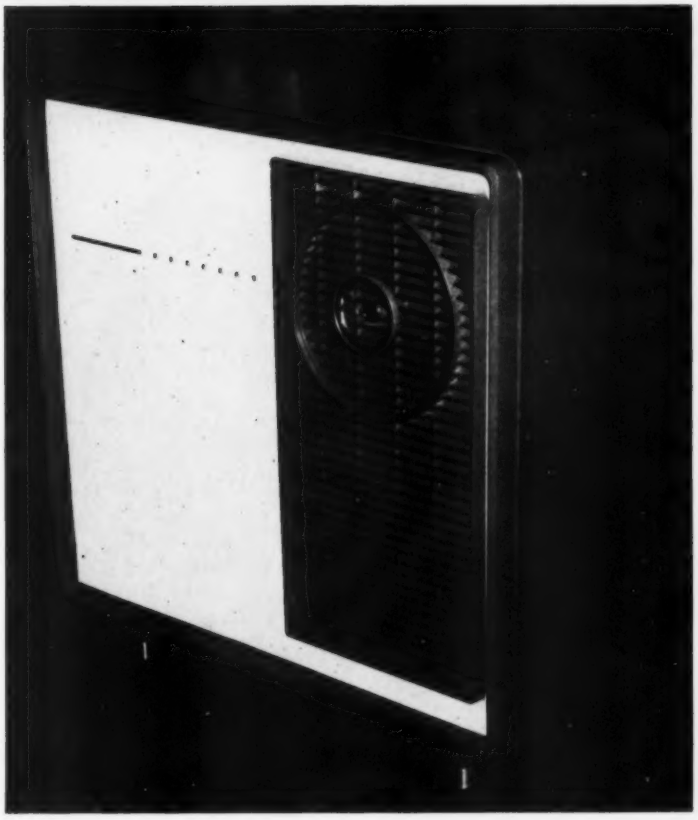


← Top to bottom: **Servel** air conditioner is controlled by a single dial on top of the unit. Dial, grille and slanting horizontal strip are gold, cabinet is blond- or mahogany-finished steel. 1 H.P., $349.95. **Fresh'nd-Aire** Custom conditioner is one of the new in-the-wall models. Unit is beige, finished so that it can be painted the same color as the wall. ¾ ton, $399.95. **Fedders'** wheel directs the air stream; other controls are in concealed panel at bottom right. Front is grey-green plastic. ¾ ton, $349.95. Another Fedders model is the floor unit, which stands 33" high. Controls are concealed in the top. This cabinet stands beside a window, or it can be installed into the wall. Colors are white and light brown. ¾ ton, $399.95.



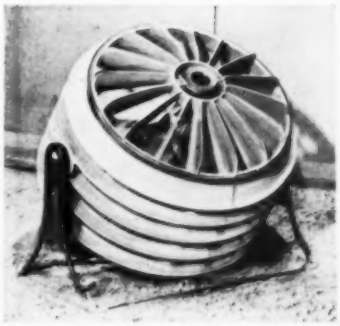






Fans for '55 are designed to live many-faceted lives. The four we show can all double as window exhaust units when installed with adjustable side panels, and they all have another available accessory — a wheel base stand. The Signal fan (bottom right) has a thermostat; it can be set to go on or off when a certain room temperature is reached. Each of these fans has two or three speeds, and each designer has produced a fan that can be adjusted to shoot air in many directions. Three electric humidifiers, similar to units previously designed for industry, now keep moisture under control at home.

Fans



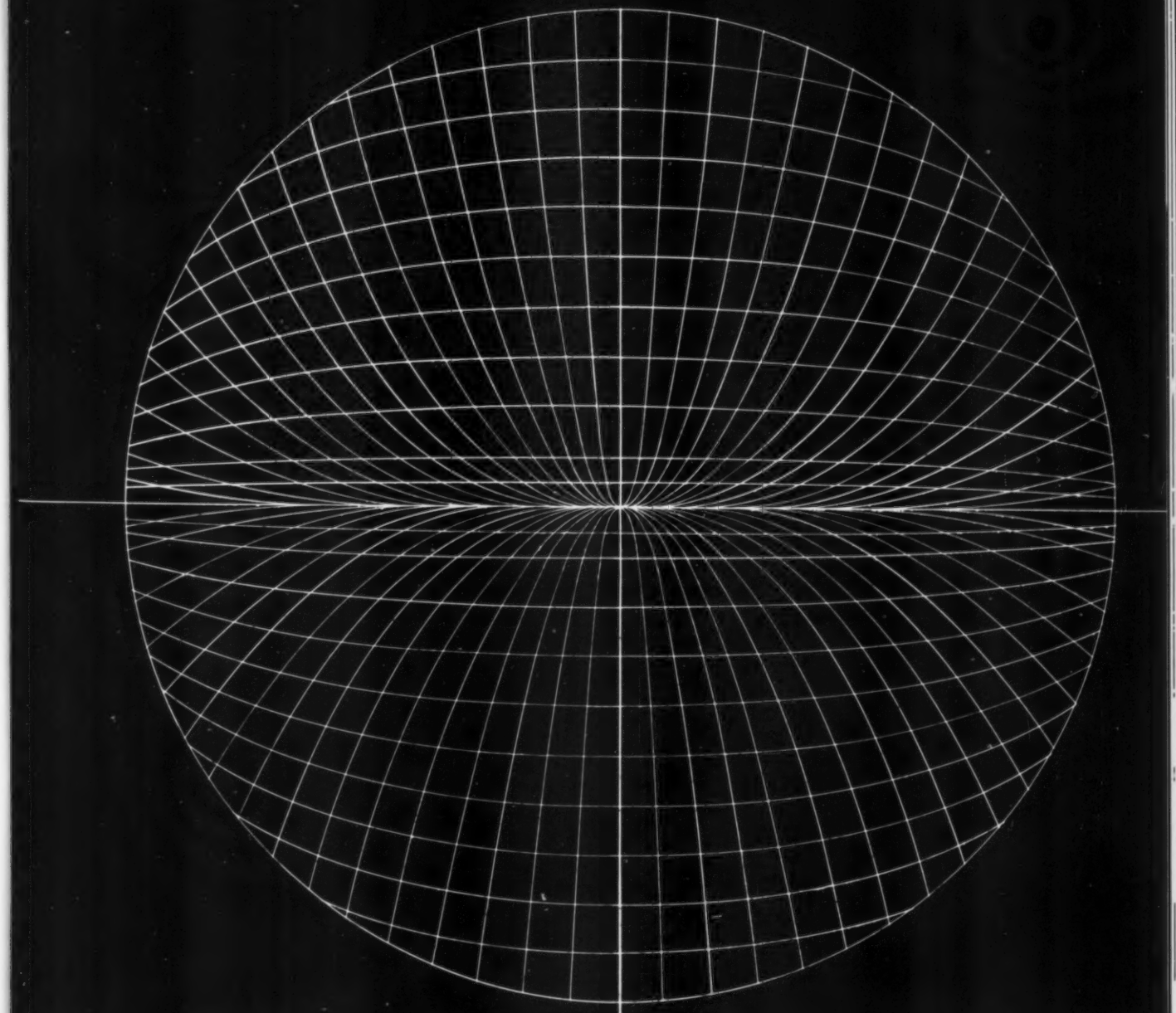
↑ Top to bottom: **Fresh'nd-Aire** portable 20″ fan has a chrome grill, grey-green steel case. $59.50. **Westinghouse** Riviera fan is blue Styrene, 16″ in diameter. $69.95. **Arvin** 20″ portable fan is housed in grey enameled steel. Design by E. A. Farr. $49.95. **Signal** 12″ fan is electrically reversible. Air diffusion grill is white plastic, the case is blue-grey enameled steel. Design by Robert Budlong. $44.95.

Humidifiers and Dehumidifiers

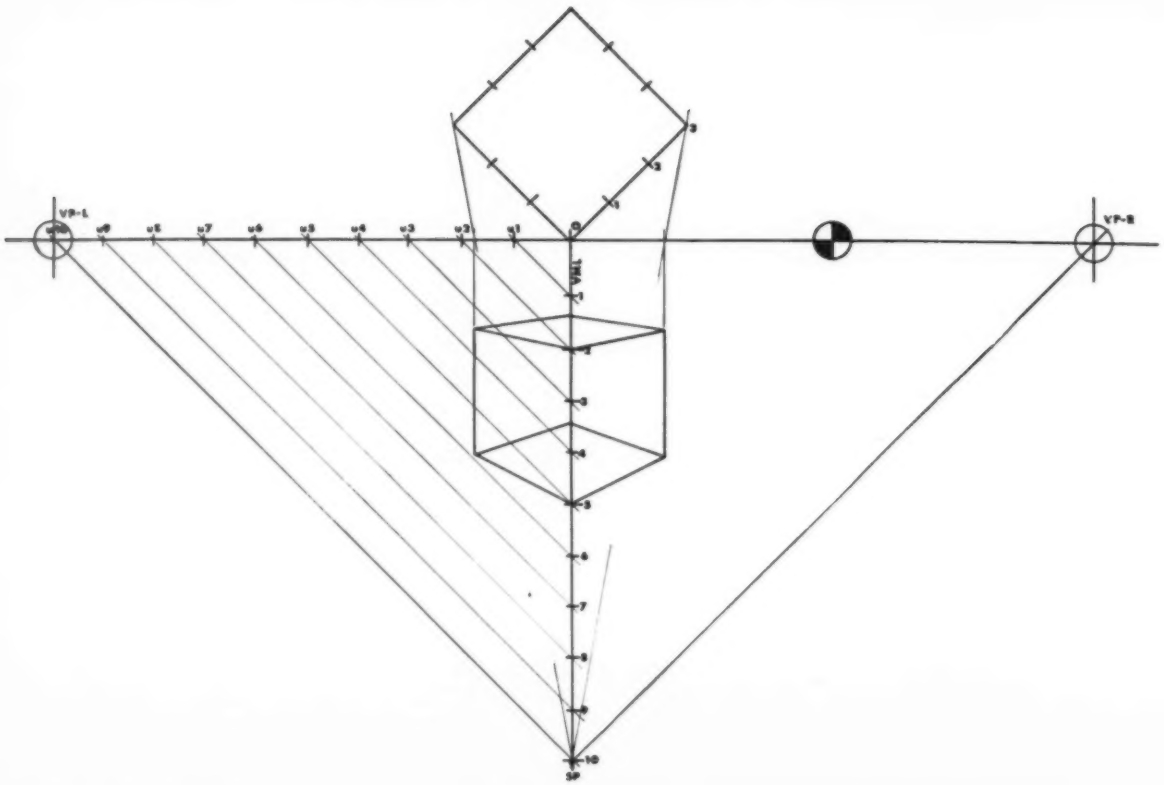
← ↓ **Fresh'nd-Aire** electric humidifier (left) evaporates a pint of water per hour at the cost of burning a 30-watt bulb. A fan on top of the vented tub circulates water over a filter. The grey-green plastic unit is 13″ wide, 11″ high. $49.95. **Micro-Moisture Weatherzone** (directly below), is a small fan-dehumidifier cased in grey steel. $39.95. **Westinghouse** dehumidifier (below) can remove a gallon of moisture from the air every 8 hours. When water container is removed for emptying, a special drain tray prevents dripping. $129.95.

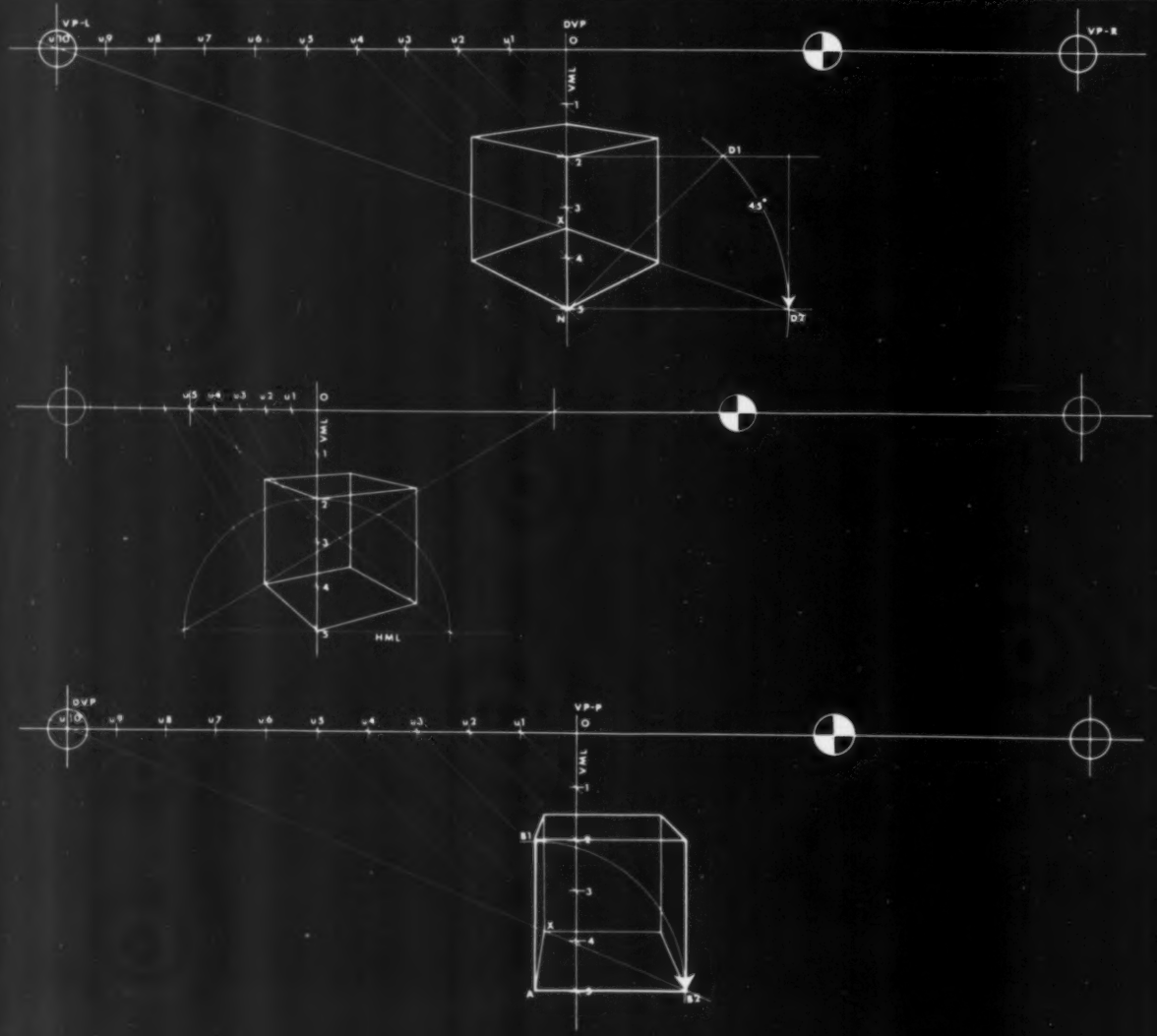
PERSPECTIVE

a new system for designers



by Jay Doblin


VP-L
VP-R
VML
SP


VP-L
DVP
VP-R
VML
D1
45°
D2
HML
VP-P

True scale

True scale can be defined as a controlled relationship between three measurements: the distance from the observer to the object, the size of the object, and its distance below or above eye level. Existing systems for achieving true scale are complicated, and usually used only when necessary. But with this perspective system, true scale can easily become an everyday tool in perspective drawing.

Suppose, for example, that we wish to show a console radio in a display room. We can imagine that the machine would be about ten feet away; that it would be about 3′ high and 2′ below eye level. Obviously if we can base our preliminary construction on these measurements we will eliminate trial and error.

To set up the principles of true scale, let us try reproducing this situation by the top plan system. First, draw a top plan of a 45° cube at a scale of 3 units to a side. Draw the horizon through the nearest angle, and draw a vertical measuring line perpendicular to the horizon. Measure 10 units down the measuring line to find the station point; measure 2 units down to find the top of the cube and 3 more to find its height. Draw lines from the station point parallel to the sides of the top plan cube to locate the vanishing points, and complete the cube.

Notice that in 45° perspective, the station point and the vanishing point are at equal distances from the top plan cube, and the measuring unit is the same in either direction. This means that we do not need to find the station point but can lay off this distance directly on the horizon.

True scale in 45° construction

1. Draw a horizon.
2. Lay off two vanishing points and bisect the distance between them to locate the diagonal vanishing point.
3. Divide the distance from the diagonal vanishing point to one vanishing point into units to equal the distance of the station point.
4. Draw the vertical measuring line and either project the units at 45° from the horizon or step them off on the measuring line to find the top and bottom of the cube.
5. Construct the diagonal plane of the cube to one side of *VML*.

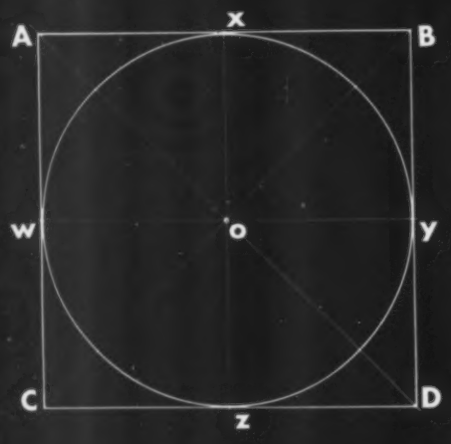
True scale in 30-60° construction

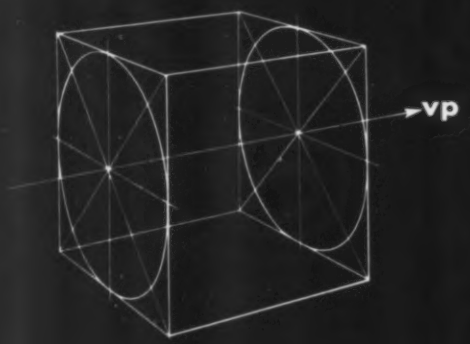
1. Establish the unit measure on the horizon from the *VML* to the nearest *VP* and project it down 60° to the vertical measuring line to find the height of the cube.
2. Divide the horizon in the usual way to find measuring points and complete the cube.

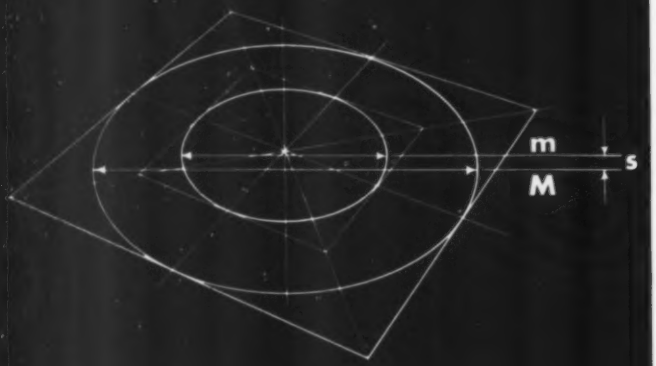
True scale in parallel construction

In parallel construction, as in 45° construction, the unit is the same on the horizon as it is on the vertical measuring line.

Draw a diagonal from the lower far corner *D2* to the opposite vanishing point, locating the depth of the cube *X*. Complete the cube as usual.







Circular forms

Any object, regardless of its shape, can be broken down into combinations of circular and rectangular forms. We have already learned how to draw rectangular forms. To understand circular forms, examine a circle drawn in a square in elevation. We notice two things:

1. The center of the circle coincides with the intersection of the diagonals of the square (O).
2. The circle is tangent at the midpoint of the four sides of the square (w, x, y, and z).

The square is the only rectilinear figure which will fulfill these two conditions. To draw a perspective circle, we need only transpose these conditions to a perspective square.

Construction of a circle in perspective

1. Draw any perspective square ABCD.
2. Draw diagonals to locate the center.
3. Draw perspective lines through the perspective center to bisect the sides (w, x, y, and z).
4. Draw a smooth curve tangent to the midpoints of the sides. This curve will be a circle in perspective.

The ellipse

Ordinarily, we would use a French curve to draw a smooth curve. However, it can be shown that any curve inscribed in a perspective square as described above is an ellipse. If we can find a simple way of matching an ellipse to a perspective square, we can use an ellipse guide for drawing perspective circles. The ellipse has two dimensions that may be useful, a major axis and a minor axis.

Draw ellipses on opposite faces of a perspective cube and connect the perspective centers of these faces with a perspective line. This line, which is perpendicular to both ellipses, crosses them at their narrowest dimensions and is thus the minor axis of both.

Now draw two concentric circles in perspective and locate their major and minor axes. Notice that while the minor axes are on the same line, the major axes (m and M) are erratic.

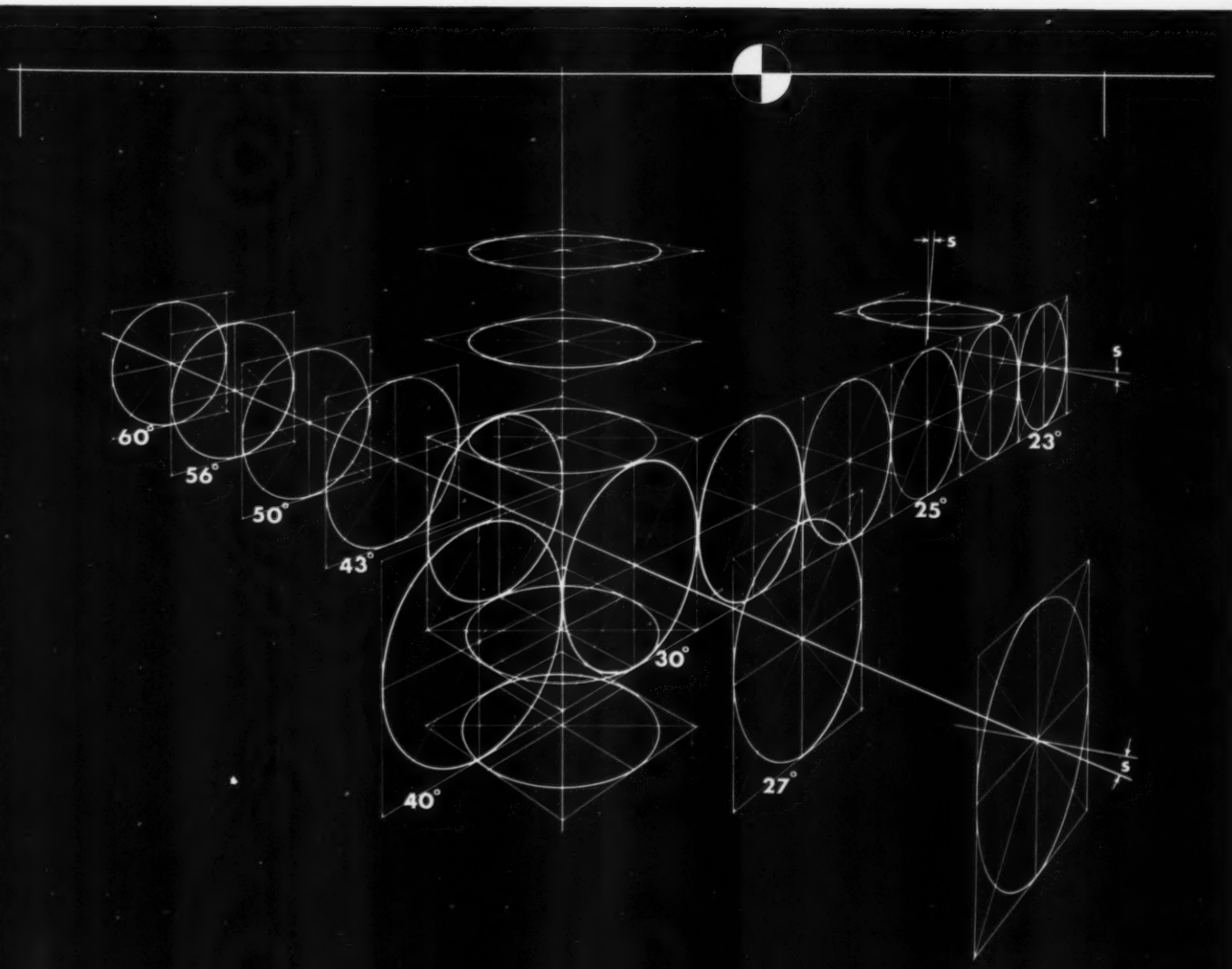
According to these two figures, the major axis of the ellipse is of no value in perspective drawing. The minor axis, on the other hand, is easily located: we need only find the perspective center of the square and draw a perspective perpendicular at this point.

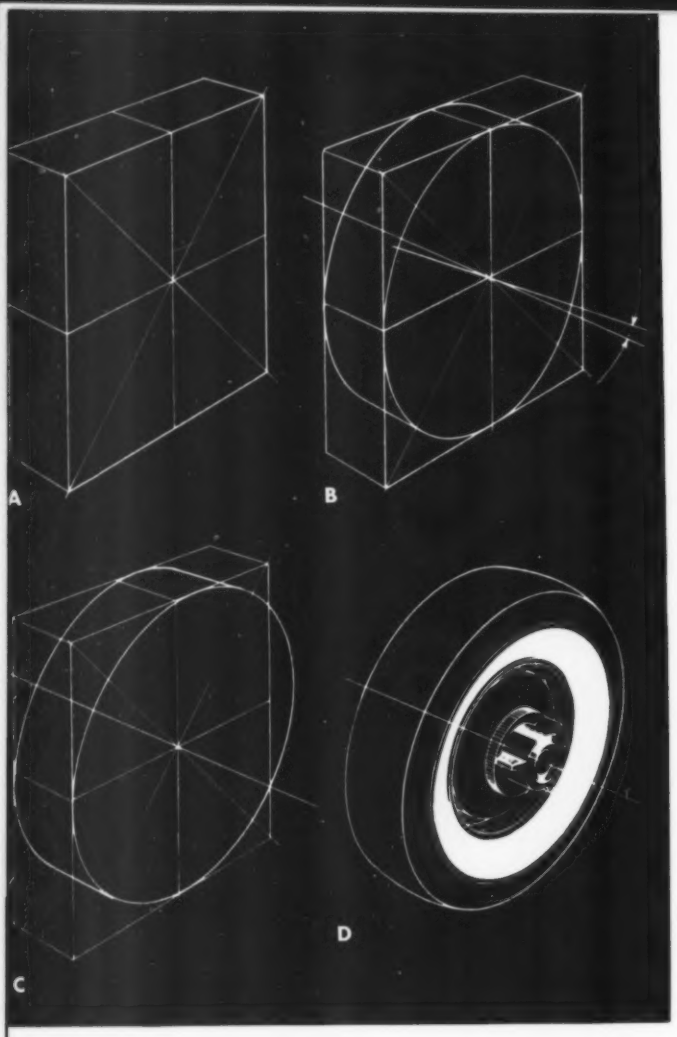
Parallel circles have minor axes on a line.

To use the ellipse guide in drawing a perspective circle, choose the ellipse that is tangent at the midpoint of all four sides of the perspective square, and whose minor axis coincides with the perspective perpendicular.

The drawing opposite illustrates two reasons why the ellipse guide may not fulfill both these conditions at the same time:

1. An accurate ellipse will not fit a distorted square. In previous chapters we have seen how distortion increases as the cube is shifted from side to side.
2. Ellipse guides usually come in increments of 5°; the required ellipse may fall somewhere in between.

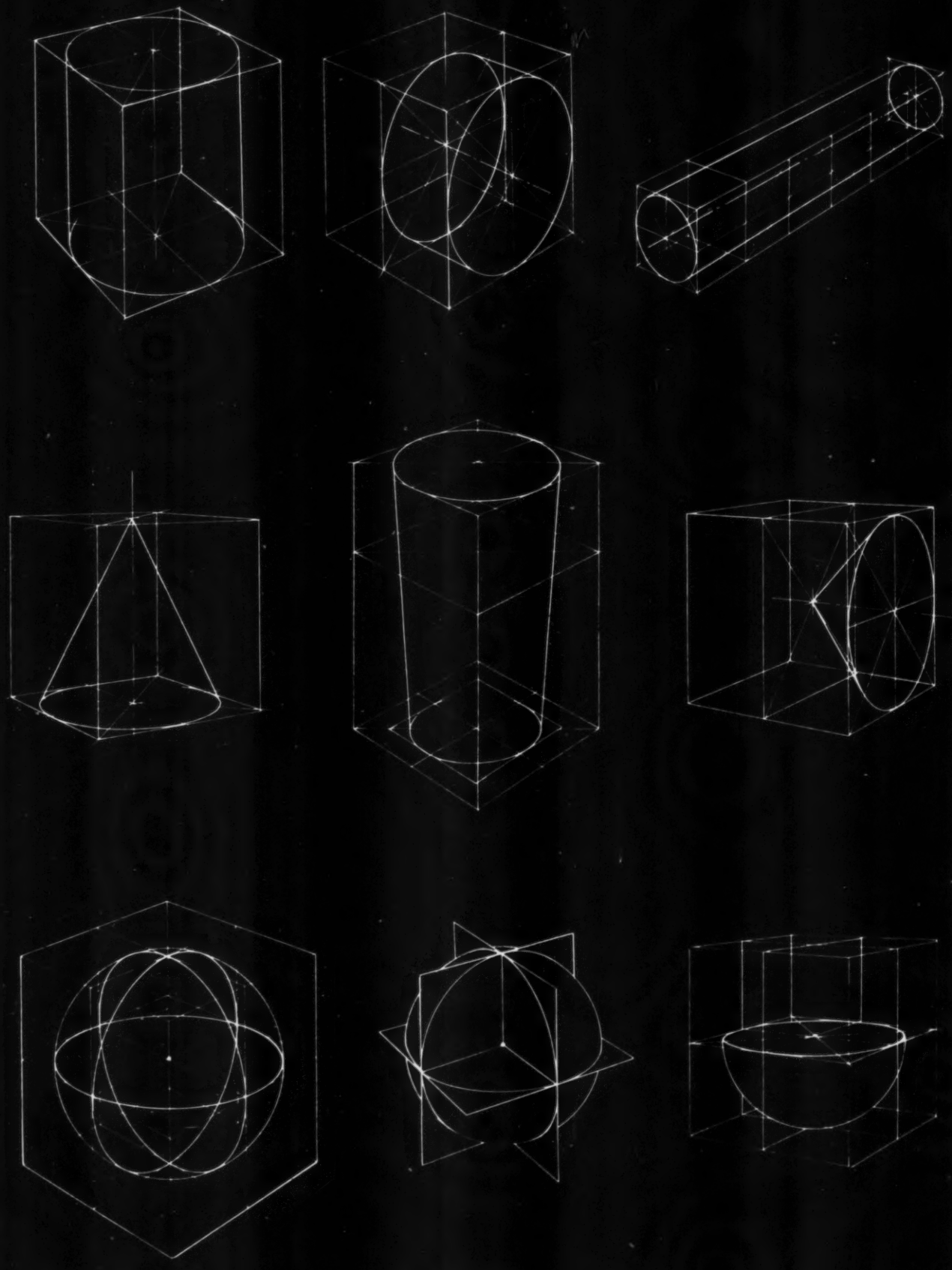

s
s
60°
56°
50°
43°
25°
23°
30°
40°
27°
s



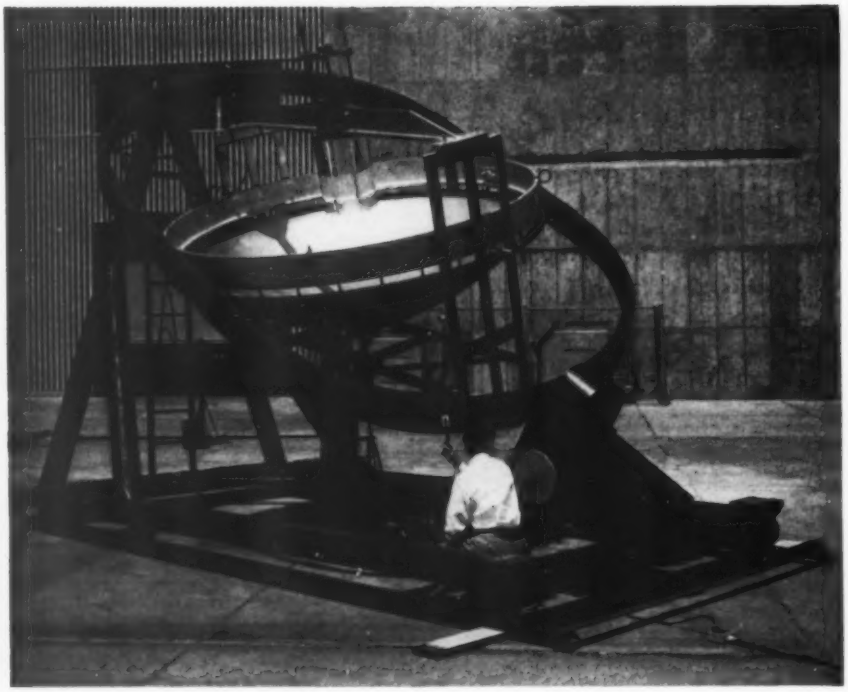
We have seen that a perspective circle is an ellipse inscribed in a perspective square so that it is tangent at the midpoint of the sides of the square and its minor axis passes through the perspective center of the square.
If we find that the ellipse guide does not provide an ellipse that fulfills these two conditions, we have two choices: We can use the ellipse that comes closest to fitting the square when its minor axis is properly lined up, or we can draw a smooth curve tangent to the midpoints of the sides of the square, overlooking the probable error in minor axis. Generally speaking, the tangent-drawn curve will look better than the true ellipse, but it may be unwieldly to produce, and the draftsman must decide in each case what is the best method for drawing an acceptable perspective circle.
Suppose, for example, that we are drawing an automobile wheel. If the front wheel is in true perspective, it is not unusual for the rear wheel to be slightly in error. This wheel may involve as many as fifteen concentric ellipses, and it obviously will save time if we can use the ellipse guides. After we have drawn the original perspective square (A), we can see how much error there is by drawing a tangent curve ellipse (B). In practice we would disregard the small error and use the ellipse guides. We choose the ellipse that fits best when the minor axis is properly aligned (C) and finally complete the wheel by lining up a series of concentric ellipses along the same minor axis (D).

Four forms

The four basic forms of which all objects are composed are the cube, the cylinder, the cone, and the sphere. By applying ellipses to the basic rectilinear form, we generate the remaining three forms.
The cylinder and the cone require that a circle be drawn on one or both ends of a rectilinear figure. The sphere is unique because in any perspective it remains a circle in outline. The ellipses are its equators; its outline is drawn from the perspective center of the cube and is tangent to the extremities of the ellipses.



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



Cloudless heat

One of the hottest things around — on a clear day — is the solar furnace being used to study metals and ceramic materials at Convair's San Diego division. An oxy-acetylene torch only creates heat around 5800°F, but the furnace can develop 8500°F of the sun's 10,000°F surface temperature, and was first developed by Dr. Willi M. Conn at Rockhurst College. A mirror ten feet in diameter made of ¼" polished aluminum has been formed into a parabolic reflector that focuses solar rays in a 5/16" area that is 34" from the center of the mirror. In a few seconds the intense heat at the focal center can melt a steel bolt, which is held there in a pair of metal jaws. A bridge structure spanning the mirror supports the specimen holder, which can be moved into the focal spot with a motor-driven screw; the bridge also supports a cylindrical barrel about 18" across that is used as a shield. The mirror has a central opening about 20" across, through which the specimens can be observed by means of a telescope that magnifies about 20 times. The mirror is mounted in a gimbal ring, and an accurate clock mechanism driven by a synchronous motor coordinates its movement with that of the sun, so that extended experiments can be made. There is no interference from electric or magnetic fields or gases with the solar furnace, and heating is accomplished under very pure conditions in an oxidizing atmosphere. Very short heating and cooling times are possible. In order to secure optimum performance, the solar furnace will be moved from San Diego to a nearby mountain top, where sky conditions are ideal.

Distortionless plate

When plate glass is made, first one surface is ground, and then the other. Unless both surfaces are parallel, light is bent as it passes through the glass, and distortion results. In a whole ground plate glass blank, only a small square with parallelism suitable for windshields, gunsights, or ports for aerial cameras may be found. For better control of refraction, Libby-Owens-Ford is now operating two enormous twin-grinding machines, which grind both surfaces at the same time, and produce much better parallelism. Production is now great enough to make the glass available for glazing. Operation of the big machines is automatic and electronically controlled; every five minutes a new load of measured, weighed, and mixed raw materials is dumped into the furnaces, from which the glass passes through the successively cooler annealing ovens, or lehr, and to the twin grinders, where rotating iron disks press abrasive sand against the glass.

Parallel-O-Plate, *Libby-Owens-Ford Glass Co., 608 Madison Avenue, Toledo 3, Ohio.*

Radiation, meat, and potatoes

Meat and grains will keep longer if they are irradiated, it was reported at two separate atomic energy conferences this spring. Preliminary designs of possible equipment for irradiating grain and potatoes were shown by William E. Chamberlain, assistant to the director of American Machine and Foundry's Atomic Energy Department, at a San Francisco conference sponsored by the Stanford Research Institute and the Atomic Industrial Forum. A quarter of a billion dollars worth of stored grain is ruined each year by insects. Gamma radiation destroys these pests or makes them sterile, at the same time preventing the sprouting or germination of potatoes, onions, and other tubers without damaging them or changing their flavor or appearance. Mobile irradiators for such use can be designed to go on trucks or railroad cars, and stationary models could be installed near grain elevators and storage bins. One design for a mobile unit included a grain drier and a separator that removed foreign matter. Cobalt 60 was used as the radiation source. Irradiation involves no chemical treatment, and only very small doses are needed to prolong stability of crops. Designs for production would involve shielding devices, a complicated mass of controls, and test equipment. Some idea of the cost of such equipment was indicated by Professor Lloyd E. Brownell, supervisor of the University of Michigan Fission Products Laboratory, who described pasteurization of meat by radiation at the Los Angeles Conference on Nuclear Engineering. Prepackaged meats could be irradiated before shipment,

which would reduce spoilage and prolong shelf life, eliminate meat parasites, and permit retailers to do away with their own cutting and packaging. A pound of meat could be irradiated for less than a mil; an important cost saving would be a reduction in the cost of handling, in shipping space, and in the refrigeration space at retail stores. A radiation chamber capable of handling 14 tons of meat an hour has been designed at Michigan. It could be built for $82,500, and operated with a rented radioactive source for $88,460 a year. If the source were purchased from the government, it was estimated that operation cost would be $154,200 annually. A powerful by-product of nuclear reactor fuels, Cesium-137, was suggested as the radiation source. Packaged cuts of meat would move through the radiation chamber on a conveyor belt to receive low dosages of gamma radiation, which do not change flavor. High dosages do, it was noted in taste tests. Animal-feeding experiments conducted for two years give no reason to think irradiated foods are unwholesome, Brownell said. J. V. Nehemias and J. J. Balmer have worked with Brownell on the project, which was sponsored by the Atomic Energy Commission and the University's Memorial-Phoenix Project. Such studies are building up masses of data that will be useful to designers directly concerned with incorporating nuclear devices into designs, and the material should be particularly useful to package designers, who must begin to consider the effects of radiation on the packages themselves, and what is printed on them.

Cold and hot

New ways of supplying heat and cold are changing the design of heating and cooling units. The experimental refrigerator developed in RCA laboratories employs no moving parts, motors, or compressors. It depends on the Peltier effect for cooling; an electric current passed through a junction of two dissimilar materials produces warmth or cold, depending on the direction of the current. A battery of thermojunctions absorbs and removes heat from the cooling compartment when electric current is applied. Heat transferred from one end to the other of the thermojunctions is carried away by a flow of water through the system, suggesting a possible application

Experimental electronic refrigerator developed in the RCA laboratories.

of the system to water coolers and fountains. New alloys had to be developed to get the necessary temperature drop, and now a closed cooling system is being developed so that the system can be used for a completely electronic air conditioner. GE now has on the market the Weathertron, which combines heating and cooling in a single unit simply by reversing the thermal cycle, and depends on the heat exchange brought about by compressing refrigerants. Two coils are used, one in contact with indoor air, the other with outside air, the heat being exchanged through transfer valves. Warm house air is cooled by the indoor coil and recirculated, and the heat is passed to the outdoor coil and blown outside. For heating, the flow is reversed. The outdoor coil is colder than the outside air, from which it picks up heat, transferring it to the indoor coil, which warms the inside air. The warm-cold system is particularly useful in climates where cooling is more important than heating. For extreme cold, a heating unit is used to warm the outside air before it comes in contact with the outdoor coil. Such heat pumps might eventually use sun rays to pre-warm the air, or take advantage of the even earth temperature (between 50° and 60°F, year around) to heat in cold weather and cool in hot weather. Because heat pumps depend on electronic devices in order to operate, the householder does not have to store fuel or provide chimneys to carry off combustion fumes. The Weathertron costs $1500, and it may cost that much again to install, the final price now being 10 per cent or 15 per cent above that of conventional heating - air conditioning systems. The cabinet can be painted or covered with paper or fabric, if the regular enamel finish does not suit the room scheme.

Weathertron, *General Electric, Air Conditioning Division, Bloomfield, New Jersey.*

Heating-cooling unit, GE's Weathertron, can be decorated to match the interior, top. Removing front panel shows working parts.

Crack-free chromium plate

When chromium is plated directly on steel, thin coats fail to provide corrosion resistance, and thick coats crack, so an undercoat of nickel is necessary. By devising a special chromic-acid-type bath and by automatically regulating catalyst concentration, United Chromium has produced a non-porous chrome plate as thick as one mil that will not crack, and is less hard and more ductile than ordinary chrome plate. No undercoat is needed; a .3 mil coating in a corrosion test at 100 per cent humidity and 120°F was unaffected after a year of continuous exposure, whereas undercoated chrome plates failed in a few days. Conventional equipment and procedures are employed to apply the plate. It exhibits excellent adhesion and levelling characteristics, and has a low coefficient of friction and a non-galling surface. A light gray matte finish is produced; it can be buffed to a high luster by an operation similar to buffing dull nickel plate. The plate has been used on washing machine shafts for its corrosion resistance, on draw dies to prevent sticking and seizing, and on cams to prevent checking or cracking from the impact of the cam follower during a grinding operation.

A producer of steel tubing is investigating the possibility of plating and buffing at the point of manufacture, so that finished tubing could be made available off the shelf. *United Chromium, Inc.*, 100 *East 42nd St., New York* 17, *New York.*

Melting in a vacuum

Designs halted at the drawing board because they call for strategic materials or for properties that cannot be imparted to metals at low cost may now be put into production through the use of vacuum-melted alloys. A 1000-pound vacuum melting furnace that will add 120,000 pounds per month of specialized alloys to the national supply has been placed in operation by the Carboloy Department of General Electric, in Detroit. These alloys are particularly needed for gas turbines and airframes, but their use will be extended to many industries. The service life of bearings and springs is often dependent on alloy fatigue strength, which is related to the cleanliness of the alloy. Bearings of vacuum-melted steel show a 4-fold increase in service life. Because there are fewer impurities in vacuum-melted spring alloys, it is possible to draw wire to finer sizes with improved surface finish. Corrosion resistance is often a function of purity, and by removing oxygen and nitrogen from the atmosphere in the vacuum-melting process, this property is increased. Such improvements may permit use of cheaper materials in current applications. Vacuum-melted iron shows as much as 70 per cent greater resistance to rupture; elongation is increased as much as 4 times, with comparable increases in tensile and yield strength. Reduction of dissolved gases in copper and nickel improves their usefulness for electronic tube applications, and copper exhibits a conductivity close to 100 per cent of the calculated theoretical value. Low alloy steels have greater fatigue strength and transverse mechanical properties, and high chromium alloys are produced with lower transition temperature and consequently an improved impact strength at room temperature. Nickel and cobalt alloys show a minimum loss of hardening elements when vacuum melted, and ductility and workability is improved. Five years ago, 50-pound vacuum melts were rare, and exact knowledge about what happened to melting metals was even rarer. Engineers are now talking about 10,000-pound vacuum melts, and have built up a mass of data about specialized alloys, and how to control their properties, so that better alloys can be made.

Consolidated Vacuum, Rochester, N. Y.

High, dry vacuums

The only pump that produces "dry" vacuums as high as 10^{-9} mm Hg without introducing organic vapors into the system has been designed for non-cyclic, static, high-vacuum systems such as those used on high-voltage particle accelerators. What's more, smaller models of the EVAPOR-ION will find applications in the evacuation of electron power tubes, color TV tubes, large X-ray tubes, and mass spectrometers. Because organic vapors are eliminated, no refrigerated traps and baffles are needed, and maximum pump speeds can be used. All gas molecules are removed from the vacuum chamber by ion entrapment or by the evaporation of vacuum-melted titanium, which was chosen for its great chemical affinity (gettering action) for such gases as hydrogen, nitrogen, and oxygen. These common gases are gettered, while inert gases are ionized and accelerated to a collector. The pumping speed for nitrogen is 2000 liters per second, for hydrogen, 3000 liters per second. An added advantage is that the titanium compounds formed on the pump side-wall are very stable at room temperatures. In essence, the gas molecules are not "pumped" from the chamber; rather, they are captured and deposited in such a fashion as to prevent any further wandering. Unlike the conventional diffusion pump, the EVAPOR-ION pump does not contain a jet assembly; mechanical pump fore-pressure is not essential to continuous operation, and no organic or mercury fluids are employed. The pressure at which its peak speed occurs is lower by a factor of 100 than that of the conventional pump. The pump is a straight-walled casing 25 5/16" long and a foot in diameter, flanged at both ends so that it can be mounted above or below the vacuum chamber. Each flange accommodates an O-ring type gasket or a metal gasket; the latter is recommended for high vacuums for it eliminates leakage. The electronic control circuit, which uses a 2000 volt power line, is housed in a separate 150-pound cabinet. A single mechanical pump is required to "rough" the EVAPOR-ION. A vacuum-tight fore-pressure shut-off valve is needed, and so is a high-vacuum valve if the pump is to be removed without breaking vacuum. The filament structure and titanium wire supply for the pump permit continuous operation for six months without breaking vacuum or requiring servicing.

EVAPOR-ION, *Consolidated Vacuum Corp., 1769 Mount Read Boulevard, West Rochester* 3, *N. Y.*

Communicating

Talking elevators that use a recorded voice on a playback tape to issue instructions to passengers in operatorless cars have been put on the market by Westinghouse. . . . An intercommunication system that uses wall stations and employs a central amplifier station—the only station in the system that needs an electrical connection—is being marketed by Executone, Inc., 415 Lexington Ave., N. Y. . . . A new 2-way FM radio system for use in mobile installations has been developed by GE, and employs plug-in units that are interchangeable. Each chassis is supported on a relay rack, independent of the housing, so that the only connections between chassis are electrical. Sixty different mobile radios are available as standard units by combining the basic units, which consist of two receiver, four transmitter, and six power supply chassis.

Air-drying Neoprene paint

Spate of plastics

Properties of organic materials are being tailored to the designer's specifications, and their range and use is being extended almost daily as chemists learn more about varying their properties. An air-drying Neoprene formulation by The Pro-Chem Co., Box 1928, Grand Central Station, New York City, has been prepared for domestic and industrial use. It produces tough, flexible films that can be brushed, sprayed, dipped, or roller-coated on wood, metal, and fabrics. No primer coat is needed, and it is supplied in black or gray. Ordinary cardboard boxes can be coated at home to make water-tight photo-processing trays, and it is even possible to rubber-coat fabric gloves with the material. Pro-Chem is particularly useful to provide non-skid surfaces on metal or concrete floors.

. . . Neoprene compounds have been used for some time during shipment to protect the plexiglass domes used over radar for aircraft, and it used to take a man a day to clean off the coating. A new polyglycol ether, Ansul Ether 181, has been developed to dissolve the coating so that the job can be done in half an hour.

. . . Both flexible and rigid micaceous insulating materials bonded with epoxy resins are now available from Mica Insulator Co., Schenectady, N. Y. They outperform other available types of insulation because of superior thermal, chemical and mechanical properties, and have longer service life. Flexible sheets or tapes can be cured during application at low pressure, and do not crack or break down.

. . . Both porous and non-porous films for electrical insulation, which combine Teflon and glass fibers, are being produced by American Machine and Foundry Co. under the name Fiberfilm. The Teflon film performs well in the range from 200 to 250°C, and various types of sheeting are produced for various applications. Other resins have been used with glass fiber to make special films; silicone Fiberfilm is strong, flexible, and has excellent electrical properties, while porous vinyl sheeting permits the passage of air and yet is water repellent.

. . . Silastic stocks designed for aircraft seals and for low-temperature service, which are highly flame resistant, retain their resilience at —130°F, have high mechanical strength and easy handling characteristics, have been developed by Dow Corning Corp. The stocks are white and may be extruded, molded, or calendered.

. . . A tough polyethylene called Super Dylan that shows only 2 per cent dimensional change without deformation or loss of surface finish at 250°F (when ordinary polytheylene loses its shape), is being produced by the Koppers Company of Pittsburgh. Dylan has greater rigidity and bursting strength than ordinary polyethylene, and is equal to it in other respects, making it useful where light, tough, rigid materials with excellent chemical and heat resistance are needed.

. . . A clear plastic called Dura-lite which is twice as strong and five times as abrasion-resistant as ordinary methacrylates, is being manufactured in sheets by The Homalite Corporation of Wilmington, Delaware. It resists crazing, which makes it valuable where difficult bends and forming operations are encountered. It is completely formable and machinable, and is immune to most chemicals. Its improved tensile and impact strength indicate that it will replace other methacrylates; particularly for glazing, where its abrasion resistance makes it more suitable for coverings over dials and faces.

. . . A putty mainly compounded of aluminum suspended in an epoxy resin, and which shrinks less than .2 per cent while hardening is being produced by the Smooth-On Company of Jersey City, N. J. It will harden to metallic density at room temperature, and curing can be speeded by applying heat. Curing is the result of polymerization, so there is no solvent evaporation to cause shrinking or cracking. When machined, its color resembles that of cast aluminum. It is unaffected by water, resists acids and alkalies, and temperatures up to 300°F.

. . . A coating formulation for curing concrete that is based on hydrocarbon resins and called Horncure by its producers, Sun Chemical Corporation in Long Island City, N. Y. has just been put on the market. It can be sprayed on the surface of the concrete as soon as the last finishing operation is completed, sealing the surface, and preventing evaporation of the moisture in the concrete.

Screw feeder

A major fabrication problem is the need for placing and starting a screw by hand, a slow and tedious operation that occupies over half the screw-driver operator's time. A new device is on the market that feeds the head of a power screw driver from a hopper, through pneumatic tubes, almost instantaneously. The system is almost foolproof, and the hopper can be as far as 20 feet from the work. The special head will fit most standard power screwdrivers, and can be used in any position, an advantage over similar devices that have only been able to drive screws straight down. After the screw is driven, a second screw is automatically fed and positioned. Screws up to ¼" in diameter and 1¼" long can be handled, and virtually any head style can be accommodated. The machine was originally developed by Taymouth Industries, Ltd. of Canada, and is being distributed in this country by Pneuma-Serve, Inc.

Pneuma-Serve Inc., 19939 Detroit Road, Rocky River, Cleveland, Ohio.

Feeding hopper, above, and head of the power screw driver in which screws are automatically positioned.

Sandwiches

A number of interesting sandwich materials are coming on the market, designed for all sorts of structural uses. A paper honeycomb impregnated with cement is being marketed by the Ferro Corporation of Cleveland, Ohio, under licenses issued by the Bettinger Corporation of Waltham, Mass. The fire-resistant core is called Cell-Air-Core, and is used for building panels faced with porcelain enamel, metal,

plaster board, and plywood. An aluminum honeycomb with aluminum skins is being produced for aircraft sections and building panels under the name Bondolite, by the Goodyear Aircraft Corporation. By bonding polyester laminate facing sheets, reinforced with Fiberglas cloth, to styrofoam, plywood, and other core materials, Haskelite Manufacturing Company of Grand Rapids has developed a corrosion- and rot-resistant panel called "Hasko-Struct." Another product is made by fusing to plywood an overlay sheet of phenolic resins and cellulose fibers. Called Crezon, it was developed by Crown-Zellerbach Corporation of San Francisco; the sheeting imparts to plywood extreme weather resistance, and splinter and check resistance. The newest structural sandwiches, however, are being produced of foamed plastics, which combine strength with lightness. The Bakelite Corporation, in cooperation with Standard Oil of Ohio, produces what they call a syntactic foam by bonding with phenolic, polyester, or epoxy resins, nitrogen-filled phenolic spheres the size of grains of sand. Densities range from 10 to 39 pounds a cubic foot, with flexural strengths as high as 4500 pounds psi, tensile strengths to 2900, and compressive strengths to 12,100. Rezolin, Inc., of Los Angeles, produces a liquid phenolic resin that will foam to a hard consistency at room temperature with the addition of a foaming agent. Densities range from 3 to 21 pounds per cubic foot, with compressive strengths ranging from 37 pounds psi for the lighter foam, to 1100 pounds psi for the heavier. The most flexible foams are produced from the new family of plastics called urethanes or polyurethanes, which were developed in Germany, and are now being produced here by the Mobay Chemical Company of St. Louis. The key components are isocyanates that have two or more NCO groups in one molecule, and polyols. As a class, the isocynates will react with almost any hydrogen compound; when the isocyanate is brought to react, the active hydrogen of the other reactant becomes attached to the nitrogen, while the remainder of the molecule is linked to carbon. Reaction with a hydroxyl, such as alcohol, gives the urethanes. When further reacted with water or acids, carbon dioxide is formed, which leads to the formation of foams. Additional reactions take place at elevated temperatures when isocyanate polymers are combined with urea, urethane, and amide groups. These reactions take place at different rates, and the addition of catalysts and emulsifiers further controls the rate of foaming, as well as the cell structure.

Mechanical characteristics of the foam depend largely on the choice of polyesters. Its density is controlled by the amount of water used, and the corresponding amount of diisocyanate.

These flexible urethane foams are currently being used for carpet pads and backing, cushions, toys, sponges, and other types of pads, while rigid urethane foams are being used in panels faced with aluminum for railroad cars and refrigerator trucks. Rigid foams can be foamed into aircraft wing tips, where they bond themselves to the aluminum skin. The weight of the foams is about half that of an equal volume of foam rubber. Chemical, electrical and abrasion resistances are good; slow return from compression gives the foams an advantage over foam rubbers for topper pads. Blocks up to 9" thick and 40" wide, of any length, can be produced.

Other formulations of isocyanates and polyesters supplied by Mobay produce coatings, adhesives and rubber-like sheets.

For the drafting room

A set of transparent sheets, each printed with a series of panels graduated from a 10% tint to a solid color, is being marketed to help the graphic designer in selecting the proper tint for color printing. The sheets were designed by Arthur Eckstein and Bernard Stone and are called COLORON. Each sheet shows the various type uses in the particular color and for each tint; surprint, dropout, tinted on solid ink, and printed on stock. The sheets are printed in the four process colors—black, process red, process yellow, and process blue — and in seven basic colors — red, yellow, blue, green, orange, purple, and brown. The graduated tints are 110 line screen, which gives good visual rendering for all screens from 85 to 133 lines. A transparent sheet printed in black with a series of type sizes and styles is also included; it can be used to see how black type overprints the various colors, tones, and combinations. By placing any single sheet on the actual stock to be used, the various tints and several type possibilities can be seen. By placing two or more sheets on the stock, and sliding them up or down all of the possible colors available are made visible. The sheets are particularly useful when the color of a product or piece of art must be matched. The sheets are contained in a waterproof portfolio. The complete set sells for $9.50.

COLORON, *Delta Brush Manufacturing Co., 119 Bleecker Street, New York City.*

A compass that will fit on any standard yardstick is being marketed for designers, pattern-makers, and draftsmen. It consists of a pair of units. One of these is fitted with a pin, the other with a pencil lead. The top of each unit is split to hold the yardstick, and is capped with a knurled knob that can be screwed down firmly against the yardstick. Variations on the basic unit are designed to hold any pen, pencil or drafting instrument. $1.50 per set.

YARDSTICK COMPASS, *Mark Specialty Company, 183 St. Paul St., Rochester 4, N. Y.*

A flash unit for color photography that emits light that is similar to sunlight in quality has been designed by Max Braun of Frankfurt, Germany, and is being marketed here by Leitz. It is called the Braun Hobby, and the unit can be adapted for use with a dry battery, storage battery, alternating current, or a combination of AC and a storage battery. Its light has a color temperature of 5600° Kevin, which is equivalent to mean sunlight; no correction filter is needed to warm up the light. An adjustable reflector base has a normal beam of 50°, which may be turned to 70° for use with wide-angle lenses. The unit measures 8¾" x 7½" x 2½", and has a guide number of 50 for daylight Kodachrome. Prices range from $84.50 to $99.50, depending on the power employed.

BRAUN HOBBY, *E. Leitz, Inc., 468 Fourth Ave., New York 16, New York.*

A visual aid kit that consists of a 68-piece assortment of fluorescent chalks, crayons, tempera colors, colored yarns, cardboards, and grease pencils, is being marketed for the use of lecturers, demonstrators, and salesmen. The kit also includes invisible ink, and a mechanical pencil with invisible lead. All of them glow in the dark.

Ultra-Violet Products, Inc., 5114 Walnut Grove Ave., San Gabriel, California.

Reproduction of drawings and written or printed matter onto spirit or fluid duplicating masters by means of the xerographic process has now been developed. In the xerographic method, a camera image is projected onto a specially coated plate, which is charged positively where the image appears. A negatively charged powder is sprinkled on the plate, and clings to the positively charged image. An offset paper master is placed over the plate and receives a positive charge. The paper attracts the powder from the plate, and the powder is then fused to the paper with heat. Copies are reproduced from this master plate.

For spirit and fluid duplicating masters, the image is transferred to the carbon sheet of what is called a master set, from which it is transferred to a blank sheet in the master set in an apparatus that transfers carbon to the sheet, where it is fixed by a chemical vapor. For this type of reproduction, a chemical vapor releases a small amount of dye from the face of the master each time a sheet is pressed against it. Making of the masters takes about 3 minutes. The xerographic equipment consists of a camera, a processor, and a fuser. A separate unit is needed to produce masters for fluid or spirit duplicating machines, another unit is available for producing half-tones, and a unit for producing drawing as large as 24" x 36" that uses a 12" x 18" plate is also available. The standard units produce plates 8½" x 13".

The Haloid Company, 2-20 Haloid Street, Rochester 3, New York.

"The indisputable truth"

Notes and quotes about machine design and automatic control from two recent conferences.

The designer works within the limits of the production facilities of the manufacturer he is serving, and his products change as the production machinery changes. What these changes are, and will be, was the concern of two machine design conferences this Spring. The NYU College of Engineering and the American Society of Mechanical Engineers sponsored a conference on production considerations in machine design, and Westinghouse held their 19th Annual Machine Tool Electrification Forum in Buffalo.

"We need more human work in design, we need less human work in production," was a comment made from the floor at NYU. The number of workers in the automobile industry has increased more than a third in the past decade, and this increase is largely due to the introduction of automatic machinery, it was pointed out in Buffalo. Both remarks indicate a belief that there will be more work for more people, both before the product is made, during the design stage, and afterwards, when it is being marketed. This should be a good thing for the designer—the product designer as well as the tool designer—and he will have much to do with making the actual transition possible. Synopses of the conference papers give a good idea of what is involved in this.

Design requirements for automatic control.

W. C. Allen, director of Manufacturing and Equipment Engineering, Westinghouse.

To get more volume per hour, per foot, and per dollar, the most inviting possibility lies in the replacement of existing high-cost production equipment with new machines that turn out more work in less time, with quality and performance dependent more on engineered controls than on operator skill.

Some equipment is too heavy, some is too light. Perhaps because the material cost in American machine tools amounts to a relatively small percentage of total cost, our designers have not found it necessary to give concentrated attention to weight problems.

Stress analysis of component parts should be considered; and the rigidity of equipment is important, particularly because of the increased loads imposed by better cutting tools. Equipment that will handle carbide tooling at high speeds lacks the reserve power to take on heavy work at the faster speeds.

Power and speed, vibration and noise, become important when automatic controls are desired, for it may be impossible to install precision machines adjacent to punch-press areas. I note that Dr. W. W. Gilbert of the General Electric Company solved this problem by installing every machine in a particular shop with vibration mountings. The vibration bases can be moved easily. The machine tool frame should be designed to fasten to these floating bases with allowances for leveling.

Self-measuring and tool-positioning devices should be reliable and accurate within the tight limits necessary under present-day requirements.

Tool heads should incorporate quick-clamping methods.

Standard machines should be flexible so that they can be tied together in a production line in such a way that automation follows as a natural sequence.

Feeding, loading, and unloading mechanism must be designed to work with standard machines. It is imperative to mechanize the work-handling function. Motions of the operator to produce a part should receive primary consideration.

Built-in or automatic measuring devices should be placed so that they terminate the work cycle. They must do more than just inspect.

As machines speed up, maintenance must be as automatic as possible, and methods of unit replacement must be devised on a kind of detour system that allows the line to continue operation. An enormous problem is chip removal. The seriousness of this problem adds to the necessity for closer liaison between the user and the machine builder, even at the stage of plant layout and equipment planning.

Many kinds of manufacturing have been automatic for decades, and here are the needed requirements.

1. Material storage at point of use.
2. Loading with a built-in demand system.
3. Automatic positioning and clamping.
4. Automatic gaging.
5. Automatic ejection of defect parts.
6. Signals for tool changes.
7. Detours or stock-piling provisions.
8. Safety and warning devices for patrol operators.
9. Automatic lubrication.
10. Computer control for workpiece and cutting-tool movements.

Production considerations in machine design.

E. P. Bullard III, Chief Production Engineer, Pratt & Whitney Aircraft Corp., Hartford.

The old time craftsmen were able to produce almost any product with a very few fundamental tools, but these tools are almost useless in the hands of the novice. Consequently, it is necessary that the tools supply the needed skill and knowledge which the novice lacks. Machine designers have been so busy supplying operators with special devices that the problem of designing such equipment for economical manufacture has been overlooked. If the designer comes up with a piece of equipment that will do the job required, all concerned feel that they have done a reasonably good job. The average tool costs ten times more to build than to design. Consequently, the additional time and effort expended in a design of such equipment can mean savings. It is amazing how often a complex design can be simplified. Too often the tool designer sees but one solution to his problem, and in following a rather fixed line of thought, finally comes up with a rather complex answer.

It is perhaps unfortunate that the draftsman is supplied with French curves. Even the conventional compass can produce very difficult shapes.

Dimensioning for easy work and handling in the shop is a major design factor. Wherever possible, parts should be dimensioned from a base line. Holes should be dimensioned from the surface on which the part will rest during the boring operation. If more than one part is to be machined, the same setting dimensions may be used for each. In axial dimensioning, it all too frequently occurs that parts are dimensioned from a surface which cannot be used as a rest point.

Improper choice of materials and methods can make production difficult and

costly, and inspection may pose as many problems as production.

Quite often, the extension of a part in one direction, or the incorporation of a ground surface, reference hole, or pin, permits simple gaging. Ease of handling and assembly should be designed into a piece.

A fixture on a machine tool represents but a small cost of the entire machine, and yet if the fixture breaks down, the entire machine must be stopped until the fixture can be repaired. Disassembly of such a fixture requires many times the hours needed to adjust or replace a worn or broken part in it.

Production considerations in the design of heavy machinery.

Charles A. Jurgensen, Vice President of Manufacturing, Laval Steam Turbine Company, Trenton, New Jersey.

We need easy-to-read drawings with dimensions given from datum lines, with bore dimensions located so that the operator can follow a logical work procedure on his drill-press. Use of standard dimensions and designations, with special drawings for the pattern maker and machine shop, are fundamental.

Allowing the shop to use its own judgment as to finish and tolerance can be a source of confusion and wasted time.

Widest possible use of existing parts, patterns, jigs, and fixtures should be made; this is tied in with the length of time and extent of use of the finished product, which should be indicated on the drawing. We use a letter code, so that the patternmaker will know whether a pine pattern, or a pattern with wood or metal trim is called for. An ABC check letter will also help the toolmaker, an A indicating no tooling, B indicating minimum tooling, and C indicating investigation for production tooling.

Use of standard fastenings, placed where they are easily accessible, dividing a machine into as many sub-assemblies as possible, and incorporating adjusting devices for wear compensation when the machine is in the field, are all necessary design considerations. Easy lubrication and bearing replacement is essential.

When such easily avoidable mistakes are overlooked, cost of design development rises quickly, production costs rise geometrically, and the final desirability of the end product is reduced. Such factors are vital when systems of automatic control are being contemplated.

Production considerations in machine design.

W. C. Cadwell, Engineering Department, Caterpillar Tractor Company, Peoria, Illinois.

In our company, machine designers work directly with manufacturing, metallurgy, and foundry experts assigned to the engineering department. These men point out obvious production problems that may not be too familiar to the designer, and make production studies prior to tooling or processing. They also compile material selection charts, condensing for the designer information about carbon and alloy steels commonly used by the company. The basis for steel selection may be the type of heat-treatment to be applied, the requirement that the part be welded, the need for close hardness control, or rough material forms; by following the chart a designer, in most cases, will make the proper selection.

A compilation of ideal stock sizes was made for the designer, and in a typical case, by a few minor concessions and adjustments in design a total of 443 sizes, shapes, and grades of tubing was reduced to 248.

The production experts are most useful when the designer wants to know how far he can go in a desirable yet unavoidable direction. In the design of a casting, the question of whether to use a contour requiring a core or one which could be made in green sand would be viewed quite differently by a designer and an experienced foundry man. To help the designer, sketches of a number of castings designed with and without cores, are included in the Engineering Standards, where applicable explanations are presented so that the principle involved becomes clear.

A council of experts from other company divisions is called in when the Engineering Department sees the need for new standards. It was noted, for instance, that there was no standard for threaded shaft ends, and after study a standard was formulated which gave optimum shape for maximum tool life with excellent provision for the minimum number of form-turning tools required. It was then found that a related problem was the turn diameter of a thread.

Tolerances were being held too closely, which meant special care in attaining the drawing limits, and required gages and inspection to check the parts. The "standard" had little foundation in sound practice or engineering requirement, and such close tolerances have had their origin in the machinist's pride in seeing how close he could hold a tolerance.

The designer is apt to be more precise in his requirements than needed, and this results in a dimension difficult to live with. It was found that where a number of bending radii were available, invariably a designer would pick the minimum. The standard was revised to show optimum size which is desired for general application. Greater or smaller radii then become exceptions.

As one compares the functional requirements of a design with the actual details shown on engineering drawings, it is apparent that much latitude is possible in certain instances, but it is also difficult for a designer to show how the latitude may be taken.

We have classified holes by tolerance class and designate each hole on the drawing accordingly, thus allowing any process to be used, as production economies dictate, without the need for changing drawings.

In selecting material sizes, it is our intent to specify the minimum stock size and finish of a bar or tubing, but larger sizes may be used, a practice that simplifies low-volume production and reduces the number of stock sizes needed.

Quality controls are probably the only method by which the designer and the producer are brought together to face the indisputable truth. We hope we can see the end of the era in which the designer applies a tolerance of 0.002 "because he knows the shop will take 0.004." The designer must know the actual capability of the machines, and emphasis must rest on the average and dispersion characteristics of any dimension.

In acceptance of materials it has been our experience that the designer's requirements as specified on the drawing and the actual part produced are much more nearly the same by applying statistical sampling, hardness checking, chemical analy-

sis, etc. Such analyses have necessitated following up in the case of castings and other rough materials to the point of origin. Certain revisions centered about mean product requirements to "make the part like the print or make the print like the part."

Mechanizing machine tools for diversified production.

B. D. Smith, General Supervisor of Mechanical Engineering Research, International Harvester Company, Chicago, Ill.

Diversified production increases the problems of mechanization. A maker of welding equipment had to get together with a maker of forming equipment to produce a machine needed by the company, and such cooperation is being extended to solve high-production problems. Low production problems must be solved by the company, for machine-tool builders cannot afford to do such development.

The company is particularly anxious to eliminate batch production methods that are laborious, monotonous, and slow; but small production may not warrant the cost of mechanized equipment. Building versatility into a machine helps solve this, whereby a single machine performs several operations.

Automatic controls often involve closer tolerances, as in the case of a curved surface of a plow bottom, which can vary as much as a quarter of an inch. Automatic polishing and grinding demanded closer tolerances.

There is the need for eliminating tedious work. Automatic loading through hoppers or magazine feed mechanisms not only aids in producing parts of more uniform quality, but greatly relieves monotony among operators and enables them to concentrate their efforts on the workings and maintenance of the equipment. As a result, operators will become more capable than at present, for their principal function will now be to monitor production and watch for signs of impending trouble rather than to handle parts in and out of equipment.

Automatic inspection is needed, because if faulty pieces are passed, equipment down the line might be damaged. There is now a tendency for the company and other industrial users to sacrifice styling and place more emphasis on machine performance, work handling, and safety.

Most designers would agree with this basic idea, although disagreeing with the implication that appearance is a matter divorced from safety, work handling, and other functional aspects. But perhaps the most interesting aspect of the paper, and of the conferences, is an understanding of how the role of the worker is changing, and the need for turning menial tasks over to machines. What the worker will do, and how he will be upgraded, is a basic concern.

Westinghouse Forum

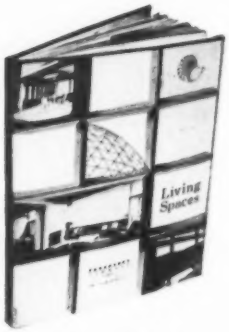
D. C. Burnham, vice president in charge of manufacturing, made an opening speech on the roots of automation. The machine tool industry should work at making present day tools obsolete. That process is the history of production development. There are several levels of production today. The lowest level is the job shop, where parts are individually handled, machined, and assembled. In progressive line manufacturing, the part to be produced moves in a straight line from machine to machine; in conveyorized manufacturing the parts are automatically transferred from one machine to another by conveyors; and the ultimate system incorporates automatic testing and controls, as well as automatic handling. All four levels are used at Westinghouse, often in combination.

Much time at the Forum was spent in explaining the working of the Cypak control system, and many of the papers were concerned with the application of the system to production. The system is made up of control units about 5" square and ½" thick. They contain magnetic cores mounted on a piece of insulating material, which are wired to current-retarding resistors and current-storing capacitors. A unit made with transistors looks like a small metal box with prongs. The various units perform "and," "or," "not," and "time" functions, depending on the arrangement of the electrical connections: "and" units would pass a part along if a group of dimensions were within tolerance; "or" units would start an automatic elevator if a call came from another floor; "not" units will control to deliver an output signal as long as no signal is fed to it, as in the case of keeping a conveyor belt moving; "time" units will deliver a signal for a specified time, or delay a signal for a specified time. Any number of such units can be hooked together to operate a production line.

Among other papers were ones on ultrasonic impact grinding, automatic gaging, a compact feed rate indicator, radio interference in control systems, and a turret lathe controlled by magnetic tape. All of them were concerned with substituting machines for human work. Westinghouse vice president J. K. Hodnette observed, in relation to this point, that automatic manufacturing "will relieve the workman of the routine and the physically difficult tasks and train him for more interesting and more skillful work."

The machine designer, at these conferences, indicated that he knew how production methods are changing, and what he must do about it. In talking about designing for production at NYU, H. Michelsen, the master mechanic for General Motors' New Departure Division in Bristol, Conn., mentioned a questionnaire sent out to all divisions, asking engineers if turning equipment they used could be improved. Answers were 100 percent affirmative. J. H. Conard of the Niles-Bemont-Pond Company, summed up the design problem by emphasizing that the engineer can no longer throw up his hands and say, "Here it is, boys, just go ahead and make it." The product designer is in the same position. How he will solve specific problems depends on more and more work with production people, and an understanding of the production levels and areas of development within the particular company. In designing the product, he may even become involved in what the worker does while making the product. He will certainly be receiving more and more material on what happens before and after production, if only because more people will become involved in those stages of manufacture. The machine design conferences this Spring have suggested the complexity and direction of production methods as machinery becomes automatically controlled.

The attempts to convert to flow production should be recognized by the product designer, so that he can avoid freezing an old production system with a new design. In his design research, the designer may discern ways to switch to higher production levels, and such changes would be a bonus for his client.



ESSENTIAL BOOKS FOR EVERY DESIGNER

Put these handsome, richly illustrated design books to work for you! Fresh ideas . . . new techniques from the entire world of design—hundreds of original applications . . . Each book is lively reading—an important reference source.

What HOUSE & HOME, the national building magazine, says of these basic design books—

"It is a pleasure to record this . . . enterprising and imaginative publisher—Charles Whitney, who puts out INTERIORS—has finally come to fill the need for first-rate American-produced books on design. Judging by the present series, Mr. Whitney is giving the famed European publishers a real run for their money. And he is putting some big US publishers (who prefer little risks) to shame."

No. **1** in the Interiors Library

LIVING SPACE

Contemporary interiors by 81 designers, including Finn Juhl, Le Corbusier, Mies van der Rohe, Richard J. Neutra. LIVING SPACES shows outstanding designs selected by the editors of *Interiors*. Edited, with an introduction by George Nelson. *Bound in full cloth*: 148 *pages*, 9 *x* 12 *inches illustrated with* 232 *photographs*. *Price* $7.50.

No. **2** in the Interiors Library

CHAIRS

This fine book of design examines chairs produced today in bentwood, laminated wood, molded plastics, solid wood, metal and upholstery . . . by 137 top designers. Edited, with an introduction by George Nelson. *Bound in full cloth*: 176 *pages*, 9 *x* 12 *inches with* 433 *illustrations*. *Price* $10.00.

No. **3** in the Interiors Library

DISPLAY

Ingenious displays that set new patterns in interior design thinking and techniques . . . in shops, showrooms, exhibitions. Edited, with an introduction by George Nelson, DISPLAY features creations of 125 designers and architects of international note. *Bound in full cloth*: 192 *pages*, 9 *x* 12 *inches with* 312 *illustrations*. *Price* $12.50.

No. **4** in the Interiors Library

STORAGE

Here are the problem-solving storage ideas of 138 leading designers for facilities that can be bought or built in—shelf systems, storage walls, room dividers, unit furniture. STORAGE is edited with an introduction by George Nelson. *Bound in full cloth*: 176 *pages*, 9 *x* 12 *inches with* 303 *illustrations*. *Price* $12.50.

and—the classic reference

ANATOMY for Interior Designers

1321 essential measurements every designer needs, in clear dimensional drawings that can save you many hours of research. Measurements that relate the human body to all interior furnishings and equipment. A second section HOW TO TALK TO A CLIENT tells how to study the prospect, make plans and talk about money. *Bound in full cloth*: 96 *pages*, 9 *x* 10¼ *inches, full of sketches and diagrams*. *Price* $4.00.

Any of these essential books will be sent for 10 days' free examination

SPECIAL DISCOUNT RATES:
Any two books—deduct 5%
Any three books—deduct 10%
Four or more books—deduct 15%

use this convenient order form ⟶

To: WHITNEY PUBLICATIONS, INC., 18 East 50th St., N. Y. 22

☐ Enclosed is remittance of ... for ... copies of books as checked in the boxes below. (For Canada and foreign countries, add 35c per copy for postage.)

☐ Send to me on 10 days' free examination.

Name .....

Address .....

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

☐ LIVING SPACES	$7.50
☐ CHAIRS	$10.00
☐ DISPLAY	$12.50
☐ STORAGE	$12.50
☐ ANATOMY	$4.00

(Books sent to New York City address add 3% sales tax)

Directory *of schools listed on pages* 38-39

Alabama Polytechnical Institute, Auburn, Alabama. Frank Applebee, Professor of Art.

Art Center School, 5353 West Third Street, Los Angeles, California. Director: E. A. Adams.

University of Bridgeport, Bridgeport 4, Connecticut. Robert E. Redmann, Head, Industrial Design.

University of California, Los Angeles 24, California. John Maguire, Art Department.

Carnegie Institute of Technology, Pittsburgh 13, Pa. Wilfred A. Readio, Chairman, Department of Painting and Design.

School of the Art Institute of Chicago, Chicago 3, Illinois. Dean Hubert Ropp.

University of Cincinnati, Cincinnati 21, Ohio. Dean Ernest Pickering.

Cranbrook Academy, Bloomfield Hills, Michigan. Theodore Luderowski, Director of Design.

Georgia Institute of Technology, Atlanta, Georgia. Hin Bredendieck, School of Architecture.

Illinois Institute of Technology, Chicago 16, Illinois, Institute of Design.

University of Illinois, Urbana, Illinois. James C. Shipley, Department of Art.

University of Kansas, Lawrence, Kansas. School of Fine Arts.

University of Michigan, Ann Arbor, Michigan. Aarre K. Lahti, Acting Chairman, College of Arch. and Design.

Philadelphia Museum School of Art, Philadelphia 2, Pa. Joseph Carreiro, Chairman of Industrial Design.

Pratt Institute, 215 Ryerson Street, Brooklyn 5, New York. Robert A. Kolli, Chairman, Industrial Design.

Rhode Island School of Design, Providence 3, Rhode Island. John E. Alcott, Chairman, Industrial Production.

University of Southern California, Los Angeles 7, Calif. Dean: Arthur B. Gallion.

Syracuse University, Syracuse, New York. Dr. Lawrence Schmeckebier, Director, School of Art.

University of Washington, Seattle 5, Washington. Boyer Gonzales, Director, School of Art.

Handy Subscription Cards For Your Business Associates

Many readers have suggested that we make it convenient for design executives in their organizations to subscribe to **INDUSTRIAL DESIGN.** To make it easy, we have prepared a handy order card, attached in back of this issue, which you can give to your business associates.

Manufacturers' Literature

Adhesives. Minnesota Mining and Manufacturing Company, 411 Piquette Ave., Detroit, Mich. Adhesives and coatings for applying insulation is the subject of a new four page folder; another new publication serves as a guide to adhesives, coatings and sealers for use in the refrigeration and air conditioning industry.

Adhesives for transparent films. National Adhesives, Division of National Starch Products. Inc., 270 Madison Ave., New York, N. Y. 18 pp., ill. The choice of proper film, machinery and adhesive for transparent packaging is discussed with an explanation of the four types of formulations for bonding transparent films.

Air Diffusers. Anemostat Corp. of America, 10 East 39th St., New York, N. Y. 64 pp., ill. A guidebook to aspirating air diffusers for all purposes, with a section on high velocity units.

Alkyd Molding Compounds. Barrett Division, Allied Chemical and Dye Corp., 40 Rector St., New York, N. Y. 8 pp., ill. Proper tools, equipment and techniques for best results with Plaskon alkyd molding compounds are discussed with specific recommendations made for each type of material.

Aluminum. The Aluminum Association, 420 Lexington Ave., New York, N. Y. 4 pp. A pamphlet describing the new alloy designation system developed by this association for wrought aluminum and aluminum alloy products.

Brass Forgings. Copper & Brass Research Association. 420 Lexington Ave., New York, N. Y. 4 pp. A helpful glossary of terms commonly used in connection with brass forgings has just been published by the association.

Castings. Crucible Steel Co. of America, Pittsburgh, Pa. 16 pp., ill. A description of the method by which Accumet precision investment castings now permit unmachinable high-temperature alloys to be precision cast.

Chemicals. Manufacturing Chemists' Association, Inc., 1625 Eye Street; Northwest, Washington, D. C. 160 pp., charts. The second edition of The Chemical Industry Facts Book is available. This useful reference source on the industry has 50 pages not included in the first edition. $1.00.

Computer Tubes. Tube Department, General Electric, Schenectady, N. Y. 50 pp., ill. A survey report, to provide electronic computer designers and manufacturers with a working guide to GE's line of tubes.

Die Castings. Parker White Metal Company, Erie, Pa. American Die Casting Institute standard specifications. tolerance tables and physical properties of die casting alloys are contained in a new engineering data booklet.

Die Stamping. M. Swift & Sons, Inc. 10 Love Lane, Hartford, Conn. 14 pp., ill. The hot-die method of product marking for decoration and identification, and use of metallic and pigment colors, is described with lists of applications.

Drafting Equipment. Stacor Equipment, 768-778 East New York Ave., Brooklyn, N. Y. 20 pp. ill. The Stacor line of steel drafting room furniture, tracing, drawing and X-ray equipment is illustrated and described.

Flooring Materials. Small Homes Council, University of Illinois, Urbana, Ill. 8 pp., ill. Advice on selecting and caring for home floors with a discussion of various materials recommended for subfloors.

Home Wiring. Consumer Service Dept., Westinghouse Electric Appliance Division, Mansfield, Ohio. A new handbook to aid in determining electric circuit requirements is available from Westinghouse for $1.00.

Joining Steels. Crucible Steel Company of America, Pittsburgh 22, Pa. 24 pp. Seventeen methods for joining stainless steel by fusion processes are described. They include manual, automatic and semi-automatic welding, brazing

Manufacturers' Literature *(Continued)*

and soldering. Cutting procedures commonly used for severing stainless are also described.

Lighting. General Lighting Company, 249 McKibbin Street, Brooklyn, N. Y. General's new folder explains their flexible lighting system of snap-on fixtures and an overhead track, for home or commercial use.

Machine Parts. Amplex Division, Chrysler Corp., Detroit 31, Michigan, 50 pp. ill. An engineering manual on Chrysler Oilite products — bearings, machine parts, filters, friction units and other special products.

Mechanical Seals. John Crane Packing Co., 1800 Culver Ave., Chicago, Ill. 12 pp., ill. An explanation of the end-face seals in the Crane line with recommended applications.

Metal Grating. Klemp Metal Grating Corp., 6605 South Melvina Ave., Chicago, Illinois. 16 pp., ill. A new specifications and data manual, covering all types of grating, open steel floor armor, stair treads, vessel liners, bridge decking and drain gates.

Metal Letters. Nelson Metalcraft Co., 3036 West Chicago Ave., Chicago, Illinois. 16 pp., ill. The entire alphabet in each of this firm's standard letter styles is reproduced in exact scale in their new bulletin, with illustrations and instructions for different mounting devices. Samples of colors available for porcelain enamel or baked enamel letters are included.

Office Furnishings. Aetna Steel Products Corp., 730 Fifth Ave., New York, N. Y. The Arnot modular system of furniture and space division equipment for offices is illustrated in full color with examples of installations.

Plastic Tooling. Rezolin, Inc., 5736 West 96th Street, Los Angeles, Calif. 6 pp. ill. Applications, properties, characteristics and handling instructions concerning the use of phenolics in plastic tooling, with a flow chart demonstrating typical fabrication procedure.

Precision Tools. Cleveland Tool & Die Company, 1643 Eddy Road, Cleveland, Ohio. 36 pp., ill. A description of the equipment in operation and their advanced methods for producing precision parts.

Seat Belts. Cornell Aeronautical Laboratory, Inc., 4455 Genesee St., Buffalo, N. Y. 16 pp., ill. Laboratory research on automobile seat belts is described in this bulletin for engineers and manufacturers.

Simplified Drafting. American Machine & Foundry Company, 11 Bruce Place, Greenwich, Conn. 36 pp., ill. Eleven rules for simplifying drafting practices are illustrated with a comparison between traditional and simplified methods.

Sound Systems. Altec Lansing Corp., 161 Sixth Ave., New York, N. Y. 36 pp., ill. Complete technical data on all Altec engineering sound products, for professional sound equipment users.

Index to Advertisers In This Issue

Classified Advertisements

10c A WORD PER INSERTION, $3.00 MINIMUM, PAYABLE IN ADVANCE. BOX ADDRESS COUNTS FIVE WORDS.

Positions Wanted

INDUSTRIAL DESIGNER *with varied production and material experience in all creative phases of product design, development, engineering and model making desires permanent position with progressive manufacturer. Willing to relocate. Box ID-43,* INDUSTRIAL DESIGN, *18 E. 50th St., N. Y. 22.*

AMBITIOUS YOUNG AIRCRAFT STRESS ENGINEER *wants position where creative, artistic ability can develop and expand with West Coast industrial design firm. B. S. in Aero. Engineering, industrial experience, and graduate work in Human Engineering with research into color psychology. Robert Scott, 4463 W. 59th St., Los Angeles 43, California.*

INDUSTRIAL DESIGNER *with diversified and successful experience in appearance design of commercial and capital goods. Understands engineering problems. Desires position with manufacturer. Age 31. Married. Box ID-44,* INDUSTRIAL DESIGN, *18 E. 50th St., N. Y. 22.*

Help Wanted

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

HELEN HUTCHINS PERSONNEL AGENCY—*Specialist Industrial, Architectural, Interior Design, Decorative Arts, Trades, Home Furnishings. Helen Hutchins' long association with a leading industrial design organization insures intelligent and individualized screening of all types of personnel for industrial designers. 767 Lexington Ave., New York 21. TE 8-3070. Interviews by appointment.*

PACKAGE DESIGNER—*Creative designer-artist, capable of carrying program from sketch through finished art. Opportunity for fast advancement and solid future with aggressive design organization. Send letter and/or samples. Salary open. Box ID-46,* INDUSTRIAL DESIGN, *18 E. 50th St., N. Y. 22.*

SALES REPRESENTATIVES—*Calling on industrial designers and architects to introduce sensational new rigid vinyl wall covering in authentic brick and stone patterns. Promotion program geared to go. Top commissions. New division of old established firm. Box ID-47,* INDUSTRIAL DESIGN, *18 E. 50th St., N. Y. 22.*

PRODUCT DESIGNER—*Highly creative, to join staff Chicago furniture manufacturer. Person with intuitive knowledge of future trends. Advise experience, education, age, other details. Box ID-48,* INDUSTRIAL DESIGN, *18 E. 50th St., N. Y. 22.*

INDUSTRIAL DESIGNERS—*An opportunity for growth with industrial design consulting studio for experienced product and packaging designer. Inquiries confidential. Include resume. Room 1630, 104 South Michigan Avenue, Chicago 3, Illinois.*

Miscellaneous

"WHY TAKE IN EACH OTHER'S WASHING?"—*Idea man; freelance; phenomenal originality; inexaustible, disciplined creativity; science liaisons; intellectual catalyst. Pen-ultimate: liquid ink, leakproof, spherical/conical point: $25,000. Ultimate razor: guardless, self honing, 36" slashing edge: $100,000. Torch, burning carbon/hydrocarbon, 16,322°F.—vaporizes creation—vitrifies hole—(oil wells)—$250,000. Tugboats eliminated: $100,000. Atmospheric oxygen: $250,000. Nigglers, "sculptors," triflers abhorred, and "cordially" detested. J. Depew, Box 2, Brooklyn 17, New York.*

PRODUCT STYLING—*Industrial design consulting firm of proven excellence has opening for new account. Product and package design specialists. Box ID-49,* INDUSTRIAL DESIGN, *18 E. 50th St., N. Y. 22.*

INDUSTRIAL DESIGNER *with experienced understanding of manufacturers' problems and needs, offers seasoned, highly effective creative abilities. Successful product design background. Will discuss in confidence. Free-lance basis only. Box ID-50,* INDUSTRIAL DESIGN, *18 E. 50th St., N. Y. 22.*

For Your Calendar

June 10-August 28. "H55," a major Exposition of Industrial Design, Architecture, Home Furnishings and Crafts. Halsingborg, Sweden.

June 12-17. Society of Automotive Engineers' Summer Meeting. Atlantic City.

June 13-18. Fifth International Design Conference, Aspen, Colorado.

June 19-23. American Society of Mechanical Engineers' Semi-Annual Meeting. Boston.

June 20-23. American Electroplaters' Society, Industrial Finishing Exposition. Cleveland.

June 20-July 1. International Homefurnishings Market. Merchandise Mart. Chicago.

June 20-July 1. Summer Market. Waters & Exhibitors Buildings. Grand Rapids, Michigan.

June 26-July 1. American Society for Testing Materials' Annual Meeting. Chalfonte-Haddon Hall, Atlantic City, N. J.

June 29-October 12. III Biennale of the Sao Paulo Museum of Modern Art. Sao Paulo, Brazil.

June 30-July 30. Selected Examples of Italian Industrial Design. The Italian Institute. London, England.

July 10-15. New York Lamp Show. Hotel New Yorker.

July 11-15. National Housewares and Home Appliances Exhibit. Auditorium, Atlantic City; Independent Housewares Exhibit. Chelsea Hotel, Atlantic City.

July 11-15. Los Angeles Summer Furniture Market. Los Angeles Furniture Mart; Auxiliary Market, Shrine Exposition Building, Los Angeles.

July 17-22. National China, Glass and Pottery Show. Hotel New Yorker, New York.

July 18-22. Western Summer Market. Western Merchandise Mart. San Francisco.

July 24-27. Washington Gift Show. Hotel Willard.

August 1-12. Chicago Gift Show. LaSalle Hotel and Palmer House.

August 22-26. New York Gift Show. Hotels Statler and New Yorker.

September 6-16. Machine Tool Show. International Amphitheatre, Chicago; Production Engineering Show. Navy Pier, through September 17.

September 12-16. 10th Annual Instrument-Automation Conference and Exhibit, sponsored by the Instrument Society of America. Shrine Exposition Hall and auditorium. Los Angeles.

September 12-16. Boston Gift Show. Hotel Statler.

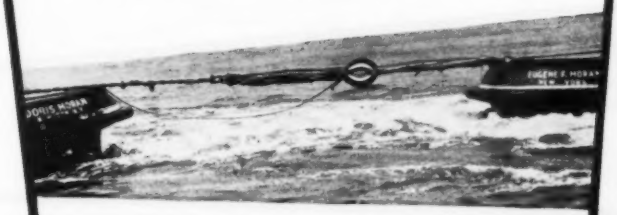
September 14-16. Annual Meeting of the Association for Computing Machinery. University of Pennsylvania, Philadelphia.

September 16-20. Denver Gift and Jewelry Show. Hotel Albany.

September 20-22. Tenth Annual Industrial Packaging and Materials Handling Exposition. Kingsbridge Armory. New York, N. Y.

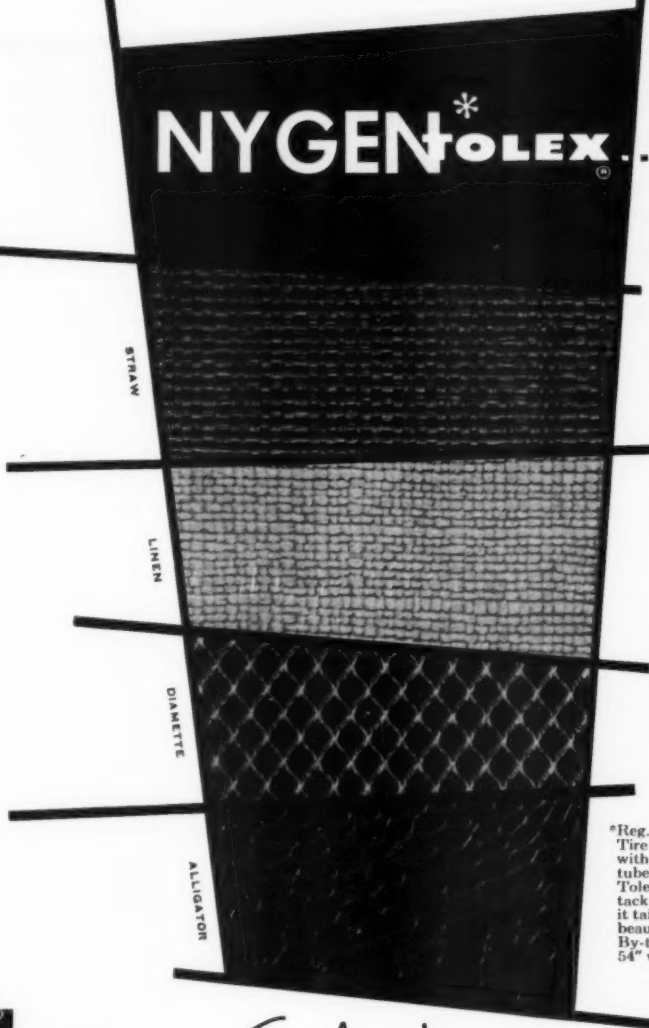
September 28-29. Industrial Electronics Conference, co-sponsored by the American Institute of Electrical Engineers and the Professional Group on Industrial Electronics of the Institute of Radio Engineers. Detroit.

for the designer...



a stronger,
more "tailorable"
supported vinyl...

NYGEN* TOLEX®... for upholstery, luggage, home furnishings, flat goods



New NYGEN Tolex is much more "tailorable" than any other supported vinyl plastic material on the market.

NYGEN Tolex is available in a wide range of weights for every design application—and on special order in a wealth of color and variety of design for which Textileather has long been famous.

Textileather, with 44 years of experience in this industry, now introduces for your serious consideration and evaluation their NYGEN TOLEX . . . truly a superlative product.

*Reg. T.M.—The General Tire & Rubber Co. as used with the famous NYGEN tubeless tire. NYGEN Tolex—glue it, tack it, sew it—it tailors beautifully. By-the-roll—54" wide.

GENERAL PLASTICS
The General Tire & Rubber Company

Samples? Write...

TEXTILEATHER

DIVISION OF THE GENERAL TIRE & RUBBER COMPANY

TOLEDO 3, OHIO

Freezer Door Panel

Steering Wheel Cap

Range Control Knob

Tail Light Lens

Refrigerator Nameplate

Plexiglas ...the distinctive touch for fine products

Molded parts like those shown above combine functional value with gleaming beauty because they are made of PLEXIGLAS. This acrylic plastic has outstanding resistance to breakage, discoloration, weather and corrosion.

The combination of rich, brilliant appearance and rugged durability is the reason PLEXIGLAS acrylic plastic is chosen by manufacturers to give added sales appeal and serviceability to their products. You find parts molded of PLEXIGLAS, for example, on cars, home appliances, outdoor lighting fixtures, optical equipment and industrial pumps. Our brochure "Molding Powder Product Design" tells how and where to use PLEXIGLAS. We would like to send you a copy.

PLEXIGLAS is a trademark, Reg. U.S. Pat. Off. and in other principal countries in the Western Hemisphere.

CHEMICALS FOR INDUSTRY

ROHM & HAAS COMPANY

Washington Square, Philadelphia 5, Pa.

Representatives in principal foreign countries

Canadian Distributor: Crystal Glass & Plastics, Ltd., 130 Queen's Quay at Jarvis St., Toronto, Ontario.