
THE DU PONT MAGAZINE
BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY
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SALUTE TO THE TEXTILE INDUSTRY



AMERICA'S great textile industry—faced with demands from our globe-girdling armed forces, and from 130,000,000 civilians at home—has stepped up its production to all-time highs.

Spindle hours have increased by 71 per cent, loom hours by over 100 per cent, output in yards of goods by 95 per cent; all in comparison with the better-than-average year 1938.

The textile industry has successfully worked out scores of new yarn and fabric constructions for the planet-wide needs of Army, Navy and Air Force.

Camouflage fabrics, parachutes, wind-resistant and rain-resistant clothing, sleeping bags for the arctic, mosquito-proof hammocks for the tropics—such products of the textile industry are but a small clue to the hundreds of problems it has solved in collaboration with the procurement services of our armed forces.

As the mills run night and day producing civilian and military fabrics, so also are Du Pont plants running on non-stop schedules, helping to meet quotas and speed production by furnishing an unending supply of dyestuffs, bleaches, solvents, water repellents, rayon and nylon yarn—to name only a few of the hundreds of necessary items made by Du Pont for the textile industry. *Chemicals collaborate with textiles*

FOR VICTORY

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THE DU PONT MAGAZINE

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DU PONT IN THE WAR

"The ability of the American chemical industry to cope with the problems of an unexpected war is the direct result of its diligence in peacetime to keep abreast of progress in a changing world . . ."

READERS of this publication may be interested in the following information presented in the annual report of President Walter S. Carpenter, Jr., to stockholders of E. I. du Pont de Nemours & Company:

DYESTUFFS

"Du Pont is now supplying more than half of all the fast vat dyes required for cotton uniforms and similar equipment by the Government, as well as a substantial portion of the dyes for military woolen goods. Other American plants are furnishing the balance. In addition, an ample capacity exists in the industry to supply all essential needs of civilian customers for dyes, subject to substitutions in a few dye groups and to the governmental allocation of raw materials. . ."

NEOPRENE

This product was placed on the Government's first "mandatory priority" list on March 7, 1941. Two months later "the Company was producing approximately 6,000 tons of neoprene annually and was making provision to produce an additional 13,000 tons. . ." That was before the Japanese conquests in the Far East put emphasis on neoprene as a general replacement for rubber. "The Company's second neoprene plant, under construction in Kentucky, was acquired by the Government. An enlargement of it was ordered, the Company continuing as builder and operator on a fixed-fee basis. . ." Following a recommendation of the Baruch Commission in September, an order was received to increase neoprene plant capacity to a total of 69,000 tons annually.

Du Pont is making every effort "to complete the authorized expansions as quickly as possible. However, failure to obtain allocation of sufficient essential materials is delaying construction of this plant."

NYLON REPLACES SILK

Rapid expansion of facilities for the manufacture of nylon yarn . . . was already under way with Du Pont funds when the silk embargo went into effect late in 1941. "Since then, the entire output of the Company's two yarn plants, which are now operating at full capacities, has been reserved by the Government for military purposes, to the exclusion of its use for hosiery and other civilian goods.

"Nylon's unique ability to replace silk with a stronger, more versatile fiber has enabled the Government to carry out successfully vital phases of its air program which otherwise might have been retarded materially. Also, nylon filaments are relieving a shortage of Asiatic bristles once used widely in all kinds of brushes.

AMMONIA AND MILITARY EXPLOSIVES

"Synthetic ammonia is a basic raw material of modern military explosives. The need for a vastly-greater output than could be supplied by all 1939 facilities was foreseen early and steps taken to augment Du Pont's own capacity. This action made it possible to save months in bringing into production a large new synthetic ammonia plant, which was built and is being operated by the Company for the Government.

"The chemical industry now has facilities to produce . . . at low cost, more than double the nation's normal consumption of nitrogen-bearing compounds for fertilizers and all industrial uses. This . . . relieves the nation, in this most critical period of its history, of almost complete dependence upon the supply of natural nitrate from Chile. Further, cargo ships . . . are released for other essential tasks.

"Likewise fortunate was the fact that Du Pont had continued, through the interval between the two World Wars, the manufacture and improvement of military smokeless powder, tetryl and TNT. These are the chief explosives required in the nation's war effort. Though making up less than two per cent of the Company's peacetime business, their manufacture served to keep in training a group of some 300 employes, who became the nucleus for the tremendously-expanded force required in the Company's war production of these products.

"Today, growing from the 'know-how' and experience kept alive in this small group, the Company has performed for the Government in two years nearly twice as much engineering design and construction work as it did for itself and its clients on all commercial projects between the close of the First World War and the outbreak of this one. The volume of engineering and construction work is now about seventeen times that averaged annually for the entire Company between the two wars.

PROJECTS IN FOURTEEN STATES

"Du Pont has been given responsibility for work in connection with Government-owned ordnance projects in fourteen states, including extensive engineering ser-

vices furnished to ordnance projects undertaken by other companies that lacked previous experience in such work. The scope of the program . . . has expanded far beyond anything originally visualized.

"However, completion dates for all Du Pont-built plants have been met, generally in advance. Contract estimates of plant unit capacities have been realized for all of the more than twenty separate products involved. For smokeless powder, tetryl and TNT, the products of largest volume, they have been exceeded substantially.

"The quantity of explosives contemplated in this program, and in large share now being delivered, is far greater than was manufactured by the entire American explosives industry for all of the country's earlier wars combined.

Savings, Fees and Profits

". . . Much larger outputs per unit than originally thought attainable have made it possible to gain the volume of production required with many fewer units. This has made unnecessary the building of several additional explosives plants. The overall construction savings to the Government are estimated as being in excess of $260,000,000; in addition, critical materials, time and manpower which would have been required have been made available for other essential purposes. Better methods have also reduced manufacturing costs per unit of finished product.

"In no way do these savings augment the Company's own compensation under the contracts. Construction fees and overhead allowances received are in the form of stipulated or 'fixed' amounts, payable to the Company in installments at successive stages of the work. Operating fees are also 'fixed' amounts paid on each unit of the product manufactured, subject to contract orders in every instance.

"The Company has reduced both construction and operation fees as the scope of the Government's program increased, with the result that the rates of compensation on all major ordnance projects assigned to it are now substantially lower than at the inception of the Defense Program in 1940.

"For the period 1940 through 1942, after deducting applicable administrative costs, taxes and certain out-of-pocket expenses for which the Government does not make reimbursement, the Du Pont Company's net profit on all construction work performed by it for the Government amounted to fifteen one hundredths of one per cent (15/100%) of the cost to the Government of the Du Pont-built plants.

"On the basis of production actually completed by plants operated for the Government, for the period 1941 and 1942, and after deducting taxes and nonreimbursed costs, the Company's net profit on Government-owned plant operations was approximately one per cent (1%) of the cost of the products manufactured. . .

"This service includes the turning over to the Government of Du Pont-developed processes and 'know-how' essential to the success of the explosives program as a whole, with a free license under a group of patents enabling the Government or any company it designates to use the patents without payment of royalties. As a result, at least seventy per cent of all military smokeless powder that has been scheduled for manufacture in plants built or being built for the United States Government is of Du Pont's development. When the TNT lines now scheduled are all built and in operation, the amount of TNT to be made by other companies under Du Pont processes will be greater than that made by Du Pont. . ."

Employes Loyally Support Nation

"The explosives program assigned to the Company has necessitated the assembling and training of a new organization that in size is about equal to the total organization employed by Du Pont in its own commercial plants.

" 'Munitions' today embrace things once considered as far removed from that category, even as far as hosiery yarn and paint brushes. Workmen who may be thousands of miles from the battlefront are, in fact, a part of it. A superior industrial supply service is the backbone of the victorious modern army.

"The thorough realization of these facts pervades all ranks of Du Pont employes, and their loyal and unswerving support of the nation in this crisis is reported with pride.

"Employes have conserved manpower and contributed to a greater production by their increased attention to the prevention of accidents. The following tabulation shows the safety record achieved by Du Pont employes in 1942 and certain prior years:

NUMBER OF "MAJOR INJURIES"* PER MILLION MAN-HOURS WORKED

For Year	In Du Pont Plants
1920	15.08
1925	13.80
1930	4.04
1935	2.10
1940	1.55
1942	1.17

*An injury involving (a) loss of time other than the shift on which injury occurred; or (b) loss of function of a part of the body.

"The foregoing tabulation shows that in 1920, for every million man-hours worked in Du Pont plants, there were about fifteen accidents involving the loss of time from work, whereas in 1942 the rate had been reduced to slightly more than one accident for every million man-hours worked. Although the 1942 rate for American industry as a whole is not yet available, the 1941 rate was 15.39 major injuries for each million man-hours worked. . .

"More than ninety per cent of the Du Pont employes are buying War Savings Bonds through payroll deductions. These deductions total over eight per cent of all monthly salary and wage payments. On its part, the Company has contributed $144,000 to the Red Cross, U. S. O. and Navy Relief Society, in each case allocating parts of the contributions to collecting agencies in the localities of plants and offices.

"More than 19,000 Du Pont men and women, including 9,000 who were employed in war plants, are now

(Continued on Page Fifteen

TEXTILES IN ARMOR

Above and beyond its specific contributions to the war, the Du Pont Company offers something else to the nation—an organization, each department of which pools its knowledge, its skills and its products to render an overall service. The story of Du Pont armored fabrics illustrates what is being accomplished by organized teamwork.

The "Fabrikoid" Division, manufacturing coated and impregnated textiles for war, may be thought of as a citizen in a town blessed with an efficient police, fire and water service. He may need any or all of them in an emergency. Similarly, the "Fabrikoid" Division in its war work calls upon other Du Pont divisions and departments to supply the materials it needs, such as rubber chemicals, fire retardants, dyestuffs, cellophane, pigments, plastics, nylon and the like. The products mentioned here are a composite of many materials, plus the "know-how" of an entire organization working together.

—Editor.

By FRANK R. PRICE

IT WAS still night, but there was a glow in the East—and a more ominous glow astern where two red geysers of flame marked torpedoed ships of the vast convoy. The loud-speakers muttered, in their metallic voices: "*Batter up.*"

Now land could be made out; a blacker line on the horizon just before dawn. Landing nets were dropped over the side. Men stopped whispering. The speakers muttered again: "*Play ball!*"

All down the line of the first ships to work inshore the whistles shrilled. There were short, barked commands. The landing boats hit the water. The invasion of North Africa was on. . .

On the arm of the first American soldier to leap ashore, on the arms of the men following him, could be seen bands of white cloth stencilled with the Stars and Stripes. These armbands were made of white "Fabrikoid" pyroxylin-coated and impregnated fabric. And they were symbolic of the wartime uses of Du Pont coated fabrics—symbolic, because they solved a problem and made a war maneuver go more smoothly.

No one would maintain—Du Pont least of all—that coated fabrics will win this war. That would be absurd. But they are accomplishing a hundred and one tasks, small and large, which will help greatly with the winning of the war. This is their story. It is the story of the wartime accomplishment of the "Fabrikoid" Division of the Du Pont Company, manufacturer of armored fabrics.*

The Du Pont Company has gained more than thirty years' experience in manufacturing coated textiles—years that now serve the Company and our armed forces in good stead in solving wartime problems. The Rubber Chemicals Division of Du Pont pioneered in synthetic rubber research, and the "Fabrikoid" Division has worked with synthetic rubber as a fabric coating since 1936. ("Fairprene" neoprene-coated fabrics were the first successful commercial products of their kind.) Today, the Du Pont Company coats and impregnates fabrics with pyroxylin, rubber, synthetic rubber and synthetic resins. With its Newburgh plant manufacturing pyroxylin and synthetic resin-coated fabrics, and with the Fairfield plant producing synthetic resin as well as rubber and synthetic rubber-coated fabrics, Du Pont has a wide choice of coating materials from which the coating best suited to any war product may be selected.

Global war has given us a new conception of our earth as a water-coated ball dotted here and there with land masses. Aviators have long known what the rest of us are only beginning to realize keenly—that in most parts of the world a plane, forced down, will land on water rather than on solid earth.

Everyone has felt concern for the men who have brought their planes down on the sea and drifted on rafts for long, torturing weeks. Nowadays, manufacturers are trying to make these collapsible safety rafts more "livable," if such a word can be applied to them.

Life-raft utility-fabric, manufactured by Du Pont, serves as a roof over the raft, protecting the men on it against salt spray and burning sun and to a certain extent safeguarding their food and equipment. This fabric also serves as an emergency sail. Coated in blue on one side, it camouflages the raft and makes it difficult for an enemy to see. Bright yellow on the reverse, it may be turned over to attract friendly searching planes. A resin-coated fabric was developed especially by Du Pont to provide a raft covering that is waterproof, light enough

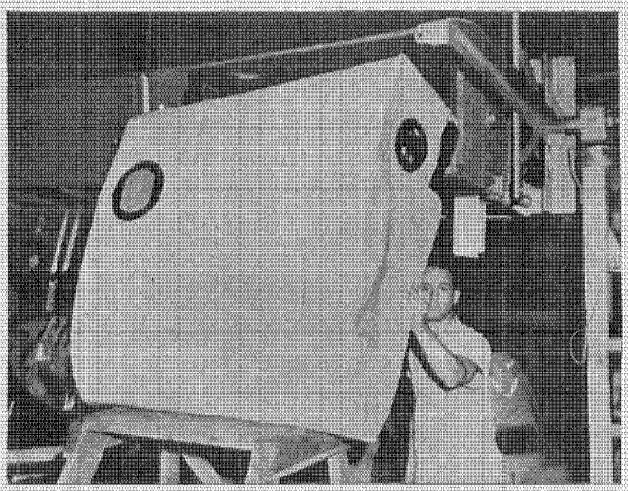
*Armored fabrics are cotton, rayon, asbestos, glass, or other textiles coated or impregnated with cellulose nitrate, rubber, synthetic rubbers, or synthetic resin compositions to protect them against exposure conditions encountered in modern warfare.



Officers and men at battle stations in the Pacific war zone. The life-jackets they are wearing contain kapok-filled bags made from a waterproof synthetic resin-coated fabric.



A radio operator at work in the field during Army maneuvers. The linings designed to protect his equipment from dirt and moisture are made from "Fairprene" neoprene-coated fabrics.



Fuel tanks of this type are installed in combat planes. If punctured by a bullet, they are self-sealing, thanks in part to the use of an inner lining made of Du Pont "Fairprene."

to be folded and stored in a small space, and proof against heat and cold.

A parachute is of course made of fabric, too. And tens of thousands of them are made of Du Pont nylon, as everybody knows. But not so many persons know that, strapped to every paratrooper's pack, there is a small, sealed kit holding a first-aid bandage, a tourniquet and a morphine tartrate syringe. Equipment for self-help in emergency, this kit is made of a fabric coated with a heat-sealing resin composition to protect its contents.

The kapok-filled life-preserver jackets worn by sailors are made of a lightweight fabric coated on both sides with synthetic resin compositions. Waterproof and air-tight, they are keeping many a man afloat on the high seas.

In building military planes, the control surfaces—that is, the rudders and ailerons of metal planes—as well as most surfaces on gliders and primary trainers are covered with a special airplane cloth. This cloth is then coated with brush and spray deposits of lacquer, to armor it against ripping and against the penetration of air and water. Or it *used* to call for such extra coating! Now, thanks to new techniques in coated fabrics, time and money are saved, for this cloth is pre-treated at the factory with lacquer compositions based on cellulose esters, and is available in rolls as tape and in wide widths, ready for immediate use in speeding America's production of war planes.

Coated fabrics also help to build many planes that are made of plywood rather than metal. Trainer planes and gliders and even giant transports are made of plywood. In the Vidal process thin wooden sheets are first treated with an adhesive, dried and then bent and shaped over a mold. With a complete section assembled, a vacuum bag is drawn around it and sealed, after which the assembly is placed in an autoclave where the air is sucked out of the bag, making it squeeze the plies tightly against the mold during the final curing or bonding process under heat and pressure. The giant vacuum bags are made of fabric either coated and impregnated with a "Fairprene" synthetic rubber compound or with special heat-resistant rubber compound. These types of fabrics have definite advantages because most other coated fabrics break down, with continual use in the autoclave under such heat and steam pressures.

Treated fabrics of one sort or another are used in many places within a plane. "Fairprene" neoprene sheet stock and coated fabrics, for instance, were instrumental in helping engineers to solve the problems of power, speed, efficiency and altitude range of the Bell "Airacobra," the Republic "Thunderbolt," and many other types of war planes. "Fairprene's" oil and heat resistance makes it far more efficient than other materials for carburetor diaphragms, oil seals and gaskets. "Fairprene" cements, adhesives and calking compounds make fuselages tight and proof against corrosion.

One of the most important plane-equipment problems in which "Fairprene" has made a pioneer contribution are the self-sealing fuel cells for combat aircraft.

As far back as 1936, "Fairprene" coated fabrics were used as the lining material for bulletproof self-seal-

ing fuel cells in war planes used by the Chinese in the war against Japan. Later modification of these lining materials found wide use by our own Army and Navy for combat plane self-sealing fuel cell equipment. "Fairprene" has made another most important contribution, as a faring material used in the construction of the patented Hamilton Standard propeller. Here "Fairprene" compositions are used with a special cementing system to bond the hard rubber sponge shape to an aluminum core, whereupon this rubber shape is then covered with "Fairprene" to form a hard smooth-surfaced lightweight blade—highly resistant to the abrasive action of dirt and of ice. Also vital to the electrical engineering of high-speed combat planes and heavy bombers is the development of semi-conducting "Fairprene" tape for wrapping high-powered transmission cables to prevent power loss from so-called "corona" effect. Without this protection modern aircraft motors couldn't operate at such a wide range of temperatures and altitudes. Incidentally, this same semi-conducting cable tape makes possible the safe and efficient operation of the new lightweight X-ray equipment which can be quickly and easily transported by air to the fighting front and moved about in the field where it can help to save lives on the battlefield.

Finally, planes as well as pilots must be protected. The transparent plastic noses, gun-turrets and cockpit covers of war planes, when on the ground, are shielded against dirt and dust and the weather in general by tight-fitting waterproof jackets and covers. These are made of a coated fabric which stays flexible no matter what the thermometer says, and which may be easily folded into compact bundles for storage and transport aboard the plane.

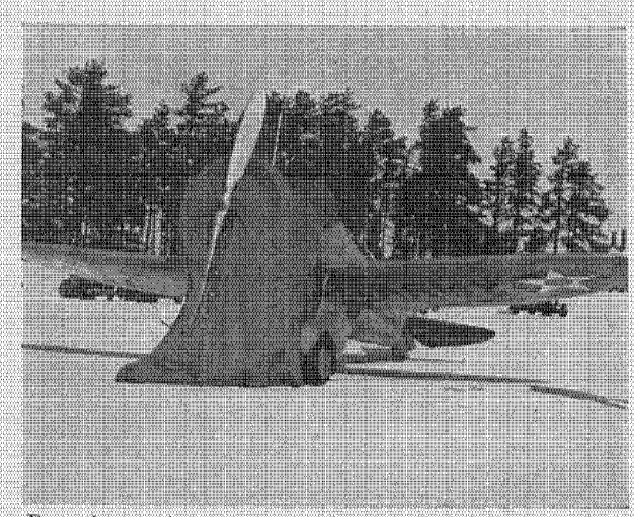
As armored fabrics are serving the air arm, so they are serving the Navy.

Not long ago the newspapers were carrying the story of a tragic accident in the operating room of a hospital. A woman lay on the operating table. The surgeons were ready to operate on the unconscious patient. At that moment the gaseous mixture of ether and air in the room exploded; it had been set off by static electricity—the same kind that makes your fingertips "spark" when you touch a metal doorknob on a dry day.

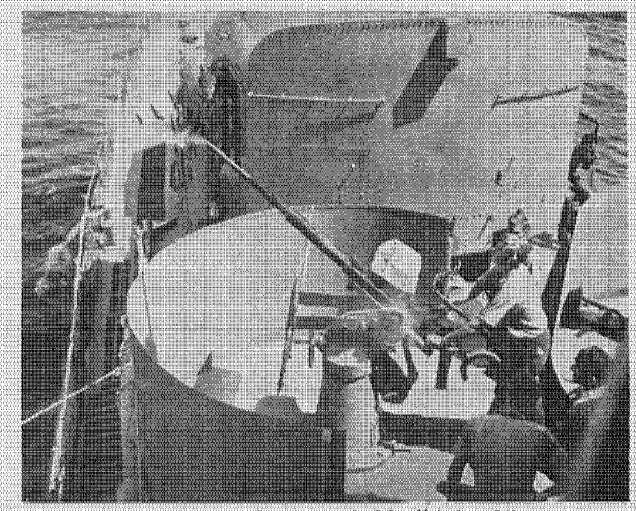
As it happens, static electricity is especially troublesome on shipboard. So, at the request of the Navy, Du Pont developed a non-static or conductive type hospital sheeting. Today, ships of our fleet, as well as hospitals ashore, use this special type of sheeting which is a neoprene-coated fabric, pigmented with a material that is an electrical conductor and carries off the static electricity.

"Fairprene" cable tape was the pioneer development which made it possible to provide the Navy with a completely vulcanized and fire-resistant electrical transmission cable for use in warship construction. "Fairprene" insulating cable tape helps to make our ships highly efficient in operation and safe against fire hazards. "Fairprene" sheet stocks are used in the construction of the degaussing cables, now in general use on fighting ships as a protection against magnetic mines.

The word "protection" comes up again and again in



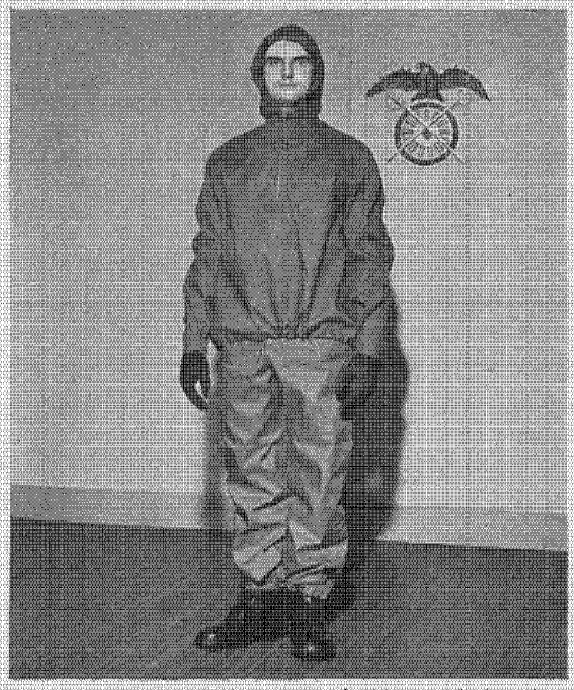
Projection against stormy weather is afforded by a synthetic resin-coated engine-and-cockpit cover like the one pictured here. View shows a pursuit plane on a New England airfield.



The hood over the mechanism of this "Ack-ack" gun on a destroyer is made from "Fairprene" neoprene-coated fabric, but not the bag below which serves only to hold empty shells.



Two types of equipment to keep sailors afloat at sea. At the left is modeled one of the life-jackets. Kapok enclosed in bags of synthetic-coated fabric insures buoyancy. Right, the rubber belt, which the wearer inflates by blowing air into it.



An Army rain suit. Fabric is coated with a synthetic resin.

any discussion of the wartime applications of armored fabrics.

The problem of shielding men of the Navy and Merchant Marine from the stinging winter gales of the North Atlantic, for instance, has been solved by the creation of special clothing—clothing depending for its efficiency upon the wind and water-resistance of coated fabrics. In sub-zero weather, the ordinary kind of pyroxylin or oil-coated fabrics would stiffen to the point where the men of the deck-watch would find themselves imprisoned in stiffened strait-jackets. So it was necessary to develop, for the outer covering of big, burly sheep-lined coats, a special drill fabric coated with synthetic resin. Cold-weather garments for use at sea also include jackets and trousers made from a jean cloth covering, and a melton cloth lining with a resin-coated rayon fabric inner-liner. Such armored fabrics keep the men on deck duty from freezing in the Atlantic's icy winds. They are worn, as a rule, with a helmet, face-piece and goggles. The resin-coated inner-liner is supple and light in weight.



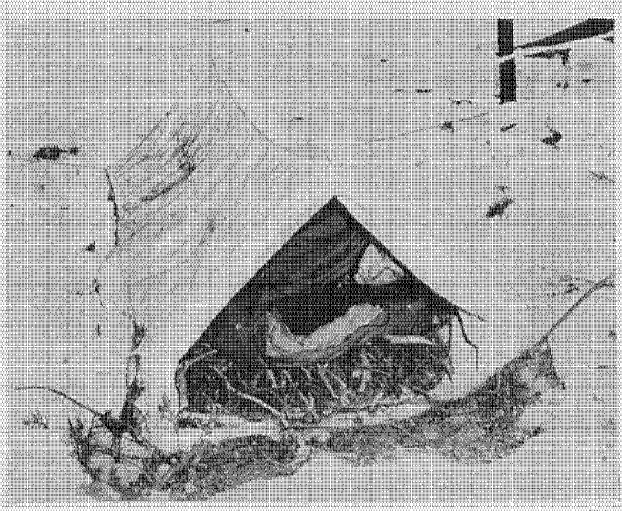
Bound for Iceland. This soldier is wearing a raincoat made from a fabric coated with "Butacite" polyvinyl acetal resin.

The Navy asked for a cloth that could resist a hydrostatic pressure—water-pressure, roughly speaking—of seven pounds per square inch. The fabric developed by Du Pont withstands a pressure of twenty to twenty-two pounds.

In combat, when a ship strips for action, sailors must stow away their bedding, spare clothing and any other belongings that might catch fire. This precaution is taken to prevent flames from spreading within the crew's quarters. For this purpose a special bag has been developed; it's coated with a fire-retardant synthetic resin.

It is a toss-up whether armored fabrics are proving more useful to the Army or to the Navy. If anything, the Army probably uses a wider variety of them than the Navy does.

One of the first problems which faced the Quartermaster's Corps upon the outbreak of war was that of furnishing millions of our fighting men with weather-proof clothing. And when it came to raincoats, the Army collided abruptly with the rubber shortage. With the Japanese controlling ninety per cent of the world's supply of rubber, how were American soldiers to be provided with raincoats?

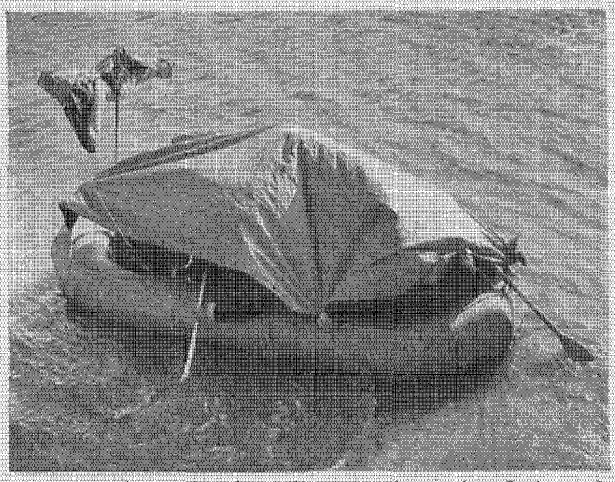


Synthetic resin-coated fabric serves to advantage in the reversible mountain tent; one side is olive-drab, the other, white.

Du Pont chemists cast a speculative eye upon the "Butacite" polyvinyl acetal resin used as an interlayer in safety-glass windshields. They knew already, thanks to long years of peacetime research, that this resin, when compounded with certain other resins, behaved much like rubber compounded with sulfur. It could be worked on regular rubber machines: samples of the special "Butacite" compound had already been tested. Going ahead, Du Pont found that a fabric coated with "Butacite" saved about a half pound of rubber per raincoat. Not only that, but it cut down the overall weight of the coat by about two pounds, because with "Butacite" it was possible to use lighter-weight fabrics. Hundreds of thousands of raincoats are being made of fabric coated



A new life-raft for emergency use of Flying Fortress' crews. The reefed sail pictured is made from a resin-coated fabric.



This view shows also the utility cover in service. It is made from a synthetic resin-coated fabric. One side is yellow for identification, the other side is blue for camouflage.

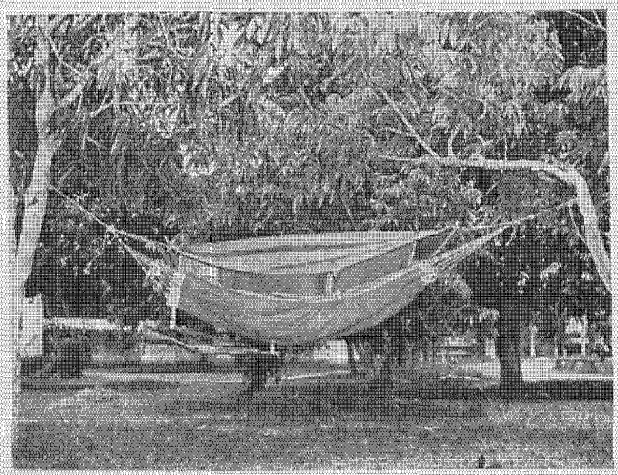
with this chemical film. In many respects these new raincoats are better than the old rubberized ones. They stand up much better in hot weather in the tropics, and stay flexible in the sub-zero temperatures of the arctic. This resin coating resists the effects of gasoline and oil, and also withstands sunlight better than rubber.

(Incidentally, it is worthy of mention that the Army field jacket—regarded by many persons as the most efficient piece of uniform clothing ever supplied to an army—is made of fabric treated with "Zelan" durable water repellent, another Du Pont product.)

In Alaska they call a sudden violent freezing wind ripping down the mountains a "williwaw." A williwaw is often strong enough to knock a man down or tear the roof off a building. American troops in Sitka, Kodiak, Anchorage and Dutch Harbor, when on the march, carry mountain-tent sections made of a synthetic resin-coated fabric. Two sections fastened together make up a two-man tent. Or joining a number of sections together makes a large shelter. The fabric—olive-drab on one side, snow-white on the other—is designed for use in wooded or snow-covered terrain. It is flexible enough to withstand folding and unfolding in zero temperatures; strong enough to resist the fury of terrific winds; light enough to fold into a small pack, and impervious enough to keep out all rain and moisture—a war fabric made to really heroic specifications!

Soldiers on mountain duty are also supplied with a new kind of sleeping bag, which has an outer fabric coated with a synthetic resin to keep out cold and damp. A built-in, kapok-filled pad insulates the sleeper from the ground. And the same soldier's food may be carried to him in a fabric bag coated with a synthetic resin.

At the other end of the thermometer scale, American soldiers are fighting in the steaming hot tropical jungles. Under such conditions coated fabrics are serving so well that it is difficult to imagine any other material which might replace them. Jungle sleeping equipment is a typical example. For the American soldier on jungle duty there is now manufactured a comfortable hammock



The canopy of this jungle hammock is made from a waterproof fabric coated with synthetic resin. Occupant is protected by an overall mosquito net with a slide-fastener closure. The rifle slung below the hammock is handy just in case. . .



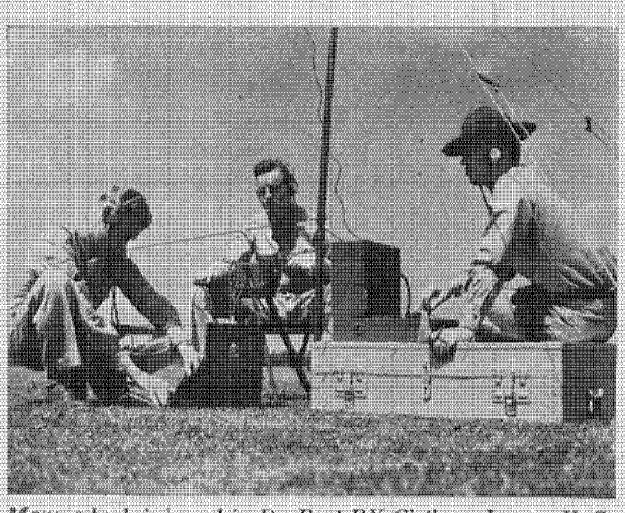
Soldiers can keep warm even in Alaska. The new Q. C. eleven-pound sleeping bag consists of a synthetic resin-coated fabric outer shell filled with down and feathers, and a kapok-filled mattress pad, the fabric of which is coated with "Butacite."



Dressed for jungle warfare and with a deep stream ahead, this soldier is inserting in his one-piece camouflaged uniform a "flotation bladder." The life-preserver cover is made from a fabric coated with an uncured "Butacite" resin composition.

which may be slung between two trees. It is complete with a mattress pad, a netting to keep out tropical insects, a sling for the soldier's rifle and a waterproof covering that fastens with a zipper. It is virtually a small house which hangs in the air on the supporting hammock ropes. The synthetic resin-coated fabric canopy is light in weight and, what is more important, proof against rain, dampness and mildew.

Water, whether it is mere moisture in the air or a tropical downpour, is the curse of every army. It ruins equipment and the soldier's temper. But good raincoats do wonders for soldiers' dispositions, and coated fabrics protect the vital parts of guns and ordnance equipment, radio and communication equipment and so on. "Paulins," as the Army calls them, take a variety of forms. They

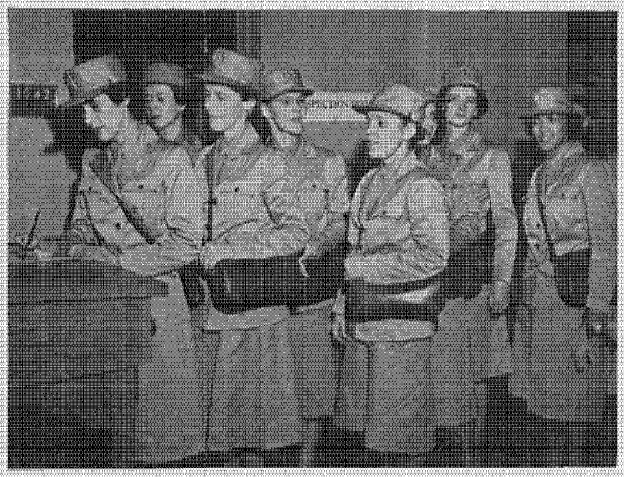


Many a book is bound in Du Pont PX Cloth, and many U. S. Signal Corps trunks now have linings made of this same material.

range from lightweight aircraft covers to the heavy-weight "bloomers" worn by guns—not for reasons of modesty but for efficiency.

So many are the uses of coated fabrics in the Army, in fact, that we cannot discuss more than a few of them here. A whole article might be written about the dark-room tent used by the Signal Corps in the field. Photographers can set up their equipment in this light-proof, weather-proof unit on a temporary airfield and deliver finished prints of enemy territory within a few moments after the reconnaisance pilots come in with their photographic negatives.

And there are many other applications of equal importance. Much could be said, for instance, of what coated fabrics accomplish for the Medical Corps. Field-dressing stations rarely have electric current or hot water. But, thanks to coated fabrics, doctors of the Medical Corps now have a "chemical hot-water bag" which can save a wounded man from death due to shock. It is a little cloth bag charged with chemicals. A couple of tablespoons of water, added to the chemicals, generate heat. The outside covering of the bag is a cured "Butacite" resin-coated fabric.



WAACs reporting for duty. Their cap visors are stiffened with "Texon" latex-impregnated fiber, and their handbags are made of Du Pont "Fabrikoid" pyroxylin-coated fabrics.

So much for the Army and the Navy. The Marines—soldiers with sea legs—also rely extensively on armored fabrics. Equipped for fighting in any climate, the Marines carry an all-purpose, waterproof poncho which serves them as a raincape, as a section of a pup tent, and may be used in general to wrap around all supplies and equipment that must be kept dry. The Marine poncho, soft, flexible and light in weight, can take a lot of abuse. It consists of two thicknesses of fabric combined with "Butacite." One side is printed in mottled greens for jungle camouflage. The other side is brown, for desert protection.

By and large, the function of coated fabrics in wartime may be summed up in one word—protection. Armored fabrics *protect*. They may cover a first-aid kit, or they may serve in the face-piece of a gas-mask. In either case, protection is their job. Du Pont has produced

(*Continued on Page Fourteen*

TOW TO TOP

QUICKLY, ECONOMICALLY

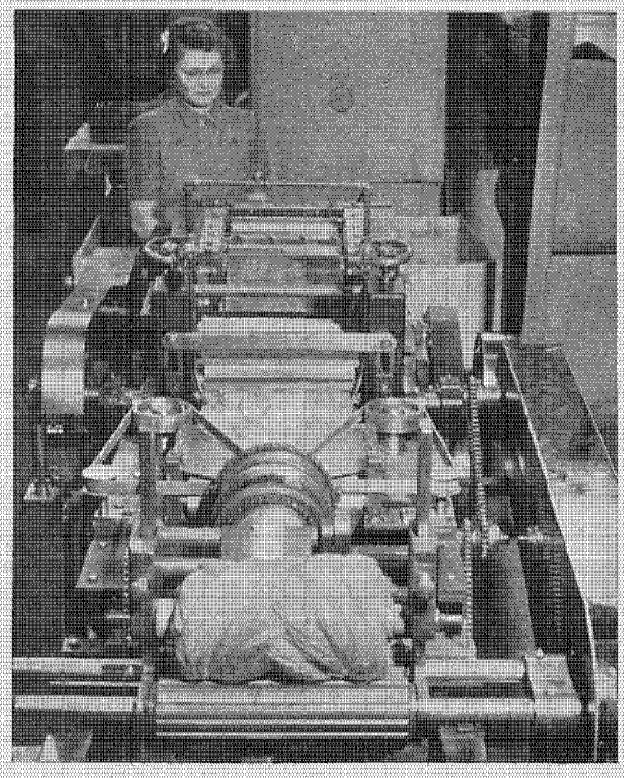
Carding and combing operations are no longer necessary in the production of spun rayon yarns

By STEVEN M. SPENCER

THIS is a story of fibers and filaments, of men and machines, and a problem now solved for the first time in textile history. It marks an achievement of note, because it speeds up the conversion of rayon tow to top for making spun rayon yarn. That, as you may know, is a big-volume product; more of it was manufactured last year than ever before. When used alone or in blends with natural fibers, it can be woven into soft fabrics with textures so like cotton and woolen goods that only experts can detect the difference.

Let's start with facts we already know about natural fibers—cotton, wool, hemp and the like—which are shipped in bales to textile mills. Snarled and tangled, the fibers must be cleaned, carded and combed before they can be made into yarn.

Men have been carding wool for thousands of years. Originally, crude hand tools, such as thorns stuck through squares of leather, were used to disentangle the matted snarls, to remove foreign matter and straighten out the individual fibers. Then steel combs were brought into play to remove any short fibers, to straighten further the long ones and arrange them in parallel alignment. Today, wire-toothed cylinders of great carding machines and power-operated combs do this work before raw wool, cotton and other natural fibers emerge as loose, untwisted strands called "top," the form required for spinning.

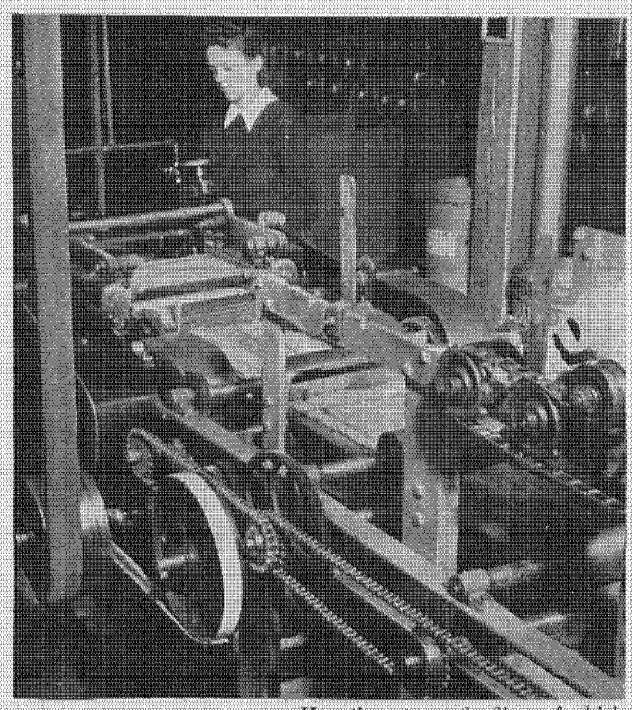


A Campbell-process unit in a Pennsylvania mill. Du Pont "Fiber-D" rayon tow is being cut into short lengths at this stage of the operation.

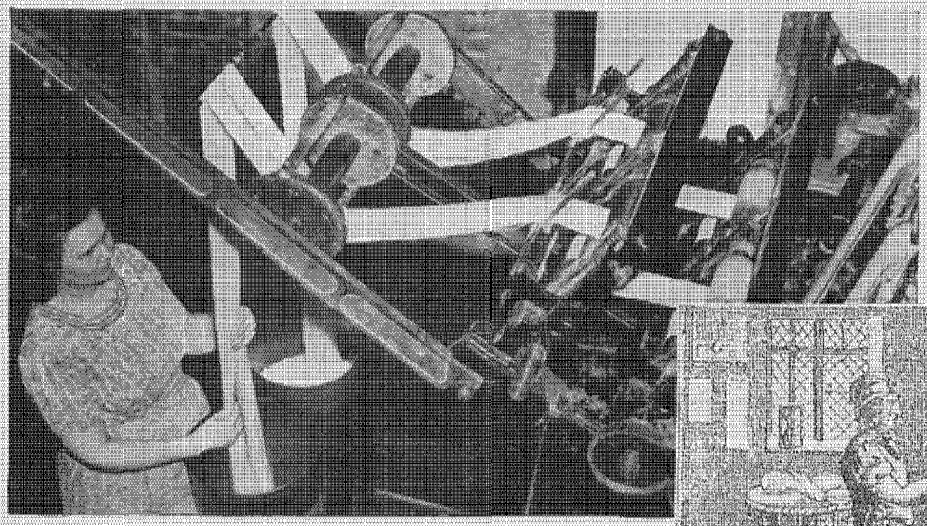
RAYON IS DIFFERENT

Unlike animal and vegetable fibers, spinneret-formed rayon filaments are clean, of uniform diameter, straight, in parallel alignment and of unlimited length; they are made into continuous-filament yarns neatly packaged on spools and cones.

In addition to these smooth yarns, rayon is also produced in short, uniform lengths, known as staple fiber, which can be spun into yarns with a distinctively-soft, "wooly" feel. This fiber, like raw cotton and wool, is baled and shipped to the mills. All of it has to be carded —and some of it combed—before it is in a suitable condition for spinning.



Here the cut tow, the fibers of which are still parallel, is drafted and blended into top before it passes on to the yarn-spinning room.



Here Du Pont rayon tow is being fed into a Perlok tow-to-top machine, which breaks the continuous filaments into staple fiber and converts it into top without carding and combing.



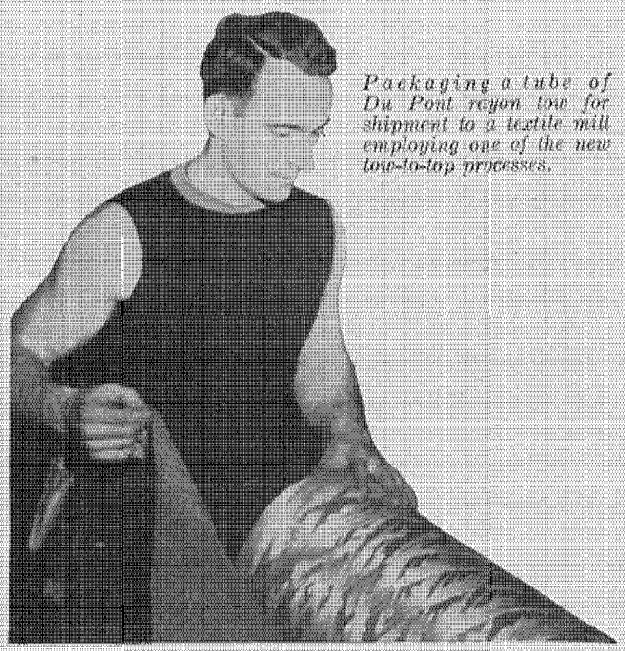
An early 19th century wool comber and carder at work; from a woodcut published in 1835.

The same work by human hands in a French mill, from an engraving made two hundred years ago.



As the first commercial producer of rayon staple fiber in the United States, the Du Pont Company has naturally been interested in supplying the trade with fiber that can be processed advantageously. All of which may be considered as a foreword to the problem first mentioned—the conversion of Du Pont's tow, the latest form of rayon, into top.

Heretofore, rayon staple fiber has been converted into top on the same machines that are used for processing wool and cotton. Mill operators used this equipment because there seemed to be no better way to get this job done. But many thoughtful textile men have believed that it should not be necessary to cut perfectly-formed clean rayon into short pieces and then spend more time and money reassembling the pieces in much the same orderly fashion as the filaments were when originally made. Wouldn't it be possible to produce rayon tow directly, and then by some means cut or break it into staple-fiber lengths *without destroying the original parallel alignment of the fibers?*



Packaging a tube of Du Pont rayon tow for shipment to a textile mill employing one of the new tow-to-top processes.

A Cooperative Project

Credit for this idea belongs to several men who foresaw the possibilities of a short-cut process. The requirements were (1) a suitable rayon tow and (2) the machinery required to convert this material into top. The Du Pont Company undertook to produce the tow, which is an aggregate of several thousand continuous filaments formed by a battery of spinnerets. Textile men—a number of them working independently—designed the equipment and developed the operating procedure. J. L. Lohrke, Philadelphia worsted and rayon top dealer, and his partner, H. H. Perry, invented the Perlok process. N. S. Campbell, of Greenwich, Connecticut, and a group at Pacific Mills likewise came forward with new, simplified methods and machines for cutting, breaking and processing rayon tow. The major contribution of the Du Pont Company has been the commercial production of materials that are adaptable for use on these machines.

This development may have a far-reaching influence in the textile industry; in fact, conditions have already operated to give tow-to-top conversion a decided boost. There has been a greatly-increased demand for rayon yarns due to the war textile program. Cards and combs have been operating at capacity. Because it has been

(Continued on Page Fifteen



COOLANTS

TO CALL a coolant, as one young lady did, "something that cools something" is an over-simplification. But, at that, such a description comes fairly close to the mark.

The stream of cutting oil gushing over a machine-tool in a war plant is a coolant. So is the mixture of water and anti-freeze solution in a jeep's radiator. A coolant is any substance which transfers heat—picks it up at one spot and carries it to another. Where Du Pont "Ventube" flexible ventilating duct carries a stream of fresh, cool air deep into the hold of a ship under construction on the ways, or into the lower levels of a mine, it would be accurate to speak of the air as a coolant.

In this war, which depends so much upon machines, coolants are handling jobs of great importance.

If the mushroom-shaped valves in the motor of your car were installed in a fighter plane they would soon get red-hot or even melt under service conditions. So aircraft motors of 300 horsepower and over, today, are fitted with sodium-cooled valves. The valves are hollow. Each of them has inside it a small charge of sodium. As the motor heats, the sodium melts. Then, every time the valve operates, the liquid sodium is "sloshed" violently down into the valve stem, where it transfers the heat it has picked up to the plane's cooling system.

You will probably never touch, or see, a piece of metallic sodium. It is not found free in nature, but is always combined with something else. But Du Pont manufactures it electrolytically by separating salt into its elements—sodium and chlorine. Sodium has, in great degree, the ability to pick up and carry heat. In other words, it is an excellent coolant. Sodium is serving today in the hollow valves of tens of thousands of American fighter planes.

Cooling the motor of a plane has always been a problem. Water, which satisfactorily cools the motor of an automobile, is no good for a plane. The reason is simple. On the ground, water boils at 212° Fahrenheit. But in a plane flying at 20,000 feet, water boils at 140°. Plane motors get much hotter than that! So ethylene glycol in water is used as a coolant in war planes, because it has a high boiling point. With ethylene glycol, the radiator of a plane can operate at 250°. At 20,000 feet, in other words, the chemical coolant radiates nearly twice as much heat as water would radiate at that altitude. Du Pont manufactures ethylene glycol, which looks like thin sugar syrup, from such basic raw materials as coal, air and water.

The coolant most familiar to DU PONT MAGAZINE readers is "Freon" fluorine refrigerant. We cannot discuss many of its wartime jobs. It is no secret, however, that many ships carrying food overseas to our troops and those of our Allies are refrigerator ships.

Railroad cars that carry perishable foods are also cooled—sometimes by ice, sometimes by "dry ice" or one of the other chemically-made coolants. Auto trucks carrying perishable foods are often cooled. Small auxiliary motors on such trucks drive a refrigerating unit not unlike the one in your electric refrigerator, so that fruits, vegetables and meats in the truck stay cold even when the truck stops rolling.

Of still greater wartime significance is the use of coolants in the quick-freezing of foods. Quick-frozen foods save great amounts of transportation space. You may have heard it said, for instance, that enough peas to fill sixty railroad cars may be quick-frozen, packed in cellophane and shipped in thirty cars. Such savings are not at all unusual. But an even newer development in the cooling of foodstuffs is now attracting attention. When a food crop is picked, truckloads of the crop often pile up at the cannery. The fruits and vegetables arrive from the fields faster than they can be canned. Some food experts now believe that when such fruits and vegetables are kept cool while awaiting their turn, they retain more of their vitamins.

A safe refrigerant, such as "Freon," is also used in cooling the strato-chambers in which not only fliers, but materials and mechanisms as well, are tested under high-altitude conditions. Planes may soon be flying and fighting at 40,000 feet. At that height—nearly eight miles up—the temperature hangs sullenly at 67° below zero, and it may drop to 100° below. The air pressure is about a fifth of what it is on the ground. Gasoline freezes. Rubber turns as brittle as skim ice. Pilots fumble and stumble. To work at anything like normal efficiency, they must wear oxygen masks and heated flying-suits and, in some planes, be protected by a pressure cabin as well. The only safe, sure way to discover how a man will behave at such great altitudes is to test him in a strato-chamber, where he can "keep one leg on the ground." The same thing is true of machines such as a new hydraulic door-opener or a carburetor, which must be tested under actual conditions.

In these complicated test chambers, which look like a cross between a subway car and a locomotive boiler, "Freon" is the coolant.

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WHAT'S silica gel? Briefly, it's a chemical product obtained by treating a soluble silicate, such as "water glass," with an acid. If the components—in just the right concentrations and mixtures—are processed properly, the result at first is a liquid. This later "sets" into jelly and after further processing eventually becomes a solid glass-like mass. When reduced to coarse or fine granulations, the material bears a striking resemblance to quartz pebbles or sand.

Silica gel—the "gel" is only a processing incident—has some almost incredible properties. For example, when dry, it adsorbs moisture to the extent of about forty per cent of its volume. What is more, this crystalline material assuages its thirst without showing by any visible evidence that it is taking on a heavy load of water.

Porosity accounts for most of the industrial uses of silica gel, despite the fact that no one has ever seen a single pore in it—not even with the aid of the most powerful microscope.

Here's another characteristic to tax your credence: It has been estimated that a *cubic inch* of silica gel contains *50,000 square feet of pore surface;* but more about that later on.

You know, of course, about the current rubber shortage and that our Government is financing the manufacture of synthetic rubber, one type of which is commonly called Buna. But it may be news to you that silica gel figures in its production, not as an ingredient, but as a catalyst holder or catalytic support.

What's a catalyst? The question cannot be answered by anyone as yet. Like electricity, it serves man's purposes, although no one pretends to know just what it is or the secret of its power. One writer describes it as "a chemical that assists a chemical reaction without entering into it, for all the world like a parson at a wedding." Another socially-minded writer illustrates its power in terms of personality, as when the mere presence of some individual puts "pep" in a social gathering; a fever of activity starts as soon as he or she joins the group. Modern chemistry employs literally hundreds of catalysts to accelerate—sometimes to decelerate—a desired chemical reaction.

The first catalyst of record in the history of the present Du Pont organization was a platinum vessel used by John Harrison, America's first commercial producer of sulfuric acid. With it, he produced "oleum"—fuming sulfuric acid. That was early in the 19th century. It is an interesting sidelight that H_2SO_4 is used to produce silica gel, and that the "gel" in turn serves as a catalytic support in the manufacture of intermediates for Buna rubber, a typical 20th century product.

Why granules of silica gel are so valuable as a processing aid may be explained, at least in part, by a singular combination of properties. The grains are hard. In the processing equipment, they preserve their rigid form, with little tendency to break down into a solid mass. Consider, too, as previously mentioned, that silica gel contains an enormously-large pore surface, and you can understand why this product is, both in form and substance, an efficient catalytic support. In short, it provides nearly ideal exposure conditions for a catalyst to perform its service to the best possible advantage.

Silica gel is not a new product, nor is the use just cited an innovation. The Davison Chemical Corporation of Baltimore, Maryland, and its subsidiaries have manufactured this product for more than two decades. In normal times there is an active demand for this material for dehydration, air-conditioning, refrigeration, oil refining and other chemical uses. Wartime needs have made it necessary to expand production facilities beyond all expectations. Lately, you have been reading how silica gel helps to keep shipments of war matériel—spare parts for tanks, airplane motors and the like—undamaged by rust and corrosion. For this emergency use alone Davison is producing a large tonnage. But that's another story.

The news of interest to readers of this publication is that the Du Pont Company, on behalf of the Government and under license from and with full technical advice supplied by The Davison Chemical Corporation, is now manufacturing its silica gel in northern New Jersey. The new plant, set up by the Pigments Department, is supplying American manufacturers of Buna rubber with a special grade of this material for use as a catalytic support. Smaller-size granulations of the "gel" are shipped to the Davison organization for distribution to industries engaged in war work.

All in all, it furnishes another example of industrial teamwork in helping to solve a production problem of great concern to all Americans, because our nation needs a lot of synthetic rubber.

WHAT'S NEW

THE twenty-second Army-Navy "E" award to Du Pont employes was made March 20 at the Alabama Ordnance Works in a joint ceremony honoring both construction and operation workers for outstanding achievement. Earlier "E" awards to Du Pont construction employes, not previously reported here, were made at the Wabash River Ordnance Works and the Chickasaw Ordnance Works early in March. Latest news is that an "E" award will be made to plant employes at the Morgantown Ordnance Works, April 13.

* * *

NEW facilities for the manufacture of "Lucite" methyl methacrylate resin sheeting are being installed at one of the Du Pont Company's plants in Massachusetts to increase production of this clear transparent plastic for military aviation needs and other essential war uses. The project, sponsored by the War Production Board and financed in part by the Defense Plant Corporation, is well advanced toward completion, which indicates that the plant may be in operation within a few months.

* * *

EXPLOSIVE RIVETS are not new, but there is a new way to detonate them—with radio frequency energy. The device commonly used heretofore is an electrically-heated iron with a silver alloy tip. When the rivets are inserted in position, the operator simply touches each rivet head with the tip of his hot iron and presto, the charge in the shank explodes, forming a "blind" head and setting the rivet. This tool is still preferred for many types of work.

Engineers of the Radio Corporation of America, working with Du Pont technicians, have recently developed a radio unit for use in large-scale explosive-riveting operations in aircraft factories. High-frequency current induced and concentrated directly into the rivet head heats the charge and explodes it. Radio energy provides instant temperature control, prolongs the service life of the firing tip, which can be used for any kind of rivet head, and introduces an important safety factor, for the tip is always cool.

* * *

THE Du Pont Company's Plastics Department has developed a synthetic resin adhesive that manufacturers of aviation equipment are now using for a special purpose. Transparent plastic airplane enclosures —windshields, cockpit hoods, bomber "noses" and the like—are usually made of acrylic plastics, such as "Lucite" methyl methacrylate resin, and these sections must be kept clean and unmarred from the time they are fabricated until they are assembled in planes ready to fly. Heretofore, a protective masking paper has been attached to all exposed plastic surfaces with rubber cement, supplies of which are now critically short.

The new pressure-sensitive adhesive is better than the old latex cement. It is easily applied to masking paper. It is chemically stable under widely-varying conditions of temperature and humidity. It holds paper to plastic with a tight grip; yet when the time comes for assembly operations, the paper can be peeled off quickly, leaving the plastic clean and unsmudged. And the paper can be reused repeatedly. This distinctly-superior rubberless adhesive is produced by the Fabrics & Finishes Department of the Company, but not for civilian uses until after the war. It is under allocation for this purpose by the War Production Board. Meanwhile, the aviation industry has a better product for its special use, and a large quantity of rubber is released for its most essential military uses.

* * *



OIL PROSPECTORS will be interested in the new Du Pont Fast-Coupler for use in seismic prospecting. This device is a simple, rapid means of joining together cartridges of dynamite to form a continuous, rigid charge. One man can easily make up a charge in a fraction of the time required by former methods; and the coupler holds the cartridges so firmly that the charge will remain intact under the most adverse loading conditions. A booklet describing the Fast-Coupler in detail, together with recommended field practices, is now available on request to the Explosives Department, Wilmington, Delaware.

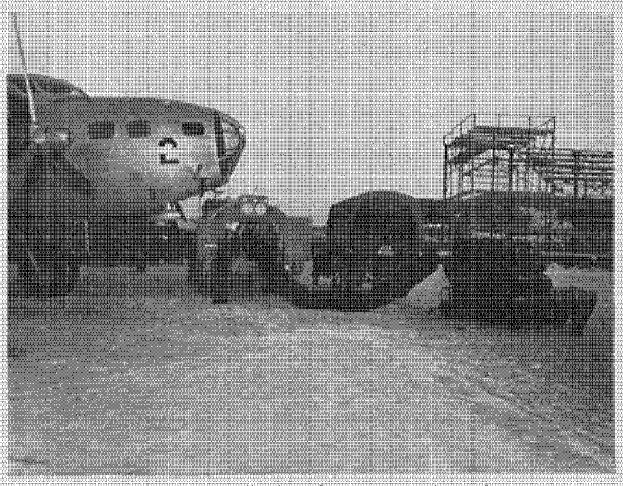
* * *

USE of peroxide of hydrogen in Du Pont's new continuous bleaching process has quickly won approval in the production of military textiles, not only because it turns cloth white at rates up to 200 yards a minute, but also permits better control and more uniform results as compared with pre-war methods. Peroxide-bleaching processes are now operating or are being installed in the mills of Massachusetts, Rhode Island, Delaware, Virginia, North Carolina, South Carolina and Georgia.

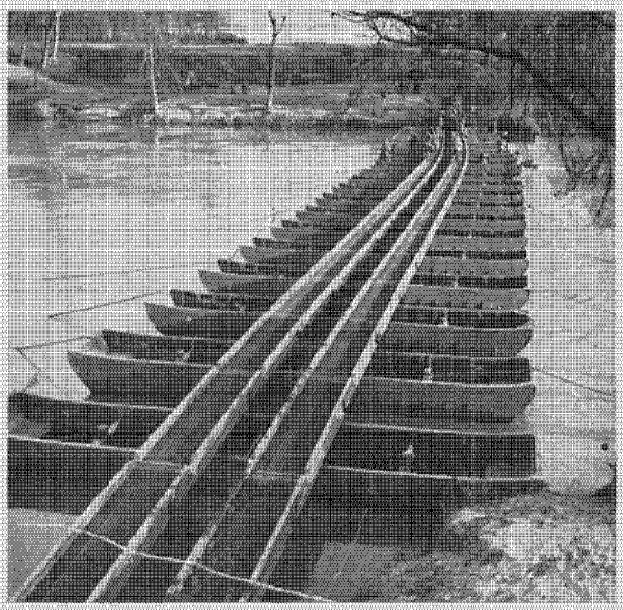
(Continued on Page Sixteen



First aid to a soldier on the march is administered with a waterproof adhesive tape, pyroxylin coated on exposed side.



Du Pont "Ventube" ventilating duct carries heated air to valves on tank wagon to facilitate fueling planes in the arctic zone.



Steel pontoons have riveted seams. P.A.W. (protective and water-stop tape) seals the seams and joints and prevents corrosion.

Textiles in Armor

(*Continued from Page Eight*)

many millions of yards of armored fabrics coated with synthetic rubber, synthetic resins and modified pyroxylin compositions for war purposes.

On the home-production front, as well, armored textiles perform a number of vital tasks. In shipbuilding, getting fresh air down to the men at work in a half-completed vessel has long been a serious problem. "Ventube" rubberized flexible ventilating duct—a flexible tube of coated fabric—is doing a great deal here to help shipbuilders, drydock companies and repair yards. In coal mines, too, it is also doing a grand job carrying fresh air down to the men at the working faces.

Long before Pearl Harbor, "Fairprene" protective and water-stop tape was developed to speed the sealing of water-tight riveted joints, and to inhibit oxidation and corrosion where dissimilar metals are joined together. Whether it is the fabrication of the metallic pontoons for the Army Engineers, or the hull of a Navy flying boat or a Liberty ship, PAW tape saves time over old-type seals, and does a more efficient job where metals are joined together.

To repeat what was said at the beginning of this article, armored fabrics will not win this war, or any other war. But they can be, and are, of great service to our fighting men and to the equipment upon which those men must depend.

Armored textiles cannot create a Norden bomb sight. But "Tontine" pyroxylin-impregnated washable window shade cloth can blackout the Norden bomb sight plant. Armored fabrics cannot of themselves bring hope and courage to men floating on a raft at sea, but they can help to protect them until rescuers arrive.

This, then, is the wartime job of Du Pont textiles in armor—*protection*. And they are doing that job superbly. The "Fabrikoid" Division of the Du Pont Company is making a notable contribution toward that day when American fighting men of peace will march in Victory parades down the streets of Berlin and Tokio.



Jungle troops are carrying machetes in cases made from two thicknesses of heavy sateen cemented together with pyroxylin.

Du Pont in the War

(Continued from Page Two)

serving in the nation's military forces. In addition, a number of executives and technical specialists are serving the Government in civilian capacities.

"At the end of the year, there were Labor-Management Production Drive Committees at fifty-eight of the Company's plants, set up in cooperation with the country-wide program of the War Production Board to speed up the national war effort. These Committees, which represent about ninety-one per cent of the entire wage roll of all Company plants, are rendering valuable assistance to management in connection with War Bond sales, pooling of automobile transportation among employes, gasoline and tire rationing, waste elimination, suggestions to increase production and conserve materials, reduction in absenteeism, accident prevention and the maintenance of production morale through special publicity.

"For 'excellence in production' the management and employes of Du Pont plants received twelve Army-Navy 'E' awards, while four such awards were made to plants of the Remington Arms Company. . ." (Ten more awards have since been made.—*Editor.*)

Post-War Prospect

"Despite the scope of Du Pont war activities and the temporary sacrifice of normal commercial interests, the post-war prospect is most encouraging for resuming quickly the Company's peacetime business.

"In no instance has conversion for war required closing or radical alteration of plants. The uses to which the Company's products are put have changed, rather than the products themselves. For example, nylon yarn formerly devoted almost entirely to hosiery is now devoted entirely to parachutes and related military uses, yet the yarn is produced in the same plants from the same materials.

"Many similar diversions of established products have occurred. In practically all cases, it is expected that the former use will revive and possibly be augmented upon the return of peace. Moreover, new uses are developing under the pressure of war; so-called substitute materials are often proving superior to those they replaced; new products and improved processes are being created by intensified research. The majority of these advances have peacetime value. It is believed that neoprene, nylon and many other products will emerge from the war with greatly enhanced importance."

Tow to Top

(Continued from Page Ten)

difficult, in most cases, to obtain additional equipment, more and more mill operators have installed the new tow-to-top machines that are relatively small and less complicated than the conventional types.

Other Advantages

The processes mentioned are adaptable to all rayon yarns of any denier; where they are employed, carding and combing equipment is no longer required, and less fiber is wasted.

The most obvious gain, of course, is in the cost. For example, a typical set-up of three cards and four Noble combs represents an investment of approximately $50,000. And the expense of reclothing the cards with fine wire teeth and of keeping the combs in repair also constitutes an appreciable upkeep item. Contrast this with the cost of tow-to-top equipment. According to the best estimates for a comparable volume of production, an outlay of about $10,000 should suffice. And much less expense is involved for upkeep, for the new equipment has no wire clothing or teeth to wear out.

Before discussing the uses of top, we may mention at least one important use for the unbroken rayon tow. As previously reported (page 21, Nov.-Dec. 1942 issue), square-braided tow is replacing imported long-line flax as a packing material for pumps and hydraulic stamping and punching machines in many war industries.

Tow-to-top conversion is, of course, chiefly of interest to textile mill operators. But top will mean something to consumers when they learn that yarns made from it are woven into a great variety of products, ranging from ribbons to carpets, and that some women's clothing and men's suitings start with blends of rayon tow and wool.

At this stage, one would be bold to predict just how influential these new processes may be in the textile industry of the future. But one may well believe that increasingly-strong yarns will emerge within the next few years to make possible the production of inexpensive spun rayon fabrics of long, fine staple. Tow-to-top processing may be applied to nylon or to any other synthetic fibers. In short, this development is packed with big possibilities. Men who have traditionally accommodated themselves to the fibers produced by nature, now have a better, quicker, more economical way of processing the fibers produced by man.

Coolants

(Continued from Page Eleven)

"Freon" goes to sea with the Navy, as well as up into the stratosphere with the Air Forces. There is only one spot hotter than the deck of a warship in the tropics, and that's down in the hold where ammunition for the big guns, and gleaming torpedoes and depth bombs are stored. "Freon" keeps powder magazines cool.

Perhaps the most uncomfortable health resort so far devised by the brain of man is the cozy interior of a submarine after a long deep dive to the bottom of the sea. Living conditions for the crew would soon be intolerable in the "pig boats," if provision was not made to keep the compartments cooled with "Freon."

These are obvious uses for coolants. There are others even more surprising. Rivets used in aircraft construction, for instance, are chilled to sub-zero temperatures before they are set in place, to keep the molecules of their metal from "age-hardening." And it has been found that when air supplied to a blast-furnace is controlled for temperature and humidity, the output of the furnace rises.

Somebody once remarked that, although we talk a lot about the weather, we don't do much about it.

Nowadays we are doing something about it—we make it cooler or warmer, drier or wetter, as we like.

But coolants are still relatively new; we are only beginning to discover the range of their application. Not so long ago engineers found it practicable to freeze part of a mountainside to provide safe conditions for men working in a cut below. More recently construction engineers have kept fresh-poured concrete in a giant hydroelectric dam from cracking, as it cooled, by circulating a cold brine through pipes imbedded in the great mass of concrete. This is a use for a coolant on a gigantic scale. On the other hand, the sodium-cooled valves mentioned earlier are an example of a coolant used in small quantities.

The scientific use of coolants is fast moving forward these days. Chemical refrigerants are helping in our nation's drive for Victory. It is a safe prophecy that we shall find many more tasks for them—tasks small and large—when the war is won.

What's New

(*Continued from Page Thirteen*)

A NEW plastic lithographic printing plate, which saves from three to eight times its weight in critical aluminum and zinc, was announced recently. These plastic plates, now preempted by the Army and Government agencies, are manufactured by The Plastolith Company of Boston from polyvinyl alcohol resin made by the Electrochemicals Department of the Du Pont Company. It is hoped some plates soon will be available for the 3,000 commercial lithographers who are short of zinc and aluminum. To date these plates have not been used in printing newspapers.

★ ★ ★

THE amount of metal required for mechanical pencils has been reduced from seventy to four pounds per thousand pencils, thanks to redesign and to the substitution of a new cellulose nitrate plastic composition developed by the Du Pont Company's Plastics Department. Large quantities of hard rubber, brass, steel, aluminum and other critical metals have been used heretofore for barrel sections, feeds, bushings, plungers, tips, clip screws and inner caps. Now these parts are being made from the new hard plastic, which is light in weight and amply strong for service requirements.

★ ★ ★

"ARASAN" seed disinfectant and protectant is a new non-metallic chemical compound recently offered for sale by the Bayer-Semesan Company, Inc., a Du Pont affiliate. The active ingredient of "Arasan" is an organic sulfur compound. Experimental results show that it effectively reduces losses in stands of peanuts from seed decay and that seed and soil-borne diseases of vegetables may be generally controlled by an inexpensive dust treatment. For more complete particulars about "Arasan" consult your local dealer, or write direct to the Bayer-Semesan Company, Inc., Wilmington, Delaware.

THE DU PONT MAGAZINE

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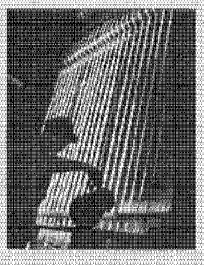


The Pictures:

Cover illustration by Robert Yarnall Richie. View shows an operator feeding reduced indigo dye solution to a vat—one stage in the manufacture of chambray at the Lindale, Georgia, plant of the Pepperell Manufacturing Company.

Other credits: Page 4, top; 5, center and bottom—Official U. S. Navy photographs. Page 4, center; 6, 7, bottom left and right; 8 and 14, top left, bottom left and right—U. S. Army Signal Corps photographs. Page 4, bottom; 5, top and 14, left center—Official photographs, U. S. Army Air Forces. Page 7, top, left and right—Press Association, Inc. Page 10, inset historical prints, right—The Bettmann Archive.

VICTORY GARDENS

AN ARMY of ten million men who will eat more than fifty million pounds of food a day is one reason why the United States Department of Agriculture asks for eighteen million Victory Gardens this year. Because the food situation is critical, all of us are going to have to pitch in and grow some of the food America needs this year.

Home gardeners will want to do everything in their power to make sure that seeds come up and grow into strong, vigorous plants—just as a commercial grower does. And that means three things—good seed, fertilizer and seed treatment.

A special Victory Garden fertilizer has been authorized by the Government—containing nitrogen from organic sources and from chemical sources like Du Pont "Uramon" fertilizer compound. You'll be able to buy this Victory Garden fertilizer at your dealer's.

Another way to produce a bigger crop is to treat seed before planting, for plants are subject to numerous diseases, many of which are carried on the seed. Plant diseases of all kinds are responsible for losses of millions of dollars every year and can ruin home gardens unless precautions are taken. This year, more than ever before, home gardeners should conserve seed, fertilizer and their labor by using the method commercial growers have proved to be satisfactory—treating seeds before planting.

Seed treatment might be called preventive medicine for plants. Scientists who have studied plant-disease prevention for many years have discovered, among other things, a number of chemical compounds effective against seed-carried diseases and soil parasites when applied to the seed. One of the best, for all-around use on ordinary home-garden vegetables like beets and tomatoes and cabbage, is an organic mercury compound trade-marked "Semesan."

A little "Semesan" dusted into the packets of seed or seeds soaked in water with the right amount of "Semesan" will safeguard against disease carried on the seeds themselves and keep seeds from rotting in the ground. In other words, "Semesan" helps gardeners to grow healthier plants and more of them. To help you with your Victory Garden, special Victory Garden packages and two-ounce cans of "Semesan" are on sale at your seed dealer's.

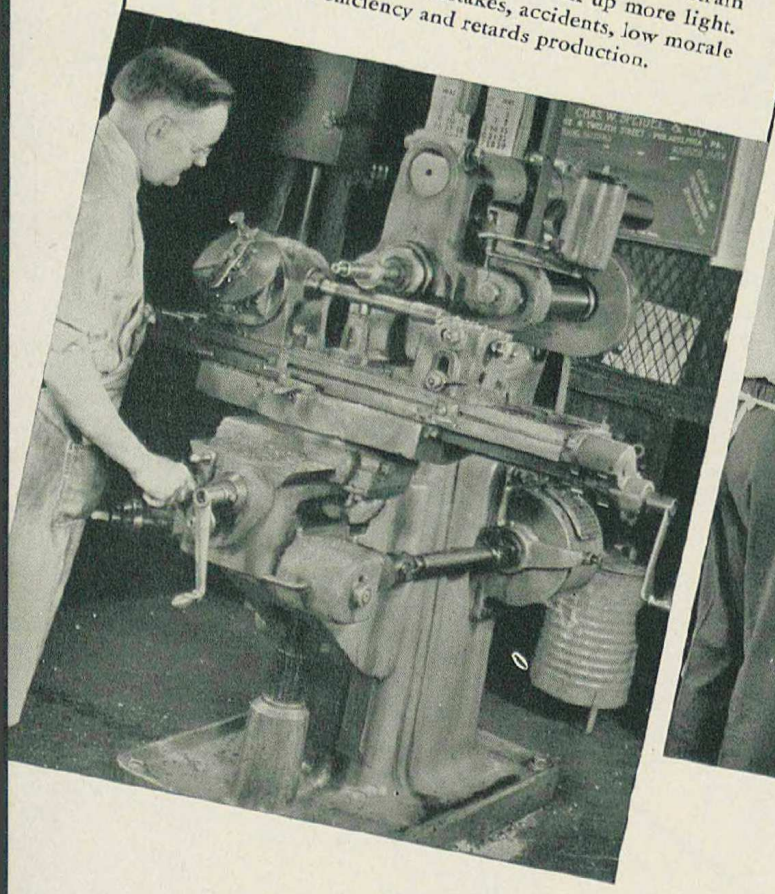
Nature can do a lot, when it comes to supplying food. We only have to do our part—and that's something every American will do cheerfully and gladly.

NOW...INCREASE WARTIME PRODUCTION

with Du Pont "Three Dimensional Seeing"

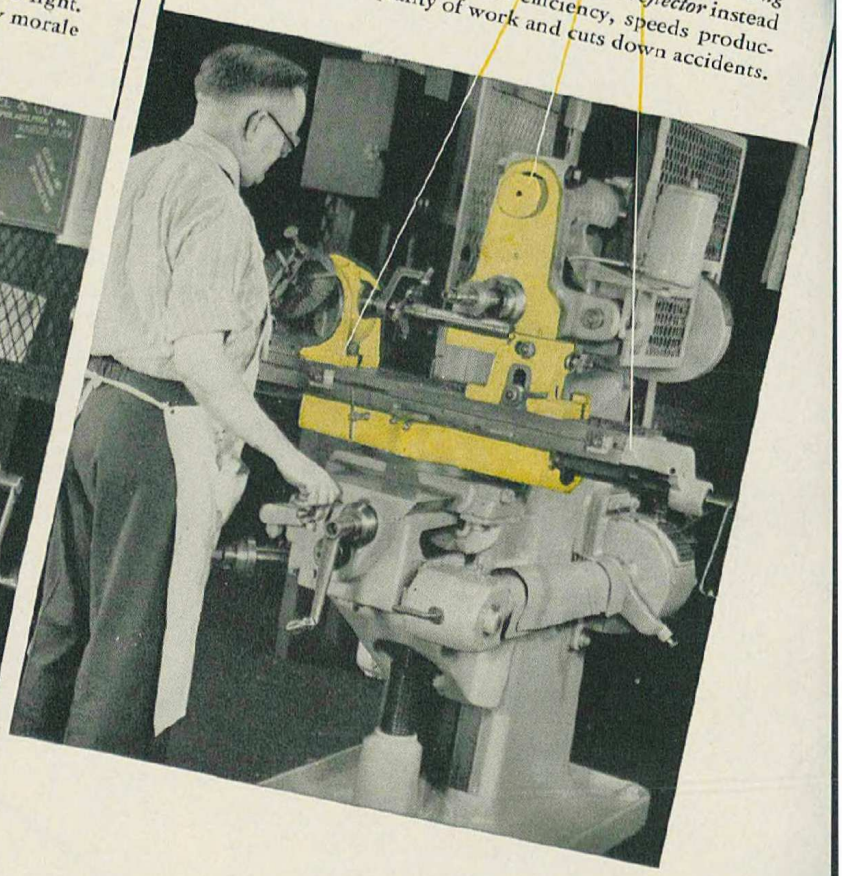
EYESTRAIN WORKS FOR THE ENEMY

This dark, dingy machinery blends into the material being worked. This results in a "blackout" which creates eyestrain. Nor will additional lighting ease the strain materially. The dark surfaces just soak up more light. This "blackout" causes mistakes, accidents, low morale ... cuts down efficiency and retards production.



EASE FOR EYES HELPS AMERICA

See how *color* and *contrast* ease the strain on the worker's eyes. The work stands out sharp and clear. Danger areas are well defined. The worker has more light for *seeing* ... since the machine has become a *light-reflector* instead of a *light-robber*. This raises efficiency, speeds production, improves quality of work and cuts down accidents.



Du Pont research brings new help for production soldiers!

THE DEMAND for planes, tanks, guns and ships requires more and more efficiency in production. This calls for *"Three Dimensional Seeing"* ... to ease the eyestrain of the man or woman at the machine for more efficiency and production. It conserves manpower by reducing accidents. It conserves materials by reducing "rejects."

This new system came from scientific research! Du Pont paint technicians worked with illuminating engineers over two years. They tested many color combinations ... on many machines, in different shops, under varying lighting conditions.

One result is the color system which is pictured here. It is ideal for most metal-working operations. It consists of *DULUX Spotlight Buff* for the work surfaces and *DULUX Horizon Gray* for other surfaces.

Scientifically-controlled tests show that in many cases this color scheme helps to raise production ... with less fatigue, fewer accidents and improved morale among workers. This research continues to develop new color systems for special machine operations. We invite you to consult with us on your particular problems.

WHAT FREE BOOKLET GIVES YOU—

24 pages with photographs in color. Results of time tests and psychological studies. Actual paint chips of best colors. Explains development steps and basic principles of the new system. Clip the coupon now. Send for your free copy.

SEND COUPON TODAY

DU PONT



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Please see that I get booklet and complete information about *"Three Dimensional Seeing."*

*Name*_____

*Firm*_____

*Address*_____