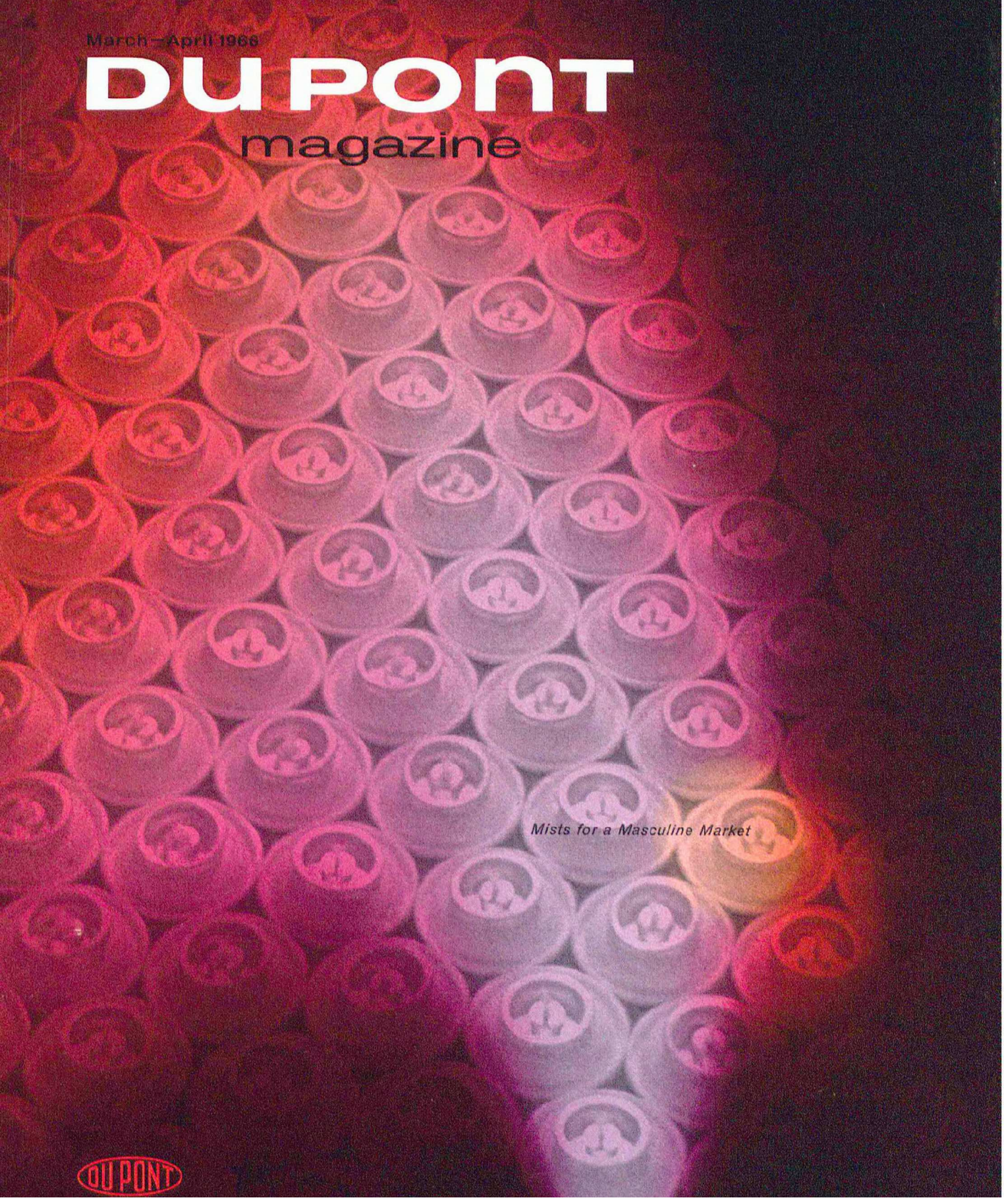
March—April 1966

DUPONT magazine



Mists for a Masculine Market

DUPONT

March-April 1966 Vol. 60 No. 2

DU PONT magazine

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THE COVER. This brightly hued aerosol spray (whose normally achromatic state is enlivened here by colored lights) symbolizes the riches that pour from the fastest-growing well in the U.S. cosmetics field: men's toiletries. For details on how "Freon" propellants have helped to change male minds and turn scents into dollars, see page 7.

Jack D. Hunter, *Editor*
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Jack Murphy, *Associate Editor*
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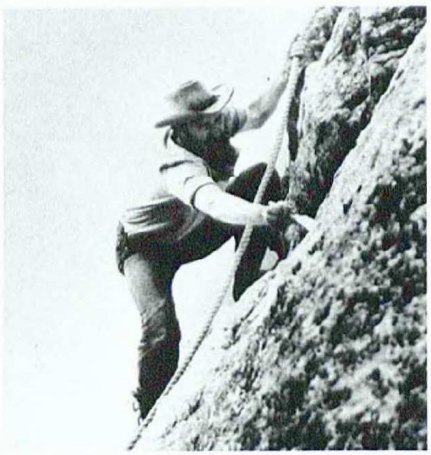
Crazy Horse: THE

With bulldozer, rock drills and Du Pont dynamite, one man . . . alone . . . carve



Korczak Ziolkowski: a man against a mountain.

The next time tasks are stacked high before you and, with your head slumping wearily against the knuckled buttress of a limp fist, you groan about "a mountain of work," give a brief thought to Korczak Ziolkowski.

"Mountain of work" is more than a metaphor to this 57-year-old sculptor. His chief preoccupation, indeed, is a mountain —an 18-million-ton, seamed formation of rock that bulges like a huge bicep above the blue-green density of ponderosa pine in the Black Hills of South Dakota. Its granite bulk is the craggy medium in which Ziolkowski (pronounced Jewel-*cuff*-ski) is shaping the world's largest statue—an immense, graven image of the Sioux warrior, Crazy Horse.

"I bought the mountain in 1947 and named it Mount Thunderhead," says Ziolkowski, squinting up at the jagged summit. His own face seems chiseled from granite, and at the jawline it plunges into a thicket of graying whiskers. His voice sounds like the rumbling aftermath of a summer storm.

"The statue was begun in 1948," he continues. "For the last 18 years it's been me against that mountain, and it'll be another 12 or 13 years before Crazy Horse is finished. But he's *going* to be finished."

The statue is to be a memorial to the spirit and courage of the North American Indians, explains Ziolkowski who, though he's never had an art lesson, won the First Sculptural Award at the 1939 World's Fair for his bust of the pianist, Paderewski. "I began this project at the request of Chief Henry Standing Bear. He asked me to do a mountain monument as a reminder that the red man had great heroes, too."

In contrast to the quartet of U.S. Presidents done in bas-relief against Mount Rushmore, only 20 driving miles from Thunderhead, Crazy Horse will be carved in the round. The Rushmore memorial was rendered by Gutzon Borglum. He and 20 assistants—Ziolkowski, for a short time, was one of them—spent 14 years and $989,992 in federal and private funds in chiseling away 450,000 tons of stone. Crazy Horse will take twice as long but will be the almost single-handed effort of one man, without Government assistance, blasting out six million tons of granite.

As yet, only a rough outline is shaped in the mountain. A scale model in Tennessee marble, however, depicts in miniature what Ziolkowski hopes to put in granite by 1978: the image of a lithe and sinewy brave astride a prancing mount; the Indian's left arm outstretched and pointing across the sloping Black Hills terrain.

"He's pointing to the lands where his dead are buried," remarks the sculptor. Tracing the landscape with a sweep of his arm, he says, "All this belonged by treaty to the Sioux, but when gold was discovered in 1874, white prospectors poured in and the treaty was ignored. So Crazy Horse took his people on the warpath."

Crazy Horse has been described by historians as "the boldest, bravest, most skillful warrior in the entire Sioux nation." In concert with Sitting Bull, he authored one of the most sanguinary chapters in the brief biography of Indian war triumphs—the stunning massacre of 241 cavalry soldiers in the Battle of the Little Bighorn. That, of course, was Custer's last stand.

Now, nearly a century later, a Boston-born Polish-American carves a lasting stand for Crazy Horse in a jutting spine of rock four miles north of Custer, S. Dak. In the transformation from marble model to mountain sculpture, the figures of horse and

GRANITE IMAGE

elated but breathtaking tribute to the North American Indians

rider will assume staggering dimensions.

The spirited steed from head to flank will measure 641 feet, or about the length of two football fields placed end to end.

The monument will tower to a height of 563 feet, roughly equivalent to a 56-story building. As a comparison, the Statue of Liberty lifts her inspiring torch only 305 feet above Bedloe's Island.

The outstretched arm of the warrior will be as long and wide as a 225-car parking lot; the horse's nostrils spacious enough to place a substantial house in each; and the completed work will be 140 times heavier than the U.S. Navy's largest aircraft carrier, *Enterprise*.

Says Ziolkowski: "The finishing work, once I get started on it, should move along quickly. Right now, it's still an engineering job that calls for dynamite instead of a mallet and a dozer blade for a chisel."

How does a man begin the grueling task of molding a mountain into a monument? "With a way to get up and down," Ziolkowski answers. In the beginning he rigged an old cable car to carry equipment to the top. His own route: a stairway built with 29 tons of lumber and every board foot toted on his own back. It's a muscle-cramping flight of 741 steps that he estimates he's climbed "eight or nine thousand times, maybe more." Even now, he scales it with the bounding, puffless ease of a mountain goat.

An outline of the statue was painted on the mountainside. "I drove steel pins into the rock," says Ziolkowski, "tied line to them and lowered myself down the face of the mountain." Swinging like an erratic pendulum, he silhouetted the steed and rider against granite with 134 gallons of house paint.

Then he began blasting and he's still at it. "Most days," says he, "I set off two blasts, the first at noon and another around five in the afternoon. Dynamite and electric caps run me about $2,000 a year."

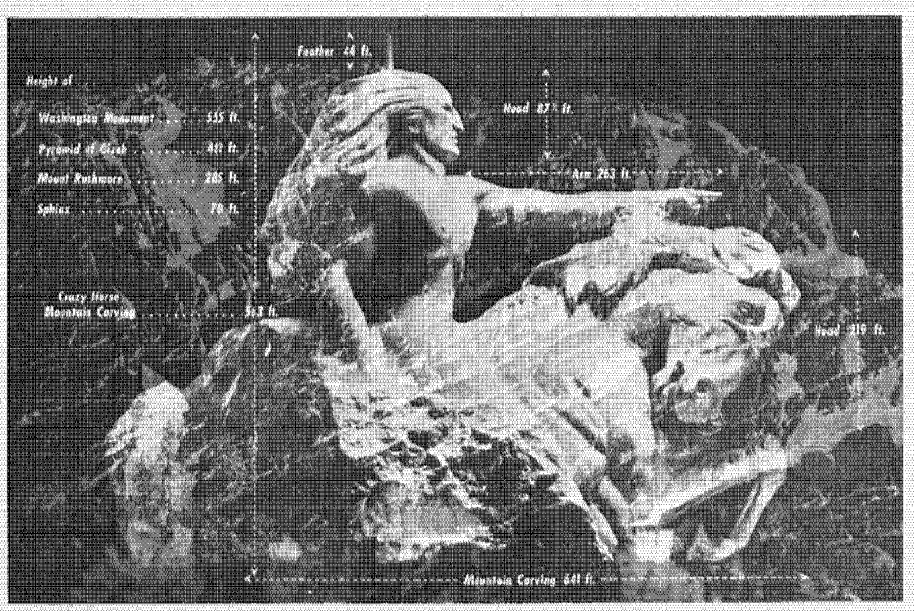


Image of a marble model superimposed on the mountain envisions the eventual monument.

To date he's exploded over 100,000 pounds of powder—Du Pont "Gelex" 2 dynamite, a semi-gelatin product used widely in mining, tunneling and quarrying. By project's end, he estimates, a half-million pounds of dynamite will have been detonated.

Ziolkowski is normally at work on his mountain by 7 a.m., cutting holes with a rotating sinker drill—a pneumatically operated, hand-held tool similar to the jackhammers used in demolishing concrete or asphalt pavement. The boreholes, drilled to a depth of 16-24 feet, are loaded with "Gelex" 2, about 20 pounds per hole.

Once the entire pattern is drilled and loaded, the sculptor descends from his craggy perch and roars off in a dusty, battered jeep to the observation platform where as many as 3,000 sightseers a day gather to watch the drama of man versus mountain. The visitors are allowed to "draw straws" for the privilege of throwing the detonation switch located on the platform.

Switch thrown, the distant mountain belches a puff of smoke and more than 200 tons of rock cascade down its brooding face. Before the dust has cleared, Ziolkowski is huddled beneath the steel canopy of his bulldozer clearing away the debris of shattered granite that will be crushed eventually and perhaps sold.

The cost of immortalizing Crazy Horse in granite will amount to $10 million, according to Ziolkowski. The money, he explains, is derived from tourist admissions, contributions, and income from the two sawmills he operates. A herd of registered Holstein milkers provides support for himself, his wife and their ten children.

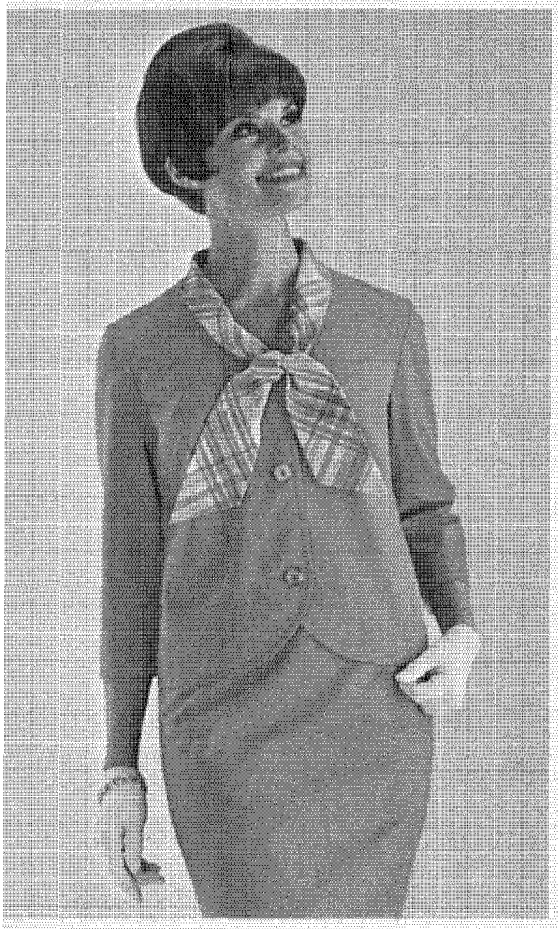
What motivates a man to pledge 30 years of his life to the wearying project of carving a mountain? "Some will tell you it's plain insanity," he answers, gazing thoughtfully at his calloused hands. "I like to think it's a reverence for beauty and courage and for the great deeds of a proud and persecuted people.

"When the statue's finished," muses Ziolkowski, "it may qualify as one of the wonders of the world. I hope for that. Still, a piece of sculpture really isn't enough." His ultimate aim: to create at the base of the Crazy Horse monument a university, museum and medical center for the North American Indians.

"Perhaps someday," suggests an admirer of the sculptor and his work, "someone should carve a granite image of Korczak Ziolkowski. But where would they find a mountain big enough?" —*Jack Murphy* ■

Man-made fibers and the durable-press process join forces to provide

Clothes with Lasting Memories



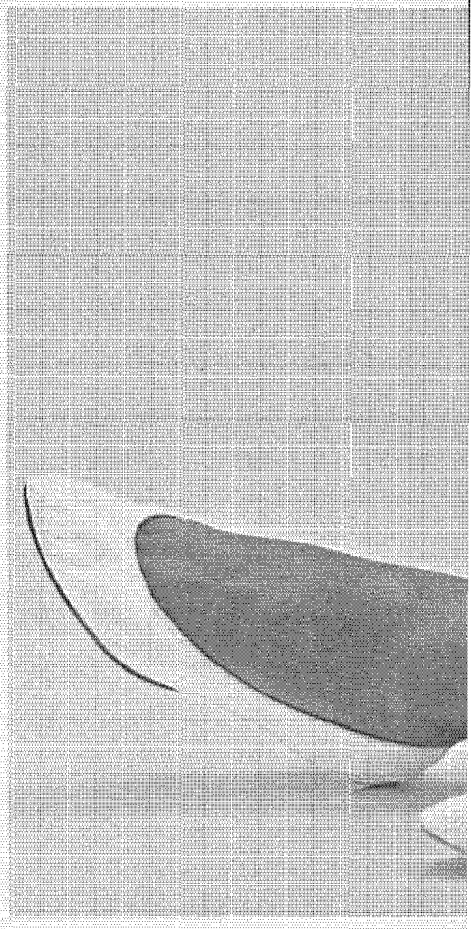
Koret of California's suit of "Dacron" polyester fiber and cotton never requires pressing.

Normal wear—or even deliberate crumpling, crinkling or crushing—won't erase the smooth finish or sharp creases of the girl's slacks at right. Reason: The press is built into the garment via a new fabric treatment that keeps clothing looking like new with nary a touch of the iron.

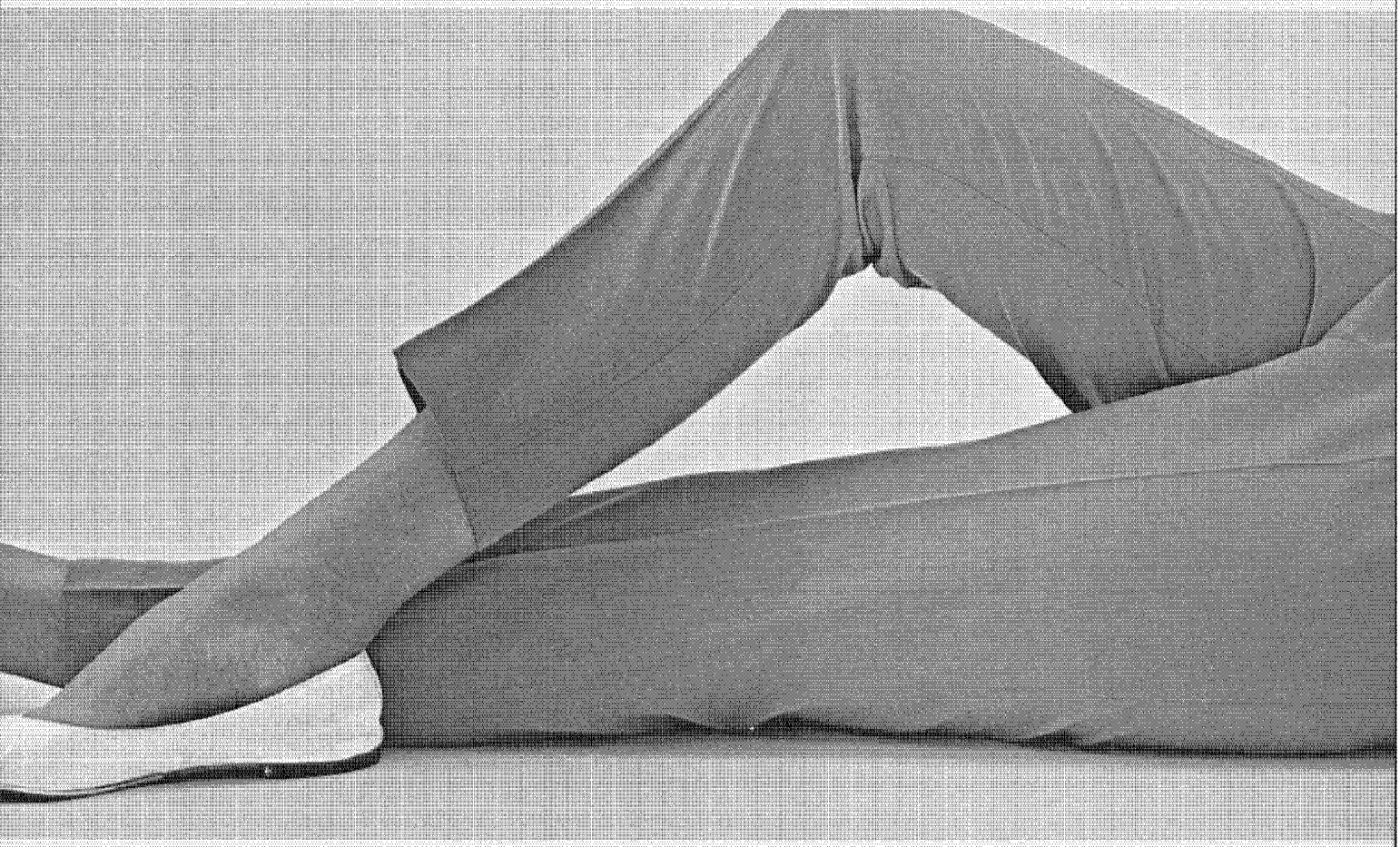
An ingenious combination of chemical, pressing and curing techniques is responsible for "durable-press" and its unwavering "memories" in cloth. Creases or smooth finishes applied by the method are faithfully "remembered" by the material throughout any number of distractions, including tumbles in the washer and dryer. The process, only recently out of the laboratory stage, has already had considerable influence on the U.S. textile industry: Last year some 300 million yards of durable-press goods were sold in articles ranging from work pants through party dresses to pillowcases. By 1970, industry experts conservatively predict, 50 per cent of all soft goods will never need to be ironed.

As might be expected, the principal beneficiary is the housewife who, if she has the average family of four, spends an average of four hours a week ironing clothes. "With durable-press goods," says one industry spokesman, "she can put, say, a suit in the washing machine, tumble it in the dryer, and don it immediately. The ironing board stays right in the closet."

Although a newcomer to textile technology, the process is an outgrowth of the "wash and wear" concept of the 1950's. Explains Mrs. Joyce Bickel of Koret of California, a San Francisco women's sportswear firm which in 1956 launched an all-out development program to improve the wash and wear technology:



"In those days wash and wear cotton garments, new to the apparel trade, were a major help in easing the ironing chore. In theory, a housewife could merely wash a garment, let it drip dry and then wear it. But in actual use it didn't work that way. The problem stemmed from the fact that the fabric was chemically treated with a resin finish and cured while it was still a bolt of material—that is, long before it was made into a garment. Therefore, this finish gave the fabric its so-called 'memory' and ability to shed wrinkles, to be sure. But when the fabric assumed its role as a made-up garment, it remembered only



Sharp creases in these slacks are locked permanently in place via a chemical, pressing and curing process applied to a special blend of "Dacron" and cotton. Garment retains its shape despite long wear, tumbling in washer and dryer.

its original flat state, and the desirable creases—such as those in a pair of pants—could prevail only with ironing."

Koret ultimately developed a process—called deferred curing—to make the creases stay put. "The difference is in the curing of the fabric," says Mrs. Bickel. "In wash and wear fabric, for example, the curing takes place before the garment is made; however, deferred curing enables us to cure the fabric after the garment has been cut, sewn and pressed.

"To do this, the weaver or finisher impregnates the bolt of fabric with a cross-linking chemical or a resin and dries it at a low temperature so as not to cure or fix the finish. Then we cut, sew and press the sensitized fabric into a garment. Finally we bake and cure the garment in a 325°-340°F. oven for 15 minutes, depending on the type of fabric and its finish. Result: The creases, pleats, seams and any other desirable shape are locked in place with a 'memory' that lasts the life of the garment."

Koret's first durable-press garments were pants and skirts, but a succession of shirts, jackets and dresses soon followed. "The early durable-press garments were of simple construction," Mrs. Bickel says. "Today the technology has developed to the point where durable-press is a factor even in high fashion, and a woman can buy a wardrobe she'll never have to iron."

In 1963 Koret of California formed the Koratron Company, Inc., a subsidiary whose function it is to license manufacturers to produce garments and garment components (i.e., fabric, zippers and pocket-

continued

Clothes with Lasting Memories

continued



Seams in durable-press togs resist puckering, appear to be ironed after repeated laundering.

ing) via the Koratron process. In addition, Koratron has established quality control standards for durable-press goods by carefully testing all garments that carry its seal. There are now, in addition to Koret, more than 350 manufacturers who have been licensed to produce Koratron clothes.

The first among these was Levi Strauss & Co., a 115-year-old San Francisco manufacturer of men's and boys' pants. Says Mel Bacharach, Levi Strauss' general merchandising manager: "Our entry into the durable-press market was with all-cotton casual slacks and walk shorts. Unfortunately, while the absorbent cotton fibers combined properly with the durable-press chemical treatment, the reaction seriously degraded the cotton fabric. As a result of the brittleness and lack of strength of the cotton, the fabric soon frayed and wore thin in critical areas of the garment such as the seat and the knees."

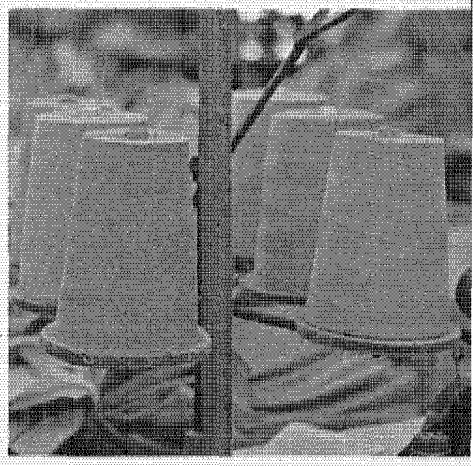
A Job for "Dacron"

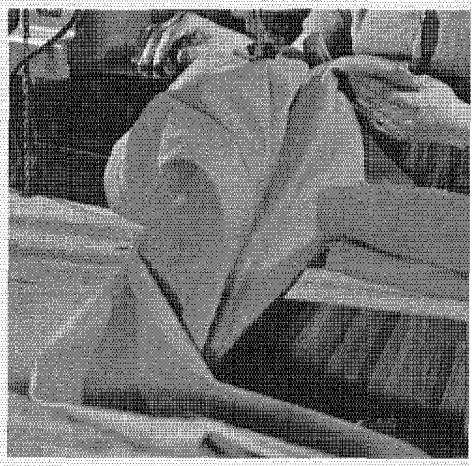
The need, says Bacharach, was obviously a strong, absorbent fabric that would withstand high temperatures and resist abrasion in the bargain. The answer: a blend of "Dacron" polyester fiber and cotton.

"Each fiber in this fabric has a particular job to do in a durable-press garment," says Bacharach. "The cotton fibers are the media which accept and react with the chemical treatment that ultimately makes the garment's press a permanent one. The fibers of 'Dacron' give the fabric its strength and ability to endure long hard wear."

Another advantage of "Dacron" is that it is versatile. In the staple form, the short, chopped-up fibers of "Dacron" are used to make soft fabrics such as those found in men's shirts. In addition, "Dacron" has a high degree of shape retention and can be made in any degree of texture or "hand" (feel of the fabric) the manufacturer wants.

In the high-temperature presses, "Dacron" becomes soft and pliable—a property inherent in most synthetic fibers. Thus, during the durable-press process these fibers readily conform to any shape, and heat-applied creases, when cured and cooled, stay locked in place. Moreover, "Dacron" is resilient and enables the end product to shed wrinkles and resist shrinking, stretching or bagginess even in humid weather.

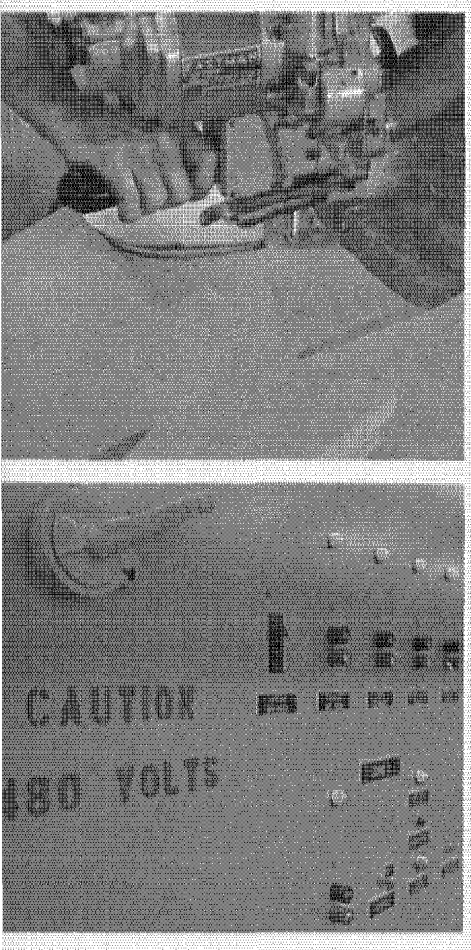


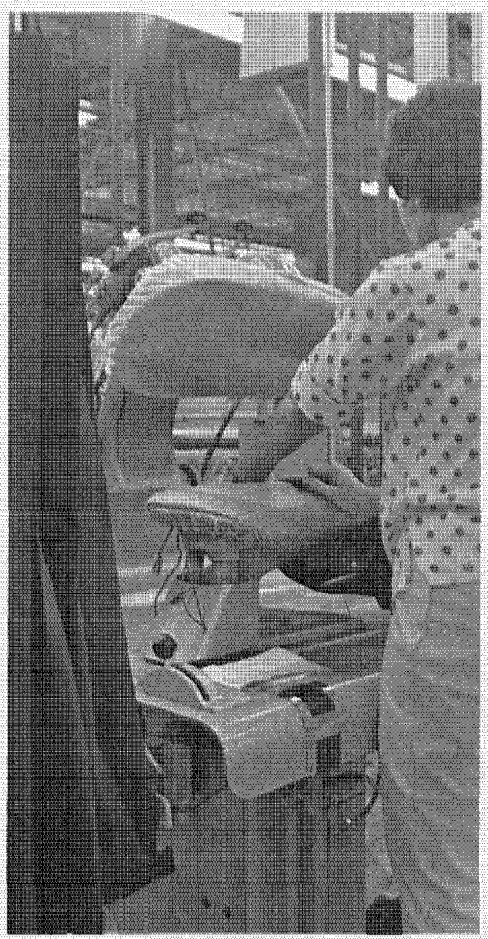


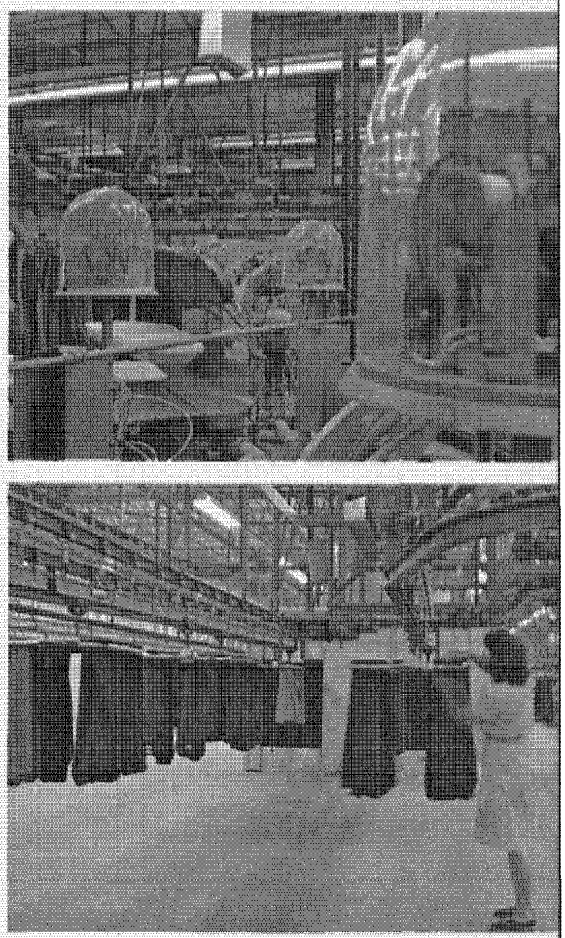
"The combination of 'Dacron' and cotton led to the first major sales breakthrough for durable-press," says Bacharach. "In 1964, the first year we offered durable-press pants of this fabric blend, our casual slacks sales increased 78 per cent.

"We now call these duds Levi's Sta-Prest and have recently completed the construction of a new half-million-dollar plant at Amarillo, Texas, to make them at the rate of 4,000 dozen a day."

Today durable-press has found its way into nearly every niche in the textile industry and has opened new jobs for almost every synthetic fiber. Explains Claude Lee of the Du Pont Textile Fibers Dept.: "'Dacron', of course, is still the workhorse of durable-press. In all weights of fabrics,







Output of 4,000 dozen durable-press items a day at Levi Strauss' Amarillo plant is based on specially treated thread, meticulous cutting, assembling and sewing, electronically controlled presses and high-temperature ovens for curing.

blends of 65 per cent or more 'Dacron' with cotton or rayon assure superior durable-press performance. The setting of the treated cotton or rayon in properly made garments supplements the desirable properties of 'Dacron'. Thus the uses of 'Dacron' now include—beyond men's shirts and pants, women's and children's garments, knitwear and intimate apparel—home furnishings items such as bed sheets, pillowcases and slipcovers. Other fibers, though, are also making strong gains in this field."

Example: Du Pont's 420 nylon, a fiber specially engineered for blending with cotton and rayon fibers. "The advantage of nylon," says Lee, "is its very high strength. It's literally unaffected by severe and protracted abrasion and is now widely used in such durable-press hard-wear goods as casual slacks and men's work clothes."

Another important durable-press fiber is "Orlon" acrylic fiber, says Lee. Not only can fabric of "Orlon" be dyed to a full range of colors with outstanding clarity, brightness and resistance to fading, but in blends with, say, rayon, it provides knit and woven durable-press fabrics that are highly desirable from an esthetic and styling standpoint.

Stretch fabrics, too, says Lee, are entering the durable-press scene. The principal fibers used here are nylon and "Lycra" spandex fiber.

Today, in addition to the deferred cure process originated by Koret, durable-press garments are being made of precured fabrics, says Lee. The precure process "makes effective use of both the synthetic fibers'

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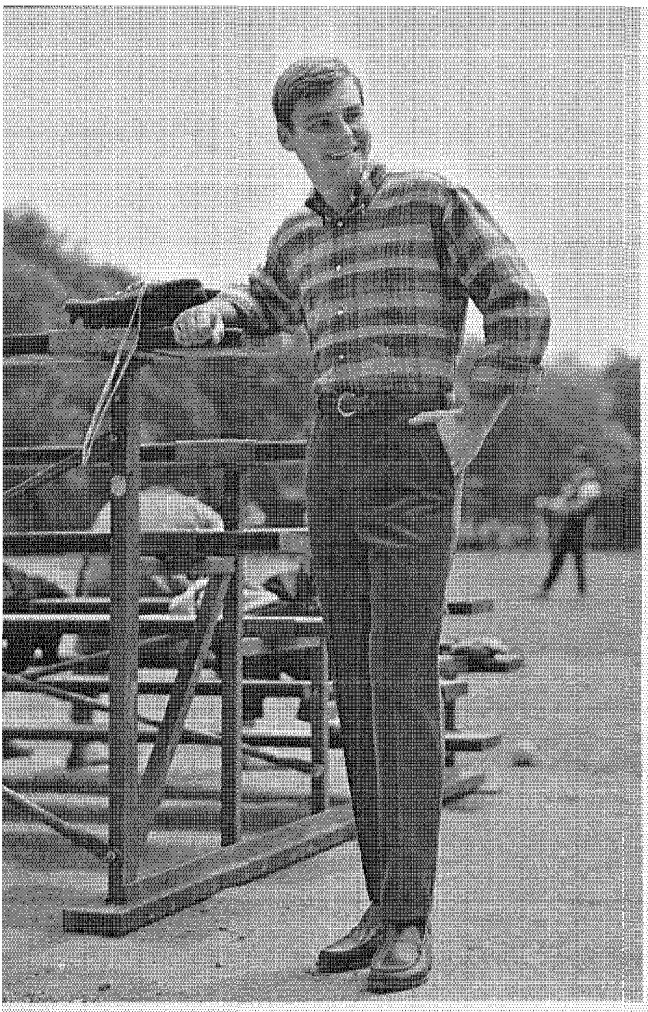


Levi Strauss' Sta-Prest slacks of "Dacron" and cotton are precuffed, creased, ready to wear.



Pleats in Koret of California's Shalimar dress remain steadfast, thanks to fabric's memory.

and the treated cellulosic fibers' ability to form a durable-press," says Lee. "The fabric is treated with chemicals and cured at the fabric finishing plant. However, after the garment is made up, it is pressed into shape at high temperature with an iron or a pressing machine. This is possible because of the synthetic fibers' pliable nature which sets the creases in place."

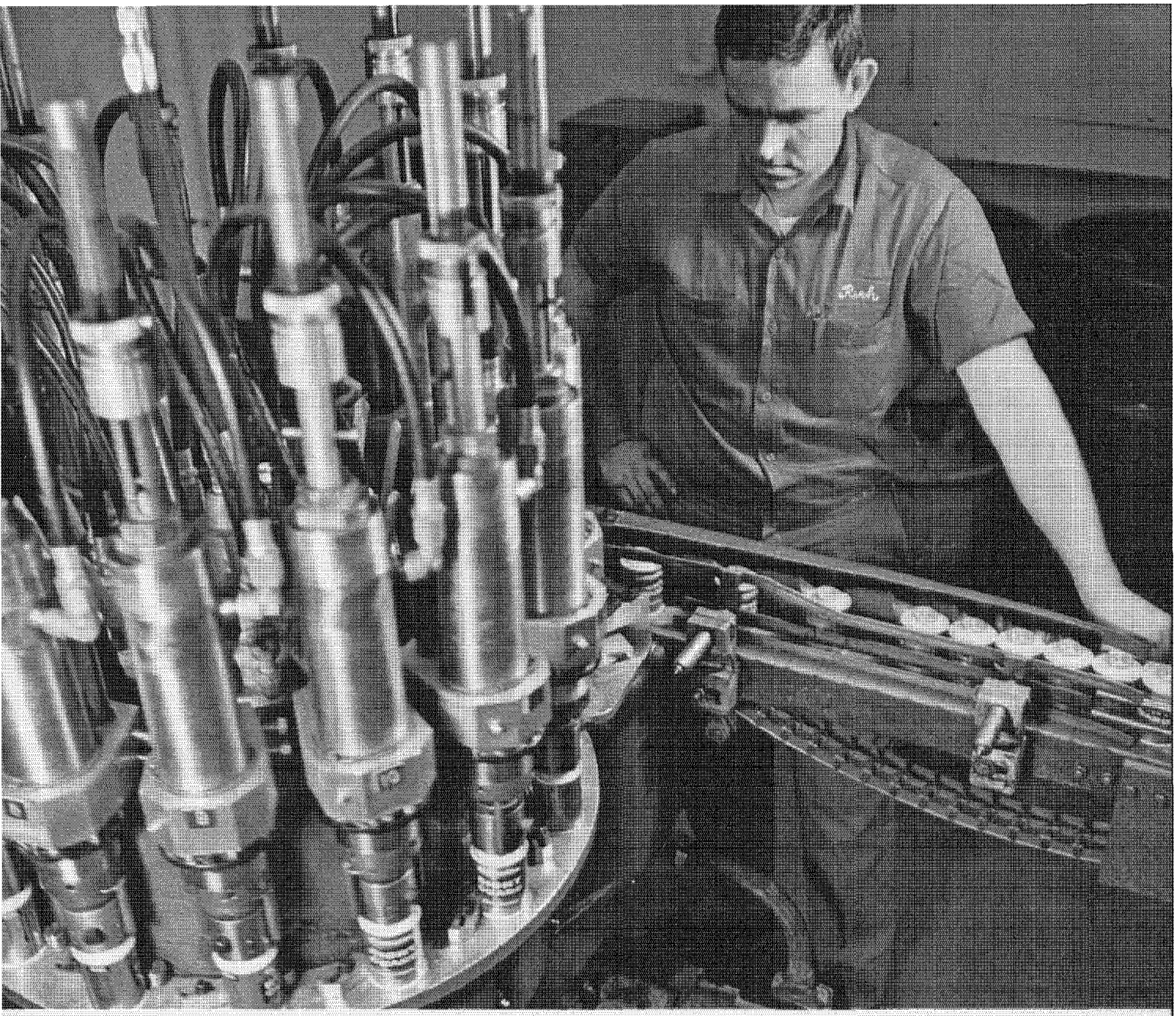
100 Per Cent Synthetic Fabrics

In addition, says Lee, fabrics made entirely of synthetic fibers can be made into garments that give the same outstanding neatness retention and wash and wear performance as durable-press garments. "Because cotton and rayon are not used, a special resin treatment is not required," says Lee. "Therefore the process is accomplished by pressing and shaping the fabric in the finished garment via the synthetic fibers' plastic memories. This is a particularly useful method for such synthetic fabrics as tricot of nylon and 'Dacron', double knits and crepe of 'Dacron', woven fabrics of 100 per cent 'Dacron', and blends of 50 per cent or more 'Dacron' with 'Orlon'."

Another advantage of these fabrics, says Lee, is the fact that garments can be altered in the normal fashion. Hems and pleats in regular durable-press garments containing cotton or rayon, for instance, stay in place permanently; however, creases in fabrics of man-made fibers can be removed and reset by pressing during the altering procedure.

"As to cost, durable-press garments retail at slightly higher prices," says Lee, "because they cost more for manufacturers to produce. Because the fabric they use has to be specially treated, manufacturers must pay more for it; they must invest in new hot-head press equipment and curing ovens; they must learn new techniques and procedures, retrain operators, and give increased attention to quality control. And as a result, consumers are getting goods that perform better than any they've ever had before."

Adds Lee: "Textile firms are moving rapidly toward the day when the need for ironing clothes will disappear altogether. By the same token, they soon might have the problem of higher costs ironed out in the bargain." ■



Spinning on turntable at Gillette plant, "Right Guard" cans receive split-second injections of "Freon".

A leading manufacturer of men's grooming products turns to "Freon" fluorocarbon propellants in making

Mists for a Masculine Market

By Charles E. Petty

Boston, Mass.

Surrounded by piers, plants and parks here is a company whose longevity belies the prospect of quick doom it confronted shortly after its birth in 1901. The firm: Gillette Safety Razor Co. Its original products: safety razors and disposable razor blades—so thoroughly sniffed at by suspicious turn-of-the-century shavers that Gillette barely survived.

Today, though, the 2,800 men and women at the Gillette plant here make products that would have bedazzled founder King C. Gillette. Not only did Gillette establish the safety razor as one of the most popular shaving instruments of the century, but in recent years the company has been among the first to exploit the men's toiletries market — the fastest growing pocket of the cosmetics industry. Object: To keep the U.S. male looking, feeling and smelling his best with products whose

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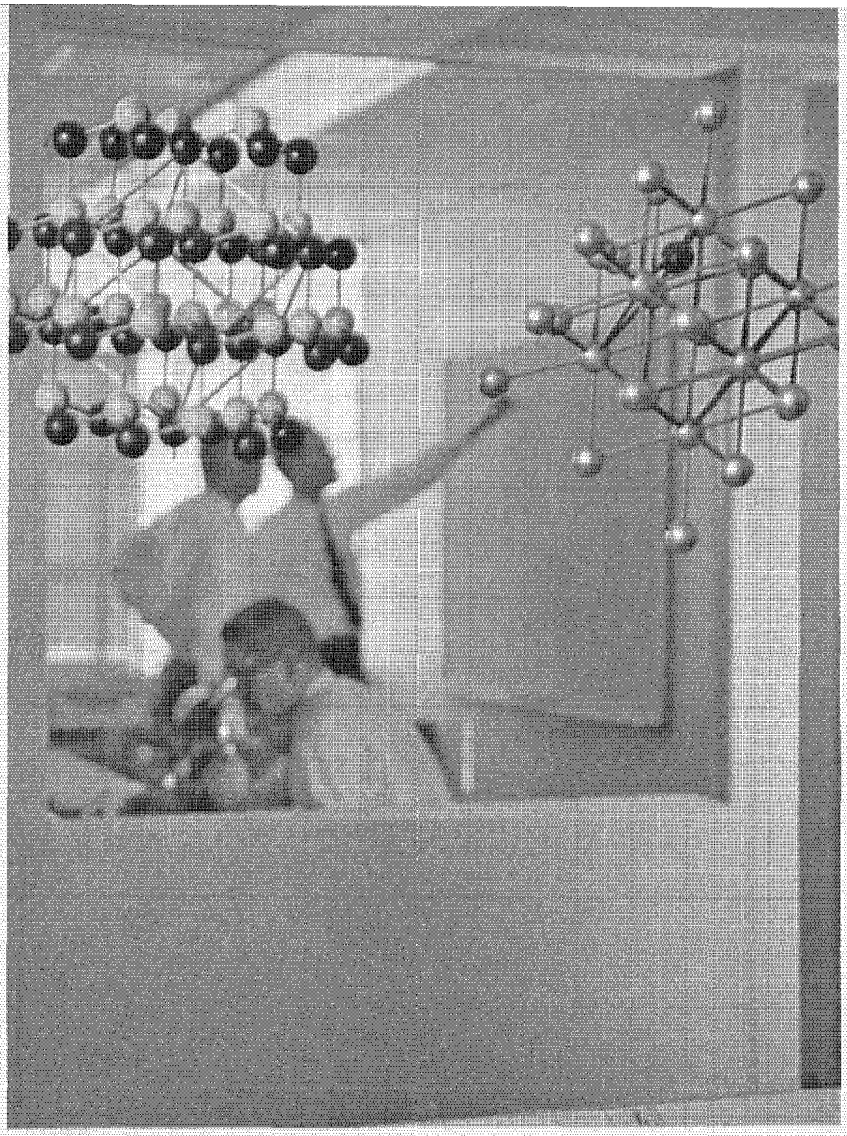
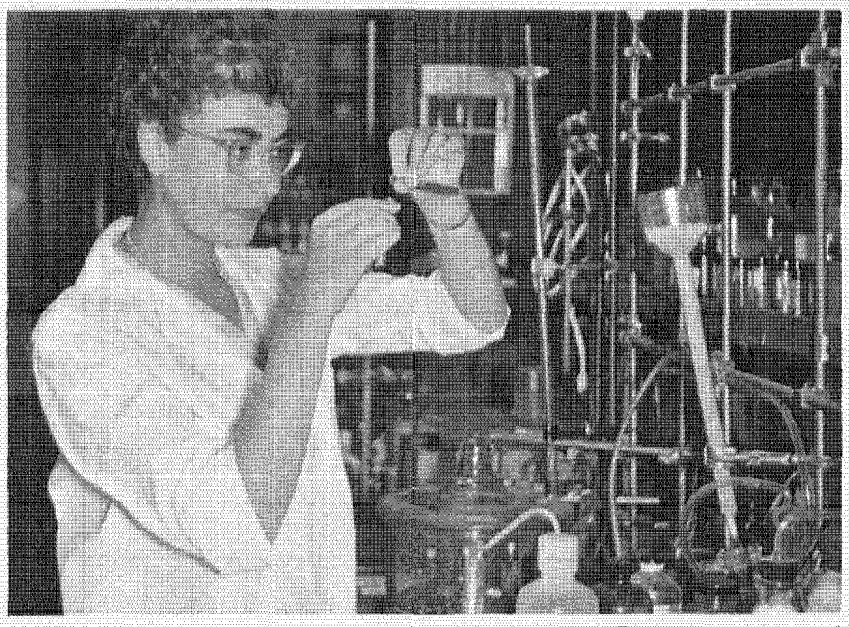


Gillette's grooming products are born in the research laboratory, where specialists ranging from nuclear physicists to dermatologists probe into every facet of hair and skin care.



Gillette chemist, one of 250-member research and development staff, prepares experimental grooming aid formulation as part of broad-gauge program to improve, develop products.

Mists for a Masculine Market

continued

total U.S. sales last year topped $500 million and are expected to increase 30 per cent by 1970.

Male toiletries involve two classes of grooming aids: (1) the utilitarian types such as shaving creams and hairdressings; and (2) the fragrant variety such as after-shave lotion, deodorant, cologne, scented soap and talcum powder. It's the customer enthusiasm for the latter category that's causing a stir in the industry these days.

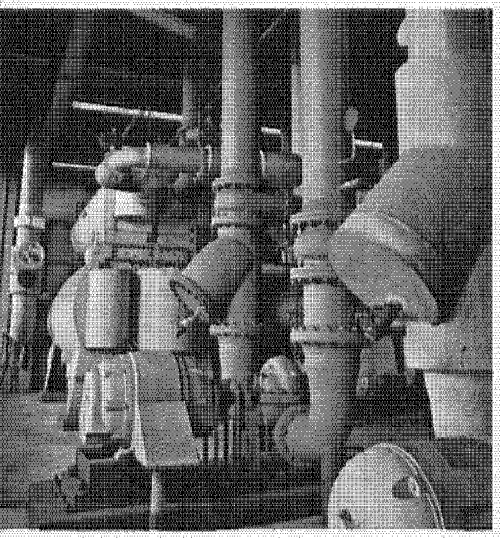
Scents not for Sissies

For a long time, most men presumably felt that scents were for sissies, reports one industry spokesman. Not so today, though. Says he: "Thirty years ago men generally frowned upon colleagues who used, say, a floral-, citrus- or wood-scented after-shave lotion. Today, however, 70 per cent of the total U.S. male population uses after-shave lotion, 70 per cent uses deodorant and 50 per cent uses talcum powder—many of which are now being scented with fragrances typical of those long used by women."

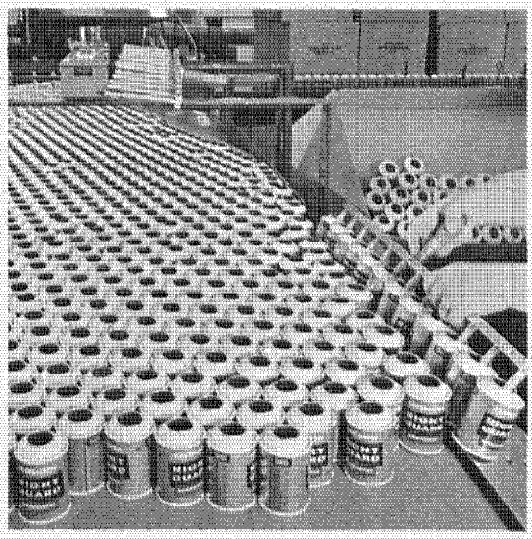
The reason? Some experts say women are behind it all. Says one: "The he-man is smelling sweeter because women want him to. At least that is the premise on which much of the advertising for the flood of men's new toiletry products is based." Beyond this, though, no one seems to have pinpointed the precise answer. Toiletries firms simply regard their rising sales figures as a happy phenomenon that's diametrically opposed to the grooming code of 60 years ago when King Gillette made his first disposable razor blade.

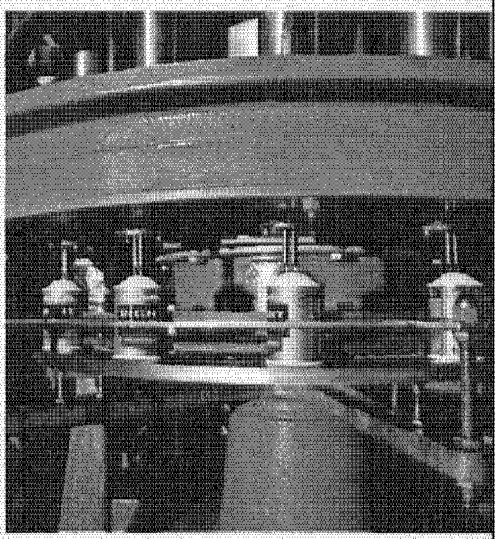
"In those days," says Doug Benedict, Gillette's executive assistant to the vice president of research, "scents were relegated to women, and masculinity was frequently betokened by nicks worn pridefully—like Heidelberg saber scars. Shaving itself was a slow process, for most men used straight razors and ordinary bath soap. Apparently everyone was used to doing things the hard way, so it isn't surprising that Gillette met a great deal of resistance when he tried to sell a razor that would ease the chore."

Gillette's first razor was much like the safety razor of today, says Benedict, for it



Underground storage tanks for liquid "Freon" are located beneath Gillette's power plant.





First step in filling aerosol cans is inspection of empties for faults, left. Suction removes minute particles of corrugated dust, then each can is partially filled with deodorant concentrate, right.

contained a safety guard and a removable ultrathin blade that didn't have to be stropped or honed. Gillette himself admitted the grim prospects of his early razor: "The razor was looked upon as a joke by all my friends, and a common greeting was 'Well, Gillette, how's the razor?' But this is where the interest stopped, and so it went for nearly six years, during which time I experimented further with blades."

Attitudes changed dramatically during World War I, says Benedict, when the Army insisted that its soldiers practice good grooming. To underscore the order, troops were even issued safety razors and self-shaving became widespread. However, it wasn't until World War II that the habit of the daily shave and personal grooming became a matter of course among U.S. men—in the Army and out—and the habit has prevailed ever since.

Today Gillette is a multimillion-dollar operation with facilities in the U.S., Canada, South America, Europe and Australia. It makes millions of razor blades a day, and its products now include a variety of safety razors and double-edge blades; an after-shave lotion called "Sun Up"; and lather, brushless and aerosol shave creams, all of which contain the antibacterial agent hexachlorophene (which Gillette identifies as K34) that prevents bacteria from growing and producing undesirable odors. Last year the company introduced a shaving tote kit for women including a pressurized preshave conditioner, skin moisturizer and a specially designed razor; "Heads Up" hair grooming for men; the Super Stainless Steel Blade; and the "Techmatic" razor with a razor band that eliminates blade handling.

To make these products Gillette employs many specialists whose ranks include nuclear physicists, biochemists, mineralogists and dermatologists. In the performance of their duties, these experts do jobs that range from counting the incredibly minute whiskers removed in a shave test through testing the effects of perfume on human skin to canning push-button aerosol shave cream.

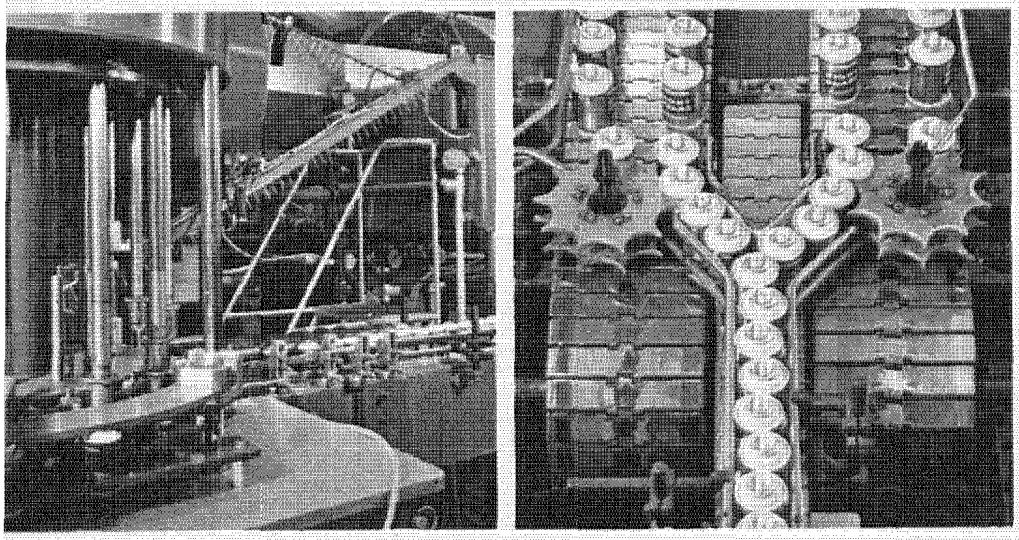
For most of its history the firm has preoccupied itself primarily with razors and blades. (Exception: a shave cream introduced in 1938.) It wasn't until 1959 that Gillette entered the scented toiletries race with its aerosol spray deodorant called "Right Guard".

"At the time," says Phil Lucas, manager of Gillette's Chemical Product Development Division, "deodorants were predominantly of the roll-on, squeeze bottle or

continued



Special delivery of "Freon 12" and "Freon 114" arrives at Gillette plant via tank truck.



Rotary clinching machine, left, seals aerosol valve and draws vacuum to adjust can's inside air. Filled containers, right, enter warm water bath that raises internal pressure and tests for leaks.

Mists for a Masculine Market

continued

cream variety. Each one generally contained a formulation based on antiperspirant aluminum salts which reduce perspiration and the consequent odor-forming bacterial action caused by perspiration. However, we elect to use a combination of hexachlorophene and zinc sulfocarbolate which is compatible with the metal can and stifles bacteria."

Another obstacle which had to be overcome was that of cooling—the sensation felt when an aerosol spray touches the skin. "Cold shock is caused by the propellant which makes the aerosol spray function," says Lucas. "The propellant has a very low boiling point, say, 0°F., and is kept in a liquid state by pressure. When the valve button is depressed, the propellant and concentrated deodorant solution leave the can; the rapid evaporation of the propellant which produces the spray cools the liquid deodorant. The tiny droplets of liquid deodorant that ultimately reach the skin are quite cold, so a way to control the temperature of the spray had to be found."

To solve the cold shock problem, Gillette worked with Aerosol Techniques, Inc., a Bridgeport, Conn.-based research and aerosol-producing company. Answer: a newly designed valve and a special blend of "Freon" fluorocarbon propellants, one aerosol member of Du Pont's fluorine-based chemical family whose assignments range from the cleaning of rocket fuel systems to the cooling of household refrigerators. Already established in the aerosol field as the driving force in hair spray, shave cream, perfume, insecticides and coatings, the newest jobs for "Freon" propellants are in masculine toiletries such as colognes and hairdressings.

Variety of Blends

" 'Freon' propellants afford a broad variety of blends from which to choose," says Lucas. "By merely blending different types in various proportions, we ultimately came up with the desired combination. Our mixture: a blend of 'Freon 12' and 'Freon 114' —each of which is commonly used for refrigeration purposes—which produces a fine aerosol spray. As a result, the sensation a user of 'Right Guard' feels is a refreshing one."

In addition, "Freon" propellants are virtually nontoxic and nonflammable; they remain chemically unchanged for long periods; and they are not harmful to skin.

"The special valve contributing to the reduction of cold shock differs from most aerosol valves that feed the can's liquid contents directly from the bottom of the can to the outside," says Lucas. "Our vapor tap valve forces the liquid leaving the can to combine with the warmer, already vaporized 'Freon' that occupies a void in the top portion of the can. This way, the valve itself helps to keep the deodorant's temperature closer to body temperature; at the same time its carefully engineered orifice controls the amount of fine spray. Thus, 'Right Guard' produces the right amount of wetness, dries instantly and doesn't drip or run once it's applied."

On the esthetic side, another major consideration for "Right Guard" is fragrance. "Scent is all-important in a deodorant," says Art Lorenson, Gillette's perfume specialist, "because it not only must mask the chemical odors of the active ingredients but at the same time provide a pleasant

and refreshing fragrance to the user."

An easy task? "Not at all," says Lorenson. "For one thing, aerosols complicate the job of perfuming. The same perfume used in conventional forms, when dispersed in a fine aerosol spray, may behave differently. Therefore, we made this fragrance by blending many different aromatic substances with the active ingredients. Result: 50 different raw materials compose the fragrance of 'Right Guard'."

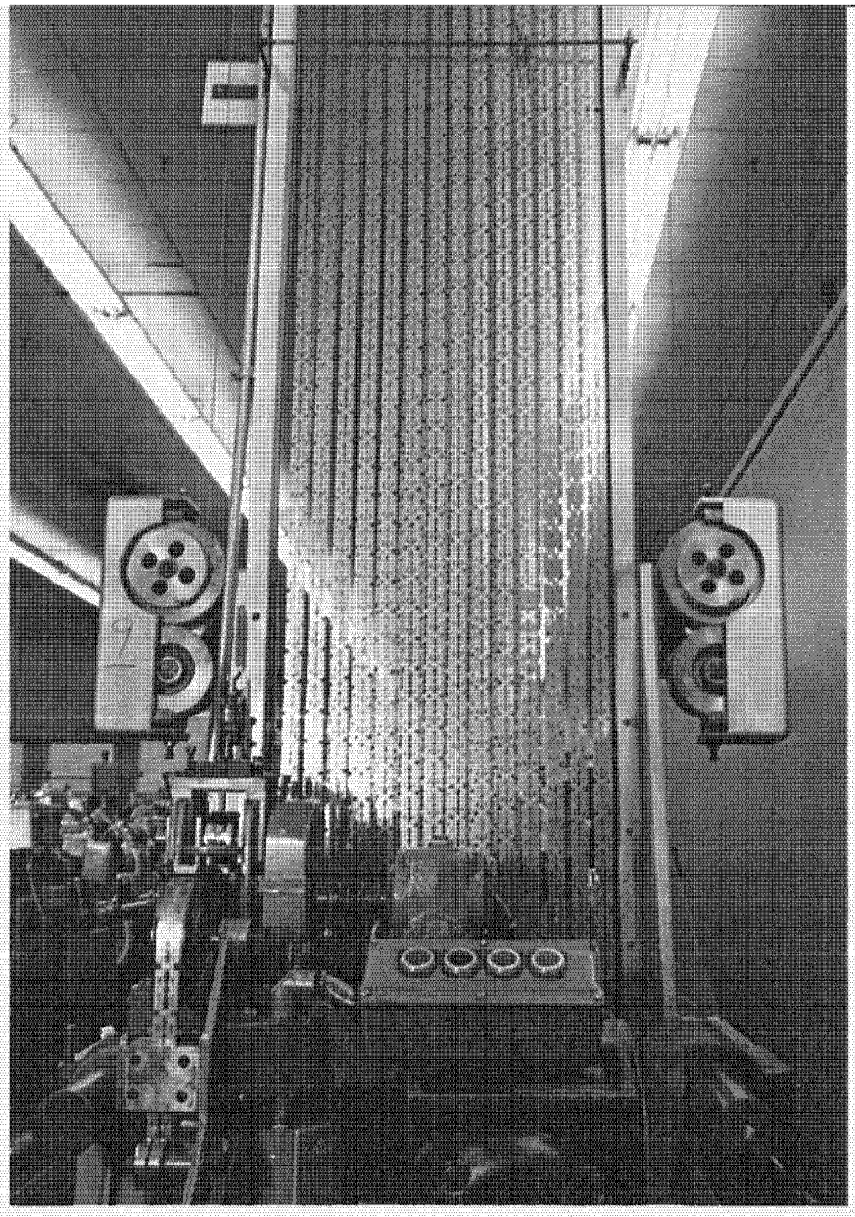
How do consumers like it? "Just great," says Lorenson. "It's far and away the leading deodorant for men. What's even more impressive is the fact that women like it too. We now have a deodorant whole families can use, and as a result we have to keep working around the clock to meet the demand."

The manufacture of "Right Guard" is a meticulous process which begins with the drawing of a vacuum in each empty container so as to remove minute particles of dust from corrugated shipping cartons that might otherwise clog the aerosol valve. The can is then filled with the proper amount of a liquid deodorant concentrate, and the aerosol valve and dip tube are attached, hermetically sealing the can and its contents. Then liquid "Freon" is pumped in through the valve.

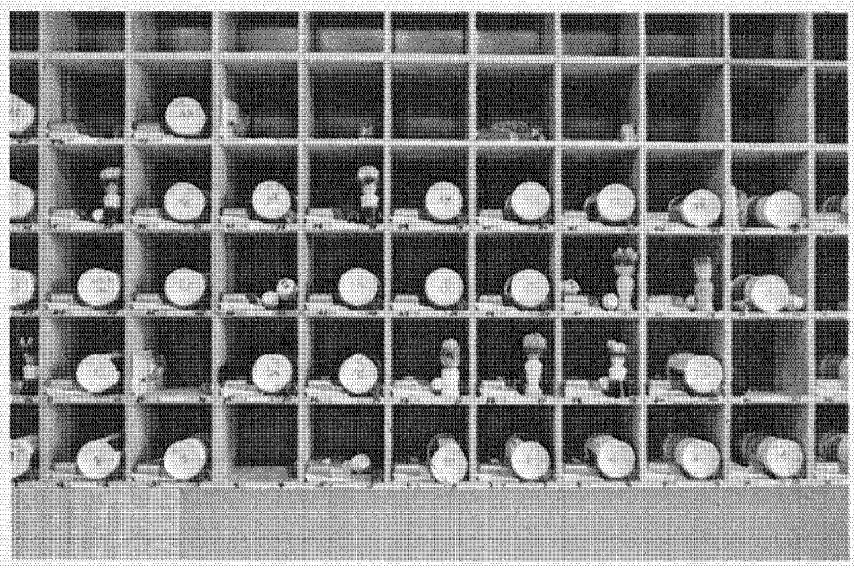
To test for leaks, each container is immersed in a bath of hot water while pressure inside the can builds up to 90-100 pounds (about twice that of normal pressure). In the last step, the cans are packaged in containers ready for shipment to drug, grocery and department stores.

As for the future for men's toiletries, the aerosol container is guaranteed to play a major role, say Gillette's research and development men. New products based on the aerosol spray are already in the wings, but as to what these may be, Gillette is understandably tight-lipped. Like its rivals vying for consumer favoritism in the hot competitive arena, Gillette guards its new product secrets as carefully as military strategists protect a forthcoming battle plan.

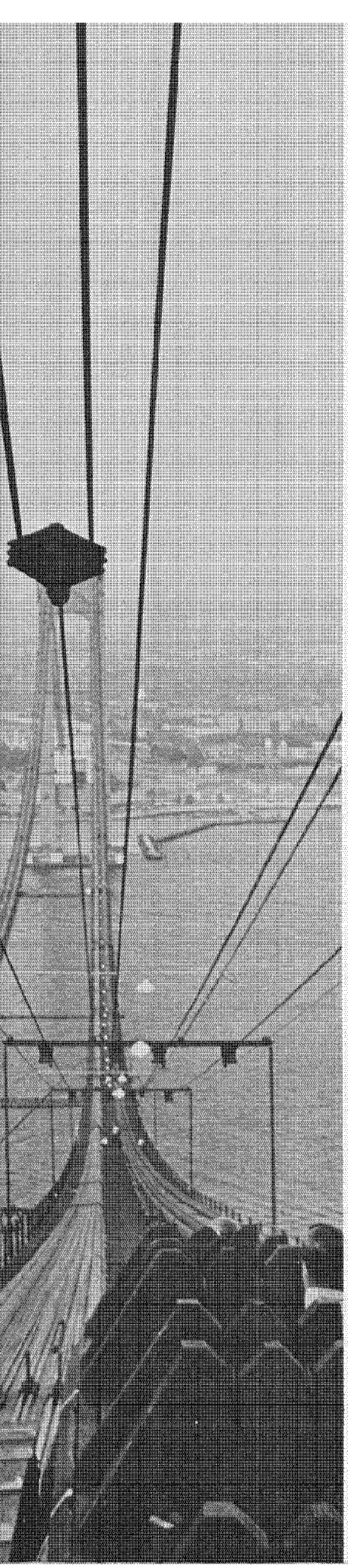
One thing that is no secret is seen in the quiet confidence of Gillette's research and development men which conveys that other products with promise similar to that of "Right Guard" are not far off. ■



Gillette's beginnings 65 years ago were based on the safety razor and blade. Today, blades, as seen in ribbons of steel, are still at the fore of a broad line of grooming aid products.



Shaving gear stowed in one of Gillette's "shave test" rooms is used by plant employees who daily shave on the job and make official reports on personal reactions to new products.





Mac Johnson eyes the competition as he phones news assignment to NBC camera crew.

Today's news comes alive in vivid detail on DuPont films to provide some of

TV's Finest Hours

New York, N.Y.

When a *Journal of Commerce* correspondent set up a semaphore on Sandy Hook in the 1830's, he signaled the beginning of American journalism's preoccupation with speed in reporting. News gathered by skiff and megaphone from incoming ships and wigwagged to a colleague on the Battery hours before the vessels docked not only provided the *Journal* with a series of "scoops" but spurred the intense press rivalries of the last century.

By 1889, when Nellie Bly returned to her desk at the old *World* to write about how in her globe circling she had sliced nearly eight days off the record 80 set by Jules Verne's fictional hero, Phileas Fogg, the U.S. public had already been conditioned to expect such exploits from the press. For it was on nineteenth-century feats and beats and triumphs of men against time that the world's great newspaper empires were founded.

Speed, relative as it may be, is still one of the more vital elements in the admixture of hunch, art and science called news gathering. But virtually gone from the U.S. scene is the drama, the excitement and the corner newsstand chaos that once attended the legendary EXTRA.

Not that there's any dearth of news. The tempo of today's journalism has risen to an almost jazzlike beat as its product flows in uninterruptedly from local town hall and the Congo alike. But for all of the advanced technology that's come to the newspaper shop, it still takes hours to set a banner headline and a one-paragraph bulletin, to roll the presses and to get a paper to the stands. So, while Columbia Broadcasting System's Walter Cronkite probably voiced the sentiments of his fellow newscasters at the National Broadcasting and American Broadcasting Companies when he said that "Daily newscasts can only supplement newspapers," the fact remains that much of the romance and thrills once associated with the "Front Page" have now transferred to the TV tube.

In today's electronic journalism a "scoop" is usually measured in minutes, 8 or 10 at the most. But chances are that the TV viewer will see this morning's news "beats" become this evening's history as battles, news conferences, laboratory discoveries, even sporting events, are reenacted for him on film in all their sound and fury.

Getting that film on the air the same day it was shot is frequently an under-

continued

News cameramen like Stewart Ruby enable TV viewers to become eyewitnesses to history.

TV's Finest Hours

continued

taking that, in itself, would make Miss Bly's adventures seem like a Sunday walk in the park. The real thrills, however, are where the assigned cameraman *is*. And it is on his skills and ability and the quality of his equipment that good stories depend.

The first NBC news cameraman into Santo Domingo last April set the "scene" by photographing the beleaguered Dominican capital from the air as his plane began its runway approach. Stepping onto the tarmac minutes later, he focused on the U.S. troops who, having barely preceded him, were just digging in at the airport. When his plane headed back to the TV news base in Puerto Rico an hour later, it carried the first filmed chapter in a story that is still unfolding.

Assignment chief of NBC's newsmen is Mac R. Johnson, former reporter, UPI war correspondent and *Herald Tribune* foreign correspondent. Johnson broke into TV under Edward R. Murrow at CBS and now plays a city editorlike role in handing out assignments to NBC's more than 200 correspondents and cameramen.

"The TV news cameraman's primary mission," Johnson asserts, "is to recognize and shoot a news story in a manner that will enable the home viewer to witness an event better than he could have if he'd been there himself.

"The mission often calls for courage, experience, wisdom and indefatigable enthusiasm," Johnson says. "When a photographer is dodging bullets in Viet Nam, say, he has to search out the subjective things that make a story live. A still photo of a combat soldier can look as if it had been posed at Fort Benning. But on TV film you can see the reaction of men; you can hear the whine of bullets; you can understand just a little bit more what war is all about."

Gene Broda, whose top film story during a 13-year stint with the old Movietone News was the sinking of the *Andrea Doria*, probably comes as close as possible to Johnson's description of a "new breed" of newsman. A Broda-NBC classic is some 100 feet of film exposed in Santo Domingo.

"I was crouched in an alley during a street battle," Broda recalls, "when this man carrying a naked baby in his arms ran out of the firing zone. As he darted from doorway to doorway, I trained my camera on him until he made it to safety."

"That's what I mean," puts in Johnson. "A story with a beginning, a middle and an end. With the actual battle sounds as background, you don't have to write much copy to go with a scene like that."

Few television newscasts carried that human punch 15 years ago. Action photos, often purchased from a newsreel firm, were usually at least a day old. The usual format for a newscast was an announcer reading from a typed script of wire copy while a "still" was screened in the background or prints were held on camera.

As the number of home TV sets zoomed, however, the networks saw that there was public service prestige to be won via news. They began to organize reportorial teams —the Big Three broadcasters today have staffs whose numbers rival that of *The New York Times*—and to develop the equipment necessary to produce what ultimately became some of TV's finest hours.

"One of our biggest boosts," Sig Bajak, manager of NBC's news film services, recalls, "was the advent of the Auricon camera in the mid-Fifties. It enabled us to switch from optical to magnetic sound tracks, improving sound and picture."

The key advantage: Magnetic-striped film could be processed under whatever conditions were necessary to bring out the best visual image; under- or over-development did not blur sound as it had on the photographic (light impression) tracks designed for studio conditions. Moreover, sound pickup could be monitored during filming, and objectionable sounds could be deleted without ruining desirable footage.

There was a disadvantage, too, however. No film maker manufactured a product with magnetic striping; the market was too small. Users had to superimpose the magnetic stripe on available film under darkroom conditions prior to exposure, a costly, inventory-swelling procedure.

The soaring importance of news programming and the significance of a second breakthrough, the introduction of prestriped "Superior" 2 negative motion picture film by Du Pont in 1959, are perhaps best visualized in comparative figures. The entire TV market for striped film that first year amounted to a little over two million feet. Last year NBC alone used more than 10½ million feet of "Superior" 2 film.

Much of that footage is now stored in NBC's bulging library, awaiting that spe-



Rapid-processing Du Pont films are assets to TV newsmen who gauge "beats" by minutes.



***Claus Krieger's film coverage of Viet Nam* brings war close to millions of Americans**



In-flight editing gave U.S. audience view o Churchill funeral pageant film within hours

cial broadcast when the highlights of 1965, from space launchings to a visit by the Beatles, will again come alive. One of them is sure to be the Northeast's big blackout, a tragicomedy that was captured on film only through "Superior" 2 film's adaptability to a variety of lighting conditions, even the sputter of a candle's flame.

While built-in sound was its big asset in 1959, the readiness of "Superior" 2 to handle interior and exterior work, its fine grain, high speed, wide latitude and its rapid processability—50 to 100 feet per minute—have made it TV's all-purpose news film, according to Bajak. Approximately 90 per cent of network TV assignments were recorded on it last year, while a companion film, Type 931 high-speed rapid reversal film, designed for processing equipment at most affiliated or independent stations, took on roughly the same proportion of local news coverage.

"I guess the finest compliment we could pay Du Pont film," observes Bajak, "is that we take it for granted. The only worry is whether there's enough on hand."

Stored on 100- to 1,200-foot reels, there usually is enough on hand in nine U.S. cities and 13 world news capitals where NBC news teams are based. On a few minutes' notice Bajak must fill in Johnson on team and equipment availability and time required to cover any point on the globe.

A word from Johnson sparks a flurry of activity akin to the "scramble" of a squadron of fighter pilots. Within the hour a chartered commercial plane can be winging its way to a trouble spot, carrying a crew of as many as 40 correspondents, directors, cameramen, sound men, technicians, coordinators and editors—the rewrite men who cull and splice to boil down a day's output into a two- or three-minute slot on the six o'clock news. Often they leave home with only the barest clues as to where the ensuing weeks, months or even years may be spent.

Two years ago Broda and correspondent Dick Valeriani, sent to cover Panama's national elections, followed a tip on U-2 surveillance operations into Costa Rica. Captured by anti-Castroite Cubans, they were held for 24 hours before flying on to a volcanic scare in the Caribbean. Their families kept track of them via *The Huntley-Brinkley Report.*

Grant Wolfkill endured a much longer period of Communist detention in Laos (15 months); Alvin Rosenfeld was shot in Cyprus; Claus Krieger wounded by bomb fragments in Viet Nam; Pedro Torre suffered saber cuts in an Argentina riot; and George Clay, NBC's African affairs editor and oftentimes cameraman, was killed by Congolese rebels in November 1964. Doug Downs is still recovering from back injuries suffered while dodging machine gun bullets mistakenly fired from a U.S. Navy helicopter in Santo Domingo.

The real hazard for most, though, is the rare "goof" that can ruin a whole story. Like the film entrusted in Latin America to a U.S.-bound air passenger and delivered in scissored fragments fit only for parade confetti. The "courier" was a participant in the unsuccessful military coup covered in the film.

There was little left to chance in the story of Winston Churchill's funeral. Film was developed and edited in a chartered jet over the Atlantic, and when rough air delayed the flight 10 minutes, NBC countered with a remote transmission of the film from Kennedy Airport.

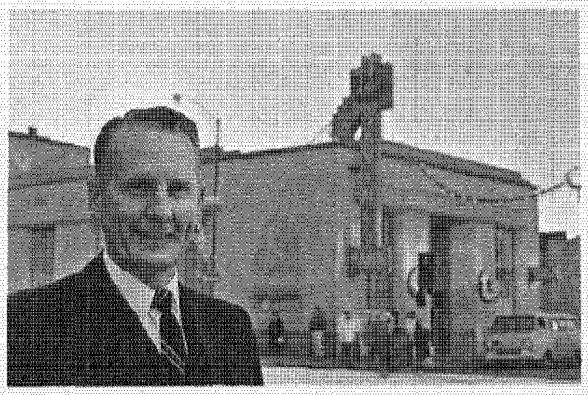
"Five minutes can make or break a story," says Johnson. "After the tremendous effort we put into getting a story, we're not going to let much stand in our way to put it on the air." ■







Cameramen like Joe Vadala—shooting Holy Land special—and editors like Tom Gavin, who scans film with *Today's* Barbara Walters, are members of a network team. They're backed by affiliates such as WWJ-TV, whose 13-man Detroit staff covers the "local" news in America's heartland.



Service and efficiency are Jack Eakin's keys to boosting business.

A midwestern bank saves time, space and materials, thanks to "Mylar" polyester film, the

Film for Faster Filing

Council Bluffs, Iowa

In 1781 the rudimentary practices of colonial moneylenders so hampered the financing of the Revolutionary War that the Continental Congress decided to pool certain public and private resources and make available larger and sounder stocks of money for the war effort.

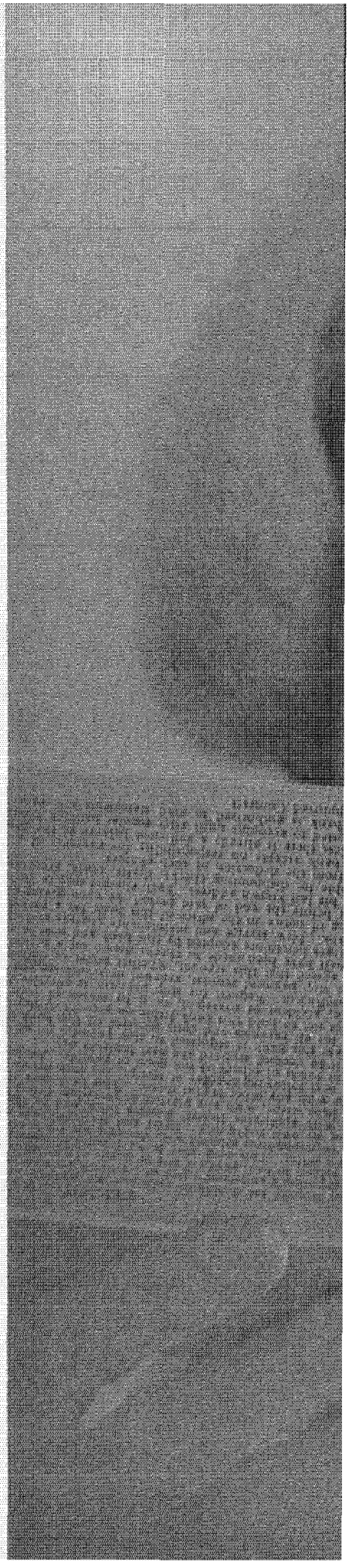
Although the war ended before the bank —the first in the U.S.—opened for business, one thing is certain: by chartering the Bank of North America at Philadelphia, the early congressmen sparked an industry that today comprises a sophisticated network of 14,303 banks whose deposits total $364 billion. The mission—the same as it was at first—is to make the use of the bank so easy, safe and profitable the populace will find maximum inducement to keep savings out of the mattress and in the economic mainstream.

("Even the diehards are capitulating," reports one banker. "Occasionally, someone deposits a pile of cash whose condition leaves no doubt that it's spent many a year inside a mattress.")

There are currently two general types of banks: (1) central banks, which serve as bankers' banks; and (2) commercial banks, which handle the deposits, savings and loans for a community's citizenry. The larger commercial banks, some of which are multibillion-dollar depositories, play significant roles in international finance; the smaller banks, on the other hand, collectively form the foundation of the domestic banking industry. And in recent years it's the latter group that has engaged its customers in a vigorous courtship that would have bemused the bankers of colonial America. Council Bluffs' State Savings Bank is a case in point.

Situated in western Iowa's rich agricultural region, this 7,000-depositor bank is staffed by men who regard themselves as salesmen rather than financiers. "You have to be a salesman today," says Jack Eakin, State Savings' president. "Banking, like merchandising, is highly competitive and the 'products' we have to sell are primarily services—checking accounts, installment loans and safe-deposit vaults—which are readily provided by all other banks. Therefore, selling these services calls for the special wooing of each customer."

State Savings' "sales promotions" programs are diverse. Examples: free checking



File guide card of "Mylar" enables clerk to verify signature, file check simultaneously.



accounts for teen-agers (i.e., potential adult depositors); seminars in which tellers learn how to charm customers; and open-house events in which the public is lured into the bank by special attractions, such as the $1 million in cash displayed during the bank's recent 75th anniversary.

How does the populace respond to the courtship? "Warmly," says Eakin. "For example, in 1960 we set out to boost our deposits by $1 million a year. We've met our goal, all right: last year our deposits totaled $18 million, nearly double those of five years ago. What's more, we've already arrived at the goal originally set for 1970."

It's an ambitious effort, and for State Savings it exemplifies a reputation for growth which began 78 years ago when the bank's founders opened for business with a modest capital investment of $50,000.

"In those days," says Eakin, "banking was a rather solemn business. Most bankers seemed to be more preoccupied with keeping thieves away than with bringing in new customers. This attitude was reflected even in the decor, which generally consisted of dim lighting, barred tellers' cages and heavy stone and marble facades. All of this served to present a seemingly hostile hauteur, of course, and few people

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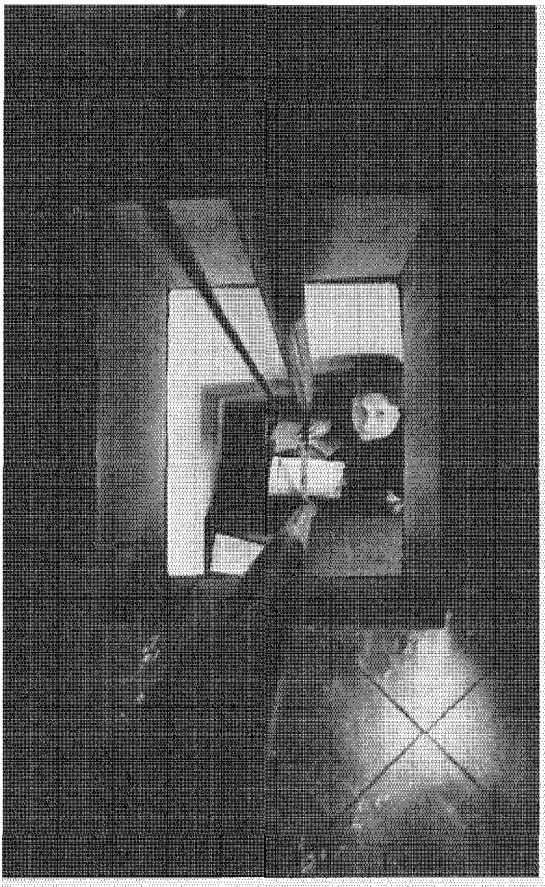


To speed handling, incoming checks are transferred to posting department via "dumbwaiter."

Film for Faster Filing

continued

ever felt at ease doing business in such formidable surroundings."

Things changed notably after World War II, though, says Eakin, when dim interiors began to defer to bright lights and cordial colors. And with the change of mien, banks went all out to sell their services to customers. Result: the greatest growth period in the history of banking.

"Sometimes," muses Eakin, "we stress the 'personalized and friendly service' concept so strongly we're frequently expected to know a lot more than just banking. Take the man who called to ask us when drivers' tests were to be given. We didn't know the answer offhand, but you can be sure we found out for him."

Many of State Savings' best services spring from behind-the-scenes improvements in office techniques that serve to expedite the handling of customers' money. Explains Eakin: "Everyday some 11,000 transactions pass through this bank and each must be recorded, posted and filed. A single mistake can cause a depositor to look for another bank. Therefore, we can't afford errors, and we must keep ahead of the mounting office work by seeking methods that lead to accuracy, speed and efficiency."

As might be expected, one of the bank's most pressing assignments is the handling of checks, each of which in a day's time must be posted to the customer's account, checked with the depositor's signature card to insure against forgery, and then filed. A typical method, says Eakin, calls for filing the depositors' cards in one cabinet and the checks in another, an awkward arrangement which could require as many as eight girls to process a day's volume of checks.

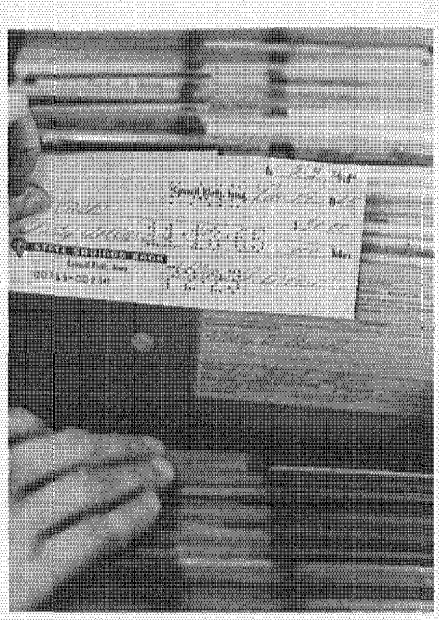
Three years ago State Savings adopted a new check filing system based on "Mylar" polyester film. Long since established in scientific and industrial applications (e.g.: capacitors for television sets, magnetic tape for computers, space balloons), "Mylar" is now playing a prominent role in the world of office supplies. Its assignments here now range from typewriter ribbons to index tabs, and one of its newest is to serve in check file guides.

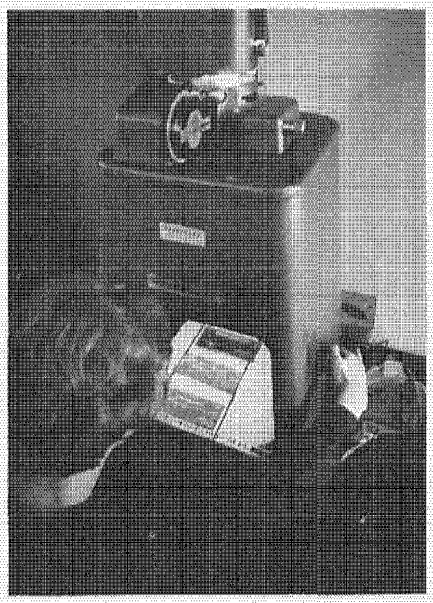
"These 4 by 9-inch guides fit in our file drawers to separate one customer's checks from another's," Eakin explains. "Each guide has a transparent pocket which holds a depositor's address and signature card. Thus, as the clerk verifies signatures, she can also file the checks. It's a time-saver, since two girls can now do in just two hours what used to be a day's work.

"Space savings are another plus with 'Mylar' because we can file more checks in



Each check, part of 11,000 transactions handled daily, is posted on the day it's received.





Thin, durable check file guides of "Mylar", left, enable faster filing and allow bank to save 40 inches of drawer space per 1,000 cards. After filing, the checks are recorded on microfilm, right.

a drawer with this new system," Eakin points out. "With our former method we separated each account with a paperboard divider—a bulky card that took up a surprising amount of space. However, a guide of 'Mylar', being less than one hundredth of an inch thick, enables us to file 200 accounts in one drawer—an increase of about 15 per cent over the previous system. In addition, for each 1,000 guides we need about 40 inches less drawer space than we did with paperboard dividers. Thus, despite the increasing numbers of checks we handle, our existing file space is ample."

Resists Abrasion

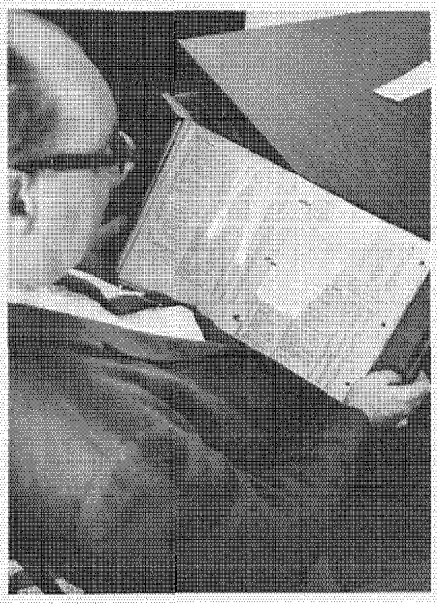
Still another advantage of "Mylar" is its resistance to abrasion—a highly important factor in check filing, since a scratched or cloudy transparent pocket can make the signature card difficult to read.

In addition, file guides of "Mylar" resist tearing, peeling and cracking; because they resist warping, the cards stand rigidly in place; they won't "yellow" during the guides' lifetime; and they retain their resilience in any temperature range normally encountered in a bank building.

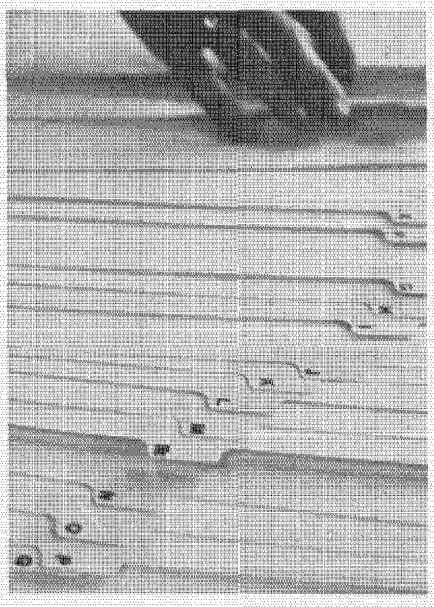
"All told," says Eakin, "we figure that a reduction in administrative costs of $1,000—about the amount we've saved in time, space and materials with 'Mylar'—has the same impact on net operating earnings as a $50,000 increase in deposits. As a result we've earned a substantial bonus that we can put to work elsewhere."

Other office supply assignments of "Mylar" include wear- and tear-resistant flexible tabs for index cards, replacing traditional metal-encased tabs; tear-resistant reinforced sheets for charts and graphs held in ring binders; transparent page protectors that shield, say, automobile price lists from smudgy ink stains and pencil marks; ultrathin and break-resistant electric typewriter ribbons that make clean, sharp impressions; and long-lasting carbon paper that can be used for as many as 100 impressions without tearing.

Office supplies of "Mylar" cost more than conventional materials, "but the extra amount is worth it," says Eakin, "thanks to the substantial savings in time and space and the fact that office supplies of 'Mylar' last longer than the conventional materials we previously used." ■



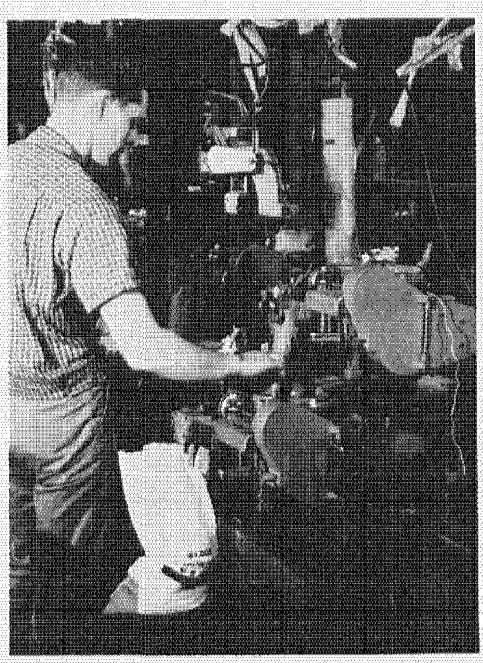
Tear-resistant page protectors of "Mylar" save automobile price listings from soils, damage.



Flexible tabs of "Mylar" for indexed sheets resist abrasion, yellowing, peeling and cracking.



Break-resistant electric typewriter ribbon is of "Mylar" coated with carbon. Ultrathin ribbon is longer than conventional types and makes sharp, clean impressions with a light touch of the key.



New clad coins are bagged at the Philadelphia Mint for shipment to Federal Reserve and member banks.

"Detaclad" explosion-bonded clad metals make a jingling debut in dimes and quarters as the Treasury Department institutes a

Big Change in Small Change

The nostalgic crowd that wistfully regards the products of the Sixties—be they automobiles, houses or washing machines—and laments with plaintive sighs that "they don't make 'em the way they used to" can now apply the assessment to a trio of U.S. coins.

Last November, Federal Reserve and member banks received shipments of 263 million freshly minted quarters. The coins stirred commentary. "They look just a little different," said some, eyeing the reddish-brown tint that circles the coin's milled edge. "Sound different, too," remarked others, noting the quarter's slightly off-key clunk rather than clink against a metal desk top. Reason for the differences: The shipment was the initial distribution of composite or clad coinage — "sandwich quarters" as some are phrasing the new coins—and, in point of fact, they're not making them the way they used to.

In the first major alteration in the metallic content of subsidiary coin since 1792, Congress enacted legislation last summer removing silver from dimes and quarters and cutting its content in the half dollar from 90 to 40 per cent. Silverless substitutes in the 10- and 25-cent denominations consist of a pure copper core bonded between face layers of 75-25 per cent copper-nickel alloy. The new four-bit piece, likewise, is a "sandwich" coin—facings of 80-20 per cent silver and copper on a core of 79-21 per cent copper and silver.

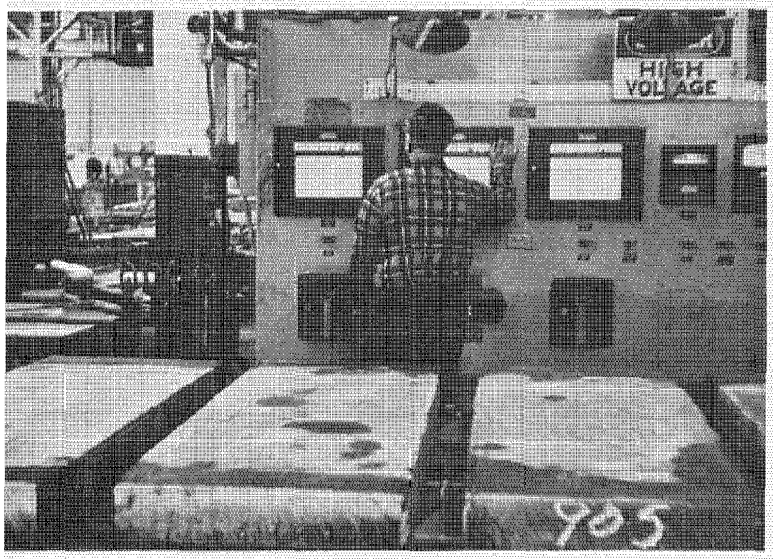
(The metallurgical recipe for the silver dollar remains unchanged; an academic point, since Mint presses haven't punched out the cartwheel since 1935.)

The Treasury Department's distribution timetable calls for 3.5 billion of the new composite coins to be in circulation by June 30, 1966. During fiscal year 1966-1967, output may be raised to seven billion; and within three years it will be possible, though perhaps not necessary, to meet total subsidiary coinage needs with silverless coins.

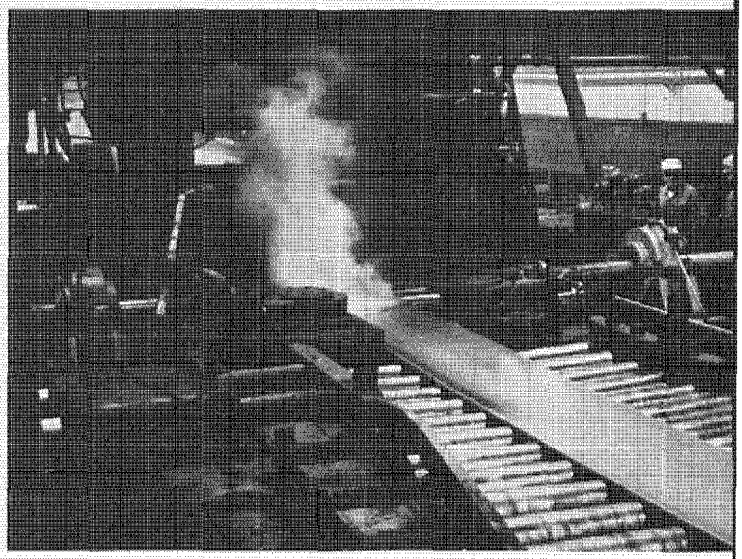
Why the extraction of silver? "Because there's a worldwide shortage of the pre-

continued

Copper-colored rim is in and silver bows out as the U.S. mints composite subsidiary coins.



Explosion-bonded clads await furnace-softening prior to hot-rolling.



Hot- and cold-rolling mills flatten five-inch clads to coin thickness.

Big Change in Small Change

continued

cious metal," answers Miss Eva Adams, Director of the United States Mint. "Over the last decade, consumption of silver in the free world has steadily outpaced production. Between 1960 and 1964, for example, consumption rose nearly 190 per cent; production was up only 3.5 per cent."

During that period industrial consumption of silver—most notably in the photography, electronics and flatware industries—increased by more than 60 million ounces. But the biggest drain by far on supply is the increasing U.S. coin production.

In 1960 the Treasury used 46 million ounces of silver in the minting of new coins. By 1964 that figure had rocketed to 203 million ounces as they stepped up operations to meet the coin shortage.

The shortage, Miss Adams comments, was not a problem of an insufficient supply of coin but the unavailability of the coin in existence. Coin movements are seasonal. The demand for coins begins to build in the fall, peaks in the Christmas season, and "flowback" (coin returned to Federal Reserve banks and branches by commercial banks and others) starts in January. However, flowback in 1964 was seriously subnormal.

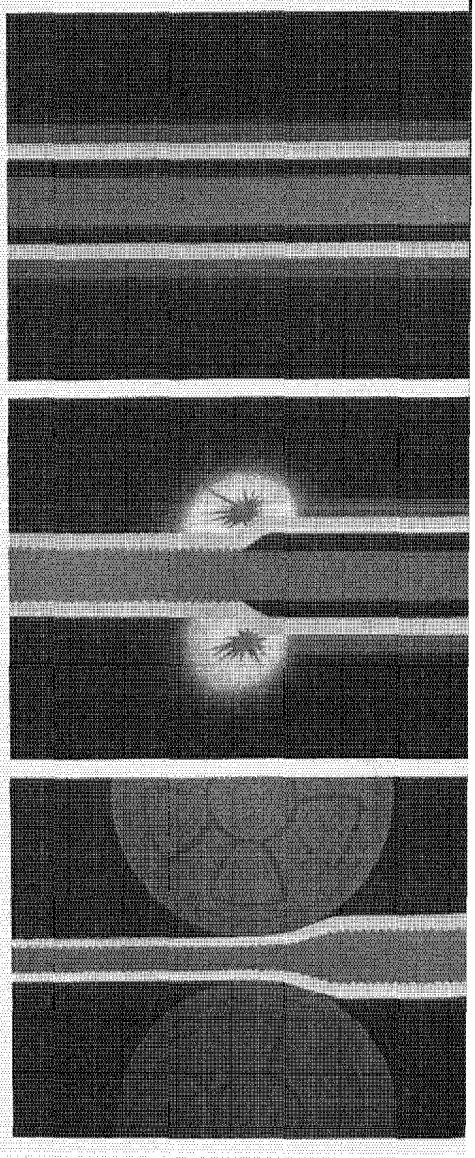
Reasons cited for the scarcity of free-flowing coins included the voracious appetites of coin-fed machines, speculative hoarding in expectation of a price rise in silver, "holdback" by businessmen in fear of a lack of coin to meet their own needs, and the swelling ranks of coin collectors, now estimated to number 8-10 million.

The solution to the problem, maintained the Treasury, was to beef up coin production—flood the country with coin and thus negate the fear and profit motives causing the shortage.

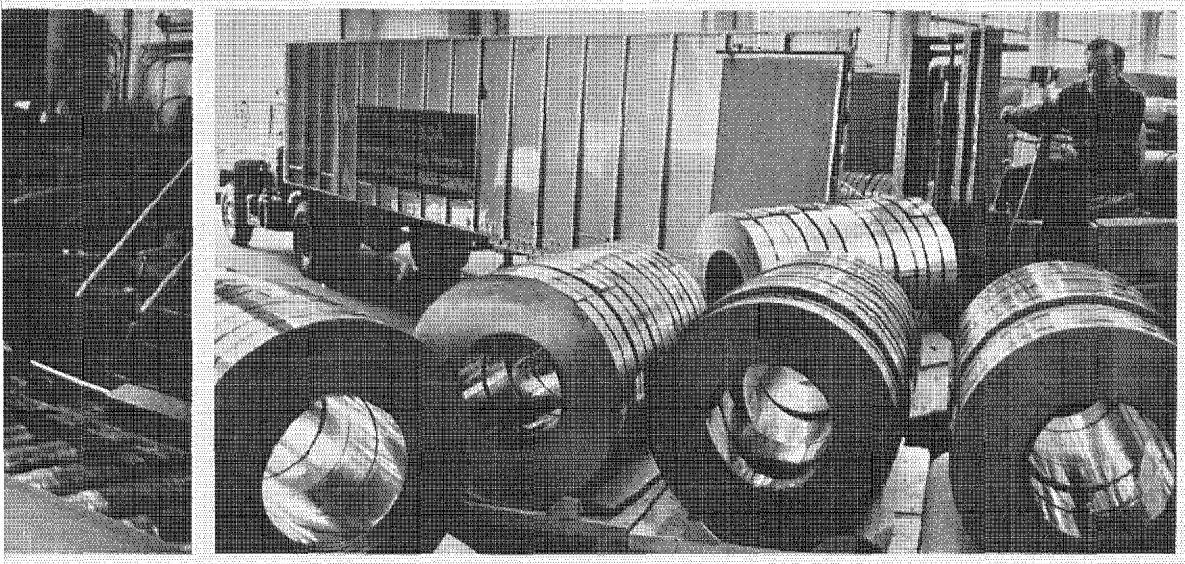
That brought coinmakers face-to-face with the dwindling silver supply. "It presented," says Miss Adams, "the choice of depriving coin of silver or depriving the economy of enough coins to keep it functioning properly." The Treasury recommended the former and Congress concurred.

The decision to mint a cladded coin rather than a single metal or alloy piece, such as the present minor coins (pennies and nickels), was necessitated by the requirements of the vending machine. Explains the U.S. Mint Director: "Only a composite type of coin could be engineered to duplicate the electrical properties of the former 90 per cent silver coins. And these properties had to be preserved to forestall the need of retooling the nation's coin-operated machines.

(There are roughly 12 million such machines and devices in the U.S.—from pay telephones to toll highway hoppers to dispensers of candy, cigarettes, cosmetics and countless other items. Half of these machines, at least, have sophisticated sensing devices and the process of revamping them



Coins of "Detaclad" metals begin with copper cakes between slabs of copper-nickel. A controlled explosion bonds the metals and then the clad is conversion-rolled to laminated coil strip.



Rolling results in coiled composite strip for the Mint's coin-blanking presses.

would take three years to complete.)

In its 174-year history the Mint has traditionally produced its own coin, from ingot to end. But with the new coinage system, private industry has been contracted to provide—temporarily at least—laminated strip from which the "sandwich" coins will be stamped. Du Pont, for one, is supplying the Philadelphia Mint with a two-metal laminate in the form of "Detaclad" explosion-bonded clad metals.

A Blast That Bonds

In commercial production since 1964, "Detaclad" metals are created by the force of precisely controlled explosions which produce metallurgical marriages that are strong, uniform in quality and easily adaptable to conventional fabrication processes. Briefly, the two metals to be joined are placed within a few thousandths of an inch of one another, an explosive is placed on top, then detonated, and the resulting explosion drives the metals together in a firmly welded bond without any significant change in the properties of the respective metals.

"Thus far the patented process has been most widely applied in producing corrosion-resistant clad plate for the chemical processing industries," points out Dr. Marshall Acken, Du Pont clad products sales manager. "'Detaclad' metals in a variety of combinations, from stainless steel on copper to titanium on carbon steel, have been used with great success in such things as pressure vessels and heat exchangers."

The measure of success is reflected in an expansion program now under way that will bring a fivefold increase in the company's explosion-bonding facilities at Pompton Lakes, N.J.

The assignment of furnishing composite strip for coins has introduced a new aspect to Du Pont's technology of "bonding with a bang," according to Acken. Says he: "Our commercial work has been largely final gauge cladding; that is, cladding directly at the specified thickness. Under the coin contract, however, we're cladding first, then conversion-rolling the clad to the thickness required for the coins."

The metals used come from the Government's metal stockpile through refiners who cast the pure copper and nickel into properly dimensioned "cakes" of copper and copper-nickel. With its explosion-bonding process, Du Pont produces a cladded composite that's over five inches thick in a layer to core to layer ratio of 1:4:1.

The clad is next reduced by hot-rolling and precision cold-rolling to the thickness of quarters (.054 inch) or dimes (.041 inch). The rolling facilities, identical to those used in producing strip for pennies and nickels, produce coils of composite strip that may yield as many as 5,000 quarters or 12,500 dimes per 100 pounds of strip.

Delivered to the Mint, the coil strip is fed into blanking presses where circles of metal are punched out in coin size. The blanks are annealed, i.e., heat-softened, and run through stamping presses where the coin design is imprinted. The finished coins then pass across reviewing tables where each is examined, front and back, to guard against production misprints that might be coveted by collectors.

"We're taking every step to see that the new and old coins circulate freely, side by side in the economy," asserts Miss Adams. Further, she doesn't feel that the new coinage is apt to stumble over Gresham's law which hypothesizes that "poor money drives good money out of circulation."

Continues Miss Adams: "There'll soon be billions of both old and new coins in existence, so neither will have the quality of rarity to make them of any numismatic value. What's more, by removing the coinage drain from its silver supply the Treasury can keep the price of the metal well below the $1.38 an ounce price at which it would become profitable for speculators to melt down the old silver coins."

How is the public reacting to the new composite coins? Replies one bank official: "Fortunately, we haven't noted any particular reaction and this is a case where no reaction is a good reaction. Sure, we heard some comments about the appearance and 'ring' of the new coins when they were first issued, but the novelty wore off quickly and now they seem to be circulating without a hitch."

Queried about the new "sandwich" coins, a customer in a supermarket check-out line comments: "I'm not concerned with how they look or feel. The important thing is they'll buy as much as the old coins."

Interjects another shopper, digging forlornly into her purse: "Or as little." ■

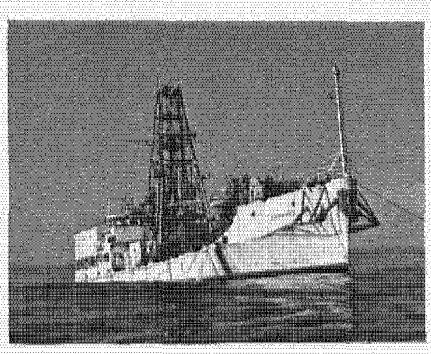
Neoprene synthetic rubber lends a hand to the seafaring scientists who prospect for precious

GEMS OF THE OCEAN

By Jack Murphy



Garbed in a wet suit of neoprene, diver descends for visual inspection of gravel beds.



As down in the sunless retreats of the ocean,
Sweet flowers are springing no mortal can see—

Over a century ago, Thomas Moore described with poetic conciseness the enigma of the world beneath the sea—a mysterious realm that covers more than 70 per cent of our globe and is marked by bottom fissures many times deeper than the Grand Canyon and submerged cliffs that dwarf our steepest mountain ranges.

Until recently, little effort was made to erase the enigmatic nature of this neglected frontier. The money spent in a single year for space research exceeds the sum spent in the last 100 years for ocean study. Comments a chagrined oceanographer: "More is known about the surface of the moon than about the sea. Even today our own oceans remain virtual riddles."

But they will not remain so for long if the recent lemming-like seaward surge by the science and business communities is an indication. Major industrial firms are adding departments of ocean research. Deep-diving vessels of both manned and robot variety are plunging into the murky depths. Underwater colonies in which men live and work for up to a month are being established several hundred feet below the surface of the Mediterranean.

Since 1961, when the late President Kennedy suggested that our survival might hinge on a knowledge of the oceans, the federal budget for undersea research has more than tripled. Similarly, annual ocean

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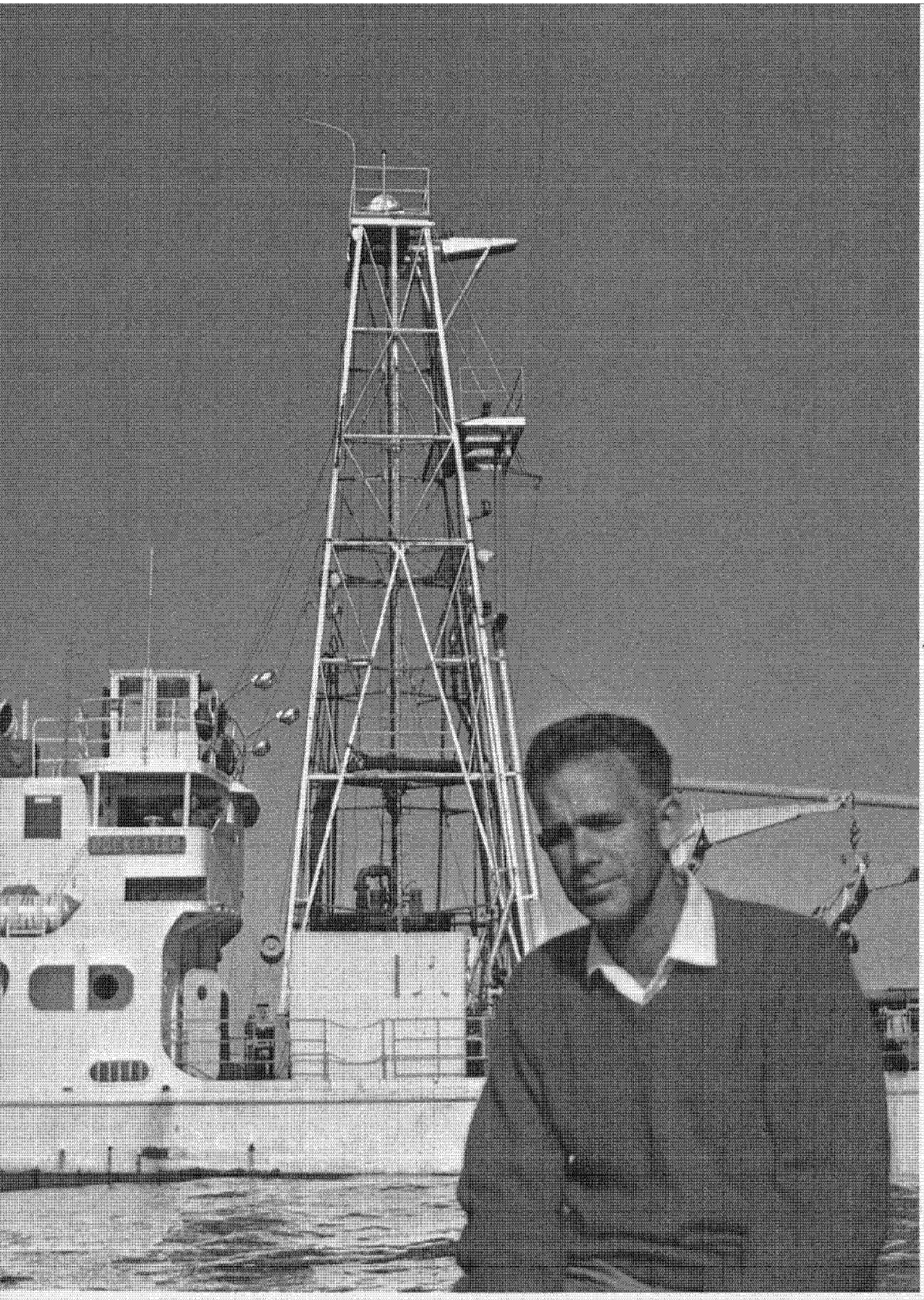
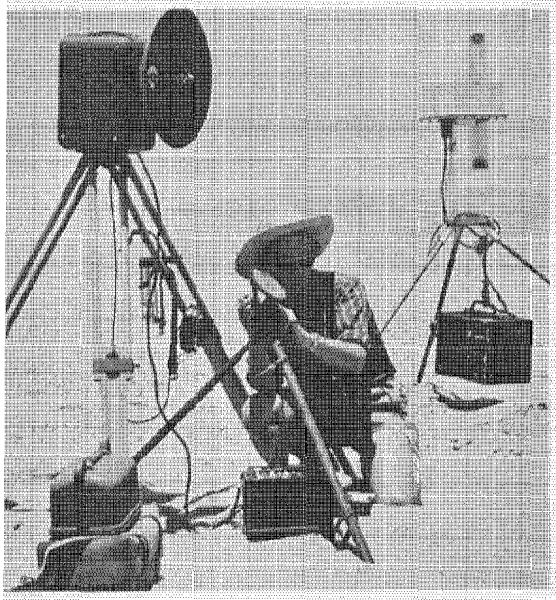
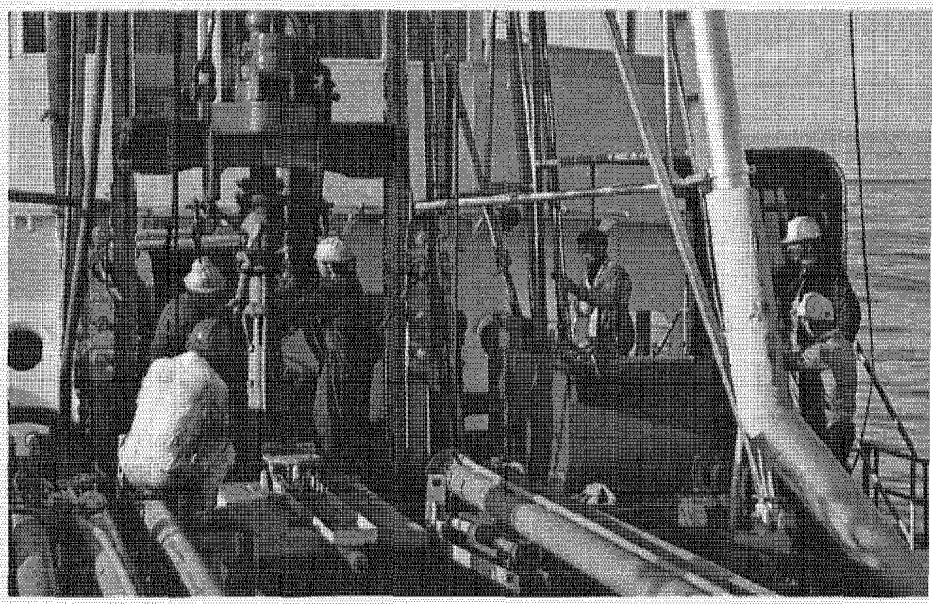


OSE president, Willard Bascom, believes *Rockeater* to be the first ship ever designed and built for mineral prospecting.



Radar-equipped shore points transmit precise navigational signals to diamond survey ship.



Derrick aboard the *Rockeater* is marked by a maze of neoprene swivels, hoses and pipe joints. Neoprene offers the rugged flexibility required in drilling 30 holes per day in the sea floor.

Gems of the Ocean

continued

study investments by U.S. companies are climbing past the $20 million level.

This mushrooming interest in the oceans is logical, if late in coming. Far from being vast wastelands, the oceans contain four-fifths of earth's animal life and the bulk of its vegetation—by one estimate, some 4,000 tons per square mile. Experts contend, moreover, that the world beneath the sea is an aqueous cornucopia of untapped riches and resources—"sweet flowers" that can fill some of our most critical needs.

Examples: desalination of seawater may provide the 70 trillion additional gallons of potable water per year the world is expected to need by 1975; dietary deficiencies might be offset through "aquaculture," i.e., the science of cultivating abundant harvests of fish and edible underwater vegetation; marine pharmacologists hope to find new cures for human ills from studies of sea organisms; and deposits of oil, gas, coal, manganese, tin, sulphur, iron ore and other minerals in the ocean bottoms hold out the promise of lush profits.

These riches, however, are not for easy plucking. In the undersea world—an opaque region of crushing pressures, restless motion and instrument-corroding salt content—research is difficult and new tools and techniques are needed. Thus the accelerating "ocean boom" is paralleled by the birth of new ocean science companies. Their specialty: finding ways and means to unshroud the secrets of "inner space."

Such a firm is Ocean Science and Engineering, Inc., whose multilingual staff includes oceanographers, geologists, geophysicists, naval architects and engineers of nearly all disciplines. Says Willard Bascom, OSE's president and chairman: "The commercial exploitation of marine resources is just getting under way. Before any harvests are reaped, there's a lot of thinking and searching to be done. That's our area of engagement—designing and engineering systems and methods that will enable men to work effectively and profitably under the sea."

Motivated by Mohole

Founded in 1962, OSE is an indirect outgrowth of the Mohole Project—a visionary and yet-to-be-completed plan to drill a hole five or six miles through the ocean floor to obtain a sample of the earth's mysterious mantle. Bascom directed Phase I of Mohole for the National Academy of Sciences, and five other OSE scientist-engineers worked with him on the project.

Phase I of Mohole, reports Bascom, saw the drilling of ten holes—five in 3,000-foot-deep waters near La Jolla, Calif., and five in depths of 12,000 feet off the western coast of Mexico. Adds he: "The project taught us a great deal, and upon its completion our group decided to remain together and form a company to do deep-sea engineering."

The activities of OSE are broad-range and globular. Among its projects: the study of wind and wave effects on African and Australian shorelines; development of a man-made research island on the California coast; creation of mooring and ship positioning systems; and the design of specialized buoy systems that measure and record oceanic and man-made phenomena.

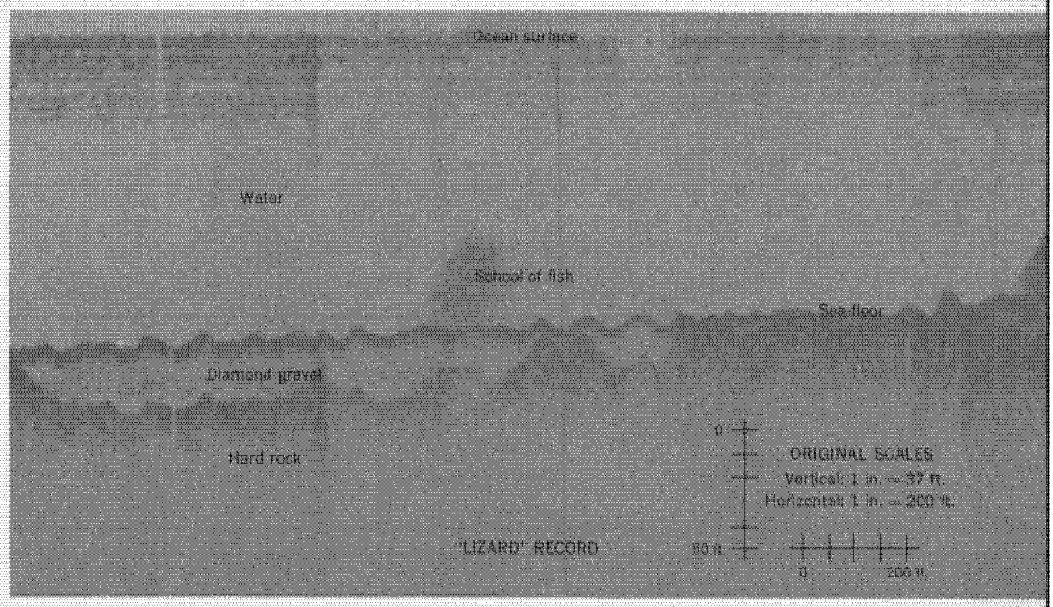
"We even came up with a toy buoy for young swimmers," says Bascom. "Not surprisingly, we call it the Playbuoy."

An OSE project with a particular smack of glamour is the company's underwater prospecting work in waters off the African coast. Objective: to search out, analyze and plot the location of diamond-bearing gravels lying roughly 100 feet deep.

Explains Bascom: "When we started nearly three years ago, the first step was to establish precision survey points on the shore. Each was equipped with a radar transponder that produced a bright blip on the radar of the survey ship, enabling it to

navigate with exacting accuracy."

The survey ship, he continues, cruised for months over an area of some 5,000 square miles recording and plotting the configuration of undersea rocks and sediments. A low-frequency sound device called a "sparker" was used for general reconnaissance of the bottom thickness and structure. Final plotting was derived from a finer instrument—the Overburden Recorder. "It's popularly called 'the lizard' and operates much like conventional sonar gear," Bascom points out. "It sends out pings of sound that are reflected back and yield a graphic record of what lies below. From these records, we're able to develop charts that show areas of possible diamondiferous gravels."



OSE's Overburden Recorder produced this graphic presentation of subsea conditions. Graph reveals pocket of possible diamond-bearing gravel that will be charted and later sampled.

Sampling Ship

Transforming speculative survey information into definitive diamond data requires a massive sampling program. A small freighter was converted for this purpose and named *Rockeater*. OSE naval architect, Peter Johnson, calls it "one of the most exacting exploration ships ever built."

Principal feature of the ship's drill-sampling system is a 52-foot-high, 100-ton-capacity derrick mounted above a center-well at the point of minimum motion. According to Johnson, it is capable of core drilling hard rock at 5,000 feet or lifting unconsolidated materials from a depth of 500 feet by means of dredge pump or air lift. The system, he adds, makes extensive use of Du Pont's neoprene synthetic rubber.

Introduced in 1931, neoprene is a man-made rubber that's been performance-proved in a wide range of applications, such as wire and cable jacketing, industrial hose and belting, structural bearings, adhesives, gaskets, seals, fabric coatings, shoe soles and heels, and a varied line of automotive and building products. Its balanced combination of properties—toughness, resiliency and resistance to flame, abrasion, oil, chemicals and solvents, ozone and temperature extremes—makes neoprene the most versatile synthetic rubber available.

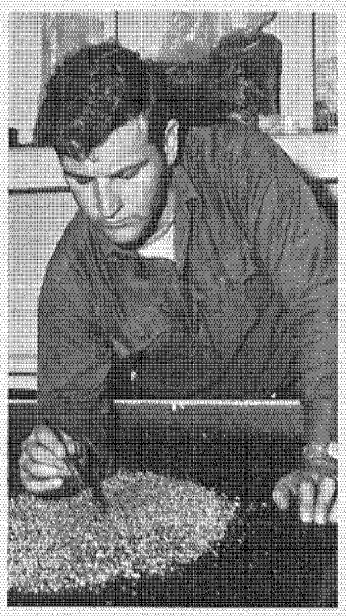
"Successful sampling in a dynamic ocean environment requires a system that's both rugged and flexible," Johnson explains. "The derrick on *Rockeater* is a planned maze of swivels, rotating and flexible joints, and hoses for air, water, hydraulic oil and the sample product. We found that neoprene offered the necessary flexibility and was durable enough to perform long and well under rugged, seagoing conditions."

In addition, Johnson cites other uses of neoprene that have "contributed to the operating efficiency of *Rockeater*." Examples include: shock absorbers on hydraulic drive mooring winches; gasket rings for sealing high pressure joints; inflatable life rafts; wet suits for diver-geologists; and conveyor belts that carry often abrasive bottom sample materials through a screening plant.

Analysis of recovered material is an on-the-spot operation conducted aboard the ship, Ocean Science's Bascom points out. The material is jigged and screened to a concentrate that is finally hand-sorted for diamonds. Says he: "As a general rule of thumb, a recovery of one carat per cubic meter of material indicates an area of mining feasibility."

More important to Bascom than the number and weight of precious gems recovered are the ocean-tapping skills and techniques being developed—skills that OSE is using in their search of Alaskan waters for gold, and hopes to employ in exploring the ocean bottom for tin off Malaysia and Thailand.

"The oceans are a long-range investment requiring patience and perseverance," asserts Bascom. "But the dividends of the deep, we think, are going to prove far richer than the returns from the moon." ■



Hand-sorter probes screened ocean-bottom sample for precious stones.

Use of new "Templex" photopolymer material speeds development of fluid amplifiers as

The Thinking Man's Toy Takes on Bigger Tasks

By Ray McGlew



Eric Metzger (right) and E. M. Dexter, Bowles executives, mull test amplifier design change.

If you have identified the photograph at right as a surrealist etching, an electronic circuit or a piece of laboratory hardware, you're at least partially right. If you have pinpointed it as a fluid circuit in a digital computer, you're apparently in the vanguard of a growing group of scientists and businessmen who hail fluid amplification as the newest and hottest field in the technology of the Sixties.

Little more than a lab curiosity at the beginning of the decade, fluid-amplification devices have already been handed such diverse assignments as guiding a test missile, controlling the cycle on a household washing machine, and moderating the pulse rate on an artificial heart. The fluid circuit shown, a laboratory prototype photoetched in Du Pont's "Templex" photopolymer material, would perform a divisional operation (by tens) in an all-fluid "brain" or computer.

Frequently referred to as fluid transistors, fluidics, or fluid systems, fluid amplifiers are basically control devices which operate on liquid or gas. Their output, measured in terms of flow, pressure and power, can be altered in infinite variety within small confines to achieve such effects as switching, amplification and oscillation.

The principle involved is not too different from that employed in many of the electronic applications they are expected to replace. In a simple cathode-ray tube similar to the kinescope tube in a TV set, a weak fluctuating voltage applied to the deflection plate of the tube acts on a stream of electrons flowing through the tube. The resulting modulation of the stream serves to boost the signal to operating levels.

In an elementary fluid-control device, a steady stream of liquid or gas (usually air) replaces the electrons and is acted upon by precisely controlled jets of fluid directed at it from the side. A jet's signal deflects the mainstream into a preplotted course along the etched channels of the device, be they logic elements or command switches.

"It may be easier to envision," offers Dr. Charles Schoenthaler of Du Pont's Photo Products Dept., "if you'll think of the mainstream as the ball in a pinball game from which the element of chance has been removed and in which there's no possibility of a tilt. The jets are the bumpers which deflect the ball to the proper targets or scoring areas. Instead of ringing bells and flickering lights, the rewards are the proper performance of whatever tasks industry assigns."

Others have described fluid amplifiers as "the thinking man's toy," an apt reference to the way in which designers and engineers have become intrigued with the seemingly limitless potential they offer. The thrust that drives a rocket, for instance, can also guide its trajectory if the main exhaust is tapped to provide a control jet. Aimed back at the exhaust from a side nozzle, the jet would deflect the thrust sufficiently to alter flight direction. On a much smaller scale, one firm's fluidics researchers have come up with a one-cubic-inch package containing 3,000 flip-flops —stable two-stage amplifiers at the heart of most computers—and their interconnecting circuitry.

The type of fluid amplifier most commonly used to date, however, is the beam deflector. It employs the wall attachment phenomenon, the tendency of a fluid jet to attach itself to an adjacent wall, first observed early in the Thirties by Hungarian inventor Henri Coanda. An increase of pressure from one of two control ports placed perpendicular to the mainstream—or a diminution of pressure from the opposite vent—will deflect the stream from one wall to another to accomplish a simple switching in either of the receivers to which it is thereby directed.

This Coanda effect is utilized in a "fixed program" machine developed at General Electric's Research and Development Center for transferring small parts from one location to another: from the rotary table

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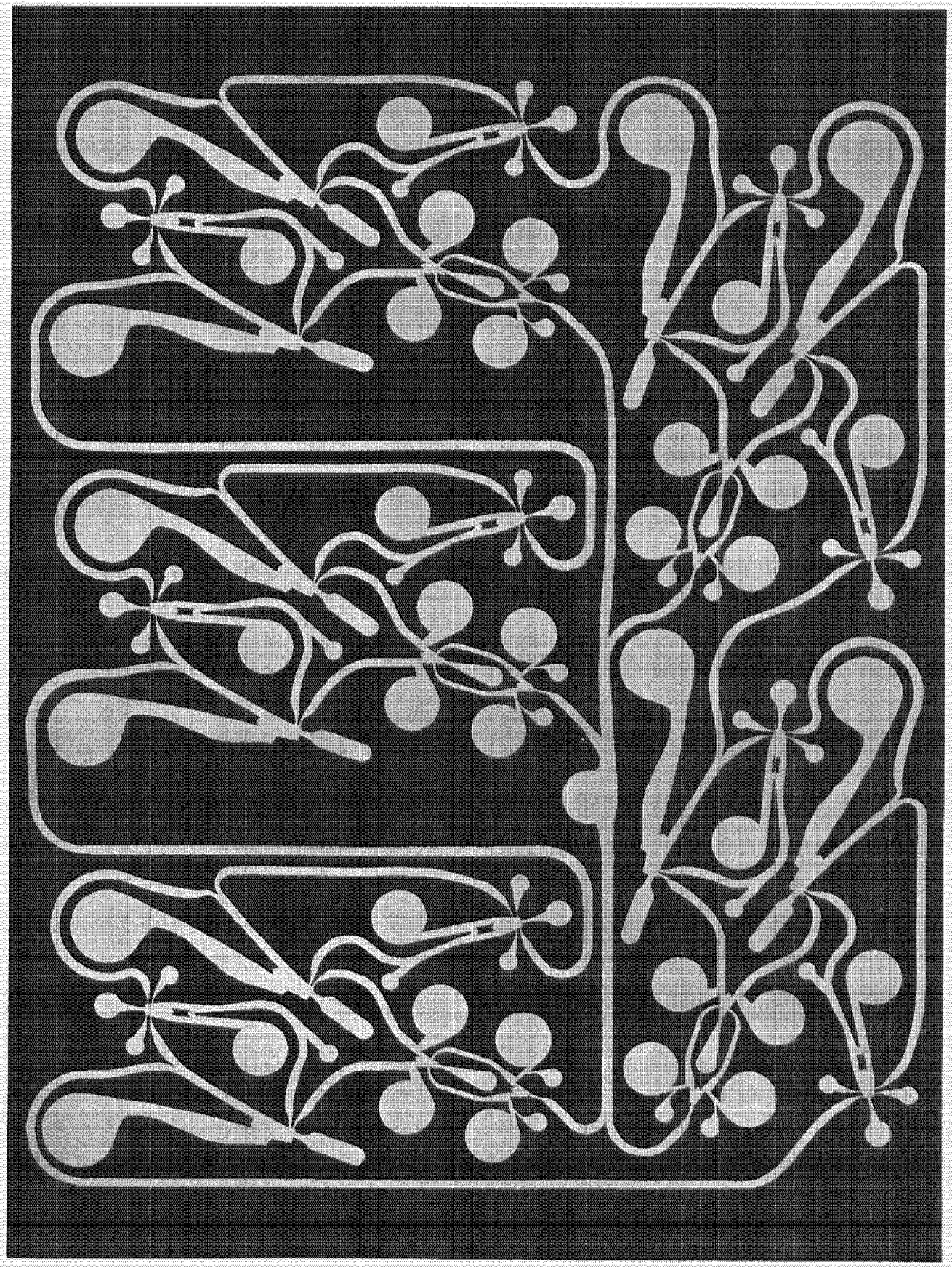


Print above was made from Bowles' negative that would be used to photoetch fluid circuit in "Templex".

The Thinking Man's Toy Takes on Bigger Tasks

continued

of an automatic process line to a conveyor belt, for example. This machine was originally designed with electrical limit switches to detect end of travel for each of three pneumatic cylinders and a pneumatically driven rotary electric switch to provide sequence logic. When service life proved too short due to failures of the electrical components, they were replaced with a fluid-amplifier control formed in "Templex" (see photo below).

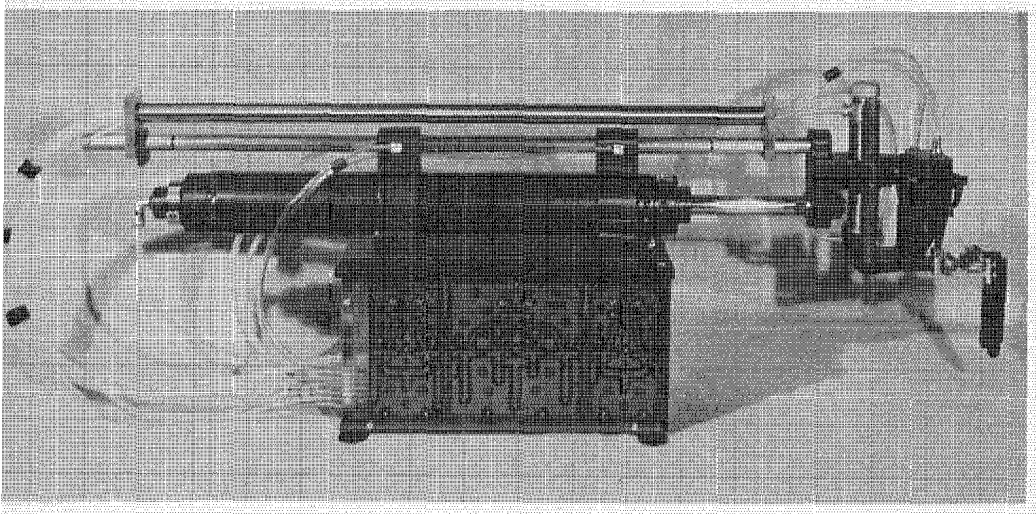
Simple grooves were machined in the guide rods for each actuator. In operation the rods move freely until a groove lines up with a pair of pneumatic lines, permitting transmittal of the fluid limit signal to the circuit. The circuit then performs all the logic necessary so that the three actuators move in the proper sequence.

"The circuits have a considerable advantage over the relay- and switching-type logic frequently used for industrial controls," according to R. A. Raber, program development manager for G. E. "Moreover, they're compatible with the hydraulic actuation means traditionally used in such equipment."

G. E., which recently exhibited a sequence control for an industrial punch press, is also applying fluid amplifiers to such purposes as fusing artillery shells, control of jet engines, and speed governing of steam turbines under contracts from the armed forces. Currently, the firm is studying space applications for NASA.

Nor is General Electric alone in the field. More than 200 other firms are believed to be joined in the race for a share in the multimillion dollar market now served almost exclusively by electronics manufacturers. And—game, toy or race—there's no blinking the fact that the stakes are high, since the research and development funds poured into fluid controls last year were reportedly well over $30 million and included a $14 million outlay for space and military applications.

While conceding that fluidics will never put electronics out of business, developers of the new technology feel that most electronic equipment is, of necessity, overengineered; that few applications actually require the ultrahigh speeds at which it functions. (Electronic impulses travel at the speed of light; fluids are regulated by the speed of sound.) They point out that: (1) Since fluid devices have no moving parts to break down, they offer greater reliability; (2) they require no special environment and can therefore easily be adapted to critical tasks where radiation, temperature extremes and vibration are encountered; and (3) fluid amplifiers costing but a few cents should soon be ready to take over jobs now performed by electronic equipment costing several dollars.



G.E. used fluid-amplifier control in "Templex" to perform necessary logic for this fixed program machine, is now applying its technology to jet engine and space vehicle controls in NASA project.

While Du Pont has been conducting its own research in fluid technology as part of a never-ending search for better chemical processing tools and controls, its role as a material supplier for the industry is an outgrowth of work in a quite separate field.

" 'Templex' is an offshoot of the company's successful development of 'Dycril' photopolymer printing plates," Schoenthaler explains. "Both provide a relief image by in-depth exposure and subsequent removal of the unexposed areas of a plastic plate. But where 'Dycril' plates have image elements with tapered walls to give long wear life during printing, 'Templex' provides straight sidewalls, a requirement for most nonprinting applications."

Boon to Designers

When backed by metal or plastic, the smooth, vertical-walled configurations are ideally suited to the flow of liquids or gases from element to element. Moreover, the plastic construction lends itself readily to miniaturization and offers exceptional economies. Their complete reproducibility via the camera lens, however, has proved the major boon to designers.

"With so much still to be learned about the behavior of confined gases and liquids," Schoenthaler points out, "photography makes up for the lack of complete predictability in current design techniques. A series of drawings containing minute design variations in curves or angles of a plotted configuration or in the location of jet orifices and vents can be exposed simultaneously on the photosensitive plastic. The light-hardened fluid-control devices produced can immediately undergo testing for fidelity without the lead-time lag involved if some form of machining were involved. And when the right design is selected from the prototypes, the negative that produced it can form the basis for immediate limited production."

Fabrication of such an amplifier, from design stage to commercial product, takes roughly 20 minutes. A film (usually a photographic negative) on which the design configuration appears as an opaque pattern is held over a sheet of "Templex" by a vacuum, and the "sandwich" is exposed to a 140 amp. arc lamp for 100 to 110 seconds. Photopolymerization takes place dur-

ing this stage. The sheet is then processed from 3 to 14 minutes (depending on sheet thickness) under a weak sodium hydroxide spray which washes out the soft unexposed portion. Once covered and with fluid input and output lines in place, the device is ready for service.

In a typical amplifier, vents would be drilled through the steel or aluminum backing of the polymer and gas- or liquid-carrying tubes attached. A Du Pont "Cronar" polyester coversheet is then adhered to the face of the device to provide an airtight seal. An alternate method of manifolding and sealing a unit would be to laminate controls carrying out consecutive functions.

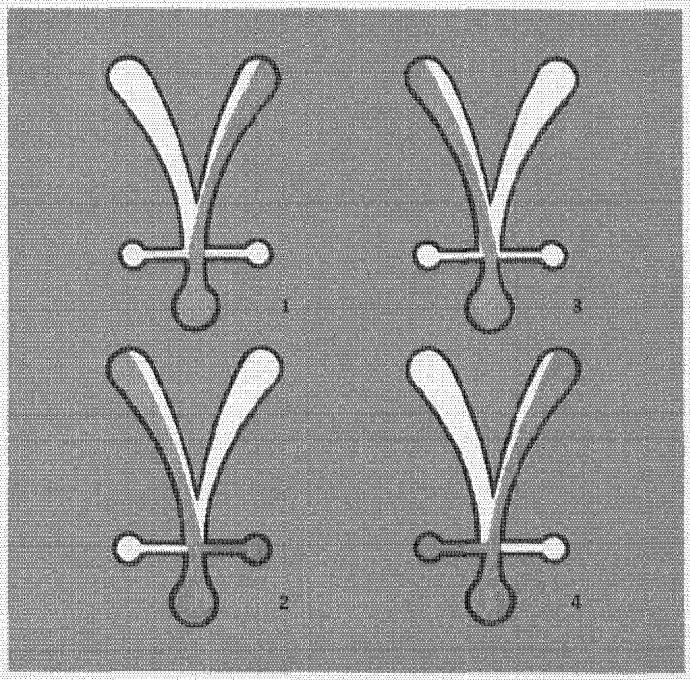
This relative speed has made "Templex" an "extremely valuable tool during the development of G. E.'s applications," says Raber. "The extremely short cycle time from conceptual design to a piece of working hardware made possible by 'Templex' has been a significant factor in allowing us to achieve the rigid schedules imposed by our military customers. The units show good reproducibility and accuracy and provide us the flexibility we need in this early state of the technology."

Flexibility of photographic materials and processes permits Bowles Engineering Corp., the holder of many original fluid patents, to claim that it is one of the few equipment manufacturing companies able to store its production tools in the same file envelope with its designs. Says Bowles engineer Eric Metzger:

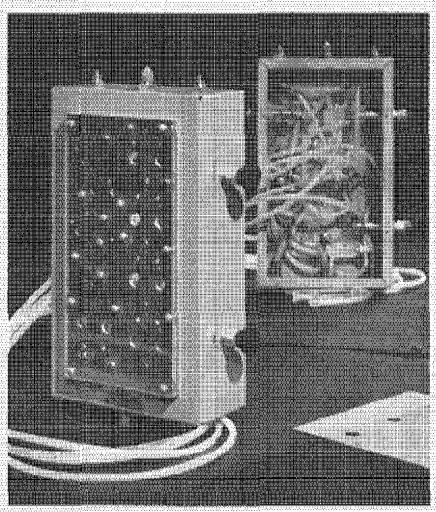
"Most system designs involve a number of components. The simplest way to keep the designs together is to commit them to a master silhouette on a negative. When we're called on to produce a particular design, we turn the film over to our production people and they put it into process immediately."

Bowles uses its own proprietary process to fabricate fluid circuits in "Templex" and sells them under its trademark "Optiform". These include analog amplifiers, multistage binary counters, frequency modulators, and such logic elements as flip-flops, or/nor gates, and amplifier-inverters.

"Design of each of these," affirms Metzger, "was hastened by the photographic technique. The necessary intricate geometry presents a real challenge when you're developing the elements. The only way to match the speed and accuracy of photoproduction is through digital- or computer-controlled machining, and costs for a prototype would be exorbitant."



In basic amplifier, power stream locks on receiver wall (1) until jet flips it to alternate (2), holds there (3) until signal flops it back (4). Changes in design can make stream "prefer" one receiver or split in two between them.



Heat or pressure deviations will alert this lab control unit to signal for corrective measures.

Power requirements for most fluid devices present little problem. Fluid power can often be "bled" from a central source or, in fast-moving vehicles, ram air pressure can be utilized. Where fluids (viz., fuels) are stored or delivered at higher pressures than required, the control function can be combined with that of a throttle or regulating valve. Where a separate source of power is required, even an item as simple as a self-contained gas cartridge has proved adequate for assignments of short duration.

Pneumatic equipment is, of course, a natural target for fluid controls. Other potential applications listed by Schoenthaler include: automatic conveyors, fill equipment, pressure sensors, gyroscopic stabilizing and thermostat-type controls.

"It's almost like a parlor word game," says Schoenthaler. "The more applications you list, the more come to your mind. Some of the excitement about fluid controls comes from watching the aura of mystery clear away. But most of the rush is engendered by the desire to capitalize on their complete simplicity." ■

WHAT'S NEW



Gutter Guard of "Vexar" plastic netting is a durable, weather-resistant barrier that helps keep roof gutters free from clogging debris. Du Pont Gutter Guard can be easily fastened under shingles or fitted into gutter itself.

● **Friction-free rod guide** reduces tubing wear and corrosion at oil fields in the Southwest. The "Well Guard", designed and marketed by Central Research, Inc., Shawnee, Okla., and molded of "Zytel" nylon resin, prevents metal-to-metal scraping of sucker rod in well casing. For use where paraffin is not present, the nylon guide eliminates rod vibration and buckling, has a temperature tolerance of 250°F., and is resistant to salt water or corroding elements in crude oil.

● **"How to be a Crack Shot"** is an amply illustrated 15-page booklet available without charge from Remington Arms Co., Inc. Ideal as an instructor's aid, the booklet covers proper gun handling, how to build rifle ranges, elements of safety, and care of sporting firearms. Copies, limited to one per person or up to 25 for a club or group, can be requested from the Advertising Division of Remington Arms Co., Inc., Bridgeport, Conn. 06602.



The difference between healthy cotton plants at right and stunted plants at left is "Demosan" fungicide, a versatile soil fungicide that controls both pre- and postemergence cotton seedling diseases. Available in 65 per cent wettable powder or 10 per cent dust, "Demosan" can be applied in the planter box or as an in-furrow treatment, and also as an overcoating on planting seed.

● **Condenser lead wire** in use on many power mowers, snowblowers and chain saws is jacketed with "Hypalon" synthetic rubber. The R. E. Phelon Co. of East Longmeadow, Mass., manufacturer of flywheel magneto-ignition systems, now specifies "Hypalon" over previous jacketing materials. Reasons: improved high- and low-temperature performance and superior resistance to abrasion, oil and gasoline.

● **New cutting fluid,** "Freon" T-B 1, is used for drilling and machining metals from relatively soft aluminum to hard stainless steel and space alloys of titanium. Applied as fine jet or spray, "Freon" T-B 1 evaporates without leaving a residue to interfere with the adhesion of paints or sealants; improves finishes and tolerance accuracy; extends drill life; and is nonflammable and relatively nontoxic.

● **Plant planning system** reduces layout time and cost and provides layout engineers with flexible tools and techniques for developing the most efficient arrangement and use of plant floor space. The kit system by Planprint Co., Chalfont, Pa., contains outline panels, precision grids, translucent overlays, and adhesive-backed templates and symbols that represent building elements and plant equipment. These materials, made of "Mylar" polyester film, are stable, nonaging and reusable.

● **The tropic touch** in tablecloths is featured in a new print line called "Tahiti" by Timely Linens of New York. The tablecloths of 100 per cent cotton come in three color combinations of "Savalux" dyes that stay fast through laundering and sun exposure. Available in squares, oblongs and rounds, "Tahiti" tablecloths are stain-protected with "Zepel" fabric fluoridizer.

● **Fern, a recent design addition** to the Du Pont line of vinyl upholstery, provides a striking effect not available in any other material. Suggestive of the fossil patterns of prehistoric plant life, Fern lends itself well to soft shades of gold, black and six near-pastels. Metallic and iridescent fern embossings fit with the most modern decor.



Bathers' beauty is bolstered by bra cups with a mold construction of "Alathon" EVA resin with polyurethane foam and nylon lace. Excellent contour-memory of "Alathon"—it always retains its original molded shape—eliminates need for bust pads. Quick-drying, comfortable cups by Metric Products Co. of Culver City, Calif., are currently used by most of the major swimsuit makers.



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