

October • November 1952



Better Things for Better Living...through Chemistry



anti-freeze

AT "ZERONE" and "ZEREX"
REG. U.S. PAT. OFF.
DEALERS

It's time to get your anti-freeze and have your car prepared for cold weather. Don't wait until freezing weather strikes and your dealer's station is jammed. Do this now—while your dealer has time to take better care of you. He'll give you complete cooling system service and the Du Pont anti-freeze that suits your needs best.



DU PONT "ZERONE"

*America's great
 money-saving
 anti-freeze value!*

\$1.50 A GALLON
(TYPE B)

O.P.S. Retail Ceiling Price.

So efficient that three quarts do the work of four quarts of most other brands of anti-freeze. Hence you buy less. The special chemical rust inhibitor in Du Pont "Zerone" gives your cooling system long-lasting protection against rust and corrosion.

DU PONT "ZEREX"

*The outstanding
 non-evaporating
 anti-freeze*

\$3.75 A GALLON
(TYPE D)

O.P.S. Retail Ceiling Price.

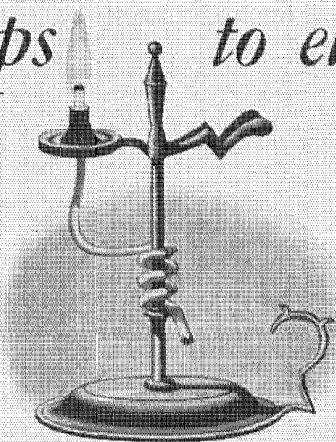
One filling of "Zerex" lasts winter in a properly operated cooling system. "Zerex" helps keep cooling systems clean and operating efficiently . . . protects against rust and corrosion. There is no finer anti-freeze made than Du Pont "Zerex."



150th Anniversary

BETTER THINGS FOR BETTER LIVING... THROUGH CHEMISTRY

Tallow dips to electric lights



"It is as difficult for you to realize how much the Chemical Engineer has contributed to your daily life as it is for your little son to realize the wonder of the motor cars that glide up the avenue: you are so used to it all.

"But turn the pages of history . . . and the luxuries that the Chemical Engineer has brought into today's civilization are written in letters of fire.

"Life has changed more in its essentials since the time of Thomas Jefferson—and remember, that was in your great-grandfather's day—than Jefferson's life had changed since William the Conqueror's day. In little more than one century civilization's frontiers have advanced farther than they had advanced in eight centuries before!

"Rushlights are not so far from tallow dips as tallow dips are from electric lamps. Jefferson's buildings rose little higher than William's . . . but what of the structural steels that make it possible for today's Woolworth Towers to pierce the skies? The doctors of 1806 took nearly as many chances as those of William's reign . . . but the Chemical

Engineer has placed in your doctor's hands specifics that silence forever the threat of many once-dreaded scourges.

"... the few years from Jefferson's day to yours are marked by startling, radical changes in the way of living, changes possible only through the Chemical Engineer's slowly won mastery over nature's elemental substances and forces . . . by his miracles in metals, in petroleum, in textiles, in rubber, in explosives, and in dyes and drugs and chemicals."

This Du Pont announcement, which sounds so up to date, appeared 30 years ago in the *Saturday Evening Post*. But the facts still fit today. At Du Pont, chemical engineering is now just as vital as ever—more so, in fact. And there are still hundreds of job opportunities in the Company for chemical engineers and others in nearly all branches of engineering and science.

As the 1922 announcement concluded, we continue to take pride "in the contributions that Du Pont Chemical Engineers have made to the development of industries in the United States."

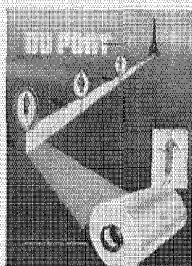


BETTER THINGS FOR BETTER LIVING...THROUGH CHEMISTRY

JAMES H. McCORMICK, *Editor*

Associate Editors, MARGARET MINER
GORDON H. KESTER

Vol. 46 No. 5



OUR COVER: Rayon, acetate, nylon, "Orlon" acrylic fiber and "Dacron" polyester fiber—they're all part of the 1952 Du Pont fiber picture. Our cover artist then carries us back along the fiber trail to 1889 when the new Eiffel Tower and the first display of rayon shared the limelight at the Paris Exposition.

Tying in with these developments are our stories of Du Pont's oldest fiber and new "Orlon" staple fiber.

Another article of special interest is on pioneer oil transportation by Paul Giddens, Allegheny College professor and Curator of the Drake Well Memorial Park. You might say he's got both oil and printer's ink in his veins.

PREVIEW: Our next issue will conclude our 150th Anniversary series. Customers and friends of the Company will be especially interested and concerned with the lead article discussing Du Pont's role in the chemical industry for the years ahead. In other stories there will be a few Christmas suggestions, a photographic roundup of our newest developments, and informative bits about some of the little-discussed chemicals that make up the bulk of our Grasselli Chemicals Department sales. Football games, television, and motion picture film are being amalgamated into still another feature that we expect to have ready for the next issue.

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The salesmen's shadows

—the men of Technical Sales Service who pass on Du Pont know-how to customers—are the subjects of Dutton's fifth article marking the Company's 150th Anniversary year.

By WILLIAM S. DUTTON

Early in the 1880s, one of the oddest events of that booming decade took place at Repauno, N. J. A husky workman, wearing an air that bespoke what he was about to do was all in the day's work, mounted a tall tower and hurled box after box of dynamite onto a pile of rocks below.

This is not the sort of treatment that usually is accorded dynamite, which is a commodity worthy of as much respect as a loaded gun. However, nothing of a disastrous nature happened, and something of a beneficent order did. Not long thereafter, for the first time, the railroads of America accepted dynamite as freight.

The event was doubly notable. It also marked the coming of age in the Du Pont Company of what is known today as Technical Sales Service. TSS is now Company-wide, and follows the salesman almost as assiduously as his shadow. Wherever Du Pont products are used in the processing industries, there, according to the need, you will usually find the men of TSS.

Back of the services is the basic purpose of making Du Pont know-how, the most valuable of the Company's assets, available to its customers without regard to their size. The problem is what counts, and it can be as big as they come. TSS specialists in the handling of explosives, for example, today range the nation to help solve problems like the following as a routine of their jobs.

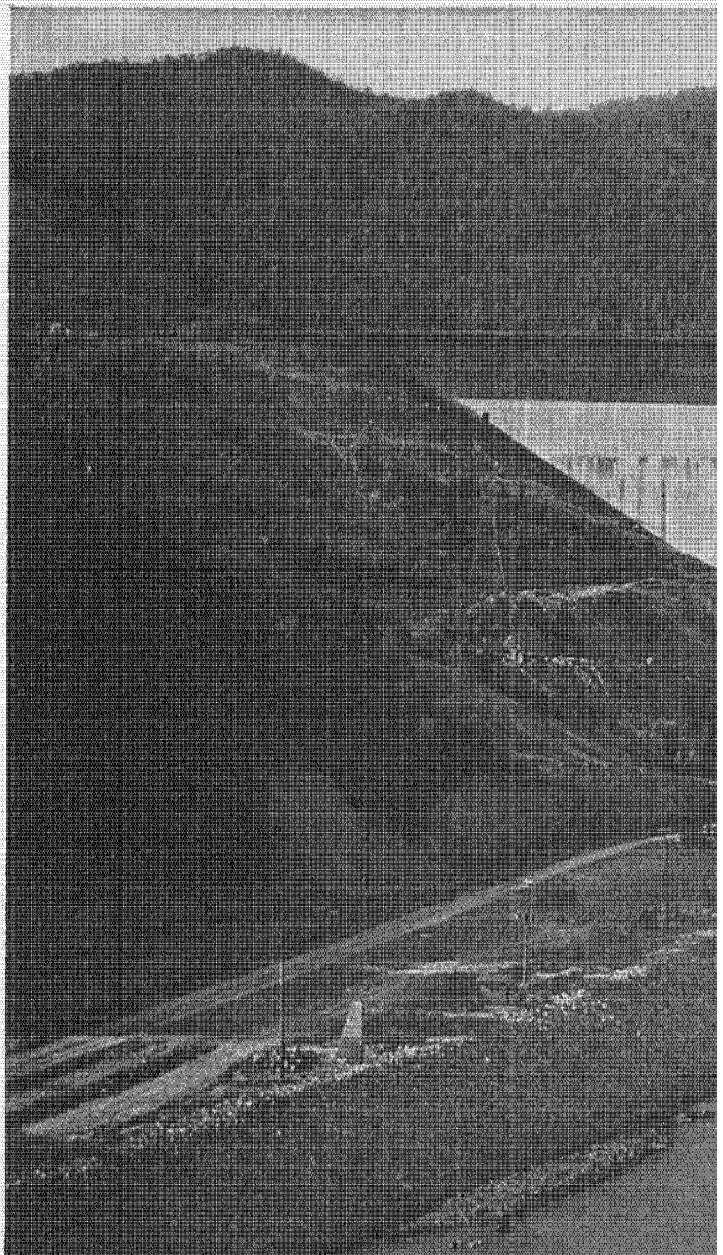
Development of the water power resources of the Tennessee Valley watershed, the final stages of which were carried out in a period of sharply rising costs, demanded the utmost from men and tools alike. Chosen as a major tool in the building of the huge Fontana, Watauga and South Holston dams—located in the Great Smokies near the Tennessee-North Carolina borderline—was Du Pont's "Nitramon" blasting agent. That choice put TSS advisers to a supreme test that extended over seven years.

In a series of nine major blasts that were shot between 1943 and 1950, about 4,800,000 pounds of "Nitramon" were exploded at the three dam locations, a money-saving total that set a record for quarrying rock at high speed. Each blast in itself set some important new record, and on an ascending scale.

Near Bristol, on February 5, 1949, the whole top of a

mountain was torn off in one unprecedented upheaval that in the space of seconds provided roughly 1,800,000 tons of broken rock for the South Holston Dam. This, the eighth of the blasts, was the biggest of industrial history—you must turn to the A-bomb to surpass it.

The ninth, a smaller blast, was none the less a challenge to technical skill and precision. It was comparable to



FONTANA DAM. "In a series of nine major blasts shot between 1943 and 1950, about 4,800,000 pounds of 'Nitramon' were exploded at three dam locations . . ."

lifting the bottom of a huge hole, amounting to 300,000 cubic yards of rock, to the height of a ten-story building and letting it fall again, without disturbing the sides of the hole. That feat was performed so gently that window panes weren't even cracked in a field garage only 500 feet away.

Over all was the record of safety set for the nine blasts. Throughout that countryside and in neighboring towns where people were properly concerned over such vast actions, not a single complaint of a bothersome or unexpected nature was filed for injury to life or damage to property, though subterranean tremors of the larger blasts were picked up by seismographs as far away as Ottawa.

That record was no accident. It was the result of advance calculations that took into account the placing of every pound of the millions of pounds of "Nitramon" exploded. On the biggest of the operations, 1,200 men worked 106 days to prepare the honeycomb of tunnels in which the huge charge was distributed with the care of a pharmacist weighing medicines. Those men did the work, but with the confidence that TSS and more than a century of Du Pont know-how was back of their blueprints.

By no means is Du Pont in the dam-building business. But with the TSS, the customer's need comes first, and being the salesmen's shadows is an assignment that leads to ever new and stranger events. Take horse racing, which is about as far removed from Du Pont's business as the moon.

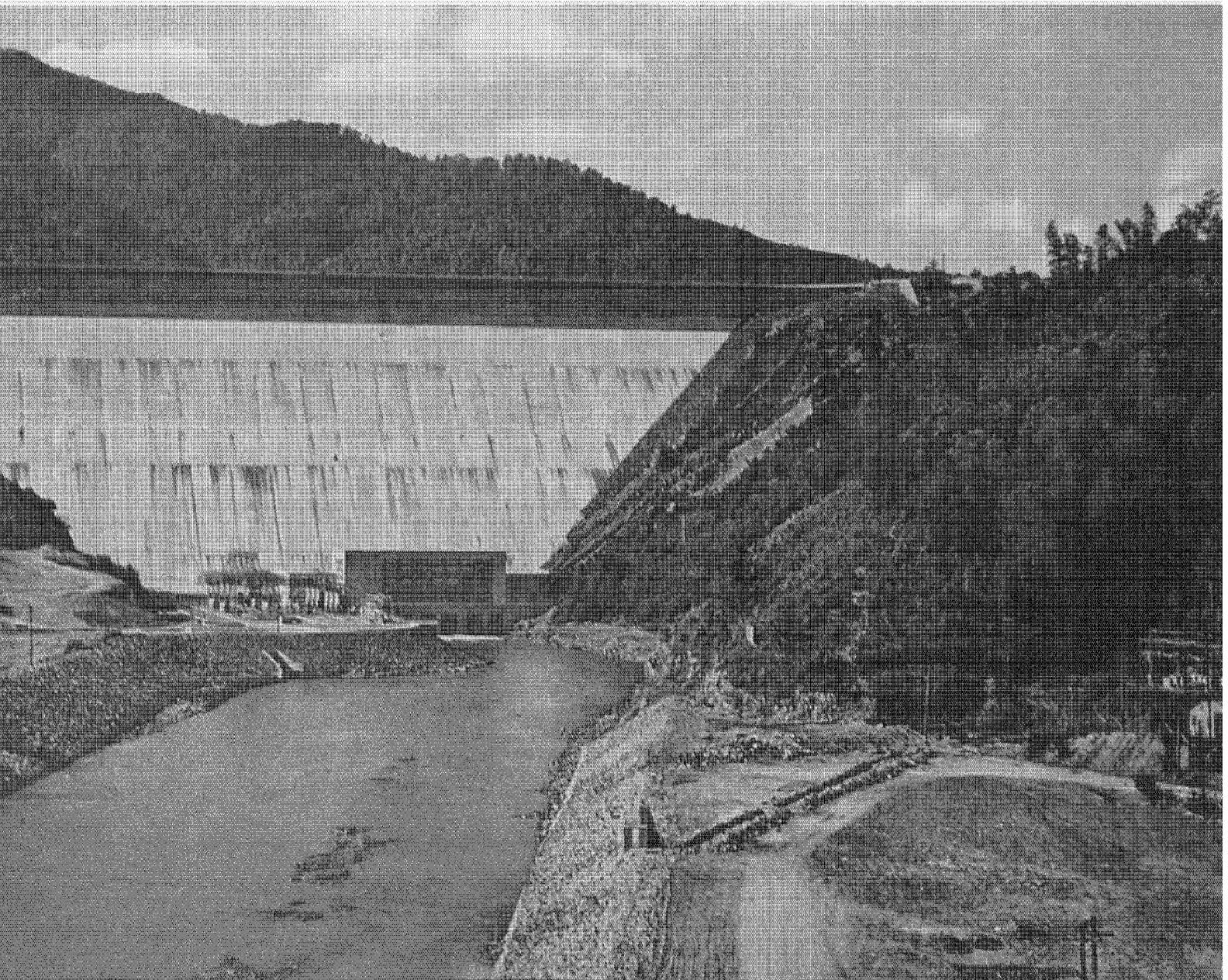
Half of our states now legalize racing and share its revenues. Cleaning up the sport and keeping it clean is a public interest. And so a TSS man, a few years ago, reported to Du Pont's Photo Products Dept. The need, he said, was for a motion picture film that could be developed faster and yet withstand the high temperatures required to do it.

Here was the idea. The photo-finish, a still shot of the leading horses crossing the line, settles beyond all question which horses are winners. But something new in track photography has been added. Cameramen perched atop six steel towers spaced around the track also make motion pictures of the whole race. The object is to record fouls or other infringements, if any, as they occur. The eyes of the six cameras miss nothing.

TIME IS OF THE ESSENCE

Time is of the essence in this new supervision. An official car follows the horses and picks up the exposed rolls of film. In less than a minute after the finish, the films are in the developing bath. In case a foul is claimed, all other business is suspended until the judges can see the race run again on the screen.

When the TSS man made this report, the best time in which films were being developed was five to six minutes. That was a costly wait. Du Pont researchers got busy. Two



new high speed, rapid reversal films were created. In track tests during the past summer, using existing darkroom equipment, the new films were completely developed in a record 3 minutes, 50 seconds.

The next move is to bring the developing equipment up to the full capability of the films. When this is done, the TSS predicts, the developing time will be cut to two minutes or less.

The research cost Du Pont \$150,000, but in a day of speed and more speed in photographic reporting, the films known as 930A for day, and 931A for night, are expected to fill a dozen needs. Night sports events of all kinds are within the special compass of 931A. Both types are promising assets for speedier television reporting. Salesmen foresee all sorts of possibilities ahead for the camera that can report almost immediately what it sees.

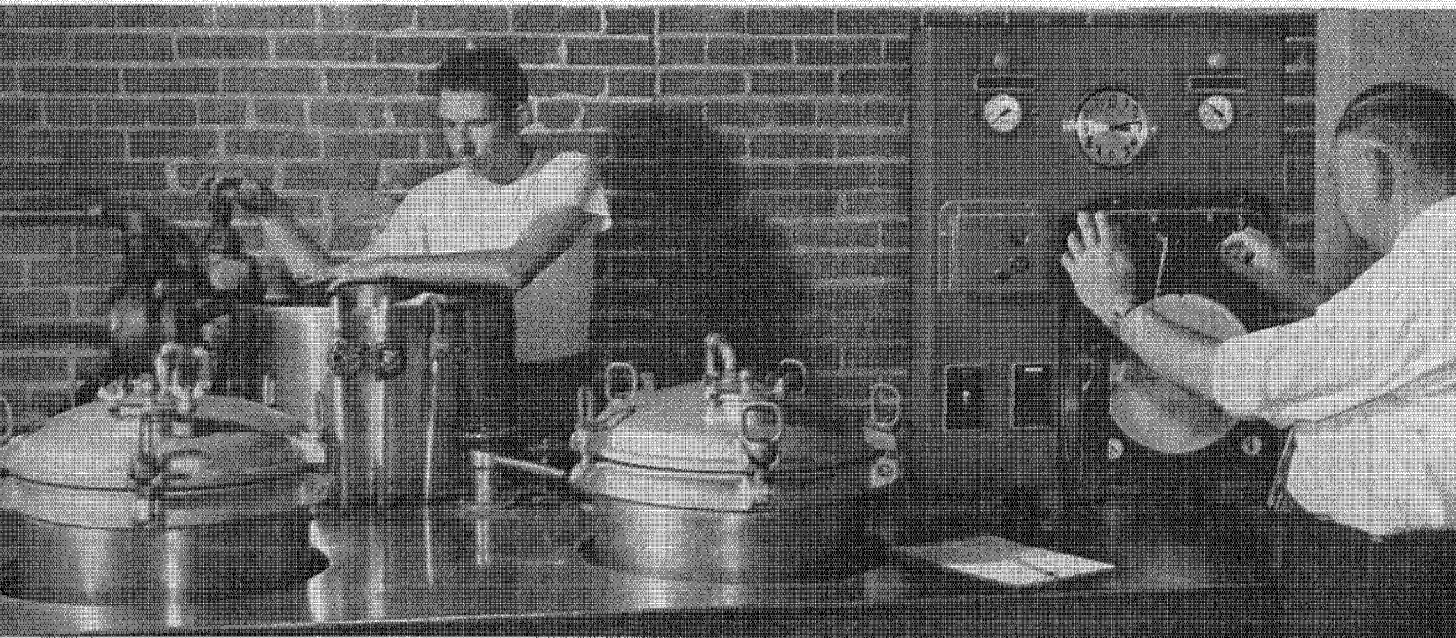
TSS work is never prosaic. In the dyes sector of the service, the Company's second oldest, that fact is redis-

covered. The TSS tackled it as one of the odd twists of the day's work. Regardless of how odd the problem, or how small, TSS policy precludes brushing aside the customer's need if it can be met within reason.

HELP FOR SMALL FIRMS

One feature of the Technical Sales Service of which its members generally are proud is that often they are privileged to help a little business grow up. A TSS man of the Rubber Chemicals Div. recalls one such opportunity of many of the kind. It was early in the great depression. A new one-room tire retreading shop was struggling to establish itself in a Texas town. Its total purchases of rubber chemicals were not much more than \$50 a year.

Small or not, the shop was a customer and of concern to the salesman's shadow. When in Texas he never failed to stop in for a visit with the owner and his little staff. Every



DYES. "The art of blending fibers, no two of which dye alike, is sweeping the industry."

covered constantly. The TSS for dyes was set up originally to aid textile, paper, leather and other mills that use colors in quantities. That is still its big job, and it is one that is growing ever tougher. Outside rayon, the early problems involved only natural textile fibers. A galaxy of synthetics has come along since. The art of blending fibers, no two of which may dye alike, is sweeping the industry. Sometimes it seems as though know-how changes almost overnight.

That isn't all. Dyes are being called on to do tasks undreamed not long ago. They range from coloring germs and tissues in medical research to dyeing a weed-killing solution so that the user could see at once what weeds he had sprayed. Another time a black dye was selected to be spread over the surface of ponds to shut out the daylight, and quickly cause underwater vegetation dependent on light to perish.

Pigs, cows and fish have presented problems. With pigs, the job was to pick a dye for use in tattooing their ears with special identifying colors. A cattleman who objected to branding was provided with a dye bath into which he could swish his animals' tails. A researcher into the habits of mountain trout asked for a brilliant dye that

now and then he was able to report experiments that had been made in Du Pont's rubber laboratory, and which were of interest to a retreader seeking to improve his work.

Then neoprene synthetic rubber was introduced by Du Pont chemists. One of its qualities is a high resistance to deterioration by oil. The alert shop owner, situated in the midst of the growing Texas oil fields, saw his big chance and seized it. He became a manufacturer of rubber products for the oil industry.

That change brought new problems, and those that were technical became the problems of TSS too. There was no magic that transformed the business during the next ten years, just steady plugging, but by virtue of it the one room became a sizable little factory. It was able to employ its own chemist. The chemist spent six weeks of training in the Du Pont laboratory, and TSS helped plan the new laboratory over which he was to preside in Texas.

Today, the Texas factory employs 150 workmen and is an important supplier to the petroleum industry. Its purchases of neoprene and rubber chemicals amount to more in one day than the retread shop bought in an entire year. Again, TSS proved to be a shadow of substance.

"Cavalcade" makes its TV debut

New television series joins 17-year-old radio program to tell stories of America's growth

"Cavalcade of America" now has a television team-mate. A filmed series of stories began October 1 and may be seen on alternate Wednesdays at 8:30 p.m., E.S.T. over the NBC television network. These video programs, like the NBC radio series on Tuesday nights at 8:00, tell the story of America and of the people, both famous and obscure, who have contributed their courage and vision to the nation's growth.

Preparations for Du Pont's entry into network television have been underway for over a year. Four of the TV films were previewed in four communities during the past year. The idea was to see how audiences would react to them, and in each case the films received an enthusiastic response.

Du Pont's decision to film the stories, rather than present them "live," was made for a number of reasons. For one thing, filmed shows allow greater flexibility in buying station time. Smoother production and a wider scope of action are also possible. In addition, it will be

possible to loan the films for school and club showings sometime after they have been used on television.

Subjects of the stories range from George Washington, Benjamin Franklin and Abraham Lincoln to such lesser-known heroes as the daring Quaker girl, Lydia Darragh, and the patriot, John Honeyman.

Three Hollywood studios have produced the thirteen completed films, and many outstanding actors and actresses appear in them. For instance, Eduard Franz, star of "The Du Pont Story," portrays an aged lawyer defending freedom of the press in "Mightier Than The Sword," as well as the inventive and resourceful Samuel Morse in "What Hath God Wrought."

At the close of each program there will be a story of chemistry to illustrate Du Pont's activities and the Company's contributions to better living.

On this page we've reproduced scenes from some of the films to which viewers can look forward during coming months.



Jefferson Davis reports for duty to Zach Taylor in TV film, "So Long As I Live."



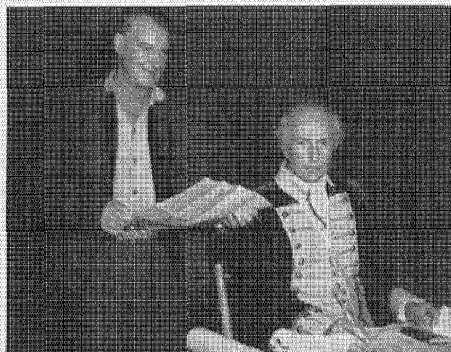
Davis weds Taylor's daughter, leaves the Army and is counseled to enter politics.



Death of his wife starts Davis on political career, a bitter and lonely man.



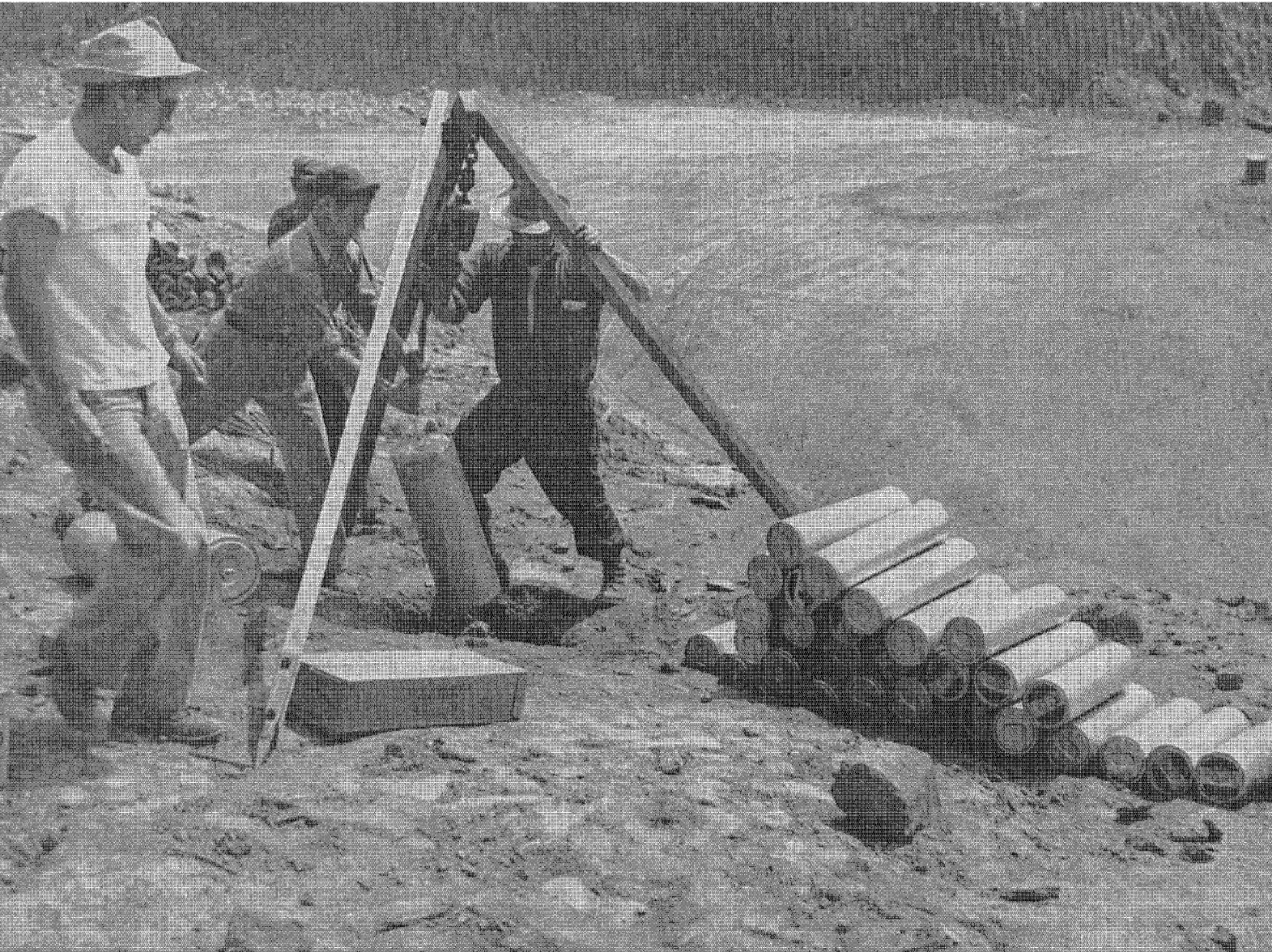
"The Arrow and the Bow": Eliza's mother predicts she'll marry Andrew Johnson.



"In This Crisis": a patriot poses as a traitor to get data for Geo. Washington.



Sam Houston is threatened by his wife's uncle in tense scene from "The Locket."



At Starlake, N. Y., "Nitramon" blasting agent goes about its job of breaking up huge cliffs of iron ore.

Blast to blast furnace

New techniques have meant a rebirth for New York's Benson Mines, which were already old when the Mesabi deposits were discovered

By M. E. WILLIAMS

When a country like ours is built on a "steel economy," dislocations in steel production can quickly derail our complicated industrial machine. No one is more aware of this than the steel companies. Right now, for instance, they have people out all over the Western Hemisphere in planes, jeeps, on horseback, and on foot combing the earth for new deposits to bolster our declining ore reserves.

It's generally agreed that there's plenty of ore lying around. The trouble is, it's in Venezuela, Brazil,

northern Canada, and so on. It behooves us to work our close-to-home reserves as economically and efficiently as possible. This is the job of men who get the ore out of the ground—like the staff of the New York Ore Div. of Jones and Laughlin Steel Corp. at Starlake, in upstate New York. Here their Benson Mines project feeds the great furnaces of Jones and Laughlin.

The Adirondack Mountains have given up the basic ores to meet the needs of other national emergencies than the present one. During the Revolutionary

War crude smelters furnished cannon balls and gun barrels for General Benedict Arnold's successful hit-and-run campaigns near Lake Champlain.

In the '80s, about a quarter of the magnetite ores produced in the country came out of the Adirondack deposits. However, with the discovery of the great Mesabi Range in the Lake Superior region, northern New York State took a back seat as a source of ores. There was one brief, frantic revival during World War I. It wasn't until World War II that the need for arming the Allies brought Adirondack ores back into prominence. There has been no letdown since.

The Starlake ore was first discovered by surveyors laying a military road between the St. Lawrence and Hudson Rivers in 1810. It is a relatively shallow deposit, as ore formations go. Sections lie practically on the surface, while others are covered by an overburden of sand and boulders measuring up to 80 feet deep. This permits an open pit operation, the method used since 1944, when Jones and Laughlin took over from an older mining company.

"A GREAT GASH IN THE EARTH"

Benson Mines, from the air, is a great gash in the earth some three and one-half miles long and ranging in width from 400 to about 1,500 feet. With its flat, tidy floor it resembles some dried-up salt lake bed. The cliffs which drop perpendicularly to the floor of the pit are always receding. It is in these "faces" that the actual mining takes place.

The ore itself is securely locked in mother rock consisting of tough, igneous quartz, feldspar, and garnet formations. It is drill and shoot, drill and shoot all the way, starting with what waste rock remains after the overburden is scooped off, and continuing through the breakage of the ore-bearing rock. Magnetite doesn't give up easily or cheaply, and each of the pit "faces"

presents its own peculiar blasting problem.

Jones and Laughlin uses column loads of Du Pont "Nitramon" and "Nitramex" blasting agents in their shooting operations. They feel this pair offers the best possible fragmentation, but even more important is its greater safety in storage, handling and use. For the most part, the breakage is so complete the broken rock can be handled by power shovels with little secondary blasting.

Blasting experts at Benson work with Du Pont technical service men in trying out improved explosives and methods of using them. They did some pioneering last year, for example, with a new device called the "Primacord" MS Connector. This permits delays of about 17/1000 of a second between holes being shot.

In one massive 29-hole blast, 44,932 pounds of Du Pont blasting agents produced more than 122,000 long tons of magnetite and waste rock. The closely controlled delay gave excellent breakage with a minimum of vibration. It was agreed all around that the new technique was a genuine advance in safety and efficiency. It was also gratifyingly economical.

To help satisfy the appetites of the Jones and Laughlin blast furnaces, Benson mines work around the clock in all kinds of weather. Last year they mined about 5,500 pounds of crude ore for each pound of "Nitramon" and "Nitramex" used.

These figures are a success story with a reverse twist on it. Compared to the 1950 figures, ore production is up but cost of blasting is down. There is no reason to believe the trend will change. Du Pont explains it this way: Jones and Laughlin has been just as receptive to new ideas and new blasting methods as Du Pont representatives have been aggressive in presenting them.

But there are no regrets. The primary goal, more efficient mining of the Adirondack ore, is being realized.



Dust and rock fly as a 29-hole well-drill blast is set off at the Benson Mines operation of Jones and Laughlin Steel Corp.



The mining operation, much of it seen here, has cut a great gash in the earth $3\frac{1}{2}$ miles long and 400 to 1,500 feet wide.



Coopers worked overtime making barrels, but they couldn't keep up with the rising flood of oil.

When the oil barrel was king

... it sometimes was more of a risk and expense to get oil to market than to drill and find it

By PAUL H. GIDDENS

Picture 20 men about to cross the burning Sahara. They stop at a bubbling spring near the desert's edge, intending to take a supply of water with them, and discover that the only container among them is a single canteen!

Substitute the United States for the Sahara, oil for water, and you have a fair picture of the situation facing oil producers in the early 1860s. Getting oil out of the ground was one thing; finding something to put it in was another. This storage and transportation problem was one of the first to demand solution by the infant petroleum industry.

The story begins on August 28, 1859, when the drill of Col. Edwin L. Drake near Titusville, Pa. struck oil at a depth of 69½ feet. This first oil well began pumping 10 to 20 barrels a day. The news spread like oil on water, bringing men on the run to

lease or buy land, and to drill wells along nearby Oil Creek. Soon other wells came in, producing at what was considered the enormous rate of 20 to 75 barrels a day. Each new strike created a sensation.

While these wells produced more petroleum than had ever been seen before, they were nothing compared with the "monster" flowing wells of 1861. The Little & Merrick well, completed in April, spouted at the astounding rate of 3,000 barrels a day. Five months later the Empire well began gushing at the same rate.

With the market already glutted, output from the Empire drove the price of crude oil down to ten cents a barrel. Then Phillips No. 2 roared in like a hurricane with a flow of 4,000 barrels a day. This was the largest oil well in the world. The daily crude oil production in the United States jumped from virtually nothing prior to August, 1859, to nearly 5,000 barrels a day in 1864. Practically all of it came from Oil Creek wells.

The owners of the pioneer wells were bewildered by the flood of oil and wholly unprepared to store such large quantities. Drake borrowed washtubs, boilers

and whiskey barrels in which to store his oil, but there were never enough to supply the demand. The cost of barrels rose to \$2.00 apiece, and coopering shops sprang up everywhere to fill the demand.

Barrels were floated down the Allegheny River from New York State, and steamboats pulled towboats and barges piled high with barrels from Pittsburgh. By 1863, prime wooden barrels were selling for as much as \$3.25.

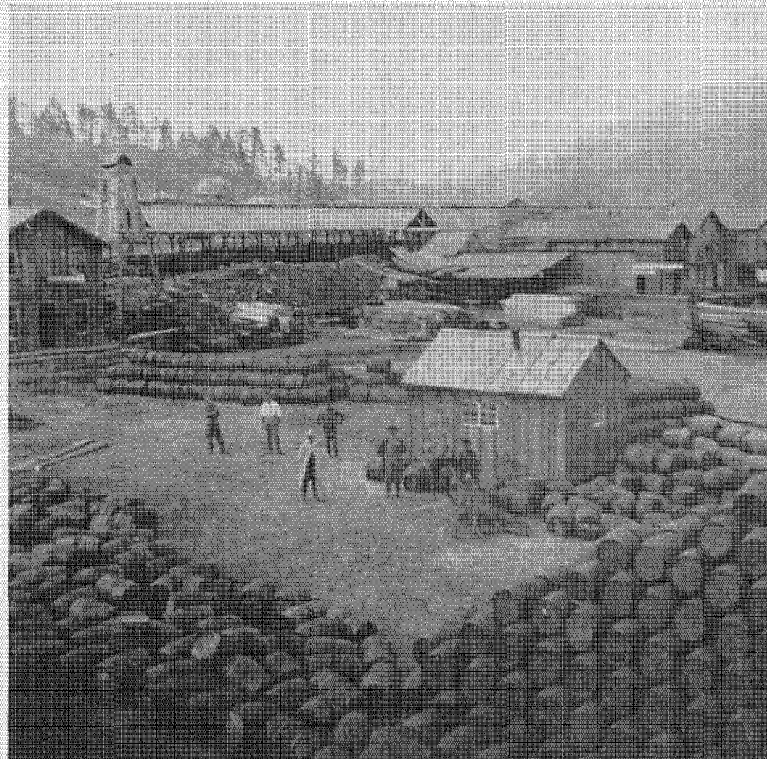
When the giant gushers began throwing torrents of oil into the air at the rate of 1,000 to 4,000 barrels per day, it was impossible to secure barrels at any price. Owners built dikes around their wells but the oil refused to be dammed. Thousands of barrels went to waste on the surface of Oil Creek.

With the production of 1,400 barrels per day from 12 wells and no facilities for storing, Andrew Carnegie and his associates excavated a huge hole in the ground

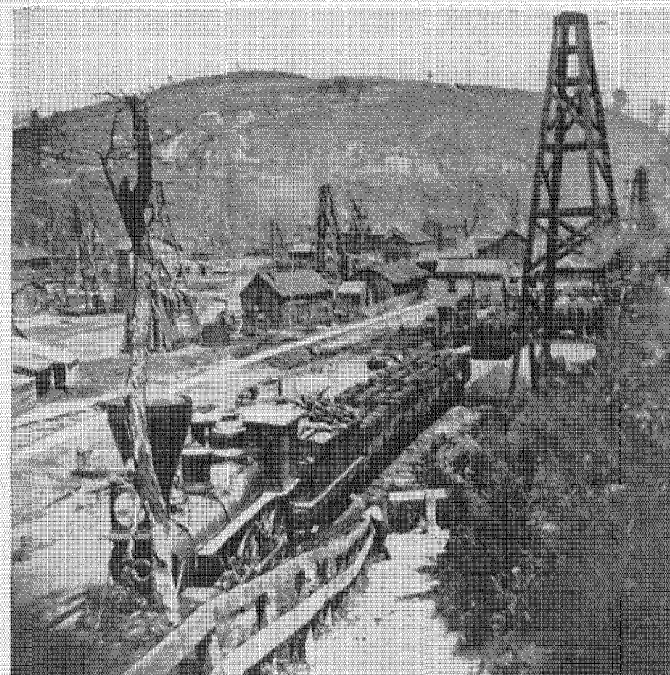
WOODEN TANKS, holding from 3,000 to 4,000 barrels, were built hurriedly to store the oil that gushed from the ground in the '60s. This one was at the Homestead well.



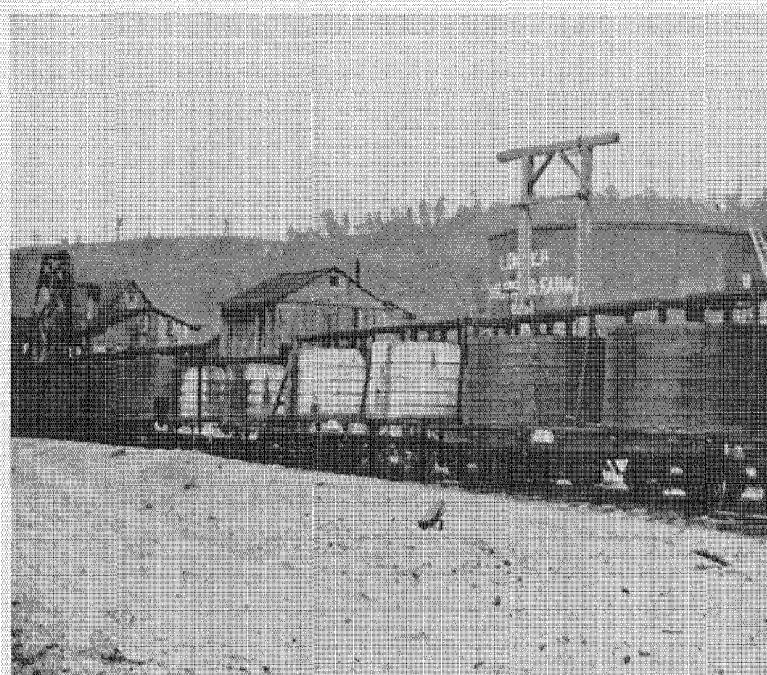
BARRELS by the thousand were needed to get the oil to market. Local coopering shops sprang up and oil barrels were even imported from New York, but still demand rose.



FLATCARS loaded with oil barrels were first step in evolution of modern tank car. About 6,000 teamsters hauled barrels to rail shipping points from wells along Oil Creek.



TANK CAR of 1865. Each wooden tank held about 45 barrels of crude. That same year the first oil pipeline was built. It carried 2,000 barrels a day, replacing 300 wagons.





FILLING OIL-TIGHT FLATBOATS WITH OIL FROM TANKS.

capable of holding 100,000 barrels and ran their oil into this. Later large circular wooden tanks, hooped with iron and holding three to four thousand barrels, were built near the wells.

Whether from small or large wells, oil traveled in barrels. Before 1862 about 6,000 teamsters were regularly engaged in hauling crude from Oil Creek to the nearest shipping points. From dawn until dark, seven days a week, wagons in processions sometimes more than a mile long moved the oil to market.

Railroads supplied ordinary flatcars onto which the barrels were loaded. Flatboats containing 80 to 100 barrels carried the oil down the Allegheny River

to Pittsburgh for 10 cents per barrel. When oil prices were low and barrels scarce, oil was shipped by boat in bulk. If boats were scarce, filled barrels were launched into Oil Creek, lashed together in huge rafts and shipped to market in this fashion.

FIRST CRUDE TANK CAR

Then, in 1865, a man named Amos Densmore built two wooden tanks on the ends of an ordinary railroad flatcar, filled them each with 45 barrels of crude and shipped them off to New York. That was the first tank car, and it was so successful that in no time hundreds of them were rolling out of the oil region.

At the same time an oil buyer named Samuel Van Syckel, disgusted by the waste, the exorbitant charges of teamsters, and the risk and uncertainty of shipping oil by boat and wagon, decided to build a pipeline. Completed in 1865, Van Syckel's two-inch pipe ran from Pithole to Miller Farm in Pennsylvania, a distance of about five miles. It had a capacity of about 2,000 barrels a day—the same amount that could be transported by 300 teamsters in the same time.

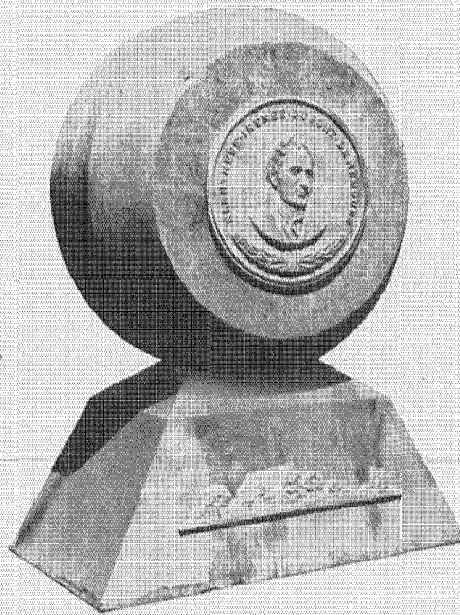
These, then, were the beginnings. Today the modern steel tank car with a capacity of 8,000 gallons or more is a common sight. Where the railroads cannot reach, tank trucks take over. Van Syckel's pipe has fathered thousands of miles of pipeline carrying crude to refineries and refined products to market. River barges, lake and ocean tankers—all are part of the team that brings gasoline to the nation's service stations and oil to its homes and industries. All are part of the progress in oil transportation that enables the modern petroleum industry to deliver its products farther, faster and cheaper.

Oil City, Pa. lived up to its name in 1864. Here the loaded flatboat fleet sets out for the Pittsburgh market. Today, in scores of oil centers, gasoline is refined from crude—and improved with Du Pont tetraethyl lead.



Du Pont

Notes



SOON AFTER COMING to Delaware in 1802, E. I. du Pont, founder of the Du Pont Company, ordered two giant millstones shipped from his native France. They were used to grind the three essential ingredients of black powder—sulfur, charcoal and saltpeter.

This year one of these seven-ton stones was lifted from the bank of Brandywine Creek, where it had been discarded long ago, and mounted on a foundation at the site of the first powder mill. It was dedicated at the Company's 150th Anniversary celebration in July. On a bronze plaque affixed to the other side of the stone wheel above are these words:

●*"On this site in 1802 the Du Pont Company was conceived. It has grown with the growing nation under a system dedicated to freedom. Its greatest asset has been all its people and its guiding philosophy that there is no privilege that is not inseparably bound to a duty."*

A CONTINUOUS NITRATION process for nitroglycerin, the first in a commercial explosives plant in this country, will be a feature of the new Du Pont dynamite plant at Martinsburg, W. Va. The plant is scheduled to go into production next spring.

The continuous process, replacing the time-honored batch process of NG manufacture, has safety as its biggest selling point. Instead of the approximately 3,500 pounds of touchy NG in a batch reactor, the continuous nitrator has only 250 pounds. In addition, automatic controls in the continuous process shut off the feed if power fails or if the temperature in the reactor gets too high.

DYEING THE NEWER SYNTHETIC FIBERS is usually about as easy as getting a cat to swim. That's why a new pressure fabric dyeing machine has been designed by a Du Pont engineer. It's the latest step in the Company's research program to perfect the dyeing of synthetic-fiber fabrics, particularly those of "Orlon" acrylic fiber and "Dacron" polyester fiber.

The machine is called the Barotor, because its main parts consist of a rotor and uniquely operating bars within a steel cylinder. It's described as the first major change in batch dyeing methods in 500 years.

Well on the way to development, the Barotor still needs "the refinement of the textile machinery manufacturer and the experienced touch of the practical dyer," according to its designer, Paul M. Cole.

The machine was developed as a service to Du Pont customers. It will be manufactured under license by textile machinery firms.

Land revolution in Ceylon

By R. J. WOODRUFF, Jr.

Tradition doesn't uproot easily, particularly in the Orient. So, when the government of Ceylon faced up to some hard facts relative to feeding and supporting its 7,500,000 people after World War II, the island's leaders were placed in the position of selling a land revolution.

The 25,000-square-mile island, which lies 70 miles southeast of the mainland of India, cut its colonial ties with Great Britain in 1948. The end of colonialism meant the end of a crop system which exported quantities of tea, some coffee and crude rubber, and did very little to meet food needs at home.

The curious climate of the island was a further complication. The southern end of Ceylon is mostly steaming jungle. A mountain chain several thousand feet high checks the drenching winter monsoons which pour up to 120 inches of rain over the southern district during a five-month period. North of the mountain backbone the land is comparatively arid, receiving only about 30 inches of rain a year.

Neither section offered good conditions for rice—the life-sustaining staple crop. So the government bravely set out to create new conditions which neither nature nor tradition had provided.

First step was a series of planning huddles with UN food-and-agriculture experts. Next came the hiring of an American construction firm and the importation of more than 150 diesel-powered bulldozers, graders, earth movers, harrows, and tractors. Toted inland over a wheezy narrow gauge railway, the snorting machines moved in to topple the jungle forests and grub undergrowth from terraces and uplands where for centuries logs had been hauled by patient elephants and the soil had been scratched by bullock teams.

FIRST JOB: IMPOUND A RIVER

This was the scope of the project: They planned first to impound the waters of the 62-mile long Gal Oya River with a dam two-thirds of a mile long and 154 feet high. Heretofore the river had been a raging flood in monsoon season and a trickle in the dry months.

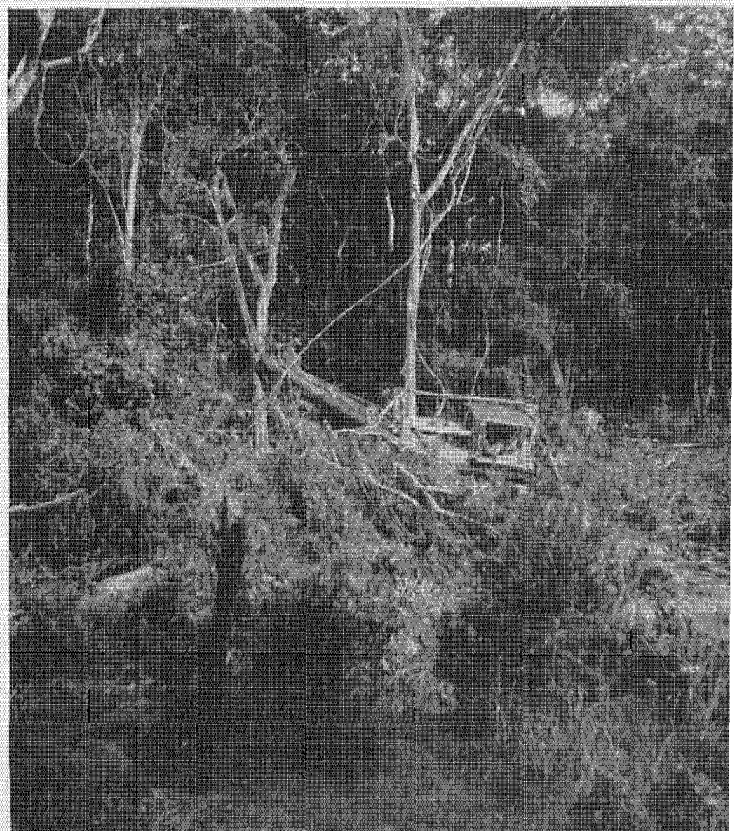
Then they planned to clear, over a 12-year period, a total of 250,000 acres of jungle and massed undergrowth for cultivation. About half of this acreage, arid and undeveloped, was to be irrigated by waters from the 30-square-mile lake created by the dam. They planned to build 25,000 four-room cottages and move in a total of 250,000 settlers, providing families with seven-acre plots, livestock and farm implements.

When conceived in 1949, it was about the largest and most ambitious land reclamation and irrigation project in the Eastern Hemisphere. Progress so far has exceeded the wildest dreams of the planners. Gal Oya dam was finished a year ago, well ahead of schedule. As of last March, 20,000 jungle acres had been cleared and 10,000 were ready for cultivation. The first 10,000 cottages are nearing completion.

The accomplishments to date took some heroic doing. The Ceylon government deserves credit, with an assist from an American soldier-of-fortune named Leeowen (Tex) Taylor and his armored division of roaring Caterpillar-built bulldozers and earth movers.

Taylor debarked in Ceylon in 1951 with more than a decade of jungle taming experience under his belt, but with only a vague idea of the challenge he faced at Gal Oya. He found, for example, that he had to teach several hundred natives of mixed and antagonistic religious persuasion how to become skilled operators before he could use the equipment waiting for him at the dock.

Tractors provide the muscle for land reclamation project in Ceylon, where 250,000 acres of jungle are to be cleared in 12 years.

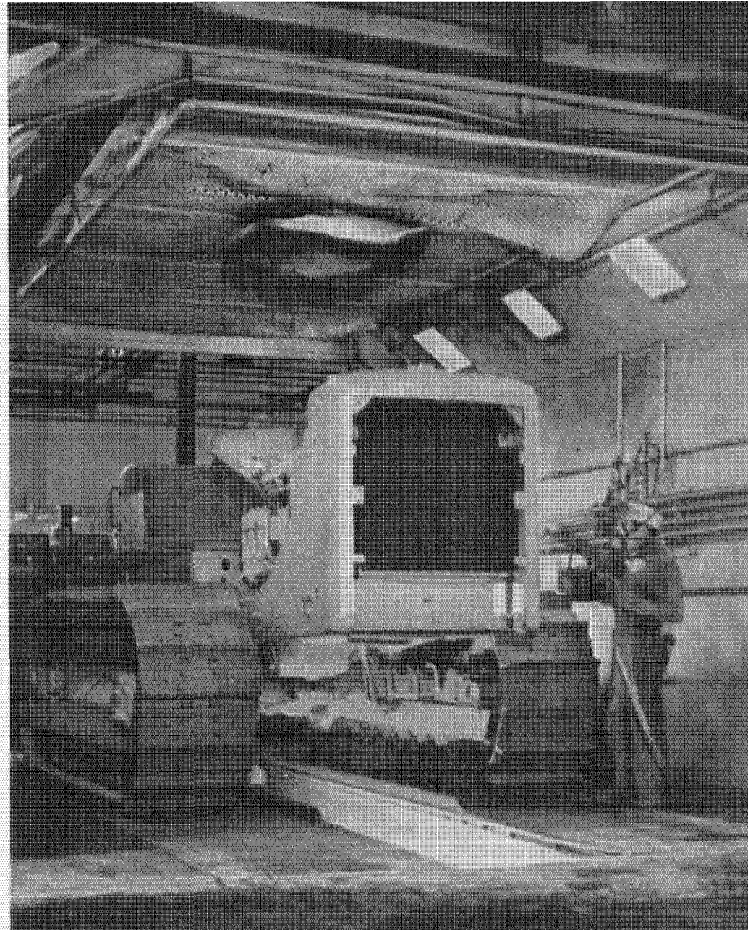


taught them how to run and care for 20-ton bulldozers, but tricks he had learned the hard way. He taught slender Ceylonese youths, barely tall enough to reach the pedals, to fell hardwood giants by pulling them down, instead of pushing them over. This operation, incidentally, entailed the nicest kind of teamwork involving a tree dozer plus two pairs of bulldozers dragging a huge iron chain between them. Once the drivers got the drift they were flattening up to 135 acres per team in a single day.

In addition to conditions that tried the souls and bodies of men, Taylor had to worry about the condition of his Caterpillar diesel tractors. But one thing he didn't need to worry about was the familiar bright yellow finish. Sprayed on at the Caterpillar factory in the United States, this special "Dulux" tractor enamel stood the gaff of just about the worst operating conditions imaginable.

Taylor also put these Du Pont finishes to work to teach his men a maintenance code. He painted water cans and radiator caps white; diesel tanks on the tractors and fuel drums were striped in black, grease cups and lubrication drums blue, and so on. It was simple, it worked, and saved time, money and machines.

The Gal Oya job is well launched but is only partly complete. Even so it appears safe to reflect that the contributions of Tex Taylor and the bright yellow Cat crawler tractors which have become synonymous with "America" all over the globe, are doing Ceylon—and the cause of the West—more good than several tractor loads of diplomatic representations.

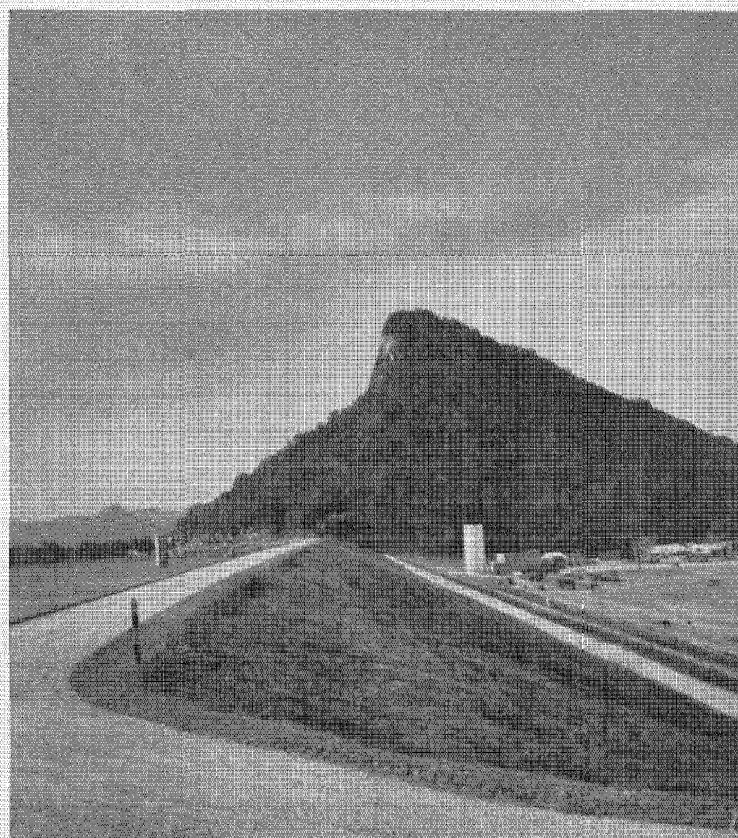


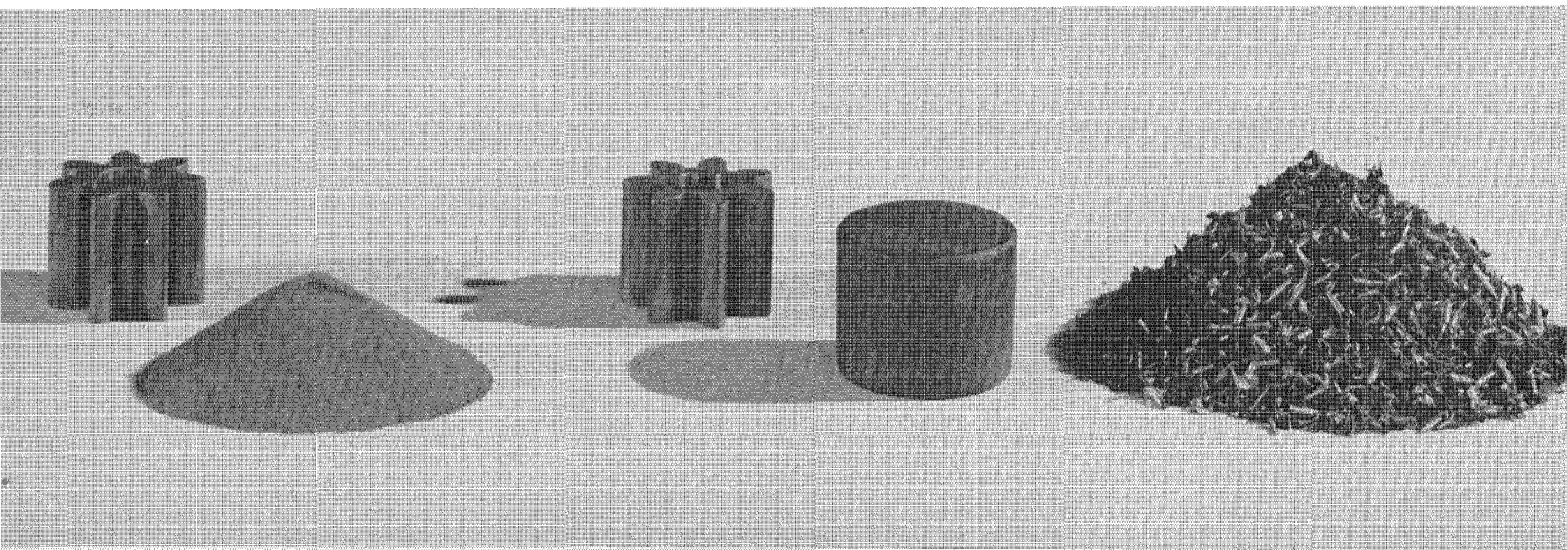
Special "Dulux" tractor enamel, sprayed on at the plant, protects equipment against ravages of operation in jungle area.

This Caterpillar tractor is hauling fill dirt for airport construction on the Gal Oya project. The Ceylonese were trained as drivers.



Gal Oya dam is a symbol of new hope in Ceylon. Water from here will generate power, irrigate 130,000 acres for rice growing.





Gears made by powder metallurgy (left) and machining (right). Powder process uses less metal.

Metals from powder

The story is told of an Army major, assigned the job of procuring a certain metal part during World War II. The written specifications called for a finely machined piece with unusual strength and heat resistance. Millions of parts were needed in a hurry.

The major, finding that the necessary machine tools weren't available, turned in desperation to a powder metal fabricator. The fabricator explained that he couldn't meet the specifications for strength or size. The major, conceding that the standards might be too high, requested that he supply sample parts anyway. He did, and they performed the job satisfactorily in every respect.

"How much will you charge to make these?" the major wanted to know.

"How much were you going to pay for the machined parts?" replied the fabricator.

"A dollar and a quarter apiece," said the officer.

"Well," said the powder metal man, "this may sound ridiculous, but mine will cost you ten cents."

Julius Sachse, vice president of the Metals Disintegrating Co. of Union, N. J., a leading manufacturer of metal powders, adds a moral to the tale:

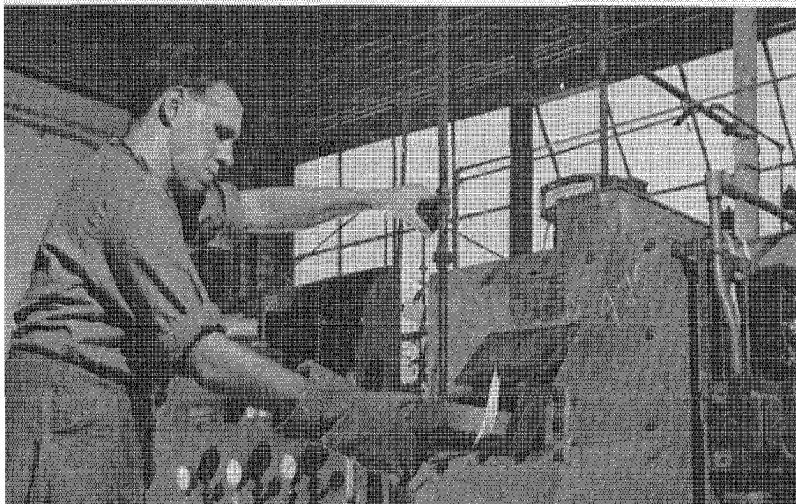
"People today are asking themselves the industrial equivalent of the World War II expression, 'Is this trip necessary?' In other words, what are the requirements of the gear or cam or whatever other metal part they want to make? With rising material and labor costs, more of them are re-examining their specifications and finding powder metallurgy an economical answer."

The powder metallurgy process, exploited but little until the 20th century, also has made possible the molding of abrasive wheels, brake bands and other friction surfaces containing a mixture of metals and such nonmetals as plastics. It fathered the porous, self-lubricating bearing, too, and more recently, a filter of porous bronze used in fuel and lubrication systems.

In the process, metal powder is placed in a die of the desired shape and subjected to pressure as high as 50 tons a square inch. Then the molded part is sintered, or heat-treated, a process which increases its strength ten times over.

The sintering is usually done in an atmosphere of hydrogen in order to reduce any residual metal oxides and prevent oxidation. In the lab of the Metals Disintegrating Co. and the plants of many of its customers, this hydrogen is obtained by breaking down Du Pont "National" anhydrous ammonia, 99.99 per cent pure, into hydrogen and nitrogen gases.

"The hydrogen we use has to be of high purity. Above all, there must be no moisture present. Du Pont 'National' anhydrous ammonia meets our requirements," Sachse told us.



After being molded under pressure, powdered metal parts are heat-treated. Hydrogen in furnace prevents oxidation.

What's New

● **TWO NEW FINISHES** have been announced by the Company. They are:

Du Pont mildew-resisting packinghouse oyster white enamel, containing a nontoxic fungicide and designed for use in food processing areas where mold is a problem. Tests in creameries, meat packing and poultry plants have shown the product's effectiveness.

"Dulux" interior varnish, an extra tough finish for floors and furniture. It has superior resistance to alkali, water, alcohol and scuffing feet. Proved on gymnasium and industrial plant floors, it's recommended where a clear, hard-wearing finish is required.

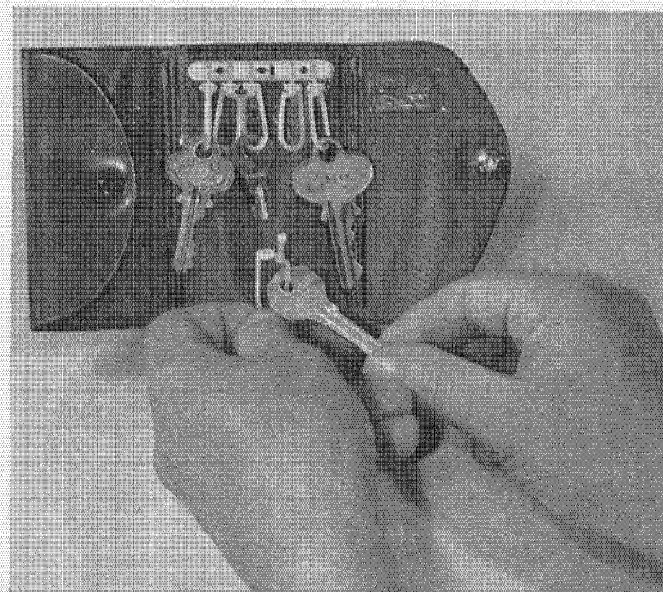
For information on either product write Room 7010-M, Du Pont Bldg., Wilmington, Del.



● **PRACTICAL INDOORS OR OUT** is this new fabric rug colorfully coated and decorated with neoprene, Du Pont's chemical rubber. Soft and resilient, it can be used in the house or on porches and terraces. Manufactured by the Miltron Corp., Greenback, Tenn.



● **SPICY IDEA.** These attractive ceramic spice pots can be re-used as cigarette urns, flower vases, etc. Cardboard cap and recipe folder are held in place by a colorful Du Pont "Cel-O-Seal" cellulose band. Maker is De Gonia's, Garden Grove, Calif.



● **KEY LOOPS** of Du Pont nylon plastic are a feature of the Orleans "KeyTainer" key case manufactured by Buxton, Inc., 93 Orleans St., Springfield 1, Mass. Tough yet flexible nylon loops lock in position so keys won't drop off. "KeyTainer" also has inside coin purse.

● **A NEW LINE** of easily dispersed pigment colors for rubber-base paints has been announced by Du Pont. They are high in tinting strength and are designed to reduce the efflorescence of sodium sulfate crystals that sometimes form on wall surfaces. For further information write to Room 2500, Nemours Bldg., Wilmington, Del.

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Focus on finishes

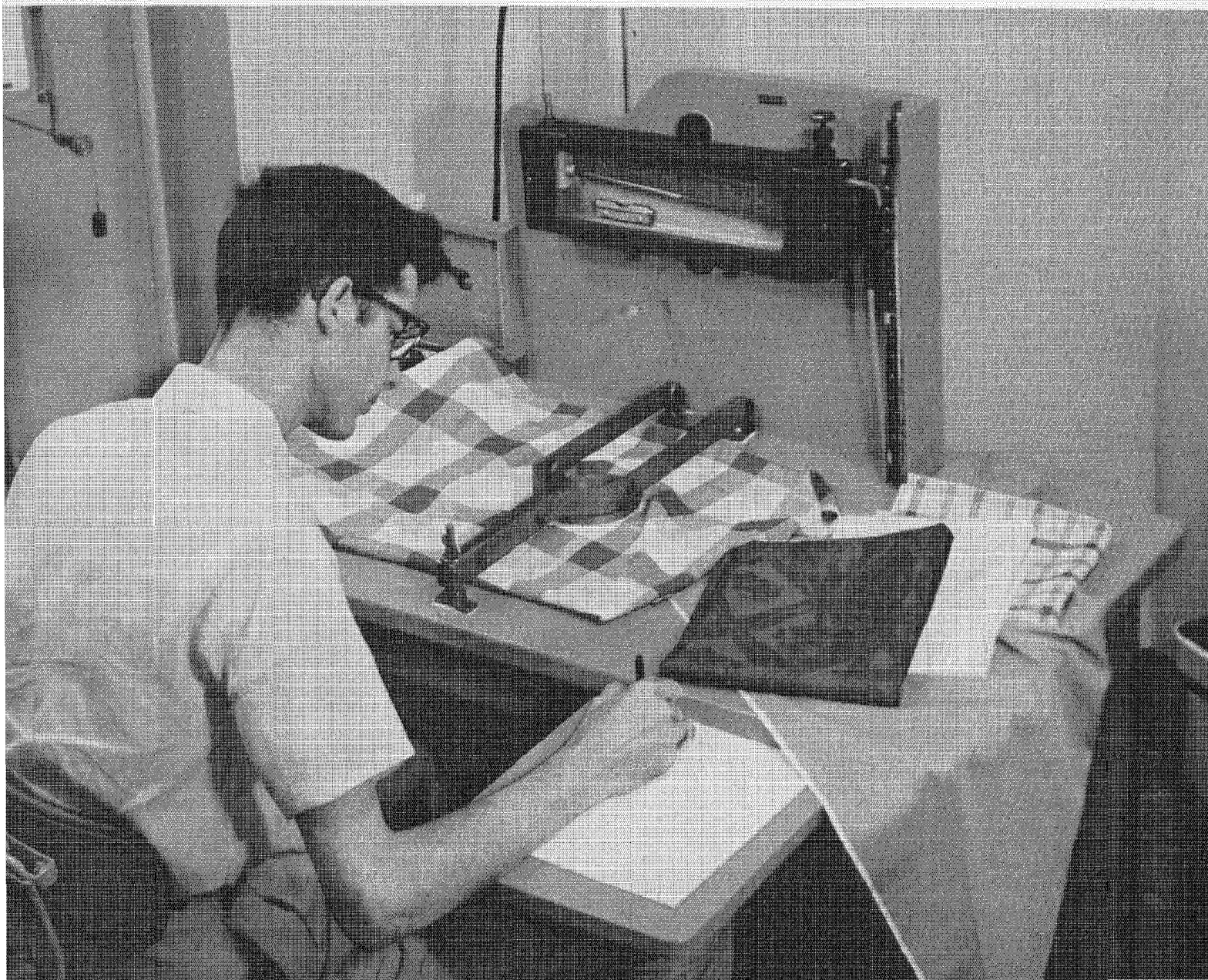
With all the discussion of new "miracle" fibers, the fact remains: your garments, to a surprising extent, are the children of their finishing agents

By PEG MINER

When an executive gets a new assignment, that's the signal for the press to round up his past achievements and current activities. Taking their cue, we'd like to introduce a newcomer among our textile finishing agents—"Panalon" FF resin dispersion—and use the occasion to review those little-known but widely-used chemicals, the Du Pont textile finishes.

On the market for several months, "Panalon" FF is proving a fine stiffening agent for man-made fibers. Applied to filmy marquisette curtains of "Orlon" acrylic fiber—its biggest use so far—it gives a durable stiffness that's pleasing to the housewife, who generally objects to curtains that are completely limp. Happily for the textile finisher, the new resin is com-

Testing a fabric's porosity in Du Pont's newly-improved textile finishing laboratory at Deepwater, N. J.



patible with other materials used in the treating process. Products like "Panalon" seldom catch the public ear. For the shopper is generally more interested in weight, weave, color or fiber: "a heavy wool tweed, please," or "a blue rayon gabardine." But the finishing-agent icing on the textile industry's cake is a vital business. With the help of chemical producers, textile finishers deal with questions like:

"Can we make this fabric flame-retardant or water-repellent at a reasonable cost?"

"What's the best way to make this one look duller?"

"Can we give this dress material a stiffness that won't wash out?"

"Will a mildew-retarding chemical lengthen this fabric's life?"

"How do we go about making a fabric softer . . . or more crease-resistant?"

"Can we keep this one from building up static electricity in dry weather?"

The answers can, to a surprising extent, make or break the performance of a suit, dress, shirt or skirt—or even a curtain, a tent or an awning.

WATER REPELLENTS

To aid the textile finisher, some half-dozen of Du Pont's manufacturing departments have been engaged in research over the years. Our Dyes and Chemicals Div., for instance, has developed a gamut of textile auxiliaries. Among its best-known are "Zelan" durable water and spot repellent and "Aridex" renewable water repellent. The latter can be applied by your local dry cleaner.

Recently, a number of customers have shown interest in the Division's new "Zeset" fabric stabilizer for wrinkle-resistance. Howard McKenna, president of New Braunfels Mills in Texas, is one. Not long ago, he reported that their spring '53 Forest Park line would be treated with this chemical. "We don't know of any other gingham that have the remarkable degree of stability that we can get by treating 'Sanforized' ones with 'Zeset'," he says. "Not only does this make the fabrics wrinkle-resistant, but it causes them to keep their original shape after cutting." Garments can be shipped just as they come off the cutting table, and still arrive fresh and salable.

McKenna is also pleased about the hand "Zeset" gives to gingham. "It's crisp and firm with some body to it," he reports.

TWO CHEMICALS IN ONE BATH

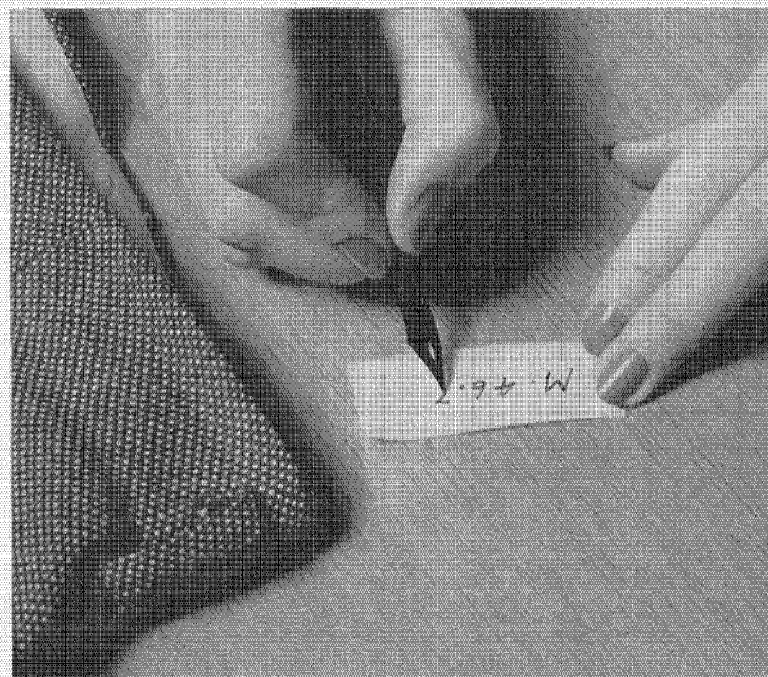
As an added plus for textile finishers, our Textile Service Section and Technical Laboratory advise that both "Zeset" and "Zelan" can be applied in one bath. The result: a fabric that's durably water-repellent, spot-resistant, and wrinkle-resistant.

To the general problem of crush-resistance, there are several approaches. One is based on our Polychemicals Dept.'s crystal urea and our Electrochemicals Dept.'s formaldehyde. These products are turned



Semi-permanent starches, used in the home, are made with the aid of "Elvacet" polyvinyl acetate. They last through many washings.

These labels must be stiff and smooth enough to write on legibly but ink mustn't soak onto garments. "Elvacet" makes this possible.



by the textile industry into urea-formaldehyde resin, the granddaddy of all crush-resisting chemical treatments. The good service you get from fabrics like rayon suitings can often be traced to U-F and its chemical cousins.

During the recent textile depression, cotton suffered less than expected, thanks to durable resin treatments. The wash-resistance of embossed cottons, like the "waffle" or picotet finished materials in dresses and children's wear, was stepped up. This washability, coupled with the fact that they don't need ironing, is making embossed goods more and more attractive to consumers. In addition, resin treatment protects nets and marquisettes against "opening up" and droopiness.

Another cure for droopy, tired fabrics lies in a product of the Electrochemicals Dept., "Elvacet" polyvinyl acetate. Here is one of those rare finishes that, like "Zelan", is familiar to the housewife. She may not

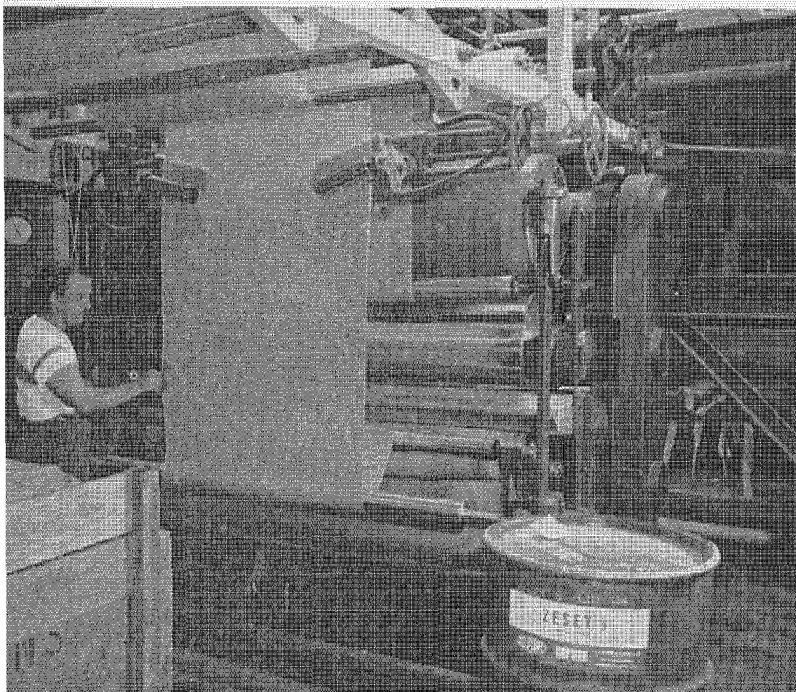
Cousin to polyvinyl acetate is "Elvanol" polyvinyl alcohol. This product is a size—a film-forming material that coats the yarn temporarily and protects it during knitting or weaving.

In the early days of nylon, "Elvanol" came to the rescue of the new synthetic fiber by providing the first satisfactory size for nylon hosiery. Today "Elvanol" is also a warp size for nylon and acetate woven fabrics, and an ingredient in sizes for new "Dacron" polyester fiber and for "Orlon".

NEW LOOM FINISHING

In addition, the textile field is buzzing these days with a radically new technique that, once again, makes use of polyvinyl alcohol. It's the so-called loom finish, applied during the sizing operation but not removed as sizes customarily are. The "Elvanol" actually becomes part of the finished fabric. Soon you may be seeing dress fabrics, such as taffeta, made in this way. They'll have a firmness that usually comes from finishes applied at a later processing stage.

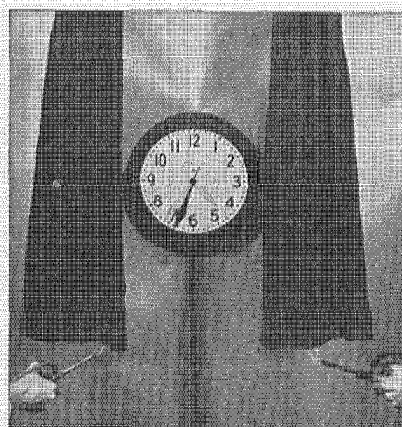
Many another product is used to change a fabric's



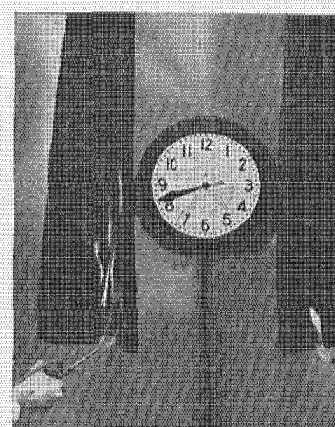
In this equipment, Bradford Dyeing Assoc. of Bradford, R. I. applies "Zeset" S to its fabrics to give them built-in resistance to wrinkles.

know it as "Elvacet", but it's the basis for synthetic stiffening materials like "Sunlight", "Texize" and "Korex" plastic starches. Used in the home, these products made by Du Pont's customers give shirts and dresses a nice feel and longer-lasting crispness.

Although it's finding a place on the family shelf, "Elvacet" got its initiation as a mill-applied finish. That's still its chief function. Textile finishers have discovered it gives a good hand to fabrics, more durability than they could get from natural materials, and brighter colors since it has little tendency to mask or dim them.



Flame testing twin fabrics; one, right, has been treated.



After 10 seconds, untreated sample has caught on fire.

feel—among them, our softening agents like crystal urea or "Avitone" and "Avitex" fiber lubricants. Still others ward off fungous attack. Nothing brought the need for this type of chemical home harder than World War II, when tropical mold, mildew and rot threatened military equipment. In those years, and ever since, the government has purchased large quantities of fabrics protected by "Shirlan" salicylanilide fungicide. "Tropicalization treated," they call them. Civilian awning makers have followed suit.

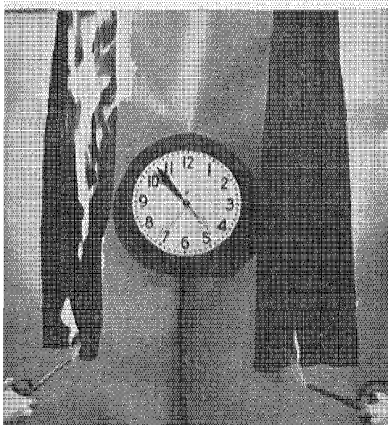
Protecting awnings, tarpaulins and tentage is also a job for IN-2555 fungicide made by our Grasselli Chemicals Dept. Small amounts of it, applied to fabrics by dipping, make them resistant to fungi. "It

only amounts to about one per cent of the cost of our tent fabrics to have them treated with IN-2555," says William Avery of the Webb Manufacturing Co. in Philadelphia. "At that rate, you can hardly afford not to protect them against mildew."

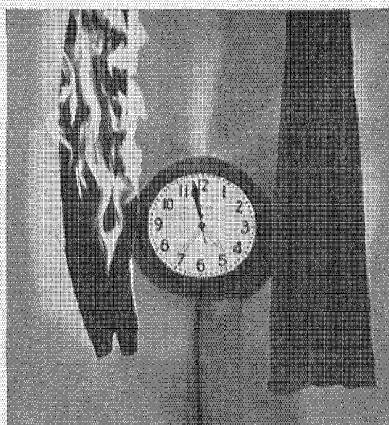
REDUCING FIRE HAZARD

Fire is, of course, a worse menace. Here the first worry isn't the fabric itself; it's going to be damaged, one way or another. Rather the question is, "What's it going to do to its surroundings?" Will a drapery in a hotel, ignited by a careless smoker, flare up instantaneously and take the building with it?

Lives can depend on a fabric's relative reluctance to burn—known more formally as its "tendency to support or contribute to the propagation of flame." To provide this reluctance, Du Pont supplies chemicals like "CM" and "Erifon" flame retardants. Fabrics treated with them will char when exposed to a flame, but won't actively feed a hungry fire and pass it along to nearby combustibles.



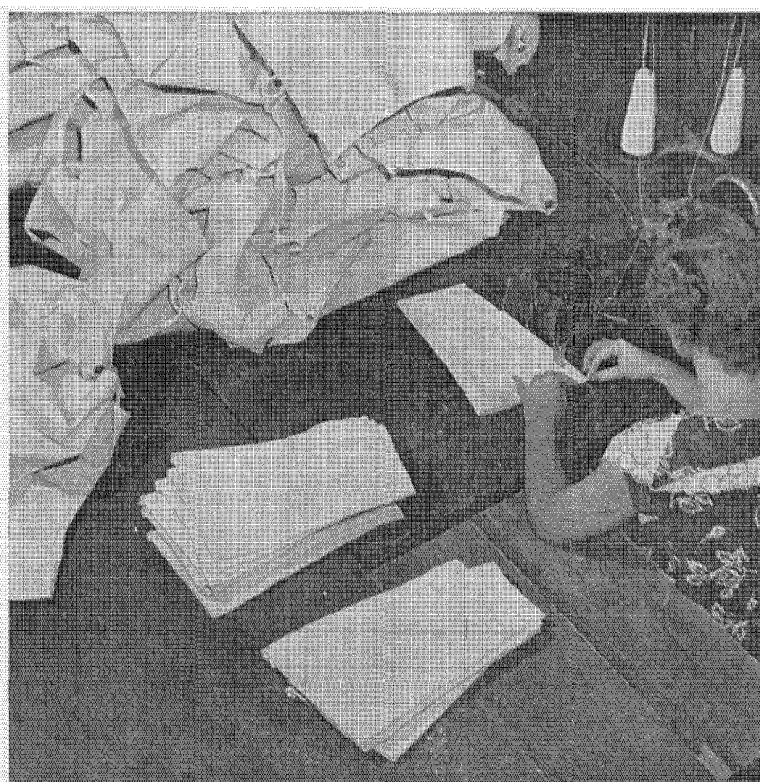
Piece treated with "Erifon" is still flameless and intact.



It remains so, but in 25 sec. untreated one is raging fire.

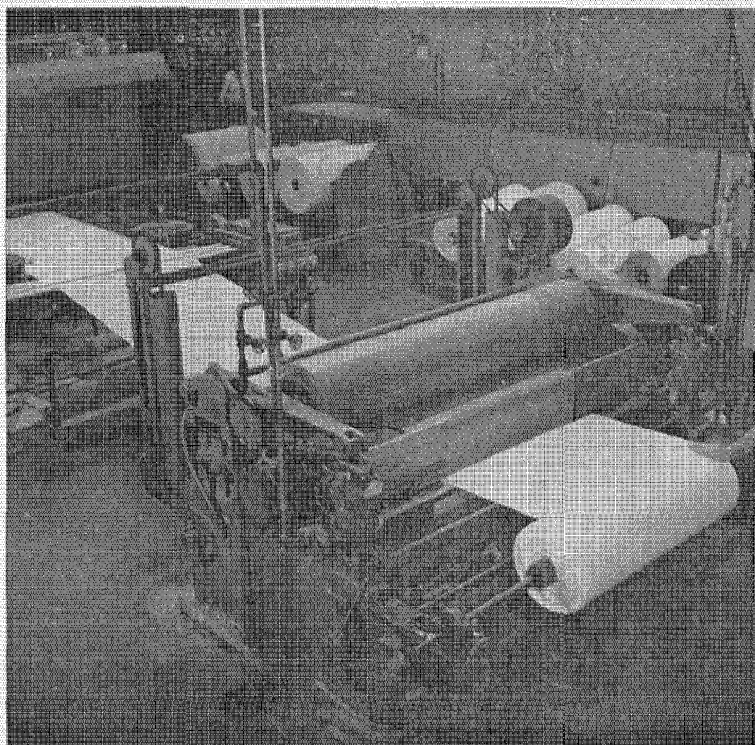
Besides draperies, flame retardants protect workmen's clothing, welding curtains, sleeping bags and many types of cellulosic textiles found in hotels, restaurants, night clubs and industrial plants. In addition, the armed forces have been so enthusiastic about "Erifon" that it is only now becoming available in quantity to civilian textile treaters.

To complete the roster of this Company's textile finishing agents and auxiliaries, we'd need many another page. For, counting each individual item, there are more than 75 of them—not to mention the dyes and pigments that add color to garments. But these chemicals will have to wait until, once again, we have space to write more about "the finishing touch."



Pretreatment with fungicides like Du Pont IN-2555 is specified by Webb Manufacturing Co. of Philadelphia for the cotton duck fabrics from which they make tents and welders' sleeves (being sewn here).

How can you keep the fibers in smooth yarn fabrics from slipping? One answer, as Pilgrim Piece Dye Works has learned, lies in treatment with our Grasselli Chemicals Dept.'s "Ludox" colloidal silica.





“Gunning the Flyways”

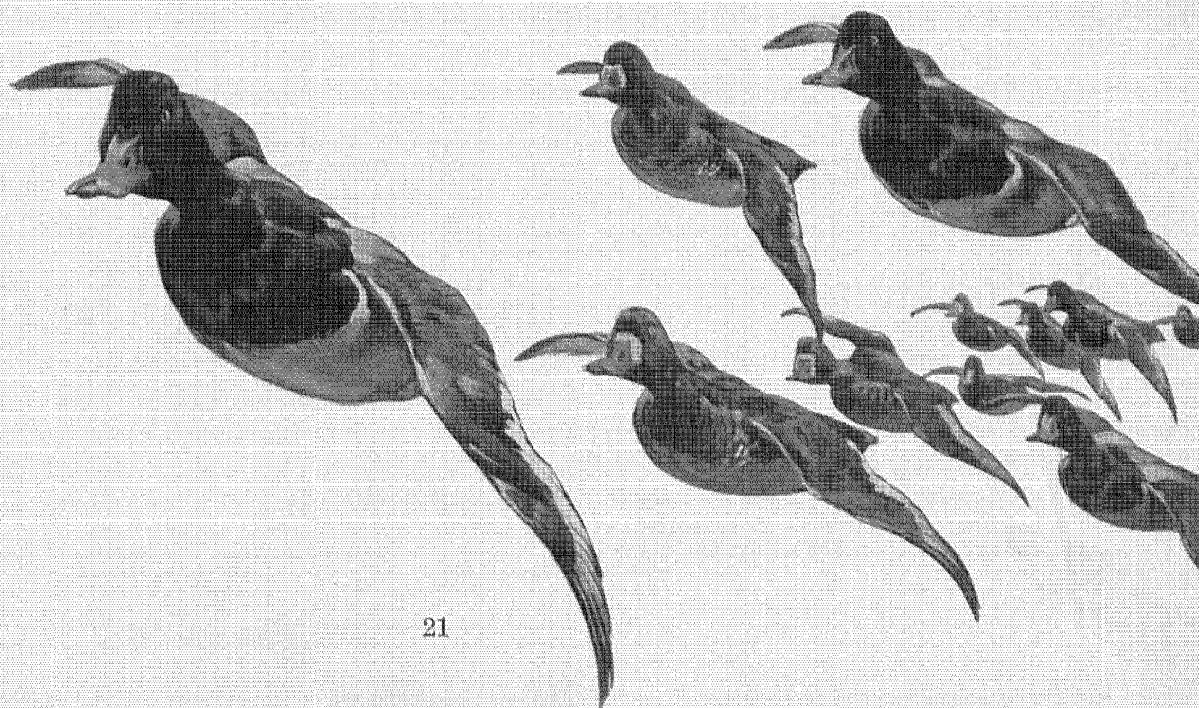
The sharp smell of gun smoke, salt air and swamp is brought to the sportsman in nostalgic fancy by the prize-winning motion picture, “Gunning the Flyways,” produced by Remington Arms Co., Inc.

The full-color 16mm. film depicts wildfowl hunting at its best in both this country and Canada. The sound is realistic, the photography superb and the marksmanship spectacular. Blue goose hunting on the wind-and-sleet-swept tundra near James Bay, Canada; broadbill gunning on Long Island Sound; lying in wait for high-flying mallards over the pin-oak flats of Arkansas—all offered unusual gunning and photographic opportunities which weren't wasted on the hunters and cameramen participating in the production. Thousands of feet of film were shot on location and then carefully edited into the final 30-minute movie.

The new film has been acclaimed by groups that have already seen it, and has won high honors in a nationwide contest. Its popularity has prompted television networks and local stations to show it—many of them more than once.

“The finest wildfowling picture ever made” is the accolade given the film by thousands of sportsmen. Non-hunters, too, have enjoyed the film's views of wildfowl and scenic grandeur.

To obtain “Gunning the Flyways” for free showing, organizations should write the Advertising Division, Dept. G, Remington Arms Co., Inc., Bridgeport 2, Conn. Requests for booking far in advance of actual showing should be made. While Remington has a number of prints available, the demand for them is exceedingly heavy.



The tape that talks back

Du Pont acetate film, familiar as a packaging and laminating material, has found a brand new career in the tape recorder

Whether it's eavesdropping on the innards of a new motor car or reciting Mother Goose to wide-eyed kindergarten kids, the tape recorder is one of the most versatile tools in the communications kit.

Today recorders are spinning in electronics labs, radio and television studios and industrial plants, as well as in thousands of American homes and offices.

In the auto industry, they're being used to track down and analyze unwanted noises in new cars. One manufacturer, for example, redesigned a noisy transmission in three weeks with the help of the tape

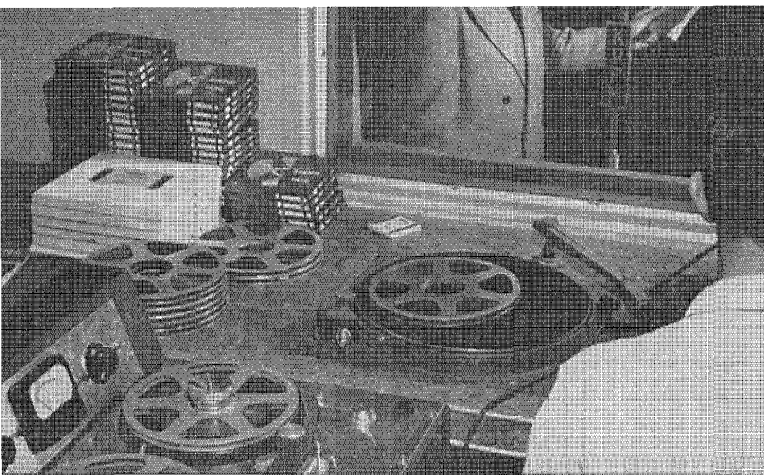
recorder's magnetic memory. The old cupped-ear method would have taken an estimated three months.

In both kindergarten and college classrooms the recorder is rated a first-class educational aid. The University of Minnesota not long ago taped an interview with a dairy cattle authority for use in classroom work. The studio was a cow barn, where the expert stood face to face with his subjects and the lowing of the herd provided an authentic background for the lecture.

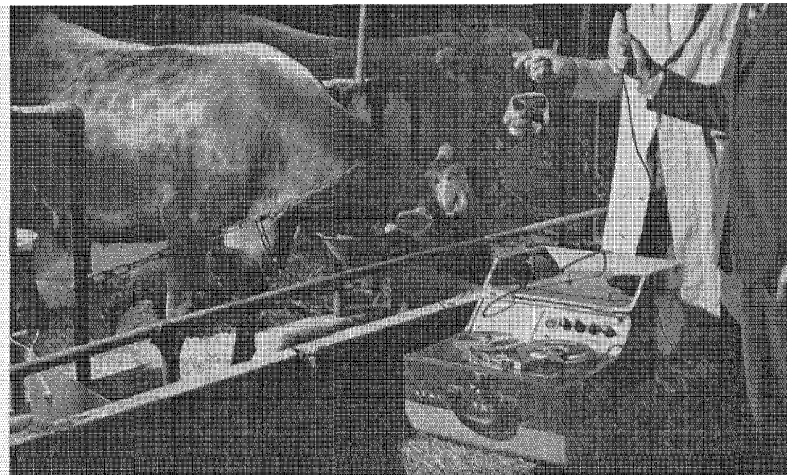
Tape recorders are not limited to picking up sound.

Tape recorder, listening through the microphone, hears the automatic shift in operation and pinpoints noise sources.





Sound tape made of acetate film is easily edited, reproduces faithfully. Radio men say it has greatly helped the business.



Cows listen gravely to expert explaining how good milk producers are judged. Later, students will hear taped lecture.

They can record any electrical impulse, and many experts are convinced that non-sonic applications will grab the spotlight in the future.

In sending a new rocket aloft on a test flight, for example, engineers must keep tabs on about 50 instruments that register speed, altitude, acceleration, temperature and dozens of other factors. It's done by combining readings from all the instruments in one radio wave and transmitting them back to the ground. There the readings are electronically unscrambled and fed into a 50-channel tape recorder—50 “sound tracks” on a single magnetic tape. The tape activates 50 duplicate instruments in the laboratory, where engineers can watch the readings just as effectively as if they were riding in the rocket at thousands of miles an hour.

The latest prospect is that television programs soon may be tape recorded. Both picture and sound—in the form of electrical impulses—would be transcribed magnetically and played back at will. Since the tape requires no processing, it would be possible to

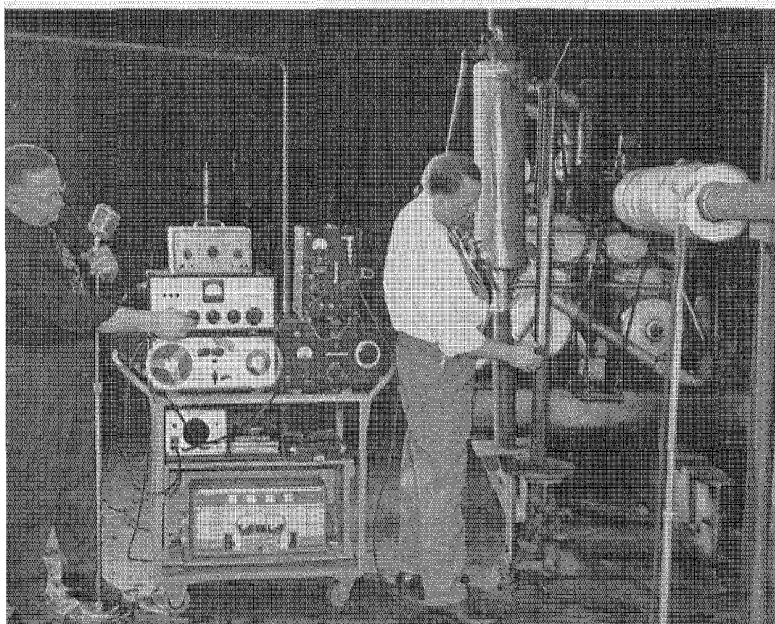
telecast remote news events even faster than at present.

Much of the increased interest in tape recorders is due to steady improvement in the throat of the recording device—the tape on which the sound is magnetically traced. The newest recording material, and the one now accounting for the major share of production, is oxide-coated acetate film.

Du Pont, which has manufactured acetate film since 1934, now supplies it to leading sound tape manufacturers. Acetate film has several advantages. It resists stretching, and its smooth surface takes a uniform coating of oxide, thus reducing background noise and distortion. It doesn't kink, and is easy to splice and edit. Words can be snipped out of sentences handily and new ones substituted. Even the “s” on a plural can be amputated to make the word singular.

Since acetate film moved in to make recording easier and more reliable, the tape that talks back has been learning some mighty interesting things to say. And its vocabulary is increasing all the time.

Industrial user of sound tape is this muffler manufacturer, who records sound level to discover how well muffler muffles.



American soldier in Korea listens to playback of his five-minute tape-recorded “talking letter” to the folks at home.





Sweaters of "Orlon" by Premier are among first 100% staple products.

More staple from Camden

*The growing output of "Orlon" acrylic staple is bringing
a flock of new spun yarn products to market*

On a onetime farm near Camden, S.C., Du Pont's new plant for "Orlon" acrylic staple fiber is nearing its production goal of 30,000,000 pounds a year. As this is written, 61,152 filaments of the fiber are being spun simultaneously, crimped and chopped into short lengths for baling and shipment to yarn-spinning mills across the country.

Until last May only continuous filament "Orlon" was being produced in commercial quantities. That's the silky type used to date in shirts and blouses. The arrival of staple in significant amounts means more soft, spun yarn for knitting into sweaters and socks, and weaving into coat and suiting fabrics. In staple form, "Orlon" also can be blended with other fibers to achieve yarns with new characteristics.

As with any new product, large-scale manufacture of "Orlon" staple brought new problems. Crimping—

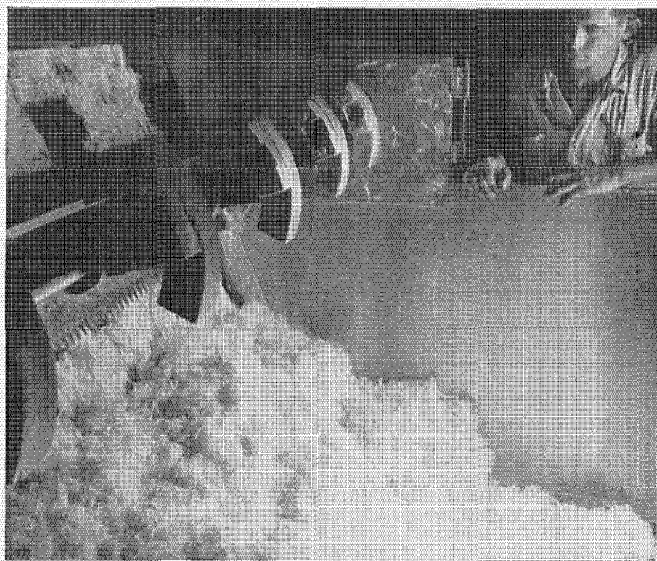
giving each of the fibers a permanent wave—was one of the first. Crimped fibers give a yarn loft, or fluffiness, and help keep the individual fibers locked securely together.

Overcoming static, plague of the yarn spinner, was another hurdle. The search for an antistatic finish that would make the fibers more cohesive involved the testing of literally thousands of compounds over a two-year period at a Du Pont textile laboratory in Waynesboro, Va. The problem is pretty well solved now, and the Company's customer service men have spread word of the solution among staple processors.

A typical staple buyer is Whittier Mills Co. of Chattahoochee, Ga., a division of Ames Textile Corp. Here "Orlon" is spun into yarn for customers like the Premier Knitting Co. of New York City, a leading manufacturer of women's sweaters.

"The fact that you people give us a constant product, one that's manufactured to a standard, makes our job of spinning a quality yarn easier," we were told by the mill manager. "When we find out at what temperature and humidity 'Orlon' spins best, we'll be able to hold to it because the fiber is uniform. With natural fibers you have to test to find out what you've got. Nature isn't as consistent as you people."

To help determine the best atmospheric conditions for processing "Orlon", a small-scale spinning mill has been installed at Camden by Du Pont. Here each day's production of staple is spun into yarn under



This "Orlon" has just been chopped into staple at Camden plant and is now going through dryer. Baling comes next.

varying conditions of temperature and moisture. The resulting information is made available to concerns like Whittier.

Soft, easily laundered sweaters knitted from the Whittier Mills yarn are being given a big push this fall by Premier. An outstanding virtue is that they can be washed without blocking. Other garments of 100 per cent "Orlon" spun yarn or blended yarns are already here or in the offing.

The history of Du Pont staple production goes back to 1928, when the Company became the first American manufacturer of rayon staple. The end of World War II brought the first Du Pont nylon staple fiber to the civilian market. Much of it is now going into blends for outerwear, where its strength and abrasion-resistance are of real value. One hundred per cent staple is used in men's socks, knitted underwear and sweaters.

Perhaps the most exciting nylon staple news is being made in the home furnishings field. Upholstery

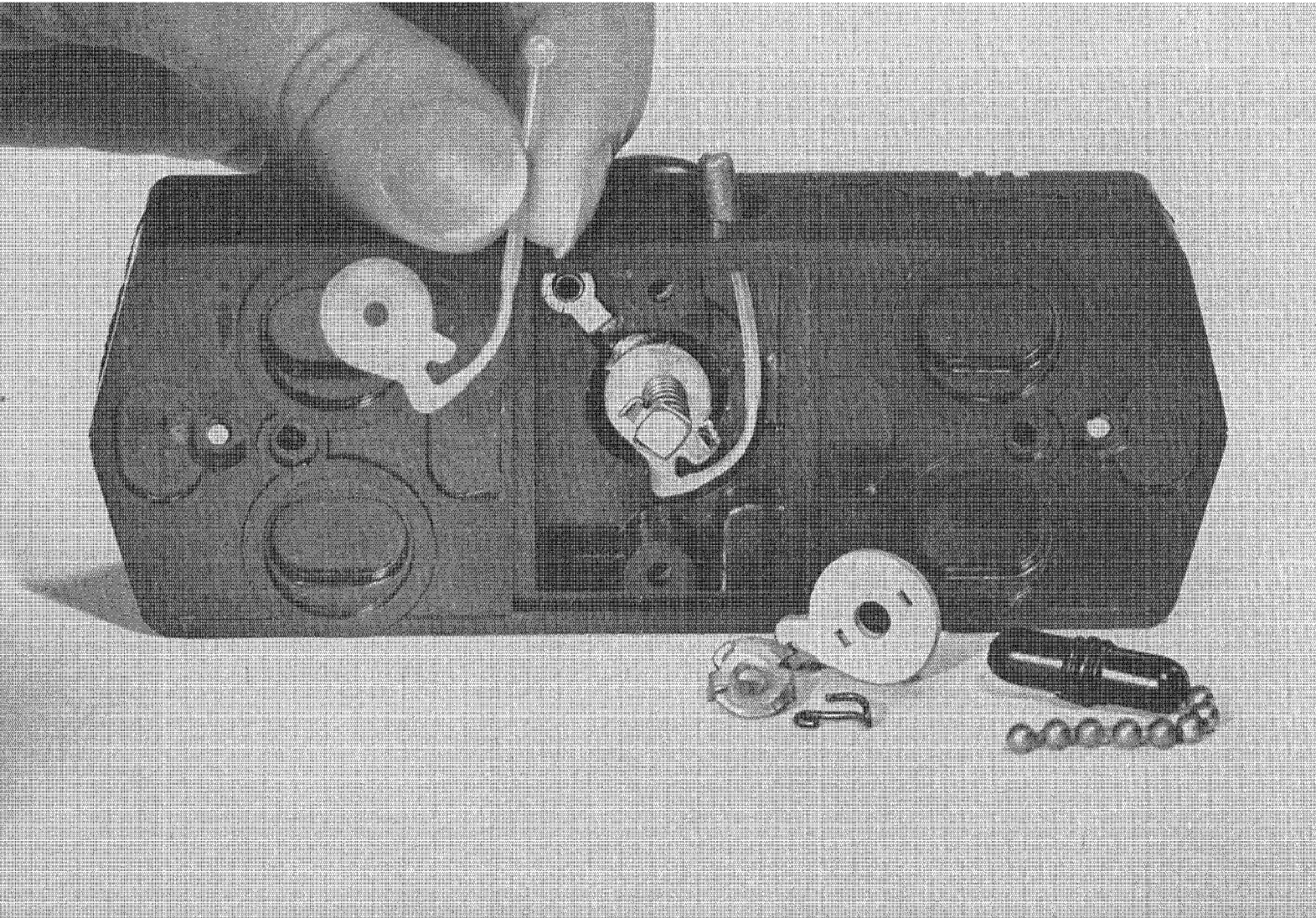
fabrics and carpets of nylon have a frosty elegance and a tremendous resistance to hard wear. Five years ago, for example, a nylon carpet was put down in the beach lounge of a Florida resort hotel. Sand is tracked across it daily, cocktails spilled on it frequently. Yet after its annual cleaning last spring the carpet looked as good as new, a fact the carpet manufacturer views as "amazing."

Meanwhile, you're likely to see an ad in tonight's newspaper for a sweater made of "Dacron" polyester fiber. Or maybe you wore a suit of "Dacron" last summer, or own socks knitted of the fiber. All are made of "Dacron" staple, now being produced in pilot-plant quantities at Seaford, Del. Large-scale production is scheduled for next year at the new Du Pont plant in Kinston, N.C.

As staple production increases, broad new fields are opened to all the man-made fibers. No one can positively say which will come out on top. On one hand they compete with each other for various markets; on the other they supplement each other in blends. But one thing is dead certain at this stage: the consumer stands to win, no matter what.



Some nylon staple goes into long-wearing rugs like this one by the Nye-Wait Co. More goes into socks, sweaters.



Single nylon part in this light socket replaces four separate parts in foreground.

Take one part nylon plastic

*... and let it do the work of two or more parts of other materials. Here are
three variations of this winning recipe*

By GERALD KING

When a manufacturer can simplify his product and improve its performance at one stroke, he's done something worth writing about. And when a Du Pont product helps him do it, we like to write about it.

That's how we felt when we heard about these three new uses for Du Pont nylon plastic in the electrical industry. Some of our readers may find the ideas useful in their own businesses.

Exhibit A involves a pull-chain light socket manufactured by General Electric.

When you tugged on the pull-chain of older models, you pulled a chain attached to a hook of one material, which turned an insulator of another attached to a ratchet of a third, which closed the circuit and turned on the light.

Now one molded unit has taken the place of the chain, the hook, the insulator and the actuator for the ratchet.

The improvement has lowered manufacturing costs and simplified assembly. More than that, it has

greatly cut down the possibility of an electrical shock. Nylon insulates against 250 volts without shorting or shocking. Where this plastic is used in the ratchet, it is tough enough to resist chipping and cracking; where it replaces the pull-chain it is strong and flexible enough to take pulling and bending.

The next case concerns a minute gadget made by the Western Electric Co. for use in the Bell Telephone System. Called a thermistor, it's a heat-sensitive resistor enclosed in a glass bulb about three-quarters of an inch long. It's used in telephone circuits.

The bulb formerly was protected by a cartridge with caps on the ends. Insulation was required between the caps and the thermistor's connecting wires.

NYLON TUBING USED

That was before Western Electric met up with Du Pont nylon. Now tubing of the plastic the diameter of a pencil is slipped over the thermistor, and the ends are pressed flat under heat and sealed.

Result: a short length of nylon tubing replaces the cartridge and the caps. Again, assembly is simplified and costs reduced. The nylon supports the connecting wires, and protects the bulb against breakage and strain when the wires are flexed.

The plastic's heat resistance is important, too, because the connecting leads are soldered during assembly and, in addition, the completed telephone equip-

ment must operate over a wide temperature range.

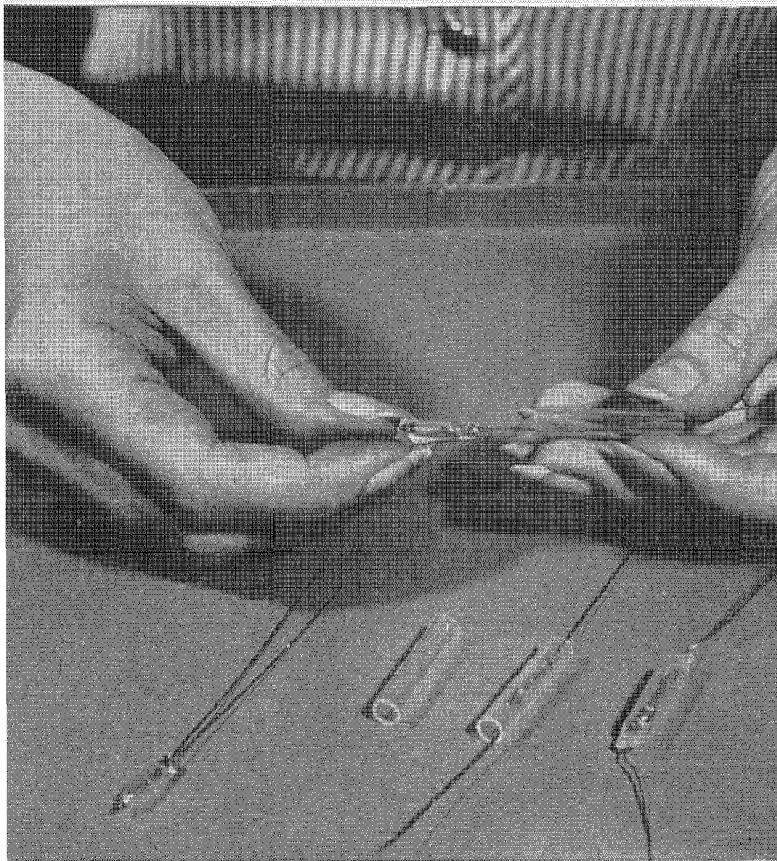
A third application has nylon plastic ringing the bell both literally and figuratively. It's a telephone interruptor—not the character on your party line who keeps lifting the receiver while you're trying to talk, but a unit that gives busy signals and other coded rings over the telephone.

The interruptor consists of a series of slowly revolving cams mounted on a motor-driven shaft. Held against each cam by spring pressure is a small wearing piece. The piece follows the varying contours of the cam, opening and closing a circuit to give the required signal.

The cam originally was a wheel with as many as 24 pins supporting rollers. Now both cam and wearing piece are of injection-molded nylon. The nylon parts outperform the ones they replace and cost less.

After accelerated tests equivalent to about three and a half years of normal service, the nylon showed no evidence of wear. Holtzer-Cabot of Boston, the manufacturer, expects the nylon parts to outlast their predecessors by several years.

That's how three manufacturers have put the properties of nylon plastic to work. The recipe they followed is no secret, either. Du Pont stands ready to suggest suppliers of molded parts, and to work with other manufacturers in developing the parts they need.



Transparent sections of nylon plastic tubing protect thermistors against breakage and insulate connecting wires. The nylon tube is a replacement for an open-end cartridge, two caps and insulators.

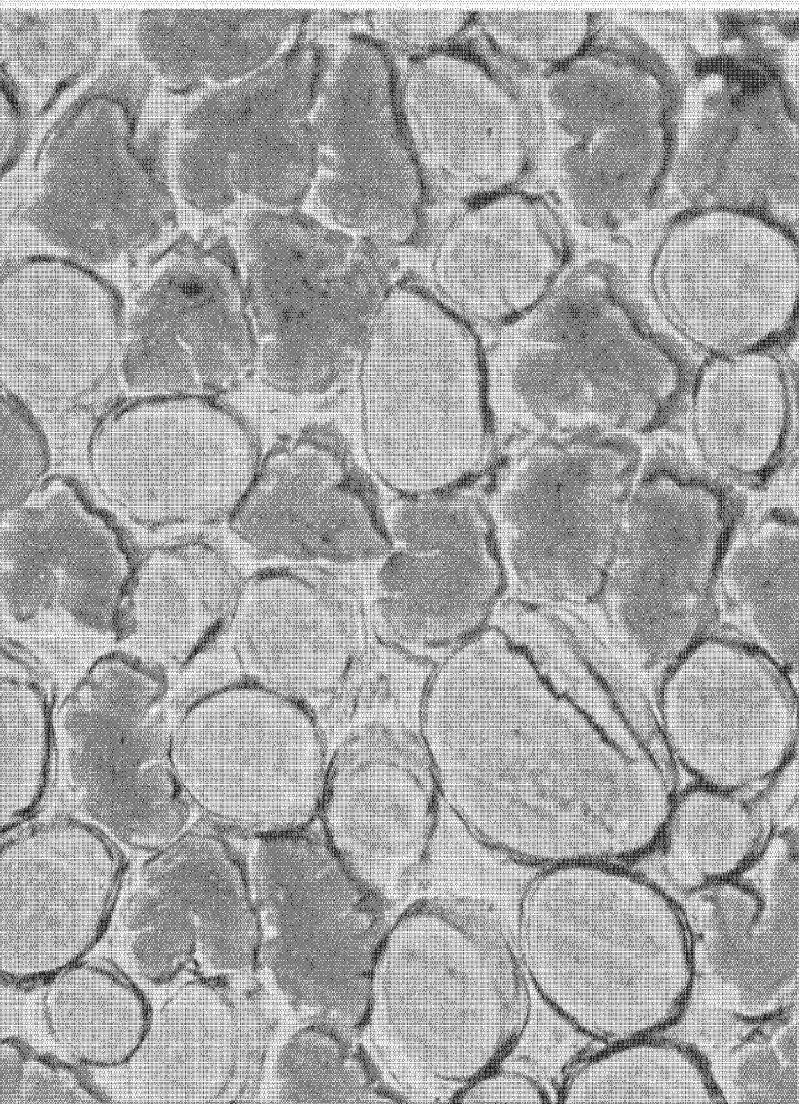


Nylon "envelopes" for thermistors are heat-sealed at Western Electric plant. Ends of tubes are pinched shut in press. In this case, use of nylon has simplified assembly, cut costs.

Fiber facts

A brief glossary of textile terms, including a description of the natural fibers and those made by Du Pont

acetate—(formerly acetate rayon) Fiber made by spinning a compound of cellulose and acetic acid. Has a luxurious “hand”, and is a favorite in women’s dresses. Du Pont is a principal manufacturer.

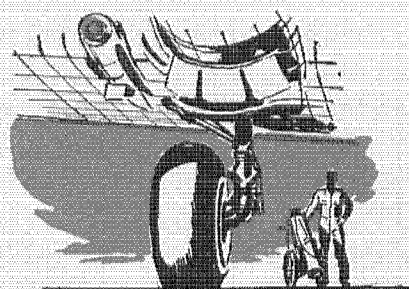


This cross-section of yellow wool fibers and blue rayon fibers, 1,000 times their actual size, shows scalloped edges typical of rayon, the oldest and largest selling of today’s man-made fibers.

alpaca—Long, fine hair from South America’s so-called alpaca sheep (actually it’s a llama); often blended with other fibers or used alone in outerwear.

angora—Goat hair (mohair); also rabbit hair, the latter distinguished for fineness. Usually combined with such fibers as wool, rayon, or nylon in knit fabrics, especially fine sweaters.

cashmere—Fabric made from wool of India’s Kashmir goats. Usually blended with wool for knitted wear.



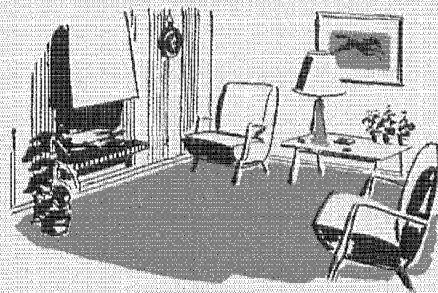
“Cordura”—Du Pont trade-mark for its high-tenacity rayon yarn. Used in conveyer belts, tire cord, etc., where unusual strength is required.

cotton—Fiber from seed pod of cotton plant. Used as textile by man for almost 5,000 years.



“Dacron”—Du Pont trade-mark for its polyester fiber. Chief properties: low moisture absorption, wrinkle-resistance, exceptional crease-retention. Used alone or blended with wool, rayon, etc.

grams) or a definite length (400 meters). The higher the denier, the heavier the yarn.



Fiber E—A Du Pont-made rayon with special physical properties. Crinkles when treated with caustic soda, for use in rugs, upholstery material, etc.

flax—Fibers of the flax plant. (see *linen*)

"hand"—The feel of a fabric when handled; its crushability, resilience, softness.

jute—Coarse fiber derived from Indian plant; woven into burlap, rug backing, etc.

linen—Fiber derived from flax.

nylon—Generic term for the polyamides. Refers to

mean Du Pont's textile fiber, outstanding for strength, shape-retaining qualities. Du Pont also makes nylon in plastic form.

"Orlon"—Du Pont trade-mark for its acrylic fiber. Chief properties: warmth with light weight, resistance to sunlight and chemicals.

ramie—Flax-like fiber derived from an Oriental plant.

rayon—The first man-made fiber, originally called artificial silk; produced from regenerated cellulose.

silk—A lustrous fiber produced by silkworms in spinning their cocoons.

spinning—1. Drawing or twisting fibers together to make thread or yarn. 2. Process of extruding liquid material through tiny holes to form man-made fibers.

staple—The average length of any fiber. Among man-mades, term distinguishes those made in short lengths from those made in continuous filaments.

wool—Hair of sheep, certain goats and other animals; spun, woven, knitted or felted into variety of fabrics.

yarn—The product of spinning separate filaments of a fiber into a composite, continuous strand.

Something to crow about

The Garden State, that's what they call New Jersey. But in the southern part of that rich agricultural area, it's a chicken's world.

With a state poultry census of 13,500,000, just one South Jersey town has more white leghorns than metropolitan Baltimore has people. In that town, Vineland, one of several hatcheries turns out over 10,000,000 chicks a year.

Vineland has several claims to fowldom fame. It is, for example, the home of America's second oldest egg-laying contest. "This competition began in 1916," reports Willard Allen, the State's secretary of agriculture, "and it was so successful that it's been going every day since. The contest, conducted on a highly scientific basis, has helped raise Jersey's production-per-bird-per-year to its present average of 180.

"By the way," says Allen, "it was in these test houses that Du Pont 'Cel-O-Glass' plastic-coated wire mesh got its start in our poultry business. The contest people put this window material in their 100 houses, and Jersey poultrymen have been using it ever since. They like it because it won't break, keeps drafts out, but lets in the winter sunlight, including the beneficial ultraviolet rays."

This past June, Vineland celebrated the anniversary of its famed Egg Auction, a semi-weekly affair

that's been bringing big-time egg raisers and buyers together for a quarter of a century.

Allen grinned. "Celebrated it," he said, "with a big chicken barbecue."



To insure a constant and reliable supply of titanium products
for its customers, Du Pont is dredging minerals from...

Florida's fossil beaches

The mammoth dredge shown below is chewing up a fossil beach near Starke, Fla. and sucking out its valuable minerals. Du Pont leased about six square miles of these titanium-bearing ilmenite deposits at Trail Ridge from the state. They will assure the armed forces of a constant source of titanium metal and the Company's civilian customers of a supply of titanium dioxide, the white pigment used in paint, paper, leather, rubber products, linoleum, inks and the like.

Since mining began in 1949, more than 500,000 tons of the black, sand-like mineral have been separated from 80 times that much sand, hardened mud, and roots and trees of an ancient buried forest.

The buried forest is an expensive, machinery-jamming headache, but others have caused even more concern. To begin with, the Trail Ridge deposit has a low concentration of ilmenite—less than two per cent—compared with ones as rich as 75 per cent on the far-removed beaches of Travancore, India. Regular

mining or dredging methods wouldn't do. From the standpoint of practical economics, it looked like a hopeless proposition only a few years ago.

Uninterrupted production of the snowy dioxide and of titanium metal have been "musts" for Du Pont, however, and a contract was signed with Humphreys Gold Corp. to do the dredging. They are old hands at removing gold-bearing rock from gravels. But even more important, Humphreys has developed a spiral separator in which gravity and a stream of water divide the heavy titanium-bearing ore from the lighter sand.

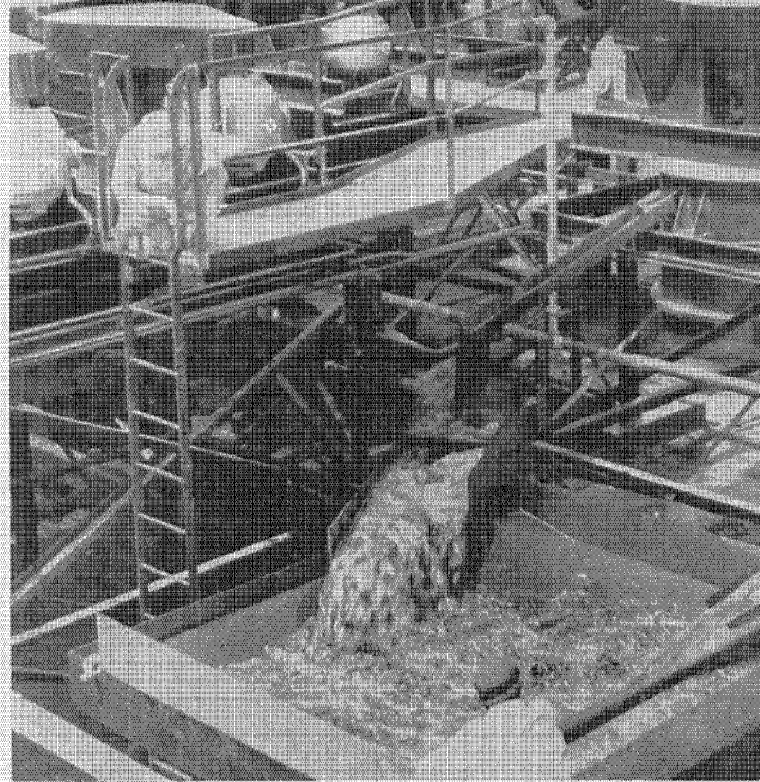
This spiral separator is the heart of the process—the ace-in-the-hole that made it practical. In all, more than 1,100 of them concentrate the titanium ores more than 20 times. After static electricity and magnetic separators concentrate the minerals thrice more, the ilmenite begins its rail trip to Du Pont plants at Baltimore or Edge Moor, Del. for chemical processing and a new life of usefulness.

A bird's eye view of Du Pont's ilmenite mining operation at Starke, in northern Florida.

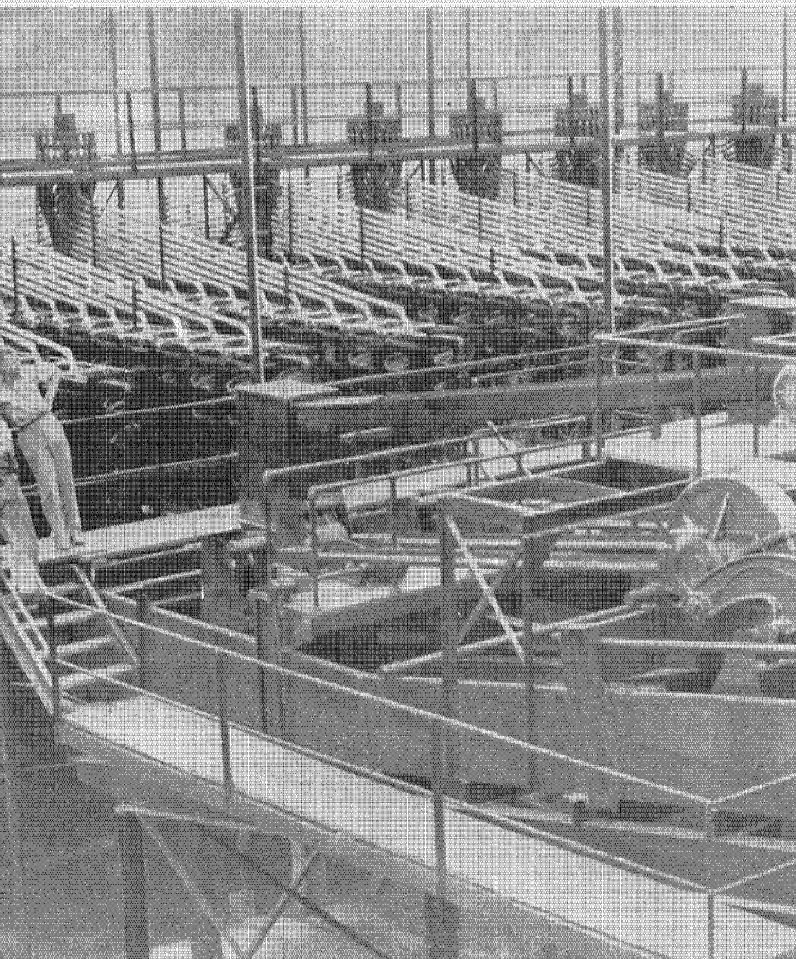




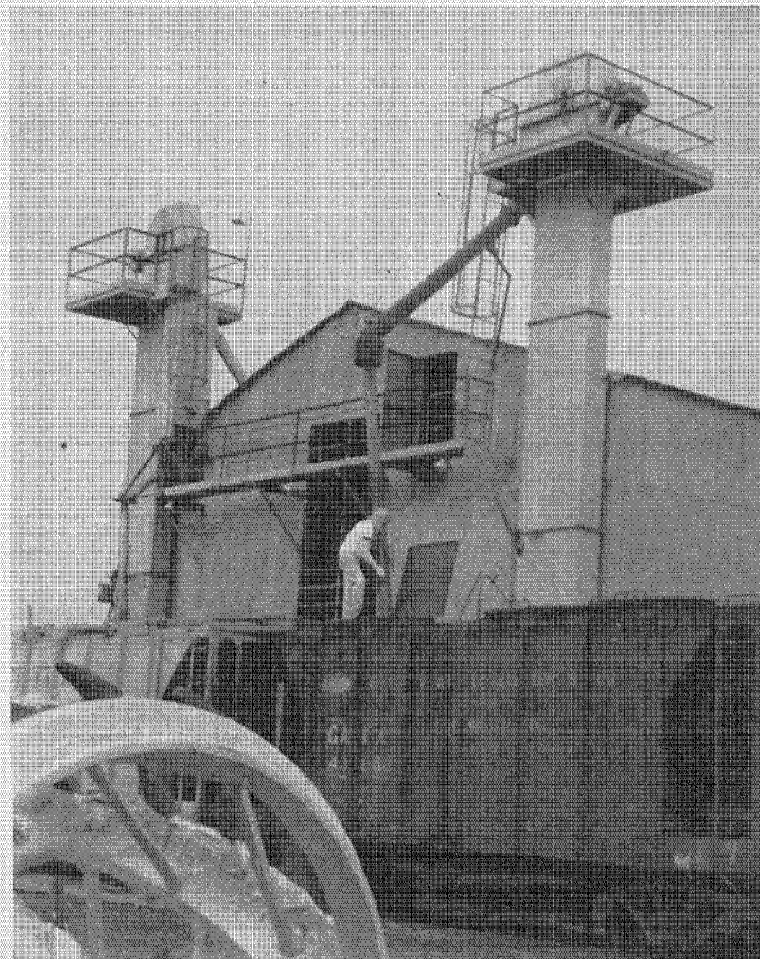
Rear view of dredge showing pontoon-supported pipes through which sand is piped to concentrator barges.



From this conditioner barge, sand, water and minerals go to concentrators developed by Humphreys Gold Corp.



These spiral separators are heart of process, separating the huge volume of useless sand from the minerals.



After drying and further concentration, freight cars haul the titanium-bearing minerals to Du Pont plants.

Du Pont's oldest fiber was born in the days of the Model T, but its spokesmen are still looking to...

The future of rayon

By F. B. RIDGWAY

While newcomers on the textile stage like "Orlon" acrylic fiber and "Dacron" polyester fiber now share the spotlight, veteran performer rayon has continued to star in one solid hit after another. After more than 40 years, the original man-made fiber is still a great audience favorite.

The history of Du Pont rayon illustrates the dynamic nature of the rayon industry, which has been growing, developing new products and uses, and opening up new markets since the early '20s.

In 1921 the Du Pont Fibersilk Co. manufactured its first rayon—although the name "rayon" itself wasn't coined until three years later. Early efforts of researchers and production men were concentrated on developing a silk-like, dyeable yarn that could be spun as a continuous filament or thread.

The new yarn made its entrance on stage in wearing apparel. Yet, five years after the first shipment reached the textile industry, rayon men took a look at their product from another angle. Already the idea of engineering into rayon the qualities needed for an industrial yarn had progressed from the talking to the planning stage. The curtain for Act II was about to go up.

Rayon next made its entrance into the tire industry in 1934. Like any newcomer it had to win approval, but by the late '40s rayon took top billing in tire cord, a spot it still holds. Great strength, uniformity, and a price advantage have constantly expanded rayon's market—and the phenomenal growth of the rayon industry from a production of less than 1,000,000 pounds in 1911 to almost 900,000,000 last year is brilliant testimony to this.

In a class by itself is high tenacity rayon. It has a record, beginning in 1936, of continuously expanding plant capacity. Ignoring the notorious ups and downs of the textile industry, this industrial rayon yarn, with double the strength of its textile counterpart, has been consumed as rapidly as expanding facilities could produce it. The rubber industry, to cite an important example, now buys millions of pounds every year for hose and belting. The carpet industry does the same for warp and backing yarns for rugs.

Many factors confirm predictions for the future growth of rayon. Its oldest form, continuous filament, has found a new market with its specialty yarns. Two important examples are Thick-and-Thin for shantung effects, and curly Fiber E for carpets, rugs and

upholstery. Other uses for Fiber E—and still newer specialty yarns—are in the research laboratory or undergoing field tests.

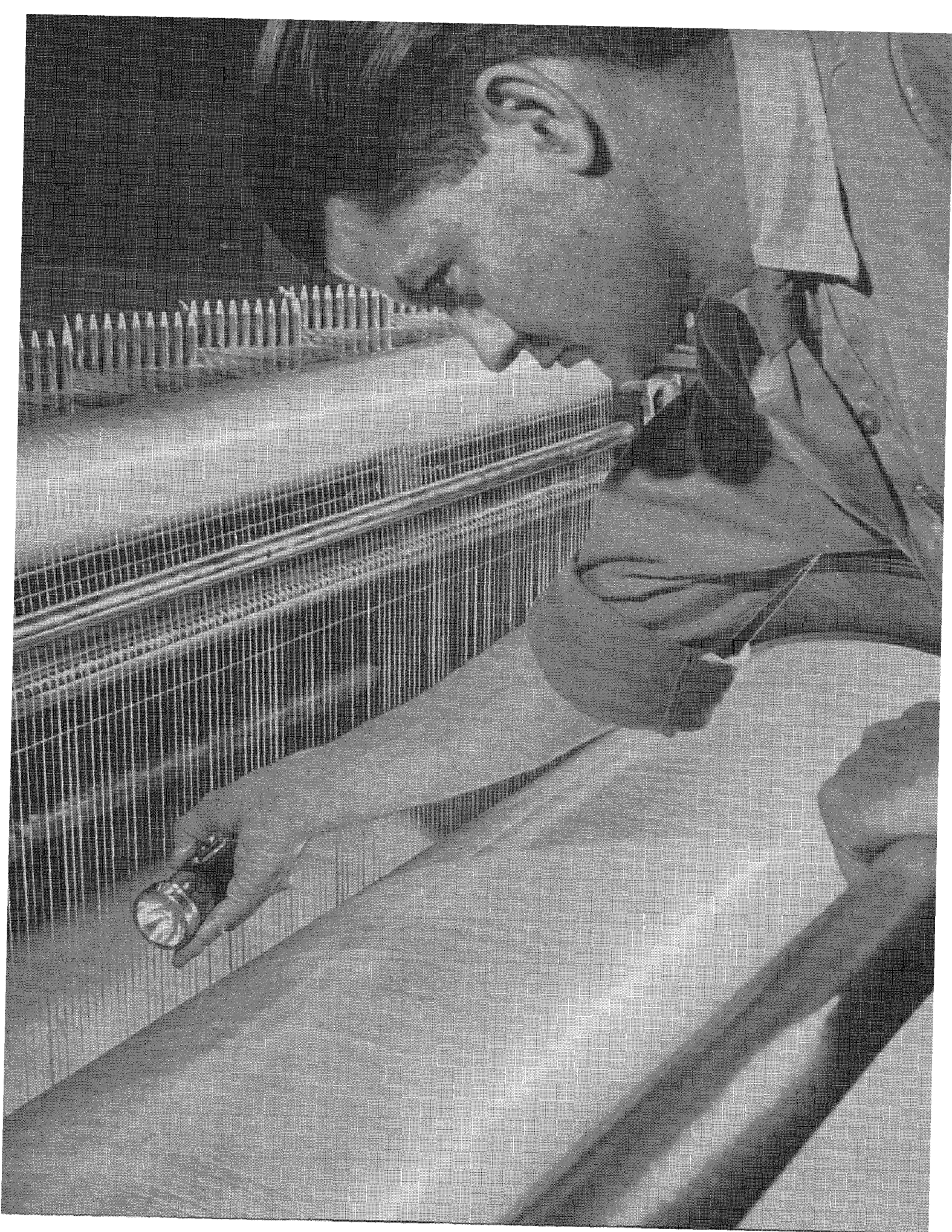
Most important to the future of continuous filament rayon has been the development of new fabric finishes and the appearance of chemical fibers like nylon, "Orlon" and "Dacron". To plied yarns or combination fabrics with other man-made fibers, rayon brings its advantages of low cost, easy dyeing, high temperature-resistance, absorbency, and freedom from static. It receives, in turn, better launderability, abrasion-resistance and resilience. The result of this combination of properties, not to be found in any one fiber, is better performance and greater comfort. Much of our fiber and textile research is now exploiting these possibilities.

Rayon's staple form, introduced about the time filament rayon was first tried in tire cord, has even broader possibilities for fiber combinations. Primarily this is because the relatively short pieces of staple can be blended one step earlier in the textile process to produce a single-ply yarn made up of several different fibers. Staple is found in a majority of men's summer suits and is making inroads in heavier fabrics. It's now making great strides on its own in the apparel field, with its pleasant hand, drape and strength. In addition, belief in the staple has led carpet mills to buy and operate rayon plants for themselves.

One of the newest uses of rayon is in nonwoven fabrics—drapery materials, dental towels, disposable diapers, etc.—which are created by bonding thin webs of fibers with resins. Eventually this bonding process may join knitting and weaving as the third important method of cloth manufacture.

Prominent as new products and markets are in rayon's future, even more important is the constant improvement of the yarn's physical properties. With this valuable background of accomplishment and tradition of vigorous research, Du Pont and the rayon industry aim to keep the oldest yarn young and in the spotlight.

"Strength, uniformity, and a price advantage have constantly expanded rayon's market. The rayon industry's phenomenal growth . . . is brilliant testimony to this."



Fathered by a safe refrigerant with the
jawcracking name of dichlorodifluoromethane . . .

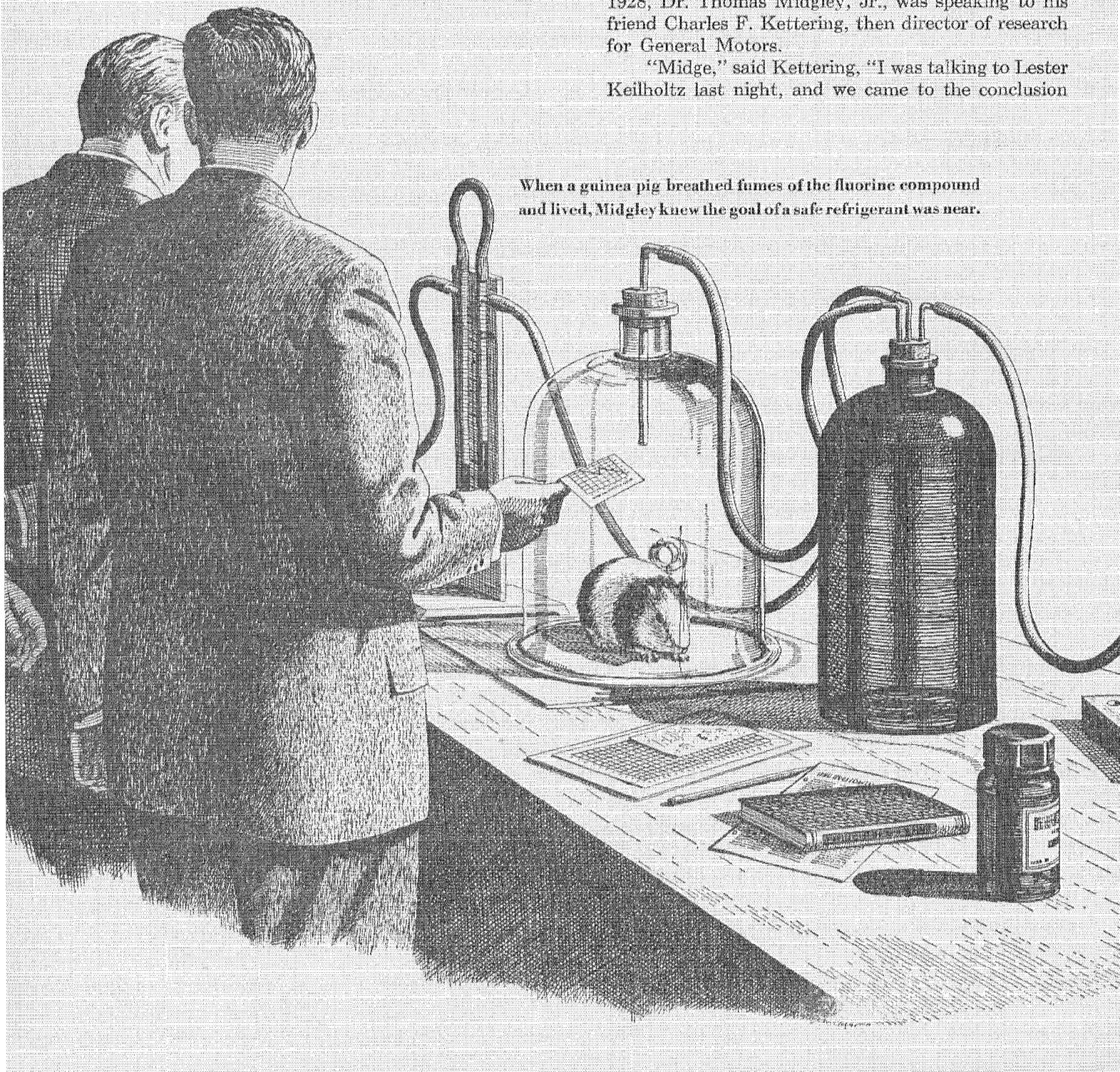
The "Freon" family grows up

By DONALD C. M. SORLEY

It all started with a phone call. One morning in July 1928, Dr. Thomas Midgley, Jr., was speaking to his friend Charles F. Kettering, then director of research for General Motors.

"Midge," said Kettering, "I was talking to Lester Keilholtz last night, and we came to the conclusion

When a guinea pig breathed fumes of the fluorine compound and lived, Midgley knew the goal of a safe refrigerant was near.



that the refrigeration industry needs a new refrigerant if they ever expect to get anywhere. I told Lester I'd call you and have you talk it over with him."

Keilholtz was then chief engineer for Frigidaire. Midgley was the General Motors chemist chiefly responsible for discovering why automobile engines knocked and for developing a chemical additive, tetraethyl lead, that stopped the knock.

What the refrigeration industry needed was a nontoxic, nonflammable refrigerant, said Keilholtz. Materials available were hazardous and often required bulky, expensive equipment. Midgley listened, was dubious. Could one substance be found that met these requirements and that would boil between 0° and -40°C, the essential range?

The scientists went to work, not in the laboratory but in the library. They looked first at the International Critical Tables, tabulations of melting and boiling points of compounds.

ERROR STARTS SEARCH

The most useful bit of information in the Tables was a mistake. It listed carbon tetrafluoride as boiling at -15°C when it should have been -128°C. But this started Midgley and his associates thinking about fluorine. They knew, of course, that fluorine by itself was super-toxic. But someone suggested that they chemically introduce fluorine into an organic compound already containing chlorine.

Dr. Midgley discarded the Critical Tables as in-

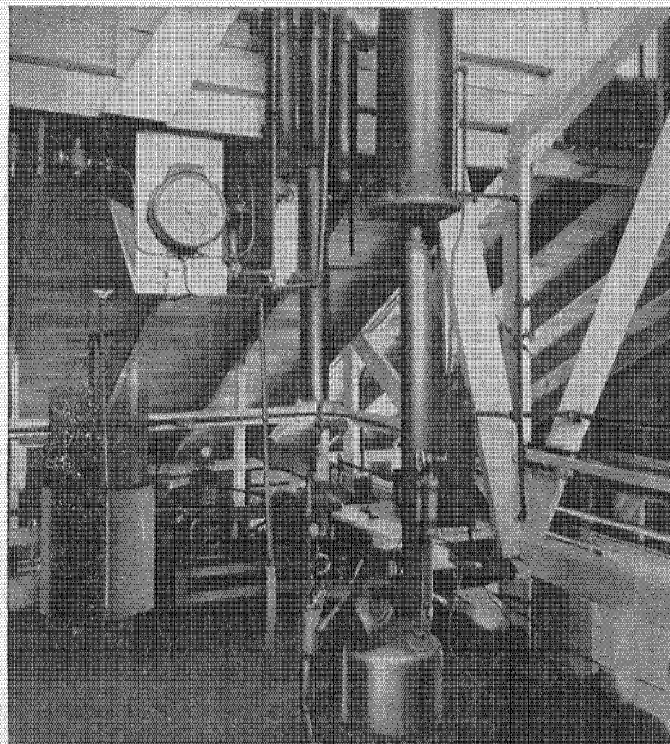
complete and turned to a periodic table in which elements were arranged according to their atomic structure. Could volatility be related to this table? It turned out that it could.

FLUORINE COMPOUND INDICATED

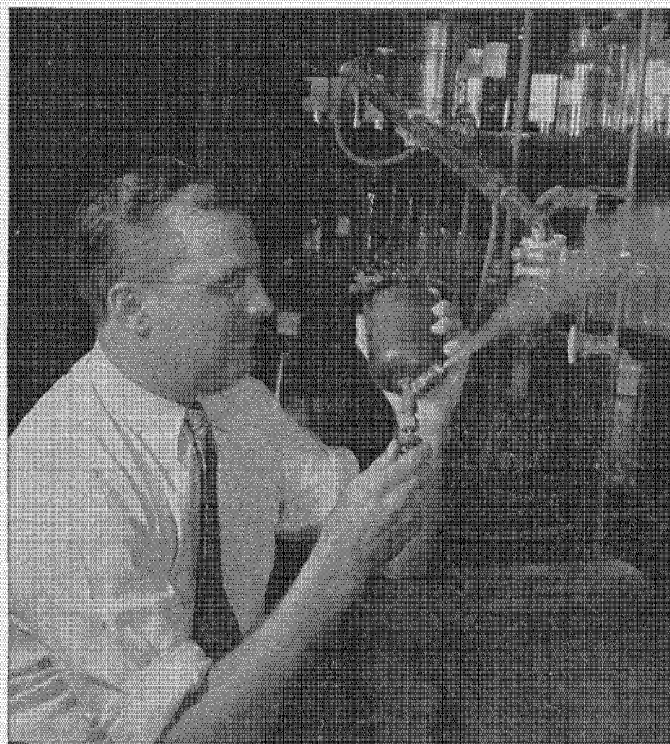
Midgley crossed off all elements whose compounds were known to be too unstable or too toxic. Eight elements remained. Suddenly, the researchers realized that all refrigerants ever used were made from these elements. But there was one of the eight, and only one, that had never been used—fluorine. Checking flammability against the periodic table, Midgley noticed that it decreased as he went from left to right. Running his eye up the column, he observed that toxicity decreased. Where the lines met was, once again, fluorine.

"It was an exciting deduction," said Dr. Midgley. "Seemingly no one had thought it possible that fluorine might be nontoxic in some of its compounds. If our problem of a new refrigerant could be solved by the use of one compound, then it would certainly be one that contained fluorine."

The Midgley team started with five one-ounce bottles of antimony trifluoride, all that existed in this country at the time. They prepared the compound whose constituents gave it the jawtaxing name of "dichlorodifluoromethane." A guinea pig was placed under a bell jar with a few drops of the colorless liquid. Everyone waited for the animal to gasp and



After the research team had completed its brilliant work, Du Pont undertook the task of manufacturing "Freon-12". This is the autoclave in which the pilot plant work on the new product was carried out. The process illustrated is obsolete.



New use for "Freon"—as propellant in aerosol containers—was developed by Agriculture Department a decade ago. Here Dr. L. D. Goodhue, USDA scientist, gives laboratory demonstration. Last year this country used 45,000,000 aerosols.

die. To their surprise, it wasn't even irritated. The goal of the researchers was in sight.

The final step—producing the new compound in commercial quantities—was a tremendous job. DuPont undertook the manufacturing process and turned out a product of high quality for refrigeration use. Dichlorodifluoromethane, trade-marked "Freon-12", was first sold to the refrigeration industry in 1931. The industry jumped from a \$100,000,000 business in 1930 to more than \$2,000,000,000 in 1951 as countless air conditioning and refrigeration systems began operating on "Freon" refrigerants. Today six "Freon" compounds are available to satisfy every requirement of the refrigeration industry.

During the early 1940s, an entirely new use for the "Freon" compounds was discovered. Our armed forces needed a more effective way to fight insects on the Pacific islands. Working on this problem, the Department of Agriculture developed the principle of dispensing insecticides by compressed and liquefied gas—the "bug bombs" of World War II. The armed forces used some 50,000,000 such bombs to kill mosqui-

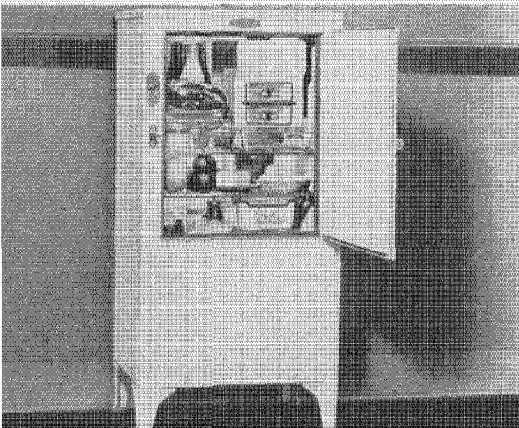
toes and other disease-carrying insects. The material that made these devices possible was the same "Freon-12" propellant.

After the war, these aerosol bombs went civilian. Their convenience and effectiveness assured popularity. Today a wide variety of household and personal products, from room deodorants to shaving cream, are available in aerosol containers. The nation used 45,000,000 of them last year. And new "Freon" propellents have been made by Du Pont to meet these varying needs.

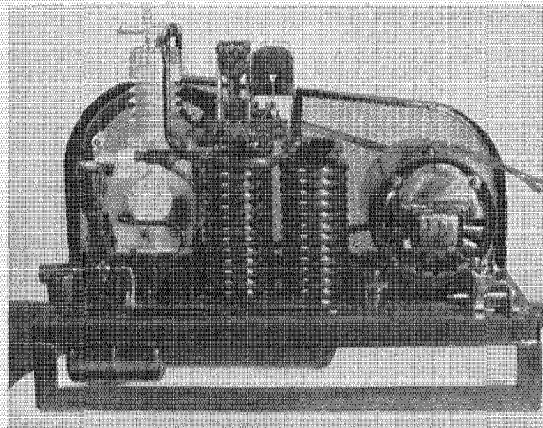
Continuing research is developing new "Freon" compounds and new uses. Already some are raw materials for the manufacture of plastics such as "Teflon" tetrafluoroethylene resin, and solvents for cleaning motion picture film. Others show great promise as fire extinguishing agents.

As a family, these chemical compounds have proved themselves our benefactors time and again. The younger offspring of "Freon-12" are as ambitious to increase the comfort, health and safety of the community as their distinguished forebear.

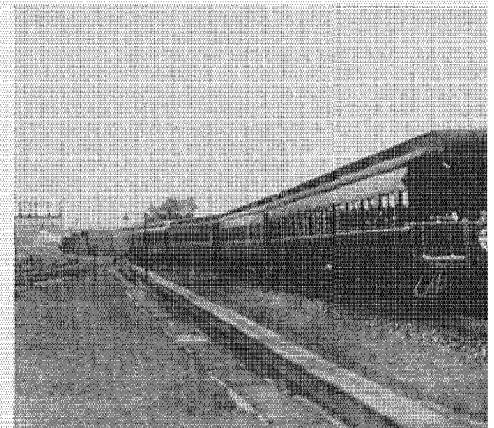
IMPORTANT "FREON" FIRSTS



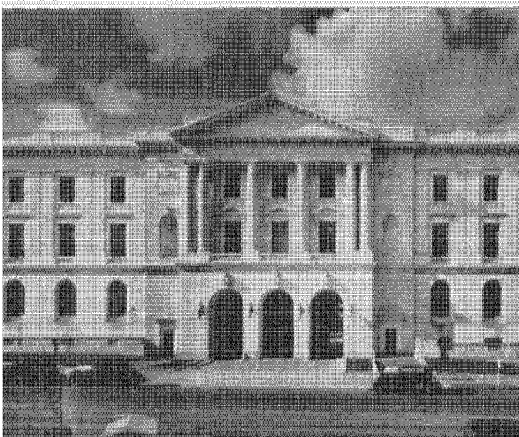
"Frigidaire" refrigerator was first to use "Freon-12" refrigerant. That was in 1931.



In commercial refrigeration, this 1932 model compressor was first to use new product.



America's first all air-conditioned train the Columbian, used a "Freon" refrigerant.



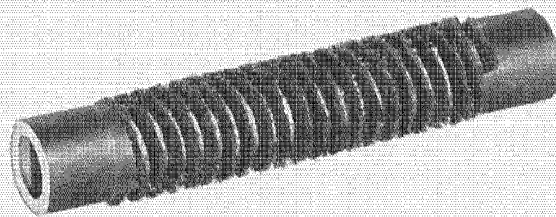
First large air-conditioning system using the new refrigerant was in the Senate Office Bldg.



Mile-and-a-half deep mine in South Africa was first cooled by "Freon"; others followed.



Use of "Freon" as aerosol propellant for insecticides was pioneered by Army in last war.



The nylon-bristled missile

Shot by compressed air through condenser tubes, unique Fuller brushes

route scale and reduce costs for a Rhode Island power plant

The workman at Newport Electric Corp. in Newport, R.I. stepped up to the steam condenser, placed a cylindrical object in a tube, set his gun and—bang—the object went sailing out the other side. With it went accumulated scale and foreign matter that gradually build up as cooling water passes through—deposits that shorten a condenser's life and raise fuel costs.

The "object" was one of the most unusual brushes ever made, specially designed by The Fuller Brush Co. for cleaning power-plant condensers. The device is bristled with Du Pont nylon and a little wire.

Used for two years now by Newport Electric, these novel brushes are outlasting their predecessor by about four lifetimes. Says a mechanical engineer for that company, "They give better cleaning action. This aids materially in keeping condenser efficiency at the highest possible level."

This user is perhaps even more concerned with efficient scale removal than many other power plants, for it draws on harbor water. This means that, as in all seashore installations, large amounts of algae and other marine organisms are present to make trouble. But the nylon-bristled "go-devils" don't seem to be bothered by the extra deposits. They clean them out to an extent engineers once believed impossible, each brush lasting for about a year.

NYLON REPLACES TEASELS

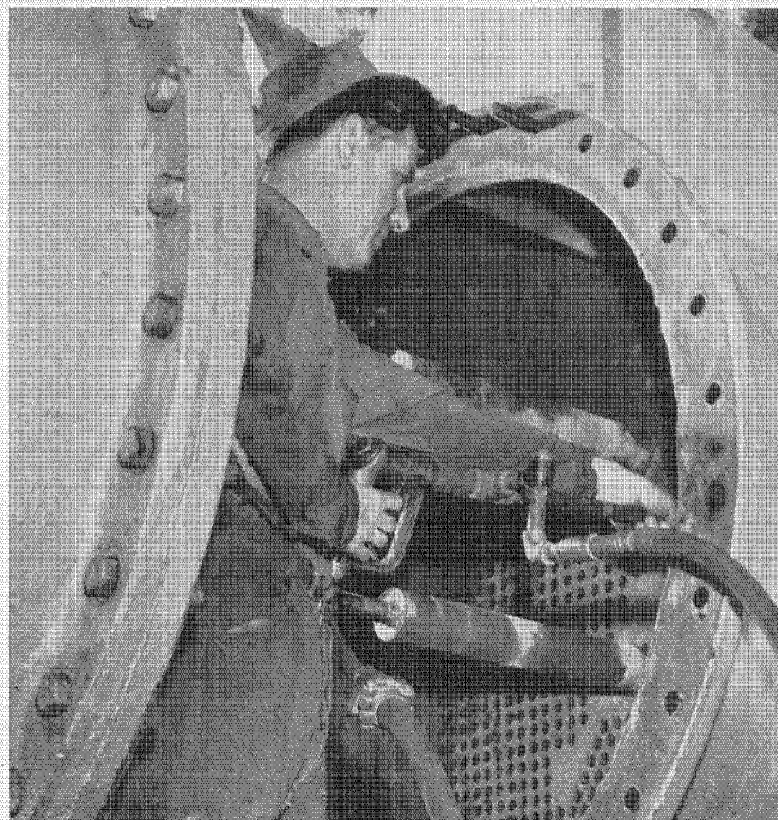
Cleaning condensers is just one job being done today by brushes in places where they once feared to tread. We've written before, for example, about those of nylon now replacing natural teasels—the small, thistle-like burrs used by textile mills to raise the nap on fine woollens. In addition, nylon-bristled brushes are whisking the excess water from the tops of cans containing food—a task once done manually.

Still another case is that of the machinery manufacturer faced with the problem of devising an automatic method for cleaning a new line of water filters. A brush seemed logical. But the filter plates were

abrasive, and the unit would be constantly filled with water. He felt that a brush just wouldn't stand up.

Then his brush supplier recommended nylon. He tried it out; it worked. Today from 10 to 50 nylon-bristled brushes are used in such a filter. Each is in contact with and "assigned" to clean one plate face. Whenever cleaning is needed, a drum to which the brushes are attached is rotated. In minutes the plates are clean. Although the operating conditions are severe, these brushes are each giving over two years of satisfactory service.

From power plants to textile mills to canneries, Du Pont nylon bristles are giving industry the happiest brush-off it's ever had.



Spring floods were coming, and men and machines raced the clock on . . .

The dam that couldn't wait

By JAMES H. McCORMICK

Cabinet Gorge sounds more domestic than dangerous, and modern-day dam building is more likely to be troublesome than treacherous. Put the two together, though, and you have something else again. The

deep, swirling Clark Fork River with its sweeping spring floods made Cabinet Gorge Dam one of the toughest nuts that big-league contractor Morrison-Knudsen ever cracked.



Cabinet Gorge is a 450-foot-deep, river-cut slash in a spur of northern Idaho's Bitterroot Range where the river makes a tight Z turn. Water 140 feet deep rushes through the tight canyon at this point when the river is normal. During floods, the normal flow of 12,000 cubic feet a second explodes into a lashing runoff of more than 125,000 cubic feet a second.

Here, a few score miles south of the Canadian border, Morrison-Knudsen Co., Inc. was to build a multimillion dollar dam and hydroelectric plant for the Washington Water Power Co., a privately-owned utility serving northern Idaho and eastern Washington. From every point of view, it should have been a full three-year project. Electricity for defense work in the area was needed badly, however, and M-K agreed to have the first of four 50,000 kilowatt generators humming this fall—agreed to jam 36 months' work into 24!

Even under the lash of defense needs, a couple weeks' delay probably wouldn't make too much difference. But, in ten short minutes, the pulverizing power of an uncontrolled spring flood, triggered by thawing snows, could have wiped out the work of ten months. This, then, was the real peril. And May 1 was D-Day. The two 29-foot diameter tunnels diverting

into the work area. It was late August now, less than nine months to D-Day.

By December, the weather was raw and the thermometer huddled a few degrees above zero. Snow blanketed the ground. The builders drove themselves around the clock and gave their tools and machinery the kind of beating that gives maintenance men nightmares. Oil the compressors, add antifreeze to this electrical generator or that power shovel, put a new valve in one of the 28 giant pumps fighting the persistent river seepage . . . No time now for overhauls: patch up the breaks and keep them going. Spring and the flood waters were coming and concrete pouring had just begun.

So pour concrete they did, 126,000 cubic yards of it, into a graceful 600-foot true-arch type dam curving in almost a half-circle across the canyon. Its strength lies in the thrust its arch exerts on the canyon walls, for nowhere is the dam more than 40 feet thick. By March the job was 80 per cent completed.

D-Day was an anticlimax. When the floods of May swept down, they spilled harmlessly over the dam's top.

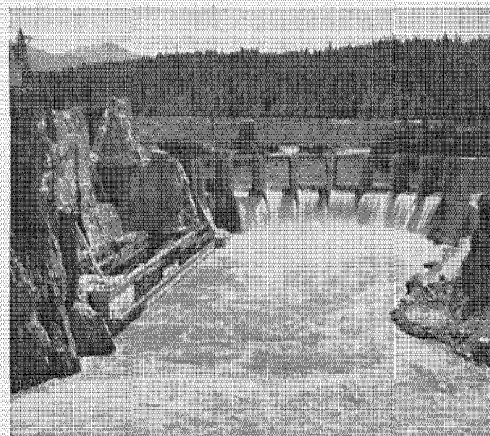
Now the dam has had its finishing touches and the hydroelectric plant has begun its song of power.



Here is the setting. Cabinet Gorge Dam was to be erected in the Z bend of the Clark Fork River indicated by the broken line.



Work went on round the clock and through the winter. "Zerex" antifreeze helped M-K keep ten different kinds of equipment operating.



Dam was completed in time to meet spring floods. When they receded after this shot was taken, spillway gates were installed.

water around the dam site area could no more handle the flood than the banks of the Wabash or Shenandoah could hold the waters of the Mississippi. There was only one answer. The dam itself must be ready to meet the wall of water.

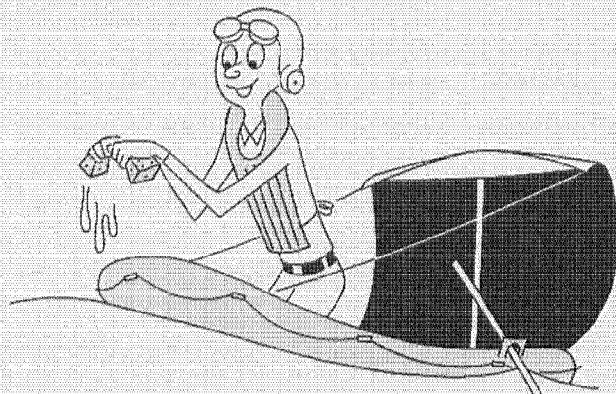
After the diversion tunnels were driven, one mighty 110,000-pound dynamite blast kicked down 60,000 cubic yards of cliff to block the gorge a few yards downstream. Minutes later, the river was flowing through the tunnels and around the future dam site. Soon, additional cofferdams were built upstream to cut down seepage, and one was placed downstream to keep the unusually deep river from backing up

In telling us a few of the many reasons why the dam was completed on time, Morrison-Knudsen Co.'s general purchasing agent, R. E. Herrick, gave credit to Du Pont antifreezes that kept more than ten types of equipment operating through the near-zero Idaho winter.

"We've been using 'Zerone' and 'Zerex' antifreezes ever since they came on the market," he said, "and they account for the largest portion of the 6,000-10,000 gallons we use for our American operations each year. You don't have to tell us Du Pont antifreezes give dependable protection against freezing without corroding the cooling system. We've known it around here for years."

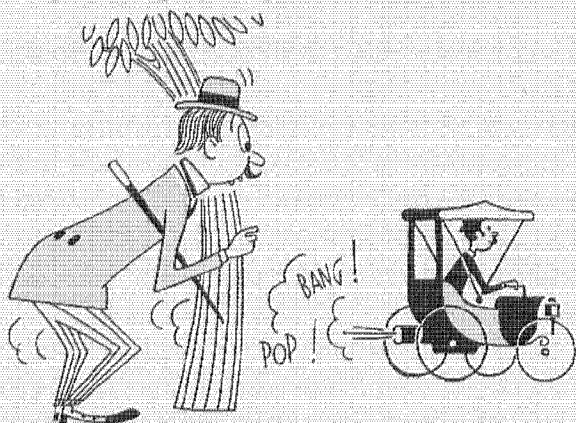
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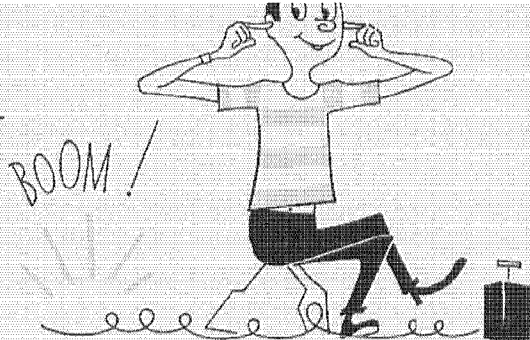


... EMERGENCY LIFE RAFTS carried by military planes on transoceanic flights are equipped with Du Pont fine pore cellulose sponges? Ability of the sponges to absorb up to seven times their weight of water makes them excellent for removing water from the raft.

... AFTER THE INTRODUCTION of liquid paints in ancient Egypt, artisans made brushes of reeds and the fibrous stems of palm leaves? This is a far cry from the long-wearing nylon paintbrush bristles of today.



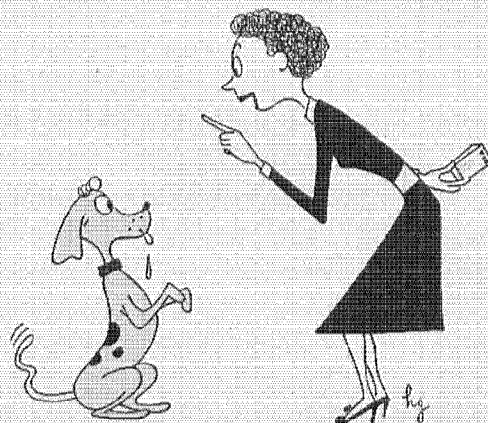
... IN 1896 there were exactly four gasoline motor cars in the United States—one built by Haynes, a second by Henry Ford, a third by Duryea, and another by Benz of Germany? Today Americans drive more than 42,000,000 cars, and the auto industry directly or indirectly uses large amounts of about 260 chemical products. Du Pont products for car makers range from "Duco" lacquer, neoprene and "Zerone" antirust antifreeze to electroplating chemicals and nylon for upholstery fabrics.



... IN QUARRYING BLOCKS of marble and slate, black blasting powder is used because it splits the stone rather than shatters it? Black powder, Du Pont's oldest product, is still made at the Company's Belin plant near Scranton, Pa.

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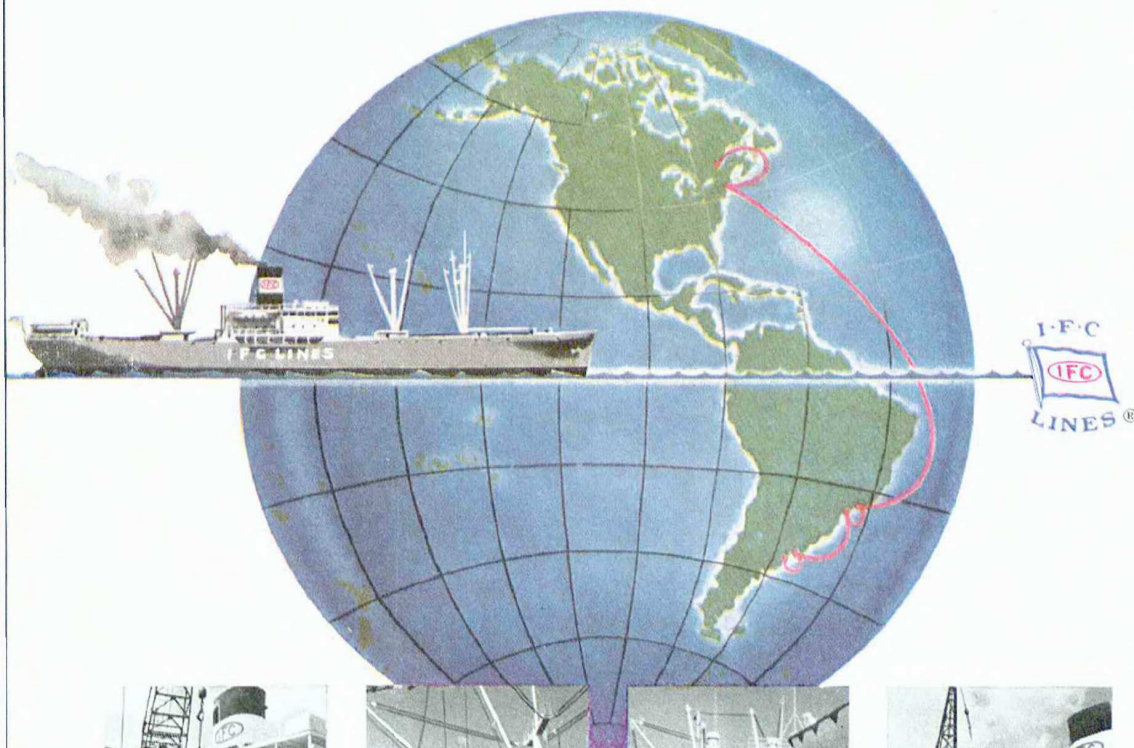
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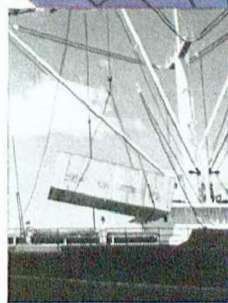
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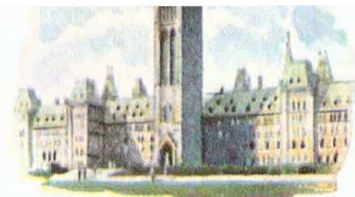
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