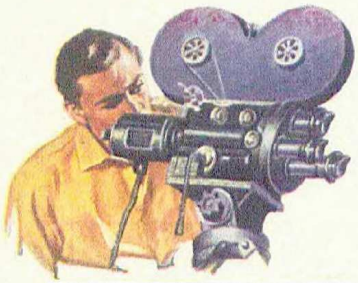
THE DUPONT MAGAZINE

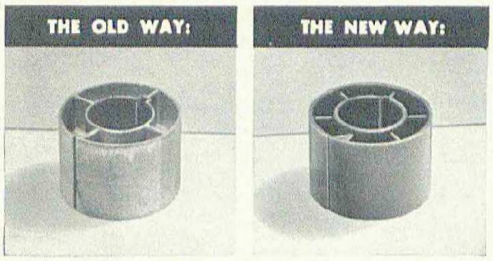
BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY





FILM CORES OF "PLASTACELE"

Cost less . . . weigh less . . . maintain dimensional stability

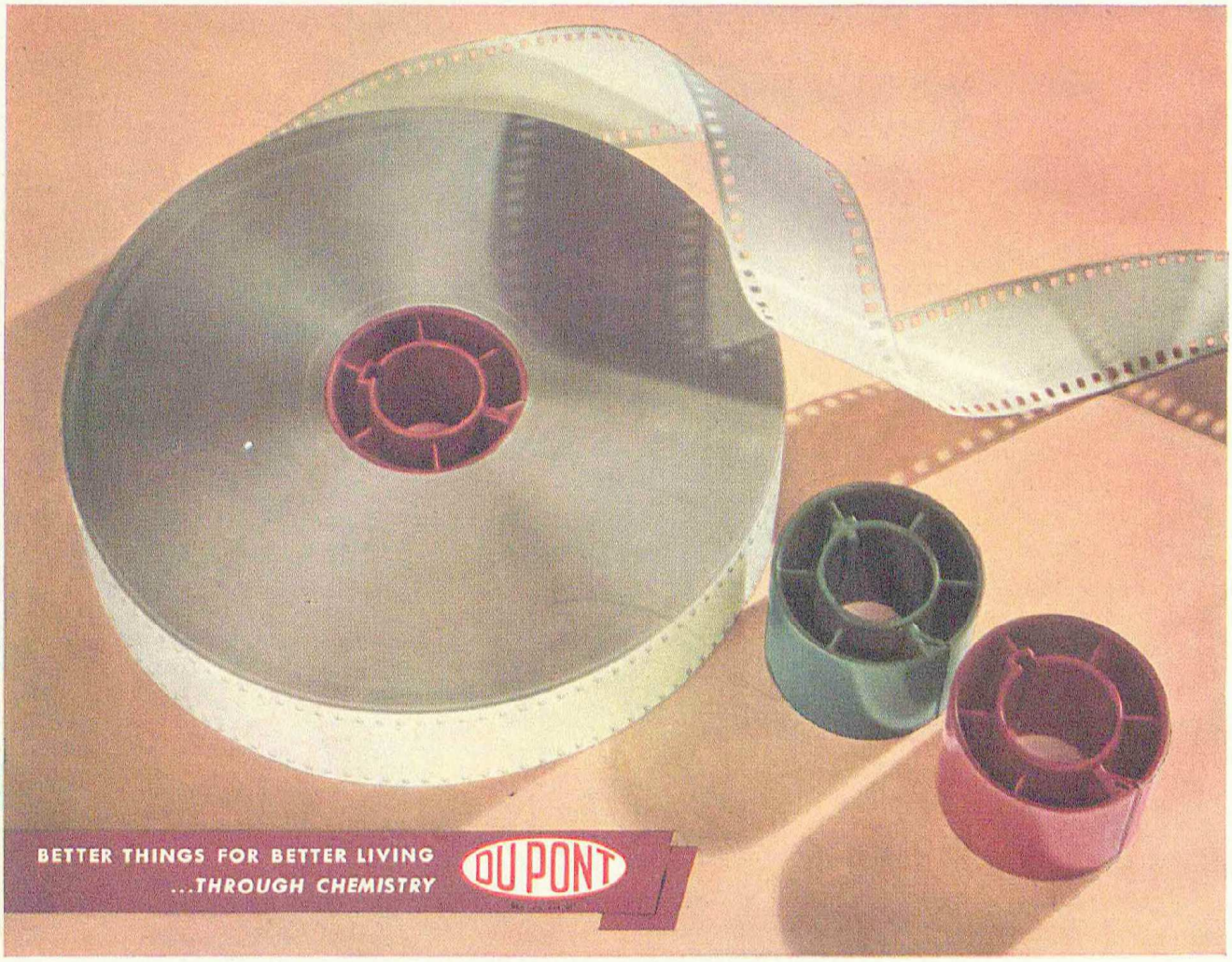


The old way: Metal core weighed 81.5 grams.
The new way: Core of Du Pont "Plastacele" weighs 27.0 grams. Molded for the Du Pont Photo Products Department, Wilmington 98, Delaware, by A. L. Hyde, Grenloch, New Jersey.

FOR PLASTICS CONSULT DU PONT

ADVANTAGES: These film cores of "Plastacele" cellulose acetate plastic have shown that they possess exceptional dimensional stability. In addition, they cost less, are lighter in weight, and will not corrode. Today these cores, which are designed to hold up to 2,000 feet of motion-picture film in 16 mm., 32 mm., and 35 mm. sizes, are made in green (to identify negative film) and brown (to identify positive film). Six cores are injection-molded at one "shot" for each 30-second cycle. Unlike some other plastics considered, "Plastacele" does not attack or fog the film. Because they do not bend out of shape, the plastic cores do not throw the film out of line if they happen to become damaged in use or in transit.

For information about "Plastacele" or other Du Pont plastics, write E. I. du Pont de Nemours & Co. (Inc.), Plastics Department, Arlington, New Jersey.



SO TO SPEAK

THE atomic bomb story is now an old one. Presumably everybody knows that the Du Pont Company designed, constructed and operated for the Government near Pasco, Washington, the Hanford Engineer Works which cost about $350,000,000 and was by far the largest single engineering job undertaken by the Company during the war. The project was carried through secretly and successfully, and for the service rendered Du Pont received a stipulated fixed fee of one dollar. You'll have to know that in order to appreciate what follows:

The sequel story—and may you enjoy it, too—concerns a project officially sponsored and carried through successfully by the members of the Pasco Kiwanis Club—a project of considerable interest, if not one of great magnitude. Perhaps the best way to tell the story is to quote the text of a letter written by Mel Swanson, president of the Pasco club, to Walter S. Carpenter, Jr., president of E. I. du Pont de Nemours & Company under the date-line, August 11, 1945. Here it is:

"At the last regular meeting of the Pasco Kiwanis Club a resolution was passed which reads as follows:

> 'An article in a local newspaper states that the Du Pont Company received only One Dollar profit from the operations at the Hanford plant and that an expense item of thirty-two cents was not allowed by an accountant, leaving a balance of sixty-eight cents. Thirty-two members of this club are contributing one cent each to make up the difference and also placing their signatures to this letter.'

"We are very proud to be so closely situated to the Hanford project, and all of us feel very sincerely that we have had a part in this magnificent enterprise. We also hope that The Lord will see fit to direct the future efforts and achievements of this product into the right channels for the good of all mankind."

For the kindly thought that prompted the contribution, and for the reverent hope expressed—it is one that all men of good will must share—we say sincerely, "Thanks, Pasco Kiwanians!"

Needless to say this letter has been framed and will be preserved along with other interesting items pertaining to the Company's wartime activities.

★ ★ ★

CHRISTMAS 1945, just around the corner, will be a memorable one. For the first time in years the angel voices can be heard clearly above the din of battle. For the first time in years, too, millions of families, long separated, will be together again to share good cheer with friends and relatives at home. Yes, it will be a day of joyous reunions—one long to be remembered.

Our Yuletide wish for you is the same old one, "Merry Christmas, friends, and may the New Year start the promised era of a better world for us all!"

THE DU PONT MAGAZINE

★ ★ DU PONT ★ ★

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E. I. DU PONT DE NEMOURS & COMPANY (INC.)

Wilmington, Delaware

E. R. MANCHESTER, *Editor*

THE COVER



Christmas morning! And the scene is set for a grand surprise awaiting the children who will soon be rushing down-stairs to see what's under the tree. It will be a Merry Christmas in this home. Reproduced from a color negative by Mead-Maddick.

OTHER CREDITS: Page 4, top, Spray-Dip Corporation photo. Page 5, center, Lord Manufacturing Company photo; bottom, Air Technical Service Command photo. Pages 10, 11, 12, 13, Westinghouse photos. Page 14, top, courtesy of Maling Bros.; center, Benjamin Franklin Hotel; bottom, New York, New Haven & Hartford Railroad Company. Page 16, top, The Howell Company. Page 17, U. S. Forest Service photo. Page 18, courtesy of Paper Trade Journal. Page 19, The Bettmann Archive.

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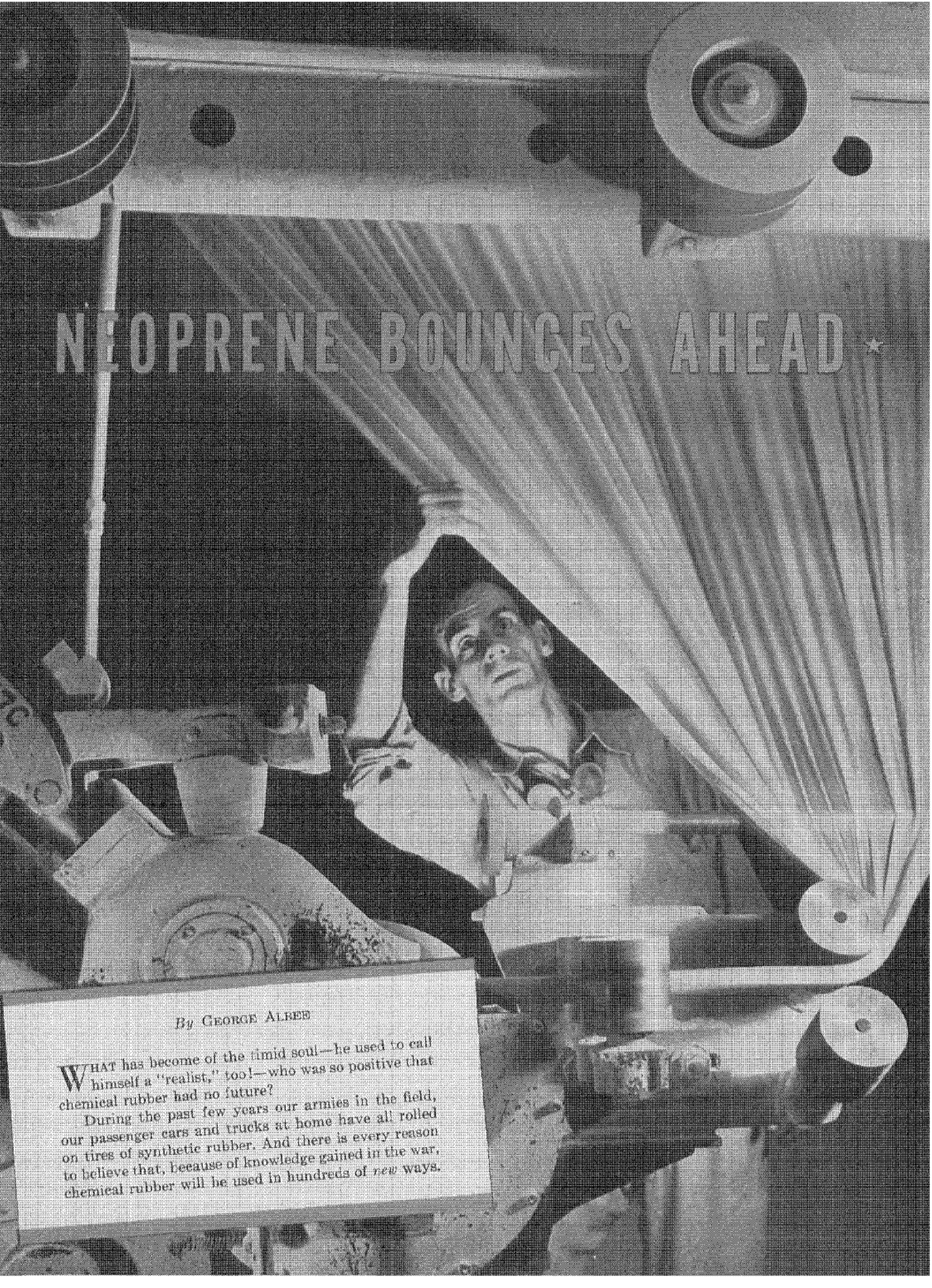


NEOPRENE BOUNCES AHEAD ★

By GEORGE ALBEE

WHAT has become of the timid soul—he used to call himself a "realist," too!—who was so positive that chemical rubber had no future?

During the past few years our armies in the field, our passenger cars and trucks at home have all rolled on tires of synthetic rubber. And there is every reason to believe that, because of knowledge gained in the war, chemical rubber will be used in hundreds of *new* ways.

A New Kind of Thinking

There would have been a good deal less confusion about these synthetic rubber-like materials if, in the first place, people had never thought of them as rubber substitutes.

Men have been "takers" for so many centuries—taking hides and wool from animals, taking fish from the sea, taking fruits and grains from the plant world—that it was difficult for many people even to conceive of a rubber which was not taken from rubber trees. Anything that resembled rubber but didn't come from trees, they thought, could only be a rubber substitute.

The fact of the matter was entirely different. Synthetic rubber is a new material, *like* rubber but *different* from it. And this is particularly true of Du Pont's neoprene, the first synthetic rubber made commercially in the United States. Neoprene is a unique substance with properties all its own—because that was exactly the kind of substance Du Pont chemists set out to make, long years ago.

Far back in 1925, when the newspapers were devoting columns of space to Thomas Edison's attempt to cultivate weeds which would yield natural rubber, the Du Pont Company attacked the problem from an entirely different angle. While most people were saying that the world stood in need of more rubber, Du Pont scientists even then saw clearly that what the world needed was a material or materials *with the qualities of rubber* . . . an entirely different approach to the problem; more daring, more imaginative and more scientific.

They were more specific than that, indeed. Rubber—natural rubber—had many bad qualities. For instance, it went to pieces when it was exposed to the weather very long. And it was easily destroyed by oils and greases. "Why," asked Du Pont research chemists, "struggle to duplicate the faults?" . . . Why not wipe the slate clean and find a chemical compound which had none of the bad qualities of rubber, but all of the good qualities—and perhaps even a few more good qualities than the natural material could boast?

So, from acetylene gas, they made monovinyl acetylene. And, adding hydrogen chloride to this, they made a thin, clear liquid—chloroprene—which was not unlike isoprene, the basic constituent of rubber.

But this liquid had properties with many advantages over isoprene. It "jelled" into a rubber substance several hundred times faster than isoprene, it required no sulfur for vulcanization, and products properly made of it outlasted rubber by many times.

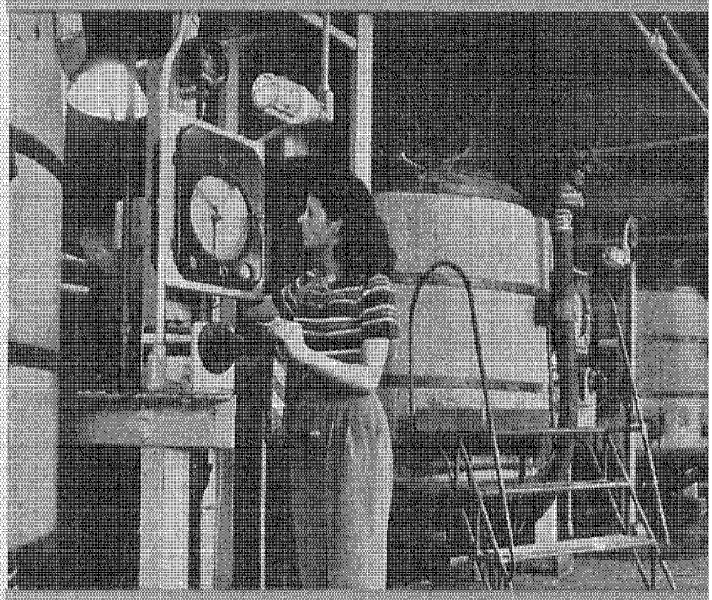
It sounds simple. Actually, research went on without cease from 1925 to 1931—six long years—before the Du Pont Company announced neoprene at a meeting of the American Chemical Society.

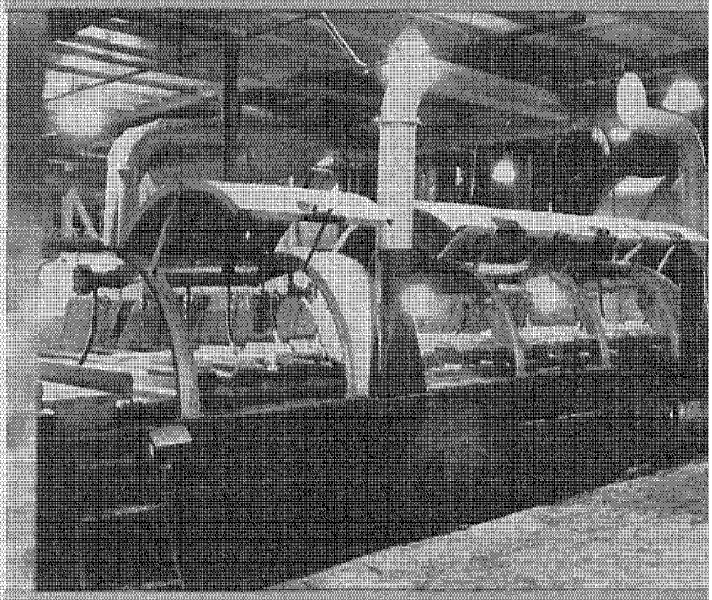
Early Growth

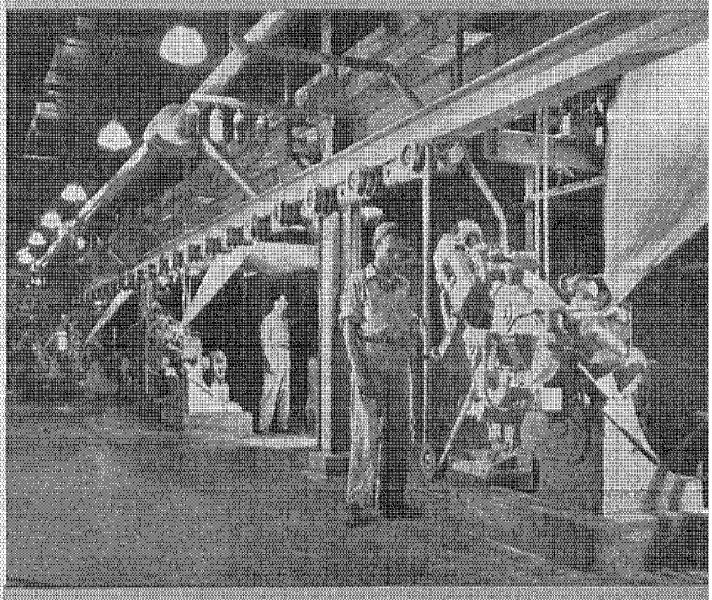
New as neoprene was, its progress from the beginning was a demonstration of the fact that it was not a substitute, not a replacement, but a brand-new building-material for the hands of man, the builder.

In 1932, with natural rubber selling for a nickel a pound, neoprene found customers at more than twenty times that price. For, while finished goods made of

In these tanks at the Louisville plant, chloroprene is polymerized to form neoprene, and then (center) it goes on a conveyor line through the washing operation.







Further along the production line the dried and film-like sheeting is made into the form of rope. A close-up of the machine is shown to better advantage on page 7.

neoprene looked like those made of rubber, and had the same elasticity, stretch and toughness, the chemical offspring of acetylene gas greatly excelled rubber in resisting the action of oil, gasoline and solvents, was less affected by heat and was much less permeable to gases. Moreover, it was many more times resistant to checking and cracking when exposed to the sun.

Between 1931 and 1935, indeed, sales of neoprene doubled each year. In keeping with the Du Pont policy of sharing the benefits of lowered costs, the price was reduced to $1, to $.75 and then to $.65. By 1939, no industry could be found which was not using neoprene in one way or another. Every automobile, every airplane had neoprene parts. The new material was used throughout industry in place of casein, glue, gelatin, plastics, leather, pyroxylin, waxes, metals, fabrics and combinations of these materials. It was tested in experimental automobile tires. And, as a final and incontrovertible proof that neoprene was neoprene and not a substitute for anything, a number of machines were especially designed around neoprene parts.

Wartime Speed

Then came the war. And neoprene suddenly bounced ahead like a rubber ball—a neoprene rubber ball!

Almost overnight the war created a vast demand for neoprene. Urged on by the Army and Navy, Du Pont built a huge new plant for the Government at Louisville, Kentucky. Du Pont engineers worked day and night to streamline the process, to push it to its highest efficiency, to deliver the desperately-needed product in great quantity, tremendous quantity.

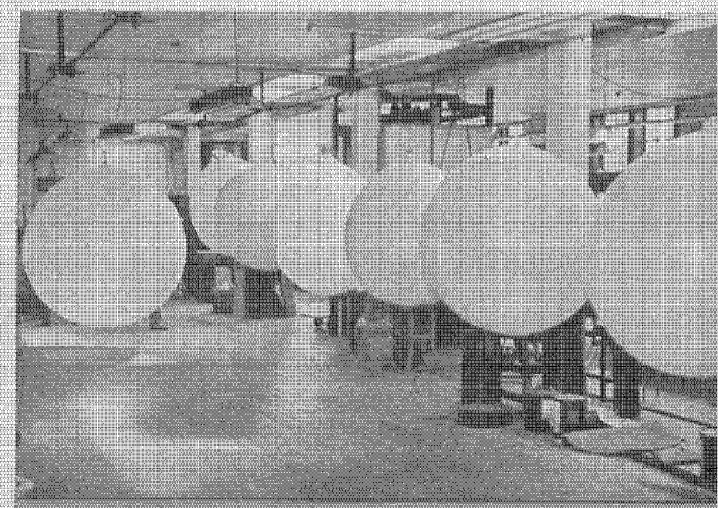
Two other things happened: First, scores of manufacturers went to work on war items for which the Government specified neoprene as a *must*—manufacturers who had never used the Du Pont product before. Second, war needs uncovered many uses for neoprene which nobody could have foretold. Thus while Du Pont operators were learning short-cuts in neoprene manufacture, rubber manufacturers were learning them, too—making *better* neoprene products faster.

Branching Out

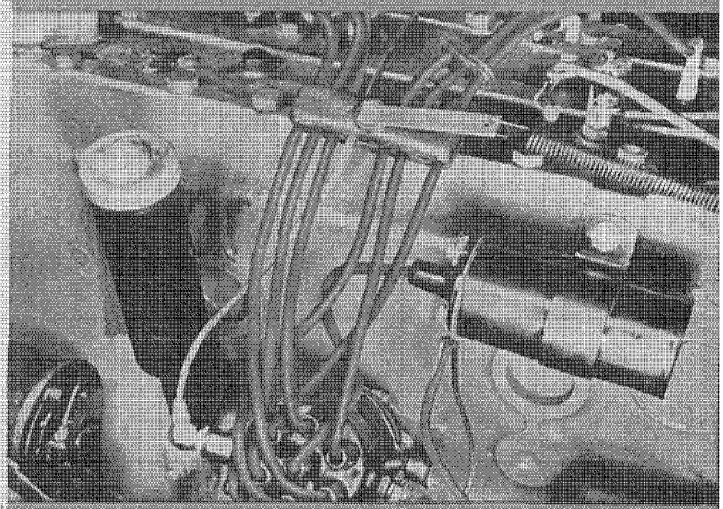
Before the war, Du Pont had known that neoprene had characteristics which made it good for motor mountings. A number of automobile and airplane manufacturers were using it for that purpose. But the war soon saw more motors produced than ever before in history—motors not only for cars and planes, but for tanks, "ducks" and all the many other vehicles needed by the armed forces. Moreover, they served in every possible extreme of climate. In this respect, the war was a vast proving-ground.

As a result, more is known today than ever before about the use of neoprene in connection with motors. Under trials more severe than any research laboratory could devise, it has been proved that neoprene absorbs motor vibration as well as rubber if not better, and that in addition to being able to withstand oil and gasoline it resists anti-freeze fluids, hot water, motor heat and aging, under the most rigorous exposure conditions.

With this new knowledge it becomes easy to predict



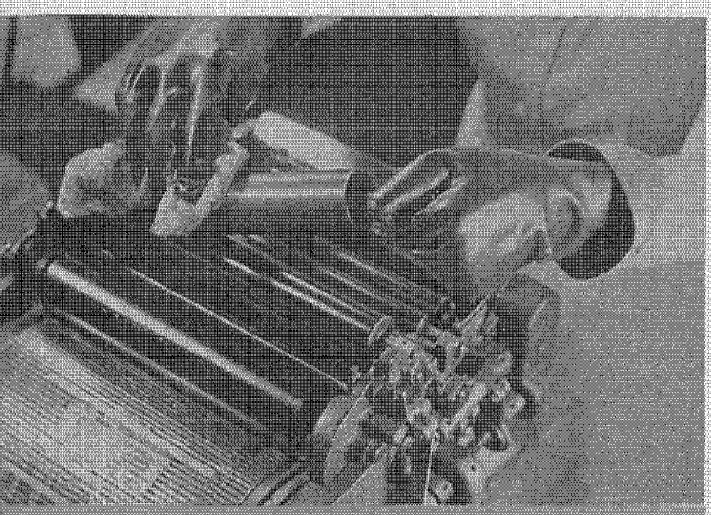


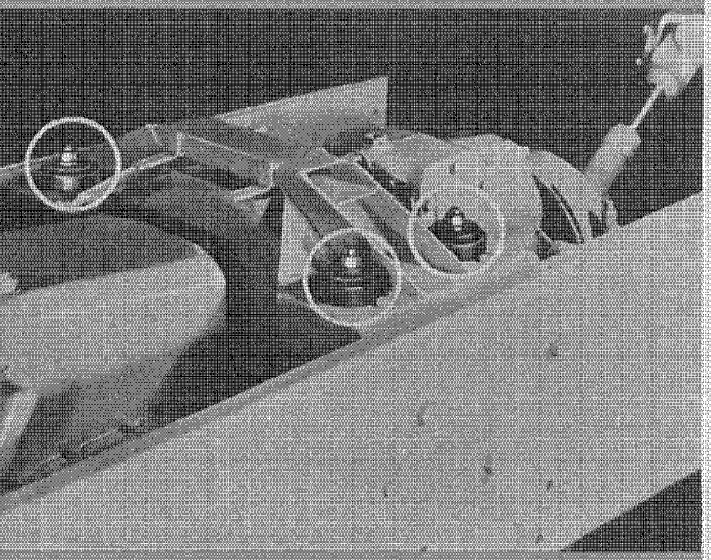


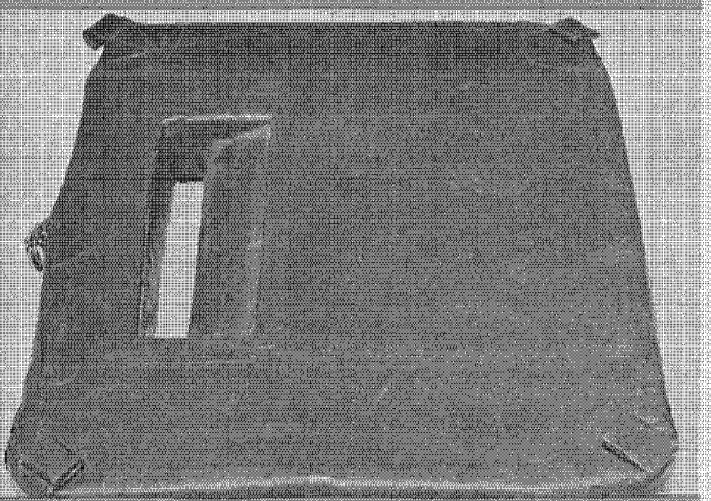
TOP: *Factory-testing neoprene balloons, they carry weather-recording instruments into the stratosphere.*

CENTER: *Neoprene was used in war balloons; several types of them were developed for air-defense needs.*

ABOVE: *Ignition cable jacketed with neoprene has been utilized extensively by motor-car manufacturers.*







TOP: *During press-cleaning operations it pays to wear solvent-resistant gloves made of neoprene.*

CENTER: *For motor mountings and vibration dampeners fatigue resistant neoprene is well recommended.*

ABOVE: *Parachute cushions filled with neoprene foam sponge were made in large numbers for our airmen.*

many new ways in which neoprene will serve the automotive field from now on. Not only will there be new types of motor mountings, but entirely different kinds of oil seals are being developed—as well as vibration dampeners, rubber automobile springs that will make riding more comfortable than ever before, and ignition wires resistant to heat and oil and the ozone produced by the high-voltage current.

Neoprene has been used in wartime barrage balloons and the smaller balloons, like big pumpkins, which carry radio aerials aloft from life-rafts—because it allows little gas leakage, and resists the effects of sunlight. Much has been learned in this connection, too. The Signal Corps has learned the advantages of neoprene meteorological balloons, and weather stations will continue to use them in future for high-altitude weather sounding. With the increased spread of air travel this weather sounding will be of increasing importance.

The fact that there is almost no leakage of air or other gases through even the thinnest film of neoprene points to other developments as well—better inner tubes for automobile tires which will hold air longer and save tire wear; better bladders for footballs and basketballs which will not need to be inflated so often.

Neoprene foam sponge was used during the war for helmet liners, parachute cushions, mattresses aboard submarines and "sight pads" inside tanks. Such uses suggest an infinite variety of future possibilities—for airplane seats, railroad-car seats and automobile seats. Neoprene foam sponge is ideal for hospital mattresses, which must withstand rigorous sterilization.

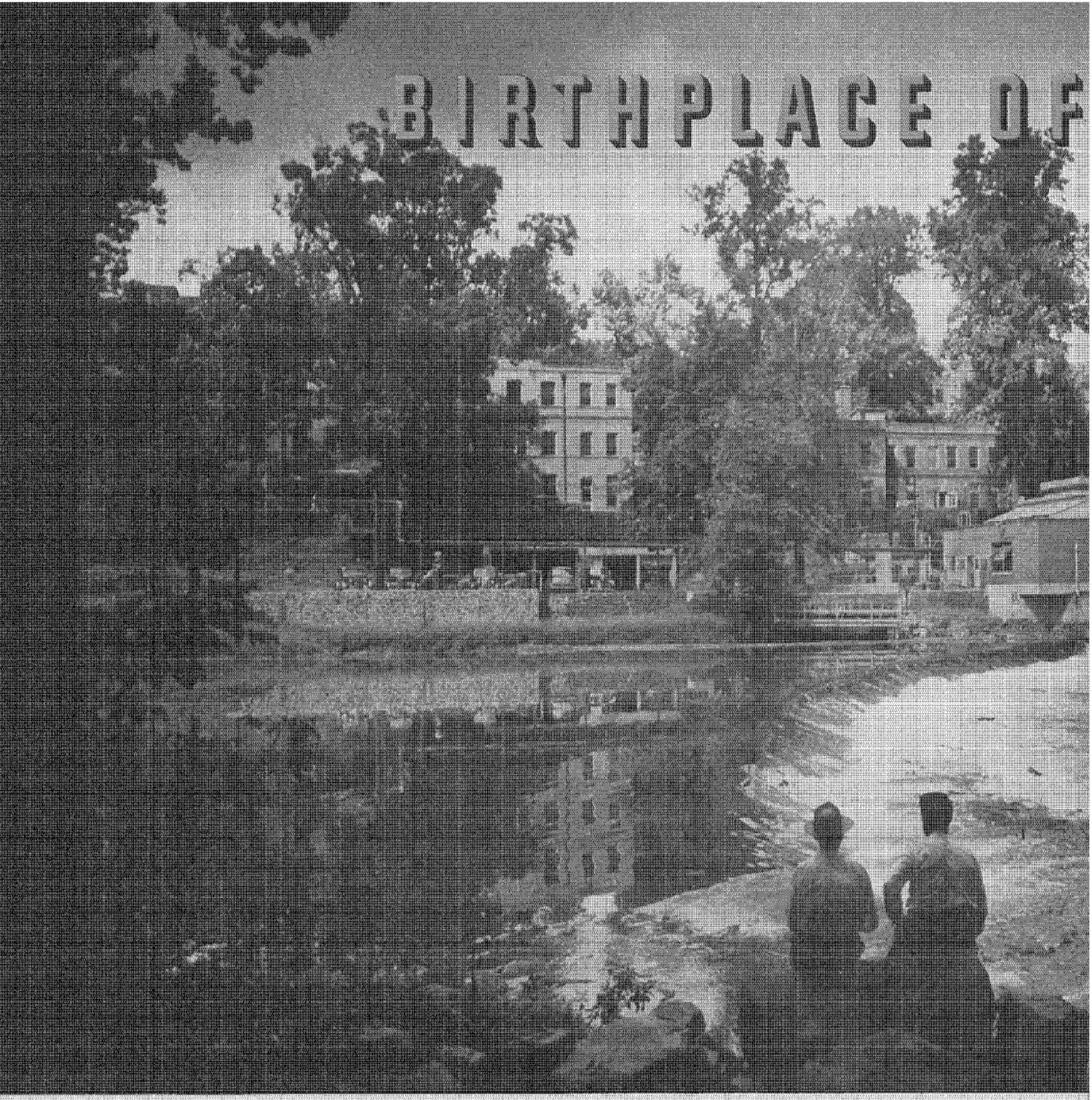
The Broadened Picture

Most of the pre-war spots in which neoprene was used had been spots in which natural rubber failed because of its shortcomings. But as the stock-pile of natural rubber dwindled during the war, neoprene also was adapted for many products which, before, had never been made of anything but rubber. In fact, neoprene was found to be the *only* synthetic rubber which could replace the natural product in many cases. Production was increased manyfold, with an overall increase in efficiency. Not only has the cost of making neoprene itself been lowered, as a result, but manufacturers gained so much experience with neoprene during the war that *their* costs were lowered, as well, for their finished products.

These lowered costs alter the whole picture of neoprene's future, in a most encouraging way.

It is a foregone conclusion that neoprene's price will be closer to that of natural rubber than ever before. And manufacturers, with the knowledge of neoprene they gained during the war years, will be able to produce articles of neoprene at costs much closer to costs using natural rubber. This explodes the last argument of those who once said that the synthetic product could never compete with the natural because of price. So far as neoprene is concerned, this is not 1945—it is 1955.

As a result of years of experimentation and testing compressed into months, you and I will enjoy the benefits of speeded-up wartime developments in hundreds of products soon to reach the market.



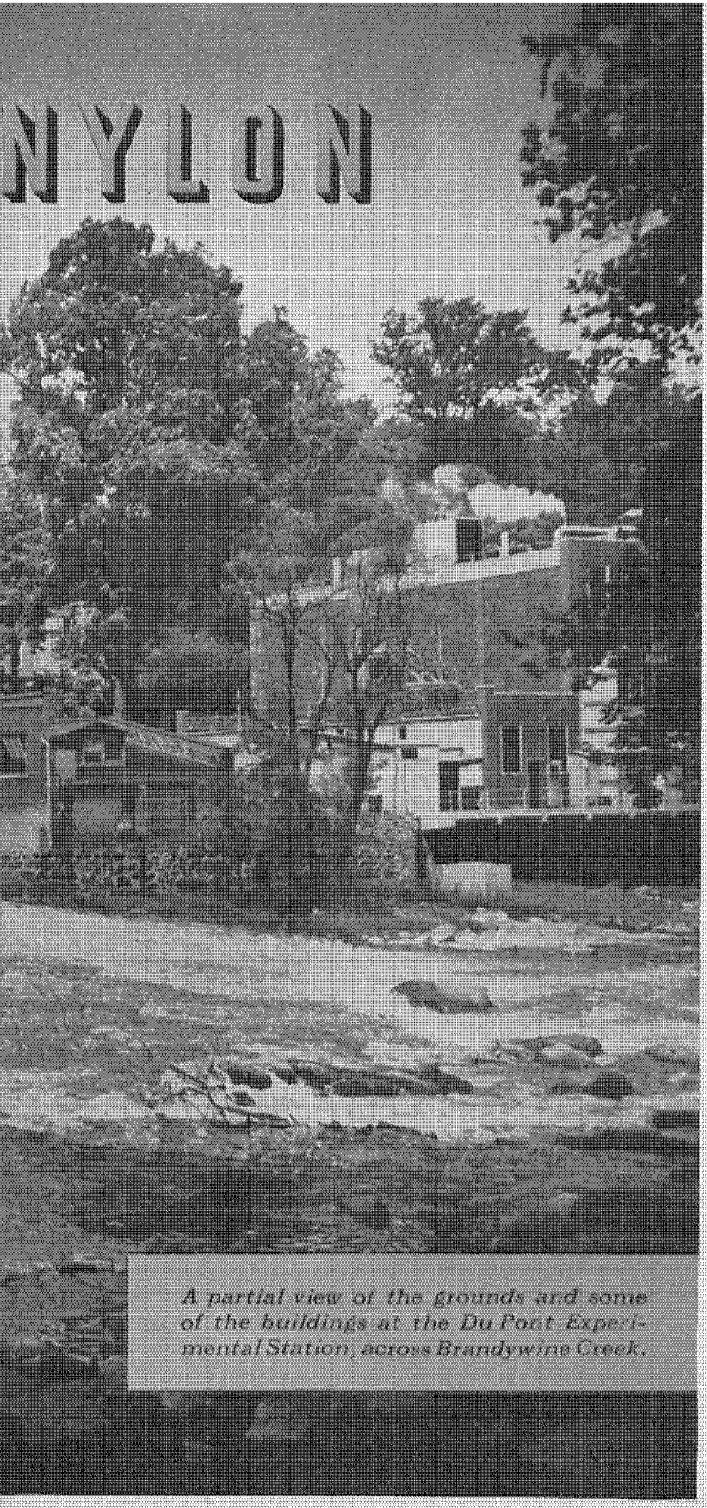
REVIEWING SOME FACTS ABOUT THE DEVELOPMENT OF THE DU PONT EXPERIMENTAL STATION

By FREDERICK W. MILLER, JR.

OUTSIDE the city of Wilmington, Delaware, along historic Brandywine Creek about a half mile downstream from the site of the original Du Pont powder mill, is the Du Pont Experimental Station. It occupies a sheltered location on a steep, forested hillside overlooking the stream. Today, within the thirty-one acres of fenced-in grounds are more than eighty structures of one kind or another, many of them almost completely hidden from view by Nature's own camouflage of trees.

This Experimental Station was started in 1903 in a small laboratory outside the present grounds, but the history and traditions of this region go back a full century before that time, when the founder of the Du Pont Company, E. I. du Pont de Nemours, started to manufacture a better gunpowder. His laboratory, we are told, was in the old saltpeter refinery some distance upstream.

Mr. du Pont, who had been trained under the great



A partial view of the grounds and some of the buildings at the Du Pont Experimental Station, across Brandywine Creek.

French chemist, Lavoisier, realized that the success of his enterprise depended upon his ability to produce a high-quality gunpowder, and for that purpose he needed good raw materials. Locally, he bought the willow wood, which was made into charcoal under his direction. Sulfur and saltpeter, however, were imported, and the latter ingredient had to be refined. Thus, in a limited sense, chemistry was first introduced in Du Pont manufacturing operations.

In fact, the first Du Pont work for the United States Government was to refine a quantity of salpeter and to re-process some low-grade military powder that had been deteriorating in Federal storage houses since Revolutionary War days.

Du Pont sporting powder quickly earned high repute for its superior quality. Thereafter, throughout the founder's lifetime, he sought constantly to improve his product and to make it more generally useful. He succeeded, too. Before he died in 1834, the Company had produced more than a million pounds of black powder.

As the business grew, the plant was expanded downstream along the Creek until eventually it included an area that was known for many years as the "Lower Yard," which is now a part of the Experimental Station grounds. Black powder was produced there as late as about 1900.

During the nineteenth century the Du Pont Company manufactured only black powder, dynamite and smokeless powder, and its research activities were limited to the explosives field. Dynamite production, starting in the early '80's at Repauno, and smokeless powder in the '90's at Carney's Point, New Jersey, had made chemical processing an increasingly-important factor in the business.

Broader Horizons

In 1902 the Eastern Laboratory for high explosives research was established at Repauno. This was one of the first industrial research laboratories in this country. The following year the Du Pont Development Department, then newly organized, undertook to expand the business, not in the field of explosives alone, but in any others in which the Company's logical chemical interests might lead. Thus came the need for another research laboratory which was built on "the Brandywine."

At that time development work on smokeless powder was well under way, and some of it was to continue at the Experimental Station for almost three decades until the Burnside Laboratory was built at Carney's Point.

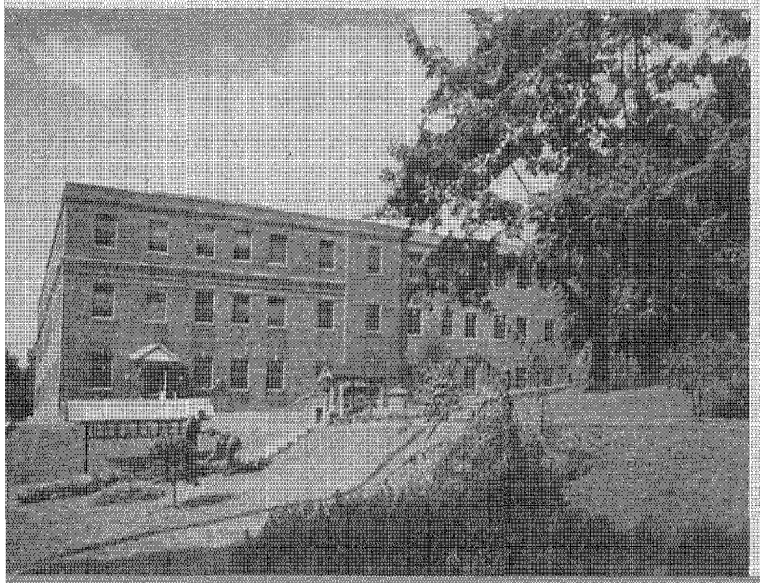
Meanwhile, in 1904, through the purchase of the International Smokeless Powder and Chemical Company, Du Pont began manufacturing special types of nitrocellulose for industrial uses. This led to a further expansion of the Company's chemical interests. In 1910 Du Pont began manufacturing pyroxylin-coated textiles, and the next year a centralized Chemical Department was established to take care of all research activities of the Company. This plan continued in operation for about ten years, a period of rapid expansion into new fields.

In 1921, however, a complete reorganization of the methods by which the business of the Company was conducted marked the beginning of a decentralized plan of research. Each industrial department maintained its own research division to improve existing products and processes and to develop new products within its field.

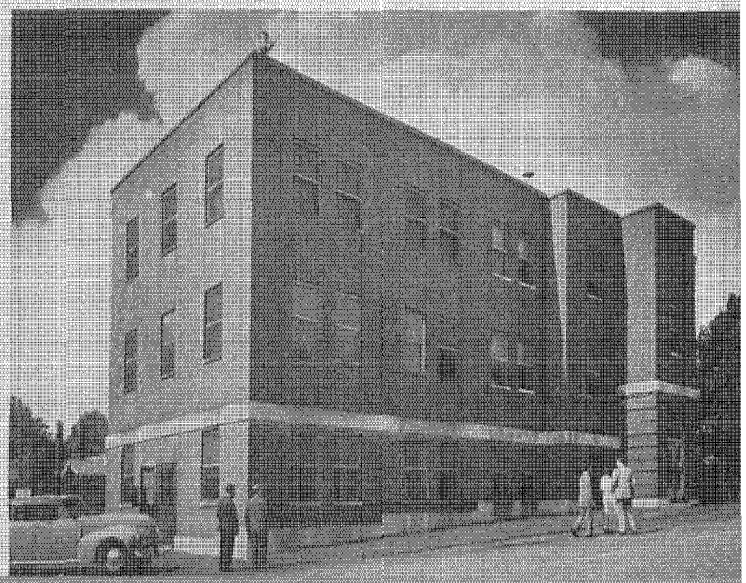
The Chemical Department, established as a separate department and operating independently of the industrial departments, was to direct its activities largely to pioneering research with the object of opening up new fields which could be further explored by the research divisions of the industrial departments. In 1927 a formal program of fundamental research was initiated in the Chemical Department for the purpose of enlarging the

tain research laboratories near their plants, others, for

Powdermen once worked where chemists work today.



Looking along the hillside toward one of the research laboratories of the Company's Chemical Department.



A partial view of the Engineering Research Laboratory. Another section at the rear was once a ballistic range.

reasons of convenience, policy or lack of available space elsewhere, conduct research in their own establishments at the Experimental Station. The administration of the physical facilities and services of the entire Station area is the responsibility of the Chemical Department.

The Ammonia Department, for example, occupies several buildings and conducts its own research program up through the process-development stage.

The research groups of the Engineering Department occupy a recently-enlarged laboratory in which they study the selection of suitable materials of construction and seek to develop information leading to more efficient design and operation of equipment used in the Company's processes.

The Nylon Research Section of the Rayon Department conducts its laboratory-research and semi-works-development studies in still another group of buildings.

The Grasselli Chemicals Department maintains a laboratory which was enlarged during the past year. It houses a staff of scientists who devote their entire time to pest-control studies, and a chemical staff whose function is to carry on scouting research, cost studies, pilot

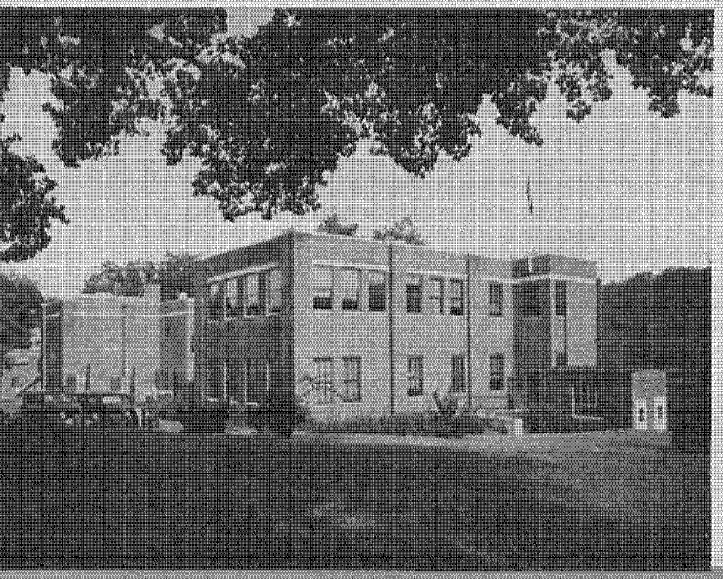
Along the banks of the Brandywine are many of the service buildings—a heat and power plant, shops for machinists, carpenters, plumbers, electricians and the like. There is plenty of work for craftsmen and even artists; in one shop in another area chemical glassware is blown and fabricated to order by masters of this highly-specialized art.

The first office building, erected in 1916 and enlarged in 1929, houses the technical library of 16,500 volumes collected through the years by the Intelligence Division. Three librarians, fourteen clerical assistants and nine graduate chemists devote their entire time to making available all of the technical and patent literature that may pertain directly to the Company's interests. Library research at the Experimental Station is an important activity.

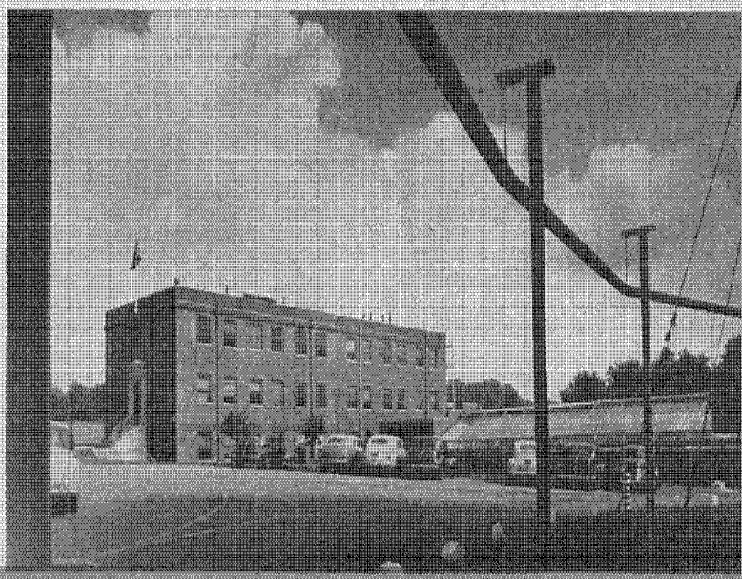
Higher up on the hill some of the old ballistic buildings, where smokeless powder ammunition was once tested, now serve purposes far different from those originally planned. The shotgun and pistol range, for example, is now used as part of the Engineering Research Laboratory.

An underground range for testing one-, three- and six-pounder ammunition in the old days has been partly filled in, but one section now serves as a laboratory for spectroscopy, and another room houses the big ultracentrifuge—one of the few installations of its kind in America.

Half of an old 200-yard enclosed rifle range is now a storage house for "excess" chemicals. There has been no gunfire in that vicinity for many years. The side walls of the 100-yard, corridor-like room are lined with shelves on which, in neatly-labeled and catalogued glass bottles and other containers, are stored about 10,000 chemicals and chemical products; they can be requisitioned for use as needed in any of the laboratories.



The Nylon Division's research and semi-works buildings. In one of them the first nylon stockings were knitted.



Looking toward the Pest Control Laboratory and the greenhouse of the Grasselli Chemicals Department

The main laboratories of the Chemical Department are among the larger structures on the hill. One of them has been enlarged four times. Incidentally, within its courtyard is a century-old relic—a large cornerstone salvaged from one of the old powder mills that was torn down to make room for new construction. Inscribed on this cornerstone are three dates, 1845, 1877 and 1889, indicating that the old structure had been rebuilt twice. This old relic could be used for the same purpose again in a new building.

Equipment

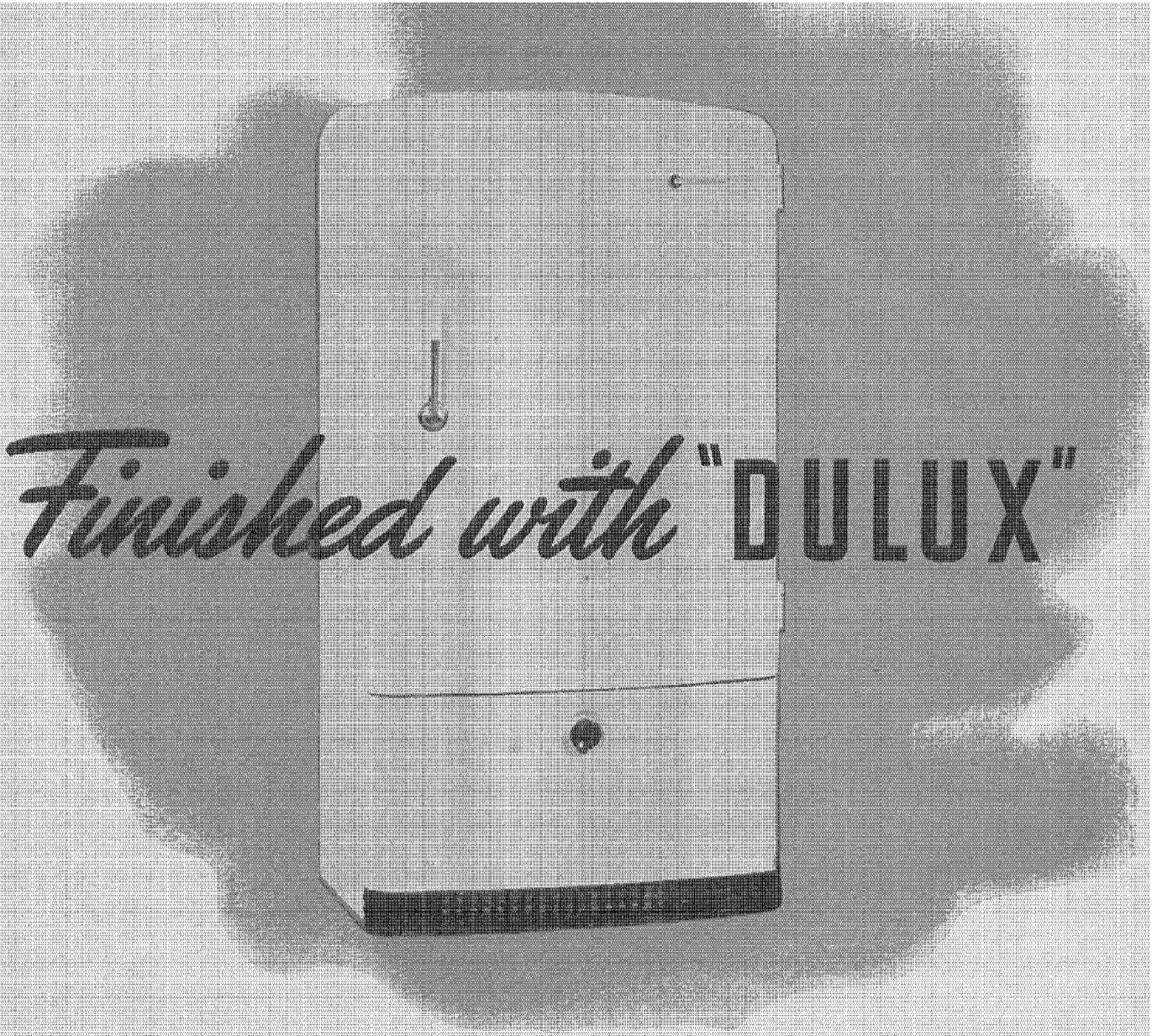
Aside from the usual apparatus for physical measurements, such as microscopes, polarographs and the like, the Experimental Station is equipped at one place or another with many special instruments. For example, there is an electron microscope, three ultracentrifuges, one capable of operating at 60,000 revolutions per minute and exerting a force 270,000 times that of gravity; an automatic recording x-ray spectrometer, ultra-violet and infra-red spectrographs, a molecular light-scattering apparatus, an Emmett surface-area measuring machine, a profilograph for measuring surface areas, and a well-equipped microphotographic laboratory. And this is by no means a complete list.

Personnel

Buildings and equipment are important, but the personnel of a research center such as this one is what makes it "tick." The mainspring of the works is people, trained in the sciences to know what's what in their particular fields and skilled in applying their knowledge to useful, creative work. The Experimental Station personnel is a carefully-selected group, with high scholastic attainments. Included in this roster are more than 350 graduate chemists, and more than 200 of them hold the degree of Doctor of Philosophy or its equivalent. Altogether, more than 950 individuals are now employed at the Experimental Station.

The effectiveness of Du Pont research, both fundamental and applied, is well known to readers of this magazine. But there is point in mentioning that the Annual Report for 1942 showed that forty-six per cent of the Company's gross sales consisted of products which either did not exist in 1938 or were not then manufactured in large commercial quantities.

During recent years Du Pont research has been concentrated on problems of application in support of the war effort rather than those of fundamental character. It is still too early to forecast the scope of the post-war program, but there is reason to believe that facilities for both fundamental and applied research will be greatly expanded. From the Experimental Station laboratories have come many of Du Pont's "Better Things for Better Living . . . Through Chemistry"—products of great usefulness both in times of peace and war. It is the confident expectation that more will be forthcoming from this same source—the place where nylon was born.



Finished with "DULUX"

THE SCIENTIFIC CONTROL BEHIND THE GLEAMING WHITENESS OF MODERN REFRIGERATORS AND OTHER APPLIANCES • • •

By R. F. BISBEE, *Manager of Quality Control, and*
H. L. FARBER, *Chief Chemist, Westinghouse Corp., Electric Appliance Division, Mansfield, Ohio*

DO YOU remember your first mechanical refrigerator? If you do, you remember that its finish was not "a thing of beauty and a joy forever"—not by a long shot! The first time Aunt Mollie bumped into it with a mop or broom, the older types of paint fell off and, after that, chips fell faster and faster. Along the edge of the door, on the side where the handle was attached—where buttery hands touched oftenest, and where the box was washed oftenest—the finish sometimes wore right down to the metal. The luster dulled. And then, after a year or so, the white began to turn yellow. Many people had to have their refrigerators refinished.

How different were the refrigerators that came off the production lines in the last years before the war. If you are lucky enough to have one of these comparatively-late-model boxes, you know that you don't give the finish a thought. In all probability it is as white and smooth today as it was the day you bought the refrigerator. The same is true of washing-machines and other electric appliances protected by organic finishes.

This great progress is not the result of accident. It is the result of quality control—step-by-step, scientific control over every factor in finishing electrical appliances, from raw metal to packing-crate.

First, the Steel

At Westinghouse, our efforts to give you the kind of finish you demand on a refrigerator begin with the

steel we buy. In other words, we begin "from the ground up," because much of the durability of the finish depends upon the steel which carries it. Over the years we have standardized on our acceptance method for steel. As it comes to us from the steel mills, the metal is protected by an oil which we carefully specify. It is an oil which can be thoroughly removed in our cleaning process. We take sample sheets of steel from the cars, as they are delivered, and send them to our laboratory where they are tested for cleanability. Then we test the steel itself for ductility, tensile strength and surface hardness. If we doubt the results of any of these tests, we make doubly sure by putting a sheet of the actual steel in the dies which form our refrigerator cabinets and actually make a cabinet from it.

We check the surface of the metal against commercial standards to find if it meets our specifications for uniformity—that is, freedom from scratches and "dings." The word "ding" probably does not appear in any dictionary, but we use it because it is a useful way of describing a small dent. Over the years we have worked out with each of our main suppliers of cold-rolled steel a standard method of checking the degree of surface roughness. The steel must be just rough enough for the finish to stick to it when the "Dulux" is later applied. Samples from each shipment are sent to the control laboratories, cleaned with alcohol and studied under the microscope. The steel must have just the right surface.

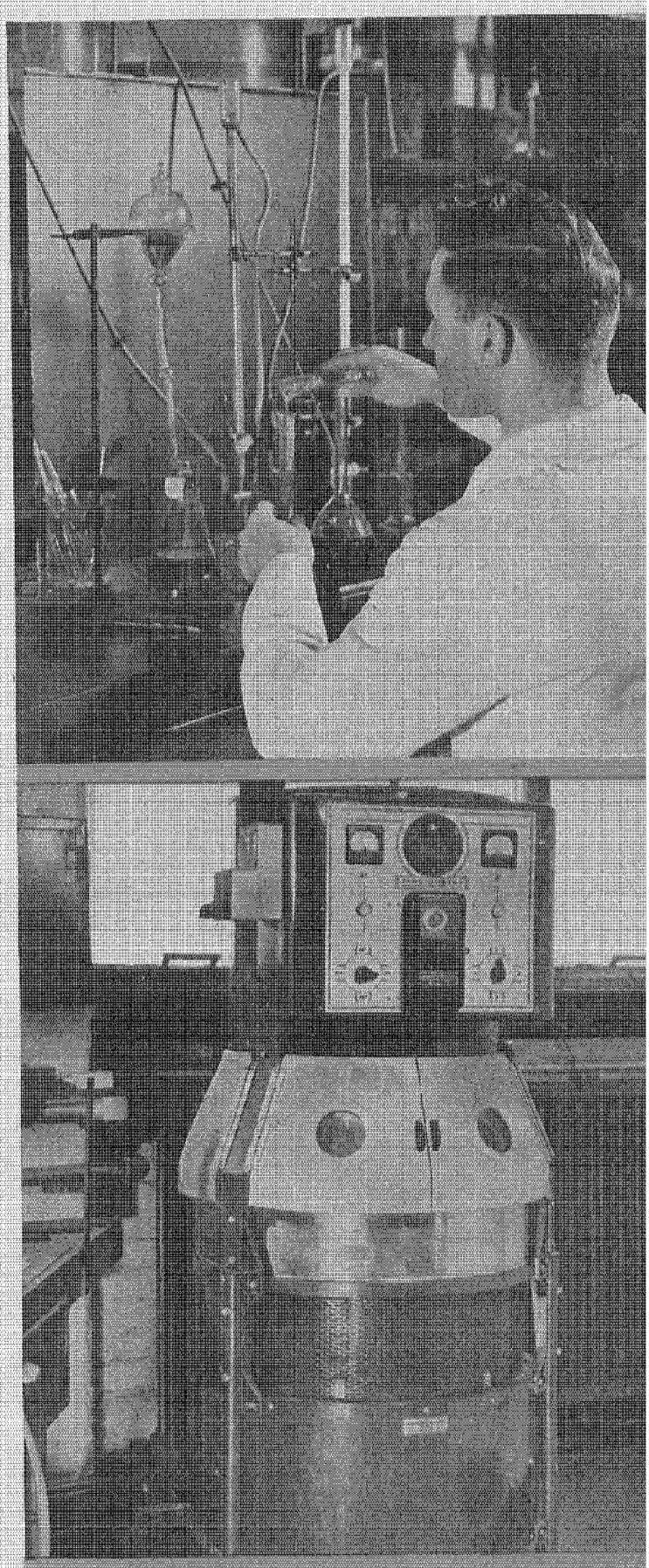
In order to maintain consistent results in the cleaning and metal treatment of parts to be finished, the cleaning solution, bonderite solution and chromic acid dip tanks are analyzed and replenished on a regular four-hour schedule. Samples are taken to the laboratory for test. The test results and additions required for each tank are recorded for reference and cost calculations.

Finishing Materials Pre-Tested

Next comes the "Dulux" itself. Each lot of paint is checked before we use it. Samples are taken from the mixing tank and applied to test panels in the laboratory. A finish is baked on, under standardized conditions in the laboratory oven, and then checked for color, gloss and hardness by comparing it with a standard panel. These standard panels are supplied to us by the laboratories of the Du Pont Company. We make these tests because the quantity of material involved in one mixing batch at Westinghouse is enough to finish several thousand refrigerators!

The paint-mixing control is an important part of our finishing process. Each batch of "Dulux" mixed is checked for viscosity. It must flow with just the right amount of easiness, to insure consistent results in spray application of the finish. A chart record is kept of each batch we mix. This record includes the Du Pont Company's batch number, our own mix number, and the quantities of paint and reducer used.

In order to insure uniform quality, it is always essential to have the correct thickness and uniform coverage of the paint material during the spraying application of the primer and finish coats. Pressure of the paint fluid and the air used at our spray gun is estab-



TOP: *Cleaning and bonderite solutions and acid-dip fluid are continually tested in this laboratory.*

ABOVE: *In the "fade-ometer" finished panels, one-half exposed, are subjected to intense light for 72 hours.*

lished and controlled by the use of master regulators, which are checked and adjusted to maintain constant pressure and uniform spraying conditions.

Production Line Tests

Next, since the proper curing of an organic paint finish does much to insure its quality, both for appearance and for durability, we find that we must control our baking operation with great accuracy. Our paint-oven chain speeds and baking temperatures are checked and adjusted daily. The equivalent baking of each oven is determined by the use of a temperature recorder which travels through the oven and shows the temperatures throughout the entire length of the baking. The baking values at all points in the oven are summed up to get the correct total baking time and temperature.

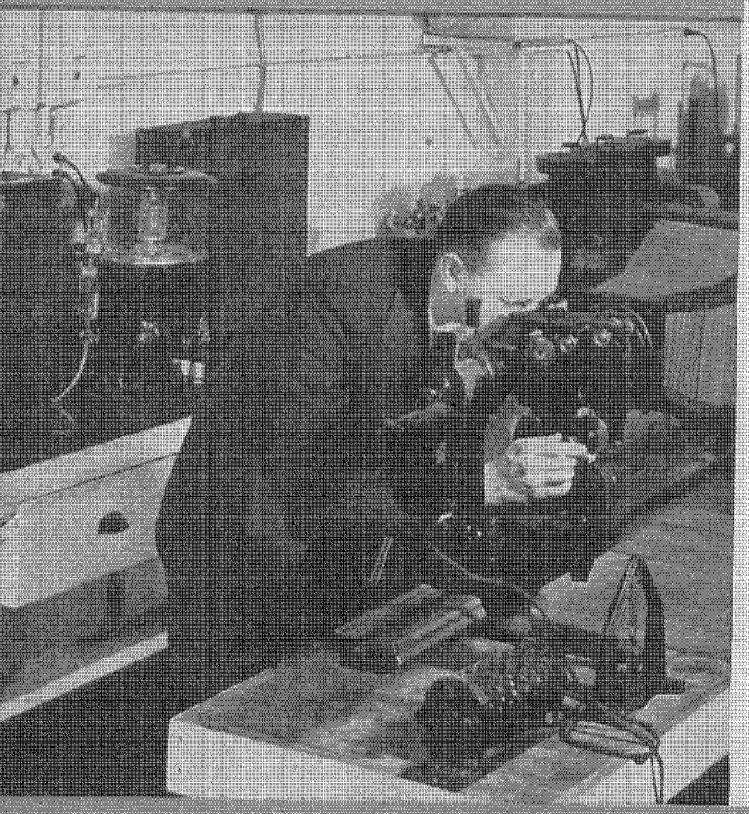
At regular intervals, we take a finished part from the production line and cut it up into test panels. We test these panels for many things. For instance, they must be able to withstand soaking in water for 720 hours at 105° Fahrenheit. They must stand 1,000 hours of exposure to 100 per cent relative humidity at 100° Fahrenheit. We bend a sheet of the painted metal 180° over a ⅜-inch rod. And we expose a panel—with half of it shielded—to ultra-violet light for 72 hours. Finally, we coat a test panel with a half-and-half mixture of lard oil and oleic acid and heat it for 100 hours at 100°. The results of these tests are compared with standards and test results on previous production samples, in order to determine our trend in quality.

Logically, you might expect the problem of finishing an electric appliance to end when the coat of paint has been applied, baked and dried. But such, we have found, is not the case. In the old days, some appliances which were satisfactorily finished arrived in the customer's home in an unsatisfactory condition. The reason was—packaging. Packages failed in transit, and appliances arrived scratched and marred.

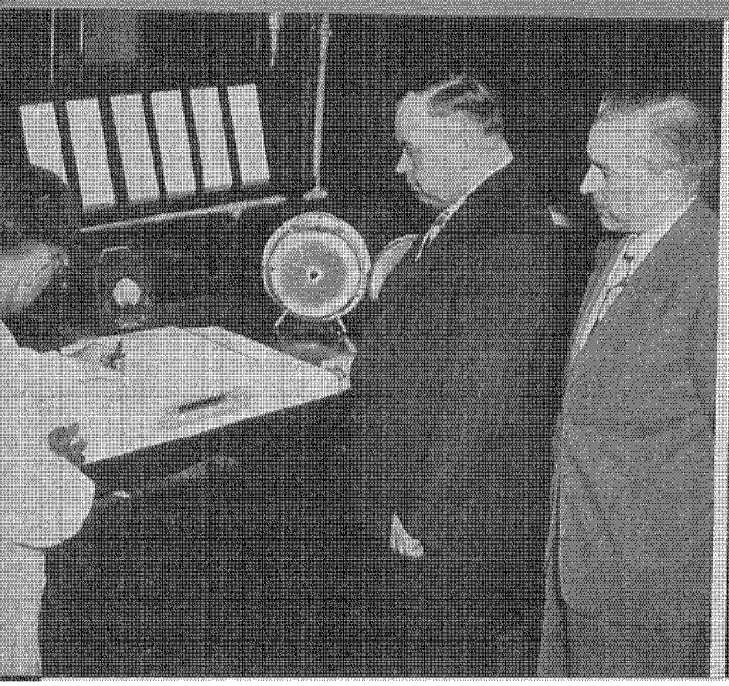
Packaging, Too

No matter how high the quality of a product may be, or how efficient the process control, it is all wasted if the packaging is faulty and the products become damaged during shipment. So we have worked out a scientific transportation test on all new products at Westinghouse which eliminates the chance of going wrong when releasing new designs on both products and packing.

Clean steel samples observed under a high-power microscope are compared with a control standard panel.



Correct thickness and uniform coverage are important, so finished panels are subjected to fact-finding.



R. F. Bishee, one of the authors of this story, inspects a finished sample after the bending test.



With the help of the Freight Container Bureau of the Association of American Railroads, we have developed two methods of transportation tests. The first is known as the Conbur or incline-impact test. It was developed for the purpose of eliminating the human element and guesswork in conducting transportation tests, and the variations that occurred in test shipments. The product is placed on a "dolly" and pulled up to a predetermined point on an incline. There it is released and allowed to roll down the incline, at the bottom of which it crashes against a backstop. A shock-recorder is fastened to the product. On the recorder are five zones on a tape. A shock over the second zone is considered unusual by the railroad. Our products and crates must stand a shock within the *fifth* zone, for we know there is always the possibility of unusual shock!

The second test tells us whether our package will stand vibration, like that encountered on rough railroad beds, or from flat wheels on a railroad car. The crated product is placed on a platform connected to an electric motor which shakes it 226 times a minute. Half an hour on the machine equals a trip by freight to Chicago. Two and a half hours equal a trip to Los Angeles.

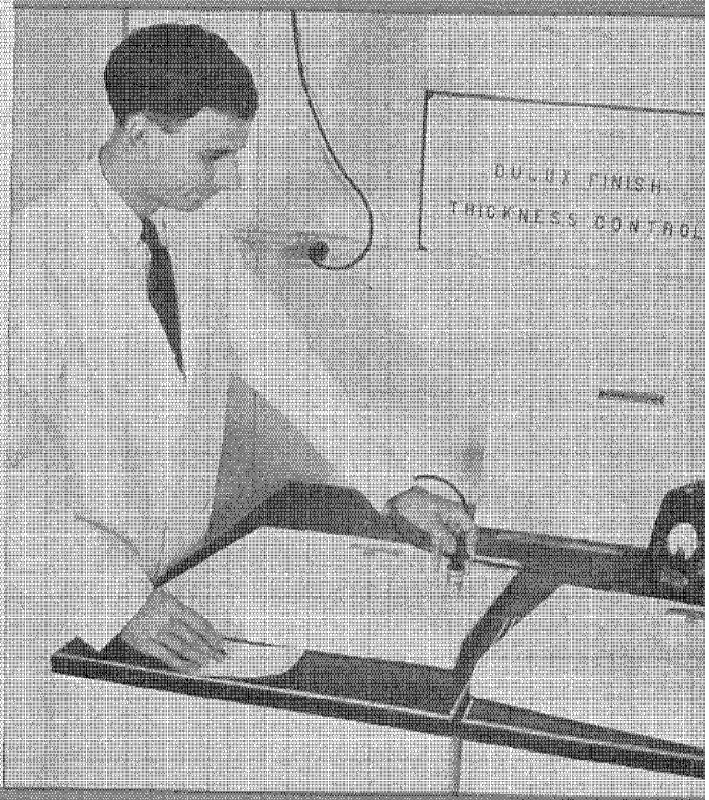
In addition to making tests on new designs, two products are taken from each day's production and subjected to these same tests. This eliminates the chance of having something go wrong due to faulty workmanship or material. We work closely with our Sales and Service Departments on the condition of our products as received by the customer, and on any service requirement due to inferior finishes after the products are placed in use.

While space does not permit the telling of our entire story, these are the principal steps in the control of quality finishes at Westinghouse. Our engineers have cooperated closely with Du Pont paint engineers since 1931.

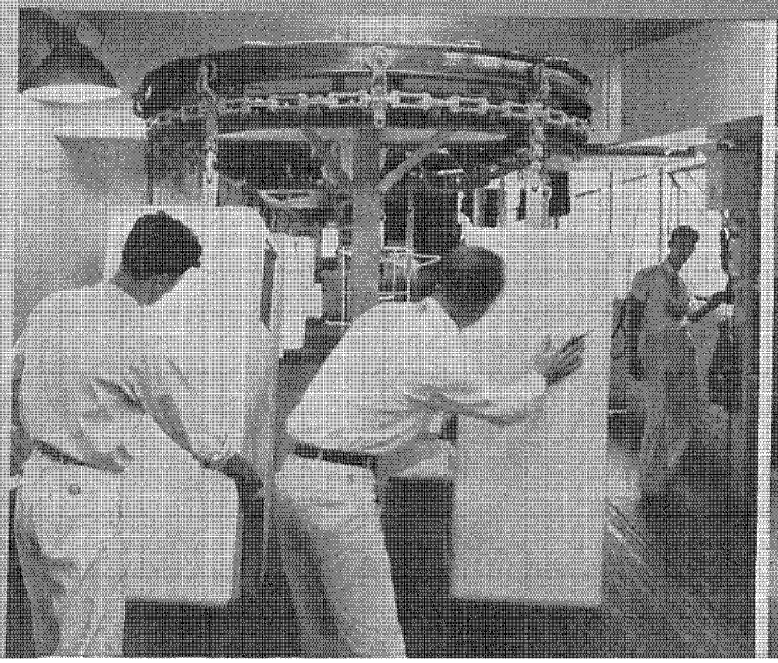
Finish jobs which failed to satisfy customers cost us, in 1932, an average of 22 cents a cabinet. By 1941 the cost had been reduced to less than one cent!

The development of "Duhax" and subsequent improvements in its formulation have been instrumental —along with our own quality control work—in achieving these really phenomenal results. And the results have meant not merely lowered costs for Westinghouse but, more important, increased satisfaction with Westinghouse appliances for hundreds of thousands of American homes.

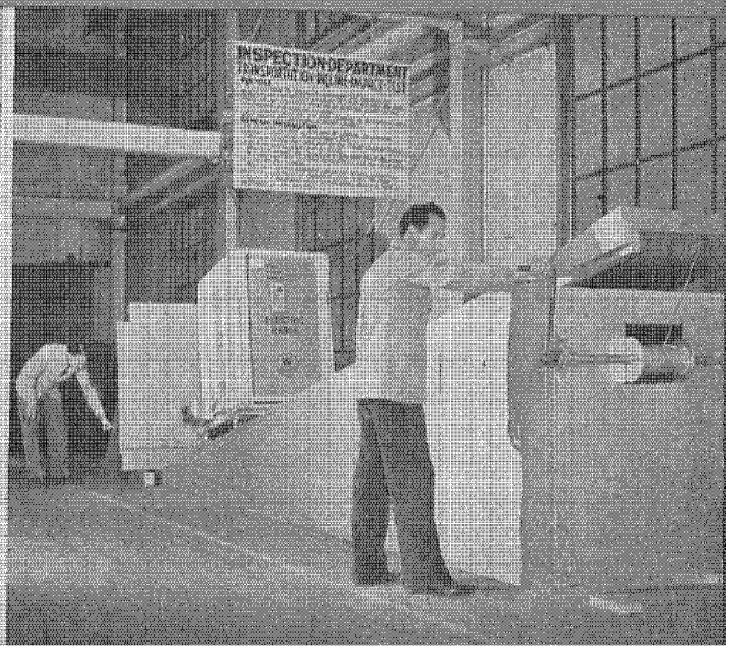
Once every hour a panel is selected at random, and film thickness is checked with an electro-magnet gage.

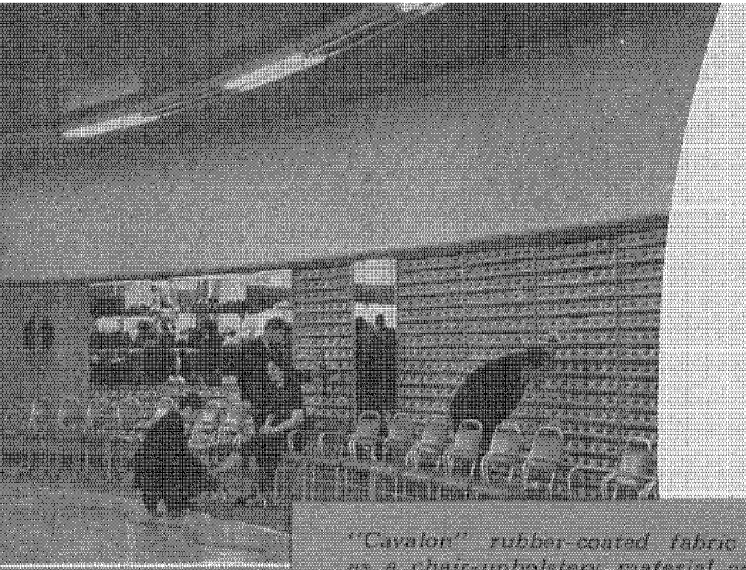


After the baking operation, finished cabinets moving along the production line are carefully inspected.



Crated products slide down the runway and bump the backstop. If they survive the shock, they are ready to ship.





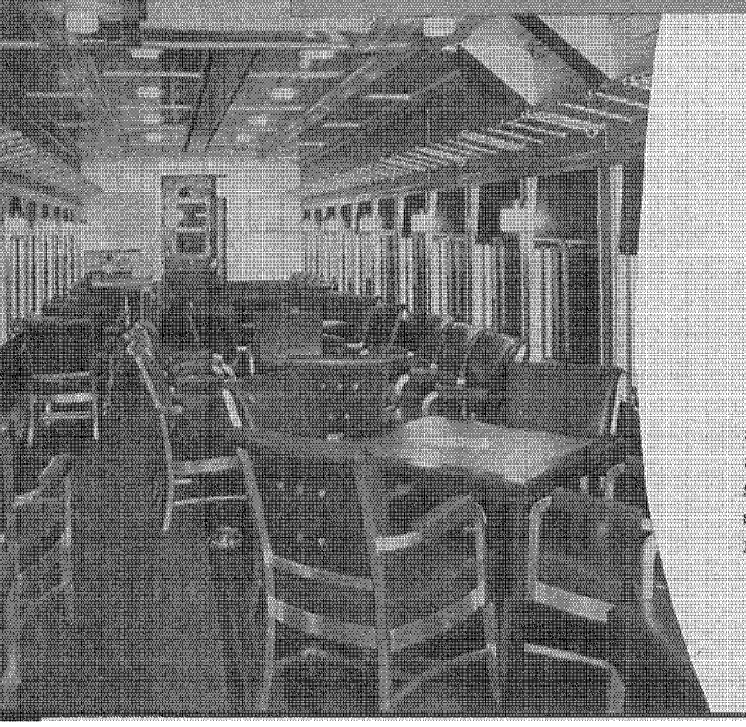
New IN COATED

IN PARTICULAR, THOSE FOR HEAVY-

"Cavalon" rubber-coated fabric in service as a chair-upholstery material adds a color note to this interior—a Chicago shoe store.



That's true also of "Armor" Quality "Fabrikoid" in the Coral Cafe in a Philadelphia hotel. BELOW: *Coated fabrics in another service role.*



By F. R. Price

DU PONT men and women and machines have made millions of yards of coated and impregnated fabrics to protect America's armed forces and their equipment in all parts of the world.

With the coming of peace, the machines which processed military fabrics are again free to turn out materials for civilian uses. It may be assumed the public will want to know about them before they reach the open market. So we shall venture a brief preview.

One thing is sure—there will be a wider range of Du Pont coated and impregnated fabrics for selection than ever before—and they will be better products. The older ones have been improved. Some new ones, too, have been developed in wartime to meet rigid military specifications. These materials of necessity have been developed and rigorously field-tested under actual service conditions during the world's greatest war.

The Du Pont Company has manufactured pyroxylin-coated textiles for thirty-five years, and rubber-coated fabrics for nearly three decades. At first only cotton-base materials—the so-called "grey goods"—were processed. Today, textiles of many types and kinds—fabrics made from both natural and synthetic fibers—are processed. Base fabrics will be more numerous and more varied in composition than ever before.

Coating Materials

Importantly, there will also be a greater variety of coating compositions. Prior to Pearl Harbor, Du Pont specialized in applying pyroxylin and rubber coatings and had even then developed neoprene compounds for some of its coated products. But when the acute rubber shortage came, replacements had to be found for both rubber and neoprene, and the chemical industry came

DEVELOPMENTS
FABRICS ★ ★
UTY UPHOLSTERY USES

forward with new synthetic materials. These synthetic rubbers, resins and other plastic compositions, when applied to military fabrics, proved to be extraordinarily serviceable. Such skill was developed in handling and compounding these new substances that products were perfected which met the widely-varying conditions of global war.

In short, the coated-textile industry will have not only more base fabrics, but also a considerably wider range of coating compositions to use on them, plus the "know-how" and experience acquired in wartime work.

Consider, for example, one group—the coated upholstery fabrics; they are certain to be in increasing demand. Careful thought has been given to coating compositions that will best meet civilian-service needs.

The Du Pont Company is in the unique position of being able to offer a wide range of upholstery fabrics coated with materials of its own manufacture. It produces a variety of coating ingredients and can without prejudice select those best adapted to meet specific service needs.

For coated upholsteries, Du Pont plans again to offer a complete line of cotton-base, pyroxylin-coated materials in which are incorporated improvements developed as a result of war research. Added to this line will be new post-war products made with synthetic resins and with synthetic rubbers. These three types, it is believed, will amply cover the field.

To Refresh Your Memory

"Fabrikoid" is Du Pont's name for its pyroxylin-coated and impregnated fabric; and pyroxylin is one form of nitrated cellulose. When properly compounded and applied to a strong cotton-fabric base, it produces a tough, durable, uniform film that is water-resistant and washable. Moreover, because pyroxylin is a colorless vehicle, color pigments incorporated in it retain their brilliance or clarity, and the coating is easily embossed or "grained" to give it a desired texture.

While some pyroxylin-coated fabrics have rendered acceptable service for outdoor upholstery where continued resistance to wear and weather is a requisite to long life, war research has developed other compositions which, when properly compounded, will be superior to pyroxylin-coated fabrics for upholstery on gliders, beach chairs and garden furniture. Pyroxylin-coated fabrics are not as resistant to cracking upon flexing at low temperatures and to exudation of oil at very high temperatures as our plastic-coated or synthetic rubber-coated materials. Pyroxylin-coated fabrics of high quality are not now available in fire-resistant coatings, because the ingredients which must be added to make the coating fire-resistant seriously affect the quality of the finished coating.

Quite obviously, pyroxylin-coated fabrics should not be used for upholstery applications where service in use involves conditions subject to the limitations outlined above. However, when used for padded or firmly-upholstered cushions on dining-room chairs, pull-up chairs and some types of bar and restaurant seating equipment, pyroxylin-coated fabrics of high-quality coating composition represent good values and will deliver service commensurate with that expected of good seating materials.

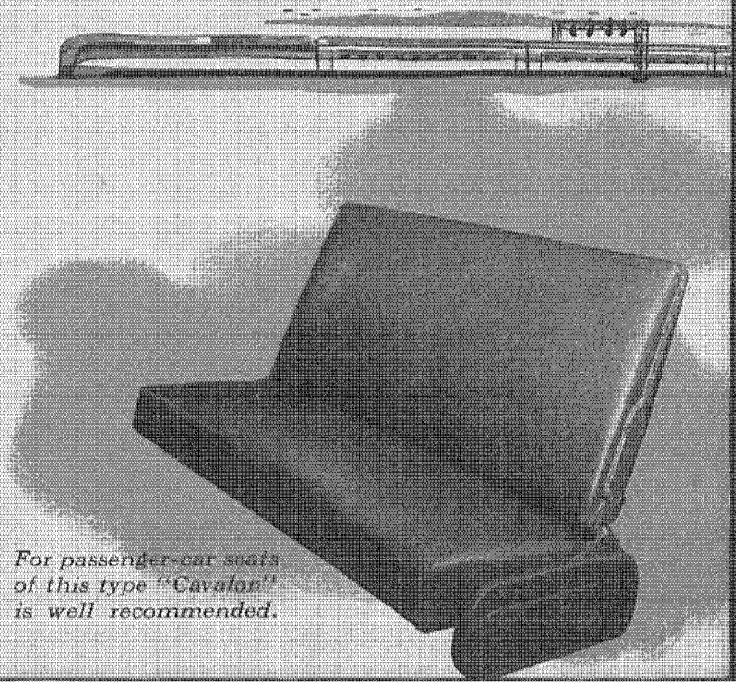
Du Pont 6200 "Armor" Quality "Fabrikoid" has established a leadership over a period of years among pyroxylin-coated fabrics based on high quality and good value. It will continue to occupy this position post-war as an all-around upholstery material for padded seats and firmly-upholstered spring cushions of medium depth.

Synthetic Resin Coatings

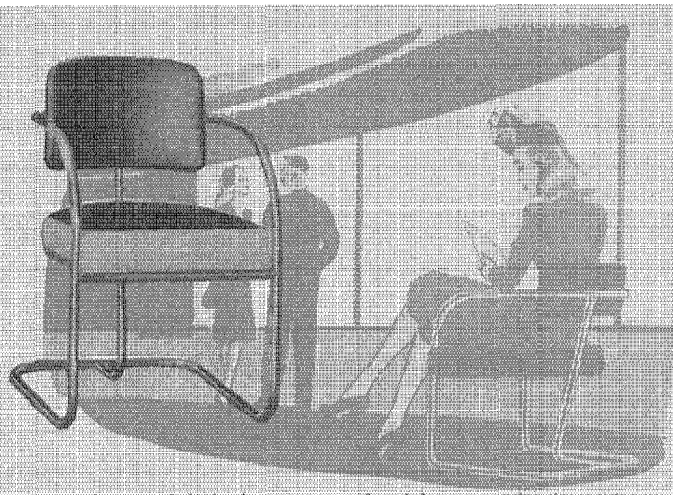
In the coated-fabric industry synthetic resins are no longer pinch-hitting for natural rubber. True, they started in that rôle during the critical wartime shortage of rubber—and they came through with a performance on military fabrics that is now historic. Because of their exceptionally good properties, they are now up front in the regular batting order, a position won entirely on merit. Here's why:

Compared to pyroxylin, the *high-grade* synthetic resin coatings have better pliability and dryness of finish; better resistance to cracking at low temperatures; better "hand" or feel at ordinary temperatures, and a greater freedom from exudation or tackiness at high temperatures. They are thoroughly water-resistant, washable, sanitary and possess all the desirable characteristics of pyroxylin coatings. What is more, some of the *first-quality* synthetic resin coatings are fire-resistant.

Note the words italicized above, lest you draw too broad an inference from the foregoing comparison. The



For passenger-car seats of this type "Cavalon" is well recommended.



fact that a fabric is processed with a synthetic resin does not, on that account, endow it with outstanding properties. There are many of these resins, but only a comparatively few are good enough to produce coated fabrics with superior quality characteristics. Those expertly selected and properly formulated can be used with good results for upholstery on bar stools, theater chairs and other seating equipment.

In the present state of development, these synthetic resin-coated fabrics are not considered to be entirely suitable for outdoor upholstery—at least where continued resistance to wear and weather is a requisite for a long service life. Nevertheless, they should give a better performance than pyroxylin-coated fabrics for gliders, beach chairs, garden furniture and the like.



"Cavalon" Rubberized Upholstery Fabric

Prior to the war, Du Pont's best-grade material for heavy-duty use was "Cavalon," which was processed with a compound of crude rubber. After Pearl Harbor, this product had to be re-formulated, using a blend of reclaimed rubber and synthetic rubber; and when these products, too, were Government allocated for the most-needed war uses, a third type now known as Plastic-Coated "Cavalon" upholstery fabric was put on the market for military needs and certain essential civilian uses. Incidentally, too, P.C. (plastic-coated) "Fabrikoid"—also made from synthetic resin compositions—was a wartime introduction.

Both products have established an outstanding record in their applications to war-product upholstery. Because of their special formulations it has been possible to produce both types in "FR"—fire-resistant—grades. P.C. "Cavalon," made by the "calender" process, and P.C. "Fabrikoid," made by the so-called "spreader" method, not only represent a marked advance in formulation, but also offer important advantages in actual service. Whichever process proves most economical from the standpoint of costs and results will probably determine the final selections in so far as these two lines of Du Pont coated upholstery fabrics are concerned.

Synthetic-rubber-coated textiles for heavy-duty use, assuming they are of proper type and proper formulation, are unique in their resistance to heat, cold, oils and greases, perspiration and oxidation. They are less liable to stiffen and crack at low temperatures than either the pyroxylin- or the synthetic-resin types, and they perform equally well at high temperatures. In brief, S.R.—synthetic rubber—coatings compare favorably with the other types mentioned in all respects save one; they are not available in "high" bright colors or in delicate shades, but can be manufactured in a wide range of subdued colors, grains and finishes.

S.R. "Cavalon" is made with neoprene, Du Pont's chloroprene rubber, one of the best-quality synthetic rubbers in its field and the first one to be Government-allocated. Neoprene's service record as a component of upholstery fabrics for military use—and 1,001 other things, too—justifies the expectation that it will be used for many of the better grades of heavy-duty coated materials. It has stood the gaff of wartime service overseas on military tanks and other mechanized equipment. For heavy-duty, deep-spring seats of trucks, tractors, locomotives and industrial vehicles, where coated upholsteries are exposed to heat, cold, oils, greases, perspiration and dirt, S.R. "Cavalon" in the years to come will be a logical selection, as will be noted from the following table, which shows a quality comparison of this Company's post-war coated fabrics:

Properties	6200 "Armor" Quality "Fabrikoid"	P.C. "Fabrikoid" P.C. "Cavalon"	S.R. "Cavalon"
Resistance to—			
General Abrasive Wear	Excellent	Excellent	Excellent
Peeling	Good	Good	Excellent
Flexing	Good	Excellent	Excellent
Tackiness	Excellent	Excellent	Excellent
Low-Temperature Impact Cracking	Poor	Good	Excellent
Aging	Excellent	Excellent	Excellent
Color Bleeding	Excellent	Excellent	Excellent
Fading	Good	Good	Good
Flame	Poor	Fair*	Good*
Oils, Greases and Perspiration	Excellent	Good	Excellent
Outdoor Exposure	Fair	Fair**	Good
Low-Temperature Pliability	Fair	Good	Good
Embossing Characteristics	Excellent	Good	Fair
Color Range	Excellent	Excellent	Fair

*Can be supplied in FR—fire-resistant—grade.
**New types now in development indicate outstanding improvement in this property.

The foregoing analysis applies only to heavy-duty coated fabrics for upholstery uses. To discuss the lightweight textiles for bookbinding, clothing, household and other specialties would require more space than is permitted here. In a word, broader horizons of serviceability are confidently looked for in Du Pont coated fabrics for the post-war years.

More and better LOW-COST PAPER

WAR taught many people, who perhaps did not realize it before, how dependent our modern civilization is upon paper. Tens of thousands of different items of war—for instance—were packaged in paper in one form or another. And packaging was but one of many uses.

In peace, this need for paper in vast quantities will go on. Indeed, it even shows signs of increasing—paper not only for packaging, but for newspapers, for typing and mimeograph papers upon which our complex world of today depends for business communications and records. It is safe to say that more paper is used nowadays than in any other era of the world's history.

The Old and the New

In paper-making, logs are brought in from the forest, stripped of their bark and then chipped by machinery. The chips are then "cooked"—chemically treated to get out color and impurities, so as to get a light-colored paper. The sap, the tar, the resins in the wood are washed away as waste. What remains is cellulose—the basic material of a tree and the basic material of paper. Cellulose is easy to bleach. This is the way many of the higher-grade papers have always been made. But it's wasteful. Only half of the log is used.

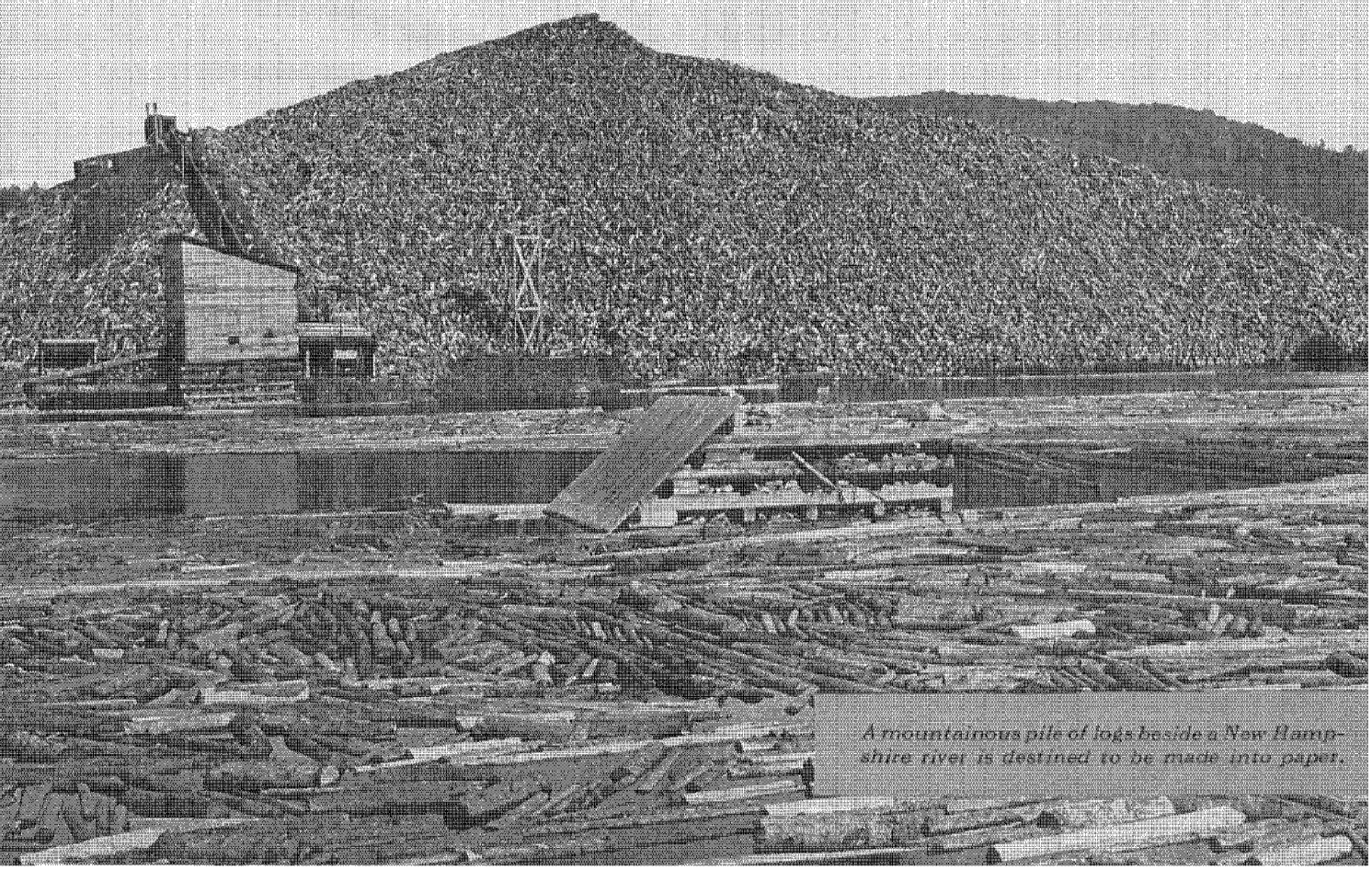
A much more economical way, as paper manufacturers have known for years, would be to use the whole log and turn it into paper at once. And there is a process which does this. It is called the groundwood process. However, the pulp carries all the discolorations of the wood and it has been practically impossible to get this pulp white. Until now it has been satisfactory only for coarse kinds of paper. Newsprint, for example, contains a high percentage of groundwood.

Du Pont has discovered how to bleach groundwood.

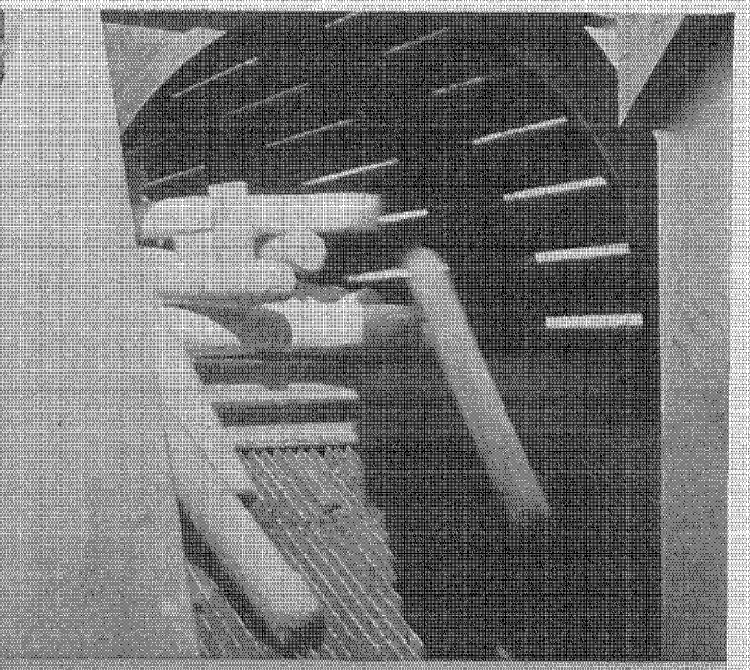
Using the Du Pont process, groundwood pulp may be incorporated into paper which compares favorably with chemically-"cooked" paper in many respects, and in some even improves on it. And the overall cost is less.

Groundwood pulp taken right from the grinding stones is treated with a Du Pont-developed sodium peroxide bleaching solution. It is stored in a tank long enough to permit bleaching to be completed, after which it is treated with a neutralizing agent, blended with "cooked" pulp stock and delivered to the paper-making machines.

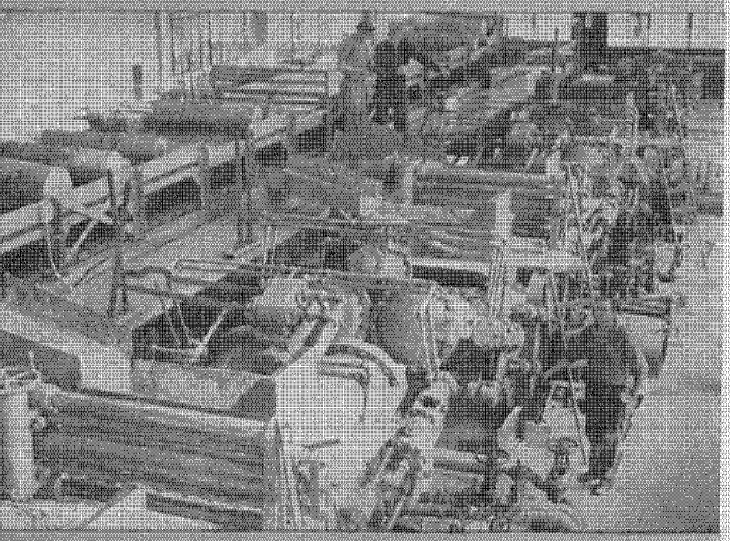
In earlier attempts to make paper of groundwood, to quote from the *Paper Trade Journal*, "There has always been present the objectionable features of low brightness, harshness and lack of permanence as compared to some of the other pulps. But" —the *Journal* goes on — "the sodium peroxide treatment eliminates these objectionable features in one stroke."



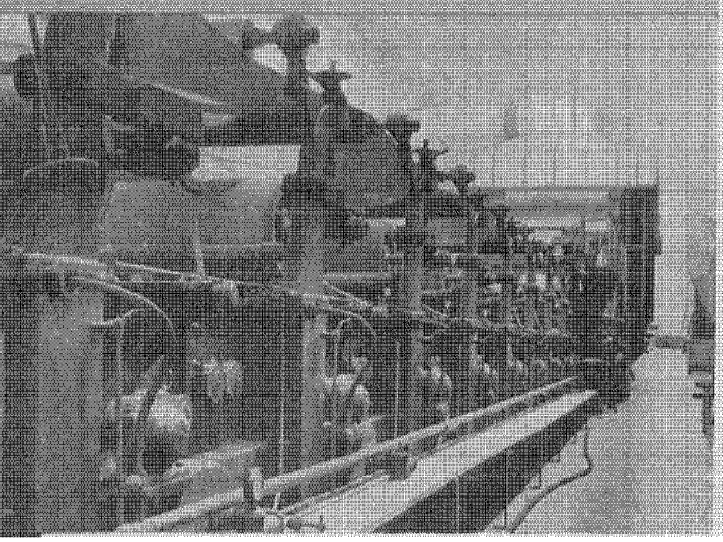
A mountainous pile of logs beside a New Hampshire river is destined to be made into paper.



At the mill, the first job is to remove the bark, and here you see the debarked logs leaving the conveyor. They will soon be found in the grinding mills below.



The view above shows a battery of grinders in operation reducing the debarked logs to groundwood, and below a Fourdrinier machine is manufacturing paper.



The Paper

The next question is what kind of paper does this Du Pont process produce? How good is it?

Paper containing this bleached groundwood pulp has been used by one of the most expensive magazines published in this country—*Fortune*, which sells for a dollar a copy. *Fortune* uses a heavy paper which feels soft to the touch, like the paper used in printing the better books. It has been found that, compared with sheets made of chemical pulps, paper containing groundwood as used by *Fortune* has a "springiness" which permits its being printed with less pressure. According to Mr. Kent Rhodes, *Fortune's* Production Manager, it prints more uniformly and has less tendency to fuzz or lint.

There is good reason to believe that use of groundwood stock treated by the Du Pont process offers a more efficient and less costly way of producing many papers—not only for magazines and books but also for catalogues and directories, tissues and toweling, mimeograph sheets and writing tablets. The finished paper has a smoother, more velvety feel, and does not have the harshness found in papers which contain unbleached groundwood. It is highly absorbent, which means not only that it takes ink well in high-speed rotary presses, but also that facial tissues and towels made of it take up more water.

To quote once more from the *Paper Trade Journal*, "Lightweight sheets which can now be made both opaque and good in appearance and stability are in a position to take full advantage for the first time of their natural economies over heavier papers."

Sodium Peroxide

The Du Pont compound which has brought about this outstanding improvement in paper manufacture is sodium peroxide. This chemical, sold by Du Pont under the trade name "Solozone" DFF, is a dustless, free-flowing, pale-yellow powder. An alkaline bleaching agent, it releases active oxygen when dissolved in water. Its use in paper-making is bound to have a beneficial effect on the paper industry now that peace is here.

Development of this groundwood bleaching process can be expected to make available a new raw material for many small paper mills. They may be able to expand their newsprint manufacture, or by developing new products expand into the manufacture of specialty papers and paper products. There is some indication that this trend will bring back to life small paper-making plants which have groundwood resources but have not been fully active for some years.

Chemistry is sometimes spoken of as the science that hates waste. This new Du Pont bleaching process for paper pulp is a case in point. Here we see a case in which chemical development, in a single stroke, can greatly increase the amount of printing paper to be obtained from a given amount of wood, sharply reduce operating costs of paper-making, give a new lease on life to small business men in the paper industry and, finally, make available better papers at lower cost.

This, we think, is no small achievement for one chemical compound.

FIFTY YEARS OF X-RAYS ★



Wilhelm Konrad Roentgen—1845-1923.

IT WAS in the year 1895 that Roentgen, a German, was experimenting in his laboratory with a Crookes tube—a pear-shaped glow-lamp that was a sort of grandfather to the modern fluorescent lamp. The tube was hidden by black paper, so that light from it could not leak into the room. Yet, when the current was switched on, a screen treated with barium platinocyanide glowed with a pale radiance. There could be only one explanation: the glow was caused by some kind of invisible light, or ray.

Thus was born the x-ray. The story that it was discovered when a scientist happened to leave a doorkey on a photographic plate, which was later exposed to a chance barrage of rays from a Crookes tube, is more dramatic. But it happens not to be true. We have the x-ray thanks to methodical, undramatic laboratory investigation. In fact, Roentgen was not so much discoverer as recognizer. X-rays had already been observed at the University of Pennsylvania, but not recognized for what they were.

Public reaction at the time of the discovery ranged from awe to anger. Much the same sort of pseudo-scientific nonsense was written about the new ray as we read, in August, about the atomic bomb. Then, as in 1945, predictions were made that the discovery would wipe civilization from the face of the earth. There were medical men who saw at once the tremendous importance of a device which could "look through" the human body. But many people missed that point entirely. It was said, for instance, that the new rays put an end to privacy, and hence were "a revolting indecency." Humor magazines printed verses about them. One such little poem ran:

> We do not want, like Dr. Swift,
> To take our flesh off and to pose in
> Our bones, or show each little rift
> And joint for you to poke your nose in!

A firm in England quite seriously advertised—successfully!—x-ray-proof underwear; and an assemblyman in New Jersey introduced a bill forbidding the use of x-ray opera glasses in theaters. (Evidently he had never seen a burlesque show.) A newspaper reported that a young farmer in Iowa, using x-rays, was able to change 13 cents' worth of scrap metal into 152 dollars' worth of gold.

Luckily for the world, however, serious x-ray research was allowed to proceed. Major developments were announced every few years:

1895–1900	Edison, Pupin and others improve fluorescent screens.
1900–1910	Heavy-duty transformers produced commercially.
1910–1920	Invention and perfection of the hot-cathode tube, forerunner of the modern tube permitting complete control of intensity. . . . X-ray studies of the nature of matter. . . . Films used instead of cumbersome plates. . . .
1920–1930	Silent valve rectification introduced. High-voltage tubes introduced, making it possible to treat deep-seated cancer without burns. . . . Super-voltage tubes approximating the wavelength of radium in their output.
1930–1940	Introduction of safety-base film. . . . Rapid growth of the use of x-ray in industry. . . . Improved high-power portable equipment.

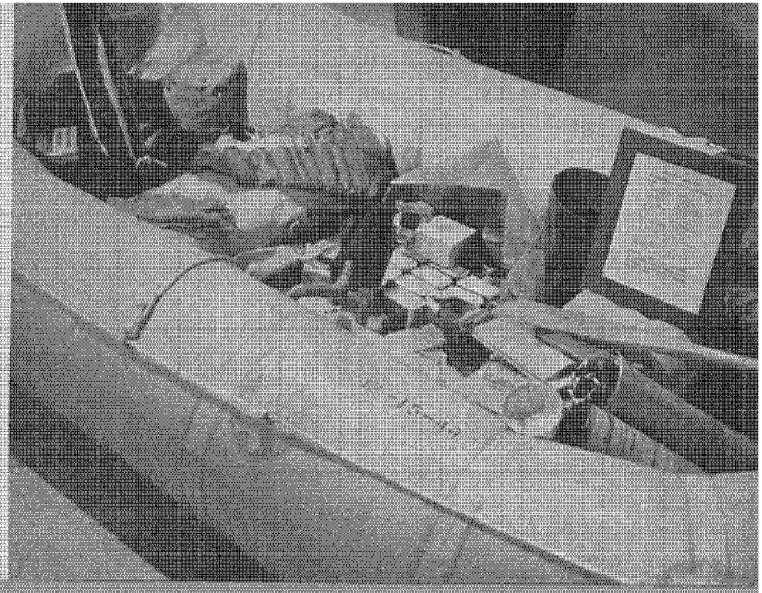
The fiftieth birthday of radiography finds this science firmly established and universally recognized. In industry, as in the prevention and cure of sickness, the x-ray has proved to be a unique contribution of the greatest benefit to mankind.



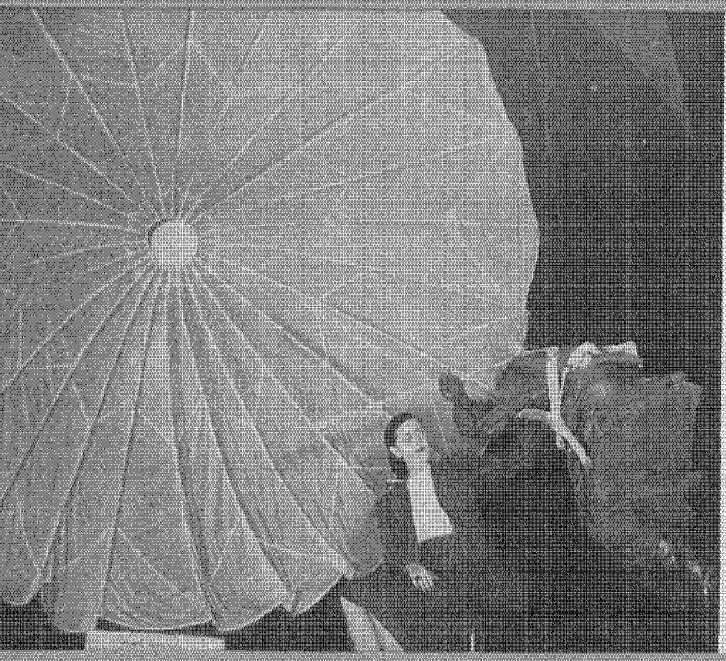
In 1903, New York surgeons, lacking an electric power source in a patient's home, connected their x-ray machine to a storage battery in a car parked outside.



Visitors were keenly interested in Du Pont products that fitted into equipment needed for aerial warfare.



A fully-equipped emergency life-raft contained a number of items made from or packaged in Du Pont products.

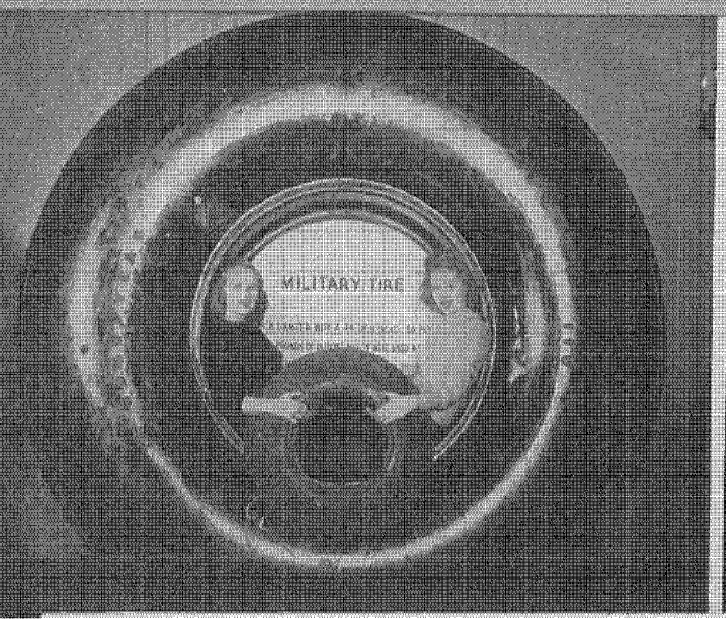


Speaking of nylon cord tires, here's one 110 inches in diameter with a 44-inch tread. It weighs 1,500 pounds.

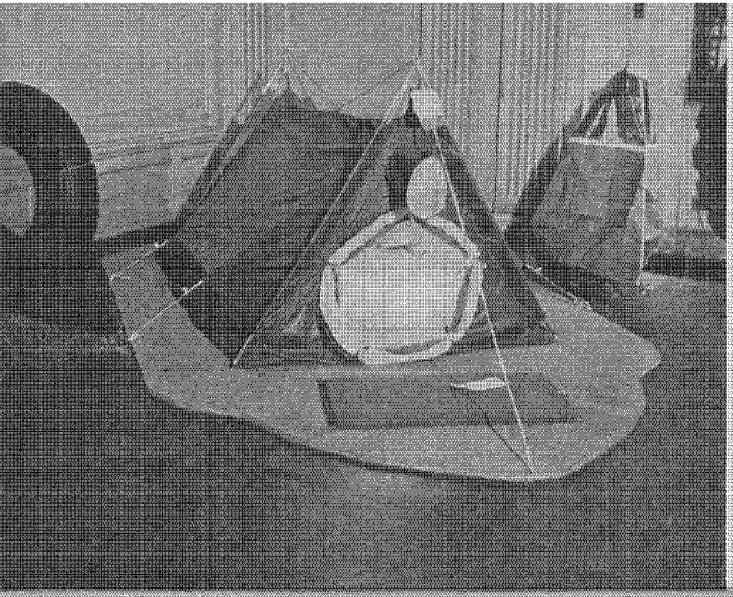
WAR EXHIBIT

A feature display was this nylon escape parachute with a "Plastacele" manikin suspended from the shroud lines.

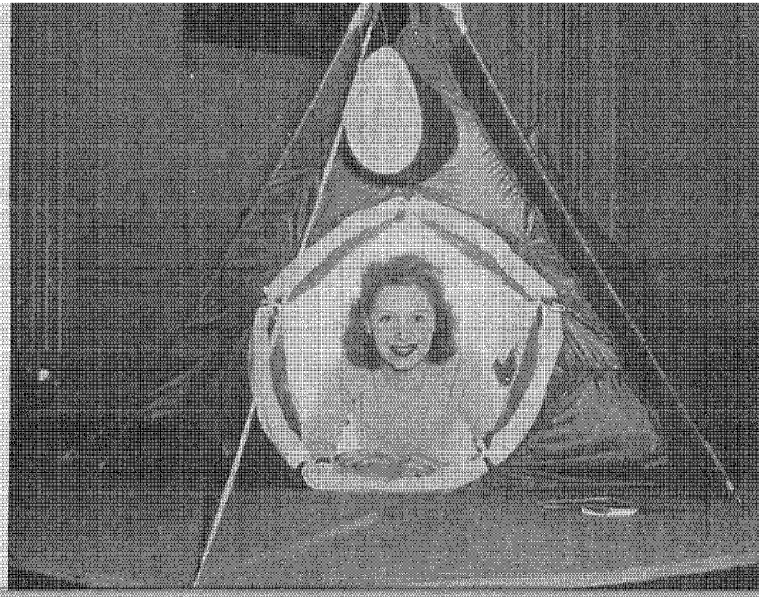
A neoprene-coated fabric pontoon was a feature exhibit. Army engineers made good use of them in bridging rivers.





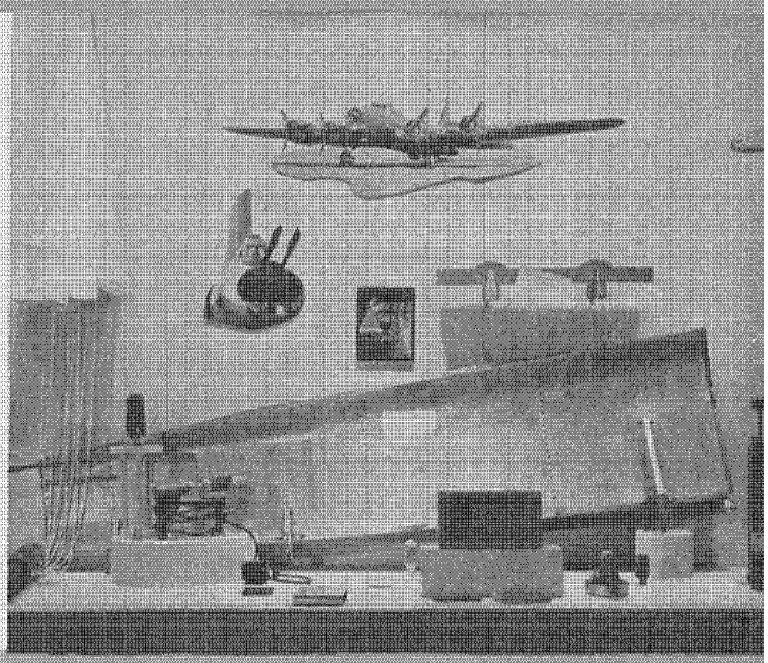


Mountain tents of coated nylon fabric were put to good use by combat troops in many of the war zones.



This reversible tent also served camouflage needs. One side is olive-drab and the other is snow-white.

So strictly were the rules of military secrecy observed in Du Pont plants, throughout the war, that employes working in one section of a Du Pont plant—even executives—often did not know what employes in another section of the same plant were doing. It was the rule, rather than the exception, not to know where or when or how a product would finally reach the fighting fronts. As a result there was great interest in Wilmington, some weeks ago, when more than 2,000 war items, in which Du Pont products were used, were gathered together in the Gold Ballroom of the Hotel Du Pont. In the thirteen days it was open, 28,527 people visited the exhibit.



Here was demonstrated the usefulness of Du Pont explosive rivets in the construction of airplanes.

A ship's hawser in a tug of war. Nylon cordage products were wholly new to many of the exhibit visitors.



Many Du Pont chemical products helped to save lives. In this display they were brought to public notice.



DU PONT TRADITIONS LIVE ON ★



Eleuthere Irénée du Pont

THEY HAVE BEEN EMBODIED IN THE COMPANY'S EMPLOYE-RELATIONS PLANS AND POLICIES FOR NEARLY ONE HUNDRED AND FIFTY YEARS

TRADITION accounts for many things in the lives of individuals and nations. Its stabilizing force is like that of a gyro-compass holding a great ocean liner on course in a gale-swept, stormy sea. Passengers do not see the mechanism; it's deep down in the hold, developing and exerting its controlling power.

Consider our Ship of State. She has lately passed through a devastating hurricane of war. What held her on course? A resolute nation of earnest free men united in purpose to uphold sound principles of Government—and a responsiveness to those silently-operating forces within our body politic—American traditions.

These same forces are control factors in many long-established business institutions—E. I. du Pont de Nemours & Company, for example. Du Pont traditions upheld for four generations are still alive, active, powerful. The earnest purposes of the founder of this organization are still earnestly pursued. His credo on employe relations is expressed in a personal letter to one of his business associates early in the Company's history. Here are excerpts of what he wrote:

". . . It is a great happiness to form, as we can, a sort of republic in which the abilities and energy of each are used for the good of all . . . If we stand together and march side by side with no hanging back, we can accomplish even more than we have undertaken and will be able in our new industries to offer new benefits to all of us."

The principles and objectives outlined by E. I. du Pont in the Company's formative years are still as sound as they ever were. Traditional adherence to them for generations has all along influenced the industrial relations plans and policies of this organization from 1802 until the present day.

Safety Traditions

Consider safety engineering, for instance. Mr. du Pont had ideas of mill design that were regarded by his masons and carpenters as highly eccentric. As his first gunpowder plant began to take shape along the Brandywine, these rugged artisans shook their heads and spoke darkly about it over their lunch. Instead of a single structure, the plans called for a series of small buildings spaced well apart. In place of four simple walls and a sturdy roof, such as they built for barns and public houses, they were told to construct solid stone buttresses three times the customary wall thickness and to erect a flimsy wooden framework on them.

This improvement in design and construction was introduced to make powder-mill operations as safe as possible both in the interests of the Company and its employes. Because the manufacture of gunpowder was inherently a hazardous business, Du Pont accident-prevention work was started with the building of its first mill.

Today, in all Du Pont operations, as the employes well know, safety is given prime emphasis. Measures to achieve it have become increasingly effective. In 1944 the Du Pont Company established a frequency rate (number of major injuries per million hours worked) of only 1.32, compared with the rate of 10.24 for the chemical industry as a whole and of 14.46 for all industry!

Thus adherence through the years to an early safety tradition has brought beneficial results. The founder's purpose to establish a unified, mutually-responsible and mutually-cooperative community "for the good of all" has been carried forward in accident-prevention work and in others, too.

Employe Benefit Plans

Today, the Du Pont Company has a long-range, comprehensive program of "Employe Benefit Plans" on which was spent, last year, more than $24,000,000.

Within recent years, "social security" has become a lively and generally-approved issue. The American people have agreed that old-age benefits, insurance against financial disaster, and health measures, both public and private, are desirable and essential. Yet the present Social Security Act has been in effect only since 1936. The first American Workmen's Compensation Act is now less than fifty years old.

At a time when Industry is frequently accused of trailing behind Government in social responsibility, it is pertinent to note that almost a century before Work-

Du Pont manufacturing centers, and at the larger plants hospital facilities are also available. This Company's medical organization is believed to be one of the largest of its kind in this country, and it is especially well equipped. One activity rates a special mention.

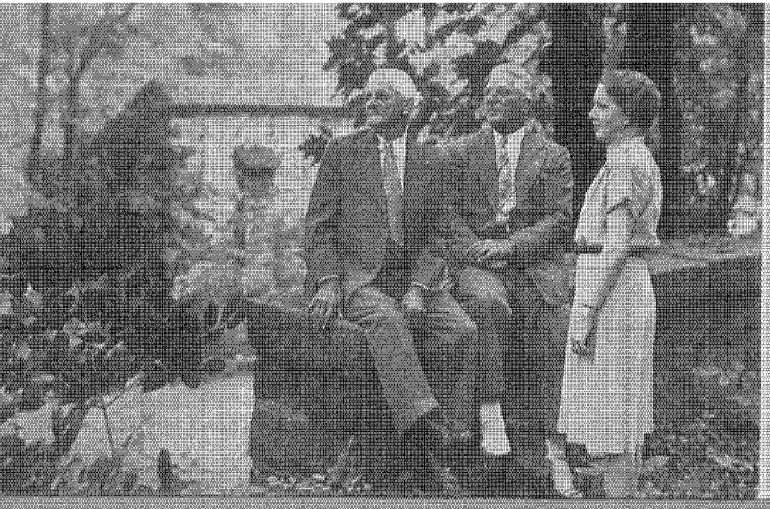
At the Haskell Laboratory of Industrial Toxicology, established at the Experimental Station, a competent research staff is always busy studying the products and processes of the Company from the standpoint of health.

incorporation in 1903, these activities had to become more formalized. The following year a fund was established for pensioning employes of fifteen years' service—employes who, because of age or physical infirmities, were no longer able to work.

Today, Du Pont pensions are paid to more than 1,900 former employes who have earned a retirement status. All expense is borne by the Company, the aim being to supplement, by this means, whatever rainy-day

John Andrews, left, retired Experimental Station worker, and ex-President Pierre S. du Pont are interested in reviewing items of account in one of the early 19th century ledgers. They were inscribed by E. I. du Pont.





Albert W. Buchanan, retired, oldest living Du Pont powderman, his son, William H., and daughter-in-law, Alice, make up this family group of Du Pont employes.



Ralph Ruth, Sr., Newport plant employe, is explaining to Mrs. Ruth and their children the provisions of his Du Pont Group Life Insurance policy.

provision the employe has made for himself. The amount of a pension is based generally on the employe's average earnings over the ten years preceding retirement and the number of years of service.

Pay While Ill

One of the distinctions that formerly existed between a wage-roll and a salaried employe was that if the former was unable to work because of illness, his earnings ceased while he was ill. Salaried personnel were paid while on sick-leave.

To correct this condition, Du Pont in 1938 instituted a "disability wage plan" under which *all* employes, both salary and wage workers, are paid while they are sick. Those with a year or more of service are entitled to draw full pay up to thirteen weeks in any one year for time lost through non-occupational illness or injury.

Life Insurance

Du Pont employes and their beneficiaries, including those of subsidiaries and Company-operated war plants, shared life insurance benefits of more than $7,277,000 since the adoption of a group insurance plan in 1919. Altogether, 5,366 employes or families have participated in the benefits. Under this program, all employes at no cost to them receive policies after completing one year of service. Graduated increases in coverage are provided for employes with dependents, the coverage increasing from $700 at the end of the first year to $1,500 at the end of five years.

Incidentally, the mortality rate among Du Pont employes is well below the average indicated by general actuarial experience.

Health and Accident Insurance

In addition to life insurance payments, accident and health benefits of more than $12,500,000 have been paid to employes. The Du Pont accident and health insurance plan, which was put into effect in 1930, provides for weekly benefit payments for non-occupational illness or injuries. Maintenance of this insurance is shared by the Company and those of its employes who desire to participate in this plan.

Vacations with pay, the establishment of recreational facilities for employes—in fact all of the various Du Pont plans now in effect are a reflection of the ideas and ideals fostered by the founder of this Company, and steadfastly carried forward by its management for nearly one hundred and fifty years.

In truth it may be said, "Du Pont traditions live on" to guide the industrial relations policies of this long-established organization.

Alex Voiers is undergoing his annual health examination by Dr. Paul Johnson at the Belle Works plant.



Du Pont safety traditions live on. Seaford workers a few years ago set up this new world's record.



The dog with the "choke-bored" nose



A MAN we know has the most quail-crazy pointer we've ever seen. She has a nose that reaches out like a choke-bored gun. One day we saw that dog stop dead on a point astride an old rail fence, a bird still in her mouth. No wonder she's called the dog with the "choke-bored" nose. For a free color enlargement of this painting, write Remington Arms Company, Inc., Dept. D-I, Bridgeport 2, Conn.

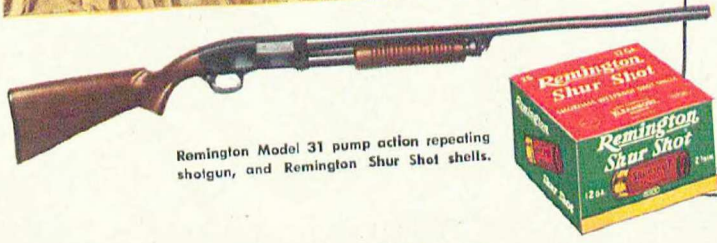
* * *

During the war, Remington produced vast quantities of military materiel. We are now converting as rapidly as possible to full peacetime production of sporting arms and ammunition to meet your every shooting need. Your local hardware or sporting goods dealer will have Remington products as soon as available.

Remington

DUPONT

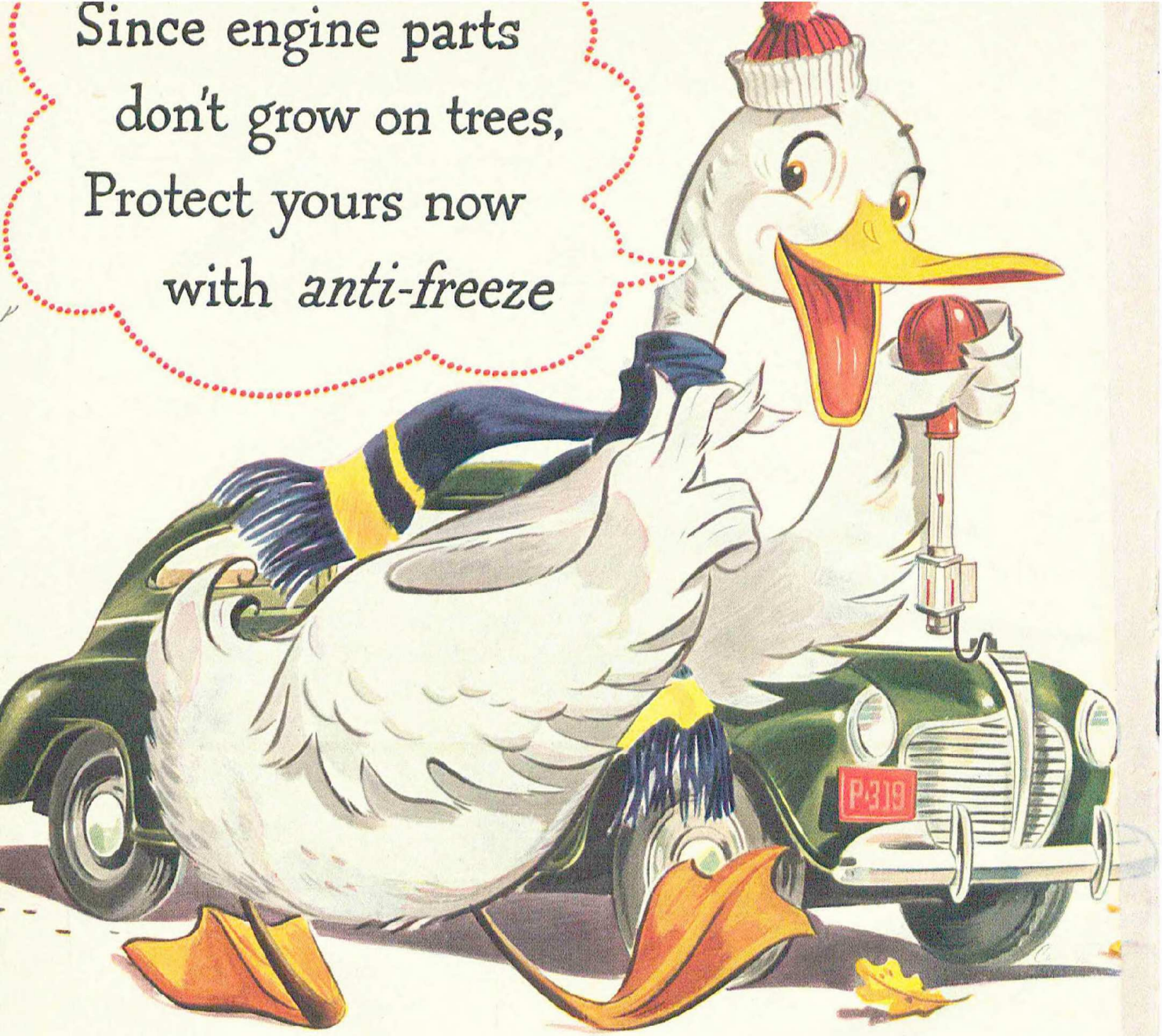
"If It's Remington—It's Right!"



Remington Model 31 pump action repeating shotgun, and Remington Shur Shot shells.

Shur Shot is a trade mark of Remington Arms Company, Inc.

Since engine parts don't grow on trees, Protect yours now with *anti-freeze*



Du Pont advises car-owners to make doubly sure that their anti-freeze solutions are up to strength this year. Radiators, cylinder heads, and engine blocks—parts that a freeze-up can crack wide open—are hard to replace and expensive.

That's why it's wise to have your anti-freeze solution checked occasionally—and wise to ask your motor service man to look over your cooling system for possible leaks.

When buying anti-freeze, ask for Du Pont "Zerex" or War Emergency "Zerone." They're absolutely dependable, and both are tops in their respective price fields.

$1.40 a GAL. War Emergency "Zerone"* gives thorough protection against rust and corrosion as well as freezing. Until regular "Zerone" comes back (this season's production went to war), there's no better buy at the price.

"ZERONE" AND "ZEREX" ANTI-FREEZE

DU PONT
REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING...THROUGH CHEMISTRY

$2.65 a GAL. A limited supply of "Zerex"*, Du Pont's non-evaporating anti-freeze, is available. "Zerex" won't boil out. One filling lasts all winter. Gives thorough protection against rust and corrosion—won't clog radiators.

*Trade Mark

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