

THE DU PONT MAGAZINE

BETTER THINGS FOR BETTER LIVING...THROUGH CHEMISTRY



"A NAG LIKE YOU SHOULD BE IN HARNESS"



JILL: We hired this sleigh for fun, remember? And all you've done is kick because it's snowing.

JACK: But, doggone it, I'm wet as a spring thaw! Since I had this ski jacket laundered, it won't shed a snowflake.

JILL: Don't blame the laundry, my wet pet! Most water repellents come out in washing or cleaning. Get weather-wise like me — get Du Pont "Zelan" ... the rain and snow protection that won't wash out!

Du Pont
Zelan

REG. U. S. PAT. OFF.



Weather Protection that Won't Wash Out

"Zelan" is Du Pont's durable repellent finish, applied to fabrics by manufacturers to make clothes water and stain repellent. When clothes are properly washed or cleaned, "Zelan" protection won't wash out. "Zelan"-treated garments similar to the one illustrated, and the accessories shown, are in good stores everywhere.



BETTER THINGS FOR BETTER LIVING
... THROUGH CHEMISTRY

SO TO SPEAK

WILL America have jobs for workers after the war? Millions of people are pondering that question at this time—our armed forces overseas and the industrial war workers on the home front.

It is not a new problem. Our nation faced it twenty-seven years ago, during World War I—and eighty years ago during the Civil War. Industry then had to adjust itself to changed conditions and to plan for the future. You know what happened. Science and invention brought forth new opportunities for employment in new and expanded enterprises, and America again forged ahead.

Will history repeat itself? Answer that one yourself after reading "Research Makes Jobs."

★ ★

DU PONT research in the chemical field is well known and well appreciated. Since the preceding number of this magazine went to press, the American Section of the Society of Chemical Industry has presented to Dr. Elmer K. Bolton, chemical director, the Perkin Medal for outstanding accomplishments in industrial research.

The presentation was made by Dr. Marston T. Bogert, professor emeritus of chemistry, Columbia University, and senior past-president of the Society, after Dr. C. M. A. Stine, a vice-president of the Du Pont Company, who had previously received the Perkin Medal Award in 1940, introduced Dr. Bolton.

In his acceptance speech, Dr. Bolton reviewed the history, growth and organization of Du Pont research. Printed copies of this address may be obtained from the Public Relations Department of the Company.

★ ★

THIRTY-FIVE postgraduate fellowships at twenty-nine universities have been offered by the Du Pont Company for the academic year of 1945-46. This is an increase of thirteen over previous years and for the first time includes two fellowships in physics, reflecting the increasing need for physicists in the chemical industry. Five of the fellowships are in chemical engineering and twenty-eight in chemistry.

The Du Pont fellowship plan was adopted by the Company in 1918 to encourage and assist graduate students at a time of acute shortage of trained research chemists. Since then, with only one interruption, the plan has been maintained continuously.

Two changes have been made in the fellowship plan this year. To equalize the value of fellowships among the various universities, where tuition rates differ, the Company is paying the tuition in addition to the stipend. And the amount of the stipend has been increased from \$750 to \$1,000. Women as well as men are eligible, and selection of the recipients and the subjects of their researches is left to the universities. Holders of fellowships are not restricted in any way in their choice of a position when a fellowship expires.

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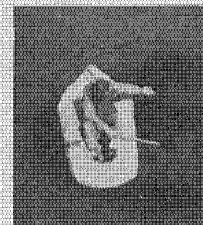
E. I. DU PONT DE NEMOURS & COMPANY (INC.)

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E. R. MANCHESTER, Editor

THE COVER

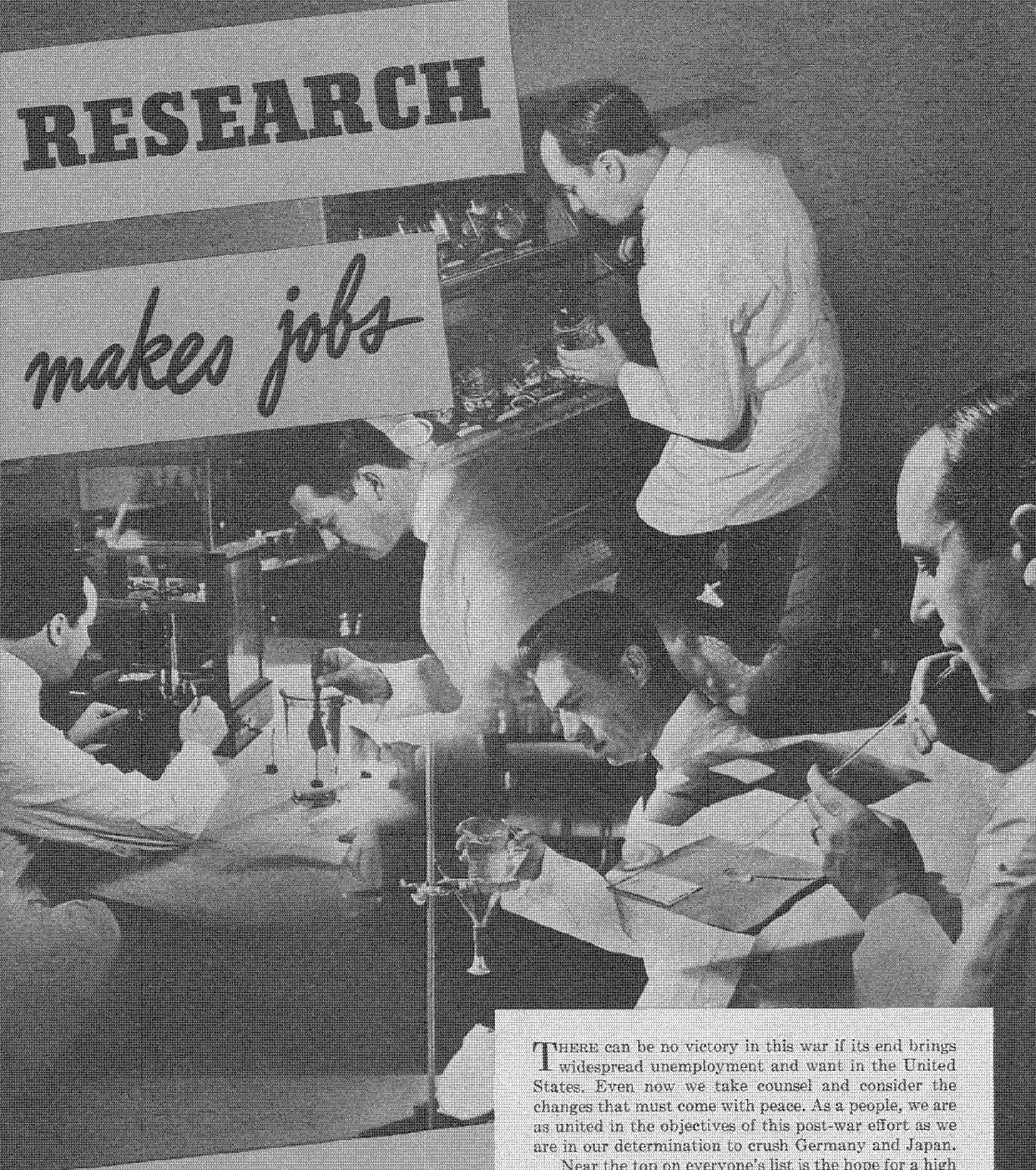
Forced down, an American pilot is releasing an orange fluorescein dye that changes the color of the water around his boat to a broad patch of verdant green. Then rescuing fliers can more easily locate their comrade in distress. The print is from an official U. S. Navy Kodachrome.



OTHER CREDITS: Page 6, top and bottom, U. S. Army Signal Corps photos. Pages 9 and 10, courtesy of Iowa City Press-Citizen. Page 11, courtesy of Western Construction News. Pages 15, right, and 19, Official U. S. Army photos. Page 20, U. S. Army Air Forces photo. Page 22, top, right, Press Association, Inc., photo; bottom, U. S. Army Signal Corps photos.

RESEARCH

makes jobs



By DR. COLE COOLIDGE, Assistant Chemical Director,
E. I. du Pont de Nemours & Company.
From an Address Made Before the Herald-Tribune Forum

THERE can be no victory in this war if its end brings widespread unemployment and want in the United States. Even now we take counsel and consider the changes that must come with peace. As a people, we are as united in the objectives of this post-war effort as we are in our determination to crush Germany and Japan.

Near the top on everyone's list is the hope for a high level of productive employment—for an economy that will provide jobs for our returning veterans, for those now making war materials, and for the youth that will come to maturity in the happier years which will follow the war.

There is ample ground for entertaining such hopes. Research has provided millions of jobs in the past, and there is reason to believe it can do it again.

Here's Why

Let me recall to you two facts from American industrial history. First, fifteen of our major manufacturing industries have been developed since 1870, and it has been estimated that they have created fifteen million jobs that never were dreamed of before. Second, on the basis of these figures, about one out of every four persons gainfully employed today owes his job in whole or in part to developments based on scientific research.

In this connection, I can say that a study recently made by our Development Department indicates that the new projects and products that Du Pont will be ready to launch when the war is over, together with increased outlets for existing products, are expected to bring an all-time high in the Company's peacetime employment. Certainly we are not alone in this prospect.

I speak to you as a research chemist, and I believe that the great research laboratories which have been established in America since the last war represent a national asset of extreme importance in the solution of future problems, particularly the problem of providing adequate employment at our high American standards.

Organized industrial research is the road to economic progress. Our own experience, when projected on the screen of the future, may suggest a pattern.

When we came to 1928—and that was not so long ago—we were selling a lot of products we thought were modern. When we came to 1942, we were selling still more. But in 1942 nearly half of Du Pont's gross sales—46 per cent, to be exact—consisted of products that either did not exist in 1928, or were not then manufactured in large commercial quantities.

Fruits of Research

Possibly the best known of these new materials is nylon, which in 1928 was neither a name, a number nor even a remote idea. It is perhaps significant, however, that in that year our Company initiated the program of "fundamental" research which finally produced this entirely new material. Three years before that, Du Pont had initiated research that resulted in neoprene, first commercially produced in 1931 and today's outstanding synthetic rubber. Moistureproof cellophane, synthetic resin enamels, high-tensile rayon for tires, new plastics, polyvinyl alcohol, synthetic camphor, and synthetic urea for fertilizer are other notable products of this period of research. After the war, when the laboratories can get back to work on peacetime problems, the list is sure to grow.

Chemical research already has a brilliant record in the creation of new jobs. This record will be extended. For example, we recently announced a chemical which hardens wood—a treatment that actually transforms ordinary wood into a new and different substance.

In the laboratory, wood treated with this chemical became durable far beyond the limitations placed upon it by Nature. We have made soft wood such as pine as hard as maple, and have given maple the properties of mahogany or ebony. The transmuted wood was resistant to rot, to flame, and to insects. The process is the result of general long-range investigations conducted over many years by the Forest Products Laboratory of the

U. S. Forest Service, by Du Pont, and other groups.

The announcement of this development was received with encouraging interest, not only in the lumber trade but by the public. A few days ago I noted a forecast in the papers, listing "wood chemistry" among eleven industries which offer inviting post-war opportunities. We hope it may prove so, for that means more jobs.

Like many products that research makes available, this development must depend for the realization of its many possibilities on the further experience and research of those who are to use the material, in this case the wood-processing industry.

Plastics

New developments are numerous in the field of plastics. Progress can be expected, not only in the production of plastics, but also in those industries that use them. A new plastic called polythene, originated by Imperial Chemical Industries in England and further developed by Du Pont, is a conspicuous example. It is a material with unusual properties, particularly valuable in the field of electronics. Polythene will make your post-war television set more efficient than otherwise would be possible.

Plastics illustrate the imaginative enterprise of modern industrial research. Those which the chemist calls the methacrylates were just coming into their own when plastics went to war. Du Pont's methyl methacrylate resin sheeting is now engaged wholly in military uses, such as the noses of bombers and the canopies of fighter planes.

Many of these new scientific developments, not only of our own Company but of many other research-minded groups, have important long-range significance in public health. Recently the United States Army announced the results obtained with a new insecticide, called DDT, which our Company is producing, although it is the invention of others.

It proved itself early last year when it stopped an incipient typhus epidemic in Naples. The Office of the Surgeon General of the Army foresees "a new era in insect control" as a result of this development, which ranks with "the really great discoveries in medicine of the past century."

New things are expected of nylon. The strength, toughness, elasticity, and abrasion resistance of nylon textile fibers as demonstrated in hosiery are inherent in nylon, and suggest that this versatile product may find wide application in the field of plastics.

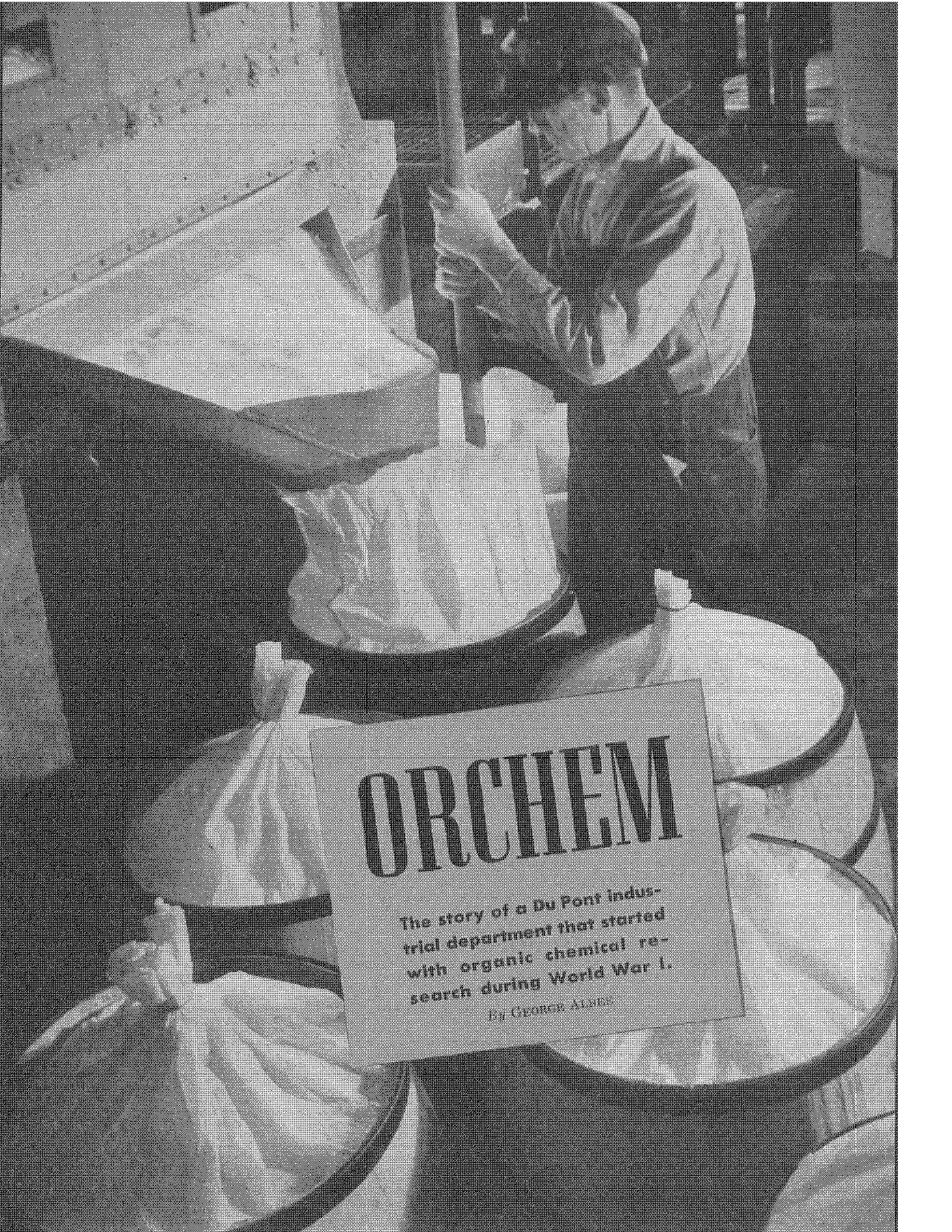
Now, what will these developments mean in the post-war world? Will they mean more jobs at American wages for American workers?

We know that research and invention create new industries and new markets, which in turn generate new auxiliary industries and new jobs. In 1900 the horse and buggy business gave work to around a million persons. In a typical pre-war year the automobile industry furnished employment, directly and indirectly, to more than six million persons. The performance of the chemical industry is comparable.

Productivity, the Key

How has progress of this kind been achieved? We say through research, but actually, the results spring

(Continued on Page Twenty-four)



ORCHEM

The story of a Du Pont industrial department that started with organic chemical research during World War I.

By George Albee

AT DEEPWATER POINT, New Jersey, across the Delaware River from Wilmington, is the principal plant of the Organic Chemicals Department of the Du Pont Company. This plant, now known as Chambers Works, occupies 600 acres of meadow-land beside the river and consumes enough power to light a city half the size of Wilmington. The story of Chambers Works started a generation ago with World War I.

1914

In 1914 Germany did not have an Adolf Hitler; but she had a Kaiser Wilhelm and a grim determination, inherited from Bismarck, to conquer the world. Her plans were economic as well as military.

Here in the United States, business and Government—although now and then they tread on each other's toes—are separate.

Not so in Germany! In 1914, as today, German business men were regarded as servants of the State; and the German government used them unscrupulously to advance its national interests. The German dye industry in particular was used as a means of securing economic and technological domination over other countries.

If Nation X built a chemical plant and started to manufacture and sell its own dyes, for example, Germany simply flooded that country with chemical goods at prices far below cost. Army officers of the German general staff knew well that a nation without a chemical industry could never successfully oppose Germany in war!

When Germany, feeling that the time was right, declared war in 1914, *she controlled six-sevenths of the world's coal-tar chemical industry*. Americans began to learn bitterly what it meant to live in a country without a well-rounded organic chemical industry! Many dyes and drugs were not to be had at any price. One-fourth of all our manufactured output depended in one way or another upon dyes. Our humiliation was so complete that we had to beg England to let Germany send us dyestuffs in neutral Dutch ships.

And when events drew the United States into the war, three years later, there began an almost hopeless race. Although Germany had a long head start, the United States set out to catch up!

In March, 1916, a group of Du Pont chemists began research on dye intermediates. It is doubtful if any industry was ever born under such difficulties. It was a venture into the dark, beyond even the twilight zone of American chemical knowledge—with only hope, courage and skill to go on. This was the beginning of the plant that is now known as the Chambers Works.

First Fruit

The German secrets were well kept. American chemists had to proceed, as the saying goes, "by guess and by golly"—that is, by trial and error—a slow and costly method. But in 1917 the Du Pont Company succeeded in making on a commercial basis sulphur black, a fundamental cotton dyestuff. This was followed in 1918 by the azo dyes, another basic group, and by indigo.

In 1918 World War I ended; but the struggling American dye industry was still in its infancy. The following year saw the development of anthraquinone vat

dye colors; and in 1923 these were followed by the thio-indigo vat dyestuffs.

Today, the Chambers Works manufactures many hundreds of colors. Whereas during the last war we could not even supply our Army and Navy with fast-dyed khaki and blue uniforms, for the reason that ninety per cent of the dyes we used were imported, when World War II began, the United States was making ninety-five per cent of *its own dyes*!

What a difference!

These dyes touch our daily lives at a hundred and one points—in paper, leather, and any number of other things besides fabrics. A list of the many ways in which dyes are used today will serve no purpose. Mention of uniforms does, however, call for some further mention of anthraquinone vat dyes.

A tabulation by the Army Quartermaster Depot shows that 136 yards of cotton material are required to equip and maintain a soldier for one year. In addition to materials which can be measured in yards, the Quartermaster Corps also supplies each man with about forty-two pounds of cotton in the form of mattress filling, knitted garments and other items of clothing and equipment—barrack bags, towels, sheets, and so on. A fighting man uses four times as much cotton as wool in his equipment.

Now, the best dyes for cotton are anthraquinone vat colors. Du Pont has supplied textile mills with more than half of all these dyes used in service uniforms. In addition, Du Pont supplied about thirty per cent of all dyes for wool uniforms.

Colored Smokes

Early in the war, it was recognized by the Chemical Warfare Service that colored smokes might prove of great assistance to our armed forces. Du Pont dyestuffs chemists were called in to help solve the problem of perfecting such smokes, and the results obtained have been much publicized. It is not too much to say that this development was one of the outstanding achievements in this war. Today, the Chambers Works produces a large portion of the dyestuffs used in making these colored-smoke canisters and shells.

In addition to the cotton and wool dyes and those used for smokes, there is the problem of dyeing artificial fibers in fast shades. Ordinary dyes used for cotton and wool are not suitable for these synthetic fibers, and along this line there are hundreds of dyestuffs problems awaiting solution. During the war we have been able to tackle only the most important problems for the war effort; for example, Du Pont chemists had to find a way to dye nylon with fast colors. This problem is in the final stages of its solution.

Last October, Du Pont announced two new processes making it practical to use vat dyes for many materials on which they could not be used successfully before. For technical reasons, vat dyeing has always been difficult on woolen goods and on fabrics made of mixed fibers. The two new Du Pont developments extend vat dyeing to such materials. One process is simpler, more versatile and more economical, doing in seconds what used to take minutes—in some cases, hours! The other process

minimizes the pulling and stretching which always used to make it difficult to use vat dyeing on the more delicate fabrics. These developments are reported in greater detail on pages 17 and 18 of this number.

Branching Off

The Chambers Works has been called "The Plant That Never Stops Growing." And such a description is no mere figure of speech. It would take a man with sturdy leg muscles to visit all of the buildings at Deepwater Point in one day. There is every reason to believe that the plant will continue to grow in the future.

This is because of the nature of scientific progress. As the chemists went ahead with their research in dye-stuffs, they learned how to make other things. Every discovery gave rise to further discoveries and developments. Dye research, like the trunk of a tree, began to send off branches.

Rubber Chemicals

The first one began to grow out from the trunk in 1921 with the development of rubber chemicals. These products, as the name implies, are chemical compounds added to rubber to give it special qualities—to make it tougher or more resilient, or to enable it better to resist deterioration. The Chambers Works manufactures so many of these compounds that it requires a book of more than a hundred pages to describe them. They have names like MBT, "Tepidone," "Vulcanex" and "Antox"—familiar enough to people in the rubber business, but meaningless to almost anyone else.

The best way to tell you what these compounds do is to pick one that is typical and describe its action. For instance, 2-MT is an abbreviated name for 2-mercaptothiazoline, a white powder used in the manufacture of tires, tubes, belts and mechanical goods where superior age-resistance and resilience are required.

World War II calls for literally tens of thousands of articles made wholly or in part of rubber, both natural and synthetic. To the manufacture of these products the rubber chemicals of the Chambers Works have contributed in great measure.

Tetraethyl Lead

In the 1920's improvements made in automobile motors prompted more intensive research to improve the efficiency of automotive fuels. Using motors with quartz windows in the cylinder heads, so that the action of fuels could be observed while the motors were running, General Motors engineers and chemists studied the action of a hundred or more gasoline mixtures. It was found that the standard gasoline used at the time exploded too sharply, causing the motor to knock and operate inefficiently. In exhaustive, painstaking tests, various chemical compounds were added to the fuel to see if knocking could be reduced.

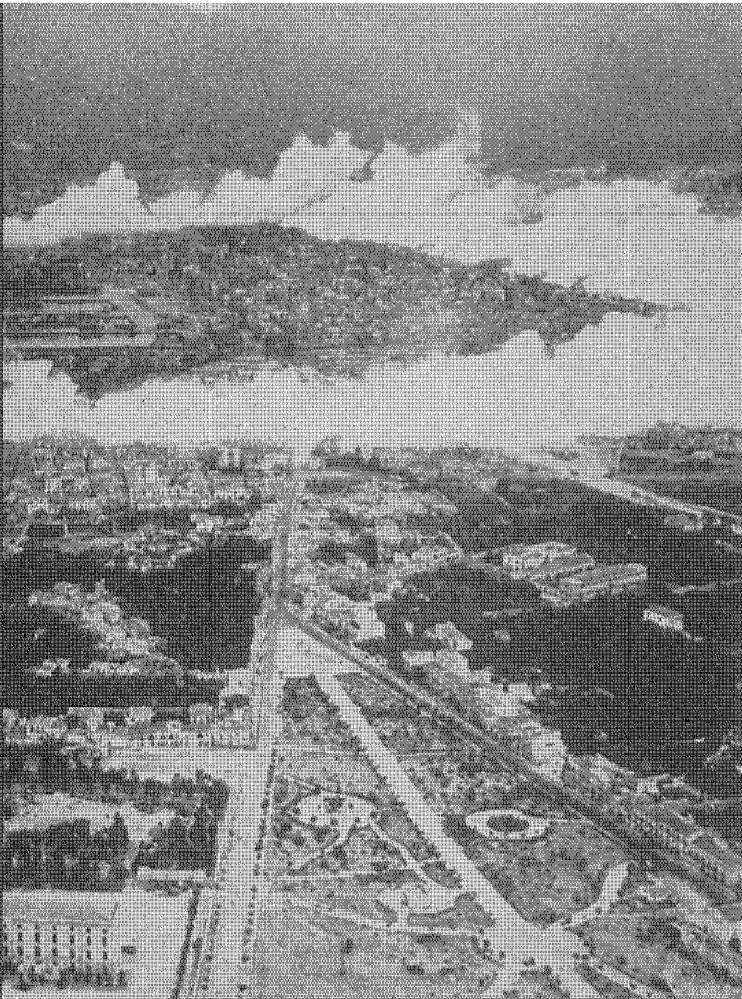
At length it was found that tetraethyl lead was the compound best for the purpose. In 1923 gasoline containing tetraethyl lead, manufactured by Du Pont, was placed on the market by the predecessor of the present Ethyl Corporation and offered to the motorists of the United States; and, as more efficient high-compression



A view of Palermo, Italy, during a smoke-screen demo

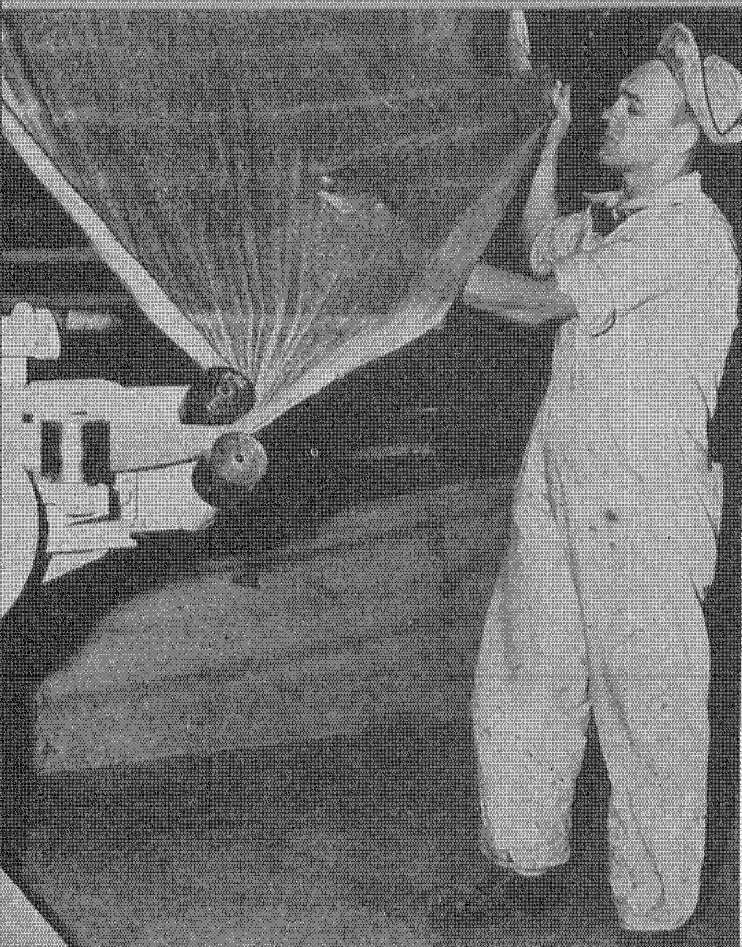
Colored smokes are used to disclose the identity of this tank to U. S. fighter pilots flying overhead





ation by the U. S. Army. Note the large area enclosed.

Dried neoprene film at this stage is being twisted into a rope and cut into short lengths for shipping.



motors came into being, it soon became the accepted motor fuel. No user of inferior wartime gasoline need be told how good America's peacetime motor fuel is!

It is America's 100-octane gasoline, containing tetraethyl lead as one of its ingredients, that enables American warplanes to operate at high efficiency. Chambers Works produces a large part of the Ethyl Corporation's output of this important ingredient.

Ethyl Alcohol

Another branch grew on the tree when, in 1926, the Chambers Works began the manufacture of ethyl alcohol. Roughly half of the alcohol output at Deepwater is used in the manufacture of tetraethyl lead. The rest, in wartime, has been used in making nitrocellulose and smokeless powder, as well as ethyl acetate and other solvents used in the manufacture of plastics.

Refrigerants

In the early 1930's the manufacture of mechanical refrigerators increased, much as the manufacture of automobiles had leapt ahead ten years earlier. Faced with a mounting public demand, the mechanical refrigerator industry looked around for a refrigerant that would be completely safe. Such a refrigerant was found by General Motors chemists in a family of relatively-simple organic chemical compounds containing fluorine.

Today, a large proportion of the mechanical refrigeration systems used in homes in the United States utilize such a refrigerant which is known as "Freon-12" and is manufactured by Kinetic Chemicals, Incorporated, at Deepwater Point and East Chicago.

A number of types of "Freon" are in production. One of these, for instance, is "Freon-22." Like all "Freon" refrigerants, "Freon-22" is a chemical compound which in refrigeration machinery exists alternately as a liquid and as a gas. When it changes its form from a liquid to a gas it takes up heat. In this way it cools the contents of a refrigerator. Under the same operating conditions, "Freon-22" is capable of lowering the temperature by many more degrees than "Freon-12." It is used in the quick-freezing of foods.

There are others—"Freon-11," "Freon-21," "Freon-113" and "Freon-114"—used in different kinds of refrigeration equipment, and in air-conditioning.

It is hoped that after the war a whole series of these refrigerants will be available, making it possible to produce any degree of cold that may be desired.

Needless to say, "Freon" refrigerants have performed invaluable services during the war. Food is sent to the troops in refrigerated ships, and kept under refrigeration after it arrives at the front. Several floating refrigeration plants were built by the U. S. Maritime Commission, especially to follow the action in the South Pacific, tying up at a convenient island to manufacture ice and ice cream by the ton. "Freon" refrigerants chilled strato-chambers to 70° below zero so that scientists could study the conditions fliers would meet at stratosphere heights. They are used also in the manufacture of penicillin and in the chilling of blood plasma.

In industry, Kinetic refrigerants find many uses—shrink-fitting metal parts, stabilizing gauge blocks,

speeding the heat treatment of steels and alloys, cooling the lubricants used in turning metal parts on lathes and testing instruments and combat equipment.

Perhaps the most dramatic wartime rôle of "Freon" is the part it plays as a propellant in exterminating flies, mosquitoes and other pests. Insecticide compounds dissolved in "Freon" are loaded and kept under pressure in a small metal container that a soldier carries into any enclosed, insect-infested place. He merely opens the control valve, and the gas carrying the insecticide in the form of a fine mist or aerosol is released to remain suspended in the air six to seven times longer than would be the case if a mechanical spray gun were used. The lethal fog, thus formed and propelled by "Freon," easily and quickly exterminates all insects that come in contact with it.

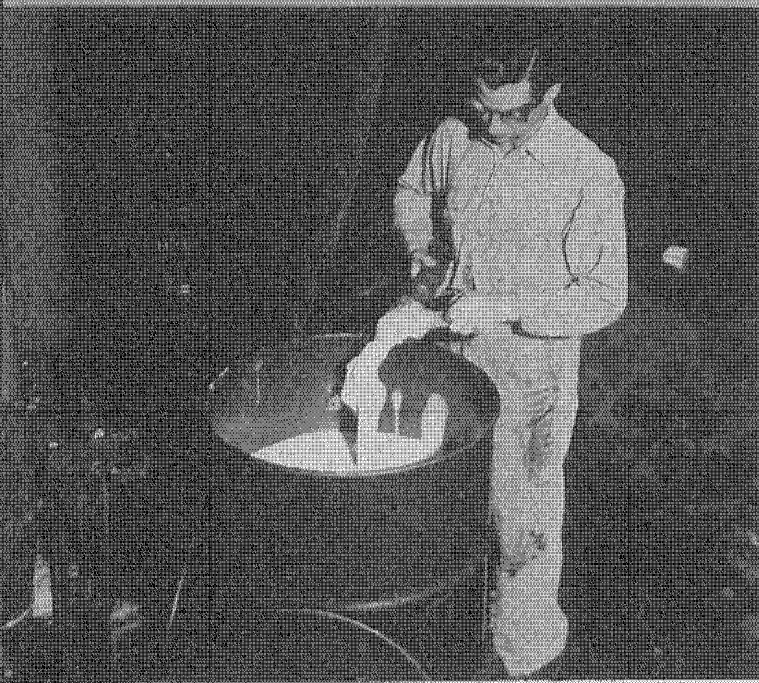
Aerosols hold great promise for the post-war future. It is believed they may be used in spraying gardens and orchards, as well as living rooms and bedrooms.

Neoprene

The Organic Chemicals Department also manufactures neoprene, Du Pont's chemical rubber, which is a synthetic product derived from acetylene gas—the illuminating gas once used for old-fashioned bicycle and automobile lamps. Chemical processing with a catalyst changes this gas to monovinylacetylene, and further treatment with hydrochloric acid yields a thin, clear liquid which can be polymerized—or combined—to form larger and heavier long-chain molecules. The material, a plastic polymer, is chloroprene rubber. The first plant for its commercial production was completed in 1931, at Chambers Works.

Since then, many refinements in the technique of making neoprene have been developed. Chloroprene may be emulsified in water and sold as a latex, much like that obtained from rubber trees. This liquid latex is used in the manufacture of many products, such as gloves, metal coverings, adhesives and cements, and so on. On the other hand, it may be frozen on rolls, pressed out and washed to obtain sheeted neoprene.

Du Pont manufactures neoprene in both solid and liquid forms. Here latex is flowing into a drum.



Du Pont manufactures several types of neoprene. Because it is much better than natural rubber in many respects—particularly resistance to sunlight, heat, aging and oxidation, as well as to oils and fats—neoprene has been used in large quantities during the war. Superior resistance to sunlight has resulted in its use in balloons that carry aloft the radio aerials of escape rafts used by fliers forced down at sea. Resistance to heat, oil and gasoline has brought about its use in tanks, trucks and airplanes for motor mountings, bumpers, grommets, oil seals, gaskets, hose, wire, and the like.

Regulations now provide that merchant seamen on ships of American registry must be provided with life-saving suits. They are made in one piece of fabric impregnated and covered with Du Pont neoprene. Seamen hop into them in a few seconds, drawing them on over warm clothing and life-belts, and jump into the water. The waterproof suit keeps the heat of the body in, the cold of the icy water out. And if a sailor must swim through burning oil, the neoprene gives him added protection because it resists flame.

Synthetic Camphor

Another compound manufactured at Deepwater Point is synthetic camphor. Here in the United States we used to import all of our camphor from Japan, and the material sometimes sold for nearly four dollars a pound. Today, although we use upwards of five million pounds of camphor a year, and the war with Japan has cut us off from the old source of supply, the United States makes all of its own camphor. The price is barely a tenth of what it sometimes used to be.

Stumps of pine trees in the cut-over areas of the South are dug out of the ground, cleaned, and chewed into flakes by specially-designed machines. From these flakes turpentine is extracted, and from this, in turn, pinene is made and converted into synthetic camphor by an involved chemical process.

While some of this camphor goes to the drug trade, most of it enters into the manufacture of pyroxylin plastics and pyroxylin-base photographic film. The importance of these products in the war effort has been mentioned previously in these articles. You have learned how plastics fit into the manufacture of military airplanes; how photographic film is used by many branches of the armed services for visual training, reconnaissance, x-ray and other needs. The Du Pont Organic Chemicals Department, by keeping our nation well supplied with high-quality camphor, has rendered an essential service.

Sum Total

The picture of the Chambers Works is one of a plant that has grown steadily with advancing scientific knowledge until it now manufactures hundreds of products under the various sub-headings noted here.

And here our story must end for the time being. The rest must remain a secret for the duration. When the war is over we hope to tell you the things that cannot now be revealed. Then the men and women of the Du Pont Chambers Works will feel even greater pride than they do today, realizing in full measure how well they have served their country and the cause of democracy.



High

WATER EXPLOSIVES ACHIEVEMENT

**Floods came to Iowa last spring, but
Du Pont Ditching Dynamite helped to
reset the stage for wartime
crop production**

By W. C. LAUE

INDUSTRY's wartime job is to build more planes, tanks, trucks, ships, and so on—and you have read a lot about that. Agriculture's part seldom makes the headlines, even though Washington authorities say, "Food will win the war, and write the peace."

So, for a change, let's revive some news you probably overlooked last spring. It's a story of flood waters on the rampage in Iowa. And it's worth retelling, for if Nature gets ugly again—and she may—high-water conditions may recur so that farmers cannot get ahead with their job of growing food.

The most adverse weather conditions recorded in Iowa since 1892 were experienced last spring. Unusually heavy rains persisted from March through June. In many localities five to six inches of water fell in twenty-four hours; in Cedar County, the officially-reported high record was 7.55 inches. Result: Thousands of acres of valuable bottom-lands were flooded. During May alone, according to estimates made by the State Soil Conservation officials, Iowa's loss of topsoil from erosion amounted to \$154,000,000. In June, the flood damage in eastern Iowa was estimated at \$16,956,000. And during the May flood, the Des Moines River, from Fort Dodge to Keokuk, is said to have forced nearly 1,000 families out of their homes. They returned later to find buildings, fences, bridges, highways and railways badly damaged. Things looked bad out where "the tall corn grows." That's the high-water side of this story.

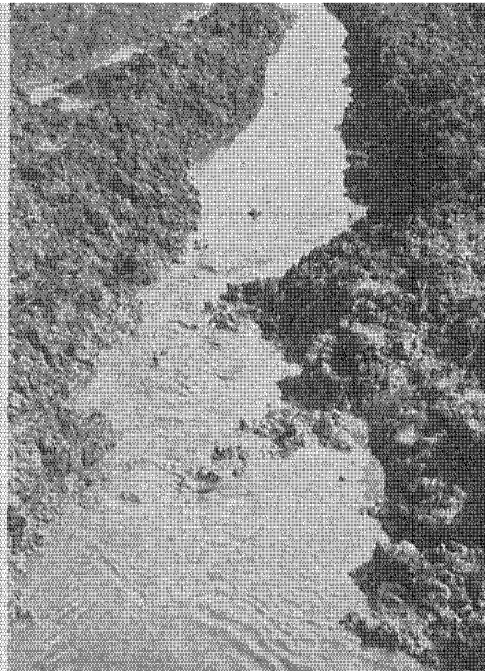
Nature's "blitz" came at a time when it was imperative that spring planting be done—and many farms in the state were under water. Drainage was the first problem, a difficult one too, because of an acute wartime shortage of both labor and equipment. The situation called for open ditches and channels to dewater the flooded areas—and that's where high explosives enter this story.



A tall blast. Its height dwarfs the telephone pole at the right.



A roadside stream in Johnson County before a demonstration shot was made.



Soon after the blast, this broad, deep ditch was functioning as shown here.

Now ditch blasting is not a new practice in Iowa, but it was employed more extensively than ever before. In fact, last year ditch-blasting work was done in more than sixty of Iowa's ninety-nine counties. Du Pont jobbers and dealers cooperated wholeheartedly in field demonstrations. The writer assisted with sixty-six projects; his associate, R. P. Henry, handled thirty-five more. Federal, state and county officials worked hard to get Iowa out of the mud. More than 218,000 pounds of Du Pont Ditching Dynamite 50% was distributed in the state during ten months of 1944. It is estimated that about fifty miles of open ditches were blasted up to November.

Most of the work consisted of cleaning drainage channels and opening up small ditches to relieve the flooded lands. These were mostly "single-stick" ditches; that is, single cartridges of ditching dynamite were

placed twelve to eighteen inches apart and to a depth of twenty inches, all in a single line, and all shot by the propagation method. On an average in wet soil, this technique resulted in a ditch six feet wide at the top and three feet deep.

In one case a half-stick emergency ditch, about thirty rods long, removed from six to twenty-four inches of water from a planted cornfield of sixty acres. Instead of a total crop loss, this field produced 4,200 bushels with a value of about \$4,000.

One outstanding example of work of this type was done on the R. A. Stolz farms near New Hampton, where a continuous ditch, nearly three miles long, was blasted diagonally across three farms to a river outlet. Result: Several hundred acres of good farm land became available for growing diversified crops.

County officials watching a test shot. Left to right, Phil Engleitt, Elmer M. Dewey, Stanley Beranek, (Mr. Laue), J. E. Pechman and Ray H. Justen.



Representative Laue explains how to load dynamite to the best advantage.



Highways—and particularly the farm-to-market roads—were hard hit. Many of them, rendered wholly or in part impassable, were drained and reopened to traffic by blasting roadside ditches. Scores of projects of this kind were carried through by small crews of county employees. One quite extensive program of this kind was sponsored by the officials of Johnson County.

The county engineers made excellent use of ditching dynamite in straightening streams to prevent loss of bridges and culverts. In one instance a 300-foot post-hole blast, involving 1,000 pounds of this explosive, forced a small river to flow under the central span of a bridge instead of around a flood-cut bend which threatened to destroy the structure.

removed, and a surface subsidence had left a pocket over the abandoned workings. It was important to keep this hole from filling up with water; otherwise, operations in the active mine areas would have to be suspended. Timely use of ditching dynamite kept the nearby stream away from the property.

Scores of emergency drainage projects in Iowa last year were carried through quickly and at low cost. Indeed, the farmers of this state saw ditching with dynamite demonstrated effectively in every county affected by the floods. "So what?" you say. The following statistical records tell the best part of this story: In 1939, before the war, Iowa farmers grew corn on 9,330,000 acres; in 1943, the acreage was 10,448,000, and in 1944,

Another picture sequence, with farmers, left, loading ditching dynamite in swampy soil. The companion view, right, photographed after the blast, shows the completed ditch carrying off a large volume of surface water.



Floods Threatened Coal Mines

In another part of the state a strip-mine pit became brimful of water, with the roadway leading to it turned into a quagmire. Some of the lighter equipment, including pumps, had been moved to another location; but the heavy machinery was marooned. Here, 150 pounds of ditching dynamite was used to construct a ditch which lowered the water level far enough so that this equipment could be removed.

To cite another instance: A five-foot ditch was blasted to divert flood waters which threatened to enter an underground mine. From one area the coal had been

the big flood year, Iowa's corn acreage was actually boosted to 11,440,000!

As this is written, crop estimates indicate a high total of 607,608,000 bushels of corn; 144,270,000 bushels of oats; 42,580,000 bushels of soy beans and 5,676,000 tons of hay, not to mention various other agricultural products. In short, Iowa farmers met the challenge to increase food production for wartime needs—and came through gloriously, in spite of high water and with the effective and timely aid of high explosives. It is a source of pride to us that DuPont Ditching Dynamite 50% contributed to that high achievement.



BOTTLENECK AT THE BUTCHER'S BLOCK



Self-service meat departments help to relieve this trouble

By J. D. RANKIN

WAITING at the butcher's counter, a "pastime" that has irked every housewife, is probably going to be as old-fashioned in the post-war era as those other symbols of unprogressive merchandising—the open cracker barrel and the butter tub.

Crackers and butter long since went into individual packages, and when self-service stores came along, the customer was able to pick them up quickly and easily as she trundled her basket around the aisles. But at the meat department she found a traffic jam, particularly in rush hours. Here self-service stopped, because she was unable to cut herself a steak or a half dozen chops or carve out a rib-roast. Ration points and the meat shortage did not help the situation. They simply brought into sharper focus this out-of-date feature in an otherwise modern food-dispensing system.

Retailers and customers are agreed that a change in meat-selling techniques is long overdue. Fortunately, the change is already on the way, thanks to two contributions of industrial science—controlled refrigeration and engineered packaging. Together they have made self-service of fresh meats practical. Open display cases, providing visibility and easy access to the shopper, were tried out experimentally before the war. Since then the tremendous growth of self-service food stores has given this meat-selling idea a new impetus, and today it is hailed by retail authorities as one of the most important merchandising developments of our day.

The display case is so engineered that the cold, dry air cascades down over the packages of meat in a steady stream. Sometimes a tilted mirror at the back of the case helps the customer see the display, but the important requirement is the package itself, which must be transparent so that the buyer may see what the meat looks like.

Cellophane, therefore, has been an integral part of this self-service development from its inception. And the DuPont Company, through its specialists, has helped in solving many of the problems involved. Moistureproof cellophane has long been used by commercial quick-frozen food producers, because it prevents the frozen food from drying out during storage. For packaging fresh meat, the DuPont Company developed a special type of film that permits just enough

moisture to escape to prevent fogging and thus obstructing the view of the contents.

A few years before the war a large food chain, recognizing that the meat department was a serious bottleneck in its self-service units, worked out a plan whereby all meats sold in one group of stores were pre-wrapped in cellophane. The packaged meats were placed in refrigerated cases where they could easily be seen and easily picked up by the customers.

This innovation was so successful that special display cases were ordered and the self-service meat department idea spread rapidly through this chain and to other chains as well, including the leaders in the field.

Two years ago there were approximately 300 stores operating self-service meat cases. They were located in 145 cities in twenty-eight states, and several in Canada. Because of the difficulty of getting packaging supplies and normal quantities of meat, due to wartime rationing, many of these stores had to discontinue self-service meats for the duration. But the fact that the self-service method invariably increased meat sales and solved the problem of the rush-hour bottleneck is an almost certain indication that this development will resume its expansion after the war.

In addition to the increased volume of sales, this method of merchandising eliminates considerable waste because it permits the most effective cutting and packaging of all meats, and because weight-loss, due to shrinkage, is minimized by the use of the special-type cellophane. As the meats are packaged, they are labeled to show the exact weight, the name of the part or cut, the price per pound and the price of the whole piece.

This labeling procedure has brought about an interesting educational result. Numerous surveys and the casual observation of butchers indicate that the average young wife—at least in normal times—does not know much about the variety of meat cuts available. Day in and day out she orders lamb chops, steaks and ham, with perhaps an occasional roast. Wartime shortages have forced her to depart from this routine. She and many other women too are purchasing cuts they never knew about before. Items that ordinarily are not in much demand, such as sweetbreads, liver, hearts and even tripe, are reported to be selling well in the self-service stores.



A typical traffic jam at the meat counter, where customers had to stand and wait for the butcher.



Pre-packaged fresh meats displayed in refrigerator cabinets enable customers to serve themselves.

At present the development is well advanced on the West Coast, where 100 per cent self-service meat departments are being operated for thousands of customers. In the industrial areas women war workers constitute a large part of the population. They are too busy to spend an hour or two a day in the grocery store, the experience familiar to so many women these days when ration points and manpower shortages accentuate the normally slow movement in the meat department. The self-service idea has been particularly welcome in the California cities.

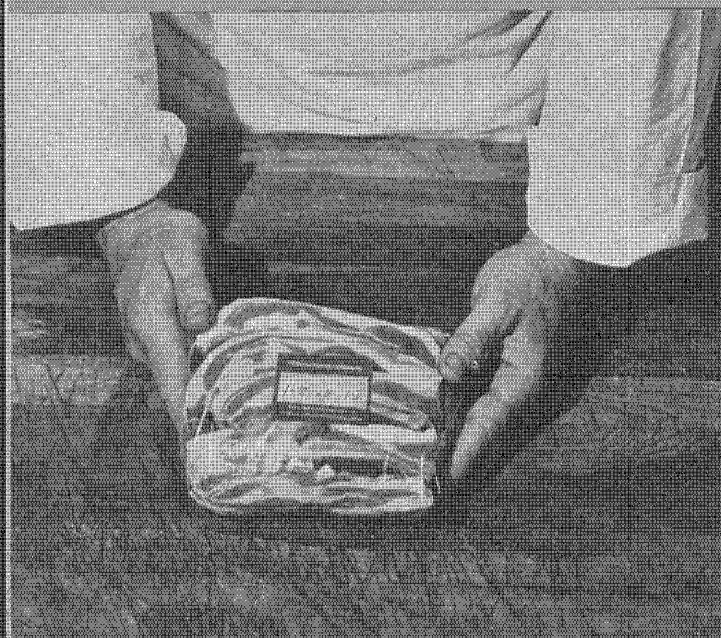
Store operators report that the woman shopper prefers to buy self-service meats for the same reason that she prefers to buy packaged groceries. She can take her time in making a selection because there is no line of waiting customers, and she is more satisfied with her choice after examining all offerings at her leisure. Since meat is a principal item of diet and represents a large part of the food dollar, it deserves special attention. The ability to see all the varied items on display frequently gives her all the information she needs without consult-

ing the butcher behind the counter. And because the meat is already cut, wrapped and labeled, she can complete her purchase quickly and thus have more time to shop for other groceries.

So far as the butcher is concerned, the self-service plan permits him to devote most of his time to his specialty of meat cutting. In nearly every case the increased volume of sales keeps him busy behind the scenes where he can work without being constantly interrupted. Traditionally, behind-the-counter meat service has had to contend with the problem of crowds of customers at certain times of the day. Pre-cutting and pre-packaging permit much of the work to be scheduled more evenly than before. Thus the orderliness and efficiency of a manufacturing operation can be achieved in this branch of retail selling.

Authorities believe that the selling of pre-packaged fresh meats, which was well started before the war, will expand rapidly when peacetime marketing conditions again prevail. This plan, they maintain, serves the interests of both retailers and consumers.

Cellophane-wrapped lamb chops. Package is labeled to show quality, weight and full price information.



Neatly-packed lunch meats, price-labeled and wrapped in cellophane, are popular self-service items.



titanium had no commercial use worth mentioning. In fact, chemistry textbooks published about the turn of the century contained little titanium information. It was considered widely as a rare element.

Titanium is, however, familiar to the mineralogist as a minor constituent or impurity in most minerals. Vast iron deposits long lay idle because of the contaminating presence of titanium. It was out of the research aimed at finding a practical method for eliminating this "impurity" from iron ore that led to the discovery of the great importance of the substance as a pigment. Today, some American iron ores are being mined not primarily for their iron content but for the valuable "impurity."

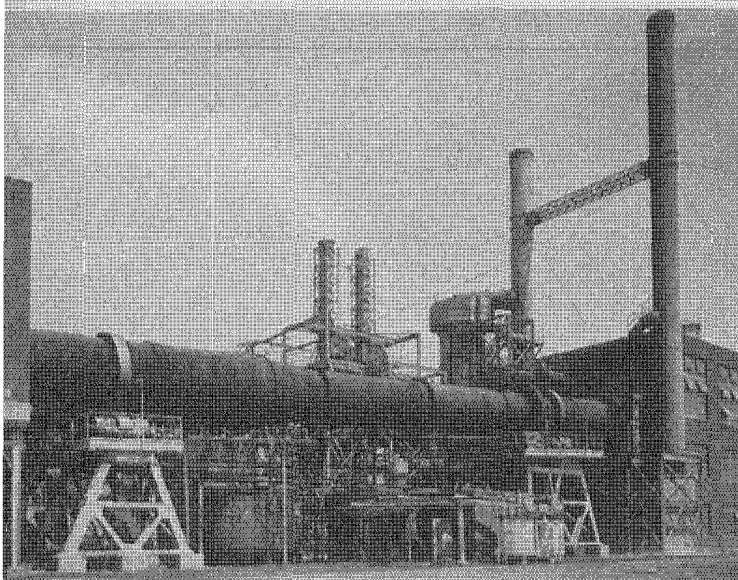
Occurrence

Common as titanium is, few ores contain enough of it to make mining commercially practical. Ilmenite is one exception. The largest-known deposits of high-grade ilmenite lie on sandy beaches along the southern tip of

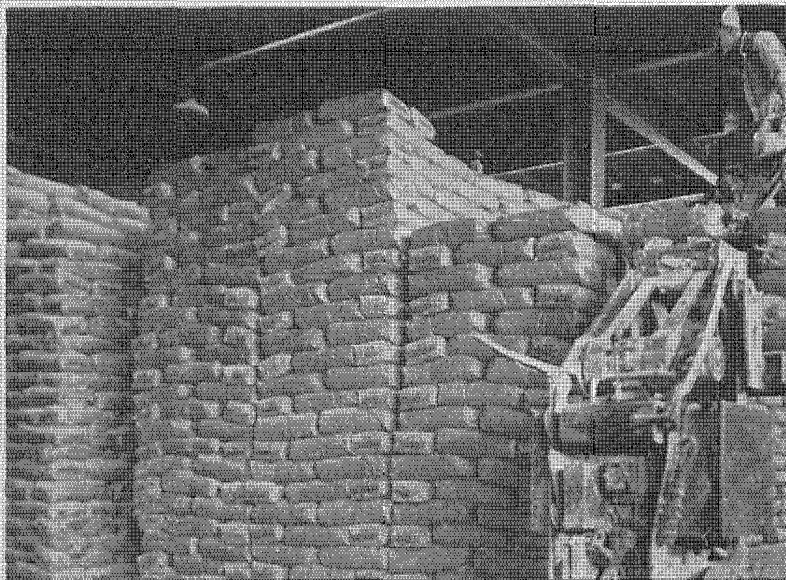
Now the conversion of the black ilmenite grains into the whitest of all white pigments requires some complicated chemical processing with expensive equipment. The DuPont Pigments Department operates two titanium plants, one at Edge Moor, Delaware, the other at Baltimore, Maryland, and both are very busy.

Manufacture

A step-by-step description of the chemistry of changing black sand into white pigment belongs only in a technical journal. It will suffice here to explain that finely-ground ilmenite is dissolved in concentrated sulfuric acid. A violent reaction follows, resulting in a hard, dry mass which is dissolved in water under carefully-controlled conditions of temperature and concentration. After the solution is clarified and hydrolyzed to precipitate the titanium in the form of "hydrate," it is filtered. The solid material is then washed, calcined at bright red heat, and ground. During the calcining operation the "hydrate" is changed to titanium dioxide, and at



In this large rotary kiln, raw titanium slurry is changed to titanium dioxide—white pigment.



The finished product ready for shipment in the warehouse at the Edge Moor plant near Wilmington.

India. This has been the chief source of supply. Lower-grade ilmenite is found in many other parts of the world, including some large deposits on the North American continent.

From time immemorial, Indian rivers have carried down to the sea ilmenite and dirt eroded from the hills. The heavier particles of ilmenite settled near shore, where ocean currents, wind and waves combined to wash away the lighter materials, leaving a black beach fifteen miles long.

Natives gather this sand and transport it to a mill where impurities are removed in magnetic sifting machines. Then the ilmenite concentrate is loaded in small boats and carried to freighters moored offshore and reloaded for shipment to this country. Prior to World War II, cargoes of the concentrate came regularly to America's eastern seaboard ports for further processing.

the same time certain physical changes take place which transform the titanium compound into a snow-white pigment of extremely-high hiding power.

Properties

The history of the development of white pigments shows a constant trend toward higher opacity, which means more concentrated covering power. The reason for this is obvious. The pigment portion of an organic coating usually serves chiefly to conceal the surface covered, and to give it the desired color. The other functions which it frequently fulfills are relatively minor and can be performed more effectively by the vehicle constituents of the film. Consequently, a pigment that will give equal hiding and whitening power at lower pigment concentrations, or greater hiding power at equal pigment concentrations, makes possible better finishes.

The phenomenal growth of titanium dioxide pigments in the past decade may be attributed principally to its high hiding power per unit volume. Wherever a pigment of maximum whiteness and hiding power is desirable, titanium wins by wide margin. On the score of hiding and tinting strength alone it is rated at about 400, based on lithopone as 100. The next "strongest" pigment, zinc sulfide, rates approximately 240. Pure titanium dioxide has a higher light refraction capacity than that of a diamond.

A titanium pigment with a further increase in hiding power and more concentrated opacity was introduced by DuPont in January, 1941. This TiO_2 is the rutile crystal form as distinguished from anatase-type of pre-war days. The development of this better product is expected to have a profound effect on the paint industry, for it makes possible manufacturing coatings of higher hiding power, or paints of equal hiding power that are improved materially in other respects.

Uses

The extended pigments containing 25-30 per cent of titanium dioxide were first manufactured in this country shortly after 1920. They were easier to produce with satisfactory quality, and they possessed what was then thought to be adequate hiding power. Pure titanium dioxide of domestic manufacture first attained large-scale output, beginning in 1928.

Synthetic paint vehicles and titanium dioxide became available about the same time, which was fortu-

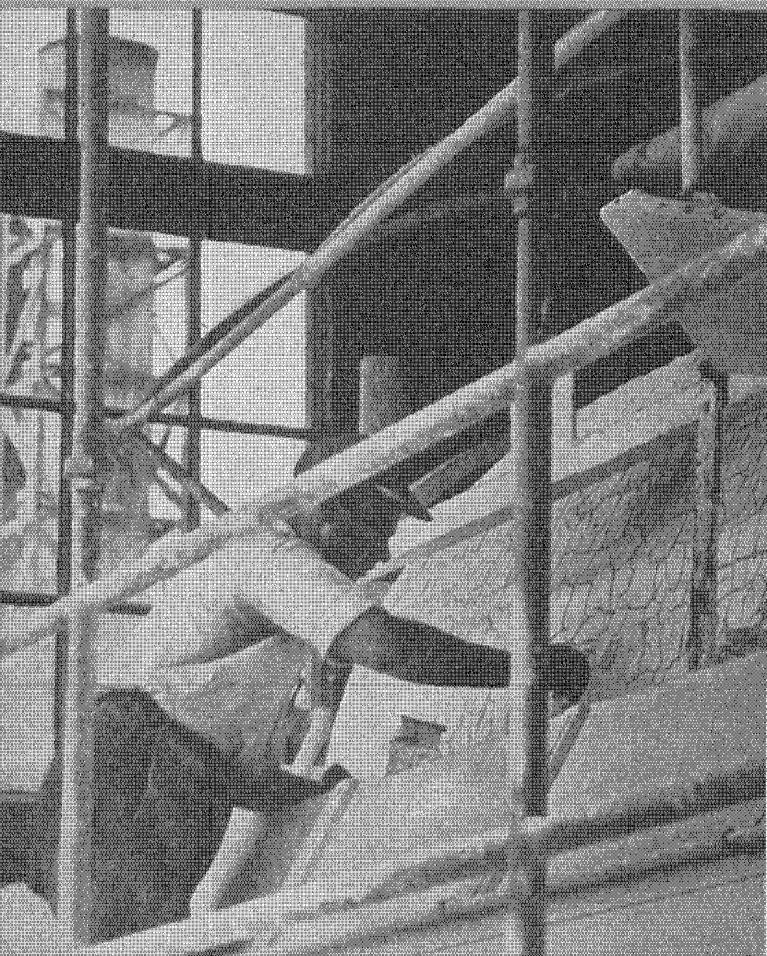
nate. Previously, no pigment was satisfactory for use in the new synthetic vehicles, because of their thick consistency. The older pigments were low in hiding power, so that if one attempted to put enough pigment into such vehicles, the resulting products were heavy pastes that could not easily be spread. Titanium dioxide, with its higher opacity, permitted the use of much less prime pigment per gallon of paint.

Even before the war, titanium had attained the top-ranking position among the white pigments. It holds that place today and will probably continue to do so. Manufacturers of paints and finishes are the largest consumers of titanium products, but the range of uses goes far beyond that field, which is normally a very broad one, and in wartime even more so. The fact is this product has a multiplicity of essential uses intimately related to the war effort.

Titanium dioxide is doing an important war job in electric welding; in Government-specification paints for the Army, Navy and all branches of the armed services; in manufacturing paper products, linoleums, rubber articles, white leather, printing inks, coated fabrics, glass, ceramics, cosmetics, and so on.

This list, if not complete, at least will give you some idea of the importance of titanium dioxide in our nation's wartime economy. Chemical pigment research has been carried forward steadily along with the development of ilmenite deposits in this country. At present, DuPont titanium plants are operating at capacity, consuming both foreign and domestic ilmenite.

An operator at work inspecting the "hydrate" as it is discharged from a large rotary filter.



Yes, TiO_2 has many wartime uses—even as an ingredient of face creams for jungle fighters.



Introducing

PAD • STEAM AND MULTI • LAP

Du Pont technicians have developed new and more economical methods of applying vat dyes continuously

OF ALL coloring materials made for textiles those rating highest in fastness properties are the vat dyes. When properly applied, they are little affected by sunlight, laundering, perspiration and other color-destroying agencies. That fact is reemphasized in our day by a world-wide demonstration of color durability.

America's armed forces today wear service uniforms made from vat-dyed fabrics—uniforms now being tested everywhere in this global war. You may have noticed that the colors are not fading to any noticeable extent.

In contrast, the khaki-colored clothing worn by the doughboys of World War I did fade and wash out badly. Then, European dyestuff manufacturers alone produced vat colors, and when foreign sources of supply were shut off, there was a serious color famine in the United States, if you remember. Today, the American chemical industry is producing vat dyes—enough to meet all of our nation's military and civilian requirements.

Why These Colors Are Long-Lasting

One reason these dyes are so durable is that they are highly insoluble, but they can be made soluble temporarily for the purpose of application. Chemically, this is a reduction process brought about by sodium hydrosulfite in the presence of caustic soda. While the dye is in the soluble form, it has a strong affinity for the fibers and easily penetrates them. Then, on exposure to the air or to certain chemicals, the dye changes back

to its original insoluble form and becomes firmly locked into the fiber.

Improved Techniques

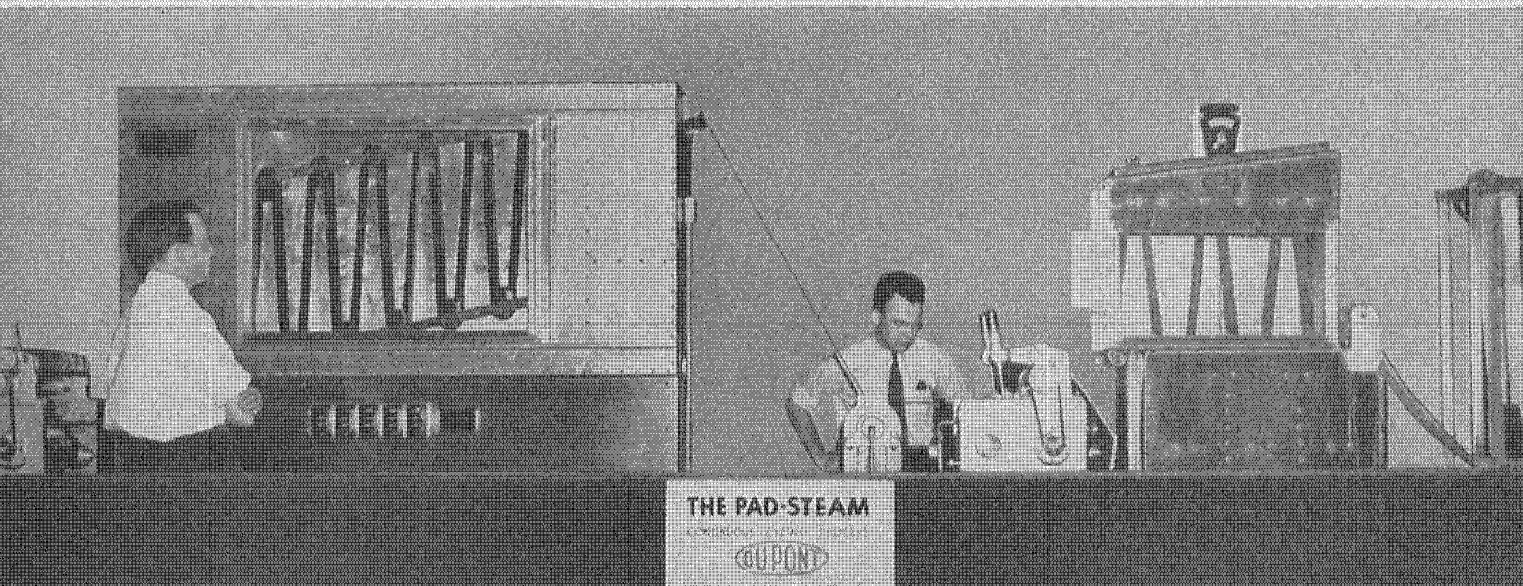
Vat-color durability on cotton cloth is an old story. To a limited extent these colors have been used on viscose rayon textiles, but technical obstacles have stood in the way of applying them to wool and mixed fiber fabrics until comparatively recently. When the military demand for vat dyes reached a new all-time high a few years ago, more intensive research on problems of application was already under way. It has been successful, too. From the Technical Laboratory of the Du Pont Company have come two new methods of applying vat dyes.

Machine Models Previewed

At the recent annual meeting of the American Association of Textile Chemists and Colorists in Atlantic City, the Pad-Steam and the Multi-Lap processes were demonstrated with small working models of two machines set up in the Du Pont Exhibit. Both processes and machines are designed for continuous operation. Both simplify and expedite the work with high efficiency and at low cost.

Time Saved in Processing

The conventional batch method involves a reduction of the dye in a heated chemical solution (120° to 140° F.) from fifteen minutes to an hour or more.



THE PAD-STEAM

CONTINUOUS DYEING PROCESS

DU PONT

It has been known for a long time that quicker results could be obtained by raising the bath temperatures, but prolonged heat at the higher levels usually induced some undesirable chemical reactions.

By the new Du Pont processes, vat dyes are reduced and applied at 212° F. without any loss of chemical stability. And the colors on the cloth are identical in fastness and other properties with those produced under the customary lower temperature conditions.

The Pad-Steam Process

Briefly, here's how it works: The dye, in pigment form, is applied mechanically to the fabric as it goes through a conventional padder. The cloth, when dried, next goes over a cooling cylinder and through a chemical solution. It then passes through an air-free chamber where it is exposed for *less than a minute* to a saturated steam atmosphere at 212° F. or slightly higher. Then follows the usual oxidation, soaping, rinsing and drying of the fabric—and the job is done.

Both pastel shades and very deep shades of colors can be applied with equal facility and with excellent results.

While this process was developed primarily to apply vat dyes to military textiles, experimental work on civilian fabrics indicates that the pad-steam technique will be used to apply these dyes to a wide variety of fabrics.

The Multi-Lap Process

This method is designed to process the more delicate fabrics—those better fitted for civilian peacetime needs, such as ladies' woolen dress goods, spun rayons and various combinations of animal, vegetable and synthetic fibers.

A few years ago Du Pont introduced its patented

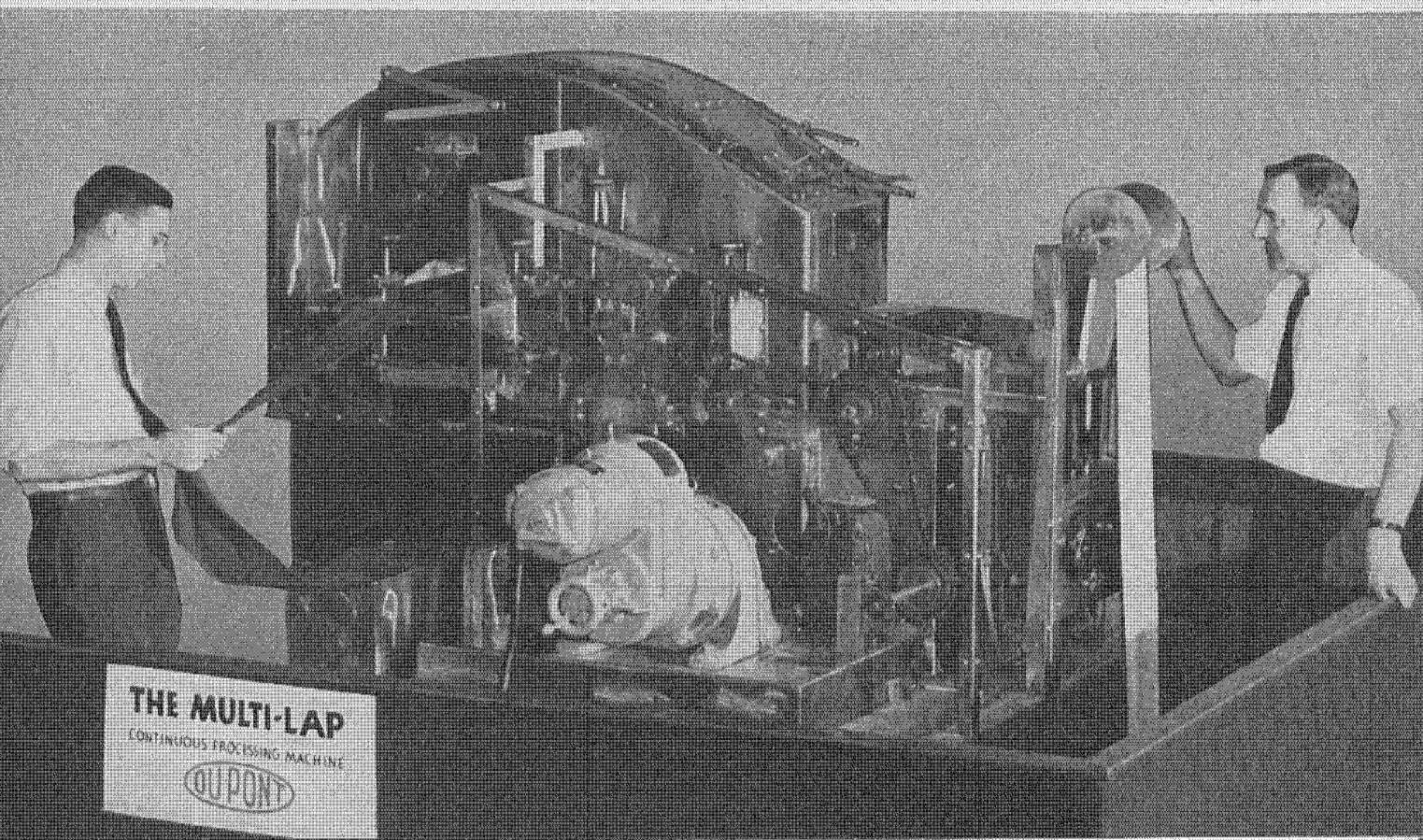
Soda Ash Development process which made possible the practical application of vat colors under mildly-alkaline conditions. The strongly-alkaline baths commonly used in vat-color dyeing have a deleterious effect on wool, silk and other animal fibers. The Multi-Lap machine* provides a satisfactory mechanical means of dyeing such fabrics continuously under positive controls.

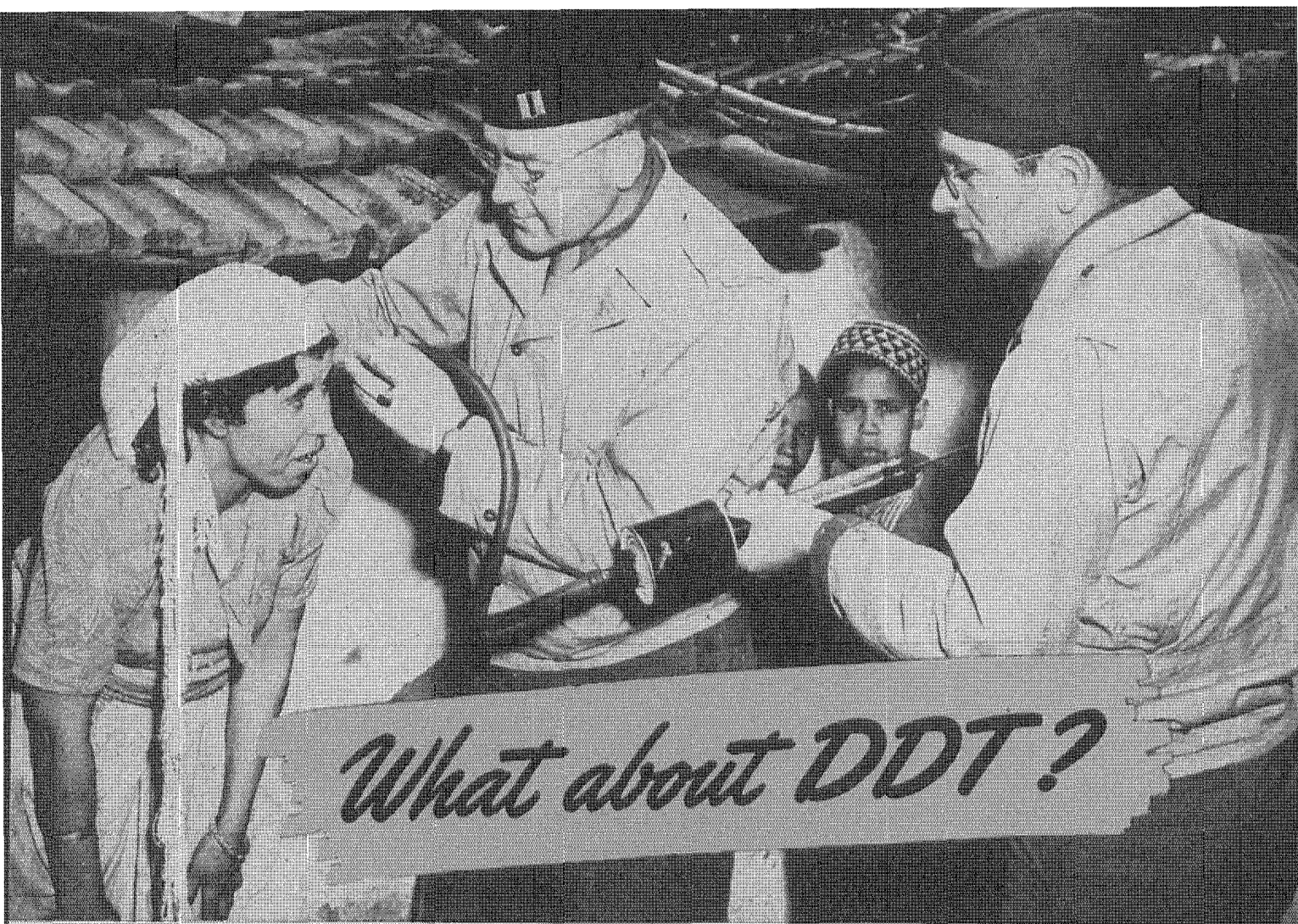
Essentially the equipment consists of a padder and an enclosed development bath and chamber. Considering that delicate fabrics must be processed without undue distortion, crushing or chemical deterioration, wet processing in this unit has special advantages. The cloth is carried through the development chamber on an endless slatted reel or conveyor, and is in contact with the development bath for a surprisingly long time, considering the small size of the unit. It finally turns a right angle and comes out from the center of the reel. Throughout this program there is very little tension on the cloth. This equipment is still in the development stage; however, successful results obtained thus far in experimental work point to its extensive use after the war.

Both the Pad-Steam and the Multi-Lap processes involve much less handling than is required in dyeing fabrics by the batch method. In short, vat-color dyeing has been made less laborious and more economical, thanks to these new processes; they are being made available to the textile industry without cost as a part of the Du Pont Company's technical service to its customers.

The benefits to accrue to the public—the ultimate consumers of textile materials—are already foreseen. More vat dyes than before will be applied to a wider variety of fabrics. The color-fastness of military fabrics, so strikingly demonstrated in this war, will be obtainable in civilian fabrics for personal and home uses.

*Patent applied for.





What about DDT?

After the African landing, an Arab family at L'Arba is reported to have welcomed this dusting team.

IN JANUARY, 1944, dichlor-diphenyl-trichlorethane, now best known as DDT, broke into the headlines of American newspapers. "Army Develops New Insecticide to Destroy Lice." "Paralyzing Chemical 'Hot Foot' Kills Flies, Lice, Other Pests." Sensational stories soon appeared in the Sunday supplements, and some over-zealous writers were more fanciful than factual in reporting this development. As a result some erroneous ideas about this product need to be corrected.

First, DDT is not new; it was produced in Europe at least seventy years ago, but its insecticidal properties were unknown until 1939 when Geigy Inc., Swiss chemical manufacturers, discovered its efficacy in controlling moths and plant lice. U. S. Department of Agriculture entomologists learned about it from Geigy & Company, American subsidiary of the Swiss firm, and made tests to confirm the claim that DDT would also control body lice. It did. The Army soon recommended its adoption as a replacement for the louse powder then in use.

The Grasselli Chemicals Department of the Du Pont Company, a licensee under the Geigy patents, made plans to manufacture DDT. Government authorization was obtained to build and operate an experimental plant at Cleveland, Ohio. This project was rushed to

completion, and the first lot—500 pounds—was shipped overseas shortly after American troops landed in Italy. Even then plans were being made to build and operate a full-scale plant. Before long the Germans had been chased out of Naples, and the stricken city was threatened with cholera and typhus. Thanks to the prompt use of DDT for de-lousing soldiers and civilians, and to other sanitary precautions, the epidemic was averted.

The news about it was released from Washington at that time. Previously, DDT had been a "hush-hush" product.

For months past the new Du Pont plant at Grasselli, New Jersey, has been producing large quantities of DDT for our Army and Navy. In fact, its output is now two and one-half times the designed capacity, and the price has been reduced forty per cent. Other chemical companies, too, have been manufacturing this product because of the increased military demand for it.

While the supply situation is no longer so acute as it was, the entire output is still under allocation by the War Production Board. Permission has been granted to release small quantities for research work by bona-fide organizations. But DDT is not yet available for commercial use.

You have probably read that DDT is an "all-

purpose" insecticide. Pest-control experts say that just isn't so! What's more, they don't believe anyone is likely to discover a product as good as that.

Judging from the thousands of inquiries received since DDT was announced, the public erroneously believes this powdery, white material is a finished product ready for consumer use. That isn't true either. The fact is DDT is the basic ingredient in a half dozen or more military insecticides formulated for Army and Navy use. Each compound contains a little DDT—and a lot more of other components. Some DDT is shipped as 100% concentrate for compounding purposes in the field. But only a little of this is needed to leaven, with lethal power, such bulk diluents as pyrophyllite—a clay—fine-ground talc, solvents, oils, and the like.

DDT insecticides are doing a fine job for the Army and Navy, according to the health authorities of these services. But it is "jumping the gun" to assume that the products compounded for our armed services overseas will meet home-front civilian requirements without extensive modifications, because the conditions and restrictions are different.

If Army or Navy men want to exterminate insect life in any theater of operations, they do a complete job. For example, the first day after American troops landed on one mosquito-infested island in the Pacific, a specially-equipped torpedo bomber "blitzed" the entire area with a falling mist of DDT solution. It didn't matter if all insects were destroyed.

A good deal of laboratory and field experimentation will be required before it is known what commercial compounds of DDT are best for what, how best to apply them, and what precautions must be taken for safety. For example, an effective DDT compound to control household pests will be fine, if its use does not also jeopardize the life of some precious household pet. The

fruit grower who wants to get rid of undesirable insects in his orchard will want a product that will not kill the desirable ones.

The Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, deserves much credit for adapting DDT to meet military requirements overseas, and for evaluating insecticidal compounds containing DDT in the formulations required for peacetime use here at home. Du Pont pest-control experts are now working on these problems. How long it will take them to develop DDT compounds for the many home and farm uses cannot be forecast with any certainty at this time. A great deal of research remains to be done in formulating, manufacturing, packaging, labeling and selling insecticides containing DDT.

Presumably these commercial products will eventually be prepared, packaged and sold for use as dusts, solutions, suspensions, emulsions, aerosols, pastes, and the like, each containing only enough of the DDT ingredient to control the pests involved. Because of the many technical problems to be solved, this work had best be entrusted to professional entomologists and chemists who are qualified to prescribe what formulations are necessary and what concentrations are permissible under Federal and other regulations.

The ease of compounding DDT insecticides has been over-simplified by some popular writers. Readers have been led to believe that DDT can be dissolved in water and applied at will. The fact is, for all practical purposes, unmodified DDT is insoluble in water. However, it can be reduced with many organic solvents. It can also be modified by the use of chemical conditioners to permit its use as water suspensions and emulsions for spray application. The point to be underscored is that the public will have little or no facilities for using DDT, in its pure form.

Another point needs clarification. Readers have been told that all insects are killed immediately on making contact with any surface treated with a DDT insecticide, and that the potency of the product remains undiminished for several weeks after application. Experimental tests have demonstrated that this is true in some cases and with some insects, but not in all cases and with all insects. The claims made by some over-enthusiastic writers have been broader than the facts upon which they were based.

It is hoped that the foregoing notes will help to clear up some of the popular misunderstandings about DDT. This product, as a basic ingredient of insecticides for military uses, has justified many of the claims made for it. An eager public awaits the day when insecticides based on DDT, scientifically formulated, pre-tested in laboratories and in the field, will be available for civilian uses. Perhaps some of these compounds may be ready for sale in the not-too-distant future. When that time comes, it is hoped that the public will be disposed to give such commercial insecticides a fair trial on their merits alone.

EDITOR'S NOTE: More facts about insecticides containing DDT will be reported from time to time in this magazine as products are developed for civilian uses.

U. S. soldiers ditching and spraying with DDT solution to clear up a mosquito-infested water front.



DU PONT ANNOUNCES

"Fabrilite"

"FABRILITE" is Du Pont's trade-mark for its light-weight grades of special-purpose synthetic resin plastic-coated fabric.

Brought to a high stage of development early in the war, these special-coated fabrics are serving American troops at the fighting fronts. They promise, as well, improved fabrics for many purposes after the war.

The idea of a coated fabric is not in itself new. The "oilskins" worn by old-time sailors, for instance, were made of a fabric treated with linseed oil. Quite a number of substances have been used to treat fabrics in like fashion, including rubber, which was especially popular for raincoats.

But when, at the start of the war, the Japanese cut our rubber supply line from the Far East, necessitating conservation of every ounce of rubber and synthetic rubber for the war effort, the whole of the American chemical industry set to work to find a substitute—as it was thought of, at the time—for natural and synthetic rubber used as fabric coatings . . . Now, it is dangerous to ask a chemist to find a "substitute" for anything. More often than not, what he finds turns out to be much better than the material it is meant to replace! And that is just what happened in this case.

The plastic-coated fabrics trade-marked "Fabrilite" by Du Pont are so much better, for many purposes, that

there is no doubt they have arrived on the scene to stay. When Du Pont research was started on the coating problem, only a few days after Pearl Harbor, all of the emphasis was of course on speed, speed and more speed. The aim was to find a coating which would shed water, like rubber, and which could also be applied by regular rubber or pyroxylin-type coating machinery. Otherwise, if new machines were called for, too much time would be lost.

First experiments were therefore made with "Butacite" resin—the Du Pont-made plastic resin used as an inner layer in the manufacture of safety glass. And serviceable rainwear coated with "Butacite" instead of rubber was soon on its way to the Army and Navy. But in the effort to make sure that soldiers and sailors would have the very best raincoats it was possible for chemical science to provide, experimentation was continued.

And as a result of this continued research Du Pont found that special fabrics, treated with "Butacite" and other special plastic coatings, offered a higher degree of efficiency for certain purposes than had previously been thought possible. Mountain troops, for instance, now use a shelter tent of coated nylon—a tent so sturdy that it stands an unbelievable amount of hard usage, but still weighs only a few pounds. In other words,



different coatings may be applied to various fabrics.

It is out of the "know-how" achieved in developing these special plastic formulations that the product Du Pont "Fabrilite" has come.

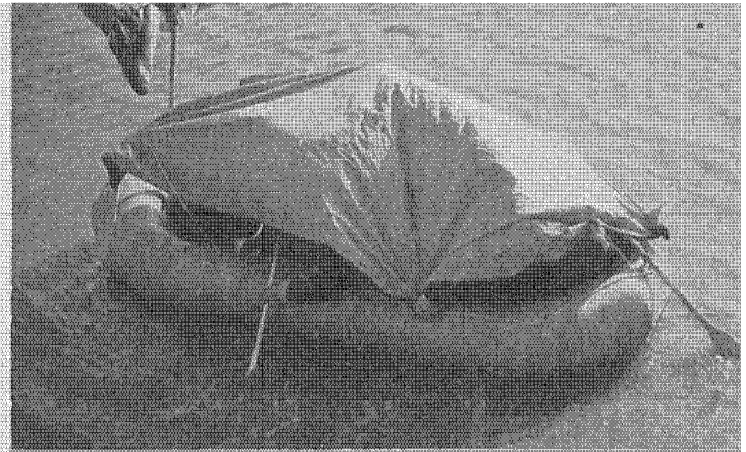
In its original form, the coating material is an undramatic white powder, like so many other chemical compounds. When it is mixed with a plasticizer, however, it becomes what, for want of a better word, may be described as a syrup. This may be either water-white or colored. It is this syrupy plastic resin which is used to impregnate the woven fabric—cotton, rayon, nylon, linen, or whatever it may be.

For war, Du Pont "Fabrilite" serves not only in raincoats and mountain tents but also in ponchos, jungle hammock canopies, life-raft sails and paulins.

It is light, tough, flexible, washable; it resists cracking, stretching and shrinking; it is serviceable at zero temperatures and it is proof against water, cold, wind, dust, perspiration, moths and food chemicals.

As you can see, these same properties—making "Fabrilite" such a valuable material in wartime—inevitably hold out any number of possibilities for your post-war comfort and convenience.

"Fabrilite" may be stitched on a sewing-machine like an ordinary piece of cloth, or it may be cemented or



Life-raft sails and utility covers of "Fabrilite" are handy accessories for airmen awaiting rescue.

sealed by heat. Thus it offers a better material for garment bags, make-up capes, food-bowl covers, baby pants, waterproof ironing-pads, all-weather clothing, shower curtains and caps, hospital and crib sheets, lamp shades and dress shields, to name only a few possibilities.

To dwell on two or three possible adaptations at greater length—have you ever had your eye nearly jabbed out, on a rainy day, because people with their heads buried in their umbrellas didn't see you? Umbrellas made of "Fabrilite" will be almost as transparent as a sheet of window-glass. Their owners will be able to see through them and avoid collisions.

Then—tablecloths. A table covering of oilcloth is a great labor-saver, since it can easily be sponged clean. But an oilcloth cover isn't "dressy" enough when company comes for dinner! . . . Tablecloths of embossed, delicately-tinted "Fabrilite" will be attractive enough to grace your dining-room table at any time.

And, finally, have you ever spilt a bottle of ink, or shoe polish, or shaving lotion inside a traveling bag? A suitcase with compartments lined with "Fabrilite" will prevent that kind of annoying accident—or, if it cannot prevent the accident, it will at least prevent the annoyance!

Here is a new material that has proved its worth in wartime and that, after the war is won, will challenge the ingenuity of America's manufacturers. Woven fabrics have served mankind well for centuries past. Chemical science has now endowed them with new qualities and wider usefulness.

The men who sleep in jungle hammocks think well of the canopies that shelter them when it rains.



Soldiers who must march in stormy weather do enjoy the protection of their light-weight raincoats.



A NON-COLLAPSIBLE "Ventube" flexible air duct for auxiliary ventilation in shiphold construction and in cleaning, repairing, loading and unloading ships has been developed by Du Pont engineers. The improvement consists of a tempered steel helical spring, which is suitably mounted within a sleeve or tube of standard "Ventube" impregnated cloth of either the regular or fire-resistant type. Although the helical-type "Ventube" is designed especially for use in connection with an exhaust-fan system, it serves equally well in a blower-fan system. This improved product, a wartime development, promises to find numerous applications in other industries wherever auxiliary ventilation is needed.

★ ★

A NEW molding compound of "Lucite" methyl methacrylate resin, combining heat-resistance 30° to 40° F. higher than general-purpose powders, has been announced by the Plastics Department of the Du Pont Company.

This new formulation, known as HM-122, has fast "setting" properties, when properly-heated dies are used. It is resistant to breakdown from heat at molding temperatures. These factors contribute to molding efficiency and enhance the clarity of the plastic. HM-122 can be produced in a wide range of transparent, translucent and opaque colors for both indoor and outdoor applications. The entire output is now allocated for essential uses. Articles being made from it include aircraft colored caps for switchboard light signals; parts for sextants and stethoscopes; black-out lenses for military vehicles; air-field landing-light lenses; relay box covers, battery adapters, and control wheel knobs.

★ ★

A SALES OFFICE to provide packaging service to the growing industries of the South has been opened at Atlanta, Georgia, by the Du Pont Cellophane Division. The new office is located in the Trust Company of Georgia Building.

MOLDERS, extruders and other fabricators of plastics will be interested to know that the War Production Board has increased the permissible allotment of polythene for experimental purposes from five pounds to twenty-five pounds per month. That's good news, and it carries an invitation to explore more thoroughly the possibilities of this new resin for both wartime and peacetime applications.



PICTURED below is a simple appliance devised by Alvin H. Potter, still operator at the Du Pont plant in Toledo, Ohio, to up-end filled steel drums. It fits over the base of a standard Colson drum truck, and works so well that the Company is offering descriptive details in the general interest of industrial safety. One man employing this device can easily raise to a vertical position a 650-pound drum,



and a 900-pound drum can be up-ended by two men. More detailed information about this Up-Ender may be obtained by writing to the Du Pont Finishes Division, Wilmington 98, Del.

★ ★

A NEW southern district office of the Pigments Department has been opened in the First National Bank Building at 201 Main Street, Houston, Texas. The states of Texas, Louisiana, Mississippi and Alabama will be served by the new office, making possible more direct service and greater technical assistance to consumers of white pigments and dry colors in that area.

★ ★

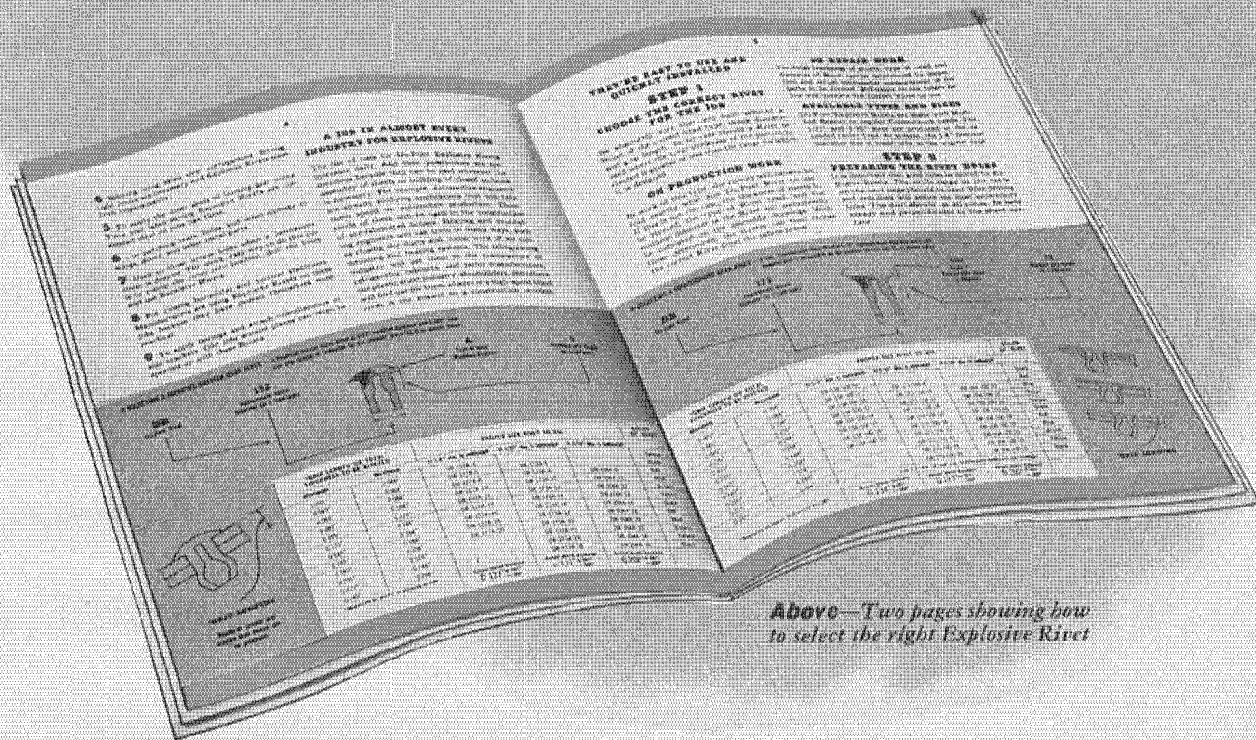
IN ORDER to serve better the agricultural interests of the Northwest and California, the Du Pont Company's Grasselli Chemicals Department has established new district sales offices in Tacoma. The new facilities have been established at Taylor Way and Lincoln Avenue, Tacoma, where Du Pont manufactures lead and calcium arsenate in a plant acquired from the Latimer-Goodwin Company last spring.

★ ★

A NEW addition to the Du Pont family of textile softening and finishing agents is "Avitex" DD fatty alcohol sulfate. It is well recommended for use on cotton and rayon fabrics. Excellent processing results are obtained with these extra advantages: no rancidity, no after odors and no discoloration of the fabrics. For more details write to the Fine Chemicals Division, Wilmington 98, Delaware.

New Manual now ready!

on Du Pont Explosive Rivet



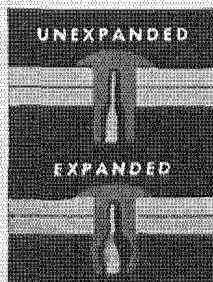
Above—Two pages showing how to select the right Explosive Rivet

FOR THE PAST three years Du Pont Explosive Rivets have helped make aircraft production history. They have helped build better planes and build them faster. As a result today they're being used by most of the leading aircraft builders in America. And tomorrow they'll be doing hundreds of jobs in other industries.

A new Manual, sent upon request, tells all about Du Pont Explosive Rivets. It shows how they simplify riveting in hard-to-get-at places . . . why they do a better job and provide strong, tight joints. "High Speed Blind Riveting with

Du Pont Explosive Rivets" is a working manual chock-full of helpful data, instructions and technical information. Illustrations show typical applications . . . suggest new ways in which these Rivets can serve designers, engineers and production men.

Whether you're in sheet metal fabrication work, the automotive, refrigeration, air conditioning, radio or other industry, you'll find this Manual useful. Fill in and mail the coupon now. E. I. du Pont de Nemours & Co. (Inc.), Explosives Department, Wilmington 98, Del.



Du Pont Improved Explosive Rivets have a cavity extending the full length of the shank. When the Rivets are expanded, the shank completely fills the hole . . . even when slightly oversize. Result: tight joints with high shear and tensile strengths.

**DU PONT IMPROVED
EXPLOSIVE RIVETS**
The only one-piece blind fastener



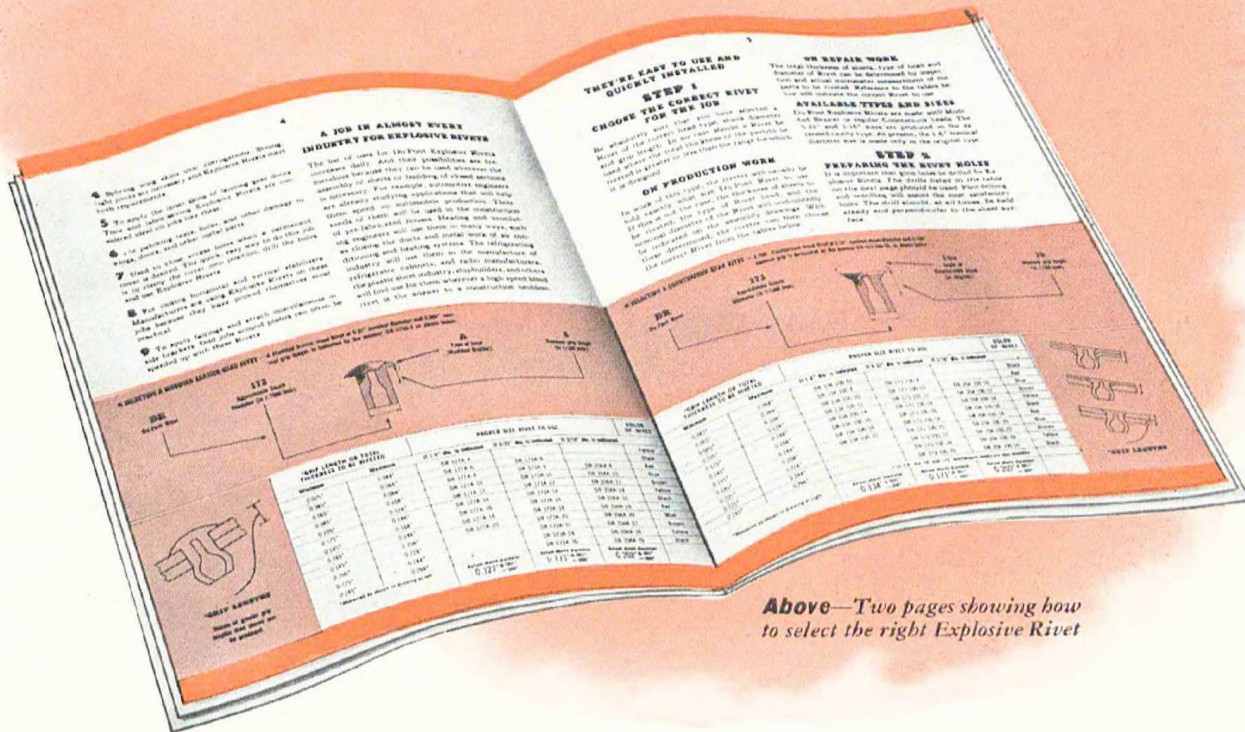
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Please send a copy of "High Speed Blind Riveting with Du Pont Explosive Rivets."



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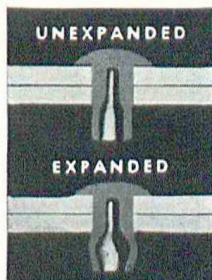
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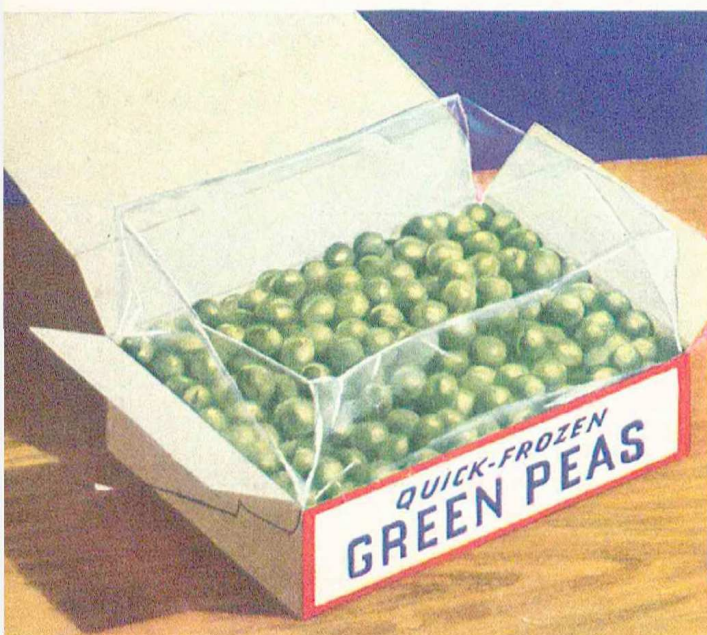


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U. S. GOVERNMENT STATISTICS SHOW 15% WASTE OF FOOD IN HOMES
 The food wasted in our homes is almost as much as we are sending all our Allies!
 They need *more*. You can help by preventing waste in *your* home. *Start today!*



HOW CELLOPHANE HELPS PREVENT WASTE

Quick freezing has done wonders in preserving our food supplies. Take the peas shown here. Maximum protection is necessary to prevent loss of their fresh-frozen quality and flavor. For many years, Du Pont moistureproof Cellophane has been used to meet these exacting requirements. Today, Du Pont Cellophane is protecting vital foods for our armed forces, as well as protecting many of the essential foods you buy for your family.



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