

DUPONT

m a g a z i n e



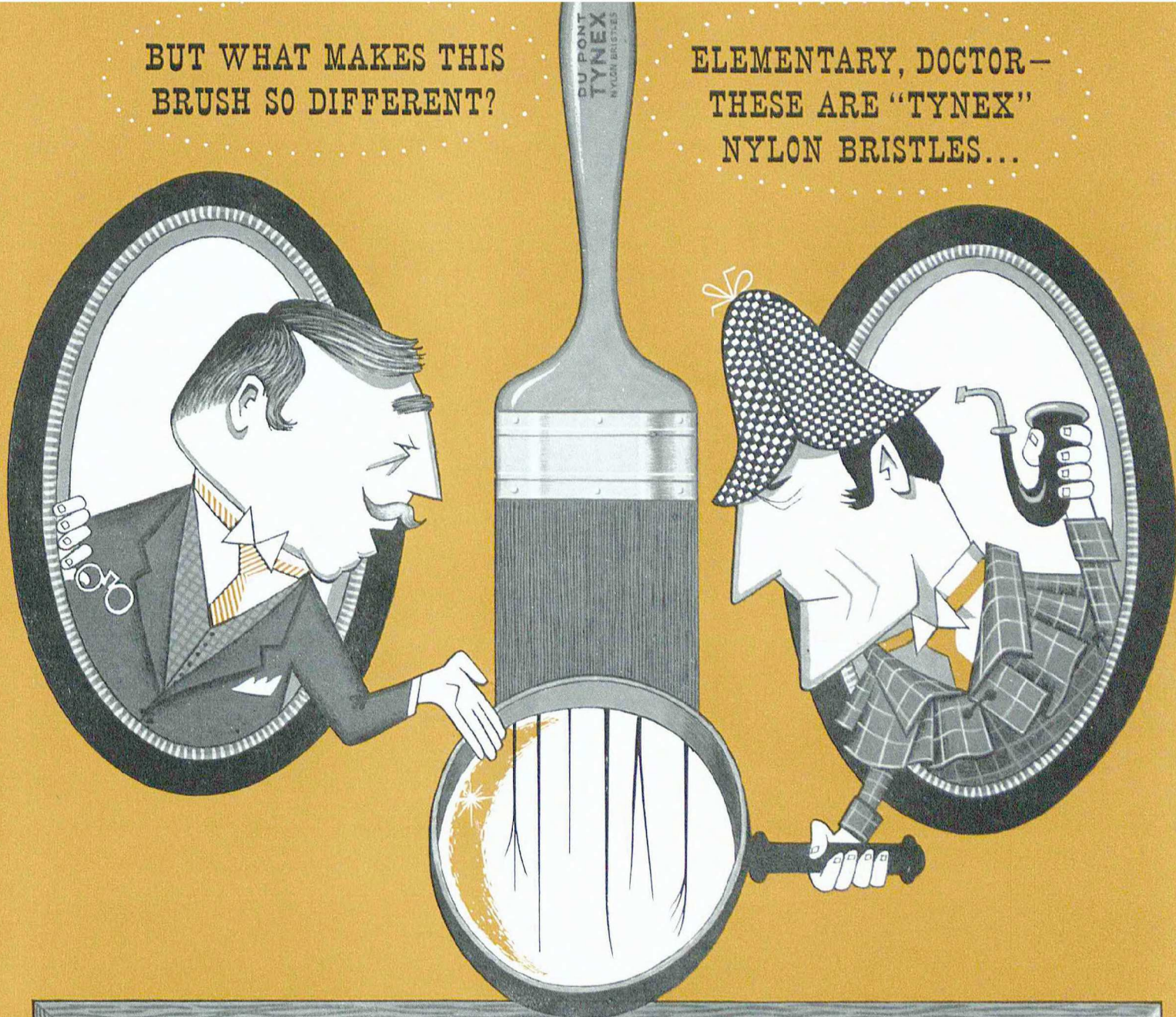
WASH-AND-WEAR GOES AUTOMAT



BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

BUT WHAT MAKES THIS
BRUSH SO DIFFERENT?

ELEMENTARY, DOCTOR—
THESE ARE "TYNEX"
NYLON BRISTLES...



 ...AND HERE IS WHY THEY MAKE A BETTER PAINTBRUSH

"As you know, Doctor, I esteem the scientific method, whether applied to the capture of evildoers or the design of a painting implement. Thus I invite your attention to the part brushmaking science has played in designing 'Tynex' nylon bristles to pick up paint, hold it and release it smoothly.

"The magnifying glass reveals that these bristles are both tipped and flagged. The pointed tips and the split ends increase paint-holding capacity and contribute to the smooth-

ness of the paint film. Both are clues to brush quality.

"Moreover, a brush made with 'Tynex' bristles allows one to paint with any finish on any surface. The bristles retain their resiliency, even in water-base paint, and produce handsome results with no annoying streaks.

"To sum up, Doctor, a uniform, man-made bristle, plus the skill of brushmaking artisans, is what makes this brush so superior. It's really that simple."



TYNEX[®] **NYLON BRISTLES**

BETTER THINGS FOR BETTER LIVING...THROUGH CHEMISTRY

Hoffman

COMPETITION SPURS CHEMICAL PROGRESS

Beginning April 13 the U. S. chemical industry will observe its fifth annual Chemical Progress Week. Industry representatives will be talking to groups all over the nation, explaining how chemical manufacture contributes to a better America.

One of the topics they will touch on is competition, an area where considerable misunderstanding exists. According to recent surveys, many Americans believe a handful of companies control the industry.

They may be surprised to learn that of the seven biggest chemical firms, the one with the largest share of the market has less than 8 per cent of the business, while the lowest has barely 2 per cent. Sales of the three largest—Du Pont, Union Carbide and Allied Chemical & Dye—total less than 16 per cent of sales for the industry as a whole.

Our economy is expanding so fast that individual companies find it difficult to increase their share of the market. Between 1953 and 1957, for example, Du Pont sales rose 12.3 per cent, yet the company's share of the chemical market declined slightly. Although it's the largest single unit in the chemical industry, Du Pont competes vigorously with other major producers in all its basic product lines.

The chemical industry's key role in the economy—it supplies products to all other manufacturing industries—keeps competition within it lively. Lately, too, many firms not formerly associated with chemical operations have entered the field. W. R. Grace, General Mills, Sunkist, Deere & Co. are among those now in the industry.

For the public this competition spells an ever-widening range of new products at prices that have remained reasonable. Chemical prices last year were only 9.5 per cent above the 1947-49 base, while prices of industrial commodities as a whole had gone up 25.6 per cent during that period. Du Pont managed to hold its 1957 prices

to a level only 6.2 per cent above the 1947-49 base.

The price line has been held through more efficient production and through research, the chemical industry's invaluable weapon in the competitive battle. From the laboratory come the new ideas that improve products and processes. The answer to a competitor's challenge is not always a brand new product; it may be one improved greatly in quality and usefulness.

Among the many products of the chemical industry that give the buyer more for his shrinking dollar than they did 10, 15 or even 20 years ago are cellophane, neoprene, nylon and the nitrogen compounds so important to the farmer. Thus have products—and the people who use them—benefitted from the competitive atmosphere in which the industry lives and grows.

OUR COVER

On the cover and on page 2 you'll notice two versions of the same story. As cover artist Vince Hoffman tells it, Pop discovers belatedly that his favorite suit is

DUPONT
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soiled. Photographer Tony Pappas has young Freckles spilling milk just an hour before church time. No matter in either case, since the suits in question are specimens of that remarkable ge-

nus known as "automatic wash-and-wear." The happy ending to both stories—and perhaps to your spring shopping saga as well—begins with our lead article on the following four pages.

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ART AND PHOTO CREDITS

Cover, second cover & p. 19: Vincent E. Hoffman; p. 2: Tony Pappas; p. 3, top p. 4, top (left & center), bottom (left & center) p. 5, p. 14 & p. 37: Larry Keighley; bottom p. 4: Lubitsh & Bungarz; top right, center & bottom right p. 5: Pagano; pp. 6 & 7: U.S. Dept. of Commerce; pp. 8, 10, left p. 11, bottom p. 13, pp. 16, 17, top p. 29, p. 32, right p. 38, p. 40 & third cover: Edgar N. Adams; p. 12 & top p. 13: National-Standard Co.; p. 18: Howard L. Slater; p. 22: U. S. Dept. of Agriculture; top p. 23: United Press; bottom p. 23: Bridgeport Brass Co.; pp. 24 & 25: Mississippi Lime Co.; p. 26 & left p. 27: Aeroquip Corp.; left p. 28: Cities Service Co. (*Servitor Magazine*); right p. 28: Paul

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- Construction features that distinguish automatic wash-and-wear: Sewing thread of "Dacron" or nylon assures smooth seams. Fabrics of "Dacron" or nylon are used in such key spots as shoulder pads and sleeve heads; coat and collar canvases, which must retain their shape for neat lapels; stays, piping and tapes; linings, edged or stitched to prevent fraying; waistbands; trouser pocketing; zipper tapes.

automatic

By EMILY HEINE

This spring you're pretty sure to encounter "automatic wash-and-wear"—clothing especially designed to be machine washed and then put through a modern tumble dryer. The whole business from washer to wearer takes about an hour; little if any touch-up pressing is necessary.

One manufacturer of men's summer suits pioneered automatic wash-and-wear last year and easily sold his entire stock. Back strong this year, he has been joined by some three dozen other makers of men's wear. Brand-new in 1958 are automatic wash-and-wear outfits for women, boys and girls.

An automatic suit sounds vaguely like something a knight might don for battle. It's not. In fact, a typical automatic wash-and-wear suit looks and feels like a conventional summerweight suit. But there is a difference.

First of all, the fabrics in automatic garments are made with a high percentage of Du Pont "Dacron" polyester fiber, "Orlon" acrylic fiber or, in a few cases, 100 per cent nylon. Such fabrics are notable for their recovery from wrinkling at certain elevated temperatures, the feature that makes automatic wash-and-wear possible.

The garments also are tailored carefully, using lining materials, thread and other components that are stable and sturdy enough to withstand machine washing and drying. Inside seams are stitched to prevent puckering and edged so they won't ravel and pull apart. It's these things that distinguish automatic clothing from wash-and-wear of the drip-dry variety. Don't ex-

WASH 'N' WEAR MADE FOR HOME MACHINES

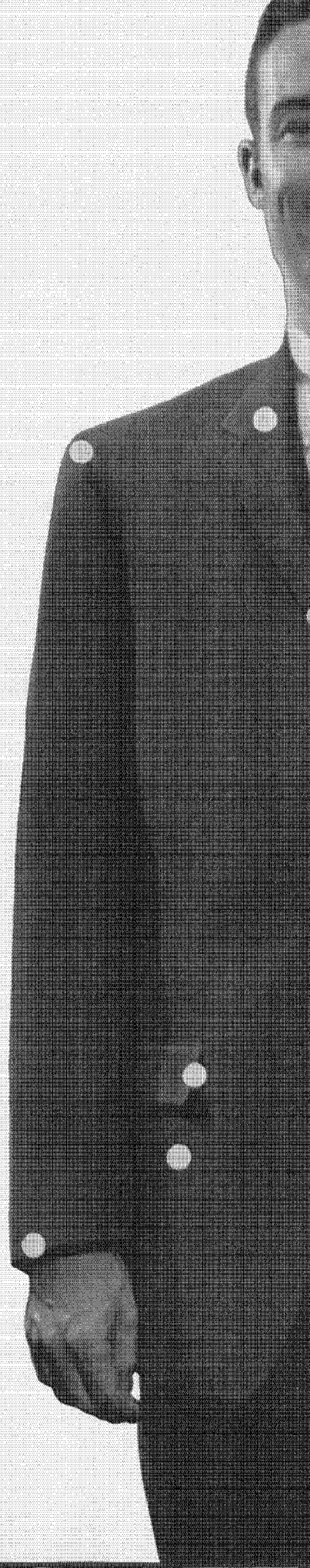
Men's and women's wear will be available next spring in machine washable fabrics that can be put through automatic washing and drying machines and then worn. It was announced yesterday by E. I. du Pont de Nemours & Co.

'Automatic Wash, Wear' For Women Introduced Wash-Wear Fashion Plan Set by Du Pont

A new era in women's apparel fashions was ushered in yesterday by E. I. du Pont de Nemours & Co. at a demonstration of tailored suits, dresses and sportswear that can be put through a home washer and dryer and emerge as if freshly pressed.

In this construction, stitching, trim and other findings are used that withstand the rigorous mechanical action of home washing and tumble drying. Dress, sportswear, and suit fabrics in plain, patterned and tubby stylings, as well as chambray and poplin, all containing high percentages

By MARVIN KLAPPER
Automatic wash and wear, a concept that describes garments that may be worn, washed, and dried in a modern home tumble dryer to a smooth, wrinkle-free finish.



just require more time to go through the dryer without requiring touch-up pressing; it isn't built that way.

Automatic wash-and-wear is tagged or labeled so you can spot it easily. Laundry instructions usually are included, since following them carefully is of prime importance. The garments go through the full cycle of an automatic washer, using warm (about 100°F.) water. Most tumble dryers have a low temperature setting (140° to 160°F.) suitable for synthetic fibers. In newer dryers, use "wash-and-wear" setting, run complete cycle and remove garment immediately. For many older dryers, use "low" or "medium" setting, run about 25 minutes, remove immediately and let cool on a hanger at room temperature.

Incidentally, even if washing isn't called for, the dryer can be used to renew freshness by removing wrinkles. Automatic garments also can be washed by hand and drip dried, or dry cleaned, if you prefer.

FROM LABORATORY TO LAUNDRY

Automatic wash-and-wear owes its beginning to studies by Du Pont's Textile Fibers research men. It was well known that wrinkles in fabrics of "Dacron", "Orlon" and nylon could be erased with moderate heat. Why not capitalize on this, the researchers asked themselves. They set out to study, under various washing and drying temperatures, the behavior of Du Pont fibers alone and in blends. Their report, which proposed a radically new method of "pressing" clothes in an automatic dryer, was presented early in 1956.

From there the story spills out in all directions, as necessary technical advances were ticked off.

Could existing laundry equipment handle automatic suits? An industry count showed that half of the dryer models then being made could be set in the 160°F. range required. Washer and dryer manufacturers reacted eagerly when the new concept was explained to them. Thirteen brands of 1958 washing machines are equipped to handle automatic wash-and-wear, and dryers from at least nine manufacturers have simple one-step controls for it.

High percentages of "Orlon" and "Dacron" were necessary in blended fabrics, but just how high? Du Pont tested fabrics and, in time, could suggest to the industry such "minimum blends" as these for specific fabrics: 65 per cent "Dacron" with cotton; 55 per cent "Dacron" with rayon; 50 per cent "Dacron" with "Orlon"; 70 per cent "Orlon" with rayon; 70 per cent "Orlon" with wool; 80 per cent "Orlon" with cotton in knits.

Such a seemingly simple thing as sewing thread threatened to prove a stumbling block. Besides being exceptionally strong, the thread used in automatic garments had to be dimensionally stable, or its shrinkage would cause seam puckering.

Both "Dacron" and nylon had these qualities, but they handled differently than natural fiber threads. These differences led to the creation of new sewing techniques—among them a more precise method of loosening thread tensions, use of the smallest needles possible, a reduction in the number of stitches and lightened foot pressure on the presser.

Came the day when Textile Fibers merchandising men felt ready to introduce the automatic concept to a suit manufacturer. Haspel Brothers of New Orleans, a firm already experienced with regular wash-and-wear, agreed to give the idea a try.

Working together, Haspel and Du Pont men made up



Man's suit is 50% "Dacron"/50% "Orlon" in gray glen plaid. Dress is pin check, 65% "Dacron" with rayon,

several garments using techniques and components that looked most promising. These suits went on trial in household washers and dryers. Zippers with nylon tapes were substituted when conventional ones puckered; frayed lining fabrics were replaced with a special nylon taffeta; seams were protected by overlocking.

The first commercial automatic wash-and-wear suits, a blend of 65 per cent "Dacron", 25 per cent rayon and 10 per cent mohair, reached stores in April 1957. Hailed at first as a novelty, they quickly proved themselves a solid fashion success. Late last fall when Haspel and Du Pont checked with 1,500 owners, they found nearly all of them enthusiastic. A total of 46 per cent said they "definitely" would buy another such suit and 47 per cent more said they "probably" would. Fifty-seven per cent of the men had washed their suits and 94 per cent of these were satisfied with results.

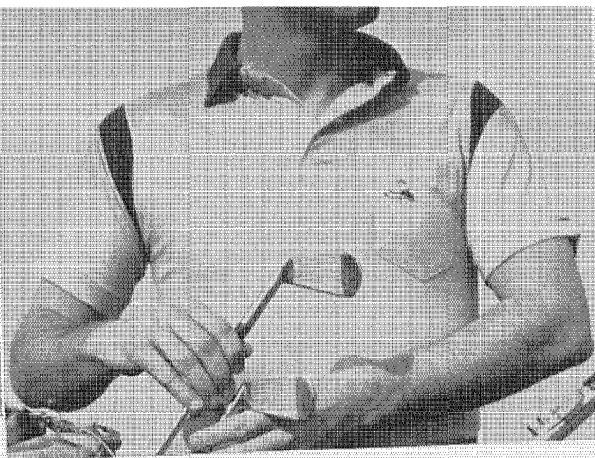
This spring men will have a choice of automatic suits from 14 manufacturers and slacks from 16. Fabrics come

Like all other fashions shown, this raincoat is automatic wash-and-wear. It's 65% "Dacron" with cotton.





Lightweight but warm golf jacket is 100% nylon taffeta with knitted collar and cuffs.



Knitted sport shirts of 80% "Orlon" with cotton, offered by six makers, won't shrink in the dryer.



in plain, patterned and nubby stylings and in a variety of colors. Nine makers of boys' apparel are offering suits, slacks, jackets and knitted sport shirts.

In women's wear, at least seven manufacturers are offering garments that properly can be called automatic. Du Pont technical service men again have been on the road to help make the necessary manufacturing switches. American Jr. Suits, for instance, adjusted matter-of-factly to such things as synthetic thread and nylon shoulder padding and linings. But the company found, too, that patterns had to be altered, and cutting, sewing and pressing techniques modified. For the manufacturer, then, automatic wash-and-wear means changes as radical as those that affect the buyer.

With two million items of automatic men's wear alone promised for 1958, it's evident that the idea has captured the imagination of the fashion industry. This, of course, is just the beginning. It seems likely that your future wardrobe will be largely an automatic one.

Fisherman pants and easy-cut pullover top are firm poplin of 65% "Dacron" with cotton.



Lightweight suit in slubbed fabric of 50% "Dacron" with "Orlon" keeps its neat look.

For youngsters: an automatic dress of "Dacron" and rayon, and a tropical suit of "Dacron", rayon, mohair.



Slacks are 50% "Dacron"/50% "Orlon", a blend noted for good over-all performance.



Sleeveless dress and jacket of "Dacron" and rayon comes in blue, navy and beige.

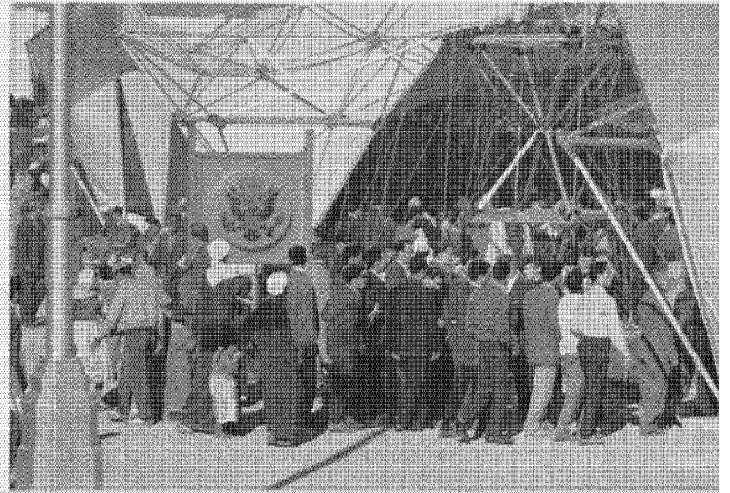


SELLING TH

Things Americans take for granted—the myriad prod



A nylon dome and a solar water heater utilizing "Mylar" polyester film were features of Salonika fair. Du Pont's "Magic Barrel" also was shown.



Turks visiting U. S. pavilion at Izmir fair looked over 250 tons of machinery depicting American industrial and agricultural progress.

"Supermarket U.S.A." was a big hit at Zagreb fair last year. Entire market was purchased by the Yugoslavs and set up in Belgrade.



Multitude of everyday American products impressed Poles at Poznan, showed advantages of free industry.

WORLD ON UNCLE SAM

By GEORGE REYNOLDS

our free industry—enchant the thousands of ordinary people who throng to international trade fairs

By late afternoon last June 9 the crowd milling around a big nylon and aluminum dome in Poznan, Poland, had boiled into a near-riot. Special policemen stood by to keep order. Still the eager Poles pressed forward.

Thousands of them entered the dome to see and feel the wonders they'd been told were the lot of the American workman—"wonders" like frozen food and home freezers, new cars and mail order catalogs, toasters and TV sets.

In international trade fairs like the one at Poznan, the United States has found an ideal arena in which to compete for men's minds. Having proved their worth, trade fairs will be on Uncle Sam's agenda again this month as the 1958 fair season opens in Lyon, Milan, Osaka, Casablanca and Hannover.

People in those cities will be seeing typical products of American industry—things most of us accept without a second thought. The very ordinariness of the displays is a key to the success of the U. S. approach.

When the American pavilion opened last fall at Zagreb, Yugoslavia, for instance, the main attraction was a full-scale, fully stocked supermarket. A staff of local citizens "shopped" in it continuously, checking out bags of groceries that were given to every 100th visitor. Enthusiasm ran so high, in fact, that the Americans had to quit giving away the food parcels. At fair's end the entire market was sold to businessmen who set it up in Belgrade.

While the supermarket drew throngs in Zagreb, a Turkish mother and her two begrimed young sons joined the crowd watching a laundromat in action in the American pavilion at the Izmir Trade Fair. Soon the lads were led into a back room; out came their dirty shorts and shirts. Minutes later the boys were back in clean clothing that was still warm from the automatic dryer. The watchers, most of them brought up on pump-and-bucket laundering, gaped in fascination. The idea was getting across: in Turkey, too, many might have these things some day.

So went scene after scene last year in Italy, Japan, Morocco, France, Spain, Sweden, Greece, Austria and Tunisia. There were variations to suit the particular people who watched, of course, but the basic theme remained the same: Show them how we live.

American participation in world trade fairs is a joint effort of the Government and hundreds of private businesses of all sizes. It's designed to counteract the advances Russia and her satellites made by concentrating on the fairs, almost unchallenged by the free world, during the immediate postwar years. The growing threat was recognized in 1954, and President Eisenhower drew on an emergency fund to set up the Office of International Trade Fairs in the Department of Commerce.

Industry pitched in with gusto at the Government's suggestion, augmenting OITF's efforts. Some 3,200 companies, Du Pont among them, have contributed products, built exhibits and sent technical personnel to the fairs. In the process they've made thousands of foreign trade contacts while spreading good will for Uncle Sam.

More than 40 million people have streamed through the American pavilions. Each group has seen a show specifically tailored to its locale. Italians, perennially short of meat, saw animals fattened beyond belief with the help of American feed supplements; agricultural peoples watched gleaming farm machinery at work; technically-minded Swedes saw automation in action in a scale model of a Du Pont chemical plant.

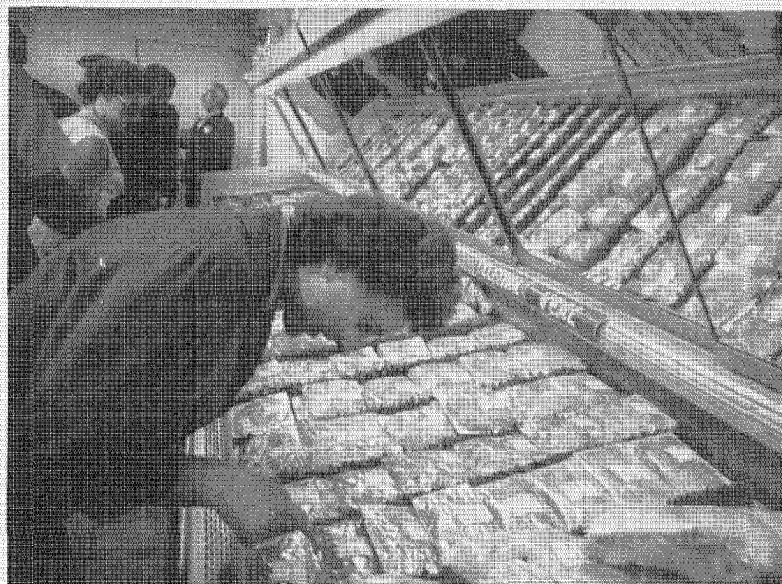
Everywhere people fingered such appliances as mixers and fryers in awe. They saw radio and television sets, and clothing made of synthetic fibers that held its shape and color in water or sun. Such products sometimes are made nearby, as will be illustrated at Milan this year by Italian-made sweaters of "Orlon" acrylic fiber.

Almost any modern American product can be counted on to thrill the fairgoers. Vending machines and juke boxes, electric water fountains and toys draw fans by the hundreds. Usually, too, there are special scientific and technological exhibits such as Du Pont's "Magic Barrel" of petroleum chemistry, showcase for the latest petrochemical products, and General Electric's "House of Magic."

"In a nutshell," says Henry Kearns, Assistant Secretary of Commerce for international affairs, "we believe products of free industries are the best salesmen for the free enterprise economy."

Consistently the American displays outdraw Russian exhibits, which usually lean to heavy machinery, complex equipment and argumentative ideology. The peaceful articles shown by the Americans weaken claims that U. S. production is devoted largely to war material.

When skepticism arises, as it did last year in Poland



Yugoslav "shopper" in supermarket exhibit gazes at meats prepackaged in clear cellophane. Asked one: "Why can't we package meats this way?"

and Yugoslavia, the American program scores its strongest point. "Rich man's show," claimed the Red press. "Luxuries for the few."

People came by the thousand, anyway, and the charges simply didn't stick, recalls Paul Medalie, who managed both fairs for OITF. The bewildering array of goods made it obvious to the fairgoers that these things had been mass-produced for millions.

"But can the American workman really buy them?"

a reporter asked when Medalie called a press conference. "Can I buy them?"

For that question, Medalie had lain in wait; here's where the trade fair system is a natural.

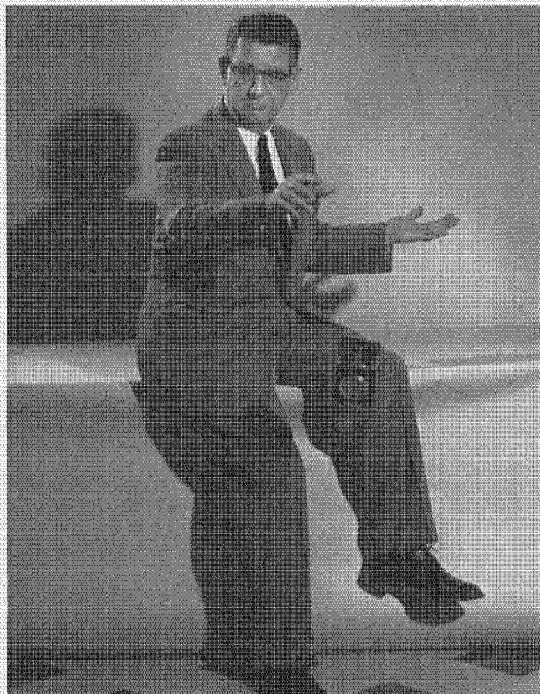
"Yes," said Medalie, "American workers can and do buy them. And so can you. What's more, American manufacturers are willing and eager to sell you five—or a thousand. And they can ship them within weeks."

A man simply can't argue with an offer like that.

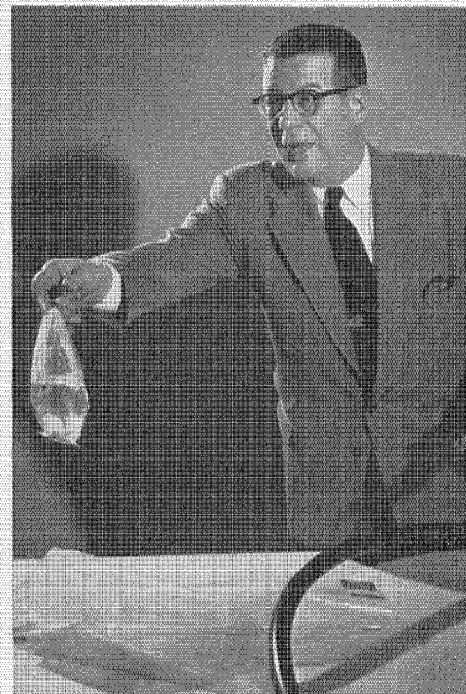
"The Wonder World of Chemistry," Du Pont's new show designed for trade fairs, opens this month. Here are some highlights:



"What a beating this thin sheet of 'Mylar' will take! It makes a fine packaging film."



"Don't worry, it won't break. The case is nylon, and silicon transistors replace tubes."



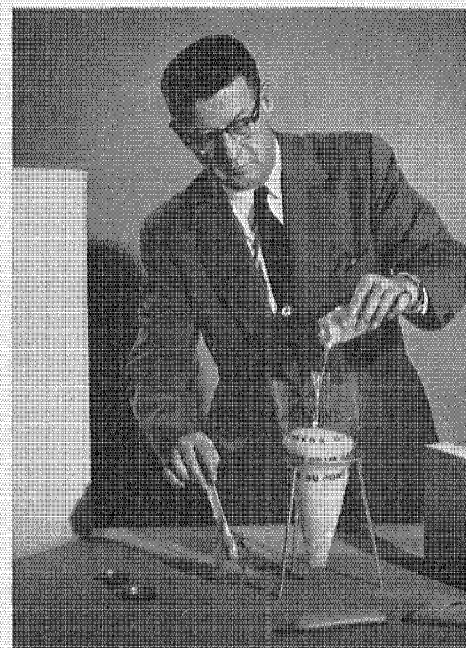
"Polyethylene has many uses. One is packaging, like this fish 'bowl.' Here, eat



"The crease stays in these wet slacks. Synthetic fibers make care of clothing easier."



"Safe 'Freon' refrigerant froze this flower; other types power aerosols and blow horns."



"Now this is urethane foam. Many are popping up for this chemical wonder."

Sales hit peak, earnings don't

That, in brief, describes Du Pont's business in 1957.

*Here's a year-end summary based on the
company's annual report to stockholders*

IN 1957

		1956	1955
Du Pont had sales of	\$1,985	\$1,888	\$1,909
... earned	397	383	432
... had a tax bill of	307	285	345
... paid in dividends	306	306	329
... spent for new and improved plants	220	157	119
... spent on research and development	60	77	66

(MILLIONS OF DOLLARS)

Last year was a good one for the Du Pont Company despite a slow-down in business activity during the final quarter. Sales set a new record, although earnings weren't as high as in 1955 (see table). Dividends paid on the common stock, \$6.50 a share, were the same as in 1956.

More money than in any other single year—\$220 million—was spent on new production facilities. A nylon yarn plant opened at Richmond, Va., in early 1958, and production of sulfuric acid was begun in a new unit at Ecorse, Mich. Six other plants under construction will enable the company to begin manufacture of a new plastic, "Delrin" acetal resin, and to increase production of pure silicon, "Orlon" acrylic fiber, cellophane, "Ti-Pure" titanium dioxide pigments and dimethyl terephthalate, a chemical used in making polyester products.

Building was going on overseas, too, as Du Pont subsidiaries stepped up efforts to serve foreign markets. A neoprene plant is being constructed near Londonderry, Northern Ireland, and a finishes plant is going up in Cuba. The manufacture of paint in Venezuela and "Freon" fluorinated hydrocarbons in Brazil also got under way during the year.

IN THE LABORATORY

Approximately 2,200 scientists at more than 30 locations were engaged in research and development during 1957. This activity cost the company

\$80 million. These were funds exclusive of those used for laboratory construction and technical assistance to manufacturing and sales.

An important part of Du Pont's scientific program—the fundamental research carried on without any specific commercial objective—is marking its 30th anniversary. These investigations add to knowledge in fields of interest to Du Pont and lay the basis for discovery of new processes and products. In 1957 this portion of the research program cost \$15 million and occupied the efforts of 400 company scientists.

GENERAL MOTORS CASE

Du Pont, the Supreme Court ruled last June, violated the Clayton Act by its investment in General Motors. The investment was large enough, the Court said, to create a "reasonable probability" that Du Pont would receive preference in supplying the auto company with the fabrics and finishes used in General Motors products.

The Court also found "that all concerned in high executive posts in the two companies acted honorably and fairly, each in the honest conviction that his actions were in the best interests of his own company, without any design

to overreach anyone, including Du Pont's competitors."

The Supreme Court then returned the case to the District Court in Chicago "for a determination after further hearing of the equitable relief necessary in the public interest."

At the present time Du Pont owns 63 million shares of General Motors common stock, approximately 23 per cent of the total outstanding.

"The outcome of this litigation," said Judge Walter J. LaBuy of the District Court, "could have far-reaching consequences affecting the market and the value of Du Pont and General Motors securities in the hands of many, many thousands of investors." Accordingly, the judge appointed two lawyers as *amici curiae* ("friends of the court") to watch over the interests of the stockholders of the two corporations.

In October Government attorneys submitted a proposal that would require Du Pont to dispose of its entire interest in General Motors over a ten-year period. Judge LaBuy, on motion of the *amici curiae*, directed that a ruling be obtained from the Commissioner of Internal Revenue to determine the tax consequences of the Government's plan for divestiture. After the tax ruling is

In '57 a record \$220 million went to

*Du Pont "Teflon" and hyperpure silicon
—both on the expansion list—are in orbit*

Two of the products for which Du Pont is increasing output are riding in the Army's Explorer I satellite. While the Explorer's batteries held out, they helped it radio information back to scientists on earth.

A "Teflon" TFE-fluorocarbon resin is in the tiny microphone that picked up the whispered impact of microscopic meteorites as they collided with the satellite, and the company's hyperpure silicon is used in transistors that helped send coded data to the ground.

The ultrasonic microphone and its attached amplifier were built for the Air Force by a team of physicists at Temple University. Dr. J. Lloyd Bohn, who headed the group, calls the device a micrometeorite impact detector. It weighs less than two ounces, he said, and is a miniaturized descendant of a 25-pound piece of equipment he developed in 1950. The latter was sent up in V-2 rockets to get the same sort of information Explorer collected at a greater distance from the earth.

The microphone crystal is mounted inside two ring-shaped pieces made of a "Teflon" resin that cushion it against shock. The assembly nestles against the inner skin of the satellite. The mike is sensitive enough to pick up the sound of a micrometeorite striking anywhere on the Explorer's surface.

"Teflon" is used for its heat resistance, Dr. Bohn explained. The mikes must pass muster at more than 300°F., since the satellite is exposed to the direct rays of the sun. Miniature coaxial cable in the device is insulated



with a "Teflon" resin for the same reason, he explained.

Micrometeorites—bits of matter ranging in size from the smallest grain of sand down to particles only four hundred-thousandths of an inch in diameter—interest scientists as a possible source of radio interference. They come winging in toward the earth at a speed of 45 miles a second, or 162,000 miles an hour.

The number of such particles that hit the satellite, plus data on temperature and cosmic radiation, has been radioed back to earth from the Explorer. Silicon transistors used in the telemetering circuit are made by the Raytheon Manufacturing Co. Silicon rather than ger-

received from the Commissioner—it had not been handed down as we went to press—Du Pont and the other defendants will have ten days in which to submit to the District Court their own plans for compliance with the Court ruling and their comments on the Government proposal.

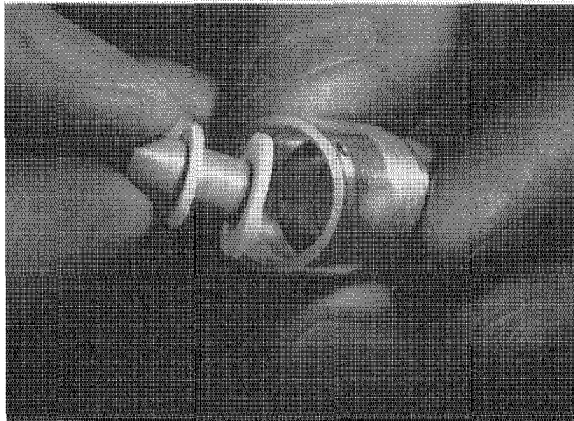
BRIEFS

Only 5 per cent of Du Pont's 1957 sales were made directly to ultimate consumers. The remainder went to companies that use these products in their own manufacturing processes.

Du Pont employees numbered 89,319 at year-end. Their safety record, as measured by the frequency rate for disabling injuries, was .35 (about a third of a disabling accident for every million man-hours worked). This compares with the latest available rates of 3.38 for the chemical industry as a whole and 6.38 for all industry.

There were 200,880 owners of Du Pont stock at the end of 1957, up from 168,675 a year earlier. Most of the increase is due to the new employee-stockholders created by Du Pont's Thrift Plan. Under the plan employees buy U. S. Savings Bonds and are given a 25 per cent "incentive reward" which is invested in the company's common stock.

expand production



v. Bohn, in picture at left, holds micrometeorite detector. Weighing less than two ounces, it's a miniaturized version of equipment in right foreground. Above is the heart of the detector, the microphone crystal with its rings of "Teflon".

manium is used, reports Raytheon, because it "performs more uniformly at the temperatures for which the satellite equipment was designed."

Hyperpure silicon, made first by Du Pont during World War II for radar equipment, is finding wide application in semiconductor devices. A new plant capable of turning out 70,000 pounds a year is being completed by the company at Brevard, N. C.

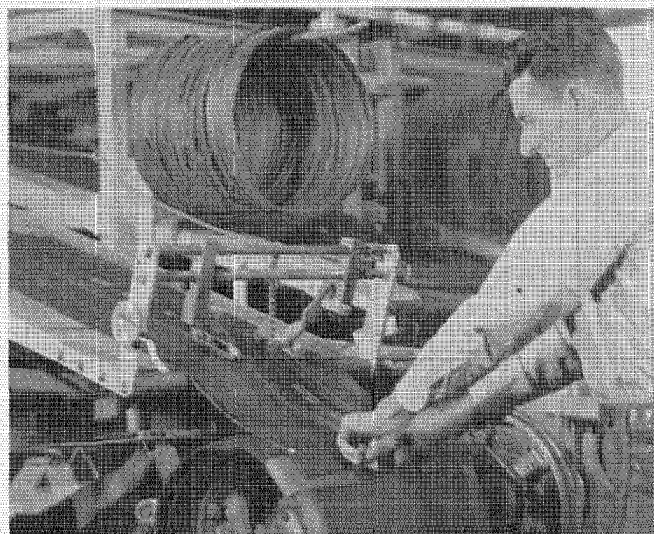
Company increased capacity for nylon yarn, shown in tire cord, with opening of the Richmond plant.



"Ti-Pure" titanium dioxide pigments whiten floor tile. They are among 16 products for which Du Pont is expanding output.



Cellophane is on expansion list, too. New plant at Tecumseh, Kan. will begin manufacture of the transparent film later this year.



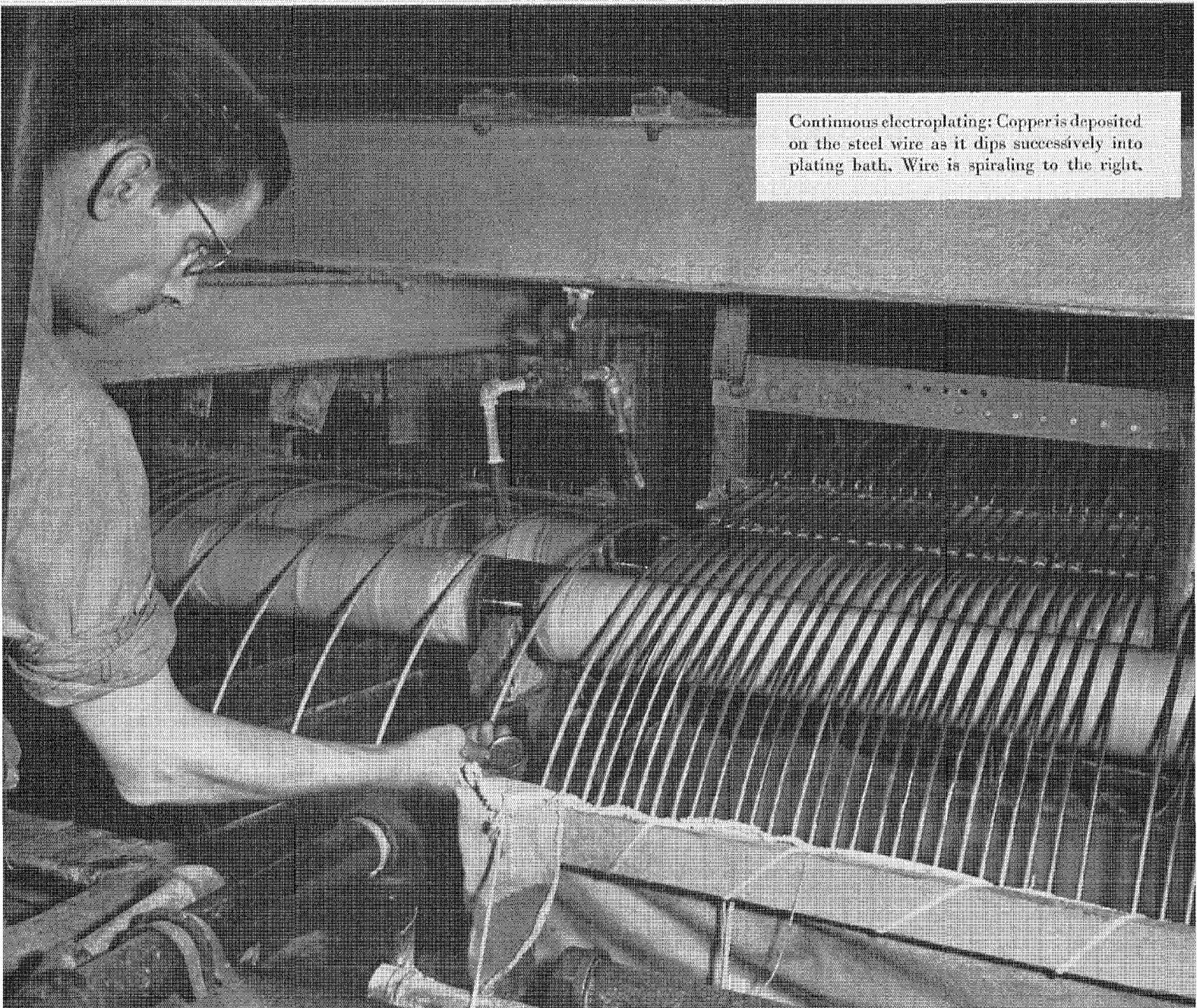
It grows as it goes

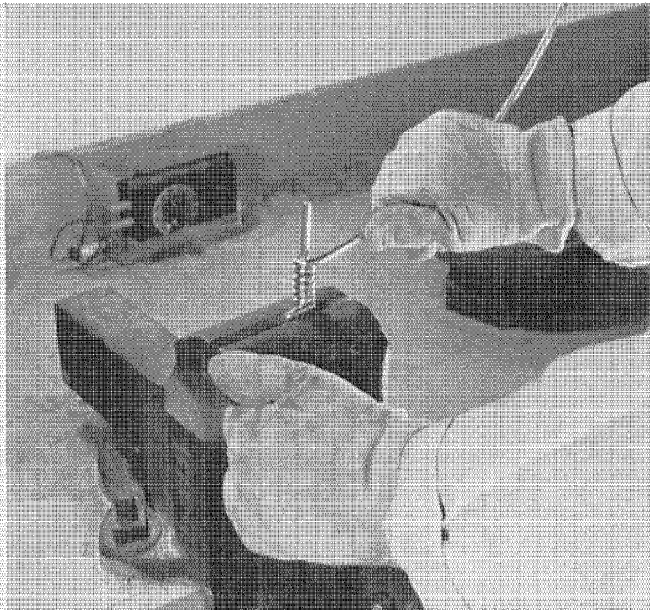
*... is probably the best way to describe
this wire maker's new continuous
technique for copperplating steel wire*

"Here, take this length of copper-coated wire and try to mangle it," research director O. E. Adler tells visitors at National-Standard Co., Niles, Mich. "Twist, bend or flatten it. Wrap the wire around itself. You won't hurt it."

He's right. The copper clings to the steel without a hint of separation. Because the copper atoms are laid down electrolytically, the bond between the two metals is as good as a weld. Using its new machine and Du Pont's copper-plating solutions, National-Standard has been the first to

Continuous electroplating: Copper is deposited on the steel wire as it dips successively into plating bath. Wire is spiraling to the right.





Electroplated wire is bent severely without rupturing tight copper-to-steel bond. It is as good as a weld.

produce continuous lengths of heavily coated copper-on-steel wire by electroplating.

For years the only other method of making this type of wire has been by mechanically casting copper on a steel core and then drawing it into wire. Electroplating, Adler explains, gives a more uniform copper thickness. Actually, he says, the variation is less than one per cent. Equally important is the leeway the manufacturer has in choosing the steel core—from annealed low carbon to hard-drawn high carbon steel.

National-Standard's experience with copper dates back to 1906, when the company came into existence as a producer of stranded copper lightning conductor cable. Since then it has made many specialty copperplated wires. The present process is an extension of this activity.

Several years ago the company introduced a lightly coated copperplated steel wire for use as television antenna lead-in wires, tinsel, jewelry chain and building tie wire. Then, with the nation's communications industry burgeoning, National-Standard concentrated on developing heavier coatings to meet such special needs as precise copper concentricity and wire strengths up to a quarter-million pounds per square inch.

The company started experimenting with an electroplating machine originally developed by Herbert Kenmore and Walter J. Manson in New Jersey. Later National-Standard called in Du Pont electroplating specialists, who spent weeks at the Niles plant tailoring Du Pont's copperplating solutions to fit the new machine.

TRY, TRY, TRY AGAIN

"Plating baths can't be predicted for all situations, especially new ones," plating specialist Bill Huey of Du Pont relates. "We had to make a lot of trial runs before we got the plating solutions just right." Minor variations in the amounts of organic and inorganic addition agents, for example, influence plating speeds, copper smoothness and brightness.

Today the process looks easy. Steel wire in a precise helix enters the 60-foot-long machine and comes coiling

out completely electroplated at the other end—continuously and automatically.

Each pass the wire makes through the plating solutions within the machine adds more copper until finally as much as 37 per cent by weight is added. More than a mile of wire is in the machine at one time. Once the plating is complete, the wire is drawn to standard sizes ranging from .040 inch to .310 inch in diameter.

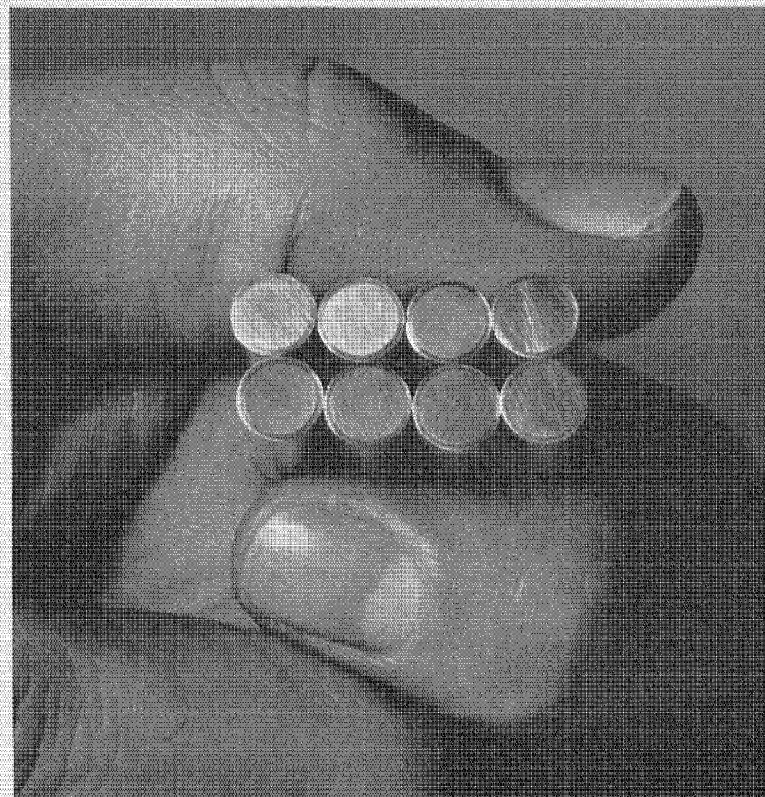
Copper and steel are teamed up to complement each other's best properties. Alone, copper wire resists corrosion and is a superior electrical conductor, but it isn't strong enough to support itself properly in many applications. Steel, on the other hand, is strong but has discouraging rust resistance and electrical properties.

As an example of how the two metals get along as teammates, take power lines. Adler reports that the new copper-coated steel wire "is strong enough to be supported on one-third fewer poles and yet does its electrical chores just as efficiently as would the same amount of copper in a solid wire."

The coated wire also will support an extra heavy coat of insulation so that telephone and telegraph lines can be run through tree branches, thus eliminating much tree trimming. In such nonelectrical applications as guying and fencing, the uniform copper coat protects the steel against corrosion and extends its life many times.

National-Standard now has several continuous copperplating machines in operation at its Niles plant. It plans to add more as demand grows for electroplated wire with 15 to 40 per cent of the electrical conductivity of solid copper wire. The Niles firm also has licensed a St. Louis ground rod manufacturer, who is producing coatings of 20 to 25 per cent conductivity on heavy steel wire.

Big advantage of electroplating is the uniformity it makes possible. Thickness of copper coating varies less than one per cent.



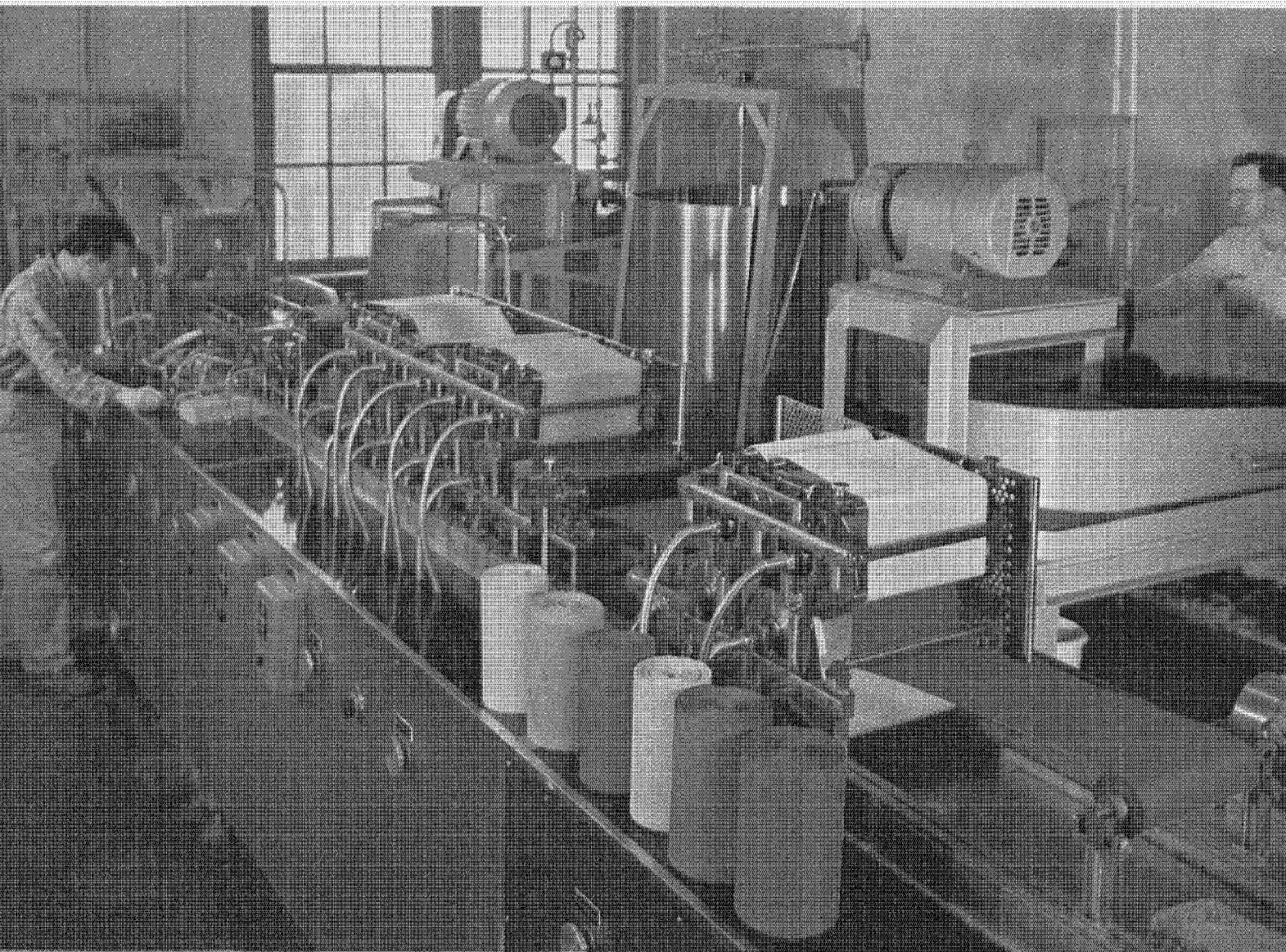


Du Pont "color detective" matches shade sent by a customer, who wants to know what dye formulation he needs to make it. This typifies lab's services.

New push

Du Pont's miniature papermaking machine, t

Dyes and Chemicals



Just as the big ones do, this miniature Fourdrinier turns out mill-quality paper in a technical lab of Du Pont's Dyes and Chemicals Division. Rolls in foreground are for dye sample books.

on paper work

First of its kind ever made, turns out mill-quality products in the laboratory. Together with the

Division's new paper sales section, it means a step-up in company services to the paper industry

"This is not a toy," technical men in DuPont's Dyes and Chemicals Division emphasized last year in announcing acquisition of a miniature papermaking machine.

No one who has seen the pilot-scale Fourdrinier in action has found reason to question its status. A few seconds after watery pulp starts flowing through it, a dry ribbon of paper 8½ inches wide winds briskly out the other end. The paper has traveled 18 feet instead of the nearly 500 it would on a big Fourdrinier, but it's similar in quality to the mill product.

There's this to be said for the toy idea, though. The DuPont men who work with the machine—and the visitors from other companies who come to watch it—are as intrigued as kids at Christmas.

"Now, for the first time, we can take on mill problems without actually going into a mill," explained Joe Gessner, paper lab supervisor. He pointed to a nearby technician. "She's making a hand sheet about seven inches square. It's plenty big enough for the shade-matching she's doing, but it isn't adequate for testing every dye formulation or a new paper chemical. For that sort of thing, we once had to go into a customer's plant. Now we simply put the new machine to work on it."

The vest pocket Fourdrinier's first major project, just completed, was making the sample books that illustrate all of the dyes DuPont offers to the paper industry.

"These make it possible for our paper customers to tell at a glance exactly what DuPont dyes they need to obtain a certain shade," explained Heinz Lips, manager of the Division's newly established paper sales section.

Along with the papermaking machine, the creation of the new sales section testifies to the expanded service Dyes and Chemicals is now offering the paper industry.

The machine already has had a part in several research projects. For one thing, it aided in the development of DuPont's new "Zoron" WS wet strength resin by providing data on the best concentrations to use and the curing time required. Such information ordinarily would have been gained in lengthy and costlier mill trials. Current research centers on more economical ways of coloring paper.

Here's how the laboratory machine is helping customers. A maker of station wagons uses colorful material woven of latex-treated twisted paper for the headliner in his vehicles. For the last several years, DuPont has

helped the paper manufacturer by making up small paper samples dyed to match paint colors to be used on the wagons. On the basis of DuPont dye formulas, the paper manufacturer then made up larger samples for the converter to twist and coat.

Last spring, when it was time to plan colors for the 1958 wagons, DuPont ran samples on the then brand-new machine, producing rolls several hundred feet long. As a result, the paper manufacturer saved several thousand dollars by not tying up his mill on the project. Moreover, the precise formulas developed on the small machine meant that fewer adjustments were necessary when the actual mill runs began.

Meanwhile, the more traditional customer service work, which bulks large in the paper lab's responsibilities, goes on much as it always has.

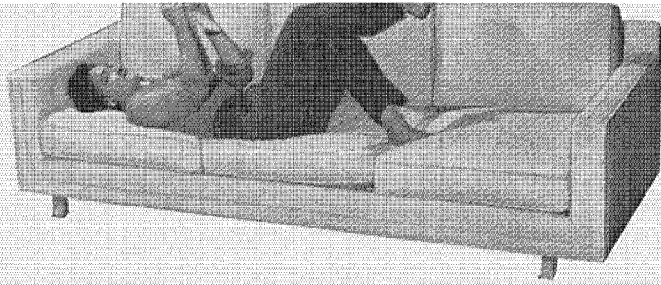
NO INSULT INTENDED

"You're too green and too dull," a supervisor told a girl technician. Instead of taking offense or dissolving in tears, she calmly returned to her work on shade matching. In a few minutes she was back with another paper sample that was a precise match for one a customer had supplied.

"A lot of our work is of this type," Joe Gessner commented. "A customer will send in a sample—maybe only a scrap of paper or cloth—and ask us for dye formulations that will duplicate it. Service has to be fast because paper mills need the information for bidding on contracts. We ordinarily send an answer off within 48 hours—and we can do it faster in an emergency.

"It helps a lot if we know what the dyed paper will be used for," he went on. "Then we know whether the dye to recommend must be bleed-fast—for shopping bags, perhaps—or light-fast. Sometimes, though, we'll just get a request for something like 'grass green.' Then we try to offer a range of several shades, all with a good balance of properties."

Shade-matching requests continue to be the backbone of the paper lab's work. But the miniature papermaking machine means that the laboratory force can offer better service on special projects. With colored paper of all sorts gaining in popularity and with unusual paper products calling for improved chemicals, it's safe to say that there'll be plenty of such projects for the little giant to tackle.



1. For furniture with a soft touch, manufacturers are turning to "Dacron" fiberfill for cushioning

Now "Dacron" polyester fiberfill is giving furniture the same soft touch it bestowed earlier on pillows and comforters.

More than a dozen manufacturers—among them Baker, Tomlinson, Shaw Manufacturing, Sherman-Bertram and Widdicomb-Mueller—are using "Dacron" fiberfill now. Others are expected to introduce sofas and chairs containing the man-made fiber at the June furniture market.

Current models employ the cushioning material as a complete filler for back or seat cushions, or as a wrap-around for Marshall springs (innersprings) or foam rubber cores. It also works well in styling such things as tufted backs and special trim effects.

Public enthusiasm for "Dacron" fiberfill products previously on the market—pillows, comforters, sleeping bags and insulated underwear—will be repeated in the case of furniture, Du Pont Textile Fibers spokesmen predict. It's being eyed for many other cushioned products as well.

The unusual resiliency of "Dacron" polyester fiber, scientists explain, is the work of hexagonal benzene rings that give its long molecular chains a girder-like structure. These are stiffer than the single-strand chains of most other fibers. Once heat-set in a particular shape, "Dacron"

fiber resists change and strives to return to its original form when it's bent. Creases that remain sharp in wash-and-wear clothing are an example of this property.

To best bring out this quality of "Dacron" for cushioning, Du Pont laboratory men worked for months to find the right combination of size, crimp, finish and length of fiber. The result was "Dacron" fiberfill, which has some physical properties that differ from those of the parent fiber.

Its prime quality in furniture is simply this: It's comfortable to sit, lie or lean on. It firms up gradually when compressed, and distributes your weight evenly instead of concentrating it on "pressure points." It's much more resilient than natural fibers, can take more punishment and weighs less per cushion because of its lofty bulk.

Extra benefits for the housewife: "Dacron" fiberfill won't rot or mildew, isn't attacked by moths, can be washed, dries quickly and isn't harmed by cleaning solvents. It has no odor, is lint-free and nonallergenic. Finally, its resiliency keeps cushions plump and neat.

All of which is important to remember, of course, but the fundamental test obviously is this: sit on it yourself.



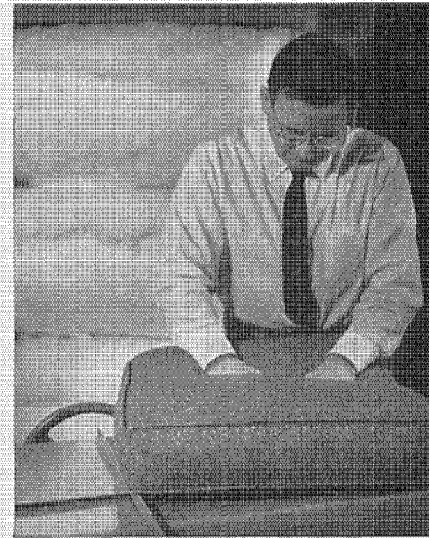
Enough "Dacron" fiberfill to stuff cushion of normal size weighs only four pounds.



Fibers are compressed here in hand-operated machine duplicating commercial process.



Compacted fibers, forced from enclosed tube, expand immediately in partly-sewn cover.



Finished cushion is plump and soft, displays excellent resiliency of "Dacron" fiber.

HOME FURNISHINGS FRONT

2. Now it's smart to be dull—for a carpet, that is. A new delustered nylon staple opens many styling possibilities for floor coverings

You can expect a wider choice of styles in nylon carpet within the next few months, thanks to a new delustered nylon staple developed by Du Pont.

The first commercial product containing the dull fiber is a nubby, deep-pile carpeting called Bountiful by its maker, Bigelow. It's made of a blended yarn containing the new Du Pont fiber and the company's conventional bright nylon. The blend takes attractive color tones that remain practical underfoot, according to this floor covering manufacturer.

Coming soon are other variations obtained by blending dull nylon with bright. Among the most promising are tone-on-tone tweed combinations. These can be achieved in a single dyeing operation because the dull and bright fibers soak up dyes at different rates. Use of a pure white accent yarn in carpets also becomes more practical, due to the improved soil resistance of delustered nylon.

Uniform light reflectance is another important advantage of blending dull nylon with regular nylon in constructions like Bigelow's Bountiful. Variations in reflected light are reduced and that "footprinted" look is avoided. By varying the blend of bright and dull nylon in carpet yarns, however, the rug designer can achieve whatever degree of shading he wishes.

Knowing the industry's interest, Du Pont several years ago began studying likely ways to make delustered carpet nylon. Last spring one approach appeared promising in the laboratory. Thorough evaluations of the new dull fiber on the three major carpet spinning systems followed. Next came weaving and tufting tests, with Du Pont technical service people following the process closely.

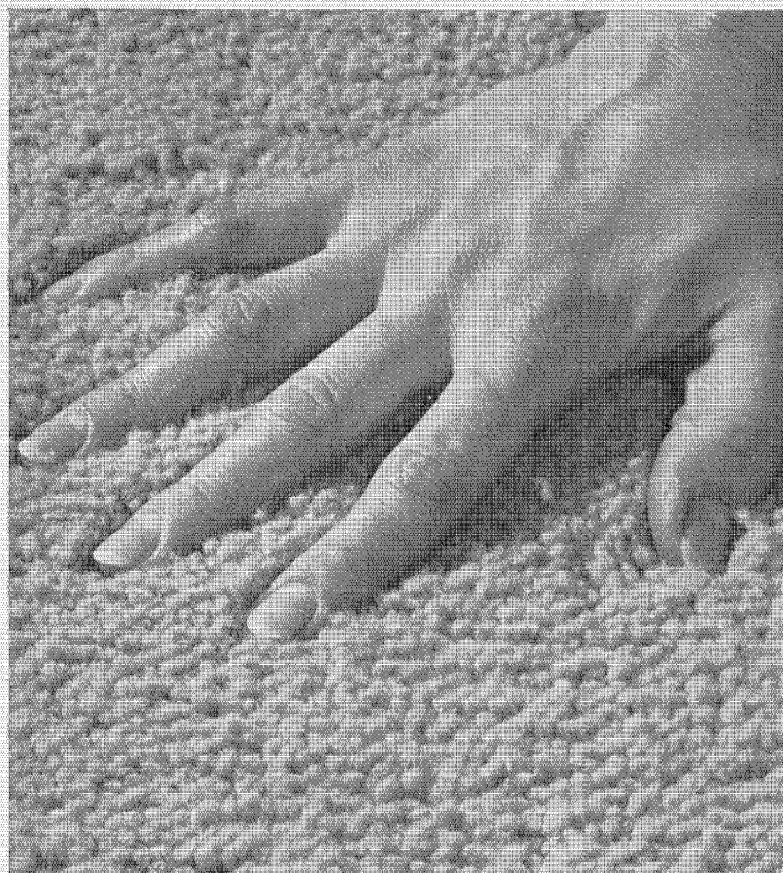
Of particular concern was the lightfastness of the dyed staple, since some earlier prospects had been deficient here. The new product proved equal to bright nylon in this important quality.

When they're placed in the same dye bath, dull and bright nylon compete with each other for the dye liquor. The bright always wins. By capitalizing on this predictable larceny, stylists found they could achieve attractive light-and-dark-toned effects in blends.

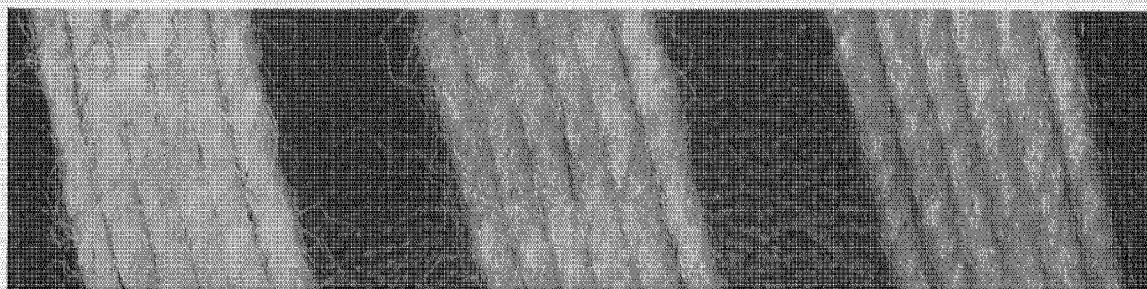
Meanwhile, the sample carpets were going through a series of laboratory and floor tests to check on such major

performance characteristics as crush recovery, soiling, cleanability and appearance change. One carpet spent two weeks in the corridor of a Du Pont plant where 100,000 feet tramped over it, a pounding equal to about four years' normal home use.

In all categories the delustered staple measured up to the high standards of Du Pont's bright yarn. First offered to carpet manufacturers last fall, the new fiber has lost no time in making its way to market.

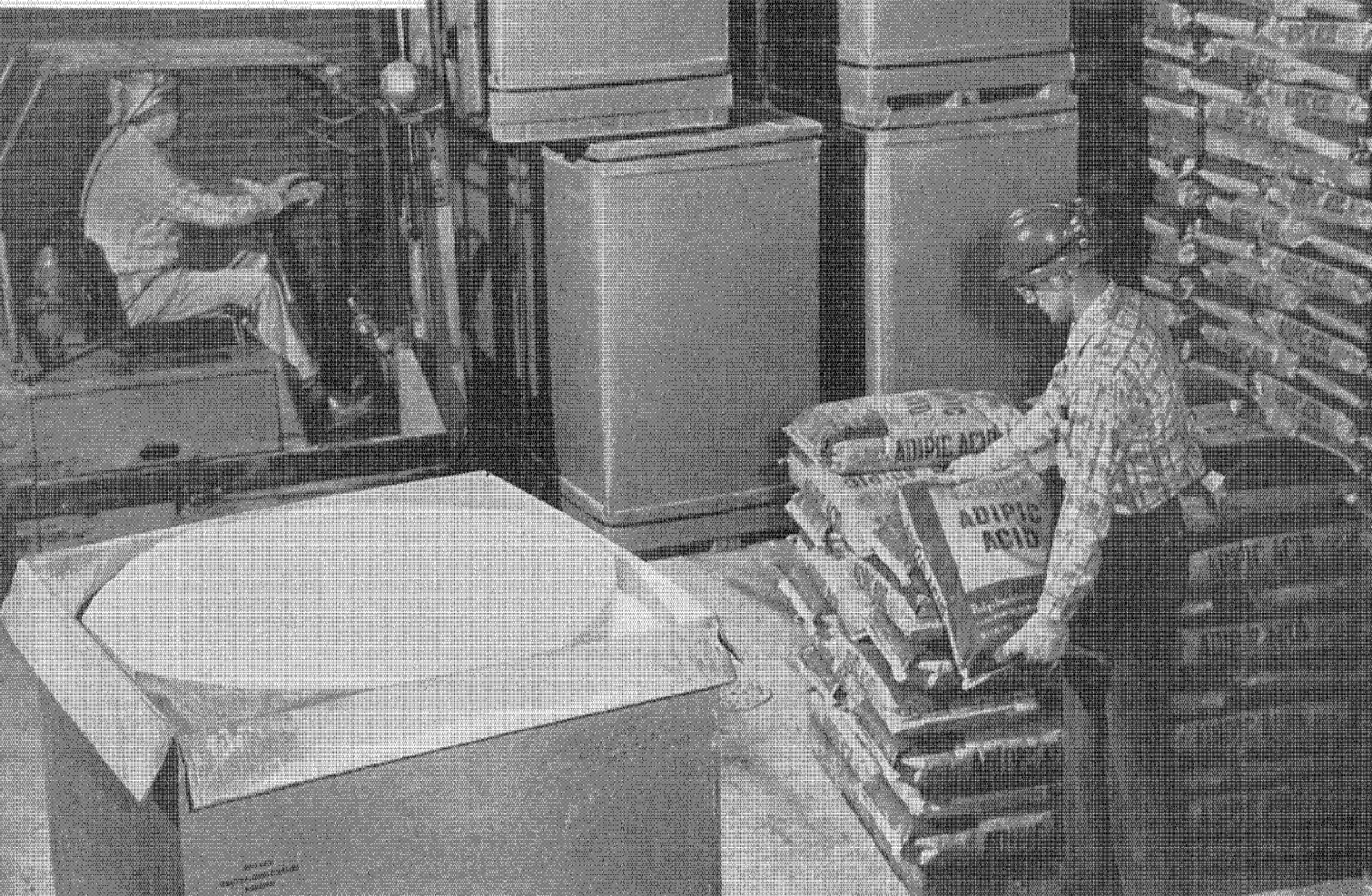


New dull-luster nylon carpet fiber, blended with conventional bright nylon, above, adds great variety to appearance of all-nylon carpets.



Dull-luster yarn is at left. Note highlights in the bright type, right. Blend of two, center, is one of many possible variations.

much as 40 bags, handles easily with fork lift. Top of new container, foreground, shows how cylinder is inserted.



PILLAR-PAC: customer-tailored container

Designed by Du Pont for adipic acid, it's so well suited for other bulk products that it's now on the open market

A customer's so right that even his unspoken wish often registers with his supplier. One such quiet need led Du Pont Polychemicals Dept. field men to urge a new disposable bulk package for major users of adipic acid.

That's half the story of the unique Pillar-Pac shipping container. The other half: a talented team of engineers who inserted a hollow round "peg" into a square hole to give packaging a new kind of backbone. Thus they coupled a cylinder's strength with the storage and handling efficiency of a four-sided box.

The Pillar-Pac now is being made under license by several container manufacturers and is available generally. The design principle has been patented by Du Pont.

Basically, Pillar-Pac is a corrugated box slightly less than three feet square and five feet tall. Inside the box is a cylinder of the same material, fitted so that it touches all four sides. Designed to hold a ton of adipic acid, it's equally well suited to shipping other dry solids. "Alathon" polyethylene resin, for instance, also is being shipped in it.

With both the cylinder and the corners around it filled, each Pillar-Pac replaces 40 fifty-pound bags. It's scaled to the dimensions of standard freight cars and is self-palletized for quick loading, unloading and stacking in storage with a fork-lift truck. One user of Du Pont adipic acid credits the Pillar-Pac with saving him \$30,000 annually in handling and storage costs.

Still other customer benefits: No elaborate equipment is necessary for emptying the new container. It can be re-used for another product, sold, cut into smaller packages or converted to such things as waste disposal containers.

A final note about adipic acid, the product that sparked the development of the Pillar-Pac: Besides its role as a nylon intermediate, it's now an ingredient of urethane foams, plasticizers, dyes, adhesives, laminating resins and other products, and is used in synthesizing salts, esters, amides, nitriles, diamines and ketones.

All of which explains why the Polychemicals Dept. wanted such a *big* container to hold it.

Garden chemicals short course

Presenting a four-page guide to the control of pests with Du Pont garden chemicals

In the last ten years even the plainest dirt gardeners have found themselves engaging in back fence conversation that smacks of a chemistry seminar.

"Methoxychlor really goes to town on bean beetles," one man may tell a neighbor. His friend, in turn, drops such names as malathion, chlordane, ferbam and maneb.

Despite these neighborly exchanges, many gardeners admit to grand confusion about which chemical works best against which pest. The list of possible controls runs into the thousands. To clarify the situation Du Pont this spring is offering a printed guide to users of its line of 28 garden chemicals. The technical information is beamed at the non-technical gardener—the digger with a green thumb but no Ph.D. in plant pathology.

Some of this material is condensed in this article. In addition, the labels on Du Pont garden products carry detailed how-to-use information.

Spray or dust? Many of the company's garden chemicals can be applied either way. Whichever method you use, the best advice is to act early. By the time you spot symptoms, many plant problems have progressed too far to be stopped. That's why it's simplest and safest to use products that control a whole range of pests.

The new Du Pont Garden Insecticide, for instance, is

a liquid combination of methoxychlor, a less toxic chemical relative of DDT, and malathion, an organic phosphate that fights most of the hard-to-kill insects.

You can apply it—and other materials as well—with the handy new Du Pont Garden Hose Sprayer, which has two interchangeable nozzles for fine or coarse spray, a special control valve and back siphonage protection.

Convenient to use, especially in small gardens, are Du Pont squeeze dusters—polyethylene containers that need only light finger pressure to spread dust uniformly. Rose Insecticide & Fungicide, Floral Dust, Tomato Dust, Vegetable Garden Dust and 6 per cent Chlordane Dust come this way. Each of the first four is compounded from a number of chemicals for all-out attacks. Rose Insecticide & Fungicide, for instance, contains methoxychlor, lindane, "Fermate" ferbam fungicide, sulfur and a miticide.

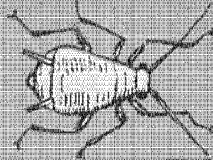
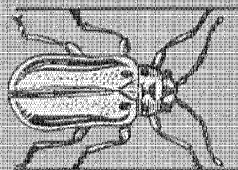
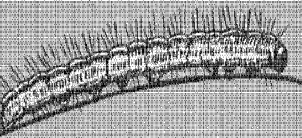
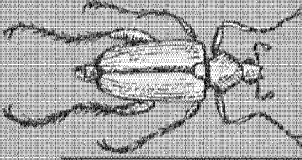
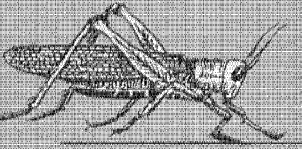
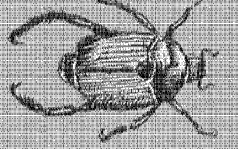
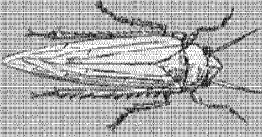
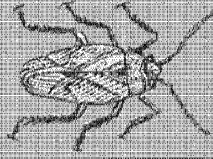
This shotgun approach to pest control—protecting plants simultaneously against a number of assailants—is considered the best method for the amateur gardener. It requires less close observation, takes less of his time and gives his growing things better protection against sneak attacks that can spell quick ruin.

The following three pages tell how to identify and control specific insects and plant diseases...



FLOWERS, SHRUBS AND TREES

DU PONT CHEMICAL CONTROLS

	APHIDS	Garden Insecticide Floral Dust Aphid & Mite Spray Rose Insecticide & Fungicide Rose Spray Duster
	ARMYWORMS	Rose Insecticide & Fungicide Rose Spray Duster 6% Chlordane 72% Chlordane
	ELM AND WILLOW BEETLES	Floral Dust 50% DDT Methoxychlor
	IRIS BORER	Floral Dust Methoxychlor 50% DDT
	TENT CATERPILLAR	Rose Insecticide & Fungicide Floral Dust Garden Insecticide Methoxychlor Rose Spray Duster
	ROSE CHAFER	Rose Insecticide & Fungicide Floral Dust Garden Insecticide Methoxychlor Rose Spray Duster
	GRASSHOPPERS	Rose Insecticide & Fungicide Rose Spray Duster 6% Chlordane 72% Chlordane
	JAPANESE BEETLE	Rose Insecticide & Fungicide Floral Dust Garden Insecticide Methoxychlor Rose Spray Duster
	LEAFHOPPERS	Rose Insecticide & Fungicide Floral Dust Garden Insecticide Methoxychlor Rose Spray Duster
	LYGUS BUG	Rose Insecticide & Fungicide Rose Spray Duster Garden Insecticide Methoxychlor
	CYCLAMEN MITE	Garden Insecticide Aphid & Mite Spray

SPIDER MITES

Rose Insecticide
Garden Insecticide
Rose Insecticide & Fungicide
Rose Spray Duster

SPITTLEBUGS

Garden Insecticide
Aphid & Mite Spray

THRIPS

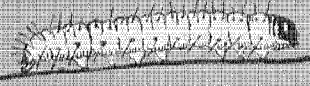
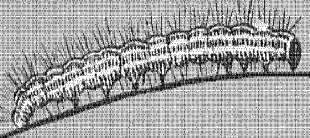
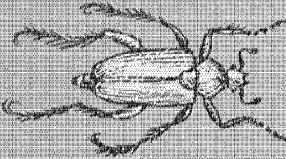
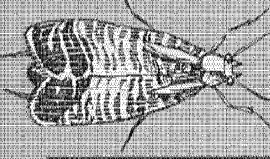
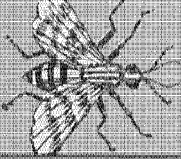
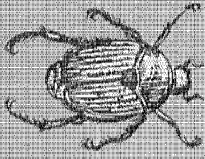
Floral Dust
Garden Insecticide
Methoxychlor
Rose Insecticide & Fungicide
Rose Spray Duster

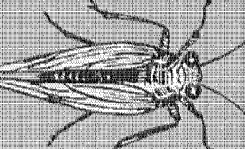
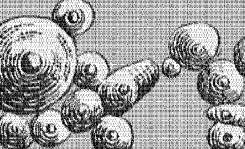
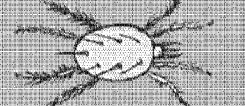
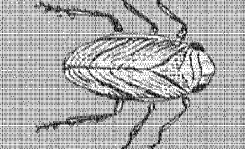
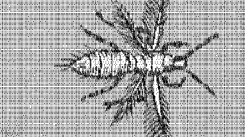
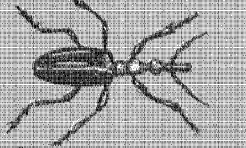
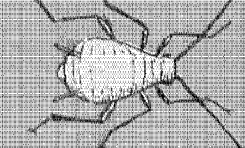
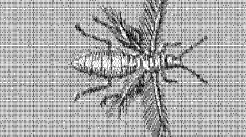
FALL WEBWORM

Garden Insecticide
Floral Dust
50% DDT

INSECTS THAT ATTACK FRUITS

DU PONT CHEMICAL CONTROLS

	PEACH-TREE BORER	50% DDT
	TENT CATERPILLAR	Fruit Tree Spray Garden Insecticide Methoxychlor
	ROSE CHAFER	Fruit Tree Spray Garden Insecticide Methoxychlor
	CODLING MOTH	Fruit Tree Spray Garden Insecticide Methoxychlor
	PLUM CURCULIO	Fruit Tree Spray Garden Insecticide Methoxychlor
	CHERRY FRUIT FLY	Fruit Tree Spray Garden Insecticide Methoxychlor
	JAPANESE BEETLE	Fruit Tree Spray Garden Insecticide Methoxychlor

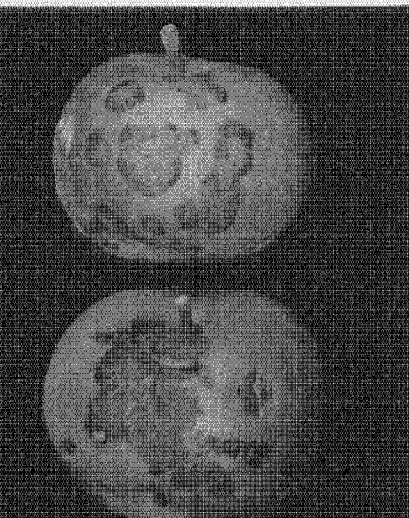
	LEAFHOPPERS	Fruit Tree Spray Garden Insecticide Methoxychlor		BEAN LEAF BEETLE	Vegetable Garden Dust Garden Insecticide Tomato Dust
	RED-BANDED LEAF ROLLER	Fruit Tree Spray Garden Insecticide Aphid & Mite Spray		BLISTER BEETLE	Vegetable Garden Dust Methoxychlor Garden Insecticide
	EUROPEAN RED MITE	Aphid & Mite Spray Garden Insecticide Dormant Spray Oil		CABBAGE LOOPER	Vegetable Garden Dust Methoxychlor Garden Insecticide
	GRAPE BERRY MOTH	Fruit Tree Spray Garden Insecticide Methoxychlor		IMPORTED CABBAGEWORM	Vegetable Garden Dust Methoxychlor Garden Insecticide
	ORIENTAL FRUIT MOTH	Fruit Tree Spray Garden Insecticide Methoxychlor		TOMATO FRUITWORM	Tomato Dust Vegetable Garden Dust Garden Insecticide
	PEAR PSYLLA	Dormant Spray Oil Aphid & Mite Spray		TOMATO HORNWORM	Tomato Dust Vegetable Garden Dust 50% DDT
	SAN JOSE SCALE	Dormant Spray Oil		LEAFHOPPERS	Vegetable Garden Dust Garden Insecticide Aphid & Mite Spray
	SPIDER MITES	Dormant Spray Oil Garden Insecticide Aphid & Mite Spray		MEXICAN BEAN BEETLE	Vegetable Garden Dust Garden Insecticide Tomato Dust
	SPITTLEBUGS	Fruit Tree Spray Garden Insecticide Methoxychlor		PEA WEEVIL	Vegetable Garden Dust Methoxychlor Garden Insecticide
	THRIPS	Fruit Tree Spray Garden Insecticide 50% DDT		POTATO BEETLE	Vegetable Garden Dust Methoxychlor Garden Insecticide
INSECTS THAT ATTACK VEGETABLES		DU PONT CHEMICAL CONTROLS		SWEETPOTATO WEEVIL	Vegetable Garden Dust 50% DDT Garden Insecticide
	APHIDS	Vegetable Garden Dust Garden Insecticide Aphid & Mite Spray		ONION THRIPS	* Vegetable Garden Dust Methoxychlor Garden Insecticide



Black Spot



Powdery Mildew



Apple Scab



Stem Anthracnose

DISEASES OF ROSES

Black Spot: Black spots with fringed margins. Leaves may turn yellow and drop.

Powdery Mildew: White coating on leaves, canes and buds. Prevalent on succulent shoots. Buds may not open.

Rust: Reddish-later black-pustules on leaves.

CONTROLS: Du Pont Rose Insecticide & Fungicide and Du Pont Rose Spray Duster control all three diseases. Du Pont "Fermate" ferbam fungicide is effective against Black Spot and Rust.

... OTHER FLOWERS, SHRUBS AND TREES

Anthracnose: Water-soaked, browned and dead spots on leaves, sunken cankers on stems; may cause girdling.

Bacterial Leaf Spot: Spots, pin-point to 1/4 inch in size, with brown or reddish-brown centers.

Blights:—*Alternaria* and *Septoria*: Brown spots on leaves, flowers and stems, overlaid with black spore deposits. Sudden and conspicuous withering.

—*Botrytis*: Gray mold on flowers, foliage or stems, especially in moist weather.—*Petal*: Pinhead spore spots on petals. Blossoms will wilt rapidly but remain on bush.

Leaf Scorch: Discoloration as if by intense heat.

Leaf Spot: Most common plant disease. Typically consists of rather definite spots with dark margin, brown or white center. Numerous spots are known as a blight or scorch.—*Septoria*: Dark-margined spots with grayish centers speckled with black.

Powdery Mildew: Powdery whitish mold on leaves, causing dwarfing or stunting.

Botrytis Rot: Shining black masses of fungus tissue on rhizomes.

Rust: Reddish or rust-colored spore masses, often accompanied by stunting.

CONTROLS: Du Pont Floral Dust controls all of these diseases. "Fermate" may be used for all except powdery mildew.

... FRUITS

Anthracnose (currant, gooseberry, raspberry): Small purple spots on canes, leaves; may cause girdling of canes.

Blights:—*Botrytis* (blueberry): Gray mold on fruit.—*Leaf* (quince, pear): Reddish spots on leaves.—*Spur* (raspberry): Large dark blue or purplish spots around buds.

Blotch:—*Apple*: Dark raised spots on twigs, water sprouts and fruit spurs. Cankers become larger during second and third year. Fruit has mottled or blotched appearance.—*Sooty* (apple, pear): Sooty brown or black areas 1/4 inch across on fruit.

Fruit Spot (quince, pear): Small spots on fruit, at first red, then dark-colored.—*Brooks* (apple): Small spots, less than 1/4 inch wide; red or black on red apples; green on yellow apples.—*Fly Speck* (apple): Black specks on fruit.

Leaf Curl (peach): Young leaves become curled, puckered and distorted, and may drop.

Leaf Scorch (strawberry): Dark purplish spots about 1/4 inch across scattered thickly over upper surface of leaves.

Leaf Spot (apple, cherry, currant, gooseberry, plum, raspberry, strawberry): Small spots, often reddish, later gray or brown.

Rots:—*Black* (apple, grape): Reddish-brown dead spots on leaves. Fruit shrivels, wrinkles and finally mummifies.—*Bitter* (apple): Light brown circular spots on fruit, gradually enlarging.—*Brown* (cherry, plum, peach): Flowers turn brown prematurely. Small brown spots on fruit spread rapidly, and fruit rots on tree or falls.—*Mummy Berry* (blueberry): Young growing tips wilt just before blossoming; grayish spore tufts form. Berries mummify.

Rusts (raspberry): Small, light-yellow spore pustules on young leaves.—*Cedar-Apple* (apple): Yellow areas with amber pustules on upper surfaces of leaves. Later in summer black dots appear in rather reddish circle. Disease causes premature defoliation, dwarfing and poor quality fruit.

Scab (apple, peach): Black spots on leaves and fruit, somewhat raised scabs on peach.

CONTROLS: All of these diseases are controlled by either Du Pont Fruit Tree Spray or "Fermate".

... VEGETABLES

Anthracnose: Brown spots on leaves, sunken cankers on stems and fruit.

Blights:—*Leaf*: Black or brown spots on leaves, death of older foliage.—*Early*: Irregular dark-brown spots on leaves. Dry rot at stem end of fruit.—*Late*: Gray, water-soaked spots on leaves; large rotted areas on fruit.

Purple Blotch: Small, white spots that increase to large purplish blotches on leaves and flower stalks.

Damping Off: Seedlings die soon after germination.

Downy Mildew (Blue Mold): Grayish or purplish patches on leaves.

Leaf Spot:—*Gray*: Small dead spots with white centers, purple borders.—*Septoria*: Small water-soaked spots on older leaves, 1/16 to 1/8 inch in diameter.

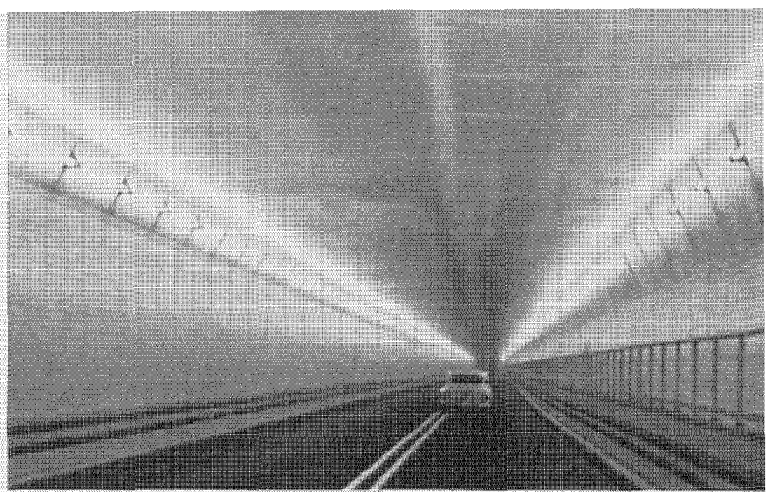
Fruit Rots: Stem rots at soil line. Large brown spots with small black pimples develop on fruit, which blackens and shrivels.

Rust: Orange powdery pustules on stems and leaves.

White Rust: Blister-like white pustules on leaves.

CONTROLS: Du Pont Vegetable Garden Dust is effective against all of these diseases. Du Pont Tomato Dust may be used to combat fruit rots, septoria leaf spot and early and late blights. "Fermate" works against all other vegetable diseases listed.

New roof for an underwater highway



*Porcelain-enameled aluminum goes below to make a first-of-its-kind
ceiling in the new Hampton Roads Tunnel*

Virginians are justly proud of their new Hampton Roads Tunnel, which with its two bridge approaches forms a three-and-one-half mile link between Hampton and Norfolk. Driving the expressway between the two cities takes seven minutes; the old ferry required about 40.

The tunnel is notable for its engineering achievements as well. "For the first time in vehicular tunnel design, an underwater tube has been built with portals emerging on man-made islands in the middle of the watercourse," reports the engineering consultant, Parsons, Brinckerhoff, Hall & MacDonald. From these islands in Hampton Roads, bridges stretch to the northern and southern mainlands. Motorists travel about one and a half miles under the Roads and two miles over it.

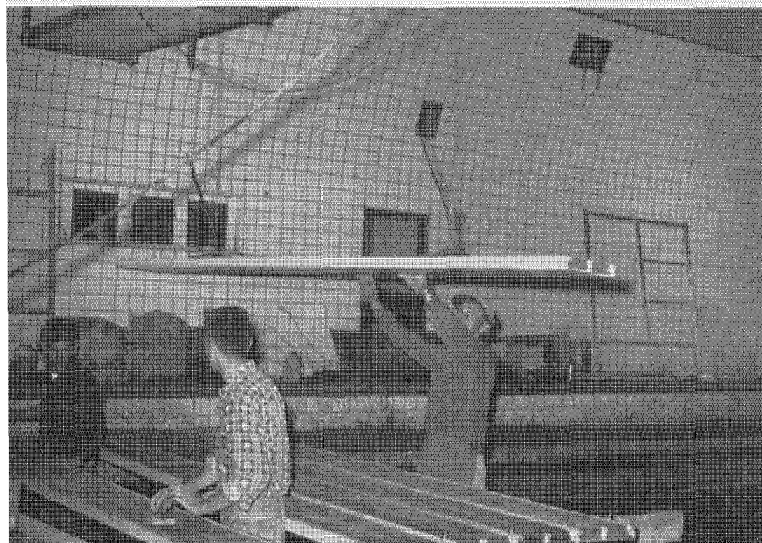
Twenty-three prefabricated steel-and-concrete tube sections make up the tunnel. These have been sunk in place in prepared trenches and securely anchored. The tunnel is the longest of this type in the world.

Inside, the tunnel also features design innovations. Its ceiling is porcelain-enameled aluminum, marking the

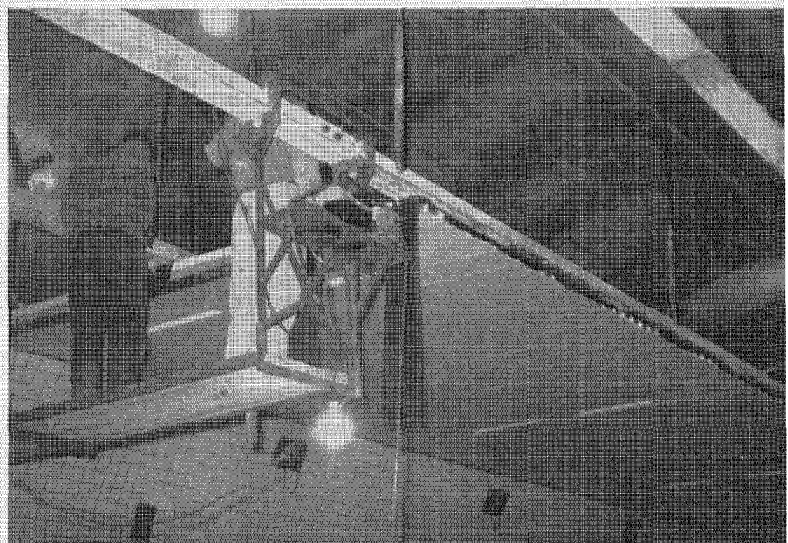
first such use of this lightweight building material. The ceiling consists of 14,200 panels designed by Atlas Tile & Marble Works, Inc., New York, extruded by the Aluminum Division of Bridgeport Brass Co., Bridgeport, Conn., and enameled by Halrick, Inc., of nearby Danbury. Halrick is a pioneer enameler of aluminum, using porcelain enamels supplied by Du Pont.

The panels—12 feet, 9 inches long and 1 foot wide—have a number of points in their favor. They are only one-third the thickness of conventional tunnel ceilings. Installation, a matter of suspending each prefabricated panel in place, was quick and easy.

What's more, the ceiling will require little maintenance, since the ceramic finish is immune to salt-air corrosion and is easily cleaned. The promise of low long-term maintenance costs, incidentally, was what really sold the tunnel fathers on porcelain-enameled aluminum. Like the speed-up in transportation that the tunnel itself represents, this modern building material was an effective way of meeting a problem.



Tough ceramic coat adds rigidity and needs little care. Here the panels are reinforced with concrete, which also will absorb heat.



Panels are then hoisted into place and suspended from ceiling hangers. Roof consists of 14,200 of these strips, each 12 feet, 9 inches long,

LIMESTON

From deep in a Misso

whose pu

STE. GENEVIEVE, MO.

Driving down 600 feet of four-lane tunnel, miners coming to work here park their cars in a towering cavern, 165 feet underground. Other men, through work for the day, clamber off trucks that have hauled them in from far-flung corridors. Distant, dull booms of exploding dynamite mingle with nearby sounds.

They're changing shifts in the huge limestone mine of the Mississippi Lime Co., and miles away their work is being cut out for them by Du Pont explosives. Soon the oncoming crew will board trucks and head for far reaches of the sprawling catacombs. There they'll find freshly shattered tons of stone ready to be sent to the crusher and the kiln and on to the outside world—almost anywhere in the outside world, in fact.

Here is no neighborhood rock quarry for building blocks and concrete gravel, but a giant of a mine that meets the exacting demands of modern industry for lime of top purity. Mississippi's limestone, locked in the earth's interior 300 million years ago and left undisturbed by a strange flaunting of nature's usual ways, tests more than 99 per cent pure calcium carbonate. It's this purity that makes the company's lime valuable enough to ship to distant markets, even where native limestones abound. It has gone as far away as Europe and Asia.

What's more, despite the inroads of miles of corridors soaring to 100 feet or more in height, the supply remains all but inexhaustible. That's important to dozens of firms that use lime in making such things as glass,

From the top of this 90-foot crane, men scale loose rock from the towering walls and ceilings of Mississippi limestone mine. Height of corridor can be judged by size of crane operator.

UNLIMITED

Mountain, the Mississippi Lime Co. mines a product
s won it markets across America, and even abroad

heavy chemicals and insecticides. Lime also is the base for ingredients in your baking powder, toothpaste and even some candies. It's valuable, too, in metallurgical and fluxing processes and as a water softener.

Impurities limit most limes for many of these uses. That's why an Oregon chemical plant or a Pennsylvania steel mill will buy Mississippi lime, confident that its content of magnesia, sulfur, alumina, iron, fluorine, phosphorus and other impurities is minute.

As the mine's corridors probe deeper into the formation, gleaming white pillars are left standing as supports. Jumbo-mounted drills bore into the stone at levels up to 20 feet, cutting four 15-foot-deep holes simultaneously in a matter of minutes. Above the machine's reach, hand-held drills continue the job.

BLASTING CREW TAKES OVER

Blasters load the holes with Du Pont "Extra" A-1 dynamite in 1½ by 8-inch cartridges, detonating it with Du Pont MS Delay electric blasting caps to control the explosion most effectively and prevent excessive shattering. Working from a 90-foot truck-mounted boom, two men scale the ceiling with long steel hooks after each blast to dislodge loose rock fragments.

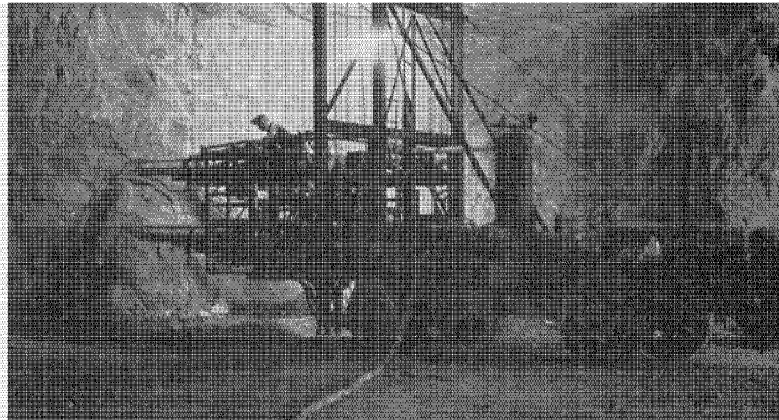
Mountains of blasted limestone are stored throughout the mine, waiting to be loaded into trucks by electric shovels and hauled to the primary crusher at the bottom of the mine shaft. Skip hoists carry the stone to the surface, where it's crushed further.

Some is sold as agricultural lime and livestock feed supplement, but most of the mine's output goes into huge rotary and shaft kilns. From there it emerges as quicklime, an incredibly thirsty product. When water is added, a tremendous amount of heat is released. This hydrated lime is so fine that the total surface area of the particles in one-third pound equals that of a football field.

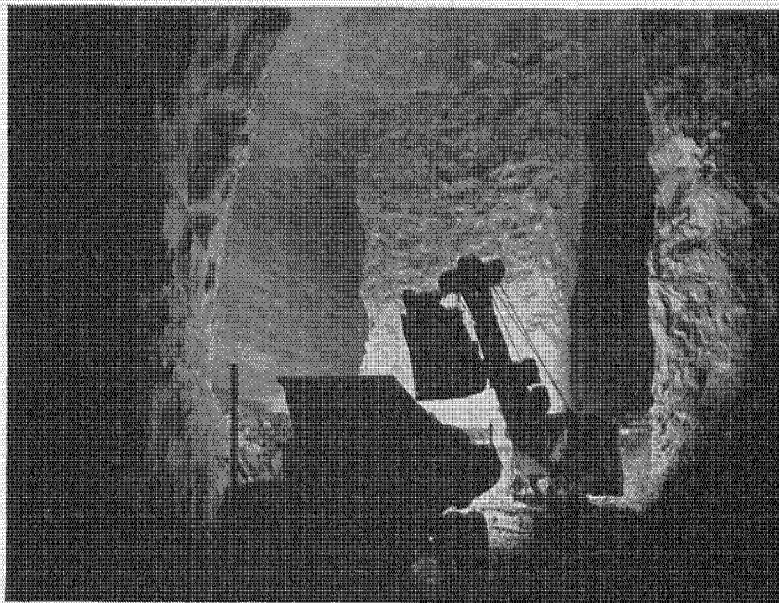
Shipped to customers in bulk or in bags, the "great white servant of industry" then undergoes a number of other chemical changes before it ends up in your stomach in a piece of cake or touches your daily life in 101 other ways. But it all began right here in a storehouse nature took 50 million years to create.

Cathedral-like appearance of huge mine's miles of corridors is apparent here. Limestone pillars up to 100 feet tall are left standing to serve as supports. Ten-ton truck at right shows comparative size.

Chemical purity is the deposit's greatest asset.



Holes to be charged with Du Pont explosives are bored in walls up to 20-foot level with four drills mounted on large "jumbo."



Big electric power shovels load fleet of trucks that's always on the move. Complete maintenance shop keeps vehicles running.



HIGH-FLYING HOSE LANDS IN PLANTS

Hose made of a "Teflon" resin has made its reputation carrying fuel and hydraulic fluid in jet planes and rockets. Today steam and chemicals for industry are flowing through it with equal success

"Service on our presses knocked out steam hoses within six weeks—rubber or metal, it didn't matter which kind. Then last June we put on the first hoses of 'Teflon'. I'm amazed to tell you this, but not one of them has failed yet."

Those are the words of Carl Toothaker, plant engineer of U. S. Rubber's footwear and general products division in Naugatuck, Conn. What he told us is being substantiated by an increasing number of engineers around the country.

"The hose on our presses alternately carries steam at 350° and water at 90°F.," Toothaker elaborated. "One end is twisted 180° during each cycle. We used to have constant hose breaks, our men suffered painful burns, and production was interrupted. This new hose costs more initially, but you can bet it's well worth it."

Manufacturer of the hose used at U. S. Rubber is Aeroquip Corporation of Jackson, Mich. Aeroquip also supplied us with information on other users of its industrial hose of "Teflon" TFE-fluorocarbon resin, some of whom are pictured here.

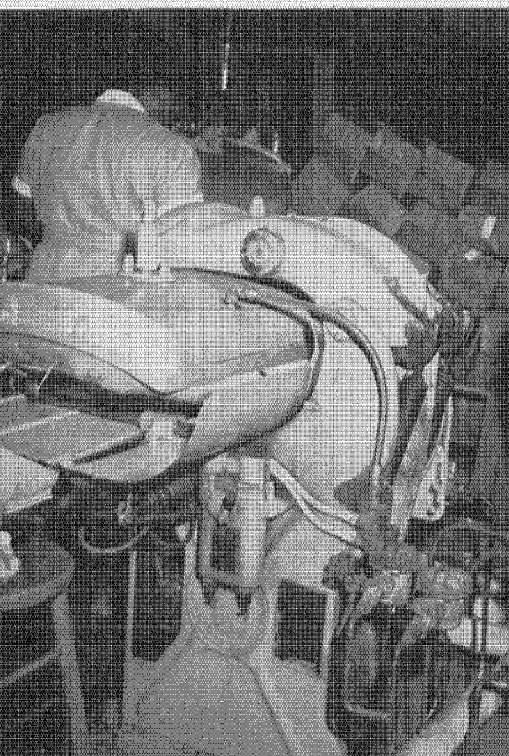
Peter Hurst, Aeroquip's president, filled us in on the company's jet-propelled rise: Founded in 1940 with \$10,000 in capital, Aeroquip last year had sales of \$42 million.

A maker of hydraulic hose for aircraft during World War II, the company prospered, thanks in part to Hurst's patent on a detachable, re-usable hose fitting—a feature that made possible quick repair of hose in the field.

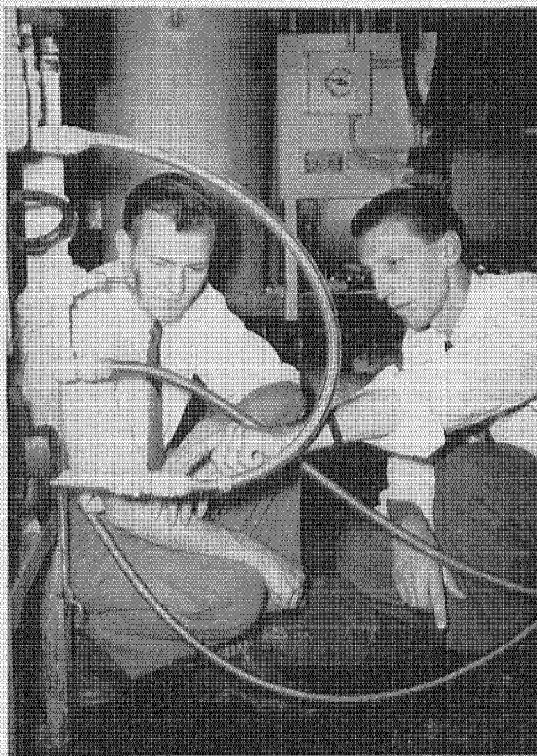
The arrival of jet engines led the company to "Teflon" TFE-fluorocarbon resins after the war, Hurst said, because the Du Pont materials function at temperatures from -100° to 500° F. and are inert to most chemicals. Recently Aeroquip launched a campaign to push its industrial version of the same hose.

Its price is three to four times that of conventional steam hose, but experience so far—especially where flexing is involved—indicates a life correspondingly longer. The re-usable fittings are an economy, too, since replacement hose can be cut to length in the plant, Aeroquip says. Most important, the reliability of the hose means fewer expensive shutdowns, as Carl Toothaker reported.

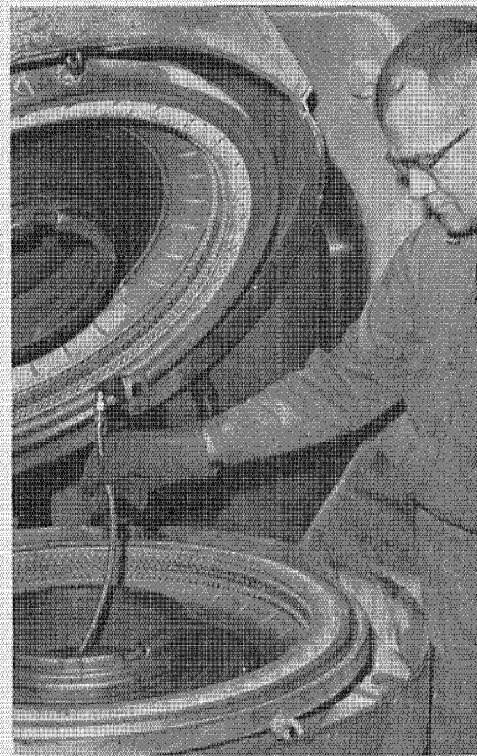
Other areas where hose of "Teflon" may find an industrial welcome: in compressor discharge lines, where oil and carbon shorten the life of ordinary hose, and in hot spray painting, where the fact that the hose can be flushed clean makes it easier to switch from one color to another.



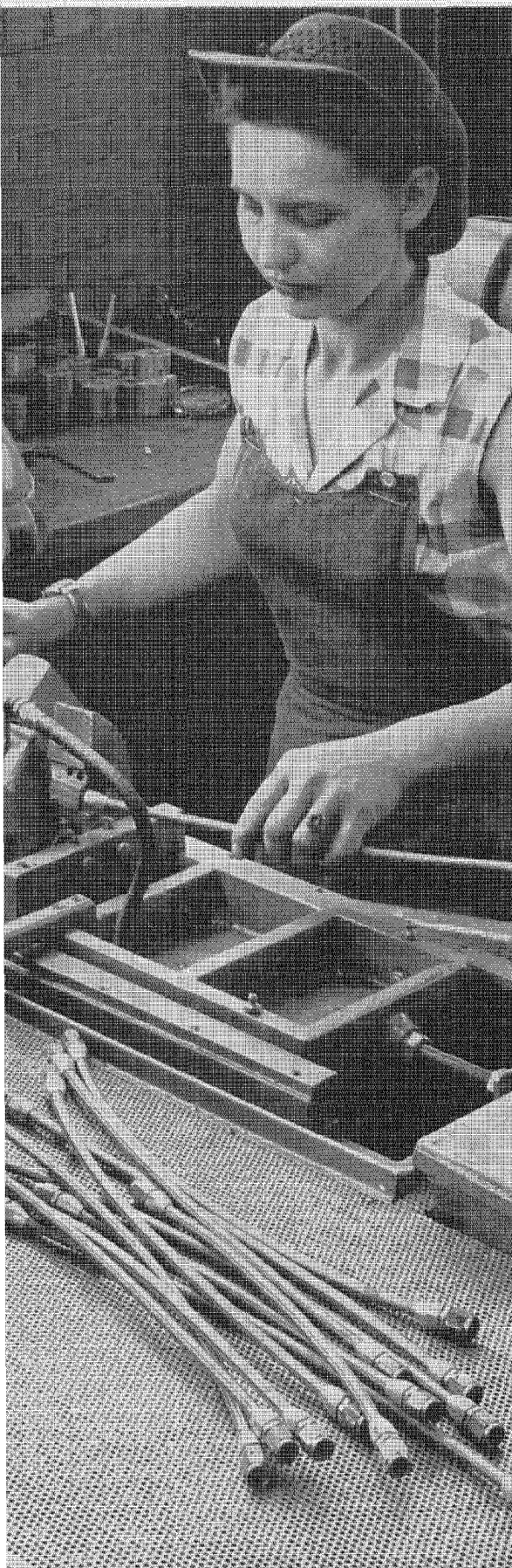
After testing hose of "Teflon", North Carolina laundry adopted it throughout plant.



Toronto aerosol packager likes fact that hose picks up no odors, resists chemicals and cold.



Hose of "Teflon" carries steam on tire cur press, replacing leaky pipe and swivel joint.

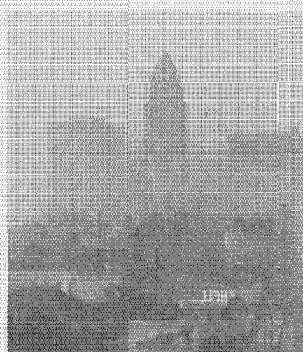


Aeroquip's detachable, re-usable fittings are attached to braided-covered hose at company's Jackson, Mich., plant.

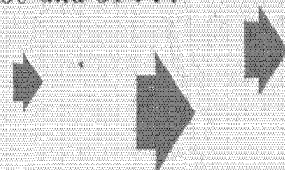
TIRES: the inside and outside stories

Answering the demands voiced by most Americans, Detroit has been making bigger, heavier cars, equipped with such tire-wearing accessories as power brakes and steering. Couple this with new roads that invite high speed and you can see why tire manufacturers must run just to keep up with the tire-punishing pace.

Their latest sprint has given us a passenger tire designed expressly for modern driving. For the story of nylon cord in tires, turn to the next two pages.



In certain parts of the country—and the trouble spots are increasing in number—tires are plagued by ozone, a form of oxygen that saps the life of ordinary rubber. Accepting the challenge, chemists and tire engineers have enlisted a successful opponent of ozone, neoprene synthetic rubber. For more on this, see pages 30 and 31 . . .



SUPER TIRES FO

Modern roads reward the traffic-weary driver, but they punish an ordinary tire beyond what it

Remember the two reporters who drove the turnpikes from New York City to Chicago in 13 hours flat? As a stunt this was dramatic; as an example to other drivers it could be unfortunate. Anyone who attempts a similar speed run on ordinary tires in hot weather is begging for trouble, warn tire engineers.

Ten years ago there were so few such highways that the engineers confined their worries about high speed to the Southwest, where the roads were long and straight and the pavement hot.

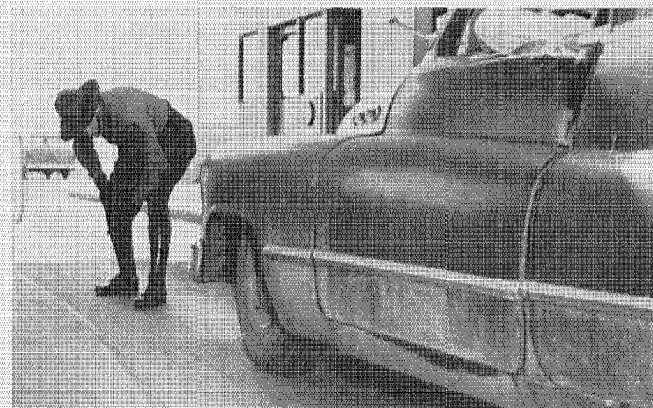
Now, suddenly, we have 825 miles of pavement from New York City to Chicago on which anybody can drive like a Texan. Of the 2,100 miles from Oklahoma City to Augusta, Me., over 1,900 are now four-lane divided super-highways. All told, a 9,000-mile web of such roads ties the nation together. On them you can drive at various legal speeds up to 80 miles an hour. What's more, within a few years some 41,000 miles of new high-speed highways will link practically all cities of over 50,000 population.

An ordinary tire was never designed for this new type of driving. The first to discover this were the state troopers who patrolled long sections of the pikes. When they began throwing treads all over the right-of-way they promptly tried out racing tires, only to find that such tires are designed for short bursts of high speed rather than sustained pounding. By repeated trials, though, they did find a tire—one made with nylon cord—that performed safely. Soon patrol cars on most of the pikes were using them.

Sustained driving at high speed quickly points up an ordinary tire's worst enemy: heat. This is the villain that finishes off the wrecking job started by impacts, flex strain and moisture. The result, of course, is tire failure, as the troopers discovered.

It's the chemical nature of nylon cord, however, to resist the effects of heat. Work in the laboratory and on the road shows that nylon starts out with higher strength

To cut down on tire-caused accidents, troopers often run checks on turnpikes, will not let motorists with shabby tires on road.



Nonstop highways like the New York Thruway, above, were scarce ten years ago; so were the tire problems this new type of driving has created.

UPERHIGHWAYS

igned for. Here's what tire makers have done about it

and loses it at a slower rate than does rayon tire cord.

So much slower, in fact, that the nylon tire remains a safer tire throughout its life. As a bonus, nylon's greater strength is used to build a thinner tire that runs cooler and thus offers double protection against blowouts.

Nylon's impact resistance, too, is the higher of the two tire cords. Bruise breaks and consequent blowouts are all but eliminated. Researchers at Du Pont's tire laboratory demonstrated this by jabbing spinning tires with a three-inch-long steel plunger. On the average, nylon tires took more than 13 times as many blows as rayon tires—658,000 impacts vs. 49,000.

That's good data, you say, but what's the score in actual service? A number of taxicab tests run by Du Pont over the past three years have borne out the lab results.

In the first comparison test, no nylon cord failure was recorded through the fourth retreading. Half of the rayon tires, on the other hand, had suffered cord failure. By the time all of the rayon tires were out of service, 70 per cent of the nylons were still going strong. The champion among the nylon tires lasted through a dozen retreadings. Other tests produced similar results.

TAKES TWISTING, TOO

The other two major tire enemies—flex fatigue and moisture—have little influence on nylon. The same chemical structure that lets the fiber take impact blows also permits it to twist and bend safely. And because nylon resists rot, moisture that seeps into the tire from cracks and cuts doesn't affect it. This, incidentally, is one reason why the fiber is used so successfully in fishing nets and lines.

Because they see the serious accidents that result from tire failures, troopers on some of the pikes last year declared war on shabby tires. Motorists are either put off the roads or—if caught at the toll stations—not permitted to get on. Weak tires may get you from home to the super-



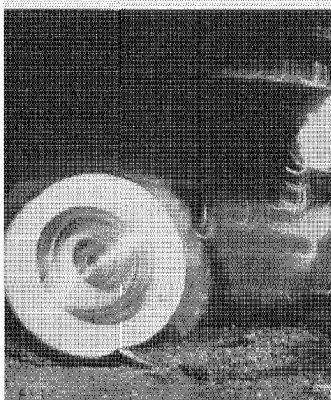
Ability of nylon tires to take punishment was verified in taxicab tests. Tire above was the champ; it lasted through 12 retreadings.

market, but 1,200 tire-troubled motorists a month on the New York Thruway alone can tell you they won't stand fast, continuous driving.

Municipal police, race drivers and owners of sales fleets back that up. Nylon tires are rapidly becoming standard on their cars. What about drivers like you and me? In 1953 we could buy just three brands of nylon tires. Last year, because of the alacrity with which average motorists have accepted them, replacement tire buyers could choose among more than 240 brands. Nylons also are standard equipment on a few of the new model cars.

Here's why nylon is well equipped to cope with a tire's worst enemies:

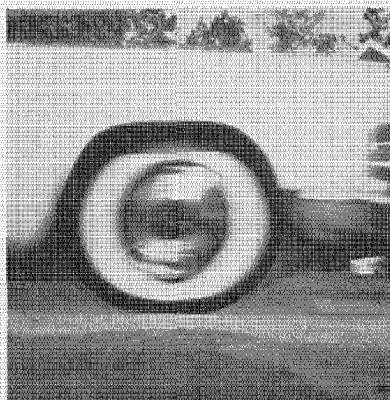
withstands brutal impacts



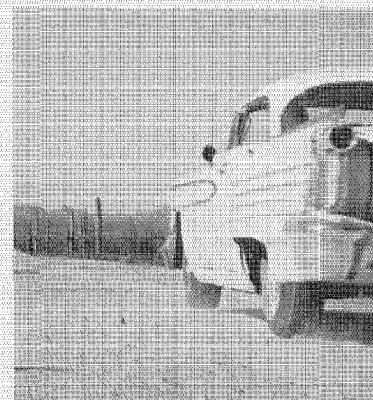
... resists damage from moisture



... holds up under flexing



... resists heat degradation.



A TIRE KILLER

Scene: Southern California. At stake: the life of

By A. J. HAWKINS

LOS ANGELES, CALIF.

Neoprene, the synthetic rubber made by Du Pont since 1932, has been enlisted by a tire merchandiser to clear up a problem that has plagued his Southern California outlets for some time.

The source of the trouble is ozone, a chemically active form of oxygen familiar to anyone who has ever taken a good whiff near an electric motor. Ozone in high concentrations can open deep cracks in the sidewall of an auto tire in less than a year, a fact that was precipitating a major crisis for the Montgomery Ward Co. in this area.

Now a premium tire whose sidewalls incorporate ozone-resistant neoprene appears to have licked the problem. As announced to reporters last month, the tire has been sold locally by Ward's for more than a year and not a single adjustment for sidewall cracking has been required in that time.

The concentration of ozone in the atmosphere here is related directly to smog. The Los Angeles County Air Pollution Control District, in fact, uses ozone as a sort of smog index. The smog alert is sounded when the atmosphere contains 50 parts of ozone per hundred million of air. In normal atmosphere, by contrast, the content is about five pphm.

The ozone concentration in Los Angeles is particularly acute—it may rise well above 50 pphm at times—but the problem isn't confined to this region. San Francisco reported 48 pphm one day last June, and Denver, Colo., and Litchfield, Ariz., have been cited as other places having occasional above-average ozone concentrations. The problem apparently has been increasing in U. S. urban areas generally in recent years.

"RUBBER BAND" MEASURES OZONE

The effect of ozone on most kinds of rubber is illustrated dramatically by a test chemists have used since smog first was recognized as a major problem. In an instrument called an ozonometer, a single strand of standard thread rubber is stretched over a pulley and attached to an indicating arm. As the exposed natural rubber is attacked by ozone and as cracks appear in it, the indicating arm moves. By using a thread previously calibrated in known ozone concentrations, the instrument can be made to give a direct reading. Lately, a device called an ozone recording photometer has been developed to do the same job.

While oxygen attacks rubber over its whole surface, ozone gets in its licks primarily when the rubber is distorted or stretched. Cracks appear at these stress points and they deepen as ozone attack continues. Ordinary rubber is particularly ripe for attack at a low stretch of about 15 per cent—precisely the range in which auto tire sidewalls operate.

Motorists whose tires crack prematurely can be counted on to sound off about it. Stung into action in 1956 by the volume of these complaints, the local retail branch of



Motorists in Southern California had a beef: their tire sidewalls were cracking severely. Ozone was the culprit, neoprene the answer.

OUTWITTED

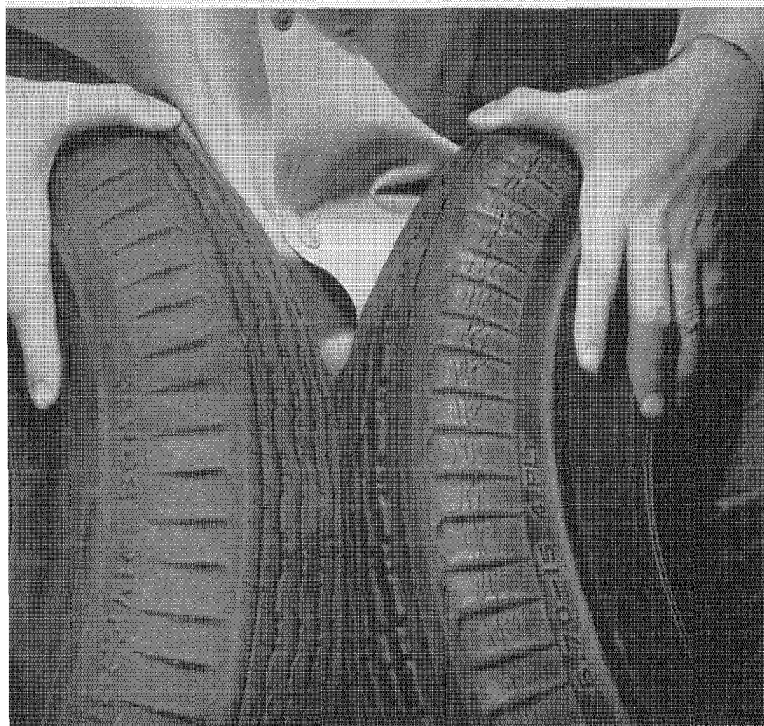
Merchandise's premium tire. To the rescue: neoprene

Montgomery Ward appealed to national headquarters, which in turn appealed to the manufacturer of Ward's tires: Get us a tire whose sidewalls won't crack.

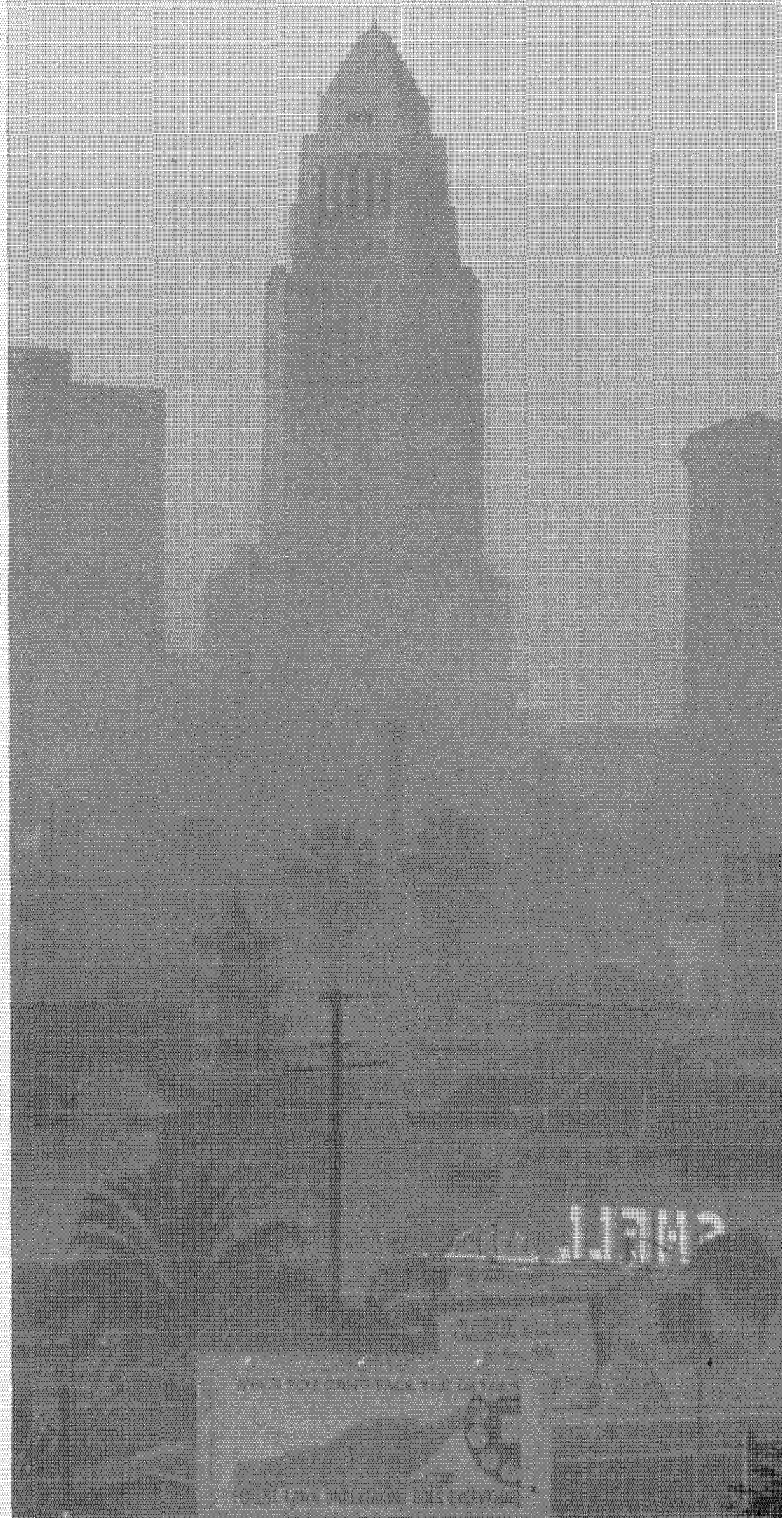
Rubber chemists have known for years of neoprene's outstanding ozone resistance. Automotive ignition wire jackets and spark plug boots are made of it; so are washing machine hoses and telephone cords. It has been used in white sidewall tires and in buffer strips that protect sidewalls from curb scrapes. But little had been done to incorporate neoprene in a black-wall premium passenger tire until the ozone problem cropped up. Now, appealed to for action, Ward's tire manufacturer tried various neoprene blends, chose one and adapted it to his tire-making process.

The first of these neoprene sidewall tires went on sale at Montgomery Ward here in January of last year. Since then, reports John R. Sebastian, the delighted merchandise manager of Ward's tire department, thousands of the tires have been sold without the need for an adjustment because of the old ozone bugaboo.

Ozone isn't beaten. Neoprene undoubtedly will be called on to fight it again where it accumulates in the air. But in the meantime, Montgomery Ward is confident that it has its own tire cracking problem well in hand.



Neoprene sidewalls on tire at left are smooth after three months' exposure on West Coast. Ordinary tire at right cracked in same period.



Los Angeles Civic Center on a smoggy day. Southern California sometimes has ozone concentration about ten times greater than normal.

"Mylar" makes goo

Starting from a few novel and specialized jobs in 1955, Du Pont's polyester film

By KARL WERLINE

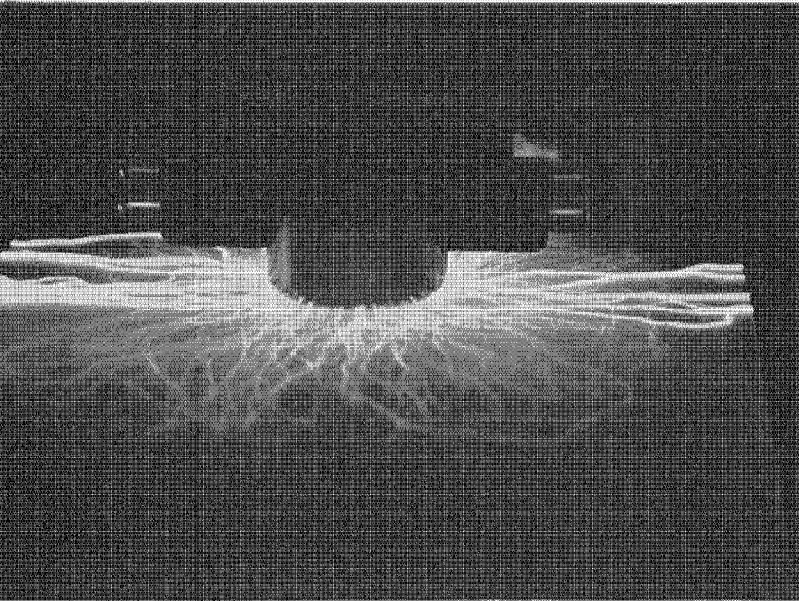
Memo to manufacturers: A product that started with a promise several years ago is keeping faith today by cutting costs and upgrading quality. That's the success story of "Mylar" polyester film in the electrical industry.

Ever since the film's introduction, manufacturers have faced the happy challenge of trying to use all of its unusual properties. Some specifically wanted its strength of about 20,000 pounds per square inch, others its resistance to oils, moisture and chemicals. Still others wanted the film's flexibility and stability at temperatures from -80° to 300°F. But it remained for the electrical designer to put these properties to work in conjunction with the film's excellence as electrical insulation.

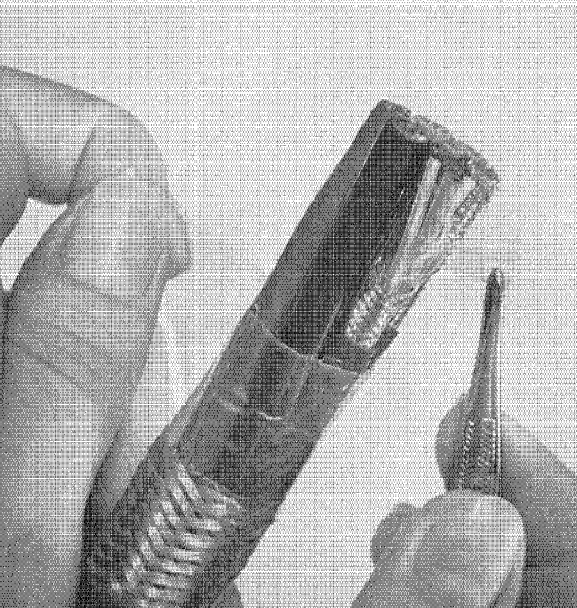
In the wire and cable business alone, "Mylar" is used in a dozen ways—as insulation, plasticizer barrier, abrasion and mechanical protection, separator and binder tape, moistureproofing and identification tape, to name a few. Applications range from low-cost switchboard and building wire to power and premium high-voltage cables. Pictured on these pages is a representative sampling of the things "Mylar" does well.

For example, the multi-conductor communications cable uses "Mylar" as a binder tape. Laminated to rubber, it performs these several functions:

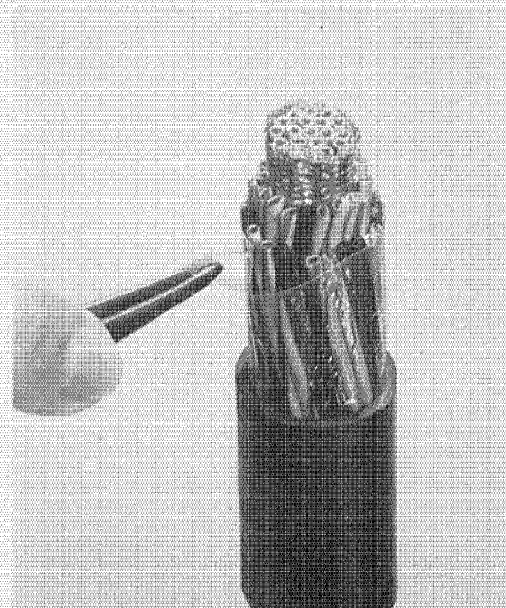
As a heat barrier, it prevents the inner wires from fusing when the outer jacket of polyethylene is extruded over the assembly. Its strength prevents the corrugated shield from breaking through the rubber tape when the



High voltage arcs course around, don't penetrate sheet of "Mylar" polyester film placed between two electrodes. Dielectric strength of "Mylar" is highest (4,000 volts per mil) of all plastic films.



"Mylar" under copper braid of this cable protects insulation from braid puncture.



Tape of "Mylar" reduces outside diameter, helps increase flexibility, ups safety factor.



Binder of "Mylar" and rubber helps production and prevents lightning damage.

n electrical design

invaded every major area in the electrical field. Here's a semitechnical report on its contributions

shield is added to the assembly during manufacture and later when the cable is flexed in service. Being hard and abrasion resistant, the tape can be applied smoothly over the core by automatic equipment with little danger of snags and tears interrupting production. These functions of "Mylar" are in addition to its job of insulating.

LONGER LIFE FOR CABLES

The abuse a cable can withstand often determines its service life. Since the polyester film has no plasticizer to dry out, it keeps its high flex and strength, extending the life of cable subjected to rough handling.

The manufacturing process itself occasionally causes cable failure. The shielded conductors of an instrumentation cable, for example, were being shorted during manufacture by broken shielding wires that punctured the insulation. By adding "Mylar" under the braided shield the maker cut his reject rate 75 per cent.

As primary insulation—the covering next to the wire—"Mylar" has the necessary electrical qualities plus an aversion to moisture. It neither lets moisture pass through to the conductor nor "wicks" it along under the outer jacket. Recent study shows that the film will withstand constant stresses up to 600 volts at 250°F. For some applications, it will take 1,000 volts continuously. Ultimate strength is about 4,000 volts per mil as measured by a standard short time test (ASTM D-149).

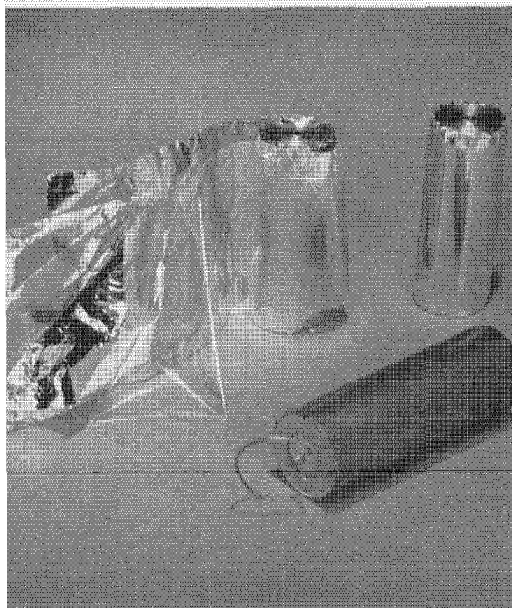
The properties of "Mylar" also have won it a place

in capacitors, motors and generators, transformers and coils. In capacitors, for instance, the film is replacing the standard insulating material because age has little effect on its properties—an important asset in such equipment as missile controls and radio and television sets. A recent development, fostered by the miniaturization trend, is the use of metallized "Mylar" in capacitors. Their size and weight are less than a fourth those of standard components.

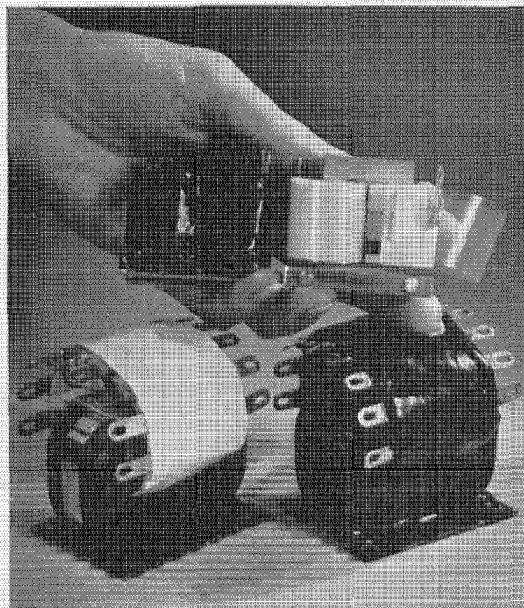
With the help of "Mylar", manufacturers have been able to reduce the size of some motors by about one-fifth. What's more, in Class A applications (up to 220°F.), the film has helped manufacturers double motor life. It also is used in some Class B (up to 265°F.) insulating systems. Motor users, especially appliance makers, have found the moisture resistance of "Mylar" a big help in cutting down electrical leakage.

In most cases, the film upgrades an electrical product without increasing its cost. Savings are realized through increased production speed, less machine downtime and fewer rejects. When a pound is translated into square yards, "Mylar" often effects a direct material saving. As an example, one-mil-thick "Mylar" at 13 cents a square yard is replacing a standard cable tape at nearly 32 cents.

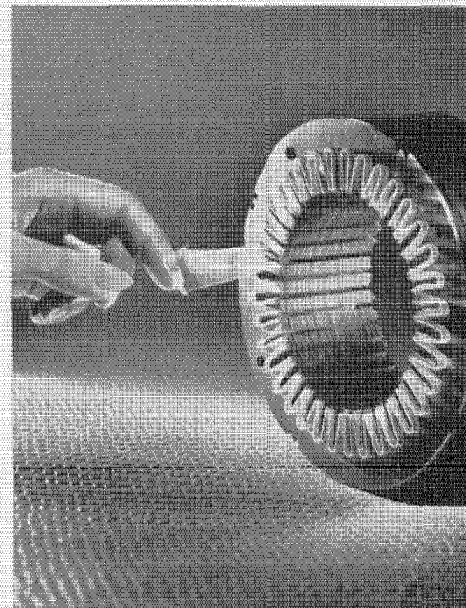
Here we've been able to do little more than make a quick survey of the field. If you'd like specific data for an electrical application, write us and we'll see that your letter gets to the right man in the Du Pont Film Dept.



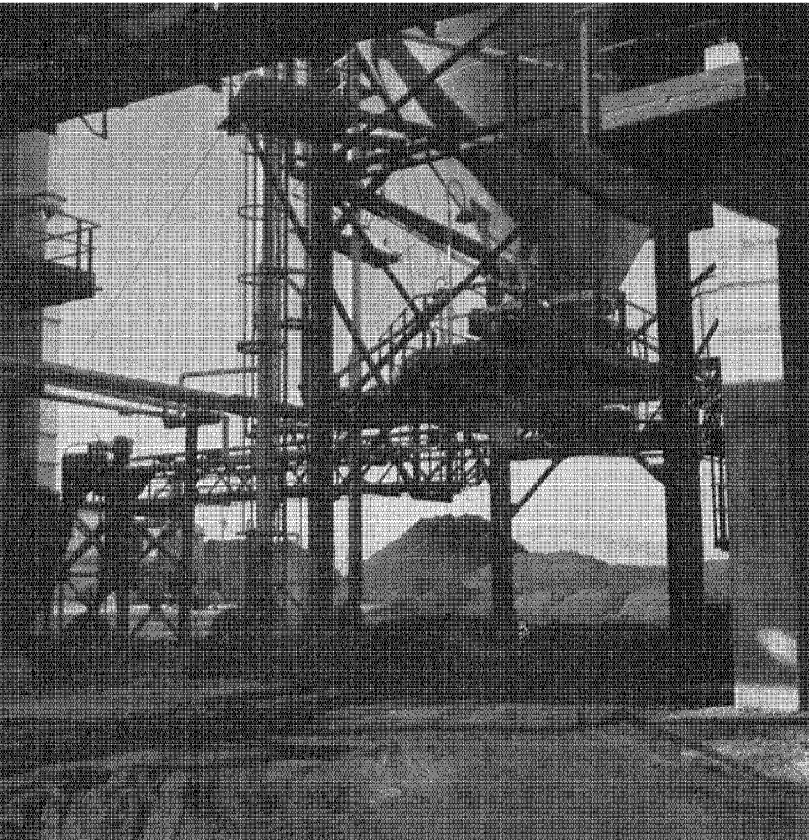
Use of "Mylar" in capacitors reduces size and assures long life, high reliability.



High dielectric of the film in thin gauges makes smaller transformers possible, too.



Slot liners of "Mylar" in stators can help double the motor life expectancy.



Stockpiles of black Gilsonite ore, above, are turned into high octane gasoline and petroleum coke in refinery near Grand Junction, below. A catalytic cracking unit is at the left, a delayed coker at right.



Now they're

An infant industry takes its first steps at

GRAND JUNCTION, COLO.

Set against a scenic mountain backdrop, the shiny new refinery of the American Gilsonite Co. near here looks like many of its cousins the world over. It isn't quite the same, though. Here, for the first time, engineers are producing gasoline and other "petroleum" products not from liquid crude oil but from solid hydrocarbons. And they're pulling off the trick commercially.

Pull up to a pump at certain service stations along Colorado's western slope and you'll fill up with gasoline indistinguishable from the finest petroleum product. This, however, is fuel distilled from Gilsonite, a shiny black ore that is stripped from seams buried deep in eastern Utah.

To learn the where and how of this wizardry, I toured the refinery here in western Colorado and the world's only commercial Gilsonite mines at Bonanza, Utah. Bob Mifflin of Du Pont's Petroleum Chemicals Division went along with me. Du Pont designed TEL blending facilities and supplies chemicals and technical assistance at the refinery.

Bonanza, Utah, is headquarters for Gil



mining oil

By TED DUTTON

American Gilsonite Co. begins the commercial production of gasoline from ore

Roy Nelson, a tall, friendly Gilsonite vice president, flew us to Bonanza by company plane—a sleek Lockheed Lodestar. “Except by air, you can hardly get there from here,” he said. He wasn’t kidding. It’s 84 miles from Grand Junction to Bonanza. Thanks to the rugged Book Cliffs Mountains, though, the trip would require an arduous five-hour journey by automobile.

From the plane we caught glimpses of the famous Gilsonite pipeline with its two spidery suspension bridges spanning deep gorges. Through this pipeline, second longest in the world for the bulk transport of solids, the company pumps to its refinery 750 tons of ore a day.

MINING WITH WATER

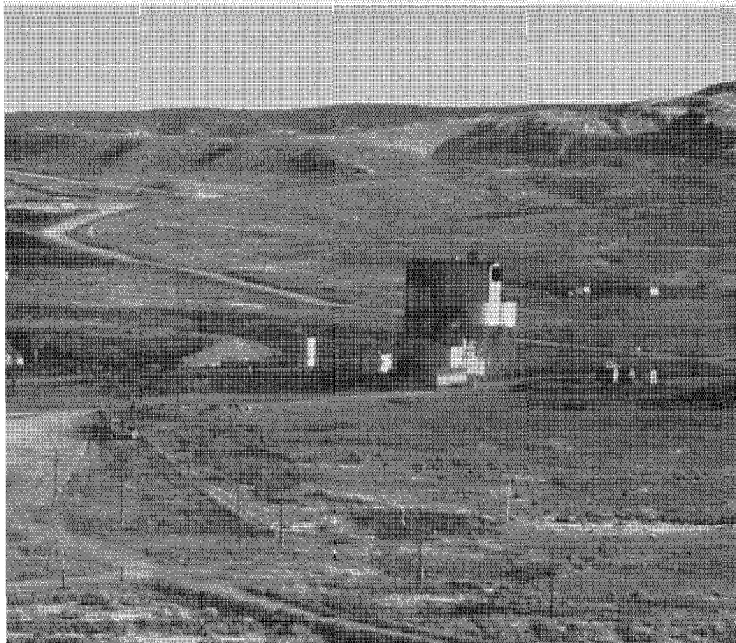
Down in the mine, the potential explosiveness of Gilsonite dust would make conventional mining methods hazardous. That was one big hurdle engineers faced. Their solution proved ingenious. The crumbly ore is ripped from

its seam by quarter-inch water jets of such velocity that they’ll slash through a two-by-four as fast as any buzz saw. The jet operator rides a shielded tractor. He senses his distance from the working face by sound. This new wet mining process eliminates dust and blast hazard and is highly efficient.

Water from the jets washes the ore down long drifts to a sump reservoir. With Nelson, we rode a jolting cage

Deep in Bonanza mine a hydraulic cutter rips ore from the face with a high-speed water jet, eliminating blast hazard inherent in Gilsonite.

mining operations. Ore is pumped from here in slurry form to the refinery.



elevator in total darkness to a pumping station 800 feet underground. There a battery of whining pumps pushes the ore to the surface. A processing plant then crushes it, screens it, mixes it with water and feeds the slurry into the pipeline. The suspended ore then flows to the refinery at high speed to prevent clogging.

Back at the refinery next morning, we chatted with superintendent Jesse Boyce. After a 27-hour trip through the pipeline, Boyce explained, the Gilsonite is de-watered

by filtration. Then it's either stockpiled or fed immediately into a melting tank heated to 450°F. by hot recycle oil returned from the refinery's delayed coking unit.

Finally the melted Gilsonite is transformed into high octane gasoline and petroleum coke by conventional refining methods. The petroleum coke, calcined to remove impurities, is sold to manufacturers of electrodes for use in the manufacture of light metals. Said Boyce of the process: "It sounds simple, but it took a lot of doing. Years of research and pilot-plant work, plus \$18 million for the refinery and pipeline alone."

Where does Du Pont fit in? The company's Petroleum Chemicals Division supplies tetraethyl lead and dyes to American Gilsonite, plus antioxidants and Du Pont Metal Deactivator, additives important to gasoline quality because they help keep it stable during transport and storage. Du Pont engineers designed the refinery's tetraethyl lead blending plant and advised on its construction and testing. They continue to offer the refiner help in operating and maintaining the blending plant.

Tetraethyl lead, which arrives at the refinery in tank cars, has become the life blood of gasoline refining. Auto engines will soon hit 11:1 compression ratios, calling for 100-plus octane ratings to prevent engine knock, explained Bob Mifflin. "You can boost gasoline's octane number beyond a point with extensive processing, but it's terrifically expensive. It's more economical to gain the same objective by adding tetraethyl lead."

But tetraethyl lead is toxic, so the design and operation of a blending plant is an exacting business. To keep it safe, Du Pont specialists regularly inspect operating techniques and all equipment. They also screen and train personnel and provide yearly medical checkups for all employees concerned with tetraethyl lead blending.

"Du Pont has done a terrific job," Jesse Boyce volunteered. "During construction, those boys were right out there with their slide rules and wrenches. They're out there today whenever we ask them."

73 YEARS OF TRYING

The Gilsonite TEL blending plant is typical of dozens Du Pont has helped build the world over. But this one marks a special milestone—the successful conclusion of a 73-year campaign to unlock the commercial potential that lay buried with Gilsonite ore.

How big is the victory? Substantial. Today the American Gilsonite Co., owned by Barber Oil Corp. and Standard Oil Co. of California—whose engineering know-how aided the project materially—is producing 1,300 barrels of gasoline and 275 tons of petroleum coke daily. Utah, which contains all of the known Gilsonite deposits, boasts reserves totaling 16 million tons. This is well over a 50-year supply at present production rates.

But that's only part of the picture. Encouraging progress also is being made in the commercial refining of gasoline from oil shale, a first cousin to Gilsonite, geologically speaking. This is another story and one we hope to bring you in a later issue.

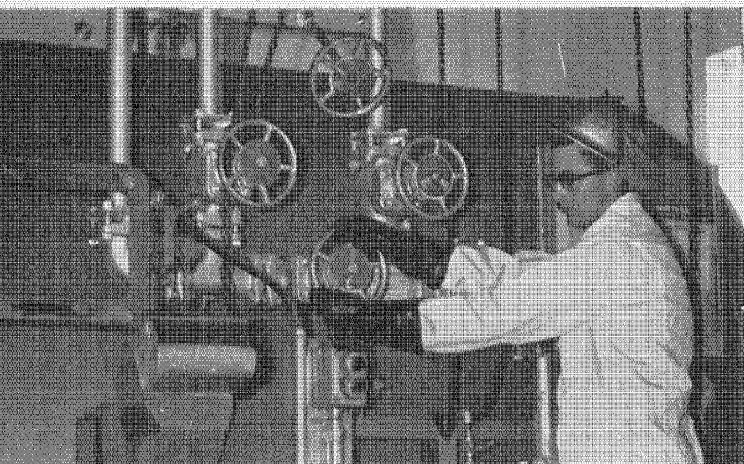
Should the need arise, the experts tell us, oil shale in the Green River deposits of northwestern Colorado could yield 600 million barrels of crude. Considering this and the already striking success of Gilsonite, it's no wonder that the eyes of the world's oil men are turned expectantly toward this corner of the West.



Here's Roy Nelson, American Gilsonite vice president, set to make an inspection trip down the main shaft at Bonanza.



Du Pont's Bob Mifflin, left, meets with refinery superintendent Jesse Boyce. Mifflin helps refinery with its TEL blending plant.



Supervisor of refinery's blending plant adds tetraethyl lead to gasoline to boost fuel's octane number. Du Pont supplies TEL.



ROWS AND ROWS OF ROSES

"Some people want them short stemmed. Others like them long."

"Christmas is a gamble, but Easter is a sure thing."

"People don't buy when the weather's bad, yet a nice summer is the slowest season of all."

These reflections on the vagaries of Americans' rose buying habits come from Tom André, left, whose André Greenhouses, Inc., near Philadelphia, probably are the country's largest one-man rose business.

André must contend with calendar as well as human variations. In years when Easter comes early, rose growers can have a crop for that market and another for Mother's Day, traditionally a heavy favorite for roses. When the two holidays fall close together, though, the plants don't have time to produce twice, and the crop must be split.

A man of both imagination and precision, André skillfully balances many such factors when planning his production. He must know seven weeks in advance how many blooms he will need, since it's that long from the time a shoot is pinched until there's a salable bud. When Tom André's grandfather founded the business in 1887, rose growing was far more an art than a science. Today, with ten acres and 230,000 rose plants under glass,

the owner watches the greenhouse soil even more closely than he does the calendar.

"We have soil test data and records of insecticides and fungicides used for years and years," André says. "We don't throw on fertilizer because we think the soil needs it. We go by the book."

Always on the lookout for better methods and materials, André two years ago read a trade magazine article describing the new Du Pont "Uramite" fertilizer compound. It explained that "Uramite", a clean, odorless material, contained 38 per cent nitrogen, which it released to plants as their growth required it.

André asked the help of Polychemicals salesman W. W. Duff in testing the Du Pont fertilizer, and results were so encouraging that he soon adopted it.

"We used to have a lot of trouble with burning from fertilizer that released nitrogen too quickly," André recalls. "'Uramite' has ended that and we don't have the rank growth that comes from overstimulation either. We just have good, uniform-looking bushes."

From these plants come large, uniform-looking blooms—seven million of them a year—that promise to keep Tom André's future as rosy as his present.

IT'S NEW

- **CRISP BACON** that's easy to cook to a golden brown without charring is promised by new Du Pont Meat Curing Compound. The product contains sodium cyclamate, a synthetic sweetening agent recently approved for use in curing bacon. Meat so cured won't turn dark or stain pan in normal cooking, says the Grasselli Chemicals Dept.

- **FLAVOR INTENSIFIER** for foods, L-monosodium glutamate, can be made synthetically, reports Du Pont's Explosives Dept. Used to enhance the flavor of meats, vegetables and other foods, the compound now is made from grain and sugar beets. Du Pont is considering use of the more economical new process on a commercial scale.

- **PHOTOGRAPHERS' "HYPO"** now is being distributed nationally by the Du Pont Grasselli Chemicals Dept. under its own label. The photographic quality sodium thio-sulfate is available in two grades, photo rice and anhydrous, sold in 100- and 64-pound bags, respectively.



- **CHRISTOPHERS AWARD**, for providing family entertainment of high quality and "using God-given talents in a constructive and positive way," went to the production staff of "The Prince and the Pauper," the Du Pont Show of the Month for October. Scene above is taken from the prize-winning television drama.



- **STRONG DIVIDERS** of "Myler" polyester film stabilize stacks of soft-drink cartons, automatically roll to back of display stand in tight coils as cartons are removed. Made for Pepsi-Cola Company by Mead-Atlanta Paper Co., Atlanta, Ga., the dividers also are expected to be found useful in other display applications.

- **"DU PONT FIBERS IN INDUSTRY"** describes the company's synthetic fibers and lists their uses in more than a dozen industrial fields. The handbook also gives tips on handling and blending of fibers and tells how to identify both natural and synthetic ones. It's available to research and development people in industry who write on company letterheads to Du Pont Textile Fibers, Nemours 5518-M, Wilmington 98, Del.

- **A NEW SKIN** for inflatable structures is made of high-tenacity nylon fabric coated with Du Pont "Hypalon" synthetic rubber. The material resists fire, weather and abrasion, is serviceable from -65°F. to 200°F. and is translucent. This "Fairprene" coated fabric was designed and developed specifically for industrial air-supported shelters by the company's Fabrics Division.

For your summer out of doors

• **DECK FITTINGS** of "Zytel" nylon resin molded by the Danielson Manufacturing Co., 150 Holt St., Danielson, Conn., are strong and lightweight, need no polishing because they resist corrosion. Available in five colors, they include handles, cleats and chocks as well as running lights with lenses of "Lucite" acrylic resin.

• **ANCHOR CHAIN** made by Campbell Chain Co., York, Pa., has coating of Du Pont neoprene synthetic rubber to minimize scratching and marring of boat deck. The "Red Kote" chain also is easier to keep clean, Campbell says, since neoprene keeps chain from rusting and pitting.

• **NEW DU PONT INSECT REPELLENT** keeps off mosquitoes, gnats, ticks, chiggers, flies and other biting insects for up to eight hours. It's non-oily and safe to apply to skin and most clothing fabrics. Based on N,N-diethyl toluamide, described as the most effective repellent yet developed, it's available either as a lotion or as an aerosol spray powered by "Freon" propellant.

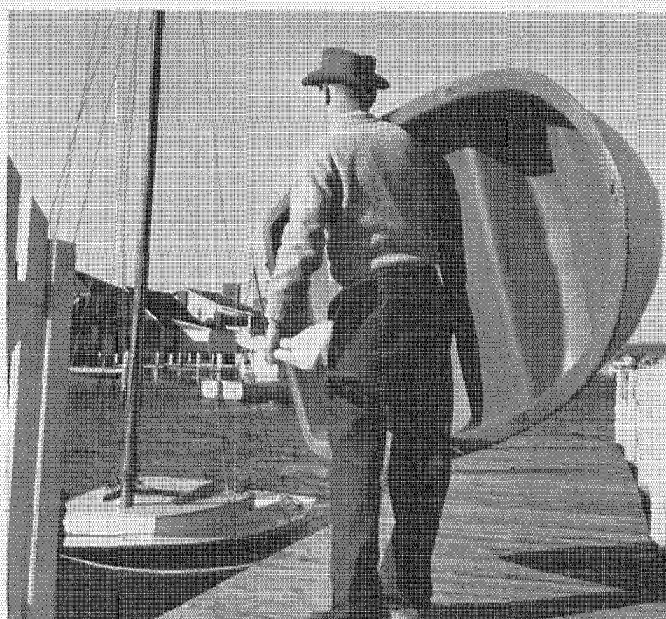
• **SHOOTERS HAVE A CHOICE** of crow-wing black or buckskin tan barrel and receiver in new models of the Remington Model 572 "Fieldmaster" slide action repeating rifle. Said to be the lightest 22 caliber rifle on the market, it weighs only four pounds.

• **FOOTWEAR FOR BOATERS** now includes durable, lightweight "Kleets" yachting shoes with uppers of Du Pont nylon-reinforced cotton sailcloth. Featuring nylon stitching and nonslip soles for wet decks, they float if accidentally washed overboard, reports the maker, Cambridge Rubber Co., 748 Main Street, Cambridge, Mass.



• **SWIM SUITS FROM CALIFORNIA.** Shell-knit pattern by Gantner, right, made of "Orlon" acrylic fiber and elastic yarn, is said to be soft and comfortable in or out of the water. The other suit—a Fort Knox model by Cole—gets its glitter from metallic yarn of "Mylar" polyester film in gold or silver. Suit also comes in black.

• **TWO BOAT HORNS**, redesigned for 1958 by the Buell Manufacturing Co., 919 W. 49th Pl., Chicago, Ill., are molded of "Zytel" nylon resin. Highly resistant to weathering and corrosion, the horns are sounded by an aerosol power pack using "Freon" propellant.



• **URETHANE FOAM** fills interior of eight-foot floating dock that can support 1,500-pound load, won't sink even if hull is punctured, the maker claims. Foam, made with Du Pont "Hylene" organic isocyanates, also forms a bond between double hull of new lightweight plastic dinghy to give craft added strength and buoyancy. Both are made by Riverside Plastics Co., Box 123, Mystic, Conn.

The Rites of Spring

... include cleaning chores the housewife dreads.

But nowadays she can keep carpets and upholstery

clean longer—not to mention a slip-resistant

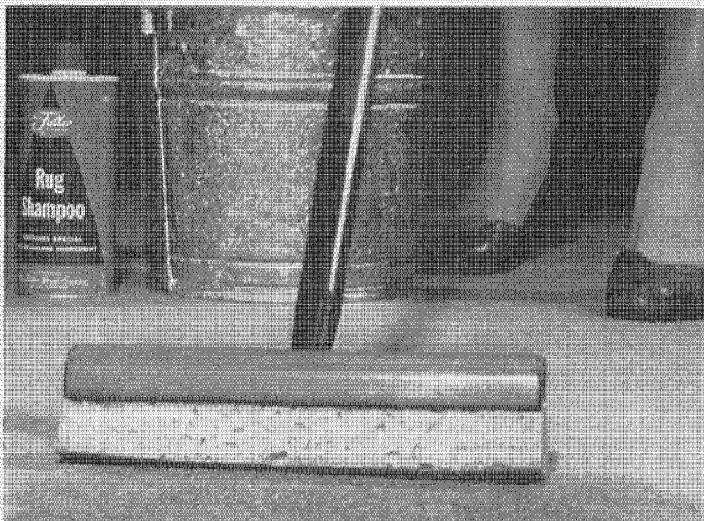
shine on the kitchen floor—with the help of “Ludox”



“Ludox” colloidal silica is ingredient in this self-polishing wax. It reduces slipperiness, says maker.



Here the Du Pont silica takes on another assignment. It stays behind on freshly cleaned fabric to retard soiling.



It's not so much the cleaning that gets them down, women will tell you, but the fact that everything gets dirty again so soon. It's downright discouraging.

This wifely lament has been taken to heart by the chemical specialty manufacturers who are incorporating Du Pont “Ludox” colloidal silica in their home cleaning products. These microscopic particles of silica retard soiling by filling up the invisible cracks and crevices in fibers where dirt ordinarily will accumulate. Surfaces thus stay clean longer and are easier to keep that way.

Take these two products, for example—“duo-dellay” double action cleaner for rugs and upholstery and a new rug shampoo being marketed by the Fuller Brush Co. Diluted in water, both are brushed or sponged on the fabric to loosen dirt. Up to this point they work like other fabric cleaners. But both of them also contain “Ludox”, which stays behind on the freshly cleaned fibers to retard future soiling of the carpet or fabric.

The dirt-shedding ability of the Du Pont silica isn't confined to fabrics, either. A couple of issues back we told how Eastern Products Corp. of Baltimore was treating the painted slats of its venetian blinds with “Ludox” to slow the soiling process.

ANTISLIP ACTION, TOO

For years industrial floor wax formulations have included the Du Pont colloidal silica to make them slip-retardant and thus safer to walk on. In this instance, hard particles of “Ludox” are pressed into larger wax particles, providing a snubbing action that reduces slipperiness.

Now the same idea has been adopted by a maker of household floor waxes. The A. S. Harrison Co. of South Norwalk, Conn., recently introduced “Preen” self-polishing wax containing “Ludox”. The new wax is outstanding for its durability, the manufacturer says. It should remain attractive and protect a kitchen floor for an average of three months, he estimates.

“It's primarily a true wax, not a resin or shellac,” explains Allrich S. Harrison, president, “‘Ludox’ reduces surface slipperiness while maintaining the valuable properties of the wax film. It gives us a safe waxed surface with a slip resistance well above minimum requirements.”

From living room to kitchen then, spring housecleaning is getting a big assist from “Ludox”—a product made up of particles of silica so small it would take one and a half billion of them to cover the head of a pin.

“Ludox” is in Fuller Brush's rug shampoo, too. Again it's left behind on carpet fibers to ward off dirt.



*"Dacron" is Du Pont's registered trademark for its polyester fiber. Du Pont makes fibers, not the fabrics or draperies shown here.

Most beautiful move you can make . . . pre-Columbian prints in washable sheers of 100% DACRON

REG. U.S. PAT. OFF.

Now . . . colorful screen prints in a sun-loving fabric. These designs by Melanie Kahane, A.I.D., inspired by ancient pre-Columbian culture, come to you in the newest modern-living fabrics that perform as only 100% DACRON* can. Aren't you glad to know these sheer beauties are completely washable, dry quickly, need barely a touch of the iron! Thanks to DACRON polyester fiber, there's no stretching, no sagging, no tearing in a breeze. Make the first move in your spring decorating by selecting from the wide range of colors, prints. All 48" fabrics priced under \$5 a yd.



REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING...THROUGH CHEMISTRY

Next Du Pont "Show of the Month"—"The Red Mill" 7:30 p.m., EST, April 19 on CBS-TV

NEW FROM REMINGTON...

Two Mechanics Maintenance Tool Kits that pay for themselves in a few jobs...

Here are two new Mechanics Maintenance Tool Kits—portable, versatile—that are just the thing for getting into those tight places. In fact, they'll go any place your hand will go. Remington engineers developed the two kits—one electric and the other air-powered—after studying plant maintenance requirements. Either of them will handle up to 80 per cent of all maintenance operations. Each kit contains a half-inch square-drive Remington Impact Wrench, plus accessories that give the tools new versatility.

More than just nut-runners, these reversible impact wrenches are replacing hand and power tools for drilling, screwdriving, tapping, reaming, wirebrushing and many other operations. See the table below for the time saving realized when the new kits are used in overhauling and rebuilding a typical medium-sized pump.

For more details about Remington's new Mechanics Maintenance Tool Kits and what they can do for you, write the Mall Tool Company, Division of Remington Arms Company, Inc., DM-1, Bridgeport 2, Conn.



Electric Impact Wrench
UL and CSA approved

Remington *Mall*

MALL TOOL COMPANY . . . Division of Remington Arms Company, Inc.,
Bridgeport 2, Conn. In Canada: Mall Tool, Ltd., 36 Queen Elizabeth Blvd., Toronto, Ont.

NEW KIT CUTS A 4.5-HOUR MAINTENANCE JOB TO 3.9 HOURS

OPERATION	TIME IN MINUTES	
	STD.	IMPACT METHOD
Remove and replace pump.	30	27
Remove and replace casing and clean	17	7
Remove and replace shaft.	2	2*
Remove and replace impeller.	11	9
Remove and replace head bearing	10	9
Remove and replace grease fitting	4	4*
Remove and replace stuffing box and packing	12	11
Line up pump	46	46
Remove and replace bearing pedestal	7	6
Remove and replace bearing cap.	4	3
Remove and replace thrust bearing	6	5
Remove and replace oil ring	2	2*
Remove and replace drain plug.	2	1
Remove and replace oil	3	3*
Line up pedestal	12	12*
Remove and replace suction flange and clean	22	16
Remove and replace discharge flange and clean	11	9
Remove and replace motor.	13	10
Remove and replace coupling	15	12
Fabricate head gasket	8	8*
Ream and fit impeller.	13	11
Clean pump base.	5	3
Paint pump	18	18*
TOTAL	273	234

*Impact wrench not used.

Time saved with impact wrench:
39 minutes