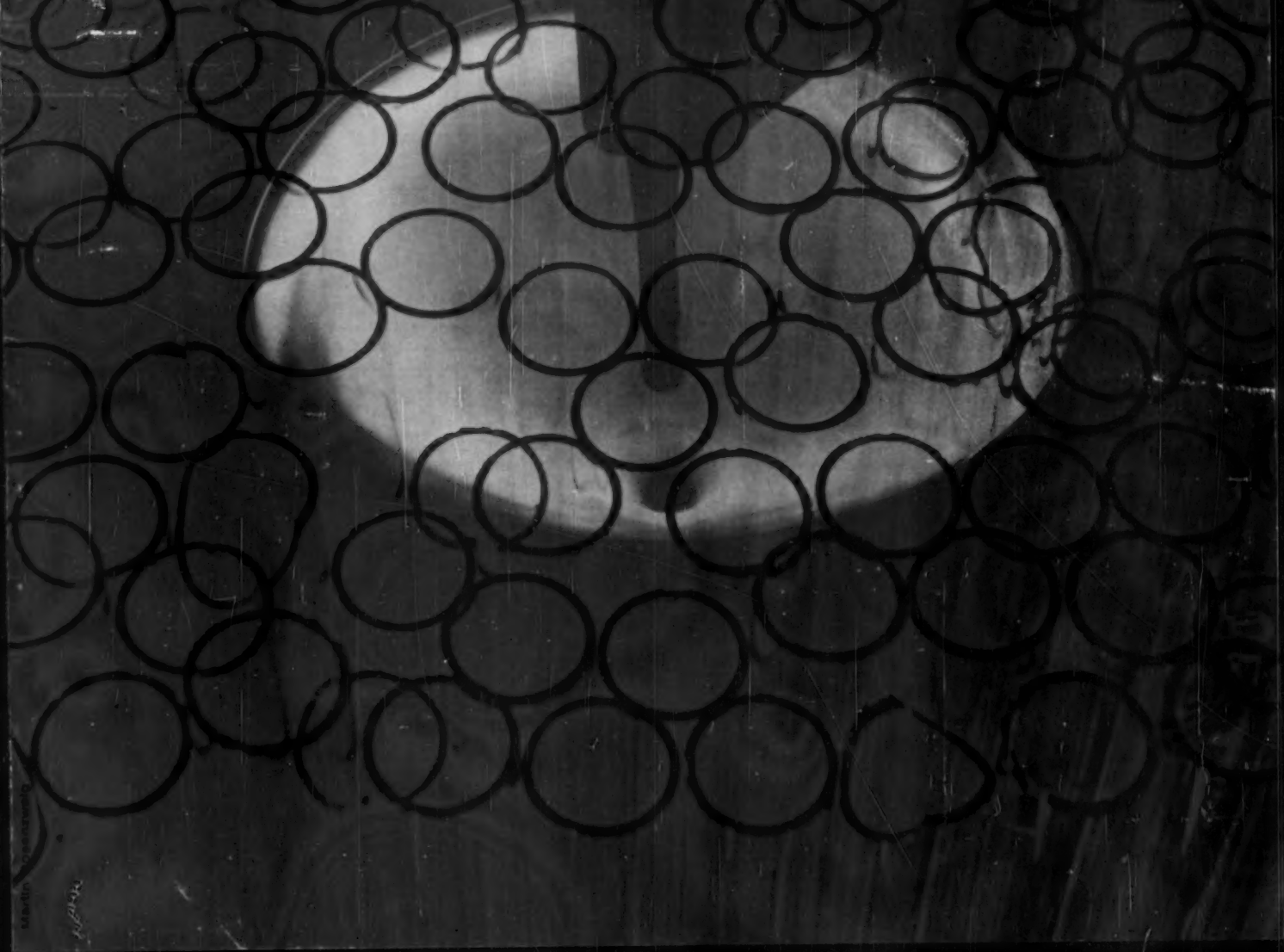
INDUSTRIAL DESIGN

January 1967

Glass fabrication: first in a series on industrial techniques

The question of creativity

Portable TV: a roundup



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JANUARY, 1957 VOLUME 4, NUMBER 1

INDUSTRIAL DESIGN

A 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 development and marketing.

CONTENTS

Cover and frontispiece: Glass fabrication methods in photographs on the cover and frontispiece were taken at Corning Glass Works by Erich Hartmann. In the cover montage, "spinning," the newest method of making TV tubes, is imposed on a background of glass tubing which is "drawn," an older glass forming process. The jumble of light bulbs on the frontispiece are automatically blown by the fastest glass-making method—the "ribbon machine." Other methods are discussed on pp. 44-55.

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CLIPS AND QUOTES

BUSINESS WEEK

Industry Studies Styling as Key to Sell New Engineering, *a feature article in* **Business Week** *(November 10, 1956), reviews a subject with which ID readers are already acquainted (Design in Detroit issue, October, 1955).*

"General emphasis on styling in the auto industry is not as old as you might think —in spite of the fact that GM has laid great store by it for 20 years. It was only a few years ago that the head of one of the large companies was threatening immediate dismissal for any engineer who built a car "so low I can spit over it." And until 18 months ago, Ford styling was under the chief engineer, who could see no good reason for creation of a separate styling department. A Ford executive gave him one: The stylist sells your engineering."

Making its point graphically with color photos of three stylists who have assumed top management responsibilities (General Motors' Harley Earl, Chrysler's Virgil Exner and Ford's George Walker), the story explains the reasons for the stylist's rise in the auto industry. It points out the basic goal of reselling the market through planned obsolescence:

"One of the strangest, yet best recognized, secrets of Detroit is "planned obsolescence" —a new model every year. And for this the stylist is responsible. It is the auto industry's ability to renew and resell its market that has awakened the interest of other industries."

The article suggests a unique way of looking at the central importance of the stylist in Detroit—and of the designer in industry generally:

"The designer, or stylist, in Detroit is concerned with much more than colors and chrome shapes. In a very real sense, he controls the production machinery. His design consciously determines the size and extent of tooling and plants; even further, the success of his designs determines the level of output."

Hugh Du Pree *(vice-president and general manager of Herman Miller Furniture Co.),* **Design Planning: How it Works at Herman Miller** *(an address at McGill University's International Design Conference, October, 1956). After describing the increasingly important role design has assumed at Herman Miller, Mr. Du Pree went on to relate new efforts the company has made to control its operations in advance and to coordinate related functions:*

"Management put design on a pedestal and we all felt design could plan and design us out of any situation. This resulted in a levelling off of sales. We began to see that management had abrogated its responsibility in planning and control. We found that as we grew bigger we could afford to make fewer mistakes and, therefore, design planning had to take into consideration the problems of sales, production, and finance. The interesting thing about this is that the designers themselves were the first to see this and urged complete planning upon management.

Design at Herman Miller affects everything, from long-range planning to production, quality control, pricing, costing, inventory control, finance, advertising, sales promotion, and sales planning. In a company of our size some of these things are handled by specialists but all must be coordinated and controlled by top management. Thus, top management has to assume more positively its own responsibilities. Design, too, however is responsible because it is a part of top management and thus continues to play its important role in the company. We believe that when design functions under planning it can acquit its high responsibility more effectively."

L&M

J. Gordon Lippincott, *Lippincott & Margulies, Inc.,* **Educating Designers for Management,** *(an address to the National Association of Schools of Design meeting at Pratt Institute, Oct. 14, 1956):*

"Not too many people in management realize that design is another form of communication. This is strange because management is very conscious of verbal communications today and they are spending substantial sums in training executives in communications skills. Therefore, someone at the management level should be *visually oriented in his communications technique,* and most logically this should be the industrial designer. Of course, it may be a business executive who is design oriented as well as a design executive who is business oriented."

RCA

Dr. Elmer W. Engstrom, *Senior Executive Vice President, Radio Corporation of America, in a talk on* **automation** *before the Investment Group of Hartford, Conn.:*

"Automation is more than a continuing evolution in the direction of greater mechanization. The introduction of electronic control has greatly accelerated this evolution, but it has also added a new dimension. Mechanization replaced human skill by machine skill in repetitive tasks. Automation does more than this. It replaces routine human decision-making functions. Mechanization has in some respects made the worker a part of the machine. Automation reverses this process and frees man's work from routine. It provides increased scope for the excercise of man's highest skills. Automation involves the industrial system as a whole. It is the only approach which we can envision for obtaining the increased productivity required if our economy is to continue to grow and to expand."

MECHANICAL ENGINEERING

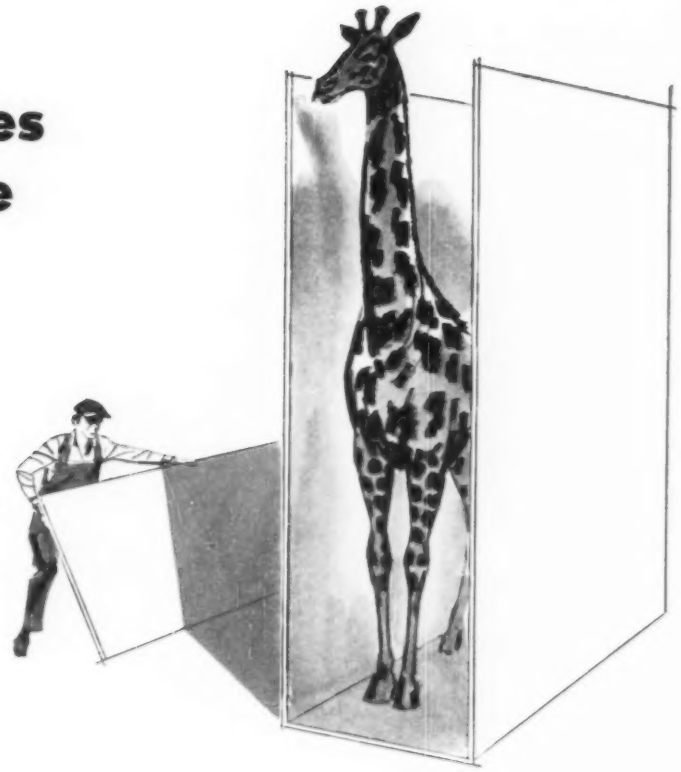
The other side of automation, its effect on the people who are still needed to control its increasingly complex machinery, is discussed by **George A. Peters,** *Human Engineer at Samuel Feltman Ammunition Laboratories of the Picatinny Arsenal at Dover, N. J. In his article,* **Human Engineering—A New Approach to Operational Design"** *(Mechanical Engineering, October, 1956), Mr. Peters reviews the growth and work of this field and suggests the need for better communications through a professional organization.*

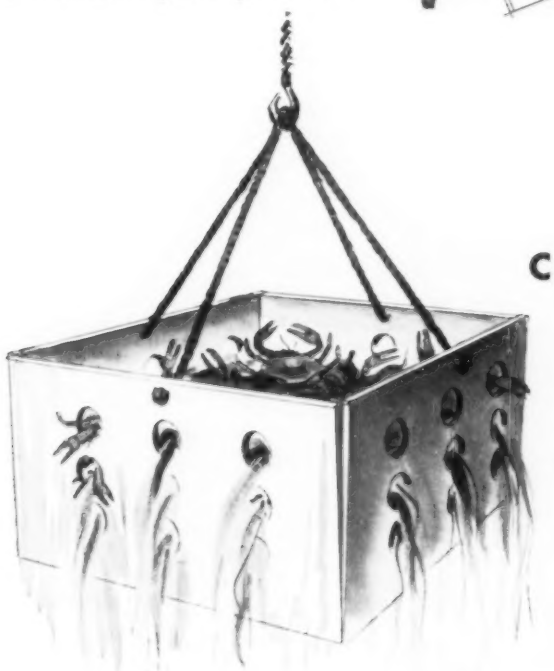
"Although the human engineering field is composed primarily of experimental psychologists, a wide variety of scientific disciplines is represented. Of course, it does not replace any existing design function but actually broadens the range of design possibilities by adding a valuable adjunct to the design team. If there is to be some formal organization of human engineers, by the very nature of the discipline it should include members from all the sciences capable of making constructive contributions to the field. It has to be all-inclusive rather than restrictive if its great potential is to be realized rather than hindered in its growth."

—unlikely uses for Homasote

Packaging a young giraffe

The old ones run up to 18' — and more. Their four legs are all the same length. They have only seven bones in their necks — same as a man or a mouse. *More useful information* — if you need size and strength — Weatherproof Homasote comes in panels up to 14' x 8'.





Crab trap

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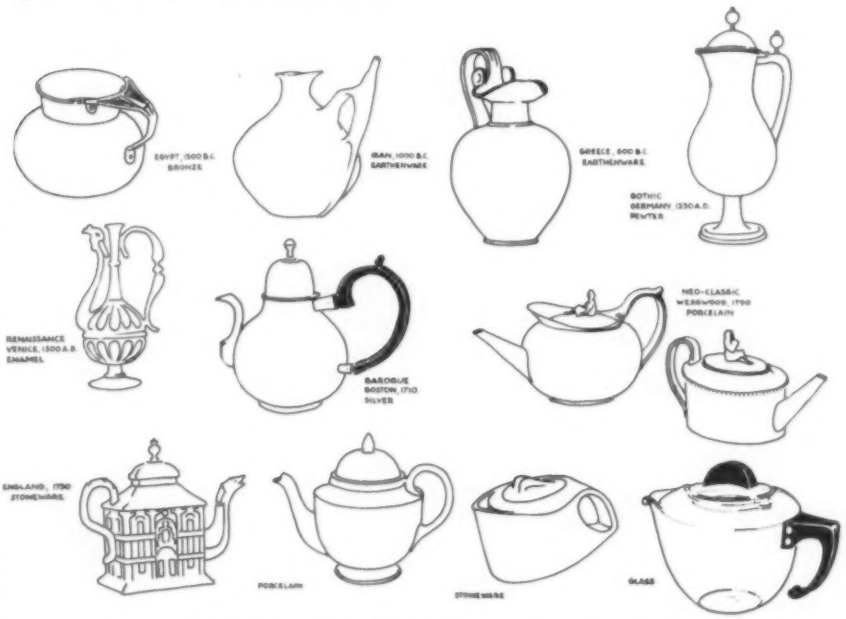
BOOKS

"Three basic qualities are needed: awareness, honesty and humility. Awareness shows the designer the ramifications of the form problem; honesty helps him to cope with all the aspects of function, meaning and technique; humility prevents him from wanting to include more than the function, meaning and material warrant. Whenever the form for any tool for living has not been satisfactory, one or the other of these qualities has been neglected. Today the quality of humility is the one that should be emphasized. Too much of the tradition of unpretentious workmanship has been lost in an effort to make things appear more expensive, more reliable and more satisfactory than can be justified by their innate quality."—Ernest Mundt



Of coffee pots and kings

ART, FORM, AND CIVILIZATION, *by Ernest Mundt. 246 pages, illustrated. University of California Press, Berkeley.*

Few would disagree with Ernest Mundt that ours is a fractured world, or that designers must assume some of the responsibility. Take any three nouns — space, time and architecture; men, women and fossils; gods, graves and scholars; gloves, glory and God. Nowadays three are all that an author needs to make a book. The triangular title now under consideration deals with our problems of communication and man's lack of unity, both in his psyche and his society.

Mundt's thesis, purpose and conclusions, however, are surprisingly hopeful, and his book deserves a place on every design reading list. Art is on the verge of effecting the needed unification of man—if one cannot swallow Mundt's thesis it is not because he fails to demonstrate that it is *possible* for art to take this inclusive role, but only for lack of complete evidence that this is happening today.

A sculptor who graduated in architecture in Berlin, and now director of the School of Fine Arts in San Francisco, Mundt has something to teach—the ideal of the whole man—and his chapters have the plain and serious tone of frequently traveled topics. To follow his brief and interesting analyses of the kinships between a series of architectural capitals and portrait busts, furniture and paintings, tools and music, is to be instructed in basic facts of cultural relationships.

Applying art in the broadest sense to include design and function, he deals with artifacts from the past, appraising the relative presence or absence of unifying concepts at historic intervals from 2500 B.C. to the present. By bringing in the profiles of ancient and modern pots, Mundt teaches that a vessel, apart from our personal reactions of like and dislike, or even the purely aesthetic qualities that it may evoke, always implies its context. Invariably, a continuity exists within a society's concepts of space, sculptures and useful objects; a chronological sequence of pouring vessels corresponds in spirit to a parallel sequence of architectural elevations and floor plans. His most dramatic illustration shows how, through the centuries, lineaments of certain portrait busts, beginning with the one-dimensional, forward-oriented Egyptian head, correspond to capitals designed during the same period. Including the last vital movement of neoclassicism, the analogies between the two hold quite well. Formal and symbolic kinships between the individuals and the capitals supported the architecture of their day. Together they suggest a way of life. From the beginning of the 19th century, however, the capital, although still used, ceased to be a creative form; it was no longer expressive of an age, but copied from others. Indeed, not since the age of the Baroque has a really new capital been created, our architectural techniques and materials having obsoleted the very need for capitals.

Torn between a romanticism and mechanization of forms, Western civilization has been concentrating primarily upon its concepts of space—our sprawling turnpikes and clover-leaf intersections, our frameless paintings, our consciousness of the theory of relativity and the quantum theory—are all spatially expansive phenomena. What we have yet to establish—or, rather, to recognize—is an equally vital sense of form: "Art as a whole is still rather incoherent, which betrays the incoherence of form in the basic issues of social existence."

Mundt is encouraged (designers take note) by a contemporary glass coffee pot, which he finds "correct on several levels." Technically, "because it meets the requirements of safe and easy handling, good pouring, and easy cleaning and storing." Economically, "because it uses methods of shaping and assembling that are adapted to the machine process, and because it uses materials—heat-resistant glass and plastics—that are easily mass-produced." Aesthetically, "because it combines an image of grace with an appearance of dependability, and because it uses contrasts of shiny and dull, transparent and opaque, that, better than applied decorations, make it pleasant and stimulating to behold." Finally, it is psychologically correct "because the honesty of its materials and formal features, economy of means, precision of line and appropriateness of shape all combine in what man expects and what the machine can do."

Although it seems both too brief and too doctrinaire in its communal desires for the fine arts, Mr. Mundt's book is well worth a designer's time. Its unifying point of view yields a broadening influence, and it suggests that design shows more promise of synthesis than other creative fields today. As far as they are concerned, Mr. Mundt would have architecture, sculpture and the fine arts take heed of the coffee pot.—*s.b.*

Bringing art to the auto-makers

ART AND A CITY, *by Joy Hakanson Colby. 84 pages, illustrated. Wayne University Press, Detroit.* $6.00.

A history of the fifty years of growth of the Detroit Society of Arts and Crafts, this illustrated and attractively printed book attempts to relate its tale as a community story. An outgrowth of the Arts and Crafts movement founded in England by William Morris as a reaction against the ugliness and dehumanization of the Industrial Revolution, the Detroit Society has found in industry—and especially in the automotive industry—the sources of a new artistic culture. Describing the activities of the Society exhibitions, education, theatre, marketing of crafts, and public information, Mrs. Colby also devotes a chapter to the Art School's history. —*a. f.*

"miracles"

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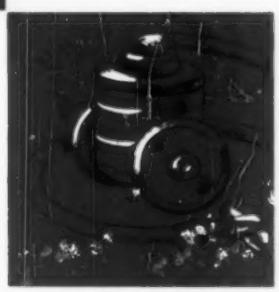

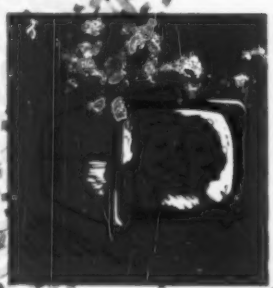

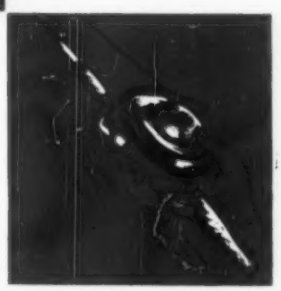

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NEWS

IDI converges on Los Angeles

National convention to feature educators symposium

The Industrial Designers Institute will descend on Los Angeles—or on southern California, as the map of meeting-sites indicates—for its national convention from February 14 to 17. Featured in the long weekend will be a forum, "Design Education Advancements," which will bring together deans and heads of many colleges throughout the nation. Another panel will discuss "New Horizons in Television Design," and will include John Vassos for R. C. A., J. Portanova for Hoffman, George Beck for General Electric, Herbert Zeller for Motorola and James W. Kelso for Packard-Bell. George Walker, Vice-President of Styling at Ford, will be the principal speaker at one luncheon and his appearance promises to open discussion on recent design advances in the auto industry. Mr. Kelso, who is program chairman, may be reached at Packard-Bell Co., 12333 W. Olympic Blvd., Los Angeles 64.

Cultural chief for Brussels Exposition

James S. Plaut has been appointed by President Eisenhower to head the United States' participation in the Brussels Universal and International Exposition of 1958. As Deputy Commissioner General, he will coordinate the largest single effort ever made to project the American way of life to an overseas audience, a project comparable to the last World's Fair. Mr. Plaut, who is director of Boston's Institute of Contemporary Art, will work with Edward D. Stone, the architect of the U. S. pavilion.

Navy ship sprouts wings

A converted cargo vessel, the Compass Island, is being equipped by the U. S. Navy with "the most fantastic array of navigation instruments ever assembled in a ship." Not the least of these is the huge Gyrofin installation which folds into the hull. Manufactured by Sperry Gyroscope Company, these ship stabilizers limit the ship's roll to about 1½°, while sister ships may be rolling 15°. This stabilization, currently in use in passenger ships, is of importance in launching missiles.

The ship also includes an inertial navigation system for precise mid-ocean determination of latitude and longitude, true North and speed over ground. Its telescope

requires no observer but employs a photoelectric cell to measure the light of stars—even in daylight. Promised in the future is a tracking device that will be able to "see" the sun, moon and stars by picking up their radio signals.

CYANAMID

PLASTICS NEWSFRONT

New Polyester Joints Speed Sewer Pipe Installation

Cast collars of LAMINAC® polyester resin promise to revolutionize installation of clay sewer pipe. Flexible, highly resistant to temperature extremes and sulfur-active bacteria, the new "Speed-Seal" pipe virtually ends trouble with cracked joints caused by settling earth, corrosive sewage and root penetration. Produced by Gladding, McBean & Co., Los Angeles, on the basis of research by National Clay Pipe Manufacturers, Inc., the joint consists of a spigot of LAMINAC polyester resin and glass fiber which restrains a live rubber gasket. The spigot, with gasket, can be forced quickly and easily into the pipe bell by hand, speeding sewer line installation.

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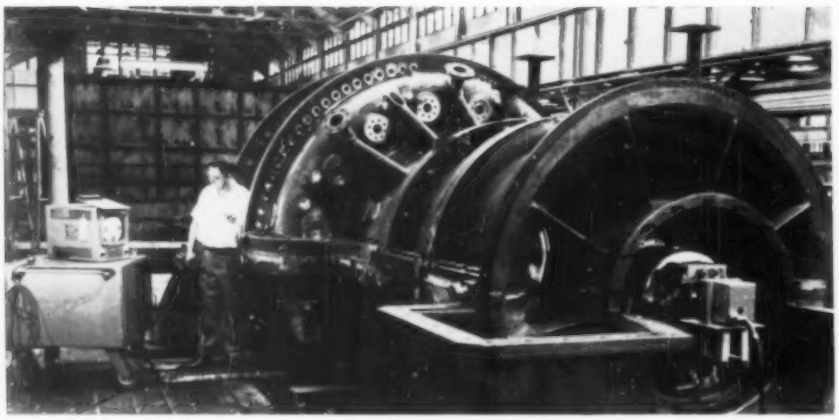
MATERIALS FOR TOMORROW



Huge turbine is new TV star

Director, producer, stage hand and audience of a daily closed circuit production at General Electric's Gas Turbine Department, Schenectady, N. Y., are combined in one television operator who accurately positions 4- to 5-ton turbine sections. When lining up the turbine shells, he watches the GE-built monitor to note where the target lies in relation to the camera lens. He can then adjust the shell-connecting bolts and align the new shell with precision. The unit being assembled is the largest gas turbine yet to be manufactured in the Western Hemisphere, rated at 16,500 kilowatts.

Auto stylists hold the fort

An audience of 450 heard five leading auto stylists give a first-hand account of "Design Directions and Influences—Forecast from Detroit." The symposium was held in New York to coincide with the revival of the National Auto Show at the Coliseum, and was sponsored by the American Society of Industrial Designers. Presided over by television's Dave Garroway, the stylists addressed themselves to the questions—from the "long low look" to the future of the sports car—that are in everyone's mind in this year of major styling changes. The discussion was then thrown open to the floor, and numerous designers attested their differences with the latest—and oldest—styling trends. Defending their own positions were William L. Mitchell of General Motors, Robert Maguire of Ford, Carl Reynolds of Chrysler, William Schmidt of Studebaker-Packard and Edmund Anderson of American Motors. The program, arranged by Nathaniel Becker and introduced by Jay Doblin for ASID, will be discussed editorially in February ID.

With sincere regret we note that **Robert Shaeffer**, west coast designer for 17 years and former instructor at the Los Angeles Art Center School, died in Hollywood of cancer on November 10, 1956.

Design reaches across Pacific

Four representatives of the Art Center School of Los Angeles visited Tokyo, Nagoya and Osaka, Japan, as guests of the Japanese government and trade groups, to acquaint Japanese industry with the needs, techniques and educational methods of industrial design. E. A. Adams, founder and director of the school, George Jergenson, head of the industrial design department, John Coleman, head of the product design department, and Frank Nakamura, Art Center graduate who acted as interpreter, discussed ways by which modern design methods can be applied to Japanese products for the betterment of that country's export business. The Art Center group has also been asked to consult on specific Japanese design problems and to explore new uses of indigenous materials and crafts. The trip was part of a broad program sponsored by the Japanese External Trade Recovery Organization for the upgrading of their product design through the training of Japanese designers at the School.

Events

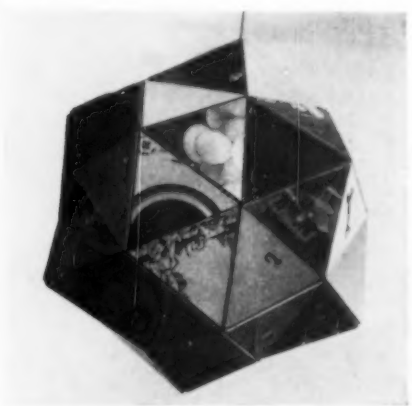
Further news on the **Eleventh Triennale** at Milan next Summer from July 27 to November 4: the winners of the official poster contest for this year's exposition of modern architecture, decorative and industrial arts will be announced January 30. Judges of the Triennale poster contest are Ivan Matteo Lombardo (President of the Triennale), Giuseppi Ajmone, Luigi Broggini, Carlo Mollino and Charles Conrad.

The **Package Design Council's Third American Design Exhibition** will be held at Cooper Union, New York, from January 28 to February 20. Winners of the PDC's 60 awards will be announced February 15. Robert Zeidman, the Council's Exhibits Chairman, reports that a record number of entries have been submitted.

Peacetime uses of atomic energy will be the topic of the 1957 **Nuclear Congress**, scheduled for March 11-15 at Philadelphia's Convention Hall, under the coordination of the **Engineers Joint Council.** The Congress is actually a meeting of 21 technical and management societies, and includes four conferences on nuclear engineering, industrial uses of atomic energy, laboratories and equipment, and international atomics.

New Pratt graphic workshop

The Contemporaries Graphic Art Centre has been incorporated into Pratt Institute of Brooklyn, under the new title of "Pratt-Contemporaries Graphic Art Centre." This joint venture has come about through a three-year grant of $50,000 from the Rockefeller Foundation to the Contemporaries. The aim of the new center is to give artists, teachers and students from all over the world an opportunity to exchange creative ideas in silk screen, lithography, etching, and relief prints on wood or metal.



Cranbrook students exhibit the year's first problems

Under K. Isaacs, new Director of Design at Cranbrook Academy, Bloomfield Hills, Michigan, the year began with some original design problems: sculpture at left resulted from problem of modifying a pine block and duplicating the pieces to their exact dimensions; and right, "record of your life experience in any 2 or 3-dimensional form".

2 VITAL FORCES IN INDUSTRIAL DESIGN

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Newsstand for the cosmopolitans

For the purveyors and perusers of an international commodity—foreign newspapers and magazines—Hansen and Theusen have designed a store with a suggestion of the international architectural style. The Hotaling store in New York, which also sells out-of-town newspapers, uses large flat planes of grey and primary colors, natural woods and metal framework to display its multitude of wares quietly. Two large maps of the hemispheres show the correct time at various world capitals—the store's most literal statement of cosmopolitanism.

Keeping tabs on rabbits

Just as rabbits multiply, so does biological research, and an automated—or mass production—system has been devised to take temperatures of 24 rabbits simultaneously. The automatic electronic device was developed by the Fielden Instrument Division of Robertshaw-Fulton Controls Company to aid Winthrop Laboratories in testing for the presence of pyrogens, fever-producing substances that contaminate intravenous preparations. Temperatures are taken three times at one-hour intervals and recorded immediately by the machine, which replaces a costly and unpleasant manual operation.

Awards

In the second annual student competition sponsored in its region by the **Midwest Chapter of the American Society of Industrial Designers**, the University of Illinois made a clean sweep of the prizes. First prize of $200 and medal went to **Norman A. Steinkamp**, second prize of $100 and medal to **Nathaniel D. Shepard**, and honorable mention to **Geno D'Ercoli**, **Donald E. Leman** and **Meyric K. Rogers**. ASID plans to make the contest a national affair, and **Raymond Spilman**, National Chairman of the Education Committee, will organize it.

The **Allmetal Screw Products Company's** first annual Stainless Steel Award of $1,000 was made to **John Hancock Callender** for his paper, "The Design of Stainless Steel Curtain Walls."

John C. Adams, winner of furniture prize

The Upholstered Furniture Design Contest sponsored by **Blocksom and Company** has announced its winners. First prize of $2,000 went to **John C. Adams**, second prize of $1,000 to **Bernard Manett**, and third prize of $500 to **R. Boyd Jones**, all of Michigan. Winners of certificates of merit were James Warren, Brian A. Cranner, J. Charles Dergins, Herbert Jaeger, James A. and Marie Howell, M. Fillmore Harty, Jr., Martin S. Lawrence and George L. Robinson.

High-powered toothbrush is here

Interchangeable heads make this electric toothbrush family property, and more fun than function may be generated by it at first. The advantages gained from motorized dental care are greater cleansing efficiency through rotary brushing (instead of the usual linear motion) and less injury to the gums. The device is manufactured by Proral Corporation and the housing made from Plaskon melamine (Barrett Division, Allied Chemical and Die Corporation).

Contests

Seven national awards for engineering education will be given by the **American Society for Engineering Education** at its 1957 annual meeting, June 17-21. These awards are given for teaching, research, leadership, and engineering drawing.

Blocksom & Company has added an upholstered furniture competition among design schools to its annual professional contest. The winning student designer in each school receives $50 and a chanee to compete for the national prize of $500, plus $500 for his school.

The $25,000 **Machine Design Awards** for industrial processing machinery, construction and mining machinery, and jigs, fixtures and tooling, are again being sponsored by the **Lincoln Arc Welding Foundation** in a contest that closes July 15. The address is P. O. Box 3035, Cleveland 17, O.

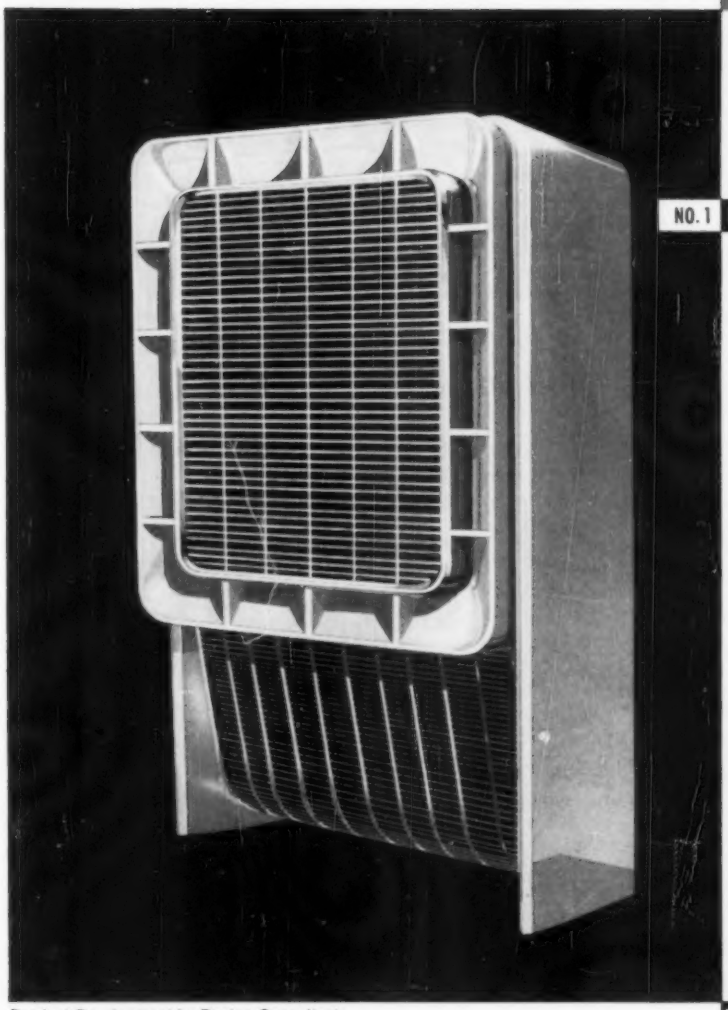
Charter members of new Upper Ohio Valley Chapter, IDI, with George Beck, National Chairman (seated, far right) and Leon Gordon Miller, chapter chairman (next to him).

Idea!

space heater design

using H&K perforated metals

NO. 1 OF A SERIES



Product Development by Design Consultants

For the Industrial Designer's never ending search for new materials and textures, the constantly expanding field of perforated metals has become an excellent solution. In the space heater illustrated, Harrington & King perforated metals have been utilized in aesthetic dominance to express the unit's basic function. Inherent rich textural qualities of such materials afford the perfect answer to style and function. With the creative spirit of contemporary product development, the Industrial Designer can find in Harrington & King perforated metals an ideal solution to both functional and aesthetic requirements as demanded by today's markets.

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The design, pattern and open area for almost every application may be selected from our thousands of perforating dies . . . at no charge for tooling. (If a special design is required, tools will be built to order.)

Harrington & King can perforate practically any material that can be obtained in coils, sheets or plates . . . from foil-thin to 1" thick. Metallic materials—steel, aluminum, stainless steel, brass, copper, monel, zinc, bronze, etc. Non-metallic materials—plastics, wood composition, paper, cloth, etc.

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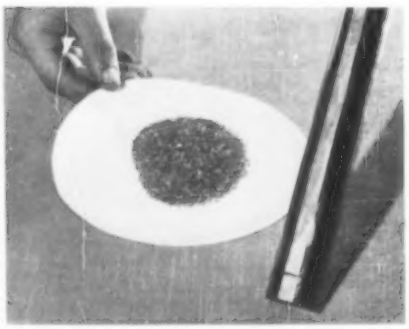
Company news

With the start of the new year, predictions of coming business expansion are uniformly enthusiastic. To sample a few: **Herman F. Lehman**, GM Vice-President and head of Frigidaire Division: major appliance sales will increase from an estimated 13,800,000 units last year to 18 million by 1960, representing a $23 billion gross in the next five years.

Joseph S. O'Flaherty, manager of Hughes Aircraft Company's semiconductor division: the fastest growing industry in America (semiconductors, shown below, are tiny particles used in transistors) will reach $300 million annualy by 1960.



C. F. Nixon, head of General Motors' Electrochemistry Department: the aluminum industry will get larger orders from automakers — more anodized aluminum will be used in decorative parts, in the face of the continuing nickel shortage.

Steelways, the magagine of the American Iron and Steel Institute: the steel industry will extend its capacity 15 million tons within the next three years.

In line with these predictions, many firms are announcing plans to expand their production and research facilities.

Continental Can Company has completed its $7 million laboratory (above) for research and engineering in Chicago. **Monsanto** is building a "country campus"-type office building near St. Louis, while **Arthur D. Little, Inc.** is adding additional laboratory facilities in and around Cambridge, Mass. A new plant for **Minneapolis-Honeywell's** Valve Division will be constructed at Fort Washington, Pa. **Koppers** will build a plant for the production of expandable styrene beads at Kobuta, Pa. Leading manufacturers have been taking positions on the future of automation in their industries. The **Woodworking Manufacturers Association** has cited the need for more automatic machines in that industry, while **Dr. W. R. G. Baker**, a General Electric vice-president, has said that automation is not the sole answer to increased production, instead emphasizing increased standardization of industrial and engineering processes. **Glen R. Fitzgerald**, director of General Motors' Process Development Section, went ahead to say that mechanization of assembly in some parts of the auto industry can become an economic burden rather than a panacea for cost-cutting. **International Business Machines** is taking account of the human environment by aiding a graduate city and regional planning class at Cornell University, in connection with its $12 million Airborne Computer Laboratories now going up in Oswego, N. Y. The students have been asked to plan a perfect living environment for the new community, including residential, business and recreational facilities.

Other recent developments in industry include **IBM's** contract to develop STRETCH, a general-purpose super-computer for Los Alamos atomic laboratories, **American Machine and Foundry's** contract to build Japan's largest nuclear research reactor for the Mitsubishi group, and **General Electric's** contract to install a highly-developed communications system along Massachusetts' new east-west turnpike.

People

IDI, Syracuse Chapter, elected the following officers for the year ending next October 1: Chairman—**Ellen Manderfield**, Vice-Chairman—**Theodore Clement**, Secretary—**Frank Perry**, Treasurer—**Sidney Warner**, National Trustees—**Theodore Clement, Joseph Federico, Seward Flynn**; Executive Committee—**George Beck, Richard Lee, Shurley Harris, Sidney Warner.**

The newly elected officers of the IDI Detroit Chapter for the coming year are **Carl Reynolds**—Chairman, **Creston Doner**—Vice-Chairman, **William E. Reddig**—Secretary, and **Kenneth A. Hopkins**—Treasurer. (below, left to right)

Thomas Helms, former chief designer of the Product Development Department at Lippincott and Margulies, has become associated with Laird Covey's design office.

Mel Boldt Associates have been appointed consultant designers for all Norge home appliances by the Borg-Warner Corporation.

Phil B. George, Jr., formerly with Raymond Loewy Associates, has joined the Reynolds Metals Company's design department.

George

Muller-Munk

Peter Muller-Munk has been appointed to the Board of Governors of the Philadelphia Museum School of Art.

Donald Deskey Associates have named three specialists as staff consultants: **Professor John E. Arnold** of Massachusetts Institute of Technology, in design and creative engineering; **Professor Hector Lazo** of New York University, in marketing; and **Dr. Robert F. Mehl**, Director of the Metals Research Laboratory at Carnegie Tech, in metallurgy.

Arnold

Lazo

Mehl

Brintnall

Robert L. Brintnall has been named Product Manager of the Kitchen Division of Whirlpool-Seeger Corporation.

Benjamin M. Holt has been appointed Project Director of the Planning and Development Department of American Potash and Chemical Corporation.

Raymond Spilman has moved his offices to 120 East 56th St., New York.

William M. Cameron, formerly production supervisor for Henry Keck Associates, has become Director of Design for Planar Associates, Pasadena.

Henry S. Prescott has been appointed vice president of planning, a new department of The Quantacolor Company, color and design consultants.

Kenneth Van Dyck has named **Ray B. Wheeler**, formerly director of Peter Muller-Munk's office in Haifa, as Chief Designer of Van Dyck Associates.

The IDI Design Award is a token of recognition bestowed on a designer or a team of designers for outstanding design of any product mass produced prior to May 5, 1957. The award is open to all designers, regardless of affiliation.

submissions Entries may be made either by the designer himself, or by anyone else on behalf of the designer. Copies of the submission form are obtainable from the address below. Forms must be returned postmarked not later than May 5, 1957.

presentation Announcement of the designers to be honored and presentation of the award medals will be made at a luncheon on June 20, 1957, at the Sarah Siddons Walk, Hotel Ambassador East, Chicago.

PAST RECIPIENTS OF IDI DESIGN AWARDS

1956 William E. Clements
Jon W. Hauser, ASID
George W. Walker and Elwood P. Engel, IDI, and Joseph Oros, and Eugene Bordinat, jr. IDI, and Herbert Tod, IDI, and Rulo N. Conrad, IDI and John Najjar, IDI.

1955 James G. Balmer and Carl B. Denny and Frederick W. Hertzler of Harley Earl, Inc.
Randall D. Faurot,
Richard Montmeat, IDI

1954 Dave Chapman, ASID
Franz Wagner, ASID and Richard Latham, ASID and 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 and Thomas Nevall, IDI
Charles Eames
Carl Otto, ASID

the Industrial Designers' Institute announces

the 7th annual design award program

Request forms from Walter C. Granville, Chairman, 38 S. Dearborn St., Chicago 3

Who gets credit?

On the third birthday of INDUSTRIAL DESIGN, we are publishing our first January issue: as 1957 is launched, ID launches a new monthly publication schedule. Our birthday also punctuates the busiest three-year span in the young history of the industrial design profession—a period that reflects unprecedented growth in the size of the profession, its stature—and its influence.

Wondering, on the eve of this anniversary, how the change had been recorded, we were thumbing reminiscently through the first issue of 1954 when something caught our eye: a note at the end of an Appliance Review apologized for "the absence of designers' credits," because manufacturers' press departments were often unable to locate the proper names. Other articles listed cars and calculators and heaters "designed by ....," the name being that of one or another independent designer. This emphasis on individual credit was an exaggeration, based on the very difficulty of obtaining names. Three years ago the fact that *somebody* was responsible for the design function in industry needed to be stressed, and one way to make the point was to single out the designer—if we could—for special credit.

In the course of three years our policy has slowly changed. For all but the simplest products, independent designers are now billed as "consultants," and they frequently share credit with engineers, company designers and even complete design staffs. Why the change? For one thing, it reflects the growth of professional prestige: the designer now enjoys so much more recognition within the manufacturing scheme that his role, though it always deserves to be underscored, does not need to be exaggerated. The change also demonstrates an increase in the scope of industrial design: the designer no longer needs to think of himself as the Atlas who supports the whole burden of product creation. He recognizes —and usually welcomes—the increasingly effective collaboration of men with related skills, inside and outside the company. He is frequently unwilling to take credit for a product that is inevitably, like all products of modern business, the result of teamwork.

If design is a matter of teamwork, who do we mean when we say designer? In some publications the word is tagged on the man who works out a circuit problem or adapts a valve to a new function. To avoid confusion, we have established *our* definition of the word and we shall stick to it: in this journal, a "designer" does a job that is both creative and comprehensive. He is responsible for guiding the character and function of a product until it is complete. He may be a bona fide industrial designer or he may operate without benefit of an official label: the inventor of a product may function as its designer, so may an engineer. But by our definition, design does not spring automatically from the solving of mechanical problems; it is a talent for total expression that must be consciously exercised.

This, of course, leads to the question, are credits necessary at all? In a totally mature world, in which every man's work was his sole satisfaction, credits would certainly be superfluous. But in 20th century America, the credit motive remains one of the creditable human motives, as well as one of the most useful ones. Recognition stirs motivation, and motivation is what gets things done well. The big change, and the big promise of maturity, lies in recognition of *who* gets credit —and in the individual's ability to get satisfaction through the achievement of the group to which he contributes.

Because ID believes that the success and quality of today's products depend on industry's recognition of the design function, we shall always look for evidence that *somebody* is responsible for that function. And we shall continue to single out the person or groups who discharge those responsibilities well. In writing our credit lines, we place no limits on who or how many they might be. The more the merrier, in fact. Modern business has repealed the old rule that allowed only one designer—if any—to a product.—*j. f. m.*

photos by the author unless otherwise noted

The question of CREATIVITY

by Suzanne Burrey

Creativity, like the weather, tends to be taken for granted — everybody talking about it but nobody doing anything. But just as our approach to the weather is more scientific than our forbears' — at least we have the means to track hurricanes — creativity is becoming a subject of systematic study. Each year John Arnold brings together psychologists, inventors and executives at M. I. T. to discuss creative thinking, new techniques in applying it, and the management of creative personnel. The following is a report on the participants in the seminar, what happened there, and how the designer and industry may be affected.

HARVARD PSYCHOLOGISTS HOLD SEMINAR ON "THE CREATIVE PROCESS"

ARTHUR D. LITTLE GROUP ORIENTS CLIENTS TO "OPERATIONAL CREATIVITY"

COURSES IN "CREATIVE THINKING" SPROUT UP IN ADULT EDUCATION CENTERS

GE OFFERS LIMBERING UP COURSE IN CREATIVE ENGINEERING

INSTITUTE OF CONTEMPORARY ART SPONSORS CONFERENCE SERIES ON CREATIVITY

FIRESTONE, IBM AND 85 OTHER ORGANIZATIONS APPLY ARNOLD'S CE COURSE TO BUSINESS

INTRODUCTION

Through all the flurry over the subject of creativity (which can get as far out of hand as the Air Force's "guided" Snark), Professor John Arnold's two-week seminar at M. I. T. holds a steady course. A sound educator, with a gift for orchestrating a program that includes practically every approach in the field from Buckminster Fuller to "brainstorming," Arnold is probably the best-known among the several investigators. Though it is called "Creative Engineering," his annual seminar acts as a center of discussion on creative thinking in general—increasingly so. The fourth annual session, which took place last June 18-29, gave more emphasis to psychology and useful creative techniques, and the common agreement among speakers from GE, AC Sparkplug and Du Pont showed how Arnold's influence (and industry's interest in the subject) has spread. At the 1956 session 144 trained executives travelled to Cambridge to take part in small group meetings in the afternoon and to hear morning lectures on topics as broad as "What is Creativity?" and as particular as "Creativity in Government Laboratories." For two weeks, the talk was of "revolution," and the engineers, chemists, physicists, tool designers, weapons specialists, army research officers and industrial designers loved it. In fact, Arnold had to advise them not to feel guilty about having a good time.

There was no doubt that the experience was different from the usual course given to hard-working analytical minds; none of the work was compulsory; participants were encouraged to relax—and listen to some surprising statements. Arnold told them, "A good share of our creative effort results in making things larger, faster, more powerful and efficient, rather than basically rethinking the needs that various products are supposed to satisfy. If we are to better satisfy the needs of man, we must not only study the creative process, but we must also study ourselves." Psychoanalyst Herbert Harris advised them to accept the feminine traits in their nature; psychologist A. H. Maslow suggested that they recapture the spontaneous creativeness of their healthy childhood; and Colonel A. H. Sykes, in his Army uniform, said blandly, "You can't get chaos in this conforming country!"

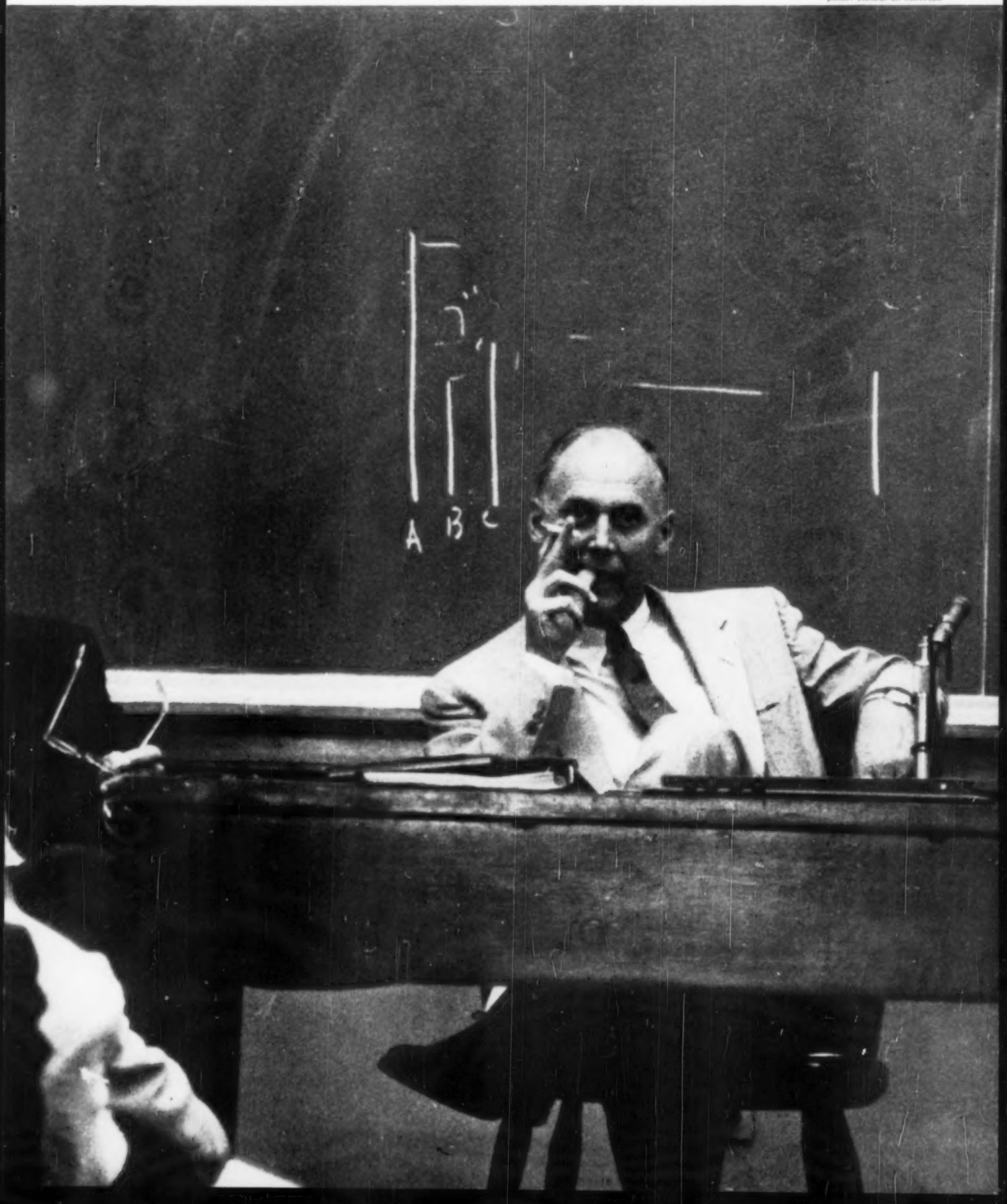
Why did they come?

An older generation, oriented to the lone inventor, might have scoffed at the idea of a course in "Creative Engineering," but a current one comes hungrily, sponsored by its corporate employers. In these days of prosperity, industry seems willing to allot a little of its profits to studying the basis of its existence—creative thinking. The trend, in the hands of some, has reached the proportions as well as the superficiality of a fad. But a few are genuinely confronting the mystery of creativity, believing there are some good reasons to do so. Among the reasons: world population has jumped three billion in the last 20 years; people are being trained to fill narrower, more specialized fields; machines grow more complex and more remote from the men who run them; and there is general grumbling in the corporation that "our old methods are antiquated and new ones must be found." And together with complaints about breakdowns in communication are the rising complaints about the shortage of creative-problem solving abilities in key positions. There have never been enough ideas at the right time and place to keep up with man's needs, of course, but nowadays we tend to turn problems hopefully over to exponents of research and to departments of scientific development. Thus the assault on the question of creativity is in the nature of research into research.

Although they knew there would be no specific information given them in their fields, whether chemistry, engineering or design, companies and government laboratories sent men to M. I. T. with the hope that they would profit as individuals. Said W. R. Evans, Supervisor of Project Tool Development at Aircraft Marine Products, Inc.: "I figure it's like a religion, this course. You get out of it what you put into it." Said Robert W. Stoner, Supervisor, Fuselage Design Group, Chance Vought Aircraft: "I would like to find out what I've been doing wrong to keep our people from being more creative." Industrial designer Jess Forrest said: "I'm here in the hope of expanding my thinking on the design problems of high-speed flight." Another industrial designer, Jack Hockenberry, a member of a similar team working on airborne environments, said, "Dealing specifically with human engineering problems, a course like this is mandatory." More likely to take a creative role than engineers (at least, more often educated to do so), industrial designers came to M. I. T. for insight, and to find the means to stimulate their colleagues. Arnold told them, "We view design as *one* of the vehicles through which man expresses his creative powers." Obviously, the close relationship between design and invention created a common ground of discussion among designers, scientists and engineers. Joining with the speakers for an afternoon question period, Arnold dealt with the questions of creativity on a practical as well as on an inspirational level: "The creative process is bigger than having an idea. That's only a part of it. There are many bugs that must be worked out in the best-conceived ideas; there is ample opportunity for high-level creative activity in the development of a prototype." Arnold's smooth awareness of the need for theory, application — and humor — managed to carry reluctant dragons over the first hurdle of the course — the "psycho" sessions, described on the next two spreads.

JOHN ARNOLD FIRST ADVISES PUTTING ASIDE THE SLIDE RULE FOR A VIEW OF THE INNER MAN

photo: Thomas B. Sheridan



ARNOLD defines ways of thinking and the effect of emotional and cultural blocks on creative thought

Arnold's chart of thinking. Definitions: **omphaloskepsis** means relaxed contemplation; **serendipity** is the act of looking for one thing and discovering something else in the process.

Professor John Arnold: Innovation is not limited to amateurs, but it may be limited to those who *think* like amateurs —who are as fearless, as uninhibited, as sensitive and observant as a newcomer to any field.

Every field of human endeavor gives rise to problems that can and should be solved in a creative fashion. Depending upon the problems, there are three distinctly different kinds of thinking (see diagram). Analytical problems are stated quite precisely and lead to one, and only one, right answer. (How do you spell cat? What is the integral of x 2dx?) The problems of judgement are more complex, and there can be more than one right answer. (When do all the judges in a beauty contest agree? And even in the Supreme Court minority reports are frequently submitted.) The synthesizing process, however, may involve an infinite number of concepts and a complete spectrum of possible solutions, and there is always a better one or a worse one rather than a wrong solution. While all three activities intermingle in daily living, the synthesizing process, the bringing together of two objects or concepts for the purpose of making a new combination or a whole (done vicariously, this is called imagination) is fundamental to all creative activity. But the creative process, as I define it, involves more than synthesizing. Without going into its various qualitative levels, from genius to simple association of ideas that makes a joke, the creative process is primarily a mental process whereby one combines and recombines past experience, possibly with some distortion, in such a fashion that the new combination, pattern or configuration better solves some need of mankind to be addressed. The end result must be tangible, something you can see, feel, or react to in some way. It must be forwardly oriented in time and it must have synergetic values. (A term adopted from chemistry, synergy means a new combination of old or familiar elements whose total effect is greater than the sum of the individual elements, having been transformed into a totality of a different character.) For example, chances are pretty good that you would not have seen much worth in combining a piece of glass, some copper wire and a piece of charred thread until after an Edison showed you how. Chance enters into creativity, of course, but rarely do chance combinations have the quality of synergism.

Invention, which involves high-level creativity, is not to be confused with *discovery*, which is the first recognition of combinations that have always existed and requires great depth of knowledge in restricted areas. **No matter what your degree of scholarship, you are well-stocked to think and act creatively—all that is needed is a storehouse of experience.** And one thing more: you must have the confidence to start the search for answers first within your own mind, rather than to turn to the experts or to the libraries of the world.

T. B. Sheridan

Psychologists BRUNER and MOONEY discuss the basis of man's world view—perception

Professor Jerome C. Bruner: Man cannot see the world other than as it is recorded in his brain. His basis of thinking is sensory information; his manner of receiving this information is called *perception*.

We have been doing tests of perception on Harvard and Radcliffe students, using tachistoscopic (both regular and distorted) cards. Each time a card is presented to a subject, he must recognize its attributes—shapes, color, denomination, etc. At this instant he must make a decision about the card, whether it is a regular playing card or an altered one (and the distortions may be very subtle). **Each choice, correct or incorrect, relevant or irrelevant, becomes information. How the choice is made represents the strategy or method of the individual. I suspect that creativity depends not so much on a person's strategy, but his ability to change his strategy as the situation requires.**

We find that there are very interesting correlations between the emotional state of the subject and his ability to perceive correctly the size, shape and color of a toy or a card. **It is as though there is always a superego inside the brain, peering through a Judas eye and scanning incoming percepts to decide which ones shall be permitted into consciousness.** Two general rules are: 1) stimuli corresponding to the prevailing directive state of the organism are the most readily recognized, 2) that the organism tends to distort stimuli so that they conform to his dominant need or expectation, whatever that may be at the time. The more familiar he becomes with his environment, the more he resists the recognition in it of anything unexpected or incongruous. We have discovered that overmotivation for any reason is one of the prime causes of a fixed and narrow field of perception. Often the inhibiting factor is too much anxiety to succeed on the card test! When you think what a selective and delicate mechanism is involved in human perception, the implications are rather frightening.

Professor Ross L. Mooney: Perception is the full sweep of man's orderly psychological engagement with his environment. We humans must be equipped with a fantastically complicated calculating machine to handle our perceptual traffic. Its function is to make sense out of what occurs at each moment while our sense organs are open to stimulation. Using something like weighted averages of past experiences, the system apparently works to sort out the "fittings" (inclusions, exclusions, tolerations among the infinite operations going on inside and out) which provide the maximum reliabilities as determined by our past experiences—all of this going on unconsciously, with the solutions announced consciously in the form of perceptions. **In order to live and to create, a man must be able to handle his outness, his in-ness, his sequential ordering, and his "fittings."** To increase in his realization of life and in his creative capacities, he is required to grow 1) wider outward openness for more extensive inclusions, 2) **sharper inward differentiation** for clearer definitions, 3) **stronger sequential controls for** longer and more inclusive transactions and 4) improved esthetic evaluations for more inclusive and refined "fittings."

Dr. Herbert I. Harris: The orthodox Freudian map of the mind divides it into three parts: the *id*, with its primitive force, which stands apart from morality and values; the *ego*, with its rational checks upon the id; and the *superego*, a culturally-conditioned watchdog over the other two. All are fed by the unconscious, and Freud's technique of psychoanalysis has recognized and isolated many mechanisms concealed under the threshold of consciousness—sublimation, rejection, repression, identification, etc. **We must assume that the unconscious contains the resources for all forms of creative activity; it is rich with perceptions, images and ideas —but in order to reach them man must get through a network of repressive barriers.** While certain repressive barriers are necessary to maintain sanity, we must strive to have them not too severe, too harsh, too prone to dampen the extraordinary, the unconventional impulse that goes beyond the boundaries of everyday rules of behavior. **The first step to creativity is self-knowledge. The individual should use any means (psychoanalysis is an aid for neurotics) to increase his understanding of his unconscious with its multitude of valuable, original impressions.** He must learn to accept its content, however "shocking," as a normal concomitant to maturing. He can also learn to control its operation with his conscious mind and thereby release valuable energy (which many waste because of needless repression) for creative thinking.

Dr. A. H. Maslow: All people are creative. I'm not speaking of special-talent creativeness —that remains a mystery—but of the creativeness of every healthy child. **In a sense, one lets oneself be creative by not being afraid of the self, of others, or of the environment —creativeness is a kind of by-product which comes without effort in people who have attained psychological health.** Unfortunately, society tends to encourage the compulsive tendencies which actually interfere with creativity; practically everyone approves of the compulsive, obsessive types who are afraid—who won't play, let go, or loaf, who think only in terms of results. The creative individual, on the other hand, may appear to be irresponsible. He comes late sometimes and may have irregular habits. These in themselves are not signs of creativity—but only if they stem from the fact that he is unhurried and unafraid. **Find out who you really are. If you are able to accept yourself without loss or self-esteem, this is the beginning. Then let this freely express itself, become less-inhibited. Creativeness will come effortlessly, having some of the qualities of play.** If you can perceive the true nature of what you are looking at, putting aside hopes, fears and anxiety to succeed, you'll recognize the true nature of the problem. And generally you will find, too, that the answer is inherent in the *perception* of the problem. Standing within our fears, anxieties, pleasures, experiences, etc., we are each imbedded in a world of our own making.

(The foregoing five pages are a freely abridged version of the views expressed by the speakers in lectures and discussion.)

Dr. Harris, Professor Arnold and Dr. Maslow answer afternoon questions.

ARNOLD RECOMMENDS A VARIETY OF TECHNIQUES IN USING EXACT TOOLS CREATIVELY

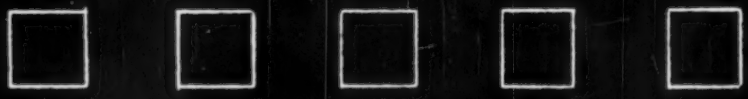
Balancing the "psycho" portion of the course were Arnold's concrete suggestions for exercising one's creative potential. Four qualities are his watchwords: *question, observe, associate, predict*. He recommends an engineer's manner of cultivating them—mainly problem-solving; and he offers several approaches, with the admonition that the search for problem-solving aids itself is a highly creative task, and individuals will have different preferences.

The more specific the problem—for example, the designing of an improved wire stapler—the more useful are check lists and attribute listings. Even in so-called "inspired" inventions, some form of check listing often plays a role. King Camp Gillette was a tinkerer, a salesman and a sociologist who also had a Big Dream: to invent something necessary which would be used once and then thrown away, thus creating a constantly expanding market. For several years he used the alphabet to list every product he knew that began with each letter, doing the same for human needs and activities. One morning, suddenly, while he was shaving, he had a moment of insight: he visualized the modern safety razor. It took years more to get an edge on strip steel and to design the machine that would produce the blades at a reasonable cost, but his is a classic pattern: intensive *preparatory* searching, long *incubation*, the moment of *insight*, and persistent *verification* while the experts said it couldn't be done. Arnold points out the difference between successful dreamers and unsuccessful ones. It lies in the amount of confidence, or intuition, the emotional energy, no matter from what source, that is required to drive the project through

PROBLEM SHEET

Monday, June 18, 1956

Here are some "warm up" problems to get the wheels in motion. Five are analytical (one right answer type) and five are creative (many right answers). Try at least one of each.

1. 

The four aces and the queen of spades have been dealt and are lying before you, face down. Which is the queen?

a) She is not next to the ace of hearts or the ace of clubs.

b) The ace of clubs is not next to the ace of diamonds, nor is the ace of spades.

c) The ace of hearts is not next to the ace of spades, nor is the ace of clubs.

d) The ace of diamonds is not to the left of the ace of hearts.

e) Pick the queen.

2. On June 23, 1947, the Hungarian Institute of Public Opinion Research included the following question in one of its surveys:

"Did you buy books this year?"

On the basis of the following results, what can you say about the group sampled?

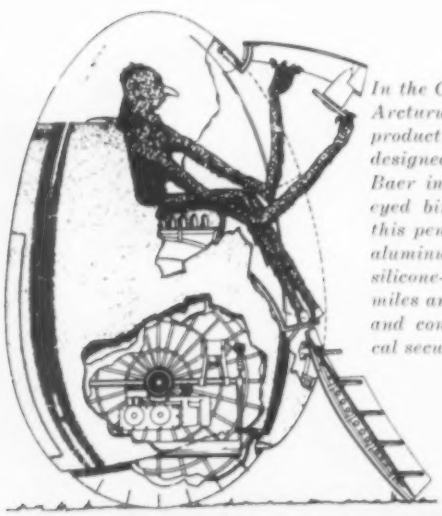
	ALL	MEN	WOMEN
"Yes"	49.6%	54.9%	44.4%
"No"	50.4%	45.1%	55.6%

and complete it in the face of others' disbelief.

Because it combines the advantages of a check list and other forms of attribute listing, Arnold favors a Morphological Analysis worked out by Dr. Zwicky of Aero-Jet Corporation to serve as an organizing element during the frustrations of the creative search. Take, for example, the Harvard Bridge problem. ("Spanning the Charles River, linking Boston and Cambridge, is a bridge which is a hardship to walk over in bad weather. List every possible way in which people could be transported across the Harvard Bridge.") Discounting, for the purposes of the illustration, the idea of shooting people out of cannons (a possibility not to be overlooked), and assuming that the general statement of the problem would be "Getting something from one place to another via a powered vehicle," one could list three independent variables: one, *type* of vehicle—cart, chair, sling, bed, etc.; two, *media* in which the vehicle operates—air, water, oil, rails, etc.; three, *power source*—steam, electric motor, belt, magnetic field, etc. The point of listing as many as possible under each heading is that three almost infinitely in turn can be systematically combined. Some combinations will be patently impossible; others will provoke some careful consideration—and possibly a starting-off point in the inventor's mind which may be worked into a worthwhile and practical solution.

The stimulus of life on Arcturus

As a means of exercising his students' imaginations, Arnold himself invented the now-famous science-fiction world of Arcturus IV, a planet whose atmosphere, gravity, soil, etc., are completely different from the earth's. In designing products for the strange planet, few participants succeeded in projecting into Arcturus' special needs during the short period of the seminar (even in a whole year, this is no mean feat!), but a demonstration brought home the basic attitudes that Project Arcturus is meant to cultivate: the creative person automatically questions the *basis* of any design problem that is proposed, and gains confidence in dealing with the unknown. "If the rate of creativity rises—it's more a matter of people's developing a spirit of confidence," Arnold said, "than the few tricks they pick up in the course."



In the Case Study book of Arcturus IV, the classic product is the Eggomobile, designed by Austin Robert Baer in 1952. For the three-eyed bird-like inhabitants, this pendulum-balanced aluminum shell, rolling on a silicone-rubber tread at eight miles an hour, is amphibious and conducive to psychological security.

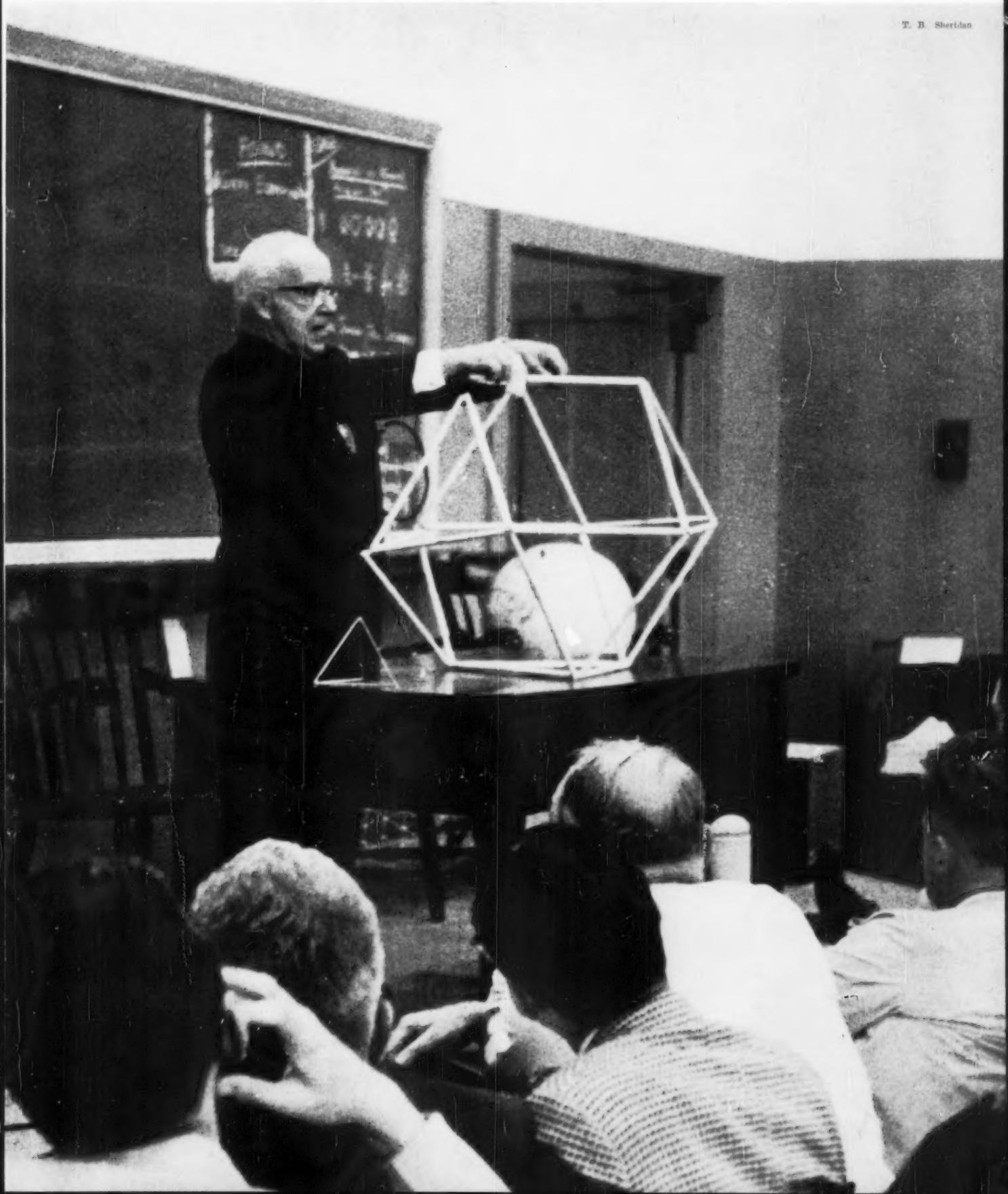
The feverish increase of Brainstorming

Out of group thinking sessions held at the advertising agency Batten, Barton, Durstine and Osborn, in 1939, Alex F. Osborn developed the "brainstorming" technique which in many different guises has become popular throughout industry. The Norman Vincent Peale of Creative Thinking, Osborn has been writing and talking about "ideation" until it is now a full-time occupation; he heads the Creative Education Foundation which he founded in Buffalo. Brainstorming is the crux of their curriculum, and personnel from more than 350 companies, including IBM, GE and Du Pont, attend their "think shops." Helping to spread the method, BBDO maintains a Vice-President of Brainstorming, Willard A. Pleuthner.

Charles H. Clark of Ethyl Corporation demonstrated the orthodox Osborn method (bells, tricks, and fire whistles are optional) at the M. I. T. seminar. The aim of brainstorming is to stimulate the *association* of ideas among six core members of a group and a few guests who are preferably in the same executive echelon. (Osborn recommends at least two days' notice on the problem.) With secretaries and tape recorder poised for action, the chairman reads four rules: judicial judgment is ruled out; free wheeling is welcomed; quantity is wanted; and combination and improvement are sought. As the hands show that ideas are popping, the chairman drives for quantity, ringing a bell at a rule infraction—i.e., any *critical* comment such as "We tried that five years ago." He urges people to latch on to each other's ideas, to elaborate and to improve (the signal for this is "hitchhike!"). At the end of about a half hour's chain reaction, everyone hears how *many* ideas were recorded, and these, without individual credit, are turned over to the executive who posed the problem. "He screens the ideas and only presents to management the screened ideas with their next steps," Pleuthner explains.

Arnold believes that brainstorming's chief value is as a form of therapy, in setting up a climate where one does not have the time to evaluate ideas or have any fear of being foolish. Having some reservations, however, about the loss of individual identity, he recommends supplementing group brainstorming with an individual practice of something similar—encouraging each person to stir the same plethora of free association using the morphological system; and in the searching phase of creativity, not rejecting, but judging later any seemingly "crack-pot" scheme.

"THE COMPREHENSIVE DESIGNER" BUCKMINSTER FULLER HOLDS AN EXAMPLE FOR THE M. I. T. SEMINAR



T. B. Sheridan

THE UNIQUENESS OF THE INDIVIDUAL

"Architects of the New Era," R. Buckminster Fuller has said, "must re-emerge as a *fraternity of Leonardos.*" (A very contemporary sentiment, this suggests the idea of a group of superior individuals, working toward the same goals.) When Bucky Fuller delivered his lecture at the M. I. T. seminar, Arnold introduced him as the foremost "Comprehensive Designer." The underlying theme of the course is to encourage each man to develop his own uniqueness, and develop confidence in the form of his individual expression. Bucky Fuller epitomizes the qualities of originality and invention and also Arnold's conviction that the impetus for improvement must always come from the spark generated in the mind of some uncommon individual.

As Fuller addressed the group, reactions were strongly pro or con—some men walked out, unsympathetic to his curiously cadenced language, perhaps, or to his doctrine of strict economy. Among those who remained were skeptics who could not help but be impressed by Fuller's products, as they unrolled chronologically since 1927: 1) his system of Energetic Geometry," a mathematics of the spatial configurations of energy patterns; 2) his geodesic structures, such as shelter-domes; 3) his Dymaxion trio, the house, the car and the map. Some stayed past the dinner hour, engrossed by the consistency that threads through Fuller's life work, all of which expresses his desire to achieve the maximum net performance per gross energy output in building, manpower, economics, politics, etc. While for many years Fuller stood quite alone, often misinterpreted as a technocentric dreamer in our waste-minded culture, his geodesic structures are now being widely recognized for their practical value. They are mushrooming in many places, from Marine Corps proving grounds to trade fairs (see below) to barnyards—and even the Brooklyn Dodgers are thinking of moving into one.

Courtesy, Office of International Trade Fairs

U.S. Pavilion at Kabul, Afghanistan Fair is 100-foot geodesic dome.

It is a fundamental mistake, Arnold believes, for the designer to think only in terms of building a better mouse trap, rather than applying to the problem some basic rethinking, i.e., how to find the best method of getting rid of mice, whether animal, chemical or mechanical. As Buckminster Fuller demonstrates, the key to the kind of redesigning which increases function and performance lies in the *interpretation* of the problem. The more deeply the problem is realized, the more the imagination is unleashed, as in the Arcturus problems. According to Arnold, the contemporary Leonardo, the Comprehensive Designer, should: 1) be motivated by very broad concepts of human thought and behavior, international in scope (i.e., that two-thirds of the world's population are continually under-fed, that only 25% of the world's people benefits from 100% of the world's manufacturing), to erase material and technological inequalities; 2) be keenly aware of the organisms and the environment related to his product, the fields of human engineering and applied psychology; 3) be articulate in all types and on all levels of communication—verbal, symbolic logic, mathematics, visual, as well as that within himself and between man and man—between man and machines and between machine and machine (cybernetics, feedback and control) in biological and social systems as well as in mechanical systems; 4) maintain a delicate balance between his ability to analyze, synthesize and evaluate; 5) be thoroughly proficient in the creative process.

Recognition that technically-trained people have latent creative powers, and that, furthermore, they need an antidote to the excess of analysis that has filled their lives, is Arnold's answer to the technician's growing fear of corporate anonymity. His description of the Comprehensive Designer proposes a specific image of a creative person; it suggests a goal for all this talk about the subject. Because he felt the need to bolster the summer group against growing pressures to conform, and because an orientation was required for the unfamiliar material, the most recent seminar increased the "psycho" content of the course. As a mechanical engineer himself, who was also trained as a psychologist, Arnold has breadth as an educator and ability to interpret both the human and exact sciences in everyday language. He feels that at this stage of our ignorance, there is something of value in almost every bit of research into creativity, and, while he is aware of the increase in group techniques, he regards them as of supplementary value to the ultimate responsibility that rests with the individual. Unlike his Cambridge neighbor, William J. J. Gordon, Arnold professes no particular *method*. He exposes the seminar to a well-rounded exchange of ideas, gives advice on how to exercise creativity, and says, "Now make of it what you will."

HOW A GROUP APPLIES THE CREATIVE PROCESS—W. J. J. GORDON'S "OPERATIONAL CREATIVITY"

T. B. Sheridan

Left to right, Harold A. Priest, Jr., Robert T. B. Davison, Robert M. Jolkovski, Richard W. Foster, John W. Lincoln and William J. J. Gordon, as they appeared at the M.I.T. seminar.

These six men may seem curiously unaware of their audience, but they are involved in something other than a conventional lecture. Arnold's seminar included two demonstrations: Charles H. Clark (Ethyl Corporation), who presented Osborn's "brainstorming"; and this live demonstration shown above of a distinctly different group technique originated by William J. J. Gordon (seen far right). His official name for it is "Operational Creativity"—meaning a method by which a group invents products and acts as an individual. In effect, the members transform their identity, their ego-consciousness, into an activity. After this session before the Creative Engineering seminar, two hours of intense discussion and concentration, they cooperatively "invented" a new sport—sailing on water skis.

How the method evolved

The conviction that a group might combine its forces and come up with an original solution to a problem, forming together a single concept, started in the mind of Bill Gordon 12 years ago. Five years ago Arthur D. Little Inc., pioneers in industrial research techniques, in Cambridge, Massachusetts, encouraged him to form an Invention-Design Group. Burly-browed, with a vigorous voice and approach, Gordon has interests that range through various fields—history, agriculture, psychology, his major studies at Harvard having been in esthetics and physics. Even as an inventor, his fundamental concern is still to decipher the common characteristics of the creative process in all fields. He has had experience directing an experimental group of artists, and he feels that inventions and scientific theories, too, have not only pragmatic value but esthetic qualities. Gordon's ideal goal is an "elegant" solution—that is, a logically beautiful solution that works.

When Arthur D. Little, Inc. invited him to put his theories into practice, Gordon initiated the first sessions with Robert T. B. Davison and Carleton S. Marden, two inventors. They had one client. Since then the group has had 36 clients, and there are now nine members, the six shown above plus Terry Underwood, Carl Marden, Arthur Janszen. The aim of the group has been to provide its clients with a concept usually in the form of a working model; the problem may concern orienting personnel in some specific area, diversifying manufacturing, or inventing a new product.

How they operate

The unique feature of their work is that the embryonic stages of the invention are developed through a group discussion. In a permissive climate, encouraging completely natural expression, with humor and physical movement for relief, the members gather in a private room for an exhausting session which may last as long as three hours, until everyone has been pushed to the utmost fatigue; there are no coffee breaks to interrupt the continuity of their thought exchanges. "It is just when we strike those seemingly impenetrable bastions that we tend toward despair . . . and it is just

then that we are on the verge of a solution." Gordon compares the method to psychoanalytic free association techniques, with one member linking his thoughts to those of another, until the trading of ideas among the group crystallizes into a conclusion. In the early stages of the formation of a group, guilt and inhibitions must be broken down by a slow process during which the director holds the group-mind at an intense pitch of conceptual excitement beginning on a plane of generalities and principles until the particular application seems naturally to emerge; for example, the following took place on the subject of "opening":

A. "Opening means 'open in' or 'open out'—even 'burst open'."

B. "Flowers burst open."

C. "Opening can be elastic, can be a cycle—opening, closing—opening, closing . . . "

D. "In nature, things open where they are weakened."

E. "That's right; pea pod, milk weed . . . "

In this instance, as was the custom during the earlier sessions, Gordon withheld from the group any previous knowledge of their objective. While they were discussing these generalities, Gordon having given them only the clue that the problem concerned "opening," they were not aware that they were setting out to devise a new method of opening cans. But, guided by Gordon, more than two hours later the group arrived at a can opening principle based on weakening the can top before removing it. This principle was then worked out in a model form and a prototype presented to the client. The director's responsibility is to tread a sensitive path between participation and detachment, "to maintain an almost pathological optimism, supporting a refusal to give up"—not allowing the group to run out of creative energy when they are on the brink of discovery.

On the basis of increased familiarity with the method among the group, Gordon has found that it is no longer necessary to withhold from the group what the objective is; they are now well-enough trained to avoid preconceptions. While the guide must be critical, he no longer bears the sole burden of keeping the objective in mind and the problem afloat for a long time in an abstract form. The members themselves do so quite naturally, and some jobs have been most successfully completed when Gordon was not present at any session. "Listening to tapes of their sessions helps us to discover where and how we may have lost an idea, and gives us an insight into how our method is changing and developing," Gordon observes. "Originally it seemed that a dominant leader was essential and that nothing would happen if there wasn't someone constantly goading things on. Now we have noticed that at some phase one man will become a leader and will show the necessary confidence to take over, then another assumes the role—and the essential quality of leadership is supporting the group with confidence while the others are going through the enormous anxieties that accompany creative thinking." Believing that they are involved in an educational as well as an inventive process, the group is constantly self-critical, analyzing previous sessions and the various relationships among the participants. Recently Dick Foster and Bob Jolkovski held a session on sessions (without Gordon) to analyze the function of the leader.

The group tells little of its work

The Invention-Design group offers to tackle anything, spending a third of its time on its method (serving rather like an Actors Studio for inventors), a third of its time holding sessions (which sometimes include guest participants), and a third putting its concepts into practice. Their products, as they describe them, are various: from finding a quick way to affix false eyelashes to the more considerable matter of inventing a new portable power source. At the moment it is impossible to appraise their inventions, because all are secret in terms of client relations. "Often what we deliver to a client is some years ahead," says Gordon. "It is too radical for the immediate market. In that case the company, or we ourselves, work on filling in the steps in between." He points out that they are more concerned with the laboratory stage of the project than the finished stage, considering themselves not specifically a design or an engineering group, but a conceptual body which puts its hand to both considerations, turning over final details to specialists in the company.

Operational Creativity vs. Brainstorming

The differences between Bill Gordon's OC method and Osborn's brainstorming technique are basic and multiple; Gordon feels that his is closer to the natural creative process. Their aims are quite different: BS seeks a quantity of ideas, to be sorted out later; OC is a method of reaching a single concept; BS is fragmented and competitive in spirit; OC operates as an organic unit; BS prohibits negative statements; OC considers all forms of response acceptable; and while BS is a means primarily to "think up" ideas, OC takes a concept all the way into practice. In brainstorming the problem must be narrowly defined and there is not necessarily a continuum of group communication; each person presents a solution, not expressing all the steps leading to it. The aim of OC on the other hand, is to attack basic problems—to establish a total, continuing inter-action among the participants, so that they can jointly develop (even over a long period of time), a wholly new concept.

The creativity question inspires further research into the creative process itself

Bill Gordon's method also provided background for the meeting (above) of 50 professionals at Arden House: "The Creative Process." (Someone said, "It's like trying to hit a ball bearing with a spear.") But there was some interesting ammunition in inventor Gordon's preliminary theory on the nature of the creative process (right) which provided a basis for discussion. These are the themes which he feels the unique experience of the Invention-Design group has brought into the open as an integrated theory. Educators from many industrial design departments attended as well as engineers and design executives from such companies as Reynolds Metals, Alcoa, GE, etc. James Plaut, director of the Institute of Contemporary Art, the sponsor, said, referring to the Institute's long experience in matters concerning design and industry: "As the years have gone by the compulsion to study in fundamental terms the elements of creativity has become more and more obsessive. Thus it may be possible for us to exercise some intelligence and some sense of direction in the analysis of the creative person, in his eventual training, in his industrial employment . . . "

Four speakers—a mathematician, Professor Osman K. Mawardi of M. I. T.; a painter, Jason Berger; a teacher of literature at Williams, Professor Donald Gifford; and Robert Jolkovski, a member of the Invention-Design group, who studied psychology at Harvard and is also a professional jazz clarinetist—presented evidence from their various fields of the presence of Gordon's six themes, involvement-detachment, speculation, deferment, the presence of the non-accidental, the value of the commonplace and the autonomy of the object. Professor Mawardi was the most explicit in his definitions; the rest more often implied or struggled with the themes. In discussion, it turned out to be just as difficult as Gordon feared to keep on the track of the process itself, to find terms corresponding in different fields—and resist the deviations into method, product, applications. (No one denied that creativity still

Professor Arnold quotes Graham Wallas, who in **The Art of Thinking, 1926,** *pioneered in the efforts to analyze the creative process. On the basis of personal acquaintance with creative thinkers, Wallas describes four stages which seem to occur naturally: first,* **preparation**—*the stage at which the subject or the problem is investigated in all directions; then comes a period of* **incubation** *when the subject is deliberately not thought about consciously (in fact, many stated that it was desirable to be in as relaxed a mental state as possible). The climax, he terms* **illumination,** *when a long train of associations (which may have lasted quite awhile and involved some frustrating turns) brings up the solution. The last phase (and the four stages constantly overlap) is* **verification** *which, unlike the others, is a comparatively conscious operation. Implying the important role of the unconscious, Wallas observes, "The best single ideas seemed to come to many thinkers by automatic illumination. They report that their more continuous work was often most successful when it was done without the strain of effort, and even without any conscious feeling of volition."*

Alex F. Osborn, in **Applied Imagination** *has elaborated upon Wallas' steps as follows: orientation, preparation, analysis, hypothesis, incubation, synthesis and verification—suggesting that there are actually seven steps taking place during the creative process.*

Unlike his colleagues elsewhere, Gordon believes that the creative process is not a matter of steps or sequence, but circular and oscillatory. He names six themes that must be present:

1. Involvement-detachment — *an oscillating relationship between the object and subject (whether painter and landscape, inventor and product).*

2. Speculation — *that a great number of basic possibilities must be kept in constant play, mutually interacting in order to arrive at a truly novel form.*

3. Deferment — *the ability to sustain for a long period this condition of multiplicity while keeping a state of constructive detachment.*

4. Autonomy of the object — *the object takes on a life of its own and actually influences the subject — the inventor or the artist.*

5. Non-accidental aspect—*that none of the ideas in group sessions or any solutions occur accidentally, but they can be explained and traced from their origin, which usually refers to (4), the autonomy of the object, its influence on the creator.*

6. The commonplace — *that commonplace matter plays an important role. Since it is impossible to determine beforehand whether or not information will be useful, high permissiveness, a low threshold of discrimination are essential in establishing a "climate" for creative thought.*

Jolkovski uses jazz themes to demonstrate the above themes.

remains a mystery—why some people are creative and some are not—why sometimes and not others.) There was also considerable resistance to the subject; and many felt that an attempted discussion of the process from the beginning, was futile. Gordon presented his case gamely, for his position as inventor-theorist is uniquely schizoid, "The things we invent are means to an end. That end is more and more insight into the creative process." He defined his views not as a finished theory but one that has passed some preliminary tests, ("We have found that when one of these themes is missing you can prophesy that the group will not get anywhere."), and invited the conference to enrich the concept. To the skeptics, he explained, "To maintain that the creative process itself cannot be understood limits us to analyzing our products. In the first place, to say that something can never be understood is a passive attitude inconsistent with any advance at all." Gordon believes a) that one can consciously go about the job of increasing creative efficiency; b) that certain factors can be learned which will increase the probability of an individual's or group's constructive imagination—*not* that a person can be conscious of the process and creative at the same time—anymore than Mickey Mantle can be conscious of his moves *while he is hitting a home run*. The observations that he discussed at Arden House were based on a retrospective look at the workings of the Invention-Design group. His insight is derived from the unique communicative nature of the *modus operandi*. Every session is tape-recorded so that the "process" can be listened to, can be observed. He regards it as no more than an initial breakthrough. He says "the function of a hypothesis is not so much to be right as to act as the speculative basis for increasing refinement."

The next development may be up to the psychologists; Dr. Jerome Bruner is advancing into the problem. He is currently conducting a Harvard seminar on the subject. Fortified by a grant from the Rockefeller Foundation, Bruner will be working with the Invention-Design group to study the creative process in terms of an Invention-Design case study which would most perfectly illustrate its abstract beginnings and empirical ends.

Industry, the method and the process

Meanwhile Gordon's activities have had some measurable influence. Kimberly-Clark, a client of the Invention-Design group, is initiating an education program which will apply Gordon's method of "Operational Creativity" to company problems. William Wilson of Kimberly-Clark participated in Gordon's sessions as a working member over a period of several months. On the basis of his familiarity with the method, and with the approval of Dr. Van Buskirk, company psychologist, Kimberly-Clark will experiment with a group over and above its regular research and development program. The personnel will be selected from various places in the company; and it will be oriented by a reading program including Euclid, Archimedes, and especially Dampier's *History of Science* for, Gordon observes, people who have a reading background in common have a shared plane of communication, and a much better climate for invention. "We have found it very revealing to read the writings of Euclid, Archimedes, and others in terms of the creative process."

Bill Gordon believes that despite the difference between individual and group invention, his six themes are present in either case. As an exponent of a group method, he seems to be in tune with some others (viz. Latham, Tyler Jensen, ID, October 1956, "No individual can invent enough products to maintain a large company today.") He names three reasons for the rise of the "integrated group as an effective creative organ": 1) that group members, being products of our analytic non-creative culture draw confidence from each other to be able to transcend the system; 2) that the group brings to the problem the kind of team excitement that is lacking in the individual; 3) (and this may be the least significant reason) that the enormous range of knowledge required in modern science make it impossible for an individual to grasp even a small part of the whole—an exactly opposite conviction from that of the Comprehensive Designer, described on page 30.

Kimberly-Clark's W. H. Swanson, Vice President of Research and Development, and Staff Assistant William G. Wilson attended the Arden House conference of the Institute of Contemporary Art.

'FINALLY THE M.I.T. SEMINAR DISCUSSED THE MANAGEMENT OF CREATIVE PERSONNEL

T. R. Sheridan

In a small discussion group, William N. Parker, Staff Engineer RCA, speaks (left to right) to Howard Westerman of Bell Telephone Laboratories, Inc.; Quentin S. Johnson, of Army Engineering Research and Development Laboratory, Fort Belvoir, Virginia; and Robert A. Covington, Jr., of the Mechanical Development Lab at Du Pont.

Two questions kept coming up at the M. I. T. afternoon seminars: *What will I tell my company about the course when I get back?* and *How does what I have learned about creativity apply to the problems of management?* Not everyone was as candid as Robert W. Stoner, Supervisor of a Fuselage Design Group at Chance Vought Aircraft, who said to his seminar group on the first afternoon, "I'm here to find out what I've been doing wrong to keep our people from being more creative." But many discovered that the value of the course extended also into their experiences as executives, and, after the lectures of three guests—Colonel H. F. Sykes, Jr., J. A. Anderson, and Roger F. Honebrink—they got down to cases during the small group meetings of the second week.

John Arnold, leading the topic, stated the essential desires of management: the company wants people to be *productive* (if quality and originality are recognized as they should be, being productive means being creative, at a constant rate). Management also requires, if it is going to get results, employees who are loyal, stable and who have the ability to grow in their jobs. The majority of creative people, Arnold said, are not eccentrics, and are not to be regarded with suspicion. When he suggested how to get the most out of people, as a matter of plain common sense, everyone who had had executive experience could realize how infrequently the employer-employee relationship is regarded with a clear end in view, and it is little taken into account that the wheels of production are being turned by live human beings, whose emotions, experiences, even problems, are not to be regarded as impediments, but rather as resources which wise management can utilize creatively for the prosperity of the company. Arnold outlined the foregoing steps and implied that when there are lapses, the failure is very often due to management's and the individual's inability to keep referring to the goal of achieving a good rate of productivity, which is in their common interest.

1) Recognize each person as an individual, not as a tool, or as just a group member, or as simply a means to increase the boss's prestige.

2) Help to stimulate him. Don't depend entirely upon an assignment to be self-stimulating. Much depends on timing, and the kind of interest that is expressed in a man's work.

3) Encourage him. Help create an atmosphere conductive to creation. Eliminate comparisons as much as possible. While this may seem to be a ready means to exert pressure, in the long run, pressure discourages creative effort, and to stress competition among employees will not bring out their best work. They will become too comparison-minded to think in terms of an ultimate standard.

4) Assist him, to the point of taking part in his work, but not so much as to inhibit him.

5) Reward him. The salary system should be as fair as possible, related to achievement and incentive. Expressions of appreciation, financial and in friendly words, are vital to both on and off the job satisfaction.

The ultimate aim is to have a sense of good control over a staff, but allowing them, at the same time, to have maximum freedom of expression, for this will help them to be flexible in their approach, to have drive and to achieve results. He suggested that each "boss" take the time to write out the characteristics of a good

T. B. Sheridan

J. A. Anderson, AC Sparkplug: Tests and training have revealed to us that a person who goes sour in his job is usually either very high in creativity or very low, or has gotten into the wrong slot. Replacement has made new men out of some. Refresher courses help too, because very few people use their full creative talents.

What is needed is to establish a "creative" classification, so that a creative person can make progress salary-wise and be promoted without necessarily having to go through the management route. Too often organizations take a good creator and make him a poor manager. A good creator should be able to work for someone and yet be paid more than his boss.

Col. H. F. Sykes, Jr. ERDL: We can spend essentially our best efforts trying to find a way to *permit* the individual to be creative, and in spite of our best efforts, the pressures of society, of our civilization, of our folklore, will be still so great that we need not fear liberties will bring chaos. For the word *management*, I would substitute *leadership*.

Leadership suggests to me that you inspire and open new vistas to people. You fight a whole series of cliches; the crushing weight of past disapprovals; controls; professional lethargy; complaints of lack of guidance; and many cliches created by the individuals. Leadership must apply its imagination so that creative personnel can function well.

Roger F. Honebrink, General Electric Co.: In our creative engineering program we emphasize: engineering fundamentals, an organized approach to problems, and a number of creative techniques—and deep in our hearts we feel that a man actually learns the material when he goes out and applies the classroom principles for himself.

supervisor, giving some thought to what an ideal job situation might be. He should also bear in mind that the best boss is always a good listener; he tries to understand the person who is working for him.

What is a "creative atmosphere?"

The main consideration in creating the right climate in an office or a laboratory is to keep people thinking about the future. On this Arnold made five points:

1) There should be a free flow of information, so that the employee is familiar with company aims and policies, and is able to see the future of the firm (thus relating *himself* to a foreseeable future).

2) There should not be too much or too constant pressure for work. Deadlines should be balanced out to give some relief for relaxation and "pure" thought.

3) Freedom of control. The individual should be given considerable freedom.

4) Take into account that people fear the consequences of failure. Make it clear to personnel that they can fail sometimes and that it is not fatal.

5) Eliminate conditioned thinking. There is always danger of setting up the psychological barriers that discourage suggestions and invention, i.e., "That isn't the way we do it here," and corresponding attitudes.

Creativity in the company

The creative person may be in departments other than such obvious places as design, research and product development, etc. where tangible results are expected. According to J. A. Anderson, of the AC Sparkplug Division of General Motors, if a company is intelligently aware of the factor of creativity it will recognize it wherever it is present, from the production line to the mail room, and will take steps to distribute people who show signs of having a creative potential in many departments. But particularly in the case of the designer-inventor, and his relations with his supervisor, it is important that the two individuals keep a balance between the supervisor's judgment and the designer's creative endeavor. Anderson advised that he should be spared routine work as much as possible and be given problems which reach far ahead. Sometimes the supervisor must know when to take a problem away from him, and he must be able to handle certain irritants that are often present in creative individuals: that their intelligence will often resent the ideas which less competent people give them; that they have a great tendency to criticize the ideas of others; that they may be loose organizers having little interest in detail; and that they often incur resentment by coming up with ideas that are technically in the province of somebody else, making suggestions on management, organization, etc.; and they may insist upon continually changing or improving their original idea, when the supervisor wants them to stop and release what they have.

Nobody left with the illusion that the M. I. T. seminar provided *the* answer to the question of creativity. What the participants had to take back to their companies was something more complex than that: a better insight into themselves and a basis for coping with the problems of their working experience—given some encouragement, too, by the fact that business is being stirred to recognize "creative ability" as a quality more basic and all-inclusive than the easy conventional notions of personnel as having "executive ability," or "sales ability," etc. They were given, of course, plenty of immediate stimulation for their return, but what was more important, ideas to germinate—that they might call upon in moments either of dalliance or decision.

Mitchell Sayers, Walter Dorwin Teague Associates: Arnold's big contribution is to expose people to the value of self-analysis and job analysis, and the problems of personnel in the light of an unlimited creative potential. An experience of this kind is valuable to anyone. It can help you to communicate with more confidence and to realize the value of what Colonel Sykes called "a sense of urgency rather than anxiety" about putting ideas not into talk but action.

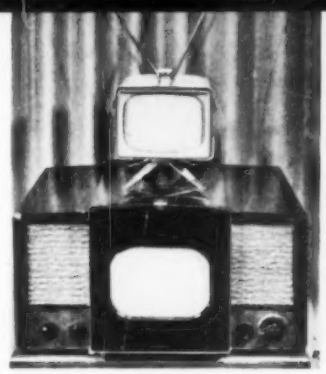
Jack Hackenberg

John Wark, Peter Schladermundt Associates: I came back eager to apply in our office the many techniques and stimulating ideas that I picked up from Arnold and the others. It has taken time to assimilate all the material and to relate it to our present similar techniques. How these are *individually* applied in any case is most important.

Jess Forrest, Bio-Mechanics Lab, Tufts University: A permanent effect of Arnold's course — I find myself going back over it — is that it gives you the tools to analyze your creative self and to improve. Though many techniques that came up are those that a designer learns empirically or in any good design school, Arnold consolidates and defines them. The distinction might have been clearer between what I would call "applied" and "pure" creativity. If an artist had been there to discuss the emotions of the process in its purest, most unrestricted form, an engineer might have learned that he has experienced something similar. Though we didn't go very deeply into the *process*, we did rediscover creativity as a unifying quality undercutting the divisions in all fields.

INDUSTRIAL DESIGNERS REVIEW THEIR EXPERIENCE

Right: R.C.A.'s 1956 Personal atop their famous 1946 set, the first table model in the industry. Left: Mike Carey frolics in Macy's with the smallest in TV, as photographed by Hugh B. Johnston.



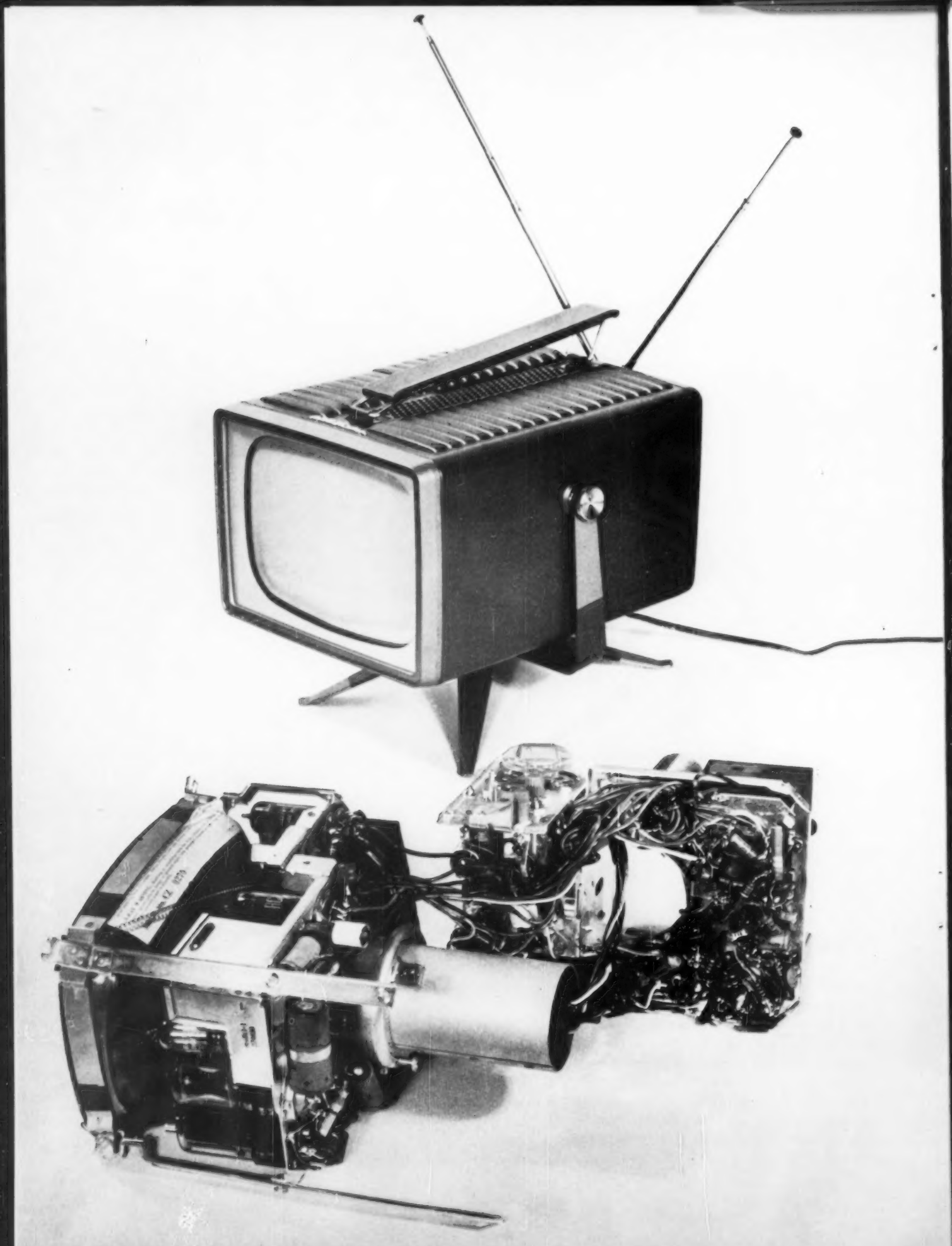
TV sets get smaller and smaller

The Coca Cola bottle and the television set are related items in American life, and last year, while the Coke bottle was swelling to quart proportions, the TV set trimmed down to four distinctly half-pint sizes. Since America's postwar offspring have been bred (and in a few startling cases even born) on television, the first thing that the four miniature sets suggest is that the industry is making concessions to the dimensions of its greatest audience. The young fry and their purchasing agents are not the only market, however; the miniature pitch is also being slanted toward hotels, motels and restaurants, hospitals and baby-sitting bobbysoxers, and that sizable and peripatetic customer group that is already far gone in its addiction for "portables," no matter what.

For the time being, the industry describes as "miniature" (or "personal") any set with a diagonal tube measurement of less than 14 inches. And "portable," as far as TV is concerned, must be defined as "something to be carried by one husky person for a limited distance, such as from one room to another." In 1954 Emerson was marketing a set which was called a "portable." It had a handle, to be sure, but it weighed 45 pounds. G.E.'s 14-inch, 26-pounder of 1955 was the set that finally proved, much to the industry's surprise, that the customer was ready to sacrifice screen size and power for the convenience of taking TV with him instead of having to go to it. The convenience had, and has, its definite limits—these "portables" can't operate beyond the reach of an electric outlet—but G.E. sold more than 250,000 of the 14-inch sets within the first year. A market had been found. The relatively light set with the handle could readily be adapted to the various household functions. It could, for instance, be in the cellar for morning laundering, in the kitchen during the afternoon, in the playroom (with closed door) just before dinner, in the dining room during dinner, in the living room after dinner, in the bedroom at night. And after you've had your beakful, the set could be stored in a closet. But the big problem with the 14-inch was, and is, that it is neither small enough for efficient storage nor light enough for everyone to carry.

Four answers were served up in 1956, when R.C.A., Emerson, Admiral and G.E. introduced the smallest sets in video's brief history. Lightness and compactness are indeed their remarkable features. Yet among the four sets the results vary remarkably—in weight (from Emerson's 23 pounds to G.E.'s 13), in screen size (from Admiral's 10.375 inches to the 8½ of Emerson and R.C.A.), in list price (from R.C.A.'s $125 to Admiral's $89.95). Cost and weight variance has been caused, in large part, by different housing materials, different circuitry designs and different picture tubes. These factors will be described as we meet the sets individually. They have been paired off—the R.C.A. and Emerson on the next two pages, the Admiral and G.E. on the following two. The former pair is the heavier and higher-priced contingent, and the sets are something unique in the company lines. The latter two are lighter and lower-priced, and they are closely related to larger portables in the company lines. All of the sets have one significant feature in common—while they use double-purpose vacuum tubes and rectifiers that replace vacuum tubes in certain applications, no transistors have been employed. And no radically new circuits have been introduced — just simplified circuits and novel component arrangements.

Performance is also, as one might expect, somewhat scaled down. Sound is restricted by the tiny speakers, receptivity is poor in weak-signal areas, and the pictures lack brightness, though lines are quite sharp—problems of focus diminish as the picture area diminishes. The industry is not liable to linger long over these matters, however, for its gaze is fixed on the TV of 1966, when color will be general, for certain, and 5 ft. x 7 ft. wall screens equipped with home video tape recorders are expected, as well as a pay-as-you-see system and really portable portables. Amid such technological evolution, the miniature set of 1956 is, at best, a momentary stopover — a technical and merchandising bridge between the cumbersome behemoths of 1946 and battery-powered, brief-case sets of 1966.—*h. b. j.*



(←) Extreme packaging problem presented by the smaller (but still untransistorized) receivers is shown in this photograph of R.C.A.'s new 8½" set alongside its chassis "broken" in half.

R.C.A., responsible in 1946 for the industry's first table-model TV (p. 39), became in 1956 the first to produce a miniature set.

Staff-designed under the direction of H. M. Rundle, Product Development Manager, R.C.A.'s 8½-inch, 22-pound personal is the smallest and trimmest of the four miniatures, and, oddly enough, very nearly the heaviest—only ounces lighter than the much bulkier TV-radio combination of Emerson.

Compactness, rather than lightness or low cost, was the primary objective in the development of this personal, which lists at $125 (with built-in antenna). R.C.A. engineers achieved such a compact package by specially designing all major components to fit into a layout of three chassis sub-assemblies.

Weight is this miniature's major deficit. When R.C.A. elected to use a circuitry with an iron-core power transformer, they also elected added poundage, heat and cost which G.E. and Admiral avoided by choosing series-string circuitries that eliminate the need for a power transformer. However, quite ironically, the R.C.A. *seems* the lightest of the miniatures, thanks to a masterstroke of design. The leg stand, which only R.C.A. utilized, seems to suspend the set in mid-air, dramatizing its qualities of compactness and portability.

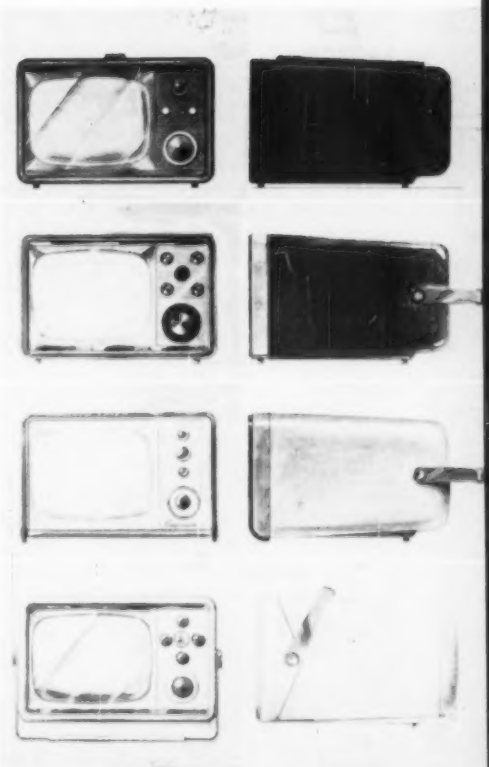
Appearance-wise, this set is by far the most interesting. The flat protective panel across the front, the hidden tuning controls, the handsomely fashioned stand (whose plunging legs reiterate the upward-thrusting "V" of the antenna), the absence of company identification from the picture side of the set—these are some of its remarkable visual qualities. They provide a successful solution to a difficult problem, which is to frame a picture handsomely and yet discreetly, without monotony and yet without irrelevancies that distract from the visual center.

Emerson introduced its miniature receiver early last summer. Weighing 23 pounds with an 8½-inch screen, it is the first personal to combine TV with radio, together with a phono jack, an under-pillow attachment, and a jack for plugging into car or boat battery.

Emerson engineers developed a much wider chassis for this set than the other miniatures have, with proportions and measurements similar to those of a large portable typewriter. The radio was added much later, and did not influence the size of the chassis or the housing designs—even the final renderings were for TV alone. As it turns out, the flat, wide look helps to give the Emerson some individuality, as the legs and clean face do for the R.C.A.

Consultant Monte L. Levin was responsible for designing Emerson's TV-radio miniature. Given the wide chassis configuration (like the R.C.A. it incorporates an iron-core power transformer into its circuitry) and specifications for controls on the front panel (this feature together with the under-pillow attachment gives this set an advantage over the others for hospital use), Levin and three of his designers each worked up a different version of the set (right), experimenting with various handle placements and control arrangements.

Emerson's top management, including president Benjamin Abrams, selected their favorite of the four designs for tooling. It called for a slight front-to-back taper, which was included in the production version, and for well-rounded edges and corners, which the engineers could not accommodate because they needed every bit of space. The housing material, like the R.C.A., is stamped steel coated with a vinyl enamel (Armorhyde) given a wrinkle finish, which provides more surface and thus serves to dissipate the heat. Again like the R.C.A., the Emerson has a built-in antenna and lists for around $125.



Even before the radio feature was added, Monte L. Levin had submitted these four TV designs to Emerson. The knob layout of the top rendering was accepted (with a few evident alterations), while the handle arrangement of the bottom rendering was the one finally chosen for production.

Admiral, in April of last year, introduced a somewhat larger personal television set, and also a different theory about how to merchandise the tiny receivers. The mathematical picture size, 10.375 inches, was arrived at, according to Admiral president Ross D. Siragusa, "after nearly a year of experimenting with picture tubes of various sizes. Our research and development engineers decided on the 10.375-inch tube as the smallest one with which full-size components could be used. We have not had to resort to miniaturization."

Designed as one in a line of portable receivers by Lawrence Wilson Associates of Detroit, Admiral's personal TV is built on a printed-circuit automation-built chassis containing 14 tubes, including the kinescope. It and its 14 and 17-inch sister sets bear a striking resemblance to the G. E.-Hotpoint line of portables. The shaping and placement of the handle, the treatment of the controls, the placement of the company name on the lower rim of the mask, the attachable antenna, the louvering of the wraparound cabinet—all are details handled very similarly by the two companies.

Although larger than the other miniatures, the Admiral, at 16½ pounds, is substantially lighter than two of the other three. This is true, at least, when it is housed in aluminum—it is also available in steel at 22 pounds. A series-string circuitry eliminating the power transformer provides further weight-saving.

Admiral came up with a unique system of merchandising the personal. The set is offered in one or two colors, in steel or aluminum, with or without handle, with or without antenna. The featured list price is $89.95, but when you investigate, you find your 90 dollars will get you a solid gray set, in steel, without handle or antenna. For a ri[illegible] with handle, antenna, two colors, aluminum and all, you pay over $125.

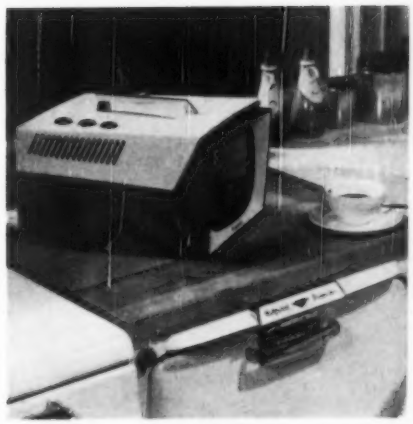
Metal cabinets (both aluminum and steel are in production) for the 10" Admiral portable are shown in the forming operation. Aluminum wraparounds are one of the important weight-saving features of both the Admiral and G.E. personal receivers.

General Electric became the fourth television manufacturer to enter the miniature field late last summer, when it introduced its 13-pound personal, by far the lightest of the four. It was designed by the staff in G.E.'s TV division, Syracuse, at that time under the direction of George A. Beck. After advance engineering had worked up a breadboard model of the chassis, design developed the appearance model, which was closely adhered to even after product engineering had worked out the tooling details.

The set's lightness is mainly attributable to three factors: (1) a series-string circuitry, (2) an aluminum wraparound housing, (3) a new type of picture tube. Internally, the circuitry is a copy of G.E.'s successful 14-inch, although the required compactness necessitated a completely new chassis layout.

A new method for making one-piece picture tubes with high-speed glass-blowing equipment resulted in G.E.'s unique 9-inch kinescope (right), a low-cost piece that is very convex across the face and very light, weighing but two pounds.

In this area of portables, the industry is trying to shorten the picture tube (crucial in determining the overall length of the cabinet), and it is trying to liberate itself from the electric cord. G.E. is experimenting with a kinescope of 110-degree deflection which could shorten the length of present sets by four or five inches. The greater problem, however, is to achieve battery-power—the batteries necessary to power present miniatures would weigh more than the sets themselves. A transistor capable of amplifying at TV power levels has already been announced, so the true portable is soon to arrive. It will be lighter, even smaller, and battery-powered, we can be sure, but what sort of package it will make remains to be seen.



Coming out with a set similar in every respect to G.E.'s, Hotpoint has introduced vivid kitchen colors (black and white, red and white) in an effort to market the set as another appliance.

G.E. cut further weight (and, at least potentially, cost) when it introduced its new 9" tube, made on a high-speed glass-blowing machine.

Beginning a series on industrial techniques: making glass is a contrast of modern methods and ancient art.

A stream of molten glass is "drawn" into tubes at 40 miles an hour at Corning Glass Works. A basic method of forming glass, drawing produces tubes and rods for neon signs and syringes, test tubes and thermometers in a continuous operation.

Glass fabrication by Douglas G. Meldrum

New tricks with an old craft needed to mass-produce today's glass products

Secrecy invariably surrounds the introduction of a new fabrication process in the glass industry, and the method shown on page 48—centrifugal casting or spinning — is no exception. Spinnning, Corning's little-publicized answer to the demand for large-area TV tubes, literally "spins" glass into shapes previously obtainable only by the ancient and most flexible method of forming glass—hand blowing. This article, the first in a series on fabrication techniques, concerns glass, its characteristics, and design problems and possibilities as they relate to glass and its fabrication, particularly to new and more mechanized methods. Subsequent articles will discuss new ways other materials are being fabricated into end products—including zinc, stainless steel, copper, plastics.

It is easy to recognize a glass factory from a distance: just look at the roof. The pincer-like structure is designed as a huge ventilator that draws intense heat — always identified with glass-making—from the manufacturing area. Inside there is heat, but it is almost unnoticeable amid the deafening roar from a jungle of flexible pipes that guide cool air under pressure and the crashing of huge presses that work unceasingly like noisy robots. In this inferno-like atmosphere, surrounded by automatic machines that turn out many of today's glass products, artisans still use their lung-power and their skilled hands. While production lines move twenty-four hours a day, producing thousands of glass pieces every minute at a cost of a few pennies each, teams of three and four men carefully blow and mold and press other pieces, one at a time. Despite the fact that the industry has developed the fastest automatic machines in the world (page 54), because of the nature of glass the hand-blower remains a very important figure in an industry where there is a great demand for limited quantities of products in odd shapes.

Glass is essentially a plastic substance, and glass-making is a continuous operation from raw material to finished product. Steel or aluminum or plastic can be shipped raw to a fabricator to be made into a product; plastic resin can be made to flow from the heat of the mold. But glass is workable only at extremely high temperatures. Raw materials must be mixed and melted and then formed and finished with intense heat using special equipment. When it is cold and hard and brittle, glass can be cut, ground, and polished, but it cannot be forged, drawn, stamped, or machined. Since making the material is virtually one step in its fabrication, the maker of the material, then, is also the fabricator of the product.

There are pros and cons to this situation: Because the raw material maker must produce glass products, he is able to exercise great control over the use of the material and take into consideration—knowingly—its inherent advantages and limitations; on the other hand, he may lose the stimulus and imagination of hundreds of producers who might constantly pester him for new types of glass to do new things in new forms—if he were able to ship material in ingots like steel or powder like plastic for fabrication outside his plant.

Formulation

The cost of glass products varies enormously. The range is determined, in part, by the method of fabrication; machine-made pieces are, of course, less expensive than those that need special handling. But fabrication is only one consideration; the glass itself—the formulation—can be and frequently is an important cost factor. Raw materials for glass, in themselves, are inexpensive, but the care with which they must be mixed varies with the type and quality of glass required. Close attention to mixing will raise costs, just as various amounts of basic materials will change the melting point and corrosive effect of the mixture—and the latter are additional factors that influence cost before the price of fabrication is even considered.

Characteristics, as well as the cost of glass, are changed as the basic materials are varied. Borosilicate and high silica glasses have high thermal endurance, good chemical resistance and electrical stability. Lime glasses are used where mechanical properties must be carefully controlled and visual characteristics are important. The use of lead in place of lime gives added brilliance, workability, and electrical resistance, making this type of glass particularly suitable for electronic applications. A variety of types of glasses and their characteristics are shown on the right.

Transparency, a traditional asset of glass, has become—because of rapid progress in formulation and fabrication—just *one* of many advantages. Research by leading glass manufacturers in the design and use of glass has continuously expanded the market and has made glass, one of the oldest materials known, the answer to many new technological problems from radar to rockets, surgical scalpels to space satellites. Flexible ribbons a thousandth of an inch thick are used in the manufacture of electronic components; large, thick blocks of glass, still transparent despite a high lead content that makes them as heavy as steel, are used as windows in nuclear laboratories where they give protection while permitting observation. And there are promising new forms of glass that have not yet been

put to wide practical use, like photosensitive glass (right), whose main restriction at the moment is its prohibitive cost. Today, types of glass are almost unlimited; nearly all of the 99 basic elements that make up the earth's surface can be combined one way or another and fused by extreme heat to make glass. More than 65,000 practicable formulas have been concocted at Corning alone, and each has its own combination of characteristics and fabrication idiosyncrasies.

Mechanical strength of glass is determined by basic formulation

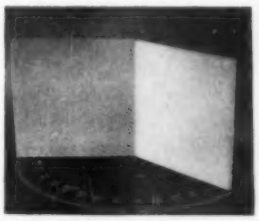
Fabrication

It is because of the combined high-heat plasticity and fragility of glass that fabrication has not moved ahead as spectacularly as formulation. When volume permits, automatic methods do replace manual ones, but as a rule they virtually duplicate them, merely substituting compressed air for lung-power or hydraulic pressure for sheer strength. Before automatic glass-forming machines were introduced, even simple shapes were produced slowly; a glass blower and four assistants could make about 216 bottles a day. Modern machines, such as the "ribbon machine" on page 54, produce up to 2,000 pieces a minute (a new experimental model has attained speeds of 4,000 a minute). The main restrictions on automatic glass forming are size and shape. Complex and large pieces still must depend on the skill of individual glass blowers.

Glass spring demonstrates the elasticity of the material

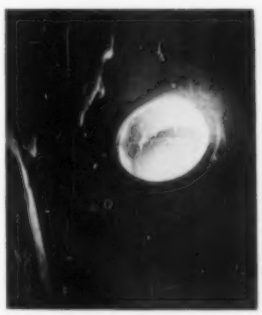
Esssentially, glass is fabricated by three basic methods—blowing, drawing, and pressing—or a combination of these processes. Fine crystal, for example, is *free blown* and shaped by hand; an inexpensive tumbler is *mold-blown* by hand or machine, depending on the shape and quality; a headlight lens or flat dish is *pressed*, invariably by machine; a tube or rod is *drawn*, usually by machine, but sometimes by hand; and a bottle is formed by a combination, the neck is pressed, the bottle blown. Blown ware has a beautiful finish whether it is free-blown or mold-blown, which brings up an interesting characteristic of glass; whether it is pressed, molded, or mold-blown, the finish of the glass piece is often finer than the finish inside the mold, a result of the flowing properties of the material. Pressed ware, made by the least expensive method of forming glass, does not have the fine finish of blown ware because it is usually thicker; the thickness sometimes imparts an irregular but rich quality.

Thin, flexible ribbon glass is used in electronic components



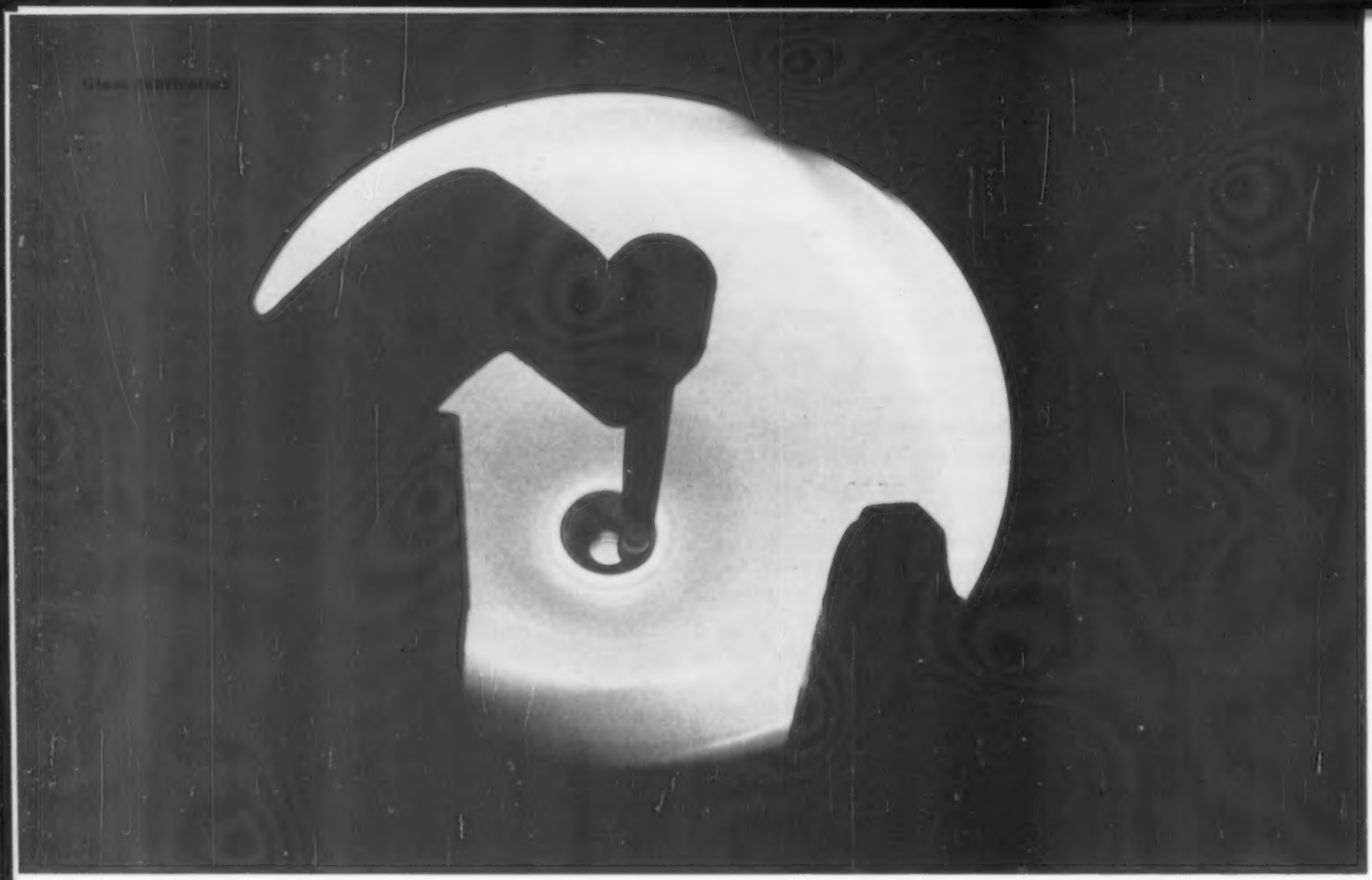
Photosensitive glass offers three-dimensional effects

Fabrication processes, whether they are automatic or manual, affect the design of glass products. Sharp changes in contour are undesirable in blown glass, wide flanges create problems in pressed ware, and so forth. These and other design considerations will be expanded in the discussion on the following pages of individual fabrication processes that typify the industry, as photographed at Corning Glass Works.



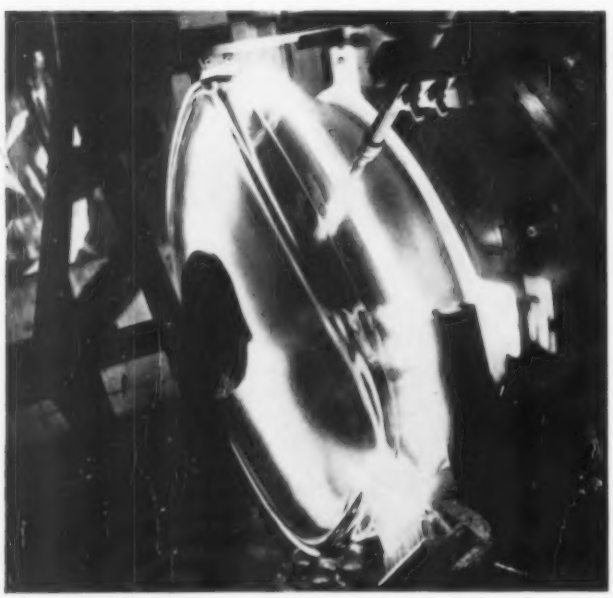
Glass with high thermal endurance is used for furnace windows

photos Corning



Corning's newest method of centrifugal casting, spinning, is used to make funnels for large TV tubes. It makes possible mass production of shapes that were previously obtainable only by hand forming. Centrifugal force solves the problem of obtaining a large lightweight funnel of uniform thickness. In production, a gob of hot glass is dropped into a mold which is spun rapidly; centrifugal force sends the soft glass up along the mold (above).

TV tube faceplates are sealed to funnels using high frequency electricity and a gas flame.



The seal, which is as strong as any part of the glass, is ground smooth for final finishing.

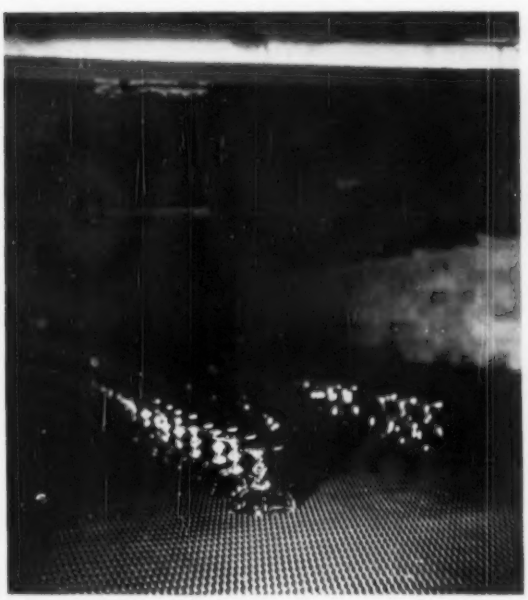
Simple tools are used (right and below) to shape and trim a piece which has been blown. The glass is still malleable and red hot.

Excess glass is trimmed from a piece of Steuben glass at Corning Glass Center.

An age-old method, hand blowing and forming of fine crystal, is still used by artisans at the Steuben Factory at Corning. They rely on their skill and experience to produce myriad forms that cannot be machine made, each one is literally custom made.

A craftsman admires—and inspects—his handiwork before removing it from the work rod.

A trip through an annealing oven removes stresses that may have been frozen into the glass as it was shaped.



Copper wheels are used to hand-engrave some finished crystal pieces at Steuben.

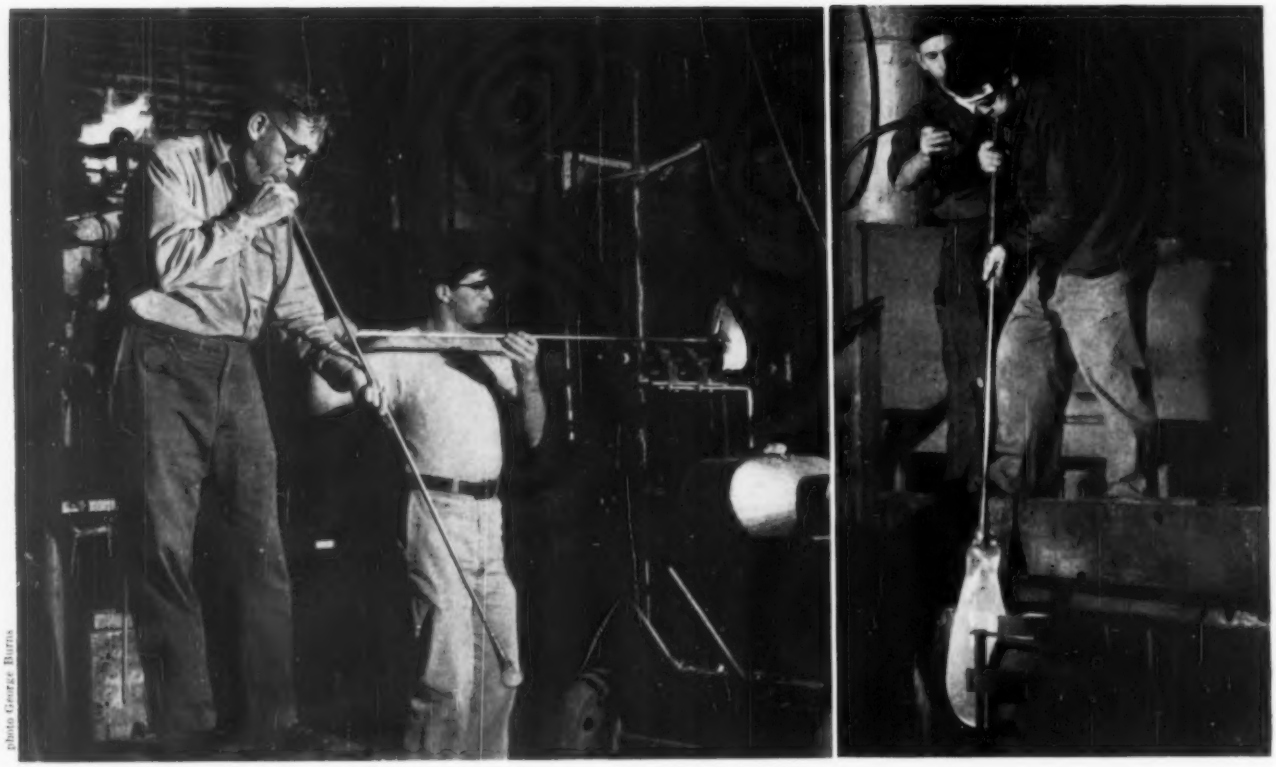
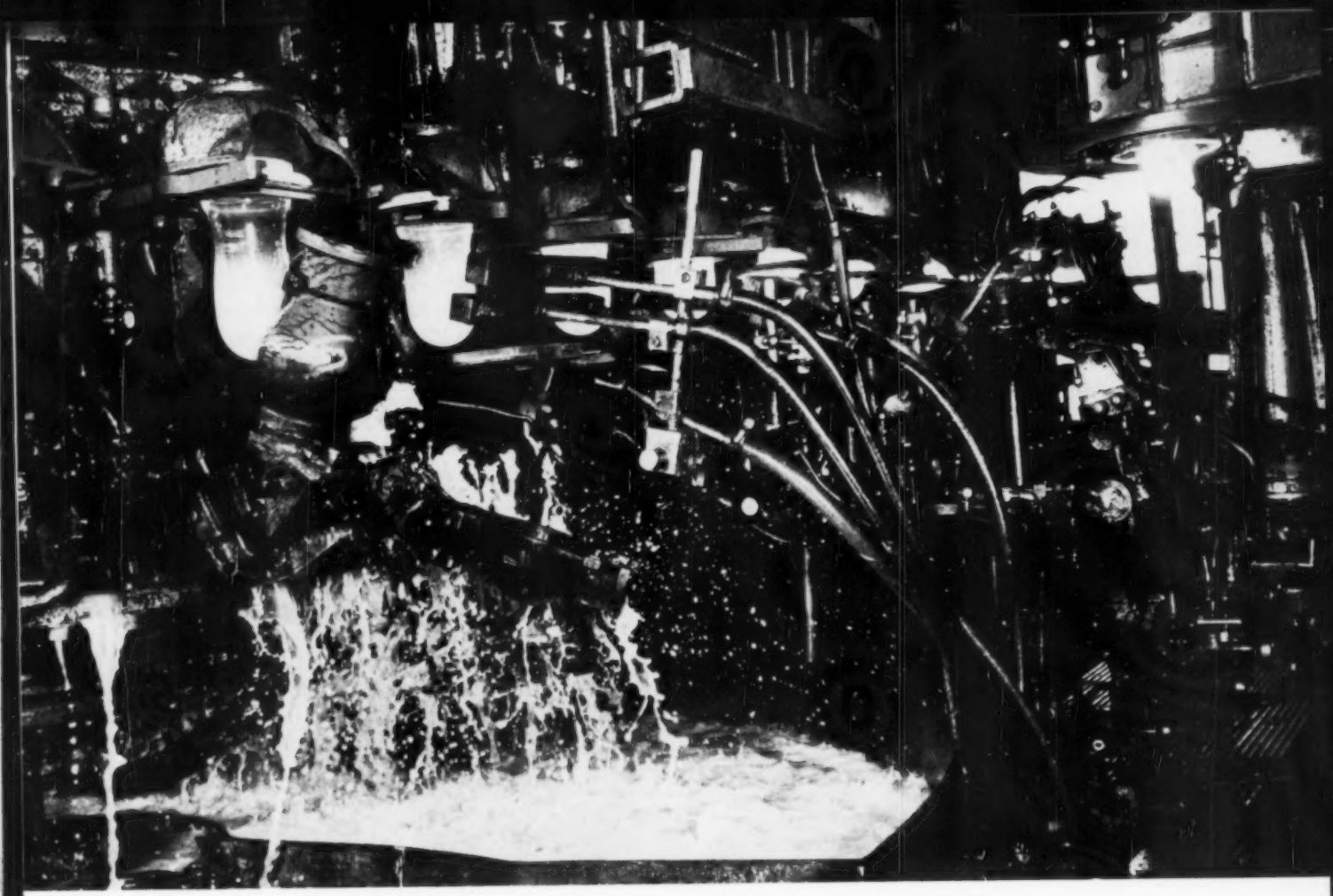
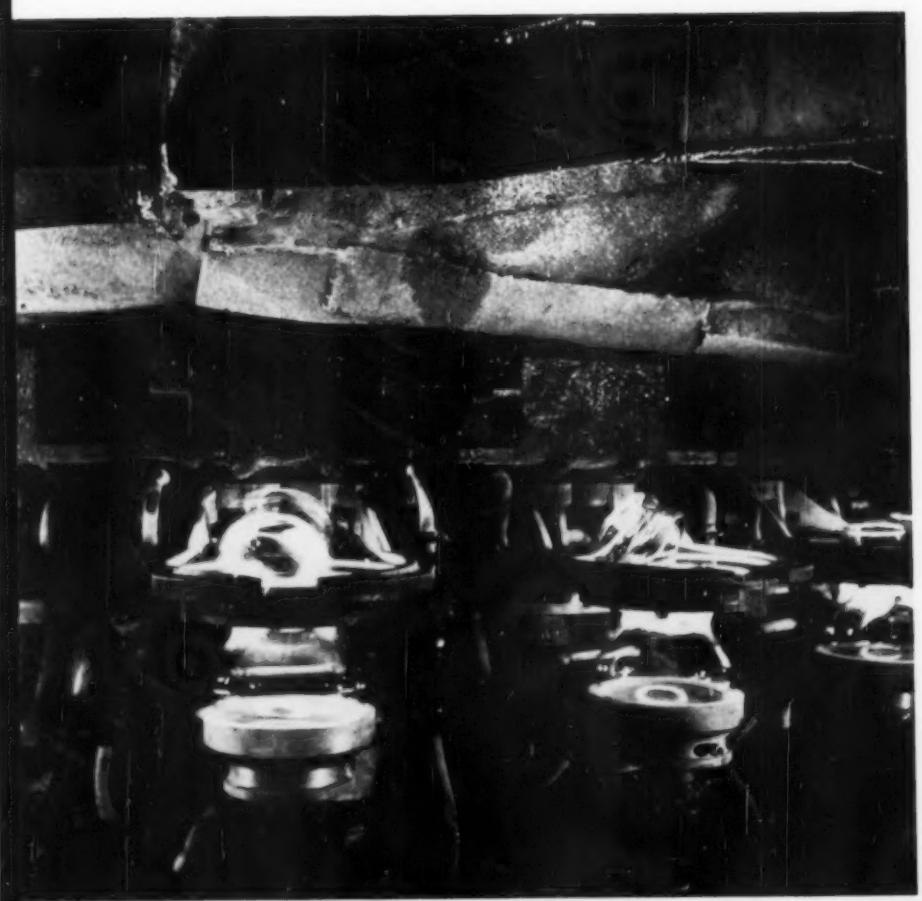


photo George Burns

For hollow shapes—light bulbs, globes, beakers—mold blowing, both by hand and machine, is used. In hand mold blowing, malleable glass is gathered on a blow-iron, a bubble is blown, placed in an open mold, and then blown out against the wall of the mold. The mechanized operation is similar; banks of molds rotate in a circle, automatically opening and closing on bubbles of glass to shape them as compressed air does the blowing. Superior gloss on the surface is obtained with paste molds whose inside surface is coated with a wet paste that forms a cushion of steam between the glass and the mold surface. These molds are rotated as the glass is blown, unlike hot-iron and press and blow molds in which the glass is blown directly against the wall of the mold to form ware of other than circular section, as shown in the diagram below.

Complex shapes (above) are not desirable for machine blowing operations as the glass cannot be blown out fully with consistent thickness. Shapes below are well-proportioned and simple, making machine blowing possible.





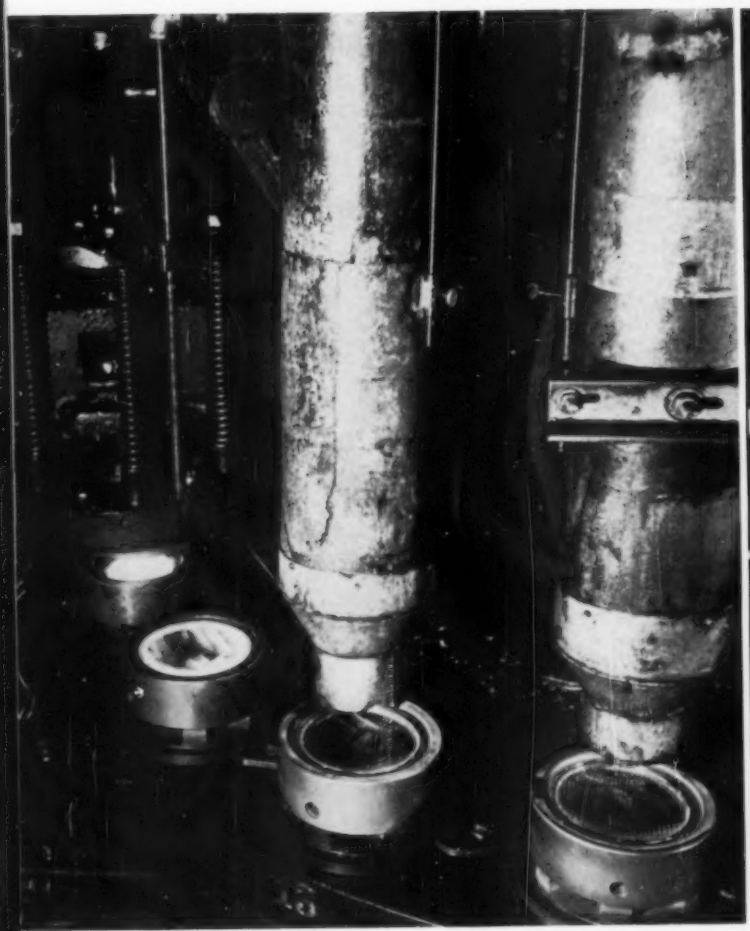
Gobs of glass (above) grow larger as they move toward a paste mold which will close on them, rotate and then disgorge the formed piece (left). The fluid in the photograph above turns to steam inside the mold and acts as a cushion between the mold and the glass. After annealing, coffeemakers are inspected before packing (below).

Pressing, either a hand or machine operation, is relatively fast, and when forms are simple and quantities large, produces the least expensive form of glass. Hand pressing is used to make large items in limited quantities, like colored lenses for transportation signals; mechanical pressing is suitable for pie plates, cake pans, casseroles, dishes, TV tube faceplates, and countless other products. There are three main types of molds for pressing: Block molds are least expensive, have no joints, and leave no vertical seam on the ware; split molds are used when the shape of the glass piece necessitates opening the mold for removal; and font or multiple cavity molds form pieces of such shapes that the glass cannot be loaded directly into a single mold cavity.

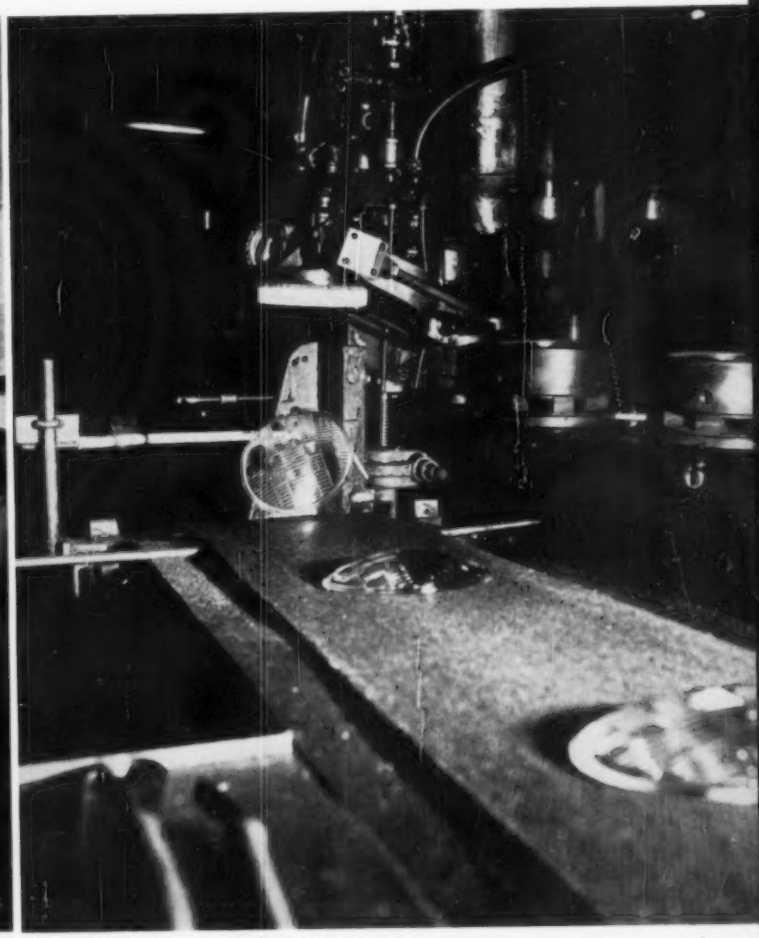
A "gatherer" holds a white-hot gob of glass over the mold as a "gaffer" cuts off the exact amount to be hand pressed (above). Pressure is applied (right), and the plunger forces the glass into the desired shape in the mold. The finished piece is removed from the mold (far right). The weight and bottom thickness of a product pressed by hand will vary from piece to piece if there is any variation in the amount of glass put into the mold. Automatic pressing minimizes this effect.

Desirable design (left) for pressed ware has sections thick enough so that glass will retain its heat and fluidity as it fills the mold. Undesirable thin sections are on the right.

For mechanical pressing, malleable glass is fed continuously from a large tank in exact amounts into the molds of a revolving press.



After pressing, headlight lenses are flipped onto a conveyor belt to begin their journey through an annealing oven, inspection, and packing.



Typical machine-pressed ware reflects characteristic glass thicknesses and depth effect.

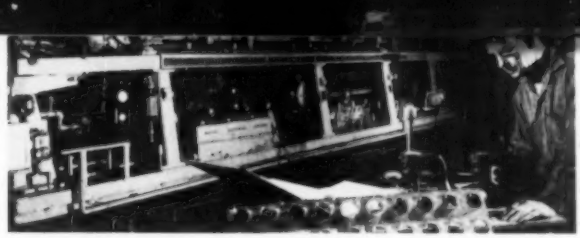


photo George Burns

The world's fastest production machine, the ribbon machine (above), was introduced in 1926. Through the years, its speed and precision have increased from 700 pieces a minute to 2,000, with twice this quantity of light bulbs, Christmas tree ornaments, or vacuùm tubes promised for the near future. In operation, a continuous ribbon of glass is fed from a tank through a series of rollers where it is shaped to the right thickness. It then rides along a belt which is perforated with precisely shaped orifices. Puffs of air, helped by the weight of the malleable glass, force bubbles to sag through the orifices. The bubbles grow larger as the belt speeds along and, when they are exactly the right size, molds on an endless chain meet and close around them. The molds spin as they grasp the glass bubbles and compressed air forces the glass into its final shape. At the moment that the glass is cooled to the proper hardness, the bulbs are released from the molds, (below), knocked from the belt and transferred to a conveyor (right) which carries them through an annealing oven, washing, frosting, inspection (lower right), and packing.

In addition to the primary undertaking of forming glass into its basic shapes, there are secondary operations that add utility and aesthetic qualities to many pieces and frequently improve the thermal, mechanical or tensile characteristics of the glass.

Annealing and tempering

During the fabrication process, stresses which tend to weaken the object are set up in glass. It is necessary, after forming, to either relieve these or create controlled stresses. Annealing is performed by passing glass objects through an oven or "lehr," which heats them to a temperature below the softening point, but high enough to equalize the stresses. Slow and controlled cooling avoids re-stressing.

Related to annealing is tempering, familiar in metal industries, but a comparatively recent development for glass. It is a process which actually turns the problem of glass stresses into an advantage. A formed glass object is reheated to a temperature higher than for annealing, but still below softening, and then the surface is cooled rapidly, usually by blasts of cold air. This establishes aligned stresses that increase, rather than decrease, the strength of the glass. Tempering increases mechanical strength from 100 to 400% and is frequently used to strengthen plate glass or flameware like Corning's Pyrex.

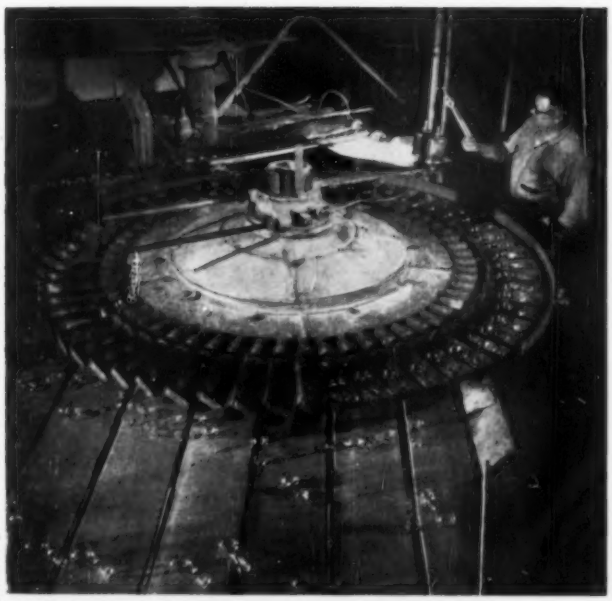


photo George Burns

All photographs on this page and elsewhere by Erich Hartmann unless otherwise noted

Secondary forming

Basic fabrication methods frequently determine whether or not secondary forming operations are necessary. Pouring lips, for example, can be molded into pressed ware during the initial operation, but this is not possible with blown ware. To form a lip, a spot on the rim of the bowl or container is heated for local softening and the lip is then fashioned with a tool.

Sealing

It is frequently easier and more economical to make a glass object in more than one piece and seal or weld the separate parts together. This secondary operation makes it possible to join parts that are fabricated by different methods or whose design makes them impossible to make in one piece.

If any one word is the key to the glass industry it is "control." From amounts of raw materials, through each step of fabrication regardless of the process, to finishing or secondary operations, every aspect of production is controlled. The panoramic windshield, a recent accomplishment of the industry, personifies this. The proper forming of the complicated curved windshield depends on the application of closely controlled temperatures to certain areas of the glass while it sags into its proper shape on top of a mold.

ROMANTIC

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"If these and the next six pages strike the reader as having a different basis from those of the rest of the magazine, then I have achieved my purpose. That is, to provide a stimulus to vision. In dealing with my own purely graphic design problems, I felt that each should be allowed to speak for itself and be laid out in a way that invites the 'reading' of a total, predominately visual, image. If the designs and their layout are successful, there should be no need for the crutch of a caption to answer the question, 'What is it?' All that is necessary is to search the evidence of the eyes. 'What is it for?' is a fair question, but since the application too is usually obvious from the design, I refrained from putting any such information on the side of the picture in order to further encourage the exercising of the visual, rather than the verbal, sensibilities. I am depending upon my 'showpieces,' for some problems offer more opportunities than others do. With this in mind, I chose to open with the 'Romantic' piece because it was so startingly different from INDUSTRIAL DESIGN's usual subject matter. It is not a sample of the Romantic typeface but the announcement, both of which I designed for a Philadelphia

DIALOGS ON GRAPHIC DESIGN—V

Matthew Leibowitz


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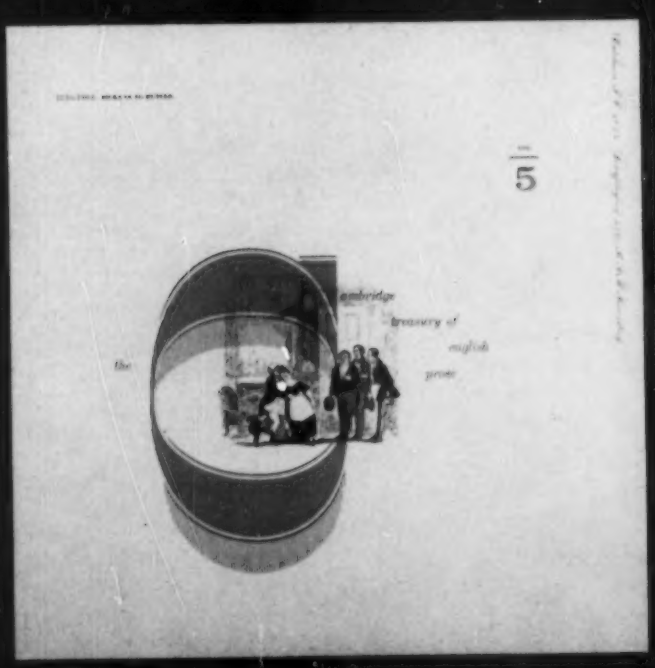
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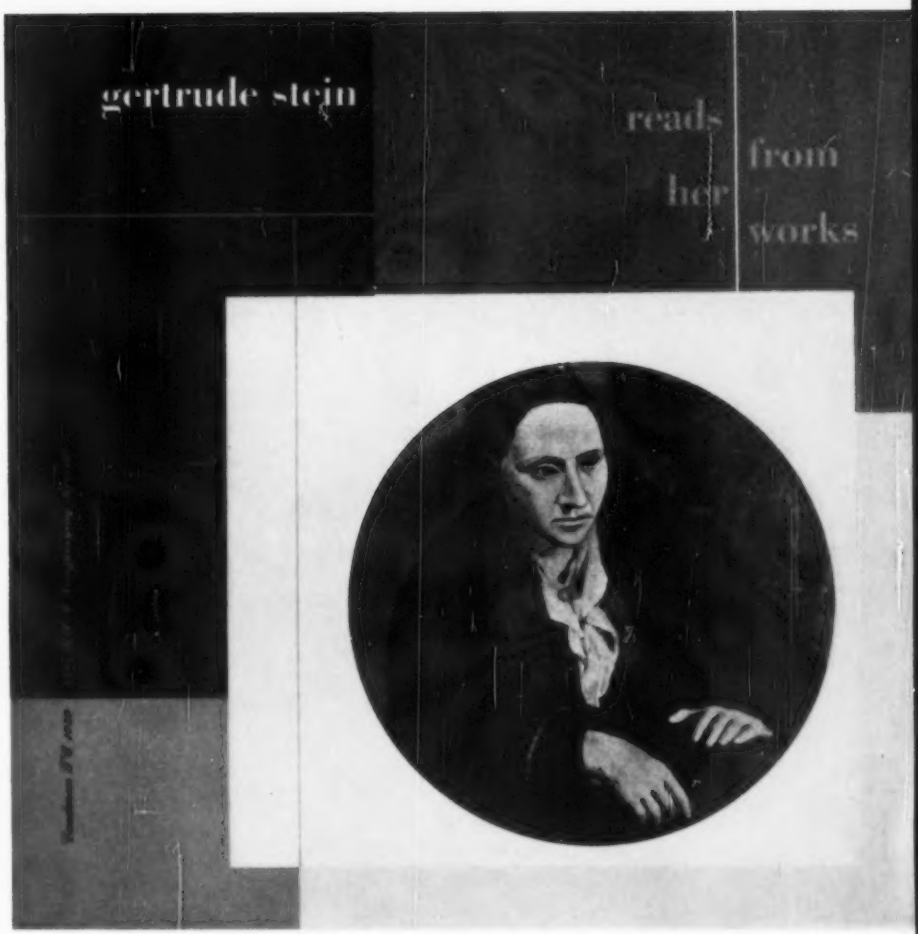
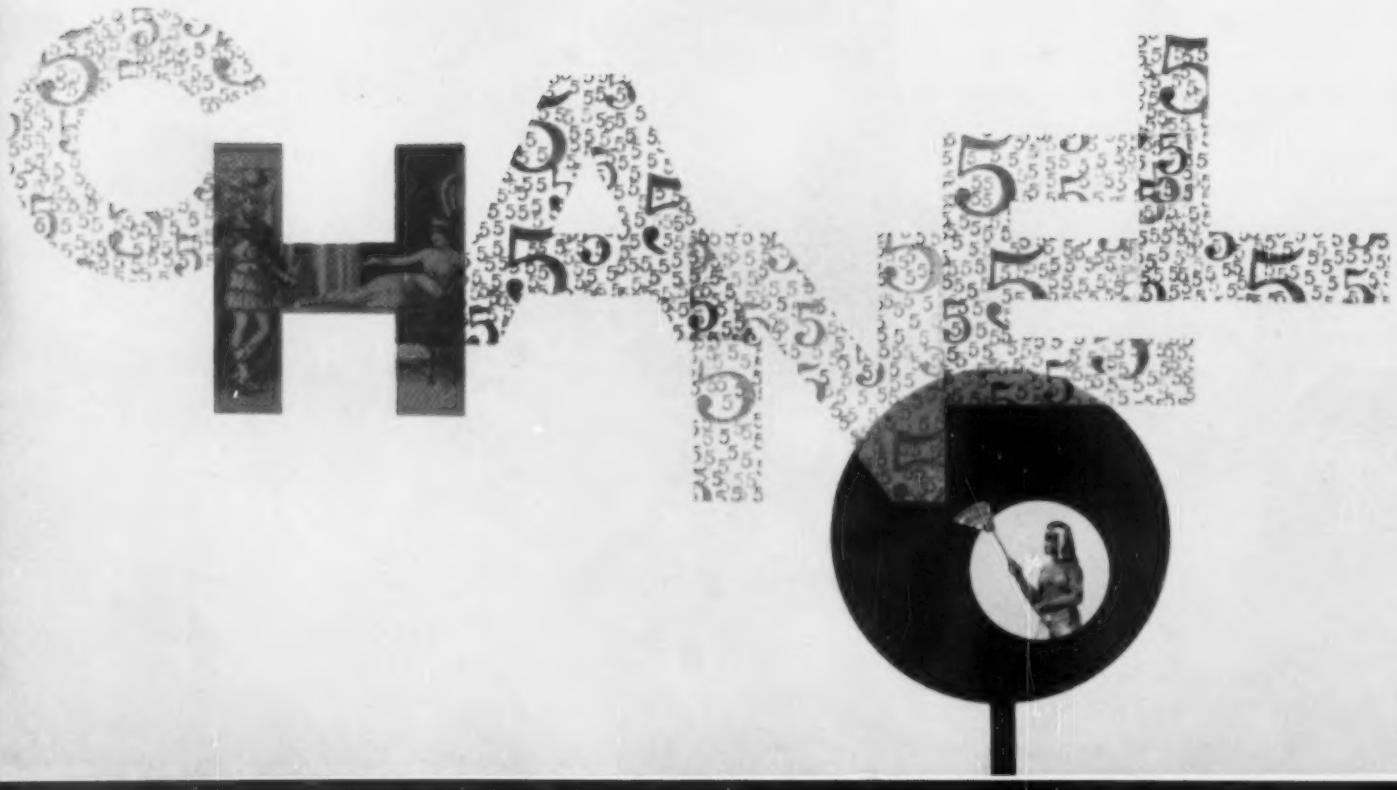
client, the Composition Corporation. The Caedmon record sleeves represent some recent assignments of sheer enjoyment, and an ideal client who encourages me to pursue an idea as I like to do it—meticulously and without limits. The Chanel ad could be called unlimited because I did it strictly on my own, for a designer should see to it that he is breaking new ground all of the time. There is that advantage too in doing the *first* annual report for a company, as I did for Reichhold Chemicals, Inc. in 1955. One can start afresh to present factual and statistical material so that it seems legible and appetizing to stockholders. The sample pages overleaf give an indication of my convictions on the use of color: a few at their strongest value against clean whites (in the annual report protected by transparent acetate), allowing them to gleam through clearly and with the utmost vitality. And finally, the last spread, including a book jacket and a pharmaceutical announcement cover, tells what I feel about the power of form. Whether precise as geometry or sculptural as stone, it must declare a clear, direct, and strong *visual* statement, complete as such."



Matthew Leibowitz

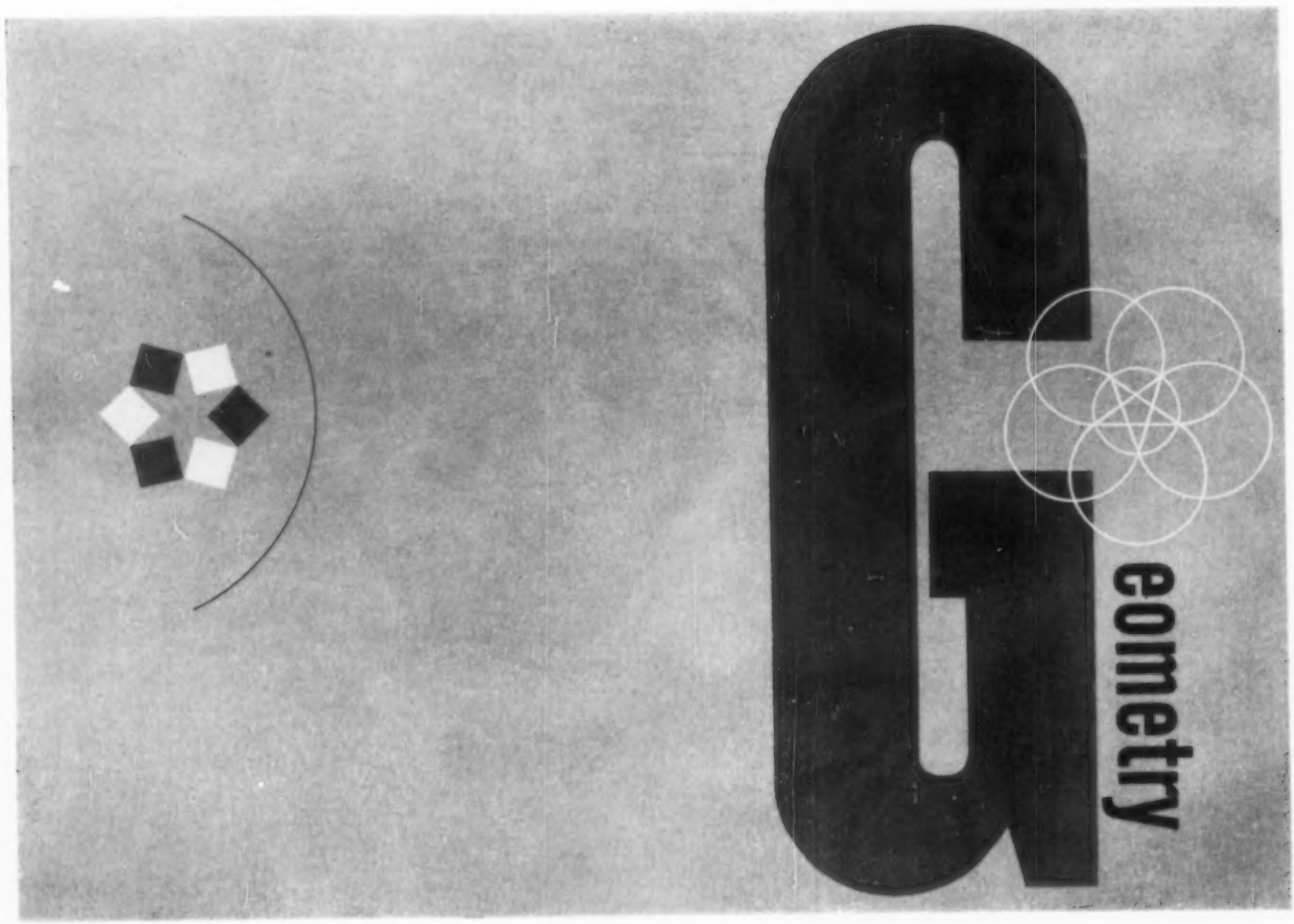
THE MOST TREASURED NAME IN PERFUME

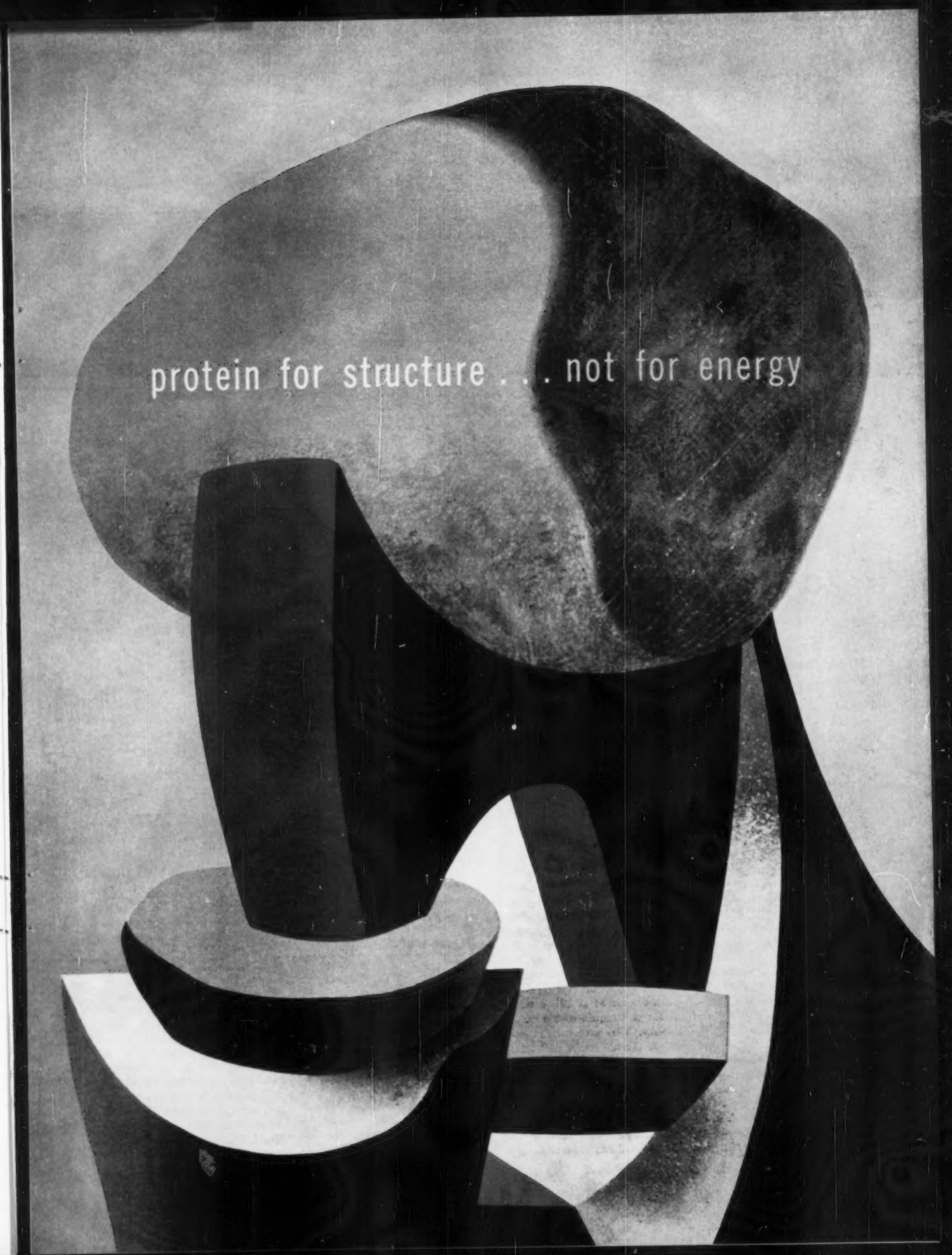


REICHHOLD CHEMICALS, INC.

First 1 *Annual Report* 1955

Matthew Leibowitz




protein for structure . . . not for energy

REPORT from the conference circuit

ASID annual meeting opens new vistas on design activity

William Snaith, *President of the* **Raymond Loewy Corporation,** *described the growth of a comprehensive service organization in his firm, and related this expansion to the social and economic forces that are changing today's forms of production and distribution:*

Inevitably we discovered that each assignment in design was really a community of problems best met in an integrated effort; that another service was needed to close the gap between the production of an object and its sale; so we developed a Marketing Division which can serve all or any areas of our endeavor. (This Marketing and Research Division integrates the other divisions: product, graphics and packaging, retailing, transportation, and specialized architecture.)

Decision as to direction divides designers today between the placing of emphasis in one of two major design objectives: to achieve the best possible design, supporting it with all attendant services aimed at the sale of an item, or to create a design which conforms with a developing aesthetic. Selling alone is an incorrect base upon which to build professional standing. A profession is evaluated against the recognizable traditional values in other professions. There can be no question that the essential characteristics of other professions are integrity, conscience and prestige. While selling is not devoid of these characteristics it is not usually rooted in these qualities. What are the dangers, on the other hand, of committing design to an aesthetic ideal alone? There is an equally valid group of objections. The danger inherent in placing our emphasis on pure design is that we gravitate away from direct contact with social stimuli and rely on solely cultural influences. In narrowing our range of contact with humanity we become just one more group of specialists.

Society is recognizing the necessity for examining from different vantage viewpoints a single complex problem having a common base and goal. The industrial designer must get on with his job of completing a professional service which meets the requirements of his society. We have within ourselves the ability to make sure that we are accepted as the one service which can contribute to a modern society, not as specialists but with a complete knowledge of and familiarity with the problems that face our society and our way of life.

Another method of pooling resources to meet the challenge of complex industrial problems, using designers with varying viewpoints as a consultant team, was described by Richard Latham of Latham-Tyler-Jensen, Arthur BecVar of General Electric, and Richard Beckhard, a consultant on management communication. Using their group association—which also includes designer George Nelson — with General Electric's Major Appliance Division as a take-off point, they suggested new ways of looking at the consultant relationship. Mr. BecVar led off by describing the often negative reaction within the company staff to

outside consultants who, the staff sometimes felt, were being brought in to teach them their jobs or take over. The need for better relationships became so important — if the talents of consultants were to be useful— that an unusual working method was developed.

Mr. Beckhard: Have you found it possible to overcome your staff's feeling that they're being bypassed when consultants are hired?

Mr. BecVar: A surgeon often calls in two or three or even more consulting surgeons to diagnose a case. We thought consulting designers might be used in a similar manner on design problems, working directly with the staff as aids in problem solving. In this new arrangement we have been working together as a team in:

Defining the problem
Analyzing the problem
Developing alternate solutions
Deciding the best solution
Converting the decision into effective action

Mr. Latham: In our relationship we do not play the role of

The twelfth annual design conference of the American Society of Industrial Designers held at Lake Placid Club, September 27-30, broke all attendance records for an ASID meeting. Records toppled, too, in the number of perspectives on design presented, in such diverse areas as government, marketing and the law courts.

"expert" but of "consultant." An expert is a person called in to solve a problem that you cannot solve. A consultant, on the other hand, is a man who helps the client solve the problem himself. This approach does a great deal to overcome staff resistance.

Mr. Beckhard: A consultant, as we understand the term, requires losing personal identity to a great degree. To work a problem through to the end, many teams have to work on it. The problem is to get it through the maze of management, engineering and production, without communications blocks.

Mr. Latham: As designers, we have got to know something about the social sciences. Management looks on designers as problem-solvers. They are not concerned with how we solve the problem nor what we do on the artisan level. We have to integrate ourselves with the team, or we can't make a real contribution.

Mr. Beckhard: Research shows that in problem-solving by group action it takes a long time to come to the decision point. Different viewpoints make it a long business. However when a decision is reached, implementation is quicker than in cases of individual decision-making, since everybody has had a chance to understand the decision, and most important, feel that he has contributed to it.

Another approach in the trend toward greater design responsibility was developed by members of the **Henry Dreyfuss office.** *Attempting to implement their concept of "design in depth," they stress a specific kind of working relationship throughout all echelons of their clients' organization, based on long-term retention as general design consultants. The Dreyfuss office's primary target remains product design, with architectural, interior, packaging and other types of design activity growing out of their effort to go beyond superficial styling to an integrated company identity.*

Designers are working not only more intensively but more extensively — and in new areas. The design firms that have contracted with the U. S. International Cooperation Administration discussed their work-in-progress in undeveloped areas of the world. **Dave Chapman Industrial Design** *working in Central and South America and Pakistan;* **Peter Muller-Munk Associates** *in India, Turkey and Israel;* **Smith, Scherr & McDermott** *in Korea; and* **Walter Dorwin Teague Associates** *in Greece, Lebanon and Jordan, reported their methods of helping these countries with production and marketing for increased trade and an improvement of their standards of living. These projects will be fully covered in a coming issue of* INDUSTRIAL DESIGN.

Dave Chapman, *who won a recent victory in a design patent appeal, and* **Lee Epstein,** *New York attorney who serves as legal counsel for many industrial designers, urged greater protection for design innovations under the law, while* **Milton Immerman** *of Walter Dorwin Teague Associates told of the efforts of the Patent Law Association of the American Bar Association to draft legislation to this end. Mr. Epstein's interpretation appears on pages 73-77 of this issue. The report of an address by Dr. Daniel Schneider will be found on pages* 70-72.

Other forms of cooperation on the international scene and with American industry were urged, as **Peter Muller-Munk** *reviewed efforts to establish an international association of industrial design societies.*

Six design educators were invited to discuss their policies on the question, "Should Industrial Design Schools Accept Industrial Grants?" The topic— a more specific one than panels on education are usually asked to handle — was also able to raise some of the fundamental issues in the ethical relations of design and industry.

Joseph Carreiro, Philadelphia Museum School of Art: The need for industrial designers is as pressing as that for engineers. Industry is undermining the schools by taking away their best teaching staff. We have a need for such things as space, materials, equipment, dies, etc. The question is not whether we should accept aid from industry but HOW.

Dean Emanuel Benson, Philadelphia Museum School of Art: ASID is concerned that the design colleges do not do personal work which normally should be in the hands of the professional designer. This is a reasonable fear because many schools have undertaken such problems. In accepting help from industry we have been careful *not* to compete. We train people for use in major industries and it is obvious that those industries should offer some degree of help to us in training the people they need. We have never, on the other hand, altered a curriculum of the industrial design department to the needs of any industrialist.

John Alcott, Chairman of the Division of Industrial Production at Rhode Island School of Design: At Rhode Island we accept industry-sponsored projects. But our visualizations, perspective drawings, etc., rarely if ever go further than the preliminary idea. Through such tentative work industry discovers students with potential. It also gives the student practical experience.

James Shipley, Department of Art, University of Illinois: Research does not necessarily imply *education*, the basic purpose of any university. As a State University any research we engage in must be educational, it must be open to students, and the university must be free to publish the significant results, whether favorable or unfavorable to the sponsor. The University feels it must not provide service for any one enterprise which would work to the disadvantage of others.

British conference compares management policies

"The Management of Design" was the main theme of the International Design Congress organized by the British Council of Industrial Design at the Victoria and Albert Museum, London, in September. Many of the problems under discussion paralleled those at recent American design conferences.

As at the ASID conference, the increased responsibility of designers in management showed up in efforts to define teamwork, communication and planning. **Leslie Gamage**, *Joint Managing Director of The General Electric Company, Ltd.:*

Without harmonious working no good design will be possible. The manager must encourage his team as a whole and encourage each member of it. The danger points usually lie between the technical designer and the appearance designer and between the salesman and the rest of the team. Each member must be made to feel that he is an important member but no more important than the others. Gradually they will acquire a team spirit with a great pride in their combined skills.

E. A. Entwhistle, *London Director of Wall Paper Manufacturers Ltd.*: I should like to see coming forward in industry young men and women with qualifications for design leadership and above all, a latent business ability which could perhaps be developed to enable them to take a more prominent place in management than is at present the case. I feel there is room for closer cooperation between the artist and the commercial expert.

R. D. Russell, *Professor at the School of Furniture Design of the Royal College of Art*: The industrial designer occupies a comparatively humble position in industry. This is mostly his own fault but partly industry's. He likes to do his own work in his own way and in his own time and on his own. He has his uses but he must, unless he is very brilliant indeed, pay for his carefree life, for his immunity from stomach ulcers, by accepting a low ceiling rate. There is a very small number of other and more ambitious industrial designers — men who develop their own creative ability as a means to an end of effectively controlling other designers — and if they are good enough and bright enough the sky of top management should be their limit.

Alec Hunter, *President of the British Society of Industrial Artists*: The leader must set his face against taking more credit than is his due. I think too many individual credits can pander too much to the original sin in the designer and can also be unfair to the technicians who have contributed to the final results.

Concurrently with these re-evaluations of the designer's role, leading industrialists described their efforts to develop a company design policy. Perhaps the most interesting of these was the philosophy of **Georges Combet**, *Director General of Gaz de France, in commissioning Fernand Leger to design a mural for the coking plant at Alfortville*:
My aim will be achieved every time a workman takes pleasure on a Sunday in bringing his wife and children to the gas works to show them not only the work of Leger but also the place where he works and the machine he directs. For this reason I must make it clear that I do not consider the commission I gave to Leger to be regarded as a tribute paid to art by industry. Leger's work at Alfortville plays a part in the process of manufacture. It fulfills a need.

Dr. Emil Rasch, *Chairman and Managing Director of the famous Rasch wallpaper firm (whose introduction of art in his industry resulted in the commercial success of "Bauhaus" and abstract artists' wallpaper)*:
There will always be a tense atmosphere between the industrialist and the artist. Their opposition can be fruitful simply because the merchant is inspired to become more critical of his market and the designer of his design. I have observed in America sometimes the opposition is diminished, and the designer is de-graded into being a junior salesman. The industrialist must not allow himself the luxury of regarding himself as a rich patron — a kind of Maecenas. If a manufacturer feels he is making too much money, should he not adopt the salutary expedient of making his work a little more difficult? Should he design articles not so much to the taste of the masses, but rather to his own judgment— or if he cannot rely on that—to the judgment of acknowledged experts? This may be uneconomical but it is surely a more ethical conception of enterprise. The prestige of the manufacturer in the future will not be maintained unless he is prepared to add to his existing monetary aspirations additional tasks of education and ethical leadership. Success brings responsibility!

Gunnar Stahle, *Managing Director of the "Arabia pottery" firm of Finland (commenting on the recent wide acceptance of Scandinavian ceramics)*:
The reasons for this success may be many. One of the most important, though, is: our connection with a tradition basically autarchic. We must respect these traditions as they are an invaluable source of inspiration and knowledge to industrial design training. I would dare to make the statement that in the Scandinavian communities you can say there exists a strong "civilization of shape." But I will also admit that this is not enough, though it is something fundamental on which to build. Before venturing to follow the American example, we must feel convinced and make certain that our industries truly need a type of schooled designers.

G. Fei, *Assistant Managing Director of British Olivetti:*
It has been frequently noted that when we invite distinguished artists and designers to work on particular projects for our Company they seem to devise designs which have an 'Olivetti look' about them, even though they have not been directed specifically in that way. We feel that this is likely to be so, not only because they understand our 'philosophy' and are sympathetic to it, and unconsciously produce something of it in their work, but also because there is a consistently original system of thought, a 'way' of life and business that demands expression through their work.

Jonkheer W. van Andringa de Kempenaer, *Managing Director of the Dutch Enschedé printing house:*
Delegation of the actual responsibility to one single person for the style of a company as a whole is just not possible. Style (House style, or any other variety) is essentially the right handling of design to fit a certain purpose. In an old firm like ours, the atmosphere of the works on design may be compared with the influence of soil on a vine. I am convinced that style has got a great deal to do with tradition and that consequently operational style of an intrinsic value and lasting nature will mostly be encountered there where it is grafted upon tradition.

A unique perspective on miniaturization in industrial design was provided by **Sir Walter Puckey**, *former president of the Institute of Production Engineers in Britain. Opening his remarks with a consideration of population trends, he attempted to relate these pressures to the work of the designer and to industry:*
Overcrowding is already here in many social and industrial situations, and in the interests of living and working room a real attack on this problem should be made by many people, of whom managers and designers are in the van.
He went on to discuss miniaturization in the context of the need to conserve human space, and his remarks suggested a new way to approach design planning—in the light of world economic and demographic trends.

Art and industry in vanguard at IDI symposium

The third annual symposium of the New England Chapter, Industrial Designers Institute, was titled by Chairman John Vassos "Design Explosives." Many of the themes sounded at other conferences were struck with resonance at the Silvermine, Connecticut meeting last October. The activities of the day were divided between morning addresses on the relation of design to art, industry and psychiatry, and an afternoon forum on design education with teachers representing five design schools. Student projects were also shown, in a tension - suspension display designed by Carlos Dyer.

The afternoon educators panel included Professors James Shipley of the University of Illinois, John Alcott of Rhode Island School of Design, Robert Redmann of the University of Bridgeport, Robert Kolli of Pratt Institute and Joseph Carreiro of the Philadelphia Museum School of Art. They are shown below, flanked at left by Chairman Vassos and at right by Tucker Madawick, Chairman of the Southern New England Chapter. They discussed a wide variety of continuing and immediate problems of design education, including the length and content of curricula, the standards for selection of students, the right use of materials, and the influence of pure arts on industrial arts.

The most provocative of the addresses was that of painter **James Ernst** *on "Aesthetics and Commercialism." There was in his approach none of the attempt to reconcile the role of the artist in industry that had been made elsewhere:*

Aesthetics and commercialism are as compatible as fire and water. One lacks the ethics of the other. Constant efforts to find a joint basis on which both can exist are mere hypocritical rationalizations which constitute one of the severest indictments of our civilization. We are mistaken if we assume that all the arts are separated merely by their separate media and are really interchangeable. An industrial designer cannot think in terms of Paul Klee when designing a new stove. To merely borrow or superimpose upon a product the surface-manifestations of contemporary art is nothing short of carpet-bagging to the same extent as a painter becomes a carpet-bagger if he is swayed in his work by considerations of fashion or popularity.

Another approach to creativity was described by **Dr. Elmer Engstrom**, *Senior Executive Vice President of RCA in his speech, "Systems Engineering —A Growing Concept," on methods of collective research on complex technological prob-*

lems that the government and major industries have been undertaking in recent years. The two major phases of systems engineering as a problem-solving method are apparently simple until the scale of these projects is considered; they are "a determination of the objective that is to be reached," and "a thorough consideration of all factors that bear upon the possibility of reaching the objective, and the relationships among these factors." The tone of Dr. Engstrom's remarks made it clear that he meant "all factors," when he added:

There is nothing new about the *practice* of systems engineering. What *is* new is our recognition of it by name and our appreciation of its universal value.

Without drawing specific attention to the role of the designer in these systems, the address implied an urgent need for better information for designers about the new forms that industrial development is taking. It spelled out the coordination that designers must submit themselves to, for these programs ignore disciplinary boundaries, invite varied personnel, require compromise and sceptical analysis of each element, and encourage the group to transcend individual limitations by a total perspective on the problem.

Another area touched on at Silvermine—one also discussed by the ASID at Lake Placid—was that of psychiatry and its relation to design. The views of Dr. Wilson G. Scanlon and Dr. Daniel Schneider are contrasted overleaf.

Excerpts from an address before the Industrial Designers Institute, Southern New England Chapter symposium, Silvermine, Connecticut, October 6, 1956

Industrial design and emotional immaturity

by Dr. Wilson G. Scanlon

Since I know comparatively little about design and art and their relationship to industry, my first assignment has been to try to understand you, the industrial designer. What has the designer, artist, and industrial engineer written about himself and the problems of his work? Van Doren, Read, Mumford, Teague, Rand, Dewey, Neutra and others opened the door for me.

In these writings, I sensed undercurrents of dissatisfaction with the role the designer has to play. I have found this same dissatisfaction in conversations I have had on the subject. No matter where I bring up the topic of industrial design—whether among artists and engineers, or lawyers, bankers and housewives—the discussion is heated and often aspersions are cast upon advertising, design and industry. The discerning housewife complains that too often the design camouflages an inferior product, that competitive products use design to confuse and mislead. Often the designer is accused of purposely using sex symbols to make the basic product appeal to the consumer—an interesting theory, but one that I am not qualified to judge, since my specialty deals with disordered emotions, and a healthy esthetic reaction to sex appeal hardly falls into the disordered category.

The layman's complaints, when they are boiled down, approximate the analysis given by the artist—design is no longer the "truth," and "things are not what they seem;" emphasis is on streamlining—a car is designed to look like an airplane; a pen is shaped like a rocket. Or, linoleum is made to look like marble; plastic is given the grain of wood.

Yet, you might argue, the products sell. Never has there been such a surge of buying. Industry must be satisfying the populace, or products would not sell. It is superfluous to point out to you that you are serving some of the utilitarian needs and some of the cultural needs of man. Whether you are always doing the latter job well is, as I understand it, one of the great debatable questions and a question I am not in a position to discuss. But another vital question from psychiatry's standpoint is this: to what degree is industry capitalizing on man's emotional instabilities?

Comparative figures on alcoholism, suicide and homicide in the Western World show that our own prosperous country is fourth in destructive acts and first in alcoholism. The latter is one technique of attempting to escape reality and ward off unpleasant anxiety. Less obvious techniques, mental or psychic mechanisms, have become familiar since Freud's time by the household terms: sublimation, rationalization, projection, etc. Simply put, these are psychic devices to avoid anxiety. Irrational and "prestige" purchasing should be added to the list.

Not infrequently, irrational, unwarranted purchasing is a telltale sign of an oncoming depression. The disorder "anxiety hysteria," which encompasses obsessions, compulsions, phobias, and ruminations, may also have as a paramount sign the squandering of money. It sometimes is the duty of the psychiatrist to limit a person's accessibility to funds until his emotional disturbance subsides. The psychiatrist is often alerted to a relapse by a call from a frantic relative or spouse, "X has begun to buy wildly again," or is "running up bills." An alcoholic "on the wagon" may go on a dry drunk characterized by spending. These are obviously clinical examples and representations, but it is to be remembered that the difference between the emotionally disturbed and the emotionally undisturbed, or so-called well adjusted, is one of quantity and not quality. In other words, the very same mechanisms seen in the "abnormal" are seen in the "normal," only to a different degree.

You might ask, where is the harm in this? If a person reduces his anxiety by means of buying and exchange, does not the end justify the means?

But what is the end? It is at best only a temporary allayment of anxiousness. Alcohol and narcotics do the same.

And again you might ask, why has this situation developed on such a large scale? Eric Fromm has reminded us that man was originally "instinct bound." His emergence from the animal state enlarged his capacity for reason, imagination, and self-awareness. Tools were invented, permitting man to master nature, and they contributed eventually to his separation from nature. With individuation came growing isolation, insecurity, powerlessness and anxiety—a trend that was augmented and enhanced by the industrial revolution, and the profound social and cultural changes attendant upon the fact that the worker was no longer

the artisan on whom others depended for a single complete product.

Man's attempt to overcome his isolation and anxiety results in various character orientations, one of which Fromm calls the "marketing character." The marketing character is one who feels that even his personality is a commodity to be bought and sold "on the market." He is extremely sensitive to the changing wishes of other people; to be successful is to be valuable, to be unsuccessful is to be worthless. He is an expert at selling his personality.

It is at this level of marketing and exchange that we recognize "prestige buying" and excessive purchasing of commodities as a form of irrational and immature behavior. Not only does man relate himself to his fellow man by the conformity of his purchases, but by the act of buying he relieves his anxiety—temporarily.

We are building and have built an industry based on mass production, obsolescence, and robot-like action. We have taken man away from that which related him to his fellow man by depriving him of the practice of art. Man in his work no longer has an essential purpose, does not know his material or tools, and does not have to use his imagination. He has been deprived of the unified satisfaction that should come simultaneously to body, mind and spirit.

For the past 300 years, religion, socialism, Marxism have failed to relieve man's anxieties permanently by any of the implied approaches. For that matter so has psychiatry failed, for the incidence of suicide, excessive alcohol and drug addiction (which are obviously forms of behavior designed to relieve anxiety) is increasing in those populations with the greatest industrialization. Man is so alienated from himself, so fundamentally insecure in his life situation, that he must be constantly moving and acting-out, to seek relief. An estimated 40,000,000 automobiles on the highways this past Labor Day attest to this and seem to parallel the high rate of consumption of all commodities—good or bad. Man cannot tolerate himself alone. Obviously, his new purchases and his increased time for leisure have not put his anxiety at rest.

Psychiatry has made some progress—especially in recent years. If we are successful in raising man's anxiety tolerance, there will be a decrease in alcoholism, destructive acts, and crippling neurosis. Man's behavior will be more mature. He will survey more carefully. He will be less in search of conformity. He will not be so dependent on prestige value to ward off anxiety. Unjudicious, irrational buying will fall off.

What has all this to do with the industrial designer? Since man's history suggests he is a better animal when treated fairly and truthfully, and when he is given aesthetic pleasure, it would seem justified for the industrial designer to consider himself a powerful, therapeutic tool, capable of bringing about at least a partial assuagement of man's emotional need. Since, according to your own literature, you are aware of the weakness as well as the strength now inherent in your profession, one could ask why don't you change the situation? Why compromise? Why not seek the "truth"?

Or is this an impossible task to ask of you? Can you be expected to start the wheel turning in the other direction? Such would imply that you are all emotionally mature enough to be without the anxieties so common today; that you are without your own need for prestige buying and other means of escape. How wonderful if that were the case. I suspect, however, that the remedy must come from emotional growth within the consumer himself.

I do not wish to imply that all anxiety states are completely psychic in origin. But of those which are, various environmental and social changes might contribute immeasurably to their eventual alleviation. Perhaps foremost would be to help the ordinary man see the wisdom in a "vocation" rather than a "job." Instruction and training of children so that less emphasis is placed on possession might strike at the roots of the problem. Investing the academician with prestige and again elevating the true craftsman to a place of social significance should help. Acceptance of some eccentricity rather than emphasis on class conformity should make for less insecurity. It is provocative to envision the potentials in a Utopia that might result from a nation that is emotionally mature. There would be a radical shift in sense of values. Commodities would be bought solely on the basis of their intrinsic, useful, *lasting* qualities. If what your experts say is fact, that the beauty of anything is an aspect of that thing's interior perfection, and not something stuck on the outside, then it would not pay the manufacturer to produce for obsolescence, which implies among other

things the mere changing of the product's outward appearance.

Can you visualize how the money now spent in irrational buying could be channeled into better schools, better built and more efficient homes for the now debt-ridden consumer, a truly higher standard of living not based on an economic bubble threatening to burst momentarily. Consider for a moment how our theoretical Utopia affects you, the designer. Your designs will no longer serve merely as a man's excuse to buy and possess only temporarily for assuaging his anxiety. You will no longer have to subjugate and compromise your own God-given creative ability at times to satisfy the demands of artistically illiterate consumers. By becoming unfettered yourself, you will be elevating the cultural level of man, for you will then be serving his "mind, body, and spirit," as well as your own. Not only will you be free to seek the truth in your work but you will find it to your advantage economically to do so, for only in its perfection will it appeal to the mature, enlightened consumer. The big question remains: must you wait for a Utopia?

The creative process in industrial design

by Dr. Daniel E. Schneider

An address to the American Society of Industrial Designers, September 1956 annual convention at Lake Placid, New York.

I can think of no single field in which the psychology of the creative process is more interesting or more important than in the field of industrial design. Industrial design is not only an art, as you know; it is a science. As time goes on, we have all come to realize that it is not just sheer decoration, but also dynamics. Sometimes you start from the dynamic end and want to get decorative, but most frequently I should think you start from the decorative end.

We must try now to relate this external world with which you have to deal and design—this very practical external world of frauds, phonies, competition, bullies, etc.—with a thing that is known as the "creative process."

If I were to leave one simple idea with you today, I should wish it to be phrased something as follows: "Study the dynamic relationship of the human body to each of your products, because the relationship of the human body to your products will give you a clue as to what to do with them."

The decorative or art object that a man owns should have identification-value for him. That is one of the ways—and those of you who know the work of Bernard Berenson already know this—by which one can judge the work of art. A good painting or a good piece of music will have identification-value. It will have tactile value which you can feel even though you only see it or hear it. It will have certain balances and weight for you. It will give your body a certain sensation, even perhaps a certain temperature, and it will relax you. It will give you a life-enhancing quality because of this relationship to your body—i.e. it literally transports you. You *live* its life when it is so designed and so decorated as to have great identification-value.

Let me give you a clinical illustration of the importance of identification-value. A man comes to me who has just streamlined his bathroom. He has taken out the old sink with the central porcelain pillar and bought one of the modern sinks with chrome legs. After the plumbers had gone, he looked down at the chrome legs and was sure that one was not quite parallel to the other, so he called the service men back. He had them come back about thirty times, and willingly paid the bills. He finally measured the legs with a very accurate millimeter rule. At this point he was so exhausted that he asked someone to lead him to the psychiatric couch—he couldn't stand his own compulsion any longer.

The clinical answer was quite simple. *He was a terribly bowlegged man.* While he could tailor his clothes and practice walking or standing in such a way that it wouldn't be obvious, in a state of undress in the bathroom even he couldn't miss it. And the object with which he became so obsessed—the chrome legs—were unconsciously his own legs.

One more example. A man who has been quite niggardly and compulsive decides to buy a house in Manhattan. He has saved all of his money for years and years and years and refused to buy anything, and at last he has bought a very expensive house. After three years there are still sawhorses in the living room and there are still plumbers in the kitchen. The house is still being modernized, although it was very beautiful to begin with. He cannot stop making it sufficiently perfect so that he will not be criticized for having exposed himself to the ownership of such a beautiful house. Its tiniest defect is a major disaster. The house is himself in a curious way. It has enormous identifica-

tion-value for him. It is himself as an institution of manhood. It must be above criticism.

Perhaps these two examples will illustrate how great a role the human body and its configurations play in the design of the places we live in and the utilitarian objects we own.

If one were to search for important psychologic principles about the design of machinery or about something that has guts inside that you want to cover up or package in a certain way, one would ask three questions from the dynamic point of view. First, *at what point does a design fundamentally change?*

An example: At first our autos were horseless carriages. In recent years we have begun to design for the motor and not for the horse, but the seating arrangement in most cars is still based on the old carriage principle. The staple reason is that most people like a ride facing forward, as a technique of fighting the anxieties of speed, direction and destination . . .

Some years ago, somebody tried to design a prefabricated circular house. It was thought every housewife would love it because there would be no corners and no dust would accumulate. The truth of the matter, as I see it, is that nobody wants to live in a circular house. It produces anxiety. Man's favorite shape is cubical, oblong, square—but not too square. That preference probably goes back to instinctive techniques of defense. Cubic space permits one to organize one's sense of space-vulnerability; also one orients oneself naturally along perpendiculars and horizontals with respect to the human posture.

The first question about industrial designing, then, is, "At what point does the design fundamentally change?" The second question of importance is this: *when the design changes, what principle determines the direction of its change?*

One might say that today all our cars are *"rockets."* Some day we will all own real rockets—big rockets and little rockets, in all shapes and sizes. Nobody will have rocket-envy. The principle here is that *designs change in the direction of our improving powers of mastery.*

Coming down from the airport today, I saw a blue Cadillac with gold rocket fins. That was the last word. Suddenly it began to look very much like the old Stanley Steamer—as strange to life. It was designed on the principle of *flight* and not on the principle of road transport. The human being is proud of his ability to achieve speed and take off into space and to glide and to fly. All of these advances are identified with power-movements of the body.

The third question has to do with *the neutralization of a threat.* This is very important in all creative processes. What kind of design reduces anxiety and increases the sense of control of an object?

If you have a machine that is very powerful, you may want it covered. If it is ugly, you want it covered. The mechanisms of power are sometimes frightening —or simply unesthetic because of unconscious disgusts evoked by the sight of machinery. *It would be very hard to write poetry, love poetry particularly, about people who had windows in their abdomen.* Modern dishwashers have a nice smooth front. Everything has to be smooth. Everything has to be like the surface of a mother's breast—just that smooth and just that reassuring.

Those are three simple principles which you might keep in mind. I am sure anyone might dispute them and find other principles, but for myself they make a convenient scheme of thinking about these things.

So much for industrial design as such. Now I will try to link it to what we know of the creative process in general. All human beings are worried about their creativeness, particularly the artist, of whatever type, community, or nation.

The first thing to know about the creative process is that it is another name for "life," and like all life it has a beginning and it ends when life ends. It also has a high point. The length of this cannot be predicted; it depends upon too many variables of time, mind, and place. But fundamentally, creativeness lives to be as old as life.

Sophocles wrote "Oedipus", probably the greatest play of the ancient world, when he was 91. He had left his money and his estate to an illegitimate son whom he loved and a legitimate son contested the will on the grounds of the old man's senility. It is said that Sophocles wrote "Oedipus" to prove that his mind was in fine shape. If somebody tells you that you are finished being creative tell him about Sophocles and his sons, or direct him to the life of Bernard Shaw. No one can set an arbitrary limit to the end of the creative process. Take your vitamins, go to your physician and your dentist, listen to your psychoanalyst, do your setting up exercises, and maybe you will make it too.

What about the psychology of the creative process? What made Mozart? What made Shakespeare, whoever he was? What made O'Neill? What gives these great men their fertility or power, or their drive?

Artists for centuries have known that there was an unconscious mind as well as a conscious mind. Freud didn't discover the unconscious; he discovered the way in which the conscious and unconscious worked together and worked out a technique for treating the consequences of the collision of these two systems . . .

On the matter of being "blocked" creatively: it is as though there were two assembly lines in a plant, one going along one axis and another invisible one going along another axis. You think you are getting all of your material together and assembling it properly

when all of a sudden nothing happens. Your product doesn't assemble. You don't know why and you begin to be afraid. You say, "I'm done—I'm finished." But you are not done. The truth of the matter is that there is an interfering, largely unheard, unseen assembly line going at cross purposes to the conscious one, and consequently you haven't got a clear road for your creative process.

What makes this state of affairs? For one thing, it is made by childhood development—unanalyzed and aging—and you haven't got the energy to overcome the obstacles it presents any more. So, when you get old, the invisible and unseen "assembly line" is more powerful than you are. The analysis of older men, which we are beginning to do in increasing numbers, shows that this process can be alleviated to quite an extent, but it is better to work at it early if there are marked signs of its disruptive patterns.

Not only the collision between the conscious and unconscious system produces interference, but also certain other forces that have to do with one's current life; i.e. susceptibility to resentment, responsibilities of various kinds, the failure to organize one's real life.

I think we will discover as time goes on that our concept of man is still very primitive. We still think that people were created to make shoes instead of to wear them. Factories are to make shoes, and people are to wear them. There are two important questions that come up in the course of an analysis properly conducted, and the first is, "Do you know who you really are? Are you merely the product of your parents' wishes? Is there some inborn capacity for expression within you which wants out and which would mark you among all of your people for what you are?"

The second question is, "Do you know what people are for?" It is surprising to discover that 9 out of 10 people cannot answer this question. What are people for? Are they for perpetuation? Are they to raise children? Are they to build a satellite between here and the moon? Are they to make wars? Are they to build Eldorado Cadillacs? *What are they for?*

There are several different kinds of answers to these questions, and to some extent the answers are different for each individual. If you know your answer, you are considerably advanced. For example, most people don't know that *people are for a family, and only the human being can create a family,* whether it be husband and wife with or without children doesn't matter. Animals cannot achieve this with any degree of stability—not even the ants and not even the bees. If one knows this, one can enrich one's life. One is not afraid either to learn or communicate if one has the sense of "the human family."

All great creators begin by imitating. We know from the generations before us that a great man is never afraid to go through an intense period of imitation. It is his way of absorbing and taking in with enormous capacities the identifications of other people and getting a multi-faceted view of what has been done. The more exhaustively imitative, the more original does he become, once he decides to depart from imitation and model his work more according to the feeling of his own body and his own perception—and the more productive, as in the case of Raphael.

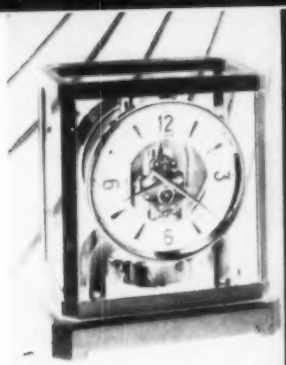
In the life of Michelangelo there is a strange contrast between the very isolated life he really led himself, as a person, and the enormous power of his work. He once wrote, "I isolate myself from people because [to paraphrase briefly] I am so much taken by their point of view that each one of them gets a piece of me, and the first thing I know I am torn apart in a hundred fragments for I love every one of them, so I must live alone." He was extremely devoted to his own personal family, to his father and brothers.

How do we make the bridge from imitation to originality—to that stamp of originality which is our signature? That is the big question. A man may be able to go all the way imitatively and yet fail at this point, and fail over and over again. There is only one constant ingredient that I have been able to find among all of the great artists. This strange quality that Michelangelo describes is a very dangerous quality because it can produce a split in the personality of considerable proportions. But if the biological powers that hold the mind together are intact and one can exercise this enormous capacity for absorbing everything that has been done—great identification capacity—one can go on to originality.

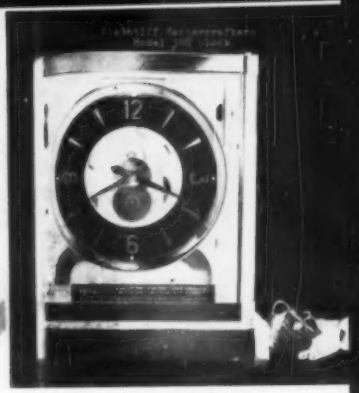
The main ingredient in expressing one's own identity is courage, and courage is a very rare item. In painting, it is called "making no concession." The courage to depart from a very safe avenue, if one has vision and is willing to follow it and suffer for it, is sometimes very hard on one's family and one's friends and oneself.

A second ingredient in addition to courage is intangible. I hardly know how to define it, but I think that it has to do with what might be called a training of oneself during this period of imitation in the field of observation. There are so many opportunities for greatness in schooled vision. Discipline, however, in the face of unconscious conflict, is generally very difficult to achieve. It is sometimes agony to try to overcome the obstacles which prevent us from schooling our vision.

Perhaps I have been of some use if I have helped you realize that all of these materials and shapes and textures you work with express essentials of certain relationships to your own body and to your concepts of what people are for, and what they are—their identification-value.



Defendant: LeCoultre



Plaintiff: Mastercrafters

by Lee Epstein, attorney

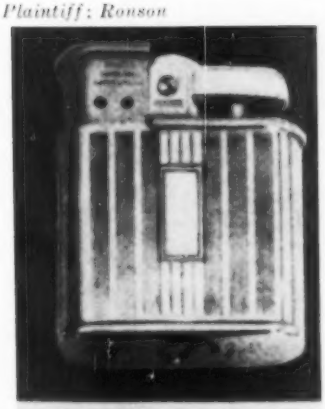
PIRACY OR PROTECTION? the design patent question

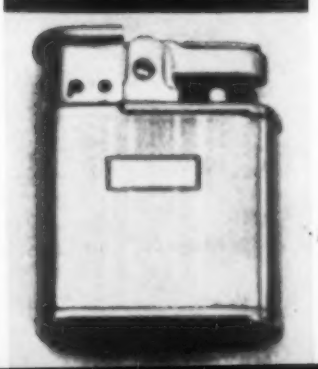
Plaintiff: Brunswick

Defendant: Kuehne

Since the important Brunswick decision of last June, the theories of design protection have been further reinforced by court actions. Dress designer Oleg Cassini for instance, recently filed suit against a dress manufacturer who had, two years ago, copied a Cassini design which was protected by a design patent. At that time, he agreed in court to refrain from copying all Cassini designs, even unpatented ones. In the recent case, he was accused of having copied an unpatented design, and the court ruled that he had violated the earlier agreement. Cassini was granted an injunction.

Plaintiff: Ronson





Defendant: Gibson

Judge John P. Barnes of Chicago, sitting last June in the United States District Court, decided the case of the Brunswick-Balke-Collender Company vs. Kuehne Manufacturing Company. The issue was alleged piracy of industrial designs. The verdict, favorable to creative designers and manufacturers alike, has also been quite controversial within the same groups. Some have hailed it as the first major case in the field, while others have doubted its supposed significance in setting precedence for greater design protection. In the hope of shedding some light on this legal tangle, the editors have asked Lee Epstein, an attorney who practices extensively in the field of design protection, to summarize the case and comment on it for everyone concerned with the protection of designs.

The court discovered not only unfair appropriation . . .

The Brunswick-Balke-Collender Company has for many years been a leader in the manufacture of bowling alleys, pool tables, etc. In 1952, it decided to enter the school furniture field. To this end, it retained Dave Chapman, fellow and former President of the American Society of Industrial Designers, to design a modern line of school furniture. More than $300,000 was spent on the development of the new line (for marketing research by Design Research, Inc., a Chapman affiliate, design services by the Chapman office and development costs within the plant). Chapman worked with Richard G. Reineman, Brunswick's staff designer, and Robert I. Anderson, Brunswick's chief engineer, and the line was completed in time for presentation at the convention of the National Association of School Administrators in Atlantic City during February of 1953.

The line met with instant success and immediate commercial acceptance (ID: April, 1954). Sales had exceeded $8,000,000 by the time of the trial. In 1954, Chapman was awarded the Design Award Medal of the Industrial Designers Institute for his part in the development of "the first contemporary line of school furniture meeting today's advances in school training techniques and contemporary school architecture."

Because of the great demand, Brunswick found itself faced with the necessity of increasing production. It decided to contract for the manufacture of some of the components. After preliminary negotiations with Kuehne, it requested Kuehne to bid on many of the items of the line, and turned over to Kuehne blueprints and specifications for most of the pieces on the line with the express understanding that they would be used only in connection with the bids, or if successful, with the manufacture of the line for Brunswick. Design patents had been secured on these pieces.

Kuehne and Brunswick were unable to agree on prices for the manufacture of the pieces and the blueprints and specifications were purportedly returned, but it later developed that one set had been retained by Kuehne.

At this time Kuehne was in the dinette manufacturing business, but after its bid was rejected, it decided to manufacture school furniture and came up, in nineteen days, with a line of school furniture very much like Brunswick's. Kuehne's president asked patent counsel whether its line infringed on Brunswick's and was advised to go ahead.

Kuehne presented its line first in February of 1955. It sold $317,000 worth of the furniture in 1955 and booked orders for $525,000 more early in 1956 (of which $114,000 worth had been delivered by April, shortly before the trial commenced).

The court found that the Kuehne designs were copies of the Brunswick designs: Kuehne's president had testified that he knew of no two lines of school furniture that were so much alike. Judge Barnes held that this copying was a violation of the express agreement of parties; that Kuehne's use of the blueprints was an unlawful appropriation of property entrusted to it, and also that Brunswick's design patents were valid and infringed by the Kuehne furniture. He enjoined Kuehne from further use of the designs, and awarded Brunswick $180,325 damages, which included $47,500 in counsel fees.

On its face, this looks like a smashing victory for design protection, and it may puzzle laymen that there seems to be such wide disagreement about the significance of the decision.

This confusion arises from the fact that there are two aspects of the case: the unfair appropriation (or breach of contract) and the design patent infringement, either of which would have been adequate to support the final decision.

Brunswick recognized the double aspect of its case and, like a good football coach, it used the two-platoon system. One team of lawyers was retained to present the unfair appropriation side of the case and another to present the patent infringement side.

UNFAIR APPROPRIATION. To the extent that Judge Barnes relied on Kuehne's express agreement to use Brunswick's blueprints and specifications only for Brunswick's purposes, the case is old hat. Of course a party can bargain not to use another's designs and a breach of that agreement will be actionable. A close parallel is found in the "shop rights" provisions of many employment contracts, which provide that any inventions, products or designs conceived by an employee shall be turned over to the employer. If the employee uses the designs or inventions for his own purposes, he can be enjoined and required to pay damages for breach of his agreement. Even if Kuehne had turned the blueprints over to a third party, or made the furniture as contractor for one of Brunswick's competitors, this would have been a breach of its contract.

The courts have gone even further. In a recent New York case, the manufacturer of the Zoomar camera lens secured an injunction against one of his research men reading a scientific paper before a learned society, on the ground that the general scientific data discussed in the paper might enable competitors to solve trade secrets known thus far only to the employer.

The trend illustrated in these cases began many years ago with the insistence by the courts that standards of

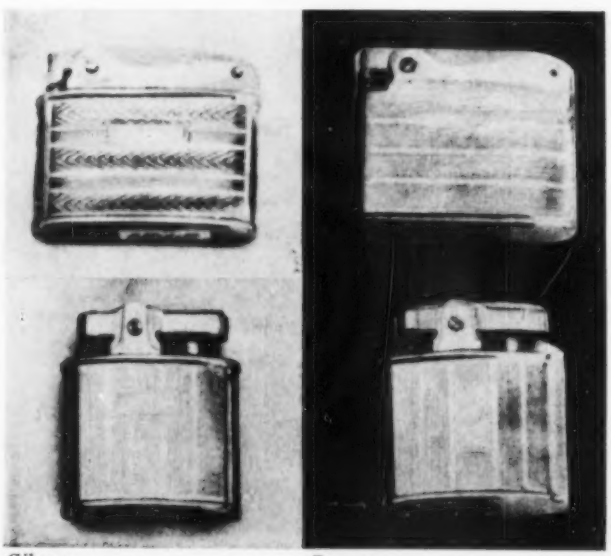
. . . but also infringement of a valid design patent.

Kuehne

Brunswick

"I can see how, just in the preparation of those specifications, it might take weeks of time of skilled engineers and draftsmen. I can see how, if they didn't have something to copy—even if one had the idea of the design—the preparation of the drawings and the specifications for the various sizes of the various chairs and desks and tables included in this line might take weeks and months of the time of skilled draftsmen and engineers."—Judge Barnes

"Now there are differences between the defendant's devices or the designs in the defendant's devices and the designs disclosed in the drawings (of the Brunswick patents). There are some . . . Yet the two are more alike than any other two lines of furniture that have been called to the attention of the Court."—Judge Barnes



Gibson

Ronson

decent behavior, rather than the law of the jungle, must prevail among business associates. The late Justice Cardozo (then sitting on the New York Court of Appeals) held that a partner in a lease could not deal with the real estate leased (even after the termination of the lease) without giving his partner a chance to participate on an equal footing; if there was a profit to be made, he was under a duty to disclose the opportunity to his partner and give him a chance to participate in it.

This doctrine has been applied even when there has been no agreement covering the acts in question. The same New York court recently held that it was improper for the employees of an advertising agency to band together and form a new agency which took over the accounts and most of the personnel of their former employer. The employer was awarded as damages the amount of profit he would have made on the business taken over.

"PASSING OFF." The breach of contract or the fiduciary relationship was, however, only one phase of the unfair appropriation aspect of the Brunswick case. The courts have always been zealous to prevent one party from passing off as his own the product, work, packaging or the design of another. Many years ago, the Associated Press secured an injunction against another news service which, instead of getting its own news, copied some of it from the bulletin boards of Associated Press members, and wired it to other cities before the Associated Press wires reached members in those cities and thus appeared to have "scooped" Associated Press. The news in question was in the public domain, and nobody had a right to prevent others from disseminating it; the crux of the wrong was in stealing the work of a competitor and presenting it at once as his own. This is closely paralleled by Kuehne's nineteen-day production of designs which took Brunswick over a year to produce.

The same reasoning has been carried over into the field of designs. When the patents on the Ronson lighter expired, there was a competitor ready, as usual, to seize the opportunity to "knock off" the lighter, not only by copying the mechanism, but also by copying the design appearance, and by imitating the slogan and advertising. The New York court held that even though the expiration of the patent permitted competitors to use the patented mechanism, they were not free to imitate the appearance and method of merchandising of the product so that they might pass off their product as Ronson's.

(continued)

"I think you have got to judge the ensemble." Court breaks ground for design

In the federal courts, a jewelry manufacturer was enjoined from selling mustard seeds encased in plastic, marketed with a quotation from the Bible, when the format of the product and the accompanying brochure was so like the original that it might lead people to believe they were getting the product of the originator. There was nothing original about a mustard seed, and certainly nothing novel (in the patent sense) about encasing a seed of flower in lucite, but the slavish imitation of the product and sales methods of the originator was more than the court would allow.

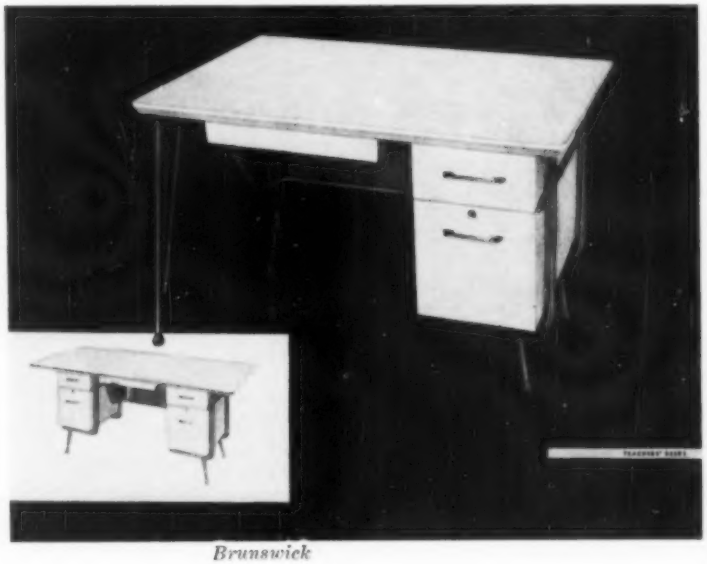
Courts have also enjoined (or given damages for) the imitation of the general format of books or magazines, the close imitation of advertising methods, and the imitation of non-patented designs. In a recent case, the manufacturer of the Atmos clock, which is propelled by changes in the atmosphere, secured an injunction against the manufacturer of an electric clock whose appearance closely imitated that of the Atmos clock although its mechanical structure was completely different. Neither design was patented, but the U. S. Court of Appeals, sitting in New York, held that the copying was so close that it was an attempt on the part of the manufacturer of the electric clock to "pass off" his product as an Atmos clock.

Any of the reasoning mentioned above, all well grounded in the law, would have been adequate to support the decision in the Brunswick case: there was a contract between the parties forbidding exactly what Kuehne was found to have done; there was an attempt to get a "free ride" on Brunswick's work; there was such a slavish imitation (see illustrations) of Brunswick's product as to constitute "passing off" of Kuehne's product as though it were the Chapman-designed original.

Nevertheless, the Court expressly said that it was deciding the patent question. It declared the Brunswick patents valid and infringed by the Kuehne furniture.

THE DESIGN PATENT. Judge Barnes himself said, "So far as my experience goes, and so far as my memory serves me, I can't remember having held a design patent valid." A month later, Judge Dawson, in a decision in the Federal District Court of New York, said, "There has not been a design patent upheld by the Court of Appeal in the Second Circuit (which covers the states of New York, Connecticut and Vermont) subsequent to 1926." Therefore, the upholding of the Brunswick patent, even though it was a mere makeweight (or what lawyers call a strong dictum), breaks new ground. Moreover, Judge Barnes awarded counsel fees which may not be allowed by the court in an unfair

"I don't think that to be ornamental something has to have curlicues on it or embossed roses. A chair or desk would be ornamental if it is pleasing to the eye. Probably they wouldn't be pleasing to the eye unless they obviously had some utility, but what the statute requires for a design patent is ornamental, and these designs are pleasing to my eye. The mechanical patent has to disclose something more than mechanical skill. . . . In order to procure a patent for a design, a man or woman would have to make a design which required more than . . . average, run-of-the-mill work as a designer. I think that these designs have that something more. . . . The result is I think the patents are valid. They have been infringed."—Judge Barnes.



Brunswick

protection

Kuehne

Another recent case in the fashion field reinforces the contract theory of design protection. Christian Dior and several other Paris couturiers brought suit against a sketching agency, claiming that employees of the agency gained entrance to exclusive showings by misrepresentation. On entering a showing, they signed an agreement that they would not copy the dresses. Later they sketched what they had seen and circulated the sketches among the agency's subscribers, who did copy. A New York court held that the plaintiff's cause of action was valid.

competition or breach of contract case but may be allowed in patent cases. In order to grant counsel fees, the Court had to find a valid patent infringed. But the Court expressly said that it found evidence supporting Brunswick's claim to damages in the amount of $265,-750 and for counsel fees in the amount of $95,000. He then cut both figures in half, and allowed a total of $180,375. This sum is less than the amount of actual damage he might have awarded without counsel fees, and the purported allowance of counsel fees amounted to a reduction rather than an increase in damages.

In considering the question of infringement, the Court refused to look at the petty details of the two compared lines and emphasize the differences. It said,

"I don't think you can take up a chair and say 'This chair has a hole in the back, and this one does not. This chair leg is tapered from the bottom to the top and this one is only tapered for twelve inches. . . . The angles at which the legs approach each other are somewhat different in the chairs.' I don't think you can do that. I think you have got to judge the ensemble. You have to look at the design set forth in the patent, and you have to look at the accused design and use the best judgment as to whether the accused design infringes the design of the patent."

This approach stresses the fact that claims for a design patent should emphasize the *tout ensemble* rather than the details of the design. If the overall effect is relied on in the patent claim, it is more likely to be held infringed than if the claim relies on minute details.

Even if the Brunswick case is held, in the future, to have been decided as a patent infringement rather than an unfair dealing case, it offers little hope for the designer in the fabric or fashion field. The Chapman design was a more or less new application of design to the entire concept of school furniture; invention is comparatively easily found in such a situation. In the fashion or fabric field, where the design is one applied to or varied from a known basic structure, it is very difficult to find invention in the patent sense, and most claims may be defeated by showing that the prior art knew something similar, or, at the least, each of the elements of the patented design were known to the prior art, though these elements may be assembled in a novel way. Mere reshuffling of known elements has not been given design patent protection unless the new assembly resulted in something completely different from the art known in the past.

In summary, while the Brunswick case may be distinguished or explained away on grounds other than design piracy, it is clearly a part of a trend in favor of protection of designs, whether by patent, application of the rules against unfair competition, or otherwise. This trend can be encouraged by designers and manufacturers who are vigilant in protecting their rights.

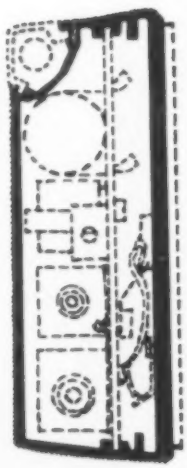
GE extrudes a radio case

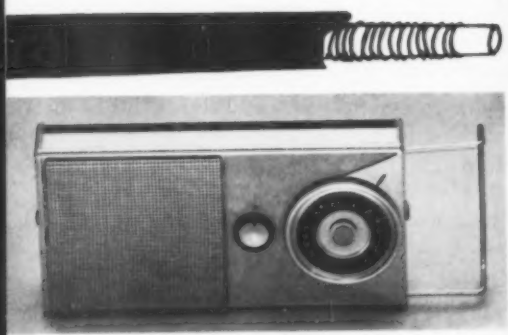
1956 was the year in which people who bought transistor portable radios in plastic cases could drop them out of upstairs windows to see how they didn't break, smash or shatter. And, in full view of the tv camera, with such national names as Vaughn Monroe doing the dropping, they *didn't* break, smash or shatter. But, despite the drama of the demonstration, some companies still feel that a small radio, which is so much more prone to dropping or knocking, would be even more saleable in a metal case. GE's new ($49.95) all-transistor pocket radio, shown here, is the first to adapt the personal set to metal, by a unique approach to fabrication.

One of the problems of designing metal radio cases is that the antenna cannot be placed inside the chassis because metal enclosure interferes with reception. The industry's first metal portable, introduced earlier this year by Motorola, solved this by carrying the antenna into a plastic handle outside the steel housing. Last summer, when the Industrial Group of the Radio Receiver Department of General Electric's plant in Utica, New York, was programming a new portable, the designers were looking for a new approach to a metal housing that might combine functional appeal and decorative potential. It was obvious that one aim in designing portables must be to lessen weight. General Electric also thought that a metal case, instead of being covered or painted, might be fabricated to have a built-in decorative surface.

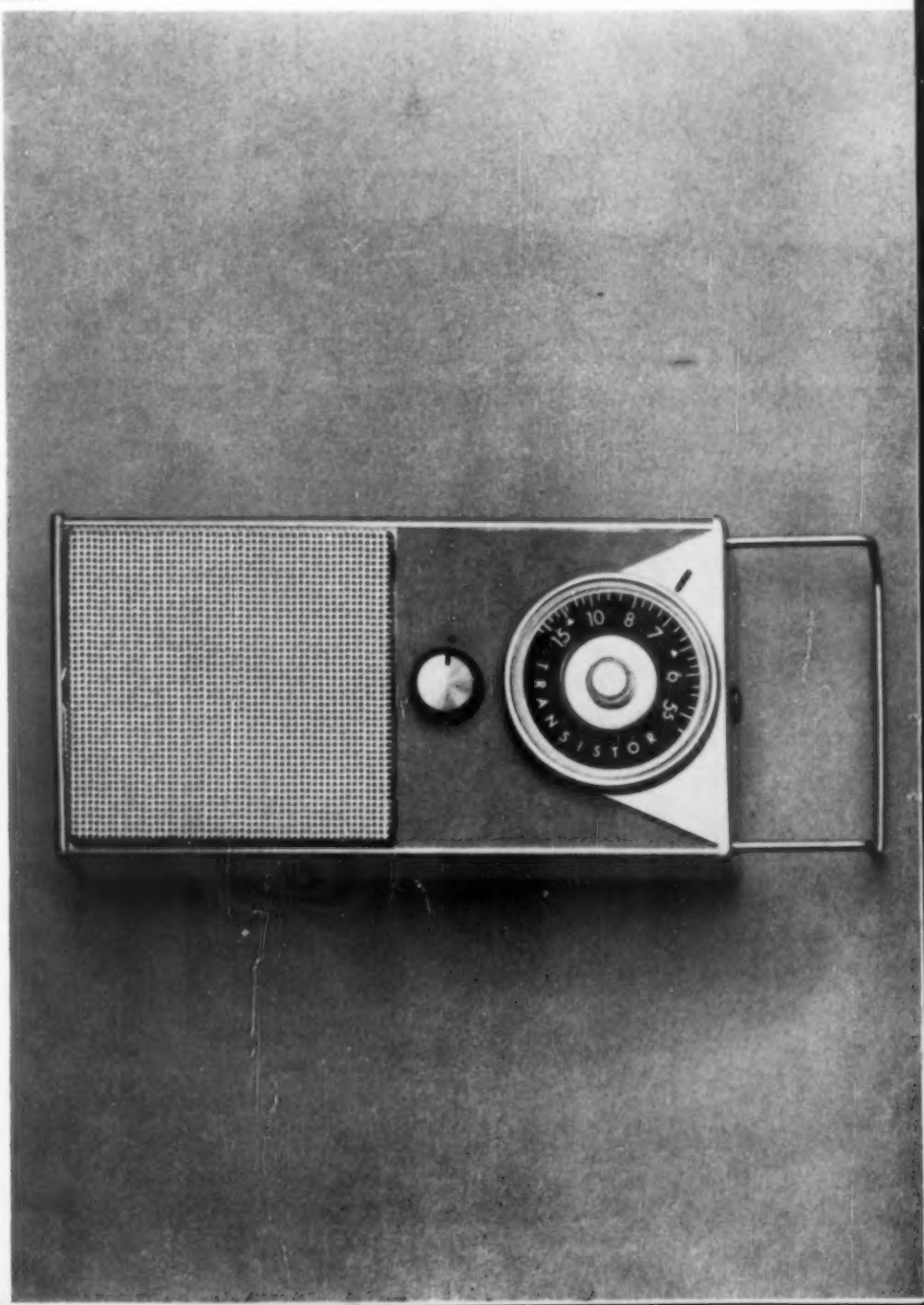
The first directions toward the new

Tom Yee





Extrusion profile (top). Antenna housing becomes decorative band (bottom).



design arose in conversations with a venturesome young firm, Park Nameplate of Flushing, New York, whose experience had been largely in making decorative foil parts. Aluminum seemed to answer the need for less weight without a loss of strength. It also extrudes easily and takes color anodizing with happy results. Park Nameplate suggested that it might be possible to design an extruded aluminum case with integral color and surface texture, and the designers decided that a handsome built-in decorative effect could be obtained by incorporating a ribbed surface into the die. Though Park had experience in anodizing metal for their foil nameplates, extrusions were a new field to them, but they were interested in experimenting to overcome the many technical difficulties of this approach.

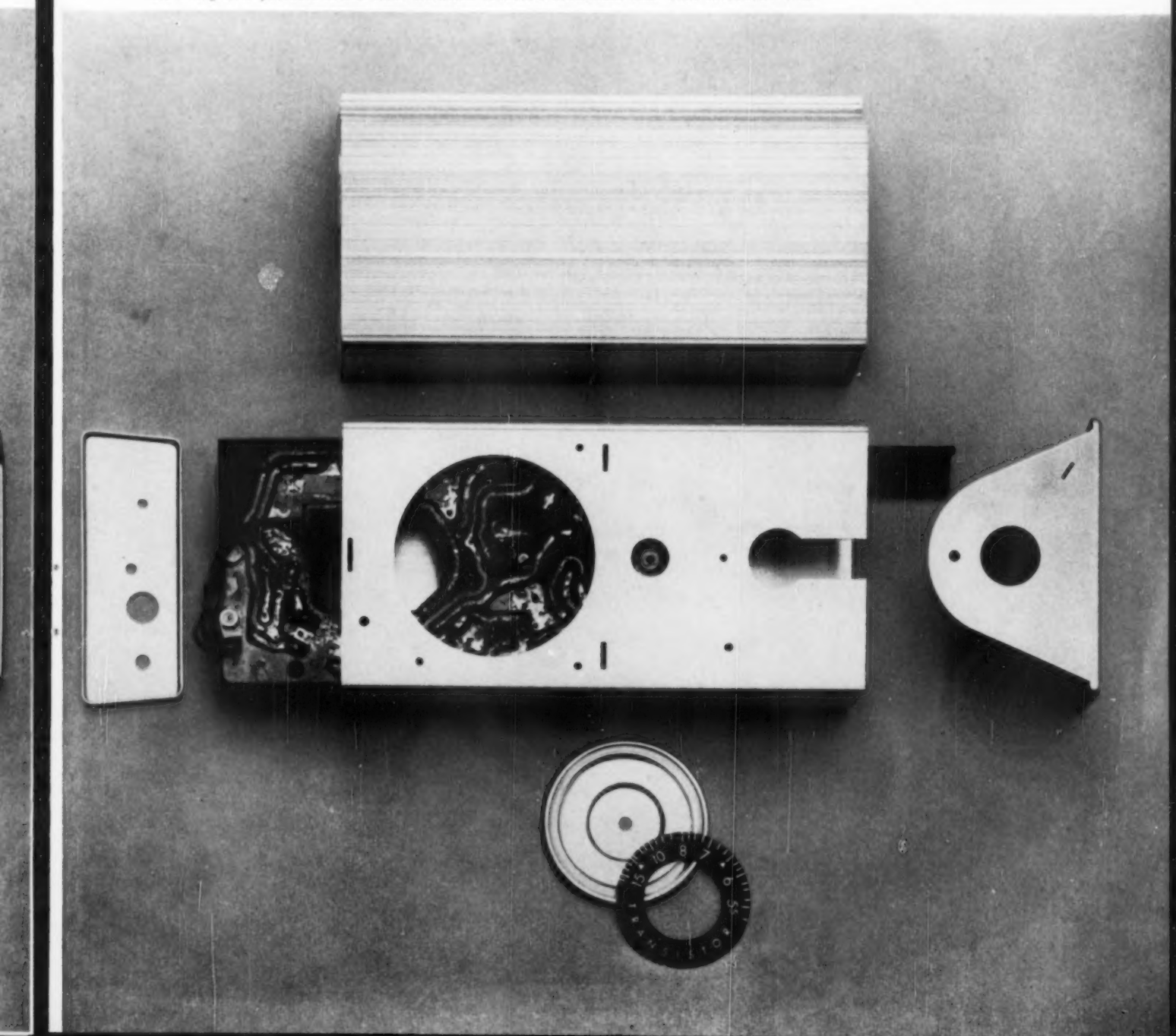
As the designers worked out the details of the housing, the next crucial problem was the antenna. They devised a simple, hollow extruded triangle which slides into one corner of the case both to hold the antenna and to form a decorative band of dark contrasting color.

Having started with a continuous fabrication process, the designers and fabricators emerged with a case made entirely of simple punched, bent or extruded pieces. Most of the other elements of the design emerge logically from these fabrication processes: the decorative ribs contrast with smooth stamped end pieces, and the anodized perforated aluminum speaker grill is treated as a decorative surface. To simplify the final assembly of the radio and accommodate the wire handle which slides in flush with one of the end pieces, two inside channels were incorporated in the extrusion, into which the electronic assembly is slipped.

The final simplicity of design and assembly came only after careful planning and much experimentation. Color anodizing is a critical process at best, and to match the color of surfaces with different qualities was especially critical: the ribbed extruded surfaces took one strength of "dye"; the smooth surfaced stamped pieces another. Close tolerances were a problem in machining the extrusion, which had to fit the breadboard well but not so tightly that it would slow assembly.

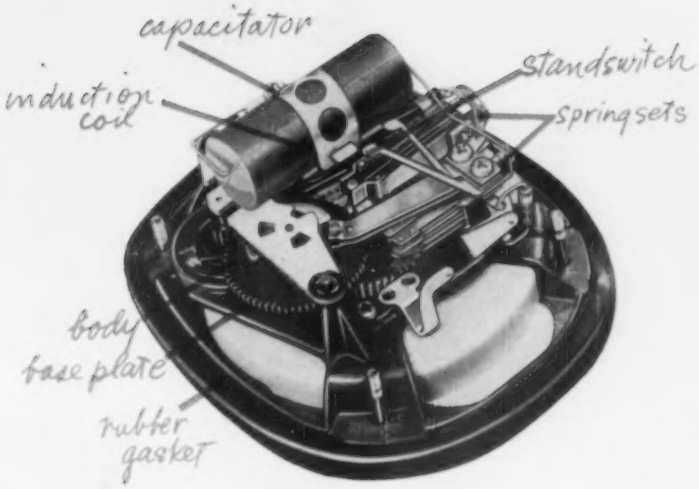
An optional recharging element brings the total price to $64.95.

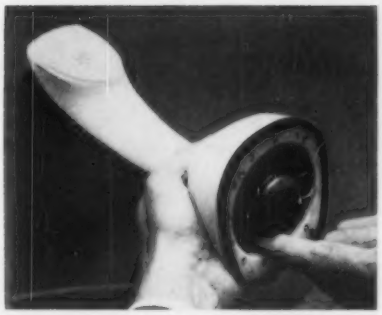
GE's tiny new portable has a color anodized extruded aluminum case with decorative ribs.



ONE-PIECE PHONE LIFTS THE HANDSET OFF ITS PEDESTAL

The unique one-piece Swedish phone, introduced recently in the United States, has attracted considerable attention as a novelty, but its main interest centers on the mechanical ingenuity that made the new shape possible. Invented by L. M. Ericsson of Stockholm, and manufactured and distributed here by North Electric Company, the phone's new concept includes compactness, mobility and a new relation to its user. Because the dial is part of the handset, it can be brought close to the user for easy viewing and manipulation, yet the total phone weighs no more than the traditional handset alone (15 ounces). One reason for its low weight is found in the internal simplification that comes from placing all components on one chassis: soldering points, wiring and terminal screws have been cut by half. Added to this is the elimination of the bulky pedestal on which the conventional receiver-transmitter rests; the one-piece phone stands up on its own base ($4\frac{1}{2}$" x $3\frac{7}{8}$"). To keep the tall ($9\frac{1}{4}$") columnar shape stable on the table and well-balanced in the hand, the major assembly lies in the base; this low center of gravity means that a tilt of greater than 45° is required to tip the phone over. Another important reason for its light weight is the use of styrene and acrylonitrile for the housing instead of phenolic or butyrate. It is produced in six colors, and has high impact, stain and scratch resistance. At a price competitive with other color phones, these Ericofons may soon be seen in many a home serviced by the independent telephone companies.



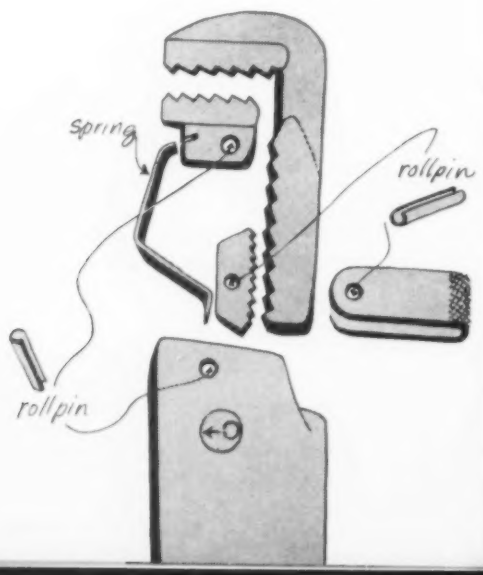


Dial on underside of base with numerals (but not letters) printed on fixed plate for easy view when dialling. Standswitch at center opens circuit when phone is lifted off the table; phone can be placed on its side during hold periods. Curved body, because it does not have to fit pedestal, allows transmitter and receiver to be placed directly opposite mouth and ear. Neck is shaped for either hand in natural grip, with ridge for thumb (top).

AUTOMATIC WRENCH: MANUAL ACTION MECHANIZED

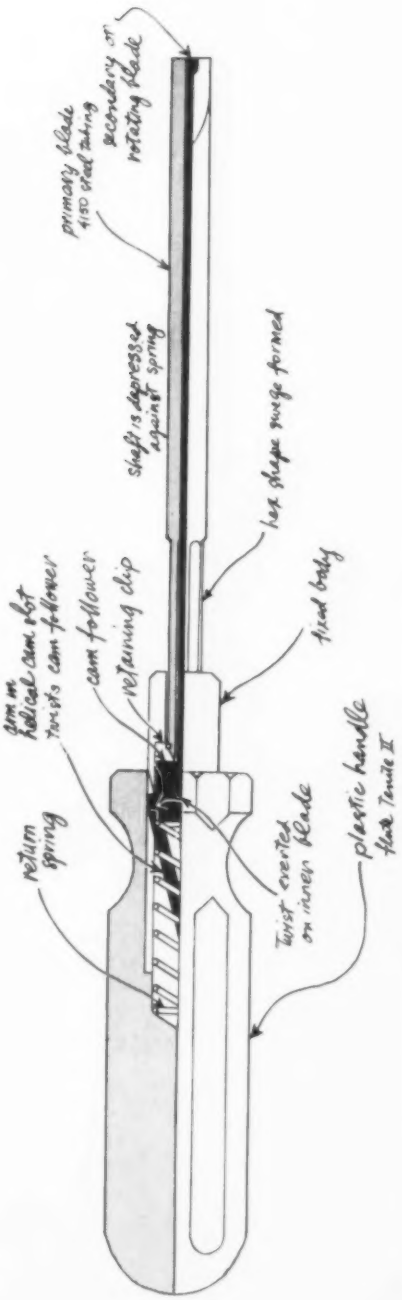
That neglected tool, the wrench, has a new character and greater efficiency through a simple method of automatic adjustment. The Gripso-Matic Wrench, manufactured by the H. R. Basford Company of San Francisco and invented by Homer Mead, is a quicker, neater and lighter implement than its predecessors because it has substituted a ratchet for the conventional screw-type manual adjustment. A small metal strip, controlled by a push-button yoke, serves as a spring. Press the yoke and the claw-like head of the wrench can be quickly extended to its full length, or may be set to an exact calibration. Release the yoke and the spring pushes the ratchet against the teeth of the head, holding it in position wherever set.

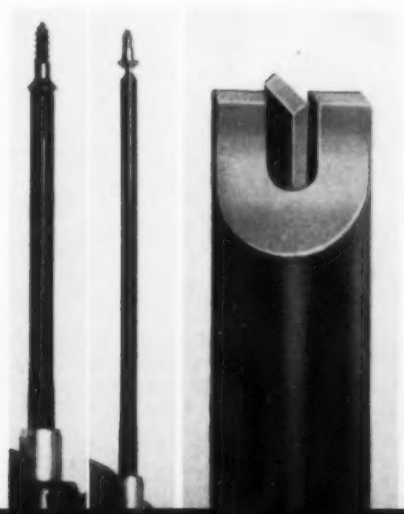
The wrench is of steel throughout, yet by using a formed metal housing instead of the usual cast elements it manages to be 40 per cent lighter than others of its heavy-duty class. Since its simplicity of operation makes it easier to use in tight places, and its lighter weight reduces the fatigue of awkward positions, the wrench serves both operator and operation. And several further refinements have been made. The handle is recessed below the ratchet to allow knuckle-room, and the housing, sculpturally smooth and rather natty in its red coat, protects the parts inside against dirt and damage from dropping. Roll-pins (Elastic Stop Nut Corporation) instead of rivets hold the working parts in place, making it possible to replace the head when the teeth are worn down.



SCREWDRIVER WITHIN A SCREWDRIVER HOLDS THE SCREW

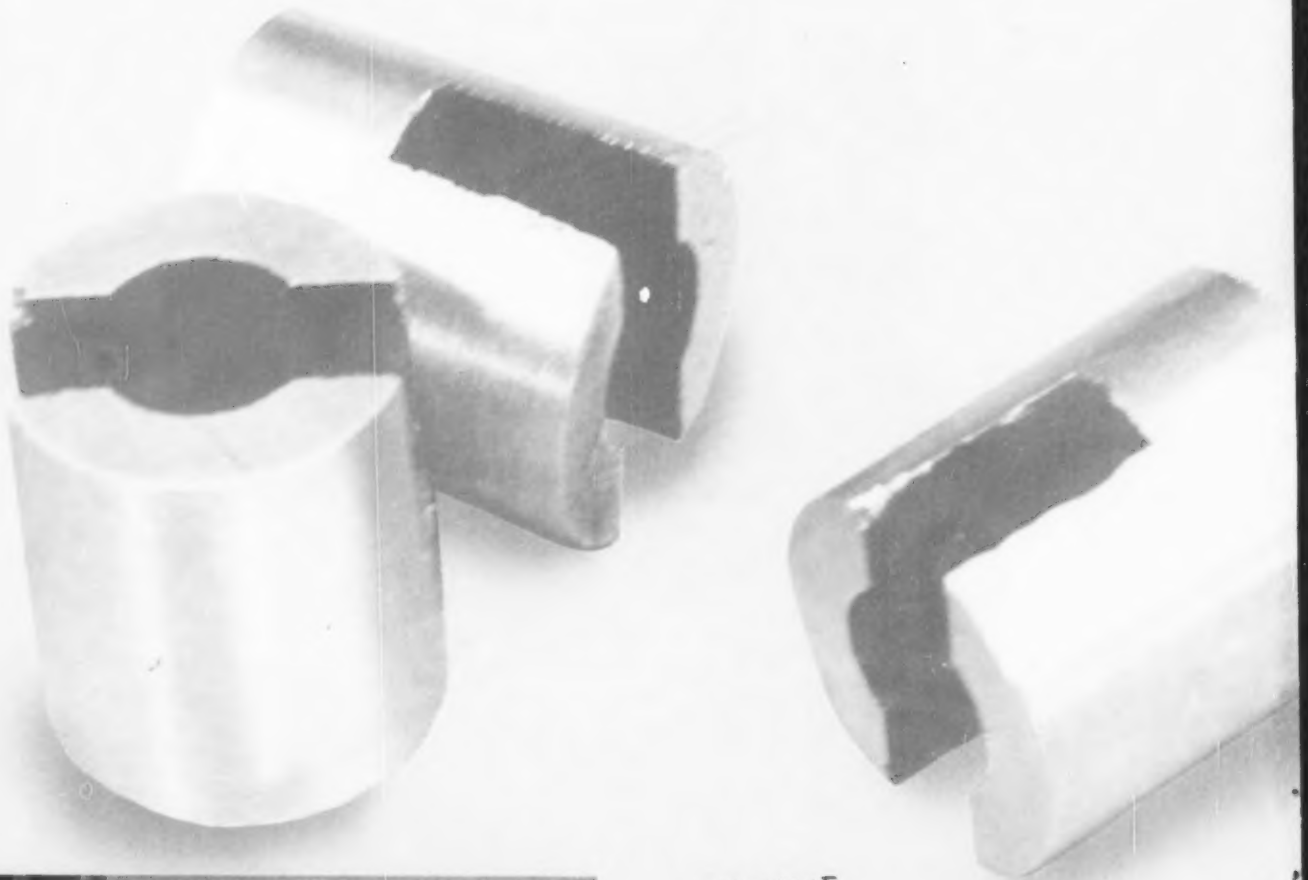
The problem of a screwholding screwdriver has been met in many ways —from the crude jaw that grips the screw to the magnetized blade that attracts it—but a driver has now been devised that practically screws the blade into the screw. The Hunter Tool Company of Los Angeles is introducing their Magic-Tip driver with a second tip inside a hollow barrel which forces itself into the screw slot for a tight grip. The mechanism hidden within the steel tubing of the barrel (Superior Tube) is open to view through the transparent Tenite II handle. When the driver is pushed against the screw, the outer blade retracts back through a shaft against a spring. This action pushes the inner blade against a cam follower which moves in a helical slot, twisting the inner blade inside the barrel. When wedged into the screw by the normal pressure exerted on the handle, the screw is held tightly in place—tight enough to be held even after the pressure is released and the screw is unsupported.
By eliminating magnetism, the Magic-Tip can be used in complex electronic mechanisms where electromagnetic components prevent other screwdrivers from being used. One application of the principle of double blades is used in a special screwdriver which recovers slugs that are turned too far into the fine tuning devices of television receivers.

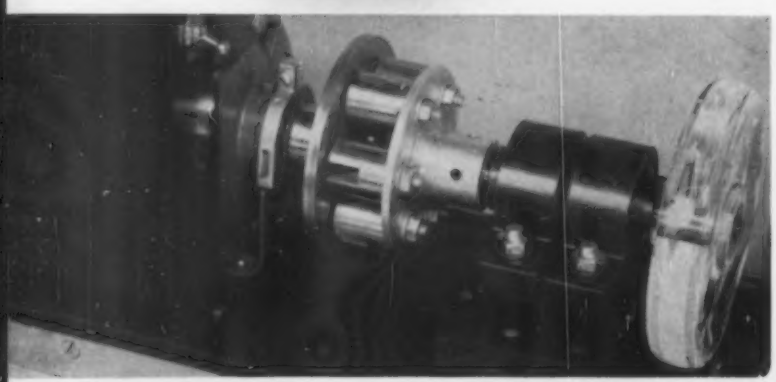


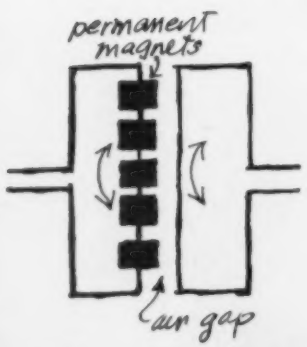


Direct magnetism simplifies power drive

Permanent magnets eliminate external dc supply essential to electromagnets, and make new Whitney-Tormag Magnetic Drive efficient, self-contained







Model of disc-type Whitney-Tormag driving a load is shown at left. Fixed airgap and permanent magnets that eliminate dc supply are shown above.

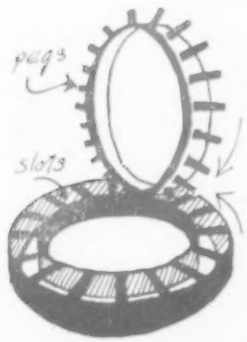
The three Alnico V permanent magnets on the left are the key to a new and simplified mechanism for transferring mechanical power from motor to load. This new transmission design demonstrates very neatly some of the methods and advantages of simplification. In the standard electromagnetic *clutch*, magnetism is generated by means of an outside source. The substitution of permanent magnets for electromagnets has eliminated an external power source; this in turn has resulted in a miniaturized single, self-contained, highly efficient unit with fewer parts; it is totally frictionless, with "built in" performance characteristics, and has considerably improved "tailoring" of power to needs—one of the most essential functions of a *coupling* unit.

The new frictionless magnetic drive is being produced by Whitney Chain Company of Hartford, Conn., under a licensing agreement with Tormag Transmissions Ltd., Vancouver, Canada. The first installation in the United States was in the Saco-Lowell Textile Plant in Massachusetts late last year, and the new drive promises wide application to all kinds of industrial machinery requiring smooth performance and improved maintenance. Whether or not this new mechanism will find its way beyond current industrial applications is hard to say, but the problems of simplification and miniaturization are basic ones, and the way in which Whitney managed to do more with less is of interest in other areas as well.

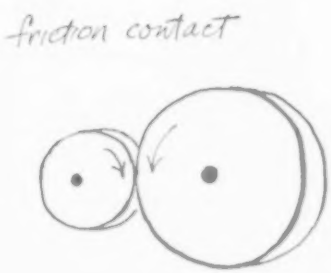
The new drive is a logical step in the evolution of driving devices. Ever since power was first harnessed, men have been trying to put it to work more efficiently. Ancient water wheels and windmills had crude gears of wood to transfer the power of the wind or running streams to drive pumps or millstones, but much of the original power was lost through friction and slippage. For the same reasons, a horse walking in endless circles to drive a wheel produced only a fraction of one horsepower in effective power. As mechanization increased, advanced gears, belts, chains and other devices were invented to reduce friction and increase efficiency. Driving systems became more and more complex, and the creaking and groaning that meant wasted power was gradually replaced by the efficiently quiet hum of fast-moving, precision parts.

The concept of using a magnetic field to transfer power from a source to a load is not new. Electromagnetic drives have been an effective industrial tool for many years, but — although they benefit from the advantages of using a magnetic field rather than gears, belts, or chains as couplings — they demand an external power source to create that magnetic field. The Whitney-Tormag with its powerful permanent magnets eliminates the wiring and power supply used by electromagnets. It avoids the tight, physical grasp which is a common behavior of the *rotors* in the conventional clutch. The friction surface in the new drive is replaced by an airgap as one component conveys power to the other by keeping its distance.

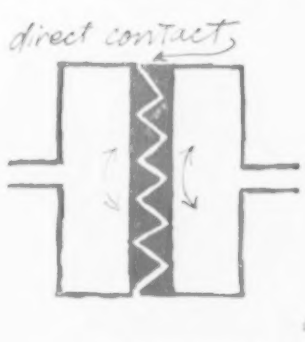
What are the implications here that relate to design simplification? It is a basic fact that power from any source must be "tailored" to suit the needs of the machinery it is running. There must be a way to control starting, stopping, speed, and changes in load. This means that the load must be independent of the motor that runs it; there must also be a method of connecting it at will to the motor through an intermediary or coupling device. Most basically, this is taken care of by a system of rotors between motor and load. Such wheels, or gears, will adapt speed and will help somewhat in "tailoring" the supply to the demand, but will not disengage the load from the motor during rotation. This, of course, can only be done by means of a clutch. In a mechanical clutch, motion is transmitted by the friction between the surfaces of the rotors engaged or disengaged by an actuating mechanism. In the electromagnetic clutch this action is taken care of by a magnetic field excited by a dc power supply. The simplification of the Whitney drive lies in the fact that power is no longer brought in but is incorporated in one of the rotors by means of permanent magnets.



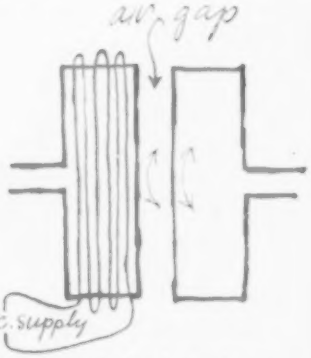
Crude gears of wood helped to utilize natural power long before era of mechanization.



Wheels driving each other cause slippage, an inefficient system for power transfer.



With mechanical clutch, load can be disengaged during rotation by actuating mechanism.



Electromagnetic clutch requires dc power source and electrical connections to magnetize field.

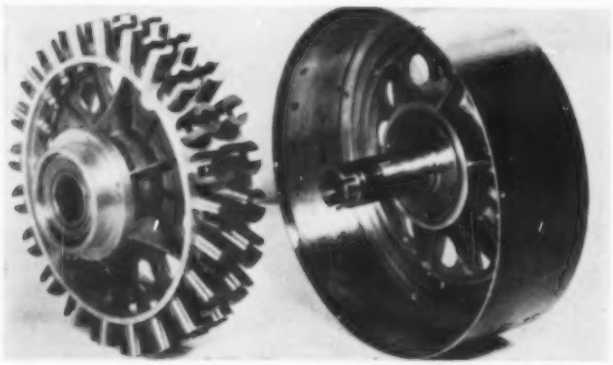
The permanent magnets which generate the magnetism by which mechanical power is conveyed from motor to load depend partially on the airgap for their operation characteristics. This makes for the performance and design quality of the new Whitney-Tormag drive. The drive consists of two basic components: a bimetallic rotor which does the driving and is always at motor speed, and a magnetic rotor with its permanent magnets, which is driven and attached to the load. The bimetallic rotor, made of mild steel with copper-facing perforated with steel rivets, can be either a disc or a cylinder. Both types — disc or cylinder — operate in exactly the same manner, the difference being that an increase in surface area permits the cylindrical design a reduction in the size of the coupling. (This disc type is shown on page 84, the cylindrical below.) The two rotors — driver and driven — are mounted face to face, but never touch each other. When the bimetallic rotor is driven, a torque is induced in the magnetic rotor through currents caused in the copper; the drag existing between the magnetic field of the permanent magnets and the current brings the driven member up to speed.

Smooth pickup

Elimination of physical contact between the rotor surfaces makes for a smooth pickup of load with no vibration or shock. This smooth operation is equally true when the motor is slowed down or the direction reversed. In a textile mill, for example, non-grabbing starting and stopping is very important: spinning machinery, although operated at very high speeds, must be started very gradually and with no jerks to prevent constant snapping of delicate threads. For this kind of gradual acceleration control, it is usually necessary to use motors with higher horsepower ratings than is necessary to run the machinery after it has reached operating speed. In addition, complex clutching devices are needed to give the smooth pickup. With the new magnetic drive the clutching is eliminated and smooth pickup is a built-in characteristic of the drive itself, where the torque is sufficient to gain proper acceleration with motors rated realistically for operating loads. Since cushioned starts are the result of built-in design precautions, it is possible to use motors that are powered to full operating load requirements without special consideration for starting and stopping problems.

Airgap advantages

In earlier types of coupling devices, where the engaging action of the rotor surfaces accounts for the transmission of energy from input to output, the resulting wear of these surfaces is a constant source of trouble for the maintenance man. This friction is, of course, eliminated here because the only contact between the rotors is the airgap. Thus, in addition to the elimination of an outside dc supply—which means no electric failures, wire repair, no reconditioning of collector rings and graphite brushes—the airgap design makes for a vast cut in time and effort taken up by maintenance. But there are other less evident—and important—advantages to airgap coupling. The torque, and consequently speed, of the Whitney-Tormag drive depends upon the airgap. The adjustable gap permits predetermined speed-torque characteristics to be built into the coupling. For this reason Whitney engineers have been able to fix the distance between rotors in units designed for commercial installation to obtain most efficient operation, while for special or future installations variable airgap units have been proposed. What this, in fact, means, is that the behavior of the drive in operation is predetermined, but in those cases where the requirements fall outside the operating curves, they can be adjusted by varying the gap. The airgap can be changed by sliding one disc rotor on the shaft by means of a collar and linkage mechanism. This will alter the output, since the width of the airgap partially determines the torque and efficiency curves. Airgap width, number of Alnico V magnets,



In cylindrical type Whitney-Tormags, magnets are mounted on rim of magnetic rotor; bimetallic rotor has copper facing.

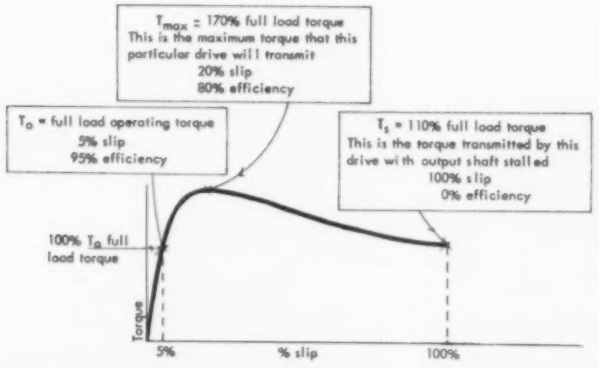
Front view of assembled magnetic drive shows tiny airgap between magnets and copper facing of bimetallic rotor.

thickness and diameter of rotors limit the torque output of a Whitney-Tormag to a specific overload point. In operation the drive also provides built-in overload protection for the motor: tests have shown that the new permanent magnet drive can be run at full stall indefinitely without harming the motor or itself. In a stalled position, input horsepower appears as heat in the bimetallic rotor only. As this rotor is invariably the driver, it is always operating at rotor speed which promotes maximum cooling. In addition, as the bimetallic rotor is always the exterior member in the case of the cylindrical design, a greater area is exposed to air, which further increases cooling.

Efficiency

The chart below is a typical operating curve for the Whitney-Tormag drive and indicates that at rated horse-power the drive has an efficiency of 95%. A drive operated along the curve shown below will do no harm to the motor. The curve is a typical one for Whitney-Tormag designs, combining high efficiency with motor protection. At rated load, the 5% loss is mostly due to slip—that is, the difference of speed between the rotors is 5%. The slip, or loss, increases to 20% when the drive is run at 170% of full-load torque. This is the maximum torque that this drive will transmit. It will stall at loads beyond this point. And it is interesting to note when stalled—which, of course, means 100% slip, or loss—the load on the motor will be only 110% of operating load. Since, as was just shown, the motor can stand the stress of 170% overload, when the drive is in the stalled position the motor will run on indefinitely without any damage to it or the drive. This means, among other things, that a "jam" need not be feared. For when it occurs the motor will run safely at 110% full load torque—that is, in the stalled position.

A drive designed to operate along the same curve will still follow the curve, should the motor be used as a dynamic brake. A motor driving through a Whitney-Tormag unit can be *instantly* reversed under full load and used as a dynamic brake without harm to drive or motor. Thus the rotational direction of a load can be reversed without operational difficulties.



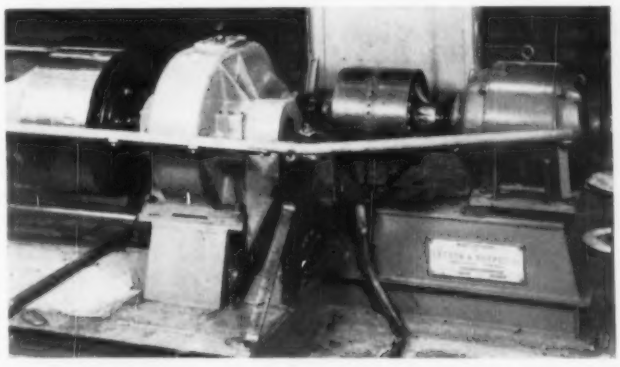
Typical operating curve of standard Whitney-Tormag unit. Subtraction of % slip from 100 *gives efficiency of drive.*

A broad range of applications

The new Whitney-Tormag magnetic drive can be quickly and easily installed between shafts, with flexible couplings, chains, stock sprockets and belts. The elimination of an outside dc supply for magnetization and the equipment necessary to transfer current has made for an unusually compact, self-contained drive in the cylindrical design. Physically adapted to the new N.E.M.A. (National Electrical Manufacturing Association) frame specifications, the cylindrical design of the drive permits the unit to be smaller than an electrical motor of similar horsepower.

That this design simplification has an incidental but favorable effect on appearance is obvious from the pictures shown on this spread. Equally obvious are the advantages over most of the standard clutches or drives operating in a similar range. In the family of magnetic clutches, the hysteresis clutch tends to get so bulky in large capacities that ratings over 1 HP are avoided; while the power loss in another magnetic clutch, the eddy current clutch, is so great that it operates at very poor efficiency. Whitney-Tormags operate in a range from fractional HP up to approximately 50 HP and are applicable to an extremely broad line of industrial machinery; the proposed Whitney stock line available during the first quarter of this year is in the range of 1 to 30 HP for off-the-shelf availability.

What are the limitations of this new coupling device? It is too early to say what and where they might be. Although Tormag units have been and are being employed in numerous applications in Canada, the first installation in this country of the new Whitney-Tormag occurred only last October in the textile industry, and news as to where this new mechanism falls short of expectation—if any—is still to come.—*a.g.*

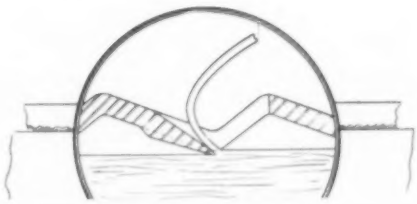


Industrial application of Tormag Magnetic Drive in Canadian plant shows unit installed between motor and load.

DESIGN REVIEW

Hardware The National Hardware Show in October drove home the fact that if hardware is anything sold in a hardware store, the modern hardware store is as varied . bazaar as the modern drug store. One of its best customers, and perhaps the spur to its new character, is the do-it-yourself suburbanite, who will this year be offered, among other things, a growing range of versatile home power and kitchen tools, often with one motor to power many useful attachments.

↑ **Dormeyer Corp.** has introduced a portable electric sander that permits fast abrasive changes. A pistol grip and knob provide a variety of holding possibilities for numerous chores. $39.95.



↑ **Stanley Tools** has announced Surform, a new tool for forming and finishing all types of surfaces up to the hardness of mild steel. Every one of the 450 tiny blades is angled and semi-circular, and functions like a miniature block plane.

↓ **Oster Manufacturing Co.** has announced an electric can opener. More precisely, it is a can opener attachment designed to fit an Oster motor base that already is powering a meat grinder and an ice crusher. Can opener head, $9.95; motor base with meat grinder head, $49.95.

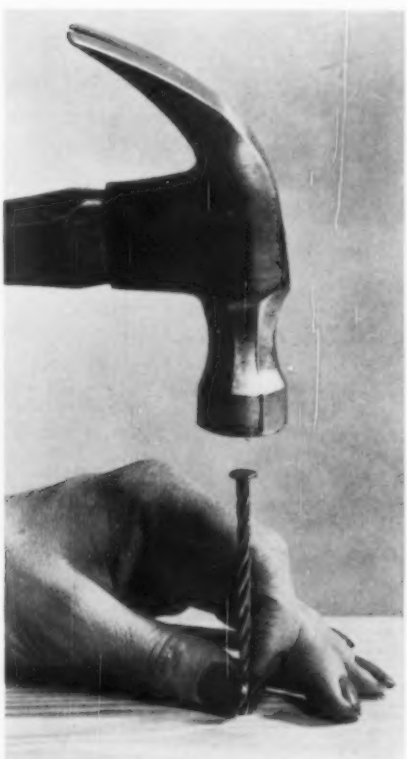
↑ **R. E. Dietz Co.** of Syracuse, has announced a new stop and tail light series in both one-bulb and two-bulb styles. The series features a snap-on lucite lens that is kept secure by a neoprene gasket. The new lights are for truck, truck trailer, boat trailer, and other vehicle use.

→ **Lawn-Boy** power mowers, made by a division of the Outboard Marine Corporation, work on a self-propelling mechanism. When the handle is rolled forward, the mower moves forward at a steady pace. The operator follows and guides the mower, but does no pushing. To disengage the mechanism, the handle is rolled back, and the mower stops instantly. Prices range from $69.95 to $129.95.

↑ **Metal Products Engineering** of Los Angeles is offering an aluminum egg boiler which can hold four eggs at a time, with a heat-resistant handle that makes it easy to lift the boiler out of hot water. The boiler fits any saucepan and folds flat for storage. $1.00 each, or three for $2.00.

↑ **CBC Electronics** of Philadelphia has designed a new heavy duty multiple outlet box for use in laboratories, industry, service and home workshops. Called the Model MO, the outlet box contains six long life replaceable sockets, a neon indicator light, and an "on"—"off" switch. Rated at 15 amps, 110 volts. $6.75.

↓ **Carson Manufacturing Co.** have made available a simple but ingenious bracket which features a grooved cross bar design that holds clothes hangers in place during the swaying and bumping of automobile travel.

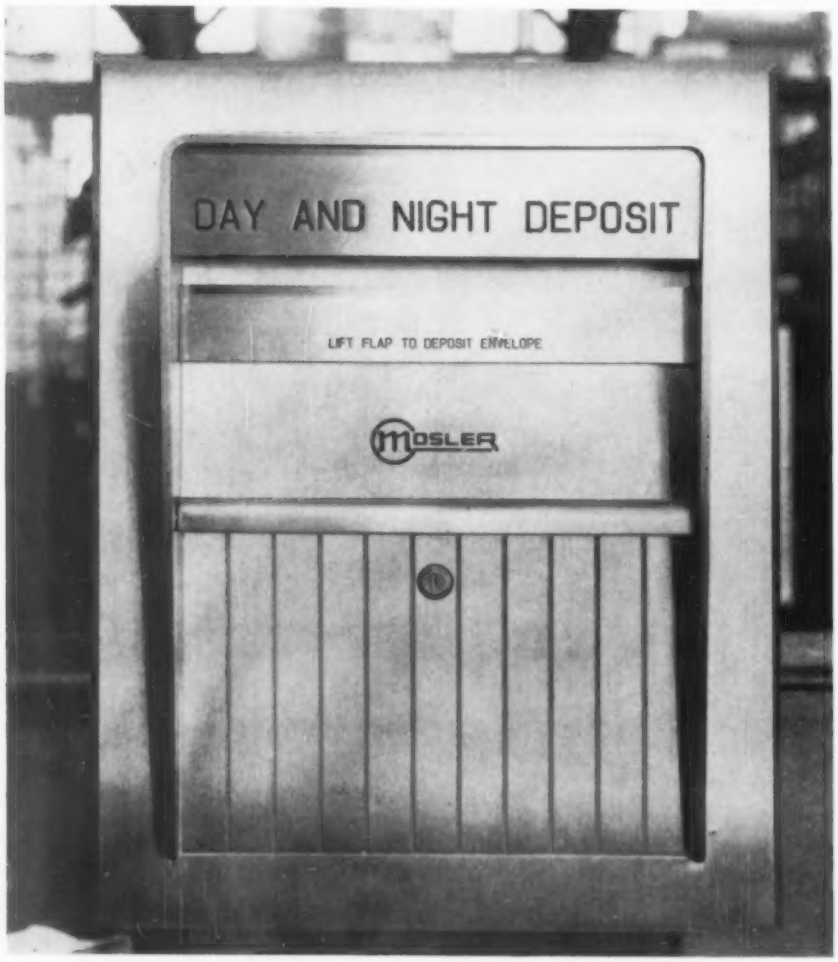


↑ **Dupont's** car top fishing rod holder has strong magnets embedded in neoprene. Rods or other metal gear can be carried securely even over rough roads.

↑ **Break-Safe** is the name of a new truck tire tool put on the market by Harvel Co., of California. The new tool enables truck tires to be demounted quickly, without the use of pry bars and sledge hammers. The tool consists of a metal base on which the wheel and tire is mounted, a "spider" of four crossbars, and a set of four pressure pads.

← **"Ardox"** spiral nail, developed by the Steel Company of Canada, Ltd., is now being manufactured in this country by the Jones & Laughlin Steel Corp. Because the "Ardox" has greater holding power, is easier to drive, reduces wood splitting and, amazingly, costs less per nail, the company believes the threaded nail will, in time, largely replace the common smooth-shank nail.

Business Show Visitors to the 1956 National Business Show at New York's Coliseum may have come away with the feeling that the world of the future was no longer something to look forward to. The array of electronic-based machines and instruments encompassed every bracket of business and every kind of office work, with notable emphasis on removing the drudgery from simple office routines like typing, addressing, ribbon changing.



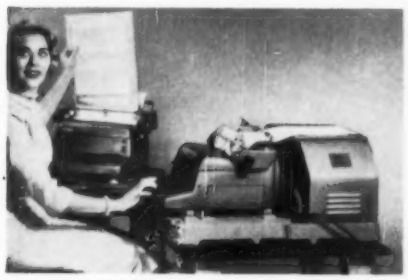
↑ **Mosler Safe Company** displayed their new Day and Night Deposit, a redesign by Henry Dreyfuss. The surface of the safe is brushed, corrosion-resistant stainless steel.

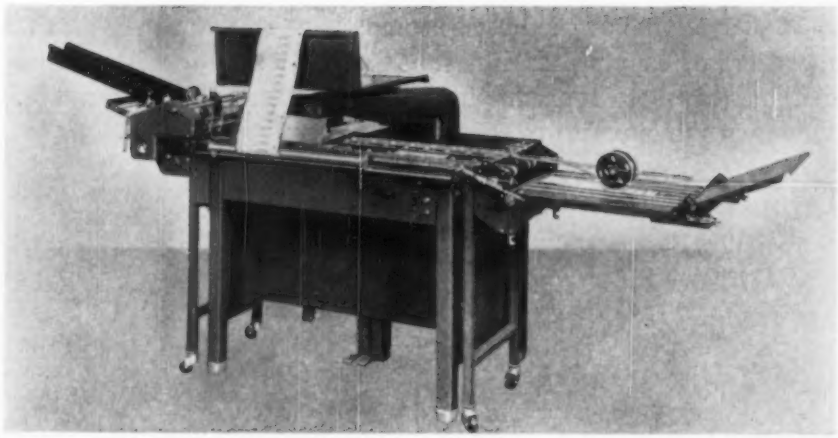
↓ **Underwood's** new line of "Golden Touch" electric typewriters offers such comfort features as half-moon keys to protect typists' fingernails and a cushioning device to reduce typing fatigue.

↑ **Royal McBee Company's** "talking typewriter" at the National Business Show delivered the sales pitch for new Twin Pak, a type of ribbon you can change without smudging fingers.

←Office beverage dispensers bulked large at the National Business Show, this year. The **Kelvinator Company** displayed this combination: Instant Beverage Vendor and a Hot'n Cold Cooler.-

↓ **Royal McBee** has a new model in their Robotyper line, the Robomatic, which types letters in volume and allows automatic duplication by a second machine operated from a record roll or from the typewriter keyboard.





↑ **Addressograph - Multigraph's** Transfer Printer uses a continuous form master to give sharp imprints on a variety of unit forms. Direct imprints are substituted for paste-on labels.

↑ **National Cash Register's** "Post-Tronic" handles many operations in checking-account bookkeeping, decreasing clerical fatigue and upping accuracy.

→ **IBM's** Ramac (Random Access Memory Accounting Machine) was one of the stars of the show. Visible in the background is the memory disc unit, the machine's brain. (See December ID.)

↓ **Underwood Corporation's** Elecom 125 is a medium size electronic computer designed for general business use and sells for approximately $350,000. The System is composed of a Computer and a File Processor.

Copying. One of the hottest competitive battles at the Business Show was found among manufacturers of copying machines, each with its own twist or new improved feature. Two new dry methods of photo reproduction were made commercially available, the Xerox copying equipment, shown on the opposite page, and the Protype machine, below.

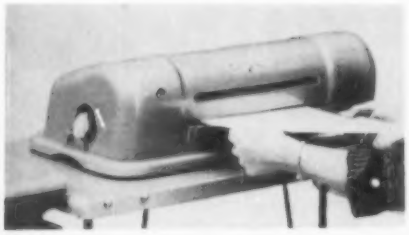
↑ **Minnesota Mining's** "Secretary" copier gives quick copies by way of heat-sensitive duplicating paper without negatives, transparencies or chemical solutions. Painter, Teague & Petertil, consultant designers.

↑ **Product Engineering Laboratories Company's** "PELprinter 60" is a portable blueprint machine that requires only a 110 volt outlet.

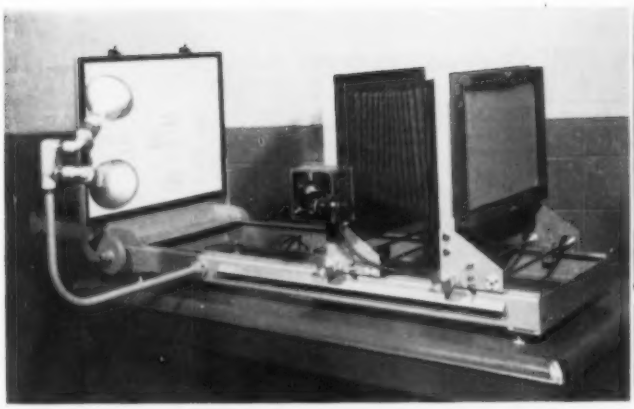
↓ **Eastman Kodak** has a trio of copiers in their Verifax series that do such things as make two-sided copies, give five copies in a minute, all with photo accuracy.

↓ **Peerless Photo Products, Inc.** have a new photocopier in their "200" series that handles any copying job up to 9″ in width. It is 20 pounds lighter and takes up less space than a standard electric typewriter. This model costs $195.

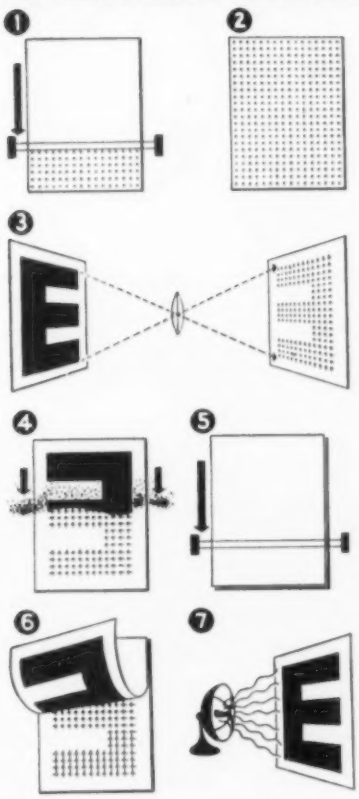
↑ **Mergenthaler Linotype** and The Davidson Corp. have become the exclusive distributors of ProType, a new machine that sets display type and headlines photographically. Type is produced on photosensitized film and paper by contact printing from negatives called ProFonts.



↑ **Copycat** photocopies under ordinary office lighting conditions, producing a copy in 30 seconds from colored stock, tissue or transparency. Made by the Copycat Corp. of New York.

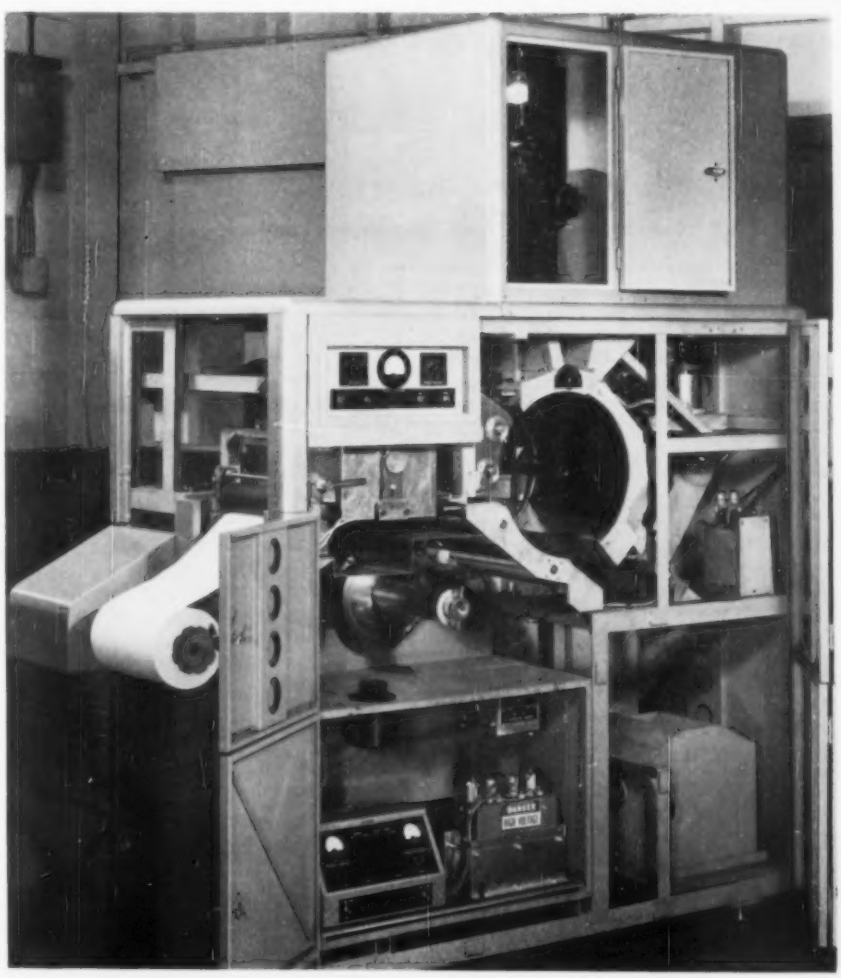


HOW XEROGRAPHY WORKS

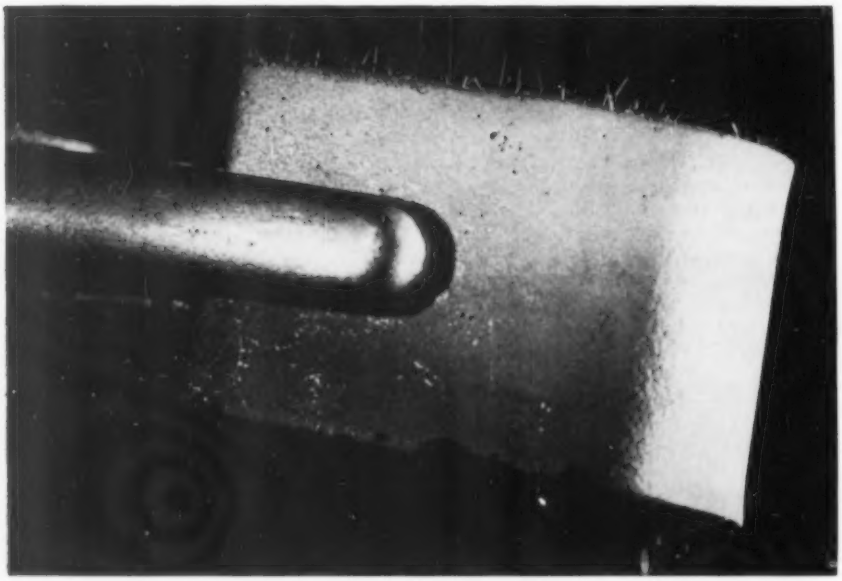


1. Surface of specially coated plate is being electrically charged as it passes under wires. 2. Shows coating of plate charged with positive electricity. 3. Copy (E) is projected through lens in camera. Plus marks show projected image with positive charges. Positive charges disappear in areas exposed to light as shown by white space. 4. A negatively charged powder adheres to positively charged image. 5. After powder treatment (Fig. 4) a sheet of paper is placed over plate and receives positive charge. 6. Positively charged paper attracts powder from plate forming direct positive image. 7. Print is heated for a few seconds to fuse powder and form permanent print.

↑ **The Haloid Company's** Xerography process (photocopying) includes: pre-sensitized positive-working metal offset plates that reproduce any drawn or printed image; a camera (upper left) that reduces or expands documents; 3 copying machines (upper right); the Processor D that charges the plate; the Copyflo (bottom) that makes prints from microfilm.



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



"Whiskers" found sprouting from metals create new problems

Tiny metallic strands which look like whiskers when seen under a microscope have been found to grow on platings of zinc, tin and cadmium used as finishes in telephone apparatus. This discovery has been the reason for thousands of tests at Bell Telephone's Murray Hill, New Jersey, Laboratory. As part of this research, needle-shaped synthetic crystals of germanium and silicon—materials widely used in transistors and other tiny electronic devices—have been grown at the Bell Laboratories.

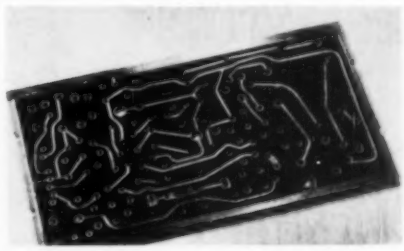
Metal whisker growth was an accidental discovery. It came about as the result of some trouble-shooting on a long distance telephone circuit, when something had gone wrong in the "wave filter," which is important in making possible dozens of conversations conveyed simultaneously over a single circuit. One of the components in the filter—a capacitor—had developed a "ground." The reason for this could not be explained until an alert engineer examined the circuit under a magnifier. It was then discovered that a very thin strand of metal connected a "hot" terminal of the capacitor to a mounting bracket 3/16" away. The bracket was "grounded." What had, in fact, happened was that the tiny strand had conducted to "ground" the electricity intended to carry voices. Further investigation showed conclusively that the zinc-coated bracket had grown "whiskers" which were electrically conductive.

Since then, scientists have been able to establish the startling fact that the strength of these whiskers far surpasses that of the material from which they sprout. Researchers have also subjected whisker-growing metals to bombardments by neutrons in a nuclear reactor. Examined after a year of "cooling off," the irradiated samples were found to have grown more whiskers than identical ones on shelves, in ovens and in cold chambers at Murray Hill.

With the increased use of tiny electronic parts likely in the telephone industry and elsewhere, whiskers could cause short-circuits between minutely spaced metal surfaces. Design of new electronic equipment will now have to take into consideration the whisker-growing potentials of various metals. Gold plating was recommended for use instead of whisker-growing tin in the repeaters of the recently laid transatlantic telephone cable. But what makes whiskers grow, and what they consist of, are puzzles researchers have not yet been able to solve.

Decorative aluminum sheet

The Aluminum Company of America has developed a new metal finishing procedure which results in a multitude of reflecting facets which create a continually changing surface pattern. The finish is based on inducing the formation of large grains in a special aluminum alloy. Individual grains are made to stand out in relief by an acid etch. Action of the etch develops tiny mirror-like facets on each grain. Waves of glittering light sparkle across the metal when there is movement in the light source, the aluminum sheet, or the position of the viewer. The new finish, tentatively called "Spangle-Sheet," has been applied in color and natural finish to plain and patterned rolled sheet, and extruded shapes. Expected to have very wide decorative applications when the finish is made available commercially, it is currently in the experimental stage.
Manufacturer: Aluminum Company of America, 1501 Alcoa Building, Pittsburgh 19, Pa.

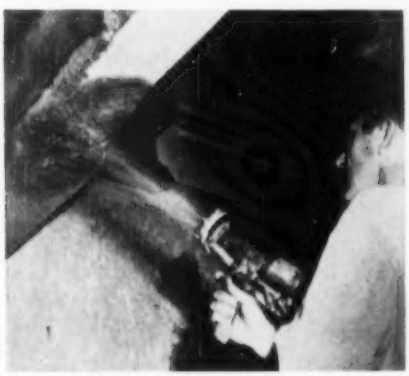


Molded printed circuit panels

A printed circuit panel can now be molded without the use of piercing dies and punch presses. Molded of a variety of resins, the panel is custom-made to any design or size with circuitry on one or both sides, as desired. It permits easy and permanent attachment of components. Large hour-glass-shaped holes allow automatic insertion free of jamming; the conductors and hole linings are of copper with electroplated solder applied to the entire circuitry to prevent copper oxidation and facilitate soldering. Rosin flux is baked onto the panel, applied to points to be soldered, which eliminates the use of wet flux and of washing off the residue after soldering.
Manufacturer: Die Form Circuits, Inc., 6045 W. Ogden Ave., Cicero, Ill.

Fireproofing structural steel

Underwriters' Laboratories have tested and rated a new fire retardant coating for structural steel. Known as "Sprayed Limpet" asbestos, the coating is a mixture of pure asbestos fibers and an inorganic hydraulic-setting bonding material. In addition to offering fire protection, this new



coating method also protects structural steel against corrosion. The thickness of the coating depends on the desired rating in hours of fire protection. For example, a column coated with a one and one-half inch thickness produced a two-hour rating.

"Sprayed Limpet" asbestos is applied easily to any surface by blowing it under pressure through a spray machine. When applied, the coating produces a felt-like effect. The asbestos fibers of the material provide wicking properties which cause the removal of condensed moisture as quickly as it is formed.

Distributors: Keasby & Mattison Company, Ambler, Pa.

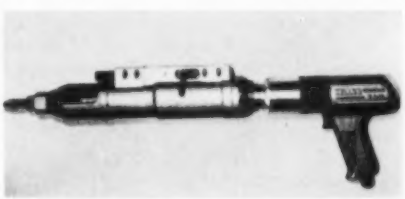
Flexible wood finish

A thin layer of wood on tough, fibrous paper backing, sold in rolls 162 ft. long, gives a wood finish on walls, ceilings, prefab walls or houses, and can be used wherever a flexible, genuine wood is desired. The finish is pre-sealed against dust, dirt and moisture. SHEER-wood, the new product, can be creased, folded around sharp edges with or against the grain, and will not split or crack. It comes in three widths up to 4 feet, and it is easily applied to any hard, smooth surface such as plywood, wallboard, hardboard, plaster, cement, plastic or metal. Special adhesives are recommended by the manufacturer, the SHEER-wood Corporation. Choice of adhesives depends upon the surface being covered. Information about the fabrication process, covered by a patent, has not been released. Complete literature and application data is available from the manufacturer.

Manufacturer: SHEER-wood Corporation, 69 W. Washington St., Chicago 2, Ill.

Portable air-powered drill

Keller Tool is offering a new air drill for hard materials called the Keller "K-Matic" which is equipped with a fixture that ab-



sorbs the thrust and torque of drilling up to ⅜" holes in hard materials. The new "K-Matic" develops up to 1000 lb. of thrust and is used for drilling in aluminum alloys, titanium or heat-treated stainless and alloy steels. Under normal drilling conditions the tool drills holes within .001" to .300" oversize, and uniform to ±.0007". Equipped with oversize ball bearings and rugged gears, the Keller "K-Matic" promises long, dependable service. A complete line of drill bushing tips for quick mounting of the "K-Matic" is also available.

Manufacturer: Keller Tool Division of Gardner-Denver Company, Grand Haven, Mich.

Stronger stud

End-welded studs are finding increased use as shear connectors in bridge and building construction, and as fasteners in

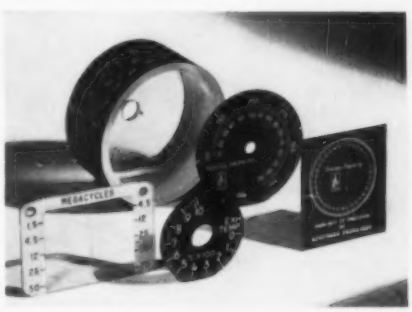
field-assembled aluminum walls. A new type stud of Gregory Industries, Lorain, Ohio, should find application in these areas. The new type CP threaded end welding stud is a granular-fluxed stud with improved welding qualities and tensile strength.

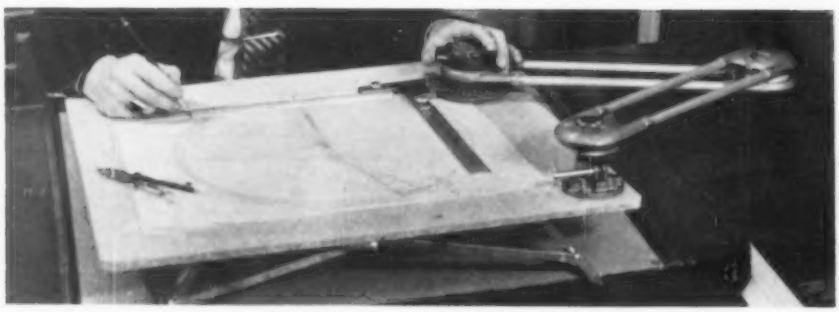
Manufacturer: Nelson Stud Welding Division, Gregory Industries, Inc., Lorain, Ohio.

Process engraved dials

Dials requiring close tolerance can be produced by a new process called Process Engraving. Accuracy is achieved by engraving a master on optical flat glass; the dials are then reproduced photographically. Use of this precision engraved glass master enables the reproduced dials to have fine graduations with a minimum graduation width of .002". Process Engraving is well suited for short and long production runs; the master will remain dimensionally stable for a long period of time. Dials can be produced on metals such as aluminum, brass, steel, and plastics such as Lamicoid and Plexiglas, among others.

Manufacturer: Ackerman Engravers, 458 Broadway, New York 13, N. Y.



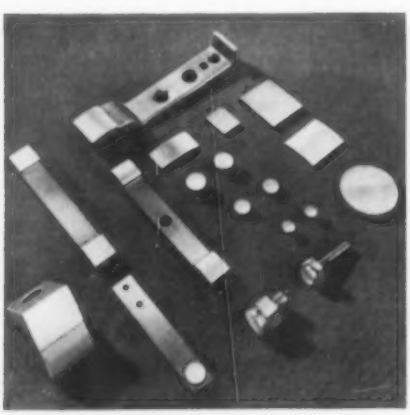


Desk-Topper drafting machine

The Desk-Topper, a drafting system for personal use, is a small, light, portable and storable ensemble with the advantages of a drafting machine. This portable drafting room set-up fits any standard office desk drawer and can be used on any table, desk or work bench. Part of the Desk-Topper is a 360° protractor, automatic 15° indexing, full base-line selector, double 10′ vernier and clamp, elbow height adjustment, screw anchor, enclosed band and pulley arms, and built-in brakes for 10° board slope. Drawing capacity is 17″ x 22″.
Manufacturer: Universal Drafting Machine Corp., Cleveland 2, Ohio.

Contacts of silver and cadmium oxide

Sintered powdered-metal mixtures of silver and cadmium oxide, able to withstand larger currents than silver or its alloys



when used for electrical contacts, have been developed by a Pittsburgh company. This new line of compositions, called Gibsiloys, provides greater current-carrying capacities, low contact resistance, and consequently, low material loss. In cost Gibsiloys are comparable to fine silver contacts. They come in two groups: KA-2, KA-3, and KB-2, KB-3. The first group are sintered powdered-metal mixtures of silver and cadmium oxide materials. The second group consists of materials fabricated from wrought alloy compositions. According to tests, the KB group tends to have more resistance to electrical and mechanical wear, and costs less than KA Gibsiloys. KA contacts are supplied in the form of discs, rectangles, irregular shapes in sizes up to 1″ thick x 8″ square maximum. KB contacts are supplied as rivets beaded from wire, rectangles cut from stock, projection weld-backed discs and discs with or without silver or solder backing.

Applications of the new contact line include motor-starting and limit switches, light and medium-duty contactors, light and medium-duty relays, aircraft relays, and industrial controls.
Manufacturer: Gibson Electric Company, Frankstown Ave., Pittsburgh 21, Pa.

Non-skid X-crepe for new disposables

Cincinnati Industries is now marketing a non-skid X-crepe paper that may open the way to disposable bath mats and even bowls. Made of heavy-duty cross-creped kraft paper, it gains the "stay put" quality from hundreds of dimples embossed straight through the material. On one side, each dimple has a small chunk of rubber deposited on its top. The rubber adheres to the dimples and the result is a gripping surface. It stretches in all directions, can be lengthened 60% of its base length and 45% of its base width, can be formed under heat and pressure, can be printed, sewn, and worked just like cloth. The manufacturer sees such possible applications as disposable bath mats and "anchors" for place mats.
Manufacturer: Cincinnati Industries, Inc., Cincinnati, Ohio.

New packaging machines reduce cost

An automatic packaging machine that seals up to 6000 parts per hour to Air Force specifications has reduced packaging costs of "O" Rings by 60% at the Ford Motor Co. Aircraft Engine Division in Chicago. Called the PAK-O-MAT, and manufactured by Product Packaging Engineering, the machine provides a complete automatic packaging system. By enclosing each part automatically in a protective individual envelope, the PAK-O-MAT eliminates the costly and time-

consuming hand-sealing operations, and protects the part against spoilage from grease, moisture or corrosion. The machine seals parts ranging in size from ¼″ to 3″. The parts feed from a hopper down a chute onto a moving strip of heat-sealable paper. An upper strip of sealing material, printed with specifications and other pertinent information, joins the lower strip at the sealing rolls, where the pouch is heat-sealed on four sides and cut. The machine prints, seals, packages and cuts off automatically, and also automatically rejects empty packages. The machine is capable of packaging such items as gaskets, slip-joint nuts, O-rings, bolts, small electronic parts, bearings, gears, valves, or grommets.

A new, semi-automatic heat sealing machine that seals unsupported plastic films such as vinyl and polyethylene, as well as most coated and laminated barrier mate-

rials, has been put on the market by the same manufacturer. Called the Comet 54 UL, the compact and economical machine is suitable for both industrial and consumer applications, and features a new heating element which is designed to extend insulation life as much as 500% more than other machines. The 54 UL is simple to operate, with pre-set dials for heating and dwell cycles to eliminate the possibility of operator error. The sealing cycle is controlled by a two-tube electronic timer. The frame of this new machine is constructed of steel, cadmium-plated for protection against corrosion and rust, and is finished in grey wrinkle baked enamel. Its weight is approximately 20 lbs.
Manufacturer: Product Packaging Engineering, 5747 Marilyn Ave., Culver City, Calif.

Tenite polyethylene pipe nipples

Resilience under impact may be had with new Tenite polyethylene pipe nipples that

are finding wide use in lawn sprinkling installations. Using this plastic instead of more rigid materials eliminates the chance of breakage which would occur if a homeowner ran over the pipe nipples with his car or lawnmower. Under the same impact, a nipple made of polyethylene will compress and pull out of the fitting instead of breaking. Since little or no distortion occurs to the nipple, it can easily be threaded back into the pipe. The plastic nipples also resist corrosion, and since they can't rust, they remain clean and open, providing unimpeded flow of water.
Manufacturer: Sloane Manufacturing Co., 12270 Montague St., Pacoima, Calif.

SE-751 silicone rubber

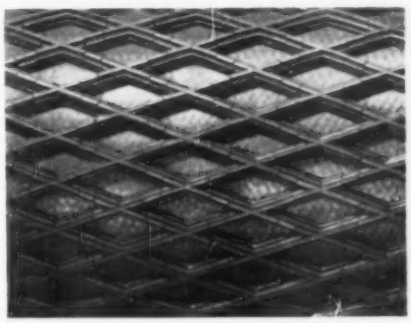
An improved silicone rubber for use in domestic and industrial oven-door seals and in other "hot" applications has been added to the standard product line of the Silicone Products Department of General Electric Co. SE-751 is a low compression set silicone rubber that can withstand intermittent temperatures as high as 600 F. A 50-durometer compound, SE-751 can be made harder by addition of certain fillers. It has excellent processing characteristics for extrusion, has low shrinkage and low water absorption.
Manufacturer: General Electric, Waterford, N. Y.

Outdoor color lamps

A complete line of "projector color" lamps for outdoor use has been announced by General Electric. These outdoor lamps are expected to find wide application for lighting motels, gardens, signs, displays, building facades, fairs, and carnivals, shopping center areas and walkways, and theatre marquees. The six colors are red, yellow, green, blue, blue-white, and pink. The former cast strong deep colors, while the blue-white and pink throw lighter tints. By blending the light from two or more different lamps, a variety of hues can be produced.
Manufacturer: Large Lamp Dept., General Electric, Nela Park, Cleveland, Ohio.

Package belt conveyor

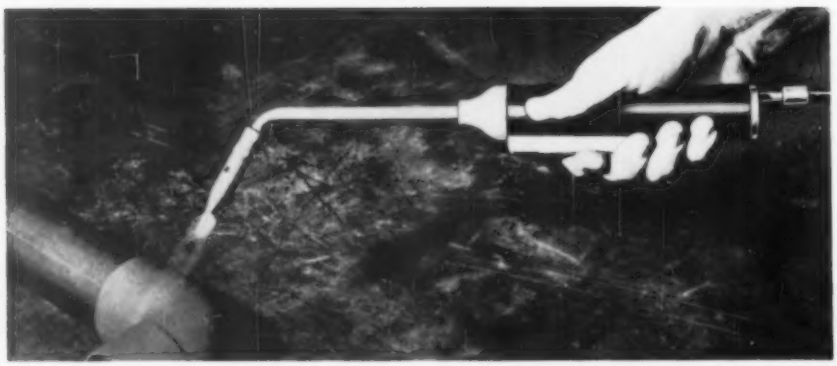
Wedge-Grip, Goodyear's new package belt conveyor, is a belt with three-stage design which gives it gripping power to handle all types of packages, from cans to rough cloth bags, on inclines ranging from 30 to 35 degrees. Certain types of smooth, hard packages can be carried by this new belt on inclines up to 45 degrees. The ribs of the belt are constructed with a "step-down" design, so that a new rib is presented for use as each step in the ribs wears down. The Wedge-Grip belt is constructed of a soft but abrasion-resistant rubber compound, and is being manufactured in square-edge slabs and cut to width up to 60 inches with edges coated black.
Manufacturer: Goodyear Tire & Rubber Co., Akron 16, Ohio.



High impedance microphone

Ronomike, the new Ronette microphone offering a sensitivity of —55.4 db. has performing features that make it especially applicable to tape recorders, public address

systems and ham shacks. A high impedance instrument, the new microphone housed in a slim, fully chrome plated case, requires a high value of load resistance and gives a flat frequency response from 30-10,000 cycles, (which is peak-free when matched to a ½ to 1 megohm input of triod stage). It is equipped with a microphone cable with a minimum of 90% shielding and a fully shielded telephone plug.
Manufacturer: Ronette Acoustical Corp., 135 Front St., New York City, N. Y.



Automatic acetylene torch

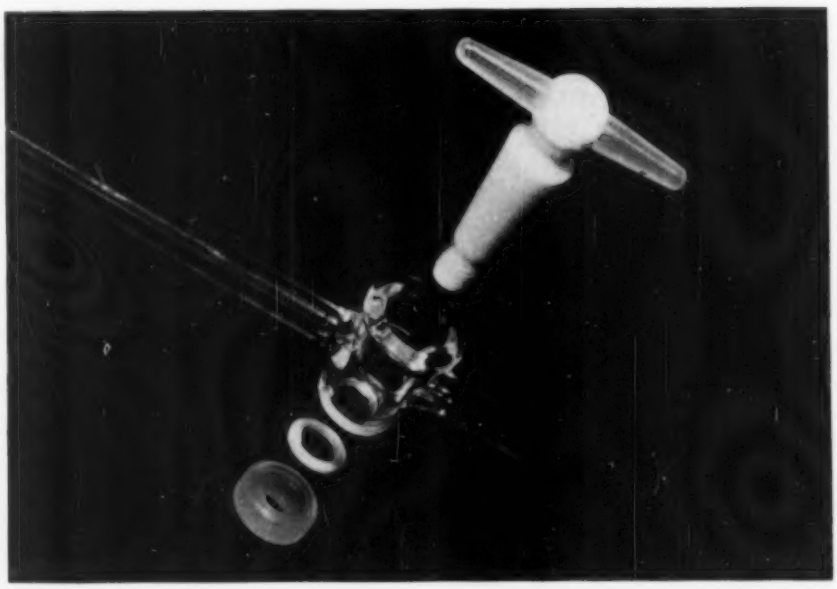
Best applied for heating, soldering, sweating and brazing operations, the new acetylene torch called the Torch-O-Matic lights automatically from battery-powered ignition when the operator presses the control lever and shuts off instantly when not in use. Pressing the lever also opens the torch gas valve and creates an electric spark which ignites the gas. This instant ignition eliminates hazardous manual lighting and adjusting operations. Weight of the Torch-O-Matic is 12 ounces, its flame temperature is approximately 3000° F. Nozzles are interchangeable and tips come in three sizes: small, medium, large. Two small penlite dry-cell batteries, good for hundreds of ignitions, are contained in the torch's plastic handle.
Manufacturer: Velocity Power Tool Company, 201 N. Braddock Ave., Pittsburgh 8, Pa.

Emergency lighting unit

Powered by a built-in storage battery, this portable automatic emergency lighting unit will provide maximum protection and sufficient illumination to carry on operations in case of power failure. The unit is plugged in to any ac outlet and will provide continuous light for ten hours. In the event of a power failure, this emergency lighting unit goes on automatically; there is no need to touch a switch.
Manufacturer: General Scientific Equipment Co., 7516 Limekiln Pike, Philadelphia 50, Pa.

New wrench chain

This new chain, primarily for chain wrenches and vises, can also be used on any application where strength in tension and quick, easy changes in chain wrap are necessary. Extended pins on both sides provide the new chain with a quick, positive locking action. This results in a natural flexibility which permits the chain to hold any shaped material firmly without scratching or marring the surface. The chain dimensions are: pitch ⅝ inches, width over plates .330 inches, and pin diameter .200 inches. Average ultimate strength is 7,400 lbs. Both pins and plates are of hardened alloy steel.
Manufacturer: Morse Chain Co., Ithaca, N. Y.



New stopcock uses Teflon plug

The usual glass plug has been replaced by a precision-machined Teflon plug in the new stopcock Fischer & Porter Co. has put on the market. The self-lubricating quality of Teflon provides "non-freezing" operation and eliminates the use of stopcock grease. Since the plug is held in place by a nut and cannot loosen during use, the new stopcock is well suited for pressure applications and handling of hazardous liquids. The stopcock's barrel and sidearms are fabricated from Pyrex.
Manufacturer: Fischer & Porter Co., 822 Jacksonville Road, Hatboro, Pa.

Heavy-duty hand stapler

Now that stapling is gaining popularity as an industrial fastening method, the Actuated Anvil heavy-duty carton stapler, model SHD, offers a pneumatic construction for hand stapling. The air-driven machine is actuated by hand through a single handle. Secure fastening is assured by these operations: Before driving, the staple is automatically placed into position; as the staple is driven, the actuated anvils pierce the board and move underneath to receive the staple points; the staple is then driven and clinched by the actuated anvils in a single movement. This procedure is the same for double or triple thicknesses of corrugated or solid fibre boards.

The new model SHD Actuated Anvil weighs 7 lbs., has a height of 12", length of 15", and width of 4¾". Its maximum capacity is 100 staples. All wearing surfaces are hard chrome plated, and the chassis is made of stainless steel to eliminate rust when the model SHD staple is used outdoors.

Manufacturer: Container Stapling Corp., P.O. Box 247, Herrin, Ill.

Miniature voltmeters

International Instruments Co. has come out with a new line of miniature ac voltmeters. By eliminating the "wasted" portion of the scale—the lower part—the expanded scale allows for more precise voltage readings at the critical point than is possible with normal scales. The new meters are being produced in a variety of models to meet a wide range of applications. Accuracy on all meters is held to ±5% of the expanded portion of the scale, that is, ±1.5 volts on a 90-120 ac volt scale. Standard ranges are 90-120, 90-130 and 90-140 ac volts. Other ranges with the lowest starting at 80 volts can also be supplied; minimum scale span is 30 volts. Standard scales are linear with black markings on a white scale. It is expected that these new voltmeters will find wide application for accurate monitoring of line voltages in electronic equipment where fluctuations would affect operation.

Manufacturer: International Instruments Inc., P.O. Box 2945, New Haven 15, Conn.

Digital read-out micrometer

The recent trend to replace needle scale readings by direct digital readings—digital ohm and voltmeters are now on the market—has been followed up in micrometer reading with the development of a digital read-out electronic micrometer. The new model HDR Carson-Dice Digital Read-out Electronic Micrometer features a digital read-out counter on the front of the instrument which displays the exact reading in ten-thousandths of an inch. Five divisions between each digit on the unit wheel permits readings to 20 millionths of an inch. With this new direct reading instrument, unskilled operators can make measurements with accuracy and precision. The instrument is 11 in. high, 9 in. deep, 5½ in. wide. Power requirement is 18 watts at 115 volts ac.

Manufacturer: J. W. Dice Company, Englewood, N. J.

"Double-Face" adhesive film

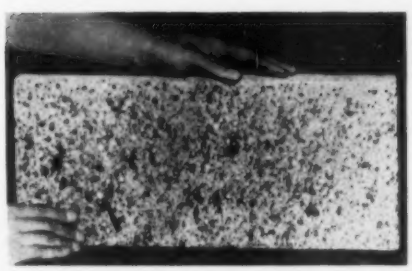
A new adhesive medium known as "Double-Face" promises to open up new possibilities as a substitute for liquid adhesives and mechanical fastenings. A special tissue reinforcement gives "Double-Face" film high strength. Readily adaptable to a large variety of porous and non-porous

materials, the new film conforms with ease to very irregular surfaces. The adhesive film is supported by a double-coated release paper which may be left on for protection or removed at once for instant bonding. This new pressure-sensitive medium can speed production, reduce waste and eliminate need for drying and coating equipment. Available in rolls of widths varying from ⅛" up to 39".

Manufacturer: Angier Adhesives, Division of Interchemical Corp., 120 Potter St., Cambridge 42, Mass.

Cold glazed concrete block

A limited number of block manufacturers have been licensed to use a newly developed cold glazed concrete process for the production of Vitricon-faced concrete blocks and panels. The new block finish produces a depth of color and three-dimensional effect not attainable with ceramic glaze. Water and stainproof as well as washable, Vitricon-faced concrete blocks



will find greatest use in schools, municipal buildings, churches, factories, hotels and institutional buildings. The color range of this new masonry unit is practically limitless.

The Vitricon-faced block is being produced to retail at 30 to 35 cents above the cost of the ordinary unfinished block.

Manufacturer: Vitricon, Inc., 26-02 First Street, Long Island City 2, N. Y.

MANUFACTURERS' LITERATURE

Acrylic Rods, Tubes and Shapes. Ace Plastic Co., 91-30 Van Wyck Expressway, Jamaica 36, N. Y. 4 pp., ill. A description of products of Lucite and Plexiglas.

Aluminum Structures. Harvey Aluminum Company, 19200 S. Western Avenue, Torrance, California. 12 pp., ill. Brochure discusses how aluminum can be utilized for structural applications and outlines design concepts pertaining to aluminum extrusions.

Asbestos-Cement Panels. Keasby & Mattison Co., Ambler, Pa. 4 pp., ill. A bulletin on the variety of uses for fluted and ribbed decorative panels in home construction.

Atomic Power Plants. Alco Products, Inc., Schenectady 5, N. Y. 12 pp., ill. Alco's new bulletin outlines the qualifications of their company to build practical atomic power plants.

Belt Grinders. Engelberg Huller Company, Syracuse, N. Y. 4 pp., ill. Photographs and specifications of one-, two-, four-, and five-head abrasive belt grinders designed for high-volume flat surfacing of ferrous and non-ferrous metals, glass, plastics, ceramics, and other materials.

Color Chart for Aluminum. Kaiser Aluminum & Chemical Corp., 1924 Broadway, Oakland 12, California. A handy chart identifying the Aluminum Association color codes for aluminum rod, bar, and wire alloys. Lists 32 alloys and their respective color codes recently adopted by the Association for use throughout the country.

Curtain Wall System. Kawneer Company, Niles, Michigan. Brochure AIA File No. 17-A by Kawneer Company describes a new exterior curtain wall system using 10 standard modular components for one, two, and three story construction.

Divided Wall. The E. F. Hauserman Company, 6800 Grant Avenue, Cleveland 5. Ohio. 6 pp., ill. Describes how Hausermann Divider Wall can be used to adjust open floor space into semi-private work units. Available color combinations and textures of the interior walls are shown in color swatches.

Fasteners. Vibrex Fastener Corp., Mt. Kisco, N. Y. Information on "Vibrex" fasteners with specific tensile strength, sealing, and anti-vibration characteristics.

Fastenings Production. The H. M. Harper Co., Morton Grove, Ill. 16 pp., ill. A photographic description of the complete process of manufacturing wire, nuts, bolts, screws and many extruded parts from corrosion-resistant, non-ferrous metals and stainless steels.

Glass Fiber Insulations. L. O. F. Glass Fibers Company, 1810 Madison Avenue, Toledo 1, Ohio. 6 pp., ill. New sales aid describing three kinds of flame-blown glass fiber insulations used for thermal and acoustical applications. Charts illustrate acoustical and thermal values.

Hardwood Parts. Holgate Brothers Company, Kane, Pennsylvania. 4 pp., ill. Folder is devoted to specifications and finishes, variety of woods, choice of finishes, type of construction and other data for prospective users of wood parts.

Industrial and Decorative Laminates. Plastics Division, Farley and Loetscher Mfg. Co., Dubuque, Iowa. 8 pp., ill. Descriptions and specifications for paper-base and fabric-base industrial and decorative plastic laminates, including suggestions for post-formed applications.

Injection Molded Thermoplastic Parts. Gries Reproducer Corp., 400 Beechwood Ave., New Rochelle, N. Y. 4 pp., ill Includes a designer's reference check list for plastic moldings.

Labor Costs and Corrugated Boxes. Hinde & Dauch, Sandusky, Ohio. 26 pp., ill. Titled "How to Save Labor Costs with Corrugated Boxes," booklet gives suggestions to help manufacturers with their packaging problems.

Loudspeakers. University Loudspeakers, Inc. 80 South Kensico Ave., White Plains, N. Y. 30 pp., delightful cartoon-style illustrations. A light informative account of kinds of loudspeakers.

Metal Molding Catalogue. John Lees, Division of the Serrick Corporation, Muncie, Indiana. 68 pp., ill. Dimensional and cross-sectional drawings and pictures of typical shapes and forms, fabricated at John Lees by the roll-forming process.

Metal Shapes. The Commercial Shearing and Stamping Company, 1775 Logan Avenue, Youngstown 1, Ohio. 24 pp., ill. Catalogue gives information on die-formed standard metal shapes being used and adapted to perform mechanical functions involving specialized design.

Molded Rubber Parts. Acushnet Process Co., New Bedford, Mass. 32 pp., ill. An extensive account of the production of precision-molded soft rubber products, with specifications on natural and synthetic rubbers and their advantages and disadvantages in various applications.

Molding Compounds. Barrett Division, Allied Chemical & Dye Corporation, 40 Rector Street, New York 6, N. Y. 4 pp., ill. Plaskon thermosetting molding compounds—urea and melamine — and Plaskon polyester resins are described with details on their electrical properties, chemical resistance, and molding advantages.

Phenolic Products Catalog. Chemical Materials Division, General Electric Co., Pittsfield, Mass. 12 pp., ill. Detailed technical data, special properties and suggested uses of phenolics, resins, rubber phenolics and laminating varnishes. Also available is a report on Irrathene (R) irradiated polyethylene, which is said to have unique insulating properties.

Plated Steel Wire. National-Standard Company, Niles, Michigan. 8 pp., ill. Booklet presents specifications and characteristics of Nickelply and Brassply electroplated steel wires.

Precision Instrument and Servo Parts. Pic Design Corp., 477 Atlantic Ave., P. O. Box "C", East Rockaway, L. I., N. Y. 128 pp., ill. A listing of over 4,000 precision instrument and servo parts available from stock.

Rubber Molded Parts. Tyer Rubber Company, Andover, Mass. 8 pp., ill. Tyer's brochure on custom-molded parts covers engineering consultation, compound selection, mold design, and manufacture.

Slotted Angle System. Flexangle Corporation, 278 Park Road, West Hartford 7, Conn. 4 pp., ill. Bulletin describes some applications of Flexangle, a space-saving system which can be used as stock racks, production benches, stock carts, pallet racks, maintenance platforms, etc.

Spring Design. Associated Spring Corporation, Bristol, Conn. 8 pp., ill. Fundamentals of spring design, including basic stress and deflection formulas, materials commonly used for springs, typical applications, and limitations for various types of springs.

Stainless Steel Bar and Wire. Armco Steel Corporation, Middletown, Ohio. 4 pp., ill. Various standard and special grades of stainless steel bar and wire and their applications are described in Armco's new folder.

Teflon Tape. The Connecticut Hard Rubber Co., 407 East Street, New Haven 9, Conn. 4 pp., ill. Describes Temp-R-Tape, a pressure-sensitive Teflon tape, for Class H insulation and non-stick facing. Mentions uses, properties, and prices.

Textolite Surfacing Material. Laminated Products Dept., General Electric Co., Coshocton, Ohio. A colorful brochure on decorative plastic counter and wall surfacings.

Vinyl Fabrics. Vinyl Fabrics Institute, 65 East 55th Street, New York 22, N. Y. 28 pp., ill. Booklet contains decorating suggestions on the use of vinyl fabrics, cleaning and stain removal information, and hints on "do-it-yourself."

Classified Advertisements

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

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Index to Advertisers

FOR YOUR CALENDAR

December 11-January 13. New Hospital Architecture, American Institute of Architects, 1735 New York Ave., NW, Washington 6, DC.

January 1-23. American Jewelry and Related Objects, Indiana State Teachers College, Terre Haute, Indiana.

January 1-30. Fifty Years of Danish Silver, Dallas Museum of Fine Arts, Dallas, Texas.

January 3-24. American Craftsmen Exhibit, The School of Art, Syracuse University, Syracuse, N. Y.

January 7-18. International Home Furnishings Market, Merchandise Mart, Chicago.

January 16-18. Thirteenth Annual National Technical Conference, Society of Plastics Engineers, Inc., Hotel Sheraton-Jefferson, St. Louis, Mo.

January 17-18. Engineers Joint Council General Assembly, Statler Hotel, New York.

January 17-February 10. Contemporary American Glass, The Philadelphia Art Alliance, Philadelphia, Pa.

January 17-February 10. Finnish Crafts, The Montclair Art Museum, Montclair, New Jersey.

January 17-February 10. Recent Work by Harry Bertoia, Indiana University, Bloomington, Indiana.

January 19-27. National Motor Boat Show, New York Coliseum.

January 20-25. New York Home Furnishings Accessories Show, New York Trade Show Building.

January 28-31. Plant Maintenance and Engineering Show, Cleveland, Ohio.

January 28-February 18. Five Management Programs, National Institute of Management, Inc., 1008 National City Bank Bldg., Cleveland 14, Ohio.

January 30-February 2. Mid-Winter Meeting, Engineering Drawing Division, American Society for Engineering Education, Rice Institute, Houston, Texas.

January 31-February 1. Conference: Digital Computing in the Aircraft Industry, New York University College of Engineering, University Heights, New York.

February 4-6. First Annual Home Improvement Products Show, Hotel Statler, New York City.

February 4-8. National Auto Accessories Exposition, New York Coliseum.

February 5-7. New England Production Ingenuity Show, The Hotel Bancroft, Worcester, Mass.

February 5-7. 12th Annual Technical and Management Conference of the Reinforced Plastics Division of The Society of the Plastics Industry, Inc., Edgewater Beach Hotel, Chicago, Ill.

February 5-26. American Jewelry and Related Objects, Art Gallery, Memorial Library, University of Delaware, Newark, Delaware.

February 7-8. American Management Association Conference on Nucleonics in Industry, Hotel Statler, New York.

February 7-28. European Glass Design, Wichita Art Museum, Wichita, Kansas.

February 10-March 3. American Craftsmen Exhibit. College Center, State University Teachers College, Genesee, New York.

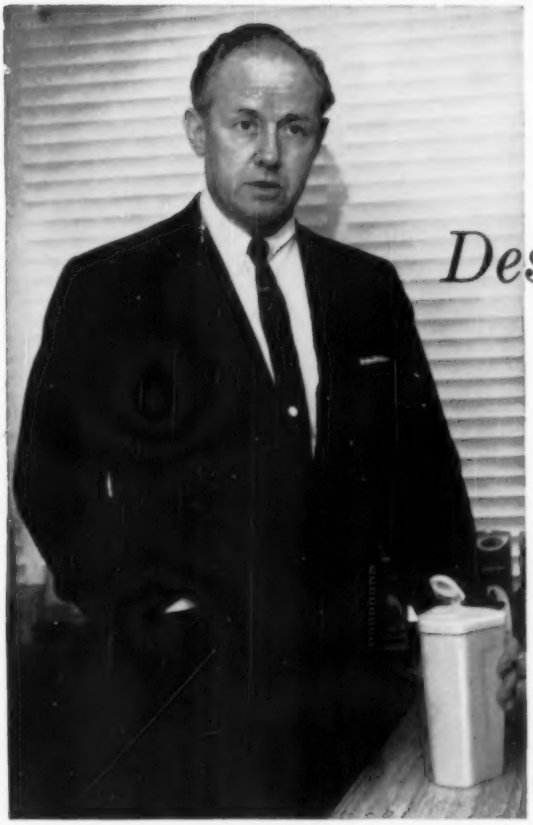
February 15-16. National Meeting of Industrial Designers' Institute, Los Angeles, California.

February 16-24. National Photographic Show, New York Coliseum.

February 19. 13th Annual Quality Control Clinic, Rochester Society for Quality Control, War Memorial, Rochester, New York.

February 24-March 17. Contemporary American Glass Exhibit, Duke University, Durham, North Carolina.

February 25-March 1. Thirteenth International Heating and Air-Conditioning Exposition, Conrad Hilton Hotel, Chicago, Illinois.



Francis Blod, Design Associates, New York City

Mr. Blod discusses the handsome decanter that won 1st Prize, Class II, in the Koppers 1956 Design Competition with associate George Stehl. The prize-winning decanter is being marketed by Hutzler Mfg. Co., Long Island City, N. Y.

Designer Francis Blod talks plastics:

"This container *had* to be made with polyethylene . . . because it offers so much to the user. It has a soft translucency . . . a graciousness that any housewife will appreciate. It does not rattle and it will be less cold to the touch. This container is safe for children . . . possesses lightness, a cover that won't come off and a non-drip spout. Too much cannot be said for the eye-appeal we get from polyethylene-designed items. We use it whenever possible in designing something that is to appeal to women or children.

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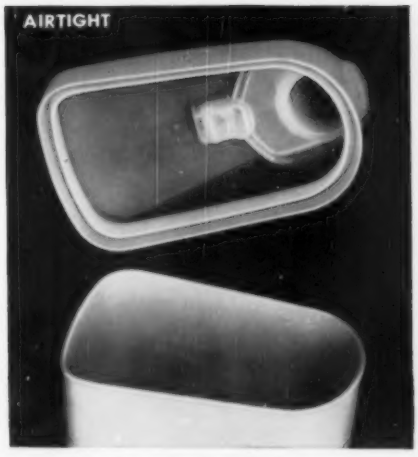

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