DUPONT
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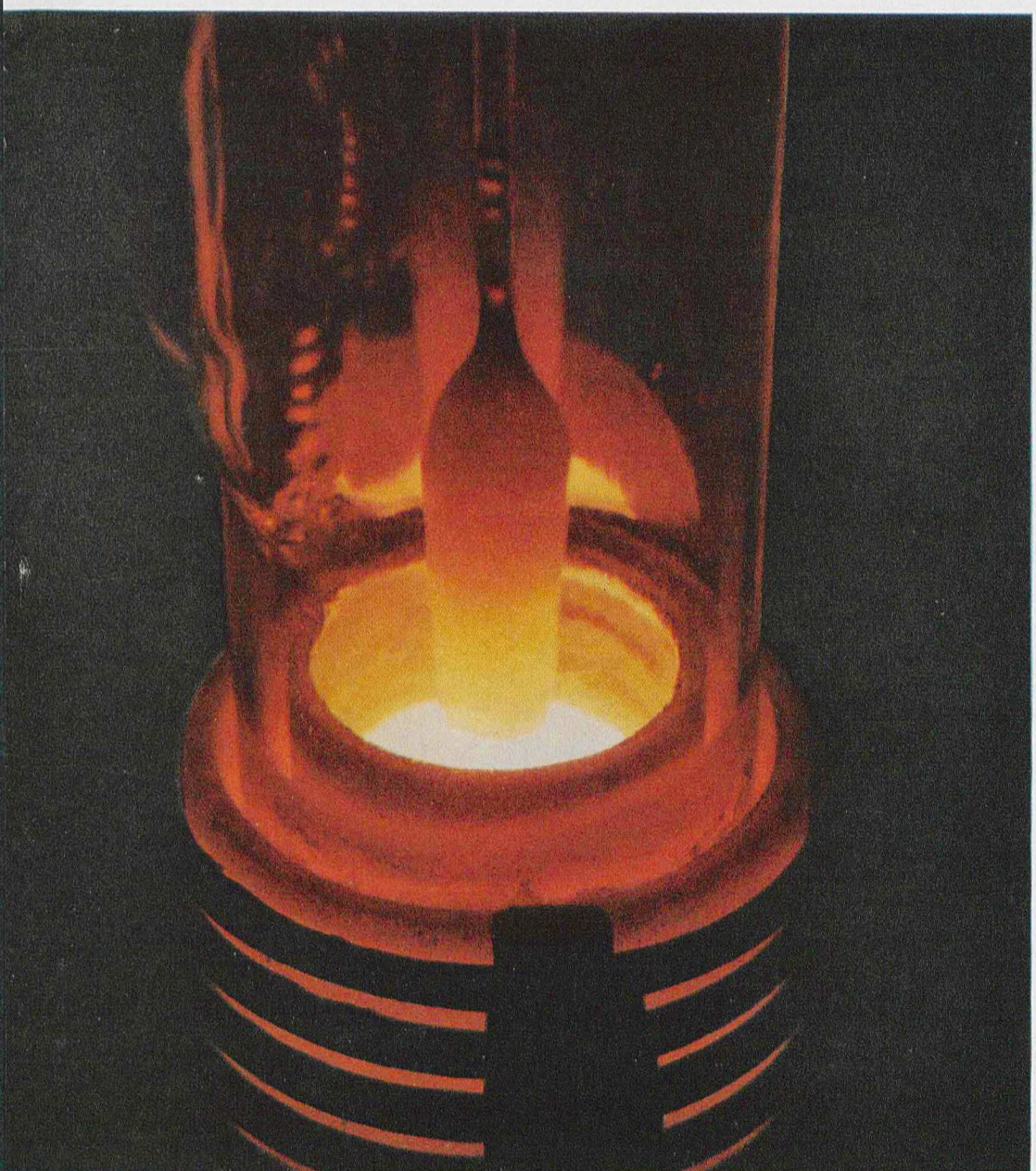
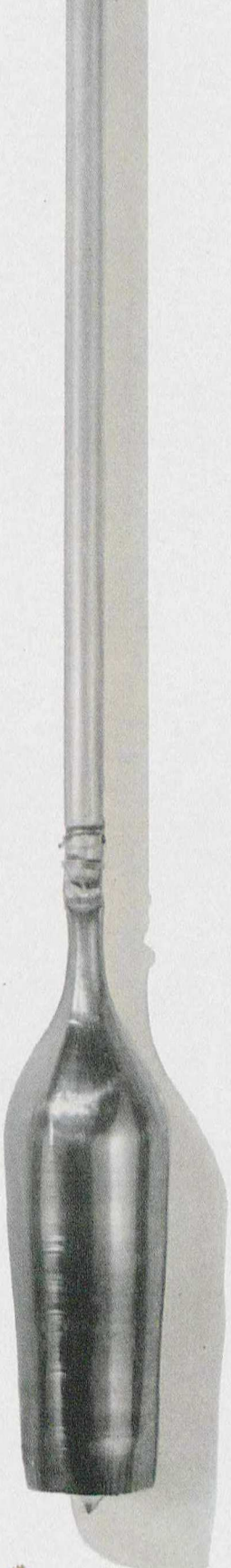
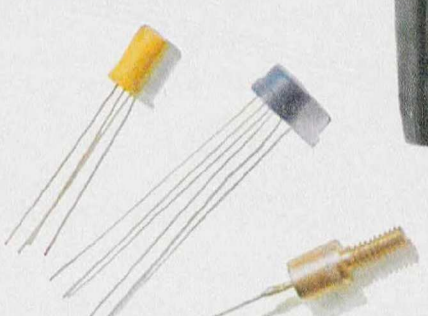




SILICON SEMICONDUCTORS



DUPONT
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BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*



Photographed at John Wanamaker, Wilmington

She wanted to wait for Santa . . .

but she's off to sleep. We suspect, though, that she'll find him. And whether it's Christmas Eve or some less magic night, the bed in which she sleeps is a dream-come-true for child or grownup.

Sheets of Du Pont nylon with fitted corners stay smooth, even for active sleepers. Pillows and comforter, filled 100 per cent with "Dacron"* polyester fiberfill, are exceptionally soft and easy to care for. The washable blanket of "Orlon"† acrylic fiber with nylon binding is warm as a fireside, yet light as a little girl's caress.

Have you considered such gifts for the sleepers on *your* Christmas list? You'll find pillows, comforters and blankets made with Du Pont fibers at most stores where quality bedding is sold. Look for the tag or label that identifies the Du Pont fibers used in these many fine products.

DU PONT
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*DACRON is Du Pont's registered trademark for its polyester fiber.

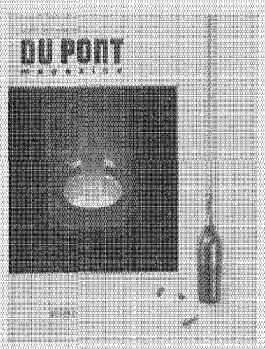
†ORLON is Du Pont's registered trademark for its acrylic fiber.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

M A G A Z I N E
VOLUME 51 NUMBER 6

OUR COVER

That fiery glow you see through the quartz walls of the furnace on this month's cover comes from a molten pool of Du Pont hyperpure silicon, 2,650°F. hot. But it isn't nearly so "hot" as the semiconductor devices—transistors, diodes and rectifiers—made from the solidified crystal in the lower right-hand corner.



These precocious electronic babies helped get our nation's missile program off the ground, and now they promise to simplify automation. Their life is potentially limitless; about the only way you can kill them is to damage them mechanically or break their hearts by forcing them to do jobs they're not rated to do. For much more about silicon, turn the page to our lead article.

MODERN COLOSSUS

A recent visitor to our editorial offices informed us that the sun may be heating our bath water sooner than we think.

He's John I. Yellott, executive secretary of the Association for Applied Solar Energy, which has its headquarters in sun-kissed Phoenix, Ariz. Yellott was just back from Salonika, where he had exhibited a new solar water heater at that city's International Trade Fair. The Greeks, impressed by the heater's 50-foot height and anxious to say so in appropriate local terms, dubbed it the Colossus of Thessalonica. The Colossus responded by heating 1,000 gallons of water to 140°F. each sunny day.

"Mylar" polyester film covers the heat-absorbing area of the device, Yellott told us, and a batting of "Dacron" polyester fiber keeps heat from escaping. New materials like the weather-resistant plastic film, he added, have cut the cost of solar heaters to the point where we should be seeing more of them soon. So saying, Yellott walked out into the rain, Phoenix bound.

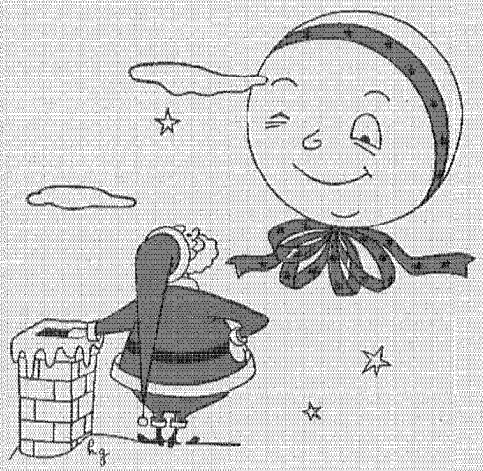
CLEARLY OUR DUTY

When Du Pont's Spruance plant at Richmond, Va., produced its billionth pound of cellophane recently, the statistician let his imagination run free. At standard mill width, he figured, that amount of cellophane (6,440,200 miles of it) would extend to the moon and back some 13 times.

Caught up in a holiday mood, we wrestled with the possibility of gift-wrapping the moon in that billion pounds of transparent film.

It turned out that the film simply wouldn't go that far. But it would encircle the moon with a splendid ribbon 900 miles wide, leaving another several hundred miles for a bow of truly magnificent proportions.

Which qualifies us, we think, to wish you a Merry Christmas in a very big way!



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of the future

. . . gets bigger every day as semiconductor devices prove their ability to take on more and more current-modifying jobs in electronics

By KARL WERLINE

"S — S — S — S — . . ." A modest signal, but one that heralded the coming importance of a fledgling electronics industry. The date: Dec. 12, 1901. The event: Guglielmo Marconi's first wireless message across the Atlantic Ocean.

Today, a half century and a good many messages later, electronics has grown into the nation's fifth largest industry, with sales and services last year adding up to $11.6 billion. In the last ten years alone, this business concerned with controlling the electron has quadrupled. Now such tiny devices as transistors, diodes and rectifiers are helping make it even bigger.

These so-called semiconductor devices are valves that control the flow of current through electronic circuits. Transistors "open" and "close" in instant response to minute control signals. Diodes and rectifiers pass current in one direction but block it in the other. By doubling for vacuum tubes, these midgets promise to simplify and improve the reliability of electronic units.

What's more, the compactness and low power requirements of semiconductor devices already have shown that they can cut weight drastically in aircraft and missiles and simplify electrical circuits in other fields. For industry these advantages mean that automation is ready to move out of the dream stage. Mechanization has provided America with the highest living standard in the world, but experts predict that only automation will keep it there.

Right now semiconductor devices made with silicon are finding a place in radio and television broadcasting equipment, machine tools, ultrasonic systems and computers. By next year they may even alter your kitchen stove or the generator of your car. Eventually, you'll see them wherever it's necessary to amplify current or change alternating current into direct current.

The semiconductor segment of the electronics industry got off to a small start during World War II, when DuPont made a special high purity silicon for use in radar. The silicon wasn't pure enough, however, for present-day transistors and diodes. Continuing to pioneer in the field, the Company in late 1951 succeeded in producing the first semiconductor grade in commercial quantities. Now it produces four grades of hyperpure silicon—three for semiconductors and one for solar cells. These are supplied to makers of electronics equipment, who convert the material into finished components.

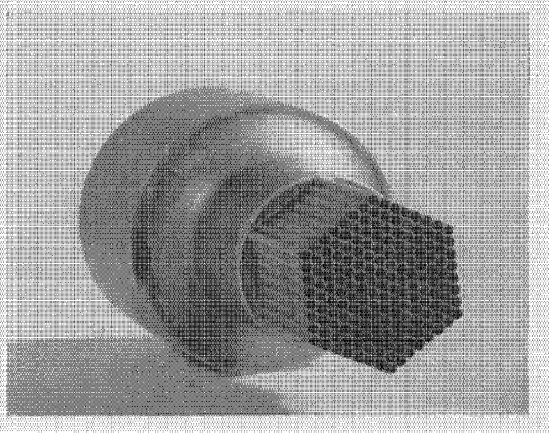
At Raytheon Manufacturing Co. in Waltham, Mass., for example, the first step is to make DuPont silicon electronically active. Traces of desirable elements are introduced into a molten pool of the material, and a solid single crystal about one inch in diameter is pulled from it.

This crystal is cut into thin slices by a diamond saw, and each slice is diced into segments as small as one-sixteenth of an inch. The latest method of dicing is with an ultrasonic tool, which cuts each slice into a number of tiny round wafers. The wafers are then assembled into components. Raytheon, one of the largest companies devoted exclusively to electronics, has already turned out more than 20 million semiconductor devices of all types. Recently, the company disclosed a new one, the spacistor, which promises to amplify frequencies up to 10,000 megacycles, or some 50 times higher than present transistors.

Since Raytheon began producing transistors in 1952, the semiconductor business as a whole has doubled and tripled annually. Sales last year amounted to $77 million; they promise to exceed $140 million this year. No one is



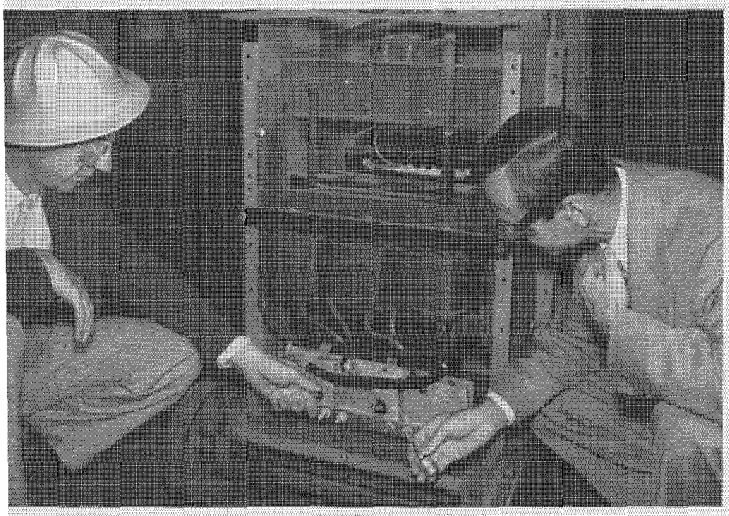
Single crystals of silicon are grown in furnaces like this. Operator is checking the temperature with pyrometer.



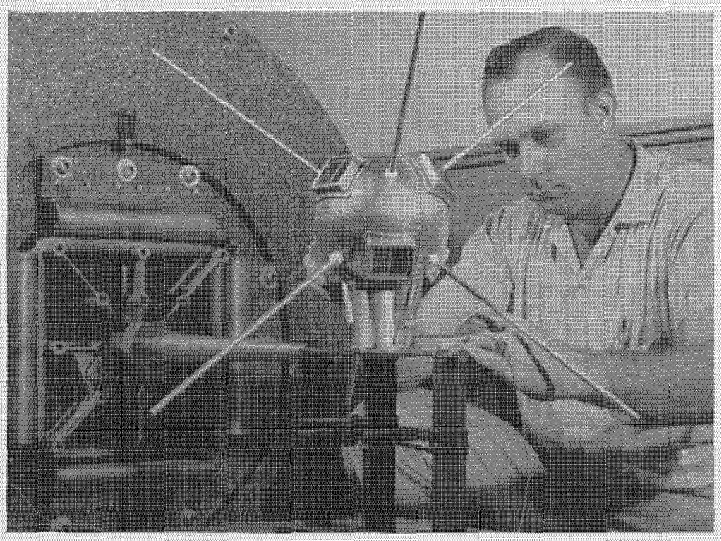
Next step is to slice crystals with a diamond saw and then cut slices into wafers. Latest method is to make wafers with an ultrasonic tool, right. This is Raytheon's.

rash enough to predict the size of the ultimate market, but many makers agree that in another ten years we'll wonder how we ever got along without these devices.

Raytheon makes a silicon power rectifier no bigger than a thimble, for example, that replaces a suitcase-size selenium rectifier weighing 30 pounds. Aircraft makers can use the space and weight saved to carry more payload or more fuel for longer flights. The weight saving is significant when you consider that a fighter may need nine pounds of fuel and structural parts for every pound of equipment it gets off the ground.



Silicon's phenomenal rectifying efficiency makes it a natural for d-c arc welding machines. This one uses six of them.



Another use of silicon: converting sunlight to electricity. Six solar cell units are mounted on test satellite.



Thanks to the miniaturization possible with silicon semiconductors, this F-94 is a flying computer.

Recently, Hughes Aircraft Co. of Los Angeles succeeded in making a silicon diode for use in the very fastest type of computer circuits. This should interest any manufacturer who wants to hook two machines together so that they act as one unit. The device rectifies current at temperatures where most other types fail. Consequently no bulky cooling systems are needed. Furthermore, its high voltage characteristic protects it from a blowout caused by accidental shorting of a computer. It's dependability like this that manufacturers are seeking before they're prepared to turn production over to computers.

Hughes scientists are convinced that future devices will have still higher operating limits and be put up in correspondingly smaller packages. Right now they're working with silicon fragments only 10,000 atoms thick, or about one-thirty-fifth the thickness of this paper.

Another advance, scored last year by Westinghouse Electric Corp. at Buffalo, N. Y., is a direct current arc welder using silicon rectifiers. Its efficiency is a phenomenal 98 per cent. Performance tests, Westinghouse says, show that a 400-amp silicon welder costs $77.20 less to operate annually than a selenium welder. This is based on a 60 per cent duty cycle for 2,080 hours.

CONVERTS SUN'S ENERGY, TOO

Silicon has the ability not only to amplify and rectify current, but also to convert sunlight to electrical power on a practical scale. Photons of light energy penetrate the material's surface and cause a current to be generated. Bell Telephone Laboratories scientists demonstrated this in a practical telephone application in 1954.

The Hoffman Semiconductor Division of Hoffman Electronics Corp., Evanston, Ill., currently the only commercial maker of silicon solar cells, has advanced the science to a stage where all the power needed to run the electrical equipment of a modern home could be derived from a solar-shingled roof. A dollar barrier keeps the roof from becoming a reality right now, but costs are shrinking steadily. Several years ago silicon sold for $430 a pound, while today Du Pont is selling a solar cell grade for $100.

Earlier this year, at a symposium on solar energy, Hoffman revealed a 400-cell solar energy converter that develops 25 watts of electrical power. It was designed for such uses as powering unmanned radio transmitters, telephone relays or remote weather stations. Used with storage batteries, installations could run continuously and unattended.

Other Hoffman solar cells cause sunbeams to operate portable radios, electric fences, flashlights, clocks, toys and navigational aids. Barring mechanical damage, Hoffman reports, the solar cells will last indefinitely.

There's plenty of silicon for all these uses. Unlike fossil fuels and uranium, found in limited supply, silicon is the second most abundant element in the earth's crust. Along with many electronics manufacturers, Du Pont is betting on its future. The Company now is building the nation's first full-scale hyperpure silicon plant on a 10,500-acre tract of rolling timberland near Brevard, N. C. It will be able to produce 50,000 pounds of semiconductor grade and 20,000 pounds of solar cell grade silicon yearly. Production is scheduled to start early in 1958.

TAMING A CHEMICAL WILDCAT

Of little use by itself, highly reactive chlorosulfonic acid is turned into dozens of products that in some way touch the lives of almost everyone

Put through its paces by a skillful handler, a trained jungle cat chills and thrills, as the circus posters say, and becomes a useful article of commerce. Without the transformation caused by extensive training, however, a wild beast has only a limited value. Some basic chemicals are like that.

With chair, whip and pistol, figuratively speaking, chemists have uncaged chlorosulfonic acid and trained it to jump through hoops. From it they have managed to elicit a number of desirable responses, ranging from death in the form of miticides to life in the form of sulfa drugs.

A highly reactive chemical, Du Pont chlorosulfonic acid almost always works in conjunction with other materials. In the field of organic chemistry, it is used principally in three processes, yielding dozens of products so familiar we take them for granted.

Sulfa drugs, for example, credited with saving the lives of thousands of soldiers during World War II, are produced by a complex chemical process called chlorosulfonation. They came into being in the late '30s and early '40s, a period when chemotherapy made a greater advance than in all previous history.

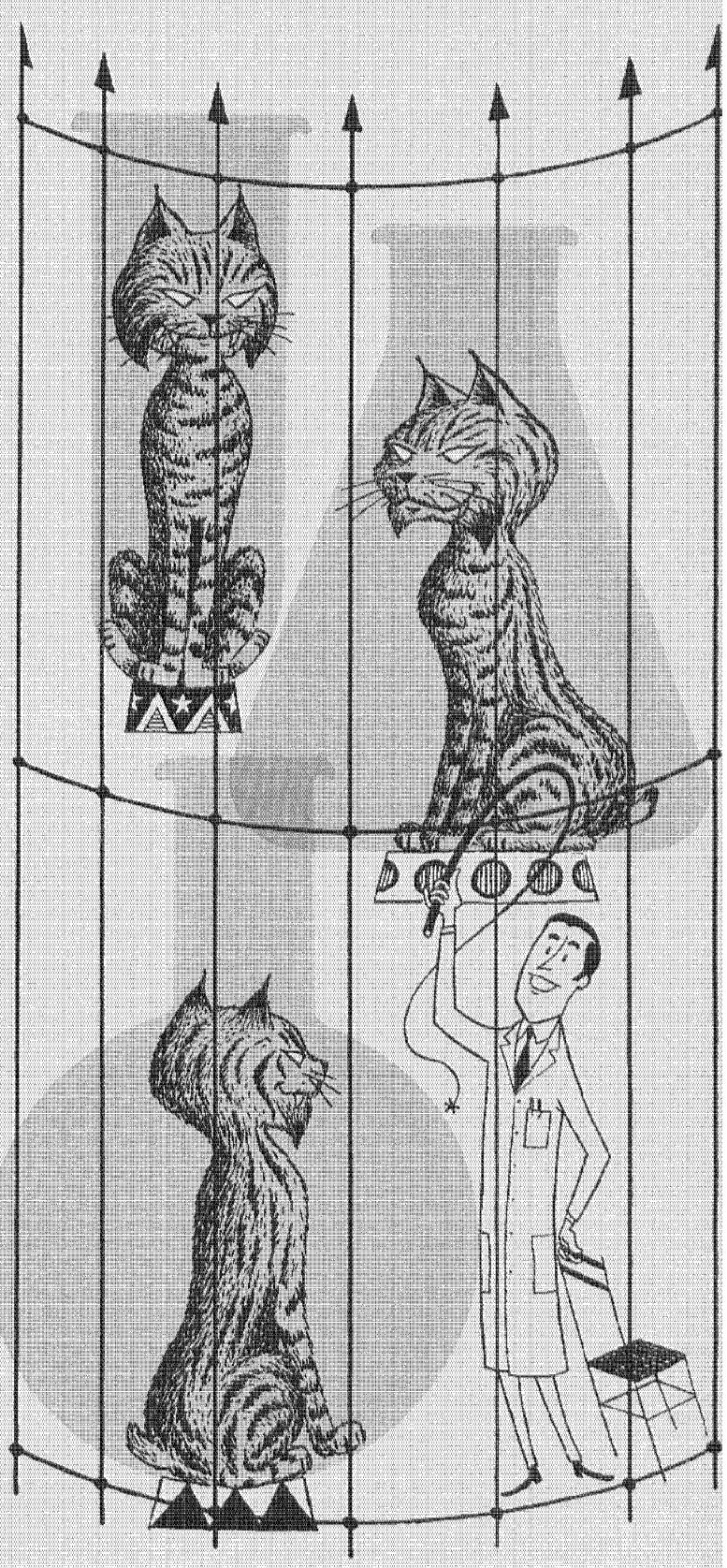
LIFE FOR MAN, DEATH FOR MITES

One of the most important tools in the chemist's bag of tricks, chlorosulfonation also leads to such products as miticides, sponge rubber blowing agents and water disinfectants. The new miticides are especially valuable because they do not kill important insect predators that help in the mite-control problem.

Another process involving chlorosulfonic acid, called sulfonation, results in intermediates for dyestuffs, wetting agents, water softeners and leather tanning agents. Chemists like to use the acid in these reactions for several reasons: It gives high yields of the desired products. Instead of water, HCl is produced as a reaction by-product. This passes off as a gas and is usually recovered.

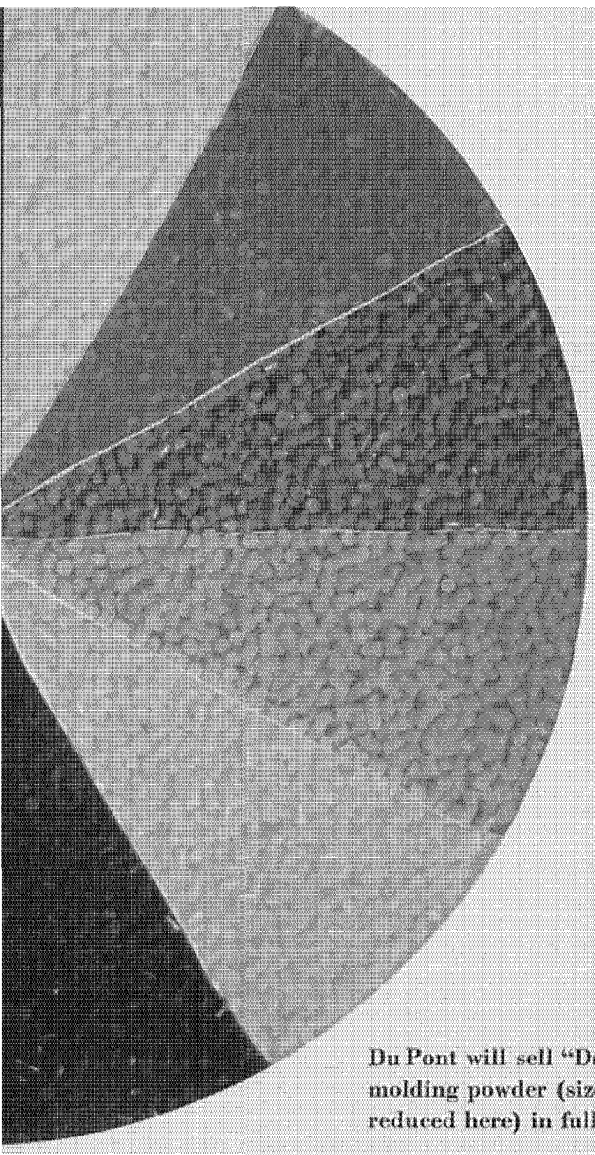
The third application of chlorosulfonic acid is as a sulfating agent. Widely used by cosmetic manufacturers, this process results in high-quality shampoos and detergents. Most sulfation processes using chlorosulfonic yield a minimum of unwanted by-products.

These listed products by no means exhaust the possibilities of the clear, straw-colored liquid. Its ringmasters range from the armed forces, which put it through its paces as a potent smoke screen, to the many industries that use it as a vigorous dehydrating agent. One fact stands out clearly, however: Chlorosulfonic acid isn't fully domesticated. The skilled hands and heads of chemists are still working away at taming it.



3 NEW

THIS IS "DELRIN"



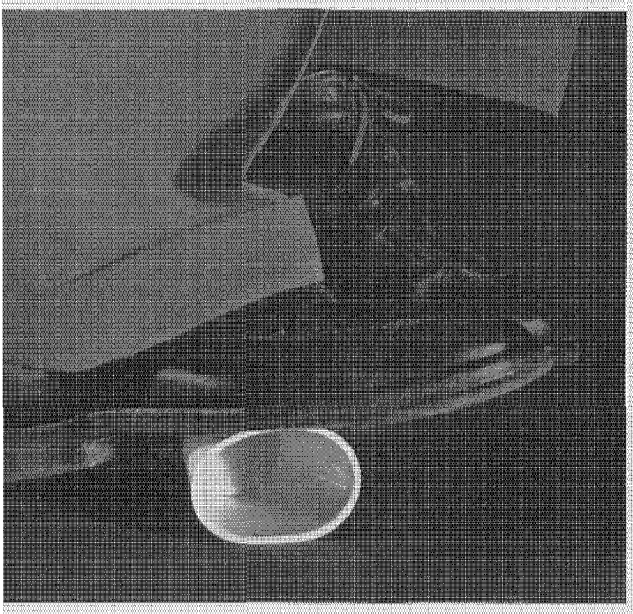
Du Pont will sell "Delrin" as cylindrical molding powder (size slightly reduced here) in full line of colors.

Du Pont has converted one of the old industrial organic chemicals into a plast —"Delrin" acetal resin—that promis to do more jobs than any now in us The new material, made from formald hyde, has a combination of mechanic properties unmatched by any other the moplastic.

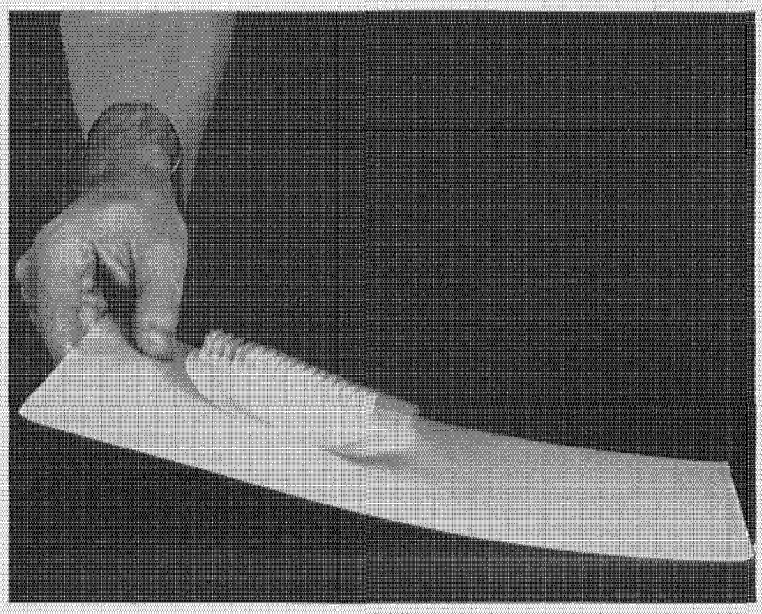
"Delrin" approaches metals lil aluminum and zinc in strength a toughness. It resists chemical and m chanical forces over a wide range temperatures. Yet it is fabricated wi conventional plastics equipment.

More than three years of in-u testing has established the new plastic versatility as an engineering material. can be injection molded, extruded in pipe, rod, sheeting and other shape blow molded into bottles, and machine from rods, cylinders or discs.

By 1959 you can expect to see pro ucts made of "Delrin" in homes, aut mobiles and business places. Commerci production is scheduled to begin th



"Delrin" is strong and resilient



... has low coefficient of friction



...

PLASTICS

Production schedules are announced for a promising trio:

- *A formaldehyde-derived plastic that promises to stake out a broad claim*
- *A new fluorocarbon resin that's easy to mold*
- *A linear polyethylene, stronger and more rigid than the branched types*

year at a new Du Pont plant near Parkersburg, W. Va. Meanwhile, the limited pilot-plant supply of the material is being used to continue a field evaluation program on promising end uses.

The new plastic has excellent tensile strength and stiffness and holds its size and shape well in water, air or organic solvents, even at elevated temperatures; it resists creep, abrasion, staining and the chemical action of solvents; it recovers quickly from deformation and has a very low coefficient of friction.

Additionally, "Delrin" can be produced in an unlimited number of colors and, apparently because of its high crystallinity, displays a sparkle and brilliance that color alone doesn't produce. It also can be painted and vacuum metal coated, although its own hard, satiny surface is pleasing to the touch.

This blend of properties is expected to open up many uses for "Delrin" in the automotive, plumbing, appliance, packaging, hardware and industrial fields, as well as in consumer products. It already has performed well in tests as engine timing gears, valve parts, dishwasher components, thin-walled bottles, bearings, typewriter cams, water sprinkler parts, football cleats, combs and other items.

"TAILORED" POLYMER

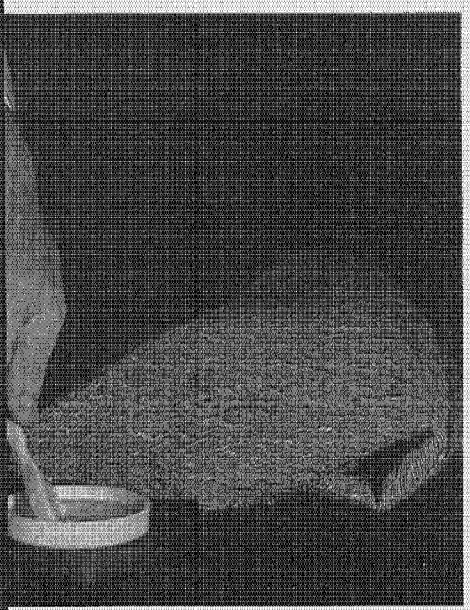
"Delrin" is a specially tailored long-chain polymer of formaldehyde. It represents no sudden, isolated discovery, but was developed systematically by Du Pont chemists.

Polymers of formaldehyde were noted when the compound was synthesized 90 years ago, and a study of them in the 1920s laid part of the foundation of modern polymer science. Earlier long-chain polymers of formaldehyde were too weak and unstable to be valuable as plastics, but their theoretical possibilities were established by a Du Pont fundamental research study that began in 1939, was interrupted by World War II, and resumed in 1948. This work led to the discovery of more stable high molecular weight polymers and a method for making them in quantity.

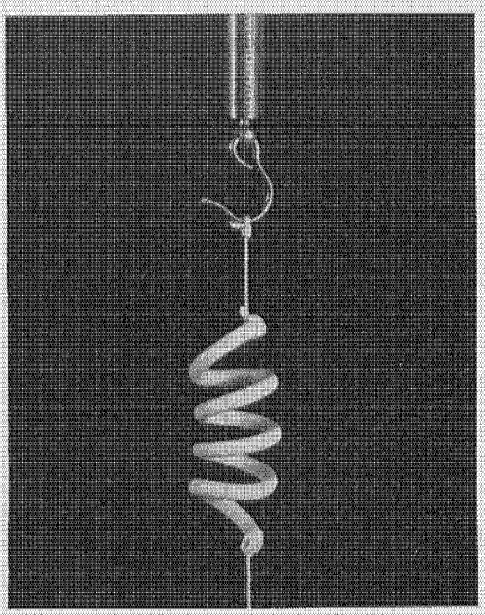
Progress was slowed, however, by the many problems of working with the intractable formaldehyde molecule. "Formaldehyde," a Du Pont chemist notes, "is one of the most reactive organic compounds known. You can think of it as a sort of restless chemical chameleon, polymerizing or changing into other compounds with annoying facility."

Du Pont gambled on the soundness of the researchers' estimates by forming a large technical task force to untangle some of the remaining mysteries of formaldehyde. In two years this group created what was to become "Delrin"—a polymer of very long chains made up of 1,500-odd formaldehyde molecules. The task force went on to devise a workable manufacturing process that is now being translated into reality to keep that promise of delivery in '59.

continued next page . . .



ents (bowl, brush handle of "Delrin")



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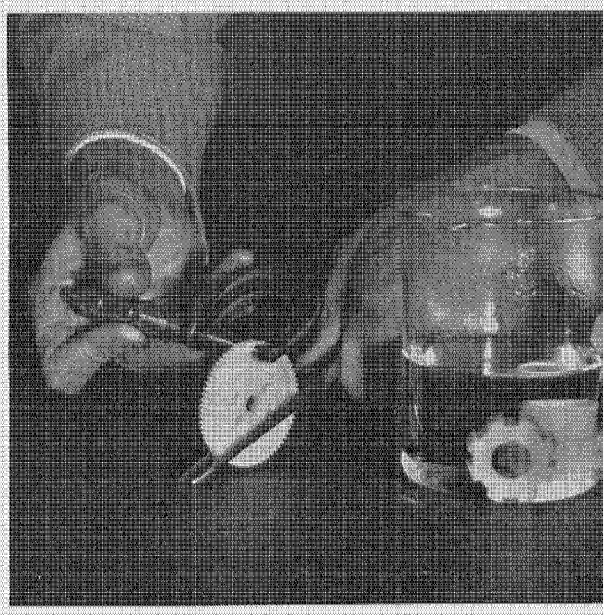


. . . and has dimensional stability (beaker holds wa

A TEAMMATE FOR "TEFLON"

New "Teflon" 100-X perfluorocarbon resin, described by a Du Pont chemist as a plastic that "knows when it's melted," promises to extend the unique benefits of the fluorocarbons to many new users.

Production of the resin is scheduled to begin on a commercial scale in 1959 at a new plant at Parkersburg, W. Va. Experimental quantities are available now for evaluation.

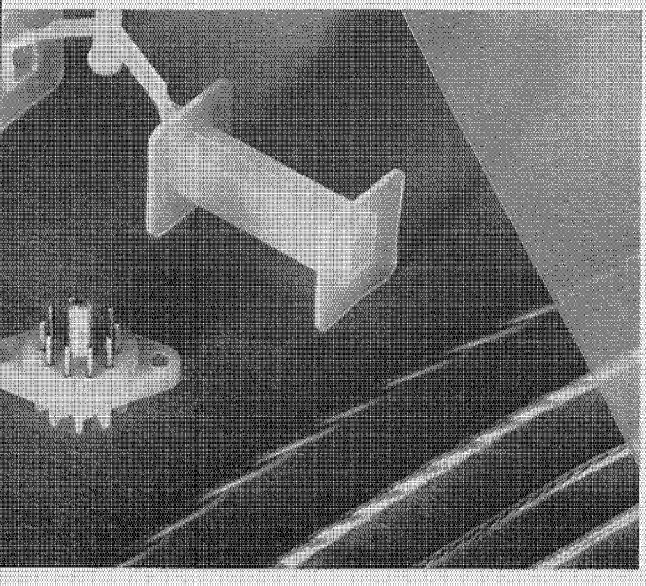
Unlike "Teflon" tetrafluoroethylene resins, the only members of the fluorocarbon family previously sold by Du Pont, new 100-X has a melt viscosity comparable to those of standard plastics. This makes extrusion and molding easier.

Like the earlier product, however, the new resin has no known solvent, is inert to practically every chemical, weathers very well and remains useful at temperatures well below and above zero. It absorbs essentially no moisture and has an extremely low coefficient of friction.

"Teflon" 100-X—chemically it is fluorinated ethylene propylene—is capable of continuous service at 400°F. and in some cases higher. This is about 100 degrees below the maximum for tetrafluoroethylene resins. Its other use properties, though, are essentially the same as those of the older material.

Easily extruded onto wire, it's expected to be particularly important as primary insulation and jacketing in the electronics and aircraft fields because of its excellent dielectric qualities, toughness and high-temperature performance. It can be fabricated into complex wire and cable constructions, printed circuits, coaxial cable cores, molded electronic components and the like.

"Teflon" 100-X also excels as hose, tubing and bottles for corrosive chemicals and as bearings and mechanical parts. In the form of heat-sealable film, which will be manufactured by Du Pont's Film Dept., it is promising for such uses as electrical insulation, corrosion-resistant linings, solar stills and greenhouses.



Tube socket, coil forms, coated wires and sheet demonstrate ease of processing new "Teflon" 100-X.

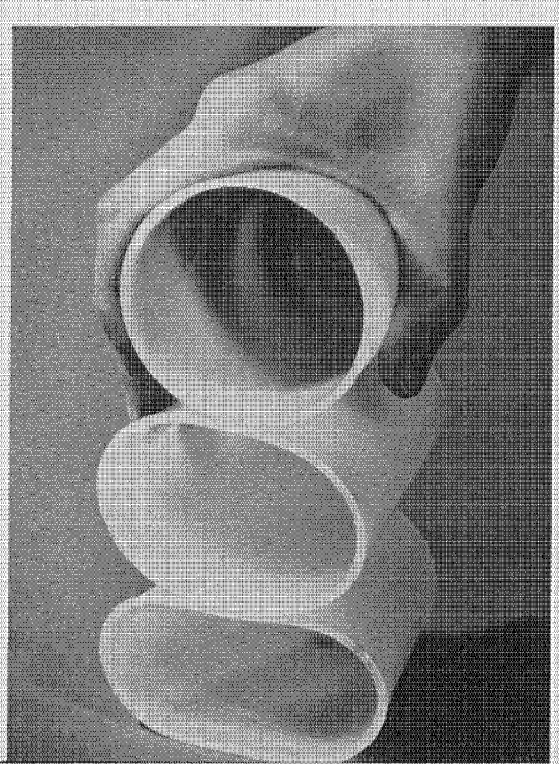
"ALATHON" with FEWER BRANCHES

Commercial production of a new type of polyethylene by a specially developed Du Pont process is expected to begin in 1960. The program hinges on approval of designs now being drawn up for a proposed plant near Laplace, La.

The new plastic, "Alathon" linear polyethylene resin, is so called because its long molecular chains have very few side branches. This virtual absence of side chains results in greater crystallinity. Present Du Pont "Alathon" is the conventional branched type.

The higher crystallinity of the linear poly gives it greater strength, stiffness and heat resistance, with correspondingly less pliability and toughness than the earlier type. The new Du Pont process, sought since the Company first synthesized linear polyethylene in the laboratory some ten years ago, makes possible the production of resins with an unusually broad range of properties.

Major uses for the new material are expected to include stronger, stiffer molded objects, fiber for industrial and automotive fabrics, pipe, wire and cable insulation, film, paper coatings and thermoformed containers. Experimental pilot-plant quantities of the resin are being produced at Du Pont's Sabine River Works, Orange, Texas.



Flexibility demonstration shows a major difference between linear polyethylene (top tumbler), branched types.









Lewine, in sport coat, is CBS producer of four "specials" for Du Pont this season. Bob Cummings, above, Paul Ford and Jeannie Carson have roles in upcoming "Junior Miss."

THE BIRTH OF A TV "SPECIAL"

A musical version of Broadway's "Junior Miss" is the next Du Pont "Show of the Month." Producer Lewine has worked since May on what will occupy your screens for a fleeting 90 minutes

The prodigious rate at which television gobbles up material is illustrated vividly by an original TV musical like "Junior Miss," the live production you'll be seeing—in color, if you're equipped—on the Du Pont "Show of the Month" December 20.

"Junior Miss" will require as much preparation and involve as many people—about 150—as any two-hour stage musical. It must be written, scored, choreographed, cast, costumed and rehearsed. Yet the melding of these elements into a smoothly running whole must be done in a bare fraction of the time that Broadway would devote to it.

"Instead of an out-of-town tryout lasting for weeks, we'll have one walk-through and a dress rehearsal before an audience," says the producer, Dick Lewine of CBS. "But when we go on camera some 40 million people will be watching us. Consider that a stage musical would have to play continuously for 80 years in a good-sized theater to reach an audience that large."

Lewine, who is producing four of the ten 90-minute live shows Du Pont is sponsoring this season, started in show business as a composer-pianist. He joined CBS in 1949, producing Noel Coward's three TV programs and last spring's dazzling "Cinderella" for the network.

The idea of doing a musical adaptation of "Junior Miss" has been with him for some time. When Du Pont decided on its "Show of the Month" series, the hit play about a teen-ager's antics was one of the first selected.

Lewine began work on the project in May by lining up Burton Lane to do the music and Dorothy Fields the lyrics. Lane wrote the music for "Finian's Rainbow." Miss Fields, says Lewine, "is one of our most accomplished lyricists. Best of all, in my mind, is the fact that she has teen-age kids of her own. She knows how they talk."

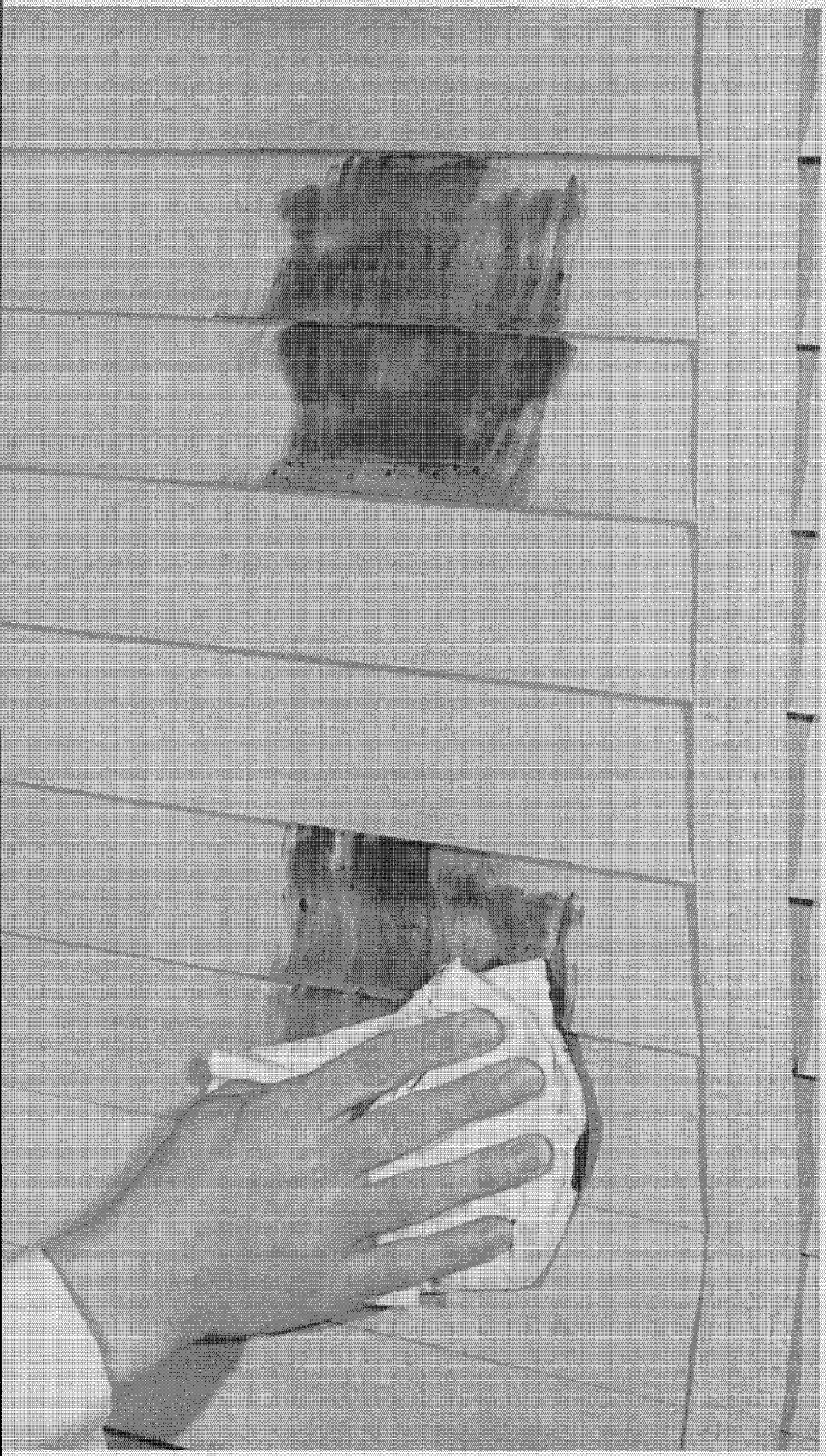
Lane, Miss Fields, Lewine and the scriptwriters got together for an all-day session in June. They agreed on the song spots and roughed out the kind of show this was to be—in Lewine's words, "a funny, warm, family story that millions of people could identify themselves with."

By July, with a rough draft of the script in hand and some of the show's songs already ringing in his ears, Lewine turned to casting, one of the more hair-raising aspects of his job. What with prior commitments, restrictive contracts and the like, signing a cast today often resembles a game of blindman's buff.

The first actor engaged was Robert Cummings, who will play the father of 15-year-old Judy. Cummings couldn't come to New York, however, so the decision was made then to originate the program in Hollywood. Anxious weeks followed as other top roles were filled. Lewine conceded that casting probably wouldn't be complete until rehearsals began in Hollywood December 3.

On the West Coast meanwhile, Director Ralph Nelson, an Emmy award winner, was hiring a musical director, costume and set designers, a lighting director and the other specialists who help create a show. Coast-to-coast phone conferences, some lasting two and three hours, kept producer and director advised of each other's doings.

Five days before the show, said Lewine, the actors, singers and dancers will perform together for the first time. This walk-through rehearsal before a picked audience will give the director guidance for last-minute script polishing. Finally, on the 20th, comes dress rehearsal and, a few hours later, the first—and last—performance of an original musical show designed expressly for television.



Dus

This

Stardust has its place, of course, but a determined battle has just been won to make a certain Star no place for dust.

The one in question is Eastern's Star, a new venetian blind developed and manufactured by Eastern Products Corp., Baltimore. Its 2½-inch-wide steel slats, viewed from the end, are S-shaped.

"We knew that in Eastern's Star we'd created a blind with outstanding features," reports the company president, Harry Rosenbaum. "The wider slats make for better visibility when open, and their new shape locks out light when they're closed. But we wanted an additional feature that design couldn't achieve—a soil-resistant surface that the housewife could clean more easily. For that, we turned to Du Pont for help."

It was a logical move, notes Rosenbaum, because for years "Dulux" enamel has decorated and protected Eastern products, and it already had been selected as the finish for the Star model.

Another Du Pont product—"Ludox" colloidal silica—came to mind when Eastern determined to make the new venetian blind shrug off dirt.

"We'd like to know more about 'Ludox' and whether we can apply it in our finishing operation," an Eastern official told Du Pont's Grasselli Chemicals Dept. Don Dempcy of Grasselli provided some of the answers and Eastern's own engineers the others. Even the finest finish, Dempcy noted, has micro-

This, so help us, is an unretouched photo. Carbon black, rubbed down blind made especially for us by Eastern, simply does not stick to two middle slats treated with "Ludox".

nisses a blind date

ıetian blind is dirt-shy, thanks to its transparent coat of "Ludox" colloidal silica

scopic surface irregularities from which it's sometimes difficult to wipe dirt. Transparent "Ludox", he continued, creates a more uniformly slick surface that sheds such dirt with greater ease.

This was a new application for "Ludox". Working together, Eastern technicians and Du Pont representatives began ironing out problems that arose in adapting it to the manufacturing process. Full-scale production got under way only after many months of development work and testing at the firm's Baltimore plant.

"The Star has design advantages we can get across simply by demonstrating them," an Eastern official pointed out, "but we feel strongly that cleanability is the extra that will make the venetian blind almost universally accepted. That's why we were willing to invest in it."

The new blind, complete with its special ability to fend off dust, already has made a successful introductory appearance this fall in three Eastern cities. Components soon will be in the hands of franchised manufacturers all over the country who will custom-make the finished blinds.

All concerned are confident that buyers of venetian blinds will be grateful for the Star without the dust.

KNOW HOW

. . . to decorate a Christmas window

There must be a lot of holiday artists like young Jimmy, because last year four million sets of these stencils were in use by the middle of December.

The stencils, sold by Gold Seal Co. with its "Glass Wax" glass cleaner, are calculated to make holiday decorating as easy as finding a street corner Santa. Not the least of their advantages, either, is the way they keep children occupied at this busy time.

Using a Du Pont cellulose sponge, window trimmers young or old simply dab the glass cleaner over a stencil held against the inside of the window. It dries quickly, leaving a lacy design. The 1957 packet, offering 34 stencils as well as harmless dyes, is on display along with Du Pont sponges in most stores.

While Jimmy the Artist is using sponges in this novel way, Mother is using them, too, for her holiday sprucing up. Right now, for instance, she's polishing silver. And there'll be mountains of dishes to sponge clean after that big turkey dinner.

One more thing. Sometime after January 1, Jimmy—or Mother—will have a second go at that glass. As the designs are sponged off, there'll be shining windows to start the New Year.



Industry's answer man

Buyers of chemicals—Du Pont Elchem customers are the examples here—are often shopping for more than products alone. They want the kind of help that a technical service representative is trained to give

The telephone rang impatiently, as it often does in the district office of Du Pont's Electrochemicals Dept.

"I've been fighting a condition here that's got me just about licked," complained the paint maker on the other end. "My suppliers can't help me, my inventories are practically gone and I've got orders that must be filled next week. What can you people do for me?"

"We can send a technical representative. He's on his way over now," came the response.

The Elchem representative arrived, checked the process thoroughly and finally located the paint maker's trouble in the emulsion he was using. Then he phoned his office for supplies and reinforcements—several drums of "Elvacet" polyvinyl acetate emulsion, plus someone to give him a hand during the emergency.

Three work-filled days later, production was back to normal and loaded trucks once more rolled out of the plant. The paint maker heaved a sigh of relief. The Du Pont men checked out, their work done for the moment.

Troubleshooting naturally is a big part of the job of Du Pont's 600 technical service representatives. But it's not the whole story. As liaison men between the Company and those who use its products, technical representatives may find themselves designing a manufacturing process, helping order equipment or even training a new work force for a customer.

"The only thing they're not expected to do is raise capital for the man," was one deadpan comment we heard.

Technical representatives, of course, don't work alone. Eighteen Du Pont sales service laboratories stand ready to help them on jobs. If necessary, the research group that developed a product initially can be called in, too, thus bringing to bear on a single customer's problem the Company's entire technological experience in the field.

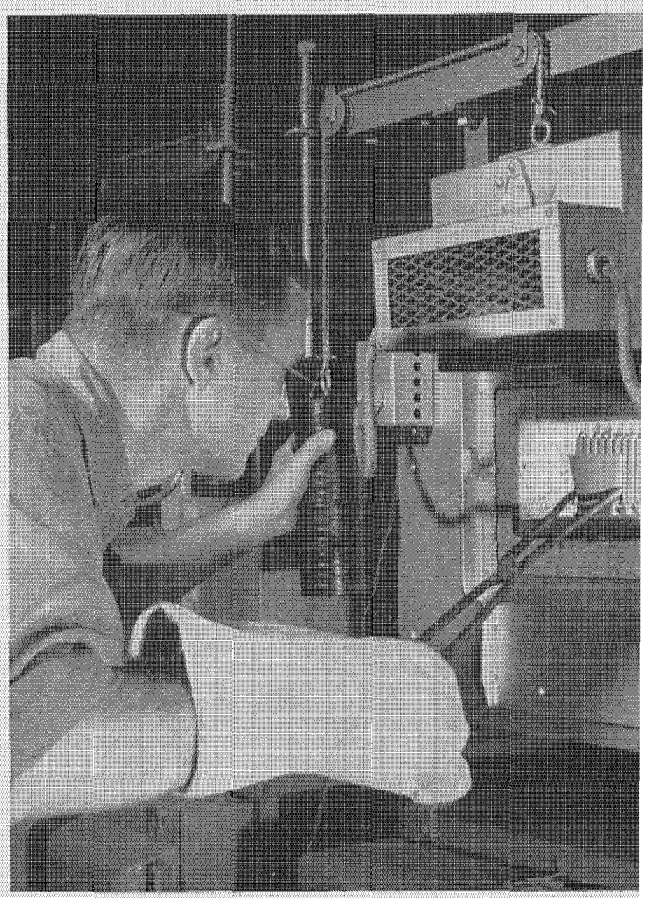
"Products that might interest users are often new ones for which no backlog of experience exists," says an Elchem spokesman. "Uses, handling techniques and associated processes may be almost unknown. It's up to our technical representatives to fill the void. We also help by calling on the skills of others in the Company if we have to."

A recent development at a midwestern textile mill traces a few links of this service chain. "I knew the mill's bleachery was outdated," said the Du Pont technical man in the area, "so I made several calls to tell them about our Solo-Matic single-stage bleaching process using 'Albone' hydrogen peroxide.

"Our proposal was studied, and the mill submitted samples of its gray cotton goods for a trial bleach in our laboratory. Results were

Elchem technical specialist, always available to help customers use product effectively, checks bleaching solution at Spring City Bleach & Dye Co.

Service laboratory helps with customers' problems, too. Here technician is test firing ceramic colors for pottery.





Pretty beer salesmen

Girls and a fleet of 1,000 brightly painted trucks have helped boost a Brooklyn brewery to No. 1 spot in the East

One of the charming girls pictured here will be declared the winner this month of an election that draws more votes in the U. S. than any other except the Presidential contest.

She will be the new Miss Rheingold, dimpled symbol of the beverages made by Liebmann Breweries, Inc., Brooklyn, N. Y. Store and tavern patrons in the New York area cast more than 23 million ballots this fall in the process of choosing her, and they'll be rewarded by seeing her smile from TV screens and hundreds of advertisements during the next year.

The first and probably most famous Miss Rheingold was Jinx Falkenburg in 1940. She also was one of the judges who picked this year's contestants. Unlike Jinx, most ex-Miss Rheingolds have retired from public life after their tour of duty.

"Miss Rheingold's job is to symbolize Rheingold beer and carry on the brand image of quality created for the product," a brewery spokesman explained. "You might say our delivery trucks have a similar advertising mission. The secret of their success is the colorful, distinctive impression they make on the street or highway."

Rheingold trucks have been finished with DuPont "Dulux" enamel in blue and yellow for the past 20 years, Liebmann said, "with complete satisfaction in the finishes' appearance and durability." The work has been done all that time at the refinishing shop of J. Witten in Brooklyn.

Long the leading beer in New York, Rheingold is now the top brand in the East, the brewery claims. Founded in 1854, when German brewer Samuel Liebmann emigrated to New York, the company is now directed by the fourth generation of Liebmanns.

President Philip Liebmann, acknowledging that astute promotion has helped put Rheingold where it is today, insists that product quality must come first. As he told a *Business Week* reporter recently: "In beer, people recognize quality. Any fool can get people to try a product, but keeping them depends on your quality."



Jolene Brand



Carolyn Stroupe



Madelyn Darrow



Robin Bain



Marylu Miner



Cathy Monahan



New arrival at Idlewild

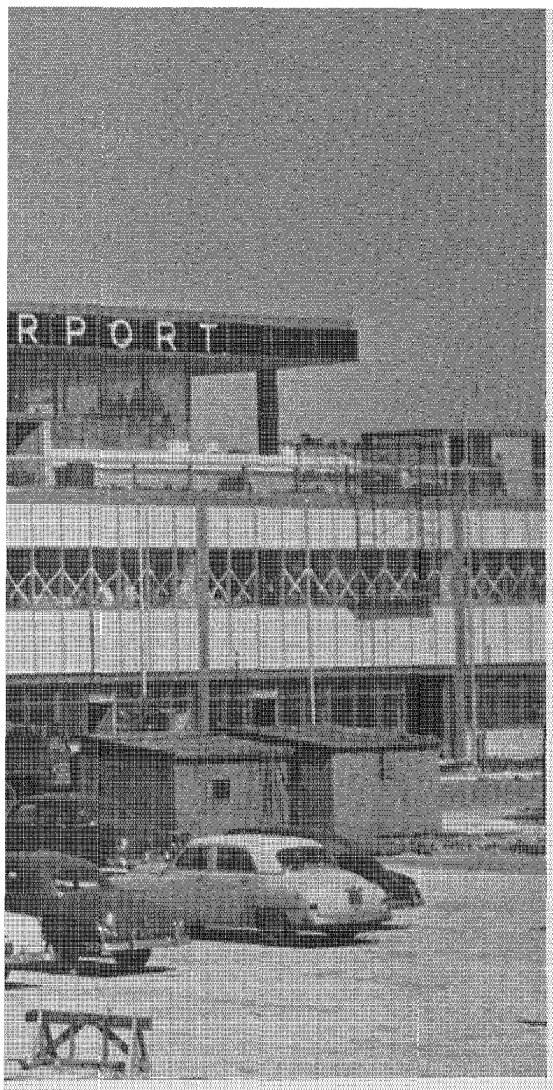
The $29 million Arrival Building at New York International Airport, its sleek glass sides sealed with Du Pont neoprene, is the centerpiece of tomorrow's Terminal City

Travelers entering the U. S. through New York International Airport, better known as Idlewild, can anticipate a brighter welcome once the nearly finished International Arrival Building is in service.

The huge structure, 11 city blocks long counting its two Airline Wing Buildings, will serve all incoming overseas passengers and those outbound on 17 flag airlines. Yet few travelers will have to walk more than 250 feet to or from their planes. Incoming passengers will be handled on the first floor, claiming their luggage quickly at supermarket-type customs checkout counters. The second floor is for outgoing passengers and visitors. Offices, a restaurant and an observation deck are on the top level.

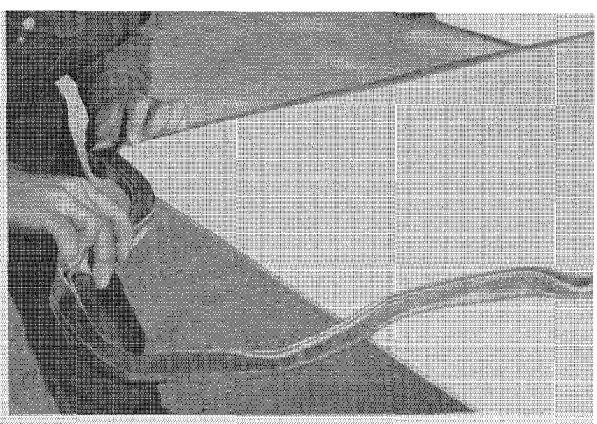
The $29 million Arrival Building is of special interest to architects because it's completely enclosed with thousands of glass and metal panels. This is curtain wall construction, in which thin panels enclose the building's interior much as a human being's skin contains the skeleton. To hold these panels in place, architects Skidmore, Owings & Merrill needed an inexpensive sealing system that would be long-lasting and leakproof.

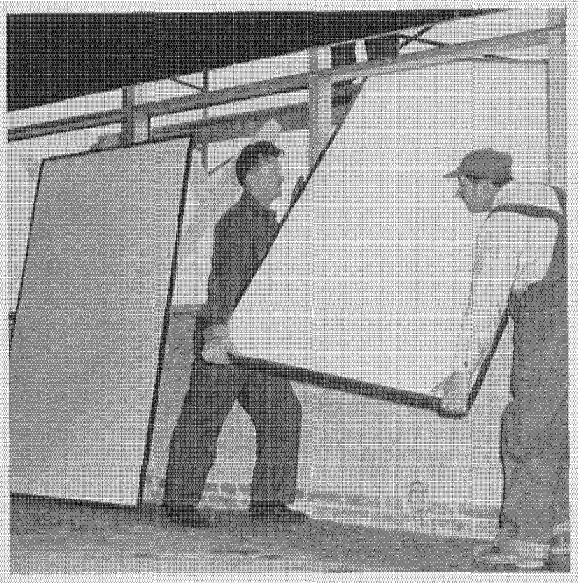
Leaks are a bugaboo, because walls of this type actually move slightly due to wind pressure and temperature changes. When they warm up in the morning, for example, different sections expand at different rates. The effect of this movement is most pronounced where the glass or metal joins the frame, and between adjacent frames. In some earlier curtain wall buildings the sealing system simply couldn't take this expansion and contraction, and tedious recaulking was necessary to seal the resultant cracks.



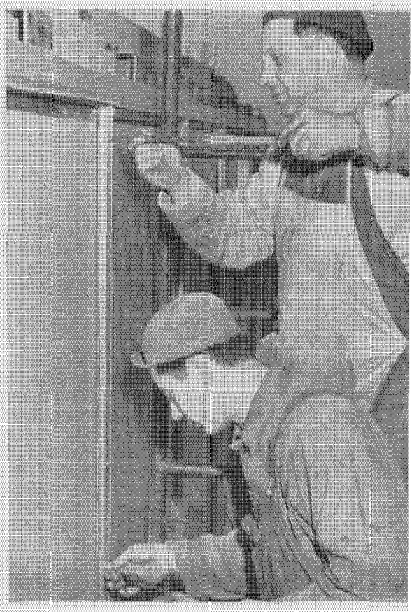
The Arrival Building required one of the largest contracts for glass in construction history.

Workman easily snaps one-piece neoprene gasket around a glass panel. Bands are U-shaped in cross section.





Gasket in place, glass panel is set into aluminum frame. Work goes rapidly.



Pressure stops are screwed down to compress gasket and seal pane.

Skidmore, Owings & Merrill's solution: a *dry* sealing system in which a resilient channel gasket is held under pressure to seal the windows and the glass spandrel panels. Of the various gasketing materials available, Du Pont neoprene synthetic rubber seemed to offer the best combination of properties.

NINE SEALING DESIGNS STUDIED

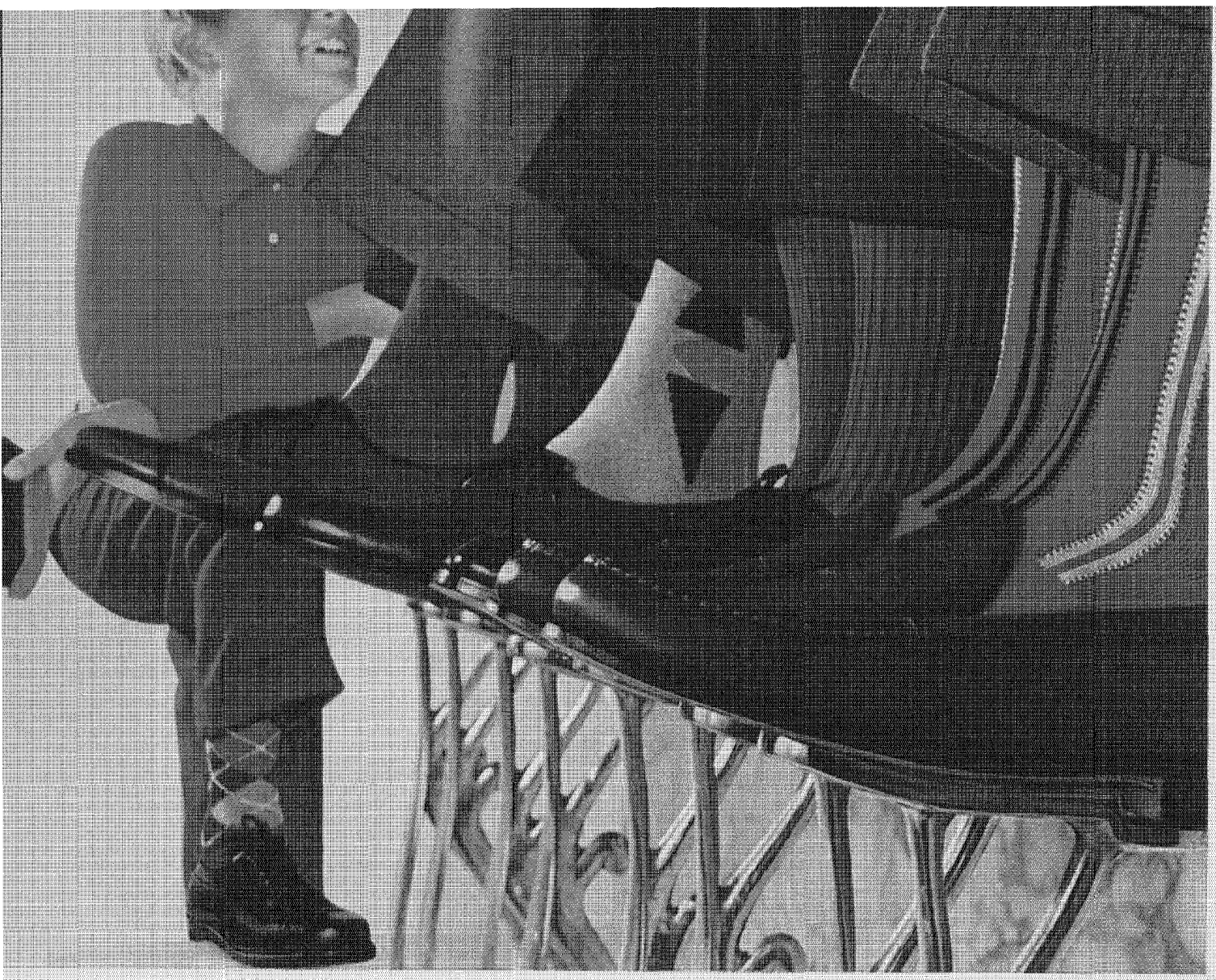
Consultations with glassmakers and with the glazier who would install the panels followed. All told, nine possible designs for sealing the panels were considered. Encouraged about neoprene's possibilities as a dry seal, the architects turned to Pawling Rubber Corp., which had had considerable experience with sealing systems. Work with Pawling engineers led to development of a continuous, U-shaped neoprene gasket. Du Pont technical men then helped Pawling work out a neoprene compound that met specifications, and production of gaskets began.

Each gasket arrived at the construction site as a unit and was easily snapped around a glass pane by one man. Once the pane was installed in the wall, an aluminum stop exerted pressure on the glass through the neoprene, making a tight seal. The resilient neoprene allowed the gasket to absorb thermal expansion and contraction of the glass and permitted the wall to flex under heavy wind loads.

"A big advantage as we see it," said a spokesman for the architectural firm, "is that the architect is better able to control the sealing system from his drawing board. Chances for human error in installation are kept to a minimum."

Because there's no caulking to be done, the job moves very rapidly. Costs are chopped considerably, too, especially when labor is included in the picture. Replacements aren't expected to be a problem, either, thanks to neoprene's resistance to sunlight, rain, snow and atmospheric gases. Abbott Glass Co., the glazing contractor, calls it the best and fastest glazing system yet.

While such details of construction are of interest primarily to architects, the millions of travelers who will use the Arrival Building annually can take pleasure in the result—a building worthy of the air age.



Enough for a billion feet

That's the annual output of men's hose. Many are stretch socks of Du Pont nylon

How many pairs of socks do you have? The National Association of Hosiery Manufacturers says U. S. males over 15 years of age averaged 10.8 pairs in 1956.

The Association doesn't break the figure down, but we have an idea that a fair portion of those 10.8 pairs went into bureau drawers during the Yuletide season. If you suspect that you're in line for socks this Christmas, here are some remarks you can drop casually within earshot of fair gift-givers to make sure you—and your sons—get what you want:

"Interesting item about a sock survey I happened to read the other day, dear. It claimed that about half of the men who go shopping for socks are looking specifically for nylon stretch socks. Imagine that."

"Tell Bud to stop raiding my bureau drawer; he always takes my last clean pair of stretch socks."

"My feet hurt. Seems like my socks are usually a half size too large or too small. If I had some nylon stretch socks I wouldn't be bothered with the problem. I understand they fit all sizes neatly."

"Nice pair of nylon stretch socks you gave me last year, honey. I could sure use more of them."

If these hints don't work—if Christmas morning comes and there are no stretch socks in your stocking—don't despair. Stores will still have the socks in 100 per cent Du Pont nylon or nylon blends, and they'll still be displayed in a variety of styles, colors and patterns. You can buy some as your gift to your feet.

IRA T. ELLIS, DU PONT'S ECONOMIST, SUMMARIZES THE BUSINESS PICTURE FOR THE YEAR ENDING AND TAKES A LOOK AHEAD ...



We are nearing the end of the most active business year this country has ever enjoyed. The U. S. economy in 1957 provided jobs for a record number of people who produced more, earned more and spent more than ever before in history.

Not every graph slanted upward, to be sure. There were declines in some areas; there are likely to be even more next year. It's probable that 1958 will not match 1957 in over-all business activity, although the long-term trend still points upward.

Here are some of the things that make 1957 a record-breaking year: Civilian employment will average about 65.5 million, a half-million above 1956. Personal income probably will be 5 per cent above 1956, the previous peak year. Spending by consumers may be up 5 per cent, too. Business spending for new plants and equipment will hit an all-time high, 6 per cent above 1956.

At the same time, the value of residential construction has slipped significantly this year, although it is still at a good level compared with any except the three previous years. Output of steel, building materials and home appliances also fell below the 1956 level; bond and stock prices skidded.

Prices of many basic raw materials were off this past year, while prices of manufactured goods and farm products rose significantly. Consumers paid steadily higher prices during the year for goods and services.

Rising prices are evidence of imbalances in our economy. Perhaps inventories are absorbing goods that should have been consumed. Perhaps demand exceeds supply in certain areas. Perhaps prices are rising because costs are rising. Actually, all three of these factors probably are at work.

The price of money rose in 1957, too. The high level of business investment, plus a high rate of individual borrowing for home mortgages and consumer credit, put a decided strain on the nation's credit supply.

The American people, to put it bluntly, are trying to borrow more than they are willing to save. The strain is reflected in this year's rising interest rates and "tight" money. Federal Reserve policy has been aimed at preventing this excessive demand for credit from developing into a rapid increase in our money supply, which would exert an upward pressure on prices.

BOON FOR SAVERS

Although interest represents a cost to the borrower, we shouldn't forget that it represents income to the saver. Interest earnings are rising for depositors in savings banks, shareowners in savings and loan associations, owners of life insurance policies, beneficiaries of pension and endowment funds, and individual owners of debt securities.

Many straws in the wind indicate that further business adjustments lie ahead in 1958. Although business activity next year probably will be below the 1957 level, no major decline is suggested. What we look for is merely the readjustment that usually follows several years of high business volume.

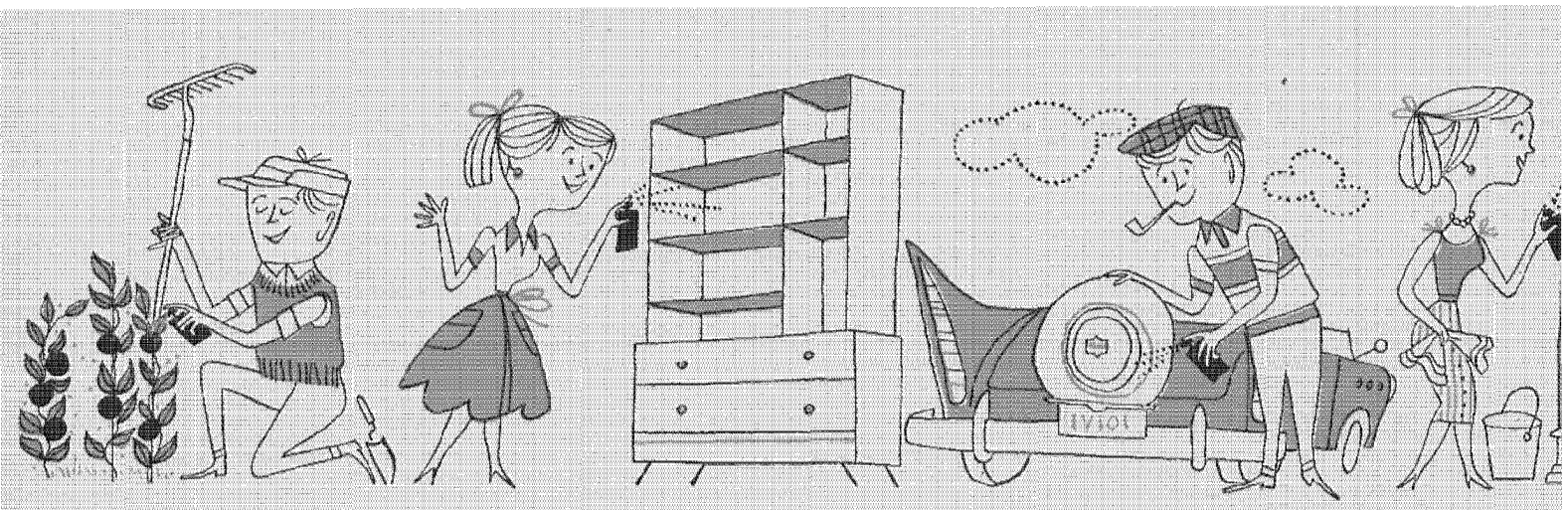
Business spending for new plants and equipment may have been pushed too rapidly. Significant excess manufacturing capacity in some industries suggests the need to re-examine expansion plans. Business spending may be cut next year, particularly in manufacturing, railroad transportation and the construction of stores, restaurants and the like. Public utility construction, on the other hand, probably will set a new record.

Next year looks like a good one for automobiles, home building and road and school construction—all financed heavily with borrowed funds. Because business borrowing probably will decline, however, there may be some easing in the total demand for credit.

The outlook also is favorable for a high level of consumer spending in 1958, particularly for nondurable goods and for services. These purchases closely follow the trend of personal income after taxes, and such income is expected to remain high next year.

Looking beyond 1958—and assuming no further increase in international tension—the trend of business activity should be upward. This is based on our rising population, advancing technology, and anticipated high level of investment in plants, homes, roads, schools and so on.

The rate of growth will not be steady from year to year; readjustments will wiggle the line from time to time. In short, we have not eliminated the business cycle, but perhaps we have learned to moderate it by restraining the excesses of credit creation, business expansion and inventory pile-ups characteristic of business booms.



Little-known

More push-button products exist than most of us know about, a Du Pont study discloses

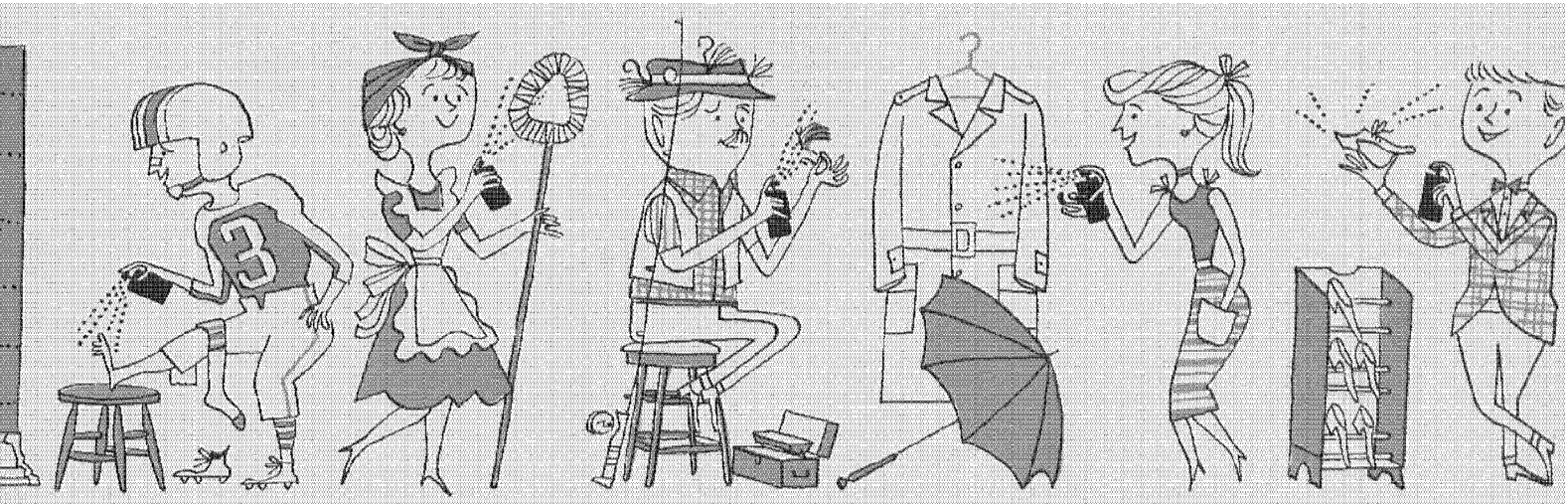
How many different aerosol product types have you used? Two, five, a dozen? How many have you heard about? If you're at all like the consumers questioned by Du Pont interviewers recently, you're acquainted with a bare handful of the more than 100 different products now put up in push-button packages.

Aerosol manufacturers have gone all out to make life easier for us, whether we realize it or not. Dad can use aerosols today for jobs ranging from lathering his beard to polishing his shoes. Mother's dressing table holds an aerosol hair lacquer and a mist cologne that has its fragrance locked in an airtight aerosol container. Even Pooch gets a break with a dog shampoo and an antiflea spray made for his comfort and his owner's convenience.

Have You Heard of These?

Adhesive tape remover
Antistatic spray
Athlete's Foot spray
Athlete's grip spray—for a nonslip grip
Auto tire sidewall cleaner
Cookware spray—to prevent sticking of food
Diaper freshener
Dry fly spray for fishermen
Dust mop spray
Dust repellent for furniture
Fur cleaner and lusterizer
Furniture wax
Garbage can spray—to control odor and insects
Girdle spray—to reduce friction
Special purpose silicones—including one that prevents grass sticking to lawn mower
Plant growth stimulator
Shoe polish
Suede refinisher
Water repellent





aerosols

By M. J. HEFFERNAN

Work is made lighter with such aerosol products as weed killers, mothproofers, furniture polish, auto polish, room deodorants, touch-up paints, silver antitarnish spray, oven cleaners and rust preventives. Minor household injuries get rapid first aid with aerosol burn preparations, antiseptic sprays and spray bandages.

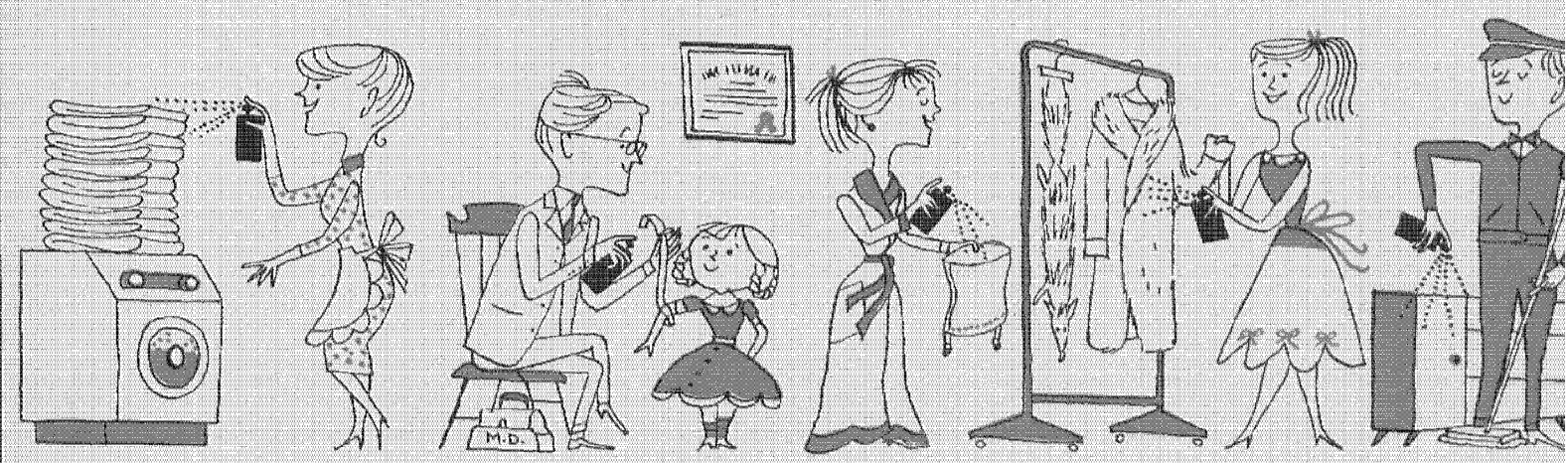
Du Pont, which manufactures the "Freon" propellent powering many aerosols, recently sponsored a study to find out what consumers think of them. Nearly 2,000 housewives across the country were queried on their use of 15 specific products in the pharmaceutical, household and personal product lines.

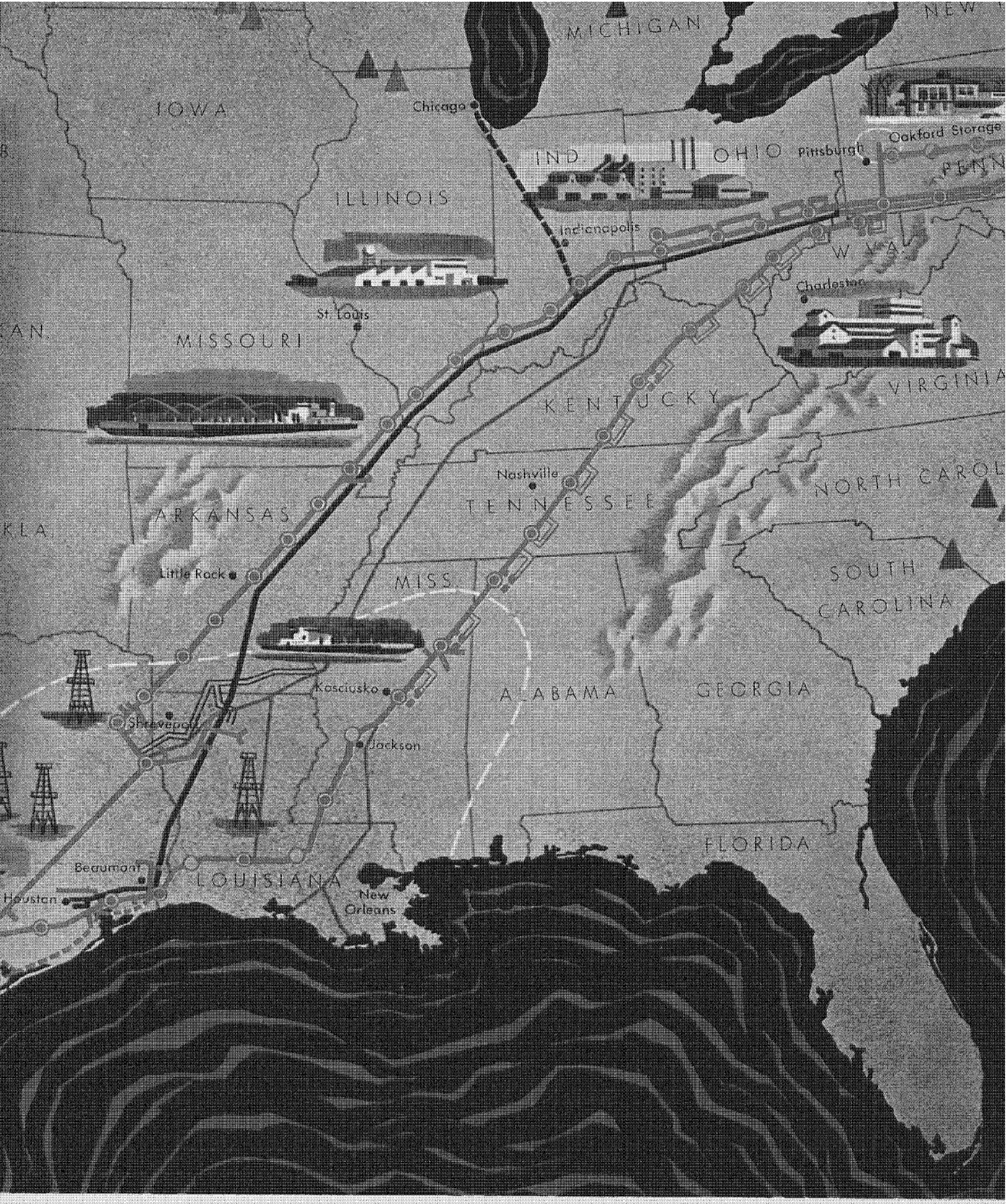
Cologne was one of the products studied. Those who had used it in aerosol form preferred this method of packaging three to one. Hair lacquer, the largest selling aerosol product today, was liked best in aerosol form by 95 per cent of those who had used it. Aerosol packaging also won the preferential nod for sun tan lotion and touch-up paint among housewives who had used these products.

Wherever aerosols had been tried, in fact, they were the choice of the majority of women, no matter which of the 15 specific products they were asked about. In a number of cases, however, consumers hadn't tried aerosols because they didn't realize a particular product was available in that form. Put these two facts together, and you conclude that a large, untapped market for aerosols still exists.

An estimated 400 million aerosols will be produced this year, 75 million more than in 1956. Just five product types—insecticides, hair lacquer, room deodorants, paint and shaving cream—account for 80 per cent of the sales. It's logical to suppose that some of the 100-odd remaining product types have what it takes to match the records of the five currently at the top, especially in view of the public penchant for push-buttons.

If you're one of those who like aerosols, keep a weather eye out for those you may not have known existed. If you manufacture products that might be packaged in aerosols, write us for the full report on this survey.

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Nashville
NORTH CAROL
TENNESSEE
ARKANSAS
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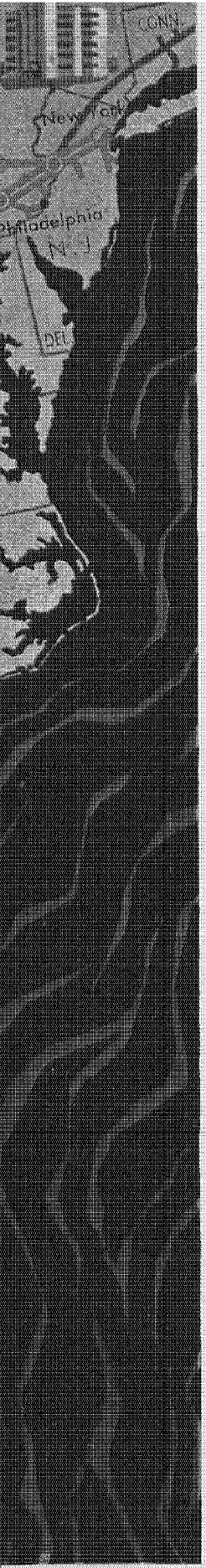
LOUISIANA
Houston
New Orleans



Texas Eastern's pipeline network in early 1957: Solid red lines are natural gas carriers; broken red lines and "loops" along lower route show new pipeline under construction. Solid black line is "Little Big Inch," now a petroleum products carrier, paralleled by "Big Inch." Other colors designate interconnecting systems, affiliates, proposed line.

Bolstering the big inches

Whenever the going got rocky on Texas Eastern's latest pipeline project, the contractor called on this new method of controlled ditch blasting

By GEORGE REYNOLDS

The weather-tanned pipeliner sat in his jeep and squinted across the rocky creek bed toward the ranks of machines chewing at the hillside beyond. Nearing the deep cut that the Kentucky River makes through the limestone plateau of the Blue Grass country, the H. C. Price Co. was adding more "inches" to the mid-section of Texas Eastern Transmission Corporation's network of gas and petroleum pipelines.

Back-hoes crawfished along the steep grade, their claw-like shovels digging deep and swinging wide with loads of earth and stone. The straight ditch they were finishing climbed to the ridge and topped it in a clean notch against the sky.

The pipeliner turned to his visitor. "We've blasted every day during the last 27-mile stretch," said Curly Shadinger, ditch superintendent for the Price Co., "and if we've knocked down so much as a stalk of corn outside the right-of-way, I don't know about it."

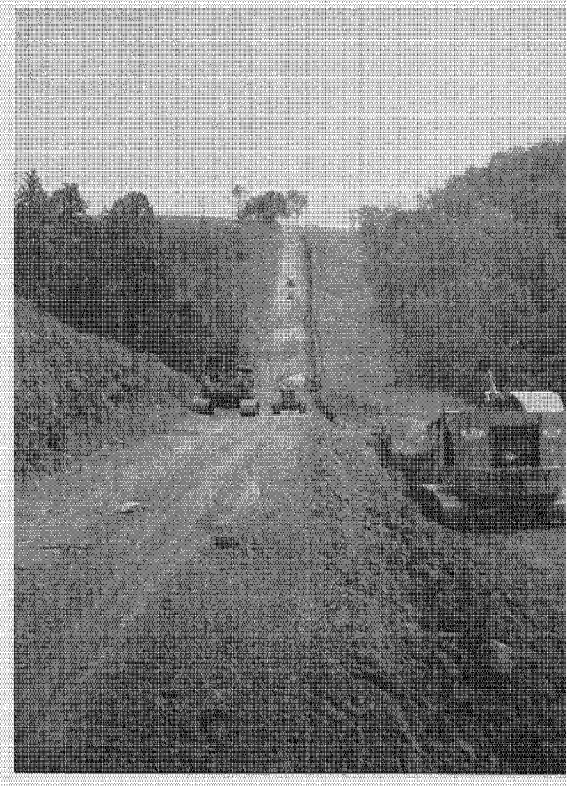
He pointed toward a valve assembly that jutted from the ground a scant 25 feet from the new ditch and added, "The blasting hasn't sprung a leak in that other line, either."

Shadinger's pride was well taken; he and other pipeliners had a hand in developing the new blasting technique that was performing so well. It originated with Du Pont field men who set out to solve some of the more rocky problems of ditch digging four years ago.

Six years before that, newly formed Texas Eastern had paid $143,127,000 for the famed "Big Inch" and "Little Big Inch" pipelines that had bored from the Southwest's oil wells to the East Coast in record time during World War II. At war's end Texas Eastern converted the system to carry natural gas.

These lines were augmented in 1951-52 by a third that crossed parts of Mississippi and Alabama and passed through Tennessee and Kentucky to Ohio, where it joined the "Little Inch's" right-of-way. It continues to transport gas under high pressure even while the new line goes in alongside. An uncontrolled blast or other mishap, the pipeliners knew, could rupture it with disastrous results—reason enough for following the safest procedure possible.

Like the four other pipeline "spreads" operating from the boldly modernistic Price Tower at Bartlesville, Okla., this one was composed of crews with specific jobs. Ranging out of sight over valley and hill, their big machines were bending, welding and wrapping the 30-inch steel pipe and



Price Co. crews, laying a new pipeline across Kentucky, used new blasting technique to cut ditch cleanly, minimize "throw" in rocky areas.

lowering it into the ditch. Up ahead, wherever the going got too tough for the ditching machines, the drilling and blasting crews tackled rock with the new system developed especially for pipeline ditching.

On hand with technical advice was Russ Baskervill, one of the Du Pont regional representatives who helped work out the new method.

"We realized that ditch blasting had its own particular needs," says Baskervill, "and we all came up with the same general solution—'delaying tactics,' you might call it."

Working out of Explosives Dept. offices at Huntington, W. Va., Joplin, and Denver, respectively, Baskervill, M. S. Ahlgrimm and W. L. Patty applied their new ideas under diverse conditions, adapting them as necessary.

They found that by substituting a combination of "Primacord" detonating fuse and MS (millisecond) delay connectors for the conventional cap and fuse they could gain a significant safety margin and at the same time improve the quality of the blasting work.

Misfires and cutoffs in the older system sometimes left unexploded dynamite and caps in isolated drill holes where a back-hoe shovel might strike and explode them. When a trunkline of "Primacord" was used alone to initiate the individual charges, it set off an almost instantaneous detonation of all the holes. This sometimes threw rock and dirt too far and left ditches wider than desired.

The blasters usually drill two parallel rows of holes in rock from which the overlying dirt has been cleared. Depth of the holes and the distance between them depends on the nature of the stone and the desired depth of the ditch. They load the holes with dynamite and a length of "Primacord", allowing a "tail" to extend out the top of the backfill for a foot or so. About an hour before the shot is to be fired, a trunkline of "Primacord" is laid along the ditch. Each "tail" is tied to it with a clove hitch.

Essentially, the new system breaks up the big blast into many small ones. Groups of holes are fired in sequence from one end to the other, with a small delay interval between each group. Usually there are only two to four holes in each group, and the delay interval provided by the MS connector is about 17 thousandths of a second.

Hooking-up procedure is simply to cut the trunkline between each group and tie in a connector. The delay allows room for lateral movement of broken rock between groups, reducing ground vibration and scattering of material as well as providing a better ditch. The greater the number of delays, the greater the effect on results.

CHOOSING THE EXPLOSIVE

Blasters find that soft to medium tough rock can be broken well with Du Pont 40% "Red Cross" "Extra" dynamite. Very hard rock, creek bottoms and sags require water-resistant 40% to 60% Special Gelatin.

What the controlled shots lack in spectacular display of flying debris they gain in safety and effectiveness. Set off at the downhill end, they rip uphill like giant moles, lifting the earth for an instant and then letting it drop back.

Breakage is excellent and well confined. When the back-hoes start clearing out the shattered rock their tracks rest on solid ground, and the sides of the ditches they uncover are unusually clean-cut.

The efficient way the crew handles the new system was illustrated by a Price safety engineer, Bill McCabe. The ditch cut through hard limestone right up to the paved road on which he stood, connecting with a tunnel driven beneath it. The pavement was unbroken.

Then he indicated a pair of power lines strung beside the road. "Part of the charge went off right under those," he noted, "and you can see the insulation isn't damaged. We didn't hear a rock hit that metal barn roof, either, and it's not 40 feet away."

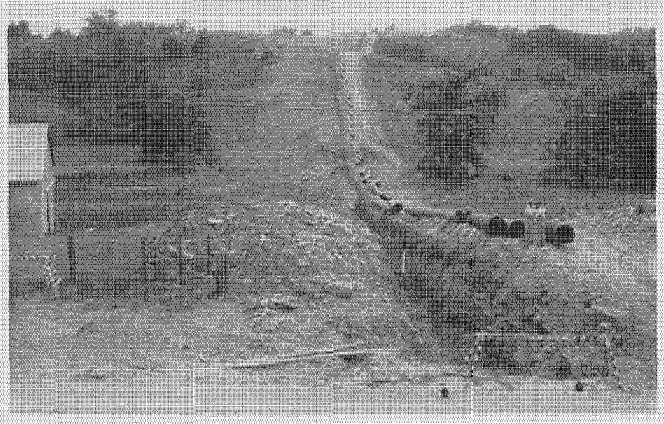
So controlled blasting becomes another useful tool in the big kit that stretches "inches" into miles and already has made the pipeline our third largest carrier of goods.



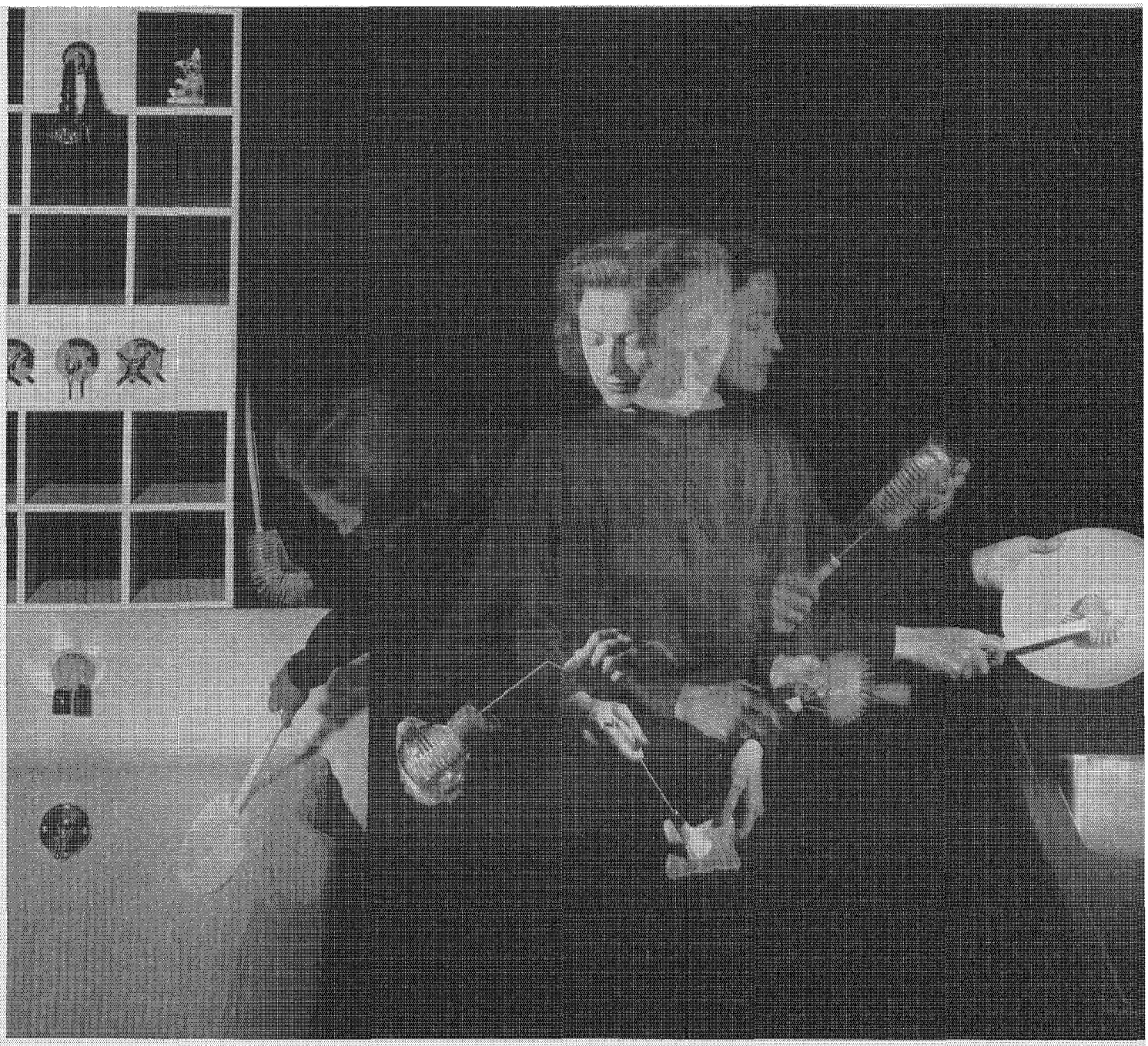
Pipeliner hooks up for blast, using technique developed by Russ Baskervill, left, and other Du Pont explosives field men.



Controlled blasting shattered rock in ditch's path, but didn't rupture gas-charged pipeline beneath valve assembly at right.



Barn, power line and buried pipeline escaped damage when new blasting method was employed to clear this section of ditch.



Fashion memo: matched household brushes

Our busy model's showing you a fashionable new idea in home cleaning—a matched set of household brushes, all boasting "Tynex" nylon bristles.

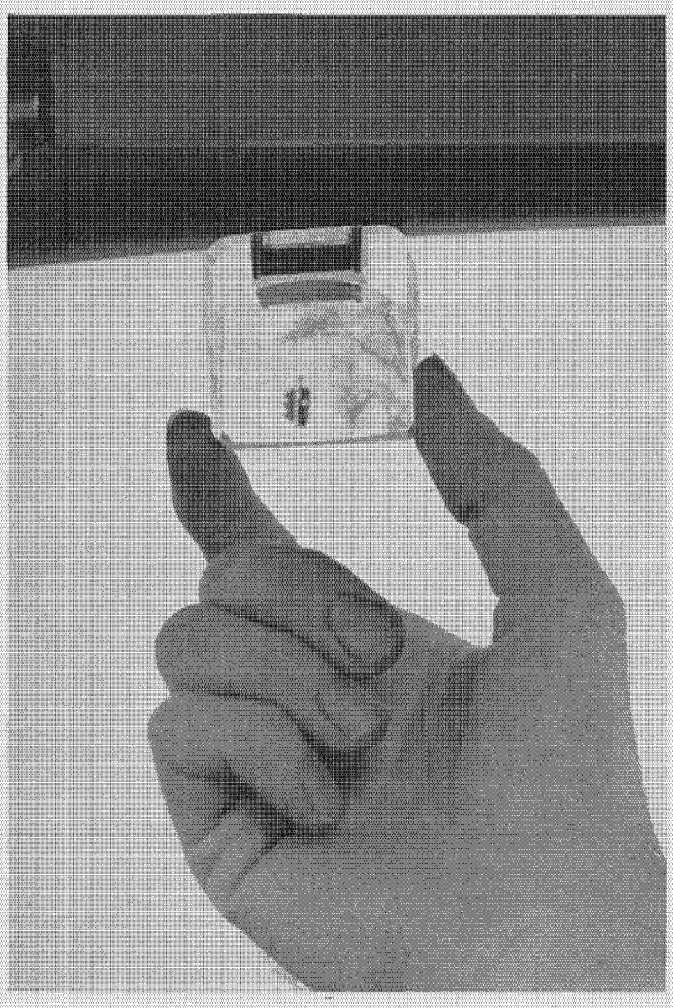
In pastel shades that mix or match, they're from the new Holiday series made by National Brush Co., Aurora, Ill. Their plastic handles are colored turquoise, yellow or pink—two-toned with beige—and they go together so well that we've illustrated all these chores in one large multi-exposure photo rather than in several small ones.

It's one of the first complete lines of household brushes bristled with "Tynex" for more efficient cleaning. To show them in action, we asked our model to pause at intervals between bathtub and sink while we "froze" each task by photoflash. You see her using bath, bottle, pastry, vegetable, tumbler and dishwashing brushes. The Holiday series includes another vegetable brush, two other bottle brushes and two bowl brushes in addition to the one pictured behind the tub.

We couldn't show you this in the photo, but "Tynex" nylon bristles last three to ten times as long as other man-made or natural bristling materials. They can be sterilized in boiling water and resist chemicals, household cleaners, fats and oils. And because they absorb little or no water, they can be cleaned quickly and stored immediately.

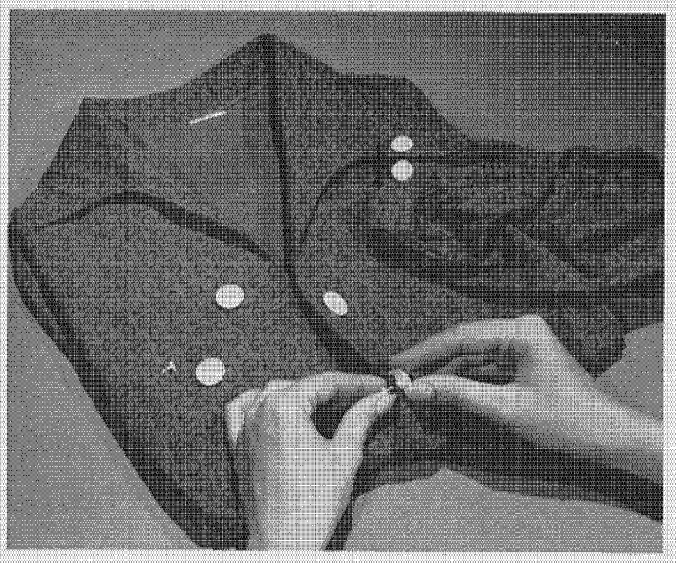
What's New

• COLE PORTER'S FIRST original TV musical score is for "Aladdin," the Du Pont "Show of the Month" for February. The script will be by S. J. Perelman, who wrote the screenplay for "Around the World in 80 Days." The January show will be "The Bridge of San Luis Rey," following this month's "Junior Miss" (see page 9).



• TRAFFIC SIGNAL FINDER with lens of "Lucite" acrylic resin is easily secured to windshield frame by strong magnet. It gives a driver undistorted, wide-angle vision both horizontally and vertically, says the maker, Lite-Site Corp., Box 21, Tonawanda, N. Y. The lens is molded by Du Bois Plastic Products Inc., Buffalo, N. Y.

• LOSS OF HELIUM in Navy blimp was halved by replacing former covering with fabric of "Dacron" polyester fiber coated with neoprene and "Hypalon" synthetic rubber. The Navy reports that the new "skin" also is lightweight, strong and weather-resistant.



• HANDY NYLON BUTTON fastens to clothing without thread. Sharp shaft of "Jiffy-Lok" button pierces fabric and locks into inner segment. A simple twist disengages parts. Molded of Du Pont "Zytel" nylon resin by the Bourget Co., Inc., Brockton, Mass., buttons can be dry-cleaned and washed safely, won't chip or fade.



• LIGHT FROM SUN or incandescent lamp operates new solar clock by activating cells made with Du Pont solar grade silicon by Hoffman Solar Division of Hoffman Electronics Corp., Evanston, Ill. Clock will operate in darkness for a year on stored energy and requires no other power source, reports the developer, Seth Thomas Division of General Time Corp., Thomaston, Conn.

• HOW TO CLEAN MOVIE FILM with "Freon"-TF solvent is described in a new bulletin that lists properties of the selective solvent and ways to use it. Copies are available from Du Pont's "Freon" Products Division M-1, Nemours 8541, Wilmington 98, Del.

• A NEW SPHERICAL BEARING is faced with fabric of "Teflon" fluorocarbon fiber. It will withstand static loads as high as 60,000 psi, according to the maker, Micro-Precision Division of Micromatic Hone Corp., Evanston, Ill. Self-lubricating and self-aligning, the bearing faced with the slippery fabric has lasted ten times as long as lubricated metal-to-metal bearings in wear tests.

• FIRST COMMERCIAL CARPETS made with Du Pont's new type 600 dull-luster nylon carpet staple appear next month at the Home Furnishings Market in Chicago. Matching bright nylon in dye lightfastness and long wear, the de-lustered fiber reduces shading effects and broadens the styling range of all-nylon carpets.



• DOG'S DAYS are brighter when he's groomed with "K-9 Guardian" shampoo and parasite killers, says Guardian Industries, Inc., 4066 Boston Road, Bronx 69, N. Y. Sculptured gilt heads of America's 12 most popular canine breeds decorate aerosol containers. They are powered by Du Pont "Freon" propellent.

• CLAMS ON THE HALF SHELL, frozen in clear film of an "Alathon" polyethylene resin by Redi Food Co., Inc., 2505 Butler Place, Bronx 61, N. Y., are ready to eat after bag is submerged in hot water. This and other packaging applications for "Alathon" are outlined in a report available from the Du Pont Polychemicals Dept., Room 92-121-A, Du Pont Building, Wilmington 98, Del.

• "SHOTGUN SPORTS," a new booklet, gives practice pointers and tips for enjoying skeet and trapshooting all year. It also suggests games that are variations on regular clay target shooting. It is available free from the Sporting Arms and Ammunition Manufacturers' Institute, 250 E. 43rd St., New York 17, N. Y.



• EYEGLASS FRAMES of Du Pont "Zytel" nylon resin and lenses molded of allyl resin comprise almost indestructible spectacles, according to the House of Vision, Inc., Chicago, Ill. The nylon frames for women and children, made by Limited Editions, Inc., Linden, N. J., are lightweight, strong and flexible.



• TEARS THAT ROLL from eyes of "Sunny Tears" dolls this Christmas won't harm eyelashes of "Tynex" nylon bristles or glowing complexion imparted by Du Pont pigments. Made by Sun Rubber Co., Barberton, Ohio.

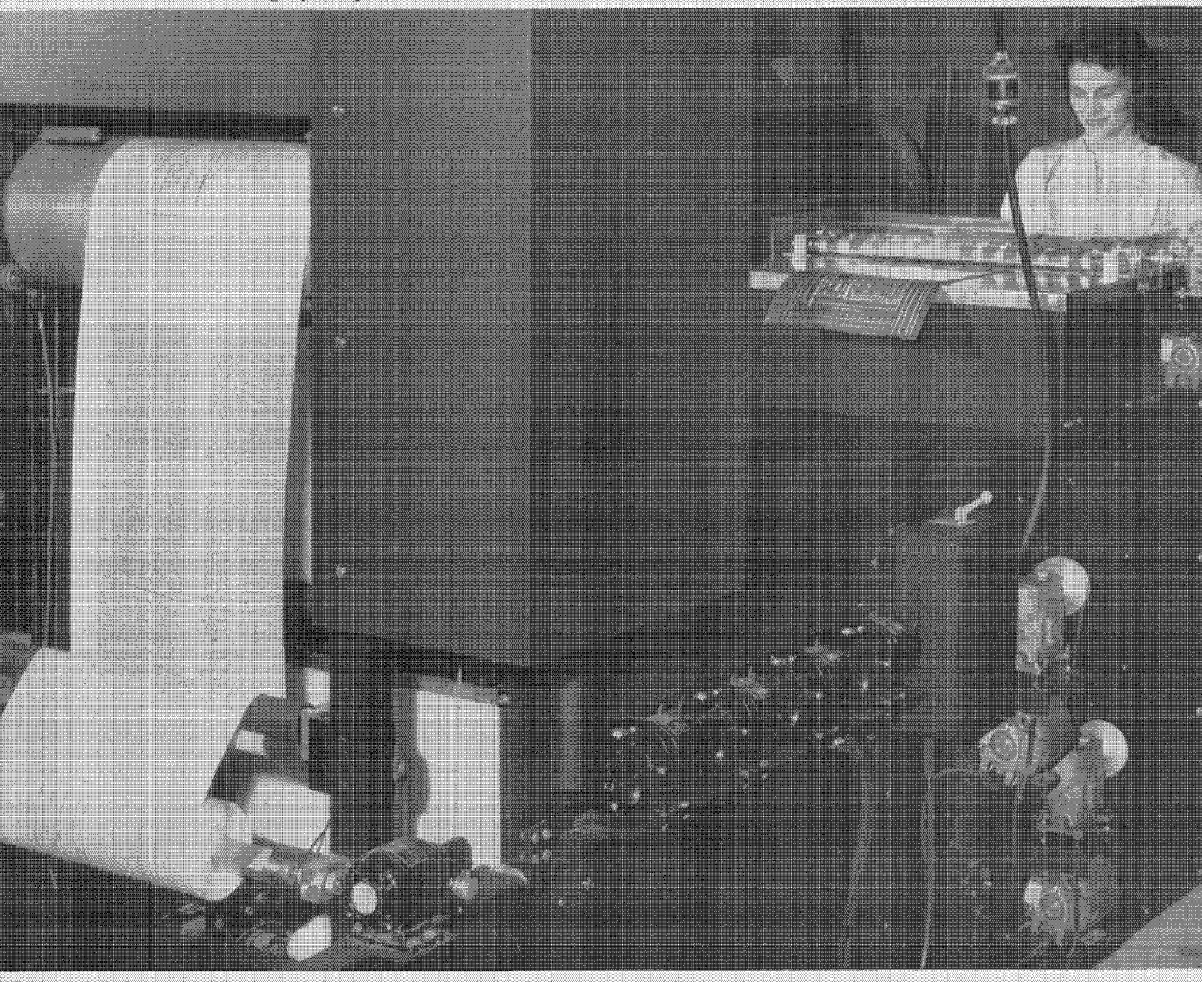
Photocopies by

Making single photocopies of printed matter is almost as old as the camera itself. But here's a unit that reproduces continuously at a fraction of the cost of regular darkroom methods

It was early 1950 and the oil company couldn't wait for C. H. Topping and his Reproduction Equipment Co. to chase the last few bugs out of a new continuous photocopy camera. "Load the machine on a plane," the purchasing agent said, "and fly it to New York so we can ship it to Arabia pronto."

That's the way Topping's business has been ever since, even though his RE-Co photocopy unit has been in an unbroken state of development until recently. Today the Dallas firm offers a unique automatic camera and proc-

L. L. Ridgway Company of Dallas rolls out copies of records at six feet a minute with this RE-Co photocopy unit.



the mile

essing unit that will copy continuously, on film or paper, practically anything that's printed.

The complete unit, which eliminates the need for a darkroom and hand-operated drier, is 3 feet wide and 12½ feet long. It makes a picture from 2 to 18 inches wide and up to 1,000 feet long at the rate of six feet a minute.

Topping says that since one person can run the machine, labor costs are as much as 75 per cent below those for conventional darkroom reproduction methods. Paper and film are saved, too, because the full width can be used. Conventional equipment won't reproduce to the edges, and the unexposed margin must be trimmed.

The new machine has been widely accepted by the oil industry. Seismic logs, 60 feet long, formerly had to be photographed in sections and then glued together—a painstaking and sometimes inaccurate process.

Banks, commercial reproduction houses and insurance companies, too, are leasing or buying the RE-Co camera to copy everything from abstracts and checks to transcripts and trial balances. Industry and the government also are showing interest. One state uses the unit to photocopy auto and truck title certificates.

Here's how the photocopy unit works: The operator feeds documents to be reproduced into the camera end. A lens picks up the traveling image and exposes photocopy paper moving at precisely the same speed. The exposed paper passes through five processing tanks and is dried on a roller drum by infrared heat. Then it can either be wound on a spool or run out on a table to be cut.

CAMERA ADJUSTABLE TO NEEDS

"Most copying of printed material is original size or half size," said Topping, "so we've made our camera to meet those accepted standards. But if a customer wants an odd-size reproduction we can adapt the camera to fit his requirements.

"To make snappy reproductions and bring out fine detail without worrying whether the exposure is right on the button, we recommend Du Pont 'Photo-Writ' photocopy paper. With five different types of 'Photo-Writ' to choose from, a customer can fit his specific photocopy needs. If he needs a film negative, we've found that Du Pont Photolith Ortho A will get the results he wants.

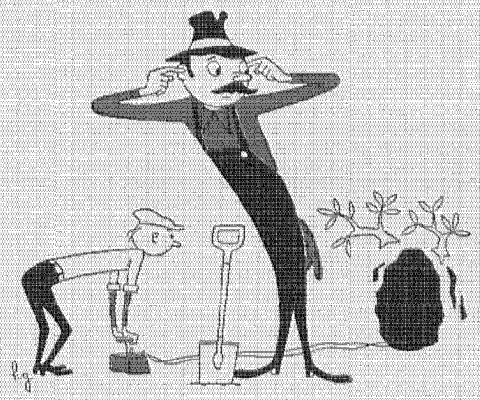
"Lab tests of the paper after processing point to a life of at least 100 years. This suggests its use by industry for preservation of important data. One other advantage: if storage space is really short, live and semi-live files can be photocopied to occupy one-fourth as much space, and the originals can be destroyed."

On the other hand, the camera can be used to safeguard original and expensive documents, as the Arabian user of the first unit found out. A plane carrying a bundle of seismic logs out of the desert crashed and burned. The loss was tragic but not complete. Only duplicates were lost; the originals rested safely in the company's files.

Today many other firms are locking up their originals and letting photocopies become the work horses. In the process, thanks to the versatility of his new camera, they're keeping Topping hopping.

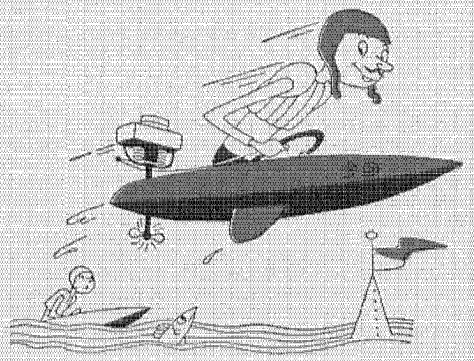
A BACKWARD GLANCE

. . . through earlier issues of the *Du Pont Magazine*



35 YEARS AGO (1922)

"The world's longest tunnel is being driven with Du Pont dynamite to assure New York City an ample water supply from the Catskill mountains, a hundred miles or more away. Through an aqueduct, free from contamination, the water flows under tunneled mountains and siphoned rivers. The total cost will be $180 million."



25 YEARS AGO (1932)

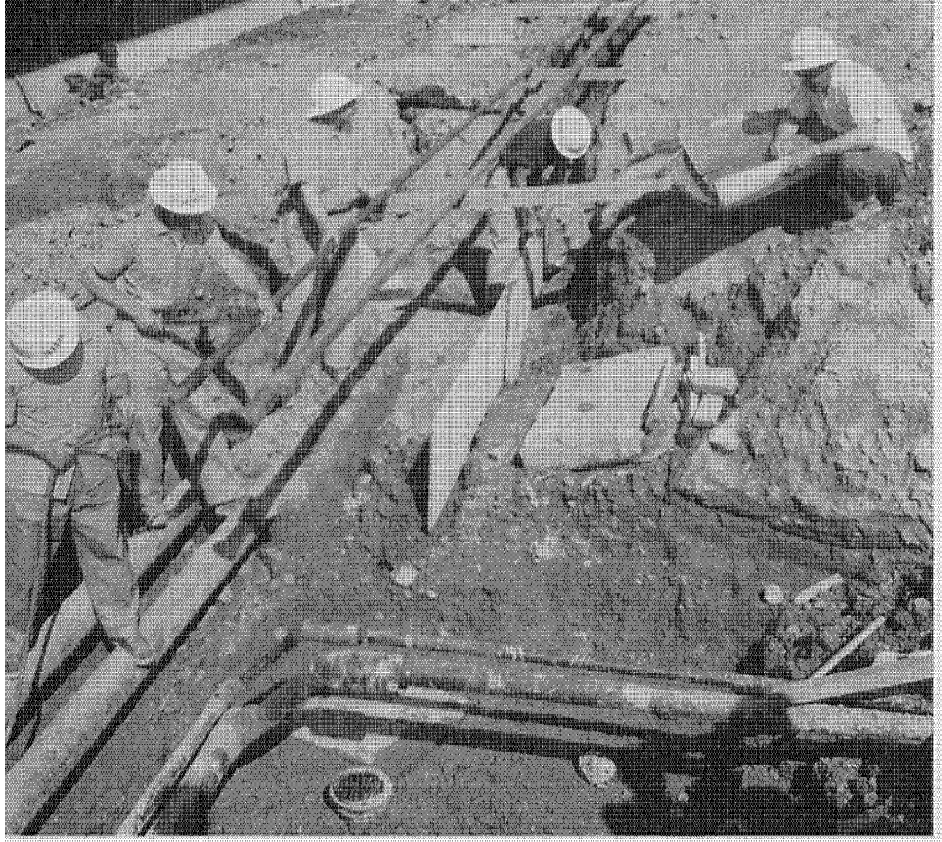
"'Dynax',* the new outboard motor speed fuel recently developed by the Du Pont Company, was used by Fred G. Chase, of Northampton, Mass., in setting up two records in the Worcester Regatta held on Memorial Day. Mr. Chase averaged 39.564 miles per hour in the Class A-11 statute mile time trial."

20 YEARS AGO (1937)

"The Company's radio program continues through the summer months with a lighter type of entertainment called Du Pont Cavalcade of Music, featuring the works of various outstanding living American composers—George Gershwin, Jerome Kern, Cole Porter, Irving Berlin and Vincent Youmans . . ."

"Six years ago this month the Hotel Waldorf-Astoria Corporation opened up its magnificent new 47-story hotel on Park Avenue, New York. Millions of dollars had been spent to make this structure the world's finest, regardless of expense. Washable 'Tontine' window shades and 'Dulux' and 'Duco' finishes contributed; so did 'Fabrikoid' coated fabrics for desk pads, wastebaskets and book covers."

*This fuel is no longer manufactured by Du Pont.



Colored shirts worn by construction men identify separate trades. Coding system is on trial as way of helping on-the-job safety. Vat dyed, the fabrics aren't faded by sun or laundry.

an electrician (blue), a steelworker (orange), a bricklayer (yellow) or a laborer (purple).

Eight colors, selected by Faber Birren, fit a safety color code that classes trades as hazardous, semi-hazardous and moderately hazardous. Such identification, it is hoped, will make for improved efficiency and may help cut the markedly high accident rate among construction workers as a whole.

Elsewhere in Syracuse—and in several hundred other cities across the country—high school home economics students are learning firsthand the vat dyeing process by which these workers' shirts were colored. Using a new demonstration kit, they quickly master a five-step procedure that shows how vat colors are fixed chemically into each fiber of a fabric to insure lasting colorfastness.

Diverse as they are, both the Syracuse safety study and the color kits are activities of the same organization—the Vat Dye Institute. Formed last fall by 13 leading vat dye manufacturers, including Du Pont, the group aims at increasing the use of vat dyes in the textile industry.

"As a class, vats are the most durable colors known to man," says H. F. Herrmann, the Institute's executive secretary.



Handkerchief's changing color shows students reduction, dyeing and oxidation steps in vat dyeing process.

"One of the things we're trying to do is make housewives aware of all the trouble and disappointment they can avoid by demanding colored fabrics that won't run, bleed or stain in either machine or hand washing."

Why is this missionary effort necessary? For one thing, the term "vat colored" isn't entirely familiar, although vats have been used extensively on cotton, linen and washable rayon fabrics for years. Moreover, it's easily misunderstood. Many people think of vats as a means of applying dye (actually the origin of the name) rather than as a family of colors derived from coal tar.

COLORS CAN STAY BRIGHT

The shirts worn by the Syracuse construction workers offer convincing proof that bright colors don't have to fade, even after frequent scrubbings and long hours under bright sunlight. Why this is so is best explained by a demonstration of the vat dyeing process.

Color kits sold by the Vat Dye Institute for $15 contain all the materials necessary for a simple, yet dramatic vat coloring test. Students dip a handkerchief in orange dye, then watch the color change quickly to purple as a chemical reducing treatment makes the dye absorbable by the fibers. When dye penetration is complete, students can reverse the process. Oxidation makes the dye return to its insoluble form, and the original orange shade comes back to stay. The whole process takes only a few minutes.

As befits a staunch supporter of vat dyes, Herrmann maintains in his Empire State Building offices a tiny color testing laboratory. "Not long ago a friend from a large department store called to say he was getting complaints of fading in vat-colored infant wear," Herrmann relates. "He sent over some dingy samples that had been returned to the store after washing.

"Into the lab I went and applied caustic soda and hydrosulfite, which, you know, react immediately with a vat dye to produce a color change. These samples just lay there looking at me, completely inert. I could report at once that vats weren't the culprits. Happily, such cases of misrepresentation are rare. We're able to concentrate on being teachers rather than policemen."

A major goal of the Institute, however, is establishing a tagging program for vat-colored merchandise. This means that eventually Institute controls will have to be set up to insure proper use of the "vat-colored" label. Right now an interim tagging program is under way, with individual manufacturers taking the responsibility. Having such tags to guide them, the Institute figures, housewives can be sure they are buying performance along with good looks when they choose colored fabrics.

"We have no quarrel with beauty," Herrmann says. "The fact is, we like it so much that we want it to last the lifetime of the fabric. Vat colors are the best way we know to make sure this will happen."

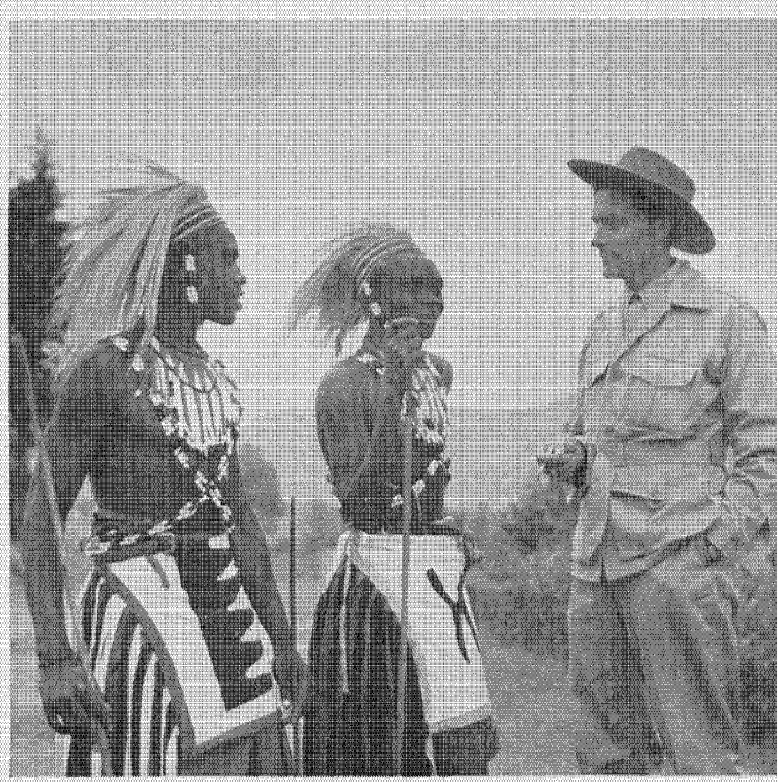
JUNGLE TEST FOR "ZELAN"

In this day and age it's unlikely that your raincoat or jacket will ever suffer the tortures of being scrubbed clean on rocks in a river. On a recent trek through the Belgian Congo, however, clothing treated with Du Pont "Zelan" water repellent was subjected to that and more without losing its ability to shed water.

The safari, made to film a series of television movies, offered a chance to jungle-test some two dozen products, including a transistor radio and sun tan lotion as well as wearing apparel. Such garments as the hunting jacket at right were (a) scrubbed in huge, bonfire-heated vats and stirred with boards, and (b) swished through pools and slapped against rocks by native laundry boys.

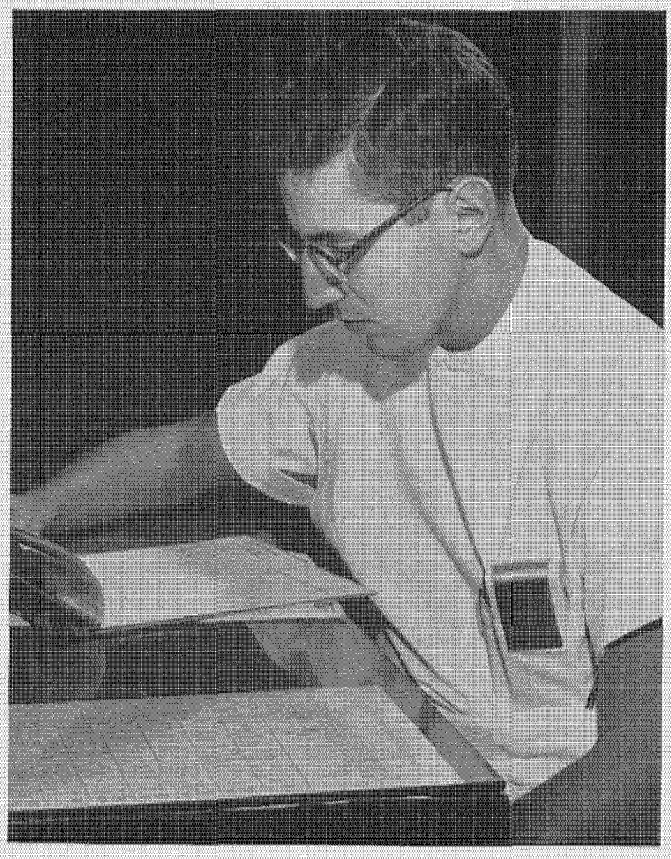
On one occasion, crouched in the dripping Ituri Forest, the party watched for hours as pygmies danced the story of an elephant hunt. "We would have been drenched if our clothes hadn't shed water," one member said. Conventional rainwear, also finished with "Zelan", got almost daily workouts on the expedition—and frequent Congo-style washings. But when the safari party got ready to head for home, the clothes were still giving excellent service. Sent to Du Pont's Technical Laboratory, a jacket and pair of trousers both earned good ratings in water repellency although the fabrics showed hard wear.

This simply goes to show that garments treated with "Zelan" really do take to water—and to washing. As a matter of fact, a thorough tubbing actually refreshes their water repellency. After washing and a light ironing, raincoats treated with the chemical are ready to shed water anywhere—perhaps on your next North American safari.

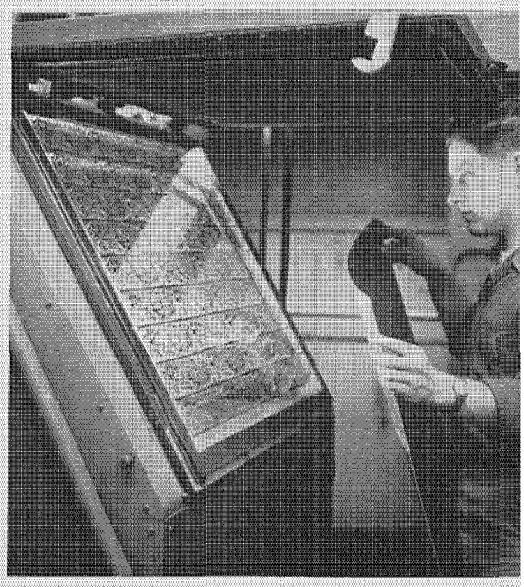


White hunter's jacket is typical of clothes treated with "Zelan". Water repellency stood up through rugged African test.

Operator above transmits coded signal that buzzes in doctor's pocket, below. His receiver contains printed wiring.



Wiring pattern is printed on copper coated with a light-sensitive plastic.



"TRI" TRIES A NEW ROLE

"Triclene" D trichlorethylene, familiar as a degreasing solvent, pops up as a developer in the manufacture of printed wiring at Stromberg-Carlson

"Calling Dr. Kildare," that urgent summons familiar to moviegoers a decade or so back, has been reduced by science to a discreet, pocket-sized buzz.

Responsible is an electronic development called the "Pagemaster" selective radio paging system. Using the system, a telephone switchboard operator can summon any one of 3,000 persons to a telephone without letting the other 2,999 in on it. She dials a code number into a transmitter; the person paged hears a buzz on a small radio receiver in his pocket and heads for the nearest telephone.

The "Pagemaster" was developed by the Stromberg-Carlson Division of General Dynamics Corp., a company that also makes the partially transistorized radio for the new Edsel automobile. Both the "Pagemaster" receiver and the Edsel radio, as well as other Stromberg equipment, use printed wiring boards, made at the company's Rochester, N.Y., plants.

Printed wiring, a network of conductive metal laid down on a thin slab of insulation, is easy to produce on a large scale, dependable in operation, and cheaper to assemble than a spaghetti-like handful of individual wires. It also helps make possible the kind of miniaturization represented by the "Pagemaster" receiver.

Du Pont "Triclene" D trichlorethylene, widely used by industry to degrease metal parts, takes on the new role of a photographic developer in Stromberg's production of printed wiring. Here's how the boards are made:

A light-sensitive plastic coating is sprayed on a sheet of copper-clad phenolic resin. The sheet is then exposed in a light box against a photographic negative of the electrical circuit. A two-minute trip through a specially adapted vapor degreaser removes the unexposed plastic, the vapors of "Triclene" D first loosening it and a liquid spray of the solvent then washing it away. In the next step, acid etches away all the copper except that protected by the plastic. Then the remaining plastic is stripped off, and the wiring board is complete except for adding components.

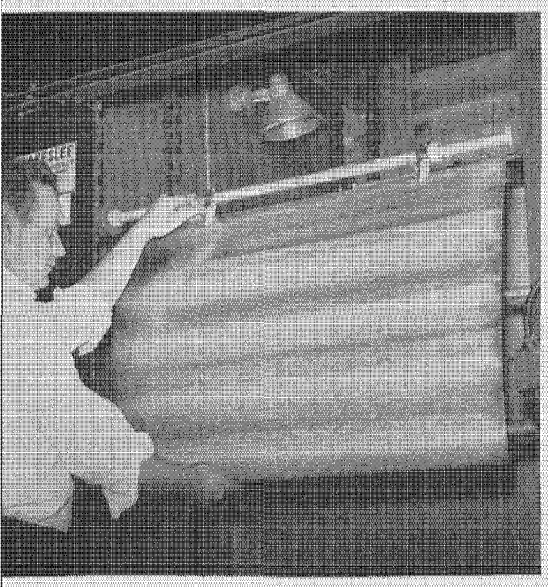
Lower-priced solvents could have been used, admitted Henry Hodge of Stromberg's engineering staff, but none could match the combination of safety, long-term economy and stability found in "Triclene" D. Unlike other commonly used developers, trichlorethylene is not flammable. Economy is served by reclaiming and recirculating the solvent for repeated use in the equipment. Finally, "Triclene" D is stabilized by Du Pont to meet the stiffest demands imposed by vapor cleaning.

A second solvent, Du Pont "Perclene" perchlorethylene, is used in a dip-soldering machine that automatically solders such components as transistors and diodes to the printed wiring boards. Dipped in flux, preheated and soldered, the boards pass through a trough of "Perclene" where the residue of flux is dissolved and washed away.

"Perclene" is favored for its high boiling point, reported Hodge. The solvent vaporizes very little, he said, although freshly soldered connections are at 300°F. when they plunge into it. The used "Perclene" is then distilled and recirculated to cut down solvent consumption still further. Like tri, perchlorethylene presents no fire hazard.

So efficient is the company's setup for producing printed wiring boards, says Stromberg-Carlson, that capacity is currently outstripping internal demand. Anyone interested in having circuits printed to order?

Image is developed in trichlorethylene degreaser. Unexposed plastic is washed away.



After acid etching of boards, components are added, soldered automatically on this machine.



Here completed wiring board an components go into Edsel radi





You should have his luck this Christmas! Already gifted with a Mall router and power saw, he admires an orbit sander.

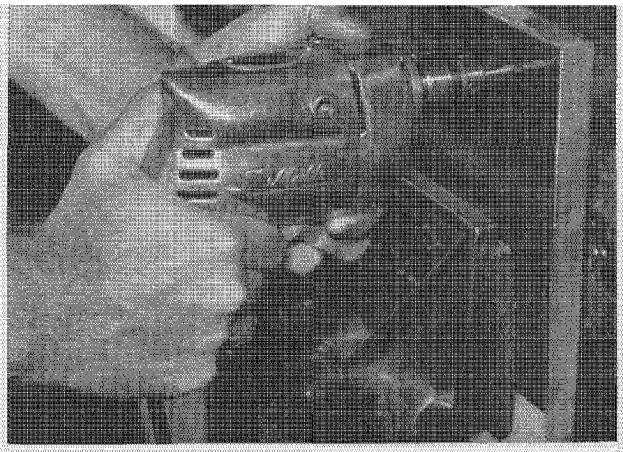
Presents with a future

For the man who takes pride in a job well done, you can prolong the pleasure of Christmas with new Remington power tools by Mall

Appearing under Christmas trees for the first time this year will be a complete line of power tools bearing the Remington brand name.

Portable electric aids like the drill, saw, sander and router we've pictured are most likely to emerge from gay Yule wrappings. If Dad is a farmer or man-about-the-estate, however, you might consider giving him one of the many chain saws made by the new Mall Tool Division of Remington Arms Co., Inc., Bridgeport, Conn.

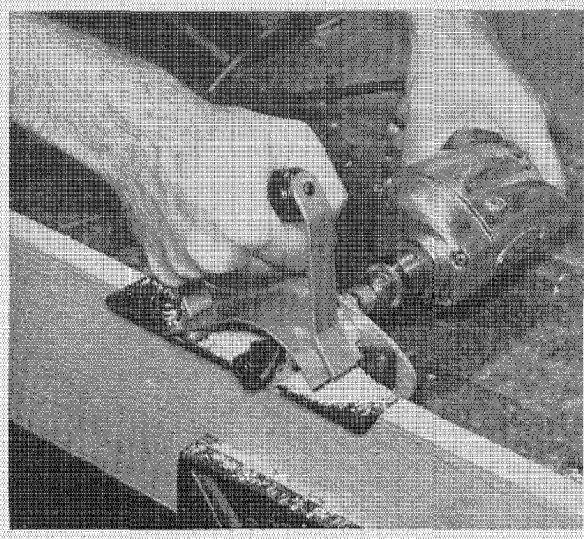
Mall portable electric drills do drill holes, to be sure, but that's not the half of it. The tools also . . .



Work needs from home shop to factory assembly line are filled by the wide assortment of Mall-made tools powered by electricity, gasoline and compressed air, augmenting Remington's line of powder-actuated stud drivers (see page 37).

At this season of the year, when it's being broadly hinted that the man of the house should make known his Christmas wishes, handy utility tools naturally reach a peak of popularity. It's these convenient worksavers that have added volume to the "do-it-yourself" boom of recent years. The trend has been so fast-growing, in fact, that reliable statistics haven't kept pace. One thing is certain, though; for the majority of American men you can't miss the gift mark with one of these handy mechanical helpers.

Most home workshops get their start with that basic power tool of many uses, the portable electric utility drill. It's made in several models by Mall, ranging in size from ¼ to ½ inch. With attachments, it far outstrips its original purpose of drilling: it will sand, buff, polish, stir paint, grind, wire-brush, sharpen knives, saw (by three methods) and even clip hedges. It's multipurpose with a vengeance.



. . . plane a board smoothly and with very little effort

NEXT STEP: POWER SAWS

For the craftsman ready for the next step, Mall offers five utility hand power saws that slice through wood up to three inches thick. All can make bevel cuts and have carefully engineered safety guards.

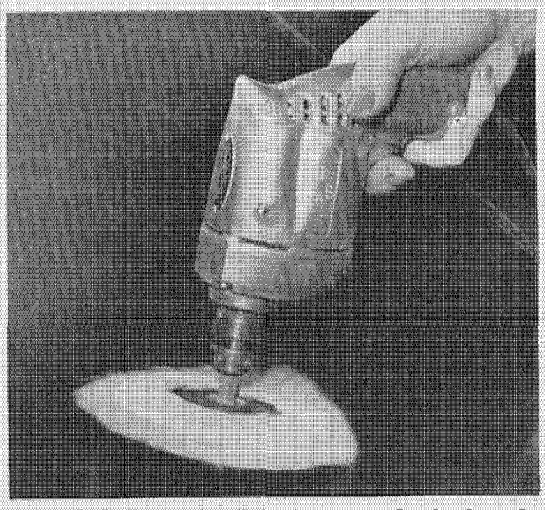
Then there are belt, orbit and polisher sanders, grinders with multiple uses and, for the more ambitious workman, home workshop tool kits that save time on household repair tasks and give the professional touch to those basement woodworking projects.

The Mall Tool Co., before becoming a division of the nation's oldest sporting firearms maker, had manufactured quality tools for more than 35 years. Its heavy-duty farm and industrial power tools have been known a long time. They include concrete vibrators, earth augers and such portable power implements as impact wrenches, screwdrivers, nut-runners, trowels, chain saws, sump pumps, die grinders, motor generators, railroad maintenance equipment and automotive specialty tools.

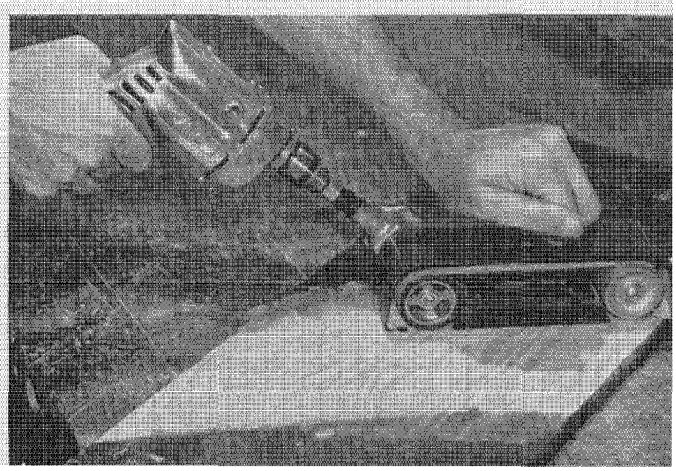
There's also a complete list of accessories and attachments and a line of flexible-shaft-driven equipment—the original Mall product. We expect to have more to report on these in forthcoming issues.

Meanwhile, Remington utility tools by Mall are decked out in special wraps and all set for their first big Christmas, with but one question still unsettled:

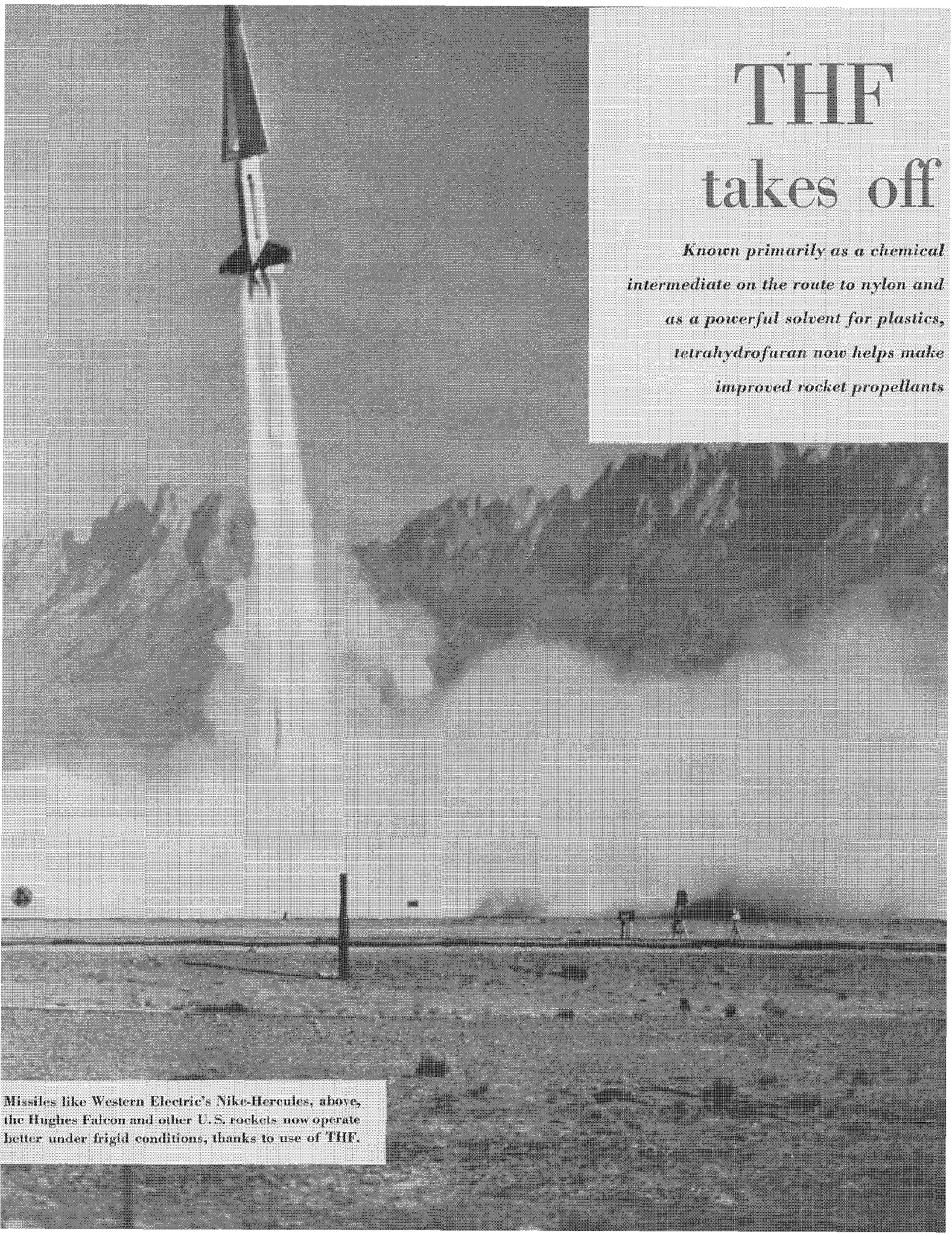
What with cribs, tree-stands, bobsleds, plywood displays and model train layouts in prospect, should you give the lucky guy his new Mall tool in time to lighten these holiday chores, or hold it back until Christmas morning?



. . . polish a variety of surfaces to a high-gloss finish



. . . or, as belt sanders, remove old finishes and prepare for new ones. They saw, grind, clip hedges, too.



THF takes off

Known primarily as a chemical intermediate on the route to nylon and as a powerful solvent for plastics, tetrahydrofuran now helps make improved rocket propellants

Missiles like Western Electric's Nike-Hercules, above, the Hughes Falcon and other U. S. rockets now operate better under frigid conditions, thanks to use of THF.

"We are perfectly capable, right now, of landing an object the size of a beer can on the moon," says Dr. Harold W. Ritchey, technical director for the Rocket Division of Thiokol Chemical Corp., Trenton, N. J.

What he might have added was that tetrahydrofuran could help put the missile there.

Thiokol, a pioneer maker of solid rocket propellants, has found that its fuels can be made to operate more effectively at temperatures 30°F. below the former limit by using tetrahydrofuran (THF) as an intermediate in the manufacture of the propellant binder.

These solid fuels, which now are powering guided missiles like the Nike-Hercules, Lacrosse and Falcon, could send a rocket moonwards so fast that the final stage would reach the satellite's surface, Dr. Ritchey believes. For present uses, Thiokol's development means better rocket performance in the extreme cold of high altitudes and arctic regions. And, the maker reports, greater energy output accompanies improved low-temperature capabilities.

Du Pont began making THF as an intermediate in the manufacture of nylon, deriving it from furfural, which in turn comes from corncobs and cottonseed hulls. Now a number of other uses are developing steadily.

Users have found that THF readily dissolves the highest molecular weight polyvinyl chloride resins and high vinylidene chloride copolymers, which are practically insoluble in other commonly used solvents. THF solutions of these polymers make it possible to produce vinyl films and coatings with high resistance to abrasion, soiling, tearing, repeated flexing and chemical attack. Additionally, THF's high volatility and rapid rate of diffusion permit increased machine speeds during casting and coating.

Vinyl resin ink ingredients dissolve rapidly and thoroughly in THF, forming quick-drying inks that adhere well to vinyl sheeting and film used for shower curtains, wall coverings and upholstery.

Many adhesives for plastics and films contain THF, too. Here it carries out the double purpose of dissolving the selected resin and providing a good bite into the materials being joined to ensure a strong bond. Rigid polyvinyl chloride pipe joints sealed with such adhesives, for instance, have been able to withstand tests which caused the pipe itself to fail.

Use of tetrahydrofuran as a reaction solvent, particularly in the manufacture of pharmaceuticals, is growing rapidly. Its higher boiling point and ability to dissolve a wide range of organic compounds increase reaction rates and give higher yields than are obtained with ethers that boil at lower temperatures.

Manufacturers of paint remover and cold cleaning mixtures also make use of the high solvent power of THF. They have found it a potent ingredient in cleaning formulations. Because it is water-miscible, it can be incorporated in compounds that can be flushed off with water after use.

Pending that first trip to the moon, then, THF is certain to be going places right here on earth.

STUD DRIVER "RUNAWAYS" CORRALLED

A new powder-actuated tool developed by Remington Arms Co., Inc., is designed to prevent free flight of steel studs through structural material. In effect, this is like halting a misdirected bullet at the muzzle.

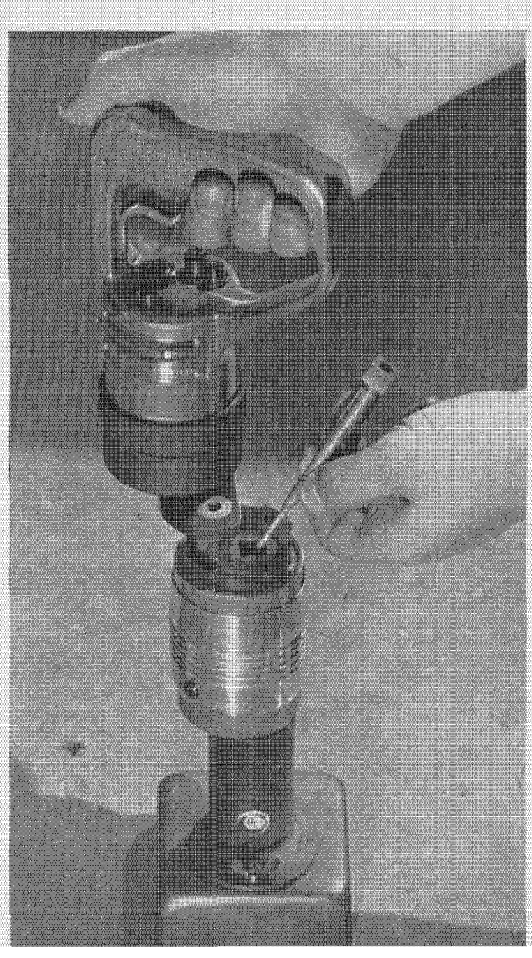
Steel pins that would pass through soft wood, sheet metal, or plaster walls not backed up by concrete or steel can be stopped in the guard of the Model 455A Remington Stud Driver with Model 440 Captive Stud Guard Assembly. The feature is of particular value in attaching roofing and siding and in similar operations.

Specially designed studs are screwed securely into the end of a captive piston; if it travels as much as three-eighths of an inch too far when fired, the corners of the piston's square head embed themselves in an aluminum buffer and the entire unit is safely stopped. The damaged buffer is easily replaced.

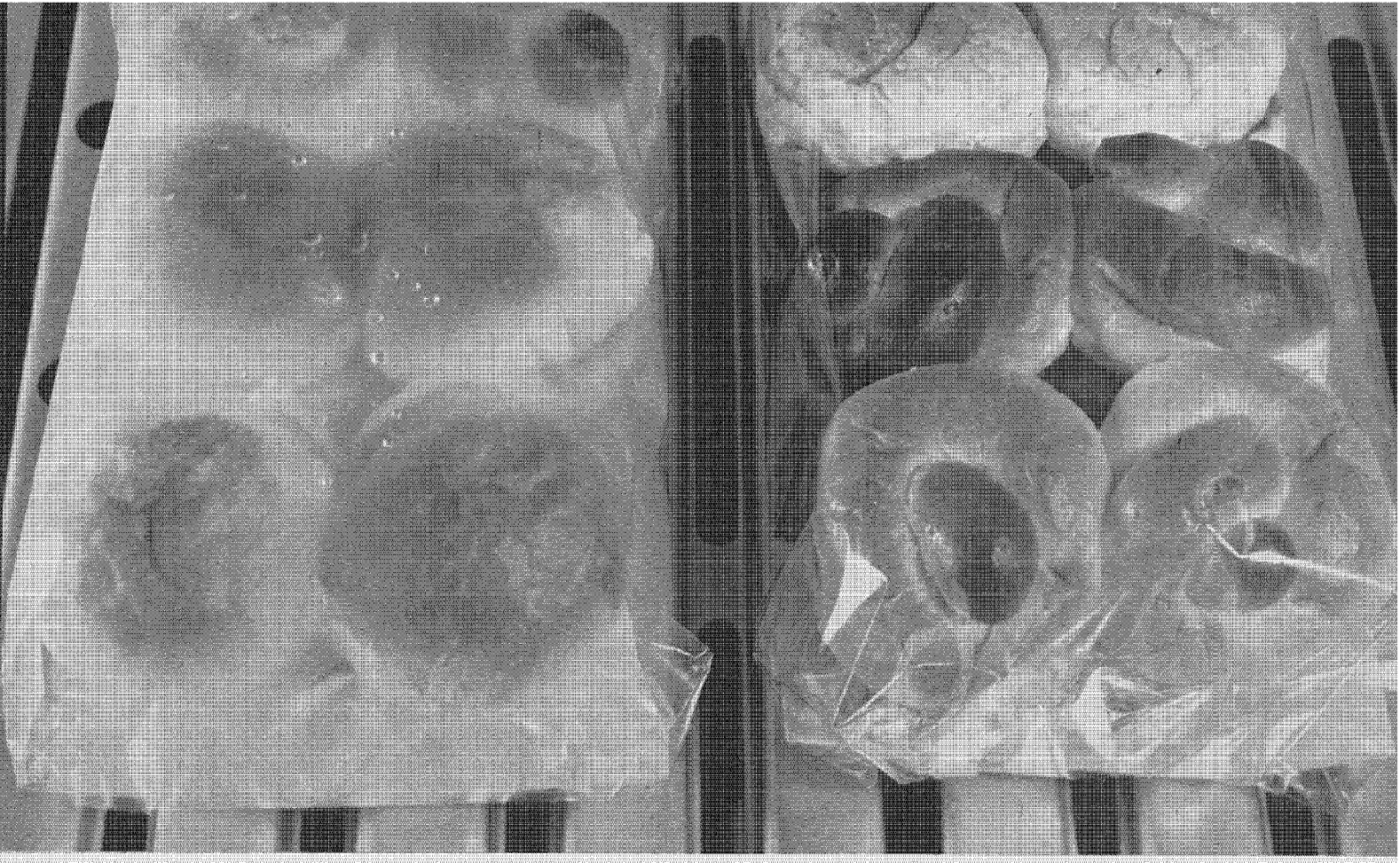
Piston and buffer do not meet in normal use when studs are driven to proper depth in solid concrete, masonry or steel—materials for which the tool is designed.

Here's how the new safety feature works: Both the stud driver barrel and the interior of the buffer are bored square to accommodate the square-headed piston and allow its release after normal firing. Then it is merely unscrewed from the head of the driven stud.

The buffer is turned slightly out of line with the barrel, however, so that when the piston travels beyond regular driving distance it is trapped—and the potential projectile is braked.



Piston takes combination-head or threaded stud (shown here). It is halted by buffer only when stud passes safety limit.



These rolls were frozen and thawed together; K-203 cellophane, right, is clear, unfogged.

Clarity that keeps

Du Pont K-type films mark a sharp advance in cellophane's appearance and performance.

They're about to write a new chapter in packaging history

"It is now apparent that the new K-type films represent the third major improvement in cellophane since we began making it 33 years ago," asserts V. M. Morrel, product improvement manager for the Du Pont Film Dept.

That, he says, is the broader story behind this year's fast-breaking series of announcements, highlighted by the debut of K-203, second of the Du Pont polymer-coated cellophanes, and a general price reduction on the new line of packaging films.

"The first big improvement in the original cellophane came when Du Pont made it moistureproof," Morrel relates. "This meant that perishable products like food and cigarettes could be given clear, protective packaging. A few years later, cellophane also was made heat-sealable. This cleared the way for fast and efficient machine packaging."

Rapidly expanding use of the new K-type cellophanes in packaging, he continues, indicates that they are spurring yet another development cycle.

"There are good reasons for that," says a spokesman for Film Dept. sales. "You can learn some of them simply by looking at the K films. They all have a special luster and sparkle, and their surface has a sheen that brings out printing quality and color. Tests of packaged goods for taste and freshness show that K cellophane offers superior protection for many products. It has extra durability, too."

In addition, he notes, K-203 has a unique antifogging characteristic that's important in displaying products high in moisture content, notably frozen baked goods that are thawed before sale.

Growing demand for the K films already has resulted in greater production efficiency, leading Du Pont to reduce prices on them in August. Coupled with the price cut was the announcement that K-203 was being made available in 300 gauge. This is a thinner film for packagers who don't require the extra durability and strength of 450-gauge K film.

An early leader in the field of frozen baked goods, Arnold Bakers, Inc., Port Chester, N. Y., began using

K-203 soon after its introduction. "We feel," says R. A. (Pat) Casey, Arnold's sales vice president, "that K-203 will help us boost sales and let us distribute our frozen rolls more widely. It makes the package a topnotch salesman at all times."

The Thomas D. Richardson Co. of Philadelphia has found that the sugar coatings of its after-dinner mints don't rub off and cloud the interiors of bags of K-203. Other products like dried apricots and prunes are packaged in K-202 because food oils don't cause the film to wrinkle, pucker or cloud. Curtiss Candy Co., Chicago, has learned that the same film keeps its marshmallows "just right"—previously difficult to do.

Highly impervious to gases, the K films combined with polyethylene score important extras in vacuum and gas packaging of meats and cheeses. Another example of the impermeability of K film: its use in a prize-winning package for the "Cedaroma" garment bag. Here the film keeps the aroma of the cedarized plastic bag from escaping.

K FILM FOR TOWELS, TOO

Dundee Mills, Inc., Griffin, Ga., has introduced gift packages of towels in K-202, helping to boost them from the I'll-get-it-when-I-need-it class into the area of impulse buying. For decoration, by the way, the towels use metallic yarns made with "Mylar" polyester film.

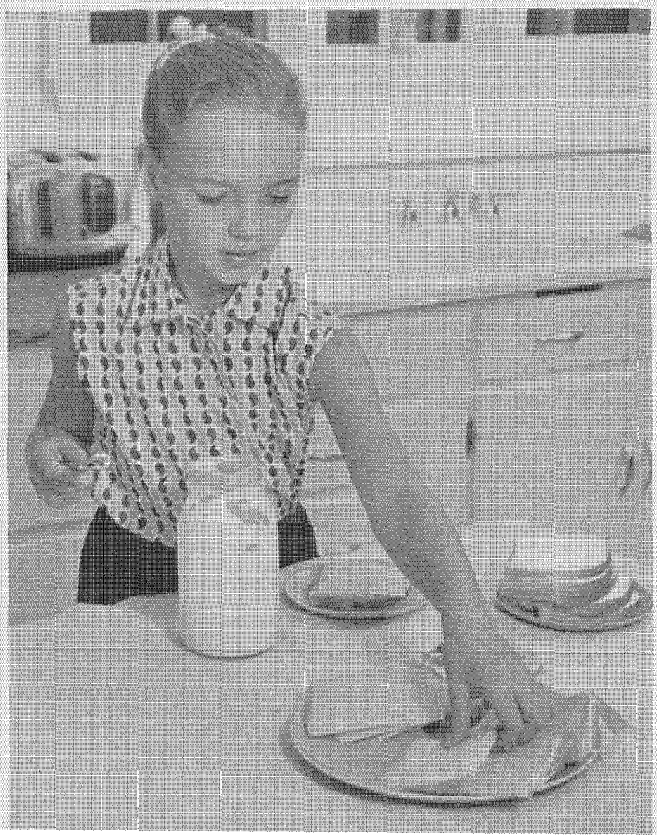
Demands made of packages are as varied as the products they enclose, the Film spokesman notes. "Ideally, a package should combine a good view of the product with attractive design and color, and provide the right amount and the right kind of protection. A balance of properties for almost any need can be found among the more than 100 varieties of cellophane we make. All of them are heat-sealable, printable and free from static—essential for machine packaging at top volume."

Now, with the added properties of the K films, still more manufacturers can call on cellophane to help them display and sell their wares.



Richardson's mints always look as fresh as they actually are because sugar coatings don't cloud K-203 package.

Individual slices of Clearfield cheese are overwrapped in K-202 for extra freshness and convenience.





Dundee Mills, Inc., finds that towels and washcloths have added gift appeal when packaged in K-202 cellophane.



DU PONT'S MOTION PICTURE LIBRARY

Did you know that non-theatrical films account for far more titles and footage yearly than Hollywood theatricals? Industrial films, which make up the greater share of the non-theatricals, today are a prime business communications tool. The Du Pont Company alone, for example, reckons that its movies have been shown at least 773,000 times to more than 109 million persons.

The Company supplies free, on request, motion pictures that explain in dramatic terms various aspects of its business and products. The most frequent borrowers of these 16 mm films are schools, churches, civic organizations and clubs.

Top picture on the list continues to be "The Du Pont Story," a 39-minute film in color. Originally, a 72-minute version was made to help employes understand the Company and chemistry's contribution to human life. But the first public showings were so popular that the historical film was edited to its present length for general outside distribution. It has been shown 169,000 times so far to a total of 27 million persons.

Runner-up is "A Story of Research," a lucid 19-minute film that also is in color. It highlights Du Pont research and describes how a man or a team goes about finding the answers that ultimately upgrade our living standard.

More than 500 commercial producers today turn out most of industry's movies. Some use Hollywood screen stars as performers; others use a company's own personalities; a few specialize in animated cartoons. Cartoons often are used to tell business stories because of their high entertainment value. Practically all of these films have one thing in common, however: They make it easier for the layman to understand our complicated modern technology.

A new booklet that tells how to go about borrowing Du Pont motion pictures and summarizes the most popular titles is available from Du Pont Motion Pictures, N-2420-DM, Wilmington 98, Del.

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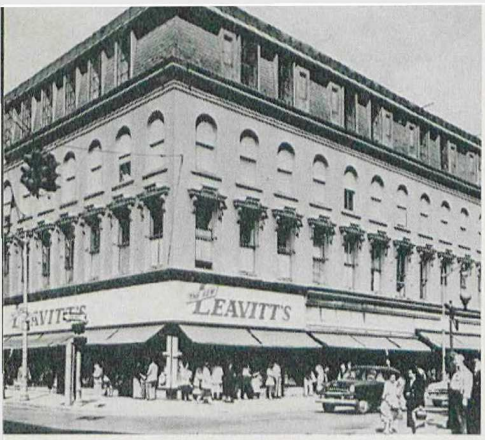

Drab masonry walls of Leavitt's Department Store, Bridgeport, Conn., now show attractive new face. Aluminum panels were enameled by Kawneer Co., Niles, Mich. Panels were cut to size on the job.



For the new look that lasts...
PORCELAIN-ENAMELED ALUMINUM

To put modern faces on yesterday's buildings, architects and designers are specifying panels of durable porcelain enamel on aluminum. What's back of their choice?

For one thing, this material is a *ceramic* coating that effectively answers the need for long-lasting color in architecture. Du Pont porcelain enamels for aluminum are available in an almost unlimited color range, from soft pastels to rich, deep tones. Surface textures can be varied, too.

Moreover, aluminum sheets finished with porcelain enamel are lightweight and a cinch to handle. They can be sawed, sheared, drilled and punched right on the job without damaging the tough ceramic coating. Panels resist abrasion, corrosion and weathering, and need little or no maintenance.

Coatings of Du Pont porcelain enamel can increase the rigidity of sheet aluminum up to 60 per cent, allowing the use of lighter-gauge metal. Such savings in weight are a particular advantage in new buildings using curtain wall construction.

Porcelain enamels also can add beauty and durability to a variety of other aluminum products. If you want more information or would like the name of an experienced enameler, write: E. I. Du Pont De Nemours & Co. (Inc.), Electrochemicals Dept., D-3123-DM, Wilmington 98, Del.



RIGHT FOR SIGNS, TOO

Trucks belonging to Transcon Lines, Los Angeles, sport eye-catching signs made by Mulholland-Harper Co., Philadelphia. Reports Transcon, which chose porcelain-enameled aluminum for its light weight and durability: "The signs dress up the entire unit."

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BETTER THINGS FOR BETTER LIVING...*THROUGH CHEMISTRY*

Next DuPont "Show of the Month"—"Junior Miss" 7:30 p. m., EST, Dec. 20, on CBS-TV