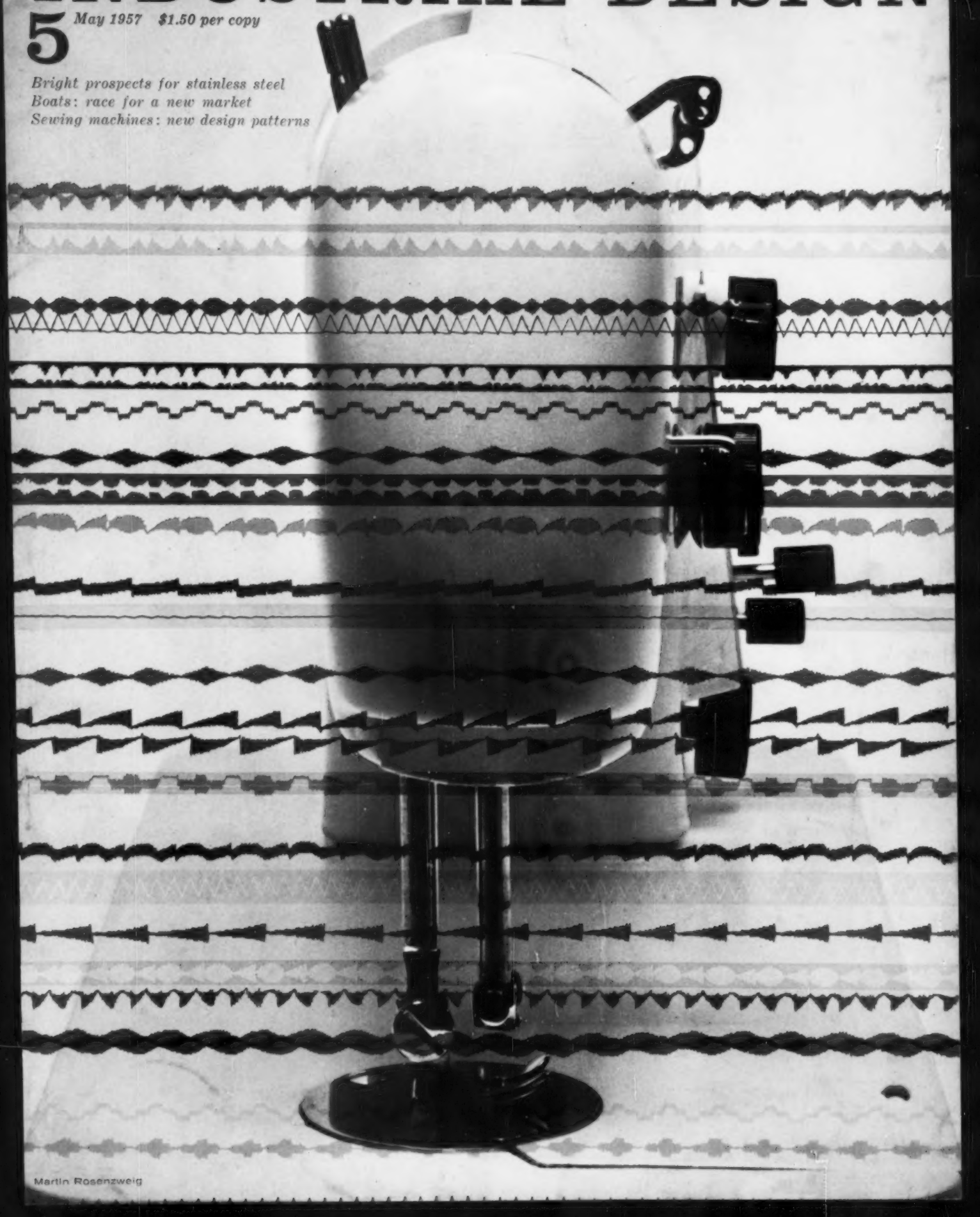
INDUSTRIAL DESIGN

5 *May 1957 $1.50 per copy*

Bright prospects for stainless steel
Boats: race for a new market
Sewing machines: new design patterns



Martin Rosenzweig

CREATING A NEW WORLD WITH ELECTRONICS

How soon can you ship by missile?

In the foreseeable future, cargo-carrying missiles can be expected to fly shipments anywhere in the world hours faster than the fastest jet planes.

The same kind of intensive research that brought about the "thinking" FALCON air-to-air missile developed by Hughes for the Air Force will make such cargo missiles possible. Their safe guidance and control from take-off to landing will be assured by systems which include such electronic advances as Hughes SEMICONDUCTORS.

SEMICONDUCTORS are but one example of Hughes Products leadership in electronics research, development and manufacturing. These and other Hughes electronic advances promise undreamed-of wonders as spectacular as cargo-carrying missiles.

Hughes backs its semiconductors, electron tubes and industrial systems and controls with a long record of technical accomplishment. These include not only the FALCON, but also the self-directing Hughes Automatic Armament Control, standard equipment on all Air Force interceptors.

Your own business can undoubtedly benefit by the application of Hughes electronic products to office and plant problems. A Hughes Products sales engineer will work with your staff on request. Please write: Hughes Products, Los Angeles 45, California.

HUGHES SEMICONDUCTOR

ATTENTION SCIENTISTS AND ENGINEERS—CHECK WITH HUGHES ABOUT CHALLENGING CAREERS IN ELECTRONICS

HUGHES PRODUCTS

Electron Tubes · Semiconductors · Industrial Systems and Controls

MAY, 1957 VOLUME 4, NUMBER 5

INDUSTRIAL DESIGN

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

CONTENTS

COVER: A montage of stitches from the Pfaff automatic zig zag sewing machine embroiders a photo of the Italian Borletti. These machines and others from the U. S. and abroad are studied on pages 36-51.

FRONTISPIECE: A photogram of a stainless steel honeycomb structure made by Solar Aircraft Company shows the cellular construction that reduces weight and increases strength for aircraft applications. Other new developments in stainless and its fabrication are surveyed on pages 86-101.

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LETTERS

Point of view

Sirs:
Your April editorial is right! ID is the most stimulating "trade" magazine in the U. S. because you do project a definite point of view.
John Maass
Philadelphia, Pa.

Confidence and creativity

Sirs:
The thing that struck me most about the article on creativity (Jan. '57) was the extent to which the basic psychological factors that underlie creativity also underlie general competence along other lines. These other lines might be managing or working in groups, etc. I thought you might be interested in a little formula that I have developed which shows the importance of confidence as a factor in making general mental capacity useful. [See below.]

On page 26, you quote Dr. Maslow as saying that confidence is something with which one is born but which becomes depressed through learning to live in a complex culture. It would seem to me that what all of this boils down to is the necessity of getting in tune with our environment so that we are not fighting it and making ourselves tense and apprehensive. If we can do that, then our inborn ability has a full chance to be "creative."

In some of the recent literature in the general field of group dynamics, the words "threat reduction" are frequently used. It is necessary to create a climate in which there is a reduction of threat in order to get people to think freely and creatively.
Theodore A. Jackson
Stevenson, Jordan & Harrison, Inc.
New York, New York

PSYCOLOGICAL FOUNDATIONS FOR GENERAL COMPETENCE by Theodore A. Jackson

$GC = I \times D \times C^2$

	INTELLIGENCE mult. by	DRIVE mult. by	CONFIDENCE mult. by	CONFIDENCE
Definitions	Basic mental power	Physical and mental energy	Basic self trust	Faith in others
	Capacity to learn	Inner NEED to be "on the go"	Confidence and courage to face the future	Attitude of being able to work with and trust others
	Capacity to comprehend complex ideas	Urge to get things done	A secure feeling that one can solve one's problems as they arise	Freedom from basic hostility toward other people
		Desires for action	Freedom from anxiety	
Explanations	Becomes relatively fixed early in life	Individual's drive pattern established fairly early, usually remains about constant	May vary greatly from time to time or from situation to situation Most susceptible to development	Is subject to considerable development

In defense of a whipping boy

Sirs:
You ask the question in the February editorial: is it good sense for our major industry to let the consumer bear responsibility for product and planning?

I believe the public's influence is limited to acceptance or rejection of the Detroit offering and, because the public wants and needs cars, it is up to the designer to make his company's cars the most attractive.

I hope that some of the future symposiums will present *both* sides of the question. I am tired of seeing the automobile industry made the whipping boy of the so-called expert design critics.
Robert M. Emerson
Emerson, Johnson, Mackay
Los Angeles, California

How about policing Detroit?

Sirs:
I have read the editorial "Afterthoughts on the Automobile Symposium" (Feb. '57). The questions put to the automotive industry are certainly well founded and have needed reasonable answers for some time.

In line with the thinking of many authorities who are directly concerned with the effects of automobile design, the solution seems to lie in the establishment of an independent governing body which would set standards for, test and approve automobile design in a manner similar to Underwriters Laboratories' testing and approval of other consumer products. A logical sponsorship would include the industry itself, insurance companies and certain educational institutions and research foundations, with direct guidance by the Society of Automotive Engineers. The existence of this controlling organization would finally demand full and proper use of the capabilities of the industry and of the individual designers.
David O. Chase
Stevens-Chase Design Associates
Syracuse, N. Y.

Design by representation

Sirs:
Your February editorial on the auto symposium was much appreciated for the searching, fundamental questions which it raised.

But whence this notion that the public determines the design of today's products? To anyone in design it must be obvious that many voices and opinions—those of management, a product committee, distributors and sales personnel—shape an automobile (or any product) beyond change, well before the buying public has any chance for direct expression of opinion.

But those who ostensibly speak for public opinion are too likely to hear simply their own voices and interests – whether these be demands for a "competitive product" (aping the look of a competitor) or "more features" (gadgets of questionable utility) or "high style" (some designer's pet whim). Not that these are objectionable, but they tend to crowd out a real concern for consumer needs.
Stephen W. Osborn
(Kelvinator Styling)
American Motors Corp.
Detroit, Michigan

Already ridiculous

Sirs:
Thank you for exercising your criticism on the American Automobile, vintage '57.

I do not think, however, that "some day" the rear cantilevers—you name only this one item—will look ridiculously out of balance. This day is here already.
Eric Stearne
California College of Arts & Crafts
Oakland, California

Errata

Sirs:
Your error in names under the group picture on page 35 of INDUSTRIAL DESIGN for Jan. '57 has been called to my attention. You have me labeled as Q. S. Johnson, who was not a member of this group. I was group discussion leader. Other members of this group were Emile Baros, O. C. Coho, and W. H. Farley.
W. Everett Swift
Foxboro Co.
Foxboro, Mass.

WILSON AIR-FLOAT CEILINGS* / another new application of Homasote

MODERNIZED

...WITH CEILINGS THAT

FLOAT

Whatever the type or condition of the existing ceiling, here is a new construction method to modernize it — economically. Wilson Air-float ceilings are hung from the present beams or from strapping under old plaster — without "leveling up". The ceiling is "continuous dry-wall construction", as low as desired, and with no perceptible joints.

The whole ceiling, of Homasote in big sheets up to 8′ x 14′, literally floats — clear of all walls — free to expand or contract as a unit in either dimension. It easily accommodates and hides pipes, wiring, or air-conditioning equipment.

Wilson Air-float permits ceilings of two or more layers — for indirect lighting and for sound-deadening. Consider it in new designs, for ceilings of any size. Let us send you complete blueprint information and construction data. Kindly address Department E-26.

*Patent applied for

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BOOKS

Requiem for the trolley . . . People, prunes and hidden persuaders . . . The facts behind transistor science

TROLLEY CAR TREASURY *by Frank Rowsome, Jr.; Technical Editor: Stephen D. Maguire, McGraw-Hill Book Company, New York. 200 pages, illustrated.* $5.95.

On Sunday, April 7, 1957, the *New York Times* carried the obituary of another trolley line, New York City's last—and very little was left to trolley lovers but one last ride across the Queensboro Bridge. This book is the sentimental biography of all familiar forms of surface transportation on rails—from the horsecar to the sleek and speedy PCC cars which are still in service. The latter are only postponing, the author believes, the eventual total surrender to the oily-breathed bus."

The trolley's rise and decline, lovingly traced and copiously illustrated in photographs and old engravings, is one of the strangest tales in America's rapid transportation growth. The electric trolley, which scared some citizens of the Nineties into the law courts ("Cars run by lightning invite thunderbolts!"), grew into such a vast network that even a continuous track from Chicago to New York was once envisioned. It is the survivor of many wild and wonderful 19th century inventions: of cars driven by steam, by compressed air, hot water, ammonia gas, naphtha and mechanical legs. Even giant clock springs were proposed, and a sea-going trolley was demonstrated in England. It was hard to distinguish a bold and splendid idea, like Hallidie's cable car, from the crackpots.

Every design, Mr. Rowsome points out, had its drawbacks. The horses that pulled the cars from the 1830's to the '80's died of the "Great Epizootic," a form of influenza. Horsecars, looking like a rail drawn omnibus, had inward curving sides sloping up beyond the wheel heights, though there was no need for such wheel clearance. The horsecars could coexist with the cable cars but not with the electrics, which soon outstripped all others because they were far more profitable. Cable systems had previously been an immediate success, although they cost about $200,000 a mile to install. Some are still preserved in San Francisco, but the fanciest cable car lines are long extinct, having been replaced from the mid-Nineties on by electrics.

The electrics promised to be faster and cheaper, once a satisfactory method to generate current and transmit it to the motor of a car was found. It was the bright idea of Leo Daft to dangle a dolly on wires, a dolly that would skate along to maintain electrical connection as a *troller* that gave the "trolley" its name. Others, including the electrical expert Frank Sprague, made important contributions to the standard streetcar design. In spite of yellow flashes, blown fuses, shocked horses and frantic firemen, the trolley reached a golden age in 1902, carrying 5.8 billion riders that year.

From that point, Mr. Rowsome goes on to tell of the trolley's demise and transformation into scrap, museum pieces and roadside diners. "The streetcar industry," he notes, "born of Sprague's brilliant ideas, has repeatedly found solace in the dream that all its difficulties might be dispelled by some wonderful new design." But the book does not cover any of the monorail designs which have currently revived hopes in rail transportation. It closes, sadly and sentimentally, appealing to the nostalgia of an older generation who remember Sunday afternoon trolley rides to the tune of the calliope, the Sousaphone and the drum. For popular consumption, Messers Rowsome and Maguire have documented with pathos a design that fought against impossible odds.—*s. b.*

THE HIDDEN PERSUADERS *by Vance Packard. David McKay and Co., Inc., New York. 266 pages, index.* $4.00.

This, we predict, will be a much-quoted book. The author, a former Collier's editor, planned it that way: he has chosen an explosive subject, and with determined irony has set out to expose it to public view. The subject is MR — motivation research — a persuasive tool being used to make masses of Americans buy something, behave somehow, vote for someone. What bothers Mr. Packard is that MR, employing the insights of modern psychiatry and the methods of modern research, dredges up facts about the deepest workings of the human psyche — and then uses them to steer its unsuspecting subjects up commercial alleys and down political lanes.

After introducing the principals of the field — "depth probers" Ernst Dichter, Louis Cheskin, James Vicary *et al* — he poses the problem that sparked this new science: people are just plain irrational. Time and again, reasonable assumptions about how they will behave turn out to be totally unreliable. Men *say* they want less costly and more maneuverable cars, but turn out in droves to buy big fat ones. Women test detergents in different colored boxes, whose contents happen to be identical, and earnestly report that the soap in the blue box harms their clothes and the one in the yellow-and-blue box is mild.

In their consternation, advertising men and merchandisers have turned to the depth probers who, instead of taking data at face value, use disguised tests to un-

A Daft car of 1887 *with "troller," in East Orange, N. J.*

A cartoonist's view of the New York rush hour in 1889

KEY to a revolution in electrical design– Reynolds Aluminum strip conductors

Aluminum Strip Conductor becomes its own insulation through anodizing—a process by which the non-conductive film of aluminum oxide, natural to aluminum, is deepened. This revolutionary conductor and its companion product, Reynolds Interleaved Strip Conductor, used with a very thin layer of insulation between windings, make many more aluminum advantages available to electrical design. Both conductors are now available as a result of Reynolds pioneering research.

Space and weight are saved in coils and transformers—and there's up to 50% savings in conductor material costs. Aluminum Strip Conductors provide added conductive area without increasing the space now required with copper wire. Space formerly taken up by insulation and voids in round wire windings is eliminated.

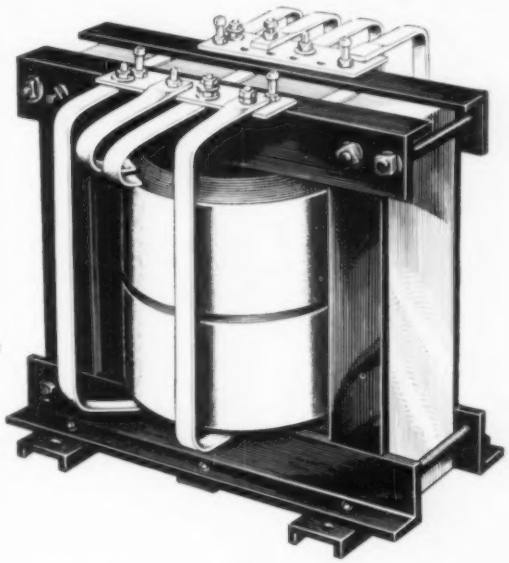
Heat dissipation is greatly improved because each coil winding is externally exposed and because of aluminum's high rate of heat transfer. Hot spots are eliminated, cooling ducts usually not needed. Electrical performance is increased because of lower average operating temperatures.

For all aluminum applications, advantages like this are available through Reynolds Design and Engineering Services. You can gain most from the strength, light weight and versatility of aluminum by asking these men to work with you on design problems. For their assistance call the Reynolds Office listed under "Aluminum" in your classified phone directory. Or write *Reynolds Metals Company, P.O. Box 1800-HK, Louisville 1, Kentucky.*

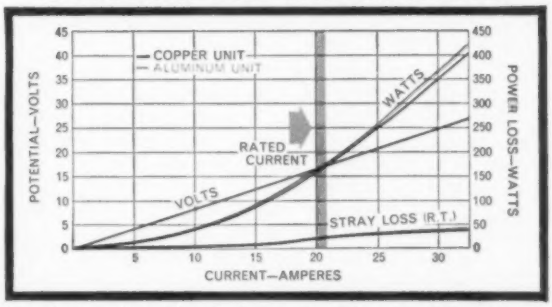
The Finest Products Made with Aluminum are made with REYNOLDS ALUMINUM

See "CIRCUS BOY", Reynolds exciting dramatic series, Sundays, NBC-TV

VISIT THE REYNOLDS ALUMINUM EXHIBIT at the Design Engineering Show New York Coliseum—May 20-23



CONDUCTOR LOSS AND IMPEDANCE



Graph shows how electrical characteristics of a 10 kva copper wire wound transformer are virtually duplicated by a transformer with Reynolds Aluminum Strip Conductor wound in exactly the same physical space as conventional copper coils.

WEIGHT AND COST

COILS:	SQUARE COPPER DOUBLE GLASS INSULATION	ALUMINUM ANODIZED FILM INSULATION
CONDUCTOR SIZE		
PRIMARY	1—#6 GA	1—.008x3⅛
SECONDARY	2—#6 GA	2—.008x3⅛
TURNS:		
PRIMARY	2 COILS—84 TURNS	2 COILS—84 TURNS
SECONDARY	2 COILS—42 TURNS	2 COILS—42 TURNS
COIL WEIGHT	41 lbs	20 lbs
PRICE $/lb	$0.77	.....
CONDUCTOR COST, $	$31.57	APPROX. 50%
CORE (SHELL TYPE) WEIGHT	132 lbs	132 lbs
CROSS-SECTIONAL AREA		
CENTER SECTION	14.625 in.²	14.625 in.²
YOKE	20 in.²	20 in.²

Here is a comparison of 10 kva—480/240—240/120 transformers of conventional copper design and with Reynolds Aluminum Strip Conductor in exactly the same physical space. Note that aluminum strip design saves approximately half the conductor cost and weight.

People, prunes and hidden persuaders (continued) . . . Transistor science

cover such things as why Arthur Godfrey is popular (since there is no mother in the Godfrey family, the housewife's fantasy permits her to project herself into the role), why owners of certain cars buy specific brands of gasoline (each brand has a personality that helps "play back" to the consumer who he really is), and how people feel about prunes (they connote old maids, constipation, boarding houses.)

Armed with such reports, merchandisers have built a new "science" of selling. One game is selling the self-image: they build into a product or ad a personality that comfortably rounds out the consumer's picture of himself. Another is to play up to secret hostilities and guilt feelings: for instance, eating candy makes people feel guilty, so cough drops — a permissible kind of sweet — have been made to boom by a gentle promotion of their tastiness. And of course, there are always sex and symbolic overtones: Dr. Dichter found that men associated a convertible car with a mistress, and tended to buy a sedan because it is like a secure, practical wife — so the hardtop was developed as the perfect compromise.

One of the reasons business is turning to the depth probers, Mr. Packard suggests, is that products are becoming more and more identical: thus to put over on the public the immense quantities of goods that industry must somehow unload, they must catch us with our resistances down and lure us to spend money for things we don't really need.

In a final section on the use of MR to persuade us as citizens, he portrays even more sarcastically the commercialization of the 1956 presidential campaign by ad agencies, when speeches were abandoned for spot TV commercials, "father images" were built up for leading candidates, and politicians were taught to look "sincerely" at the TV camera.

So far so bad — for all of us. The author paints a convincing picture of creeping consumership in the U.S.A. He makes it sound as if any political sow's ear can be turned into a silk purse by Madison Avenue witchcraft, as if before long every brainwashed consumer will be a walking receiving station for signals to "Buy!" This should give us pause: the miracles of mass communication often seem to be in league with the promoters of foolishness; it *is* possible to fool more and more of the people — simply because there is less and less time between communiques for the democratic check system to function.

In raising this hue and cry, Mr. Packard's stated aim is to build a stronger sense of responsibility in the users of MR, and encourage the public to exercise a little more scrutiny. But what he really wants to say seems to come out at the end: is it moral to "give the public what it wants" when this often turns out to be unsavory or ethically distressing (to some)? Is it moral to exploit our sexual impulses for commercial purposes, to raise money for charitable affairs by playing up our secret desires for self-enhancement, or promote politicians by likening them to fathers?

Since he is more interested in a rousing polemic than in an essay on human thought, he by-passes the implications of the really ultimate questions he raises. A little more discussion might have revealed that these are not simple moral issues at all, but complex human problems:

How much Soap do we need?

First of all, is there anything new in the discovery that people need large doses of subjective satisfaction — or in the fact that this need is prone to be exploited? Who in the history of business — or theater, art, politics—ever succeeded without penetrating people's inner realm, however haphazardly or intuitively? For that matter, who *could* manage to side-step the personal and public psyche, even if he thought it morally desirable? Symbols, associations and ego projections are the basic fabric of human beings, operating relentlessly beneath every vote, every purchase, every enthusiasm, every viewpoint. What is lamentable, perhaps, is that a large number of influential citizens are only now discovering "scientifically" what they might have known all along, humanly.

Now there is no denying that Americans today are living out their lives, and their needs, through material symbols: the fins and portholes serve a deep-seated purpose in leading consumers into new social realms — imagined or real. But the author reserves not one word of comment for the irrational consumer, and the ambitions and insecurities that drive him into the arms of businessmen. Is the condition the fault of merchandisers? Or are the merchandisers, rather, a symptom that people themselves might do well to examine?

Then too, who among us is equipped to decide which needs are "good" enough to appeal to and which ones are unacceptable for commercial purposes? Who can decide for us how much money we "should" save, and how many cans of beer or boxes of soap we really "need?"

In the long run, is there no hope that public discretion can outfox the manipulators? Though ad men may have discovered that voters place their confidence in a candidate with "father-image" appeal, it seems likely that Abe Lincoln, without benefit of press agents, gave the voters the same kind of confidence. It also seems likely that they voted for him on a number of other counts too. Perhaps when products offer little real choice on the basis of superiority — as tends to be the case both in the voting booth and the supermarket — a little image-building goes a long way. But the public has often demonstrated its response to men and products that stand out by their innate greatness.

From all this the designer might draw a conclusion: the very fact that depth-probing is needed to merchandise "indistinguishable" goods suggests that a designer may build into a product — in quality and innate greatness — an appeal that no amount of calculated image-building can achieve.

The author performs a service by cautioning the buyer to beware. But — beware of whom? Self-defense comes not from defensiveness but from self-understanding. People can outwit would-be manipulators not by denying their right to psychological knowledge, but by knowing themselves, knowing why they allow themselves to be manipulated.

Quite inadvertently, Mr. Packard has brought *some* fascinating, amusing and perhaps alarming truths to view: not what the ad men are telling the public, but what the depth-probers are finding out about people. To our view, those who seek to defend the great unwary public might do better with more fact and less moralizing. —*j. f. m.*

The facts behind transistor science

HANDBOOK OF SEMICONDUCTOR ELECTRONICS; *A Practical Manual Covering the Physics, Technology, and Circuit Applications of Transistors, Diodes, and Photocells. Edited by Lloyd P. Hunter. McGraw-Hill Book Company, Inc., New York*, 1956.

In 1948, Bell Telephone introduced a new device that shook the electronics industry. The transistor was an innovation along totally unexpected lines, and it opened up new areas of industrial development to the extent that the manufacture of the transistor and its related products has become a multi-million dollar enterprise in less than a decade. Products related to the transistor are all those components that amplify electric current (in solid state conduction) by means of a semiconductor material.

A semiconductor is a material that has properties between that of a conductor, like copper, and an insulator, like glass. The materials used in semiconductor devices—diodes, transistors, and photocells—are germanium and silicon.

Since the time when electronics was concerned exclusively with conductors as its current-conducting medium, a new engineering science which deals with the application of semiconductors to electronics has emerged and is rapidly developing. This *Handbook Of Semiconductor Electronics* attests to the fact. It is a reference book for the semiconductor electronics engineer, and it treats its subject in a scientific manner that offers only little clarification to the layman. Compiled by thirteen specialists in the field, it gives an authoritative coverage of the various sub-categories, but full comprehension depends on a substantial knowledge of physics and electronics.—*a. g.*

WHAT CAN YOUR IMAGINATION DO

with a material as versatile as this

- Strong and durable in thin sections.
- Light weight (one-half the weight of aluminum).
- Easily formed, punched, sheared, corrugated and cold embossed.
- Resists hard blows and abrasion—cannot rust or corrode.
- Bonds well with many adhesives—can be riveted, stapled, stitched.
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- Can be colored in manufacture in production quantities.
- Chemically inert, has no odor and absorbs no odor.
- Combines its desirable properties with those of metallic and non-metallic materials.
- Has low thermal conductivity and good dielectric strength.
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The virtues of National Vulcanized Fibre don't end here. They may be the first step toward the solution of your current design problem.

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Write today for technical data and a personal set of samples of this unique material. A brief note on your letterhead will bring them without delay. Address Dept. D-5

See National at the DESIGN ENGINEERING SHOW
New York—May 20-23, Booth No. 837

Designing with BAKELITE Plastics
BRAND

- *Durability plus quality appearance*
- *Precise small parts that resist chemicals*
- *New trick with a coating*

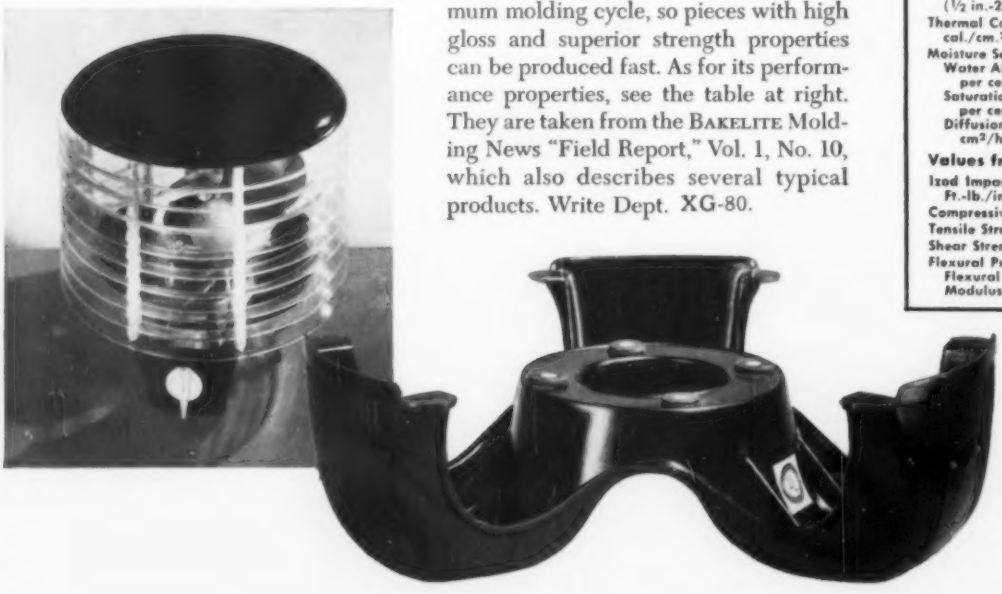
Here are three materials whose properties can help you solve design problems. One is a general-purpose phenolic plastic notable for its strength and appearance. Another is C-11, a tough plastic that resists staining. The third is an abrasion-resistant vinyl organosol, a coating with eye-appeal to match its proven durability. These are just a sample. The hundreds of BAKELITE Brand Plastics provide a tremendous range of properties to improve design, effect production economies. Remember: Bakelite Company offers larger resources, longer experience, and a greater variety and number of plastics—vinyls, epoxies, polyesters, phenolics, polyethylenes, styrenes, silicones and impact styrenes.

1 Designed for strength and beauty— with phenolic plastic above and below

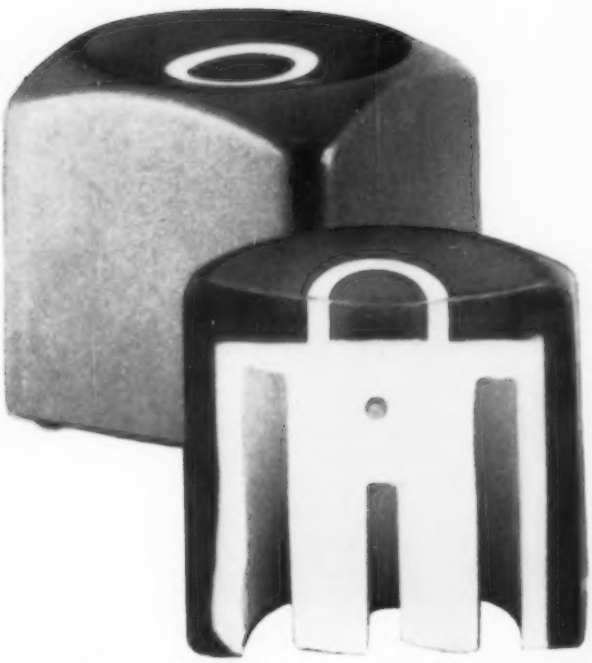
Where the treatment is roughest—on the cover and base—the manufacturer of this electric hassock fan uses parts molded of BAKELITE Brand Phenolic Plastic BMG-5000. This material keeps its fine surface finish and rich color. It provides cleanly-molded details that point up the fan's quality construction, and aid in fast, faultless assembly. And, as a sales point, the manufacturer emphasizes that the cover and base of the fan will resist food acids, beverages, soaps, and detergents. BMG-5000 offers your plastics molder the best combination of molding and end-use properties. It requires a minimum molding cycle, so pieces with high gloss and superior strength properties can be produced fast. As for its performance properties, see the table at right. They are taken from the BAKELITE Molding News "Field Report," Vol. 1, No. 10, which also describes several typical products. Write Dept. XG-80.

BMG-5000
Typical Test Values

Values from Electrical Tests			
Dielectric Strength (D149-44) Short time, volts/mil	370		
Volume Resistivity (D257-54T) megohm-cm.	10^6		
	60 c.	1 kc.	1 mc.
Dielectric Constant (D150-54)	5.7	5.3	4.6
Dissipation Factor (D150-54)	0.07	0.04	0.03
Values from Miscellaneous Tests			
Molded Specific Gravity (D392-38) Black 25			1.34
Brown 15			1.36
Heat Distortion Temp. (648-45T), deg. F. (½ in.-264 psi)			330
Thermal Conductivity cal./cm.²/sec./deg.C/cm.			5×10^{-4}
Moisture Sensitivity: Water Absorption (D570-54T) per cent wt. gain			.45
Saturation Constant (WC-78-8-2), per cent			8.0
Diffusion Constant (WC-78-E), $cm^2/hr.$			1.3×10^{-3}
Values from Mechanical Tests			
Izod Impact Strength (D256-54T) Ft.-lb./in. of notch			0.30
Compressive Strength (D695-54T), psi			34,000
Tensile Strength (D651-48) (⅛"), psi			8,400
Shear Strength (D732-46) (⅛"), psi			13,000
Flexural Properties (D790-49T): Flexural Strength, psi			10,000
Modulus of Elasticity in Flexure, psi			1×10^6



This "Air Flight" circulator has both cover and base molded of BAKELITE Phenolic Plastic BMG-5000. Note particularly the elaborate one-piece molded construction of the base.



"Two-shot" molded typewriter key—the outer shell is molded first, while the letter and the key lever slot are molded in the second shot to complete the button.

The leather-like textured finish gives the "Soundscriber 200" a high-quality look. And since the machine is portable, it is imperative that the finish be tough and abrasion-resistant—as soundly engineered as the machine itself.

2 "Two-shot" molded parts of C-11 Plastic—Highly Accurate, Tough, Chemical-Resistant

The key buttons above are typical of the small parts molded of BAKELITE Brand C-11 Plastics for IBM electric typewriters and accounting machines. The choice of C-11 was based on its resistance to staining by inks, carbon paper, oil, and cleaning fluid, together with toughness, accuracy in molding, and smooth, comfortable finish. It can be made clear or colored . . . and is a plastic that can be used in many home products, packaging, and mechanical parts. Several other applications and properties of C-11 are discussed in BAKELITE Molding News Vol. 1, No. 4. Write Dept. XH-80.

3 "Leather-textured" Vinyl Finish Designed to take hard knocks

The exterior finish of the "Soundscriber 200" portable dictating machine is a specially formulated organosol coating based on BAKELITE Brand Vinyl Resins—able to take the knocks of travel and still look attractive. The leather-like textured finish gives the "200" a high-quality look. And since the machine is portable, it is imperative that the finish be tough and abrasion-resistant—as soundly engineered as the machine itself. Colors are virtually unlimited with organosols based on BAKELITE Vinyl Resins. Write Dept. XK-80 for "Industrial Applications for Vinyl Resin Finishes."

See Bakelite Company exhibit
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NEWS

U.S.A. Triennale committee: (left to right) Frank Jacoby, Sally Swing, Peter Muller-Munk, Jay Doblin, Walter Dorwin Teague, Paul McCobb, Jack Masey, Jane Fiske Mitarachi, Robert Gruen, Jacqueline Griffith.

U.S.A. enters Triennale international exhibition

For the first time in the history of Italy's well-known "Triennale" exhibitions of art, architecture and design, held every three years in Milan, the United States has appropriated money for a special American exhibit. The United States Information Agency has made a grant of $25,000 to the American Society of Industrial Designers for the preparation of an exhibit of American industrial design, inside a geodesic dome at the Eleventh Triennale, opening in Milan on July 28th. Mr. Walter Dorwin Teague has been invited to act as chairman of an exhibition committee.

Mr. Teague's chairmanship is an expression of his role in activating the U.S. participation. After the failure of attempts by several groups to stimulate the government's interest in participating, Mr. Teague made a personal visit to Washington and convinced USIA officials of the importance of having this country officially present to show its works alongside regular exhibitors like France, England, West Germany and the Scandinavian countries. (The U.S.A. is the only major western nation not represented in the last Triennale. See Editorial.)

Because of time, budget and space limitations, it was necessary that industrial products alone—rather than a wider selection of craft and decorative products—be the subject of this exhibition, and that the field be limited to a single design area. Immediately after the appropriation was made, Mr. Teague appointed an advisory committee to formulate the specific direction the exhibit should take. The committee, consisting of Peter Muller-Munk, Paul McCobb, Jay Doblin and Frank Jacoby of ASID, Robert Gruen, past president of IDI, Jane Fiske Mitarachi, editor of INDUSTRIAL DESIGN, and Jack Masey of USIA, selected "Communications at Home and at Work" as the theme around which products would be selected. They will be displayed in an aluminum and plastic Buckminster Fuller dome which is 84 feet in diameter and provides 4,500 square feet of exhibition area.

Final decisions about the inclusion of material will be made by Messers Teague, Doblin, Muller-Munk and Gruen. Mr. McCobb will design the installation.

Aspen plans develop

Focusing on the designer's ultimate client —the individual consumer—and the underlying values that prompt him to live as he does, buy what he does, and respond as he does to design in his physical environment, the 7th International Design Conference will convene in Aspen, Colorado June 23-9.

With "Design and Changing Values" as the central topic, this year's conference will bring to bear on design problems the experience of a number of practitioners and theorists in fields related to human behavior—sociology, anthropology and psychology—in an effort to probe authoritatively into the society with which every designer must be concerned. According to conference chairman Saul Bass, the conference will consist of three "cycles" of discussion.

Cycle I (moderated by James Marston Fitch, Professor of Architecture, Columbia University) will delve into "The Shaping of Values." Social historian John Kouwenhoven (author of *Made in America*) will deliver the keynote address, referring to the way developing American taste patterns have expressed themselves through technology and culture. He will be complemented by Conrad Arensberg, chairman of Columbia's Anthropology Department and Dr. J. Bronowski, mathematician and literary critic.

Cycle II on "Values in Action" (moderated by Jane Fiske Mitarachi, Editor, INDUSTRIAL DESIGN), will deal with value problems in the design of products and in the physical environment: how people express their feelings and aspirations in the physical world they buy and build for themselves, and what effect the designer's work has on their way of life and the nation's social pattern. Panelists will include designer Richard Latham of Latham-Tyler-Jensen; Edward Bacon, Executive Director of the Philadelphia Planning Commission; Ernesto Rogers, architect and editor of the Italian publication *Casabella;* Robert Anshen of Anshen and Allen, architects, who have designed numerous housing developments; and Lewis Clarke, landscape architect and educator.

The final cycle, on the "Transmission of Values" (moderated by James Read), will concentrate on the role of mass media—radio, TV and advertising—in the formation and change of the American public's design values. Panelists will include Dr. Michael Helfgott, Director of Research at Ogilvie, Benson and Mather; Bruce MacKenzie, editor of IBM's *Journal of Research and Development;* and Dr. Richard Meier of the University of Michigan.

Arrangements for attending the week-long conference may be made through George Culler, 22 East Illinois, Chicago.

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PLASTICS NEWSFRONT

SOCKETS TO MATCH YOUR '57 CHRISTMAS TREE

A more colorful Christmas—1957 is in the making today. To match the trend to Christmas trees sprayed in a host of colors, Conart Co., Inc., is now molding light socket husks in a variety of colored BEETLE® Molding Compounds to be strung on matching wire strands. Sturdy, hard BEETLE is an excellent insulator, and its molded-in color resists heat and discoloration, can't chip off. Conart produces enough husks each month to stretch twice from coast to coast.

LAMINAC® SIGNS WARN OF "OPERATION ELECTROCUTION"

These LAMINAC signs point to a great experiment in sea lamprey control being conducted by U.S. Fish and Wildlife Service in the Great Lakes area. To kill these destructive eellike fish, electrically charged lines are stretched across areas where lampreys return from spawning. Passers-by are warned off by signs posted on land and in the water. To make them waterproof, with warnings that can't wash off, Perry Plastics, Inc., makes the signs of glass-reinforced LAMINAC Polyester Resin. Color is molded in, so signs never need painting and will never rot or rust away.

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MATERIALS FOR TOMORROW

ALCO's army package power reactor

On April 29, a dedication ceremony at Ft. Belvoir, Va., marked the first installation of a nuclear power plant for the power supply of an Army base. As a result of bid invitations to private industry for the construction of nuclear power plants, the Army and the Atomic Energy Commission awarded the contract to the American Locomotive Company in Dec. 1954 (now called ALCO Products, Inc.).

The Ft. Belvoir plant is the first prototype of a family of nuclear power plants under development by the Atomic Energy Commission and the Department of Defense for use by the three military services. To utilize the new heat source for military advantages, a system was developed which allows nuclear plant components to be transported by air and makes it possible to erect plants at remote field sites within a six-month construction period. Because of these features this type of reactor has been called the Army Package Power Reactor.

To fulfill a wide variety of requirements with a "tailor made" reactor, ALCO built a "criticality facility" near its plant in Schenectady, N. Y.—a laboratory-like installation where the heart of the nuclear plant — the reactor core — is assembled, trimmed and tested until the characteristics necessary for full power operation have been obtained. This means precise determination of the fuel elements (fuel rods and control-rod assemblies) including their dimensions and placement.

Nuclear theory is not yet sufficiently backed up by practice to permit nuclear plants to be constructed and immediately operated on the basis of advance calculations, as is possible for conventional power plants. Atomic reactor design must still be determined empirically, and correct operation must be insured beyond doubt before the reactor is installed in a plant and operated full power. At the criticality faciilty the reactor is operated at a very low power level; since the behavior of a reactor varies in proportion with the power level, it is possible to determine its full operation exactly within a low and safe operating level. Once the reactor design is verified it is then transferred from the criticality facility to the field installation, the actual power plant.

"Portable" reactor at Ft. Belvoir, Va.

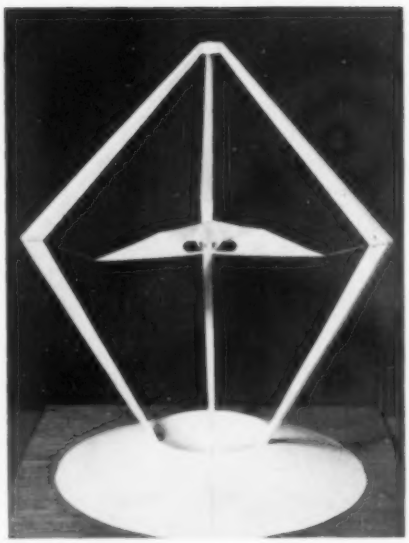
The major military advantage of this power reactor package is that it eliminates all but a small fraction of the effort required to transport and store bulky conventional fuel. The Ft. Belvoir plant is designed to operate at full power of 2,035 kilowatts for a year and a half on a single charge of nuclear fuel (uranium-dioxide in this case), which is smaller than a barrel and weighs only a few hundred pounds. Over the same period a comparable conventional plant would consume some 60,000 barrels of fuel oil, equivalent to the capacity of a medium-sized tanker. The cost of a nuclear plant does exceed that of the conventional plant, but transportation savings, even in peacetime, are expected to counter-balance the greater capital investment, so that the nuclear plant will pay for itself in a few years.

Another military consequence is that, by reducing the load, military operations are made less dependent on long lines of supply. Mobile sources of more electrical power than has thus far been available will considerably affect future planning where a high degree of mobility is desired. The Army feels that the use of small portable reactors could make feasible certain operations that might not otherwise be practical.

The new reactor at Ft. Belvoir can produce sufficient power to supply the needs of a community of 2,000. In addition to opening a new chapter in the military application of nuclear energy, the new power package helps lay the foundation for future civilian uses in areas where conventional fuel is a supply problem. ALCO has already designed a 10,000 kw nuclear-power station, based on the Ft. Belvoir package power reactor, which can supply a community of 10,000 people.

IDI hears cracks on picture windows

The New York chapter of the Industrial Designers Institute heard John Keats, author of "The Crack in the Picture Window," denounce mass-produced housing on April 9th. Describing the monotony of the houses — and people's lives in them — as blighting the landscapes and souls of America's suburbs, Mr. Keats included industrial designers in his indictment for creating standardized goods and furniture.



New British industrial design course

The Royal College of Art in South Kensington, England, has instituted a four-year course in industrial design which is one of the first comprehensive industrial design programs in that country. Although each of the subjects offered is available in at least one other British art college or technical school, the Royal College claims that no English school has assembled them into one program which includes mathematics, ergonomics (the study of relations between man and his working environment), and other theory courses, as well as practical workshop and design training.

As part of the first entrance examination, candidates made constructions of plasticine and wire, illustrating their choice of an abstract concept, and structures of paper and card illustrating the mechanical qualities of these materials. One of the entrance projects is pictured above, a stabile by G. P. Burden, St. Peter's School, York.

Student architectural exhibit

The first international exhibit of student work collected by the National Institute for Architectural Education opened at the Carnegie Endowment for International Peace, New York, last month. It included drawings and pictures of 240 architectural projects of students from fifteen countries. Over 30 universities were represented, including entries from three Eastern Europe countries: Czechoslovakia, Rumania and Yugoslavia. The American contribution was the Lloyd Warren Fellowship prize winning airport by Robert J. Burns, Jr. of North Carolina State College.

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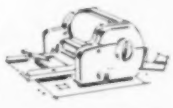

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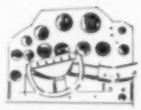

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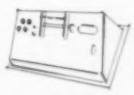

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World Trade Fair comes to New York

The first U. S. World Trade Fair at the New York Coliseum April 14-27 proved such a major commercial and popular success that plans have already been made to repeat it at the Coliseum next year.

The idea of the fair, which totalled a sales volume of more than $1,000,000,000 and was attended by more than half a million visitors, was originally suggested by the city's Department of Commerce and Public Events. Its intention was to boost foreign trade and increase international contact to advance the city's position as a commercial and cultural center. Unlike international trade fairs sponsored by the Federal government, the Fair was privately financed and managed. It was planned by the Charles L. Snitow Organization, and assisted by U. S. and New York State government agencies.

President Eisenhower invited 71 nations of all continents to exhibit at the fair and 59 countries responded, among them two from behind the Iron Curtain—Poland and Czechoslovakia.

Sixty classifications of products were displayed in 3,000 exhibits which offered a diverse selection: the British crown jewels in exact replica, Mexican silver, Turkish fashions, Japan's (and reputedly the world's) most powerful electronic microscope, Venezuelan pearls and emeralds, French and Italian cars, Indian silks and folk crafts. Many booths, particularly those of Japan, were distinctively and consistently national in decor and wares. Most arresting among the Italian exhibits was the booth (above) of La Rinascente, Italy's retail distributing group, which exhibited the prize winning products of its Golden Compass competition of 1956 (ID, Feb. 1957).

In addition to the commercial exhibits, 42 countries set up national booths which advertised tourist vacation facilities and included educational, entertainment and cultural exhibits.

Brussels Fair display commissioned

The Paris exhibit-planning firm of Peter G. Harnden (below, right) has been appointed to design the American exhibits at the Brussels World's Fair in 1958. Howard S. Cullman, U. S. Commissioner-General to the Fair, announced the appointment. The Harnden firm has served as designer-producers of U. S. exhibits in 35 national and international fairs in thirteen countries, most of them European. Bernard Rudofsky (below, left) New York architect, will be associated with the Harnden firm. The problem posed for the project is to design and dramatize the American exhibit, in a doughnut-shaped building by Edward Stone (ID March, page 16) within the framework of the Fair's general theme, "A New Humanism: an era of man's greater understanding of his world and his opportunities for a fuller life." The designers' full plans for the exhibit will appear in ID in September.

Rudofsky and Harnden draw up plans

Free-form design is child's play

Fantastic Village is part of a free-wheeling playground at Public School 130, 156th St. and Prospect Ave. in the Bronx, dotted with indestructible concrete structures that change from plane to fort to mountaintop—depending on how the child looks at them. The "village" is designed to keep pace with the imaginations of its 450 young citizens, aged five to eight. "I didn't know what to do at first," said one teacher. "I couldn't supervise the children's play, because I wasn't sure how or what they were supposed to play. But *they* knew and they taught me."

Fantastic Village, which was awarded a first prize in a national Play Sculpture Design Competition sponsored by the Museum of Modern Art and Parents Magazine, is a group of five Pueblo-like forms, constructed of pre-fabricated, reinforced concrete slabs. The parts can be assembled in a variety of ways with ladders and pipes to aid the children in crawling, jumping or running over, through or under the forms. Tunnel Maze and Serpentine Wall are other constructs in the playground. Sand and clay pits complete the playground facilities.

These imaginative play-aids are the work of Creative Playthings, Inc., of Herndon, Pa., which has designed them with not only the child-consumer but the constructor in mind. Instead of shipping the heavy concrete pieces from the factory to the playground site, they can be built and assembled by local maintenance and service personnel without special technical skill by following the company's plans and molds in various arrangements.

Bronx playground lets imagination travel far from city streets: Fantastic Village in foreground, Tunnel Maze and Serpentine Wall at rear.

Mass-produced housing criticized at ASID symposium

Designers and architects met at New York's Museum of Modern Art auditorium to flail contemporary mass-produced housing with constructive criticism, in an April 11 symposium sponsored by the American Society of Industrial Designers. William H. Whyte, Jr., author of *The Organization Man*, set the background for the discussion with a sociological report on the vast housing project at Park Forest, Illinois, which typifies the middle class housing market.

Park Forestites are, according to Mr. Whyte's recent survey, young marrieds (28-32) with 1.7 children and an income of $6500 to $7500 a year. Suburbia was a social upgrade for 50 per cent of them, he noted, but turnover in this melting pot community is high, with people who move up socially usually moving out. In Mr. Whyte's view, the closeness of the houses reinforces the aggressive neighborliness of the inhabitants. Suburbia is a group with a tremendous sensitivity to consumption, he pointed out, and the spread of an item in popularity makes "holdouts" appear almost anti-social.

Giorgio Cavaglieri, New York architect criticized the spread of mass-produced single-family houses. "Unless the homeowner has enough land for some trees to see out of his picture window, he is better off in a multi-dwelling unit surrounded by adequate park areas. The beauty of a community lies in the variation of types of building," he continued, "and prefabricated housing must achieve a system that permits wide variation in the assembly of the modular elements."

Designer Paul McCobb, typifying the overall house criticism of the evening, commented that "If you take the kitchen out of most brand new houses today, all you have left is a classic reproduction." He said that merchandising gimmicks were being used to sell a product — the contemporary house —that is tremendously behind the times, and predicted that the house of the future will be made of new materials and "will not necessarily require an architect."

William Renwick, partner in George Nelson and Co., New York, introduced his firm's idea for a mass-produced pre-fabricated house-of-the-future to which you can "button-on" 12-foot-square modular units. The house is made up of a system of cubes and tack-on rectangles which function as corridors to other cubes or annexes to the rooms. "The beauty of the button-on house" Renwick said, "is that you can expand and retract it almost at will." In its flexibility of plan and size, it seemed to point to some answers to the questions of earlier speakers.

Arthur BecVar showed slides of kitchens which would fit into modular units such as the "button-on" house. The kitchen can be programmed in advance to move whole frozen meals from the freezer to the electronic oven and cook them automatically.

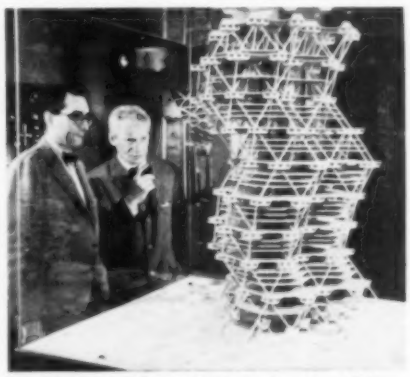
Other speakers in the symposium were David Slipher, President of Webb and Knapp Communities; Allan Dibble of National Homes Corp.; and Peter Schladermundt, who organized the symposium for ASID. Wilder Hobson, Associate Editor of *Newsweek*, acted as moderator.

Fermi Memorial Competition jury (l. to r.): Ludwig Mies van der Rohe, Pier Luigi Nervi, Lancelot Law Whyte, Gordon Bunshaft, John O. Merrill, Jose Luis Sert.

Day-after-tomorrow's office building

The Universal Atlas Cement Company sponsored Louis Kahn, Philadelphia architect and city planner, in an experimental project to extend the applications of precast, pre-stressed concrete. A model of the proposed structure is now being exhibited at Cornell's White Art Museum in a special Festival of Contemporary Arts exhibition of Mr. Kahn's work.

The experimental municipal structure would use triangular prefabricated frames to stock ceilings at various heights. Hollow concrete sections provide arteries for air conditioning, heating and other service lines, and a central core consolidates elevators and stairways.



Architect Kahn and White Museum Director Alan R. Solomon examine model.

Fermi Memorial competition winner

Reginald Caywood Knight, a member of the M.I.T. Architecture Department, has been named winner of the International Architectural Competition for design of the Enrico Fermi Memorial. His winning structure will be a key unit in Chicago's Fort Dearborn Project which will re-develop 150 acres north of the Chicago River. The Knight buildings are an auditorium and exhibition hall, serving as a memorial to the atomic scientist, Enrico Fermi. Mr. Knight uses sound as a unifying imaginative motif for the project: a system of vertical tubular bells placed in three rows on a central plaza. "Through the controlled medium of sound," the judges noted, "architecture will be able to reach out and touch the lives of many more people than would be possible through vision alone."

$10,000 in prizes were awarded by the Chicago Junior Association of Commerce and Industry and the Chicago Joint Civic Committee of Italian Americans.

The distinguished international jury included physicist Lancelot Law Whyte, structural engineer Pier Luigi Nervi, architects Ludwig Mies van der Rohe, Gordon Bunshaft and Jose Luis Sert. John O. Merrill was professional advisor.

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Summer design studies offered

For three weeks beginning July 7, Boston's Institute of Contemporary Art will conduct its annual Summer Program of Advanced Study in Design. The theme of the coordinated courses will be "Processes for Design Problem Solving." The American Society of Industrial Designers, Industrial Designers Institute, Package Designers Council and the National Society for Decorative Design have helped formulate the program and it is suggested that companies and design firms regard it as a management training program for their employees.

Creativity will be featured at the session as John E. Arnold of the Massachusetts Institute of Technology, R. Buckminster Fuller, and W. J. J. Gordon of Arthur D. Little, Inc., are scheduled to teach courses on the creative process. Alfred Auerbach, who heads his own advertising agency, will teach marketing to graduate industrial

Jones

Auerbach

designers. James F. Pfeufer of the Rhode Island School of Design will emphasize visual communication in his course in graphic art, Charles A. Dempsey of the Wright-Patterson Air Force Base will discuss cross-discipline creativity, and George Nelson will present applications of problem-solving techniques.

Other instructors are ceramist William Daley and photographer Robert Forth.

Administrative Director of the Program will be Theodore S. Jones, Associate Director of the Institute. Joseph Carreiro of the Philadelphia Museum School of Art will serve as Academic Director. Applications may be made by writing to the Institute, 230 The Fenway, Boston 15, Massachusetts.

Events

An exhibition of "100 Years of American Architecture," celebrating the centennial of the **American Institute of Architects**, opened in the Washington National Gallery of Art, May 14.

The **American Management Association's** summer educational program at Colgate University, Hamilton, New York, will be 25% larger than the program of last year. More than 2,000 executives are expected to attend some 50 seminars.

The third in a series of annual Creative Problem-Solving Institutes is planned for July 8 to 10 at the **University of Buffalo**, New York.

The **United States Department of Commerce** "American Business and Design Patents" Exhibit opens to the public May 27-June 7 at the Department's Washington building. Some 15 companies, including Knoll Associates, Brunswick - Balke - Collender Co., Argus Camera Co. and The Hoover Co. will display their design-patented products.

Vance Packard, author of the new and controversial book on market research, "The Hidden Pursuaders" (see page 8), will speak at the **Package Research Conference**, Tuesday, May 21, at the Hotel Plaza, N. Y. The two-day conference will bring together experts in hard-sell and science: 400 marketing executives and merchandising specialists are expected to attend. Reservations may be made through Lippincott and Margulies, sponsors of the conference, at 430 Park Ave., New York.

Engineers and others involved in the design of new products of all kinds will gather for the **1957 Design Engineering Show** in New York's Coliseum May 20-23, expected to be the largest show of its kind ever held. Three days of technical sessions will be held in addition to the display: the Design Engineering Conference, sponsored by the American Society of Mechanical Engineers. Subjects to be discussed include new materials, design development procedures, and electrical and mechanical equipment.

Company news

Lippincott and Margulies quote estimates indicating that industry spent about $90 million a year for industrial design services ten years ago. In 1955 the cost had risen to $500 million, and probably reached $600 million in 1956.

Alcoa reports that a new record for the use of aluminum in bridges has been set by the Walt Whitman Bridge which links the Pennsylvania and New Jersey Turnpikes. In addition to aluminum members, the entire bridge is coated with aluminum paint.

A group of scientists and engineers with experience in aircraft and missiles have formed the new corporation **Era Engineering, Inc.** in Santa Monica, California. Era will develop electronic, radiation and rocketry systems and devices.

Ekco Products Company's expansion program in the builders' metal supply and hardware field is geared to add 18 million dollars to their sales volume, the housewares manufacturer has announced. U.S. Maritime Administration has awarded a contract for design of the first atomic-powered surface ship to **George Sharp, Inc.** of New York and **Walter Kidde Nuclear Laboratories, Inc.** of Garden City, Long Island.

GE's Technical Products Department has been awarded a $4,594,905 contract for development, mock-up and testing of a new "over the horizon" communications system.

Sullivan Powdered Metals, Inc., of Cleveland, Ohio, has announced the formation of a new division that will work in cooperation with Alcoa on special blends of aluminum pastes and powders for use as pigments in plastics, paper coatings, printing inks and fabric finishes.

The Appliance Division of **Westinghouse** reports that it was able to do a full year's business in the nine months remaining in 1956 after their strike was settled.

People

Reino Aarnio, who designed the U.S. exhibit for the Stockholm Trade Fair, will design the first American trade fair in Poland, at the Poznan Industrial Fair.

Frank Mansfield, formerly Manager of Product Planning and Market Research for GE's Metallurgical Products Dept., has been named Sales Manager and Vice President of Wagner Bros., Inc., Detroit.

Harry H. Foster has joined Leotta & Parcher, industrial designers at Conshohocken, Pa., as Director of Design Promotion (left).

Henry W. DeVore has been named director of Plaskon plastics and resins sales for Barrett Division of Allied Chemical & Dye Corp.

Lawrence Singer has moved his office to 16 West 46th St., New York 36, N. Y.

Michael Melack announces the opening of his own industrial design office at 294 McMane Ave., Berkley Heights, N. J.

H. Perry Smith, formerly manager of the general research laboratory of Underwood Corp., has joined the Associated Spring Corp. as assistant director of research.

Andrew Kucher has been elected a vice president of Ford Motors, with direct supervision over all central product engineering.

The **Raymond Loewy Corp.** has moved to new and larger quarters at 425 Park Avenue, New York, New York.

Becker and Becker Associates have been named designers for the American exhibit at the Paris International Trade Fair.

Roy Larsen has been made a Vice President of Raymond Loewy Corporation, as announced in the April ID, but not a partner as was erroneously added.

Stevens-Chase Design Associates of Syracuse, New York, have been retained by Smith-Corona Inc., to act as general design consultants.

Penson-Tuttle, Inc. of Chicago, Illinois, design consultants, have a new office at 228 North LaSalle St.

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Aluminum can match the iridescent rainbow of a peacock feather or the hard, jet black of onyx. The process is called anodizing and Alcoa can show you how. You can capture the deep, rich colors of porcelain enamel and fix them permanently to aluminum. You can paint, lacquer and enamel aluminum. You can brighten it electrically or chemically so it absorbs colors from its environment. Any metal that will electroplate can be firmly deposited on aluminum. Where is the limit of tints and hues and shades possible with aluminum? Only in the designer's mind, and Alcoa color research keeps his thinking unconfined. Color is a dramatic reason why aluminum is the designer's metal, and Alcoa your source of the new and different.

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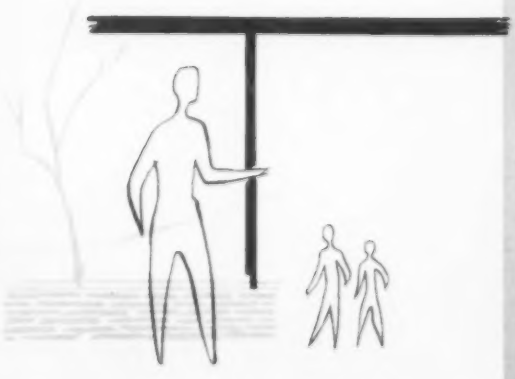
Finishes for Alcoa® Aluminum—a colorful, penetrating handbook prepared by the men who know the most about aluminum finishes. It includes all of the latest and most exciting finishes and tells how to achieve them.

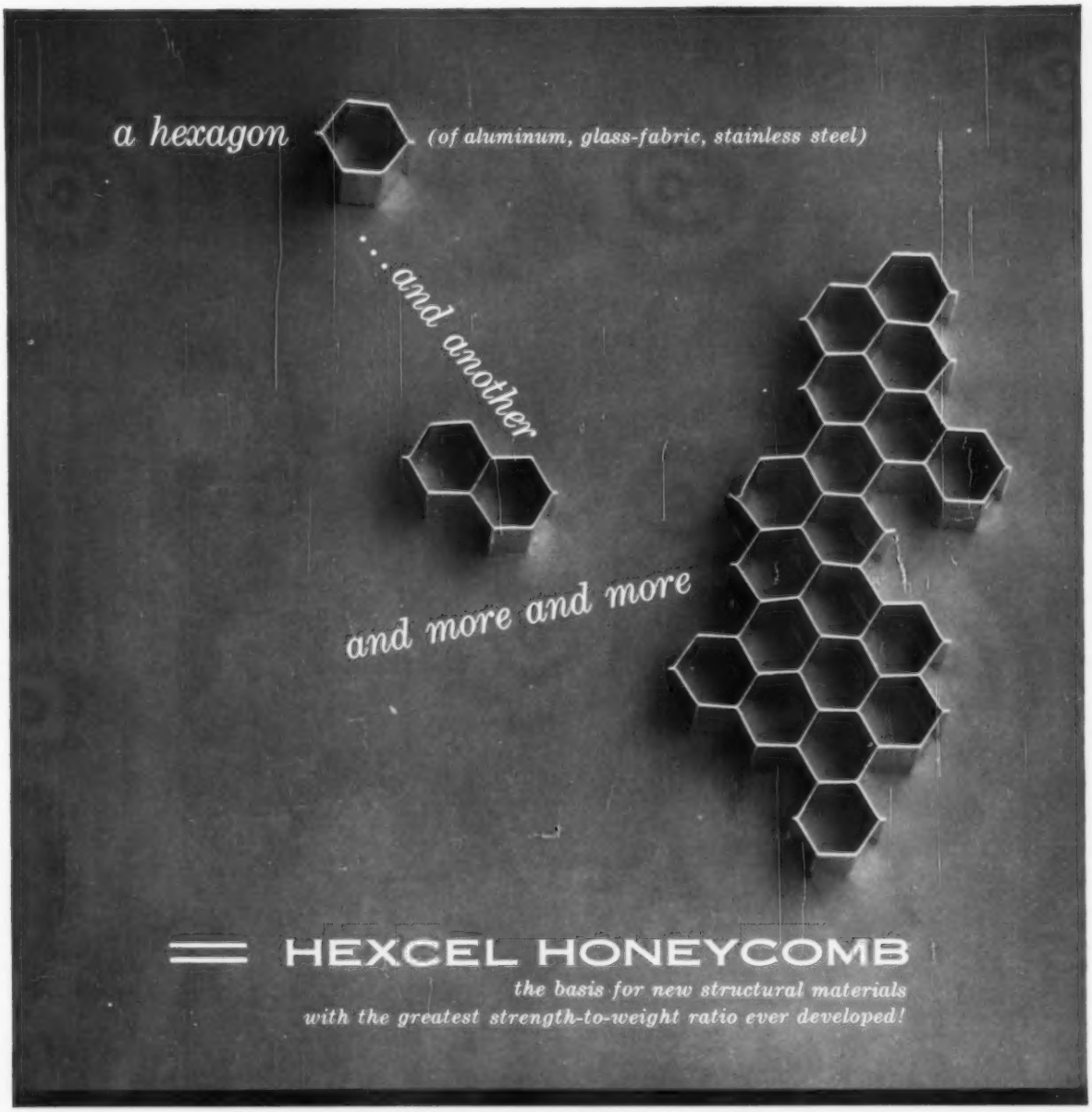
A New Horizon in Extruded Shape Design—a thorough text designed to stimulate imaginative thinking about designing and applying extruded aluminum shapes.

Metal in Motion . . . Alcoa Impacts—the very latest facts on this fascinating way to produce complex shapes in aluminum with a single press stroke.

In addition to these newest Alcoa publications, the Alcoa library has hundreds of others, plus dozens of motion pictures. Most of these are described in a 41-page index called *Alcoa Informational Aids*. All of these films and publications are available from Alcoa for your use.

Order this index and these newest publications right now. Send your name, address and company affiliation to Aluminum Company of America, 2194 Alcoa Building, Pittsburgh 19, Pennsylvania.





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Where do you fit into this

Products of PLASKON Plastics and Resins in this kitchen:

Nylon—baby bottles, cabinet knobs, food bag
Urea—electric blender base, radio housing, electrical outlet and switch plate, can opener
Melamine—dinnerware, washing machine agitator, utensil handles
Polyester Resins—translucent panels, chair

Barrett PLASKON

picture?

IN THIS KITCHEN ARE TWELVE NEW PRODUCTS MADE WITH PLASKON MATERIALS...THERE IS ROOM FOR MANY MORE! YOURS?

Throughout the kitchen at the left are twelve new products produced with PLASKON® Plastics or Resins. For example, the washing machine agitator the woman is holding is molded of PLASKON Melamine, the chair is PLASKON Polyester, the drawer handles are PLASKON Nylon, the radio is PLASKON Urea.

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Polyester Resins: For glass reinforced laminates with great strength, light weight, excellent electrical insulation properties, good dimensional stability. Used in boat hulls, decorative panels, chair seats, car bodies and parts, etc.

Molders and end-users alike can avail themselves of Plaskon's research and design service personnel.

For further information on PLASKON Plastics and Resins address BARRETT DIVISION, Allied Chemical & Dye Corp., 40 Rector Street, New York 6, N.Y. HAnover 2-7300

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DESIGNING WITH ALUMINUM

This is one of a series of information sheets which discuss the properties of aluminum and its alloys with relation to design. Extra or missing copies of the series will be supplied on request. Address: Industrial Service Division, Kaiser Aluminum & Chemical Sales, Inc., 1924 Broadway, Oakland 12, California.

NO. 24 STRENGTH AFTER FORMING

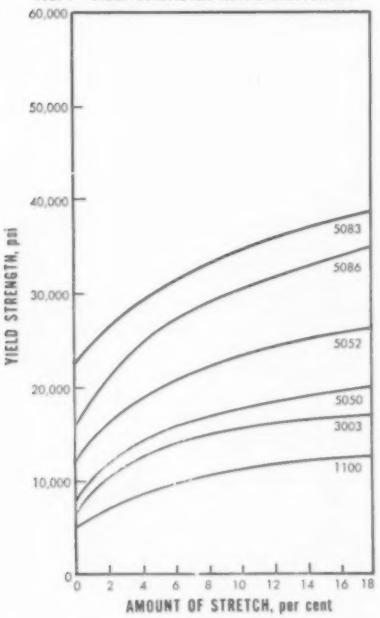
RATES OF GAIN IN YIELD AND TENSILE STRENGTHS VARY FOR DIFFERENT ALLOYS

(Note: This ad includes new and revised data from Product Design Ad. No. 5, "Strength After Working.")

THE increasing use of wrought aluminum alloys in load-carrying, formed parts has emphasized the need for quantitative data concerning the effects of forming operations on the mechanical properties of these alloys.

Such data are essential to design engineers. By taking advantage of forming effects, they can produce sound designs with greater economy by using less expensive alloys or thinner sections.

FIG. 1—YIELD STRENGTHS AFTER STRETCHING



The effects of plastic deformation during forming are especially important in the case of the non-heat treatable (or "common") alloys. The strengths of these alloys cannot be increased by heat treatment, but can be increased substantially by deformation.

The mechanical properties of all aluminum alloys are affected by plastic deformation. The extent of the effects vary from alloy to alloy, however. In general, yield strength and tensile strength increase with increasing deformation and for this reason the effects of deformation are referred to as "work hardening." Ductility is also affected by work hardening and, in general, is decreased by increasing deformation.

Effects of Stretching

Recent additions to the list of available non-heat treatable alloys have further extended the range of strength attainable in finished aluminum products. Alloys 5083 and 5086, developed by Kaiser Aluminum's Department of Metallurgical Research primarily for high strength welded construction, are finding many uses in high strength formed items.

This increased use of non-heat treatable alloys prompted the Kaiser research group to conduct tests which compared the new alloys with those already being widely used. The results of these tests provide data of paramount importance to engineers interested in the design and production of formed parts.

Tests were made on six alloys: 1100, 3003, 5050, 5052, 5083 and 5086. Commercial sheet material in the "O" temper and 0.064" thick was used, with the exception of alloy 5083. Here, the minimum commercial "O" temper plate thickness of 0.250" was used. All tests were made parallel to the direction of rolling. The test procedure was:

1. Stretch sample strips in tension by specified amounts.
2. Stabilize the strips using a thermal treatment of one hour at 300 F.
3. Cut two standard sheet tensile specimens from each strip.
4. Test the specimens to failure in tension.

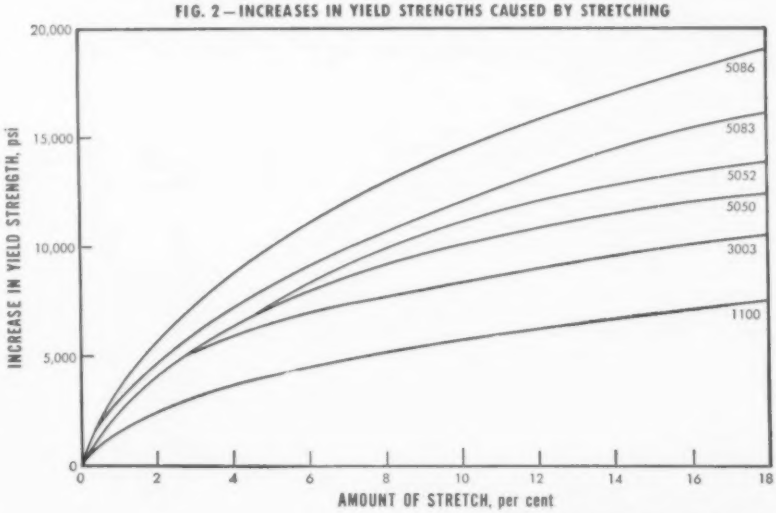
Alloys of the 5000 series containing Mg may show some changes in mechanical properties when held at the usual ambient temperatures for long periods of time after work hardening. In commercial materials such changes are frequently accomplished in a short time and a stabilized condition reached by suitable heat treatment. Such a stabilizing treatment was applied to all samples used in the present tests.

In general the changes consist of:

1. *A decrease in the yield and tensile strengths to stable values well above strengths of the same alloys in the "O" temper.*
2. *An increase in ductility of the work hardened materials.*

Ordinarily, the design of a stressed part should be based on the stabilized properties of an alloy or the properties retained after long periods at normal ambient temperatures. The manufactured part need not receive a stabilizing treatment, however, unless the resulting increase in ductility is considered essential for the application.

FIG. 2—INCREASES IN YIELD STRENGTHS CAUSED BY STRETCHING



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What the Tests Show

Figs. 1 through 4 disclose the average results of these tests. Of primary interest to most designers is the yield strength of a material. The effect of stretching on the yield strengths of these alloys is shown in Figs. 1 and 2.

It is immediately apparent from Fig. 1 that the new alloys 5083 and 5086 are capable of yield strengths far higher than were formerly available in non-heat treatable wrought alloys. Alloy 5083 is particularly outstanding in this respect.

FIG. 3—ULTIMATE TENSILE STRENGTHS AFTER STRETCHING

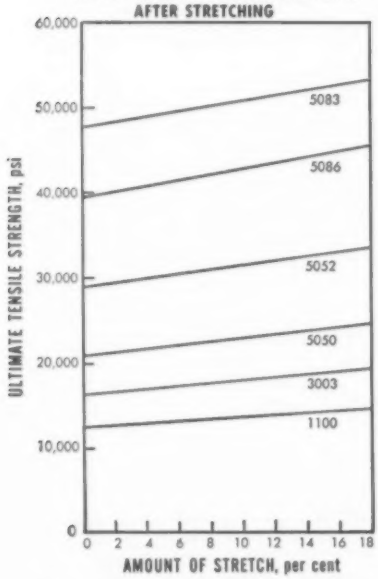
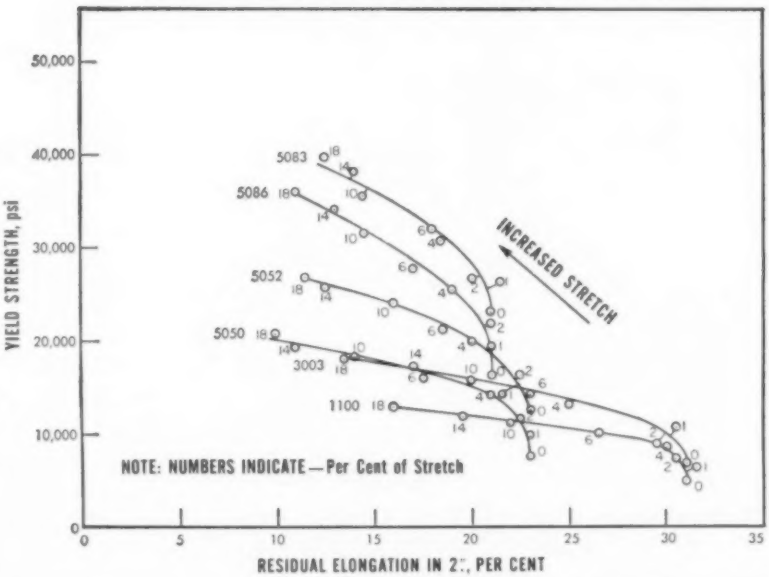


Fig. 2 shows the increase in the yield strengths of all six alloys caused by stretching. This figure demonstrates clearly that the higher yield strengths of 5083 and 5086 are due in large measure to their greater susceptibility to work hardening. The ability of 5086 to increase its yield strength through work hardening is outstanding.

Fig. 3 shows the effect of stretching on the tensile strength of these alloys. Although the tensile strengths are increased substantially by stretching, the increases are not so pronounced as in the case of the yield strengths. The new alloys 5083 and 5086 are shown in Fig. 3 to be far stronger than the previously available alloys.

Fig. 4 summarizes graphically the effects of stretching on the residual ductility and yield strengths of these alloys. This figure demonstrates that the large increases in yield strength caused by stretching may be obtained in combination with good residual ductility in all of the tested alloys. It also shows that the remarkably high yield and tensile strengths of 5083 and 5086 are obtained in conjunction with ductilities that are equal to the ductilities of the much weaker alloys 5050 and 5052.

FIG. 4—YIELD STRENGTHS AND RESIDUAL ELONGATIONS AFTER STRETCHING



Alloys Compared

To illustrate the interpretation of the data presented in Figs. 1 through 4, assume that:

1. The method of forming a part results in 10% stretch regardless of the thickness of the material used.
2. The formed part must be able to carry a load of 15,000 lbs. with a factor of safety of 2 with reference to yielding.

The table below compares the six lots of material tested using yield strength data taken from Fig. 1.

The remarkable strengths of the new alloys 5083 and 5086 are illustrated by the last column of this table. For conditions of tensile loading, this column shows that parts made from 5052, 5050, 3003 and 1100 must contain 31, 72, 100 and 173 per cent more material, respectively, than a part made from 5086.

Other Factors May Be Important

In selecting an alloy for a specific application, it is necessary that all relevant factors be taken into consideration. This includes such factors as the corrosive effects of environments in which the part may be used, the type of surface finish required and problems in connection with fabrication of the part. The performance of aluminum alloys with respect to each of these factors varies considerably.

Technical assistance in connection with aluminum alloy selection and fabrication may be obtained through the Kaiser Aluminum sales office or distributor listed in your telephone directory. Kaiser Aluminum & Chemical Sales, Inc., *General Sales Office*, Palmolive Bldg., Chicago 11, Illinois; *Executive Office*, Kaiser Bldg., Oakland 12, California. Copies of a product information book on aluminum sheet and plate, containing comprehensive tables, may also be obtained on request.

Cross-Sectional Areas Required in Parts Stretch-Formed 10% in Order to Support a Tensile Load of 15,000 Pounds with a Factor of Safety of 2

Alloy	YS after 10% Strain, psi	½ of YS, psi	Area Required in Stretched Part, sq. in.
5083	34,000	17,000	0.89
5086	30,000	15,000	1.00
5052	23,000	11,500	1.31
5050	17,500	8,750	1.72
3003	15,000	7,500	2.00
1100	11,000	5,500	2.73

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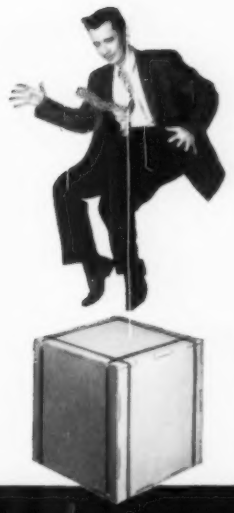

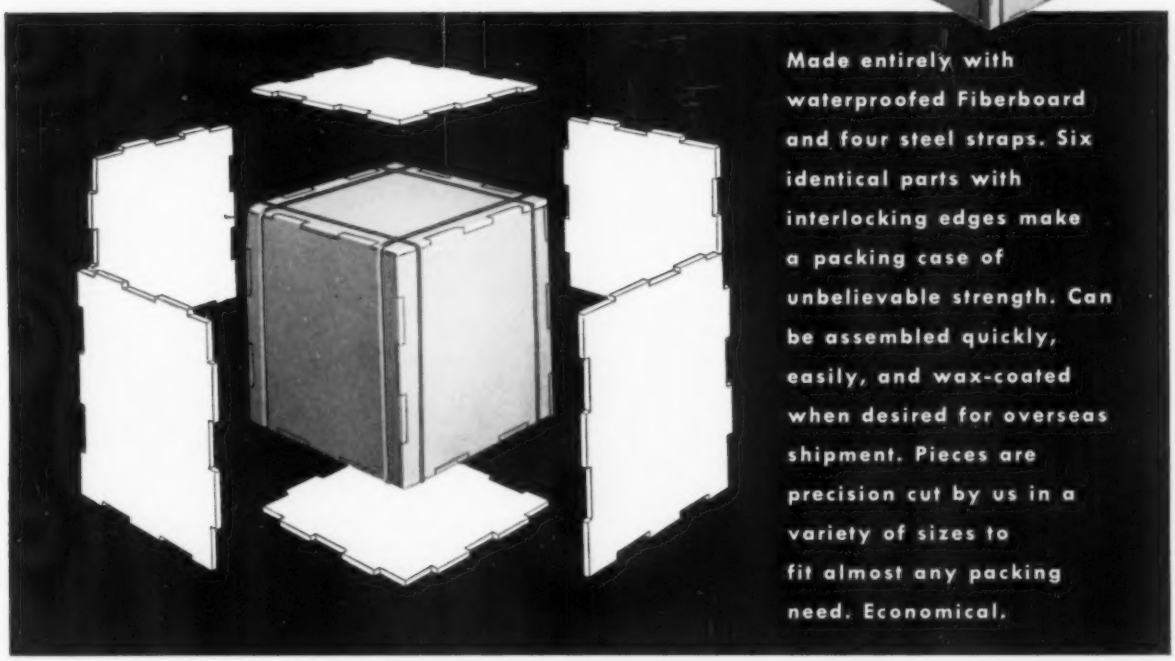

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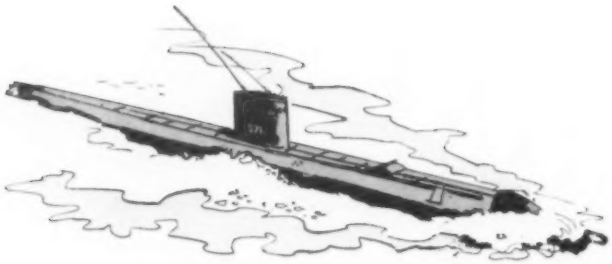
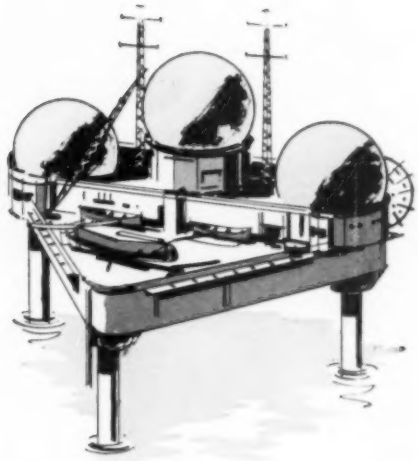


USS NAUTILUS
AND
TEXAS TOWER NO. 2
have much in common —*including specification adhesives*



"Texas Tower No. 2" was so named because of its resemblance to some of the oil drilling platforms in the Gulf of Mexico. Officially it is *U. S. Air Force Station, Georges Bank*. It is the first of five radar stations being established in the North Atlantic area.

The platform stands 81 feet above water level. The lower deck—just below this platform—is a world of boiler rooms, power plants, fuel and water tanks, motors, generators, pumps, and blowers. As in the *USS Nautilus*, it is this highly complicated assortment of equipment which keeps the unit operational. A high percentage of this equipment, together with connecting pipes and ducts, are scientifically insulated. It is vital that the heat stay where it belongs—and the cold where it belongs.

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Editorial

Millions for commerce — but how much for culture?

With the episodes of XI Triennale as a lesson, the design profession can do more than it's doing to influence government design policy.

For the first time in the 35-year history of Italy's famous "Triennale," the U.S.A. will have a specially-designed exhibit at the eleventh exposition opening in Milan this July. How this American display is being handled is told in a story on page 14; why this is the first time, and why it matters to the design profession, is a somewhat more complicated story that goes something like this:

The Triennale, which blooms every third year in Milan's Il Parco Sempione, is a sort of world's fair specializing in decorative art, architecture and industrial art. Its entire purpose is to integrate these varied contemporary art expressions. An exhilarating exhibition, full of Italian surprises and robust displays from some 20 other nations, it is certainly the most influential event in the design world.

Ironically enough, while the U.S.A. has been spending billions to build American prestige through foreign commercial fairs, it only once accepted Italy's invitation to participate in this major cultural event. Most American products that have appeared in the Triennale since the war have gotten there by dint of individual enterprise. In 1951, an existing design exhibit, prepared by the Museum of Modern Art for U.S.I.A., was displayed in an Italian-designed pavilion. In 1954, several U.S. firms privately put up money to build two paper geodesic domes in the park, and the American Society of Industrial Designers sent 40 products, contributed by members, to the international industrial design section.

It happened that in 1956, when the Triennale Committee was planning the 1957 fair, the U.S.A. was deeply involved in preparing trade fairs for Italy and other European countries. As the Committee repeated its efforts to interest the State Department in participating, several professional groups here began to campaign for action. The U.S. Information Agency received at least two formal proposals: one, from the A.S.I.D., suggested an elaborate exhibit of mass-produced designs. Another, from an informal committee representing various architectural, interior and industrial design groups, offered to set up a "pan-society" committee, to help the government prepare an outstanding—and representative—exhibit of all the arts in the Triennale.

It was in 1957, six months before the opening, that the U.S.I.A. made its decision: it would not participate. The Italians then turned to six leading American designers, inviting each to contribute a case-study exhibit of one product, to be shown in the international industrial design section.

One of those six designers—Walter Dorwin Teague—was not content with this outcome. In Washington, while working with the government on Trade Fairs, he happened to learn a top official of U.S.I.A. was an old friend. This coincidence changed the whole course of our policy toward the Triennale: Mr. Teague visited the Agency and argued emphatically for official action—for the importance of telling Europeans about our pride in cultural as well as commercial achievements. His argument and enthusiasm were persuasive. At the end of March, U.S.I.A. appropriated $25,000 for the preparation, by A.S.I.D., of an exhibit of industrial design to be housed in an aluminum geodesic dome. (He later raised another $25,000 from the Department of Commerce.) Mr. Teague immediately appointed an advisory committee (see page 14) to program the best possible exhibit in the few remaining months. Despite limitations of scope and subject matter, the very existence of the exhibit is—under the circumstances—a formidable achievement.

It is tempting to chide the U.S. government for the handicaps the committee faces in putting together this major exhibit on an emergency basis. But there are some arguments in the government's favor, too. There is, after all, no council or commission that automatically administers government activities relating to art, architecture and design—a fact that many professionals have cause to be grateful for: it assures them of freedom from the rigid official standards that might drain the vitality from art and design. U.S.I.A., for instance, leans heavily on individual designers and museums in preparing cultural exhibitions. The Office of International Trade Fairs, likewise, went to A.S.I.D. and other groups for help in designing a new kind of Trade Fair. All of this suggests, happily enough, that reliance on the established design organizations could become the government's best answer to all design decisions.

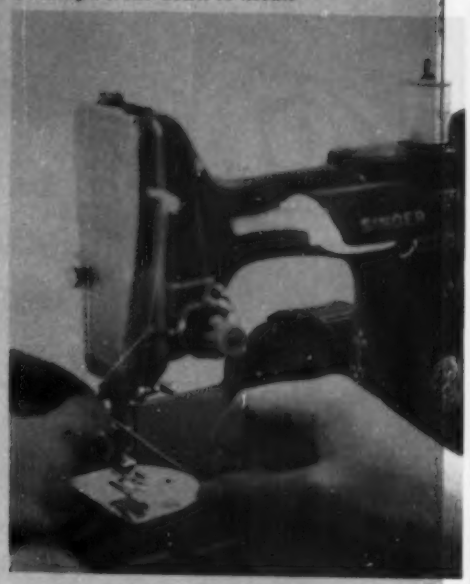
But what does a government agency find when it seeks help? A scattering of groups—A.S.I.D. and I.D.I. (industrial designers), A.I.D. (interior designers), P.D.C. (package designers), N.S.D.D. (decorative designers), A.C.C. (craftsmen)—each concerned with a private corner of the field. How does an agency know which one to choose? How, in fact, does it know which ones exist, or who their members are? And does an agency—or any other client—feel encouraged to put its confidence in any one of the splinter groups?

The episode of the Triennale may force the entire design profession to put its house in order. Is it not time for a central office for all these groups, to correlate information for everybody who wants to deal with designers, design groups, or design schools? Wouldn't it be possible for each organization to complement its colleagues, as a section of a super-organization, without sacrificing its identity, purpose, or membership standards?

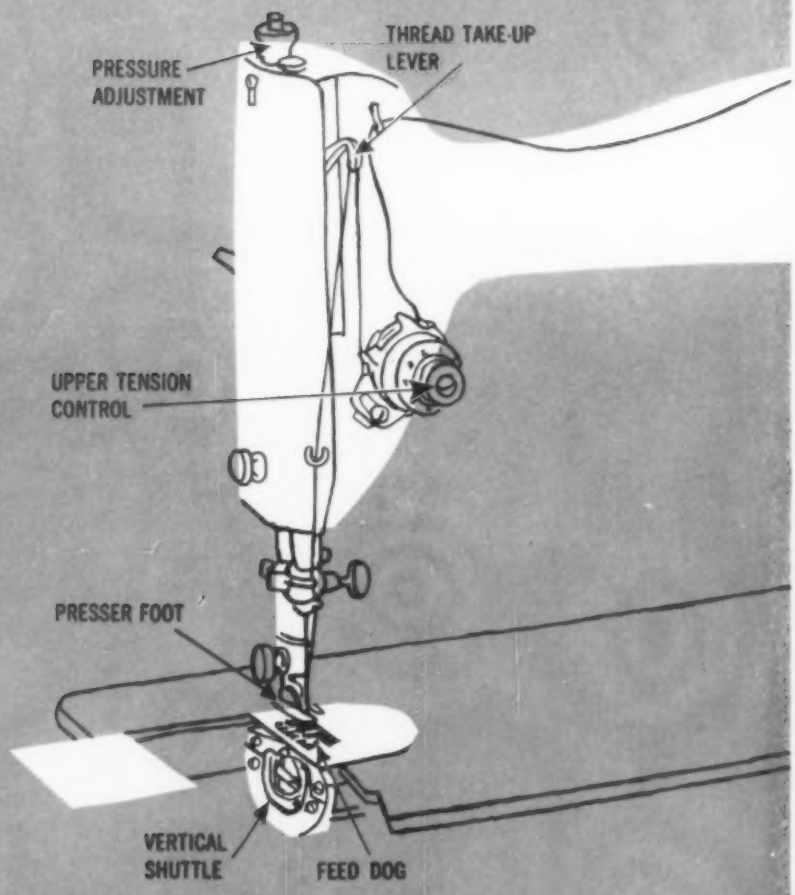
The question of professional integration is more complicated, of course, than we can outline here. But there *are* answers—if the profession wants to take advantage of the valuable inroads made this year. To be sure, it is up to the government to foot the bill for important design events like the Triennale. But it's up to designers—if they want a stake in the way their work is presented—to offer an authoritative, *unified* group to which the government can turn, not only automatically but with complete assurance, whenever a design problem is in the offing. With the help of such a professional association, government and designers alike might enjoy not emergency conditions but optimum results when the 1960 Triennale rolls around.—*j. f. m.*

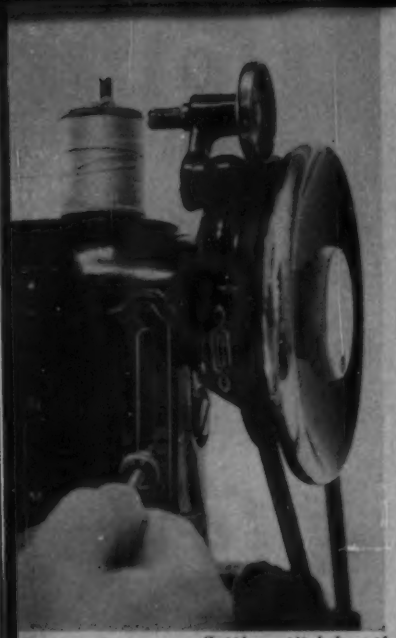
Threading needle

Guiding thread down to needle



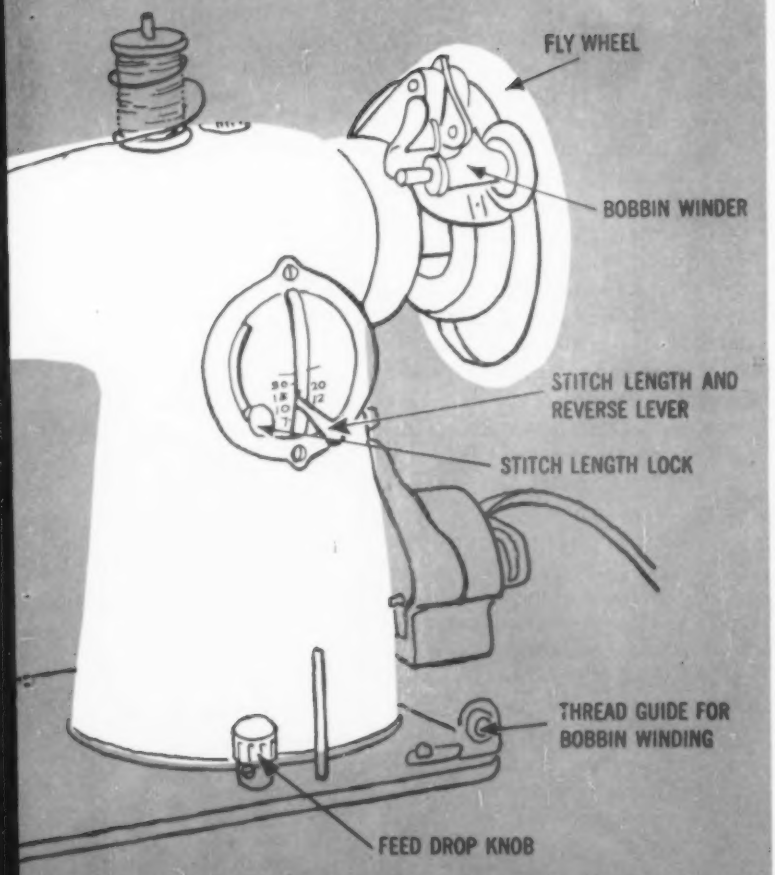
Adjusting upper thread tension





Setting stitch length

Winding bobbin



Putting bobbin in case before placing it vertically under throat plate.

Look what's happening to

the sewing machine

A century-old worksaver

has been learning to do more,

in better style,

to meet the new demands of today's market

Women are making their own pizza pies, storm windows and mobiles these days, so it seems natural that they should be making their own curtains and clothes. Since the war a surge of interest in sewing has resulted in a remarkable revolution in sewing machines—remarkable because between 1900 and 1940 (about half its life span) — the sewing machine hardly changed at all. Then came a revolution—a new sewing machine that reflects a change in attitude toward sewing. Where once it was woman's work and a way of saving money, the modern woman is likely to sew for fun, and to design her character into her clothes. And she is not an easy person to design for. She certainly wants a machine that will sew a straight and speedy seam with a minimum of guidance. She wants to be able to sew slowly or quickly, stopping and starting at will, without being interrupted by jamming, broken threads, or broken needles. What's more, she's been taught to expect technical miracles.

For all this, her sewing machine is a precision instrument and its adjustments are delicate. The new machines have many more functions than the old ones, but by and large they are not much different: no one has yet found a way to simplify the basic mechanism and the numerous steps involved in sewing. Chances are that your grandmother could sit down to a 1957 model and sew a straight seam in five minutes. She would know that the first step is to place the spool on the spindle, guide the thread through various loops, around the tension control, through the take-up arm, and down through the needle eye. She would look under the throat plate for the bobbin. If it were empty she would place it on the bobbin winder, thread it from the top spool, flop it against the flywheel belt and run the machine until the bobbin was spun full of thread. Then she would set the stitch length, put the fabric under the presser foot, test the stitch, adjust the thread tension. If the stitch didn't lock in the right position, she would have to adjust further; if the fabric didn't move, several other adjustments might be needed to tune up the machine for her piece of fabric.

For a generation of women who first welcomed the sewing machine as an enormous labor saver, the nuisances of the delicate mechanism were minor indeed. But the industry today is no longer selling an essential workhorse; it has to offer a product with a multitude of new talents yet sufficient simplicity to appeal to women who sew with a new purpose. On the next 14 pages tell the exciting story of how the sewing machine is changing to meet these demands.

The basic mechanism, developed a century ago, is almost unchanged today

When the industrial revolution reached the United States in the 1800s, it took the form of a revolution in textile manufacture; thus there was strong reason to expect that the sewing machine would be developed here, even though inventors were also tinkering with the idea in Europe. In a short ten years, a handful of American mechanics and tailors put together the machine that was to revolutionize the clothing industry and free women from hours of hand labor.

Every would-be inventor of a sewing device studied the action of the human hand as it sewed with a needle, pointed at one end, threaded at the other. Attempts to imitate this action mechanically were unfruitful. It is to Elias Howe's credit that he went beyond this to an entirely new concept: a stitch formed by interlocking two threads, one from an eye-pointed needle, the other from a shuttle. He was not the first to think of this device–Walter Hunt in New York City designed a machine on this principle in 1832, but did not patent it and Howe, working in Boston in 1845, was not aware of its existence. Although Howe's machine was limited in practicality, his resolution of the basic problem paved the way for the eventual formulation of the sewing machine.

Finding a workable shuttle mechanism required many more steps. In 1849 C. S. Blodgett and John A. Lerow patented a machine with the first continuously moving shuttle, but its circular motion took the twist out of the bobbin thread. When Isaac M. Singer was asked to take a look at it, he proposed designing a new machine with an oscillating shuttle. At the same time Allen B. Wilson, knowing nothing of these other inventions, invented a lock-stitch machine with a vibrating shuttle which formed a stitch on each movement, an improvement over Howe's shuttle mechanism which made two moves for each stitch. Wilson later replaced the entire shuttle with the mechanically sounder rotary hook. Today all three shuttles–the vibrating, oscillating and rotary hook–can be found in household machines.

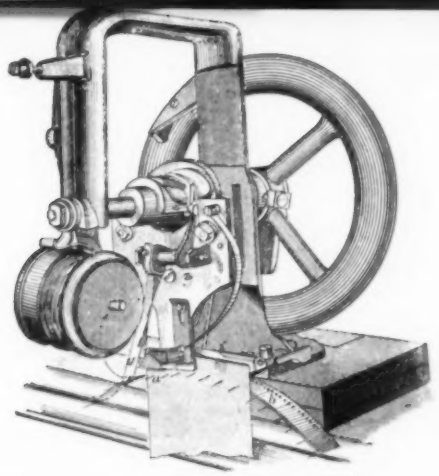
The next problem was how to move the fabric at a steady rate under the needle. In Howe's 1846 model the fabric was hung on a row of pins on the edge of a thin steel baster plate. After six inches of straight line sewing the fabric had to be rehung. John Bachelder eliminated rehanging by using a continuous leather belt, but the feed was a row of small, steel pins which perforated the fabric and prevented sewing around corners. It was Wilson who came closest to the answer with his "two-motion" feed: a toothed device which moved forward with the fabric, then returned to position. Because this backward motion also pulled the fabric, Wilson went on to the "four-motion" feed, which is still used today. The teeth move the fabric forward, drop into the machine bed, return to their first position and rise to start their job again. This was the last of basic inventions, and the household lock-stitch machine could be considered finished by 1852.

One man can be credited with organizing the various mechanical parts into a workable sewing machine and proving its worth to a then skeptical public: Isaac Meritt Singer. The cast iron housing of his 1851 patent model gave the machine its first sculptural identity, which still influences it today. Already the characteristic overhanging arm can be seen anchored at the right by a heavy flaring pedestal; in this arm a turning shaft transmits the motion of the flywheel to move the needle up and down, while the lower mechanism, the oscillating shuttle, and the feed wheel are buried in the machine bed.

While Singer aroused interest in the machine by house to house demonstrations, his partner, Edward Clark, made it available to the housewife by hire-purchase plans and trade-ins–and price cutting. By 1867, the original three manufacturers had swelled to twenty in this country and two in Germany, and competition was fierce. In the next 50 years, the Singer Sewing Machine Company emerged as the largest manufacturer in the world. One factor, along with shrewd distribution and financing, that saved Singer from extinction by wars and depressions was its overseas markets and factories. But as they helped Singer, they also held back design progress, for the machine exported to backward areas needs a design identity that is changeless. With continually expanding virgin markets and home sewing on the wane in the United States, Singer made no attempt to change the machine, which, after all, worked well enough.

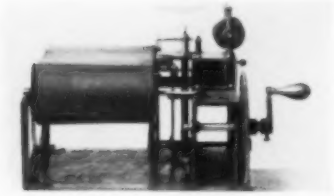
The only new factor of any importance in household machines was the introduction of electricity in 1909. This added two elements: the electric motor and light. Since electricity was not found in every sewer's home–and still is a rarity in some foreign markets–they were optional conveniences. The motor was therefore not encased but attached to the machine bed in back of the flywheel and connected to it by a belt; the light was also tacked on as a separate unit. Since electricity provided a smoother source of power, Singer fly wheels became lighter and lost their spokes.

By 1900 the sewing machine had achieved its classic character. The sharp edges of the first machines had become gently rounded. The pedestal now curved outward to meet the machine bed, the overhanging arm tapered down to the head, which also tapered as it met the needle. The total effect, particularly when viewed from each successive side, was one of romantic contours broken by attachments. This genteel Victorian object was the machine made available by virtually all manufacturers after World War II, as women began to rediscover the rewards of home sewing.



1

It all began in 1846 *with Howe's model* (1) *which established the basic lock stitch; Bachelder solved one aspect of the feed problem with a continuous leather belt* (2); *Singer gave the machine its first sculptural identity* (3). *The Turtleback* (4), *first household machine, had an ornate wrought iron foot treadle, a Singer innovation. It cost* $125 *in* 1856 *when average yearly incomes were* $500, *but could be bought on the hire-purchase plan—*$5 *down and* $3 *monthly. The* 1900 *Singer* (5) *represents the model marketed for the last fifty years, still standard for the industry when the German Pfaff* (6) *was introduced here in* 1948. *Their mechanical organization* (7) *is the skeleton on which all machines still are hung.*



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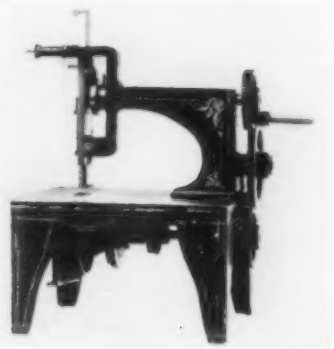

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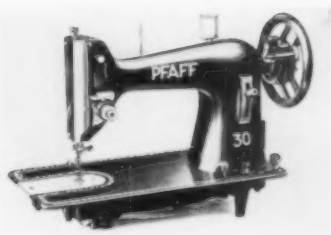

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The postwar boom in sewing brings the first changes in the machine

In 1949, $2.50 patterns for Paris fashions.

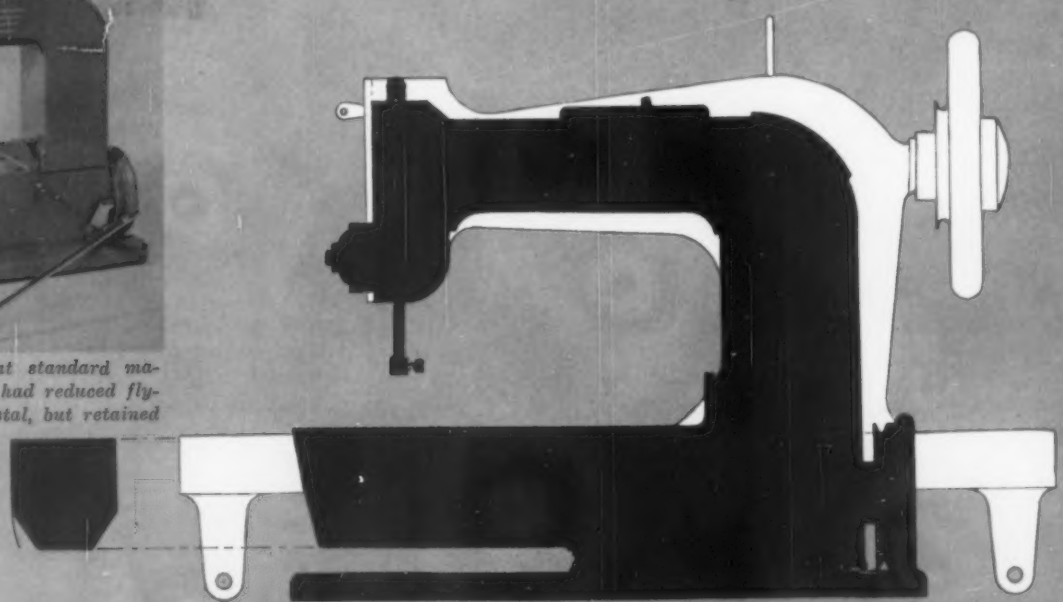
If postwar periods can be expected to follow a pattern, it might have been predicted that sewing would disappear after World War II. During the raucous postwar '20's, domesticity was as unfashionable as femininity, and women turned willingly to ready-to-wear clothes, then a novelty. The depression later made sewing an economic necessity as many homemakers were forced to sew to stretch meager incomes. After the Second World War, when the pressure for penny-pinching disappeared for a more prosperous middle class, there was every chance that the sewing machine market would fade with it.

But the postwar mood produced an unexpected return to domesticity, involving new satisfactions in cooking and homemaking. The homemaker went back to sewing not so much to save money—mass-produced fashions were often inexpensive—but to get a better fit, a more suitable style, a fabric with individuality. The stigma once attached to "homemade" rapidly turned into pride in the ability to "do it herself." The pattern industry was quick to respond: it offered her complex Vogue patterns for "Paris Originals" at a luxurious $2.50, or easy-to-make patterns that allowed anybody to sew up the chic but sack-simple fashions that came along after the war.

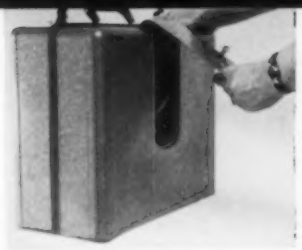
As sewing shifted from drudgery to creativity, millions of women, in the market for the first time, viewed sewing machines in a new light: they needed a new kind of appliance that would satisfy the seriousness of their intention and their expectation of pleasure from sewing. To meet this demand, domestic machines were still patterned after the classic black Singer; the only portable was the popular Singer Featherweight, introduced in 1934 as a miniature version of the standard. It offered good performance and important space saving, but it did not attempt any basic changes in operation. In short, the postwar consumer found herself turning to Europe for the machine she wanted.

The first machine that came close to her ideal was the Swiss Elna, designed in 1940. Tavaro S.A. of Switzerland, a manufacturer of military time fuses for export, lost its foreign markets when the war broke out in 1939, and began to look around for a precision product with an assured peacetime demand. Their choice was a household sewing machine, directed at the largest market in sight—the U.S.A.

Weighing about half what standard machines did, the 1940 Elna had reduced flywheel, more compact pedestal, but retained full-size working area.



More conveniences came in later models



Metal carrying case of the Elna can be fitted around its free arm to give expanded working surface. When closed, thread-and-tool box is stored under free arm, knee bar folds flat against the machine. New recessed electric outlet is neat, snag-proof.

Tavaro made an astute estimate of the market that would open up seven years later. They designed an electric portable that was compact and convenient enough to appeal to a busy, intelligent housekeeper, a woman who would make new demands on all the electric appliances that were to become her form of domestic help. They considered every point of contact between machine and user, reconsidered both major and minor details of the machine's function, and produced the first thorough redesign in the field.

Foremost among the changes was the free arm, a projecting work surface around which a tubular garment—a sleeve or a sock—can be placed for easy sewing of a single thickness. Unlike the Singer, the Elna was conceived from the start as an electric machine, so the motor was permanently encased in its own machine bed, and the flywheel placed next to it at the base rather than at the top. The carrying case—itself an ingenious container—was designed to double as a work surface that fits around the free arm. Such basic improvements, coupled with the Elna's new light color and numerous conveniences, stirred manufacturers in a once-conservative industry to take a new design tack.

Bobbin winding (1) *is more accessible operation at top of machine near recessed spindles, placed on side away from operator. Separate threading path and second spindle permit bobbin winding during sewing. Cover of case* (2) *in which bobbin fits horizontally, flips up at a touch to give unobstructed view.*

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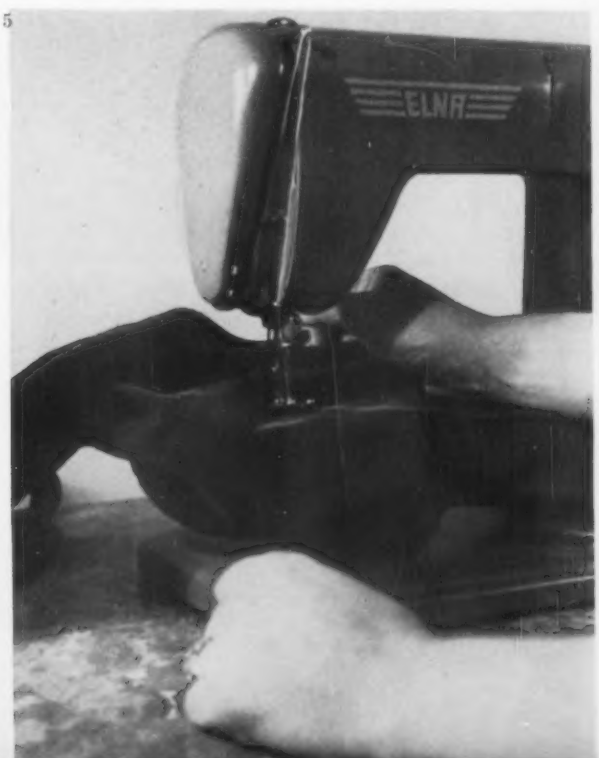


2

In Elna's new threading system (3), *thread comes from back of machine, is drawn under front plate, where it unfailingly falls into place on tension knob, and up to take-up lever. Needle is threaded* (4) *from front to back for quicker location of eye. Ready for work* (5), *Elna has free arm for coping with sleeve patching.*

The zigzag sewing machine, which was another aspect of the postwar sewing boom, stood in direct contrast to the simplified Elna; it offered more sawing versatility, but also greater complication of controls, in the traditional black machine. Also a European import, it opened up a whole new realm of decorative sewing as it simplified other sewing operations. It also introduced, although few at first realized it, wholely new problems of machine design.

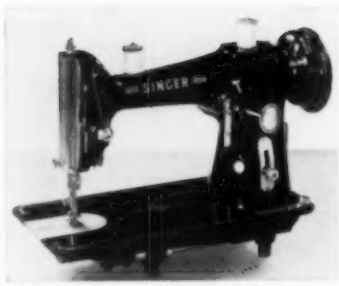
Actually zigzag sewing is nothing new. The movement itself was patented as early as 1873 and the machine had been used in the clothing industry ever since. Singer manufactured a zigzag in Europe which it distributed in the thirties to tailors and seamstresses in Germany. It naturally occurred to Singer to introduce a zigzag to the general public in America after the war, but the idea was voted down on the basis of their long experience in selling to the American housewife: selling on the installment plan, Singer read its market as one of women who sewed either to save money or make it. They doubted that they would pay an extra $100 for a sewing machine that made rarely needed decorative stitches or merely did more easily those operations which could already be performed by a straight stitcher with attachments.

This discussion was in a sense academic, for it is doubtful that Singer could have acted on a positive decision. Its American plants were producing for the war, and overseas factories were out of touch or partially destroyed.

It was a Polish immigrant, Leon Jolson, former representative for the Necchi Sewing Machine Company of Italy in Poland, who imported the first zigzag into the United States and successfully merchandised it. This was in 1947. A year later Pfaff of Germany had a zigzag on the American market and the race was on.

The interest in zigzags was fanned to a flame by insistent advertising. Women found out all they could do: eliminate attachments for overcasting seams, blindstitching, attaching lace, making buttonholes and appliqueing; sew stretchable seams on fabrics like jersey; and, greatest of all wonders, embroider more precisely than the human hand. It was all made possible by a needle that swung back and forth as the fabric moved along. By varying the forward movement, the stitch can be changed from a satin stitch to a widely spaced zigzag; increasing the sideward action produces anything from straight-line stitches to a wide zigzag. For more variety, the needle can be positioned at right or left as well as center. Two new controls were added to the standard machine to handle the zigzag operations: a needle position changer, and a zigzag width control. The stitch-length lever, as in a straight stitcher, continued to control the forward movement.

The promise of unlimited versatility was soon dampened by the realization that it took two hands—one on the fabric and one on the controls, moving in a steady rhythmic pattern—to produce the embroidery stitches. It was the first time the American home sewer was asked to divide her attention between controls and fabric, and her response to this difficulty forced the American distributors and the European manufacturers to think about an easier way of operating the zigzag machine.

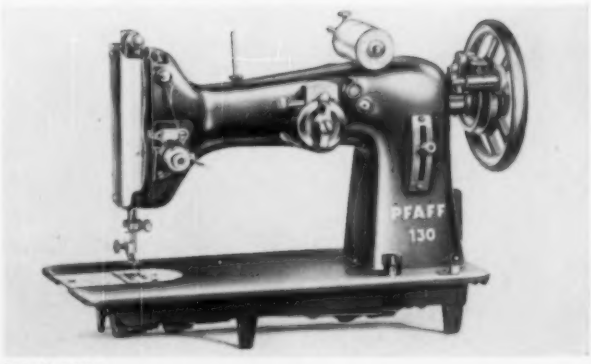


Singer zigzag of the thirties

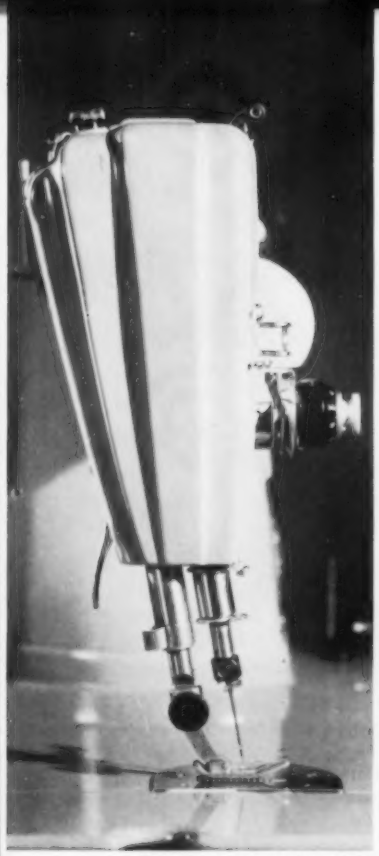
1947-1957

Ten years saw three more steps toward a modern machine for a fashion-wise market

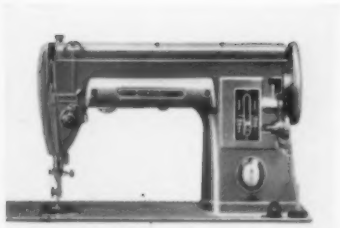
Necchi, 1947

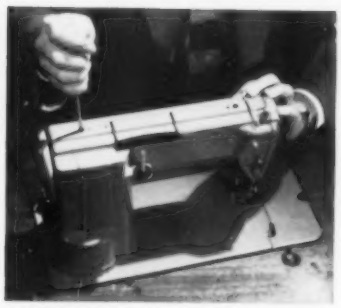


Pfaff, 1948



Singer slant needle, 1951





has motor housed in pedestal

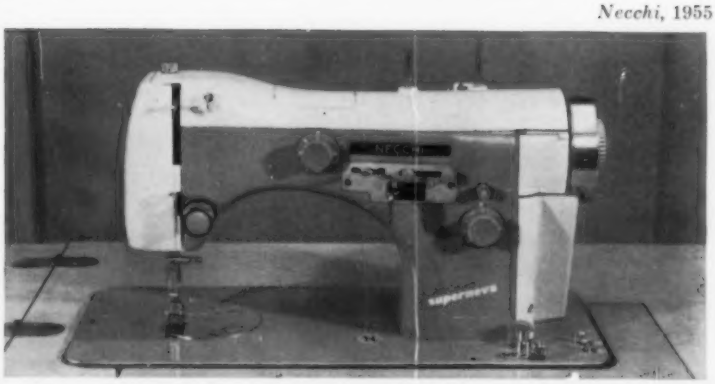
The slant needle, a completely redesigned straight stitch machine, was Singer's 1951 answer to the demand, as they saw it, for a streamlined sewing machine. Despite its name, which derives from the angled needle said to give the sewer a better view of her work, its real importance lies in its integrated motor, new light weight and color.

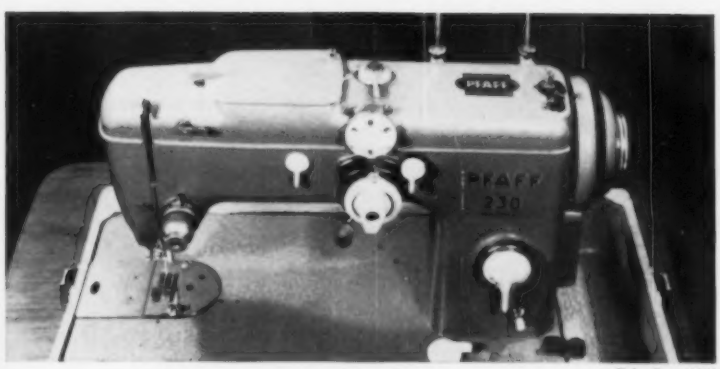
In producing their first postwar sewing machine, Singer's first concern was to engineer a better piece of equipment. Once they determined to incorporate the motor, they put it completely inside the machine — in the pedestal. This meant redesigning the motor, standing it on its end and replacing the belt drive with gears. To lighten the housing, they chose die cast aluminum, which produced a machine that weighed half as much as its standard predecessors.

Of secondary importance, the housing was built around the mechanical organization and then decorated. One hazard of this method is revealed in the bulge in the pedestal necessary to accommodate the motor. Another is the beveled surfaces and panels which have no functional reason and effectively separate the light and the stitch-length control from the body of the machine.

For the slant needle, Singer tried color for the first time. Not completely sure of its acceptance, they offered both a black and a beige version. At first both sold equally well, but today the beige, which became two-toned in 1953, is the better seller.

Necchi, 1955





Pfaff, 1955

The automatic zigzag machine was the answer to the cry of "too difficult," and the result was a fancy sewing operation that was even simpler than sewing a straight seam on a standard machine. Running on cams, either built-in or put into the machine by hand, the machine would virtually sew by itself without any guidance.

In sewing machines today there are two degrees of automation: the first gives control of the needle position and the stitch length and width; with this feature you can embroider a pattern row that will repeat without variation for as long as you wish. More complete automation also controls the backward and forward movement of the fabric. This not only permits complex embroidery stitches, such as the Greek key, but automatic darning, buttonhole-making and an automatic elastic stitch for stretchable fabrics. For greater embroidery variation, there is a further control that will elongate the design unit without increasing the stitch length.

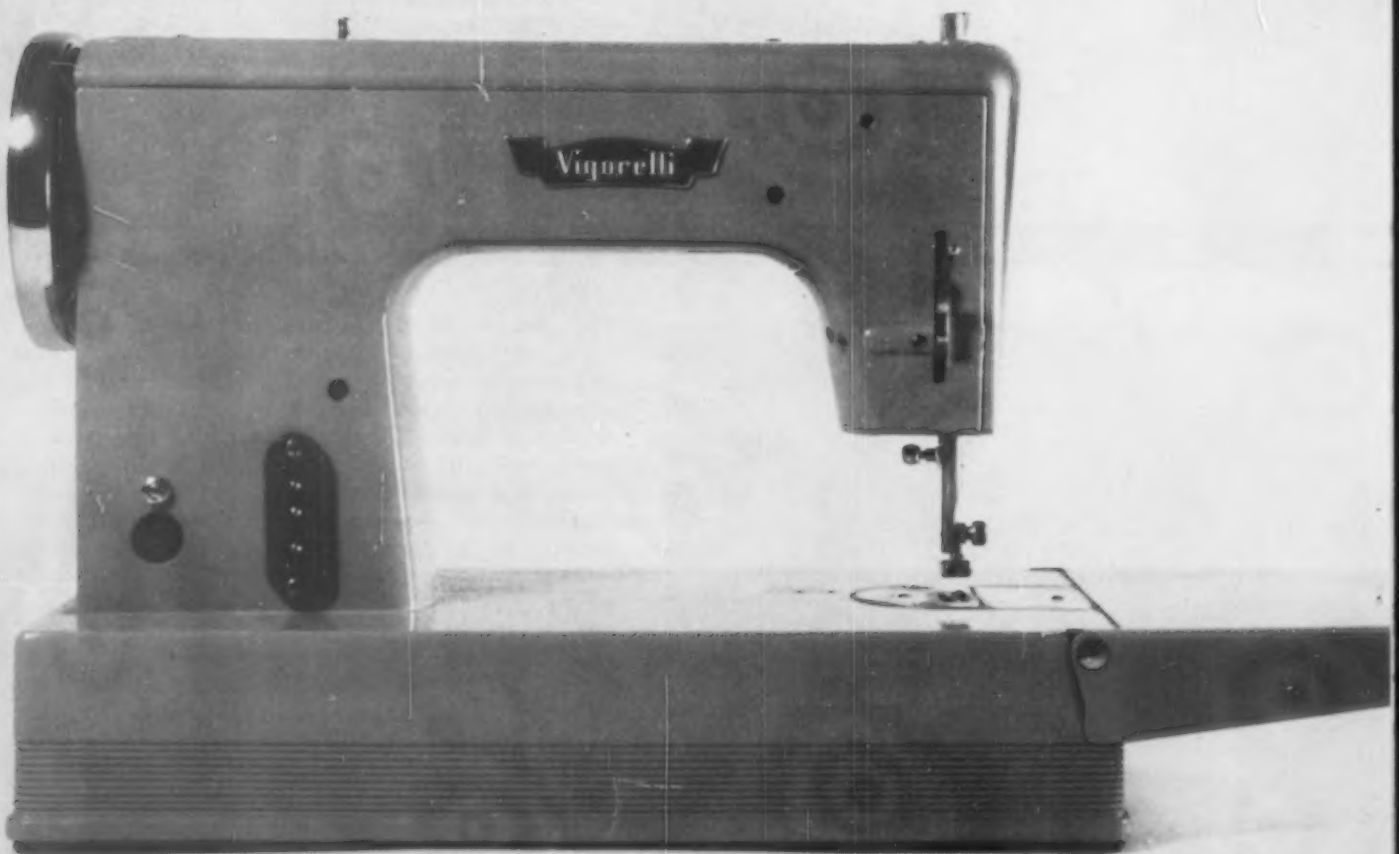
Tavaro was the first to produce an automatic machine: the fully automatic Elna Supermatic. By 1955 the Necchi Supernova, with all the automatic features described, and the Pfaff Automatic 230 of limited automation were being sold here. For both machines the short interval between first models and automatics had meant a step from the nineteenth to the twentieth century. The means of controlling the new automatic features, on the other hand, had still changed very little.

What is a sewing machine? Postwar designers come up with some new definitions

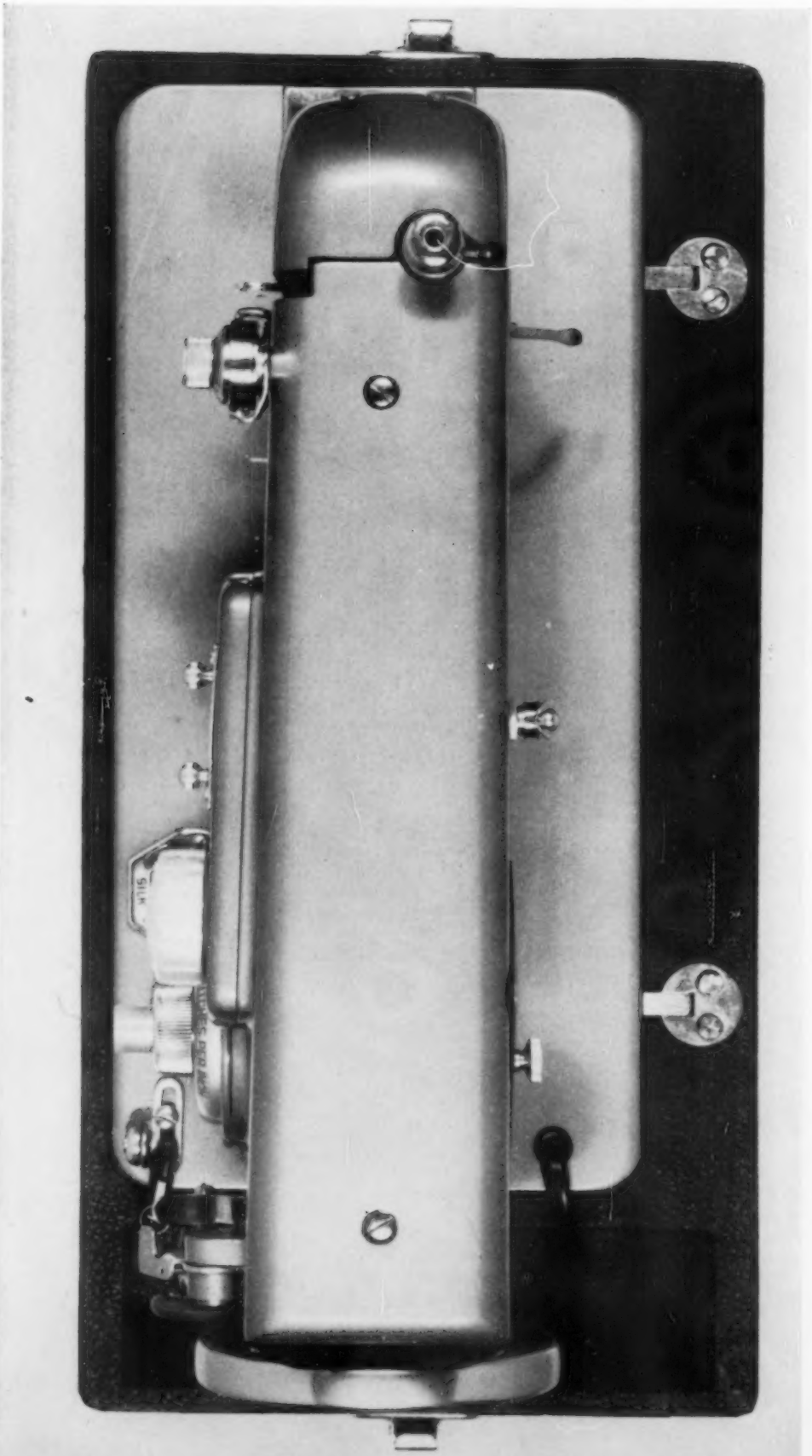
The new character that postwar sewing machines developed is primarily designers' work: it grew out of their handling of its overall shape. In contrast to the parent machine, composed of lyric curves that seemed to derive from an ideal of beauty related to the human form, today's product is more machine-like — harsher, bolder, composed of more complicated shapes. The change is an esthetic reflection — if not the outcome — of changes in technology. The first cast iron housing enclosed a mechanism that was actually self-supporting, but its organic, muscular form had a structural conviction that was typical of construction concepts of its time. Lighter cast aluminum or drawn steel housings, like those on most mechanisms today, eschew structural importance; designers conceive them as enclosures around self-supporting mechanisms, giving up one-piece sculptures for forms composed of intricate planes and subtler forms.

The impetus for this change came from Europe — especially from Italy. American designers create machines that are characteristically composed of bold masses hung together while the Italians, unafraid of intricate relationships, get distinct character from the sensuous linking of elements into an almost inseparable whole.

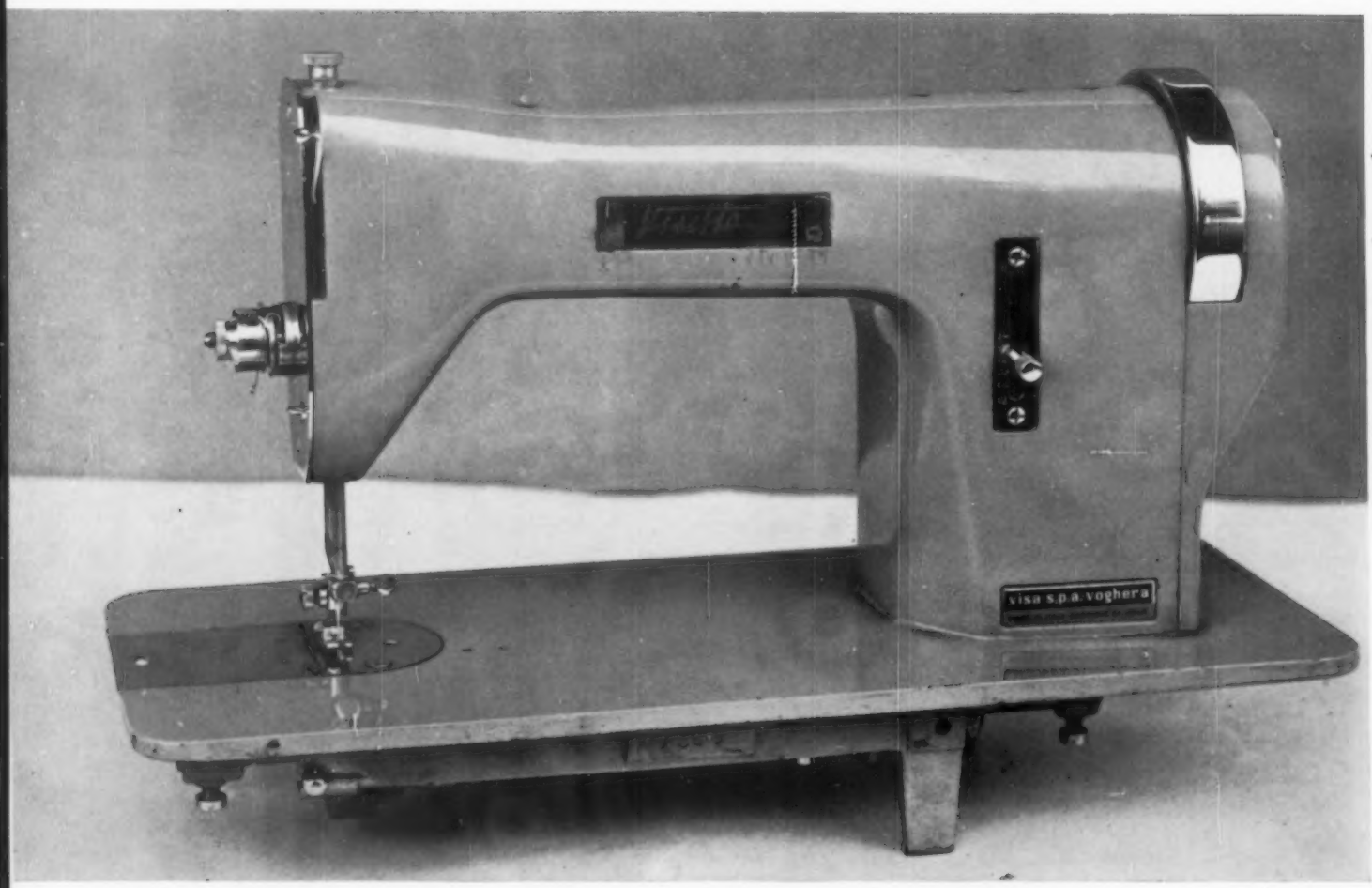
This new character has been shaped, interestingly, around an object that has a highly characteristic mechanical shape to start with: pedestal, arm, needle, lower shaft prescribe an instantly recognizable silhouette. For designers, this has meant reconsideration of problems once solved by the Singer: questions of balance, articulation of parts, handling of openings and joining. Four machines, here and overleaf, answer these questions with a vocabulary that states what the essential character of each machine is: precision instrument, or workhorse, or home appliance.

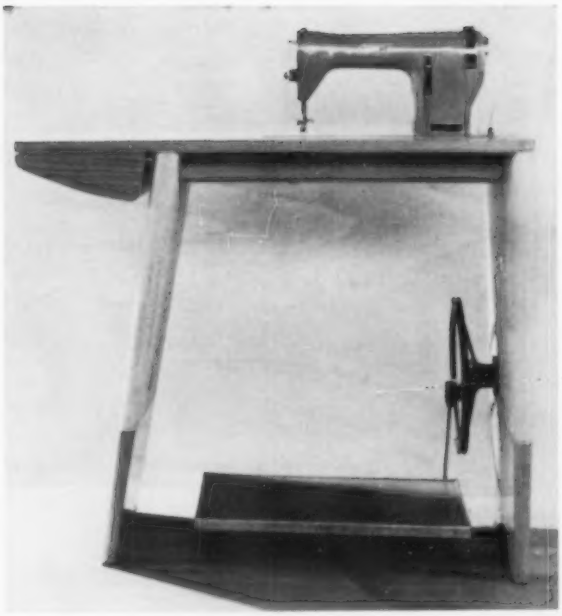


Vigorelli *smooths all its parts into a strict straight-sided rectangular form only lightly shaped for essential balance: the pedestal turns in slightly, as on the Morse, to emphasize the girder-like span of the arm suspended between pedestal and needle head. Sections of the case are placed so that the joints reinforce the impression of contingent slabs, giving the machine an architectural, assured, workhorse quality.*

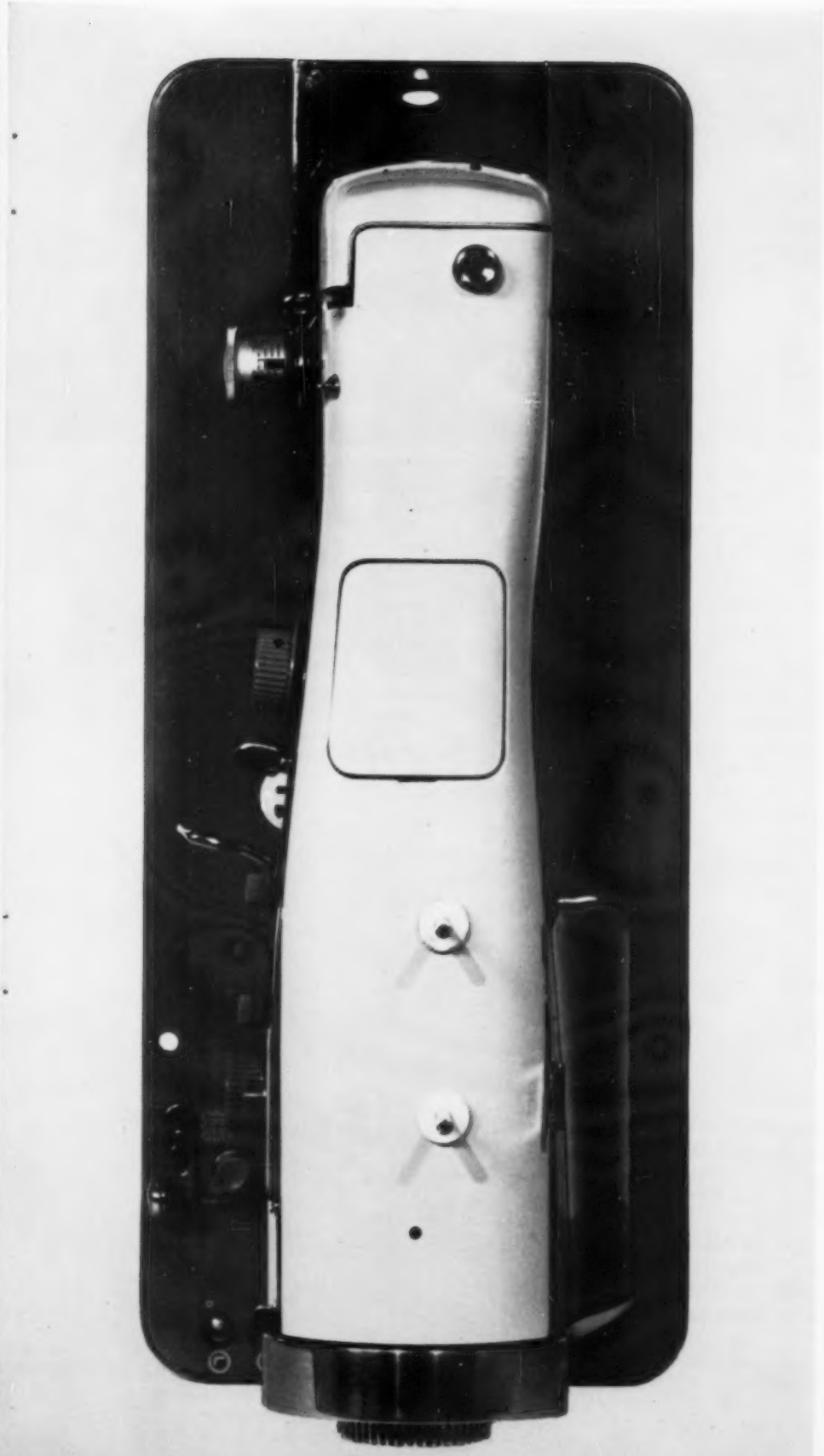


Morse, *made in Japan but designed here, under Italian influence, also reiterates the suspension of the arm. Whereas the curve of the old Singer pedestal achieved enough weight to suspend the needle head clearly, the head of the Morse cuts off abruptly. It seems to close the arch like a structural post terminating on the needle. The head is also given more importance than on the Vigorelli by its enclosure in a cap-like casting.*

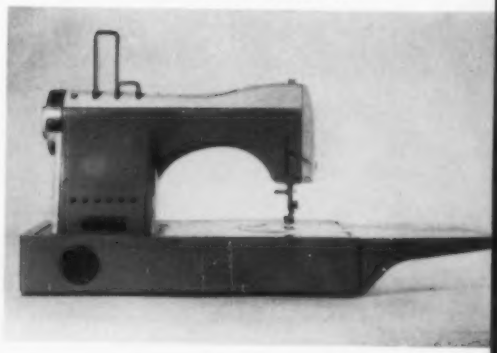


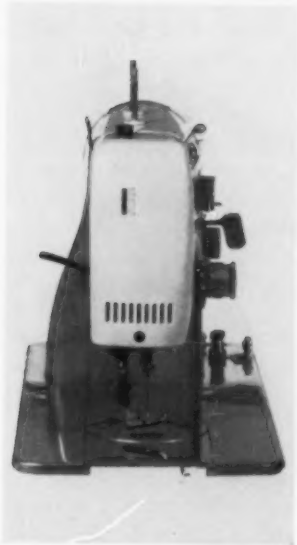


Visetta, *designed by Gio Ponti in* 1948, *is clearly a precision machine. The weight of the long arm, offset by more massive pedestal and enclosure around flywheel, balances delicately on the needle toward which the head gracefully tapers. Three-quarter exposure of the flywheel emphasizes its weight and importance as on no other machine. Unlike the Necchi and Morse head enclosures, which are continuous with their bodies,Visetta's head is terminated by a flat chromed plate like the old Singer, which, by its abrupt contrast, seems to clarify the front-to-back shape of the rest of the enclosure. The taper, evident in the top view, shows skillful handling of a problem created by the extreme contrast of size between needle head and pedestal.*



Necchi, *designed by Marcello Nizzoli, is less purposefully symmetrical than the others. It gets its character from subtle balances and freer use of curve and voids.*





The motor in the pedestal, for instance, is allowed to force an asymmetrical projection of the back of the sculptured shell. The clear arch under the arm emphasizes the shaped line of the head tapering into the needle. The flywheel, wholly exposed and standing outside the enclosure, gets less emphasis than the semi-enclosed one of Visetta. Bulky without being coarse, molded with more interest in robustness than refinement, the two-tone Necchi seems closest to the character of an appealing appliance.

Because the sewing machine is one of the few household machines a woman invariably tries out under working conditions before buying, the initial impact of the showroom demonstration is an important test. The accomplished sewer knows exactly what she wants in a machine and what small adjustments can provide major irritations when she is embarked on a project. The novice makes further demands: in executing all the tricky maneuvers she has been led to expect, does the machine also give her confidence that she can learn to master it? Designing clarity and convenience into the machine, both with special features and through the total organization of controls, is a problem no less important than the creation of the character of the machine.

Because the sewer adjusts and tests the tension and the various stitch controls for each new operation, their position is an obvious consideration: all must be within reach of her right hand yet free of the sewing surface, and it makes sense to have them close together. They should be clearly marked to make it easy to reproduce exact settings.

Calibrations are tending to become more precise, if not always more comprehensible. Tension was once indicated on a one-to-six scale, and can now be set in a range from one to nine (4); yet none of the machines offer any indication of what tension is appropriate for what fabric. The presser foot, which must be raised and lowered more often these days, generally has a screw control with one marking for normal. Necchi's presser foot control is calibrated from one to nine in a vertical line (6), and other machines are following suit with number markings for guiding this operation.

The traditional stitch length markings indicating number of stitches per inch is being simplified by using an arbitrary one-to-four scale. On the other hand, a few manufacturers are communicating more clearly by using pictorial symbols: the Morse stitch dial visualizes the straight stitch length (5), and on the Bernina all controls are related to diagrams (11).

Organizing the controls of an automatic zigzag machine is even harder. Invariably two controls are added — zigzag width and needle position. There may also be a pattern elongator or other special knobs, and machines with built-in cams have control levers or dials. Beyond this, the machine is communicating a totally new operation. For mechanical reasons, there is often a scattering of controls on pedestal, arm and head, confusing the user and the machine's lines.

The cams that produce various automatic stitches are usually inserted manually into a chamber behind a movable plate on the body of the machine. The built-in cams used on a few models allow better management of controls (11), but because of space problems offer limited variety of stitches and, thus far, none can offer automatic reverse stitching. Pfaff builds in its cams, yet offsets one advantage of this by placing the control dial inside the machine (12).

Automatic zigzags still retain some degree of manual control for sewing without cams. Thus it is still necessary to have a stitch-width control that can be easily moved by hand as the machine is sewing. Necchi's automatic still uses a lever designed for its first zigzag: curved to fit the thumb, it is moved horizontally by thumb and forefinger — an easier, more exact and less tiring motion than twisting a knob.

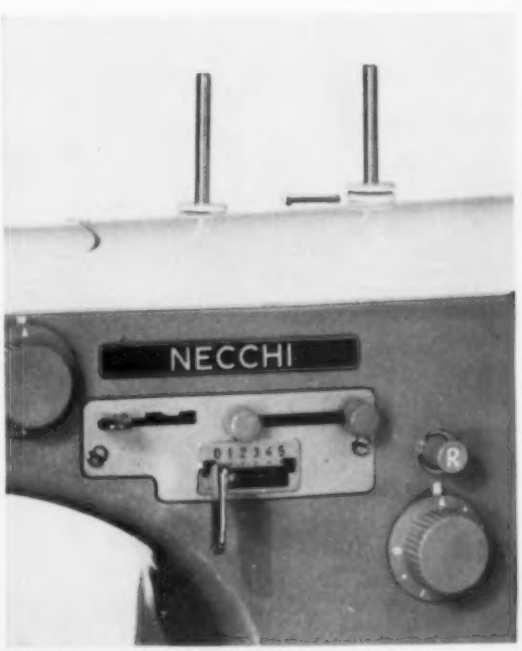
1

2

3

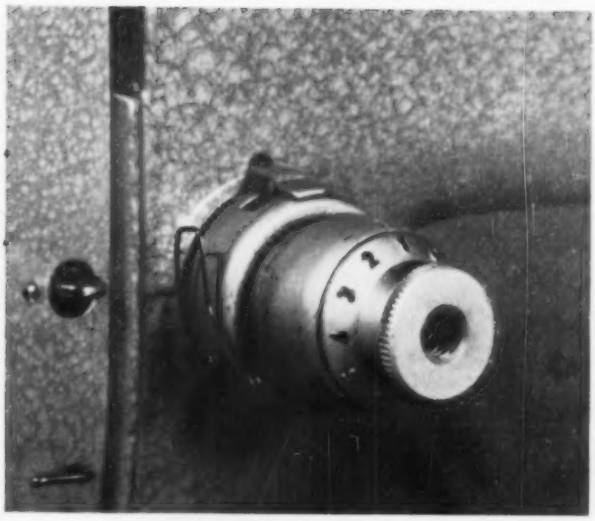
Refinement in operation: (1) *Pfaff needle threader;* (2) *Viking free arm opens for good view of bobbin case;* (3) *Necchi bobbin when fully wound stores out of sight.*

9



Necchi controls are gathered together on machine arm in logical pattern. Round knobs control similar vertical movements.

4

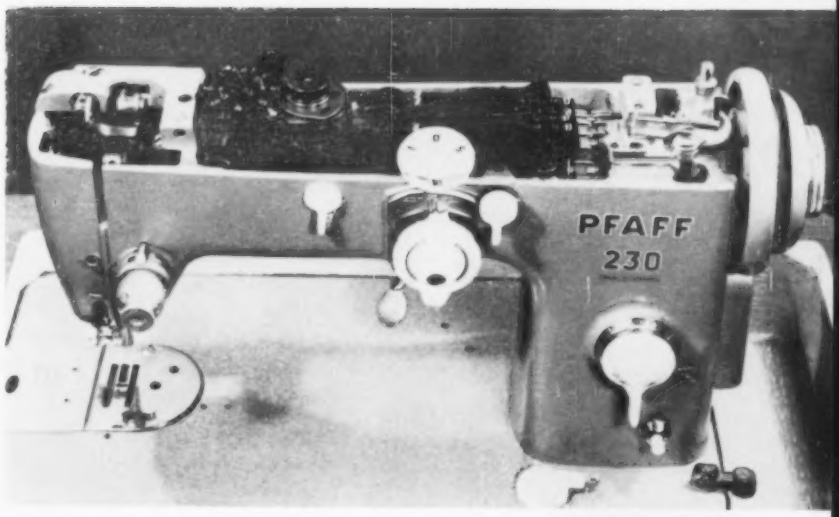


5

6

Greater control: (4) *Pfaff thread tension has metal discs rather than coiled spring;* (5) *Morse stitch-length dial pictures stitches;* (6) *Necchi presser foot is calibrated on front plate.*

7

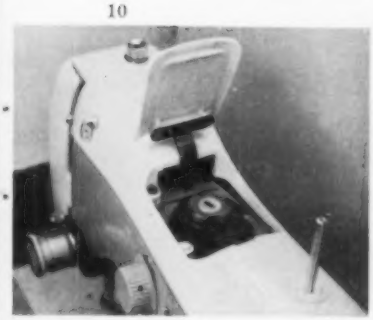


Simplified maintenance: *Sewing machines now come apart so housewife can get at parts for oiling and removing dust and lint.* (7) *Pfaff top comes off completely;* (8) *Singer front plate is hinged.*

8

Pfaff controls (13) *bypass logic for symmetry. Two polywog knobs control unlike operations; needle position lever is separated from its arbitrary* 1, 2, 3 *markings by large dial. In Viking* (14) *needle position knob points to diagram.*

10



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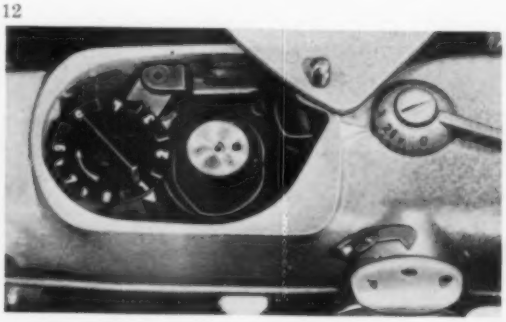
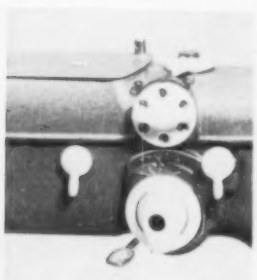


11

Necchi cams are assembled, put into machine (10). *Built-in Pfaff cams* (12) *are dialed inside machine. Bernina lever* (11) *sets cams inside.*

13

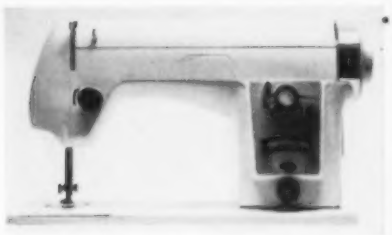


14

15

Clumsy knob of Singer 319 (15) *is result of superimposing two functions on one control. Typewriter keys on top of machine dial cams.*

Borletti 1946: *Gio Ponti*



Model of Borletti, 1956

Marco Zanuso tackles controls from within

Borletti: To the woman who first sees it in a showroom the new Borletti conveys power in a massive structure and an ability to perform befitting an automatic zigzag machine that promises all sorts of sewing wonders. At the same time, the clarity of its lines and logical arrangement of its controls assure her that when she sits down to sew she will be its master.

It is not by accident that the Borletti, made in Italy, is both visually and functionally a successful machine. Its designer, Marco Zanuso, gave 18 months' thought and experiment to every aspect of its design. His job, as he saw it, was "to suggest not a new form for an old one, for the sake of elegance, but to arrive at one that is an outgrowth of functional improvements."

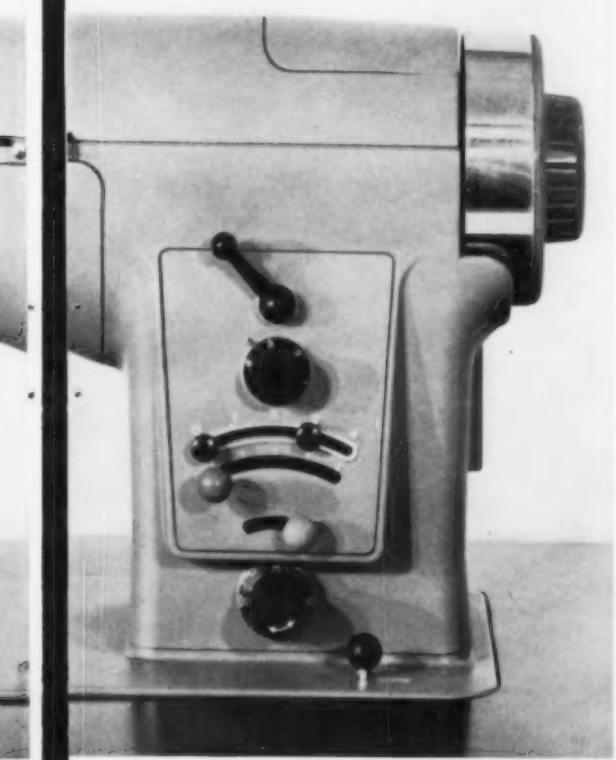
There was much debate over the situation of the controls. Zanuso proposed to unite them on a panel at the foot of the machine to make them easier to find and manage. The new placement would also allow resting the forearm on the machine bed during manual zigzagging. This suggestion aroused some resentment in the factory because it would require new connections between the various mechanisms and their controls. Since Zanuso had been called in after the mechanical organization was established, resistance to any changes was to be expected.

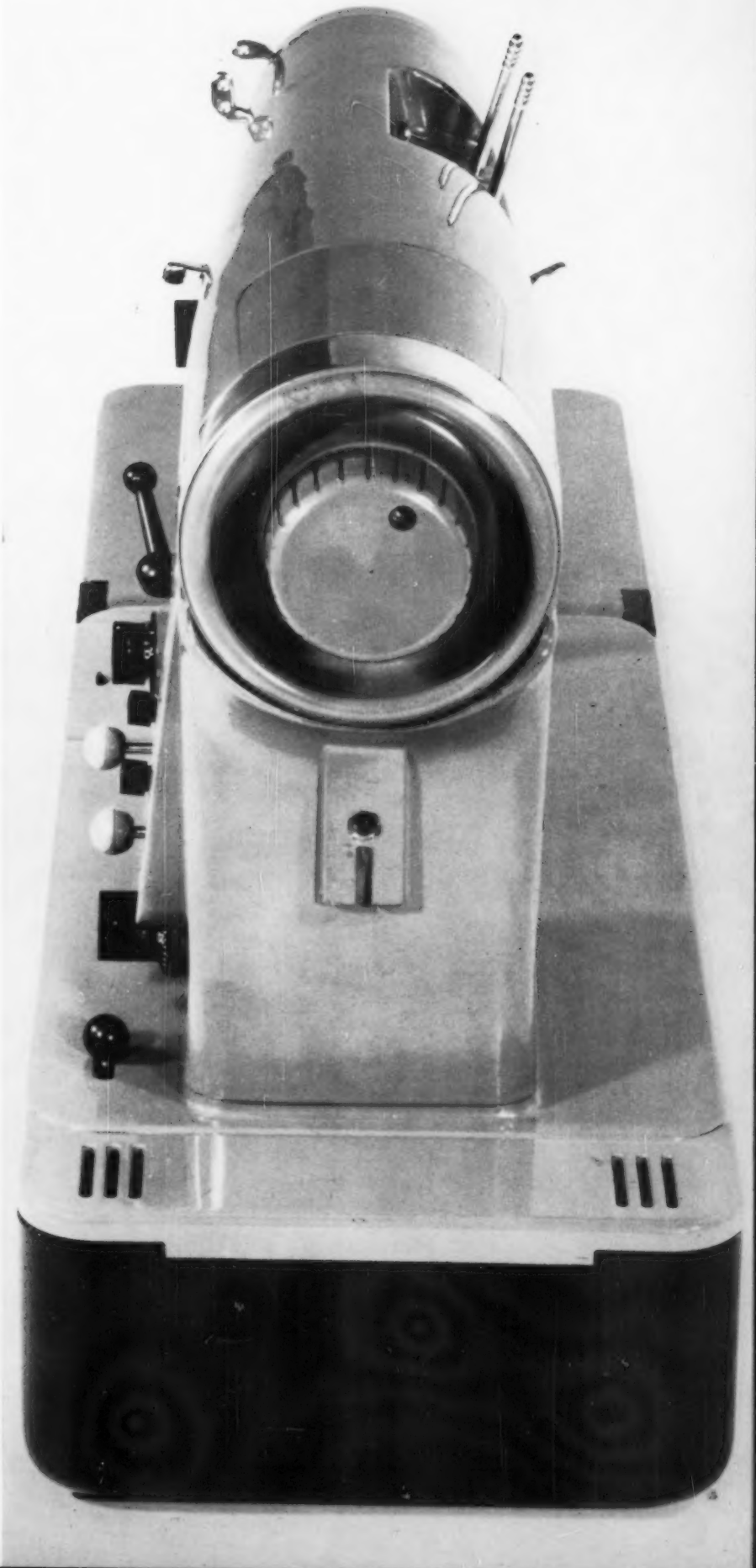
Yet Zanuso persuaded the production men of the importance of the new organization and the mechanical modifications were made. Four or five models were constructed in the search for a coherent arrangement of the knobs on a raised panel, for an elegant head — a problem because the light is housed there—and for structural strength of the arm and inner part. He arrived at a new sculptural resolution of the difficult meeting of head and needle. A system of openings in the housing was devised for easy access to all mechanical parts, including a particularly large and convenient opening for getting to the bobbin case. Design of the flywheel was influenced by the need to connect it to two forms of power: the foot pedal, which is sometimes preferred in Italy where electricity is expensive, and the electric motor housed in the base of the machine. It is a necessarily heavy flywheel integrated into the machine body with a supporting lip.

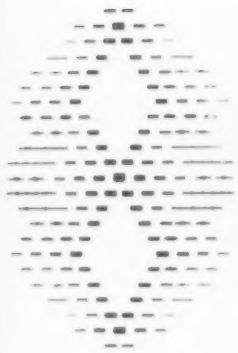
Zanuso wanted a white machine for lightness and purity. Former Borlettis were a dark shiny green and the manufacturer wanted to continue this color, which he considered a trademark. Compromise: the Borletti is a light gray and green mat finish.

For the next model Zanuso is thinking along totally new lines. Well acquainted with the machine's mechanics, he questions the standard arrangement arrived at by Singer in 1851. "One can imagine," says Zanuso, "a connection between what are now two separate movements — the bobbin whirling and the needle traveling up and down. If an engineer solves this with an industrial designer, the outcome will be a totally new form."—*i.m.w.*

Above: model of control panel at one stage of its development. Similar looking knobs mask very different functions. Below: on completed machine, zigzag controls are collected on panel; stitch length adjuster, only knob used in straight stitching, is separate. Controls are gay and simple; different hues, shapes and distance from machine (see right) help identification.







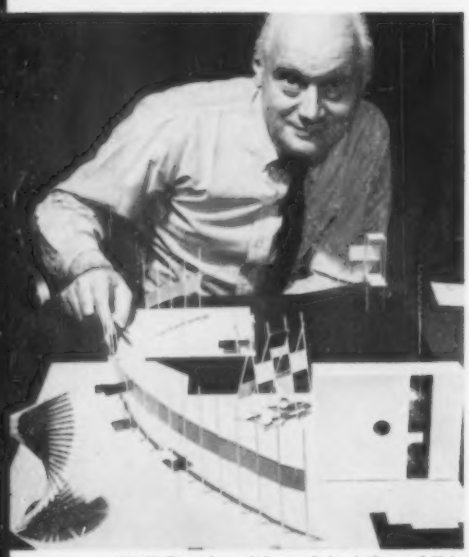
X-ray diffraction

Oscillograph

Scope cover

From an Upjohn ad

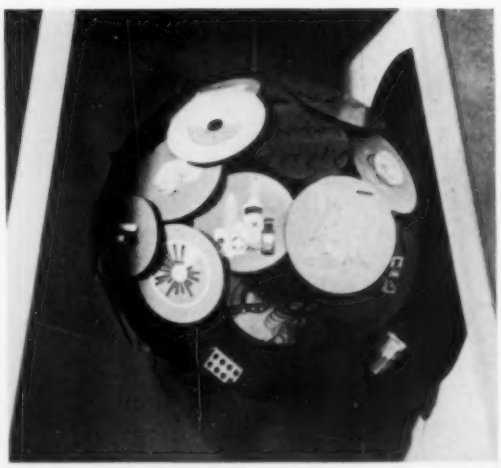
Two graphic exhibits

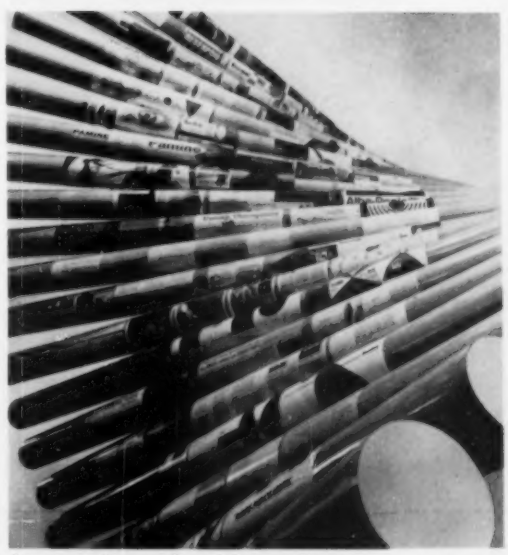


Will Burtin with model of the exhibit.

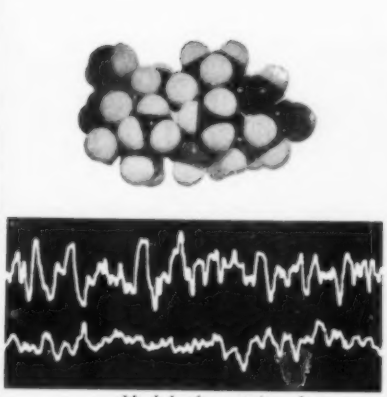
Rare is the traveling exhibit that doesn't *look* demountable, that the spectator cannot immediately take apart in his mind's eye and slip into boxes. This complex display for the Upjohn Company, however, designed by the experienced hand of Will Burtin, fools the eye. In the Kalamazoo Art Center, where it made its debut in January as a framework for Burtin's Upjohn graphics, the exhibit curves and zigzags its way under the high ceilings and uneven beams of a Victorian interior and seems made to order for that very place. On these grounds, obviously, it will fit in anywhere, and that was the designer's intention; even the special features, such as the globe of bright, colored discs dramatizing the capsules and graphs that pertain to pharmaceuticals (right) can be collapsed into a package; and the twisted roll (mailing tubes) display may be taken apart by removing one central rod.

The comprehensiveness of Upjohn's activities, and Burtin's role as their graphic interpreter, is borne out even to the smallest imagery in the catalogue of the exhibition, as shown at the top of these pages. All is derived from actual medical material by Will Burtin—from *Scope*, a quarterly, of which he is Art Editor, direct mail folders and blotters for doctors, ads in medical and technical journals, and other publications including *Scope for the Veterinarian*, *Scope Weekly*, *Upjohn News* and *Overflow*. Upjohn's purpose in spreading the visual news is to help its specialists as well as its customers to realize the breadth of company research.

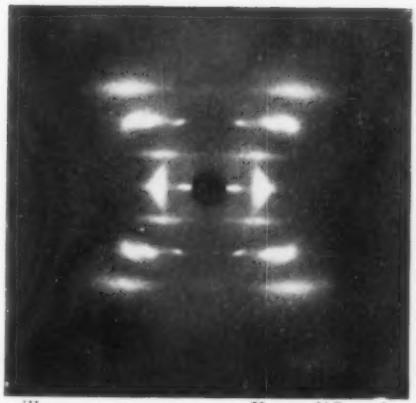




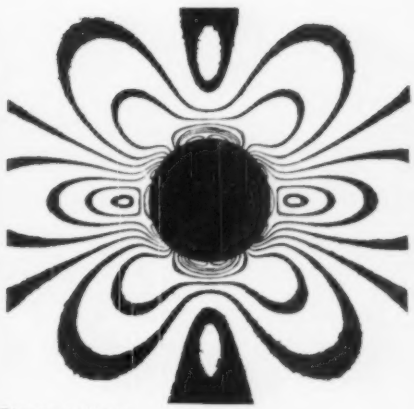
Imagery from advertising matter.



Model of protein, electroencephalograph, vitamin pill.



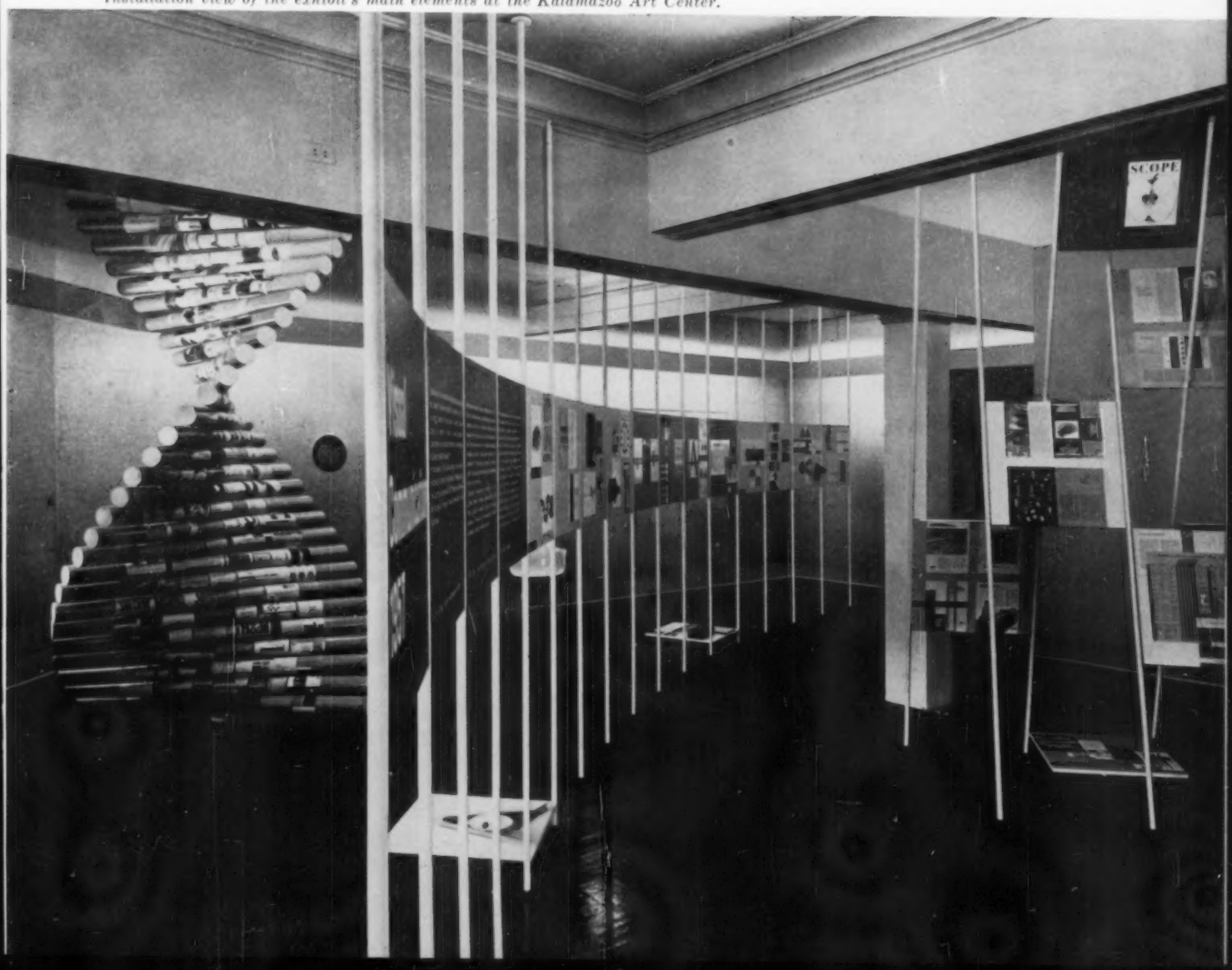
X-ray diffraction



Stress pattern

Burtin's reflects the scope of his work for the Upjohn Company

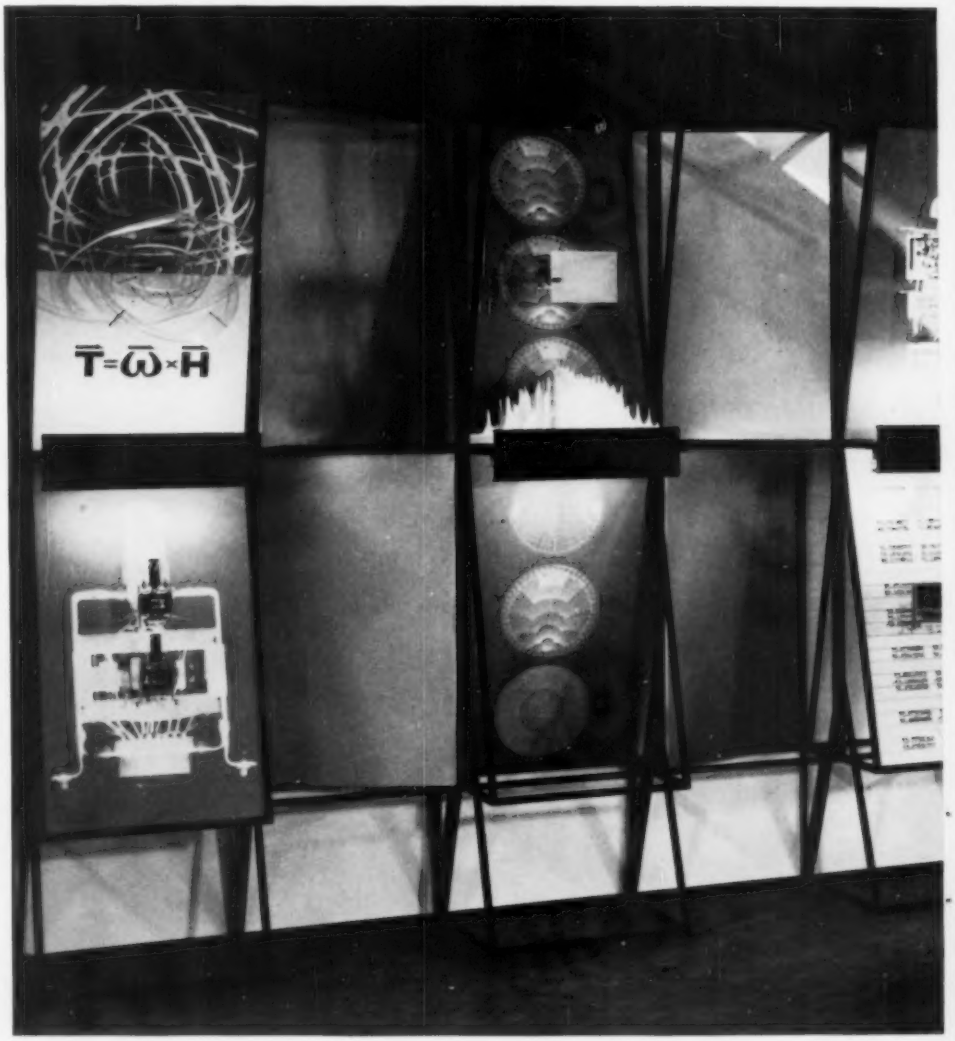
Installation view of the exhibit's main elements at the Kalamazoo Art Center.



Beall finds a systematic framework for The Martin Company's many purposes

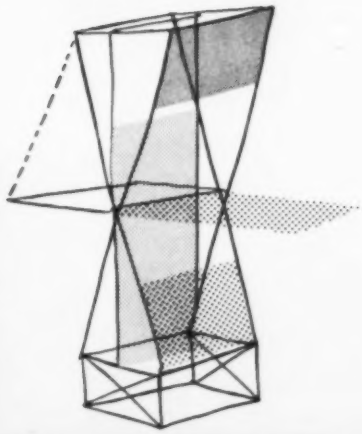
Trade shows with their fixed booth sizes (and many of them different) present a continual problem in installing a good industrial exhibit. For The Martin Company, Lester Beall devised a system fitted to the basic needs of trade shows and professional meetings, which can be put up with the minimum of labor costs and hazards and can be varied in size by adding to the framing. Each unit is composed of a flexible steel framework (one inch square tubing) into which panels can be fitted at different levels and angles, and the contents of the panels varied for the occasion, a principle explained in the drawing at the top of the next page. Each modular unit has individual lights neatly concealed and painted to match the color of the panel—rich yellow, red or blue.

Beall's graphic designs in this version express the nature of Martin's advanced research in aviation and electronics, centering on Vanguard, the earth's satellite's launching vehicle, for which Martin is the prime contractor. Beall presents this project as the single moving element in the display —a revolving model of the earth suspended from a curving aluminum sheet, with the satellite, a half-inch in diameter, circling around it in an elliptical path. This drama is presented from a moon's-eye view. The 12 units can be fastened together with standard hardware while the fact that so little hardware comprises the exhibit itself, and that its strong impact comes from the color and images of the panels, provides substantial immunity in transit.

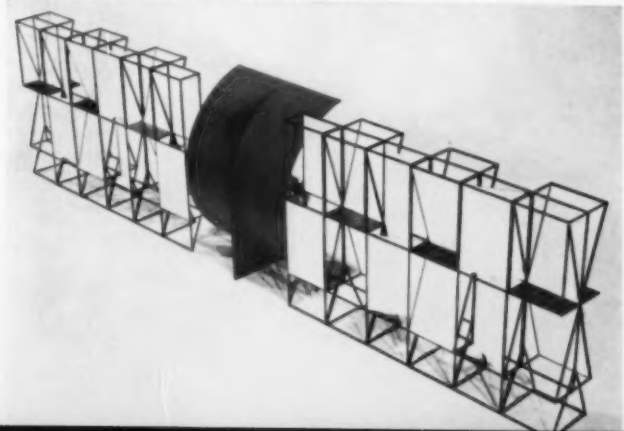


Designer Beall and friend.

Below, the revolving earth attracts a visitor at the Power Show in New York. Right, an early drawing shows principle of interchangeable panels.



Above, panels may be varied at each show; below, back view.



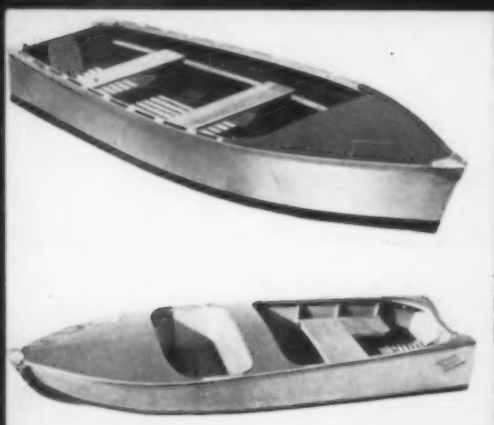
Coliseum exhibit told story of an industry's range: from traditional sailboat to

Boating world creates a new industry

Some six million boats will crowd America's waterways this season, carrying nearly twenty-eight million Americans in search of new leisure-time diversions. As the widening middle class has taken to the water in the past decade, it has added 3½ million boats to the fleet (more than half the present total). Boating has become as popular in the interior as on the oceans, and man-made lakes are bringing it to all areas of the country. Sports like water-skiing and skin-diving have taken hold, nautical weekend and vacation habits have spread, and waterfronts show the haphazard growth in their parking and traffic problems.

The boom has meant business—about $1¼ billion was spent last year on boats (434,000), motors (584,000), supplies and services. And it has left the boat-builders, once clustered around small and traditional craft businesses geared largely to a custom market, panting to keep up with the demand. Yet despite their limited experience with mass-production, the builders *are* inevitably mobilizing into an industry. Their boats show a common response to a more popular market—with pressures to lower cost on the one hand, and to obsolete models through innovation on the other. The formal debut of the industry took place at the National Motor Boat Show held at the New York Coliseum this winter, when almost a thousand distributors of everything from docks to (boat) dollies, fuels to (boat) jewels, greeted the public with a profusion that indicated how complex the boating world has become. The frenetic, uneven and often imitative industry revealed both vigor and uncertainty about its proper direction in design. It is taking many tacks as it feels its way—Inventive and stylistic, ingenious and fantastic—and design is part of them all.—*a.f.*

runabout, from dinghy to auto-style convertible, from prefabs to Cadillacs



Boating industry

Malleable post-war materials shape new styles in boat design

Boat shapes have changed steadily since the first rash of post-war models hurried out to meet an unexpected demand, and materials have played a major role in the process. A huge new market slowly made its demands clear: economy, easy upkeep, lightness for portability, appealing shapes, and in some cases design for do-it-yourself. Since traditional craft products made of carefully fastened, heavy wooden planks were no longer able to meet the demands, aluminum and fibre glass were quickly seized on for their inherent advantages on the water: they don't rust, rot, dry out, warp, or become water-logged, are light yet have high impact resistance. Easy maintenance was the big selling point — the customer has very little seasonal seaming, caulking or repainting to worry about — but equally important to the boom was the ease with which the new materials could be fabricated on a quantity basis and at more popular prices than custom-building allows.

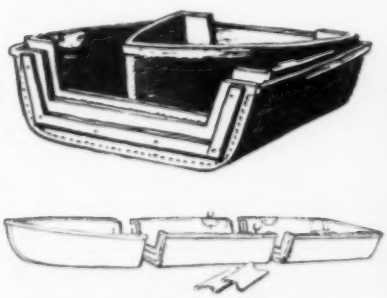
The continuous structures that moldable materials offer are often *too* great a temptation: taking its lead from the auto-industry — perhaps in the hope that boats can be new symbols of prestige and power — many boat-builders are molding fibre glass into curvy hot-rods and tacking aluminum fins on gunwales that once expressed a field of design that was notable for sheer classic line. But some runabouts are deriving sleek — and aerodynamically sound — shapes with fibre glass, and even the standard family 14-footer is beginning to show some of this grace. Double hulls for flotation and even bait-boxes (in Thunderbird's Flamingo) are being molded right into the boat. Meanwhile, aluminum is being welded and formed more and more, and developments in molded plywood promise to make a comeback for "the material that was left behind."

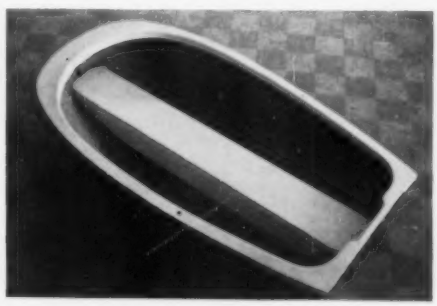
Bellingham Shipyards' Bell Boy Bikini, designed by racing-boater Ted Jones, has fibre glass hull, hydroplanes to lift hull for 100 *mph.*

← *Three stages in post-war design of aluminum Arkansas Traveler Boats: company's straightforward first model in 1946 (top, left) makes little effort to conceal rivets, has wood plank seats, floor boards and gunwales ($215); 1949 model (bottom, left) develops rounded contours, integral plywood seating; latest edition has fibre glass deck, one-piece stretched metal hull ($700-850).*

Molding of fibre glass boats at Tomahawk Boat Manufacturing Co. begins by coating glass cloth with Vibrin polyester resin (U. S. Rubber Co.), ends with finished hull being lifted from mold. Fibre glass allows family boats like Thompson Star (right) to take racing-boat shapes. Some plastic boats have integral color to cut down on repainting.

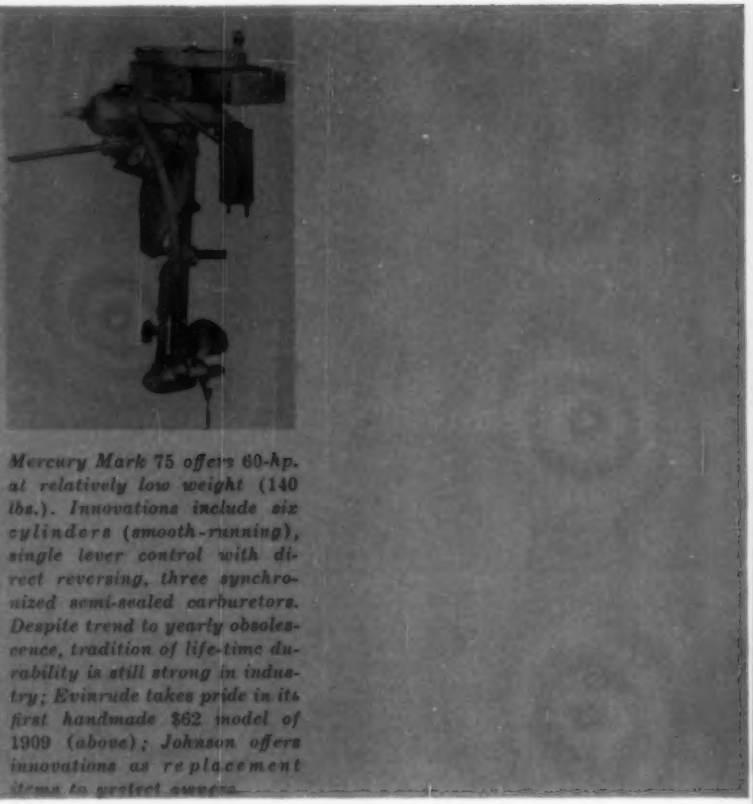
Plywood is taking new forms for unique applications: White Pack Boat is demountable for easy transport (100 pounds), can be assembled in seven minutes. Plywood prefabs like U. S. Molded Shapes' Bluebird Kit ensure do-it-yourselfers of seamless rounded hull. Ray Greene & Co.'s Tubby Dink uses fibre glass for sturdy, unpretentious lines.





Evinrude Lark, designed by Brooks Stevens, was commissioned by motors manufacturer to stimulate boat-builders: only a year after it was introduced, Cadillac's Sea Lark emerged (p. 57), using different materials in a production model. Stainless steel fins for speed stability, bucket seats, two individual wraparound windshields, steering hand-grips replacing wheel were introduced to create boat on model of sports cars.

More motor for the money means convenience as well as power



Mercury Mark 75 offers 60-hp. at relatively low weight (140 lbs.). Innovations include six cylinders (smooth-running), single lever control with direct reversing, three synchronized semi-sealed carburetors. Despite trend to yearly obsolescence, tradition of life-time durability is still strong in industry; Evinrude takes pride in its first handmade $62 model of 1909 (above); Johnson offers innovations as replacement items to protect owners.

Technical advances in outboard motors take a good share of the credit for the boating boom. As the noisy put-put, the stifling exhaust and the stubborn rope starter become memories, the less mechanically-inclined sailors — or any member of the family — can take to the water with more confidence and less expectation of fatigue. Today the trend is to more power: power to handle bigger, more comfortable boats, or for just plain speed. This year Mercury's Mark 75, for instance, entered the market as the first six-cylinder-in-line motor to be mass-produced — a 60 horsepower package. Heavier though such motors are, the tilting boom, winch and marina launching ramp have made it unnecessary to remove the motor after docking.

For special kinds of performance, innovations come trooping out each year: Fageol offers a vertical-inboard-power motor — an outboard mounted through the hull of the boat to give greater maneuverability; and the Mercury Mark 10 has a forward-canted power-head that drains off unconsumed fuel to ensure idling without choking the fuel line. For greater reliability, 12-volt starters are replacing the 6-volt systems, generators are becoming standard equipment to prevent battery failure (and are permitting more electrical accessories on board even the smaller boats, and new safety devices are being introduced — like Outboard Marine motors' slip-clutch propellers to guard against damage from underwater objects. Though motors are being made to look like everything from juke-boxes to space helmets, design is making them the consumer's, not the mechanic's, instrument and is giving them distinct brand identity for the first time.

Scott-Atwater line designed by Raymond Loewy Associates uses fibre glass hoods for corrosion- and impact-resistance, interchangeability in five colors; Oliver Olympus designed by Wally Droegemueller uses fibre glass snap-off hood to expose engine for easy maintenance. Olympus has alternate-firing twin cylinder 35 hp. engine, removable powerhead for portability, 12 tilt adjustments, underwater exhaust, relatively small size.

Continental Kit (below) assembles with screwdriver and wrench into three hp. motor, weighs 22 lbs. At $69.95 it features air cooling, quiet underwater exhaust, integral gas tank (2½ hours of cruising). Another development in low-priced field is Silver Creek's Silvertrol which runs on six-volt auto batteries instead of gas, develops two hp., operates silently for 8-12 hours without recharge.

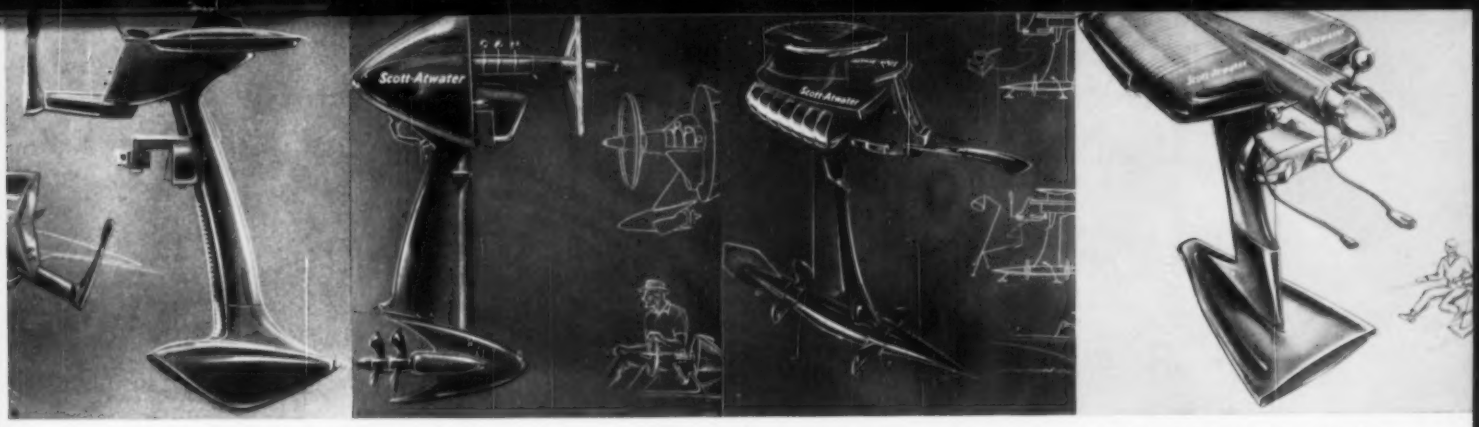
Brooks Stevens' outboard prophecies (l. to r.): Aqua Jet uses engines to pump water back at high speed through underwater jet nozzles; Turboprop gas turbine similar to jet plane motor drives twin propellers, has remote-controlled steering; Turbojet's twin exhausts thrust hull forward at high speeds with aileron-like steering controls angled for banked turns.

Boating industry

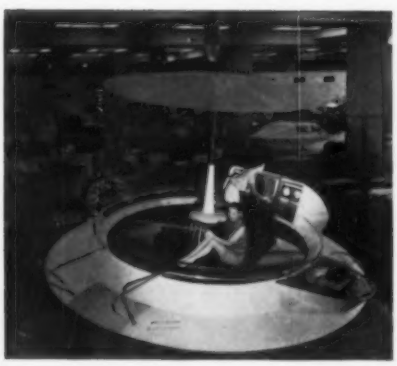
Engineering advances and "dream-boat" thinking hint at boating's future

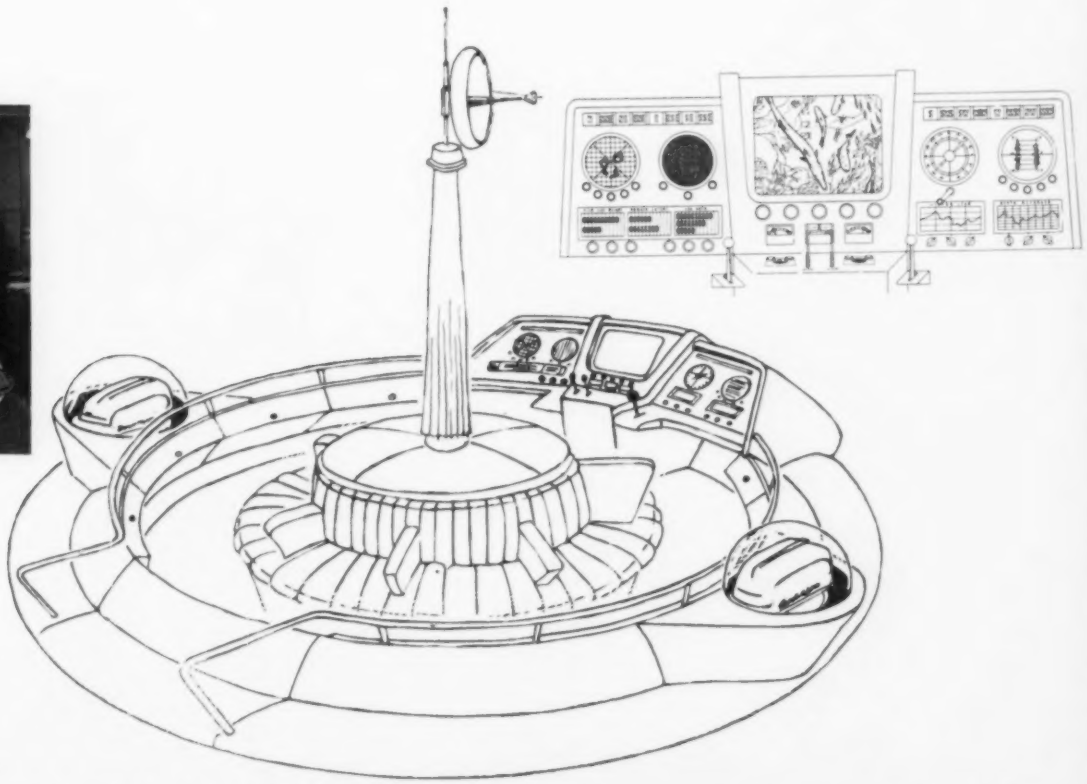
Exterior hydrofoils, much used in racers, can also lift cruiser (Presso Cantiere Rodriguez, Messina, Italy) clear out of water for minimum drag, maximum speed. Foils and multiple-plane racing-type keels for speed may become standard, instead of heavy motors, but projecting parts are prone to damage. Motors-makers aim to meet speed-demand with high power in light packages.

Although fantastic-looking boats and motors on these pages reflect an industry-wide urge to be spectacular, many of them may well become standard equipment in the next decade. Hydraulic systems, fuel-injection engines, fluid-drive clutches are even now close to production; fuel-producing and jet propulsion systems from the electronics and aviation industries may seem remotely connected to popular boating today, but the industry is not letting the possibilities slip by. Manufacturers of motors are providing much of the impetus: they are thinking not only of "bigger and better" in their own field, but are introducing basically different boat prototypes to inspire the slower-moving boat-builders to provide new outboard markets. And one of them, Scott-Atwater, has called attention to the critical problem of inadequate docking facilities by suggesting a thorough redesign of waterfront servicing centers by commissioning a model of a "boatel" (right).

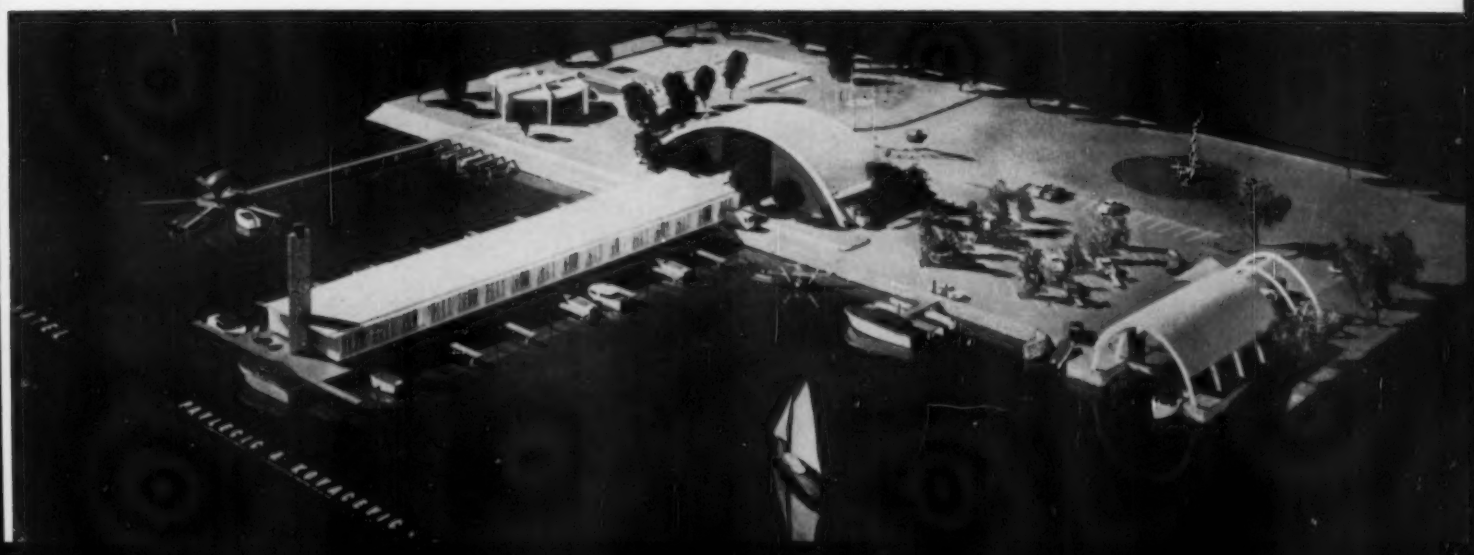


Scott-Atwater's projections for the future (l. to r.): Sonic outboard powered by sound waves; full wheel-steering that incorporates counter-rotating propellers to eliminate torque; solar-energy motor that traps sunlight in concave disc to charge batteries; and water-cracking reactor that produces hydrogen for fuel as needed.





Radical round fishing boat, designed by Brooks Stevens for Evinrude Motors, gives all fishermen a ringside seat around central hub. Heavy interest in accessories, appliances and instruments is pointed up by simulated electronic nerve-center which includes tracking, navigation, communication, depth finding and computing equipment. Scott-Atwater's "boatel," designed by Pavlecic and Kovacevic, envisions complete and organized service area to improve present waterfront chaos.



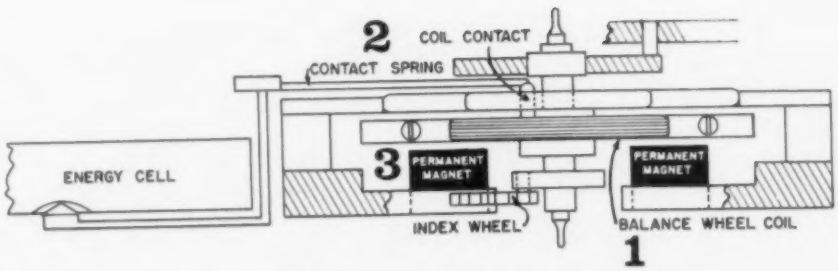
REdesign

THE ELECTRIC WRIST WATCH — MAJOR NEWS IN AN OLD INDUSTRY

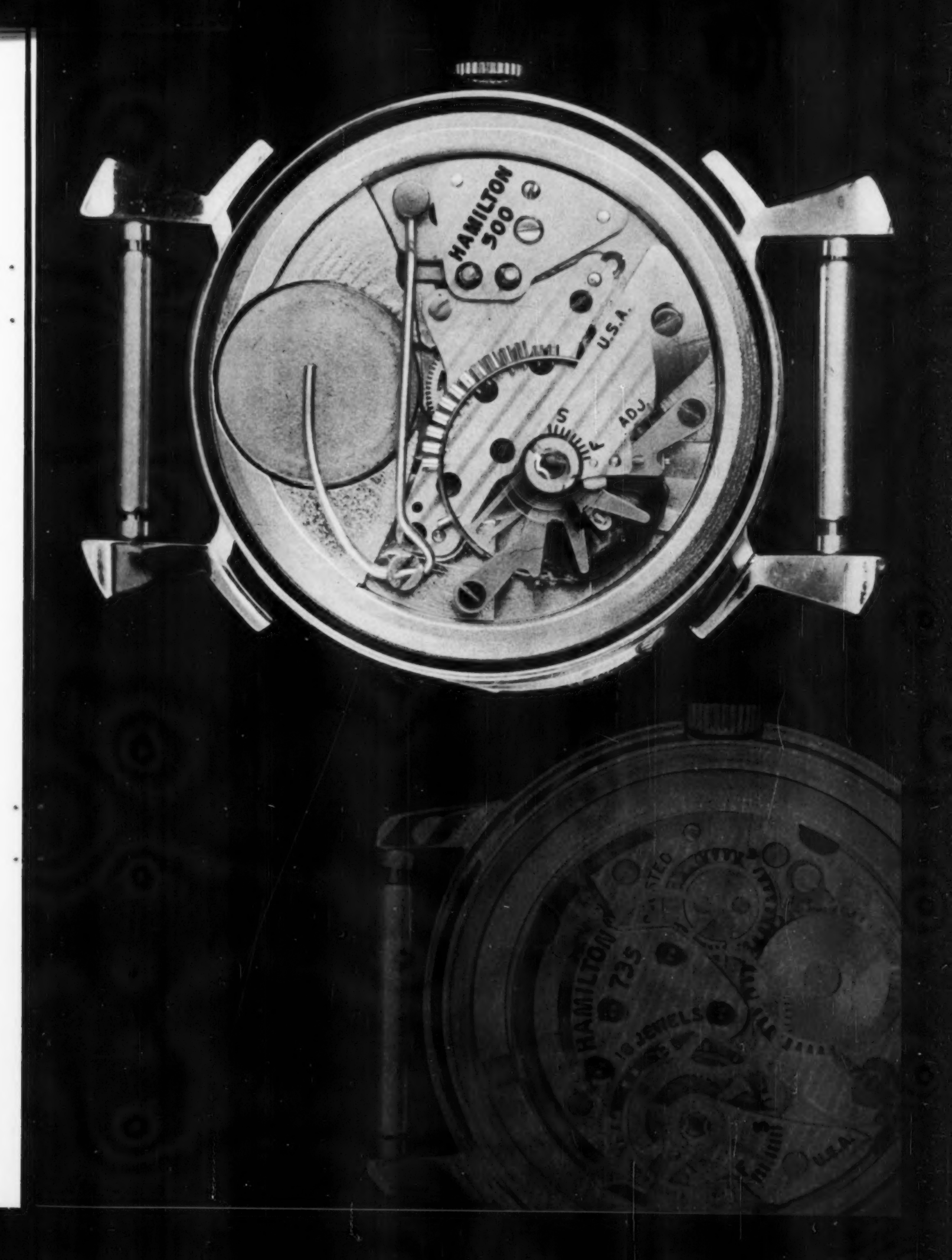
Blessed with an ingenious mechanism which has left little room for mechanical improvements, the portable watch hasn't basically changed for centuries. The self-winding watch was an important redesign, but it still operated on the classic power principle —mechanical power stored in the mainspring and transferred via the controlling balance wheel to the gears that move the hands. Now, with the development of new power sources, the whole concept of wrist watch operation is subject to change. There has already been talk of atomic batteries powering the wrist watch of the future, but more realistic evidence of a new watch concept was recently demonstrated by Dr. John Van Horn, Director of Research and Development at Hamilton Watch Company: a wrist watch run by electricity, made possible by the constant strides toward miniaturization of power plants. The movement of the new electric Hamilton is contrasted on the opposite page with the standard mechanical watch shown at the bottom. In the upper picture, the drum-like shape held in place by a wire is the new battery, a chemical energizer that replaces the mainspring; it has enough energy to supply current for a year and can easily be replaced for $1.75. Rather than being set in oscillation by the conventional mainspring, the balance wheel of the new watch has been made the central element of a tiny motor. The motor is supplied with power from the energizer through a contact spring, which closes a switch each time the motor coil mounted on the balance wheel shaft is pulled past two tiny permanent magnets. The closed switch allows current to flow from the energizer through the coil; the electric current then reacts with the magnetic field of the magnets, setting up a force which kicks the balance wheel back and causes it to oscillate.

For the user, the redesign means a wrist watch that need not be wound and offers more reliable timekeeping. The speed of the new Hamilton can be held to an accuracy of more than 99.995 per cent, the result of the stable power supplied by the energizer. A 14 karat gold Hamilton Electric now retails for $200.00; gold-filled models, starting at $89.50 will be available soon.

New watch contains button-size energizer, miniature motor (below).



Power plant schematic: 1 Magnets pull balance wheel, closing contact spring. 2 Contact lets current flow from energizer through coil. 3 Current reacts with magnetic field, kicks wheel, sets up oscillation.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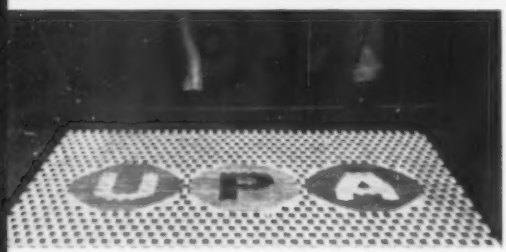

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Simultaneous meetings of two professional groups drew a number of designers to Los Angeles in February. Design educators, convening for the third time to decide the future of their informal group (5), *voted to form a permanent national "Industrial Design Educators Association" with Joseph Carreiro as head of "IDEA."* (*Between sessions, the educators visited UPA Studios* (3) *where executive producer Stephen Bosustow* (4, 7) *told them how UPA got started with its original cartoon productions.)*

Over 125 *IDI members and guests attended the banquet at which President-re-elect George Beck presented an honorary membership to speaker Richard Neutra* (1).

Both groups toured classes at the Art Center School (2, 6, 8), *which served as headquarters for the meetings, and heard the panel discussions and talks that are summarized on the following pages.*

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IDI discusses TV, styling, and creativity

What's wrong with the television industry? A design panel disagrees.

Planned as the first of a series of annual forums on the problems of television design, the panel meeting took place at Art Center School on February 15 before an audience of 150. The panel consisted of: **George Beck,** *General Electric (formerly Manager of Design, Radio and Television Division);* **James Fleming,** Telechron Division, *G. E.;* **Jon Hauser,** *consultant designer, Philco Corporation;* **Dan Jensen,** *Philco Corporation;* **Joe Portanova,** *Director of Design, Hoffman Radio Corp.;* **John Vassos,** *consultant designer, R.C.A.;* **Herbert Zeller,** *Director of Design, Motorola, Inc. The program was moderated by* **James Kelso,** *Director of Design of Packard Bell Electronics.*

Kelso: Television has been a major factor in bringing the electronic field into millions of homes, yet in a few short years television has gone from boom to bust. The improvement of the basic black and white set has been sporadic; color is getting a very slow start. About a dozen companies have ceased producing television sets in a period of as many months, crying that there is no future in the business. Those who have remained in the business have found themselves trapped in a price war. Something is wrong when an industry provides the public with an instrument worth millions in education and entertainment yet finds itself in economic trouble. Who is at fault? Management? Merchandising? Design?

Jensen: I feel that as designers we lack freedom to advance TV merchandising as much as we might like to. One reason is that component costs have risen while the final sale price has dropped, which has caused a profit squeeze for everybody.

Portanova: I think the major difficulty is that we have gone into cheaper and cheaper cabinets, which has reduced the prestige of TV sets. I believe that doors belong on television sets, for example.

Zeller: Doors! The only time you look at television is when the doors are open.

Jensen: It has been our experience that you cannot sell sets with doors because it raises the price.

Portanova: All I am saying is that it is difficult to achieve a "period of furniture" style on a cabinet without doors.

Kelso: I don't agree. The furniture look is easily achieved without doors.

Zeller: And what does a French Provincial cabinet have to do with 20th century television?

Vassos: I have a friend who recently purchased a receiver in a French Provincial cabinet because his house is furnished in that style, and he would be very unhappy with anything else—a portable set, for instance.

Hauser: I agree that it is just as important to have furniture as to have the set itself.

Beck: It all depends on what kind of set you are talking about. When it comes to a portable, you don't seek to imitate furniture because what you have is an instrument. So the object is to produce a light compact unit that can easily be carried.

Kelso: Do you panelists notice a sharp trend away from the 18th century mahogany and borax-modern cabinets?

Panel: Definitely.

Kelso: Then I think we have made strides in advancing good taste.

Zeller: Our industry had a poor year last year. Yet the furniture industry has the best in its history. And its success is attributed to television.

People are spending more time at home, and are becoming more interested in its appearance. Existing furniture is wearing out and being replaced.

Here is the key to our problems, a place where designers can help immensely. The appliance industry has done an effective job in integrating its products into complete and efficient packages. Think how much more easily an electronic entertainment center could be promoted: 1) This is for all the family. 2) This provides a money-saving rather than a money-taking service.

Of all the equipment in the house, the most looked at is the television set—so shouldn't it be the best looking, properly located so that everyone can see it completely?

I venture to say there is not a homemaker who has not faced the problem of a proper room arrangement, lighting, color and decoration for TV viewing —and even hi-fi listening. Yet let's be honest: the industry has not made an effort to solve this problem.

It may be some time before we can do the complete package job, but we can take steps in this direction. We can show how to use the products being used today. And as we study these problems, we will find that the electronic devices take new forms and involve new materials. I can forsee the time when home architecture will be affected by the planning of complete electronic entertainment centers. That is why I object when television sets are referred to as furniture. I believe they are instruments and as such look unlike furniture. As time goes by, that is how they will have to be designed.

Portanova: I disagree with Mr. Zeller. It is my conclusion that television should be designed to fit in with the consumer's surroundings — treated as a piece of furniture emphasizing good design.

Question: Would it be possible to produce a television set having a master chassis with a tube that could be built in and one that could be carried around, in order to make television available in more than one room?

Kelso: Yes, but only one channel would be available at a time, which would defeat the objective of allowing the children to watch one show in the den while you watch another in the bedroom. It would be an expensive, probably custom-built, proposition.

Beck: Why not just buy two portables? They would serve

the same purpose. Besides, Underwriters' Laboratories frowns on the idea of a "slave" unit.

Question: Could I have a black and white set that produced an image that was sepia, blue or green instead of grey? A monochrome picture.

Kelso: It is possible. On my own set, a color set, I can adjust to get a monochrome image in sepia, which is very pleasing and restful.

Portanova: This can also be obtained with a filter or color glass lens, such as our "easy-vision amber lens."

Zeller: This whole question is one of the biggest jokes in the industry today. The engineers have to aluminize the picture tube and build hotter and hotter chassis to get a high level of brightness in the picture, and then they put a 50% black glass in front of it, defeating the entire purpose.

Beck: We call it "black daylight" and the purpose is to increase the contrast.

H. Creston Doner, Director of Design, Libbey-Owens-Ford (from the floor): We have conducted extensive research on glass coloring and found that there are about four suitable shades for TV. This information can be made available to designers if desired.

Kelso: In conclusion, I would say that we are agreed that there is something wrong with our industry, and it is our job to correct whatever part of the fault that may be in the design realm. For my part, I am convinced the problem is merchandising. The prevalence of the "Chinese deal" is certainly the clue. The quickest way out of a price war is to sell honest quality under controlled conditions, and I feel the designer must play a more important role in directing the industry's thinking — not just designing but planning.

Where does auto styling fit on the management team?

by John Najjar
Chief of Styling, Lincoln Studio
Ford Motor Company

Automotive styling is basically no different from its allied fields of industrial design. The objectives are the same; it is merely the application that varies. The stylist, however, is a blend of many skills. Like the architect, he designs the envelope of the car; like the industrial designer, he works on varied components; like the interior decorator, he selects and designs the fabrics. And like the furniture designer, he establishes the interior trim and seat dseigns.

The styling operation at Ford Motor Company can best illustrate our acceptance as part of the management team. In 1955, when Mr. George Walker was made vice president and director of styling, a styling office was organized so that each of our family of cars would have the undivided attention of its own group of stylists. Each chief stylist is also an important part of the Division whose cars he designs. To do his job, he must know the goals of the division manager and the objectives of the sales manager.

Mr. Walker, as director, has an operations manager who assures the functioning of our "wiring diagram." Direct line responsibility for each car line is assigned to the individual chief stylists, and each is assisted by two executive stylists: one in charge of exterior, the other of interior. (Each studio also has its own planning manager who executes schedules and orders.) Each executive stylist is assigned a number of stylists, clay modelers and layout personnel; one of the smaller studios has a total complement of almost 60 people in all.

To produce a car on a specified date, the division programming office schedules completion dates for each affected component activity. It is logical then that styling, being the first of a long chain of events and exercising a large degree of influence on the complexity of the car, should be in a pivotal position in management decisions . . .

The great strides in automotive styling in the past 10 years will be dwarfed by the developments we foresee in the next decade. Future developments in air conditioning could permit fixed side glass and establish new areas for air intake and exhaust apertures that might result in an entirely new approach to roof styling.

The lowness of the cars of the future will be limited only by requirements for passenger comfort, road clearance and practical mechanical factors. The lower cars will, of course, require new methods of entry through the use of roof flippers, sliding roof panels or unique door action. The interiors will require new seating, which will be thin and form-fitting. . . .

An entirely new concept in automobile packaging — different proportions of hood, body and deck length — can quite quickly develop with the advent of engineering innovations in propulsion, transmission and riding comfort. . . .

Duddy

Dempsey

The final IDI panel session presented two members of a unique investigating team working at Wright-Patterson Air Base — Lt. John Duddy, chief of the Design Unit, and Charles A. Dempsey, Chief of the Design Research Group of the Aero Medical Laboratory of the Air Research and Development Command. In their joint presentation they explained how they are using a new research tool to evaluate human factors in designing critical military equipment — a method they call

Cross-discipline creativity:

A new strategy for comprehensive design research

by Lt. John Duddy

Since its conception in the early thirties, the industrial design profession has developed tremendously in scope and in influence on the American economy. The profession's change of direction during these years from disproportionate emphasis on aesthetics to a functional compromise of manufacturing economy and appearance criteria has been a profound evolutionary process. Today, as it rapidly matures, industrial design is reorienting itself still further to face the complex problems inherent in our realization that we are trying to plan *the entire human environment.*

The challenge of this new and broader goal demands attention to human factors as well as familiar engineering and aesthetic criteria. The methodical integration of human factors into the creative process of design introduces an element that has been grievously neglected. Furthermore, it automatically provides the designer with a diversified set of efficient scientific tools, developed over the years by psychiatrist, anthropologist, physiologist, etc., by which a comprehensive design solution can be evolved and evaluated. The proper application of these research tools through an objective human-factor evaluation program can provide the comprehensive designer with a critical assessment of the product and its acceptability to the consumer, prior to its release on the market. Such a program can insure a high probability of product success before production and marketing funds are committed.

Problem: 1975 *cockpit*

In this connection, the work of the Design Research Group of the Aero Medical Laboratory at Wright Air Development Center should be of interest to all designers. Although the group is obviously not concerned with consumer products, its work requires scientific attention to human factors, and a method of evaluating success in this area is essential.

The Aero Medical Laboratory is constantly faced with broad and complex problems in total airborne environment design, in the design of sub-systems and personal equipment, in ideation and human factor operation research. In an effort to compress the time required for the entire process of identifying first the problem, then the potential means, both proven and new, for solving it, the Laboratory employs an operating concept that is unique to the field of industrial design, although it has been the *modus operandi* in the

fields of aviation and medicine for many years. This concept is called *cross-discipline creativity;* it is an integrated team strategy for comprehensive problem-solving, and can be applied to many kinds of problems.

The primary objective of cross-discipline creativity at the Aero Medical Laboratory is the achievement of optimum functional efficiency in operations where man and weapons-systems must perform in combination. Most of the design problems we encounter are in critical compromise areas, where the human effort normally required by the man and weapons-system complex approaches and sometimes exceeds the theoretical limits of human capability. The ultimate achievement of optimum efficiency requires the integration of basic knowledge about human beings, their environmental requirements and their operational tasks, as well as the functions that the weapons-system components within their environment are called upon to perform and the technology by which the environment and the weapons-system components are created.

Endurance limits

During the past several years, the Aero Medical Laboratory has been conducting an investigation of the limits of human endurance to conditions of confinement in minimum-space aircraft compartments for extended periods of time. This program has been divided into two distinct projects, each delineated within the context of a high-performance weapons system. The first project, conducted in 1954, was concerned with the confinement of an individual in a fighter cockpit for 56 continuous hours. The second project, currently under investigation, deals with group confinement problems arising during a simulated 120-hour flight. A review of this latter problem and our approach to it should illustrate the flexibility, the efficiency, and the creative potential inherent in our cross-discipline strategy for comprehensive design research.

In the 120-hour study, Aero Medical research efforts have been focused upon two things: the design aspects of an airborne environment and an analysis of the complex human response patterns to prolonged, concentrated activity. This combination of comprehensive design and human-factor research is typical of the assignments given to the Design Research organization. Problems of this sort are presented to the organization by higher-level authorities within the military establishment as a whole.

When a research program directive is received, the Chief of Design Research, Mr. Charles A. Dempsey, conducts a technical evaluation of its scope and complexity and develops a research plan for optimum utilization of manpower, funds, and facilities to satisfy the program requirements within the context of long-range military goals. The Design Research team is then convened and the entire problem matrix is presented as the initial subject for creative activity. This team is the basic, full-time staff of the Design Research organization, composed of designers, engineers, aviation physiologists, psychiatrists, biophysicists, anthropologists, psychologists and technicians.

The initial creative session has two purposes: first, the team delineates the problem; second, the individual team members identify themselves and their disciplines with the problem context. If it is discovered that areas of the problem cannot be investigated adequately by the technical talent available within the staff, the project director prepares a manning document that establishes the additional talent requirements. The necessary specialists are then drawn from the reservoir of talent available within the greater research establishment.

Total environment

In its broadest terms, the design and human-factor research program we were embarked on required the cross-discipline team to create a total environment for five flyers confined together for five continuous days. Each individual had to be provided with a daily work program and a homelike habitat wherein he could satisfy his personal, nutritional, sanitation, rest, and relaxation requirements and maintain optimum emotional and social relationships with other group members. The problem was further complicated by the inevitable aircraft requirements: this environment had to be miniscule and to weigh as little as possible, to insure maximum speed and altitude potential for the aircraft it might eventually implement. An analysis of the facilities required for five crew members indicated that many compromise areas of cockpit design—areas, that is, where the conflicting needs of man and weapons-systems must be compromised—are greatly magnified by long-range, high-performance airframe requirements. One of the most critical of these compromise areas was the integration of crew members within an environment that seriously restricts individual mobility and limits the effectiveness of behavioral and physical adaptation mechanisms.

Throughout the early phases of a program, the complete task force meets fairly frequently. No specific time schedule is set up, and meetings seldom last more than two hours. These meetings are informal and may

be held at the Design Research planning offices, at experimental test facilities, or at various military and industrial research sites around the country.

Problem-solving methods

One of the first steps was a study of previous research that might have a bearing on our problem. A complete review of the literature available in the spring of 1956 indicated that there was no precedent for this type of program and therefore no information of immediate value. It was necessary at the outset to establish the basic ground rules: length, height, and width of a compartment that would satisfy the incompatible requirements of man and weapons-systems; types and amount of food stuffs; operational parameters involved in performing a typical mission and the types of trained airmen and equipment necessary to do the job; the amount of water required for cleansing; the frequency and type of body relief; the absolute minimum volume required to store clothing and soiled garments; acoustical requirements; lighting and color requirements to minimize visual and emotional fatigue; and many other factors.

Once these problems had been identified it was necessary to reduce them in scope and complexity so that they could be solved within the time period established by the original program directive. This ideation and time compression can only be accomplished by highly trained specialists who call upon an immediate fund of knowledge in their own and related fields. For example, in the area of nutrition, it is quite obvious that the trained research specialist could provide more acceptable creative ideas within a given time span than a philosopher, engineer, or jack-of-all-trades. Nevertheless, the team contributes to the over-all effort not only as individuals but also as an integrated group.

In any group activity, the contributions of one individual will often stimulate another to develop a new and different approach to the problem. In the cross-discipline group the acceptance of each different approach was higher than usual just because the team members are specialists in their scientific fields. But while these specialists are mentally mobile in their own areas, they are not eminently equipped to communicate across the boundaries of their discipline. As pointed out by John Arnold of MIT (ID, January, 1957), this situation contributes greatly to the creative potential of the group but inversely reduces each member's ability to manage the team effort. Continuing high levels of group activity depend on the director's ability to maintain effective communication.

Co-ordinating many specialties

The project director of this program, Mr. Charles A. Dempsey, has served in this capacity on other major research efforts during the past several years. He was assigned to his position by virtue of his broad background and experience in aviation, design, engineering, and human-factors. The director of a design research team is a comprehensive manager and planner who deals with a total problem complex with the detachment inherent in a non-specific technical field. It is his job to keep in touch with and constantly explore a broad fund of knowledge of fundamental principles and technical advances in many design, engineering, and human-factor areas.

After the direction of group investigation had been established, the director assigned cognizant responsibility for detailed investigations to individual team members and sub-groups. These sub-groups are actually small task forces detached from the total creative team, and employ a similar cross-discipline strategy for solving smaller problems within the total problem context. One task force composed of a comprehensive designer, physical anthropologist, biophysicist, escape physiologist, mechanical engineer and electronics engineer was responsible for the design of an escape system. In the course of this assignment, the escape physiologist and biophysicist conducted individual investigations of previous research into windblast injuries, etc., and engineering investigations of the human-factor compromise areas involved in the 120-hour mission requirement. The creative anthropologist helped evolve capsule seating and space specifications compatible with the body dimensions of 90% of the Air Force flying population, and also assisted in calculating center-of-gravity relationships for airborne escape attitudes, parachute descent, and flotation. He was responsible for several basic scientific contributions in these areas of his professional field. The mechanical engineer assisted in the design of the aerodynamic configuration and of mechanical actuation systems. The electronics engineer designed and developed an intercommunication-music system to go in the capsule headrest. It was my pleasure to serve as task force director on this task operation and similar ones. The result of the study was the single-place, minimum-volume ejectable escape capsule shown and explained on page 74.

An integrated food storage and preparation unit was designed by another sub-group whose members represented the fields of nutrition, sanitation, refrigeration,

and comprehensive design. Meanwhile, criteria for the over-all design of the environment were established with the assistance of experts in psychiatry, group dynamics, bioacoustics, electronics, applied experimental psychology, and air conditioning. Throughout this phase, the project director functioned in a broad management capacity, coordinating and directing the activities of each individual and sub-group toward an integrated, comprehensive team solution.

The product of this cross-discipline research program is an unorthodox crew compartment configuration. The compartment is divided into two independent areas, a "work" area, and a "leisure" area. In the work area, crew members are integrated into an efficient, disciplined flight deck arrangement. Individual, minimum-volume, ejectable capsules for crew members, together with automated sub-systems, have permitted the centralization of Aircraft Commander, Flight Engineer, and Navigator/Bombardier. Because of this, Co-Pilot and Defense Director can relieve these primary stations with minimum interruption of flight continuity.

The leisure area is the fundamental provision for relief of mental and physical fatigue. Visually and physically apart from the centers of activity on the flight deck, this airborne "bachelor's apartment" is completely equipped to satisfy the crew's personal needs and requires very little effort to maintain. Complete individual storage facilities for clothing, toilet articles, and private effects are conveniently located near the concealed lavatory and bunks.

Warm earth colors combined with indirect lighting minimize glare and provide positive visual orientation within the work area. Striking colors illuminated by spot and flood lighting are employed in the leisure area. The compartment exhibits the first use of foamed vinyl padding on the bulkheads and ceiling of a military aircraft. Since protection against injury, a necessity in minimum-space compartments, is an integral part of the furnishings, the need for headgear is obviated. Three channels of recorded music are integrated into the intercommunication system so that each crew member has a choice of entertainment as he works or rests. Two low-output speakers mounted in each capsule headrest restrict the sound to the "immediate" vicinity of the occupant. Command radio and intercom signals override the music to assure reception by all crewmen.

This compartment incorporates principles, facilities, and sub-system concepts that are projected well beyond the contemporary state of the technologies. However, Air Force personnel, unlike civilian consumers of commercial products, are selected, highly trained men, and their final acceptance of a new system is based upon confidence in its design and functional efficiency under operational conditions. To insure that the crew compartment will satisfy man- and weapons-system requirements, the cross-discipline team has therefore initiated a critical and objective human-factor testing program. The criteria by which the payoff in design research and development is assessed are concrete operating dividends: a man needs less training to operate a system that is properly designed for human use; he reaches the required standard of proficiency with less expenditure of time, money, and effort. He can reach peak efficiency more quickly and function at this level over longer periods of time. His higher over-all performance level guarantees a higher probability of mission's completion. Failure of a system to satisfy basic human-factor requirements results in loss of life and millions of dollars worth of equipment. The significance of this is plain when one considers that the time required to train a replacement is measured in man years, that each B-52 costs six million dollars.

The crew compartment evaluation program will simulate typical operational conditions. Five-man crews of selected personnel will be briefed for a 120-hour mission and required to accomplish this flight within the crew compartment mock-up. Integrated instrumentation of aircrew members and their environment will record a complete picture of the functional efficiency of the total man- and weapon-system complex.

Defining the problem of evaluation

The subject's responses to stress will be approached by asking several questions:

1. How does each subject's state of consciousness and level of alertness vary during the experiment?

2. What are each subject's physiological and biochemical responses; how do these relate to performance?

3. What levels of performance are the subjects capable of achieving and what psychological or physiological changes are correlated with performance variations?

4. What emotions are aroused and how do these affect the subject's ability to perform adequately? Further, what are the physiological correlates to emotional change and how does the emotional state affect the body's response to stimuli?

5. How does the group inter-act and in what way does this influence behavior, performance, and perception?

In order to establish a complete frame of reference for each subject, thorough physiological and psychological evaluations will be conducted over a period of five days before the mission. These tests will be compared with psycho-physiological measures taken during the experimental situation and with post-stress investigations. They will also make it possible to correlate physiological and psychological changes.

Special test equipment

To provide an objective measurement of alertness, two highly specialized bio-electric techniques have been modified and adapted at the Aero Medical Laboratory. One is the electroencephalograph, the other the skin resistance meter. A system for the analysis of "brain waves" shows great promise: subjects will have "brain waves" recorded during various phases of the test and these will be analyzed to provide a continuous measure of subtle changes in the state of consciousness. A skin resistance meter of increased sensitivity can be used as an indicator of an individual's arousal or alertness as well as his reactivity to external stimuli. Thus the skin resistance meter and the electroencephalograph together should afford some picture of the neuro-physiological activity occurring during the experiment.

A series of psychomotor tests to be performed by the subjects are designed to reflect the abilities that may actually be required to accomplish an operational mission. These tests tap the sensory, motor, integrative, and coordinative abilities of the subjects.

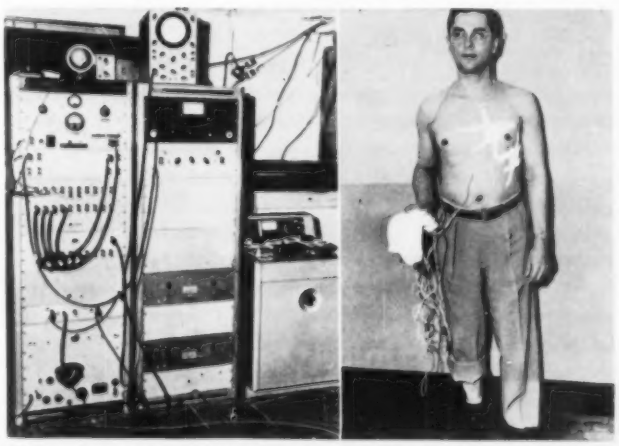
Variations of emotional state that may affect the subjects' phychological and physiological capacity will be evaluated by interviews, projective psychological tests, and subjective reports, as well as by behaviorial observations through direct-view closed-circuit television systems, motion pictures, and sound recordings. Eight hidden cameras will look at each man's face continuously, one frame per minute. Three group cameras will focus on area relationships and closed-circuit television cameras will scan the compartment. A tape recording system will take down every word that is said.

A problem that falls in this general area, though it overlaps also in other areas, is the problem of the influence of the group on individual responses. Efforts will be made to obtain measures of the group's interactions and the effects of these on perception, behavior, performance, and physiological responsiveness.

The Aero Medical Laboratory Design Research Group has established cross-discipline teams outside of the military establishment to conduct additional design and human-factor operation research studies. Two such groups currently operating under Air Force contract at Tufts University and the Georgia Division of Lockheed Aircraft Corporation are making important contributions in the areas, of design research, human-factor functional evaluation, and basic aviation medicine.

A review of advanced Air Force weapon-system requirements indicates that the present Aero-Medical Laboratory research task force may have to be supplemented to provide additional depth in manpower and technology. Proposed programs include a human-factors study of materials, development of a three-dimensional crew compartment design evaluation system, and the design of an encapsulated escape system to provide global survival capabilities for two aircrew members. The most challenging new project ahead of the cross-discipline team, now in the early planning stages, deals with human travel in space-equivalent vehicles. With this advance in technology, the success of future human endeavor will be measured in terms of human effectiveness as well as system performance.

The cross-discipline program described in this article provides a new approach to the gathering of objective design information through human-factor analysis. At the Aero-Medical laboratory such data may be used as design requirements for the development of new airborne systems or to predict the reduction of human performance capability that will occur as a result of stressful conditions in any current or future system. Through the use of this integrated team strategy and the objective measurement of product design, the Industrial Design profession can predicate its contributions to the human environment on the same sound basis as all other scientific fields working for human betterment.



Electroencephalograph testing equipment and subject in harness.

The air-borne vehicle of 1975: a complex cross-discipline problem by Charles A. Dempsey

The problem given to our shop had to do with flight about 15 years hence. Essentially, we were told to study the problem of confinement in long-term flight (120 hours) with reference to the man-machine system.

If we are to plan for long-range flight in 1975-80 we must consider the propulsion system that will keep people aloft that long. Today, jet propulsion through atomic energy is technically possible and chemical thrust through an internal rocket engine is technically feasible. Thus we are talking about vehicles that will fly in excess of Mach 2.5 (1500 mph) and up to Mach 55.3 (38,000 mph). It is also conceivable that we will be able to travel at the speed of light, which would get us from here to Mars and back in 17 months. By comparison, a confinement of 120 hours is not such a difficult technical problem.

If we expect engineers to supply us with a vehicle faster than the speed of sound, we must think of human reaction time in terms of fractions of a second. At present the only vehicles we have operating at 1975 levels are large black boxes—computors—into which we put numbers and out of which we get more numbers. Then we have to interpret the numbers for the right or wrong answer and program the computer for a specific maneuver.

In 1975, an air-crew member will perform a function of some sort once every 84 minutes. This schedule permits boredom, which increases fatigue and raises the problem of interpersonal relationships. If you are to house five individuals with all their operating equipment and everything needed for their personal comfort for four nights you need the equivalent of a three bedroom house—at least. We were given a compartment the length of a Ford, 73 inches high at the center, and 80 wide. The furthest you can get from a person in that area is 14 feet.

In identifying this problem, a cross-discipline team was obviously necessary. An industrial designer couldn't solve it alone, and specialists were needed to do it within a reasonable time. We had to be prepared to solve the problem and test it within 30 months of the time it was given. With the cross-discipline team we could do it on time but we had problems of another sort: we found out early in the game that the designer was fighting the psychologist, engineer, psychiatrist, sanitation man and nutritionist. Each was so steeped in his specialty that he sometimes lost sight of the total problem. The psychiatrist, for example, assumed that the crew members would start punching each other or accusing each other of stealing; the problem of the designer was to insure that proper design solutions would prevent this from happening.

In testing crew members' reactions to 120 hours of confinement in our cockpit we use an electronic harness that measures the central nervous system. Anything men react to is an emotional situation. If a man gets into the harness and we show him a product and ask for his reactions to its weight, noise, and tactile qualities we will get answers which we can put in the form of a curve. But we want to measure unconscious, physiological responses instead of verbal reports of the subject's emotions. Our psychiatric diagram is a bell-shaped curve with "sleep" on the left, "alert" at the top, and "panic" on the right. An emotional answer on the left would be a lethargic or negative response; on the right, an aggressive or positive one. This is the kind of emotional information that the designer doesn't get from ordinary surveys. If you ask a man about his reactions to a product you can't really be sure of finding out whether it is pleasant or unpleasant. The electronic harness measures emotions he may not know about, and does so objectively, with no chance of error by prejudiced communication.

We have been toying with the idea of the harness as an objective pre-marketing device for designers. Its development would take another five years, but it is extremely sensitive. It could be used on a sample number of consumers to eliminate the communications problem of ordinary surveys and reduce the results to reliable numbers, units of communication that can be understood without confusion.

Do research tools of this sort do away with creative design? On the contrary. Design is a scientific business. The designer will increase his responsibility to business by having more information. Specific operating facts will not interfere with creativity, but will make the designer more comprehensive.

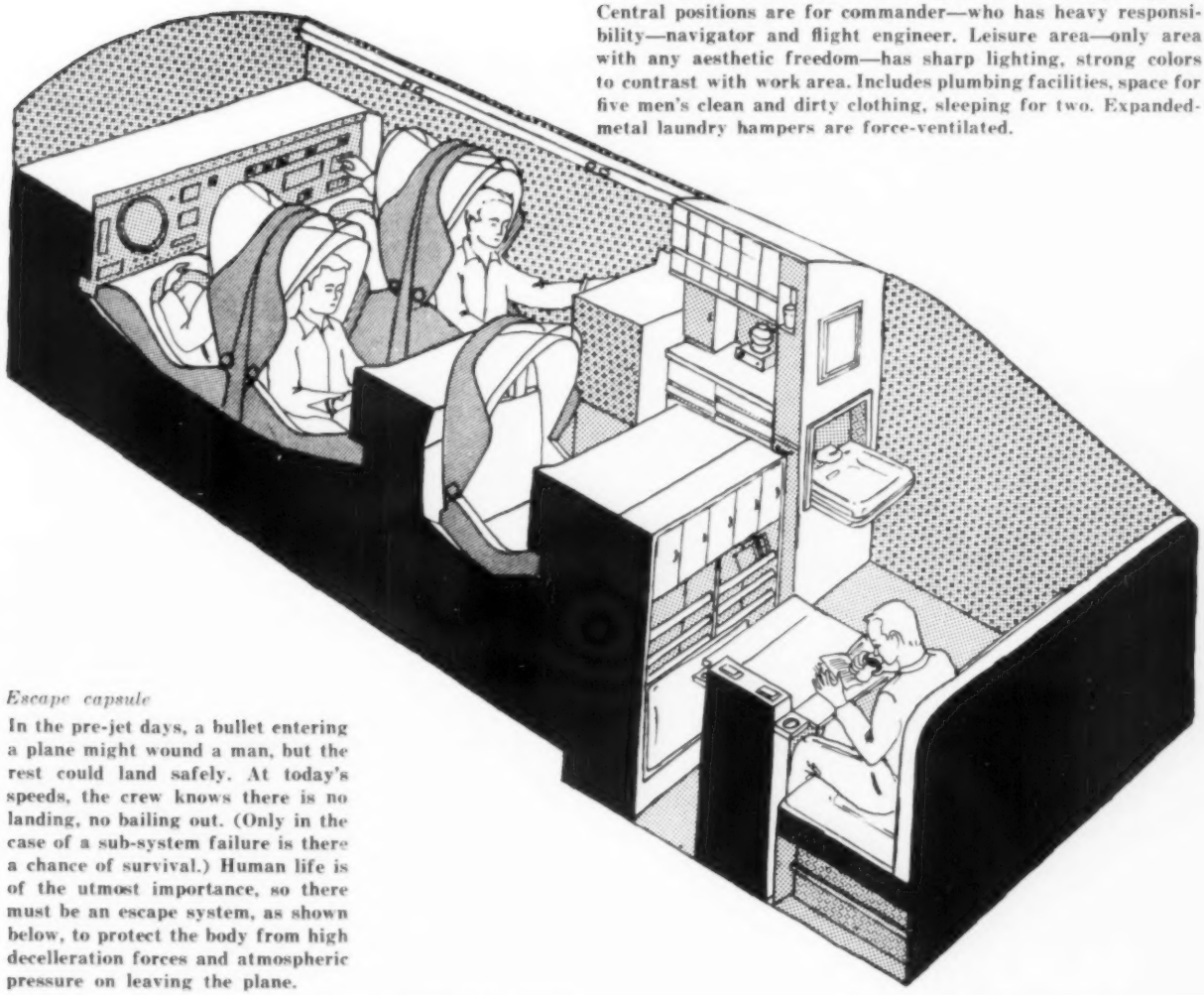
Food Center

Food bar provides three low-bulk, high energy meals a day for each crew member, with provisions for three extra days. Includes 1½ cu. ft. locker specially developed to hold 25 frozen meals, five drawers of canned meals, (to avoid problems each man has his own drawer), five juice drawers holding 18 cans each, warming oven, unique two-shell cooker for sandwiches, hot cup, fresh water tap, incinerator to eliminate waste.

Side of unit contains pull-down lavatory with medicine chest above. Since water weighs 6 lbs. per gallon, it must be calculated to the drop. (Lavatory also is used as research device; it measures individual water consumption to provide sanitation engineers with accurate data.) Towels impregnated with lotion, provided for face-washing, are also under study.

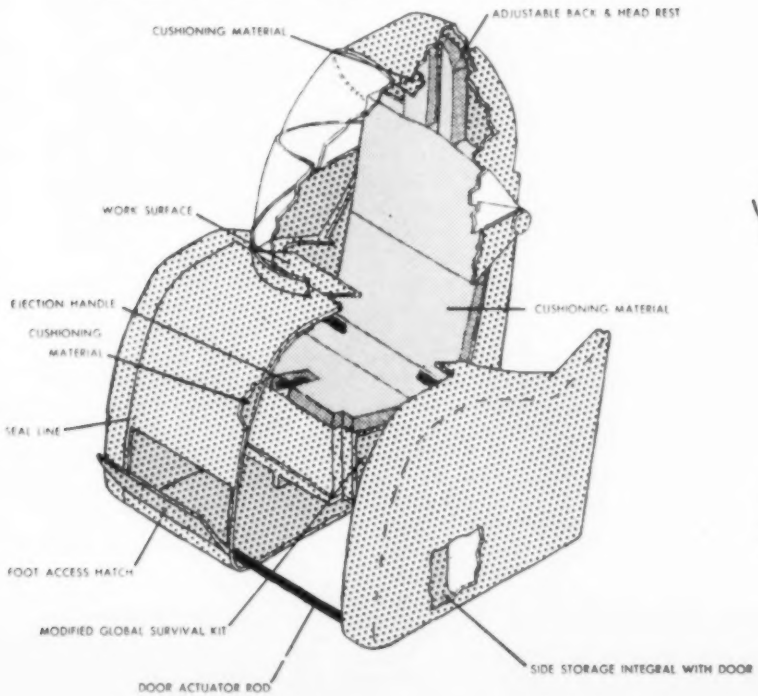
Crew compartment

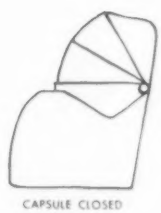
Crew compartment divides into work and leisure areas. Work stations are used 12-16 hours at a time; each has escape capsule. Central positions are for commander—who has heavy responsibility—navigator and flight engineer. Leisure area—only area with any aesthetic freedom—has sharp lighting, strong colors to contrast with work area. Includes plumbing facilities, space for five men's clean and dirty clothing, sleeping for two. Expanded-metal laundry hampers are force-ventilated.



Escape capsule

In the pre-jet days, a bullet entering a plane might wound a man, but the rest could land safely. At today's speeds, the crew knows there is no landing, no bailing out. (Only in the case of a sub-system failure is there a chance of survival.) Human life is of the utmost importance, so there must be an escape system, as shown below, to protect the body from high decelleration forces and atmospheric pressure on leaving the plane.

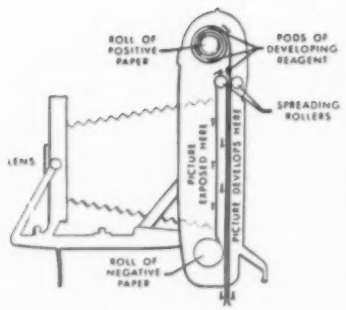




Solution is minimum-space escape capsule built around each work station. Occupant climbs in, sits on polyurethane foam 15 hours in continuous comfort, in space 22 inches wide and 35 inches deep at the floor. Ceiling is also padded. Two hi-fi speakers in headrest give choice of three musical programs. Under seat is survival kit (15″ x 18″ x 6″) to sustain a man under emergency conditions anywhere on earth. Personal parachute, helmet, headgear, special clothing are unnecessary. In event of engine failure, system closes and seals, pressure changes. Capsule is ejected, floats to earth, serves as house or boat anywhere on globe.

Student project:

SYRACUSE POINTS TO NEW VISTAS IN CAMERA DESIGN



school: Syracuse University's Department of Industrial Design
instructors: Leland C. Smith and Douglas R. Cleminshaw
participants: fourth year design students
problem: to apply the Polaroid film principle to a camera for professional use

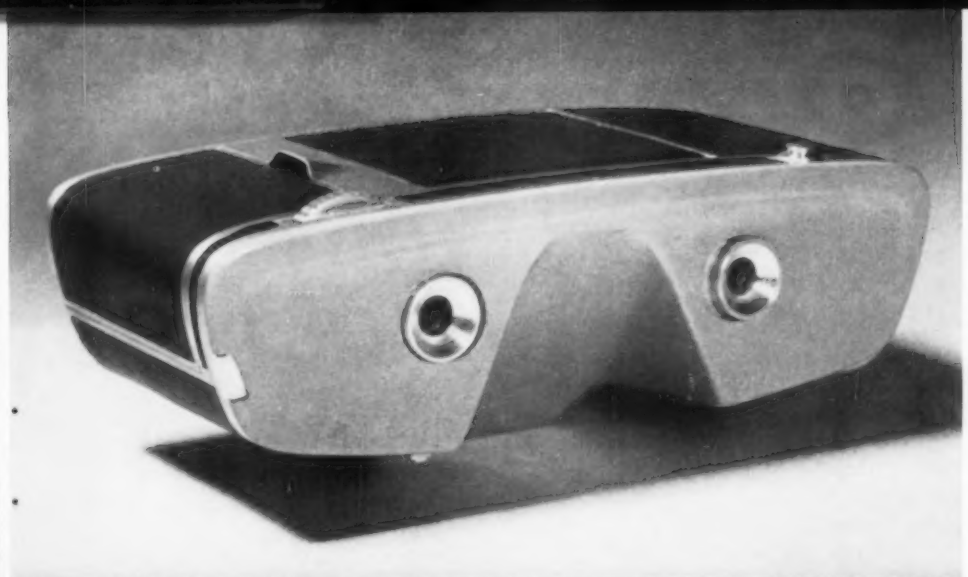
The Polaroid Camera, invented by Dr. Edwin H. Land, snaps a picture and develops it within 60 seconds—a process which has an obvious influence on the design of the box that houses the film. The action takes place entirely on the film, with rollers spreading a chemical jelly evenly between negative and positive sheets to form a picture layer. Unlike an ordinary camera, two rolls are required—one for positive paper and one for negative paper, and they are attached to a single leader. Exploiting the advantages of the fast development process (which is now available for black and white transparencies), Polaroid has put it in a bulky camera in order to produce an ample print size and to accommodate the diameter of film the chemicals require. The four Polaroid camera models to date (designed by Walter Dorwin Teague Associates) have been the bellows type, the back of the camera being large enough to produce a good-sized print. As the positive is removed, the negative is destroyed, and although one can always send the positive to Polaroid for enlargements, such a delay limits the convenience of the process.

Deciding that Land's invention could provide a good semester's worth of challenge, Professor Arthur G. Pulos of Syracuse University's Industrial Design Department, posed it as a problem for his fourth year students this year. They were not to be limited by the standard film sizes, which are at least 2¾ inches wide, but were charged to utilize the basic Polaroid principle, the 60-second film processing method, in a way that would "fulfill as completely as possible the needs of the serious photographer."

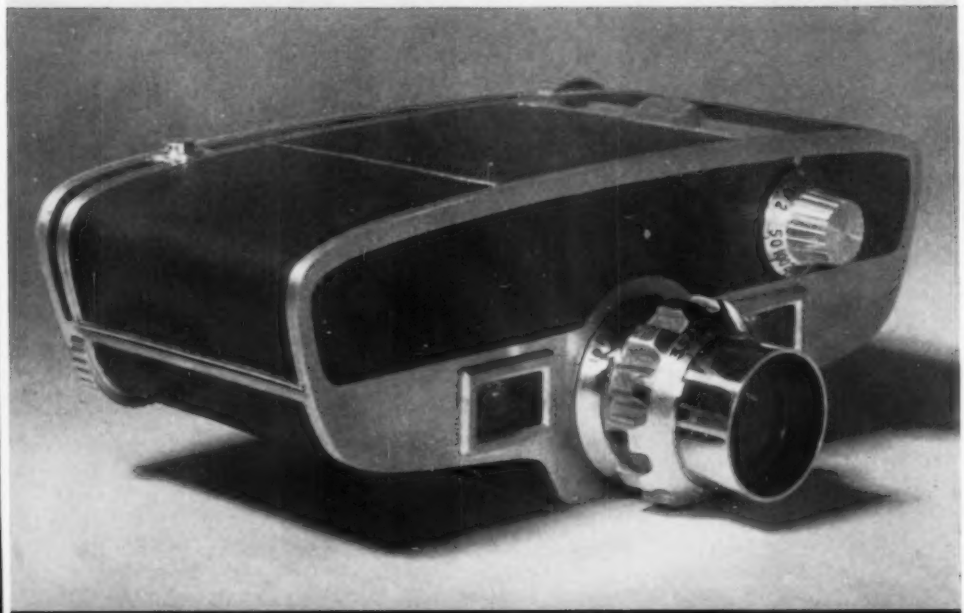
With no limits on the type of camera which might be designed, the project, under Professor Leland C. Smith and Douglas R. Cleminshaw, drew the students into a considerable depth of research—not only into the mechanics of the Land process, which are slightly more involved than the film action in a conventional camera, but also into considerations of lenses, rangefinders, focusing mechanisms, shutter action and of problems in handling and fingering the instrument.

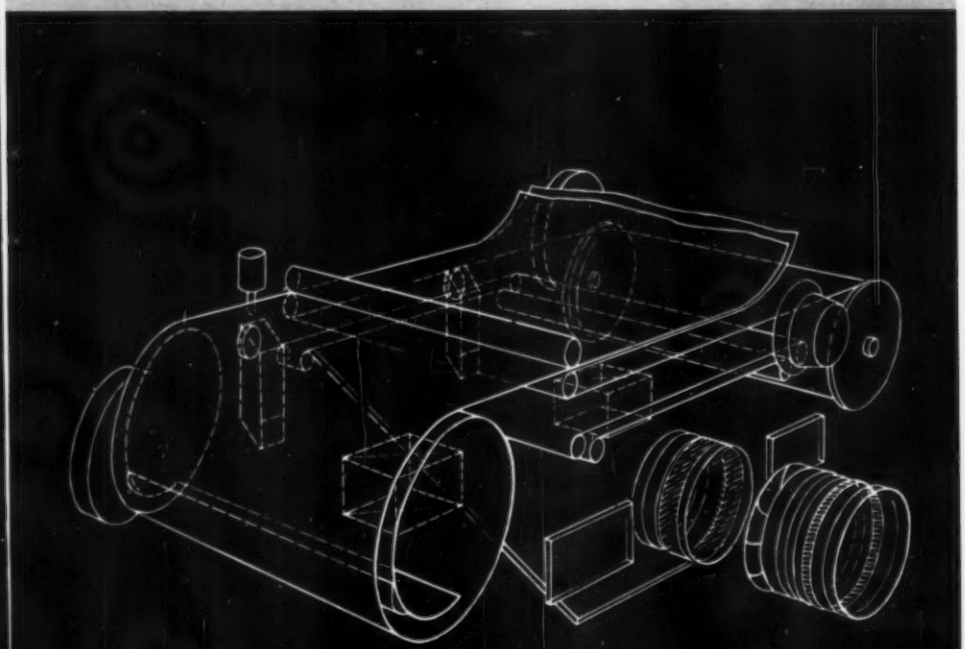
As it turned out, the majority were attracted to designing hand-held cameras, willing to sacrifice print size in the interest of smaller housings; a few ventured to incorporate features for which no counterpart exists on the present market. Although the ultimate criterion of the project, according to the teachers, was that the cameras *work*, and the actual test of function is beyond the power of a full-scale model, Syracuse requires a student to carry out his projected design in mechanical drawings sufficiently detailed to test the logic of a design scheme. Roderick Bunyea has designed a binocular viewing camera, Eugene Klumb a click-stop mechanism for broad focusing; James Edgell incorporates a built-in photo-electric exposure unit, and James Muir, thinking of the advantages of fast action (and the fact that the Polaroid requires a minute's interval between snaps) has provided two reloading doors so that the positive and negative rolls can be disassociated at will — the photographer could thus snap an entire roll without a time lapse and develop it in one sequence.

While the following designs are not demonstrably practical within the existing limits of the Polaroid process, the assignment provided an excellent chance for the student to probe the mechanics of photography and to suggest some distinctly different methods of applying the potentialities of the technology developed by Dr. Land.—*s.b.*



A twin-eyed model





The most novel conception for the Polaroid process is Roderick Bunyea's binocular viewing camera—a single lens reflex. Advantage of the binocular in this system, which is particularly intended for use at sporting events, is the combination of comfortable and uninterrupted viewing and reflex film exposure. Ordinarily, with a single lens reflex camera, a blackout occurs when the shutter is released and the mirror flips out of position (a problem that the twin lens reflex with its separate viewing lens overcomes). This binocular design would have an interocular adjustment to maintain constant viewing; in principle, viewing and exposure of film would occur as separate actions. The significant advantage of the reflex treatment, Bunyea contends, is that it allows the film to be placed horizontally—and from this follows a compact form. He has also placed the mirror in a position to permit space for the viewer's nose—a feature which adds considerable comfort to using an eye-level camera.

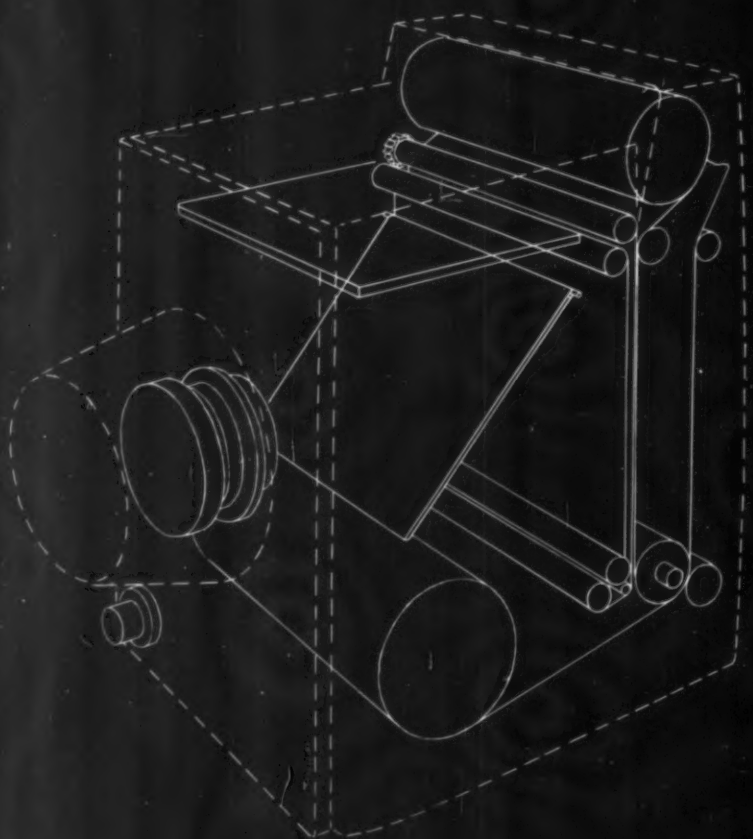
The reversal of the image, Bunyea explains, which results from this binocular design, is not a problem because the camera is primarily intended for making transparencies. Like James Muir on the last page, he has considered the disadvantage of the developing interval in the Polaroid-Land process in covering such quick action events as horse races and boxing matches, and proposes a cartridge loading feature for rapid shooting. Only the negative material passes through the camera at the time of exposure; it is transferred at a convenient time to a separate processing flask for immediate printing, or processing in the case of a transparency. In the latter form, of course, the image can be projected to any size, the proportions of the film-size being $1\frac{5}{8}$ to 2 inches.

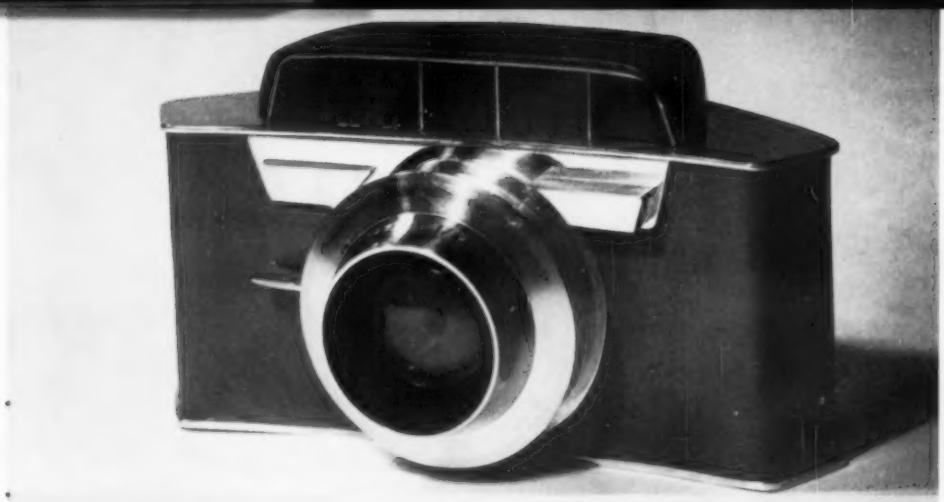
Student project

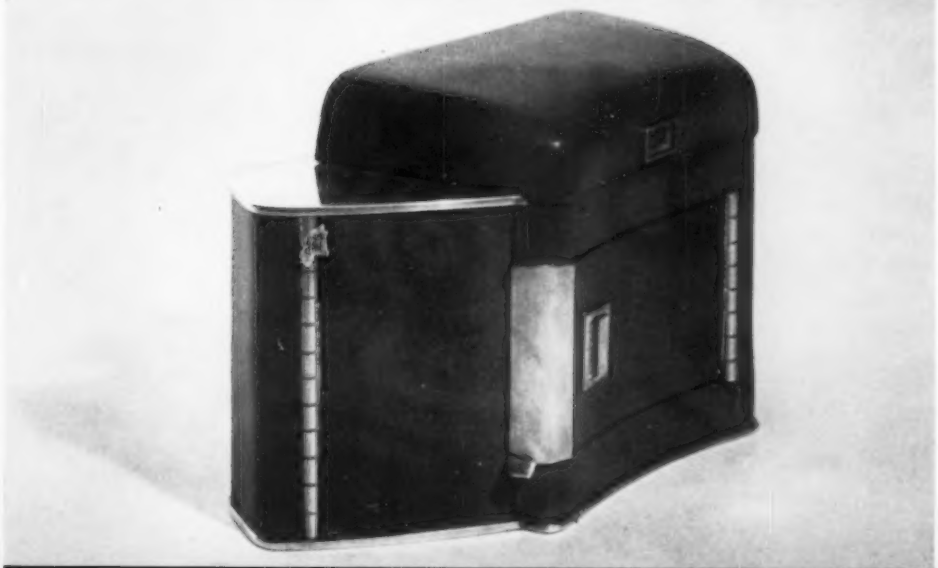
A large reflex model

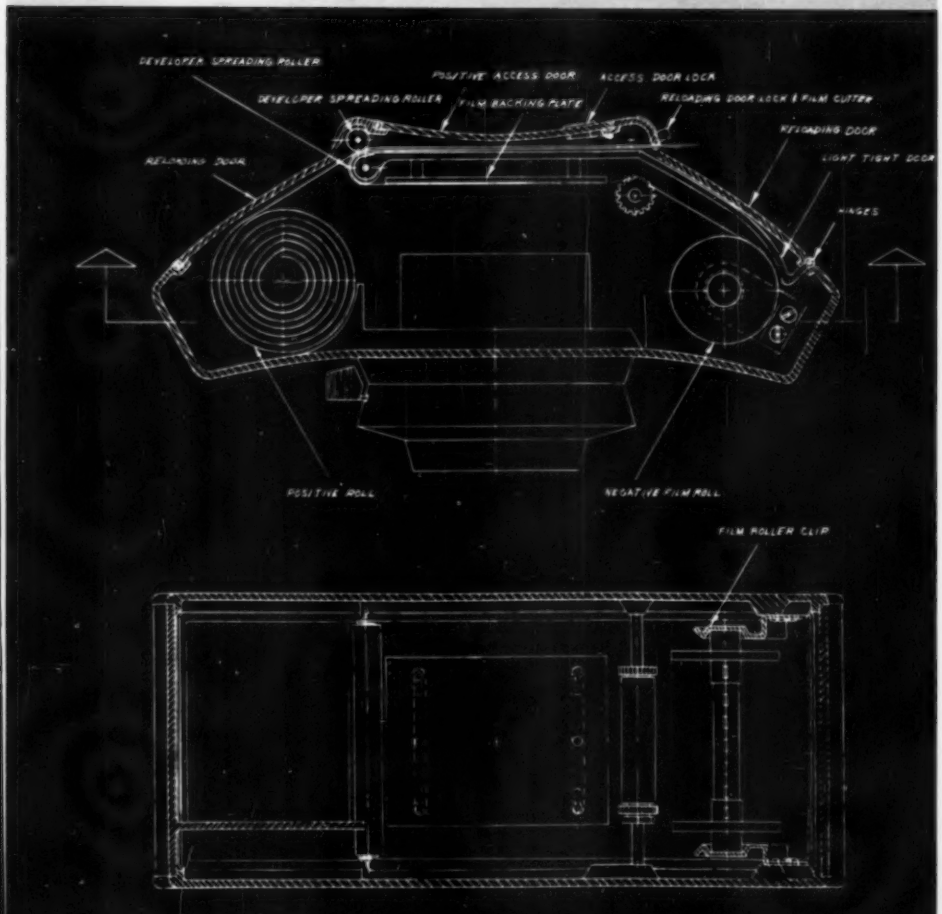
This single lens reflex camera by Eugene Klumb sticks to the conventional system with the viewing blackout and mirror action occurring simultaneously. It is not intended for covering sports events, however, but particularly for jobs requiring fine detail. The unique feature, related to this purpose, is the ball-loaded mounting of the lens barrel on the body of the camera, and the consequent range of its focusing action from 12 inches to infinity. Fine focusing is accomplished with a body wheel, protruding at the lower right of the camera. There is also a clickstop mechanism for approximate focusing, the ball loaded mount of the lens catching in click position as it is pulled forward. The shutter release is placed on the lower left front of the camera, and a shutter control bar at the upper rear allows the shutter to be disconnected from the film transport for intentional multiple exposures.

A bulky camera, it is intended to produce a 2¼ square print, and not necessarily to be hand held. Yet the designer has not wished to sacrifice all convenience and mobility in the housing but anticipates occasions requiring hand control. The shape of the hood through which one views the reflected image is unusual in its front curve and the openness on all three sides. Although it does not look adequate, one would have to try it out to see if the shielding is comfortable. Loading and unloading of Polaroid film takes place through a hinged back with the finished print ejected at the top and each exposure recorded in the cutter bar window.







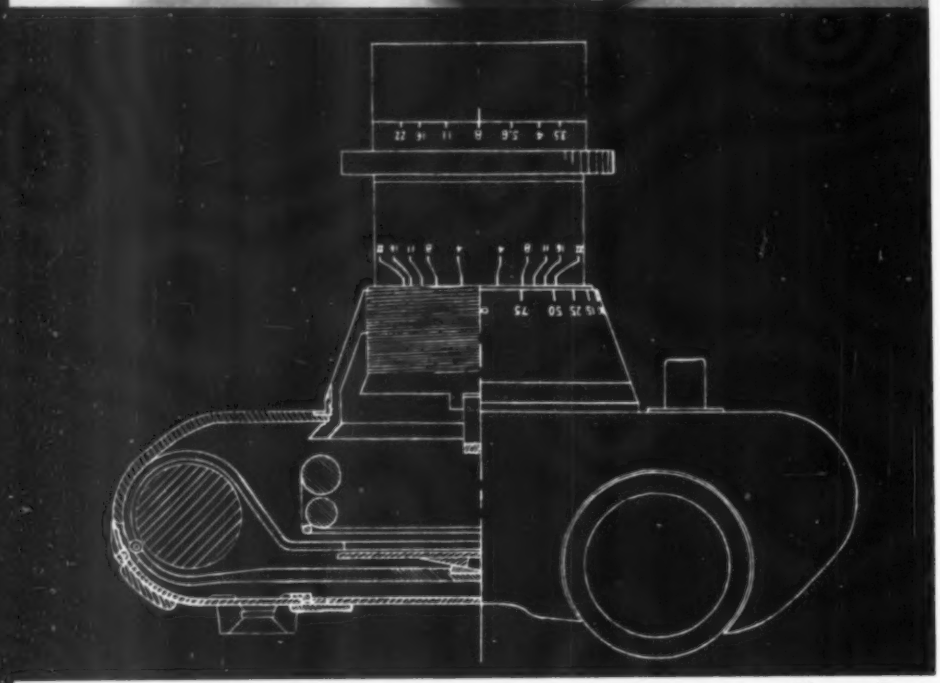


A quick 35mm. model

An eye level camera by James Edgell incorporates an electronic operating exposure control system; the camera was conceived for the field of fashion photography, for accurate reproduction with as little bulk as possible, with light meter built in and inconspicuous. It would be equipped with a fast lens (f. 1.9) and, presumably, the fastest Polaroid film, if there were such available in 35 mm. double frame format. The image, of course, would be exceedingly small, and it would probably not be practical for fashion shots unless the camera could be used for transparencies.

While there are cameras existing with a built-in automatically operating exposure unit, systems to operate them vary in function and degree, and a really satisfactory solution does not exist. The difficulties are 1) that light is measured according to the position of the camera, not necessarily corresponding to the light condition of the object to be photographed, and 2) that no reliable automatic device has yet been found. Edgell theorizes one powered by a photoelectric unit — the light entering the camera to generate electricity and this to be sufficient to power an electromagnet. The magnet is attached to a gear which controls the shutter and diaphragm, setting them to an exposure value according to the strength of the light. Whether or not a small photoelectric unit would generate enough electricity to accomplish this is an interesting speculation. Another feature of this camera is the focusing controlled by a push-button rocker arm within reach of both hands.

The designer, wishing to avoid "the appearance of an instrument" and any mechanistic overtones, has given the camera a rich warm brown leather covering and brilliant gold detailing.



Thomas Brown

James Muir

Student project

Two eye-level models

Two other eye level cameras have been designed for use in sports and action photography. Thomas Brown's (above) is a straightforward conception whose exterior reflects the total action of the Polaroid processing operation, with a very large control wheel at the top left rear of the camera expressing the fact that the camera has a generous range of focusing. The prominent lens barrel allows the lens to move a good distance forward for closeups, and lenses may be interchanged forward on the barrel rather than at the camera box, as is most common. A hefty size, this model would produce a $2\frac{1}{4}$ x $2\frac{1}{4}$ image.

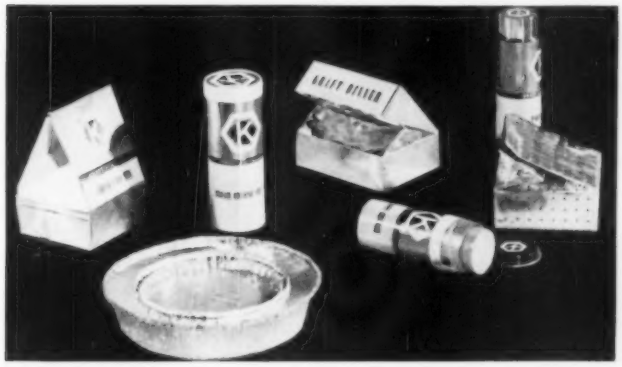
James Muir's camera has a built-in photoelectric exposure meter, but unlike James Edgell's, it is not directly coupled to the other operations. A conspicuous feature is the viewfinder, which is long and padded. Looking through it, the user would see not only the field of his picture but also indicating ports registering the lens opening, shutter speed, number of exposures and the focus scale. The camera would have a semi-fixed focus, with a range from infinity to 15 feet. The designer suggests that the twice-normal focal length and high speed of the film reduces many routine focusing operations and that this camera would require the minimum of focus manipulation.

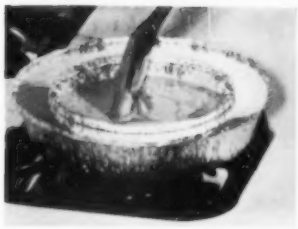
The designs as a whole had to be worked out to a reasonable extent in the eight mechanical drawings, including exploded perspective and inner working parts, and these with the mock-ups, some of which used actual leathers, proved out the cameras as the products of original research. The faculty could thus examine each solution both as to conception and to craftsmanship. And the students, tackling such a complicated instrument in terms of the provocative Land-Polaroid process have the experience and the satisfaction of projecting new applications for it that may not be out of the realm of possibility.

Packaging show '57

by Walter Stern

Technical Director of Packaging and Graphics, Raymond Loewy Associates



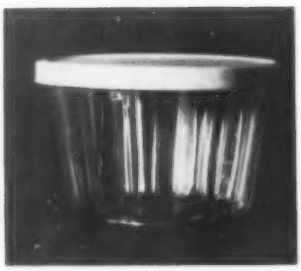


1

2

The ingenious aluminum containers pictured here, which are prototypes developed by Alcoa for evaluation by the Kraft Foods Company, help to indicate the nature of some of the developments seen at this year's National Packaging Exposition sponsored by the American Management Association last month. There is a cake mix package that is packed in a carton which can double as a shaker for mixing the batter; a "double boiler" (1) for heating a frozen cheese rarebit in the package; a frosting gun that applies its contents directly to a cake and a pastry gun that dispenses cream cheese spreads; a cook-in container for macaroni and cheese dinner; a pusher-type cylinder that allows easy slicing of Nippy cheese rolls, and a perforated foil bag in which macaroni is directly immersed and cooked. The grater, integrated with the cheese package (2) is perhaps the most dramatic example of the inventiveness that is beginning to mark the progress of the packaging industry. Some 30,000 visitors were on hand to review these developments, presented by over 380 exhibitors, in Chicago this year. Improvements in production equipment were emphasized more heavily, while materials handling equipment was less in evidence. Perhaps the most impressive progress was found in the exhibits of packaging materials and production methods. Many of the examples on the following pages will affect the industrial designer's approach to packaging and merchandising products in the year to come.

In molded, formed and fabricated plastic packaging, one of the most significant developments has been the growth of low-cost expendable or short-use formed plastic containers, which had hardly begun to emerge last year. Thin-wall high impact styrene and molded polyethylene and their laminates have been turned into realistically priced picnic items, such as decorated picnic plates; into hot and cold beverage cups for vending machines; and packages for supermarket distribution of dairy products — like the ice cream cup (3) which is also made for a 16-fluid ounce content at about $36.90 per thousand.



3

Plastics' entry into the giant container field of cargo carrying units is another notable development. The Rock Island Railroad recently put its "Convert-A-Frate" refrigerated carrier units to the test in transshipment of Swift & Company meat; the 17-foot long containers are made of panels of balsa wood laminated to epoxy-resin glass fibre, prepared by Minnesota Mining and Manufacturing Company.

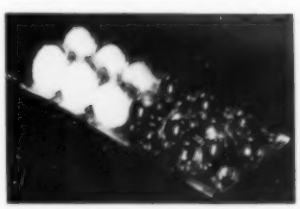
Plastics have also caused a revolution in collapsible tubes. Bradley Container Corporation's pioneering in extruded polyethylene tubing has brought about the mass-distribution and display of collapsible tubes without individual cartoning (4). We can now expect to see squeeze tubes containing such varied items as paint pigments, egg-base fish bait, and pasteurized cheese spread (5), moving into supermarkets within reach of impulse buyers.

4

5

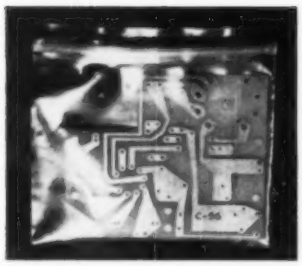
Remarkable progress has been made in vacuum formed plastics, both dome pack and skin pack. Last year only a handful of firms were making commercial vacuum forming and draping equipment, whereas this year's exhibit saw close to a dozen firms offering forming, trimming, and related machines.

One of the most unique applications of vacuum forming turned up in a new Braille former, capable of reproducing Braille books economically in small quantities, for foundations and schools for the blind that usually require only a few hundred copies of any book. This Braille former, which may ultimately make it possible for blind children to attend ordinary schools with sighted children, is now in full production at Production Packaging Engineering, in Culver City, California. Another interesting prototype venture shown by Celanese Corporation was a vacuum-formed transparent acetate butyrate egg container (6) that is said to protect its fragile contents well.



6

The unusual "Flexigrip" closure for plastic pouches, first reported last year as a "plastic zipper," has found many new uses. Early applications of this rather high-priced closing device concentrated on clear vinyl



7

luxury packages and colored vinyl briefcases; it has proven extremely useful in the materials-handling end of the electronics industry, and in Army logistics. For example, polyethylene bags (Kennedy-Car Liner & Bag Company, Shelbyville, Indiana) using "Polytite" fasteners (Flexigrip, Inc., New York) have been used extensively for storage and handling of delicate printed circuits (7), and by the Army and Navy to provide dust-proof, leak-proof, air-tight, water-tight bags around Walkie-Talkie sets (8). The sets may be removed for repair or adjustment, but can be operated inside the transparent protective package.

Polyethylene has also moved ahead in drums and expendable fibre drum liners. The Delaware Barrel & Drum Company of Wilmington is showing a whole line of disposable polyethylene drums and tanks for 5, 15, 30, and 55 gallons; and the Hedwin Corporation is showing what is believed to be the first expendable circular cross-section polyethylene liner that is not fabricated but is drawn from a flat sheet.

8

Finally, plastic films have made important advances. Mystic Adhesive Products of Chicago hopes to start commercial distribution in June of the only pressure-sensitive tape made from non-plasticized vinyl film. One of its advantages over some cellophane tapes is said to lie in the fact that it will not react to humidity changes by swelling, drying, or oozing adhesive.

DuPont demonstrated a new type of cellophane, called K-203, which will resist fogging or clouding on packages of frozen foods, bakery goods, and other high-moisture-content products. Another demonstration involved a new type of "Mylar" polyester film that can be heat-shrunk to provide a brilliantly clear, durable skin-tight wrap for meats and poultry, now being tested by Wilson & Company. DuPont also indicated that polymer-coated "Mylar" will be available in limited quantities this year; the coating will make possible the heat-sealing of Mylar on standard high-speed automatic packaging machinery with only minor mechanical modifications, and without the addition of adhesives or solvents. Also in the domain of film sealing, Bakelite demonstrated its method of sealing polyethylene film at rates up to 500 feet per minute, with equipment that extrudes a continuous filament of molten polyethylene between two layers of film to fuse them.

9

Aluminum was another industry that made a vigorous showing at this year's exhibition. In addition to the experiments in collaboration with Kraft Foods shown previously (1), there were a number of inventive developments in aluminum packages. The new Pillsbury Flour Shaker package (9), developed and

10

now being tested by Alcoa, makes a sifter part of the container. Alcoa has also developed a variety of bottle and jar closures that for the first time offer in aluminum a smooth exterior surface with the threads concealed (10). This type of closure is said to be competitively priced with comparable plastic caps, and is being considered for national introduction by at least one major distillery.

Two new aluminum foil container ideas were featured by the Reynolds Metals Company. The "Cass-Rol Pak," which is instantaneously opened by a tear strip (11), will be particularly adaptable to "heat and serve" frozen foods, since housewives are now often required to struggle to open some of the rigid food containers on the market. Reynolds' new "Clo-Can" is an intriguing three-way combination: a single wall carton, aluminum foil liner and foil overwrap bonded by micro-crystalline wax (12), offering the protection of a rigid container in a flexible package.

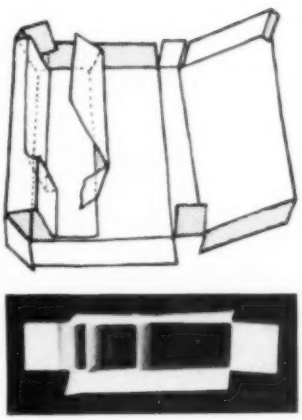
11

12

Lamination of aluminum foil to double-faced corrugated board to create shipping containers with extremely good insulating properties was demonstrated jointly by Alcoa and the Stone Container Corporation of Chicago. The "Sta-Temp" container is said to retard deterioration by limiting temperature rise to 1°F. per hour during 100°F. exposure.

Among the other interesting container developments at the show were such items as these:

United States Metered Container Corporation, whose Mr. Stan Silver has been working for over a year to perfect his "Metered Container," has finally succeeded in producing it from a single blank — and has enlisted the enthusiastic cooperation of major container producers throughout the country. The "Metered Container" (which is really a metering container) is a one-piece folding carton (13) which, for a fraction of a cent, can convert a conventional box into one that will automatically measure multiple pourings of any dry, free-flowing product with 97% average accuracy. It seems to lend itself especially well to detergents, rice, dry milk, chocolate, chemicals and pharmaceuticals; it is being commercially used for the first time, in miniature, to dispense Colonial Sugar in teaspoon servings (13), would also lend itself to cereals (14).



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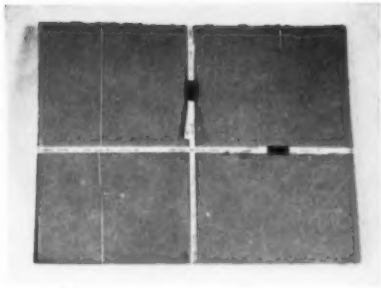
15

Chicago Printed String Company displayed what is believed to be the first commercial application of the Zip-Tape principle to folding boxes. Shown here in a baking-mix box sold by Jewel Tea Company (15), it consists of a chipboard shell with a horizontal nonwoven fibre 1/8" tape, overwrapped on a standard tight wrap machine. When the tear tape is pulled, the top is completely removed. This novel feature is also being tested on Tide and Ken-L-Biscuit. The same firm also



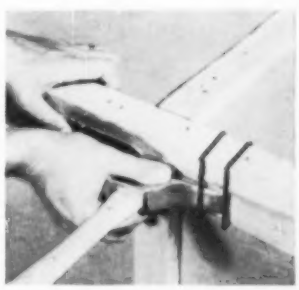
16

displayed a machine that tightly bands rigid objects with flat, non-woven, non-stretch string that is secured not by knotting but by a crimped metal clamp, similar to those used in conventional steel strapping (16).

The Swedish Tretra-pak container, recently introduced in this country, is being used in an ingenious 6-pack sleeve to merchandise individual servings of ice cream; it is produced by Andre Paper Box Company of San Leandro, California, for Safeway Stores (17).

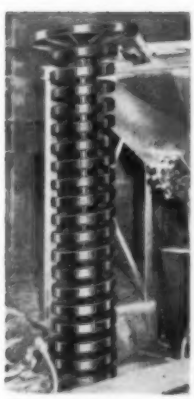
An entirely new way of assembling and holding cleated panel boxes, in plywood or fiberboard, has been the result of research by North American Aviation. The Klimp Fastener, distributed by Lumen, Inc., is designed to replace nails in cleated panel box assembling at a substantial saving in labor and container cost, and with significant improvement in protection. The fastener, basically an "L" shape spring clamp, uses a special tool for application and removal (18), makes it easy to re-use expensive cleated boxes.

17



18

In the field of package handling and processing, the Syntron Company of Homer City, Pa., demonstrated a striking method of elevating or lowering bulk materials at controlled speeds with a practically immobile spiral ramp (19). High-speed electro-magnetic vibrations cause the material to flow up the spiral ramp. There is a complete absence of such working or mechanical parts as motors, gears, sprockets, chains, buckets, speed changers; it requires relatively small floor space and power. The only model presently available is capable of moving 4,000 pounds of sand weighing 100 pounds per cubic foot per hour, which amounts to a two-ton per hour capacity at 8 foot spiral height.

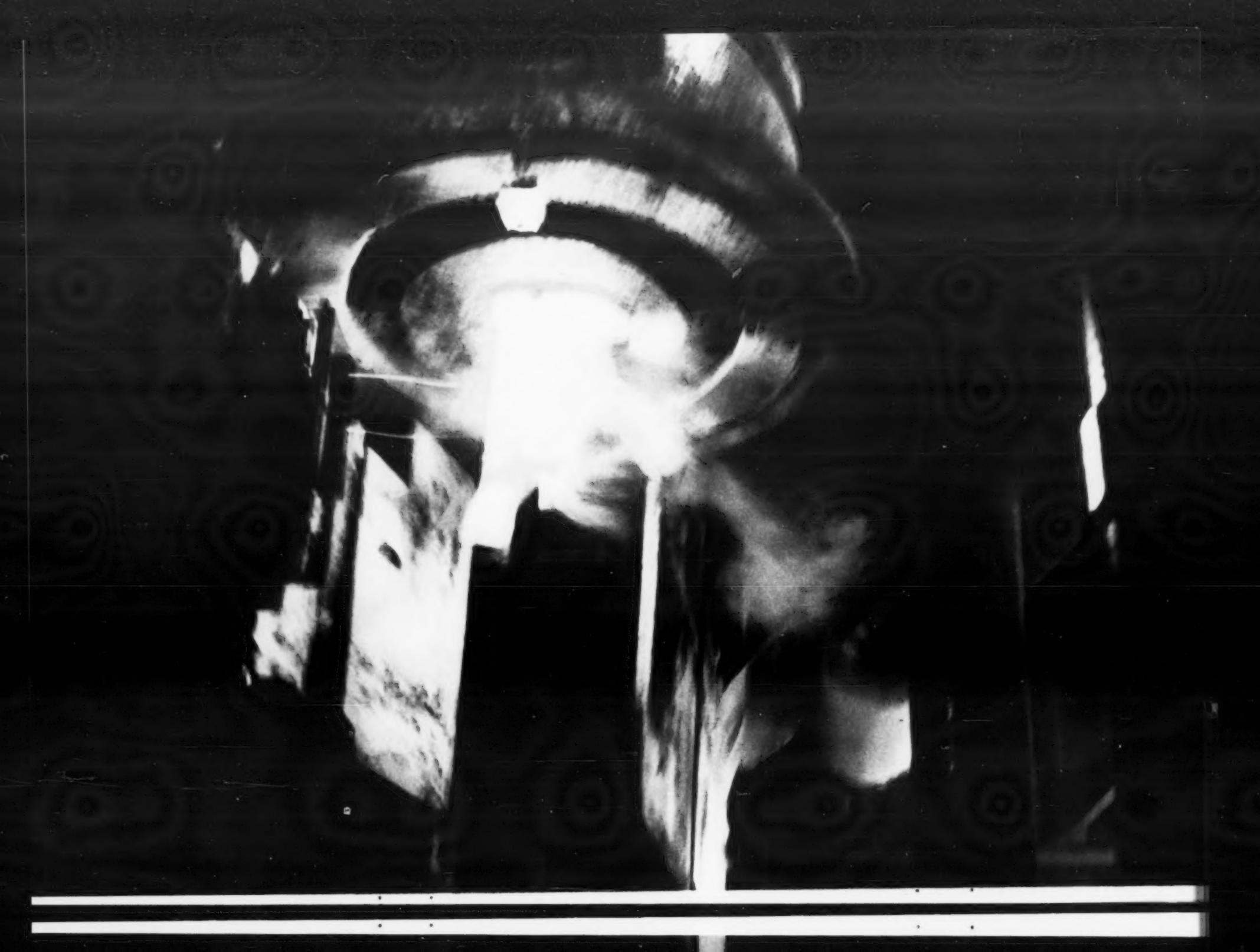


19

A new approach to cementing was exhibited by the United Shoe Machinery Corporation, shown here (20) seaming a plastic-coated paper tube. Marketed as the "Thermogrip," the machine uses cord-like coils of thermoplastic adhesive that can be shipped in compact dry form, ready to use. The coil of cement is placed in a holder, and once the free end is inserted into the receiving station of the applicator, it is fed automatically. Because "Thermogrip" adhesives are said to set up in a fraction of a second, machine speeds are no longer limited, as they have been, by the adhesive.

20

Amidst the drive for ingenuity and improvement in many branches of the packaging industry, the paper board industry seemed, to judge by its exhibits, to have made few significant advances in the past year. Constant and continuous inroads by plastics and other materials seem inevitable unless paper board applications and processes are similarly stimulated. Perhaps next year's Exposition at the New York Coliseum will show some shift in this trend.



Stainless prospects are brightened
by new shapes and new alloys.
Part three in a series
on industrial techniques covers:
extrusions for intricate parts
new stainless alloys
large-scale production
stainless in aircraft and automobiles
decorative and special finishes
high quality fabrication

by Douglas G. Meldrum

Stainless steel fabrication

On the left, a round slug of stainless steel $5\frac{3}{8}$ inches in diameter and twenty-four inches long glows at 2300 F as it is held in the breech of an extrusion press. As this picture was taken, the ram moved forward with 150,000 pounds per square inch of pressure to force the steel billet through a die. An instant later, a forty foot length of seamless stainless steel pipe shot out of the other side of the extrusion press at forty-five miles an hour. Extrusions are not, of course, new; softer materials and metals like aluminum have been successfully pushed into shape by this process for years. Even the idea of forcing steel through a small orifice to produce complex precision shapes was conceived some time ago. But considering the higher strength of steel and severe conditions of extrusion it demands, success on a commercial basis is a spectacular and recent achievement. With it has come the realization that of all the developments in the fabrication of steel alloys, this process holds one of the most exciting and perhaps *the* most important potential for both new and old applications.

While extrusions are not by any means a pat answer to every fabrication problem, their diverse advantages are many and can be readily appreciated in terms of saving time and money. The stainless pipe mentioned above, for example, was produced at Allegheny Ludlum Steel Corp.'s Watervliet, N. Y. works for use in a nuclear reactor. Since the inside of a reactor is totally inaccessible after it has been activated, stainless steel is desirable because it is durable, strong, and highly corrosion resistant. An absence of seams in the complex piping is an important safety asset. Seamless pipes *can* be machined from bar stocks, or by piercing a hole through a steel billet and rolling it until the desired section is attained. But this is costly and time consuming, and secondary finishing is needed. The long stretches of seamless pipe that can now be extruded in a single "shot" satisfy a demand impossible to meet in steel until recently. This example is typical of many in new areas where new *needs* for stainless have been created: Stainless steel is being used in guided missiles and high performance aircraft, in functional automotive parts, in new architectural applications. New shapes, some impossible or prohibitively expensive to produce by standard methods of machining and forming, are suddenly in demand. The extrusion process, explained in detail on pages 90 and 91, is supplying some of the solutions.

Dramatic as steel extrusion is, the development of new stainless alloys are commanding even more attention from steel manufacturers and fab-

ricators. When the American Iron and Steel Institute recognized industry practice in production of a new group of stainless steel alloys—the 200 series—a little more than a year ago, they did more than add two new alloys to the already substantial list of stainless steels that have been analyzed and accepted by the industry: They announced to stainless producers and fabricators that one of the great bugaboos of the industry, the criticality of nickel, need no longer be feared, because the 200 types contain very little nickel. Nickel is the traditional element that increases the toughness of stainless to give it high fatigue strength, just as chromium increases resistance to corrosion and manganese adds to surface quality. Users and makers of stainless have long been aware of the importance of nickel and, because it is in short supply, have tried to produce new alloys containing little or no nickel. Early results with new formulations were encouraging but far from satisfactory. In spite of fabrication problems caused by austenitic* instability, the new alloys were used to some extent during the World War II emergency. When the war ended, nickel was again available in limited quantities and most stainless users went back to types that had given them many years of trouble-free service, such as the famous 18-8 stainless (18% chromium, 8% nickel). The Korean situation created a severe new nickel problem and the push for low- or no-nickel stainless was revived. Results this time were better and a stainless containing 15% chromium, 1% nickel, and 17% manganese was found to have good mechanical properties. It did not, however, approach other general-purpose alloys in corrosion resistance and hot-working characteristics. But the goal was in sight and by adjusting formulations to contain more nitrogen, the agent that increases hot workability, the 200 stainless steel alloys which have excited the industry were introduced.

Production figures bear out the success of the new stainless steels. In 1955, 1,886 net tons of 200 type stainless were produced; compared to 18,000 in 1956, this is an increase of 850%. Low-nickel stainless became a reality in 1956, and in 1957, it is anticipated, it will gain wider acceptance and application as an alternate for established types—not as a substitute.

Chromium steels date back to the 19th century, but stainless as we know it today was probably the result of a search for corrosion-resistant gun tube linings by Harry Brearly around 1912. Since the reaction to Brearly's chromium steels for weapons was not particularly enthusiastic, he thought of other uses for the material and eventually had a set of cutlery made from it. From this point on acceptance on the basis of corrosion and high temperature resistance, and its characteristic long-lasting beauty, was rapid.

Of the 37 types available today some twenty are the most extensively used. These fall into seven main categories of physical and fabrication properties: free machining, corrosion resistant, modified for welding, high temperature, mold working, hardenable by heat treatment, and general purpose.

Cost, of course, plays an eternal part in the selection of a stainless for a particular job. Sheet stainless varies in price from 38.75 cents a pound for type 410 (a general purpose heat treatable stainless used for machine parts, pump shafts, and so forth), to 93 cents a pound for type 310, which has high temperature strength and scale resistance needed for high temperature applications in all industries, especially chemical, petroleum, dye, and jet aircraft. Actually the cost of stainless is something of a moot question. It is expensive, but it lives for a long time and per annum costs are difficult to estimate.

It is interesting that approximately 50% of all consumption of stainless is of three types, 302 and 410 which were mentioned previously, and 430—a general purpose non-hardenable stainless widely used for automobile trim, as an architectural metal, as hardware, for refinery equipment, and so forth.

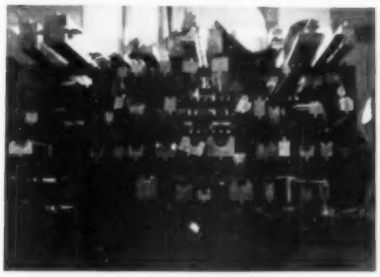
Other important advancements have been made in the development of new stainless alloys to improve characteristics and to meet the increasingly rigid demands of industry. United States Steel has introduced a stainless containing no nickel, known as Tenelon, which, they claim, has higher mechanical properties than any of the conventional austenitic stainless steels and has a potential for use in a variety of applications including automobiles, trucks, pots and pans. Compared to type 302, for instance, Tenelon's tensile strength is 125,000 psi, while 302's is 110,000 psi.

Thanks to the combination of new and improved stainless alloys that take advantage of available materials, and the continuous effort to develop new fabrication methods and improve standard processes, designers may find stainless more useful in areas where it is already established, as well as in places where it holds brand new potential. On the following pages, we shall examine a variety of fabrication methods, some relatively new and others standard, that show the range of stainless applications, the possibilities and restrictions on its fabrication, and why the type of stainless, its cost, characteristics and the fabrication methods it is suited to, must be considered as a joint problem to give optimum results in a product.

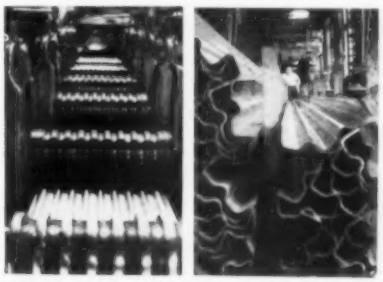
*Austenite is a chrystalline form of steel normally found at high temperatures. The addition of nickel, manganese or nitrogen enables the steel to maintain its austenitic structure at room temperature. The 200 and 300 series stainless steel's are austenitic and exhibit austenite's strength, toughness, ductility, wear resistance, and non-magnetic qualities.

Need: *Strength and light weight* **Fabrication:** *Stainless steel and a new welding method*

Brake bending—a basic operation for straight-line bends



Dies for brakes make thousands of different bends possible



Strip stainless is roll formed into shapes, then cut to length

Large structures joined by Budd's "shot welding" process

The Budd Company, a pioneer in the fabrication of stainless steel on a large scale, has necessarily become involved in the advancement of new stainless alloys as well as in the development of new fabrication methods; the two are inseparable. Work with Allegheny Steel Company revealed that cold-worked stainless has a superior strength-weight ratio, making it attractive for the construction of strong, yet light, structures like railroad cars and truck trailers. They were experimenting with a stainless with 18% chromium and 8% nickel which, they found, had sufficient elasticity for their presses and their dies—but demanded highly controlled welding that was fast, economical, and reliable.

With long experience with welding methods in the automotive industry, Budd was able to introduce a new welding process that made it possible to quickly join the necessarily thin stainless sections together with thousands of strong welds (a stainless railway car contains as many as 500,000 welds). Budd introduced their "shot welding" process in 1933, and the following year, an experimental stainless streamliner, The Pioneer Zephyr, was delivered to the Burlington Lines. This set the pace for lightweight trains with rapid acceleration and deceleration, giving better passenger service and more dollars per mile to the railroads.

Mass production methods used at Budd take advantage of the speed of modern forming equipment, but handle the material carefully to preserve its finish. The complexity of making stainless trains like the "Hi-Level" coach, built for the Santa Fe (below), requires the shaping of stainless parts with a variety of specially designed tools. Some parts are formed singly while others are the result of running endless strips of stainless through a series of rollers. The top two pictures show "brakes" and the dies that are used to bend stainless in many shapes. The dimension of the brake, of course, determines the size of the bend that can be made. The use of different rolls produces long lengths for the side and roof panels.

As a primary consumer of stainless, the Budd Company was one of the first fabricators to use 200 type stainless. Today, Budd is standardized on 201.

Need: *Intricate shapes*
Fabrication: *Extrusion*

Extrusion area at Allegheny Ludlum's Watervliet, New York, works.

With the extrusion process, more complex and varied steel shapes can be produced than by rolling or other hot working methods. Another significant advantage is that these shapes are turned out in long lengths that can be cut to size to make parts with a minimum of machining and finishing. Today, many extruded stainless parts are priced competitively with those produced by standard methods, and there is little question that extrusions will be a substantial contributor in the fight to reduce costs and simplify fabrication methods.

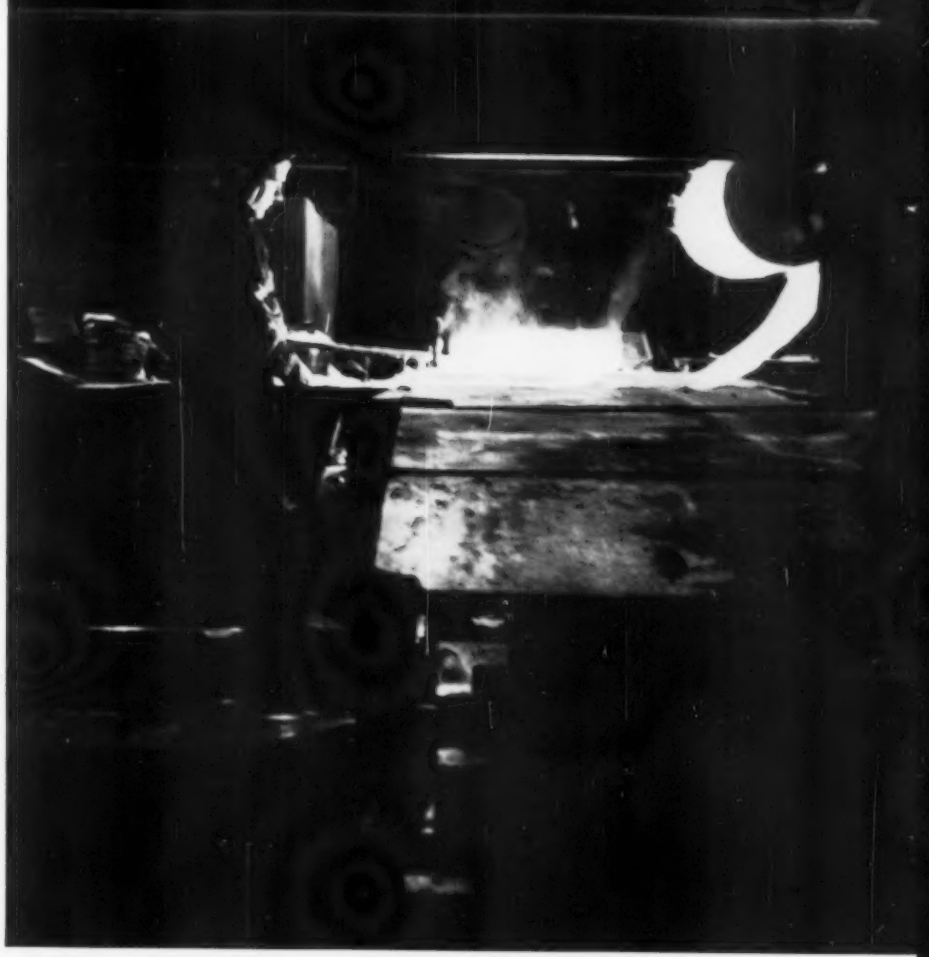
Compared to the extrusion of other materials, like aluminum, steel appears to have gotten off to a late start. The primary stumbling block was the need for a suitable lubricant to help ease the tough metal through the die. Based on research performed by the French during World War II, molten glass is now broadly accepted as the best lubricant. There are other possibilities, such as molten salt, graphite, molten metal, and many others, but glass is giving the best results in this country. Close control of extrusion temperatures is important to make the metal sufficiently malleable for extrusion. Temperatures required to overcome the flow resistance of stainless range from 2100° to 2300° F. The combination of high temperatures, pressures and speeds impose severe conditions on die materials.

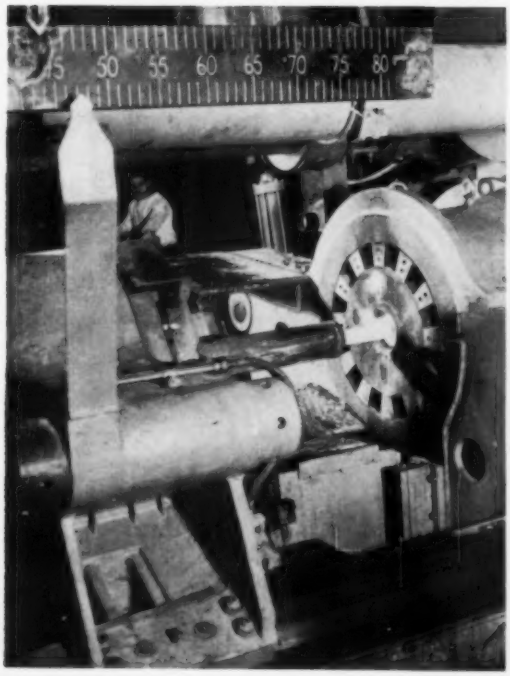
Fabrication by extrusion has one thing in common with other methods—it has design limitations. The size of a part, for example, is limited by the size of the extruding equipment. The press on the left, installed at the Watervliet plant of Allegheny Ludlum, can produce extrusion, with maximum circumscribing diameters of 5¼ inches. The size of this press is an indication of the great pressures needed for extrusions this size and makes it quite clear that with present equipment there are practical limitations. The design and consequently the strength of the die frequently determines whether or not a certain shape can be extruded: the tongue of a die must be rigid and strong enough to avoid breakage or distortion. Generally, the depth of a channel should be no greater than the width. These limitations can be minimized by changing die design and by raising and lowering the temperature of the billet being processed.

Hollow shapes, such as seamless pipe or those shown on the right among a selection of extrusions produced at Allegheny Ludlum, can be made by using a floating mandrel centered in the press ram. Fillets and corners depend largely on the overall geometry of the shape to be extruded, but sharpness is limited by lubrication and die support. Normal range for corner radii is between .031 and .125 inches. On the opposite page, the extrusion process at Allegheny Ludlum is shown.

1 ↓ *Fiber glass is inserted into extrusion press to lubricate the die face.*

2 → *Hot stainless billet is rolled over fiber glass sheet to pick up coating of lubricant.*





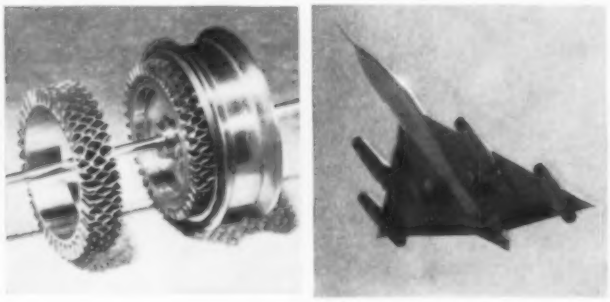
3 ↑ *Floating mandrel is inserted through center of billet to extrude seamless pipe.*

4 → *An extruded length of seamless stainless pipe shoots out of press at 45 mph.*

Need: *Heat resistance, strength and lightness*
Fabrication: *Brazing for ingenious construction*

Strength and heat resistance are the two basic and absolutely essential requirements for the structural and surface sections of high performance aircraft. Stainless steel has both these attributes and a third almost equally important to the aviation industry – corrosion resistance. Now that the sound barrier has been superseded by the heat barrier, stainless is taking over where aluminum cannot stand up. Mach number determines the temperatures generated as a plane speeds through the air. Aluminum, as a structural material, will withstand temperatures of 350°F, which are encountered at Mach 2.5; stainless can be used safely up to Mach 4.2 or 1000°F. Thus heavier and stronger materials must be used and, through design and ingenious fabrication methods, must be constructed in their lightest form.

Solar Aircraft Co., San Diego, Cal., designed and made the stainless sandwich honeycomb construction at far right to gain the highest possible strength-weight ratio for the airframe construction of the Convair B-58 Hustler. The sandwich consists of two thin sheets of stainless separated by a cellular core made from foil-thin ribbons of stainless. For the strongest possible bonds, Solar investigated a variety of methods and finally decided on high temperature brazing which has given the best results in producing stainless honeycomb structures. They promise wide application in the aviation industry by virtue of their high strength-to-weight ratio, high stiffness factor, good thermal resistance, vibration damping ability, fatigue resistance, and acoustical insulation. The piston and rod assembly shown on this page is under study at Solar. It utilizes all-metal honeycomb structures with ⅛ inch cell–another example of how the strength of stainless is fabricated into lightweight components that can withstand punishment from jet planes, guided missiles, and rockets.



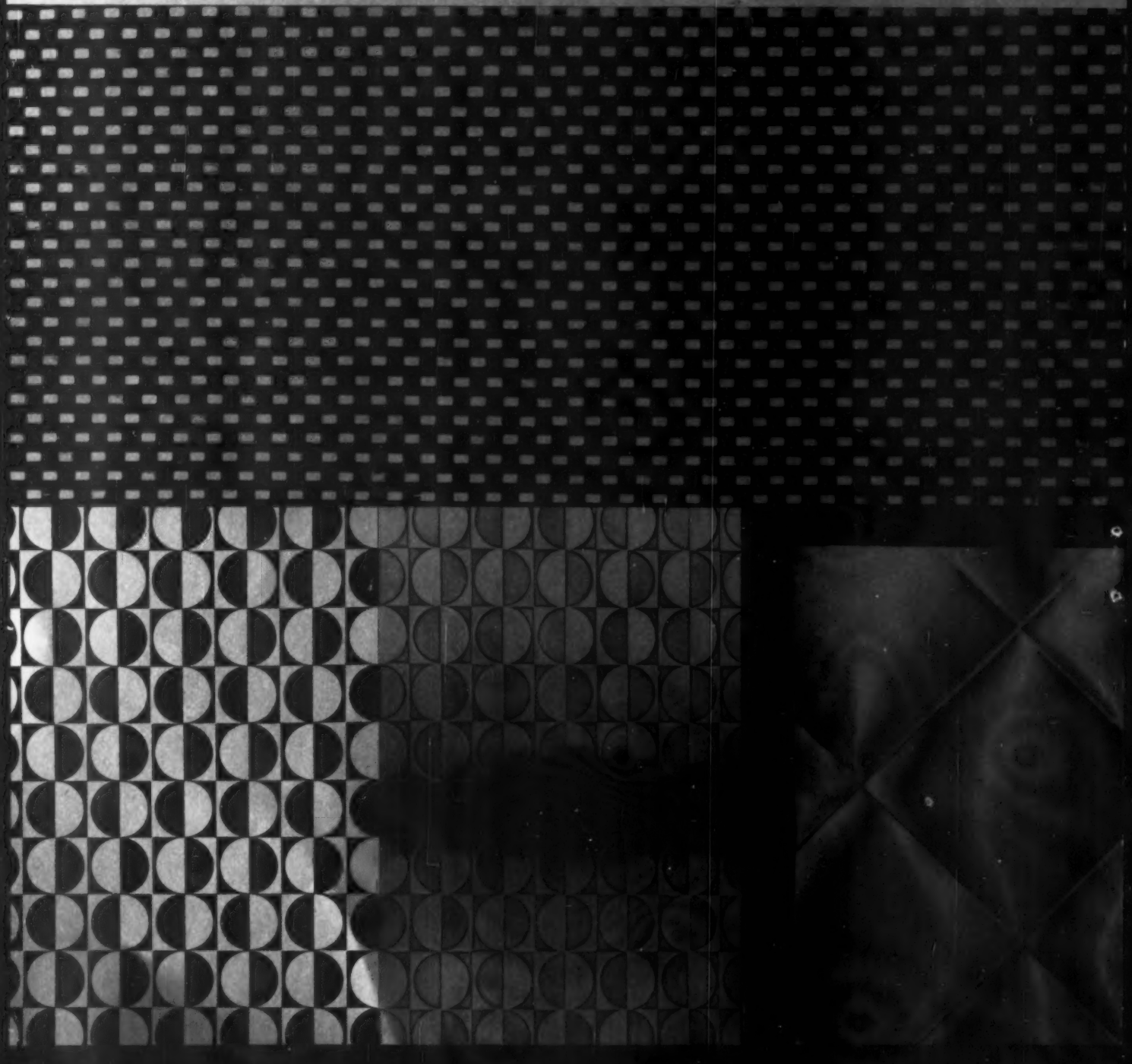
The stainless honeycomb sandwich structure on the right, shown in two views, is made by Solar Aircraft Company for structural use in the Convair B-58 Hustler, America's first supersonic bomber (left). The high strength-weight ratio and resistance to high temperatures gives this construction in stainless the characteristics to meet performance demands of today's jet aircraft. On the far left, cellular construction is designed into a piston and rod assembly.

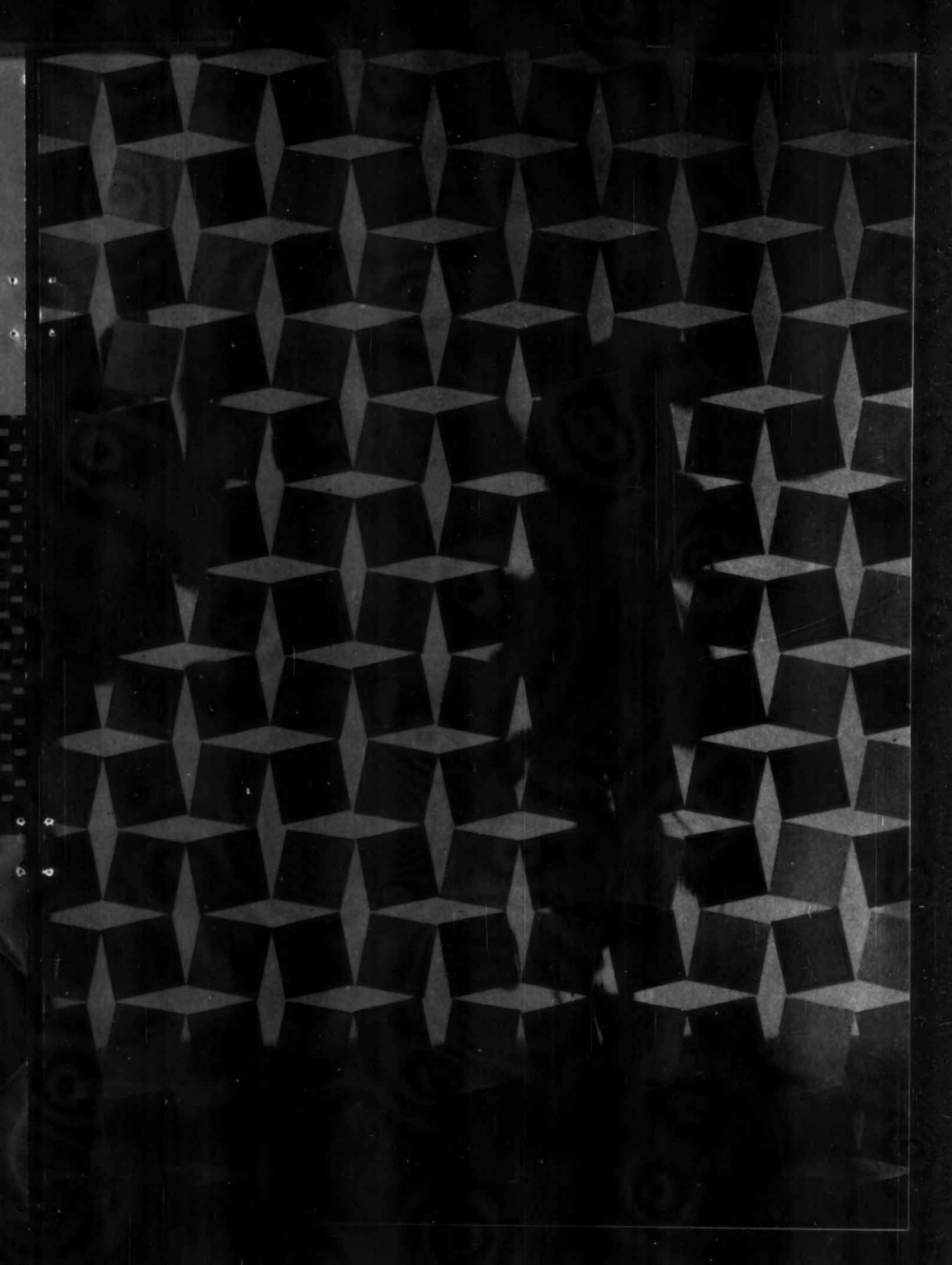
STAINLESS STEEL CAN BE GIVEN DECORATIVE FINISHES AND PATTERNS,

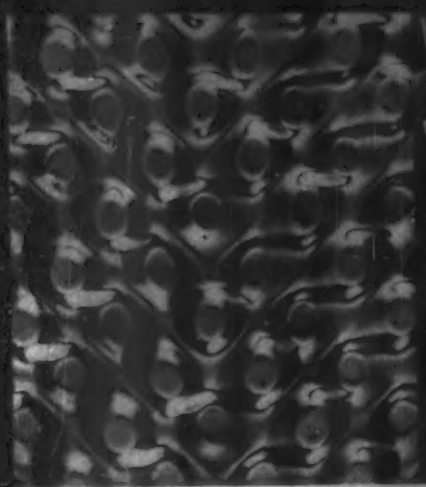
in addition to a variety of plain mill surfaces ranging from dull to mirror-like. The finishes shown on these pages were all obtained by standard methods that did not involve special techniques or equipment.

1. Embossed sheet is blackened by oxidation or chemical process. Recessed areas electro polished. 2. Sheet is masked and grit polished. 3. Dull sheet is coined and high spots polished. 4. Quilted effect obtained by "braking" (bending) a satin-finished sheet at regular intervals on two axes. 5. Polished sheet is masked and then blasted with two sizes of grit.

1
2 | 3 | 4







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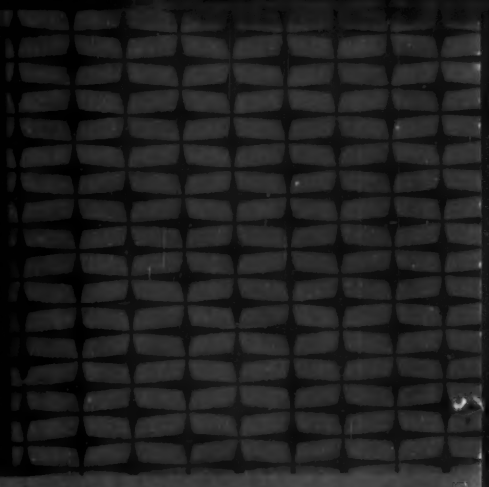


8

6. *One of many standard textured finishes obtained by cold rolling.* 7. *Engine turning with rubber bonded abrasive wheel.* 8. *Sheet is masked for application of porcelain enamel.* 9. *Stainless strip is twisted and woven.* 10. *Stainless is roll-formed to give a textured finish with high and low areas. Paint or porcelain enamel can fill low areas, leaving high spots bright.*

9

10

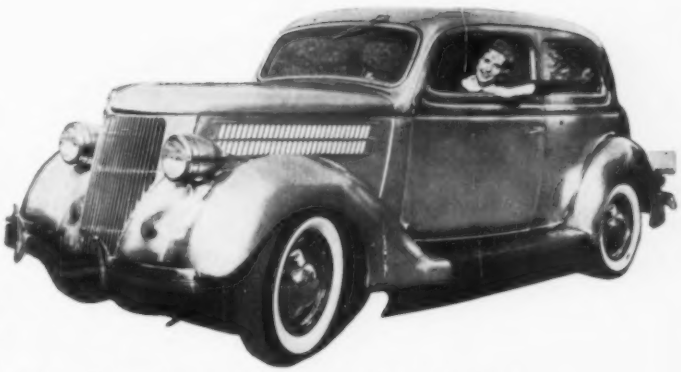
Need: *Appearance plus structural properties*

Fabrication: *New stainless shapes for automobiles*

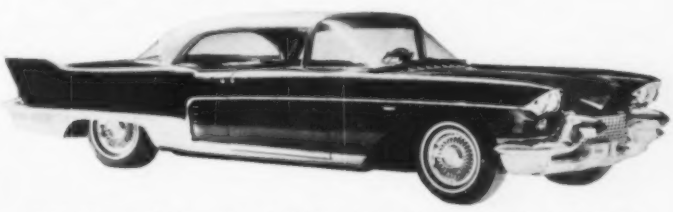
Stainless steel in the automotive industry is usually associated with visible parts. Since it can be produced with a variety of sheens, both bright and subtle, it is familiar as trim, hub caps and other decoration. This picture is changing. Stainless is reaching inside the automobile and taking over as a material that gives high performance in functional parts. It is used on some 1957 production models whose radiators have top tanks and baffles made of stainless, and McLouth Steel Corp. reports that Type 430 stainless has been approved by Ford for use in transmission oil coolers which until now have been made of cupro-nickel (70% copper, 30% nickel). Conversion to Type 430 by the automotive industry for these units would result in a saving of at least 300 tons of nickel in this application. McLouth has also designed a muffler made of stainless. They have found that the corrosion resistance of the material makes it ideal for this application and, although the initial cost is higher than standard units made of carbon steel, it can be expected to last the life of the automobile with resultant overall savings.

More than twenty years ago, stainless was used by the automotive industry in a way that combined its visual beauty with its structural strength and endurance. In 1936, Allegheny Ludlum and the Ford Motor Company joined forces to build six cars with all-stainless bodies. Although most of the six original cars have been torn apart or lost in obscurity, there is still one on the road. Repurchased by Allegheny Ludlum after 20 years, it is used as operating testimony of the durability of stainless. A similar, though not as extensive exploitation of stainless' unique surface qualities is returning in the 1957 Cadillac Brougham and Chevrolet Impala. These models have the first roofs with a built-in stainless finish. If costs can be controlled there promises to be a healthy race with chrome and aluminum for other automotive parts. Great care had to be exercised to protect the brushed stainless finish from marring during assembly of the cars.

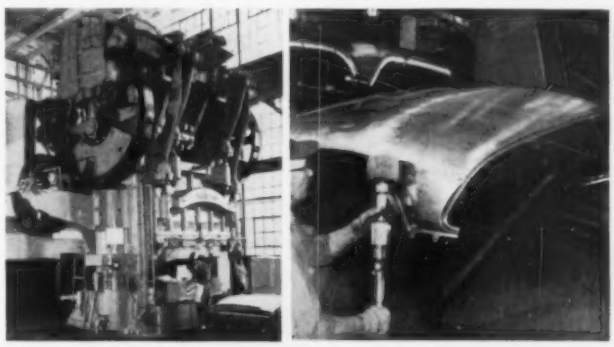
As in aircraft, the strength-weight ratio of stainless is important in automobiles. This, plus advantages of corrosion resistance and appearance qualities, gives stainless a bright future for hidden parts and structural members that are visible, as well as for familiar brightwork on automobiles.



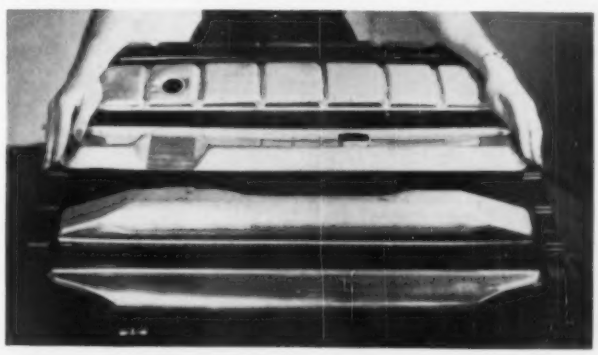
After 250,000 miles, all-stainless 1936 Ford still shines.



Stainless roof for 1957 Cadillac Brougham (above) is formed on giant press (below, left). Welded corners (below, right) are carefully ground down and buffed to make seam invisible.



Stainless gives radiator parts corrosion resistance, strength.



Need: *High quality products*

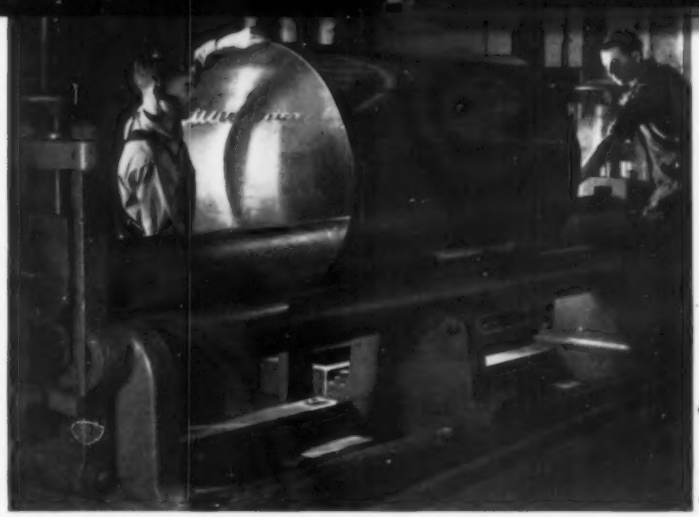
Fabrication: *Modern machines backed up by hand craftsmanship*

Stainless, in many ways, personifies quality—it has long been associated with costly commercial and medical equipment, in which both the quality of the metal used and the precision with which it was shaped combined to make a luxurious image for stainless. In a sense there are no shortcuts to this—forming and finishing methods must be controlled both to preserve the quality of the metal and to enhance it in every way possible. As in all materials, waste from mistakes in fabrication is expensive to the point of being ruinous, and since a premium price is paid for stainless, the most must be made of the metal.

The Blickman Company of Weehawken, New Jersey, known for its work with quality stainless products, is, in reality, a custom shop on a large scale. Much of their machinery for forming, bending, drawing, polishing and finishing was developed by their own engineers to meet their exacting demands. Automatic machines cannot replace the skill and care of handwork, with the result that highly skilled workmen are required to perform piece-by-piece many of the fabrication steps in producing stainless cafeteria and hospital equipment, coffee urns, heat exchangers, fractationing towers, and other intricate stainless products.

Stainless, because it is easy to clean, is fundamentally suited to sanitary equipment. Design, however, can add substantially to the sanitary properties of products, and frequently these special shapes demand very careful and individual attention. For some hospital equipment, for example, Blickman makes sinks and tables with rounded edges that are curved completely under and welded to make sure there are no crevices. Fabricators like Blickman carefully consider design factors to keep costs and problems at a minimum. General recommendations for radii, for instance, might include: bottom radii of drawn containers should be kept about ten times the thickness of the stock; the largest possible radii should be allowed at corners in box-shaped pieces.

The photographs on this and the opposite page illustrate the care that is put into some stainless products. The stainless sheets themselves are sprayed with a plastic coating before fabrication to protect their surface during all forming and working operations. All welds are ground and buffed down to a smooth surface and the welded seams are tested with black light to be sure that they are perfectly sound. It takes this kind of effort to get products whose application may be outdated long before the material shows a sign of wear or deterioration.



Large stainless coffee urn cylinders are formed on rollers.

Each piece gets individual buffing and polishing attention.

Hand grinding makes welds smooth and easy to keep clean.

The quality and beauty of stainless is evident in these durable coffee makers nearing completion at S. Blickman, Inc.

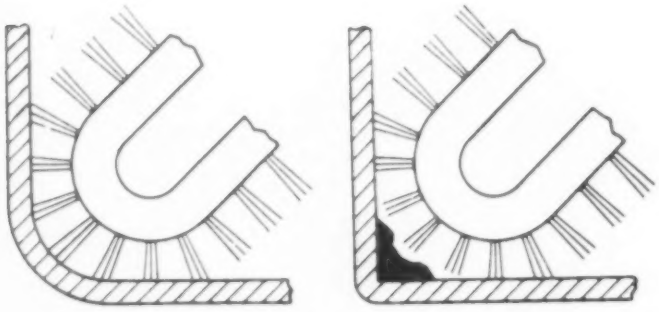
The smallest flaw in a weld shows up under black light.

Automatic welding is used for critical seam on urn bottom.

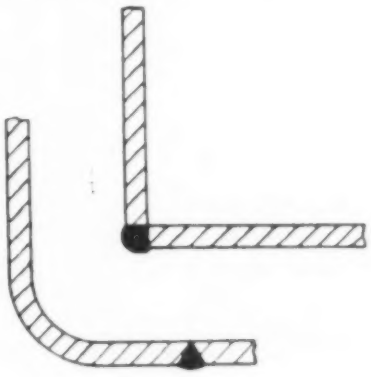
Automatic methods may be used for simple polishing operations.

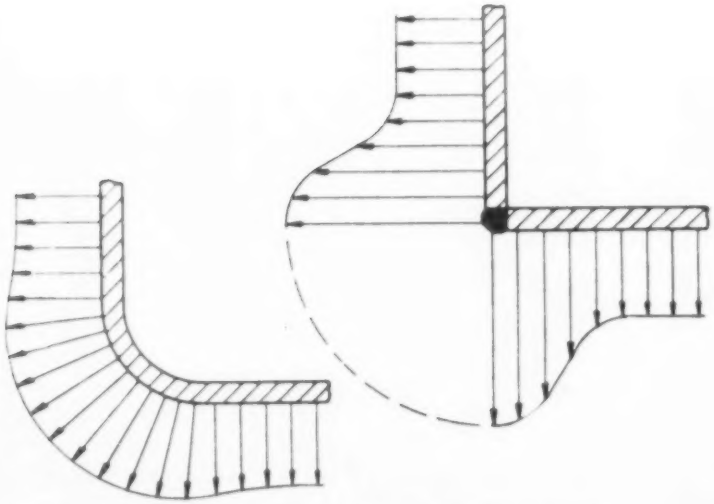
Coffee brewers have their insides shined by electropolishing.

Cleaning brushes reach all surfaces in round corners while square corners tend to be less accessible and accumulate dirt.

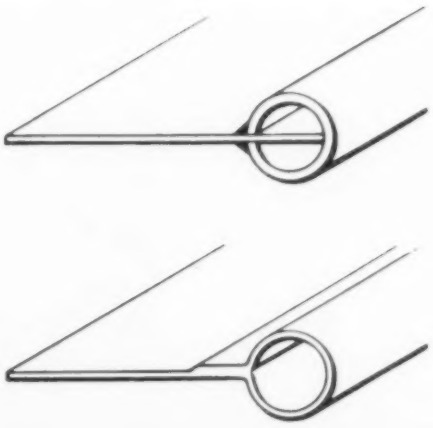


Welds located away from corners are less subject to stress than those at corners, which are more apt to fail under tension.





Under pressure, sharp angles receive greater stress than round corners as indicated by the stress ordinates shown above.



Improved design by Blickman for stainless shield (with standard method above). Sheet is rolled and welded to itself.

Product planning with stainless is based on techniques and types

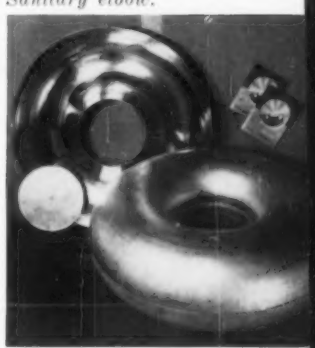
In planning a stainless product, the designer must decide more than which type will best suit his needs as far as appearance and fabrication are concerned. He must also determine in what form to order stainless from the mill. Stainless is available in a wide variety of forms from sheets, strips, pipes, tubes, plates, bars, wires, to extrusions, standard castings, forgings, formed parts, perforated and expanded sheets. Special steels have been developed for exceptional conditions of machining, deep drawing, spinning, and most other methods of fabrication. Stainless for spinning, for example, must work-harden slowly, as the process itself causes exceptionally severe cold working. Similarly, the type of stainless will determine the depth of draw that can be attained.

Special fabrication machinery and techniques can produce exceptional shapes, usually involving specialty shops that concentrate on custom jobs. On the right are three examples of how stainless is being used for reasons other than its beauty. The plate is the largest ever made of stainless. Produced for use in the pressurized water reactor for the Shippingport Atomic Power Station, it is 84 inches wide, 340 inches long, 3⅛ inches thick and weighs 25,275 pounds. It was made in a special ingot mold so the plate could be rolled as a single piece. The ingot weighed 49,760 pounds. The donut-shaped piece is an ingenious way to fabricate sanitary elbows. Two circular blanks are drawn to form half-spheres and are then welded together. The desired elbow is cut from the donut. The radar antenna is made of stainless for several reasons: it resists corrosion (a particularly important consideration since many of these antennas are mounted on ships and subject to salt-water spray) and the work-hardening characteristics of the material makes it stronger.

The scope of stainless is getting broader. Its strength, endurance and corrosion resistance are being used to greater advantage for their own sake, and its familiar appearance assets are being augmented—for new and different effects.

Largest stainless plate.

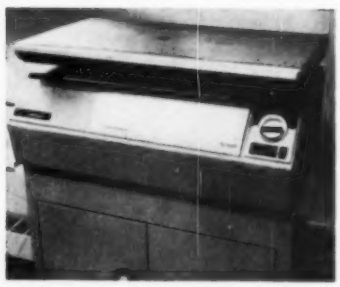
Sanitary elbow.



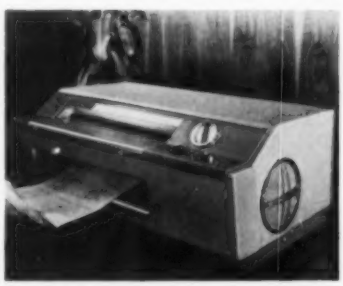
Stainless radar antenna.

Design review

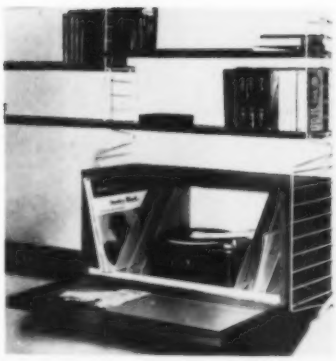
Thermo-Fax gears models to copy variety of material at high speed



A group of new models introduced by Thermo-Fax have been redesigned by Harley Earl, Inc. Each works on an all-electric process that makes it possible to get copies of written, typed, drawn or printed material in a few seconds. All machines turn out copies in a one-step operation. Model 14 (below), which sells for $429, is designed especially to take larger than letter-size papers. Any material up to 14 inches wide may be reproduced in six seconds. The console model (far right) is used for making copies from newspapers, books, manuscripts, etc. With this machine it is unnecessary to remove a page in order to copy it. Called the Premier, it is priced at $429. Ease in insertion and ejection of papers in the new Secretary (above) allows for high speed copying. The Secretary takes material up to 8½ by 11 inches, is geared for quantity work, and turns out a copy in four seconds. $299.



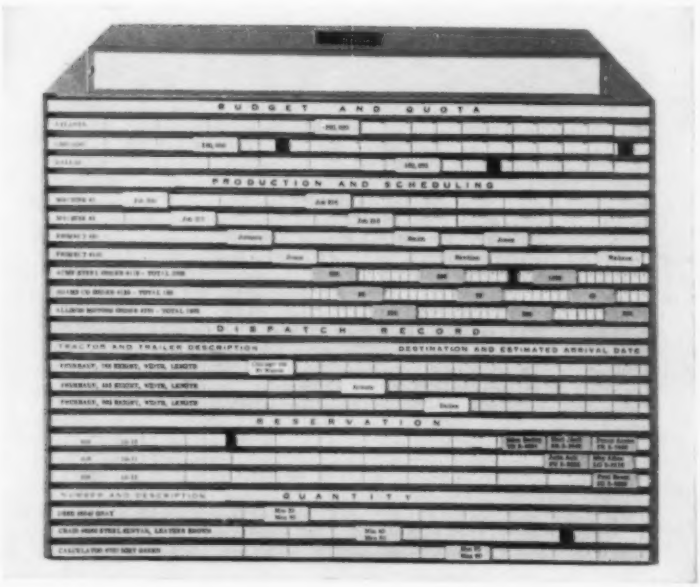
↓ **Compact** duplex microfilm camera, Film-a-Record Model 11, developed by Remington Rand, can photograph both sides of a document simultaneously. At the 42 to 1 reduction ratio it is said to film a greater number of documents per roll than any similar camera. $1600.

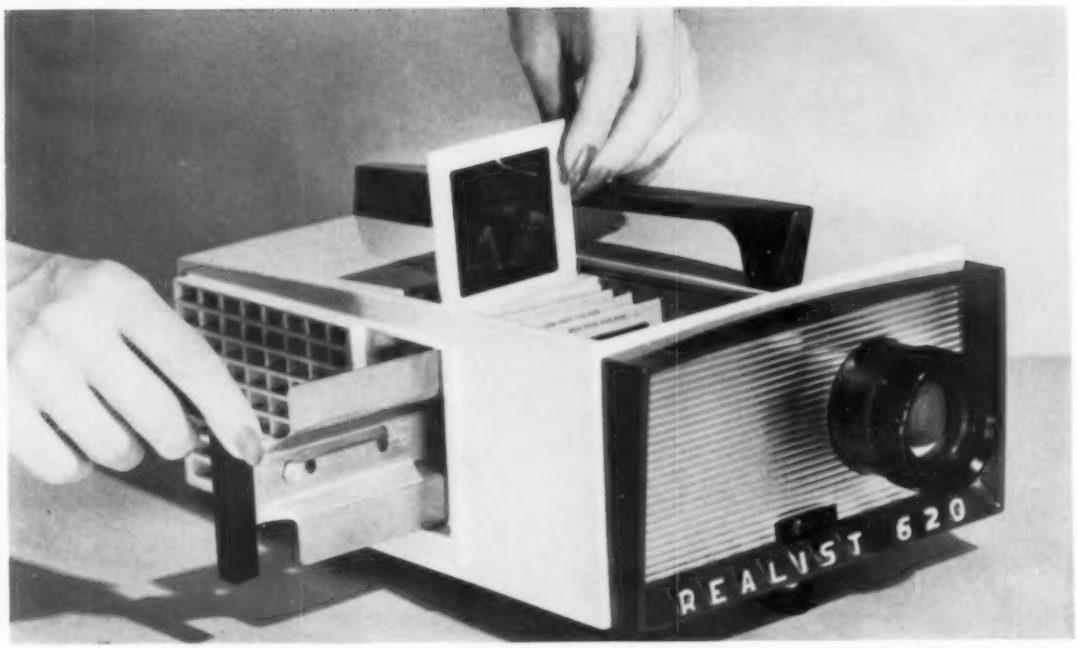


↑ **Versatile** system of hanging units by Sweden's Nisse Stringing have been introduced at Design International in New York. Including desks, cabinets and shelves, units combine by means of hooks and hinges.

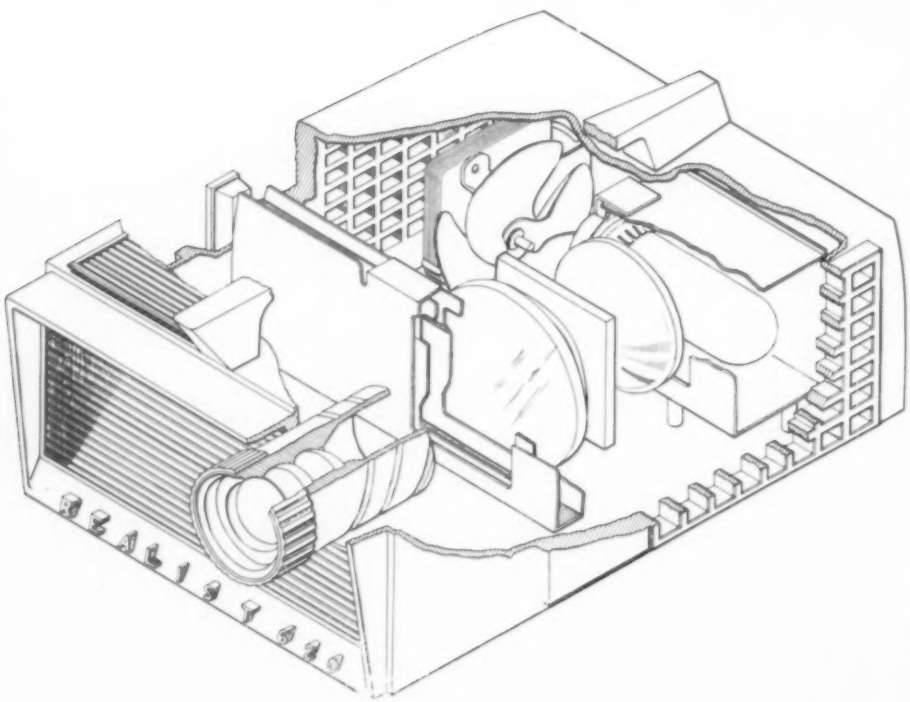
↓ **Extensive** signaling possibilities are offered in visual control panel by Acme Visible Records. Insertable index permits signaling by means of position, color, and legend. Panel is of metal with extruded plastic tubes. Prices begin at $18.75.

↑ **Portable** television receiver, in a case not boxy but curved to follow the set's inner structure, is offered by Philco this spring. Leather covering reduces scarring and adds a touch of luxury. $179.95.

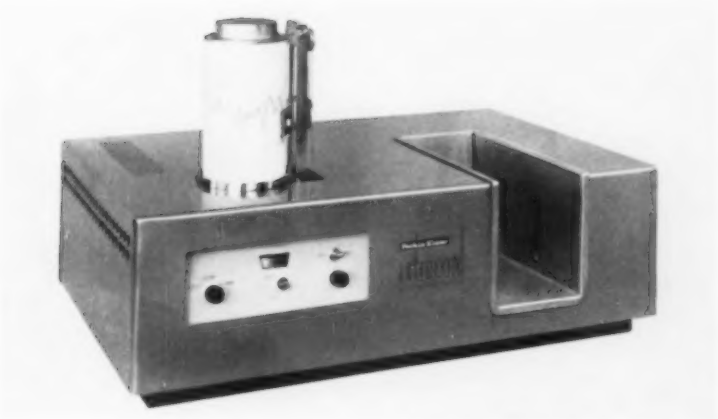




↑ **Light-weight,** versatile and inexpensive projector, designed by Jack Collins, is manufactured by Realist, Inc., of Milwaukee. This 2¼ x 2¼ slide projector takes advantage of the compactness offered by the horizontally mounted 300-watt lamp (Smaller Projection Lamp, ID April, '56). The housing is cast aluminum and the whole unit weighs only 9 pounds. Diagram at left indicates electric motor and overlapping fan blades which direct airflow between condenser lenses and against the film as well as over the lamp. Adapter permits use of 35 mm. and 38 mm. slides. Cardboard or glass mounts and metal frames may be used. $39.95.



↓ **Ansco Dualet,** another new color slide projector which will take all popular roll and miniature color film transparencies, retails at $39.-95. High light efficiency and even screen illumination are maintained with the horizontally-placed 300-watt projection lamp.



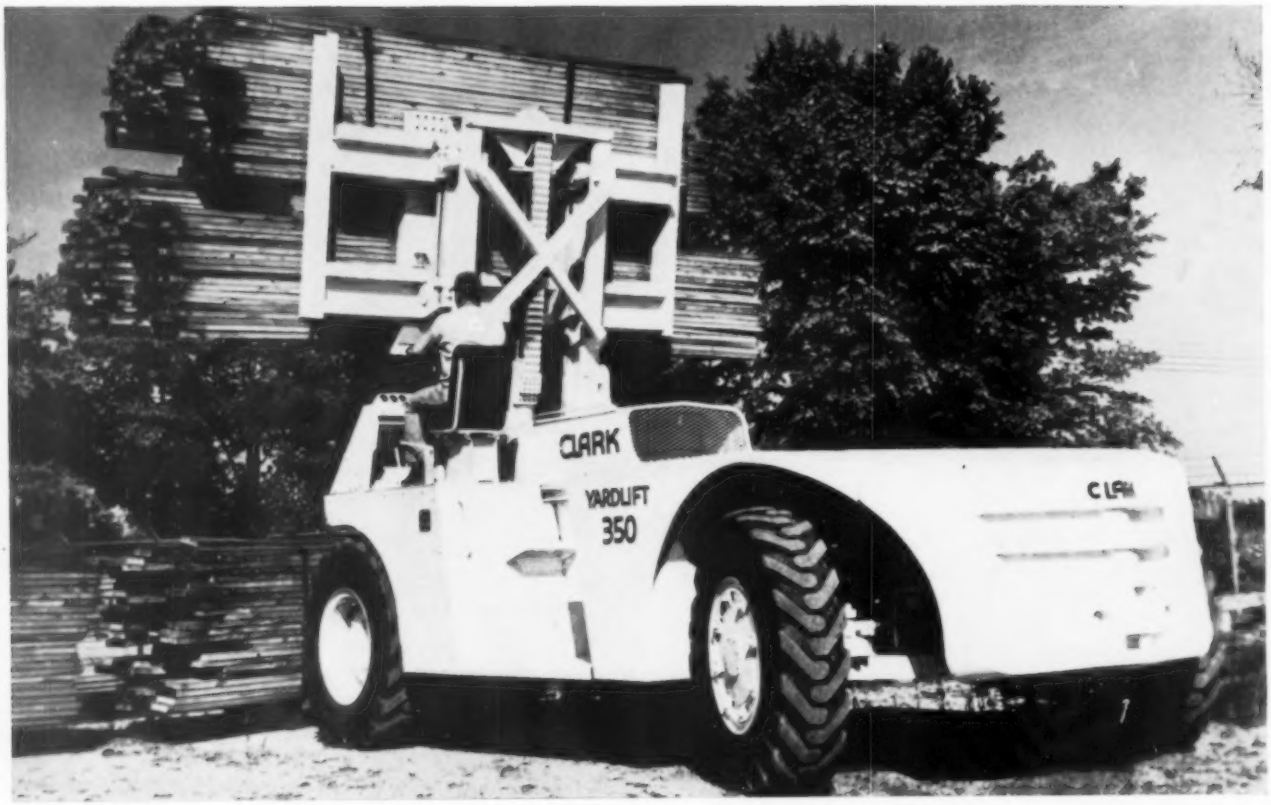
↑ **Small-size** spectrophotometer for laboratory and office use, designed by Eliot Noyes and Associates for Baird-Atomic, Inc. The double-beam, infrared KM-1 is a table-top model especially suited for limited budget operations. $7,850.

↓ **Bell's** high fidelity amplifiers only 4 inches high, with recessed base and simple in-line controls feature a long, low look. They are readily adapted for panel mounting. The 3 models are rated at 12, 20, and 50 watts. From $49.95.

↑ **Antenna** enclosed in rotatable carrying handle brings reception from any direction to Emerson's Model 868 all-transistor portable. The ferrite-bar loop-antenna offers the equivalent of an additional stage of amplification. $38.00 price includes Miracle Wand antenna.

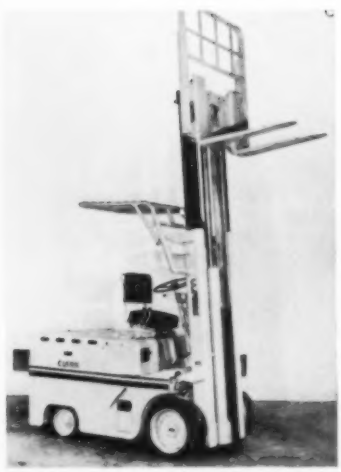
↑ **Hidden** revolving antenna that lets you dial in the clearest signal is featured in a series of 3-way portable radios by Zenith. A longer-life battery, claimed to increase playing time by 100%, reduces operating cost. The Sun Valley model (above) sells for $47.95.

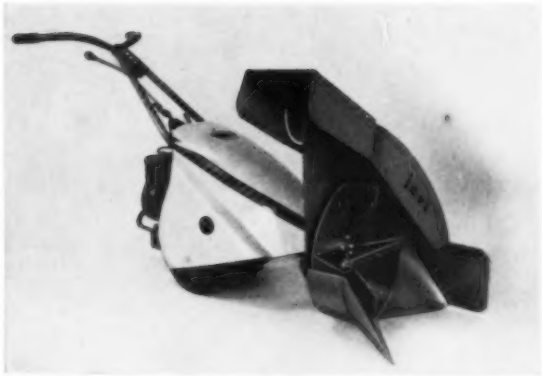
↓ **Two-way design** is a feature of Arvin's all-transistor radio. Vertical carrying is facilitated through top controls, and carrying handle is recessed when model is used as horizontal table radio. Model 9562P (below), $79.95.



Clark presents new models: A yard lift, towing tractor, and fork-lift

Continuing its redesign program on much of its materials handling equipment, Clark Equipment Company has recently introduced three new models. Latest addition to a line originally developed by Harley Earl, Inc., is the Clarklift Y-350 (above). A new feature is the position of the driver, who sits above the left front fender for a clear view of the load. Also new is the roll-back hood over the engine, similar in operation to cockpit hoods found in airplanes. Direction selector levers and lift-lower-tilt levers are located on the steering column for the first time in a large fork truck (35,000 pound capacity). A power-shifted, four speed transmission is coupled with a torque converter and a 6-cylinder gas engine to provide high power over rough terrain. The Y-350 is used for heavy lifting and tiering work required around construction sites, steel mills and lumber yards. Price of $25,871 includes 12 foot mast. An addition to the Clark towing tractor line is the Clarktor 80 (center), with a low silhouette free of protruding accessories. Only 56½ inches high (to top of steering wheel) and 107 inches long, it has a maximum starting drawbar pull of 8,000 pounds, and sells for $5,280. At far right is Clark's first 8,000 pound capacity fork-lift truck with electric powering. A new feature for this type of truck is the automatic "tilt-lock" valve in the hydraulic system, which prevents drifting of the uprights under heavy loads. This model, EUT-8024, has three independent brake systems and a 148½ inch turning radius for right angle stacking. Basic price, less battery, is $9,405.

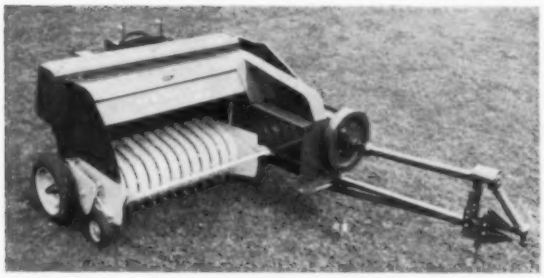




↑ **Snowthrower** attachment has been added to the Jari Junior power unit. It may be replaced with other attachments. $194 to $204.

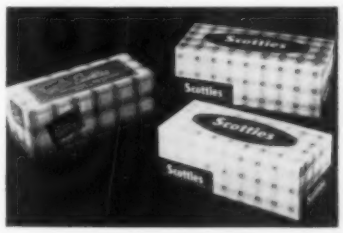
↑ **Riding-type** power lawn mower has been announced by Power Products Corp. With a 4-hp. engine, it weighs 19 pounds. $335.

↓ **New Holland Baler** conveys hay into bale chamber through finger-like feeding mechanism. Accessibility of parts and continuity of line give it a design character unusual in its field.



↓ **Lysol**, for the first time since its introduction to the U. S. over 50 years ago, has announced a new package by Charles Magers. The bottle has intersecting-triangle shape and ribbed sides.

↓ **Pastel colors** in a new package by Jim Nash and Associates have been introduced by ScotTowels. Brighter appearance of package aims at keeping Scotties more in evidence—and within reach.



↑ **Molded fibre** is used by Smith and Tepper Design Associates in this dispenser package for Saffire band saw blades. Blades coil around recessed sphere and are extracted through dispenser at top of package.

↑ **Package by Alan Berni and Associates** is designed to move Lanolon, a Squibb product, from the druggist's shelf to the cosmetic counter. Fashion style indicates a new approach for Squibb merchandising.

Striking display at the '57 IRE event was Kennedy tracking antenna which rotated in slow motion.

1957 IRE show

This year's Institute of Radio Engineers convention and exhibition, held for the first time at the New York Coliseum, differed widely from earlier editions. Innovation used to be the keyword to a show's character. This year's exhibit indicated a shift of emphasis: from a largely experimental field, electronics has graduated into a firmly established, vast and sober-headed industry. This is exemplified by a single group of electronic products—transistors and other semiconductor devices—which has within a few years become a major industry, expected to reach a yearly output of $300 million by 1960.

What was startling at the March event was not the products but the displays themselves, and the way they were organized as a coherent presentation. Since various electronic products can now be grouped within distinct categories, "streets" were set up to display them group by group, much in the traditional bazaar fashion where all jewelry stalls are put in one alley, all silk stalls in another. Street signs announcing Transistor Way, Component Alley, Scope Street, and others, aided the visitor in orienting his curiosity and his purchasing interests among the show's four exhibition floors. The elaborate ways in which the products were displayed made it abundantly clear that the stress this year was on reaping the rewards of some hard and intense years of electronic evolution. Some 800 exhibitors offered their products to over 50,000 visitors—a record IRE attendance—and most of the booths bore the look of good, up-to-date display techniques which, however appealing, must have imbued many a veteran visitor with nostalgia. Good looking displays almost seemed a substitute for product news in attracting the roving engineer.

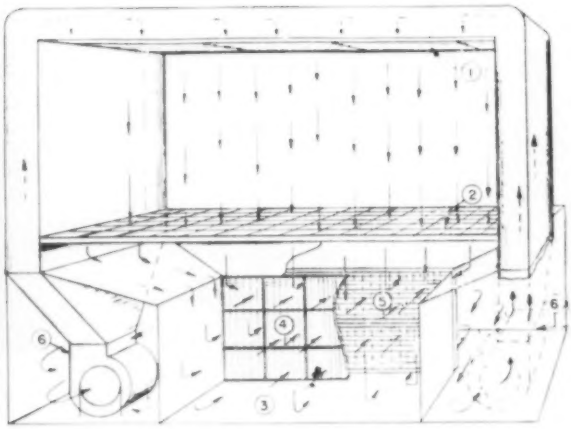
What was shown

The most prominent display was the Kennedy revolving antenna. Larger than its predecessors, the servo-controlled tracking antenna could be seen everywhere on the second and third floors. Equally impressive were RCA's floral arrangements for on-the-spot demonstrations of color TV, and GE's life-size plastic model of a section of its Owensboro, Ky. dust-free plant which produces high-reliability electronic tubes for guided missiles and for other critical equipment. Though these exhibits attracted much attention, what actually dominated the show was the vast variety of electronic components. There were tubes and semiconductors by GE, Raytheon, Sylvania, Transitron Electronic and others; mechanical components for electronic circuits including printed circuit switches by Knight Electronics and terminal blocks by Kulka Electric; new material applications, notably the replacement of metal parts by plastics, such as Walter Lee Chemical Corp.'s line of extruded, molded and machined Teflon hardware; and a vast line of electronic control and measuring equipment. These are standard IRE products, and they were presented not for their newness but as available company goods. They did, in many cases, feature some improvements along established lines: extended miniaturization of circuit components (GE's hermetically-sealed relays, Westinghouse's specialty transformers and hypersil cores), extended range and greater precision of measuring equipment.

A first in IRE-show history was the exhibition of foreign products as a group. Great Britain's own and separate pavillion gave the show an international flavor it has lacked in former years. Conservatively decorated, with portraits of the Royal couple facing the entering visitor, the British Room housed a government stand, and seven booths representing eleven British manufacturers. These introduced to the American market British measuring equipment, a new range of voltage stabilizers and voltage reference tubes, and other precision instruments.

Another addition this year was the production engineering floor. The entire fourth floor was devoted to production equipment for the radio-electronic industry—new plating and tooling techniques (Federal Tool Engineering's new precision welding heads), new materials for high temperature insulation (Diamond Vulcanized Fibre made by Continental Diamond Fibre, a division of The Budd Co.), and ceramic parts for electronic application (The B. G. Corp's ceramic-metal seals, alumina ceramics, and others). Also displayed were coil winding machines by a long list of manufacturers (among them, Boesch's toroidal coil winding machine and Associated American Trading Division's coil winding equipment).

Booths arranged in "streets" according to products, and large company displays—GE's miniature tube "factory" and Hughes' Falcon missile—were among outstanding features of this year's electronic industry's show at the New York Coliseum.



Doorless door: 1 *outlet grille*, 2 *floor, grating*, 3 *sump*, 4 *filters*, 5 *heater-cooler*, 6 *fans*.

Air flow makes doorless door

As the old-time doorman disappears from the city scene, the public finds itself having to wrestle its way through a lot of cumbersome doorways and some merchants consider it a deterrent to window shoppers who might otherwise be coaxed into spur-of-the-moment purchases. One answer to the problem has been lightweight aluminum doors that don't fight the pedestrian as much as the older models. Another and more dramatic answer is the "doorless door" that does away with barriers altogether, keeping the weather outside by means of a continual downflow of air at the portal of the building. A 1952 Swiss development, first installed in a Zurich office building, the doorless door now has a number of European installations to its credit. A new American installation is the New York office of the Knickerbocker Savings and Loan Association on Lexington Avenue.

In this installation, conventional double sets of swinging doors have been replaced by ceiling and floor grating through which a carefully calculated flow of air is maintained, sufficient to counteract the natural "chimney effect" of air moving through a building. A curved beam of air is sprayed down from the top grating and sucked in at the lower grating. Dust, dirt, wastepaper, cigarette butts and other refuse is collected in a sump below the floor grate from which it is periodically flashed. Filters, including electronic filters if desired, clean the air which is then heated or cooled–depending upon the season–and recirculated. The air current, though sufficient to counteract all but the gustiest weather, doesn't create an unpleasant draft that will muss the hair or clothing of pedestrians. The velocity of the air changes automatically within set limits to accommodate weather conditions.

Manufacturer: Sulzer Brothers, 50 Church St., New York, New York.

New colored aluminum coils

Manufacturers of products using aluminum sheets can now apply "Colorweld," a new pre-enameld, pre-finished aluminum coil by Reynolds Metals Co., to turn out finished aluminum products in a variety of organic finished colors. Using the new colored aluminum coils it is possible to deliver products directly from roll-forming machines, press brakes, or draw or punch presses, without subsequent finishing operations.

"Colorweld" is available in widths from one-half to thirty-six inches and thicknesses from .016" to .051", and in a range of twenty colors, including five pastel shades. The standard coil is white on one side, but different colors are available on opposite sides of the coil; any desired color or special finish can be matched.

Manufacturer: Reynolds Metals Company, 2500 South Third St., Louisville, Kentucky.

New insulating cloth

"Gannex" is a new British cloth that is said to combine the virtues of being water and wind-proof, with ventilation that prevents condensation. The cloth is based on a patented process involving the principle that air trapped in clothing provides warmth to the wearer. Built-in air channels hold the air between the fibres and provide a heat-retaining layer around the body. The fiber joining the weft to the outer layer is fused or "spot welded" to the outer layer at intervals, leaving air traps. The result is a cloth that is warmer than conventional wool cloth of equal weight. It is even reported that "Gannex" can compensate for the ups and downs of temperature so that the wearer's surface skin temperature will not change much when he moves from warm to cold air. The cloth keeps its insulating properties even after exposure to rain.

Manufacturer: Kagan Textiles Ltd., Elland, Yorkshire, England.

Grating design allows cutouts

Two strong structural elements have been combined in this aluminum grating–rectangular openings and riveted joinings–so that cutouts can be made in an installed grating to accommodate vertical pipes or other members in any part of the panel without a loss of structural rigidity. The grating was originally designed to meet the requirements of construction and maintenance industries, which need a strong lightweight grating for easy handling, tailored to fit a variety of installations.

Manufacturer: Klemp Metal Grating Corp., 6608 South Melvina Ave., Chicago, Illinois.

Hard-tooth saws for many jobs

A new line of versatile band saws are heat-treated for hardness along the toothed edge only, making the teeth particularly tough and durable but leaving the bulk of the blade flexible enough to take the constant bending over the wheels in operation.

The line of saws ranges all the way from hard metal cutting saws to saws especially designed to cut soft, gummy materials. The Hard Edge Standard Steel Saws cut most ferrous and hard, non-ferous materials. Skip Tooth blades cut soft metals such as copper and aluminum, as well as wood, plywood, composition board and plastics. Hook Teeth blades can cut gummy materials.

Blade widths range from ⅛" to 1", are packaged in 100' and 250' coil lengths, or are cut to length and welded to fit specific machines.

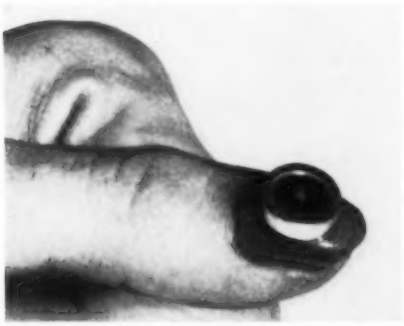
Manufacturer: Heller Tool Company, Newcomerstown, Ohio.

Tiny energizer packs high power

National Carbon Company has made available the "Eveready" W-307 energizer, no doubt one of the smallest "power plants" on the market. Weighing 1/20 of an ounce, the tiny battery is 0.440 inches in diameter and ⅛ of an inch thick. Rated at 1.5 v, the energizer's top recommended average current drain is 60 microamperes or less; it is designed to withstand shock, vibration, and acceleration, and is gold-plated for good electrical contact.

For comparison with other power supplies, National Carbon engineers have calculated that the new energizer could be rated at 1/10th of a watt-hour, will produce ½ HP for one second, can lift its own weight 80,000 ft., and will provide 266 ft.-lb. of work.

First commercial application of the new "Eveready" W-307 is in the electric wrist watch recently announced by Hamilton Watch Company (see page 64). In this application the energizer is rated for continuous operation of more than a year—or something like 125 million watch "ticks."
Manufacturer: National Carbon Company, a division of Union Carbide and Carbon Corp., 30 E. 42 St., New York 17, N. Y.



Metal embossing technique

Pattern design and trade marks, company names or other kinds of identification can now be applied on the same product identification plate by a new embossing technique known as the Rolbos "stop-roll" process.

The production method permits a break in the design pattern of the plate at any desired part of the surface. Trade marks or other identifying marks can then be applied, after which the remainder of the design pattern application is continued.

The "stop-roll" process also opens the possibility of embossing several different designs on a single panel, or running a blank section for a certain area—borders, for example—to imprint text or instructions.
Manufacturers: Electro-Chemical Engraving Co., Inc., 1102 Brook Ave., New York 56. Etched Products Corp., 3901 Queens Blvd., Long Island City, New York.

Copper surface-cleaning process

Rolled copper for laminating, for producing printed circuits and for fabricating copper products, must usually be pickled with corrosive acid solutions to remove the accumulated tarnish and to prepare the surface for electroplated, laminated or other protective coverings. Until it is cleaned, drawn copper wire can't be coated with insulating resin or varnish for use as magnet wire, telephone circuits and other electronic or electrical wiring. A new process, using a water-solution of ammonium persulfate at room temperatures, does away with the difficult-to-handle acid solutions. The copper is given a 30-second dip which is sufficient to remove surface films, to impart an etch to the surface, and to slow the inevitable process of retarnishing.

Acid-solution dips have always been hazardous because of their fumes, and the copper retarnishes quickly if not immediately processed or coated; the new process develops no dangerous fumes, and reports indicate a two-week grace period before retarnishing sets in.
Manufacturer: Becco Chemical Division, Food Machinery and Chemical Corp., Buffalo, New York.

Shocks absorbed by nylon batting

A nylon fiber batting tradenamed Ny-Sul-Loft, originally developed as a clothing interliner, has been found to have superior shock absorbency properties, made dramatic in the folowing demonstration: a pad of the material a quarter of an inch thick can absorb nearly all of the vibrations produced by banging a table with your fist. Objects not mounted on the batting will jump; objects on pads remain stationary.

Ny-Sul-Loft is already being used as a packaging pad for fragile objects like glass and ceramics. The material withstands temperatures up to 300°F, which means it can be laminated or stitched by a patented chemical-thermal process. This same thermal insulation property has fitted it for applications in guided missiles.

The batting can be used as a filter for liquids or gas with different degrees of separation possible by varying the thickness of the fibers. This quality would suit it to a variety of air filtering jobs including filter devices in oil burners and air conditioners.

Being nylon, the batting shares in all of that material's characteristics: it is anti-fungus, anti-mildew, resistant to alkalies and most acids, quick drying. It can be die-cut and impregnated with any chemical inert to nylon. It is non-allergenic, lightweight, dimensionally stable under extremes of heat and cold. The batting doesn't mat and it remains unchanged after repeated immersions in water. Current production is in a range of weights from two to eight ounces a square yard.
Manufacturer: Star Woolen Co., Cohoes, New York.

Flexible magnetic plastic

A group of flexible plastics which are magnetically attracted to ferrous metals constitute a unique new line of products that might push the miniaturization of motors, switches and other aircraft components further along. Tradenamed Ferrotrons, they are being offered to electronic designers to facilitate the investigation of new or improved concepts in circuit development. Ferrotron tapes permit a flexibility of handling and ease of product assembly not possible with conventional solid magnets.

Ferrotrons derive their magnetic power from their iron powder content and are available in rod and tape form. Although in tape form the new magnetic material is as flexible as paper, it possesses good dielectric strength, constant magnetic permeability over a wide range of frequencies, and good moisture and temperature resistance.

Rod diameter sizes of Ferrotrons are ⅛", 3/32" and ¼". The tape is ½" wide and stocked in thicknesses of 4, 8, 16 and 32 thousandths of an inch.

Rigid Ferrotons have good machineability and high impact strength. Unlike pure iron, Ferrotrons have good magnetic and physical stability at temperatures as high as 200°C. The magnetic permeability of the new plastics is constant over a range of frequencies up to about 3000 mc.

Ferrotrons have already had government as well as commercial applications as electromagnetic shielding of critical circuits for radio interference suppression, and as magnetic core material.
Manufacturer: The Polymer Corporation of Pennsylvania, 2140 Fairmont Ave., Reading, Pa.

Lightweight low-cost fiberboard

A new dimensionally stable lightweight fiberboard is being used in place of rigid metal panels or plastic sheets in separating unit components, for example as compartment dividers in room air conditioners. In some cases, the weight of the total product is reduced by using fiberboard. Other savings come as a result of its fabrication: it can be notched, scored or die-cut to any shape. Most die-cutting operations can be done with steel-rule dies. The fiberboard is available in .038-inch thicknesses, and thicker sheets can be built-up by lamination. Manufacturer: The Armstrong Cork Company, Lancaster, Pennsylvania.

Plastic coated buildings

Using the technique developed after World War Two in "mothballing" surplus Navy vessels, and later used in lamps, the Illinois Institute of Technology has constructed experimental shelters by spraying a quick-drying vinyl "cocoon" on a tubular steel frame. The shelters, twelve feet high and twenty feet in diameter, are built in the form of a hyperbolic parabaloid so that the wind doesn't flutter the vinyl after application. Cloth tape meshed at six-inch intervals gives the vinyl a base to adhere to. The vinyl fibers can span a two-foot space between the tubes of the frame with the support of a webbed backing.

To keep the first coat of plastic from deteriorating under the direct rays of the sun, a second coating is applied: a mixture of pure vinyl and a white pigment, this top coat hardens to the consistency of rubber, then shrinks — making the structure "prestressed." To its advantage, the new covering is cheaper to use than conventional sheathing materials, faster to apply, moisture-proof—and does not need a rigid framework. Richard E. Baringer, head of shelter design at IIT, who supervised the experiment, believes that the coating technique may eventually be used to build houses. Manufacturer: Vinyl plastic was donated for the experiment by Abana Products, Inc., Chicago.

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For Your Calendar

Through May 26. The 30th annual exhibition of Design In Chicago Printing, sponsored by The Art Institute of Chicago, will be held at the Institute's gallery 11, Chicago, Illinois.

May 15-June 15. Design and Printing for Commerce Show sponsored by the AIGA, Freedom House, New York City.

May 20-23. The Design Engineering Show will be held at the New York Coliseum.

May 22. The first Package Research Conference will be held at the Hotel Plaza, New York City. Lippincott and Margulies is the sponsor.

May 31-June 2. The Fifth Annual Allerton Conference, sponsored by the University of Illinois and the Society of Typographic Arts, will be held at Allerton Park, Monticello, Illinois.

June 1-30. The Chicagoland Commerce and Industry Exhibition will be held at the International Amphitheatre, Chicago, Illinois.

June 11-13. The Western Plant Maintenance and Engineering Show will be held at The Civic Auditorium, San Francisco, California.

June 12-14. The First Annual Conference of American Craftsmen will be held under the auspices of The American Craftsmen's Council, Asilomar, Monterey Peninsula, California.

June 14. The Society of Plastics Engineers will sponsor a regional technical conference, "Plastics for Electronics," at the Lowell Institute of Technology, Lowell, Mass. Contact: R. Mondano, Raytheon Mfg. Co., Waltham, Mass.

June 14-30. The Boston Arts Festival, consisting of the work of sculptors, painters, and graphic artists, will be held in the Boston Public Garden.

June 20. The Seventh Annual Design Awards, sponsored by the IDI, will be presented at a lunch at the Hotel Ambassador East, Chicago, Illinois.

June 23-29. The International Design Conference in Aspen. Subject: "Design And Changing Values." (Address inquiries to: Mr. George Culler, Chairman, International Design Conference, 22 East Illinois St., Chicago, Illinois.)

June 24-26. The Semi-Annual Meeting of the American Society of Heating and Air Conditioning Engineers will be held at the Manoir Richelieu, Quebec, Canada.

July 7-28. Processes for Design Problem-Solving. Three-week summer program, Institute of Contemporary Art, Boston, Massachusetts.

July 27-November 4. The eleventh International Triennial Exhibition of Modern Decorative and Industrial Art and Modern Architecture will base its program on the themes: 1) relationship of the arts, 2) contemporary architecture, 3) art production and industrial design. The address is, as usual, Milan, Italy.

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