INDUSTRIAL DESIGN

February 1956 two dollars a copy

Martin Rosenzweig

Cover: *surgical instruments of four centuries ago. Specifically, they are bullet-extracting forceps from "Les Oeuvres de Chirurgie," 16th-century text by Jacques Guillemeau, pupil of the eminent surgeon Ambroise Paré. Paré's surgical tools, their development since his time, and their present-day design are discussed on pages* 96-105.

VOLUME 3, NUMBER 1

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 FEBRUARY, 1956:

Frontispiece:

Hugh Johnston's photograph, a postscript to our April 1955 story, "The El Comes Down," casts a backward and forward glance on one of New York's oldest, most maligned, and—by some—beloved landmarks. With the removal of the El, Third Avenue enters a new era: extensive construction, rising real estate values, trees, and expanses of sky will characterize one of the city's broadest thoroughfares.

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in this issue...

Matter, Knoll, the McGinnises

Yamasaki

Breuer

Margulies, Lippincott

Kiefer

Pollard

Dorfsman

Koepf

Ferrari

Herbert Matter, who came to the United States in 1936 from Switzerland, designs and photographs the monthly ads of Knoll Associates. He is a staff photographer for Condé-Nast and teaches a course at Yale.

Florence S. Knoll studied architecture at Illinois Institute of Technology and in London, and is president of Knoll Associates and of Knoll-International, designers of furniture and interiors. She and Herbert Matter are shown with Mr. and Mrs. Patrick B. McGinnis in April 1955, when the New Haven engine schemes were chosen.

Minoru Yamasaki appeared in October 1955 ID as one of the leading figures in Detroit's redevelopment program; he is a partner of Yamasaki, Leinweber & Associates and, besides the New Haven shelters, designed the new St. Louis Air Terminal.

Marcel Breuer's latest work includes UNESCO's permanent headquarters in Paris and a factory for Torrington Manufacturing Company, as well as the New Haven's new trains. He was recently awarded the International Golden Compass (page 18).

Gordon Lippincott and **Walter Margulies**, on moving into new offices at 430 Park Avenue, came up with the desks on p. 80 to satisfy the working designer's many needs. Engaged in supermarket designing and store planning, they also contribute packaging for Lever Brothers, Campbell's Soups, Lily-Tulip, General Electric, and are ASID members.

Leroy Kiefer, who heads the Product and Exhibit Studio of General Motors Styling Section, directs all of GM's non-automotive design. The Kitchen of Tomorrow, p. 71, as well as the entire Motorama exhibit, come under his jurisdiction. An alumnus of the University of Michigan School of Architecture, he joined GM in 1935.

George Pollard, Project Head of this year's Kitchen of Tomorrow, was one of the designers who worked with the late Alexander Kostellow on the first two Frigidaire displays. After graduating from Pratt in 1951, he was a partner in Miller-Pollard Associates in his native Seattle until he joined GM in 1953.

Harley Earl, Vice President in Charge of Styling, and **William Mitchell**, Director of Styling, whose activities were elaborated on in October ID, supervised the design of the Kitchen of Tomorrow. (Not shown)

Lou Dorfsman, a graduate of Cooper Union Art School, has won New York Art Director's Club and American Institute of Graphic Arts Gold Medals for his work at CBS Radio.

Rudolph H. Koepf, who discusses new model making techniques for small appliances on p. 106, studied art and architecture in his native Bremen, Germany before coming here in 1929. Moving into industrial design after further training at NYU, he associated with several design firms and later headed his own construction company. He joined GE in 1946, and is now Manager of Appearance Design, Housewares and Radio Receiver Division.

Edward Ferrari, with GE since 1947, has been principally responsible for applied research procedures in making appearance models. A sculptor by training and inheritance, his interests eventually diverted, like his colleague Koepf, from fine arts to industrial design, and in 1942 he joined United Aircraft Corporation, Chance Vaught Division, applying plastics to fixtures and tools.

GEN
Fi

P-13

CORNING GLASS
BULLETIN FOR PEOPLE WHO MAKE THINGS

CORNING GLASS WORKS, 54-2 Crystal Street, Corning, New York
Please send me the following material:
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How to engineer a platypus

A happy combination of purposeful practicality is the furry platypus with its webbed feet, beaver's tail, and duck's bill.

A lot of our customers, to their continuing delight and profit (we hope), have discovered that glass is sort of platypus-like in that it, too, can be made to combine many useful characteristics.

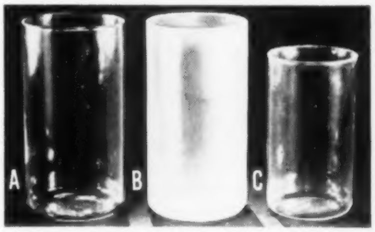
Take, for example, PYREX brand pipe. Here you see a man using a piece of it to drive a one-inch nail in a pine block. This is essentially an extra-curricular activity for glass pipe, which is more at home conveying metal-eating acids around chemical plants, but it's a way of showing just how tough glass can be when it's *made* that way.

All of which may serve to illustrate for you how we can arrange the optical, chemical, thermal, mechanical, and electrical properties of glass in different combinations to match a considerable variety of end-use requirements. In fact, we've worked up some 50,000 different formulas for glass in our years of helping customers solve specific design and processing problems.

If platypus-like glass is a novel idea to you, if you've never given glass a second thought as a highly adaptable design and construction material, we suggest your reading a pocket-size volume entitled "Glass and You." It tells in a few words and many pictures how glass contributes to profit and pleasure and we'd be delighted to send you a copy. Or, if you're more concerned with putting glass to work for you than in learning what it's doing for others there's a slightly more technical bulletin called, "Glass—its increasing importance in product design." We'll be glad to send you either—or both.

Most remarkable glass

In 1952 Philadelphia's Franklin Institute presented the John Price Wetherill Medal to Corning's Dr. Martin E. Nordberg and Harrison P. Hood for inventing the most fabulous of glasses—VYCOR brand 96 per cent silica glasses.



Evolution of a VYCOR jar: A—formed by conventional glass blowing; B—"thirsty glass"; C—finished product.

These two scientists discovered a composition that appeared to be a combination of two distinct types of glasses. One type could be dissolved out, leaving a skeleton of 96 per cent or more of silica filled with so many millions of holes that a one-inch cube contained some 60,000 square feet of hole surface.

This new child of research was dubbed "thirsty glass" because, just sitting around, it absorbed moisture right out of the air. But our researchers were on the trail of something even more exciting. They heated their "thirsty glass" and it shrank to two-thirds its original size. The millions of little holes vanished and left a vacuum-tight glass that looked like any other—except that you could take this new glass white-hot from a blazing furnace and plunge it into ice water without the slightest injury. It was a glass as ideal as fused quartz, but different since it could be melted, mass produced, and worked in its original state like ordinary glass.

If you'd like to know more, just check the coupon above.

Ribbon glass by the yard

Here's a glass that's a thousandth of an inch thin and in small widths it's flexible as—well, a ribbon. You can twist it, roll it, wrap it around your arm without cracking it. It comes in any length you want—inches, yards, miles.

Actually ribbon glass isn't a single glass. We can make it of several different compositions according to what you need it for. Originally we developed it to take the place of mica in electronic capacitors of which there are several in your radio and TV sets and in any other piece of electronic equipment you can name. As mica is formed in layers, it is subject to cleavage in the plane parallel to lamination; ribbon glass being homogenous is easily workable. This is just one advantage of this glass in capacitors.

Medical scientists have found a quite different use for ribbon glass—as microscope slide covers. These are the wafer-like pieces of glass that are used to cover blood smears and the like for examination under the microscope. In this case ribbon glass can be made clearer, flatter and more free of bubbles and striae than previously made glasses.

Seems as if this unique stuff should be good for a *lot* of things, but *what* (other than electrical and laboratorial) probably lies in the laps of imaginative designers. Would you like us to send you a little strip to play with? *Customer* ideas and problems really bring out the best in glass. So, even if what's on your mind seems unrelated to any item this page discusses, glass may still be its fulfillment. We'd like to hear from you.

CORNING GLASS WORKS
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BOOKS

Henryfordiana

TIN LIZZIE: THE STORY OF THE FABULOUS MODEL T FORD, *by Philip Van Doren Stern. Illustrated. Simon & Schuster, New York.* $3.95.
HENRY'S WONDERFUL MODEL T, 1908-1927, *by Floyd Clymer. Illustrated. McGraw Hill, New York.* $5.95.

Review by Eric Larrabee, Associate Editor of Harper's Magazine

At an early age I can remember acquiring the idea that the necessary facts to know about Henry Ford were few in number: (1) he said "history is bunk," (2) he had made a fool of himself over something called the Peace Ship, and (3) all in all he made a lot of automobiles. The impression seemed to be that this last accomplishment did not amount to much, and was something anybody might have done if he'd turned his hand to it. Since that time there has been a distinct change of heart about Mr. Ford and his achievements. Distance has lent enchantment to his idiosyncracies, and nostalgia to his masterpiece. Ford is now seen as the creator of the mass-production age whose fruits we daily enjoy, and thus as a man of transcendant genius. Not long ago I remember a Pulitzer-Prize-winning historian, the late Bernard DeVoto, saying that if he were only ten years younger he would put aside everything else and work on a life of Henry Ford.

A by-product of this revisionist frame of mind is a pair of books (there seems to be a law that requires no publisher to have a good idea unless another has it too) about the Model T — each of them frankly catering to nostalgia, each of them assuming that author and reader fully share their love affair with the car. Each is lavishly illustrated — in many cases with the same pictures — and filled with a great deal more information than anyone but a die-hard enthusiast could possibly want, from shipping weights to a complete list of engine numbers and charts of the relationship of torque in foot-pounds to horsepower, miles per hour, and revolutions per minute. Being asked to put together what amounts to a scrapbook of the Model T, each author has apparently thrown in everything he could find.

Presumably the average reader would have use for no more than one of these grab-bag collections, and a review should presumably help him decide which one. As the price suggests, Mr. Clymer's is the more copious of the two but by the same token Mr. Stern's is probably the better buy. Comparatively speaking, it has stylish drawings and make-up, and the prose is intended to be read. Mr. Clymer lacks these airs and graces. His book seems intended for the audience he normally deals with—he has a monthly column in *Popular Mechanics*—and its hallmarks are naive sentimentality, weedy jokes and cartoons, and endlessly repetitious captions. Mr. Stern tells a more consecutive story in a more appetizing way and (which is not difficult) with a greater sense of perspective. In brief, a good, slick Simon and Schuster job.

For the real hard-bitten Ford-fanciers, however, there is one thing to be said for Mr. Clymer's approach: it is perfectly in tune with its subject. One of the difficulties in reading about Ford has always been that he was written about (or had books ghost-written for him) only by those who shared something of his world-view, and were thus likely to have something of the indifference to "modern" smoothness that Mr. Clymer has. Ford-buffs, as I say, are probably accustomed to discount for this bias — or perhaps even to savor it as one of the charms of the *genre*. But newcomers to the cult would be well advised to enter by way of Mr. Stern, and to proceed slowly —until eventually they are ready for Garet Garrett, Harry Bennett, or even Samuel Crowther.

Trains and their lore

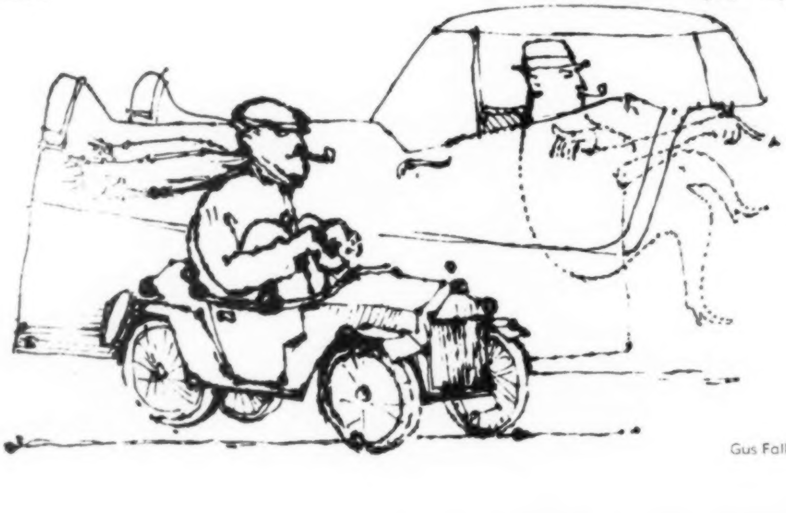
RAILROADING AROUND THE WORLD, *by S. Kip Farrington. Illustrated. Coward McCann, New York.* $10.00.

Reviewed by John Pile, of George Nelson Associates; instructor at Pratt Institute

It is, no doubt, an indication of the youth of the industrial design profession that no specialized literature exists in the field. There are books about industrial design, but they are invariably general works that attempt to survey the whole field. If a search is made for books about one phase of industrial design — the design of toasters, for example, or of cars, or ships, or trains — there is no alternative but to go to books that are not about design but about the whole subject of cooking, or sailing, or railroading. The designer must find his few crumbs of information in the conglomeration of material that has been assembled for some larger audience. It is this state of affairs that might send some designer whose interest is in transportation to this book.

Railroading Around the World is, essentially, a scrapbook of snapshots taken on a round-the-world trip by a rail fancier. It has all the well-known limitations of snapshot albums: endless pictures of the author (and the author's wife) staring blankly at the camera; endless views of scenery of the National Geographic sort in which a distant streak can be identified as a train. But then, mixed into this collec-

(Continued on page 10)



Gus Falk

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71

YEARS OF PIONEERING IN THE MAKING OF ADHESIVES

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(continued from page 8)

tion, are many fine pictures of locomotives, cars inside and out, and small details that are full of visual interest. If you want to know what a South African steam locomotive looks like (and very handsome it is), or if you would like a glimpse of the controls of a Swiss electric, or if you have been wondering what the interior of a Talgo is like, or if you would like to see the printed forms that railroads use in New Zealand, it is all here intermixed with all sorts of material that can only be of interest to the most dedicated of rail fans. The book is organized into chapters by country and the emphasis seems to spring from the length of the author's stay and the extent of his enjoyment in each place. Thus, Italy is awarded only three pages and we have little chance to learn about the famous "Rapido," while New Zealand stretches over 34 pages of very mixed interest. In the main, the text is of negligible importance ("The Spanish are great people and they are good railroaders") and about 80 per cent of the pictures have little to offer. The pictures that remain are full of interest and often reveal unfamiliar, and interesting, departures from American practice. For most designers a ten-minute leafing through this collection will discover all that is important. For the designer who is also an incurable rail fancier, the book is probably something worth owning.

High-altitude matters

200 MILES UP, *by J. Gordon Vaeth. 258 pages, with illustrations. Ronald Press, New York. $5.00.*

Reviewed by Kirk Hollingsworth

The author is head of the New Weapons and Systems Division of the U. S. Navy Special Devices Center, Office of Naval Research; the book is essentially an elementary text on the history, principles, current techniques, and future of modern high-altitude research. Profusely illustrated with photographs and diagrams, it is a readable, fascinating, and totally unclassifiable text, which, despite its shortcomings, probably deserves a much wider audience than it will have.

Mr. Vaeth has covered an enormous amount of ground: he begins with a rather thorough discussion of the atmosphere—what we do and do not know about it, and why it is necessary that we study it. The remainder of the text is a detailed description of the things in the atmosphere which we measure and study, the instruments used, the means (primarily balloons and rockets) used for getting these instruments into the upper atmosphere, and a discussion of the principles upon which some of these vehicles (particularly rockets) operate. The amount of detail involved in such descriptions is extraordinary: the section on spectrography, for instance, begins with a brief discussion of the significance of spectrograph measurements and the principles involved, and ends with a detailed description of the methods of mounting and using spectrographs on various types of rockets, including a complete diagram and several photographs.

The technical background required of the reader involves for the most part little more than a hazy memory of high school physics or general science, since most of the theoretical part of the book is explained in fairly elementary terms; however, the author occasionally neglects to fill in theoretical background, with the result that a part of the text becomes meaningless to the general reader. There is, for example, a carefully worked out and beautifully clear explanation of the "Doppler" (an electronic means of determining the velocity and position of a rocket) which is completely wasted upon the non-technical reader who does not happen to remember from physics what the Doppler effect is.

It is seldom, however, that the author makes a mistake of this kind: the book often seems overweighted with details, despite its relatively short length. Three pages of text, for example, are spent on the minute details of operations involved in the launching of high-altitude balloons: after reading this passage, the reader feels ready to attempt such an operation himself, given the equipment!

The book ends with a description of the projected orbital satellite, and a chapter describing probable future research leading eventually to space flight. Included are some cogent arguments against the practicability of building either a manned "space platform" or lunar base for strictly military purposes. The author makes no attempt to deal with these problems from a moral point of view: he simply points out the technical inadequacies of such bases for strictly military use, and suggests that man will have to wait for interplanetary flight to evolve not from some military "crash" program, but from the less immediately urgent needs of pure science.

Two architectural surveys

ITALY BUILDS, *by G. E. Kidder Smith. 263 pages, with plates and photographs. Reinhold Publications, Inc., New York, 1955. $10.00.*

LATIN AMERICAN ARCHITECTURE SINCE 1945, *by Henry-Russell Hitchcock. 204 pages, with plates and photographs. Museum of Modern Art, New York, 1955. $6.50.*

Reviewed by Paul Mitarachi, architect, instructor in architecture, Cooper Union

Two more books have appeared showing that the new architectural evolution is an international affair. Kidder Smith's third book on European architecture is the sun-bathed climax to *Sweden Builds* and *Switzerland Builds*, previously published by Reinhold. Nobody should be surprised to discover — should he still be ignorant of the fact—that author-photographer Smith is primarily an architect, his pen and his camera never straying from the man-made environment, his mind and his sensibilities never wavering from the beliefs of the thoughtful architect of his generation. Fully realizing the respect and indebtedness that every good modern Italian architect has to the tradition in which he grew, the author analyzes this tradition and presents it, not as a portfolio of the facades of important monuments, but as an incisive camera-recording of the "space-in-time" of the urban centers of large or small towns and of the elements defining and shaping them.

Conscious of the economic and geographic factors which have shaped Italian building, he shows us in a most beautiful series of photos rural structures from various parts of the land, not only as part of that same tradition but as an impressive statement of the dignity of which man is capable when building his house as an uncomplicated answer to the problems of use, climate and materials.

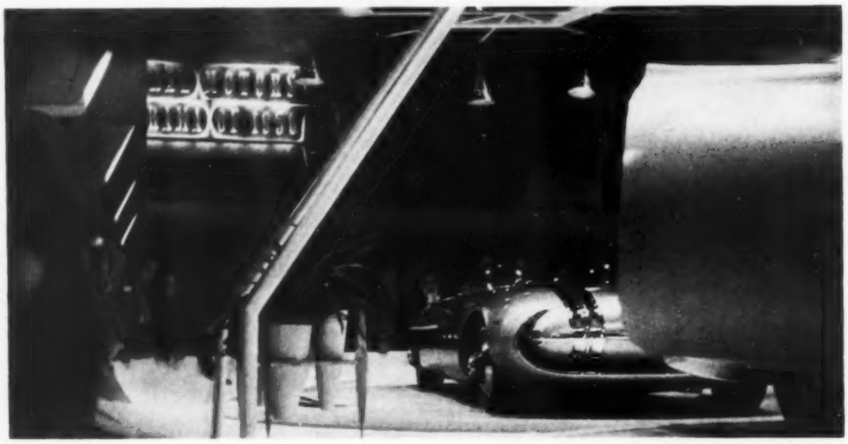
The second half of the book is a presentation of what Kidder Smith considers the best of modern Italian architecture. He is not a disinterested observer but a partisan, both with word and camera, thorough in his coverage of every building he penetrates beyond the street elevation, always aware of the historical development within the modern movement as well as beyond it. *Italy Builds* is not just a skin-deep survey of all that is good in Italy. Kidder Smith, fully acknowledging his debt to the historians and architects who have touched on these matters before, has managed to penetrate a little deeper and to sum it up in the most beautiful architectural document since his last one.

Latin American Architecture Since 1945 is a thinner volume, the result of a hit-and-run expedition of historian Hitchcock and photographer Thorne McKenna through 11 Latin American countries. The task was huge, and the book and exhibit, prepared under the Museum of Modern Art's Exhibition Program, were purposely limited to a survey of part of what must be there. 47 buildings are shown in photographs and discussed in brief. The preface by Mr. Hitchcock is also in the nature of a survey. It all goes to show that what the Museum had shown to us about Brazil in 1943—in a much more thorough book—more or less holds today for the rest of the Latin American continent. It would be interesting to know what happens beyond the pretty reinforced concrete facades.

NEWS

Motorama 1956 gives New York a free extravaganza, then hits the road

125 *double-axled trucks transport GM's latest blend of fashion, frivolity and the future automobile*



Motorama, GM's annual coming-out party, came out for six days in January at the Waldorf-Astoria in New York, and 275,000 attended to see Vistavision and 50 singers (and dancers), a Firebird and a Frigidaire Kitchen, an orchestra, an Aerotrain and President Harlow H. Curtice ("By far the finest indoor show we've ever produced").

In the classical style of "industrial showmanship," the show went on. Fountains, gold-braided guards, Grand Ballroom and all, it was *haut couture* as General Motors sees it, and New York applauded: housewives waited for an-hour-and-a-half to see their Dream Kitchen (see it without a wait on pp. 71-75), while the children pressed close to peer through Plexiglas hoods at prototype motors. Somewhat as an afterthought, but not without poise, the GM line of 1956 automobiles revolved on their pedestals in circular pools of spouting water.

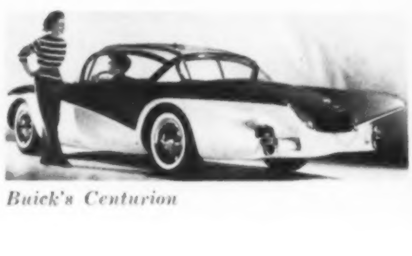
Lost in the hubbub, but no less there, were the five dreams—Chevrolet's Impala, Pontiac's Club de Mer, Oldsmobile's Golden Rocket, Buick's Centurion, and (aristocratic, futuristic and sporty in one mighty swoop), the Cadillac Eldorado Brougham Town Car.

If it was a Cinderella Ball in pretension, it was a circus in size—cluttered, breathlessly crowded, and a dubious joy for any spectator of voting age or over. Small matter though—it's the homage that counts: to the American automobile, and to the American company that netted a billion dollars in 1955.

1956 *Chevrolet Corvette*

Cadillac Eldorado Brougham Town Car

Oldsmobile's Golden Rocket



Buick's Centurion

photos Burrey and Johnston

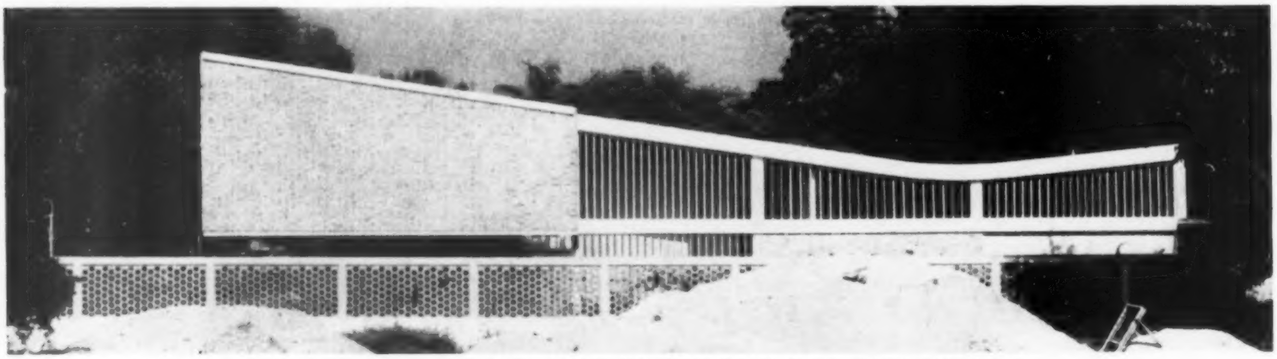
A colorful need . . . a colorful

Latin American Architecture Since 1945 makes an impressive review

Museum of Modern Art displays 46 buildings representing the last ten years

Open through February 20 at the Museum of Modern Art, "Latin American Architecture," is a *tour de force* among exhibitions for the vividness with which the scale of recent building is presented through photomurals and color transparencies. Selected by Henry-Russell Hitchcock, and installed by Arthur Drexler, the examples in one gallery are photographs in many sizes recessed in walls panelled with dark brown cork, and, in another, photomurals are made even more immediate by a low light canopy. The work of 56 architects from eleven countries includes both public and private housing which, compared to our own work, seems daring and flamboyant in form and color. Most advanced are the university cities and public buildings: Villaneuva's Aula Magna (below) for example, with its outdoor sculpture by Antoine Pevsner and abstract murals by Matteo Manaure on the facade is a major building in a compound which incorporates the work of Calder, Arp (sculpture) and Leger (mosaic screens) into University architecture.

Icaro de Castro Mello: Pool, Department of Sports, Sao Paulo, Brazil.



Sergio Bernades: House of Dr. de Souza, Rio de Janeiro.

Concrete is the most common material, in conventional cage construction and thin shell vaultings. Latin American designers, stimulated by the problem of sun control, articulate their balconies and facades in interesting ways: grids with movable louvers; sheathings in glass and other translucent panels mounted on light metal frames. Balconies are treated freely, horizontally and vertically, for the sheer pleasure of plastic variety.

At an aeronautical training center in Sao Jose Dos Campos, Brazil's master, Oscar Niemeyer, uses simple sun control devices (below) to give textural interest to an economical housing unit which extends to a long range on a flat terrain, as well as slanted screens of lattice, helical stairs and yard fences. Brazil and Mexico lead in individual house planning, while Mexico, Venezuela and Colombia have impressive stadia.

Raul Villanueva: Aula Magna, Caracas.

Niemeyer: Staff Housing, Brazil.

Pani: Housing Development, Mexico.

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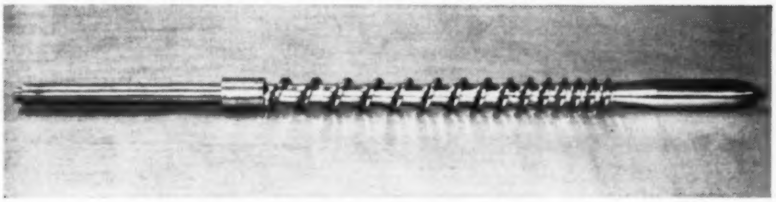

DOW'S STUDIES ON IMPROVED SCREW AND TORPEDO DESIGN HELP MAKE POLYSTYRENE EXTRUSION A MORE EXACT SCIENCE

Studies for the development of a better screw and torpedo from polystyrene extrusion are good examples of Plastiatrics at work. Manufacturers using machines equipped with a single flight screw and torpedo arrangement like this one shown here can profitably extrude high-quality polystyrene and get uniformly good results. One thing that was found in working out the details of this better screw was that single flight eliminates blocking in one channel and flowing in another, a problem of the double flight screw that more often than not produces wide variations in product output.

Further studies of the torpedo have led to extensive findings, relative to the use of the torpedo screw, which are available by simply writing Dow.

Standard pressure gage studies another area of Plastiatrics development

Extensive Plastiatrics studies in extrusion have been made on the proper design of dies, take-off equipment and cooling problems. Dow engineers, together with plastics manufacturers, also developed a method for determining optimum pressure and for providing reproducible extrusion performance using a standard gage.

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Detailed results of Dow's studies on extrusion are available to you, as they are on all work done in Plastiatrics. For further information, write today . . . Dow Plastics Sales Department PL 456K, THE DOW CHEMICAL COMPANY, Midland, Michigan.

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- Styron 475 sheet . . . for vacuum or pressure forming.
- Styron 480 . . . for extra-high-impact strength.
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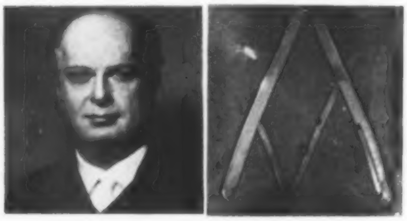
Golden Compasses awarded

Breuer of the United States and Olivetti of Italy are cited



"La Rinascente Compasso d'Oro," Italy's annual competition in industrial design, awarded golden compasses as usual to 12 Italian products, exhibited 130, and in 1955 added two special awards—the equivalent of "Oscars" in the profession—to the firm or individual having the most profound influence upon industrial design on the national and international scenes. The committee, which included Gio Ponti, Director of *Domus*, and Ivan Lombardo, President of the Triennale, awarded Adriano Olivetti the National Gran Premio, and Marcel Breuer, the International.

Olivetti (above) was cited as the "first industrialist in Italy to give a modern aesthetic character to an entire industrial organization and to its expression in advertising and sales." Breuer, (see page 6) was praised for the consistency of his philosophy of design, for its unity of conception in industrial developments as well as in architecture. He designed the first tubular steel chairs in 1925, won awards for aluminum furniture in 1933 and, while practicing as an architect for the last twenty years, has maintained an interest in product development. He has worked for the glass, furniture and lighting industries, acted as design consultant to the General Bronze Corporation of Long Island City, and most recently, has been employed by the New Haven Railroad. (p.p. 60-67).

Art Directors hold panel

AIGA Magazine Clinic discusses new approaches to magazine design

On January 20, four art directors talked shop among themselves and to a large gathering at Freedom House in New York: Leo Lionni, *Fortune;* Bernard Quint, Assistant Art Director of *Life;* Henry Wolf, *Esquire;* and Martin Rosenzweig, INDUSTRIAL DESIGN.

Lionni touched off the evening: "I feel about magazines like I do about a house. People should live there . . . Forcing words into a pattern is one of the outmoded concepts I have rejected." Wolf of *Esquire* said: 'Successful issues have islands of peace and islands of excitement." Quint said: "Being aware of what the competition is doing is just as important as Mondrian." Rosenzweig concluded: "Dullness is death. Create excitement with large type or small, whatever means you have."

New design showroom opens

International Designers Group will act as a creative agency

International Designers Group Inc. opened a retail showroom in New York City, with many attractive *objets* and a plan for the distribution of home furnishings and handling exclusive designs. IDG will select affiliate stores, one in each city, offering items tagged with the designer's name which are available only through IDG. It will seek out designers all over the world and encourage research and the supply-

ing of designs which seem marketable.

Designers, craftsmen and factories in many countries are participating: chairs by Hans Wegner, Hovmand Olsen and Carlo Gahrn; ceramics by Meindert Zaalberg, glass by Loffelhardt of Germany, and wood by John Charry of Pennsylvania. The vases (above) of blue crystal are from the Gallaskruf factory in Sweden.

Design in the Chicago area

Second Annual Midwest exhibition is coupled with two-day conference

For the second year, Chicago displayed her colors as a center of industrial design in a major exhibition at Illinois Institute of Technology from January 19 to 26. Sponsored by the Midwest chapters of ASID and IDI, and the Institute of Design of IIT, the exhibition included farm equipment, housewares, appliances, furniture, even a trailer and a jukebox, to typify products recently designed in the area. An active two-day conference on design in business was held simultaneously for a group of visiting designers and industrialists. Speakers included a significant number of industry representatives, among them Virgil Exner, Director of Styling for Chrysler, William Stuart, president of Martin-Senour, and Robert Hood, president of Ansul Chemical Corp. Exhibition and conference will be part of a special report on design in the Midwest, in a forthcoming issue of ID.

Dispatches from abroad

London—At Haymarket House in the center of London, the Council of Industrial Design (publishers of *Design*) will open 8,000 sq. ft. of floor space for the exhibition of outstanding products. Opening in April, a projected program for the year will include: case histories of product development; designs from abroad; furnishings; graphic design by British or foreign artists. . . . The British Chemical Industry will take 5,000 square feet of stand space at the British Industries Fair, April 3-May 4, and will show developments in fibers, agriculture, chemicals, plastics and drugs. The pharmaceutical display will be large, showing new developments in packaging and anesthetics.

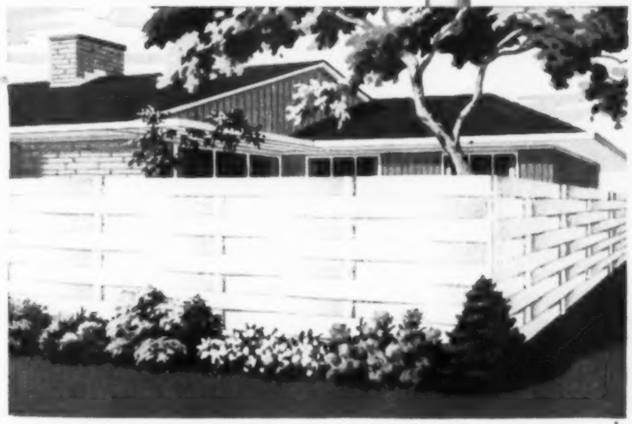
Canada—A travelling exhibition of product designs, sponsored by the Association of Canadian Industrial Designers opened at The Design Centre, Ottawa, will be in Vancouver, B. C. in early 1956, moving eastward across Canada under the auspices of The National Gallery of Canada and the National Industrial Design Council.

France—J. A. Gregoire, "flat four" engine designer, will show a two-three place sports model car, powered by a 2-litre "flat four" engine and capable of 105 m.p.h., at the SAE convention in Detroit.

Italy—Italian business men are planning a floating trade fair on the Danube in the spring, exhibiting ceramics, coffee machines, phonograph records, wines and clothing.

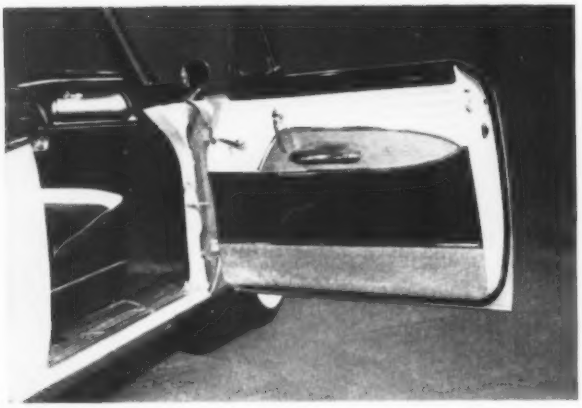
Syracuse IDI and Detroit

"Design in Detroit," the subject of ID's October issue, was given a further kicking around at a fall meeting of the IDI Syracuse Chapter by representatives of three kinds of Detroit activity. Kenneth Hopkins (left), of Lawrence H. Wilson Associates, covered the viewpoint of the independent office. George Pollard (center), of GM Product and Exhibit Studio, discussed the challenges and opportunities that await a realistically minded young designer in Detroit. Clair McKichan (second from right) traced the various steps in automobile development. They are shown with Si Silverman, Vice-Chairman of Syracuse Chapter (right), and Howard Andrews, Chairman.



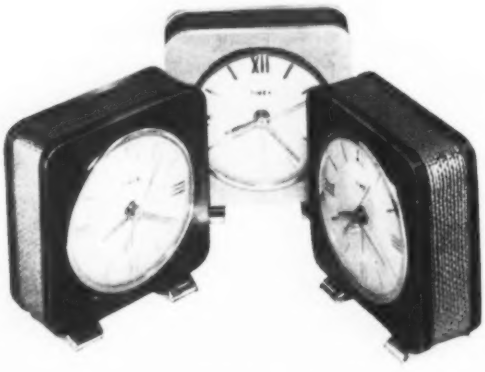
Laminates with new Du Pont MYLAR®

HERE ARE A FEW EXAMPLES OF THE WAY INDUSTRY IS USING "MYLAR"



Laminates with tough, transparent Du Pont "Mylar"* make possible new beauty and economy in auto-interior trim. "Mylar" can be metalized in a wide range of subtle colors. Side-panel door inserts, seat-welt trim and kick panels are highly resistant to abrasion . . . can be wiped clean without smearing. *Costs are reduced* by as much as 40%, according to designers!

Decorative surfacing using metalized "Mylar" highlights interior décor of Eastern Airlines' new one-hundred-million-dollar fleet of "Golden Falcons". Bonded to a backing and then embossed, this thin, remarkably strong film gives a dramatic new beauty to ceilings, bulkheads, valances, seat frames, scuff plates and handrails . . . *will not tarnish or become brittle.*

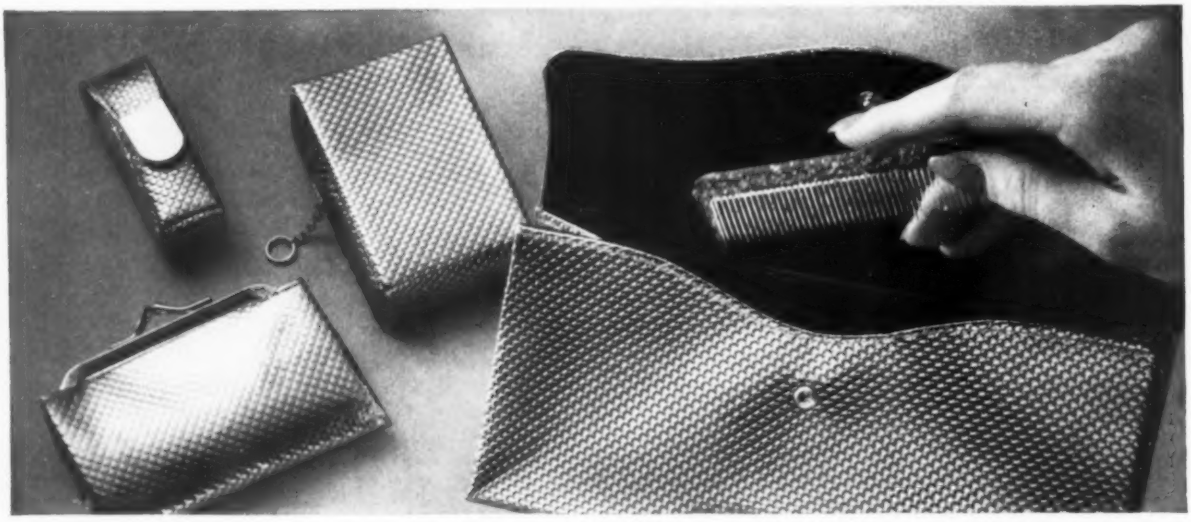


"Gold metalized 'Mylar', laminated to cloth, gives our new line of clocks an extra touch of decorative, *functional styling.* We chose 'Mylar' because it enhances the beauty of our clocks . . . best fits the needs of our basic design."

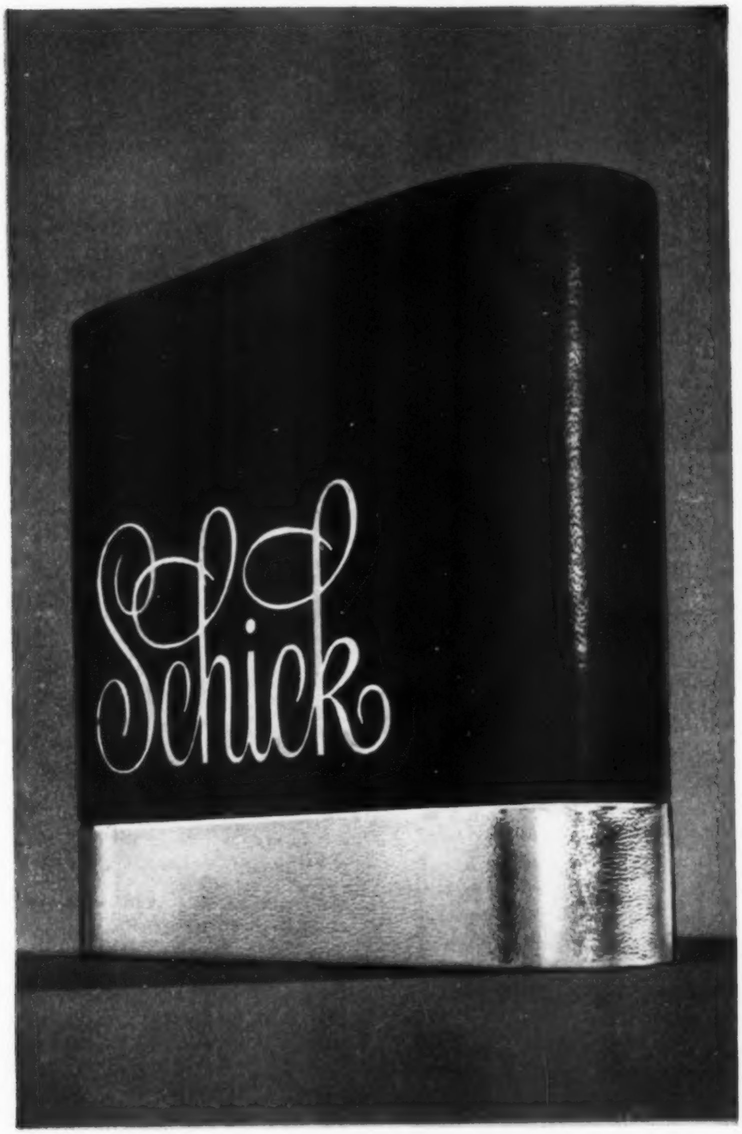
The United States Time Corp., Waterbury, Conn.

"Decorative laminates made with Du Pont 'Mylar' give our accessory items gleaming *beauty that lasts* . . . let us unconditionally guarantee our unusual 'Miracle Mesh' purse portables against tarnishing, loss of lustre, or scuffing."

Zell Products Corp., Norwalk, Conn.



offer exciting design possibilities



HOW CAN YOU USE LAMINATES WITH "MYLAR"?

From late-model cars to decorative book covers, versatile laminates with new Du Pont "Mylar" give long-lasting beauty to a wide variety of products.

Metalized "Mylar" can be used to create unusual styling effects in a wide range of colors and designs. This decorative surfacing material is stainproof, scuffproof, wipes clean without smearing. Besides being easy to install and shape around corners, metalized "Mylar" can cut production costs.

How about your products? There may be a way these decorative, yet practical, effects using "Mylar" can help increase the over-all value of your product. Mail the coupon today for swatches of laminations surfaced with "Mylar", and the names of manufacturers who sell finished metalized material. Be sure to specify the application you have in mind.

\"Mylar" is Du Pont's registered trademark for its brand of polyester film.

"The traveling case for a precision electric shaver must be functional as well as handsome. Our search for a material ended when we found a laminate with Du Pont 'Mylar'. It gives us *scuff and scratch resistance* plus permanent, eye-catching brilliance. That's why metalized 'Mylar' is ideal for the decorative band on the Schick Silver Jubilee Model."

Schick, Incorporated, Lancaster, Penna.

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

E. I. du Pont de Nemours & Co. (Inc.)
Film Dept., Room I-2, Nemours Bldg., Wilmington 98, Delaware.

☐ Please send the swatch booklet (SF-4)

☐ Please send names of manufacturers who sell finished metalized material.

Application__________

Name__________

Company__________

Address__________

City__________ State__________

Silver showcase on Madison Avenue

New setting by Danish designers displays silver to advantage

Architect Jorgen G. Hansen and designer Jens Thuesen, both of Copenhagen, have pooled their efforts to create a setting in New York that is uniquely suited to the showing of Nils Danish Silver. To make the entire store a self-contained showcase, they left the existing plate-glass area undecorated, and concentrated on distributing compact interior space to make every piece of silver visible to the passerby. Display cabinets are set low in front, and wall casements are placed at eye-level. The only material used to offset the silver is oil-finished walnut—the introduction of any other metal has been carefully avoided. Recessed fluorescent strips that are totally invisible cast softly diffused light. The two display cases on the floor are movable for easier cleaning and arranging of merchanise, the larger installed on a pivot and the smaller entirely on casters.

IDI launches 1956 program

New company membership program and national elections announced

"If your company employs designers . . . seeks to influence designers . . . is a manufacturer in or a supplier to hard-goods industries. . ." starts a suave brochure just published by the Industrial Designers Institute, then your company is eligible for membership in IDI. The company membership drive, with the objective of building a mutually beneficial relationship between industry and designers, offers non-voting company members (for a $200 fee) such specific benefits as: subscriptions to IDI publications and special reports; informational services of the National Office; participation in a Company Advisory Council, and in regional and national exhibits.

Three new company memberships were recently awarded to Container Corporation of America, Ekco Products Corporation, and Stolle Corporation.

At a January meeting in New York, the National Board of Trustees elected new officers to carry out the CMP and the Institute's other ambitious plans for the year—a landslide vote for Syracuse, as the picture below indicates.

Robert Gruen (right) hands presidential gavel to George Beck of G.E., Syracuse, new IDI president; next to him are Executive VP Robert Redmann, National Secretary Si Silverman (Syracuse). Ellen Manderfield (Syracuse) is Treasurer.

Paul MacAlister receives IDI Silver Medal for distinguished service as chairman of Design Awards Committee.

U. S. gives design aid to Israel

Boston institute to supply advice on design education and research

Boston's Institute of Contemporary Art has signed an agreement with the U. S. Government to provide special design assistance to Israel, it was announced recently by James S. Plaut, Institute director.

Negotiated by the International Cooperation Administration under the "Point Four" Technical Assistance Program, and calling for a full-scale program of education and design assistance to improve the quality and marketability of Israel's consumer goods, the contract was actually written between the Institute and Technion, the Israeli Institute of Technology at Haifa, in accordance with Washington's policy of establishing working relationships between schools that will endure beyond the termination of government support.

Plaut, who has been design advisor to the Israeli Government since 1951, will be in charge of the program, which has three major phases: the Institute will formulate an industrial design curriculum at the Technion; create a national Design Center; and initiate in the U. S. a consumer research program to give direction to the design and packaging of Israel's consumer exports.

Throughout the life of the agreement, which is scheduled to last three years, an Institute representative will be based in Israel. John Cheney, until recently a member of the Invention Design Group at Arthur D. Little, Inc., Cambridge Mass., is already at work in Israel as the Institute's first field director.

IIT establishes memorial scholarship

Show Frank A. Barr's graphics as funds in his memory are sought

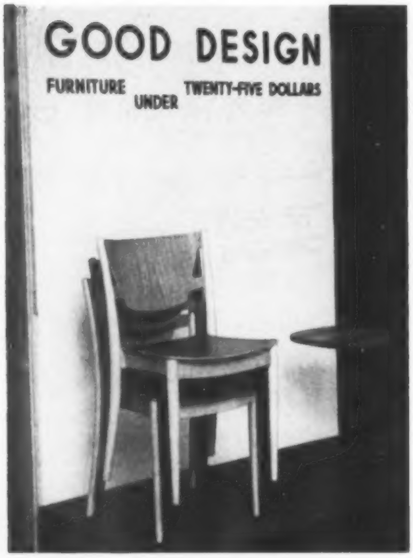
Students and faculty at Illinois Tech's Institute of Design have established a scholarship in memory of Frank A. Barr, assistant professor of visual design, who died on November 20 at his Chicago home.

As an adjunct of the scholarship fund-raising campaign, an exhibition of Barr's graphic art is being held February 14 through 28 in IIT's new Architecture-Planning-Design building. Elmer Pearson, an instructor, is chairman of the committee raising funds.

"Design for Profit" conference

Cleveland plays host to machine designers from five states on March 5

Engineers and industrialists representing five states, Ohio, West Virginia, Pennsylvania, Michigan and Kentucky, will attend the 13th Annual Machine Design Conference in Cleveland on March 5. The subject of the conference, which is sponsored by the Cleveland Engineering Society, is "Design for Profit."



Pratt exhibits low-cost furniture

Interior Design department selects pieces costing less than 25 dollars

To demonstrate that good furniture is not a matter of price, the second-year Interior Design students at Pratt Institute recently staged an exhibition entitled "Good Design: Furniture Under Twenty-Five Dollars."

Decorative and functional possibilities in low-cost furniture design were suggested by their selection of chairs, tables, stools, lamps and other small pieces, and a number of drawings illustrated ideas for placement of the pieces in various types of room settings.

"Design, material and construction all determine the quality of a piece of furniture," declared Eleanor Pepper, chairman of the Interior Design department. "We have tried to find furniture that expresses these characteristics. It is not a matter of price."

Competition and awards

American Fabrics, an exhibit of the best contemporary American fabrics, chosen by a seven-member jury, will be shown at the Museum of Modern Art, 11 West 53rd Street, New York, August 29-November 11. Data sheets may be obtained from the Project Director, Miss Greta Daniel, at the Museum. Entry deadline is March 15. The **Frederick Lunning Prize for 1955** was awarded by Georg Jensen Inc. to Kai Franck, Finnish ceramist and glass designer, and Ingrid Petersen-Dessau, Swedish textile designer. Each year the $5000 prize is divided between two Scandinavian artists to cover the expenses of study abroad. The Franklin Institute has awarded the **Edward Longstreth Medal** to Richard Y. Case, of the U. S. Rubber Co.'s Power Transmission Dept. His invention of the timing belt is considered the greatest recent advance in power transmission.

Announce Aspen registration

The Sixth International Design Conference is to take place in Aspen, Colo. from June 23 through July 1 under the proposed title: Ideas on the Future of Man and Design. For registration and information, write to International Design Conference, 220 South Michigan Ave., Chicago 4, Ill. Details will be announced in the next issue.

Products exhibited at Syracuse

University shows industrial designs of the central New York area

Professors Arthur J. Pulos, Joseph Kowalski and Donald C. Waterman, of Syracuse University's Industrial Design Department, have organized a show of products from such neighboring companies as Revere Copper and Brass Inc.; Smith-Corona Inc.; General Electric; and Oneida Limited. It will be open until February 28 at the Lowe Art Center.

U. S. Rubber develops a new textile

Trilok, in a new process, uses shrinkage of polyethelene to create depth

Woven on a regular loom with a polyethelene warp, and a woof of any conventional material, Trilok, shown at the National Furniture Show in Chicago, develops a 3-dimensional texture when immersed in boiling water. Shrinkage, up to 55%, is controlled by the pattern in which the original material is locked to the polyethelene on the loom. Upholstery designs by Jack Lenor Larsen and Harley Earl, Inc. have demonstrated the versatility of the new material, which is expected to appear in some automobiles during 1956.

People

James N. Burlin has become an associate of Henry Dreyfuss. **Irvin J. Gershen**, industrial designer, has moved his office to 1877 Springfield Ave., Maplewood, N. J. **Lt. Robert Gersin** (left), formerly consultant designer with the Special Devices Center, Office of Naval Research, has joined the staff of the Industrial Design Department of the Philadelphia Museum of Art as Associate to the Director. **W. M. de Majo**, the British designer responsible for "Designs from Britain," an exhibition to tour the U. S. this year, has been elected to the Fellowship of the Society of Industrial Artists. **Jay Ackerman**, industrial designer, died in Bethesda, Md. on January 12 after a long illness. **Clare E. Hodgman** (left), ex-Director of Product Design for Raymond Loewy Associates, has opened his own design office with **Robert E. Bourke** at 730 Fifth Ave., New York. The Executive Furniture Co., Wichita Falls, Texas, has hired **Ellis Crawford Foster** (left), industrial designer, to supervise their custom department. Harley Earl, Inc., design office in Center Line, Mich., announces the following appointments: **Robert G. Plantholt, Paul J. Petlewski and James F. Fulton** as Executive Designers for Product Design; **H. David Bishop** as Executive Designer for Graphics and Packaging Design; and **Dale D. Smith** as Executive Designer for Design Research. **George K. Marshall** (left) has been made Manager of Product Planning for G.E.'s Weathertron Department, Bloomfield N. J. **Gilbert D'Andrea** has been appointed Director of Design at Bassons Industries Corp., New York. **Robert J. Aul** has been named an Associate of J. M. Little & Associates, Toledo industrial design firm. **Peter G. Harnden**, consultant on trade fairs to the Department of Commerce, is opening a private office of product, architecture and exhibition design in New York.

"Tools of Abundance": new movie

From design engineering through purchasing filmed in color by Wesson

"Tools of Abundance," a 28-minute color and sound film (16mm), describes the basic functions of the members of an industrial team by following a single part of a new item through the phases of production. Available from the Wesson Co., 1220 Woodward Heights Blvd., Ferndale 20, Mich.

the Industrial Designers' Institute

announces the sixth annual design award program

past recipients of IDI design awards

1955

James G. Balmer & Carl B. Denny & Frederick W. Hertzler of Harley Earl, Inc.
Randall D. Faurot
Richard Montmeat, IDI

1954

Dave Chapman, ASID
Franz Wagner, ASID & Richard Latham, ASID & Don De Fano of Raymond Loewy Associates

1953

Donald Dailey, ASID
Carl Otto, ASID, IDI

1952

Henry P. Glass, IDI
Donald L. McFarland, ASID

1951

George Cushing & Thomas Nevall, IDI
Charles Eames
Carl Otto, ASID

The IDI Design Award is a token of recognition from a qualified group of professional designers bestowed on a designer — or a team of designers — for outstanding work in the field of industrial design. The award is open to every designer.

the award committee

is composed of the following elected officers and members of the Industrial Designers' Institute, the National President, Executive Vice-President, Secretary and Treasurer, the Chairmen of the six regional chapters, Paul R. MacAlister, Honorary and Walter C. Granville, Chairman.

submissions

Use the coupon below to request copies of the submission form which should be returned to the chairman, postmarked no later than May 19, 1956.

presentation

Announcement of the designers to be honored and presentation of the award medals will be made at a luncheon on June 21, 1956, at the Sarah Siddons Walk, Hotel Ambassador East, Chicago.

TO
WALTER C. GRANVILLE,

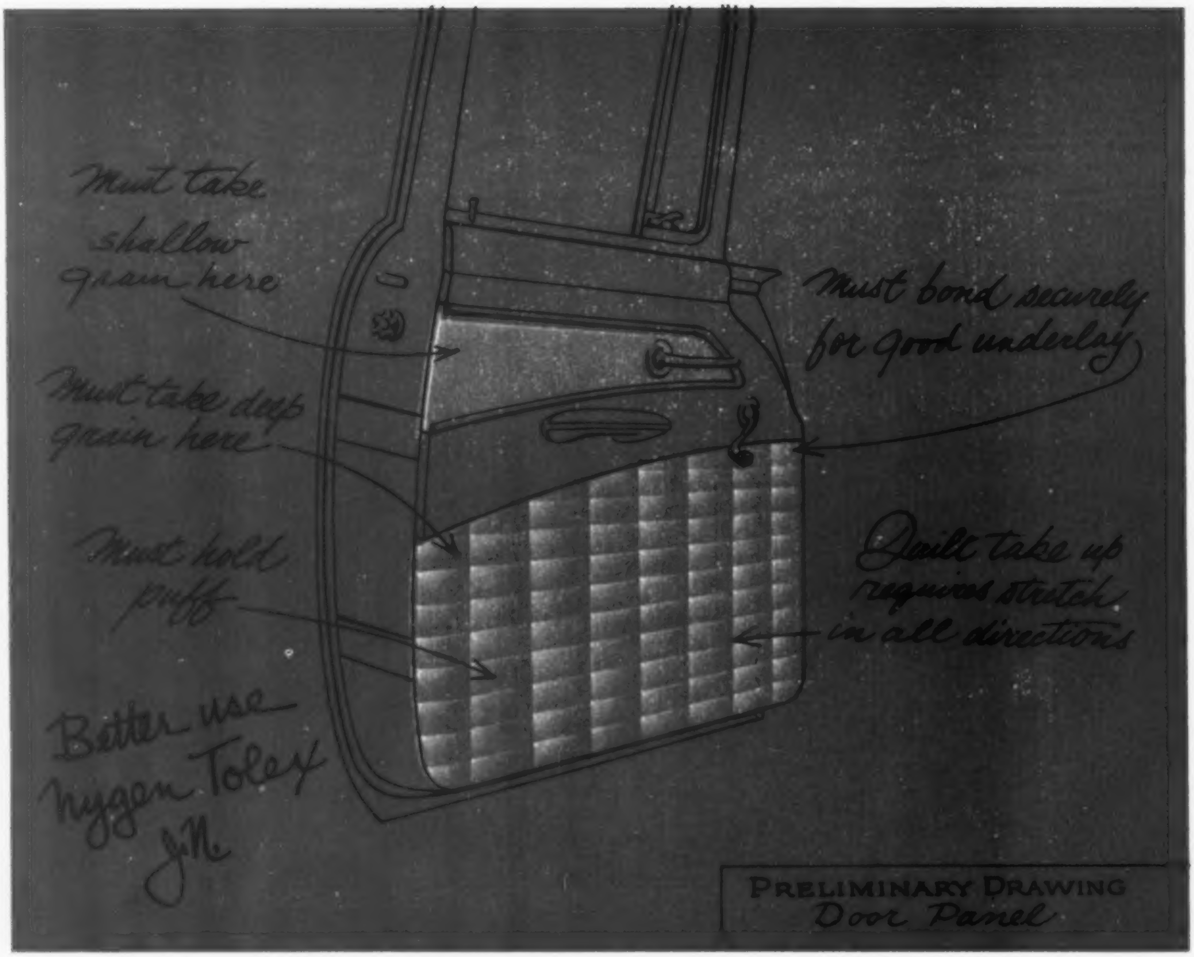
SIXTH ANNUAL IDI
DESIGN AWARD PROGRAM
38 SOUTH DEARBORN STREET,
CHICAGO 3, ILLINOIS

I plan to submit the work of .... designer(s) for consideration for the Sixth Annual IDI Design Award Program. Please forward .... submission forms to:

NAME ....

COMPANY ....

ADDRESS ....



NYGEN* TOLEX . . . SOLVES ANOTHER DESIGN PROBLEM!

New NYGEN Tolex is the most "tailorable" supported vinyl plastic material on the market today. All fibers in the exclusive NYGEN backing are securely bonded yet able to move in every direction to form smoothly and snugly . . . without pleating, folding, or wrinkling. Nygen Tolex is available in a wide range of weights, colors and patterns for every design application—from automotive and furniture upholstery to luggage and small case goods.

*Reg. T. M.—The General Tire & Rubber Company as used with the famous NYGEN tubeless tire.

IN COLORFUL EMBOSSED PATTERNS . . .

Tangle Tweed — Havana — Niagara

"BALANCED STRETCH" IN EVERY DIRECTION!

AND MANY MORE . . . SEND FOR COMPLETE DATA

THE GENERAL TIRE & RUBBER COMPANY
TEXTILEATHER DIVISION
TOLEDO 3, OHIO

GENERAL PLASTICS
The General Tire & Rubber Company

Progress and protests

or which goes first, the kitchen or the egg?

SCIENCE ENVISIONS
A ROBOT-RUN HOME
FULL AUTOMATION READY

announced a cheerful New York Times writer recently. He saw only one poser:

QUESTION IS WHETHER
CONTROL SWITCH SHOULD
BE MARKED "HIS" OR "HERS"

The automatic home would be controlled, we learned from this report of an electrical engineers' rally, from a room just big enough for two people and a mass of instruments. By taped controls, the nerve center would awaken sleepers to music, close windows, open the garage, warm up the car and the coffee. In fact, it would perform all the morning rituals except—the speaker admitted — frying the breakfast egg.

Consider for a moment this hand-fried egg, for it is as much a design as an engineering problem (and as good a problem as any to launch our third year of publication). The designer's job, after all, is to mediate between science and man, to give technology a humanly appropriate form, and the mediation between man and his egg involves delicate values indeed.

In terms of the future inhabitants of the robot-run house, is it a Good Thing or a Bad Thing that the egg defies automation? The engineers, perhaps, have regrets about its uncontrollable nature, but there are a large number of others who will proclaim that it is just as well: egg-frying should remain drudgery. These moralists, like to raise questions that could easily keep us awake nights: Do we need robotized homes at all? Does mechanization improve our well-being, or merely atrophy our sense and sensibilities? The questions, of course, are largely rhetorical, for the inquisitors have long since made up their minds about the legacies of the industrial revolution. Like the early alarmists who rose to protest the printing press, they foresee only doom in the direction we are going. Mechanization has corrupted values, straight-jacketed life, offered meaningless "time saving," and deprived us of decisions — if only the decision about when to shift gears or turn off the range — until we are gradually dulled of the wit and the eye.

Now, the opposition to this school has its own 20-inch guns, and piles of ammunitions too large to unload here. Confining ourselves to the issue of the push-button home, we shall merely fire some random thoughts calculated to give hope to the alarmists, and heart to the alarmed.

Power tools do the work, but they don't do the job, and they have been responsible for some remarkable man-made results. The house that cares for the housewife relieves her of countless decisions, but leaves her free to make choices on a broader plane; to choose, for instance, between socializing and social work.

Never before have we been confronted with *so many* decisions, both local (what tie to wear, what car to buy) and general (what candidate to choose, what career to pursue, whether or not to believe in God); our civilization seems to delight in setting up alternatives and forcing us—often nervously—to take the plunge.

Mechanization does not create or corrupt values, any more than gunpowder created war. Mechanization is our present ideal of progress; it *expresses* our values. One of those expressions is push-button fever: an acute desire to control the forces of nature by exercising power more vast than our own. But in the long push, push-buttons are not what we have to worry about. Longevity, leisure, the temptations of freedom, wealth, unlimited choice — these are the challenges that confront us, and their built-in problems cannot be escaped by refusing to come to terms with the robot-run home.

Yet even in that perfect robot-run home, there is something heartening in the happy fallacy of the egg. It tells us, to begin with, that there is less to fear in the prospect of automation, inevitable as it is, than in the specific form it may take. Why, in an automated home, fry an egg at all? An egg is as obsolete as a garage door in terms of the perfect automatized existence. An engineer who wanted to erase every last speck of drudgery from human life would not stop with the egg; he could do away with the entire kitchen in no time at all.

That is why we call that persistent, inconsistent egg a happy fallacy. For even in their vision of limited automation, the engineers did not see their way clear to dispense with either the kitchen or the eggs. Were they really unable to tape that egg into their automatic system? We suspect not. We prefer to interpret its survival (like their begging the question of "his" or "hers") as humbleness toward the larger issues of automatic life. We see in it a suggestion that what science proposes, the designer composes. And as the designer goes about his job of giving automation a humanly appropriate form, the egg may provide a useful clue: it is a kind of admission that, in some areas, total automation would be total nonsense· that the urge to mechanize is not the same as a desire to eliminate all activity, or even all drudgery; it is an admission, in fact, that some "drudgery" — especially when it's elected — is creative, and fun. If there is a question of value in the robot-run home, it lies here: what *kind* of activity, what *kind* of drudgery, will its inhabitants be free to enjoy? — *j.f.m.*

Col
are
Cyc
Div

photo Alexandre Georges

Color in the raw (left). Pigments are tossed and mixed in a huge blender at American Cyanamid's Organic Chemicals and Pigments Divisions.

To introduce a series on color problems, it is hardly necessary to point out that color is in demand. Today's tastes for color to do new jobs in unaccustomed places, on new materials, in subtle shades and finishes and textures, are the result of new attitudes —and also of new techniques. Turquoise typewriters, petal-pink refrigerators and ice-blue skyscrapers could not happen without experimentation with finishes, materials, durability, standardization, and matching. In this and subsequent articles ID will tackle the subject of color in the process of being engineered into your products.

Color problems - I

by Douglas G. Meldrum

Nobody doubts that in 1956 color will be a greater design, production—and cost—factor than ever before. It will become as much of a primary ingredient in product development and manufacture as steel or plastic, for with the complexities of modern production methods, color can seldom be successfully dabbed on a product as an afterthought. We do not claim that color is new in any sense, but its problems are distinctly untraditional and countless conditions of marketing and fabricating colorful products make it more imperative to consider color a part of engineering and basic design.

As often as color opens up new design possibilities, it throws new stumbling blocks in the designer's path. Color is expensive: two apparently identical colors can have shocking differences in per-pound price—because they are designed for entirely different jobs. Other times, the lines between dollar differences are very fine, but every economy is important in mass production.

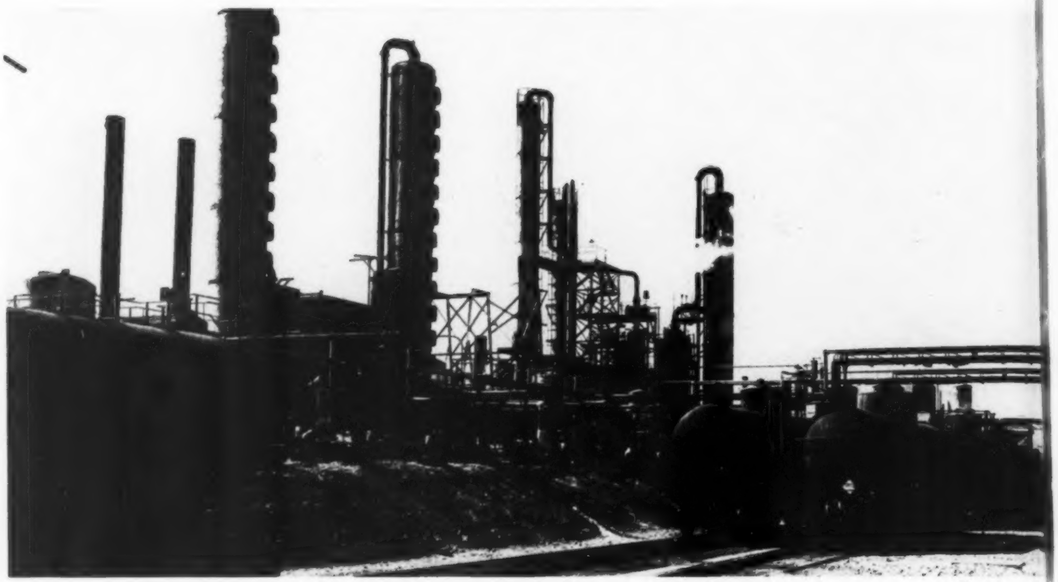
With these facts very much in mind, this series of articles will deal with color as an aspect of industrial technology. It will not be our aim to fan the fires of controversy about color preferences and "good" and "bad" taste, nor to attempt to explain what colors are popular or why; neither will we plunge into complicated formulae at a purely technical level. Our's will be a technological point of view—an interest in the problems of *application*. We will deal with major groups of materials to which color is being applied today, and through specific case studies show what has been done, what is being done, and what might be expected in the ever-widening application of color. The nature of today's color demands makes necessary this fresh examination from a technological standpoint.

Ever since man began to understand color, (understanding should not be confused with appreciation) there has been considerable confusion about terminology. For the sake of consistency, a glossary on page 37 of some of the more frequently used and misused terms may help distinguish "chroma" from "hue." It is important to say something about the word "color" itself. Color is actually a psychological experience, a physical manifestation, or a sensation in the brain of the viewer. It gets to the brain, of course, through the eye: light waves reflected from or transmitted through an object are focused on the retina and become stimuli which reach the brain via the optic nerve, where they set up a variety of reactions which depend upon the associations and memories the individual may have for a specific color sensation.

Objects do not contain color; it would be more accurate to say that they contain a coloring agent or colorant. A color sensation is stimulated when light, or visible radiant energy, strikes an object and is either reflected, absorbed, or transmitted. The reflected light, the source of color sensations, is of a variety of frequencies and falls into two categories: *achromatic reflectors*, or those that are non-selective, such as gray or white, which absorb and reflect equally light of any color; and *chromatic reflectors*, which are colorful or selective. Since chromatic reflectors are colorants, and because color sensations originate from them, it is essential to know how these colorants are created before specific problems in industry can be understood.

We shall start our discussion of color problems at the place the problems start—in the making of coloring agents. The case history on the following pages centers around the Organic Chemicals and Pigments Divisions of the American Cyanamid Company.

photo Alexandre Georges



1

How colors are made—from raw materials to commercial colorants

For centuries colorants were obtained from plants such as indigo and logwood, from animals including insects like the cochineal and a species of snail from which Tyrian purple was produced, or from naturally occurring minerals. Today, however, virtually all modern dyes and pigments are synthetic, many of them prepared from coal tar. They are formed from such starting materials as the aromatic hydrocarbons like benzene, naphthalene, or anthracene, which are obtained from coal tar by distillation. These initial or starting substances are colorless and do not have any of the properties required by pigments or dyes. They are only the bases or foundations upon which the chemist, by selective molecular architecture, builds the kind of product he wants. This procedure might be compared to making a mosaic, where colored tiles are selected and put together in a pattern until the desired design is built. By a series of intricate intermediate steps, one group of atoms after another is built into the molecular structure. Each such change modifies the way the light is absorbed. Each grouping of atoms has its own unique set of color frequencies to which it responds. When a suitable structure has been created, a product with the first requirement of a pigment or dye results—color.

The series of pictures on these pages shows some of the major steps in the manufacture of pigments. There is practically no difference between a pigment or dye as far as the manufacturing process is concerned.

It is more a difference of application—a pigment is insoluble while a dye is soluble. Inorganic pigments, obtained from colored earth and minerals, were very important in the past because they were available and inexpensive. But, organics, with their greater brilliance, have replaced many of them.

Timing, temperature, and quantity and purity of materials are vital elements in the manufacture of colorants. They must be checked constantly because a slip during any one stage could ruin or lower the quality of a batch worth thousands of dollars. In essence, the manufacturing process for colorants is a laboratory experiment blown up to a tremendous scale.

1 Raw materials, such as coal tar oils, arrive in tank cars at the Bound Brook, New Jersey Plant of American Cyanamid Company. From these, various component parts such as benezene, toluene, and zylene are produced in distillation towers. The resulting chemicals are basic in the manufacture of dyestuffs, intermediates, and pharmaceuticals.

2 The quality and properties of a colorant are dependent upon the raw materials used. Raw materials which have been tested in the laboratory for their suitability for conversion into pigments are carefully measured as they pour into a large vat in the early stages of processing.

3 Filter presses, such as the one shown, consist of plates which have cloth filters, on which deposits of pigment collect. After a carefully determined period of filtration, the flow is shut off and the pigment cake, as it is called, is dropped from the press.

4 The rotary vacuum filter comes as close to automation as is possible in the production of colorants. It does the same job as the filter press in the preceding picture. The large drum rotates through the solution, goes through a semi-drying stage and finally, caked with pigment, bulges in sections, permitting the pigment to be scraped off.

5 Brilliantly colored pigment press cake, in the same form as in the preceding picture, is loaded into tote boxes. The pigment is then put in trays and placed in oven for drying.

6 A blender, similar to the one shown on page 30, whirls around hour after hour mixing and refining pigment in the final stage of production. It is in these blenders that the dried pigments become a sales type with the necessary specified characteristics.

7 After blending, the huge cone is stopped in a vertical position and the pigment, which is powdered and dry, is unloaded into containers for shipment to customers.

2

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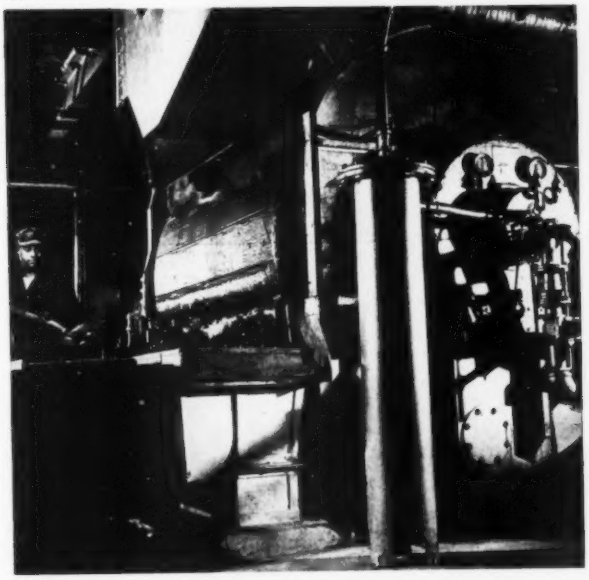

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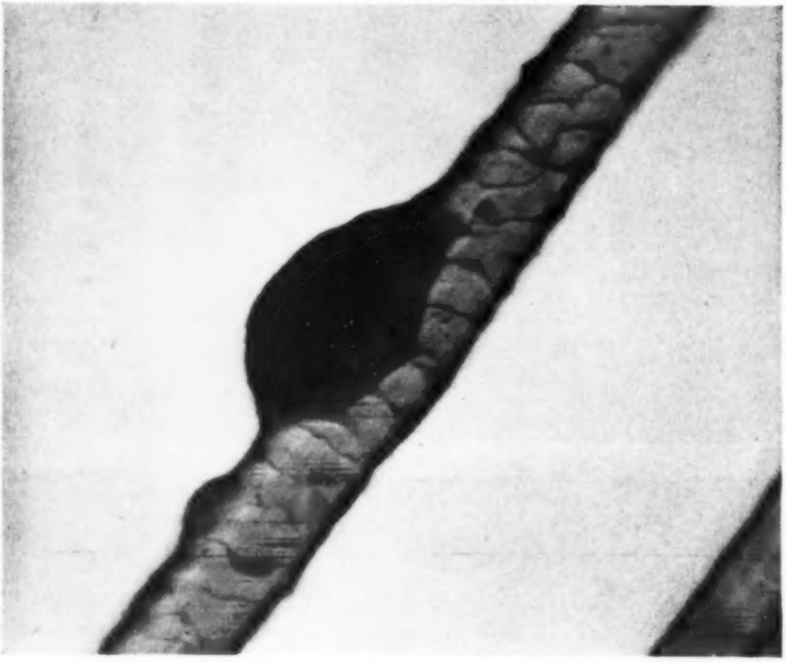
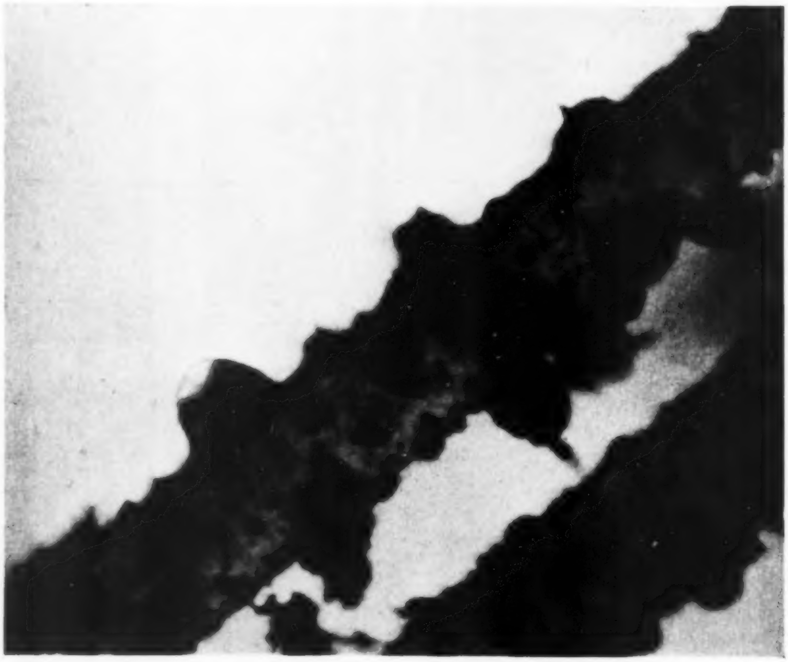
The chemistry of color: a case history on the research and development behind the creation of a new yellow.





Microscopical observations of fibers can be made continuously during the dyeing process with the Microdyeoscope. The color studies of wool fibers on the right show the exact nature of dye penetration. Observations like these are part of standard testing procedure at American Cyanamid's Technical Service Laboratory at Bound Brook, New Jersey. The spectrophotometer (below) is used to analyze the nature of a colorant by comparing, photometrically, the brightness of two spectra, wavelength by wavelength.

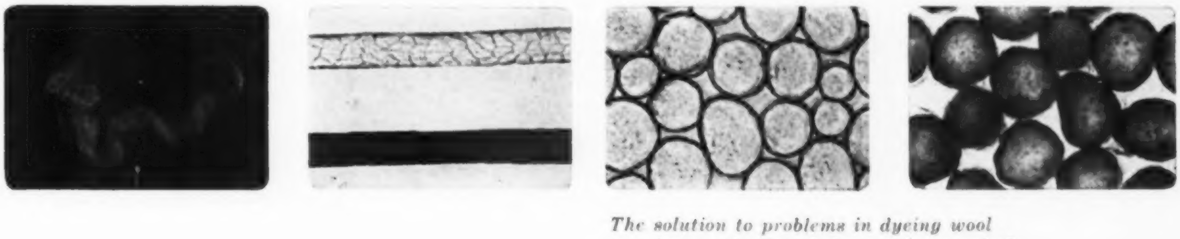
A color is born in the world of organic chemistry, a world which, according to Dr. Wendell P. Munro, Development Manager of Vat Dyes at Cyanamid's Bound Brook plant, "is so peopled with molecules that can be hooked together in different ways that there never needs to be any shortage of improvements, any shortage of new products, any shortage of challenge to the research man, to the analytical chemist, to the development man, to the production man, or to the engineer."

The growth of the dyestuff industry in America was a result of the desperate need for dyes in this country during World War I. The German chemical cartel controlled the supply of colorants, and during the war the British blockade shut off all supply to the United States. The last shipment from Germany was made by the U-Boat *Deutschland*, which made a daring blockade-breaking run carrying a cargo of indigo.

The Cott-a-lap Company, a manufacturer of decorative wall burlaps, which later became the Calco Chemical Division of American Cyanamid Company, entered the chemical industry out of self defense. In 1915, they were unable to get materials for dyeing burlap, and, with their own needs in mind, they started to make aniline, the initial raw material for many dyes, which was scarce and very expensive at that time. Anticipating a fairly secure future, Cott-a-lap decided to expand, but the fathers of Somerville, New Jersey, refused them permission to erect more building for the production of "evil-smelling" and "dangerous" chemicals. This forced the company to reorganize and relocate on the Raritan River near Bound Brook. (Water, incidentally, is practically the life's blood of a chemical manufacturer. Today, Cyanamid's Bound Brook plant alone consumes some 20,000,000 gallons of water every day.) By 1916, Cott-a-lap had expanded to six buildings and had condensed its name to Calco Company. They were creating a new industry and began by producing beta naphthol, aniline, aniline hydrochloride, R and G salts, and dimethyl-aniline, from which their first dyes were made, including methylene blue, crimson, scarlet, and tartrazine. They felt sure that their new facilities would be adequate for a long, long time. Cyanamid now has 133 buildings at Bound Brook.

Expansion meant more than the ability to produce more chemicals. It meant increased research and laboratory facilities, which would enable their scientists actually to create new colorants, improve those already in use, and perform highly technical investigations on the application and performance of pigments and dyes. The availability of special laboratory equipment, much of which had to be invented to cope with specific problems for which there were no existing testing instruments, made possible such microscopical observations as those shown on these pages.

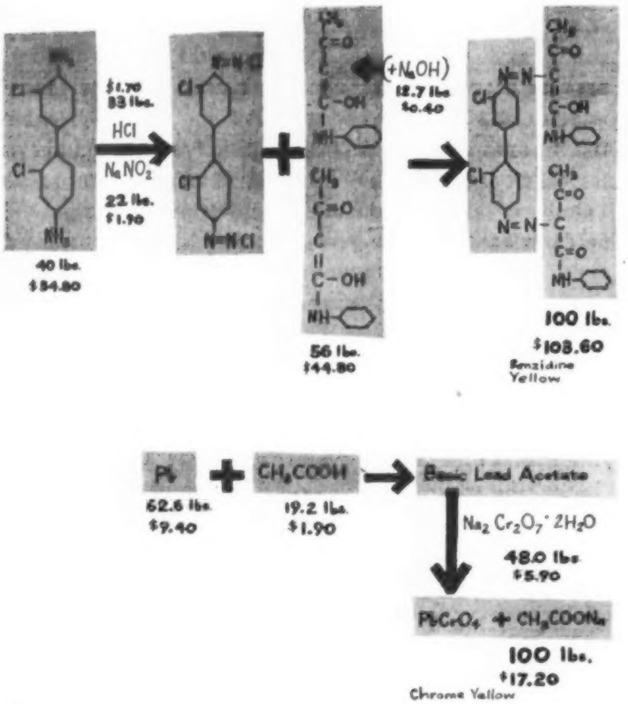
No one is quite sure whether a colorant is invented, developed, born, or discovered. It is probably a combination of all. A good example of what really goes into the development of a colorant is the story of a family of dyes that originated at Cyanamid's Organic Chemicals and Pigments Divisions laboratories. The first of this group, known as Vat Yellow GL, which will be used as a typical example, is a member of the phenyl triazine family. Interest started some years ago when the Cyanamid researchers in the Stamford Laboratories, where work on derivatives of calcium cyanamide (which is related to melamine and useful in the plastics field) was being carried on, developed a practical synthesis for a compound called benzoyl biuret. Through their regular exchange of information, Bound Brook scientists learned of the development and anticipated that benzoyl biuret would cyclize into an obscure compound known as benzoguanamide. Dr. Mario Scalera, Director of Research at Bound Brook and a foremost authority on vat dyes, made the prognosis that if the cyclization could be achieved, it should be possible to connect these atoms with those of some other dye intermediates through an intermediate chlorination, resulting in new dyes which would be somewhat analagous to known dyes but entirely different in some major respects. It presented the possibility of preparing colors from yellow to blue which could be modified to obtain minute shade differences. In experimentation, the cyclization of benzoyl biuret did occur and a dichloro compound was formed from it. From this dichloro compound the road was fairly clear to the synthesis of a yellow dyestuff which was found to have excellent fastness, strength and brightness. For years



The solution to problems in dyeing wool are frequently found from microscopical observations such as these.

Colorants endure severe laboratory tests before they go into production.

The cost of color



These formulae represent two pigments. They are both yellow, but one (Benzidine Yellow) is more than six times as expensive as the other (Chrome Yellow). The reason for this is easily understood when the prices of the raw materials are compared. These prices are indicated at different stages of processing for both pigments. An organic pigment, such as Benzidine Yellow, is formed from carbon compounds and involves the coupling of two intermediates. The metal derivatives that make up an inorganic pigment like Chrome Yellow are less expensive, as the diagram indicates, and the production requires fewer steps. Without considering the more complex and expensive manufacturing costs for organic pigments, it can be seen readily that the raw materials alone make their prices higher. Prices are based on current trade literature.

there had been a great clamor for a vat yellow because previous bright yellow dyes had not been sufficiently light-fast to be satisfactory.

This summary oversimplifies somewhat the development of a dye. It is estimated that it usually takes about seven years from test tube to production. In the case of Vat Yellow GL, the investigation of many compounds started over 10 years ago, and first deliveries were made in 1955. It was time well invested, however, for Vat Yellow GL turned out to be a very fortunate dye. It had all the properties that had been lacking in all known strong yellow dyes, and it also opened the way to a whole new family of vat dyes. A very important feature in the development of Vat Yellow GL, from the point of view of American Cyanamid, is that the products and processes for the benzoyl biuret approach were patentable. Another benefit was that the dichloro compound was made by a completely unsuspected method which could also be patented. And finally, the particular structure of Vat Yellow GL was entirely unique, enabling Cyanamid to take out a product patent on it. This is, of course, an example of an ideal situation where a company develops a family of dyes with excellent properties which can be completely protected.

To go back to the actual development pattern of Vat Yellow GL, two very important groups of specialists must be mentioned to illustrate the complexity of developing a dye. One group is the Development Department, where chemists and engineers determine whether or not the findings of the research laboratory can be reproduced on a production basis, the process simplified, be made less expensive, time cycles shortened, and production equipment, such as autoclaves, be used in place of the laboratory flask. Another vital function of the Development Department is to establish costs. To find out whether or not a dye will make money on a production scale, it is first made in a pilot plant which, for vat dyes, is about one-tenth production size. Yields and behavior are analyzed, cost estimates are revised, and if necessary, the process is changed. Sometimes, it is sent back to the laboratory for further investigation.

The second group that plays a major role in the development picture is the Technical Service Laboratory. It is here that chemical and spectroscopic and other test methods are worked out and standardized to be used on the intermediates and the final dyestuff. These tests are important for the continued maintenance of quality standards, both during the various stages of development and after the dye has gone into production. Other tests show how the dye will behave under typical mill conditions.

The weatherometer subjects dyed textile samples to the rigors of sun and rain and gives quick results that show how well they withstand the elements. Similar tests are done with paints on various types of surfaces in Cyanamid's Bound Brook Laboratories.

In this laboratory the dye is tried on all kinds of materials, and, with various types of specialized equipment and instruments, it is established how it will behave during and after the dyeing process. An example of this is the use of the Microdyeoscope. Invented by Cyanamid's Henry E. Millson, Manager of the Technical Service Laboratory, it permits the observer to make continuous microscopic observations of the phenomena that occur when textiles are in the process of being dyed. In addition to light-fastness tests, which are carried out all over the country because colorants are affected in different ways in different parts of the country, the Technical Service Laboratory performs wash tests, crocking tests that show how much of the dye will come off under friction, water-spotting tests, dry-cleaning tests, perspiration, chlorine, bleach, peroxide, and many others. The number of tests that can be made is quite phenomenal. As many as 1,000 tests may be made on a single dye before it reaches the market. If a dye falls down on any of these tests, no one outside the laboratory ever sees the dye. The ratio of the number of dyes that are approved to those that fail somewhere along the line is about 100 to one. Consequently, the profit on the dye that clicks must pay for the research on all the ones that do not meet standards. Surprisingly enough, it is estimated at American Cyanamid that well under five per cent of the selling price of a dye is spent on research.

One more thing should be said about the function of a colorant manufacturer. The specialists who develop and manufacture color agents work in an atmosphere of deliberate, highly scientific investigation. Every possibility and potentiality of the product is thoroughly examined. There is nothing hit-or-miss about any phase of the operation, and accurate information on its qualities and applications are presented in concise reports. The problems of coloring materials—textiles, paper, leather, plastics, metals—are revealed in laboratories, like those at American Cyanamid, Du Pont and other leading colorant producers. And many of these problems are solved in the same laboratories.

Important as the colorant manufacturer is to the fabricator in solving special problems, he cannot govern, except indirectly, what colors a product manufacturer should use or how they should be chosen. Every fabricating process has its idiosyncrasies which can limit the use of color. A plastic, for example, may demand certain temperatures for forming that will eliminate whole groups of colorants from possible use. It is as essential for the designer to know the manufacturing limitations of color as it is for him to make a good choice of color in the first place.

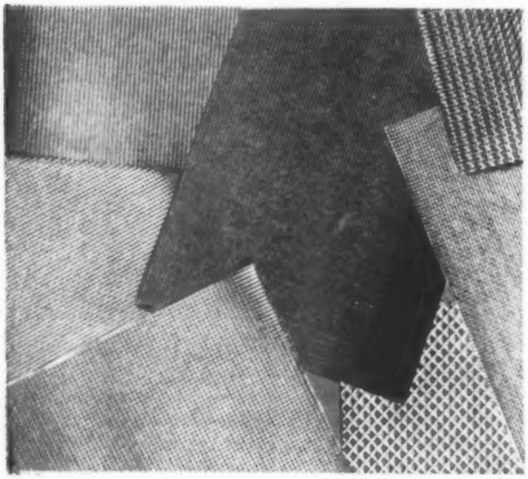
Color language

Hue Attribute of color determined by the dominant wavelength or predominant wavelengths of the stimulus that distinguish one color from another—red, yellow, green, blue, etc. Wavelengths of the hues in the spectrum vary from the shortest, violet, to the longest, red.
Value Also called "lightness" or "brightness." Proportions of colorants, or variations of lightness or darkness with reference to a gray scale. Value encompasses shade, tints and tones.
Shade Hue plus black.
Tint Hue plus white.
Tone Hue plus both black and white.
Saturation Also called "chroma." The degree of departure from gray.
Achromatic colorants Hueless — black, white or gray.
Chromatic colorants Having hue — red yellow, blue, etc.

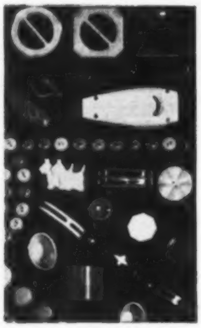
Types of dyes

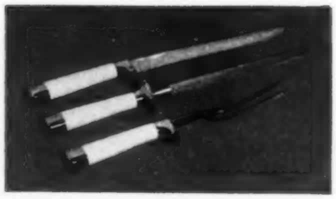
Vat dyes Used on cotton and rayon. They are insoluble in water. Before application, they are made soluble by a chemical reduction process using an alkaline medium. They are applied to the textile and, by means of an oxidation process, return to their insoluble form, fixing them firmly inside the fibers of the fabric. The line of vat dyes is the most resistant to light, washing and dry cleaning in existence.
Direct dyes Used on cotton and viscose rayon. They are soluble in water and have an affinity to cotton. The best "directs" are quite light-fast but, because of their solubility, are not wash-fast.
Basic dyes Used on wool, cotton and paper which has been mordanted. They are very brilliant dyes and were the first synthetics made.
Sulfur dyes Used on cotton or rayon. They are produced by fusing organic chemicals with sulfur and must be reduced before applying. Generally they are much cheaper than vats, but they are not as fast. They are good for dark colors but are gradually being replaced by vats.
Acid dyes Used on wool. They are soluble and are applied directly with an acid such as sulfuric acid. They are bright but do not have outstanding fastness.
Chrome dyes Special acid dyes used on wool. They react on the fabric with metals such as chromium. The process dulls their brilliance but makes them very light- and wash-fast.
Acetate dyes Used on cellulose acetate. They are insoluble but are dispersed with a soap solution. They give brilliant colors, are the most common for the acetates and are effective on the newer synthetics.
Azoic dyes Azoics are really dye components rather than dyes. They are used in two separate operations: the fiber is treated with one component which alone does not dye but reacts with the second component to form the dye on the fabric. The process is known as "coupling" and used for printing designs.
Neutral dyes These dyes are related to the chromes, except the metal salts are put into the dyes ahead of time. They can be used to dye wool without using acid, and are effective on nylon.
A special new group of "basics" with high light-fastness has been developed for wool. The major problem with new synthetic fibers is that they do not absorb water. This makes it difficult for them to absorb colorant. New methods of dyeing as well as new dyes are rapidly overcoming these problems.

Color problems



The very attributes that make Du Pont's Mylar a good protective surfacing material created color challenges. Chemically inert, it can be metalized, laminated or printed to give a range of color effects such as those shown.





Colorants with heat stability, light permanence and chemical inertness had to be found for use with Barrett "Plaskon" Melamine. The solution to these problems resulted in lightweight, long-lasting products that have color molded in.

Years of research led up to the development of color-anodized aluminum that would stand up in outside applications. Alcoa's Architectural Blue curtain wall panels add new brilliance to buildings.

Matching colors in several materials used in one product was one of the major obstacles in the development of a line of colored telephones.

A new kind of color consciousness creates big headaches for industry

The color alphabet

Every time a man tries to match a pair of pants, one of the most complex aspects of color technology comes into play: standardization. The problem of creating perfectly matched and stable colors is infinitely more difficult at an industry level; it begins with the colorant maker—who must exercise rigid controls in order to match any two batches of material — and continues through many steps of fabrication until the colored product is put to use by the consumer.

Efforts to standardize color are not new. As far back as Sir Isaac Newton, color, with its hues, shades and values, has been organized in many ways. But the need for a reliable—and generally accepted—system of color communication has become acute with mass production, involving as it does large numbers of materials, fabricators and suppliers. Two color alphabet systems, one developed by Albert Munsell and one by Dr. Wilhelm Ostwald, are in general use today. Each one subdivides the colors of the spectrum into gradients between white and black and runs the color gamut, giving attributes of hue, lightness and saturation. Each system uses a different grid, an individual vocabulary, and produces a slightly different alphabet of colors, and the merits and drawbacks of Munsell and Ostwald are continually debated.

The theoretical problems of these and other color systems will be discussed in a later article, but one practical deterrent to color communication bears mention here, as an example of a typical production problem. Munsell and Ostwald systems have traditionally been printed, and because printing inks are not perfectly stable, each new edition varies from the previous ones—defeating the purpose of the system, which is to provide an exact means of color communication.

The Container Corporation of America, to offer all color users a practical tool, has redesigned the Ostwald color system for a new medium: color-stable lacquer-sprayed cellulose chips that are dull on the pigmented side, glossy when seen through the transparent material. CCA has put 943 of these chips into a Color Harmony Manual, organized into some 30 triangles containing tints, shades and shadow values of each color. The chips are keyed, and arranged in slotted cards so that they are individually removable; duplicates of each chip are available in any quantity to users of the Manual, and the Manual can be tailored to the needs of individual producers using different materials.

Need for a vocabulary

A practical, universal color alphabet is one basic step on the road that leads out of today's color quandary. But the task of building from that alphabet a color vocabulary falls to the users of color. The headaches in this particular area are almost totally modern in origin, arising from what might be called a new color morality. Consumers have broken away from traditional attitudes about the appropriateness and place of color; no longer bound to black for telephones, green for offices, white for kitchens, gray for typewriters, they are demanding new kinds of color in new places. To meet this upsurge of color awareness, each manufacturer now has to choose not *a* color for his product, but a palette, and that palette may become a long-term investment in color research, as it departs from simple reds and greens and browns and strikes out into subtleties of lagoon blue, dawn gray, light maize, nursery pink. He chooses new shades, of course, both to complement a general trend and to gain a small edge in individuality. Often it turns out that the general trend defies all the practicalities of production and cost. The taste for pink in kitchens, for instance, has created a kind of chromatic chaos in the housewares industry. The larger manufacturers, usually in appliances, set the color "standard," and it may turn out that several standards are prevailing at once. The small firms must pick their lodestar, and, in the case of pink, translate it as best they can into polyethelene, styrene, acrylics, enamel, porcelain enamel, and even stained wood. Because of differences of media, no two pinks can be identical; because of individual formulae, they are not always meant to be identical—which often means that they are incompatible; and when you introduce the problems of metamerism, or apparent color changes caused by varying light conditions, the industry — and the kitchen—become a riot of clashing color. One manufacturer of porcelain-enameled pans, determined to bring out a line of pink utensils, reports that it took several years of experimentation to achieve a formula which could produce a satisfactory shade without toxic results; the line sells for 15% more than white.

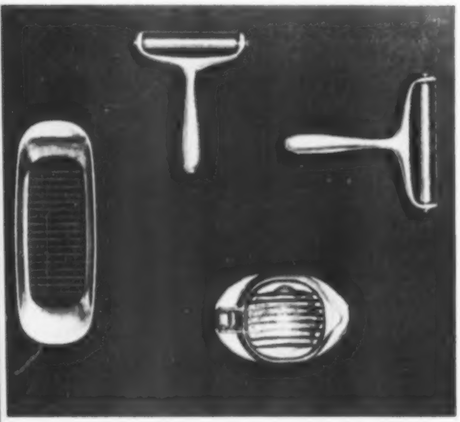
On top of demands for new colors, there is demand for new characteristics in colored materials, particularly plastics—translucence in dinnerware, clarity in decorative parts, high gloss in auto bodies, matte finish for flatware handles—and these must not only please the hand and eye but must resist the enemies of color, from heat, light and dirt to acids, detergents and abrasives. The colored telephones that brighten homes and offices symbolize another of the problematic by-products of the color rage: exact duplication of a series of colors in different materials for one product. In April, and subsequent issues, we shall discuss and illustrate these specific problems of color selection and production—in the problem, for instance, posed by one of the more currently fashionable "colors," and also one of the most troublesome in certain materials: white.

A world-wide collection, assembled in Canada, will soon visit the U.S.

"Good design in aluminum"

Coffee pot designers, left to right: Orr Associates for Supreme Aluminum Industries, Ltd., Toronto; Painter, Teague & Petertil for West Bend Aluminum Co., West Bend, Wis.; Erik Herlow for Dansk Aluminum Industri A/S, Copenhagen; J. S. Luck for Aluminum Goods, Ltd., Toronto.

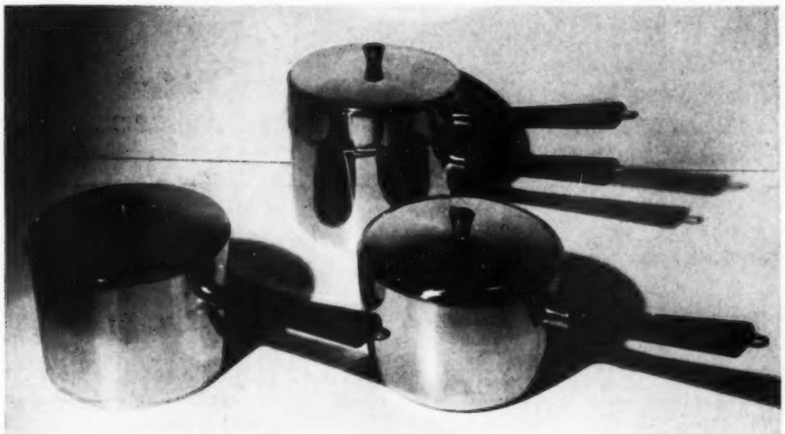
"Presto" butter cutter, egg slicer and cheese slicers designed by Willard H. Buschman for R. A. Frederick Co., Cincinnati.



Next month will mark the first stop in the United States, at the Walker Art Center in Minneapolis, of "Good Design in Aluminum," an itinerant exhibition sponsored by the Canadian National Industrial Design Council with the aid of funds from government and industry and currently on tour in the Dominion. It is the first international exhibition to be so dedicated, with articles from 13 countries, Japan to Finland, represented.

A collection of objects in a customary genre for aluminum — household utensils, lighting fixtures, door handles and a good deal of furniture — provides the substance of the show, but it is highlighted by a number of aluminum surprises as unlikely as a pair of tailor's scissors from Italy, an American ground anchor, and a French fish tub.

Selected by a committee under Mr. Julien Hebert's chairmanship, this international exhibition is one of the Council's ways, a pleasantly insinuating one, of encouraging better and more prolific use of aluminum in products designed at home.



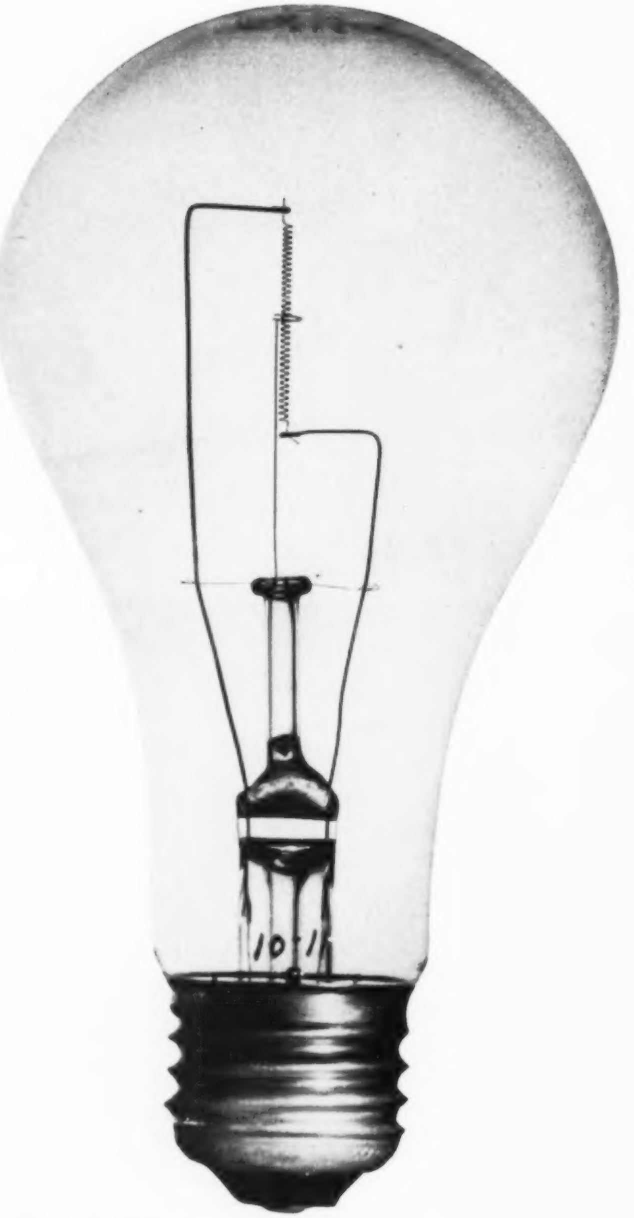
Saucepans of aluminum-silicon alloy designed and manufactured by Easipower Ltd., London. The straight-sided one (left) was measured to fit the standard electric range hotplate.

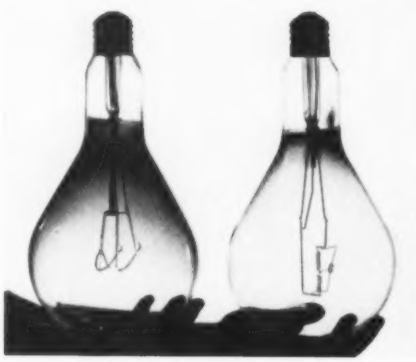
The coffee pot below, whose spout and handle create a remarkably rhythmic effect in upward and downward thrusts, is another design from Erik Herlow's office, Copenhagen, for Dansk Aluminum.

Dining chair designed by Ernest Race for Ernest Race, Ltd., Clapham, England, has a die-cast aluminum frame, a plywood seat base and back, and upholstered foam rubber padding.

"Light bonus" for incandescent bulbs with vertical filament suspension

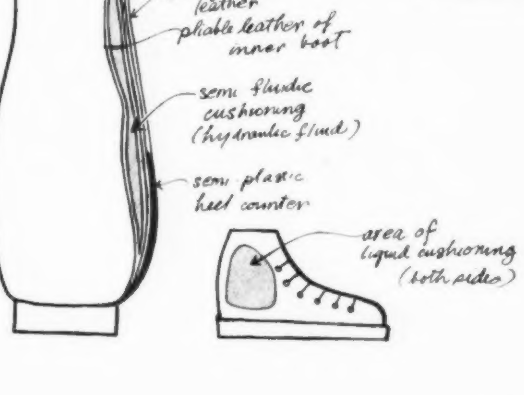
The idea of suspending the filament in an incandescent bulb vertically instead of horizontally is bringing brighter light to homes, offices, factories, stores, and schools. The new design, perfected by General Electric engineers at Nela Park in Cleveland, was not as simple as it sounds; it took four years to develop after the idea was conceived, and is claimed to be the first major advancement in incandescent light bulbs since 1913, when the gas-filled bulb was introduced, also by General Electric. The design problem that held up final development was making a support that would hold the delicate filament in a vertical position firmly enough to prevent its sagging regardless of the angle of the bulb. As the photographs on this page indicate, it was necessary to support the filament in the middle as well as at both ends to give the needed stability. Positioning the filament lengthwise, or axially, increases light output in two ways: it permits the filament to burn at higher temperatures, increasing the amount of light it produces; and it causes bulb blackening to be concentrated in a smaller area on the glass, lessening the dimming as the bulb grows older. In the lower picture, for example, blackening is shown on two bulbs, both of which have been burning for the same length of time and which are nearing the end of their life. In the standard bulb on the left, the blackened area is noticeably larger than that of the bulb on the right, which has an axially mounted filament. The new bulb uses no more electricity, yet, it is claimed, it will increase light output from 6% for household bulbs to 15% for higher wattage bulbs which are used commercially and industrially.

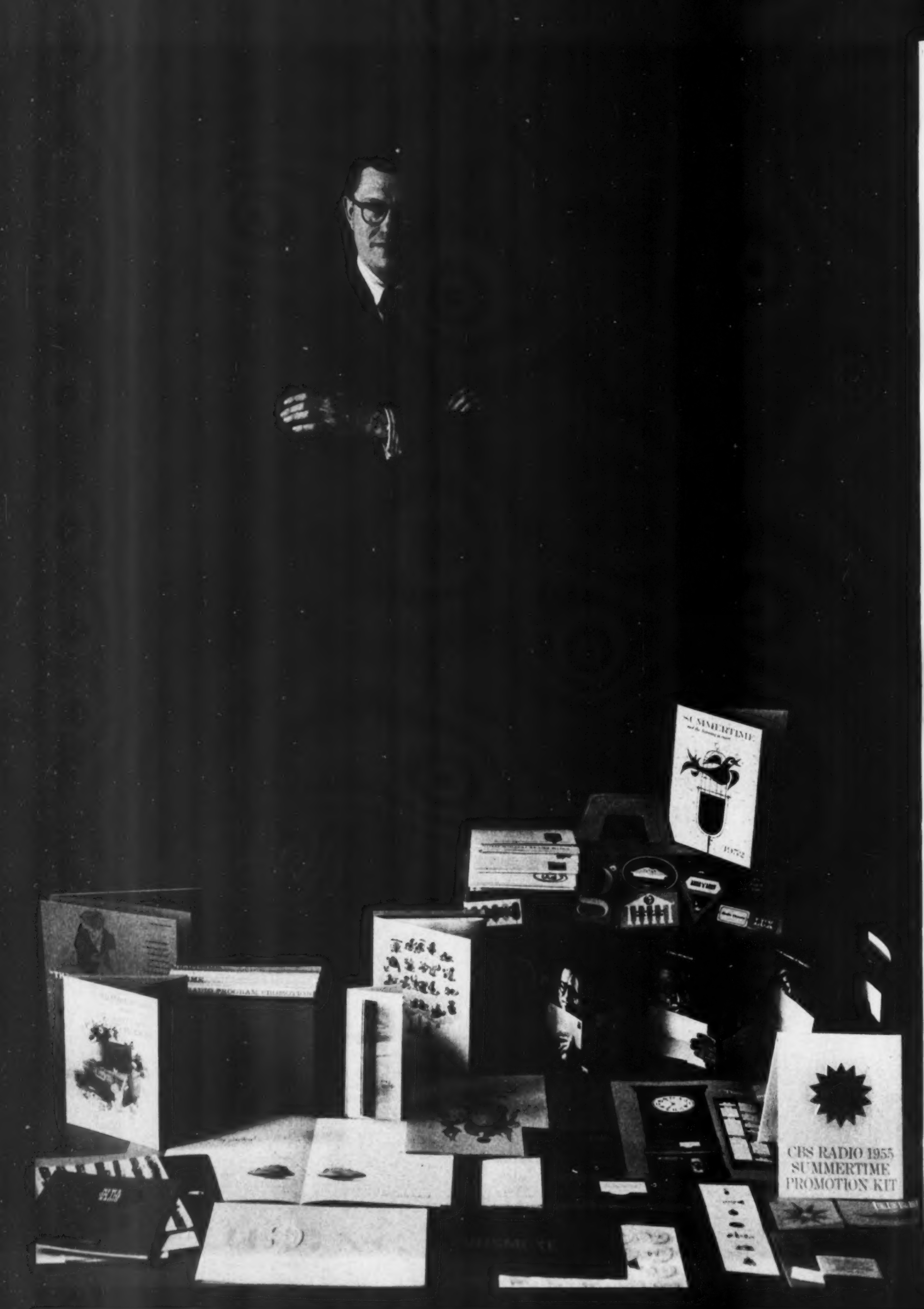




New ski boot uses hydraulic fluid for better support, more comfort

The seemingly unrelated skills of skiing and hydraulic engineering have been brought together in a new ski boot with a surprising built-in feature. The new boot, designed by the engineering-minded ski instructor Claus Obermeyer, uses hydraulic fluid to provide firm but gentle ankle support. Known as the Garmisch-Hydro Ski Boot, it is essentially a boot within a boot: hydraulic fluid is contained in strong but pliable plastic chambers which are, in turn, encased in the leather boot proper. The hydraulic fluid, which was developed in Germany at the I. G. Farben laboratories, has a low viscosity and a low temperature mobility. It grips the ankle with a cushioning pressure that changes constantly as the ankle moves, with the result that the support continuously conforms to the contour of the ankle without relaxing or binding. In addition, the hydraulic fluid serves as an insulator against cold and eliminates the painful breaking-in period usually necessary with a pair of new ski boots. Mr. Obermeyer, who divides his time between instructing skiers at Aspen, Colorado, and heading the import firm of Sport-Obermeyer, has been granted a patent on his process for applying principles of hydraulics to ski boots. The Garmisch-Hydro Ski Boot sells for $69.50 a pair.



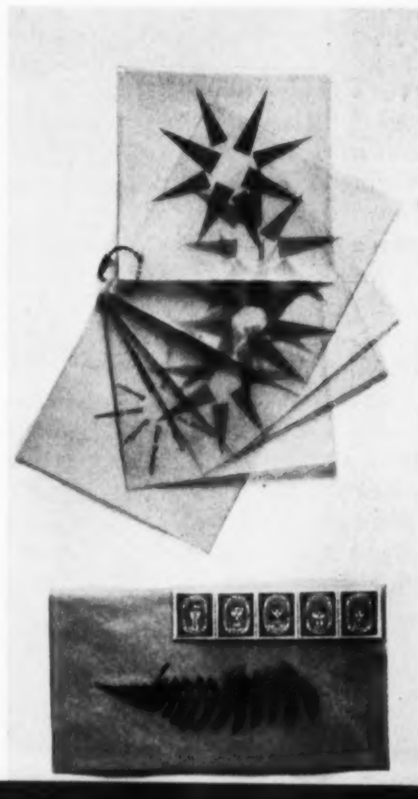

SUMMERTIME
CBS RADIO 1955
SUMMERTIME
PROMOTION KIT

radio must be seen as well as heard — visual presentation of its business is crucial to the support of many microphones. Presiding over an active inner network is a man who looks as though he might be a political newscaster making prophecies or, perhaps, brother to Robert Q. Lewis. Certainly he shares their devotion to the sound waves, their nervous tension and their showmanship, although he happens to play his part in a graphic medium. Lou Dorfsman has designed for CBS for ten years —five years as a staff designer for radio and TV, then, after their split, five years in his present position with CBS radio. With a staff of six artists and two production people he has a double-barreled job, Director of Advertising and Art Director; the fact that two jobs are held by one person reveals how closely allied design and business are at CBS radio. This also means a gain in quality for the company, for all printed matter is given a single style with one individual coordinating advertising and promotion, and seeing to it that ads, slogans and graphics carry out a unified concept down to the last detail. His two-fold job is as idea-demanding as any entertainer's: supplying program promotional material to 219 local stations (which they can then feed to local newspapers and agencies); advertising to attract both sponsors and consumers; presentation material for salesmen — pamphlets, brochures, rate lists, which have to look provocative in order to be read; and, within the corporation, designing letterheads, bulletins, Christmas cards, and even booklets to charm the employees into learning the company rules.

Believing that "there is no conflict between good design and saleability," Dorfsman has found many ways wherein one serves the other. His message is always direct and clear, whether the imagery is dramatic, for sales promotion (see the Robert Q. Lewis folder, next page), or delicate and concise, as in his personal Christmas cards (right). The distinction of his designs, however, derives from more than his graphic ingenuity. While the Director of Advertising in other companies is frequently the man who produces ideas which the Director of Art must carry out, Dorfsman, as the central figure in CBS radio promotion, combines ideas and execution, graphics and copy, gives them the continuity and quality of one mind.

CBS radio's Lou Dorfsman

One designer in two jobs creates network graphics



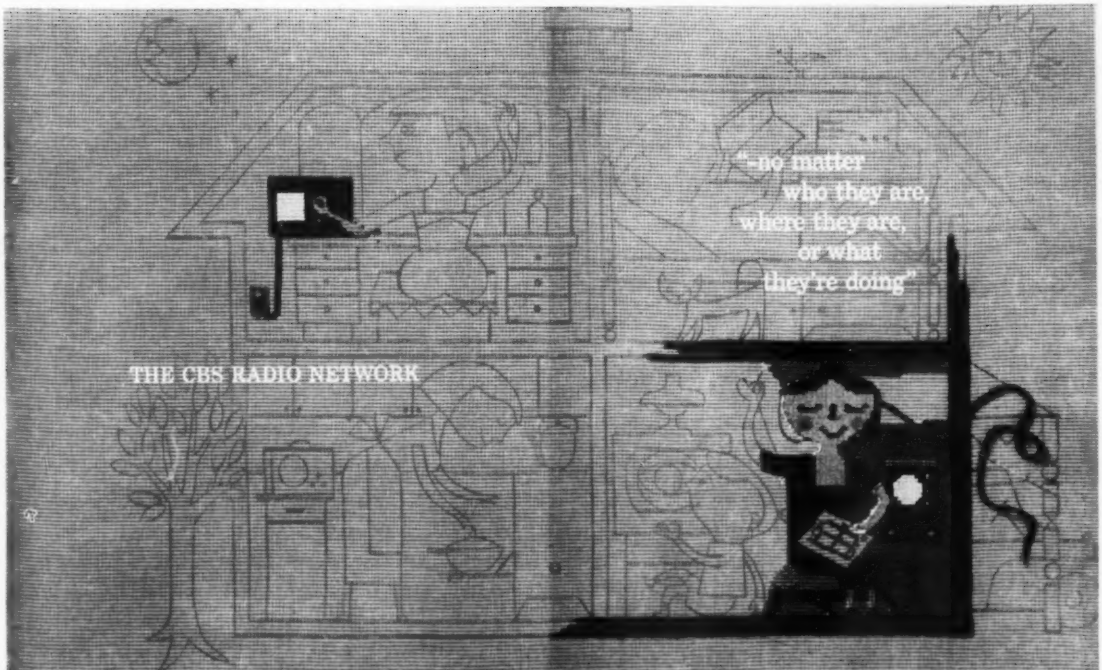
For sales promotion, radio is rich with histrionics and symbols of sound

Robert Q. Lewis reacting to a letter from a satisfied sponsor (above) is one of Dorfsman's most engaging promotion pieces. He pondered the problem: what can be done with anything so visually trite as a sponsor's letter? and hit on the idea of combining a few of its glowing phrases with photographs of Lewis mugging with delight, and, at the end, having him present the whole letter tucked in as an insert. Salesmen found this animated testimonial a useful tool. Carrying out the design required setting up the comedian and the photographer, who worked under Dorfsman's direct supervision. "Good design is strong, solid, and carries a simple message," is Dorfsman's first consideration, and whatever technical resources he may make use of—photography, drawings, special printing processes, etc.—are merely the vehicle for a design idea. His inventiveness has considerable scope, as the examples on this spread show; it extends to a command of symbols, two of which he had blind-embossed on the cover and the back page of a book (right) designed to sell sound as an effective sales jnstrument—and even to applying such a specialized craft as needlework.

The sampler (which was used both as an ad and as a promotion folder) is the essence of the Home-Sweet-Home concept; Dorfsman used the technique to combine several ideas in a master stroke. The message of the sampler was bold in 1953: it admits that while television is in the living room (engaging only one small boy), radios are in every room and also in the family car. In its unfinished state, the sampler is designed to stress the fact that one can listen *and* work; the finished version inside the brochure fills out the picture all through the house — Mary in the kitchen with radio, John Q. taking it easy in the bedroom, with radio — while the copy points out that Nielsen measures the living room sets alone, accounting for only a portion of the radio audience. Dorfsman went to great lengths to find someone to execute the sampler in the same gay and whimsical spirit of all his home-oriented designs, with cheery figures and lively props to suggest that radio is supplying a lilt to daily tasks.

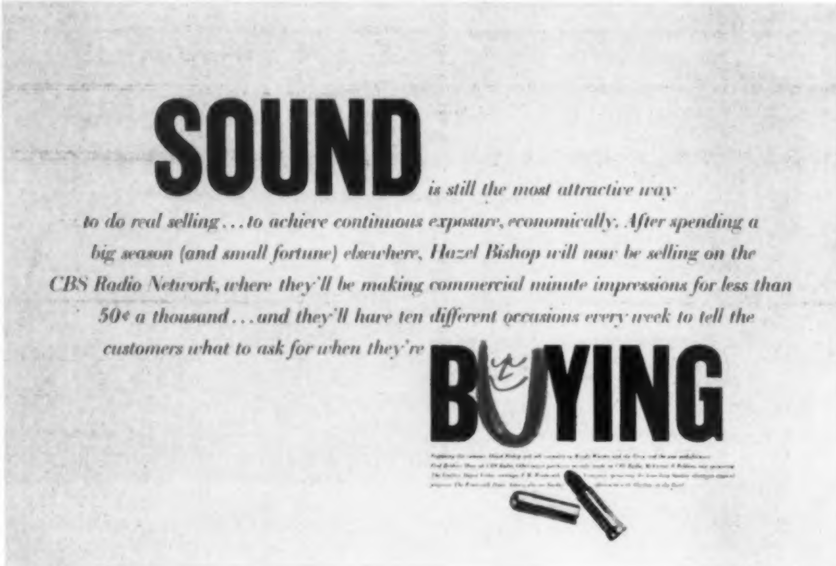
"Not so much a sales tool but rather, a prestige item, a worthy keepsake, is this recording from a program about juvenile narcotics. It represents a public service program. We used the same drawing (by Andy Warhol) in a large ad."

"Promotional letterheads go on and on, and represent some of the details in a coordinated design program. They are useful, mostly as mastheads for press releases, in carrying out in a small way some big annual or seasonal theme. We may use a slogan (as we did once with the Summertime motif) or play with symbols and typography. Or we may repeat an advertising design the way we used the luggage tag that goes with the travelling show kit."



"The clam 'Say Something' was first used as an ad, then redesigned as a promotional brochure for the network. Packaging (above, right) was specially designed to express the content of the show and to distribute material to our stations for local promotion use."

"These ads are three of a series which were carefully thought out in terms of visual and verbal puns to give them extra punch. And how you work to get a real integration of headline and copy!"



The Importance o

"*These small program ads (left) are based on one arresting symbol. Snipping the image (below) vividly makes the point that Skelton's show can be sponsored for a one-night stand.*"

"*Walking through an engineering studio I noticed all these different microphones, and the idea for this ad dawned (below). I like a simple concept, very direct, based on exciting imagery. By the same process, a pile of garbage in a super market looked like an ad to me. Then it took* hours *to arrange those old cartons to look like something interesting.*"

eof Good Connections...

In radio, any microphone will do. The difference is where it's plugged in. For the important thing with a microphone is who's standing behind it. And on the other side, who's listening.

Final reports for 1953 show that for the fifth consecutive year the most popular performers continued to gather at CBS Radio. And the biggest audiences were again out front.

CBS Radio has three times as many of America's favorite programs as all other networks combined. And 22 per cent more listeners than anywhere else.

Which is why CBS Radio has the lowest cost-per-thousand in all radio. Why it attracts more of America's Top Hundre advertisers than any other network.

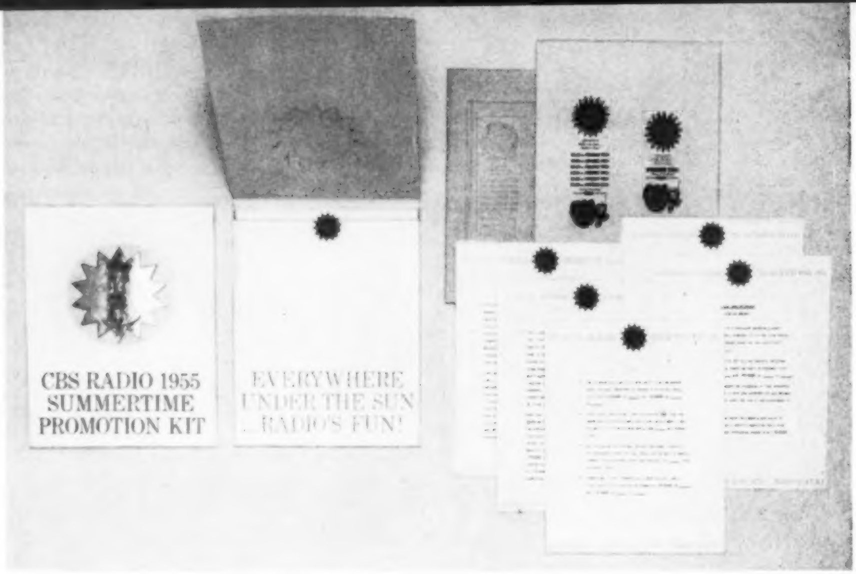
In fact, advertisers bought more time on CBS Radio in 1953 than the year before.. giving the network a billings lead over its nearest competitor that's never been equalled: 38 per cent.

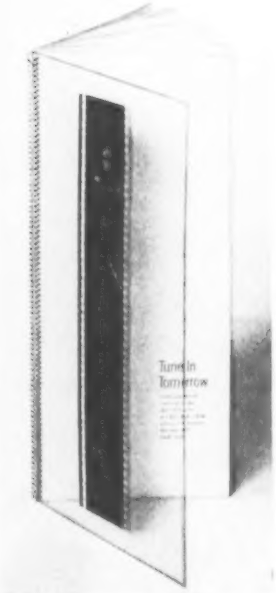
In a medium that already reaches 98 per cent of the U.S.—and that last year added 12.5 million new outlets—the leader in every connection is...

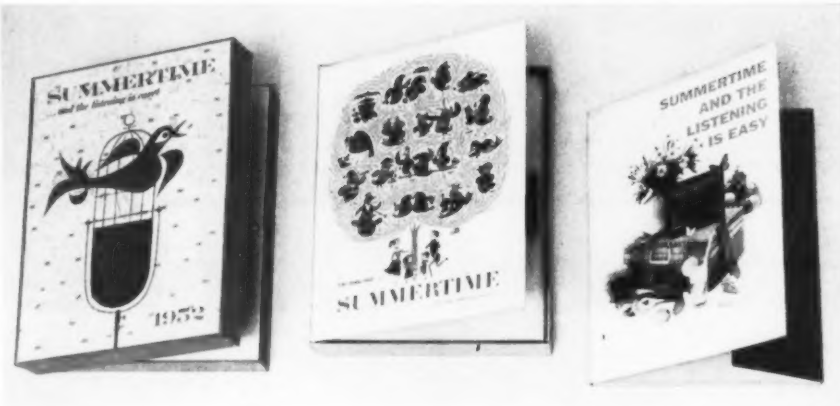
THE CBS RADIO NETWORK

Where America Listens Most

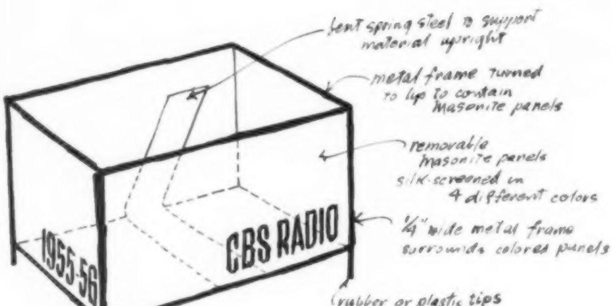
"We produced an animated film with UPA and repeated the promotion facts and figures in a booklet. A piece of actual film strip, laminated between sheets of acetate, as a cover, gave it some intrinsic value."







"Our promotion kits for local stations require a different design every year and a special presentation for summer. Here are successive solutions to the same problem from 1952 through 1955, when we used a sunburst.



"We supply a full range of promotion for every single program to all our affiliated stations. This year's kit was designed to be striking, flexible and useful. The colored panels, red, green, blue and mustard, are changeable. The bottom can be removed and you can fill it like a file (see drawing). It's a practical method of packaging a quantity of promotional material which will be used on an integrated, nationwide basis."

"This cornucopia can made a hit at the 1952 banquet of the National Food Brokers' Association, telling the same sales story — with confetti."

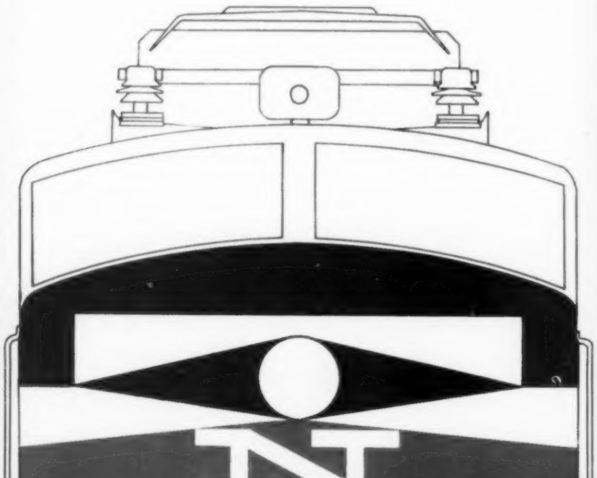
Bright ideas in packaging
are additional ways
a graphic designer sells the sound waves

The salesman's suitcase of 1953-54 is Dorfsman's most novel solution to the packing and shipping of the annual promotion kits to local stations. The travelling show theme, apt for national radio broadcasting, works in a big way, with luggage tag ads for all daytime and evening programs inside the boxes, and, on the outside, stickers in bright colors. Dorfsman starts with a symbol for each show — an open palm for "Tree of Life," a cowboy boot for Gene Autry — which, from its literal and obvious beginnings, he transforms into a sophisticated and decorative design. With a punch, each sticker sums up what Dorfsman, with the intelligent cooperation of management, is doing for CBS radio: representing it with a body of printed matter which gives the network an amiable and impressive character.—*s. b.*

NOTICED THE NEW HAVEN?

by Suzanne Burrey

What lies behind the new look of the New Haven? Who are the designers who have been working on the RR?



Patrick McGinnis changed jobs on January 20—from president of the New Haven to president of the Boston & Maine—and, like the hurricanes and floods that struck New England in 1954 and 55, the effects of his reign are with us still. For 22 months the New Haven made headlines, as much from the tempests of its president and its commuters as from the tempests of nature, lagging schedules, irate petitions, ICC hearings and, finally, McGinnis' resignation. These 22 months were long enough for McGinnis to enact some spirited changes in the operation and finances of the railroad and also in the look of its equipment. While his financial record is being hotly discussed and investigated, few people know the nature and the details of a comprehensive design program which McGinnis started. Though it cannot be divorced from the basic issues of service and finance, and though it was not an immediate answer to the performance that the public needed, the design story is much too significant, not only for the New Haven but for other railroads and industries, to be lost now either in the mud or in the martyred airs.

Like the McGinnis regime itself, the design program contains elements of shrewdness and showmanship; its daring can be credited to Patrick McGinnis, its quality to his wife, Lucille. Although some extravagant notions were entertained during its conception, what was actually done shows evidence of serious planning, careful economy and long-range thinking in terms of a railroad's survival as a means of transportation. Some of the improvements suggested by the four consultants, designers Herbert Matter and Florence Knoll, architects Minoru Yamasaki and Marcel Breuer, have been already realized, and others, such as Breuer's designs for the experimental trains, will yet appear.

Beginnings

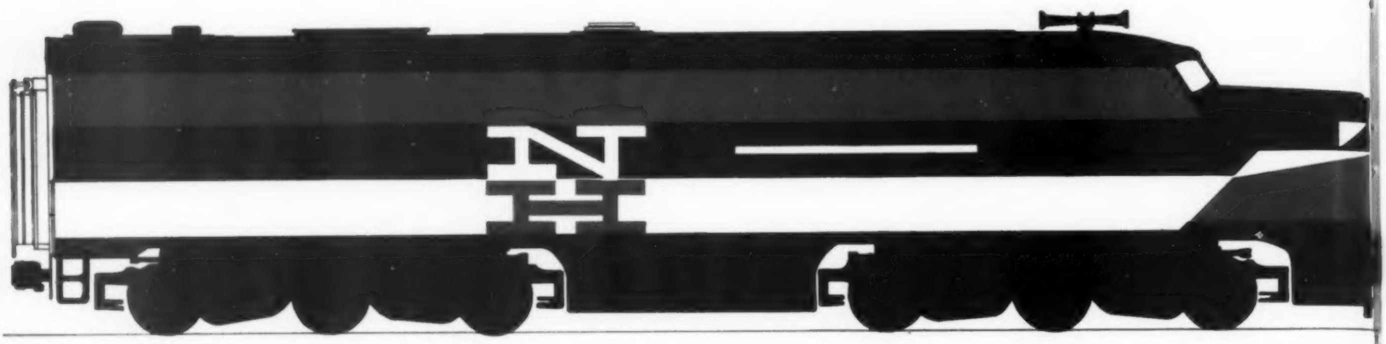
The new logotype for the railroad has, in eight months, become a familiar trademark; it was the first visible symbol of the program. "Change", "Planned Progress", "Let's do something about it," were McGinnis' slogans after he won his proxy fight in April 1954 and went to work—12 to 14 hours a day—like an impresario. As soon as he had abbreviated the name of New England's time-honored railroad, the barn-red box cars with their distinguished New York, New Haven and Hartford script looked obsolete. Early in 1955 Mrs. McGinnis asked Mrs. Knoll (who was designing the Executive Suite at Grand Central Station) to suggest a new design. Mrs. Knoll recommended Herbert Matter, who had designed the Knoll trademark, and Matter started making sketches. The first are clearly derived from the old script. "It was very nice," he said, "and I had respect for its purity in an old conception. It made me step to it to try and make as good a one

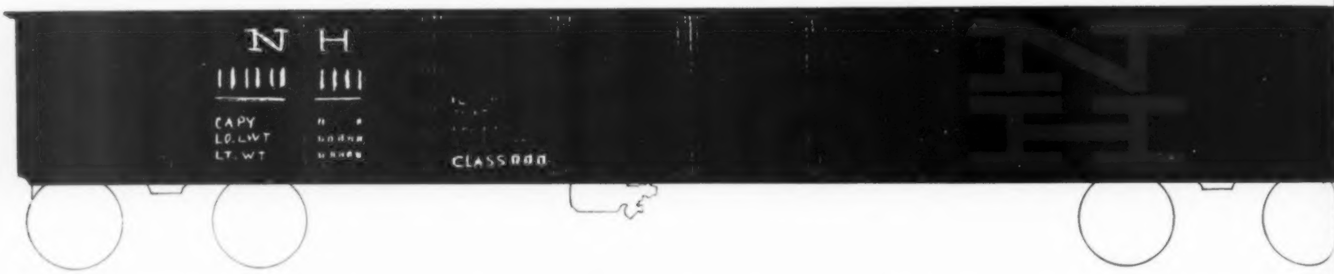
in today's conception." He superimposed the N and the H in different dimensions, at first contained in a circle, and arrived at the final version by a leap as soon as he began trying out expanded Egyptian. The serifs re-echo the old symbol; the brevity and block simplicity of the letter-forms herald a new look. As it turned out, the symbol was eminently suited to an engine's nose.

The engine paint which sets off the symbol came next. The previous regime, under Buck Dumaine, had ordered ten new diesel electrics, and Mrs. McGinnis learned one day to her horror that the maintenance department was about to paint them Brewster green with a yellow trim. Matter was called in again and his sketches began, first as ribbons of color—blue and white, yellow and black, and elegant black and white bands. Then he reconsidered the scale, the placement of the doors, windows and headlights, the problem of washing, and most of all the impression of speed and power. His proposals were narrowed down to two, and two engines were painted, one yellow, white and black, the other red, white and black, as prototypes. On a cold, windy day in Erie, Pennsylvania, the jury, which consisted of the McGinnises, Mrs. Knoll and Matter, watched both designs speed along the tracks. They all agreed that the red, white and black was more impressive. "Yellow was too fashionable," said Matter, "and it shows the dirt too easily." "The red one," said Mrs. McGinnis, "had much more a look of power."

Along the New Haven's 1,770 miles of track, the engines are bringing a charge of color into dreary winter yards. Fifteen stations have been painted black or white with gay red, yellow and blue doors in such widely divergent places as Pelham, New York, Buzzards Bay on Cape Cod, and Lee in the Berkshires. Two station shelters designed by Yamasaki have already been built, as well as a ramp at the New Haven station, and, while the new regime enters its first month, the maintenance department is following the color schemes of Knoll Associates, redecorating the interiors of ancient coaches, and painting box cars in Herbert Matter's graphic schemes with custom-mixed paint. More than a thousand cars have been painted in the designs that follow on the next pages.

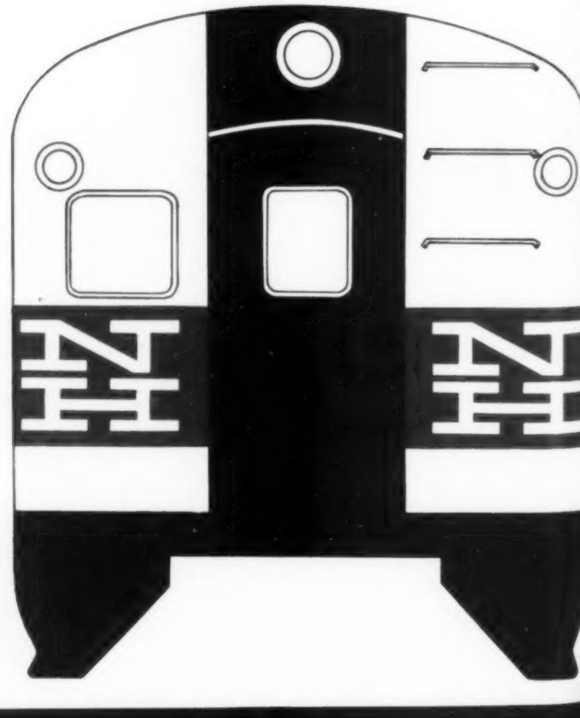
Matter's symbol and patterns of color brighten rolling stock and stations





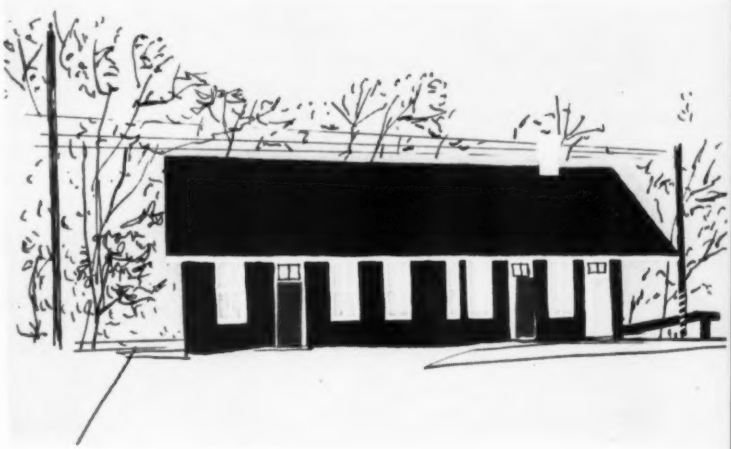
Equipment repaints: Herbert Matter

The chosen engine scheme (top) keynotes Matter's subsequent designs for rolling stock. "There were so many possible solutions," said Matter, "I tried to find one that was exciting and that would wear well." These striking elements—red, white and black, with the symbol—lend themselves to many different applications, while sustaining a stylistic unity in interchangeable pieces of equipment. The earliest box car and gondola designs are as forthright as billboards, making a logical use of existing structural elements, doors, ladders, etc. Although he could not, because of regulations, organize the legend as he wanted, Matter incorporates it as a vital area. Right, design for the rear of a passenger coach illustrates how clarity serves not only as an aid to identification but also to safety. Matter did paint schemes for the sides of coaches, too, including the newer ones of stainless steel.



Station repaints: Knoll Associates

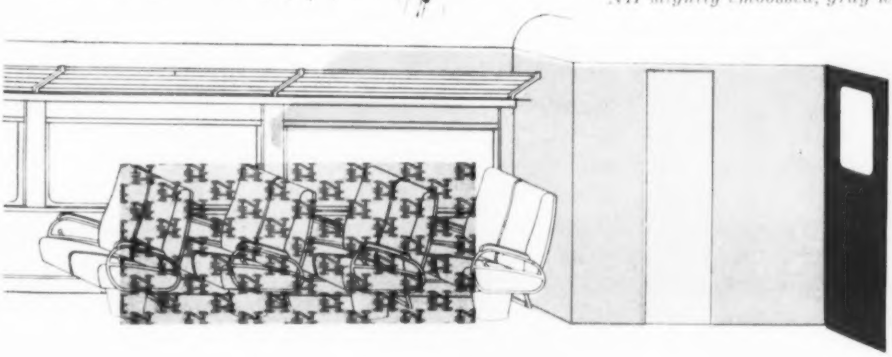
The New Haven network includes 175 stations in a pot-pourri of sizes and styles, conditions and materials. Because of the age of most of the buildings, and because a quick renovation was badly needed, Knoll did not make special designs for each one but devised two simple formulas: top, Buzzards Bay, Cape Cod, is a brick building, painted white; Sheffield, Massachusetts, below, is wood, painted charcoal black. All roofs are black for reasons of maintenance. This pattern is consistently followed as a groundwork for primary colors. Sky-blue is painted under the canopy of Buzzards Bay—all canopies are in fact treated this way, with white pillars. In adapting the schemes to each station—whether American Gothic with stick embellishments or Neo-Classical in brick—Knoll endeavored to straighten out the lines of the building, to relate the painting of outbuildings to the total scheme, and to brighten the environs of the stations—walls, loading platforms, telephone kiosks, even telephone poles. Station signs were redesigned for the utmost clarity: white on a black field or vice versa, with the red NH.



Station interiors

Knoll Associates also selected the color schemes for the interiors of the fifteen stations, continuing the bright colors and striking contrasts of the exterior: light gray walls, black benches, blue doors for men, yellow for women; and other doors, whose purposes are various and not labelled, may be in red, yellow or blue. Worn wooden floors are painted charcoal, fire buckets in red, old stoves in white and black. Below is a characteristic example. Only the finest materials, such as the marble-topped radiator in Stockbridge and the mellowed oaken benches in Buzzards Bay, have been spared a fresh coat of paint, which has an egg-shell finish, to minimize reflection.

Knoll design for the interiors of old coaches (below) includes fluorescent strips, vinyl tile floors, solid colors, plastic upholstery with NH slightly embossed, gray walls.



A feminine engineer led the way to some plain and fancy housecleaning

Mrs. McGinnis (shown above on that triumphal day when the engine painting was selected) was the guiding influence behind the new look of the New Haven. Her interest in design, coupled with Mr. McGinnis' publicity consciousness, and her enthusiasm for the work of Knoll, Matter, Yamasaki and Breuer gave the design program its shape and momentum. And too, after surveying the vast dinginess of the New Haven system—crumbling canopies, neglected waiting rooms, littered platforms and dreary walls—she felt a natural distaff desire to clean up and rearrange the furniture. The clutter of South Station, Boston, and its sooty Beaux Arts columns—more attractive to pigeons than to passengers—was her first objective. She persuaded the management to have the outside sandblasted, to tear down a monument in front of the main door on Dewey Square (no one could identify this curious columnar construction, and not a citizen remarked on its absence), to repaint the walls inside green; and she campaigned to have the shops and news stands made neater.

Her ideas for improvements which involved hiring the services of consultants were not sold to hardheaded men of the railroad for beauty's sake alone, however. Unaccustomed to viewing a clean-up program as a design program, they had to be persuaded from the practical side. Mrs. McGinnis convinced them that a well-planned clean-up could be more economical to the railroad in the long run. (She was also aware that the more attractive the improvements, the more likely they were to bring the good will of the public which the New Haven so sorely needed.) In repainting stations and equipment (many of the stations had not been painted in twenty years), she reasoned with the management—since it had to be done anyway, why not have it done strikingly? Brightly painted engines and coaches are also safer at crossings, she believes, because they are more easily seen. Rebuilding? This too had to be budgeted in future plans. Property was depreciating; why not, said Mrs. McGinnis, hire the best architects in the country? New rolling stock? It was eventually decided, since a new train represents an investment of at least $1,300,000, that instead of building them as cheaply as possible, it would be better to make a deliberate effort to create the best-designed contemporary trains in the country. How Marcel Breuer and his associates revolutionized some already revolutionary trains is a story in itself, which begins on page 60.

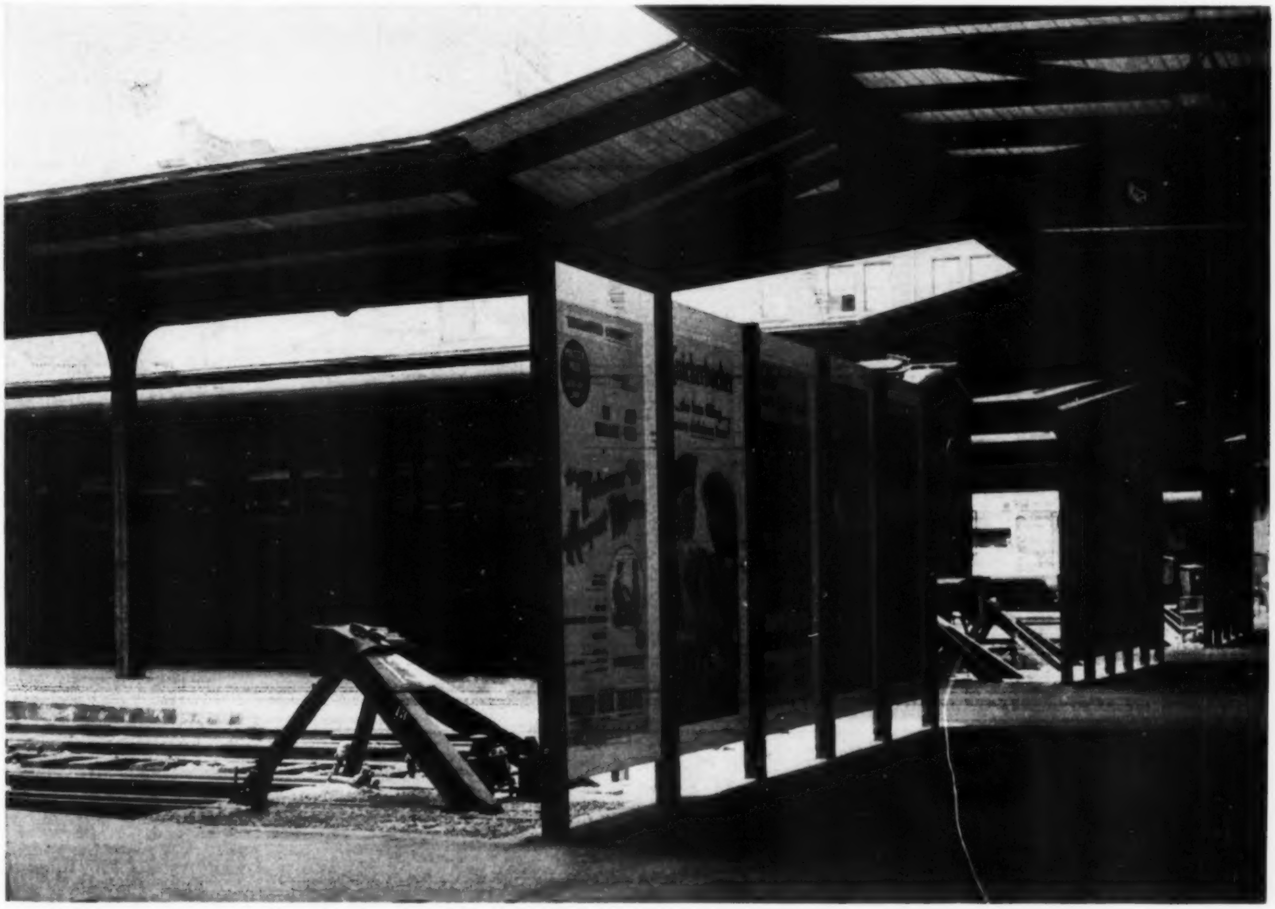
But these trains of the future could not be ready for the public until 1956; McGinnis was making promises in speech after speech, and people were expecting immediate results. The station-painting project was a spurt of effort to allay increasingly adverse criticism by action which was conspicuous and economical.

Dressing up the stations

With Florence Knoll as consultant, a survey was made of the decrepit stations in March 1955, and the jury which decided upon the engine paints came up with a quick and striking solution. In May the New Haven's maintenance paint crews, with the occasional addition of local help, began carrying out the Knoll color schemes in the Berkshires. Special representative Warren J. Cole was given the complicated task of acting as liaison between Knoll designer Haino Orro, the suppliers and the crews, and he conscientiously carried out the designs on very short notice, and in rapid time. Springdale, Massachusetts was the first station completed, barely in time for the dedication of the War Memorial Park adjacent to the station. Stratford was finished just ahead of the opening of the Shakespeare theater. Auburn was another rush job—the first brick station to wear the white paint—finished to fulfill a promise McGinnis made to the 55th meeting of the Rotary Club. Stockbridge was made ready for the concert season at Tanglewood—and so it went through the summer until all the stations on the New Haven line in the Berkshires were completed, and five on Cape Cod. It was a major operation merely to coordinate the paints, which had to be custom-mixed by the suppliers—Pittsburgh, Du Pont, Benjamin Franklin, Paterson-Sergeant and others—and had to be weather-tested and color-tested. Knoll ordered all flat paints with an egg-shell finish—no high gloss—a special challenge for the manufacturers in mixing outdoor paints.

The scheme employs the simplest expedients to enliven the New Haven property and, occasionally, its neighbors. Where taxi stands entered in, the railroad persuaded the owners (sometimes much to their alarm) to have their buildings painted red or charcoal. First alarms about these striking changes were usually quieted by the finished work; only one town absolutely refused. Another, Stockbridge, where for years a civic club has kept up the station and planted flowers, reacted very favorably to the gay paints. A granite and limestone building, Stockbridge holds its touches of color handsomely and has a long, lovely canopy.

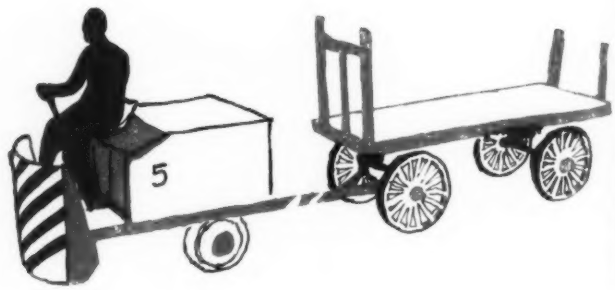
Knoll Associates also proposed a simple solution to the clutter of billboards around the stations—a neat, regular framing in metal or in wood, organized in straight lines. In South Station, Boston (below), the advertising space in its new framing serves also as a series of track screens, concealing the debris at the end of the tracks and making a clear coherent pattern.



The logotype spearheads reprints and repaints all over the New Haven system

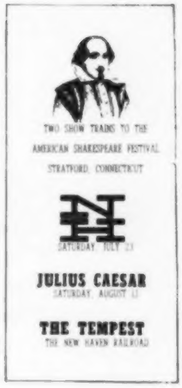
Graphic design: Herbert Matter

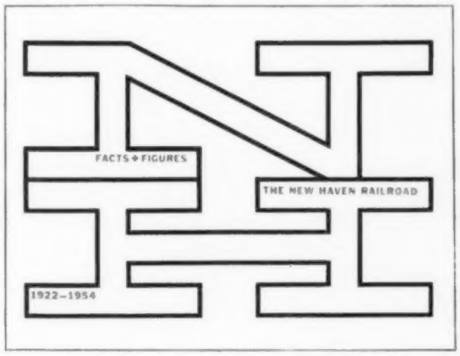
The railroad gave Matter the annual report to lay out soon after the symbol was established, and, in this context, he used it as a dynamic motivating force. In June 1955 he was appointed Director of Design for the New Haven, to coordinate all graphic design and also the work of consultants, to keep all of it in character. From the initial concept of the annual report, Matter, assisted by Norman Ives, developed a whole series of designs for documents, posters, train schedules, brochures and menus, and made rapid changes in the New Haven's printed material of 1955. As these samples show, they stress the orange-red (some call it a Chinese red) which all agreed was to be known as the "New Haven red." Every effort is made to key it uniformly in paints and inks, and it makes a powerful contrast with black and white. They strive for a similar consistency with the symbol: when it is all one color, they allow a definite break between the letters; if they use red and white, the letters are placed flush (see the boxcar on page 54). As on the boxcars, Matter creates a strong impact by the judicious handling of the scale and color of the symbol.

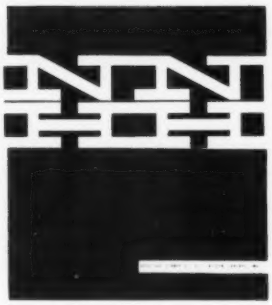


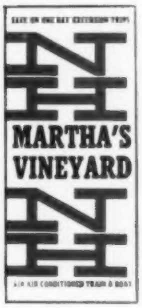
Facelifting is part of the program

Red paint or black and an NH give a new lift to such mundane items as used luggage carriers and baggage trucks.







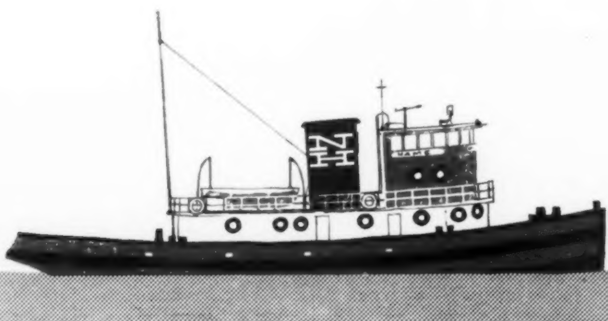


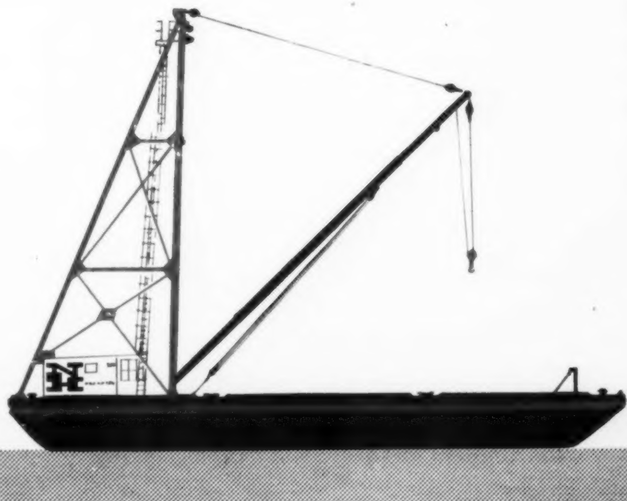
Left corner. Doyle Dane and Bernbach did the "Main Artery" ad. Its terse strength is in keeping with the work of Matter and Ives. Ives keynotes menu and poster (above) with an image from an old engraving.

In rejuvenating trucks and boats, Matter's elements prove their versatility

The New Haven also floats

The railroad owns not only trucks but a fleet of water-tow transportation—tugboats and derricks as well as box and flat barges. Matter's designs enliven these pieces of old equipment. He accentuates the structural elements, even plays decoratively with the portholes on the tug, the hook on the floating derrick, using the established elements of colors and symbol in new patterns.





Revolutionary trains, with Breuer interiors, will be completed next May

The New Haven is one of many railroads ordering new lightweight trains; it is unique only in hiring an outside consultant, the internationally-known architect, Marcel Breuer, to design their graphic schemes and furnishings. From the five new trains which are now on the market, three were selected: 1) the Talgo—the latest, most flexible version of a revolutionary concept in train engineering. (T stands for train, A for articulated, L for light, G for Goicoechea, the Spanish engineer who had the original idea and who devised the basic wheel system, and O stands for Oriol, the Spanish family which provided financial backing for the project.) This is the most publicized of the new trains, and it has profited by many tests, as well as by six years of successful operation on a mountainous route in Spain. American Car and Foundry, who manufactured the original, gave an American-adapted prototype some public trial runs last year. Since then the Rock Island Railroad and the New Haven have been running the prototype on private tests, and the Rock Island, accepting ACF's standard model, expects to have its first Talgo on the Chicago-Peoria run within a month.

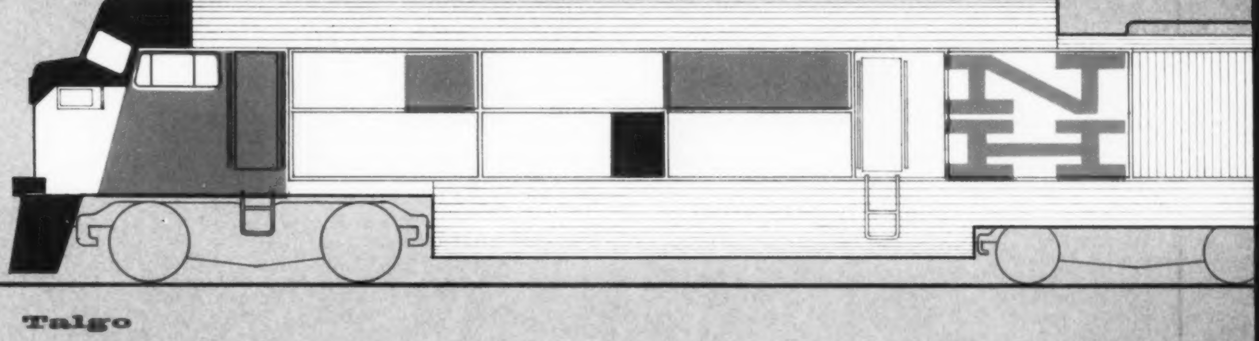
2) Pullman-Standard's Train X. This is an American translation of the Talgo idea, with a coach articulated in two sections rather than three, and an aluminum skin instead of stainless steel. The first Train X was commissioned by the Chesapeake & Ohio while Robert R. Young was president, and is yet to be presented to the public. Both the New Haven and the New York Central have ordered one.

3) The RDC "Hot Rod," A souped-up version of the self-propelled "rail-diesel car" which has been a stock item of the Budd Company since 1947. It can be used individually or coupled together; there are approximately 250 rail-diesel cars in service all over the world, largely as suburban commuter cars. The "Hot Rod" has been packed with power (9.6 horsepower per ton), has a different gear box from the standard RDC, carries its fan, exhaust and radiators in a dome on the roof (which has been slightly lowered), and will travel at 110 m.p.h.

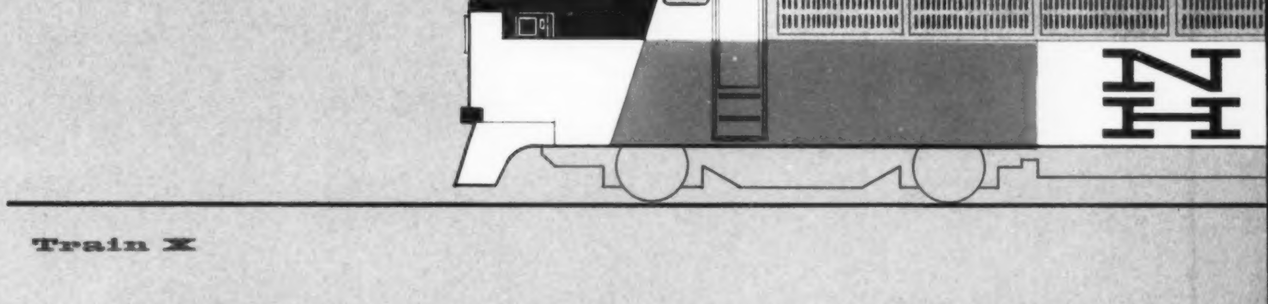
These three trains the New Haven expects to have delivered by May 1; the program is under the direction of C. H. (Harry) McGill, Manager of Purchases and Stores. The two others on the market are the Budd Company's Tubular Train, influenced by engineers of the Pennsylvania, and the General Motors Aerotrain, made up of short bus-like coaches and pulled by a lightweight diesel-electric. On January 17, the Pennsylvania sent its Aerotrain back to General Motors for repairs. Because of its speed and light weight, it needs further development to counteract vibration and noise. Engineers at ACF and Pullman-Standard have been working on these problems longer, and the Budd train, although lighter, is conventionally weighted by its equipment under the floor. With each prototype, the Talgo has steadily lessened the annoyance of the rail click, and Pullman had to delay production of Train X while they did research on acoustics.

There are many reasons why the railroads are shifting their emphasis from the diesel equivalent of the old iron horse and elephantine, custom-built coaches to lighter equipment which can be standardized and mass-produced. Losing more money every year, they are looking for a lower initial investment, lower operating costs, easier maintenance and faster speeds. The lighter trains cost less to pull and are easier on the road beds. They will also be able to afford replacements sooner; now they are burdened with engines and coaches that are 25 or 30 years old — and older. American railroads even today are but 80 per cent dieselized, and rising costs are threatening them with obsolescence wherever there is strong highway competition. They were badly in need of fresh thinking when Goicoechea, twelve years ago, visualized the Talgo principle: a string of coaches comprised of light, short units supported at the rear by a single axle and resting on each other trailer fashion. The advantages are realized in speed and safety: the wheels on a guided axle have a negative angle of attack and resist derailment when taking a high-speed curve; on a conventional car the front wheels point outward on a curve, creating positive angles of attack all the way through the train. To permit two-way operation, ACF has substituted for the trailer-like principle a simple, automatic steering mechanism that will keep the wheels constantly at a zero angle of attack.

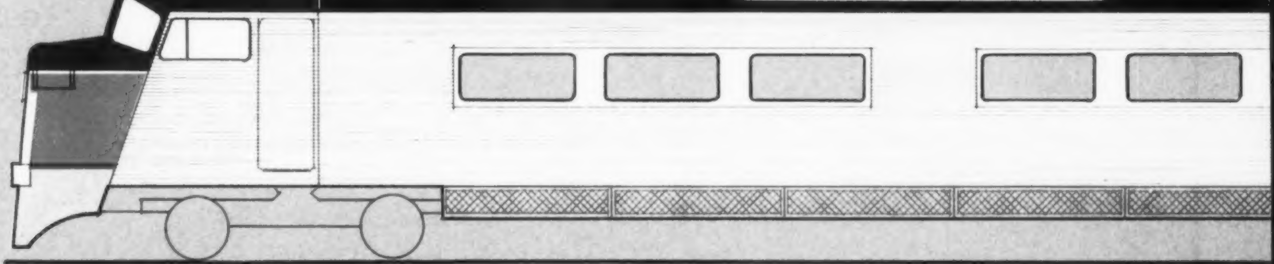
Between the Talgo and Train X, there has been a constant race since 1947. The two trains have ended up with the same general features. The Talgo which the New Haven is buying will have a trapezoidal suspension system similar to Train X's (see back of gatefold), and the latter has added an automatic steering mechanism similar to the Talgo's. Braking will be different—the Talgo has automotive brakes. The New Haven will be the first railroad to try out both articulated trains, and, presumably, will indicate their preference by some further orders. They are also considering the possibility of designing articulated coaches to be used with old equipment.



Talgo



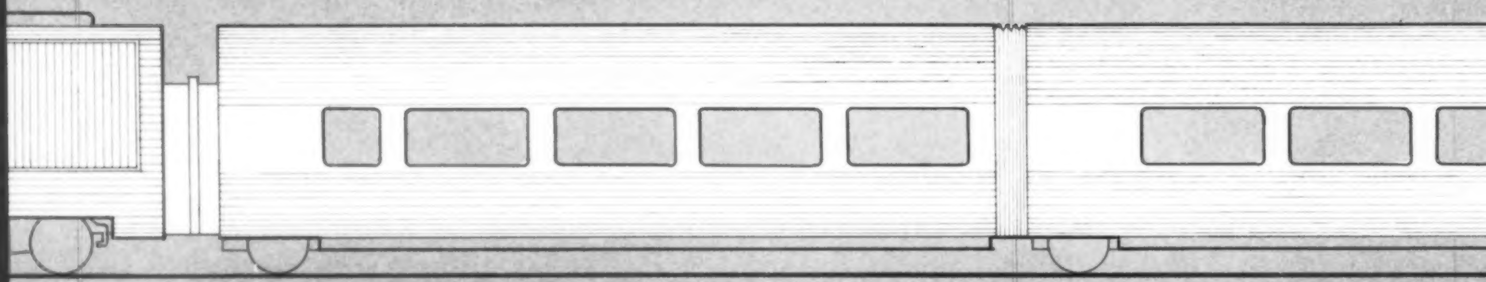
Train X

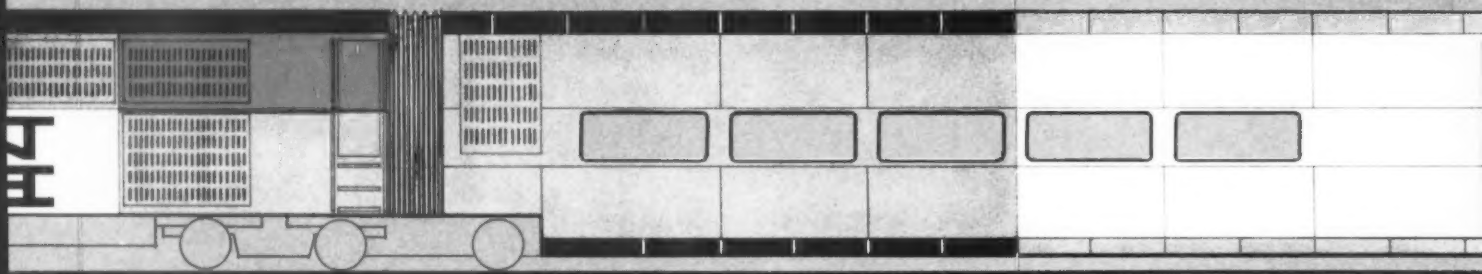


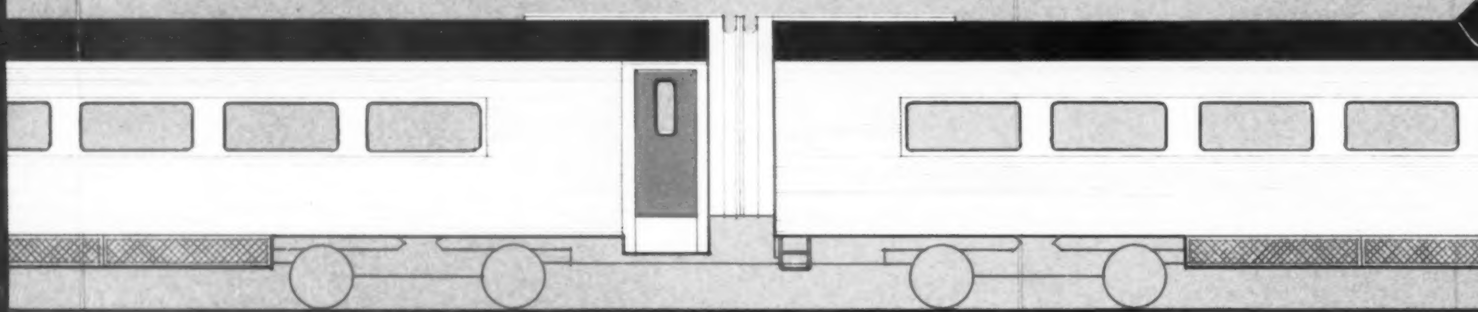
RDC "Hot Rod"

Three experimental trains

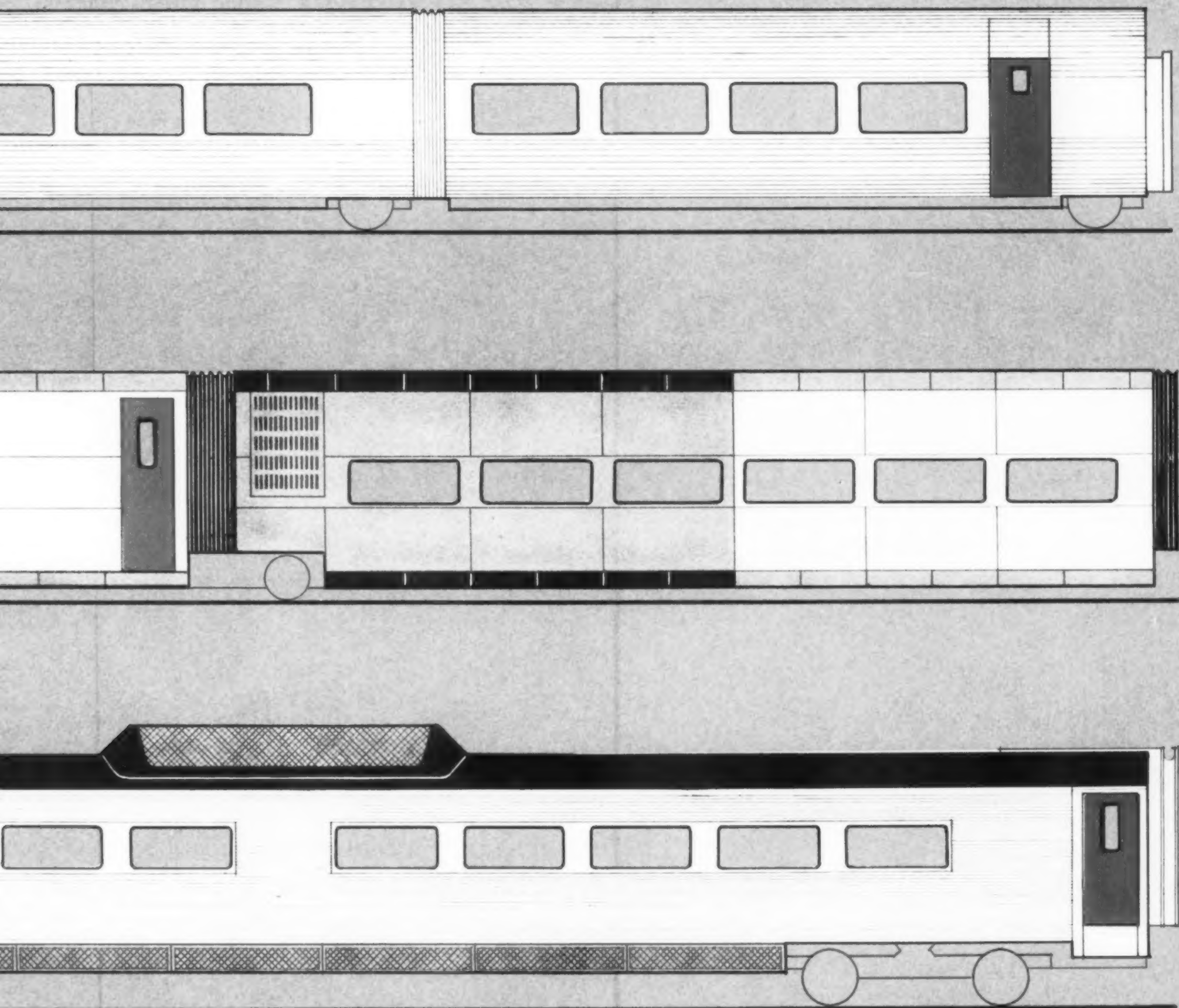
lightweight, reversible, and with a low center of gravity







The New Haven has ordered: 1) One **Talgo**, built by ACF Industries on formed aluminum ribs with a skin of stainless steel. A single coach is made up of 3 structural units coupled semi-permanently with diaphragms between. 2) One **Train X**, built by Pullman-Standard—like the Talgo, low-slung. It is divided into two structural units per coach, which Breuer expresses on the New Haven version with two grays in anodized aluminum. 3) Six **RDC "Hot Rod"** coaches built by the Budd Company, coupled as a reversible train. Each coach is self-propelled and engineered for speed, but remains conventional in size and construction. Marcel Breuer designed a cab for each end of the Budd train, influenced the exterior construction and did graphic design on all three trains.



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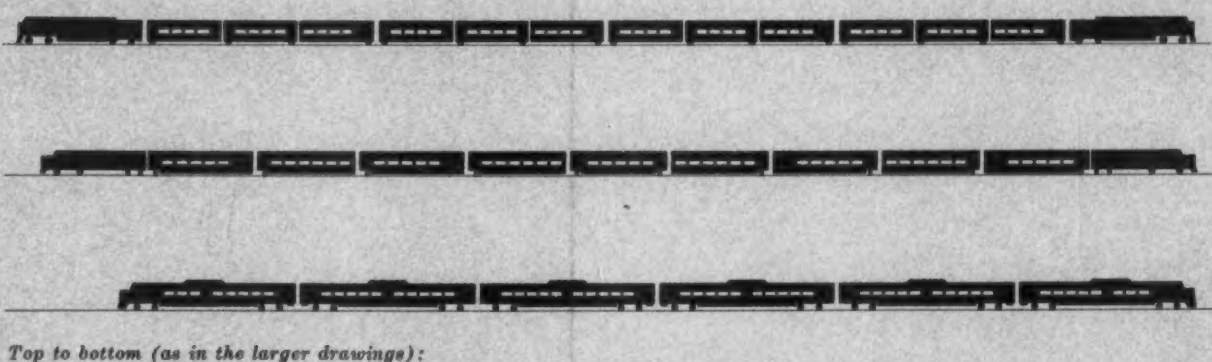
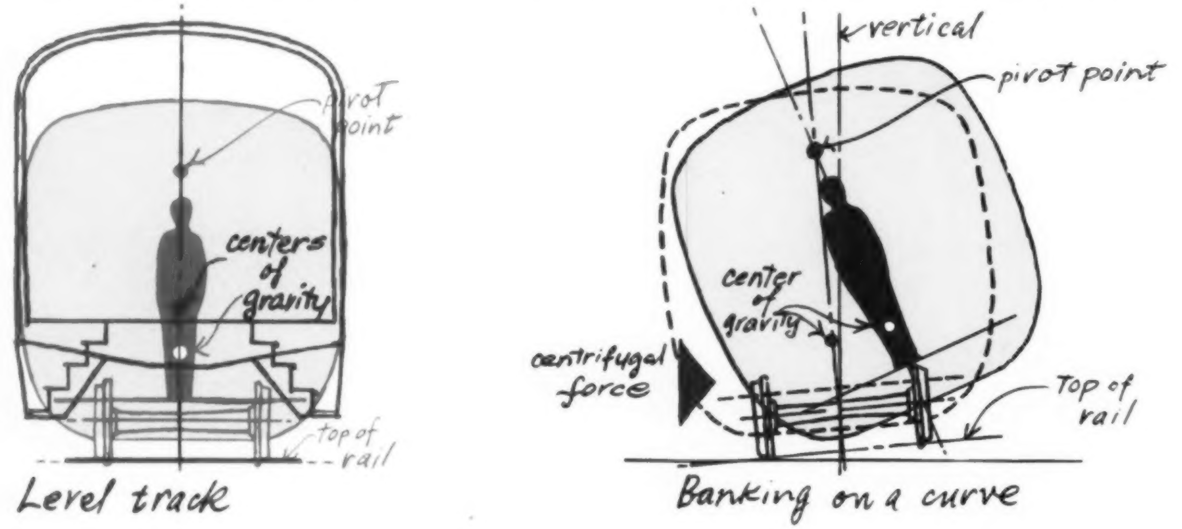
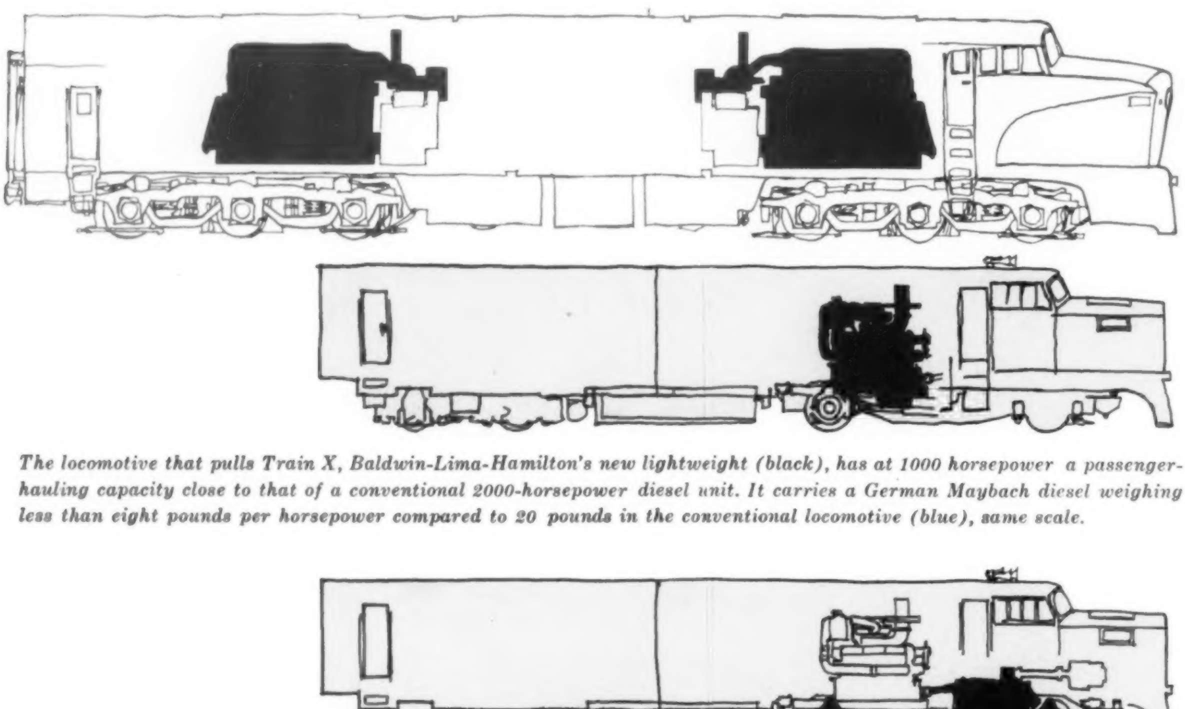


Top to bottom (as in the larger drawings):
Talgo, Train X, Budd RDC "Hot Rod"—all will be used as full-length, reversible trains.

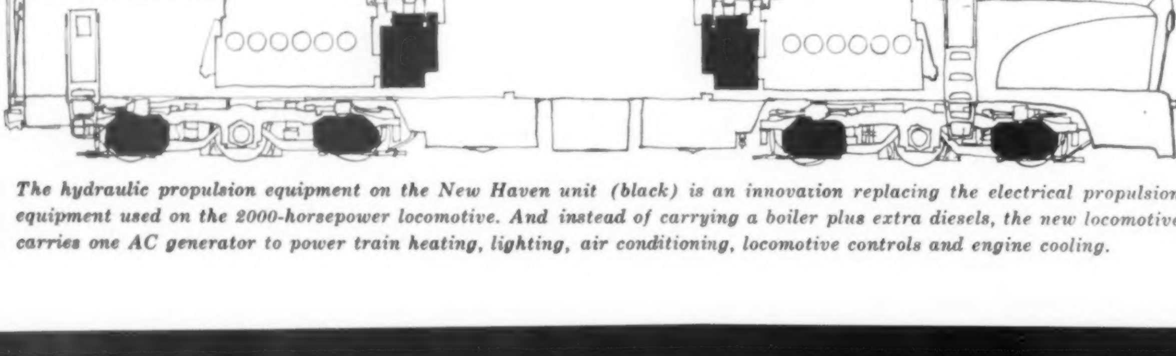
Reduced weight, articulated coaches involve radical engineering changes



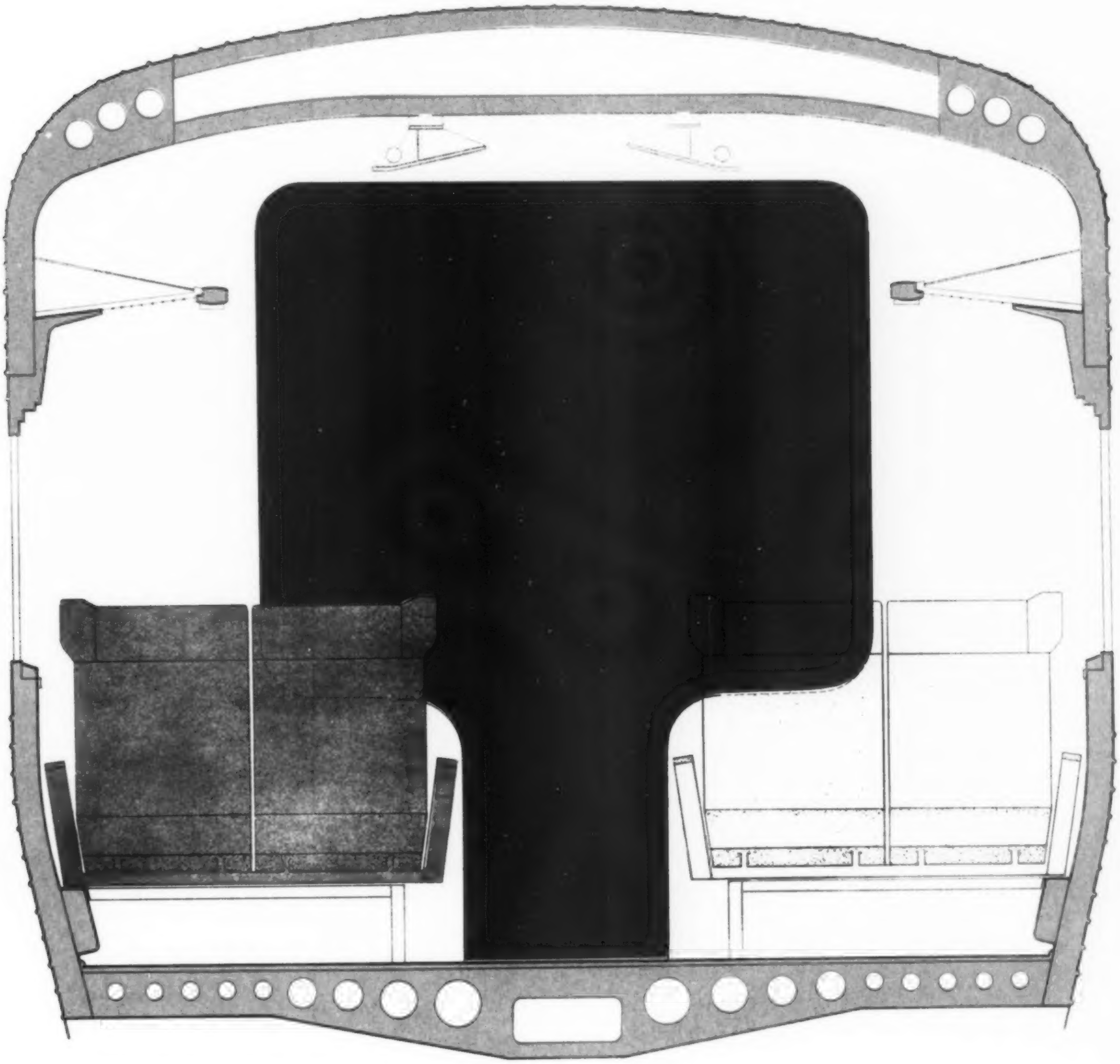
While the conventional coach (blue), which stands high above its wheels, swings out on a curve, both the Talgo and Train X (red) have a trapezoidal suspension system to bank the car inward. A special linkage arrangement keeps the wheels aligned with the tracks at all times.



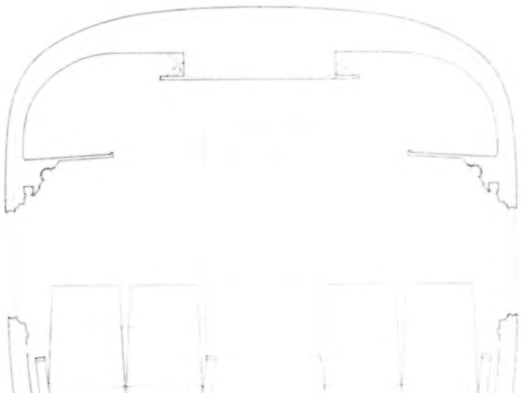
The locomotive that pulls Train X, Baldwin-Lima-Hamilton's new lightweight (black), has at 1000 horsepower a passenger-hauling capacity close to that of a conventional 2000-horsepower diesel unit. It carries a German Maybach diesel weighing less than eight pounds per horsepower compared to 20 pounds in the conventional locomotive (blue), same scale.



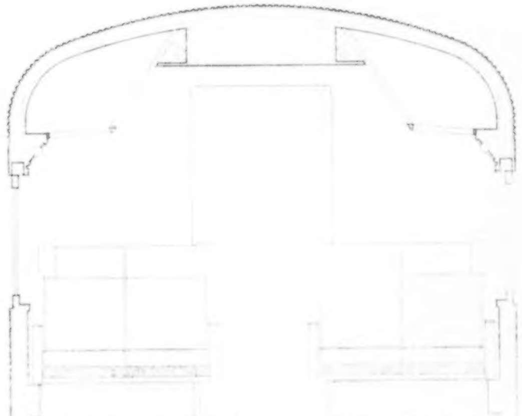
The hydraulic propulsion equipment on the New Haven unit (black) is an innovation replacing the electrical propulsion equipment used on the 2000-horsepower locomotive. And instead of carrying a boiler plus extra diesels, the new locomotive carries one AC generator to power train heating, lighting, air conditioning, locomotive controls and engine cooling.



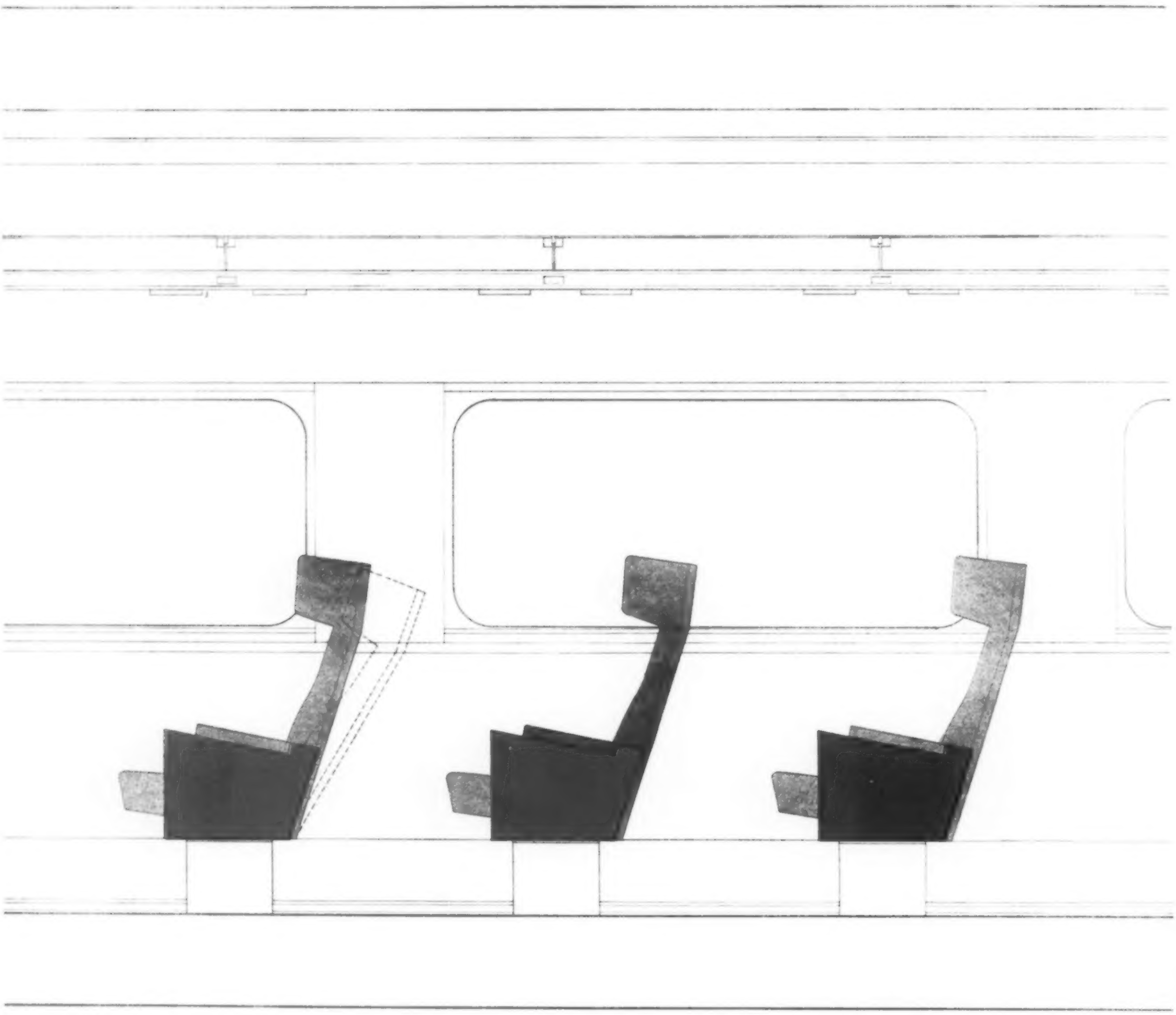
Talgo



Train X



RDC "Hot Rod"

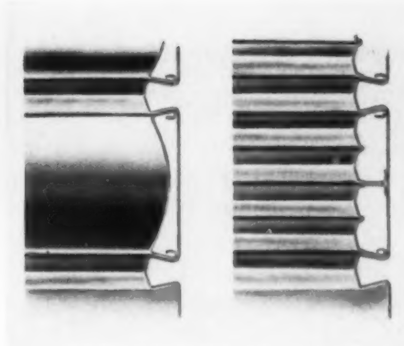


Interiors are experimental too

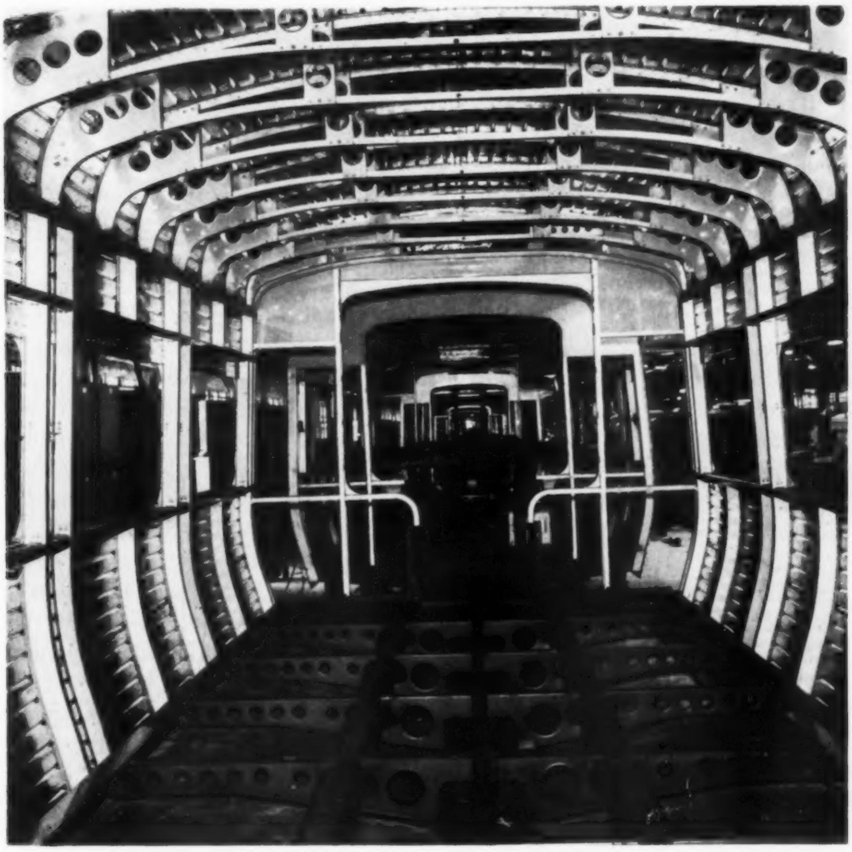
While the New Haven tries out the radical engineering of its three new trains (and will base future orders on their comparative performances), new furnishings and equipment are also being tested; heating, lighting, air conditioning and even seats in each train come from different sources. Marcel Breuer has designed all three interiors with a view toward higher standards of passenger comfort, lighter weight and easier maintenance. Materials are aluminum, foam rubber, vinyls (bonded to metal so that there are no painted surfaces) and plastic tile or sheeting on the floors. Since all the trains are reversible, seating and windows had to be coordinated to accommodate swiveling chairs, with seat spacing ranging from 36 to 40 inches. Breuer was called in late in the program – all the trains were well along toward production – but he achieved improvements which the passenger will notice: the gay impression of the alternating red and blue areas; comfortable chairs and seat spacing; the restful quality of light from a hidden source diffused by vinyl surfaces; spot reading lights as in aircraft interiors, individually adjustable. Although they have colors and fabrics in common, the three coaches differ in most particulars, each of which had to be worked out by a laborious process of consultation with dozens of manufacturers.

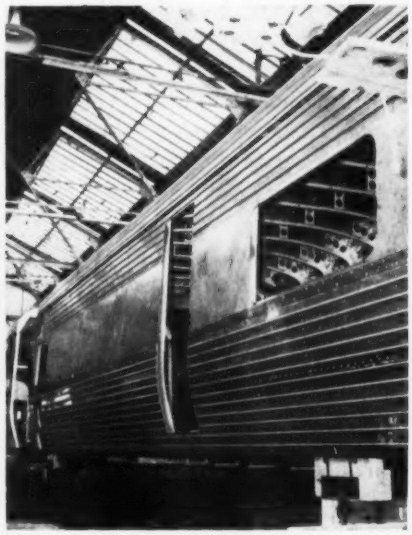
The New Haven called Breuer and his associates last May after the three trains had been ordered. Although this particular field of railroad design was new for Breuer, his experience qualified him to deal with its basic design challenges, since good design shares certain principles, whether the problem is architectural or industrial. It was important that the radical engineering of the new trains be matched with some fresh thinking about their exteriors and interiors. Breuer succeeded in freeing them from traditional stripes and fastenings and introduced new methods and materials. A Budd Company engineer said that he felt that the exchange of ideas between his engineering-minded company and Breuer (with his two associates, Hamilton Smith and Herbert Beckhard) had been "highly beneficial to all concerned." "In many ways," he reported, "our approaches were entirely opposite. For example, in fastening, Breuer wanted us to expose joints and screws, create definite color breaks, square corners and eliminate moldings. And we did this wherever possible."

On its exterior each train is designed in keeping with its own basic engineering concept, although the use of the common elements—red, white, metallic grays and Herbert Matter's "NH"—gives them a family resemblance, and all three trains have attention-calling red doors. They will look distinctly different from the new trains



Directly above are both the early and later versions of the Budd skin, the stainless steel "fluting" which acts as an enclosure and is easily removable. Breuer favored the second version (right), with a smaller scale which gives a more even overall texture, and it is less inclined to show damage than the surface on the left. Above, left, a plastic drinking-cup holder designed by the seat manufacturer, Heywood-Wakefield Company. Breuer has incorporated this convenience, which attaches to the arm and is removable, in all three trains.





ACF has given the Talgo a tubular construction. The skin (above) is actually a monoshell of stainless steel (which acts as a bracing member) on lightweight ribs of formed aluminum. Left, an early stage of production at ACF's plant in Berwick, Pa. shows how the 3-unit coach joins inside; the framing between units will have aluminum panelling. The units are only disassembled at their articulated joints for major overhaul. Each coach has standard coupling and buffer diaphragms, and is interchangeable.

of other railroads. The Budd coaches are graphically composed as a file of single units, while the Talgo and Train X, with their flush outer diaphragms between units, appear continuous, particularly Train X with its rhythmic pattern of alternating grays, and the regular accent of the red doors. To avoid the "oil can" effect—an ever-present danger in thin-sheet construction—Breuer and his associates recommended rolling a close-textured rigidized pattern into the skin of Train X. They avoided using glossy paints on the big areas; color differences were achieved by anodizing the aluminum. The two grays are the result of varying the silicone structure of the aluminum cladding alloy, which is a thin top layer of nearly pure aluminum bonded to the structural sheet. Its prime function is to resist weathering, and with its rigidized texture, it has other practical advantages: increased structural strength, and a scratch-disguising surface. Stainless steel is used on both the Talgo and Budd trains. On the Talgo the skin is structural as well as an enclosure—doing the work which is customarily done by the longitudinal framing members. Its profile of parallel ridges is designed to supply necessary strength and rigidity.

The Budd skin falls into the category of "fluting"—snap-in sections covering connections and removable in case of damage. Breuer allowed this fluting to divide the window panel into two parts expressive of the two-compartment interior created by the vertical exhaust risers. Other design proposals for the Budd train included the snub-nosed motorman's cab, and wire-mesh underskirts to conceal the mass of underbody equipment on each coach.

Breuer's role was the same in the design of the locomotives. In the case of the Fairbanks-Morse locomotive for the Talgo, the main concern was to relate the high power unit to the low-slung coaches. This was achieved by carrying the coach roof height across the rear portion of the locomotive and by duplicating the overall contour of the coach. The Talgo stainless-steel skin was used on the Fairbanks roof and side skirts, and the manufacturer's panel construction suggested a rectangular pattern using the standard colors. Although the Talgo coaches are broken into short lengths (three 36-foot units having one door and other common facilities) the accordion-pleated "bellows" between coach units, treated to match the steel skin in color, make them look as united on the outside as they are within.

For the interiors, Breuer ruled out conventional "eye-ease" colors, the greens and browns of yesteryear. Instead he makes the most of the light-diffusing textures of tough gray vinyls bonded to metal panels and alternates cheerful hues of red and blue. Each train represents the detailed designing of special features that challenge many of the time-honored practices of railway coach manufacturers, eliminating such annoyances as exposed air diffusers, glaring overhead lights, overheated seats, etc. Train X has a novel window design, worked out in conjunction with Pullman-Standard engineers. Each window is surrounded by a one-piece plastic "mask." Together these masks form a continuous panel, organizing the windows into one big element and eliminating jambs, sills, etc. The masks are connected to the vinyl-covered panels above and below by hard rubber "zippers" and do away with moldings and other fastenings, while the rubber gasketing minimizes the drumming sound of the wheels. In place of conventional shades, coated glass was used to reduce glare. Draw curtain pockets were built in above the windows, however, for night runs. The addition of wings to the seats is being tried on the Talgo and Budd, at the suggestion of Mrs. McGinnis. It occurred to her, after a long ride, that wings would make dozing more comfortable. None of the reclining seats will look heavy and overstuffed, but will express the lightness of their materials—foam rubber and magnesium tubular frames.

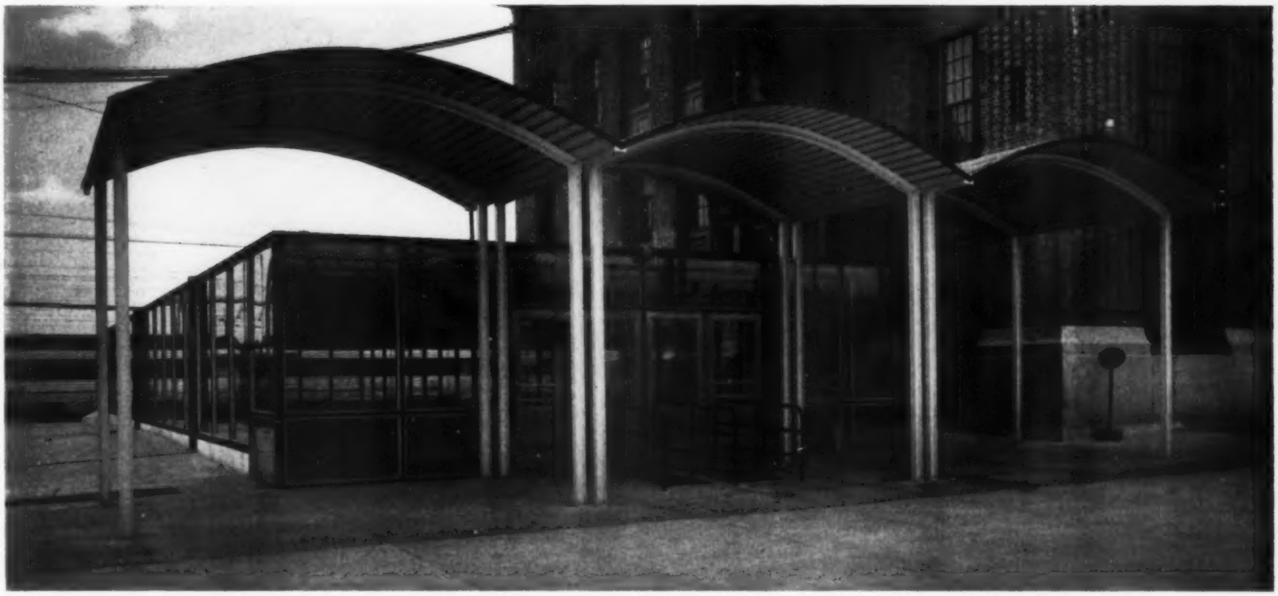
Until the trains are finished and tried, Breuer's contribution cannot be fully assessed. There is no doubt that he has attacked some long-neglected problems, and his influence, through the manufacturers, is already being felt in their approach to future clients.

About his participation and his convictions concerning industrial design, Breuer said:

"While I was asked rather late for design contributions on the train purchasing program for the New Haven Railroad, I was only too happy to collaborate. It seems to me that train design, exterior and interior, is a most interesting challenge, and one that could help the development of industrial forms in general.

"The industrial design field today seems to be dominated by the notion that the designer has to appeal to the mass public, that the mass public has bad taste, and that the designer has to invent, year by year, new forms and tricks serving sensationalism and bad taste at the same time. The designer finds himself in a passive role, delivered to the fluctuations of so-called market research and sales 'techniques.'

"I believe the designer should play a more active role; his responsibility towards the public should be greater and less comfortable; he should do for the consumer public all that he *thinks is in the public's best interest. He should keep his work at the highest level* he *knows, and should follow* his *best convictions to serve the public and his client. He should put his work to the service of long-term development, and to the service of the best solution instead of short-lived 'fashionable' variations."*



Besides stop-gap measures, the New Haven made a start on entirely new stations

Station renovation represents a vast maintenance problem for the New Haven. The Knoll repaints and canopy repairs which were done last year were to be followed by new lighting fixtures and ticket booths. These are yet to be installed, but meanwhile two shelters at small stations in Connecticut and an addition to the New Haven station, designed by Minoru Yamasaki, represent a far-sighted approach to new construction, rehabilitating the old at the same time.

Yamasaki's winged forms provide a modest and effective solution which is also flexible. To enlarge the area of passenger circulation at the New Haven station, he designed a ramp into the subway approach to the trains, covered by a glass and steel construction which admits maximum light, thus making the underground seem clean and open and very different from the dark, unsanitary-looking holes of the older stations. The permanent awning in front of the entrance (equipped with electric-eye doors) has corrugated steel roofing painted blue on the underside.

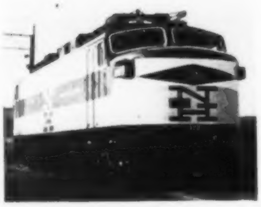
To restore weather protection for passengers at Rowayton and Noroton Heights (left) new shelters have been built where they had been absent for years. Yamasaki has designed the arched canopies in a translucent blue-tinted glass fiber, Alsynite, treated to disperse the heat of the sun. When they are completed, Transportation Display Company's advertising space will be made an integral part of the construction, organized in a neat file along the middle framing, and the steel columns will be painted white.

Conclusion: this could be a beginning

What lies ahead for the New Haven? The answer to this lies partially in the answer to another question: how will the new president evaluate the design program of his predecessor? George Alpert, who is already negotiating for new locomotives, will have to deal first with the service problem; he has yet to express his position in regard to the design program. Meanwhile, as the new management surveys its debits and assets, Maintenance is at work renovating old rolling stock; and repainted engines, cabooses, trucks and coaches flash brightly along the landscape.

During its brief existence this unaccustomed brightness, spotty though it is, has made a strong impression. This is probably the first time that a major railroad has projected such a comprehensive plan to create a fresh and cheerful identity for itself and, in the process, to improve the visible environment that all railroads have done so much to soil and destroy. Although the New Haven may have used design activity as a feint to distract the public from other problems, the self-improvement the road has realized shows some awareness of public responsibility. No doubt there was a good deal of haste in the New Haven's effort. Station painting, for example, began in a carnival exhuberance of colors, but improved with experience. Matter's designs for equipment, on the other hand, departed from chic and asserted the vitality of an old transportation system by dramatizing the structural integrity of the rolling stock; and his graphic work on signs, posters and schedules contributed rich details in a unified theme. Yamasaki's arching canopies give some substantial comfort to passengers, as will Breuer's light, bright interiors for the experimental trains. All in all, four consultants provided more improvements for both old and new equipment in one year than a struggling company could have accomplished without the help of specialists: a face-lifting which could easily be continued; and research into maintenance—the area of the railroad's greatest difficulty.

The design program could be used as a pattern for a broader conception of how a railroad, inhabiting the intimate life of a town and a commuter, may better serve its purposes. The designer is of greatest value to a railroad not when he caters to short-term needs but, as Breuer says, when he puts his work to the service of long-term development. The New Haven admitted the value of this *approach* when it gave Breuer his assignment; the value of the results will depend upon how the initial gains are consolidated and followed through by McGinnis' successor. Meanwhile, watch the Boston & Maine.



Photos 2, 3, 4 by S. Burrey; all others in story, courtesy New Haven R.R.

The Kitchen of Tomorrow — III

The newest of Frigidaire's display kitchens, just unveiled and starting a nationwide tour with the GM Motorama, continues the tradition of its predecessors by combining sophisticated showmanship and exaggerated gadgetry with serious experiment. More than just a show of mechanical miracles, "The Kitchen of Tomorrow" makes a considered statement about three aspects of kitchen design:

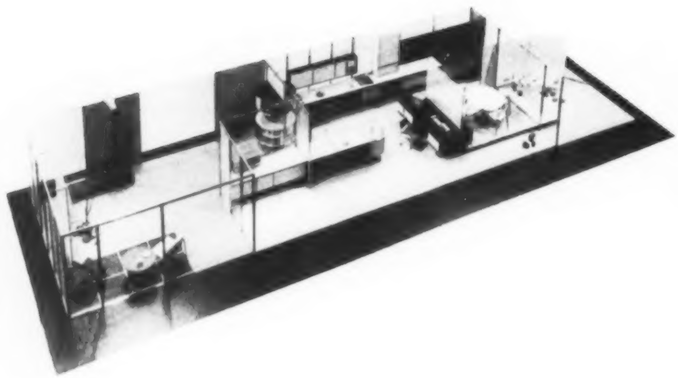
PLANNING: *It weighs the importance of equipment and work areas — the amount of space that appliances deserve, their arrangement and relationship.*

FUNCTION: *It investigates all mechanical equipment, suggests some radical new directions.*

DESIGN: *It considers the kitchen as a problem of interior architecture, and suggests how a coordinated collection of equipment should look.*

On the next four pages we discuss these innovations in the light of their implications for the future of the kitchen as a whole — and for its many components.

Planning: in the Frigidaire Kitchen, appliances dissolve into work areas



whose size and shape are no longer tied to the shape of the appliances themselves. The accomplishment of such freedom in planning is exemplary of the thinking in the whole kitchen. In the light of the problems posed by such a show kitchen—the standards of showmanship set by the Motorama itself, tight space allotments and difficult circulation requirements—it is perhaps its most remarkable achievement that it manages to be anything more than a stage set or a collection of stylish gimmicks. But it displays as much serious thought as its two predecessors did, and probably even more serious design innovation. The designers in LeRoy Kiefer's Product and Exhibit Studio of the GM Styling Section, with George Pollard as Project Head, faced the kitchen as a problem in architectural planning, and designed a total area for a 3-bedroom house: not only the equipment for food preparation and storage, but dining and outdoor spaces in which to enjoy it. Carried out in subtly varied

surfaces of black, white and gray, set off by discreet chrome and aluminum detailing and specially designed furniture, it makes an effective display and an elegant description of what a totally designed kitchen might be.

One of the significant innovations is a shift of emphasis on storage and work space. All the appliances except the dishwasher have been redesigned to fit around or under a counter, or to *be* a counter, and they add up to a rather spectacular flow of uninterrupted work surface. The range, for instance, no longer has burners; it is a smooth marble slab (with induction coils beneath it) which remains cool while metal pans simmer above it (details overleaf). With a counter-height domed oven at one end, it is an accessible island where cooking and mixing and paring may be done completely interchangeably.

The round food-storage unit is not only flanked by counters, but is divided so that it incorporates its own surface. The freezer is beneath the mixing counter, the planning desk is another large counter, and the appliance cart doubles as a portable counter. The persistence of this neat, uninterrupted horizontal is the persistence of an esthetic ideal; it also suggests that the kitchen has become less of a storage space and more of a comfortable, convenient place to work.

The new importance of counter space is emphasized by the absence of wall cabinets; and the complete elimination of wall cabinets except at the mix center is a purposeful result of the great expanses of counter, since the designers felt no need to increase the amount of undercounter storage space already available. In lowering all storage areas in this way, the designers defied a trend toward elevating them to more convenient levels; their answer to the question of accessibility is the rising cabinet, which electrically puts the contents of undercounter cabinets at counter level when needed. The designers showed equal independence of tradition in raising and enlarging the dishwasher—the only appliance that today fits modestly under the counter. The reason, again, is planning: the dishwasher has become conveyorized storage, and its increased bulk has been very sagely fitted in between the kitchen and dining area, as a partition setting off a serving pantry.

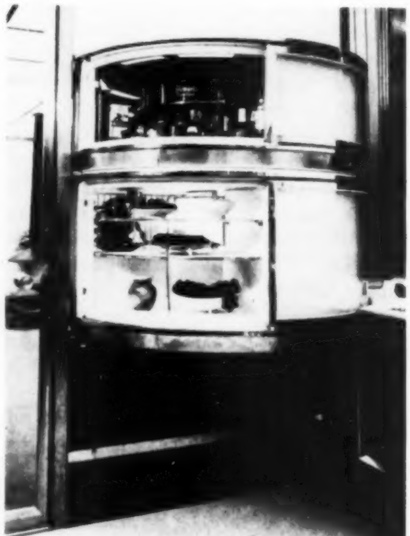
The round food-storage unit is consciously used for contrast in a rectilinear plan. It is in two parts, the lower portion for refrigerated goods and the upper for dry storage. Like giant lazy-susans, each cylinder revolves mechanically and delivers one of four compartments to the cook. (The lower cylinder rises to meet the upper, eliminating the counter as well as anything carelessly left on it.) The unit also works as a partition between kitchen and patio, where it becomes an indoor-outdoor appliance: deliveries can be made from outside, and beer is within reach during patio picnics. Like many of the design concepts in the kitchen, it contributes to a sleek and dramatic effect—but also proves to be more than an arbitrarily imposed form.

Refinements and new functions arise from mechanization in unexpected places

Because it was not the Kitchen designers' job to create a package for immediate delivery, many of their innovations are clearly costly ones. But they are not unfeasible: it is one of GM's self-imposed rules that everything in the Kitchen must work—no big ideas that haven't quite been worked out. The engineers under Project Engineer Lou Gelfand performed some remarkable feats in bringing to life many of the designers' functional innovations.

The largest of the big ideas is the conveyorized ultrasonic dishwasher, which not only cleans with the speed of sound but has assumed a new role: mechanized aerial storage. The counter-height Astradome oven makes its most practical contribution as a new concept in the relation between range and oven: the latter is an extension of the range with a special kind of heat, as easy to use as a pan on the stove.

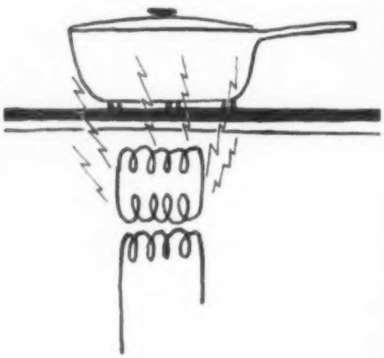
Mechanization has also been built into all sorts of new places: the electric mixer is placed in the mixing center wall cabinet, and only the beaters lower to counter level; the garbage disposer both grinds and incinerates; written messages may be sent and received by Tel-Autograph, and closed-circuit television keeps an eye on the front door,



Roto-Storage, *for refrigerated and dry food storage, has rising lower unit.*

Range *that cooks without fire is a marble slab over induction coils; electrical fields set up by the coils disturb the molecular structure of stainless or iron pans, causing them to heat. Marble is unaffected, and plastic feet keep pans from conducting heat to the cool slab. Small flush lights in the marble indicate cooking locations.*

Oven, *capped with a Thermopane blown Pyrex dome and heated by quartz lamps, is a showcase for broiling and roasting.*



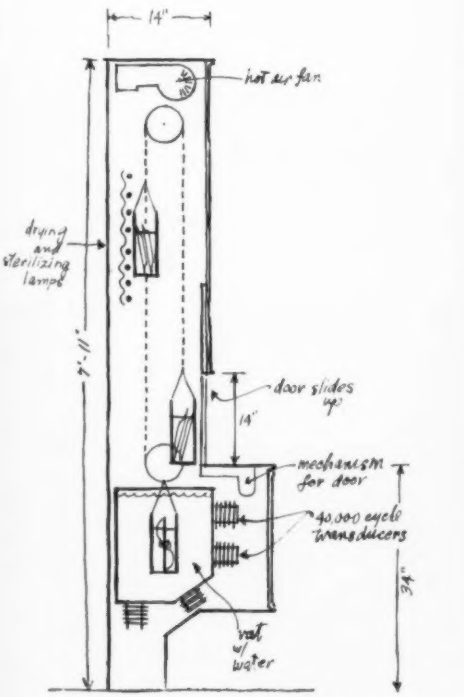
Specifications: Aluminum cabinet fronts and fittings (Alcoa), anodic finishes (Ralph Stolle); Formica surfaces and cabinet fronts (Banfield); Unistrut structural system; Amorply structural wall panels (U. S. Plywood); Pyrex double-paned oven dome (Owens-Corning); Flintdeck flooring (Flintkote); European beach dining deck (Monteath); marble table and range top (Marble Specialties); special telephunic equipment (Michigan Bell Telephone); automatic recipe file and ingredient dispenser (IBM and Electri-File); ceiling light diffusers (Cadillac Plastics).

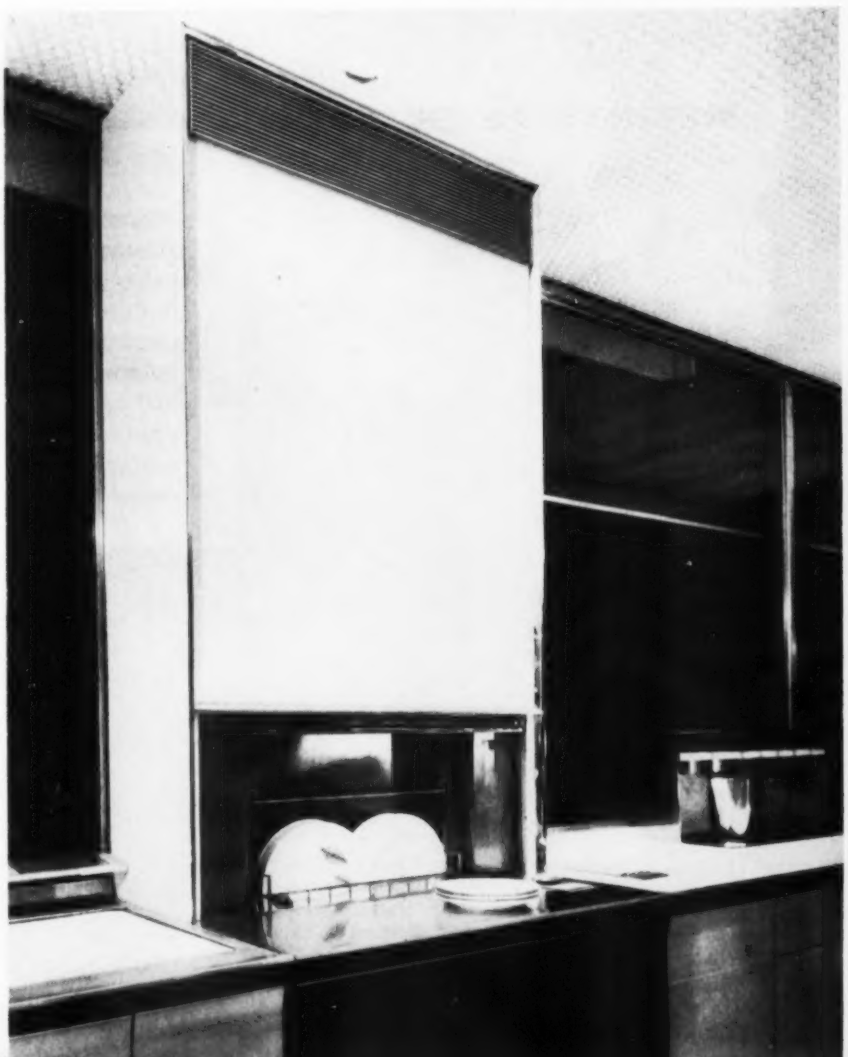
or playroom; a 3-part laundry hamper triggers the washing machine when one section is filled to 8 pounds; an automatic recipe file on IBM cards activates an automatic dry-ingredient dispenser.

Animation is the legitimate language of showmanship, and these gadgets lend an air of technical prowess that adds to the fun of such a production. Some of the mechanization can be taken lightly — automatic ingredient dispensers, and absentee ordering and delivery devices, will probably be enjoyed and forgotten by any woman who covets her control of the more creative activities in her kitchen. It is a credit to the designers' seriousness that a whole lot of the gadgets make sense; when they remove the drudgery from a routine job, or do it better, then technical miracles have been well applied, for no human or creative sacrifice is involved. If it is easy to picture the Kitchen of Tomorrow humming along perfectly, cooking and washing with nobody in it, it is also possible to picture a woman there having a great deal of fun preparing an elaborate dinner *Cordon Bleu.* Perhaps this dual personality — this ability to be mechanized for one meal, humanized the next — will be the real personality of tomorrow's kitchen.

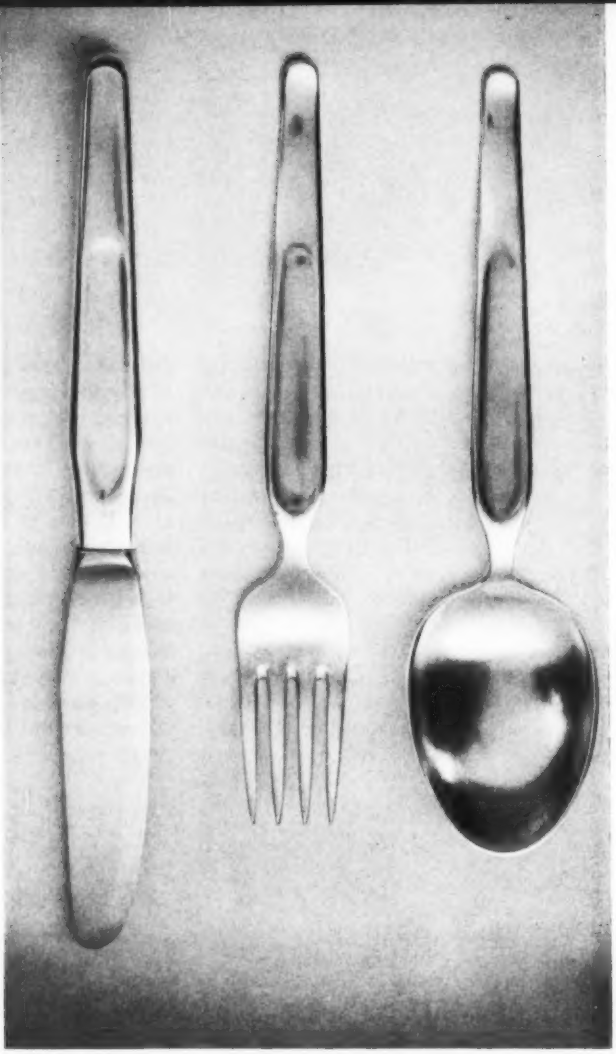
Special purpose storage *ideas include a beverage dispenser offering everything from crushed ice to coca cola. In the dining area (below), as in the serving and cooking areas, shelves rise out of the central portion of the counter to put pans, glasses, or in this case, refrigerated storage within reach.*

Ultrasonic dishwasher, *as diagram shows, moves six small baskets through cold bath, where 40,000 cycle transducers bombard dishes and remove dirt; then are conveyed past drying lamps and back to counter loading door until needed. Machine, which must be batch-loaded, washes and dries one basket in less than 3 minutes, 20 minutes for all six.*





Stainless steel flatware, made in Denmark, is available in U. S. stores. Pattern is named variously Kronberg, Alborg or Acton (for the designer, Acton Bjorn). American agent is Danecastle, New York.

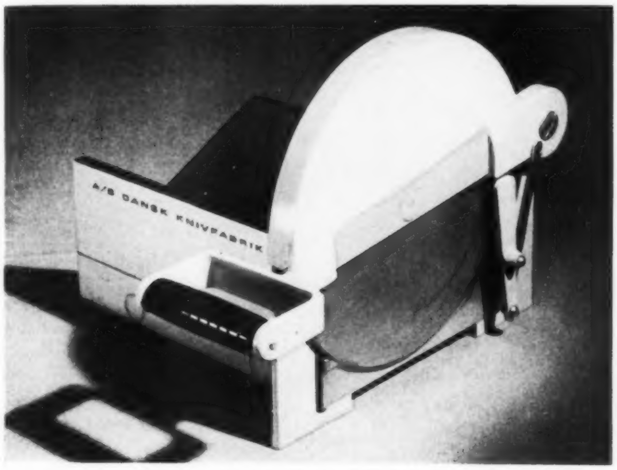


DESIGNS FROM ABROAD

"Industrial design is a comparatively new concept in Denmark—in Scandinavia, for that matter," says Count Sigvard Bernadotte, who has been practicing in Copenhagen for seven years. "It has been an uphill struggle. We have been able to overcome scepticism only when the result was on the manufacturer's table and he could compare what *could* be done with his product with what *had* been done to it."

Nevertheless, with the sensible aim of "trying to create something which is practical to use, easy to

In their offices, Bernadotte (left) holds the "Kronberg" pattern; "We do not try to anticipate what the American market wants. That would be impossible. Rather, we trust that when quality, reasonable price and attractive appearance blend together, results will inevitably follow."

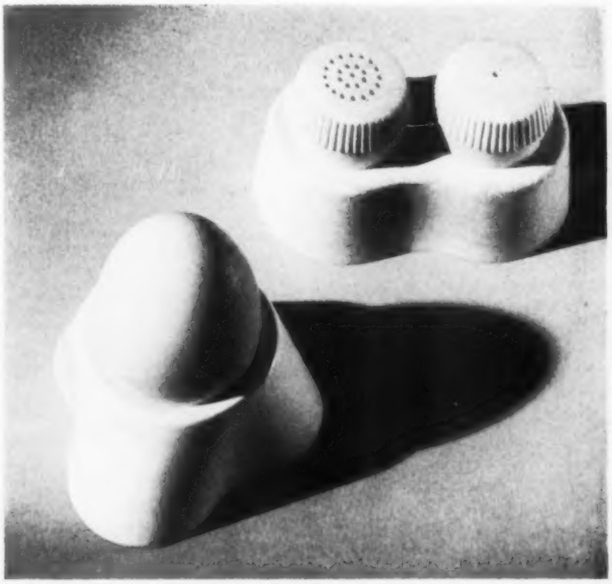


Knife-sharpener designed for A/S Dansk Knivfabrik, Copenhagen.

Table knife, celluloid handle, designed with smooth edges for easy cleaning. U. S. agent: Danecastle, New York.

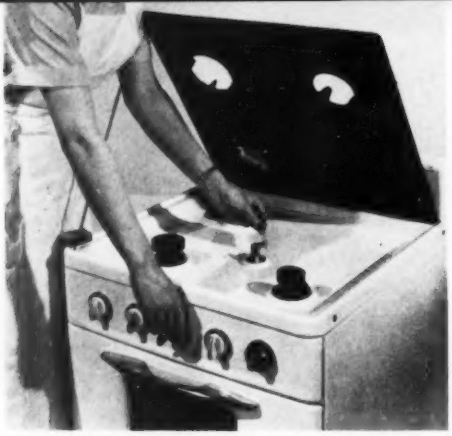
In Copenhagen, Bernadotte and Bjorn are pioneers in designing for industry

manufacture, and pleasing to look at," Bernadotte and his partner, Acton Bjorn, have been responsible for a remarkably wide range of products, have been bringing to industrial products Scandinavia's distinguishing design traits: smoothness of function; simplicity of materials and parts; in effect, an article that is neat, logical and shaped accordingly. As B & B-designed flatware is succeeding in this country, Danish manufacturers are becoming aware that they can compete on foreign markets with quality designs.



Undulating eggcup, manufactured in plastic, is one of a set that includes salt and pepper shakers and condiments. Designed by Bernadotte & Bjorn for A/S Plastica, Copenhagen.

Designs from abroad

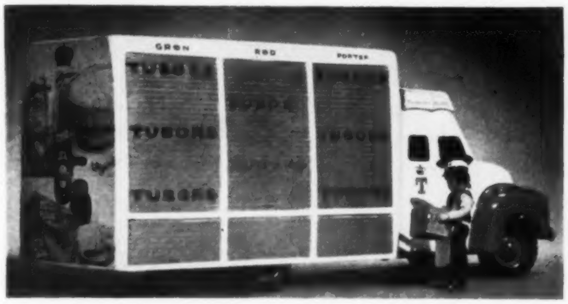


White enamel stove is designed primarily as an oven with three automatically lighting gas jets for cooking, and collapsible sides to enlarge work space. Perforations in the back plate belong to the oven ventilation system. Manufacturer: De forenede Jernstoberier A/S, Denmark.

A motorized bicycle at a low price is a popular mode of transportation in Scandinavian countries. This experimental model is a cross between a scooter and a bicycle with a mounted motor. Vestigial pedals enlarge the market by avoiding the need for a mortorcycle driver's license.
Elegant sauce pan (below) is stainless steel with bakelite handle. Lids with recessed handle are easy to stack. Designed for Moderna Kok A.B., Stockholm, Sweden

This is a contemporary version of a traditional Swedish coffeepot. Bernadette and Bjorn decided it should have a comfortable handle, a non-dripping spout, a shape easy to clean and an economical price. It can be made in stainless steel or aluminum, with handle in plastic.

Two views of a self-advertising beer truck which provides space for four in the cabin. Design uses a General Motors Bedford chassis; side blinds are aluminum.



Inter-office telephone and the other business machines follow the same principles: one piece housings which avoid sharp edges and decorations but are nonetheless crisp; angles which make the operating panels clearly accessible; a well-organized system of buttons and handles. Below right, calculating machine was redesigned for Facit, Incorporated.

Privacy without walls

a staff-room desk by designers for designers

Behind the polished receptionists and manicured conference rooms of design offices and company departments, you can usually find a larger, less atmospheric space where showmanship gives way to activity. The traditional landscape of the staff room, with its open expanses of large work tables, has the virtue of easy communication, but is often ill-equipped for the particular work a product designer does today. When Lippincott and Margulies began to plan offices for themselves in a new Manhattan office building last year, they were struck by the fact that the problem of a desk for the industrial designer had never been commercially solved. Chief package designer Norman Schoelles and several L & M designers analyzed the situation: since the product and package designer is both artist and administrator, he needs drawing and rendering space, but not necessarily as large a surface as the architect or engineer; he also needs facilities for phoning, filing, writing and ordering; and he needs some acoustical and visual privacy, even with floor space at a premium.

From these rigid specifications they designed themselves the desk unit shown here. It gains many advantages by using normally inaccessible space, made possible by the fact that the staff room was planned as a whole. The desks are independent but functionally interlocking units; the front of one desk becomes the back panel and storage area of the unit ahead of it. In sequence, they create a number of separate cubicles whose partitions do double duty as bulletin boards. Each of the boys in the back room has a business area, an artist's area, two tack-up walls, a viewing shelf, and book shelves — in an orderly office with privacy to boot.

photos: Bernard Cole

Cubicle is created for each designer without separate partitions by display boards at the front of each desk. The two-level tabaret at his right has a cupboard and drawer for art supplies; the inside of its raised section (7" x 12" x 29" deep) is used by the man in front for package and board storage, as is the back of the cork-faced bulletin board. At his left is an office center, with a lowered work surface to hold a telephone, file box, pencils. The hinged shelf above the drawing board may be folded up.

Each of L & M's desks occupies about 42 square feet of floor space. All are constructed of birch plywood, with a steel angle-iron support for the display board, and black steel pipe legs to elevate the desks 13" above the floor for cleaning convenience. Drawing boards with white Formica tops can be tilted, raised or lowered; between the board and the desk top is a horizontal storage space for the man ahead. The desks were custom-made for L & M by Herman Friedman, White Plains, New York, at an initial cost of $220 each.

"Education of a designer" debated

photos: Leonard Cohen

In a major article on design schools last June, Industrial Design *raised a number of questions about the problems and purposes of education for industry today. Because many of the educators felt a need to pursue these questions,* Industrial Design *and the Philadelphia Museum School of Art recently sponsored an all-day meeting; 25 educators were invited to clarify their common aims and understand their reasoned differences. The next 8 pages report the morning talks and some highlights from the roundtable at which the issues were aired—and at least one conclusion reached.*

Cohen

Six educational viewpoints were set forth as a basis for discussion

Lawrence Schmeckebier
Director, School of Art
Syracuse University

Objectives in the field of industrial design, like those in any other profession, are set by those actively at work in the field. Our problem as educators is to work out a program by which young men and women may be trained to accomplish what the profession needs and hopes for. There is no such thing as the perfect course in design; ideas, objectives, equipment, students and teachers are constantly changing. Whether we like it or not, we in the field of professional education are obliged to stand up to the bar of public opinion — in this case, professional opinion — and be judged. The judgement is based on the quality, character and potentiality of the product itself rather than on faith or philosophy.

In laying out a program for the education of an industrial designer, there are a few basic disciplines to be followed. First and foremost is design; the second is general education; the third is engineering; fourth is business; fifth is economics. I feel that the two most basic and essential areas are design as esthetic organization, and general education, which incorporates the nature and history of human enterprise. Economics belongs more in the class of general education, while business in its practical aspect of marketing and distribution, like engineering, is a means to an end.

But the real problems of design education must be concerned with two essentials: the student, and the teacher. Not everyone can be a candidate for an education in industrial design; he must have certain positive aptitudes and motivations — intelligence, taste, sensitivity, and that curious element called creative vitality. He must have some mechanical and mathematical aptitude, dexterity of a craftsman and, finally, the human interests of a socially well-adjusted personality.

A teaching staff should be composed of people organized as an integrated part of the Art School and University faculty, dedicated to the highest standards of educational and professional ethics, devoted to the growth of the whole personality as well as to the artistic medium of the professional. They must be productive artists themselves, and remain consistently so.

There are two other necessary elements in the educational process: first of all equipment, which includes a library through which the intellectual resources of the past are at the disposal of students and teachers; equipment includes expert and professional training in related fields, not only of engineering and business, but psychology, mining, the humanities, and the host of other areas that make up the intellectual repertoire of the modern university. Thirdly, it includes the physical equipment of teaching and also the multiple contacts with productive industry which provides the working laboratory of the industrial design course.

What is the industrial design program at Syracuse? There has been no change in philosophy but a rededication to the process as outlined above. A first year program is devoted to the fine arts of drawing, painting and design within the context of the studio, and the cultural background. In the second year begins the specific training in industrial design with its extension into a development laboratory (shop), engineering, graphics, mathematics and psychology. In the third year these are extended to include technology, physics, economics. The fourth year included esthetics and elective courses in the cultural fields; and the final year is devoted to professional practice and the development of projects large and small on the same basis as those of a professional design studio. With this variety of subject matter let it not be forgotten that the heart of the program is industrial design itself, with over half of the 5-year curriculum devoted to this creative activity. It is no fixed or frozen curriculum, but a flexible system whereby the changes in students, professional requirements, techniques and above all teaching personalities permit readjustment in the content of the program.

John Arnold
Professor, Mechanical Engineering Department
Massachusetts Institute of Technology

With my deep interest in creative problem solving, I should be the last person to suggest that there could be only one solution to the problem of educating designers. The educational profession is concerned primarily with creative problems to which there is a multiplicity of adequate solutions. I would like to use the creative process in solving the problem: that is, I will carefully question all the concepts I now hold, make keen observations in order to get new information, associate the new with the old, and make syntheses that will lead to definite predictions. I will then state my problem and ask myself many questions, then end up with a prediction which can be put to test for final verification.

The statement of the problem is "The Education of a Designer." One of the

first points to investigate is: what does industry expect from the graduate designer? Chances are that industry will base their criteria on the ways in which they have used designers in the past; if we were to follow these criteria, our products would be out of date at the time they were employed. Since it takes at least 5 years for the "new products" to come off the school assembly lines, and since they in turn should be trained to think 10 or 15 years in advance, we should probably try to imagine problems that will have to be solved in 1975 and try to see that our students will be equipped to solve them. . . .

The specialist is easy to recruit and not difficult to train. I advocate a program leading to a generalist in the field of product design.

One more question: what is the process of education, and what can it accomplish? Generally we think of any cognitive process as one of acquiring, retaining, and transferring information. An important step has inadvertently been left out: the step of organizing, relating, associating, and cross-referencing this generic information so that it can be more completely applied to new situations and result in novel solutions. . . .

Education, then, should include a basic minimum of concepts and techniques around which further experience can be marshalled and correlated. A broad "extension of experience" should be stimulated by the enthusiastic presentation of additional material. The subject matter is probably not as important as the manner of instruction. The instructor's dynamic enthusiasms and ability to stimulate and motivate his students is a vital necessity. In every phase of the program the process of creative problems solving should be constantly demonstrated. Process is vital—and must be emphasized.

What kind of an educational program do I suggest? The "comprehensive designer" I am trying to train must have five attributes:

1. He must be motivated by broad concepts of human activity and behavior, should be able to anticipate and predict very closely the impact that his design will have, and must be ready to shoulder the responsibility for bad results.

2. He should have a complete knowledge of the people who will use his product and of the environment in which it will operate. This is a new field, that answers to human engineering, applied experimental psychology, bio-mechanics, etc. Knowing the environment of which the product is a part includes a complete understanding of the materials used in its manufacture, as well as the physical and cultural environment that surrounds it and becomes a system of which the product is only a small part. This suggests a long list of engineering subjects, starting with elementary physics and culminating in the new field of systems engineering. It would include some mechanics, thermodynamics, electronics and circuit theory, and special subjects associated with metallurgy. Basic courses in economics, production and marketing should be part of this program, and an advanced course in the theory of management would be extremely desirable.

3. The comprehensive designer must be articulate in all types of communication: the written and spoken word, the language of symbolic logic or mathematics, and the language of vision. The more articulate he is, the easier will be his task of convincing others of the merit of his ideas. Courses in literature, composition, mathematics, visual representation and the principles of design must be part of his curriculum. To be fully versed, he must know a great deal about psychology, sociology, group dynamics and cybernetics.

4. He must be able to maintain a balance between his ability to analyze, to synthesize and evaluate — a quality that is more closely associated with teaching methods than course content.

5. The comprehensive designer must understand and have mastery of the creative process. He should have an inquiring mind, be sensitive to problems unnoticed by others, be very observant.

This, then, is the designer of the future. He cannot approach problems only as an engineer, or an artist, or an economist or politician. He must combine these viewpoints along with others if he is to fulfill his obligations to society. The world needs as many comprehensive designers, junior grade as well as senior grade, as she can develop, for her problems will never be solved. We should always be able to better yesterday's solutions today.

Hin Bredendieck
Associate Professor, School of Architecture
Georgia Institute of Technology

It is surprising to find that within our complex environment of mass-produced objects, so little attention is being given to the man-to-object relationship. In spite of considerable change in design procedure over the past 30 years, the performance of today's designer still depends to a large extent on the same aids his predecessors drew upon: accumulated experience, plus innate resourcefulnes. Dependence on these human factors

has been greatly reduced in other fast-developing fields, particularly in the sciences, and it is my belief that we have much to learn from them about helpful procedure. A consultant chemist who is called in by a manufacturer, is, unlike a designer, not alone in his effort to improve a product. He has at his disposal a science that embraces the whole field, and relates to other fields of science. The designer, on the other hand, is on his own, starting from scratch. His particular experience serves him, and is lost with him. There is no way his knowledge can be made accessible in the form of a general theory of design.

A comprehensive designer will not be brought into being by a declaration, but only by the same laborious building up of knowledge that has brought other fields to maturity; to act creatively, he will need a theoretical tool which will enable him to bring all the factors in the man-object relationship into a workable system, which I would call "objectology."

The general theory of design that I propose, at this early stage of its development, has three major aspects:

1. SPATIAL: object-to-object, or object-to-man relationships. Man's environment consists of "nature at large," and the "man-made" world. His relationship to each is different. With the objects of nature he has an assymetrical relationship — that is, man must do most of the adjusting. With man-made objects, there is a symmetrical relationship — the objects are adjusted to the individual, and he also adapts to the object.

The attributes that are common to all objects are:

a. *Structure*, or internal organization

b. *Form*, or boundary of the structure

c. *Position*, or structure-form within its environment

d. *Condition* in which the positioned structure-form exists.

Each of these can be further broken down; form, for example, includes surface, color, texture, pattern, etc. The more conscious we are of the factors involved in an object, the more appropriate will be the result of our manipulation of them — which is design.

2. TEMPORAL: comparison of the spatial relationships over a period of time. From a study of this pattern, we are able to formulate a law of development for objects in general as well as objects in particular. From this, we have the basis of a trend theory, a basis for predictability.

3. TRANSFORMATION, or how material is transformed into an object, includes three components:

a. *material;* b. *forming process;* c. *design process,* which directs the forming process.

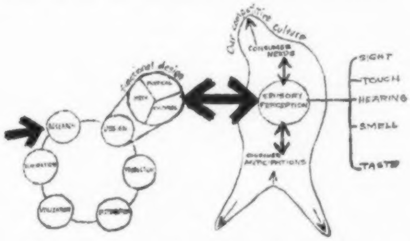
The ever-increasing magnitude of the field of forming technology makes it necessary to structure the conglomerate of material so that the information can be tapped when the need arises.

In the design aspect, we are moving toward a more organized procedure, whether we like it or not; it is the natural outcome of repeated effort, and leads to accelterated development. For the first time man is consciously beginning to design Designing, and beginning to investigate the possibility of inventing Inventing. This design procedure, as it builds up, will enable us to give equal attention to the various details of a design problem; it should take creativity off a hit-or-miss basis and put it on the plane of maximum predictability. Eventually we can look for the establishment of a criterion by which to judge the final work. Not every designer need work at this — but a few individuals will have the inclination, and their findings, if feasible, will become the property of all of us.

Aarre K. Lahti
Acting Chairman, College of Architecture and Design
University of Michigan

To those of us teaching industrial design in the universities, a rather gratifying change has gradually been taking place, at least in the Detroit area. Industry is now more willing to accept industrial design students who are university graduates than it was before — when the quantity and quality of their technical skills suffered because of the time absorbed by academic requirements. I feel this change is a reflection of the need for integration: industry now wants designers with a broad cultural background, who know how to approach the solving of a problem; the industries themselves can much better teach the necessary skills. There is a growing demand for those who know *what* to design, not just *how* to design.

I have attempted to analyze and define just what industrial design is. My premise is that it is concerned with the design of mass-produced goods within a competitive society. The following diagram is presented for discussion:



Every product has to go through a production cycle consisting of research, design, production, distribution, utilization and elimination; this cycle is never-ending and never-repeating.

In magnifying the "design" area, for which we do not yet have an adequate term, we can see that engineering is but a part of the area. I can conceive of design only as functional design, but would like to consider the term "functional" from a realistic standpoint: there is a no design or activity that is not intended to fulfill some human need; every design carries with it all the cultural implications and values. Therefore functional design includes
1. mechanical function; 2. physical function; 3. cultural function (the psychological and sociological patterns, reactions and needs).

I find that industrial design is primarily concerned with the sensory aspects of mass-produced consumer goods —sight, touch, hearing, smell and taste. Our knowledge of most of the qualities and values of these senses is extremely limited; it is difficult to find enough objective visual information for teaching purposes, and too often we teach personal opinions as facts. We know that perception is a cultural phenomenon and not an absolute, and that our perception is affected by our needs and anticipations, and that these in turn are conditioned by our competitive culture.

Since the problem-solving activity essential to industrial design is beyond the comprehension of any one individual, and since it is equally impossible to teach all the areas cognate to industrial design, I feel it would be effective for a school to go into a single cognate more thoroughly rather than a little of each. It is likely that our future design offices will be staffed with designers differently trained in schools with different cognates — engineering, marketing, physiology, culturology. Industrial design training would form the common core through which the various cognates are made continuous.

At the University of Michigan we have been moving toward Industrial Design and Culturology. It is only through a thorough understanding of a culture that the problem of *what* to design can be approached; the insights necessary for the solution come from individuals, but the problems arise from the culture and the products designed for the culture.

A very important relationship to consider is this: as our technology advances, the limitations imposed upon design by the mechanical aspects will decrease, the limitations arising from man's physical requirements will remain quite constant, while the limitations arising from human needs and desires will increase, becoming more and more the basic and ever-changing factors in future design.

Robert A. Kolli
Chairman, Industrial Design Department
Pratt Institute

The industrial design program at Pratt was one of the first offered, dating from the early 30's. Although the program has undergone many changes, the basic concepts have remained intact. We believe that designing is an art expression of our age. Man has always had a tendency to style the articles he posseses; his response to beauty is inherent. The position of the industrial designer in our culture is that of a specialist solving art needs in mass-produced objects.
To us the most important problem in design education is to make the student aware of his own capacities in art appreciation and creativity. The foundation program's chief goal is to bring about a balance of esthetic values and appreciation of the age. This is as much a cleansing process as an informative one to free him of fixed ideas, and to substitute knowledge for ignorance in this area. It is as much an unlearning process as a learning one. Very few art students come from art families. The art knowledge they possess is questionable.

At Pratt the stress is on the esthetics. We have an extensive two and three-di-

mensional design program that is closely related to the major arts. About half of the four-year time is devoted to esthetics, with great concentration the first two years. We found the average student is in sympathy with such a program. He wants to express himself artistically first. With a good working knowledge of shape, form, color, and forces of design, he then develops a tremendous curiosity to use this information. In the third year he gets accelerated programs in engineering and technical subjects. And at this point, he develops into an industrial designer, leaving the major arts for the minor art by accepting the additional controls and mechanics governing his expressions.

I might clear up a point here: during his second year he studies mechanical drawing, mathematics, material and structure under the supervision of an engineer, and he is constantly using machines and attending lectures and movies on technical subjects and visiting plants. But two-thirds of his time is devoted to three-dimensional design.

More and more time is devoted to the mechanics, architectural drafting, production methods, and human engineering. A senior student also has a course in business practices, taught by John Griswold of W. & J. Sloane in New York, and marketing, taught by Alfred Auerbach of Alfred Auerbach Associates.

About one-fourth of four years is devoted to these so-called service classes.

The remaining fourth is devoted to the liberal arts. The importance of this cannot be overstressed. I believe we all agree to the necessity of a well-rounded program for preparation for leadership in the field. This program includes: English, English Literature, Social Studies, History of Art, Anthropology, Contemporary Civilization, Psychology, Impact of Science, Music Appreciation, Stage Designing and Rapid Reading.

The establishment of the laboratory has had a beneficial effect on the Department by making it possible to introduce "live problems" into the curricular program. This has strengthened the engineering courses by close contacts with corporation laboratories. It has enabled the department to have a greater influence on industry, and to allow our graduates to do a better job.

Ours is one of the few professions that has and is practicing down rather than practicing up. Similar conditions would not be tolerated in medicine, science, or engineering. Advanced ideas are expected. We are hopeful of improving the profession by educating *up* to it.

Jay Doblin
Director, Institute of Design
Illinois Institute of Technology

Our major problem at I.I.T. is to shatter the apathy of the majority of the students. Only one-fourth of them are vitally interested in design or a career in design. To counteract this and train designers, we are doing the following:

1. We insist that each problem given be completed in working model form;
2. We try to place a student in the mental position of the professional designer by removing the abstracts and substituting real problems;
3. Rather than presenting a problem for solution — particularly problems which can be solved by a little direct application — we try to get the student to detect a problem in a given field.
4. We do not teach skills as such — but try to make the student realize he needs them to solve and present his design work. As a consequence, he persists in inventing and perfecting these techniques himself with our help.
5. We try to avoid the romantic problems such as automobiles, silverware, jewelry and telephones — and get the student to solve less worked-over problems in design.
6. We try to prevent the group of students from working on the same problem under the same set of specifications — because we know all the answers will gravitate toward the best student's.
7. We have instituted two new courses, each three hours a week:
   a. The "memo course" — in which the student receives a problem through the mail in letter, memo, pamphlet or other form — and he must process the job by replying to the communication, doing research, etc., in the same way an office does. He must keep a file, and finally make his presentation to the whole group — demonstrating his approach, his recommendations, etc.
   b. Our "field course" — in which our upper class students go out once a week to offices, factories, retail outlets, etc., with a specific problem as an assignment.

We believe this approach is more difficult to teach and results harder to see than the traditional class problem and skill-shapening techniques of the average design school. In our office interviews, we see too many students with a slick finish and without any approach or penetration into the problems. They assume that a piece of high art often involving highly fashionable cliches solves every design problem.

But — I bring more questions to Philadelphia than answers:

1. What is the relation of the schools to the profession?
2. How are the schools related to each other?
   a. If the profession demands a standard, so do the schools.
   1) We give varied kinds of credits against hours of study;
   2) Our degrees offered are all sorts: BS, BA, BID, etc.;
   3) The titles, descriptions, contests, tests, examinations are not in any way related from school to school. Therefore, a transfer of credits is extremely difficult in some colleges;
   4) Accreditation — and the basis for this — should be thrashed out among us. Some of us are members of the NASD, others not.
   5) What about advanced degrees?
   b. Are we teaching the same sort of things — or are we not? *Should* we be teaching the same sort of thing?
3. Money?
   a. What types of commissions should undergraduate schools take — particularly in regard to the profession—since they are tax-exempt?
   b. What ties with industry, specializations and graduate work, scholarships, etc. should we accept?
   c. How do we get publicity and enroll more students of the kind we need?
4. The student and the profession: How does he cross the yawning chasm in which he can't get experience without a job and vice versa?
   a. Should we study an apprentice system of some sort?
   b. What are the advantages and disadvantages of cooperative education?
   c. Should we train specialists for particular jobs?
   d. What kind of product does the profession actually want?
   e. How effective are we being in our teaching endeavors? We have very little information on students after graduation, etc.

This meeting of educators is long overdue. I propose that we set up a society, club, or whatever — formal or informal — which will see to it that regularly scheduled meetings of qualified educators and professionals are held; try to outline the aims and intent of industrial design teaching; and examine the possibility of a framework for a sound formal organization. I feel that we must communicate with each other, share our strengths and become aware of our weaknesses. We must uncloister our schools and join with the profession.

What is an industrial designer?

Bush—Brown: Whether an "industrial designer" can be given a definition on which you all agree is something I don't know, but I think it is worth discussion.

Doblin: From the way you talk, I gather you all think a designer is someone who creates a product. I disagree. I think a designer's most fruitful task

occurs in areas where there is no product at all. The fastest growing segment of Raymond Loewy's business is the Marketing Section: they work for people who have no tangible product; they try to define for an oil company, for example, how to approach the merchandising of the product: where to sell, how to advertise, whom to appeal to. It seems a great deal more important to decide these things than to redesign the gas pumps.

Lahti: There are so many things besides appearance that a designer has to know and consider; if a product is not successful, the least tangible aspect (which is appearance) is usually blamed, when the cause may be entirely different. The first post-war Ford that didn't sell is an example; people blamed its design for being too radical and boxy, but investigation proved that the styling was quite superior and that the past history of the product was at fault.

Doblin: Furthermore, the designer too often takes problems at face value, without questioning its basic nature and how it can be changed completely. It is frequently most important to come up with an answer rather than a product—perhaps to determine whether a product should be made at all. The way it works today, it is rather like a patient coming to a doctor and saying, "I have a bad appendix, please operate on me." Usually the ability to make the diagnosis is more important than the skill to perform the operation; yet designers are being trained to be skilled hands, with an emphasis on art. It's a long way from the ultimate.

Carreiro: The elements that make up the education of tomorrow's industrial designer are many and obviously quite different from those which went to make up yesterday's or even today's designer. Each day seems to see the addition of a few new elements. How these elements are arranged and where the emphasis is placed tends to differ from school to school. This does not seem undesirable in view of the breadth of the field for which he is being trained. Just think of the range of products he may be asked to design, (from suspenders to automobiles) the materials and processes he may employ, (glass, wood, metals—stamping, extruding, moulding) the levels on which he may function. From the styling of a single product to a most comprehensive design). The idea that a single curriculum could conceivably apply to all schools and all situations does not seem tenable or desirable.

Roundtable

After the six statements of philosophy, the group adjourned to the conference room of the Philadelphia Museum School. Parts of the ensuing discussion are recorded below. That the meeting was complex, uneven, and lacking in airtight conclusions is a commentary both on the nature of roundtables and on the fact that this was the first congress exclusively for industrial design educators ever held.

In addition to the six speakers, participants were: **Harold Bush-Brown,** *Chairman, Department of Architecture, Georgia Institute of Technology, as moderator;* **James C. Shipley,** *University of Illinois;* **Robert Lepper,** *Carnegie Institute of Technology;* **John Alcott,** *Rhode Island School of Design;* **Richard Reinhardt, William Parry, Joseph Carreiro, Leo Brandenburger,** *and* **Dean Emanuel Benson,** *Philadelphia Museum School of Art;* **Arthur Pulos,** *Syracuse University;* **Robert Redmann,** *University of Bridgeport.* **Douglas Marilees,** *University of Michigan;* **Robert M. English,** *University of Kansas.*

Among the invited guests: **Sally Swing,** *Executive Secretary, A.S.I.D.;* **Henry Hagert,** *National Executive Secretary, I.D.I.;* **Raymond Spilman; Theodore Jones,** *Director, Institute of Contemporary Art.*

Engineering vs. esthetics: where should the emphasis be?

Bush-Brown: There appears to be three different kinds of emphasis in the schools represented here: 1) science and technology; 2) the visual aspects of design; 3) something between the two. Are all three valid? Do you all agree with Mr. Carreiro that it is good to have a variety of this sort?

Shipley: I join Schmeckebier and Kolli in insisting that industrial design is still primarily an art field, involving subjective factors. We must teach the student that he is an artist; no matter how much data he has, he must work with it subjectively; he can't look for rules and formulas the way an engineer can.

Alcott: An engineer once said to me, "I wish there were a good scientific way to judge art." I replied, "I wish there were a good artistic way to judge science." The two are apart, and we might as well face it; it is good to have different emphasis in various schools.

Carreiro: I would say that John Arnold's is an inventive approach with considerable influence from the engineering side as opposed to Dr. Schmeckebier's interest in esthetics. How do you fit esthetics into your field, Professor Arnold?

Engineering vs. esthetics, continued

Arnold: Unfortunately, we are not fully equipped to do a great deal with esthetics. I do believe that the comprehensive

designer is looking at form as well as function, but it is something we cannot handle as completely as we would like.

Schmeckebier: John Arnold, working in an engineering school, is trying to inject a certain amount of humanity into the teaching; I see no reason to disassociate that from "esthetics"; design is not styling, nor the adding of superficial gimmicks, but a matter of going deeper into the problems of man and creative thought. The creative approach Arnold talks about, and the artist's approach that I stress, are essentially the same thing. The difference is the *medium*, which varies in each institution. He draws from engineers, we draw from artists, but our aims are similar.

Bush-Brown: But do you think that the boundary line between art and engineering will ever be eliminated, Professor Arnold?

Arnold: I am trying constantly to bring engineers and designers together; in order to do this, I must wear two hats. You in the design field act as if it must remain something intuitive and mystical; in your company I stress the belief that designers will eventually have to make a science of their field—find out what laws concern it, and even put numbers on things. To engineers I say there are some things you can't put numbers on, some things that they have to be intuitive about. Naturally, the conflict causes me a good deal of consternation, but I feel that somehow the two fields must get closer together.

Carreiro: Would you be satisfied if the fusion were not complete, but if you simply got a better working relationship between designers and engineers?

Arnold: Oh, certainly—in fact I hope that the fields will not be totally fused. I believe people will always think in different ways—there will always be pure artists and pure engineers. But some few people have to span the gap.

Pulos: In an effort to introduce designers to creative thinking of an engineering sort, many schools are introducing something that you might call the essence of engineering. At Syracuse we tried to get Engineering to offer courses that would be suitable to our students, to give them a grasp of engineering principles without getting bogged down in endless detail.

Brandenburger: I am constantly frustrated in this discussion by this differentiation between "engineer" and "designer." I was trained first as an engineer, then later took a full course in industrial design, and I can see no conflict whatsoever. Designers do more engineering than they think, and vice versa. I teach engineering here, but I call it sculpture, and it goes over fine. I think there is too much effort spent finding a dividing point, and we should try harder to see that we are walking on common ground.

Spilman: Aren't we all talking about making a total thinker? Whether we use the vehicle of art or engineering, we must give him an understanding of all the aspects of any problem, an ability to see all the aspects by the application of reason. Perhaps the confusion is management's fault because it has so often said to the engineers, "I'm going to get in one of those artists to do what you failed to do to the product. . ." Don't we have a *general* educational problem to make management, and any users of design, see that it is a *total* problem?

How do you equip a student to face the profession with confidence?

Lahti: I feel that the student's confidence does not come primarily from skills. To know that he can draw well is, of course, important; but he gets more confidence from having a philosophy of design that he can believe in.

Benson: Confidence does not come from awareness alone; it has to be related to performance. I remember times when my awareness outstripped my ability to perform, and this only led to frustration and lack of confidence. The inability to perform will usually create such frustration.

Shipley: I feel that training of a vocational nature is basic. If a student doesn't have skills, he usually won't last in the field. It isn't enough, but it is minimal.

Benson: The problem that always arises is this: A student needs skills to perform an act; he also has to have sensory ex-

perience adequate to match that skill if he is to indicate a new relationship. There are many students who don't get even the fragments of revelation until late in their career. You can show them how to observe, but you can't give them the experience that fires them to the point of real discovery. Do you continue to teach skills despite the fact that they may never be used for creation?

Doblin: You have to look at both extremes before you can answer that. At one end you have the schools that teach skill only, and turn out students who can perform miraculous imitations of the best Hollywood cartoonists or even the best Madison Avenue styles. Then there is the other extreme that abhors skills: the "we teach intellect" approach. I've never quite understood how you could teach pure intellect, and I think Pratt has taken a good middle ground approach. Its students come out with skills enough to perform, and creativity enough to perform well. To train the imagination, you simply have to stimulate the students, get them excited. Skills are duck soup by comparison.

Benson: We find that students who start out with skills are often those with whom we have the greatest difficulty; they are so satisfied with what they can do well that they have no desire to reach for awareness or to tap their other resources.

Doblin: Those students are the future hacks of the profession, and the sad thing is they are often "vocationally oriented" into design. For my money most of them should be vocationally oriented into the street.

Can a body of general design information be formulated—and is it desirable?

Bredendieck: There seems to be some agreement on the need for comprehensive designers. It is one thing to ask for them, but quite another matter to produce them. Our design field is so diversified that it is next to impossible to grasp its complexity without the aid of some tool in the form of a Method and Theory. Without a structuring device of some sort the capacity of any designer, no matter how "gifted," is bound to remain limited.

I am not advocating a "philosophy" of design, existing apart from practical experience. What I have in mind is

the amassing of data concerning present day design methods and behavior, and from this material to formulate a general theory of design.

Once the basic structure of such a theory has been established, it should greatly facilitate the design process—not only from the standpoint of time and energy expended, but also from the standpoint of quality.

Arnold: Interestingly enough, as complexity increases, it takes fewer and fewer concepts to explain things. First we should seek those few basic laws; then we can extend them to cover a wide range of knowledge.

Lahti: I agree that there is some information in this field that is basic: too much time is spent re-making physical measurements and re-gathering data that could have been organized and made available by others who have done the same. If we could get the information that *is* measurable into usable form, we would have more time to investigate the human being as a cultural phenomenon, which is much more imperative research. There is no such thing as a human being outside a culture. We all use the term esthetics here; esthetics really means a norm, a general standard of visual acceptability; thus esthetics change with each different culture, and I believe our emphasis should be not on technology but on understanding that culture and its norms. The human is the critical factor.

A chair is a mechanism that has a physical function that must be in proportion to people today. It also has a social and physiological function to be investigated and that is the critical area.

Shipley: In understanding this area, where the chair is regarded neither as a mechanism nor an object of comfort, both designers and engineers are very weak.

Lepper: There seems to be two possibilities in this matter of cultural investigation and measurement: it can be done for its own sake, or it can be done to introduce the student to the idea of investigation. Data in itself is always subject to change; if you give him data chances are it will not remain constant. It would be better to teach him how to get the data, to question his culture.

Lahti: Exactly. We are questioning things for predictive value, for *design is predicting;* pertinent information and material of a cultural nature is impossible to include in books, because it is dynamic; obtaining it is a continuous quest.

Jones: I'd like to ask for a show of hands on two questions. First I'd like to know who follows Mr. Brendenieck in the suggestion that it might be helpful to try and collect a body of design information on procedures that would be generally acceptable by teachers. I don't mean a definitive text, but simply some information that would be usable, and teachable. My second question is, do you believe it would be useful, if it could be done? Nobody wants to kill creativity, but is there room for something more? (4 hands are raised)

Alcott: I think it would be the most deadening thing that could be done (Agreement.)

Bredendieck: Designing is a matter of procedure. Anyone who repeatedly performs a task develops a procedure whether he is aware of this fact or not. It is in the nature of a procedure that it not only develops but also improves with mere repetition, and it is an integral part of this development that in time man becomes conscious of the different aspects of the procedure and inevitably begins to order them. But here I am talking about man in general, and not the individual. The individual can escape this natural evolution if he chooses to do so, but man-as-whole can not. It therefore seems to me to be the logical thing for the individual to study the pattern of development and to participate in the evolution towards a greater understanding of Object and Design. Such an understanding will never stifle the imagination, but rather, as has been demonstrated in other fields, facilitate creativity.

Arnold: I really think that designers don't want to make an effort to make something scientific of their field.

Alcott: Now there are two different points here. One is procedure or method, and the other is establishing a basis of known facts; one may be possible, but the latter isn't—even the scientists haven't got that. When I first went to school I studied chemical engineering; it was prior to World War I. When my son recently had trouble in chemistry, I couldn't even read the book.

Lahti: I detect something here that I find whenever a group of designers get together: the idea that information is stifling, that information kills your creative ability. The fact is, only when you have information do you have real freedom. When you are in an area that is nebulous, you want to hang onto whatever mysticism is available, for your protection. This has to be overcome. There is, of course, no such thing as "right" information, no absolute answer. All we can do as designers and educators is find information that is a

little more reliable than what we have, and make the old information obsolete. But getting this information does not freeze you, it *frees* you.

Lepper: It is one of our teaching problems to keep "research" information alive and somewhat indefinite, lest it give the students a false sense of security.

Doblin: The type of information you need can't be captured in a book. It may be mauve for carpets this year, but next year there may not be anything called carpets. The reason we keep measuring the human posterior over and over each year is in hope of finding some new way to seat it. The minute you stop that, there goes your new solution.

Lahti: I think all Ted Jones wants in this "book" is a few simple facts—not rules—that will serve us for a little while.

Does industry have a responsibility for the designer's education after graduation?

Carreiro: I thought that one of the important questions in the Industrial Design article appeared in some of the comments by professionals. Several designers and executives indicated that we should train people who can sit down and earn their keep from the first day they leave school. Some manufacturers seem to think

that we run glorified trade schools and that our main function is to produce people who know how to turn out 18 new styles for pencil sharpeners in an hour. We **train** people, but when they leave school their education is not 100 per cent complete; it must continue in the jobs they take. They must learn on the job the specialities and skills that it would be a waste of time for us to teach. It seems to me that industry has a real responsibility to pick up where we leave off — and in fact some companies are already meeting this responsibility with good training and orientation programs; I can see no other answer to the problem of how to produce well-rounded, comprehensive, cultured, and skilled designers.

Bush-Brown: We have the same problem in architecture. The offices want to know why we don't turn out an architect who is not only bright and understanding, but who can also do polished working drawings. One practical solution we have found is for teachers to meet periodically with the practitioners and get some of these objectives in line.

Schmeckebier: In our experience the professional groups have been extremely helpful. They have come to the school

without any urging and asked what they could do to help us implement our educational program.

Doblin: In Chicago, some of the design offices have offered to take our students in without pay for apprenticeship periods. Maybe this would be a good kind of transition between "paying" for an education and getting paid for producing something — not getting paid for not producing something.

Shipley: No, I think it is imperative for any person, even a student, to receive remuneration for work done. Perhaps it is the responsibility of the office or industry to understand, when hiring new graduates, that they must offer some kind of orientation even though they are paying for the privilege, and to be patient and helpful during the initial periods.

Postscript

Alcott: I suppose I will be very unpopular for saying this, but this seems to be to be a very unrealistic discussion. Everyone keeps talking about this ideal comprehensive designer, and I don't believe any human being can be a comprehensive designer. I don't think we can worry about turning out one great designer every decade; we have to face things on a more realistic basis: how are lots of students going to be equipped to go out into the world and keep on growing?

Arnold: I'm not proposing that we under-educate the mass of students at the expense of the unique comprehensive designer. On the contrary, I believe that by setting our sights on the ideal, we will give everyone a better training, even though the majority may fall short of perfection. There is too much "educating down" in this profession; we would serve the field better by shooting a good deal higher.

Carreiro: What has been attempted here has been a major undertaking, if any general agreement has been reached it would seem to be the undisputed value of this endeavor. This first meeting, so long overdue, pointed to the importance of continuing this exchange of ideas and information. Only the most naive individual could have hoped for pat answers at the end of an afternoon's discussion on such a difficult subject. To mistake complexity for confusion and conflict is an equally grave oversimplification. What has been accomplished is the setting of the stage for dealing with specific problems such as exchange of credits, accreditation, relationship between industry and schools, etc., by clarifying philosophical differences and areas of common ground.

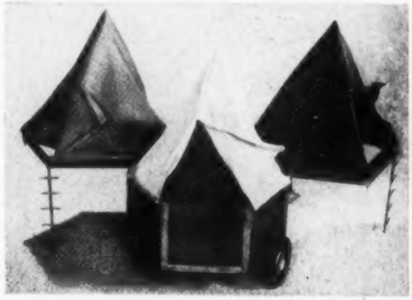
Doblin: I agree that this group, set up as a loose organization, could benefit greatly from future discussions about curricula, about specific teaching practices, about better relations with industry and the profession. I move that we agree upon a date for a meeting next spring to continue this discussion, with the idea of a subsequent meeting in the fall at which might include the profession and societies and representatives of industry.

The meeting ended with plans for a Spring meeting at Pratt Institute — the first of a continuing program of association among the country's industrial design educators.

Beginning a series of presentations of

student projects

If industry has a responsibility for the direction of design education — as was strongly suggested during the educators' conference reported on the preceding pages — it would seem to begin with an understanding of the schools themselves, of the teaching approach, and the level of work being turned out by today's students. Toward this end, ID will present in each issue a group of solutions to a problem given in one of the professional schools or university departments. We shall, as one educator put it, "try to avoid the romantic problems" and select those that challenge the student's ability to create a fresh, imaginative and realistic answer.



school: Philadelphia Museum School of Art
instructor: Joseph Carreiro
Head, industrial design department
participants: 15 fourth-year design students
problem: A modern "Conestoga" or camping trailer

"Thousands of people with increased leisure are taking to the woods for relaxation; most of them expect to rough it to some extent, but do need satisfactions of some basic needs. Most state and national parks supply such minimums as parking, fireplaces, tables, water, comfort stations. The camper must bring with him whatever else he feels necessary. The most important would seem to be: 1) food preservation and storage; 2) cooking equipment and eating utensils; 3) sleeping accommodations; 4) clothing storage; 5) transportation for equipment. This is in a sense a packaging problem. Imagine arriving at a campsite at night, in a rainstorm, hungry. Erecting a shelter quickly, finding the axe easily, starting a fire and locating utensils without waste of time is the main problem.

Requirements:

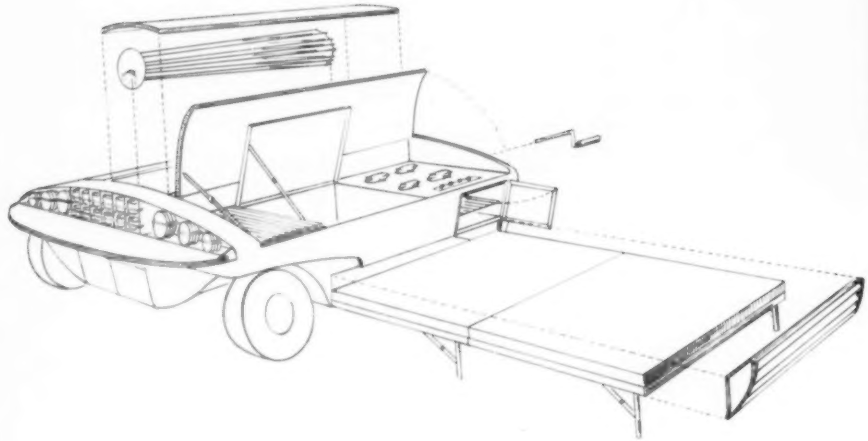
List equipment for four or six people.
Establish dimensions for packages.
Organize packages in various ways.
Exploded view or cut-away rendering.
Rendering of completely sealed trailer.
Complete working drawings.

The finished trailer and possible accessories should be marketable through retail outlets such as Sears, Roebuck."

The stacking, modular sleeping units designed by [illegible] Oakes, above, would be cantilevered off the central utility core, or individually set on the ground. The overall size of the closed trailer is 6′ x 4.′ Constructed of plywood panels, bolted to aluminum angle frames, the trailer could be easily demounted, or sold in kit form.

Photos: Aurelius Renzetti

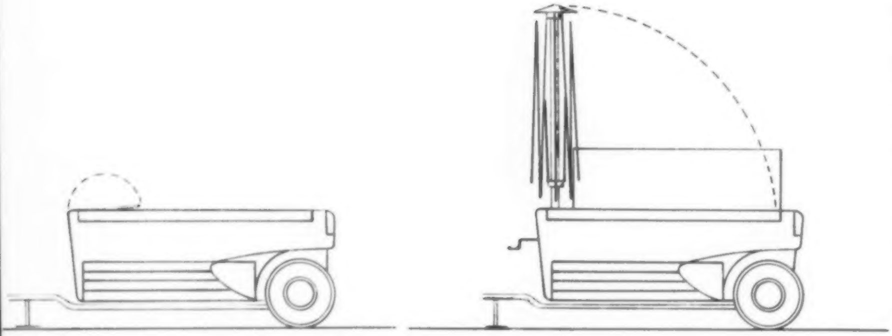
MSA students found ingenious ways to convert a package into a shelter

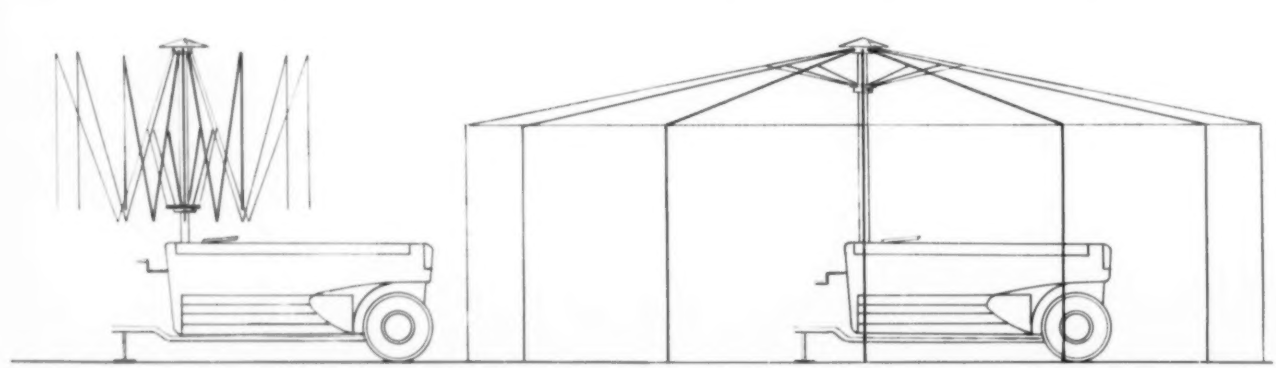


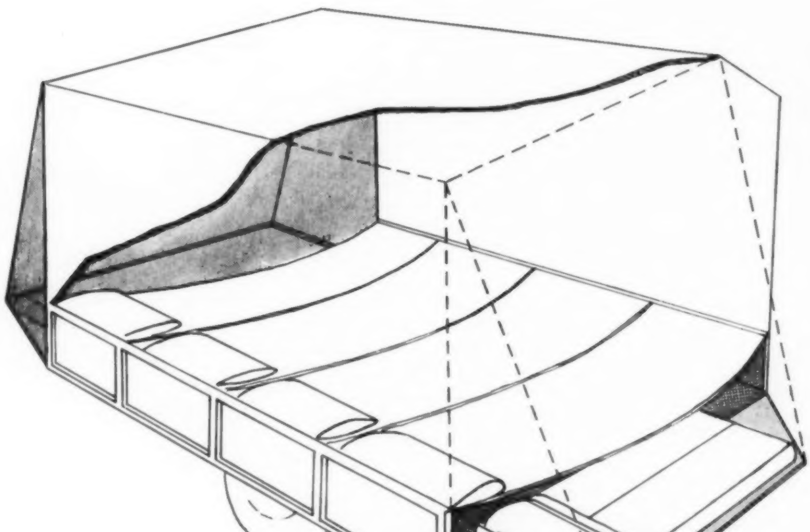
Umbrella on wheels

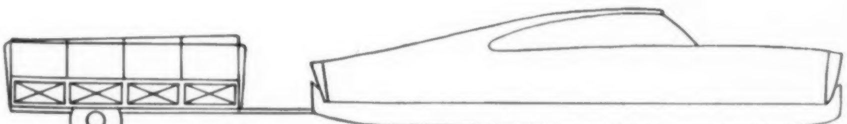
In putting a collection of equipment into a manageable package, most MSA students concentrated on achieving a flat trailer, 7 or 8 feet long. (Exceptions are the hexagonal tents and the spherical unit.) Thereafter they took different approaches to the problem of transforming this box on wheels into a human shelter, some using the basic dimensions of the box, others treating it as an expanding core; some using the rigid structure of the trailer, while most developed the idea of a light flexible canvas or plastic covering implied in the original Conestoga wagon.

Leonard Cohen's solution, shown here, was conceived as a core from which many components may be extracted; its advantage is the complete independence of sleeping, cooking, storage, and shelter facilities, as well as a large enclosure and a very simple appearance. A collapsible umbrella frame stored under a metal cover is pulled into upright position; a manual crank then automatically opens and positions the large parasol with its transparent plastic top and canvas sides around the trailer. On each side of the core a two-part bed frame pulls out, and a mattress unfolds. The kitchen compartment contains a gas stove and gas refrigerator beneath it, dry storage, and a chopping block; the opposite compartment takes care of other storage, and a table top drops down at the front end, revealing utensil storage. Cooking and eating in transit could thus be done without dismantling the shelter itself.

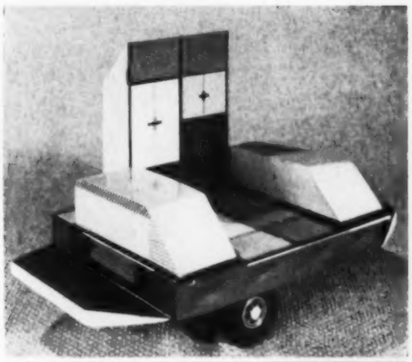






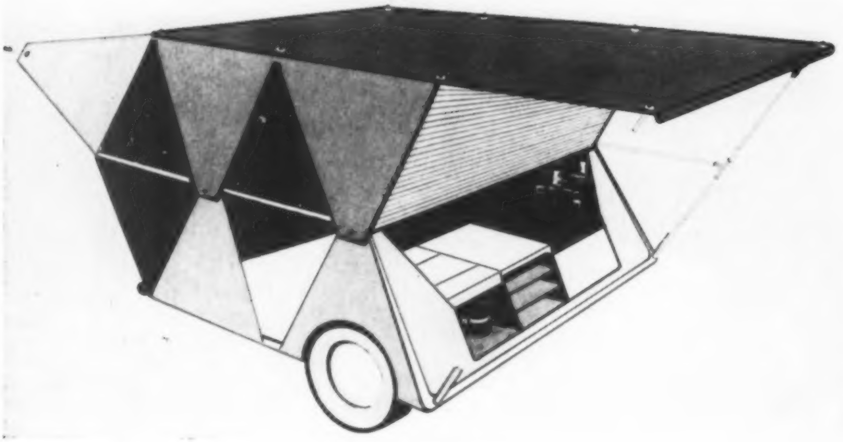


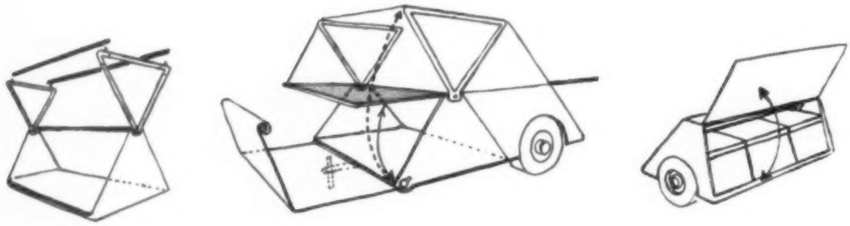
Modular clubhouse



Richard DeFeo designed a Conestoga that opens into a living room, converts into a dormitory, and stores enough for a family of professional nomads or an outing club that goes in for cross-country treks. It is designed in four modular sections to facilitate erection and to make it possible to strip down the trailer for two people. To open it, each of the counterweighted sections of the left storage wall are first raised. (The sections are hinged to a fixed 1' high base trunk containing the ice chest, which will not tilt when the wall is tipped over.) Beneath them lie four strut-braced frames covered with canvas panels which are attached to the opposite wall; they unfold when the frames are erected to make a roof. (Because the canvas is quartered to match the sectional construction of the chassis, it would be joined by zippers protected by lapped seams.) A base trunk on the right side serves as a bench during the day, and contains bedding and four hammocks; at night they are suspended over the floor recess — separated by ropes, and accessible from both ends as well as through a side entry. Two additional campers with sleeping bags can be accommodated on drop-down tail boards, and the shelter may be enclosed by end flaps stored inside. The designer estimates that the storage wall contains 11 cu. ft. of general storage, 15.2 cu. ft. of food storage; 9.2 for utensils, 5.2 for stove and ice chest. On the left, a 36 cu. ft. suspended canvas closet fits into the floor recess when the panels are folded over.

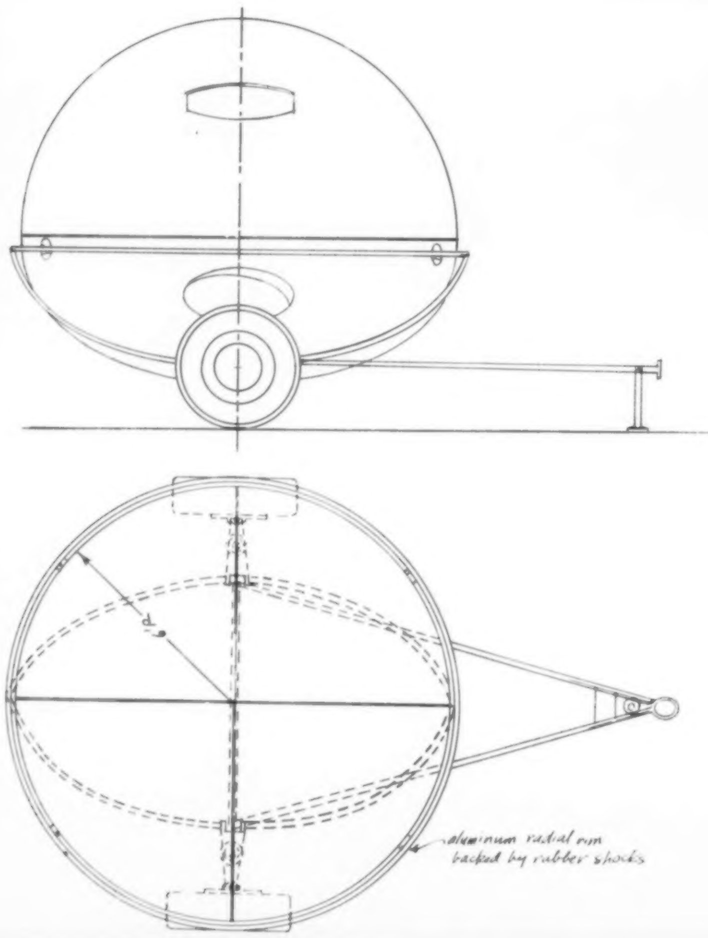
Domes, tents, and expandable boxes were transformed into modern Conestogas





Double-Decker Trapezoid

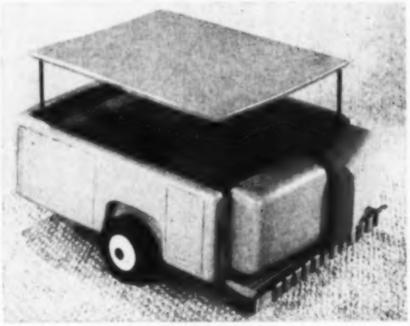
Gary Horley devised a system of erecting an upper berth and canopy out of a trapezoidal trailer 30″ high and 6′ square. Its body formed of sheet aluminum, a pair of front triangles pivot upward and are held aloft directly over the fixed triangles by cross bars. A front cover is lifted to horizontal position. A back lid rises to obtuse point and is connected to triangles by cross bars. A roll of plastic material, working from a roller underneath the front, pulls out and stretches around the front (see cutaway side panel in rendering) and over the top to the rear where it is hooked onto sectional bars to form a shelter over the cooking area. The cooking area is covered by a hinged aluminum panel. Three adults may sleep in the upper berth, two children below.
Tack-on flaps are available for open areas.



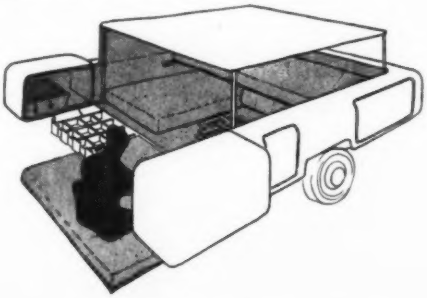
Hooped skirt and dome

The spherical trailer designed by William Sklaroff is built around the idea of a fully collapsible aluminum hoop framework, similar to a currently popular toy, which is removed from the trailer and draped with a Mylar envelop to provide a hut for two children. An opaque fiber glass-reinforced plastic dome (transparent in the model) is also placed on the ground to shelter two adults. Base of the trailer is a plastic bowl which is divided into quadrants containing cooking equipment, utensils, miscellaneous equipment, and 4 Dacron sleeping bags. The bowl is covered by a disc in four hinged parts. The domed trailer is 66″ high. Ventilation is provided through 2 screened openings in the plastic dome.

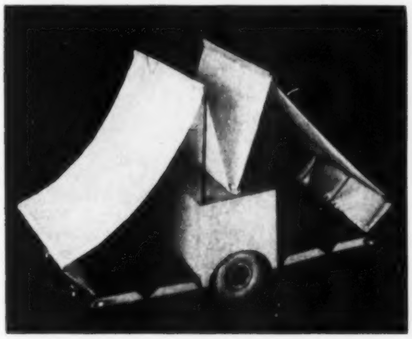
Oversized walls



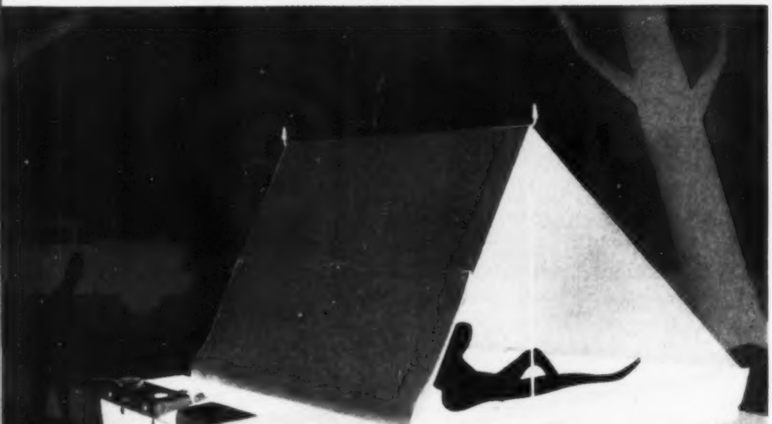
Like several MSA students, Arthur Friedman designed a trailer whose top lifts like a roof to create a low enclosed sleeping area. Its unusual aspect is the combination of structure and storage in thick walls, accessible from the outside. The end panels open outward and, like extra-deep refrigerator doors, contain food and cooking equipment. 88" x 78" x 36".



Twin tents

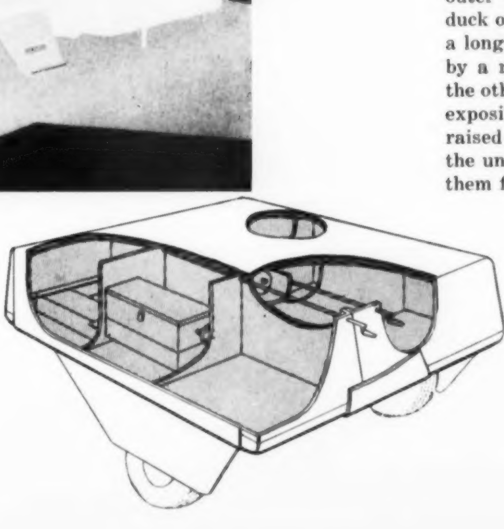


Designed to be marketed in knock-down form, Dorothy Masteller's Conestoga measures only 6' overall when it is closed, but its sides unfold into 4'2" platforms that sleep two adults each, or a couple and three children. The central core contains a 2-burner stove and a side-opening ice chest at one end, equipment drawers at the other, and side-opening clothes storage in the center. To close the unit, you lower the four poles into recesses, lift the outer canvas flaps from the poles and fold them against the platforms; the middle canvas curtains, unbottoned from the poles, retract into the center drainage crevice; the platforms then fold into triangles against the core, making a compact diamond-shaped package.



Flip-out platform

Charles Baxendell decided to match the personality of his trailer to the camper who enjoys basic, natural accommodations rather than an esthetic accessory to the modern automobile. His compact 6' x 7' package, sleeping 4 adults and 2 children, is transformed into a sizable tent platform by inverting two hinged cabinets. The left cabinet contains a storage compartment and cooking center; both the stove and ice chest are suspended on swivels so that they remain upright when the unit is inverted. The right cabinet stores other equipment, including air mattresses. Attached to its outer edge is a roll of neoprene-treated duck on a spring roller; it is pulled out like a long window blind, attached to two poles by a rod sewed to the fabric, attached to the other side of the platform (enclosing or exposing the cooking equipment) and raised to make a tent. The poles slip into the undersides of the cabinets and prevent them from jiggling in transit.



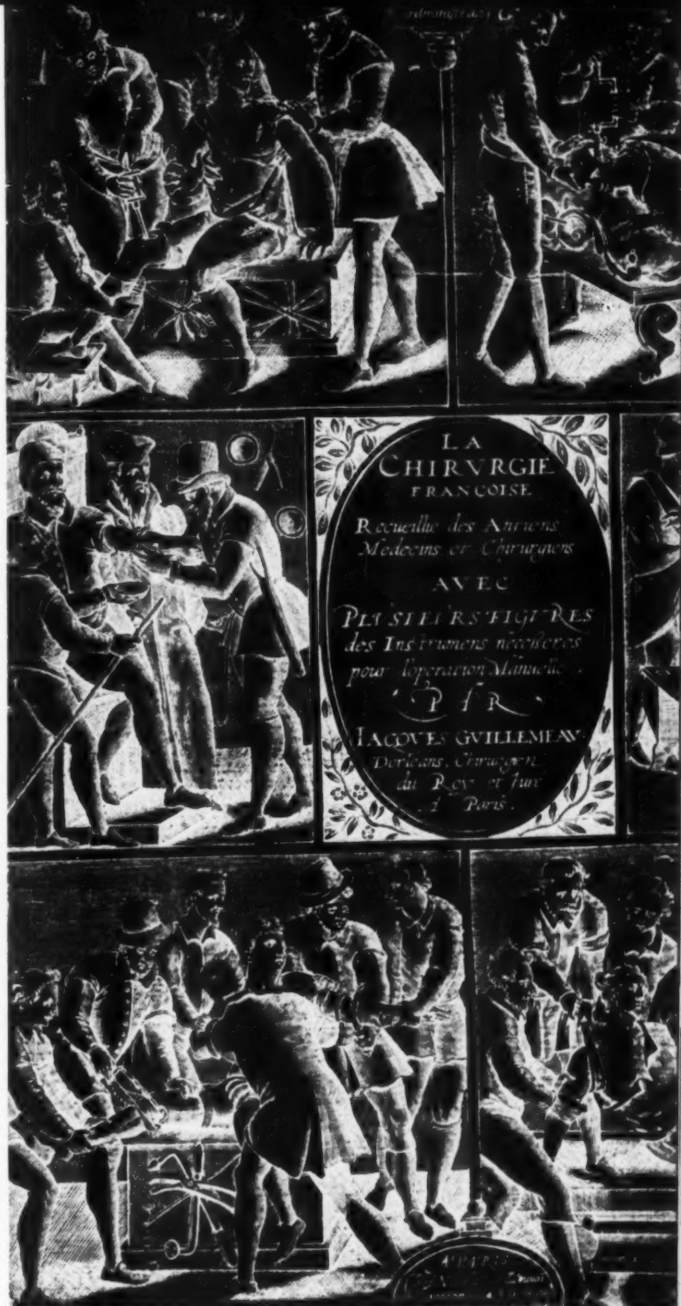
"Surgery is a great technical art. In applying scientific knowledge to desired therapeutic ends, the surgeon must be a skilled manipulator of exquisitely appropriate tools."

Dr. Chauncey D. Leake

Look to the right. These are not spies being subjected to rare and eccentric tortures at the hands of a misanthropic king. They are 16th century patients, unheroic and unanesthetized, painfully aware of the surgical tools being brought to bear. These are the tools of the bygone barber-surgeon—not so different, in most cases, from those of today. But they brought pain and pathogenic bacteria—these were the surgical demons that had to be routed—and the appropriateness of the tool, in Dr. Leake's sense of functional aptness, could not be taken very seriously by the barber or by the blacksmith who hammered it out of crude steel. In our day of antisepsis, anesthesia and the multi-syllabic scopes of diagnosis and therapy, surgery has become an infinitely precise art. Yet its tools are still created, or refined, not by designers but by the men who use them. Because they are so strictly determined by function, these instruments are often viewed as "exquisitely appropriate," as near-perfect designs—even laymen respond to their gleaming precision and directness. Whether the individual piece seems graceful or sinister, it states convincingly, and without superfluity, the nature of the job to be done. But are today's surgical instruments as appropriate as they look? Does the surgical industry, asked in recent years for a thousand new contrivances, have a need for the designer? These are questions that can be answered by examining the instruments, yesterday's and today's.

Look to the left. What the figurehead of an antique galleon is to the prow of a dreadnaught, the embellished knife of Ambroise Pare is to the modern scalpel, Bard Parker with disposable blades. The scalpel is probably the oldest of surgical instruments, though other basic implements, including the saw, the forceps, the vaginal speculum and the drill, are of a comparably early vintage. From the earliest surgery of Egypt and Greece until the late 19th century, the number of tools in the surgeon's armamentarium remained a small fraction of what it is today. The number was to multiply rapidly with the dramatic advance of surgery in recent times, but when Ambroise Pare wielded his remarkable scalpel, and into the last century, there was no effective comprehension of the cause of infection and no surgical anesthetic more consoling than a hefty slug of whiskey.

Then came Lord Lister and two American doctors. Following Pasteur's pronouncements on pathogenic bacteria, Lister proposed the possibility of sterilizing the entire oper-



Surgical tools *a consideration of their design, past and potential*

Photographs and text by Hugh B. Johnston ative field to prevent infection. The two Americans, W. T. G. Morton and Crawford Long, independently introduced the use of ether anesthesia. The general adoption and gradual refinement of antisepsis and anesthesia has had a radical effect on surgical techniques and on the design of surgical instruments.

How the tools have evolved

Some of the tools have changed essentially, others superficially. Some have remained quite unchanged; others, like the 16th century bullet forceps on the cover of this issue, have virtually disappeared. (In that day, when it was necessary to operate as quickly as possible to minimize pain and blood loss, the bullet was probed and snatched through a small opening with these long forceps. Today, with the surgeon having better control of hemostasis and effective anesthesia allowing more operative time, the patient with a bullet inside can usually be opened up and dealt with in a more precise and less traumatic manner.) Reading Pare's description (right) of the 16th century technique for amputating a major limb and comparing his basic instruments for this operation with their closest modern counterparts (opposite page) can suggest what has happened, and why, to the design of surgical tools.

His crooked amputating knife has been supplanted by a straight blade. In his day of inferior steels, and with speed essential, the amputating action had to be tearing as much as cutting, and the crooked blade provided better leverage for a hasty tearing-cutting through the tissue to the bone. With more time and better edges, the surgeon of our day can be more deliberate and discriminate in his amputating, and the straight blade provides the precision he wants and can finally afford.

Pare's amputating saw, itself not far removed from Roman versions, is only superficially different from the modern surgeon's bow saw (or, to be sure, the modern plumber's hack saw). The design principle is unchanged, though the Renaissance effulgence of carving has given way to a smoothness characteristic of all modern instruments — essential, of course, for efficient sterilization.

The "Crowes beake," Pare's hemostatic forceps, is still a crow's beak. Although there are now many sizes and shapes of hemostatic forceps, this particular model, while slightly less curved at the gripping end, is essentially, and even superficially, the same as Pare's; it is different only in several technical and minor design aspects: the material is stainless now (its strength better withstands the mighty stresses of surgery); mating rachets have been added to make it self-locking (important because in some major operations today dozens of hemostatic forceps are employed and remain in place over long periods of time); finger rings have somewhat improved its handling; a box lock with an integral rivet has replaced the pivotal screw fastener (pieces box-locked cannot get out of alignment, whereas screws loosen).

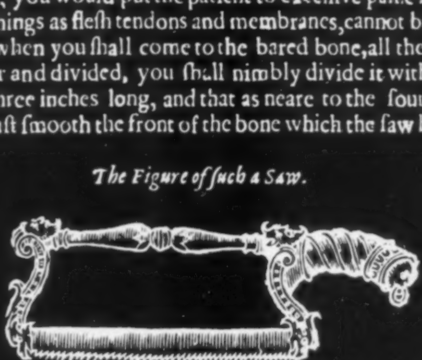
Growth of the surgeon's tool box

Antisepsis and anesthesia provided the means for more exacting diagnoses and therapies; the refinement of surgical practice created a demand for greater operating delicacy in order to reduce tissue trauma—these factors led to a proliferation of special-purpose instruments and special-purpose variations on the basic tools. Striking and drilling, slicing and shearing, grasping and holding: these are some of the actions which tools must perform, whether in surgery or dressmaking, carpentry or gardening. This relates tools, not

A crooked knife fit for diſmembring; or a diſmembring knife.

Now you muſt note, that there uſually lyes betweene the bones, a portio
certaine muſcles, which you cannot eaſily cut with a large inciſion or diſmem
knife; wherefore you muſt carefully divide it and ſeparate it wholly from the
with an inſtrument made neately like a crooked inciſion knife. I thought go
advertiſe thee hereof; for if thou ſhouldeſt leave any thing beſides the bone
divided by the ſaw, you would put the patient to exceſſive paine in the perform
thereof; for ſoft things as fleſh tendons and membranes, cannot be eaſily cut w
ſaw. Therefore when you ſhall come to the bared bone, all the other parts b
wholly cut aſunder and divided, you ſhall nimbly divide it with a little ſaw
ſome foote and three inches long, and that as neare to the ſound fleſh as yo
And then you muſt ſmooth the front of the bone which the ſaw hath made ro

The Figure of ſuch a Saw.

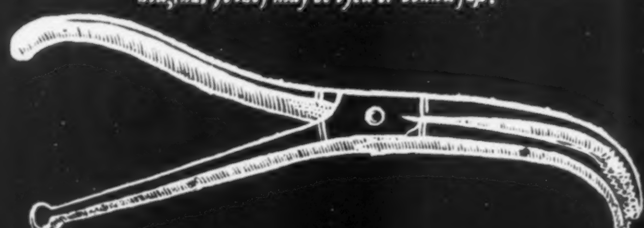


CHAP. XX.

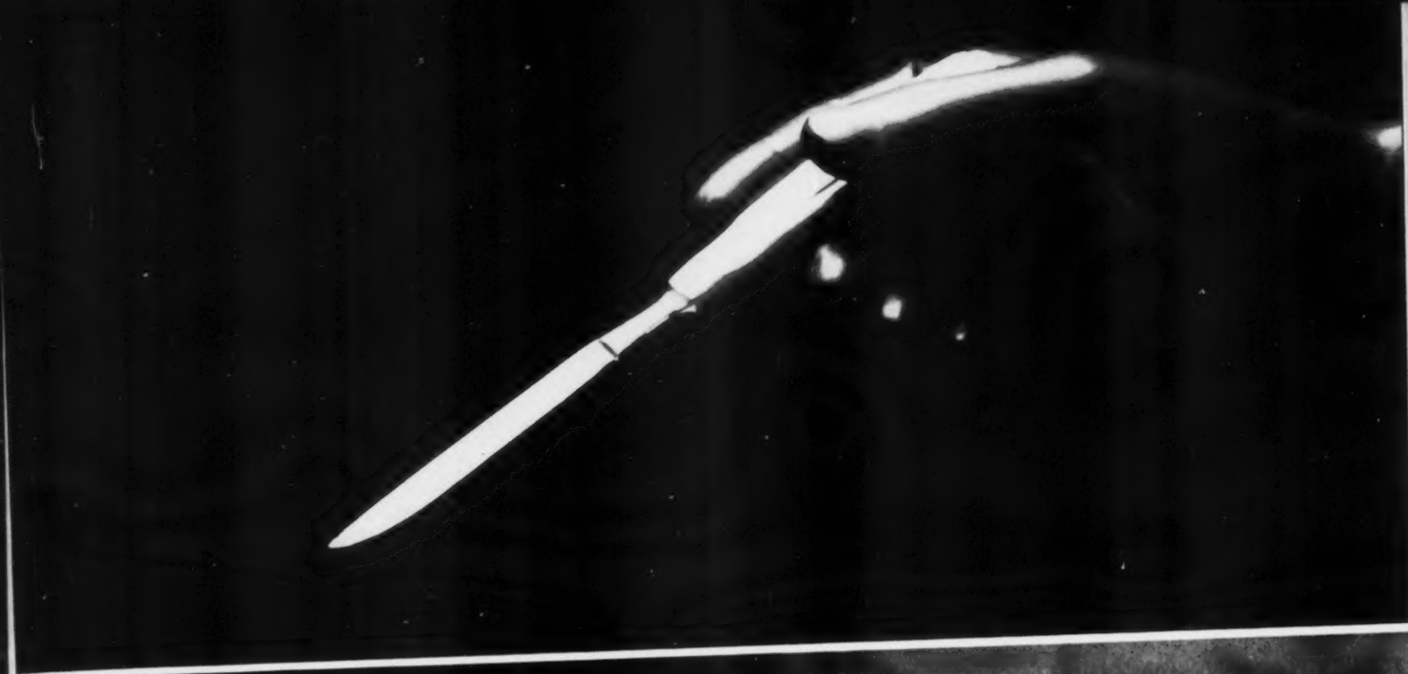
How to ſtanch the bleeding when the member is taken off.

WHen you have cut off and taken away the member, let it bleed a littl
cording to the ſtrength of the patient, that ſo the reſt of the part may
terwards be leſſe obnoxious to inflammation and other ſymptomes; T
let the Veines and Arteries be bound up as ſpeedily and ſtreightly as
can; that ſo the courſe of the flowing blood may bee ſtopped and wholly ſt
Which may be done by taking hold of the veſſells with your Crowes beake, wh
of this is the figure.

The Crowes beake fit for to draw the veſſells forth of the fleſh wherein they lye hid, that ſo they may be tyed or bound faſt.



The ends of the veſſells lying hid in the fleſh, muſt be taken hold of & drawn with
inſtrument forth of the muſcles whereinto they preſently after the amputation wi
drew themſelves, as all parts are ſtill uſed to withdraw themſelves towards their o
ginalls. In performance of this worke, you neede take no great care, if you toge



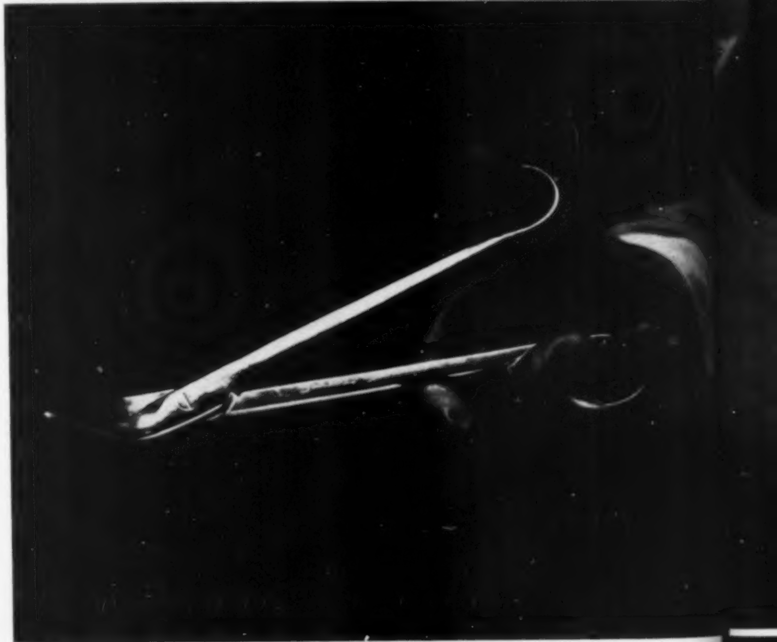
by configuration or material or medium, but by sameness of function. The instruments to the right — all surgical — have been presented to suggest their membership in the bustling family of drills and scissors, shears and vises. The large photograph opposite is of a generally useful orthopedic bone drill, with an aluminum housing (for lighter weight) that provides an exception to the stainless rule. Arranged around it counter-clockwise are: a cranial brace and burr; abdominal scissors, angulated for better visibility and facility in its particular jobs; rib shears, which could be given a wide spread for two-handed manipulation because they are always used in shallow cavities; bone-cutting forceps, designed with double-action leverage on a narrow sheath so that they could be used for heavy cutting in deep cavities; bone-holding forceps, with a racheted rear lever for self-locking.

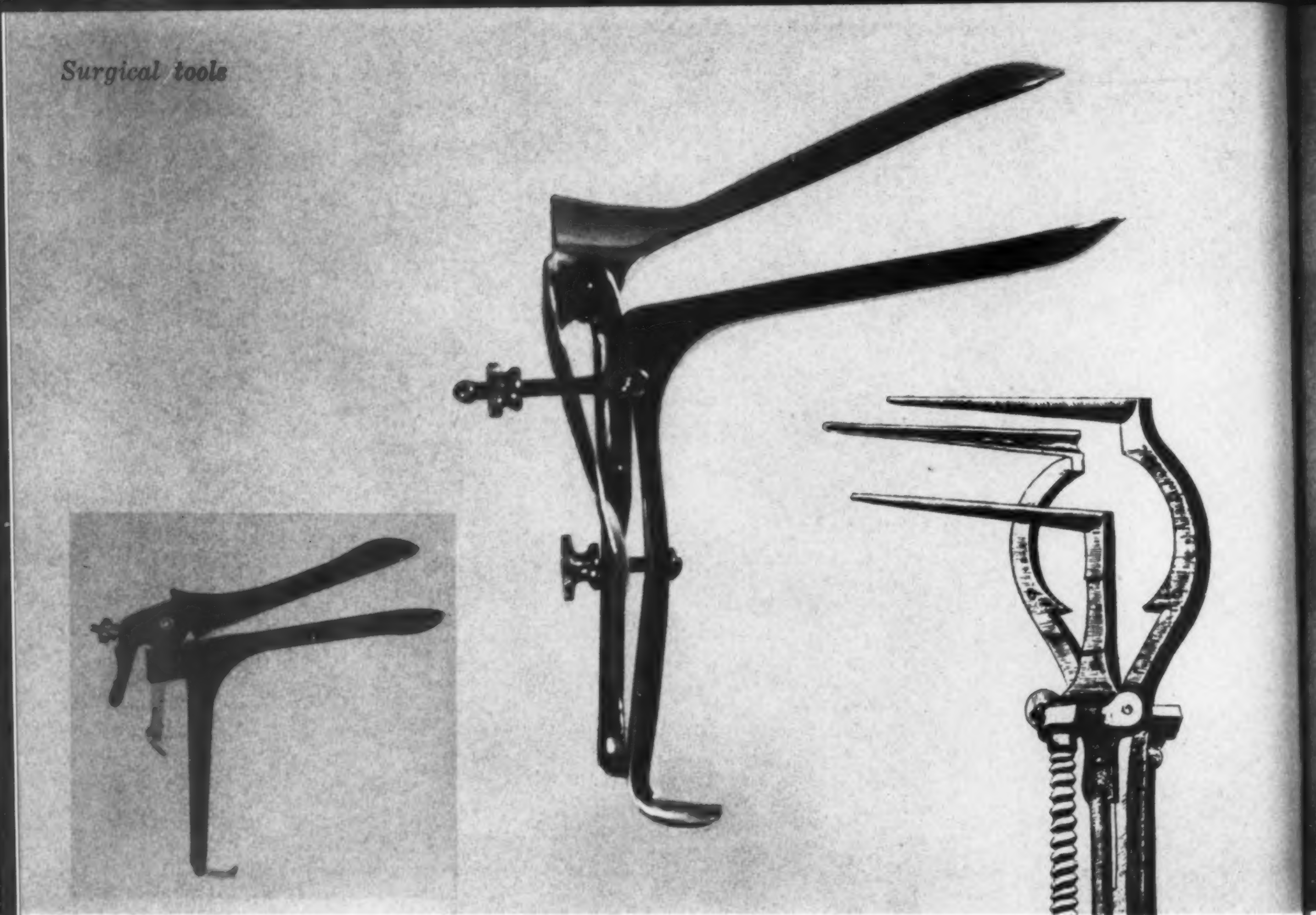
How tools are designed

The question of modern tools begins with the system that produces them. An instrument design is usually initiated by the surgeon, wanting to improve the function of a tool for a specific job. He takes his idea, perhaps with sketches, to a manufacturer, who renders it into steel. If the design seems successful and the manufacturer sees a market, the new instrument is put into production. On other occasions, where he detects a need coupled with sufficient demand, the manufacturer himself may initiate a design. Practically speaking, this method of design is direct and efficient: it tends to produce what the surgeons have in mind. But its limitations are enormous. What they have in mind is what they are familiar with. So the new designs are usually adaptations of existing instruments, often involving additional working parts. Here is one of the design difficulties, for working parts, which tend to increase with the complexity of the function, make sterilization more tedious where disassembly is required and detract from the stability that every surgeon (or carpenter) seeks. It is design by precedence rather than reevaluation, an approach that may lead not only to aggregation (vaginal speculum, p. 102) but to the misapplication of mechanical principles (aortic dilator, p. 104). Thinking in terms of known functional ideas, the surgeon may overlook possibilities for an imaginative reconsideration of the problems of efficiency, safety and comfort.

Austin Robert Baer, one of the few designers who has worked in the surgical instrument field, acknowledges the scant designer-surgeon communication, and deplores it. "No design area is so rich with the motivation of human need, and yet our contributions have been few. We have produced multi-purpose hospital beds with built-in sinks and TV, but have we created, or merely aggregated? A tour through the operating and delivery rooms of a hospital would show that the surface has not been scratched. The horror of the obstetrical table, with its leather straps and icy chrome, cannot be defended on the basis of cleanliness and function. Anesthesia apparatus, glaring lights and instrument tables are anything but reassuring to the patient. We must do more than remodel. The surgeon has done his best to provide for his own needs. We should now redefine his problems in design terms, and create his new studio. Perhaps a seminar attended by both designers and surgeons would clear a path toward undreamed-of solutions."

"We are technicians if we but carry out the surgeon's preconceived solutions," Baer concludes, "but if we can show him a better one, we have designed in the most satisfying area of creativity."

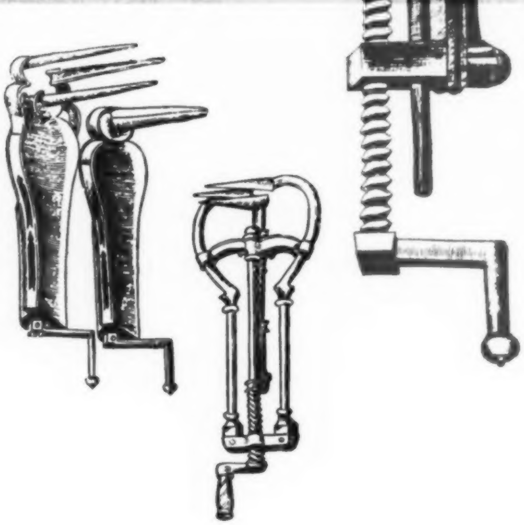


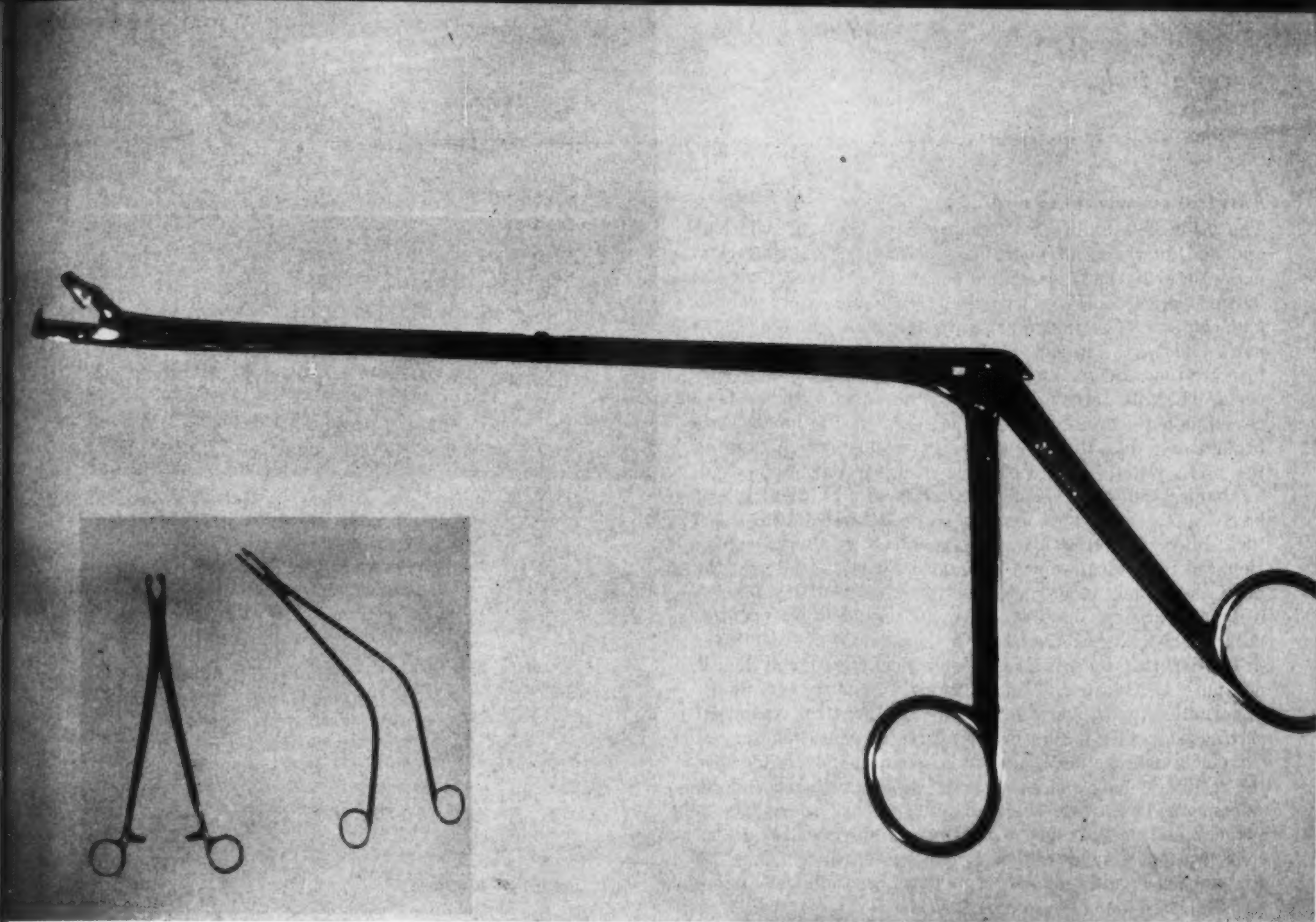


Vaginal speculum: how an old tool has evolved

To illustrate the historical and contemporary aspects of surgical instrument development, two important tools of gynecology—the vaginal speculum, ancient in origin, and the cervical biopsy forceps, of recent vintage—are presented on these two pages, one in terms of its evolution over centuries, the other in terms of its various current forms in one manufacturer's line. Dating from Roman practice, the vaginal speculum (this page) clearly derived from the surgeon's hand, with fingers first closed in the form of a cone for introduction and then spread outwards for dilation and examination. It developed in two distinct forms: the bladed and the tubular. The bladed variety, now rarely used, is represented to the right by three solid, unsubtle, downright frightening mechanisms of the 16th century.

The tubular (originally an actual tube) has developed into the widely used Graves (above). As more services were demanded—self-locking and adjustability—it became, and remains, a clattering, unwieldy aggregation of lock nuts and levers which complicate a relatively simple action with an inordinate amount of rattle and fuss. Nor is the material apt: stainless is unnecessarily cold and hard for sensitive tissues. A modification of the Graves has been effected in black nylon (inset above) which vividly demonstrates the room for improvement existing in instruments as generally accepted as the Graves. The advantages are provocative: thermally stable, it will not readily transmit heat or cold and reverts to room or body temperature almost instantly; its dark color prevents back-glare common with metal specula; working parts have been reduced and simplified. Other equally crucial instruments could well benefit from such revisions in material, color and mechanical plan.



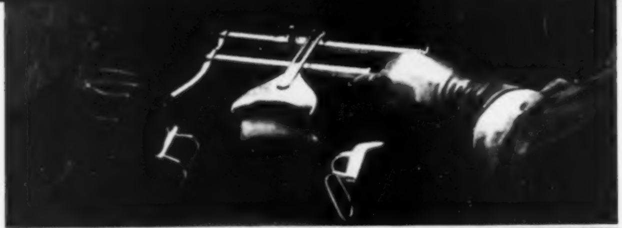


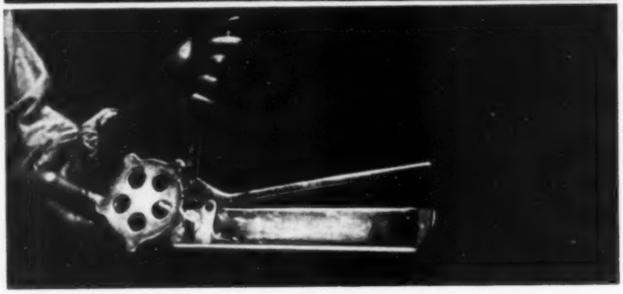
Cervical biopsy forceps: how a new tool is developed

There are over 2,500 items in the catalog of the Lawton Company, surgical instrument manufacturers; three of them are cervical biopsy forceps. This is the story of how, by a series of modest improvements, the Wittner developed out of the Thoms-Gaylor and the Schubert.

When a gynecologist, during visual examination of the cervix, has reason to suspect a serious disorder such as cancer, he extracts samples (called biopsies) of the tough cervical tissue for laboratory analysis. There are a number of ways to take such biopsies, but he is likely to use either a biopsy curette or biopsy forceps. The curette (right) cuts and encloses the bit of tissue between two diametrically opposed, sharp-edged cones that are drawn together manually. Biopsy forceps, however, are more commonly used.

The first cervical biopsy forceps to appear were the Thoms-Gaylor (inset above, left), which are still widely used. However, the Gaylor has several important drawbacks: the almost straight sheath impedes vision of the cervical area during use; the round cutting jaws get out of alignment as the screw fastener loosens; in order to get the leverage required to cut the tough tissue, the fulcrum had to be placed close to the jaws, which makes unavoidable a considerable spreading of the stems within the vaginal cavity and requires a very wide hand spread for a small jaw spread. The Schubert (inset above, right) eliminated misalignment by replacing the screw with a box lock and improved operating visibility by having sharply turned stems. But the major problem of the disproportionate hand and jaw spread remained uncorrected. Lawton, realizing this inadequacy, took the elongated Schubert jaws, added teeth to the lower one (for better purchase of the tissue), put them on an alligator stem, and sent the result (above), called the Wittner, out for trial. Apparently it answered the need—Lawton is currently battling a backlog of orders.



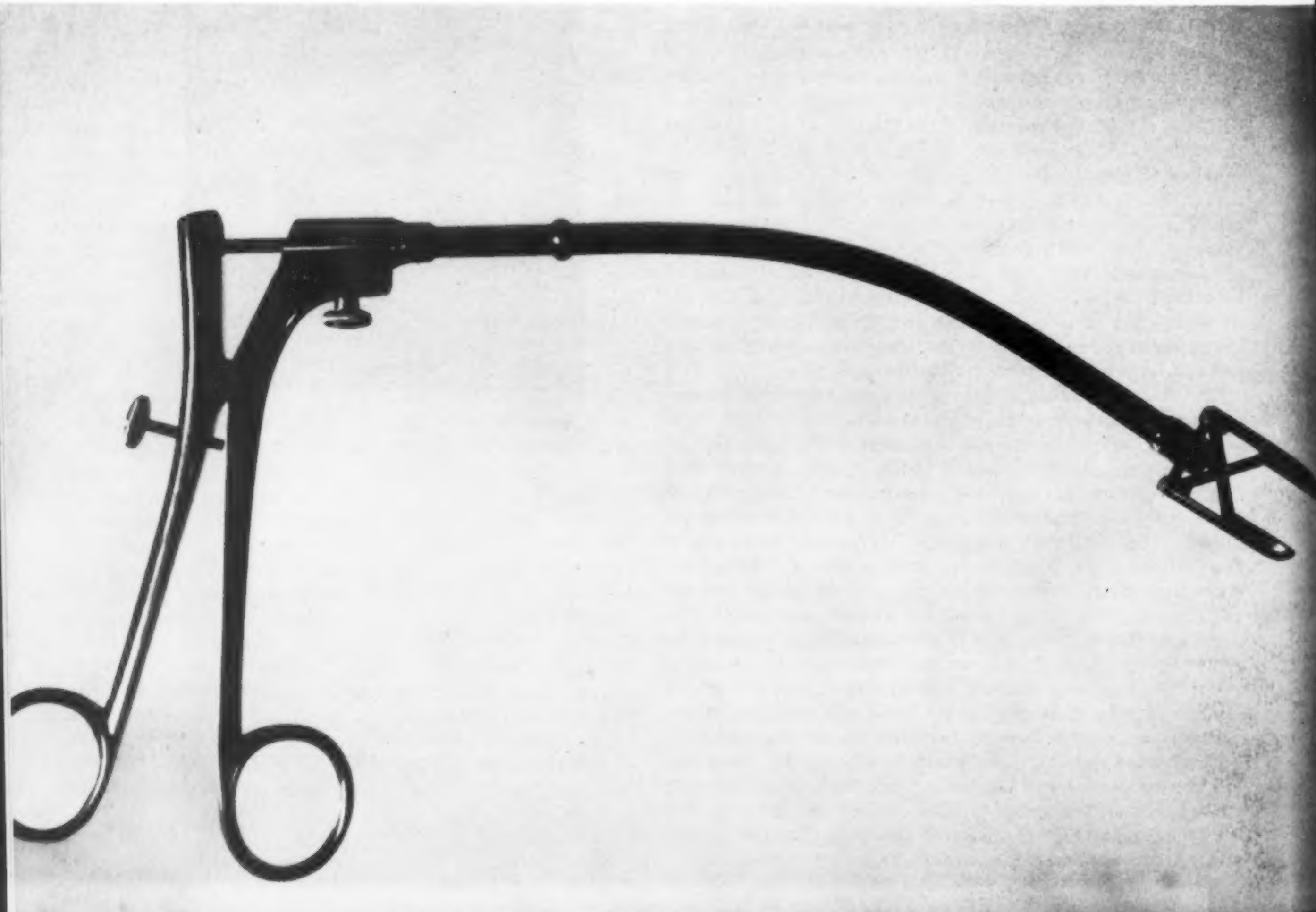


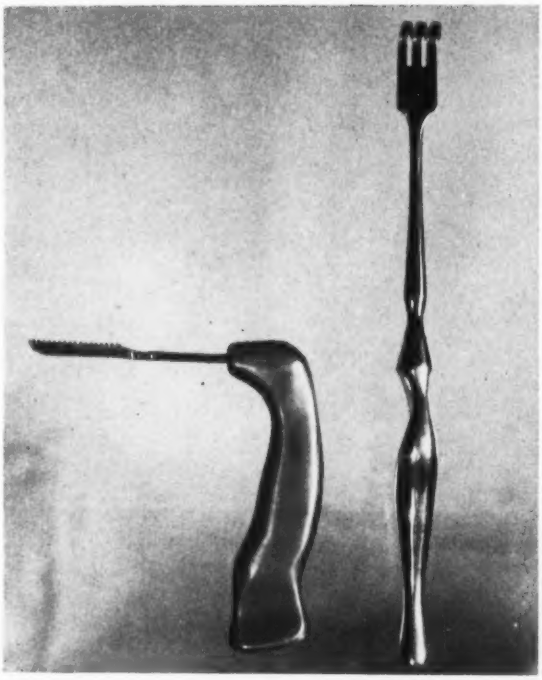
The self-locking abdominal retractor (upper) and the stomach and intestinal suturing apparatus (lower) are elaborate labor- and time-saving contrivances, the former replacing an assistant with hand retractors, the latter (a complicated cousin of the everyday stapler) providing a rapid and aseptic means of applying closing stitches in deep recesses. The worthy purpose of these designs has been established, but the solutions thus far are expensive, overly complicated, and open to reevaluation.

Surgical contrivances and . . .

The designer's ability to visualize new *kinds* of solutions and his knowledge of materials, mechanical principles and manufacturing methods should enable him to reevaluate existing surgical tools in terms of efficiency and safety, control and comfort. The instruments to the right, and, perhaps more vividly, the intricately levered aortic dilator below illustrate the need for an imaginative rethinking of tool concepts. The dilator is inserted into the aorta with its jaws closed as a flush extension of the stem. As the handles are brought together, the jaws spread in parallel motion, dilating the aortic walls. Paradoxically, as designer Baer points out, mechanical advantage and sensitivity are at their lowest level in the closed position, where most needed, and reach their highest level as the jaws approach maximum expansion (as in photo), where leverage is least needed and the jaws most likely to damage the distended wall tissues. "A hydraulic expansion," Baer suggests, "gives linear control with precision. Are the right principles always applied?"

The designer's potential in the surgical instrument field is not pure speculation. Thomas Lamb's handles and Baer's fingernail scalpel (opposite page), which provides a compact cutting edge with a high degree of tactile sensation for one extremely delicate heart operation, are actual contributions, the results of long and painstaking design research and development. They were achieved only because specialists in surgery and design came together in a spirit of respectful collaboration, a spirit which, if cultivated, can enhance the further development of surgery along broad clinical lines—and of design along broad creative lines.

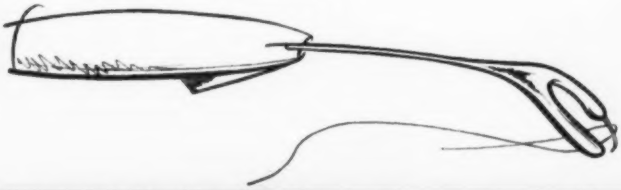


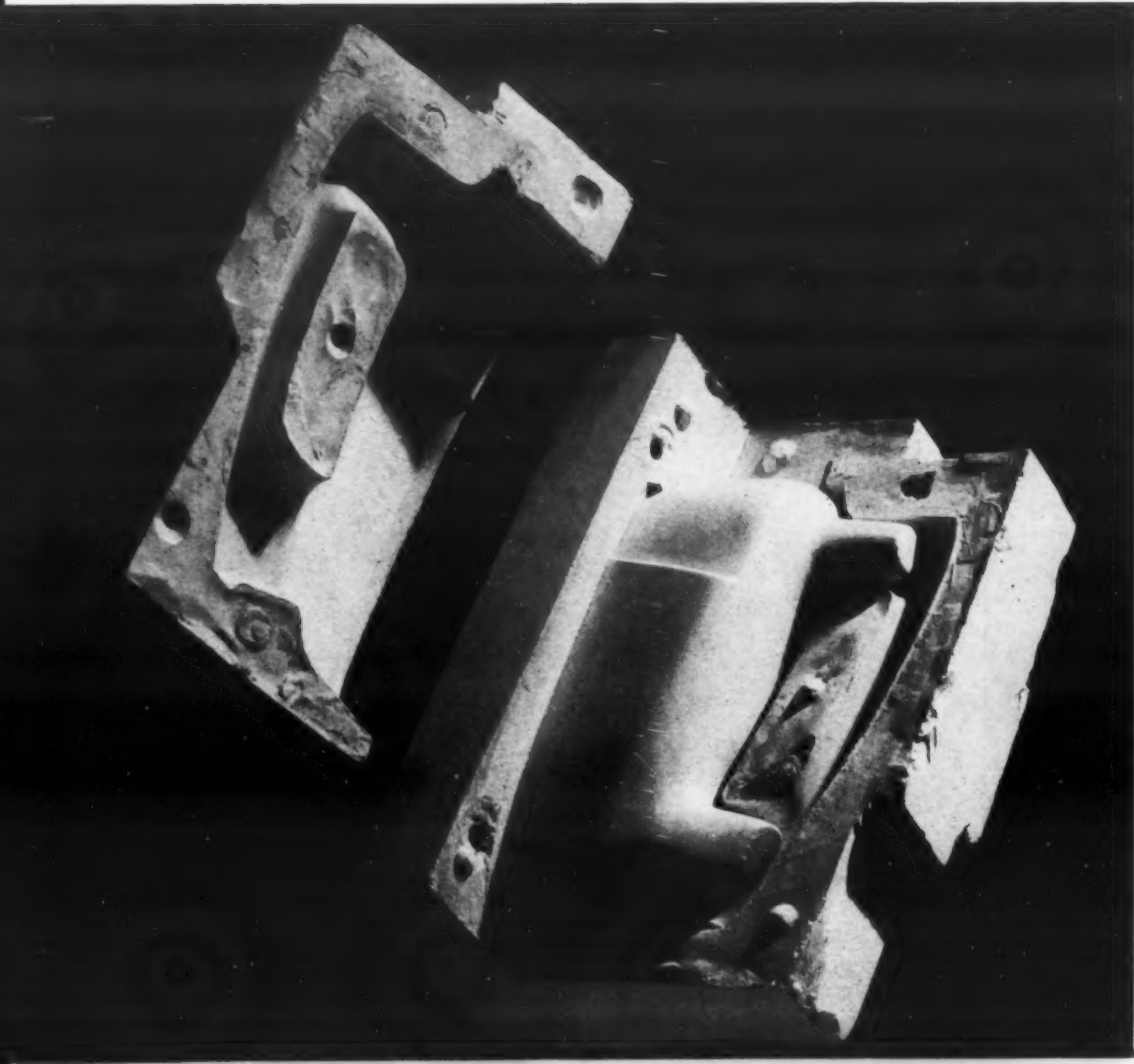


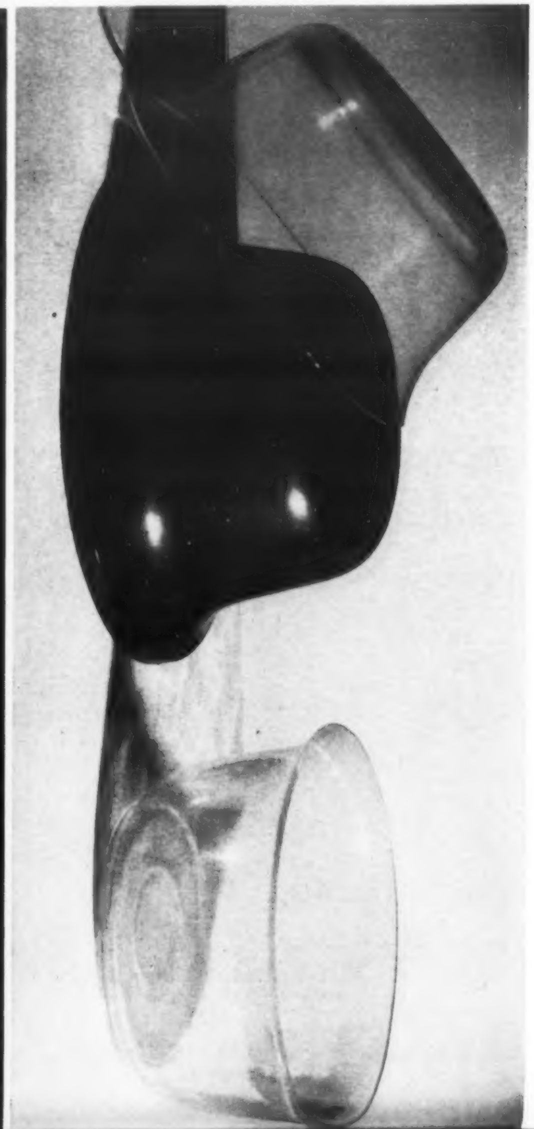
. . . the designer's potential

(←) Lamb's contour handles lessen fatigue with tools like retractor (right), held for long periods of time; increase control with tools like nasal saw (left), requiring great precision.

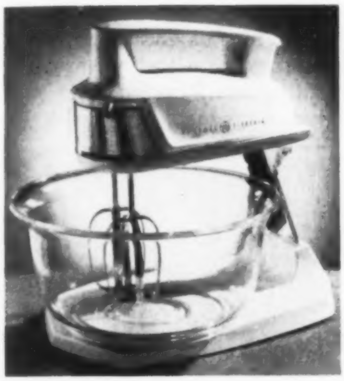
The thoughts of designer Austin Robert Baer on surgical stitching suggest an approach to reevaluation: "A self-contained rotary needle (sketch below) could produce uniform stitches with great efficiency. But is this the answer? We might try to design a hollow needle, carrying a continuous supply of suture. But a spider germinates its own 'suture' — could this principle be applied? Perhaps a chemical could react with body fluids to produce a monofilament in the needle's wake. If this could be done, does it suggest another way of joining tissues?"







Prototype model of a G.E. electric mixer (opposite page). The upper shell was cast in epoxy, using a Calcerite piece mold (below). The hollow epoxy shell permitted installation of a hand-made prototype motor, and in this way operational (as well as molding) difficulties were ironed out before tooling. Prototype mixing bowls (above) were of two types: a transparent acrylic bowl (left), vacuum-formed over a furan male mold, was useful for a design analysis of the object in terms of optical clarity; a clear-cast polyester bowl (right), although having a green tint imparted by the necessary parting agent, was useful for designing in details.



Exact appearance model of mixer

In the Housewares and Radio Receiver Division of General Electric, Bridgeport, as in many industries dealing with finished consumer products in which design is a critical consideration, there is a serious need for exact appearance models to evaluate design, pretest products and present new ideas to management. At the national meeting of the American Society of Industrial Designers last fall, two members of the G.E. staff discussed a range of new techniques for model making that have been developed at Bridgeport, and described how, by extensive experimentation with plastics and modeling methods, they have found ways to turn out dimensionally stable, highly accurate prototype models. Mr. Rudy Koepf, Manager of Appearance Design, described the background of the problem and introduced Mr. Edward Ferrari.

New techniques in model making

produce perfect prototypes of G.E. small appliances

By Rudy Koepf

Two kinds of models play a vital part in the development of a G.E. appliance: test models and appearance models. The former are made and used by the engineers exclusively for testing and analytical studies. The latter are the designer's device, the translation into three dimensions of the flat design. This appearance model is crucial for more than accurate visualization of the product; it has to serve for color studies, consumer surveys, costs analyses, tool guide, and development of manufacturing and packaging procedures.

For years at G.E. these appearance models were simply a solid mass of plaster, wood or metal, and duplications of whatever number had to be hogged out by the same laborious process used to make the original. In addition to this difficulty, the old technique had two drawbacks: the broad potential usefulness of models in testing and planning was limited by the cost and time involved in making them; and a solid model, lacking openings, louvers or baffles in its interior, obviously could not demonstrate any of the important operational factors — clearance dimensions, location of mounting bosses, etc. — encountered in checking heat resistance or air flow characteristics. A cored plaster model could help in some ways, but could not serve for many of these tests because of its extreme fragility. Clearly we needed a hardy model that could demonstrate all of these conditions and, ideally, be duplicated up to 100 times. It was a problem in duplicating an end product in number, but without any investment in tooling.

We started a search for a material that would permit repeat castings of thin-walled sections having a high degree of dimensional stability; new plastics were coming on the market, but their potentialities in this field had to be explored extensively. The answer was eventually found in several thermosetting resins, particularly of the epoxy family, which could readily be compounded in our model shop and cured at room temperature.

As Mr. Ferrari demonstrates on a later page, the process of matching the resins and the mold materials and of finding ways to finish them for exact duplication of the end product was a long and diligent experiment. Our techniques have now been developed to permit reproduction of parts simulating any material desired. Also, it is now possible to provide casts possessing properties relative to the functional aspects of production units. And the cost of duplicating model parts has been reduced considerably. In fact, a whole new service was born as the result of our interest in building better and more durable appearance models.

Model Making at G.E.

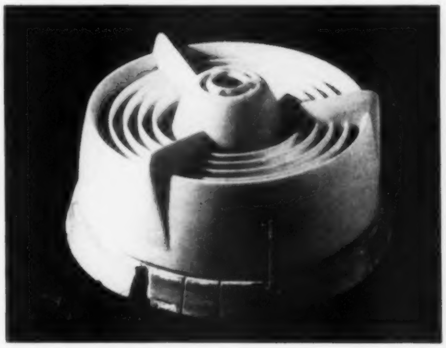
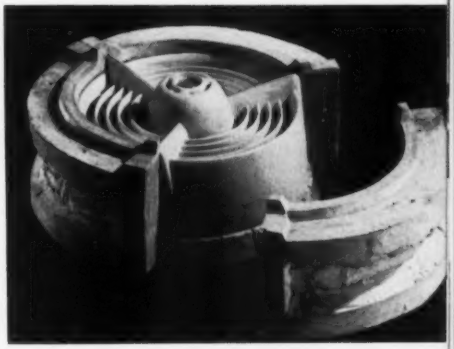
In re-entering the fan heater market this past year after leaving it in 1950, General Electric felt the need for a new concept in fan heaters, keeping to a minimum the capital investment in new manufacturing facilities and tooling. It was decided to restrict the product line to two heaters. One, incorporating a large reflective element, was to cover the space heater market and be placed in the top cost bracket ($39.95). The other, low cost ($19.95) and small, was to cover the spot heater market. The latter, depending on simplicity in construction to achieve the desired design objectives, was broken down into three major assemblies: stand, cover and motor-heater assembly. In order to give a visual presentation of this plan to management, a model was necessary which could perform as an appearance model for design study, as a test model for engineering, and, where necessary, as a tooling master for the mold maker. The following steps were taken in producing the model.

1. *Initially, a core for the fan motor housing is turned in plaster with the aid of zinc templates.*

3. *A thickness of clay is placed over the grill portion of the model and the top edge of the piece mold.*

5. *The cap piece is again taken off. The elastomer mold is removed from the model and placed in the cap piece.*

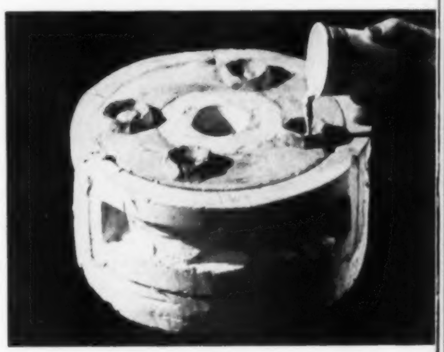
Stages of developing fan heater model illustrate typical technique with plastics

2. A core for the fan heater housing and front grill are similarly turned in plaster and related to the fan motor housing core. Then an original plaster model is turned and fabricated over the cores, after which a plaster piece mold is made around the heater shell, allowing enough space for the mold thickness. Each of the three piece-mold units is made individually.



4. A plaster cap piece is made over the clay and plaster piece mold and allowed to set. The cap is then lifted off, and the clay is removed from the grill, creating a cavity. The cap piece is replaced and elastomer poured into the gate until the assembly is filled, after which it is placed in an oven at 220° for curing. When the elastomer mold is cured, it is allowed to stand until cooled.

6. Cores, piece mold and flexible mold are disassembled and prepared for casting. The original plaster model is removed, creating a cavity into which, after reassembly of the mold, the epoxy casting resin is poured.

How materials and techniques are combined to make molds and exact castings

by Edward Ferrari

Four main types of molds and four main casting resins are involved in the process of making G.E. prototype models. According to the desired result (and the time at hand) various combinations of mold material and casting resin will be selected. Let us first consider the mold possibilities. Principal types are: 1. rigid plaster; 2. rigid reinforced plastic; 3. flexible; 4. electroformed.

Rigid plaster molds are simple and economical when it is necessary to cast a few pieces only. However, molds of this type are not durable; they are subject to damage during removal of the casts. The simplest sort of plaster mold is one which is made in one piece. The original model is placed on a level surface or background. A fence or flask is then built around the model, allowing enough space for the mold thickness. After applying a parting agent to the assembly, it is filled with successive layers of Hydrocal plaster and reinforcing burlap. When the plaster is set, the flask and mold are removed from the model, and stand ready for casting.

In the case of a plaster piece mold, parting lines must be determined. Each piece of the mold is made individually by placing a fence on the parting line. After the first piece is made, the fence is removed and adjacent pieces are molded one against the other. When all the pieces are made, they are nested in a matrix. Keys are notched into each piece to insure their proper location. A parting agent facilitates the separation of each piece from the other and from the model.

If a cored or hollow cast is necessary, the mold is reassembled. The wall thickness desired in the cast is established by placing sheet wax or clay on the inside face of the mold. A plaster core which is related to the outer piece mold is poured in the remaining cavity faced with the wax or clay. The core is then removed from the mold, also the wax or clay. The space thus created between core and mold is the cavity which will be filled by the resin.

Rigid reinforced plastic molds are more durable than their plaster counterparts. Consequently, they are preferable when many casts are desired and the cast is amenable to being poured in a rigid mold. We make these molds of Fiberglas (Owens-Corning) reinforced plasticized epoxy, phenolic, or Calcerite (Furane Plastics Company), which consists of finely divided amino resins and is mixed in the same manner as plaster. Five parts of the powdered resin are mixed with one part liquid catalyst. It can be reinforced, as desired, with Fiberglas, sisal fiber or wire mesh, and is equally adaptable as mold or cast material. In mold form, it is very suitable for casting epoxy resins.

Flexible molds are utilized when there is considerable intricacy of design in a part to be cast. They are advisable when it is necessary to reproduce fine details such as texture and embossed or debossed lettering or numerals. There is a wide variety of flexible mold materials to choose from, each serving an individual necessity. Broadly, they group into three categories: a. natural rubber lattices; b. synthetic rubbers; c. vinyls.

Natural rubber lattices are applied in a series of coatings either dipped, sprayed or brushed. Each coat is allowed to dry before the next is applied, and each is reinforced with a layer of cheese cloth or filled with cotton flock. When the self-vulcanizing rubber is thoroughly cured, it is backed up with a plaster matrix or case. Some lattice molds are compatible with polyester resins; some are not. This is dependent upon whether or not they contain free sulphur compounds, which inhibit the cure of the resin. The process of making a lattice mold is slow, and they are subject to shrinkage and a consequent loss of accuracy in the cast. The rubber lattices are marketed under the tradenames of Vultex, Rubamold, and Casto-Mold.

Synthetic rubber molds are of two types: polysulphide and silicone. The former consists of three compounds: the synthetic latex, the curing agent and a catalyst. When the three ingredients are mixed together, they cure at room temperature into a solid but flexible mass. The procedure with this material is to coat the model with a parting agent and then spread the catalyzed rubber over the model with a brush to an even thickness. After it has cured, a plaster matrix is poured over it. Since there is no heat involved in this method, it is useful in transposing a clay or plasteline model directly into plastic. This material is known as Perma-Flex CMC and is compounded by the Perma-Flex Mold Company.

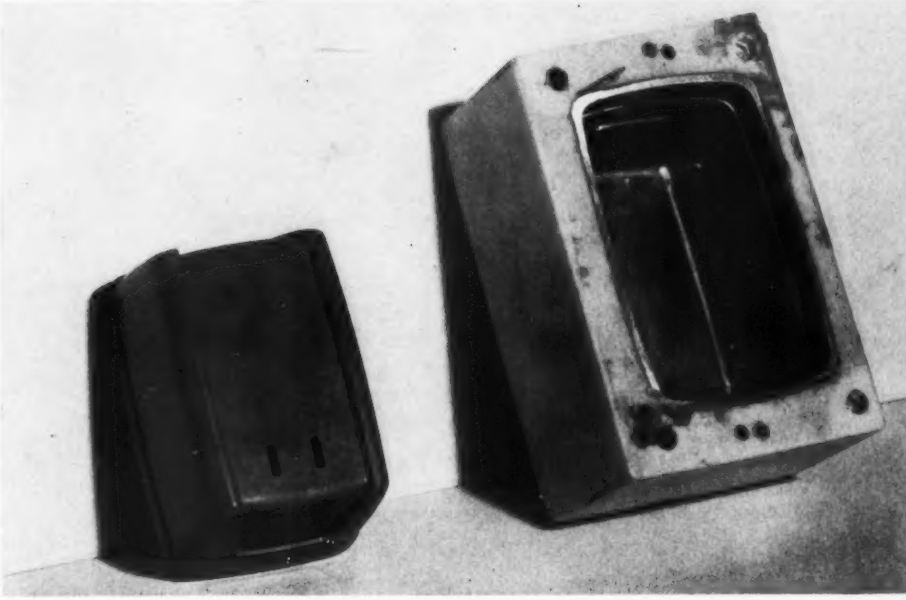
The other synthetic rubber we use is a silicone. It consists of two compounds, one of which catalyzes the other when they are mixed together, and it is known as RTV Silastic (Dow-Corning. It can applied to the model with a spatula to the desired thickness and is backed up with a plaster matrix. Although these synthetic rubbers have good dimensional stability, they are weak in structure and are, therefore, not too well suited for multiple casting. However, they are excellent for casting clear-cast allyl polyester and acrylics.

Vinyl flexible mold materials can be classified in three groups: cold-poured, heat-cured plastisols and Elastomer #105, and the hot-melt vinyls. Plastisol molds are made by fastening the model to a background. A fence is placed around the model and thoroughly sealed against leakage. The plastisol is then poured until the model is totally covered; the assembly is then placed in an oven at 350° to 365° F. and cured. If necessary, a plaster back can be poured over the mold before removing it from the pattern. The pattern must be made of a non-porous material capable of withstanding the curing temperature of the plastisol. This type of mold has good tensile strength and is well suited for all types of casting resins. The basic vinyl is supplied by B. F. Goodrich Company and is known as Geon 121. It is compounded by the Applied Resins Corporation under the name of Arco-Flex.

The elastomeric vinyls are poured in an open mold in the same manner as is plastisol. However, it is possible to pour and cure elastomer on a model made of porous materials such as wood and plaster. Because it has this property, elastomer can be used for large molds. To do so, we first make a plaster case over the model. A space is created between the model and the case into which the elastomer is poured. This is accomplished by pressing strips of ¼" plasteline onto the model until they make contact with all of its surface. To this layer of plasteline, cylinders of plasteline are added at each of the highest points to serve later as pouring gates and vents. Over the plasteline a plaster shell is made using A-11 Hydrocal plaster reinforced with AA mosquito netting. When this plaster case has set, it is removed from the model. The plasteline is also removed. The case is then thoroughly dried and covered with paste wax to insure parting from the background. The elastomer is poured into the gate until the assembly is filled, whereupon it is placed in an oven at 220° to cure the elastomer. When the mold is cured, it is allowed to stand until thoroughly cool and is then removed from the model. Elastomer #105 is compounded by the Elastomer Chemical Company from vinyl resins supplied by Bakelite.

Flexible molds of hot-melt vinyls are produced in much the same manner. They are used where molds are very large, and the fact that it can be remelted constitutes a definite economy.

Electroformed molds (photo this page) are achieved by the same process employed in electroplating, except that the rate of deposit is increased and the plating time is lengthened considerably. When the mold has reached the desired thickness, it is removed from the model and polished to a high lustre. If necessary, the back of it can be encased in a cast plastic block to provide a surface for the guide pins of the mating mold. Cast plastic parts produced in electroformed molds will have the appearance of production-molded plastic parts, both in texture and color.



Plastic model of experimental shell housing for electrical components (left) was made in nickel electroformed mold (female half at right, its back encased in plastic), developed by G.E. with Peter W. Cherry.

The type of casting resin to be used in model and prototype work is determined by the conditions of its end use. There are, as mentioned, four principal types: phenolics, furans, epoxies, and polyesters, reinforced and clear-cast.

Phenolic casting resins are used where heat resistance and dimensional stability are necessary. They are a product by condensation of phenol with formaldehyde. The reaction of this combination continues and, therefore, limits their shelf life. Refrigeration (42° F.) tends to retard this continued reaction and extends the usefulness of the resin. Polymerization is produced by the addition of a catalyst and the application of heat (120°-150°F.). A cold-setting mixture can be produced by adding an accelerator in addition to a catalyst. The accelerator produces sufficient internal heat to effect the cure of the resin at room temperature. Casting phenolics are marketed by a number of firms and are know as Rezolin, Marbelette, ARC120, Arcolite, etc.

Furan casting resins exhibit good dimensional stability and resistance to constantly high temperatures; also, their resistance to impact is good and can be controlled. The mold can be a closed one with a pouring gate and adequate vents. However, the best results are obtained by pouring into the open halves of a two-part mold and allowing the resin to reach a degree of gelation which will permit pressing the two halves together without having any run-off. This results in a compressed casting which is denser and free from any surface imperfections. The cast may be cured in the mold by the addition of heat ranging from 150° to 300° F., dependent upon the mixture used. The mold and cast should be allowed to cool before removing the cast, which will be dimensionally stable and can be buffed to a lustrous black finish. It can be subjected to a constant temperature of 375° F.; Irvington Varnish and Insulator produces furan resins known as Furatone 1347 and Catalytic Extender 1748.

Epoxy casting resins are used where impact strength and dimensional stability are important but resistance to heat is not necessary. Each epoxy producer has his own proportions of hardener to be added to the resin. Some types need a degree of heat in order to complete their cure. A high shrink factor is apt to result when epoxy is cast more than 3/8" in thickness at one time, though combining fillers such as micas, silicas, calcium carbonates, and chopped glass will tend to reduce this reaction. The basic epoxy resins are produced by Shell Chemical, Ciba, Devoe & Reynolds, and Irvington Varnish and Insulator.

Polyester casting resins which we use are of two types: the reinforced and the clear-cast. Reinforced polyesters are best suited to large castings which require good impact strength but need not be dimensionally critical. The resins are normally reinforced with glass fibers in matt or woven cloth, incorporated in a series of layers known as a wet lay up. The mold preparation varies according to the type used. A plaster mold must first be sealed with a good lacquer, then waxed, then sprayed with a mold-parting agent. If an elastomeric vinyl

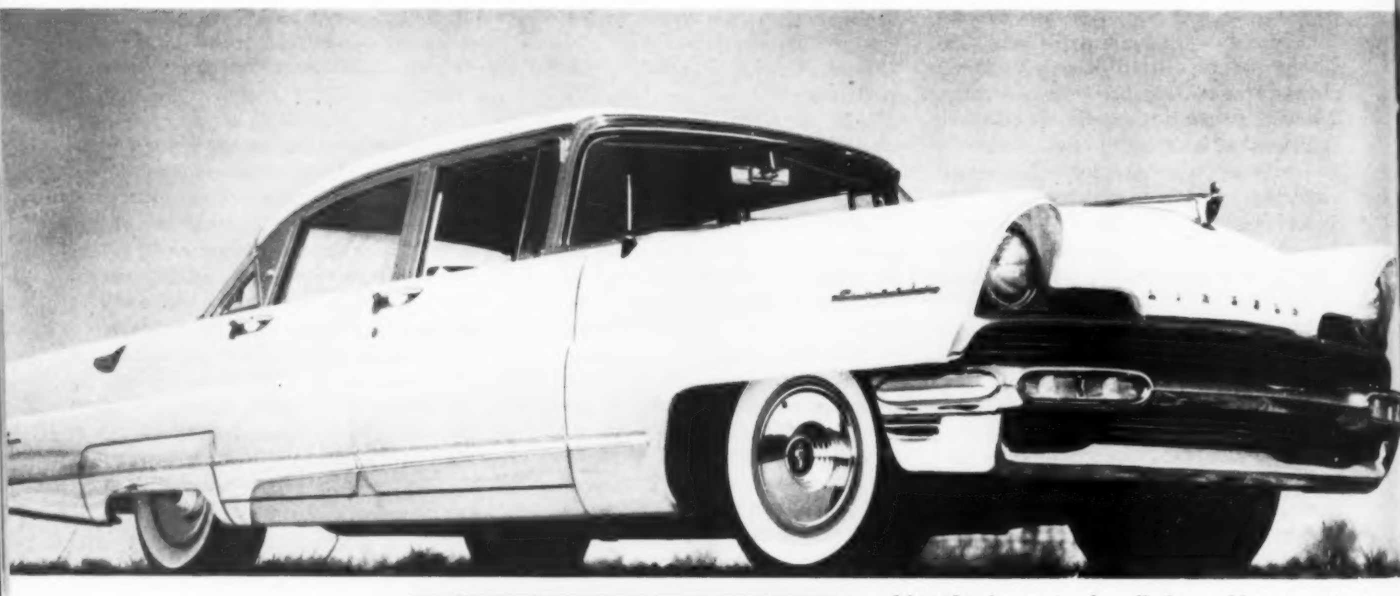
(Continued on p. 122)

G.E. has realized substantial time-saving by use of models in preparing tooling. The cast epoxy fan heater model portion (below) is a master tooling guide.

Cars '56

by Deborah Allen

The look for 1956 *is summed up* **in the new Lincolns:** big, boxy, low-lying slab of a body—square plan emphasized by wide grille—long horizontals of the sides ending in a lively cant at front and rear—hardtop-type roof with straight front post and cascading rear. Lincoln, the only all-new car of the year (save the revived Continental), serves as a focus for a look that is more or less the goal of many manufacturers. The effect, at its best, is solid and dashing, but it raises many design problems.



Lincoln *does not solve all the problems posed by the Look, but it makes a good start:*

1. A boxy car tends to be a collection of separate elevations: flat sides combine badly with a deeply curved profile. The difficulty is multiplied by the wrap-around windshield, which emphasizes the flatness of the side windows. These problems disappear if the car is conceived in the round from the start. Rolling under of the belly, the neat turn of the sides at either end, and extension of chrome side strip into rear fishtail all express a three-dimensional concept.

2. Long parallels of the slab side lack dynamite. The problem is severe in a car like Lincoln, where length is exaggerated to emphasize lowness. A slight lift to the lower line on the deep rear cantilever helps.

3. Straight front post introduced with wrap-around windshield is generally at odds with over-all modeling of car. Best solution: slant the post to the design. Lincoln's best solution: equally square lines at rear in the sedan.

Chevrolet *reemphasizes its big boxy look this year by lengthening the nose, raising the fenders, extending the grille straight across the front. Fleet line of hardtop roof is emphasized by new swept-back wheel openings.*

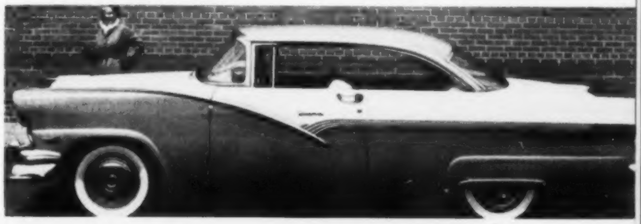
Shortcomings *of the design show up from another angle. Sweepspear and flat haunch are insubstantial from this view, and "greenhouse" does not foreshorten well. Curved windshield reads from any position, but odd outline of side window does not. Effect of four trompe l'oeil's tacked together is found on many cars.*

Packard, *an unusually high car, gained lower, fleeter effect this year by raising and canting rear fender and striping side with chrome and paint. Straight stripes and low relief modeling of the haunch emphasize unnatural marriage of flat side with sculptured front and rear.*

Nash's *lines are remarkably heavy, yet there is justice in its over-all concept. Where most boxy cars are a collection of flat elevations that contrive to look more sculptural than they really are, Nash is bluntly presented as a series of slabs joined at right angles.*

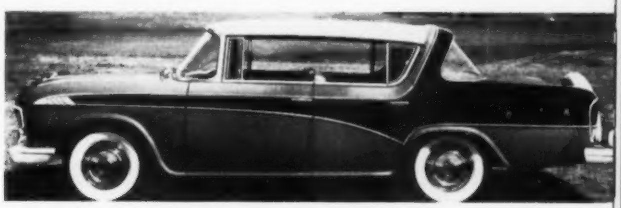
Success of the hardtop *is a big influence on design. About three fourths of cars sold last year were hardtops or convertibles; this year the four-door hardtop introduced by Buick and Olds, appears in almost every line, and even sedans try to capture hardtop glamor.*

The low-springing roof that usually spans the hardtop is typical in '56. Now that they know how to engineer it without losing headroom, designers are using it everywhere. Ford lowered roofs on both hardtops and sedans this year.



The hardtop look is an airy look, yet the lowered roof leaves narrower windows. Mercury makes them look bigger with painted trim on hardtops, actually cuts down the window in sturdier sedans, so that one is about as airy as the other. Sedan got lower windows last year, lower roof this year.

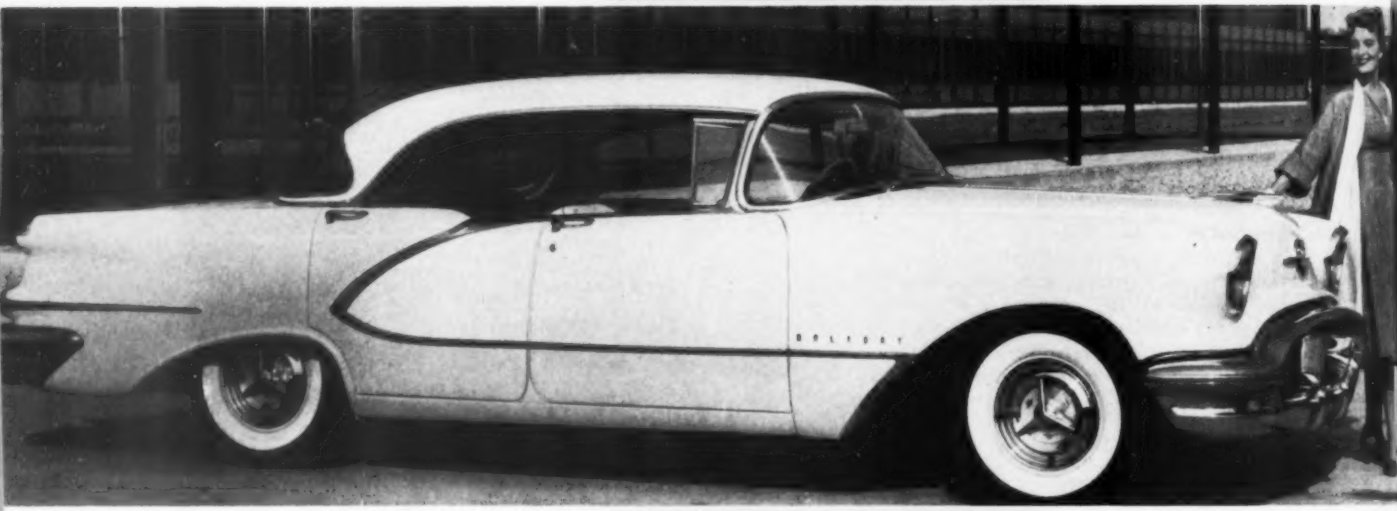
Rear door is a design problem in the four door hardtop. Actual opening is smaller than opening for front door; an overlap makes it look as big when door is shut and is also said to add strength. Result, however, is an unsightly job when door is open and a rear post that seems to hang in air.



Unitized construction of the Rambler allows a wide opening with an attractive squareness, although the heavy band trimming the roof beam at the rear detracts from the open effect.

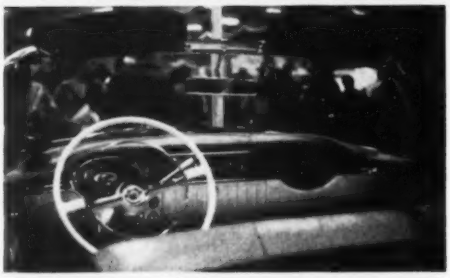
Small changes

can make a big difference. Last year Buick seemed like the stand-out in the GM line; this year small changes have shifted the balance. Though neither Buick nor Olds could be called a masterpiece of design, this year's Oldsmobile is a masterpiece of consistency in GM's current voluptuous style, while Buick seems to be pointing toward a new model in the future.



Chief change in Olds is simply the chrome sweepspear: what last year was a slight and indecisive ornament in this year's 98 is a sweeping keynote that emphasizes a composition of broad curves and repeated ovals. More important, it helps to turn the car inside out, so that Oldsmobile is not a simple enclosure but an elaborate series of convolutions. As it curves across the body it implies a roundness that isn't really there; when it reaches the belt line it turns over and becomes a horizontal band along the door that carries the eye naturally around the interior of the car.

Over-all, the Oldsmobile is bulky and pretentious. The cleaned-up rear fender is still an ineffectual trailer, but one can say the designers have captured a strong effect of substance, spaciousness, and rich abandon.



Buick's biggest change this year is in a slight pointing of the old blunt nose—a small change that shows the importance of one line to a whole design. Buick and Olds have justified their monumental proportions by looking as if they pressed the limits of

reasonable size. The pointed nose is part and parcel of a daintier design; it suggests that other parts of the car could also be shaped and trimmed. The slab sides, with their low-relief modeling and illusionistic ornament, seem unnecessarily flat by contrast. It may mean that the next model will be trimmed down all around. An innovation that could be more important is Buick's new grille ornament, which courts obsolescence by flaunting the model and the year.

Small changes make strange bedfellows: *The '56 Studebaker is said to be 80% new, but the basic body shape dates from the one Raymond Loewy designed in 1953. The new designers have contrived to make Loewy's Studebaker look much bigger by building up the front and rear ends to the boxy lines of other cars. The result is a contrast of skill and ineptitude. Loewy's hand is seen in the "greenhouse," which was neatly tailored to the economical slope of the old front and rear. Its sculptured planes do not sit well on the new box. Hood and rear deck are so flat as to look dished in certain lights, while a series of undynamic parallels destroys any effect of roundness in the sides. The sweapspear drawn parallel to the belt line destroys what was once a nice curve from the rear deck down to the side windows.*

Wings: *Chrysler's cars were designed in '55 to nose the ground like birddogs. This year the effect is heightened by new raised wings at the rear. Though at odds with the overall design, they do add drama.*

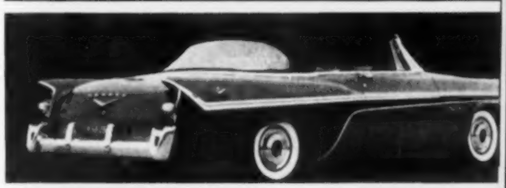
On Plymouth, the wings make a small car look fleet.

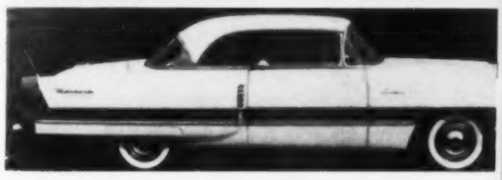
On Chrysler, long airy wings end in a complex of lights and chromework that looks heavy enough to upset the balance of the car.

Rear detailing of the DeSoto puts the new wings in better balance, but still they are a flippancy in an otherwise tight design.

Packard uses paint and chrome to give a lift to the rear of a sports model. Since the basic body is nearly as neutral in shape as a billboard, almost any applied decoration is appropriate.

Chevrolet (previous page) uses a sweepspear to get a winged effect.



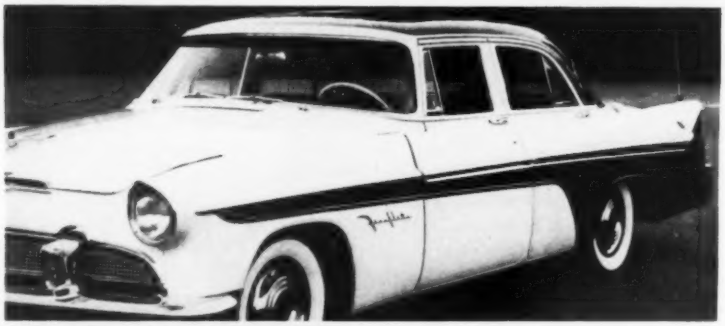


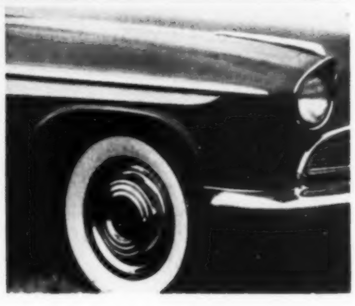
Pure beauty

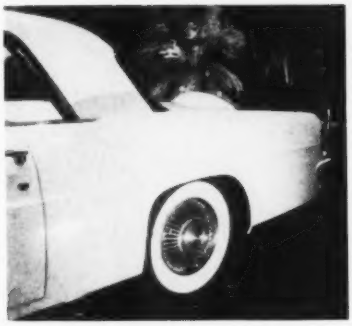
is not the single-minded purpose in Detroit; the best one can hope for is that the sure hand of a skilled designer will shine through the timely sales appeal. And if it is there, it shows first in the over-all modeling of the car, then in the detail. Now that most of the designs have been on the market for at least a year, we would say the only cars that can seriously be taken as beautiful cars are the Chrysler cars, and of these we give the biggest bow to DeSoto. We give a smaller bow to Chrysler and Imperial, a brief nod to Lincoln and Studebaker, and regrets to the Continental, which should have been the prize of the year.

Chrysler *is more restrained than DeSoto, this year, though not as consistent in shape and detail.*

DeSoto is somewhat overchromed, but its over-all shape is elegant to a degree, and its detailing more precisely planned than that on any car, including the more expensive Chrysler and Imperial. The desire for a slim and tapered line—the understanding that economy of line is no reflection on the owner's purse — is thoroughly refreshing. The substantial quality of the modeling appears in the oblique view: there is no artificial joining of side to front but a natural and fairly interesting shifting of planes. The sour note is the distinctly two-dimensional wing. The attention to the joining and finishing of lines and materials is unusual.



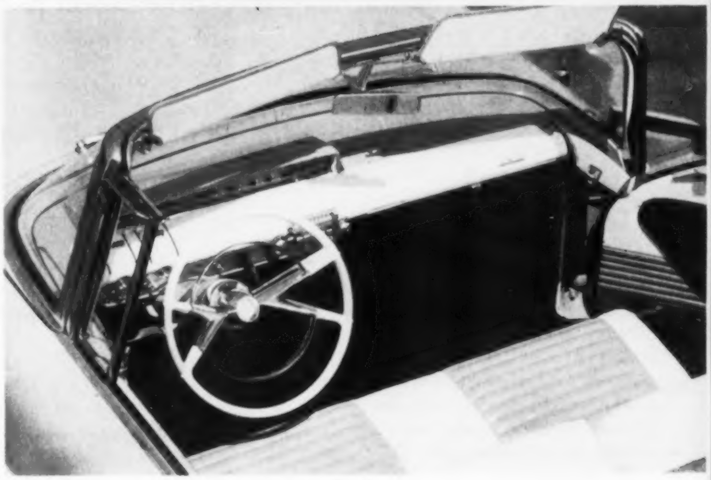




The Continental Mark II *looks fairly classy at a glance because of its snappy straight lines and sharp angles—recl reminders of the classic Continental. A longer look reveals a car so stylized as to be more like a trademark than a big, powerful, expensive vehicle. The cocky look does not come from the over-all shape of the body but from certain extreme proportions and odd angles. Since a curve or a bend will give strength to sheet metal, a nicely modeled car gives obvious satisfaction. Continental's excessively long lines and wide flat surfaces are not only uneventful but unstructural: one imagines—no matter whether it is true—that unusual bracing is required to support these stretches of metal. The unexpected interruptions at the haunch and rear tire are like embarrassing protuberances which the designer failed to squeeze within his basic outline; the metal drapes over them like a blanket. The lack of distinction in the over-all modeling is emphasized by the unsubtle use of parallels. Those that emphasize the unnecessary haunch and the odd slope of the rear post are all the more unfortunate because of their proximity. Though its detailing generally is undistinguished, the instrument panel is refined, and the finish is elegant.*

The virtues of the new Lincoln *were discussed on the preceding pages. It also has shortcomings—the length, exaggerated in the convertibles, is especially disturbing in the closed models where it is emphasized by the low, wide-springing roof. Canted front and rear extend the line unnecessarily. Nevertheless, the Lincoln — particularly the convertible — is a good-looking car. The interior and the sparse dash panel are unusually good.*

Studebaker's sports cars, *originally introduced in 1953, have a new name this year—the Hawk series. Except for details like the V design and the narrow wings on the Golden Hawk, the lines are only superficially changed from Raymond Loewy's original design. It is an extreme car, excessively showy, yet the designer's skilled hand shows through still in the solid and subtle three-dimensional modeling of the body.*



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

New General Electric "high-channel" television transmitting antenna.

More power from new TV antenna

General Electric television transmitting antenna has simplified design

Higher power than ever before for television transmission, resulting in improved reception, will be made possible by the new General Electric "high-channel" television broadcast antenna. Designed and developed at G.E.'s Electronics Park at Syracuse, the new 3,500-pound, all-steel antenna will transmit broader beams than the usual "batwing" antennae which are in widespread use. The effect of the broader beams will be better home reception in hilly or mountainous areas and in large cities.

The most powerful VHF television stations in operation today transmit at 50,000 watts. The new antenna will enable them to go to 100,000 watts. The new design is simpler than other TV antennae: it looks like a 30-foot water main with a wire coiled around it, has only three feed points—a comparable batwing requires 16—and it eliminates the need for a duplexer, a device used in transmitters to isolate aural and visual TV signals. The price of the new device is reported to be comparable to that of TV antennae in wide use. It will withstand winds up to 112 miles an hour and has a gain of four, or will deliver an effective radiated power four times greater than the signal power generated by the station equipment.

The new "high-channel" antenna was designed as a result of success with a similar type of antenna developed for UHF in broadcast stations about four years ago. This success led to its adoption for VHF television.

Manufacturer: General Electric Company, Electronics Park, Syracuse, N. Y.

Ultrasonics effective for machining

Tools that vibrate 20,000 times a second can cut without heat or noise

Materials that were once considered impossible to machine except with diamond tools can be cut without heat, noise or gross vibration with ultrasonic machining tools. Although ultrasonic cutting is not new, the Cavitron Equipment Corporation, in cooperation with the Superior Tube Company of Norristown, Pa., has overcome problems which were common in ultrasonic machining: warpage at brazing temperature and short tool life. The key to solving these problems was the replacement of carbon steel with stainless steel tubing.

An ultrasonic machine tool used to dice germanium in the manufacture of transistors, for example, is made of 271 pieces of stainless steel tubing brazed into a hexagonal bundle resembling a honeycomb. The precision of assembly prohibits the use of materials that would warp. This device is vibrated 20,000 times a second against suspended abrasive particles which are kept flowing across the work piece. Only very slight pressure is required to sink the tool into the work.

An added attraction is that ultrasonic machining can be done by unskilled workers. There are no exposed moving parts, chips or other hazards, making operation completely safe.

Ultrasonics are used to produce carbide dies, sharpen carbide tools and grind chip breakers, make jewel bearings and ceramic electronic tube spacer elements, slice and dice crystal quartz, synthetic sapphire and germanium, and emboss and engrave jade, mother-of-pearl and crystal glass.

Since the ultrasonic process involves very low stresses and an absence of local heating in the machining area, no thermal cracking or pitting takes place and heat-sensitive materials can be easily cut.

Manufacturer: Cavitron Equipment Corporation, Long Island, N. Y.; Superior Tube Company, Norristown, Pa.

An ultrasonic machine tool is vibrated 20,000 times a second to cut germanium in the production of transistors.

Fantastic fiction in motor boats

Ideas for outboard motors of tomorrow use sun, supersonics for power

Outboard motors of the future were shown in sketch form by Scott-Atwater Manufacturing Co., Inc. at the recent National Motor Boat Show in New York. Radical design changes, new fuels, lighter metals to reduce drastically the weight per horsepower, power steering were among the proposed ideas to answer the dreams of boat enthusiasts of the future.

The motor illustrated would get its power from the sun: the rays would be captured in the concave disk, converted into energy and stored. The power could also be used to run camping equipment when the motor was not actually in use to power the boat.

Another futuristic idea was a motor driven by sound waves. A disk, rotating at high speed, would emit high frequency sound waves to power the driving propellors. A variation on this was a motor with two counter-rotating disks turning underwater producing either forward or backward motion. Changing the speed of either of the disks would alter the direction of the boat.

Although Atwater does not plan immediate production of the proposed outboards, they anticipate that the 30,000,000 people in the United States who use small boats will demand such radical changes in the years to come.

Manufacturer: Scott-Atwater Manufacturing Co., Inc. 2901 East Hennep'n Avenue, Minneapolis 13, Minnesota.

Costs cut by polyethylene

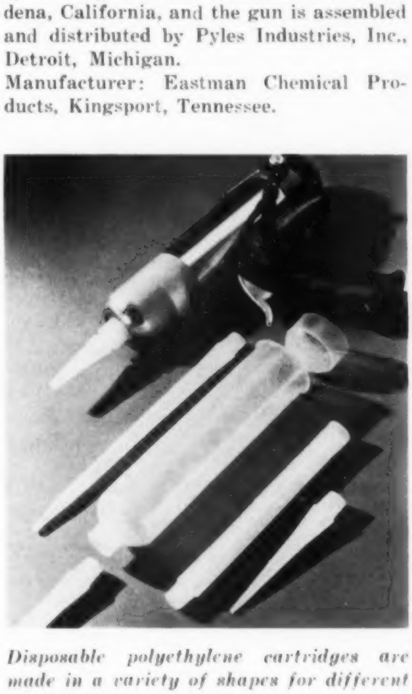
Disposable cartridges and nozzles for sealant gun save time and money

Disposable cartridges and nozzles molded of Tenite polyethylene, made by Eastman Chemical Products, Inc., are being used in a new type of sealant gun to cut costs, eliminate cleaning time and speed up sealing operations. The new gun is light, small, simple to operate and is particularly effective in close-quarters work. Polyethylene cartridges containing caulking compound fit into the gun barrel and threaded nozzles, available in a variety of sizes and shapes, screw into the front end of the cartridges. When the supply of sealant is exhausted or the job completed, the polyethylene parts can be discarded to eliminate cleaning time and costs.

Tenite polyethylene does not react with or affect the properties of commercial caulking compounds, with the result that the sealant gun is well-adapted for a variety of assembly jobs in aircraft, automotive, marine, and electrical fields.

The cartridges and nozzles are molded by Variety Plastics, Orange Grove, Pasadena, California, and the gun is assembled and distributed by Pyles Industries, Inc., Detroit, Michigan.

Manufacturer: Eastman Chemical Products, Kingsport, Tennessee.



Disposable polyethylene cartridges are made in a variety of shapes for different applications.

Beryllium copper for taximeters

Better wear, tolerance and corrosion-resistance for moving parts

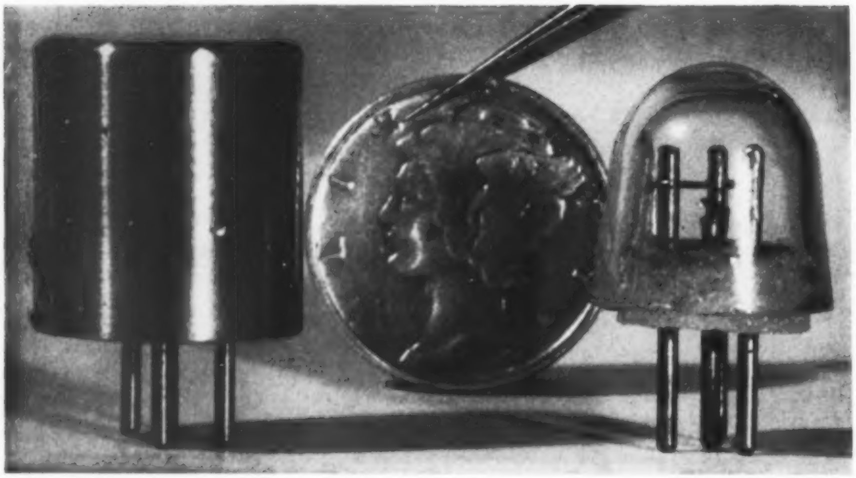
Beryllium copper castings are being used in the latest taximeters made by Viking Tool Corporation to replace steel and zinc alloy in certain parts because it gives better tolerances and maintains greater dimensional stability under the prolonged strain of day-in-day-out meter service.

Most of the gears and cams used in Viking meters bear against steel pins and shafts because, with only 38 moving parts, electrically wound clocks are used instead of a maze of gears and springs to accom-

plish dial movements. As steel wears against steel, shafts become worn, holes elongated and tolerances expanded, resulting in erratic meter operation.

The ratchet hub used to operate the "extras" tabulation in taximeters is a typical part where beryllium copper was found to be superior to steel. The center hole of this part must fit over a steel stud in a lap fit with a minimum acceptable tolerance of .001". Anything above this results in too much play and makes the dial flop around. The tolerances could not be maintained with steel and added machining raised the cost out of proportion. Not only were tolerances and wear problems solved with beryllium but the ever-present problem of rust and corrosion with steel was eliminated altogether.

Manufacturer: The Beryllium Corporation, Reading, Penna.



Laboratory models of new transistors shown in comparison with a dime. Silicon transistor (left) has brass cap, and germanium transistor (right) has a glass cap. Models were made at Bell Telephone Laboratories.

New uses for improved transistor

Bell Labs develops a transistor with higher operating frequency range

A technical but vitally important improvement in fabrication techniques for transistors has opened up many new applications for the tiny amplifiers. Bell Telephone Laboratories claims that the new techniques will have far-reaching effects on the use and manufacture of transistors. The performance of the new transistors at high frequencies surpasses that of previous ones and makes them possible replacements for the vacuum tube in many more telephone and television applications. Also, the high frequency characteristics of the new transistor make it ideally suited for use in guided missiles and in electronic "brains" for military equipment and computers.

Key to the new fabrication techniques is the development of controls over microscopic chemical layers; the heart of the transistor is a layer 50 millionths of an inch thick. The adaption of a process known as "diffusion," which is used in treating silicon for the Bell Solar Battery, makes it possible to introduce minute amounts of impurities in controlled amounts into a material.

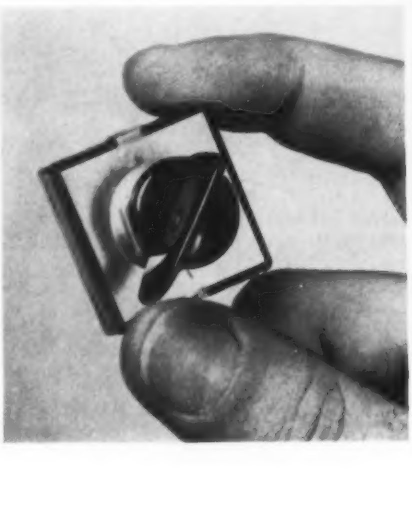
The new transistor consists of a three-layer "sandwich" with the center layer known as the "base" and the other two the emitter and collector layers. The narrower the base layer can be made, the higher the frequency at which the transistor will operate. Diffusion offers a very high degree of control when working in such microscopic dimensions.

The "frequency cut off," or the frequency point up to which there is straight, full amplification of a signal after which the signal is amplified with steadily diminishing strength, is between 500 and 600 megacycles with the new transistor. This compares to a frequency cut off of from 1 to 10 megacycles with currently available transistors and 100 to 200 with other experimental models. The higher the frequency cut-off, the greater the number of communication channels or more amplification possible. Bell Labs claims that the new transistor can amplify 2,500 telephone conversations on a telephone line, three times as many as could be handled by the best previous transistor.
Manufacturer: Bell Telephone Laboratories, 463 West Street, New York 14, N.Y.

Appliance switch is simplified

Wire-connecting easy with new General Electric rotary switch

A recently developed appliance rotary switch is now available from General Electric Company. The new switch has a pressure-lock feature which simplifies wiring connections. The prepared ends of the conductors are simply inserted into the openings of the switch housing and are automatically locked in place. This simplifies installation and eliminates expensive assembly operation for the manufacturer.



The switch has either two, three or four positions available in a single size case measuring 1¼"x1¼"x27/64". It is made with snap-in plastic handles in a variety of colors, or metal shafts can be provided to take handles furnished by the manufacturer.
Manufacturer: General Electric Company, Accessory Equipment Department, Bridgeport 2, Connecticut.

Light ladder does four jobs

Adjustable and easy to handle, magnesium ladder can be converted

A magnesium ladder that is adjustable four ways combines the functions of several types of ladders in one. It has the advantage of being easily converted to an extension ladder, an ordinary stepladder, and for use on uneven levels such as stairs by adjusting the back section.

The new ladders are lightweight (a 6-foot ladder that extends to 10 feet weighs 13 pounds) and they can be easily handled. The steps are 3½ inches wide, hard rubber feet prevent slipping and a bucket rack is built in for convenience. There are five sizes available ranging from 6 to 10 feet and in price from $33 to $60. The largest size reaches 18 feet when fully extended and weighs 22 pounds.
Manufacturer: Abbeon Supply Co., 179-33 Jamaica Avenue, Jamaica 32, N. Y.

Versatile magnesium ladder can be adjusted for use on uneven surfaces, as a step ladder or an extension ladder.

Recent Technical Publications

Aluminum pipe. Aluminum Company of America, 1501 Alcoa Building, Pittsburgh 19, Pa. 18 pp., ill. Booklet giving characteristics and advantages of aluminum pipe in industrial applications. Includes technical data on performance.

Dielectric heating for setting adhesives, by Ian Jones. 55 pp. Furniture Development Council, 11 Adelphi Terrace, Robert Street, London, WC2. A recent report discussing electrodes, materials, equipment and special applications.

Materials of Construction, by Mills, Hayward & Rader. 650 pp., ill. John Wiley & Sons, Inc., New York. $7.50. A sixth edition, revised and up-dated, of this basic text.

Modern Plastics Encyclopedia Issue, by the editors of *Modern Plastics.* 1002 pp., ill. Breskin Publications, Inc., New York. This is a gigantic review, culled from the pages of the magazine, of every aspect of the plastics industry today.

Plastics in Building. 149 pp., ill. Building Research Institute, 2101 Constitution Avenue, Washington 25, D. C. $5.00. The compiled views of many authorities in the plastics and building industries, as first presented at a BRI conference in October, 1954.

Plastics in Housing. Monsanto Chemical Company, Plastics Division, Springfield 2, Mass. 70 pp., ill. An elaborate and handsome report of a study conducted at the Department of Architecture, Massachusetts Institute of Technology.

Printed wiring boards. Electronic Components Department, General Electric Company, West Genesee Street, Auburn, N. Y. 6 pp., ill. Technical data and circuit design information for G.E. "Thru-Con" printed wiring boards.

Service regulators. Meter and Valve Division, Rockwell Manufacturing Company, 400 North Lexington Avenue, Pittsburgh 8, Pa. 20 pp., ill. Information and pictures about new Rockwell service regulators, including rate of flow graphs illustrating mathematically the determination of maximum outlet pressure build-up and amount of gas relieved to atmosphere by Rockwell safety devices.

Solvent recovery. Carbide and Chemicals Company, 30 East 42nd Street, New York 17, N. Y. 36 pp., ill. Technical data and description of activated carbon and the efficiency and economy of recovering solvent vapors in a variety of industries.

Static and Dynamic Electron Optics, by P. A. Sturrock. 240 pp., ill. Cambridge University Press, London and New York. $5.50. Concepts in classical optics and dynamics are given new applications in this recent study of focusing in lens, deflector and accelerator.

Model making, continued from p. 111

mold is used, the same parting agent is sprayed on the mold surface. If a plastisol mold is used, no parting agent is used. There are many compounders of polyester resins, a few of which are G.E., Marco Chemicals (Celanese Corp.), Naugatuck Chemical Company, and Bakelite.

Clear-cast allyl-type polyesters are used where transparency is the prime objective. They are dimensionally poor, but the shrinkage can be pre-calculated and compensated for in the model. Mold preparation, mixing and pouring are done in the same manner as with the reinforced polyesters. The casts can be sanded and buffed to produce a high degree of translucence. This material is useful in casting clear knobs and objects which must resemble glass. The clear-cast material which we most commonly use is compounded by the Castolite Company.

Finishing: Cast plastic model parts can be finished with conventional painting techniques to simulate colored surfaces, and they may be electroplated or electroformed to produce the appearance of metal parts. It is possible to electroplate on plastic, plaster or wood models. If necessary, the model is first sprayed with automotive lacquers and sanded to a very smooth finish. This is followed by several coats of a lacquer especially prepared to receive the conductor surface. This is then sprayed on and consists of a silver nitrate solution deposited on the model by means of a reducing solution. An electrical conductor is then attached to this surface, and the entire assembly is placed in a plating tank. The first metallic deposit is nickel, followed by a coat of copper. The copper is buffed to a high polish and followed by a deposit of bright nickel. If necessary, the bright nickel can be buffed and then chrome-plated.

The process of electroforming is quite the same as electroplating. An essential difference, however, is that the material is built up in a mold instead of over a surface. Consequently, the plated surface will be the one which is in contact with the mold. Therefore, the sequence of plating is nickel, then copper until the desired thickness of part is achieved. The part is then stripped from the mold, trimmed to the parting line, buffed to a high polish, and chrome-plated in the conventional manner. Since electroforming produces a separate part rather than a plate on a non-metallic part, electroforming is utilized instead of electroplating when the piece is to be used as a working part, so that it will have the same properties as the production part. With these combinations of forming and finishing techniques, we have been able to simulate a wide variety of materials with great exactness, and in markedly shorter time than by old methods.

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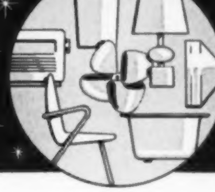

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For Your Calendar

Through February 20. Built in Latin America. Museum of Modern Art, New York.

February 5-26. Building in the Netherlands. Smithsonian Institution Traveling Exhibition. School of Architecture, Princeton University, Princeton, New Jersey.

February 5-28. Industrial Design. Lowe Art Center, Syracuse University, Syracuse, New York.

February 22-March 2. British Industrial Fair. Earle Court, London, England.

February 26-March 2. New York Gift Show. Hotel New Yorker and New York Trade Show Building.

February 27-March 2. American Society for Testing Materials. Committee Week. Buffalo, New York.

March 5-9. Tools of Operation Research. National Institute of Management. National City Bank Building. Cleveland.

March 6-8. Society of Automotive Engineers' Passenger Car, Body and Materials Meeting. Detroit.

March 8-9. Annual Conference, Society of the Plastics Industry of Canada. Sheraton-Brock Hotel, Niagara Falls, Ontario, Canada.

March 12-16. Methods Improvement. National Institute of Management. National City Bank Building. Cleveland.

March 14-16. American Society of Mechanical Engineers' Aviation Division Conference, Los Angeles.

March 18-21. Society of Automotive Engineers' National Production Meeting and Forum, Cleveland.

March 18-21. American Society of Mechanical Engineers' Spring Meeting, Portland, Oregon.

March 19-23. American Society of Tool Engineers' Industrial Exposition, Chicago.

March 19-23. Production Control and Inventory Management. National Institute of Management. National City Bank Building, Cleveland.

March 26-27. American Society of Mechanical Engineers, Instruments and Regulators Division Conference, Princeton, New Jersey.

March 27. Annual Meeting, Pacific Coast Section of the Society of the Plastics Industry. San Francisco.

March 28-May 13. Signs on Broadway. Museum of Modern Art, New York.

Through April 29. An Introduction to Glass. Newark Museum, Newark, New Jersey.

April 21-25. The Decorators' Big Show. San Francisco Civic Auditorium.

April 23-25. Annual Convention of American Ceramic Society, Hotel Statler, New York. Design Division program planned.

April 23-25. 25th Anniversary Conference of the American Institute of Decorators. Palace Hotel, San Francisco.

April 23-May 4. 1956 British Industries Fair, Second Edition, Birmingham, England, and Olympia Hall, London.

May 7-12. American Welding Society's Spring Meeting. Hotel Statler, Buffalo.

May 14-17. First Design Engineering Show. Convention Hall, Philadelphia.

June 11-15. Seventh National Plastics Exposition. Society of the Plastics Industry. New York Coliseum, New York.

June 23-July 1. International Design Conference, Aspen, Colorado.