

DU PONT

MAGAZINE

APRIL • MAY • 1946

Cover: Coated Fabric Testing



BETTER THINGS FOR BETTER LIVING
... THROUGH CHEMISTRY

N50902

*"Where there is no vision,
the people perish"*



A wise man said it a long time ago.

Today, more than ever, the world knows he was right.

Knows that jobs, prosperity, new materials, new techniques, are the end result of scientific research—and of the vision that keeps the research workers in action.

The mighty accomplishments of men of science through the war are more than matched by the peacetime research in American industry—the chemical industry, the electrical industry, the glass industry, the steel industry, every field which makes use of the scientist and his vision.

It is the longtime objective of putting more things within the reach of more people by lowering costs, of making work easier, of making life more comfortable, of contributing to the

efficiency of American home and business that is at the heart and core of every Du Pont operation.

Research cannot do the whole job. Engineers must build the plants that translate research dreams into chemical reality. Management, service departments, laboratories, foremen, the girl watching the trembling needle of a gauge—all are partners in production.

But through all their work—for all our benefit—runs the single objective—to share in the creation of a better America. To that end we are expanding research, increasing our scientific staff, multiplying our plant production program, creating new jobs, developing new techniques, new materials—dedicating our entire research and production facilities to—

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY



E. I. DU PONT DE NEMOURS & CO. (INC.), WILMINGTON 98, DELAWARE

So to speak...



THE SMOOTH red material rolling out under the scrutiny of a plant inspector—who examines every yard—is S. R. "Cavalon," a synthetic rubber coated fabric, made by the Du Pont Company. This product demonstrated its ability to "take it"

under exacting war conditions, and possesses a remarkable degree of resistance to heat and cold, oils and greases, perspiration and oxidation. Its resistance to cracking at low temperatures is excellent and it is thoroughly water resistant and washable. It can be supplied also in a fire resistant grade.

S. R. "Cavalon" was engineered primarily for heavy duty in trucks, busses, any kind of vehicle in which toughness and durability in upholstery are of first importance. Its sturdy wearing qualities and resistance to exposure make it an excellent choice as well for porch and garden furniture and beach chairs. It is available in a wide range of subdued colors, grains and finishes.

RATS ARE SAID to have spread the most destructive plague in European history. That was centuries ago. Even now, in this country, they are accountable for property losses estimated at \$500,000,000 each year. Now comes a new chemical development to aid mankind in the fight against these pests. Read about it in "ANTU—Modern Pied Piper," page 2.

VISIT the Du Pont Plastics Exhibit at the National Plastics Exposition, Grand Central Palace, Lexington Avenue, New York City, from April 22 through April 27. For the first time, the plastics industry will display its combined achievements. At the Du Pont exhibit you will see Du Pont plastics in action and in application, including completely new developments never shown before to industry or the public.

DU PONT MAGAZINE

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E. R. MANCHESTER, Editor

R. J. WOODRUFF, JR., Managing Editor

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ANTI



THE MODERN PIED PIPER!

By ROBERT F. RUMLER

ONCE AGAIN, out of the pages of scientific history has come another chemical to aid man in his never-ending fight against pests. Only a short time ago it was DDT. This time it is a rat poison known as ANTU. To be strictly scientific ANTU should be written alpha-naphthylthiourea, but most of us will be satisfied with the alphabetical contraction just as long as it kills rats.

Rats and human welfare are much more closely related than we care to believe. In the loss of human life alone, rats have taken a greater toll than all the wars in history. They have spread disease among humans in epidemic proportion. Then too, rats cause an annual loss of property in the U. S. of over \$500,000,000. Unimportant as it may seem to some, to hail the discovery of a new rat poison, there is always the possibility of coming up with another chemical that parallels the importance of DDT.

In many respects the discovery of ANTU as a rodenticide followed the same pattern as DDT. Both were prepared originally as chemicals of interest in research programs that had no thought of pest riddance connected with them. ANTU was first made by Du Pont research chemists as a part of their planned program to develop new materials for the manufacturer of improved dyestuffs and other useful products. That was in 1925. Following its development, ANTU, which did not prove valuable in the production of dyestuffs, joined the 30,000 other organic chemicals in the files of the Du Pont laboratory to await discovery of its usefulness (as later developments have proven) as an item for better living.

Less than twenty years later ANTU was lifted from the shelf in answer to a letter from Dr. Curt P. Richter of Johns Hopkins Hospital who was looking for a material with a formula similar to that of ANTU. Since then this product, known as a Du Pont Rodenticide AN, has been tried and has proved to be a highly effective rat poison.

The story of ANTU as a rat poison is another of those fiction-like tales in the progress of human wel-

fare. It all started as a part of Dr. Richter's research in the Phipps Psychiatric Clinic at Johns Hopkins. In this work Dr. Richter was attempting to determine the difference in taste desires of human beings based on heredity as well as other factors. Preliminary work in these studies is often carried out with rats since rats have the peculiar ability of being able to determine or select nourishing foods and avoid poisonous substances.

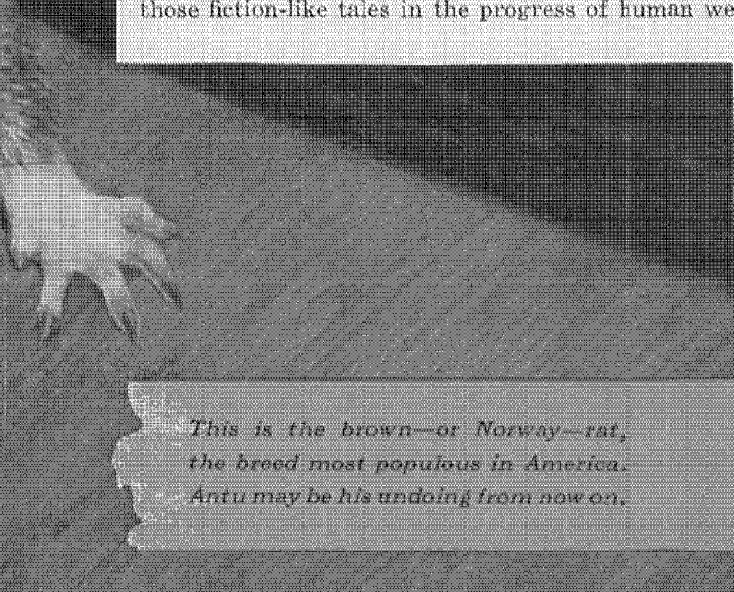
During the course of one of these tests Dr. Richter fed to the rats a chemical which had frequently been used for taste tests in humans. This chemical, phenylthiourea, which to some people tastes bitter while to others it is tasteless, was the beginning of the whole story of ANTU. The day following the test with this chemical all of the rats used in the test were dead. Imagine the surprise of the investigators who had previously felt, as a result of their work with humans, that this chemical was non-poisonous. Accidents will happen, but it is the wise investigator like Dr. Richter who makes the most of such a situation.

The need for a rat poison at that time was acute because a shortage of the more important, previously used materials had resulted from restricted wartime importations. Consequently, Dr. Richter was urged by Colonel Perrin Long of the Office of Scientific Research and Development, to continue his study along the lines of rat controls.

As he continued his work, Dr. Richter found the laboratory rats would eat enough of the chemical to poison themselves, but that wild rats trapped on the city dumps of Baltimore apparently objected to the bitter taste of phenylthiourea and consequently would not eat bait which had been treated with the chemical.

To Dr. Richter this situation raised the possibility of using chemicals which might be related to phenylthiourea, but which would not have the objectionable bitter taste. He appealed to the Du Pont Company for a supply of related materials, knowing that such materials might be available from the Du Pont laboratory file for his investigations. Twenty-four different, but related compounds, first and second cousins to phenylthiourea, were selected from the chemical files and sent to Dr. Richter for further investigations. Of these twenty-four, No. 15 on the list was ANTU, the one which is now recognized as an outstanding rodenticide. Although Du Pont subsequently sent several hundred other related chemicals to Richter for this research, none proved as effective as the early-discovered compound.

And so from the laboratory of the Du Pont Company a second important contribution was made to the research work of Johns Hopkins. The first was sulfanilamide, which, like ANTU, was taken from



*This is the brown—or Norway—rat,
the breed most populous in America.
Antu may be his undoing from now on.*



This is one section of the Du Pont file of chemical compounds. (Right) Dr. Curt P. Richter of Johns Hopkins University, Baltimore, Md., who tried Antu.

these same shelves in answer to an earlier request from Dr. Perrin Long.

These two contributions only tend to emphasize the value of constant cooperation between the organizations with facilities for production and research and those persons who are interested exclusively in research. Through such mutual aid in the past, tremendous contributions have been made to human welfare, and its continuation holds much promise for the future.

ANTU, as a rat poison has, among other things, several outstanding virtues. First of all, it is a highly specific poison for the common brown rat, or Norway rat—more toxic to them than rat poisons usually used in the past. As would be expected, ANTU also affects dogs, cats and other pets, but its poisonous effect on them is relatively less, particularly when their size in comparison with most rats is considered. In other words, a single dose which would kill a

half-pound rat in short order, would have little effect on a twenty-pound dog. Furthermore, it has been found that the digestive processes of dogs and animals capable of regurgitation refuse to retain the poison, which is not the case with rats. In so far as humans are concerned, there seems to be little danger. Of the thousands of persons who have come in more or less direct contact with this compound, none are known to have suffered any undesirable effects as a result of its use in extensive trials.

Another remarkable feature about it is the way in which it kills rats. After a rat has taken a very small quantity of ANTU its lungs have a tendency to fill up with body fluid. This in turn causes suffocation, or in other words, produces the same effect as drowning.

Although ANTU is a specific control for the Norway or common brown rat, it seems to be less effective against the common house mouse, and the

Alexandrian species of rat, except in larger doses. On the other hand, the Norway rat is by far the most prevalent species in the United States. Since the Norway rat undoubtedly causes the major portion of the damage, ANTU has a big job to do.

The true killing power of this new rat poison can be more fully appreciated when it is realized that very minute quantities of the material will kill rats. Reports indicate that one pound is capable of killing approximately 200,000 rats under ideal conditions.

Frequent failures in the earlier use of rodenticides, it was found, stemmed from the high lethal dose of the poison used, and the difficulty of inducing the rodent to eat it in large enough quantities. ANTU has such low solubility that when properly made it is tasteless to rats, yet experiments show that its lethal action is swift and certain when the rat ingests as little as two milligrams per kilogram of body weight. This greatly simplifies the administration of the poison, and under ordinary conditions, one feeding should be enough.

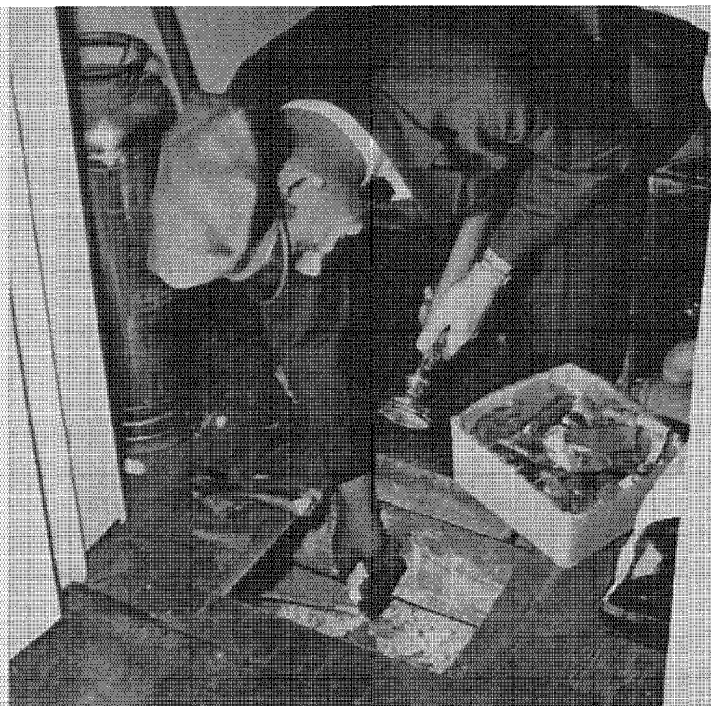
As a result of his tests, Dr. Richter indicates that in an emergency, such as might be brought on by an epidemic of rat-borne diseases like typhus or plague, the rat population of a city could be substantially reduced in a relatively short time. This of course, would depend on the availability of sufficient trained personnel and a supply of the poison.

Dr. Richter felt that it was important to carry his laboratory tests of ANTU to the field where the practical application of such a powerful rodenticide might better be determined. As a result, large areas in the densely populated sections of Baltimore were used in this test. These large-scale field trials indicated that ANTU, when properly used, is capable of producing outstanding results. Based on these investigations, Dr. Richter feels that a city block is a desirable unit for rat-eradication, especially where house construction and sanitation are inadequate. Rats have the habit of moving rather freely within such an area, but infrequently cross the streets to another block.

It seems important when ANTU is used in a rat campaign such as the one conducted in Baltimore, that a complete and thorough job be done in the very beginning. Rats are very cagey. If they are not killed by their first toxic dose, they may develop a tolerance and resistance to repeated doses.

For rat eradication ANTU is best mixed with finely ground corn or wheat. However, it may be used as a spray or dust on cut-up vegetables, potatoes, tomatoes, or other foods which are readily eaten by rats. For complete eradication ANTU should also be applied as a dust on floors and in rat runways and on water where rats are likely to drink. It should also be blown as a dust into rat holes and burrows.

ANTU, which has recently been made available by Du Pont as Du Pont Rodenticide AN, will be used by professional pest control operators and others who are experienced in this work, and it will be useful to compounders of rodenticides designed especially for



A pest control operator places baits of apple or meat dusted with ANTU in rat runs inside a house during controlled test.

the household, factory, and farm. Through these mediums it is believed that the most worthwhile use of this product can be made at the present time.

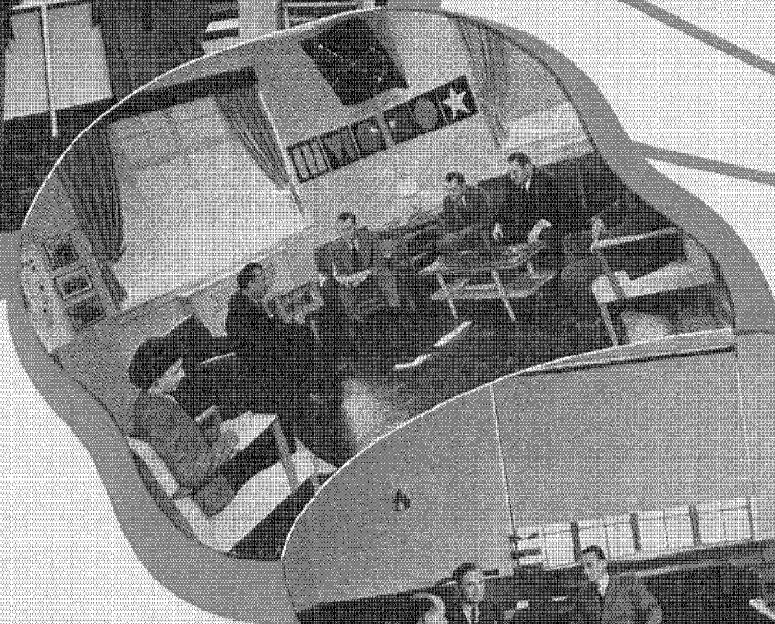
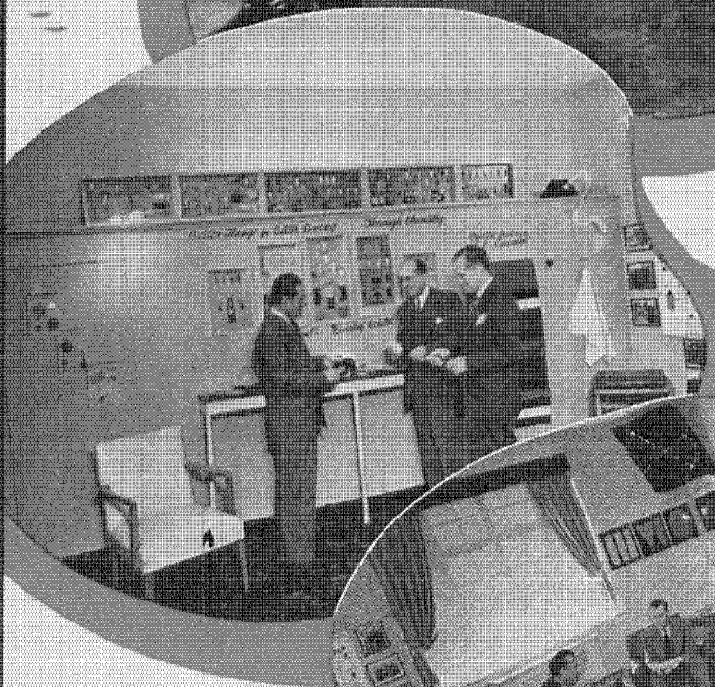
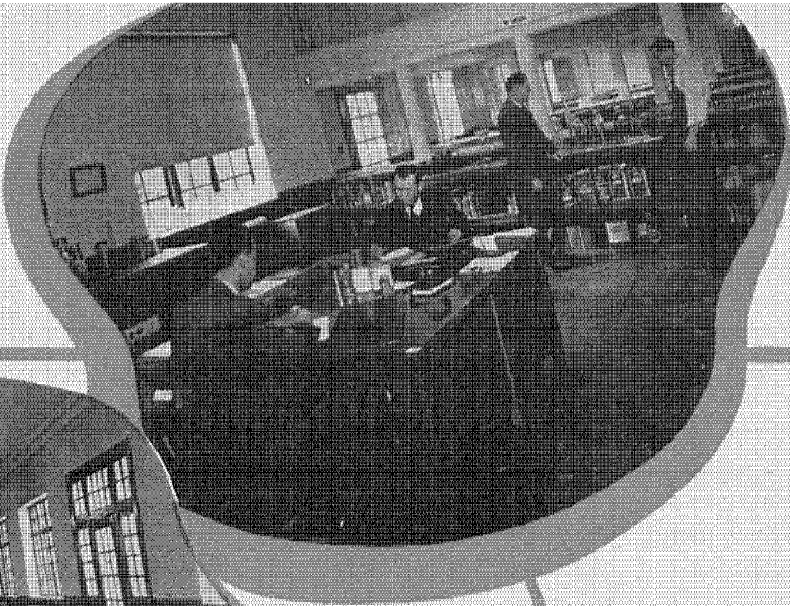
Pest control groups will probably find that the use of ANTU once every three to six months will be sufficient to keep the rat population in any area under control. In turn, a minimum number of rats will reduce disease hazards which are presented by the existence of rats and at the same time curb property damage wrought by a heavy population of rats.

"There is doubtless still much to be learned on the effective use of ANTU as a rodenticide," says Dr. Richter, "but we believe, on the basis of experience, that procedures have been developed by which in an emergency the rat population of a city could be brought under control in a very short time."

Representatives of Du Pont and Johns Hopkins watch a pest control operator dust rat runs in a city dump experiment.



THE ROANOKE



FIELD SERVICE LABORATORY • •

ACCORDING to the Southern Furniture Manufacturers Association's 1941 figures, about forty per cent of all bedroom and dining room furniture made in this country now comes from the South, and about seventy-five per cent of this total from factories in Virginia and North Carolina. Furniture making in Dixieland has become a large industry since the 1920's—and Du Pont finishing materials are used there in large quantities.

So much for a foreword. This story begins in 1932 at Roanoke, Virginia. Here the Du Pont finishes engineer who was assigned to the furniture industry found that he was working at a disadvantage because the Du Pont laboratories in Pennsylvania and New Jersey were too far away to handle his customers' technical problems promptly. As a trained technician, he was qualified to solve many of them himself, but he needed the necessary equipment and a place to work. By following the premise that successful selling requires rendering satisfactory service—and that's particularly true with users of industrial finishes—he secured permission to rent one room in the building pictured here, installed a spray booth, oven, drying rack, etc., which were the bare essentials needed to conduct routine tests and

to match colors for his customers. It was a modest start which has since grown to a complete service.

Step No. 2 involved warehousing a limited amount of material so that emergency shipments could be made to keep customers' plants in operation in case of delay in the shipment of normal orders from the factory locations. This added service proved its worth by keeping plants supplied during critical periods.

Customers and prospects like to sit down and discuss their problems with Du Pont men. A need for a place to hold these conferences was indicated. This resulted in an innovation—the establishment of a field display and reception room. This room as

*How an idea for giving
Du Pont Finishes Service to
furniture manufacturers in
Dixieland has set the pattern
for services elsewhere.*

pictured gives a general display of many products made by the Du Pont Company and pays particular attention to those of potential interest to the furniture manufacturer. In this room are also shown motion pictures demonstrating proper finishing techniques and numerous savings and production improvements of interest to the manufacturer from the standpoint of decreasing cost of production and increasing the efficiency of factory workers.

Normal growth made it necessary to increase the field service laboratory facilities and also to augment the staff of the Roanoke organization so that today it consists of a four-point field service:

1. Field Service Laboratory
2. Warehouse Facilities
3. A District Office
4. Display and Reception Room

The staff now consists of three salesmen operating from Roanoke as a headquarters supported by two field-service engineers in addition to a secretary, stock clerk, and warehouseman. Thus Du Pont service to southern furniture manufacturers has been expanded far beyond the scope of the original plans. The Roanoke establishment in short, is now functioning as a center of information and service, not only for customers of the Fabrics & Finishes Department, but also as a starting point for information on products made by other Du Pont departments. And we may add that the kind of service rendered has been rewarded by increased business for all concerned.

The Roanoke Field Service Laboratory is the first of its kind in the Fabrics & Finishes Department, but it is not likely to be the last one, for plans are under way to establish others in industrial centers where Du Pont products are consumed in sufficient volume to justify maintaining similar organizations.

NOT MANY YEARS AGO, your frame of mind when you sent a dress or a suit to the dry cleaner was much like your frame of mind when the doctor said: "Well, well; let's go into the hospital and have a nice little operation."

You were pretty sure the garment would survive, you were reasonably certain it would be the better for the operation—but you had a sneaking fear things might never, never be entirely the same again!

And, all too often, it wasn't. It was a different size. And the first time you wore it—and for several days thereafter, especially in wet weather—you gave off the aroma of a tractor with loose piston rings, burning distillate!

Today all this is changed, thank Heaven.

Or, rather, thank Chemistry!—for the quick, odorless service offered by progressive dry-cleaners nowadays is made possible by perchlorethylene, a solvent developed by chemistry.

By combining acetylene gas with chlorine, the chemist makes a series of compounds known as chlorinated hydrocarbons. All of them hint at their family origin in their names, which contain the syllables 'chlor' and 'eth.'

One, for instance, is called tetrachlorethane. Another is hexachlorethane.

Perchlorethylene—one of the family—has an extraordinarily useful family trait.

BRIGHTER • FRESHER CLEANER • • •

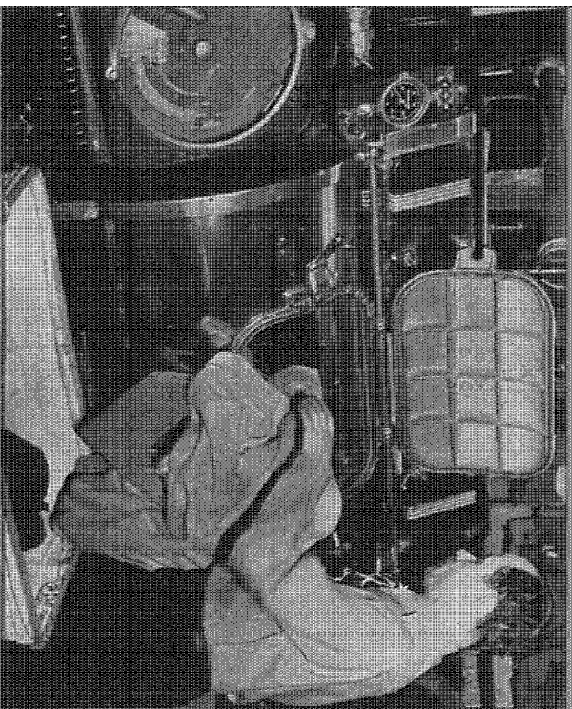


certain amount of one or many substances, and ethylene dissolves them.

As a result, the modern dry-cleaner is able to offer you better service.

"Perclene"—the Du Pont Company's trade-mark for perchlorethylene cleaning fluid—has completely altered the design of machines used in the dry-clean-

• *Dry cleaning is now a job for a single machine (left); even the most delicate fabrics are "brighter, cleaner, fresher."*



but was full on dark-colored garments too. And what it did, of course, was pick up every bit of floating dust in the air—so that having your clothes cleaned was the best way to make sure of their acquiring a veneer of "traffic film" within a few days.

These disadvantages, today, are things of the past. There are neighborhood shops nowadays which pick

ing business. In the old days, a whole row of costly machines went to work on your clothes—one to agitate them in cleaning fluid, another to dry them, another to rid them of as much odor as possible. Modern machines are built around "Perclene." Only one machine does the job. A load of dirty clothing is put in, the machine is started, and a half hour or so later, the clean clothes are taken out ready for pressing.

Many spots, in the old days, had to be removed by hand *after* machine cleaning. "Perclene" is so efficient that nearly all soil is removed in the machine.

up a dress or suit and return it—brighter, cleaner and fresher—within a few hours, if needed.

And "Perclene" leaves no odor.

The dry-cleaner himself is still the greatest factor in satisfactory cleaning. He is a master craftsman. A high order of skill and experience are called for, in his business, and he has them. But it is not in the least derogatory to the man behind the counter, nor uncomplimentary to his skill, to say that this chemically-made cleaning solvent has aided him in his work. "Perclene" may fairly be called a major contribution to the dry-cleaning industry.

By GEORGE ALBEE

IN THE DAYS when this country of ours was a British colony, handsome young English officers—with red coats on their backs and bear's grease on their hair—used to “date” the girls of Boston. The American girls were pretty, too, they wrote home—but they had shockingly bad teeth.

Today the story runs the other way around. American soldiers home from the war say the girls of Europe were pretty enough, but they didn't have the sparkling white teeth we take so much for granted in American girls.

We have better teeth today because we take better care of them. But it has required a long, long time to teach people to use toothbrushes—much longer than you might think.

Less than fifteen years ago, for instance, it was estimated that not more than two persons in five in the United States owned a toothbrush.

This is hard to believe. You brush your teeth. So does everybody else in your family.

But it must be remembered that there are isolated sections of the country in which people live under near-primitive conditions. There are counties in the Northwest so rugged as to be almost impassable; there are remote hill regions in the South in which the only automobile “roads” are creek-bottoms. Residents of one backward community, within thirty miles of New York City, have been known to shoot at strangers on sight. To them a toothbrush would be as alarming as a visiting revenue officer. The usual media of education—books, newspapers, the radio—reach these people scantily if at all.

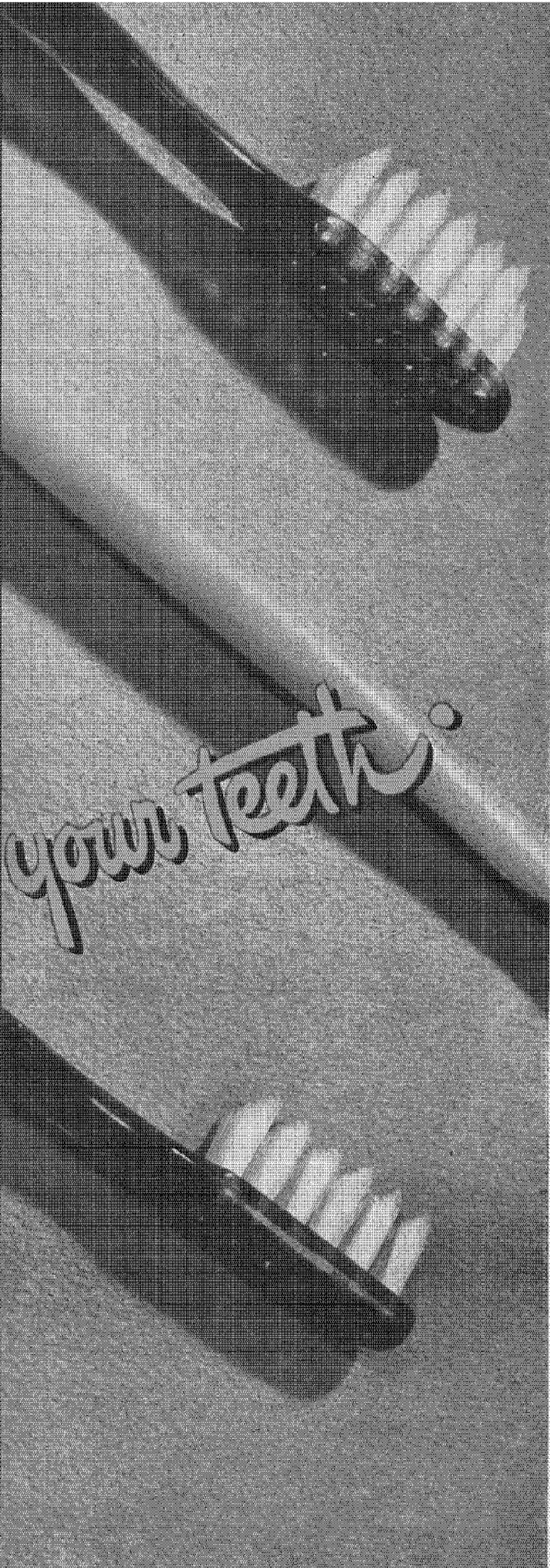
This was revealed by the war. The greatest number of selectees who were rejected for military service were turned down on account of their teeth. Of 900,000 selectees called up by the Army before May 31, 1941, more than 20 per cent were rejected because of defective teeth. (The figure for eye trouble, the second largest reason for rejection, was only 13.7%.)

Slowly, however, year by year, the lessons taught by doctors and dentists, by the schools, by public health authorities are bearing fruit. Promotional efforts by manufacturers of nationally known toothbrushes have played an important part in this educational program. More and more people are learning to brush their teeth—and do it correctly!—as an habitual part of their daily routine.

Figures on toothbrush production show this to be true. Only about 60,000,000 toothbrushes a year were made before the war. The 1945 production figures were estimated at 204,000,000.

Nylon bristles occupy a broadening part of this encouraging health picture. Before the dawn of the Age of Chemistry, people had to clean their teeth with hog bristles because there was nothing better.





But hog bristles had to be sterilized for fear of anthrax, they varied widely in thickness and stiffness, and they had to be bleached to make them white. They were designed by Nature to keep Oriental hogs warm, not to keep teeth clean.

With chemistry it became possible to design a bristle specifically for the job of cleaning teeth. This is what the Du Pont Company did in engineering the design of nylon bristles. The nylon plastic which comes jetting in single filaments from Du Pont spinnerets is so uniform in thickness, solid in texture, evenly resilient and so resistant to water that it is hardly affected by its morning-and-evening dive under the bathroom tap. And nylon outlasts natural bristles by many times—a considerable economy.

Millions of brushes bristled with Du Pont nylon were supplied to the armed forces during the war. The men and women in the services—some of whom were seeing their very first toothbrush—liked them. And the public as a whole has learned to prefer nylon because of its many advantages.

Nearly 170,000,000 of the unprecedented 204,000,000 toothbrushes manufactured in the United States last year were nylon-bristled. Although Oriental hog bristles can now be imported once more, it is doubtful if they will ever again be an important item in toothbrush manufacture.

Nylon toothbrushes are available in three textures—soft, medium and hard. Here, again, the man-made product is more nearly uniform than Nature's could ever be.

It required ten years for the Du Pont Company to perfect nylon for bristles—but their contribution to better health and better appearance makes the effort well worth while.

The material of which the handle of the brush is made has undergone a similar evolution.

Toothbrush handles used to be made of bone and wood—bamboo, for example, was much used in brushes imported from Japan. But both bone and wood had to be laboriously sawed and shaped. When chemistry made such plastics as cellulose acetate and 'Lucite' acrylic resin readily available it became possible, for the first time, to mold the handles to shape. Not only is a molded handle produced much more economically, but it has other obvious advantages. It may be scientifically designed. What is more, the plastic materials absorb far less moisture than bone or wood and are therefore more hygienic. Made in many colors, plastic handles enable members of one family to buy brushes of the same preferred design, and still select a personal brush with ease.

A toothbrush is a simple thing: the bristles, the handle—"and that's all." But just for this reason it offers a striking example of the way in which chemistry so often casts a scientific eye upon an old, familiar product and rebuilds it—makes it better. For both the bristles and the handles of nearly all toothbrushes manufactured today are contributions of industrial chemistry.

Rayon Fashions

FASHIONS for daytime and evening wear, under wartime yardage restrictions, required skillful treatment of fabrics, and American designers under the spur of necessity made the best use of available materials with an artistry that won and is still winning high praise. Many dress fabrics are still scarce, but this has not interrupted progress in design.

The accompanying pictures, showing dresses by popular New York designers, will illustrate how crepe jersey of Du Pont Rayon—a crisp, full-textured knitted cloth—can be molded into soft, full draped effects and flattering lines.

This tunic (left) of Alix-type crepe jersey, made of Du Pont rayon was created by Adele Simpson, New York dress designer.

This distinctive, yet simple, dinner dress shows the artistry of fine design and drape qualities of rayon.



for forty six!



This evening dress (right) shows the versatility of a moss crepe made from rayon yarns.



Above is another of Adele Simpson's creations in crepe jersey of Du Pont rayon in shades of beige, aqua, amber, plus basic brown, and black.



The "Junior Date dress" with Peter Pan collar, in Du Pont rayon, at right, comes in black, royal blue, green and a new red.



Seed Treatment

HELPS THE FARMER!

A BARN FLOOR TASK BECOMES A PLANT PROCESSING OPERATION

By GILBERT F. MILES



TO MOST FARMERS in the United States the use of chemicals for the treatment of seeds before planting is nowadays a well-known practice. But to Mr. and Mrs. Urbanite the part played by chemical seed treatments in the production of most of their food-stuffs and many other articles of every day use may be a new story.

The city dweller, hurrying through his breakfast to catch the subway, is usually unaware that his breakfast cereal almost certainly was grown from chemically-treated seed grain. The toast he munches, while looking at his watch, probably started its long trip to his plate as chemically treated seed wheat. The cotton in his napkin goes back to chemically-treated cotton seed. The sugar in his coffee may have been made from sugar beets grown from treated seed. The whisk broom, with which he brushes his suit at the last moment, got its start in life as treated broom-corn seed. The peanuts in the candy bar he will have as a mid-morning snack—no, don't be alarmed, not the peanuts he will eat—but the seed from which they were grown were probably chemically treated.

If we followed our city dweller through the day we would have by bedtime a long list of foods, textiles, and other materials which originated from seed carefully treated with the correct dosage of the proper chemical. Such things as watermelons, flax, onions, sorghum, corn, wheat, oats, barley, peanuts, cotton, sugar beets, spinach, flowers—all these and many other farm products, too, are grown from chemically-treated seeds.

Each year many million bushels of cereal seeds—wheat, oats and barley—are readied for planting by the application of an almost invisible coating of chemical dust. The material probably comes from a container bearing the Du Pont Oval and the designation, New Improved "Ceresan." If the seed is cotton the disinfectant applied on it may be trade-marked 2% "Ceresan." Or, if peanuts or corn, the seed treatment may be "Arasan." There are others, but these are representative of the group of Du Pont seed disinfectants developed and sold by the Semesan Division.

These chemicals possess no fertilizing or nutritional properties. All they do is to provide a two-fisted defense against countless fungous and bacterial organisms. Many fungi (molds) and bacteria (germs) on the seed and in the soil are entirely harmless; in fact, some are beneficial and even essential to normal plant growth. But there are others that do attack and often destroy seeds, seedlings, and even mature plants. Each year these pathogenic—disease-producing—organisms are responsible for crop failures on many farms and economic losses of varying degree on nearly every farm. It is to protect seeds and plants against these microscopic but devastating pests that we apply a small amount of a suitable chemical to the seed before planting time.

Compounds prepared for this purpose are popularly referred to as seed treatments. The term "two-fisted defense" refers to the dual requirements of an effective treatment. First of all, it must defend the seed against organisms carried on its surface; second,



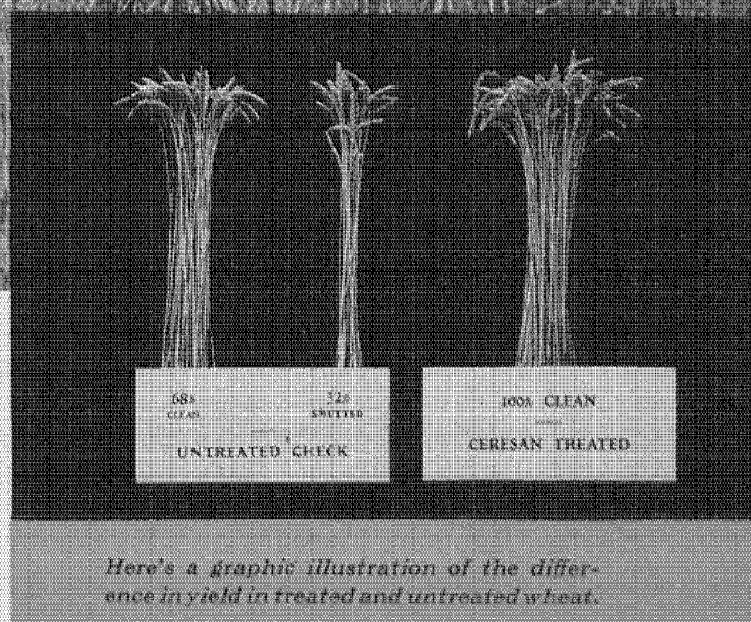
it must protect the seed against the onslaughts of organisms living in the soil. The first function is usually described as seed disinfection or sometimes as seed disinfestation.

To give you some idea of the task involved, consider that a single kernel of wheat lightly infested with the spores of stinking smut fungus usually carries about 5000 spores. A heavily infested one may have on its surface as many as 250,000 spores! And only one spore is enough to infect a plant.

An effective treatment, then, must get rid of all these disease-producing organisms; what is more, it must do so without injuring the seed.

Defense against infections by soil-borne organisms is another phase of seed protection—and that, too, is important, for the seed is exposed during the period of germination and emergence to a veritable horde of soil-borne fungous and bacterial organisms. This protection is especially important when cold, wet weather sets in after planting time to prolong the period of seed germination and seedling emergence. A good seed protectant will usually bring planted seeds through such periods without serious losses.

The methods used in discovering and developing new and valuable seed treatments cannot be told here in detail. The procedure involves the evaluation of thousands of chemicals by means of biological tests to find one with desirable properties. The occasional product that meets the requirements is tested first in the laboratory and greenhouse, then more extensively and rigorously in experimental field plots and finally



under a variety of actual farm conditions. Only after a new product or method has been conclusively proved is it accorded a place in the Semesan group of seed treatments.

When non-treated seed is planted, the depredations of seed-borne and soil-borne organisms are likely to show up in any one of several ways. For example, many of the planted seeds may decay in the soil, resulting in a poor "stand." More often than not the farmer will complain that the seed was poor, although a good stand might have resulted if he had chemically-treated the seed before planting it.

Even though a good initial stand of plants is produced, the losses of young seedlings, caused by damping-off and seedling blight types of disease, may leave too few plants growing to produce a profitable yield. The farmer then may elect to cultivate the poor stand and harvest a poor yield, or replant the field, even though it doubles his expense for seed and labor.

A good stand of plants grown from non-treated seed does not necessarily assure a satisfactory yield. In the case of small-grain crops, for example, the dread smut infestation may not show up until the crop is nearly matured. Many a fine-looking field of wheat, oats, and sorghum gives no evidence until harvest time of damage from smut diseases. Then, instead of a heavy yield of clean grain, the farmer reaps only a poor crop of smutty, low-quality grain.

That is why thrifty farmers insist on planting treated seed. They know it generally means better stands, higher yields, improved crop quality, lower production costs and greater profits. There is no lack of evidence about that.

Tests conducted by the U. S. Department of Agriculture Extension Service—representing federal, state and agricultural college agencies—show that the average increase in the yield of cotton as the result of seed treatment in several hundred farms was about 16 per cent. And the increased yield was obtained at an average expenditure of only about 15 cents per acre for seed treatment.

Field experiments in treating peanut seed were conducted sometime ago by the research staff of the Semesan Division on 48 farms in Georgia and Virginia. Results indicated an average increase in stand of 36 per cent in comparison with untreated seed. This improvement in stand, equivalent to probably 15 to 20 per cent increase in yield, was accomplished with an expenditure of less than a nickel's worth of seed treatment per acre.

Official seed-treating experiments carried out in the Corn Belt over a period of several years showed the average yields of corn were 10 per cent higher from treated than from untreated seed. And the cost? Only a cent or so per acre.

The introduction of seed treatment as a regular farm procedure and the widespread recognition of the advantages of the practice have effected important changes in the business of producing, processing, and marketing seeds. In the interval between the two World Wars seed treatment has grown from a barn-floor task to a plant-processing operation. The farmer who once bought a 5-pound can of seed disinfectant with which to treat his seed wheat or oats now insists that his dealer shall treat the seed before selling it to him. Nearly all cotton seed, corn, sugar beet, and many other sorts of seed are pre-treated before they reach the farmer.

Farmers nowadays take their home grown seed to a grain elevator, a cotton gin, a custom treater, or a peanut-shelling plant for treatment. Such agencies

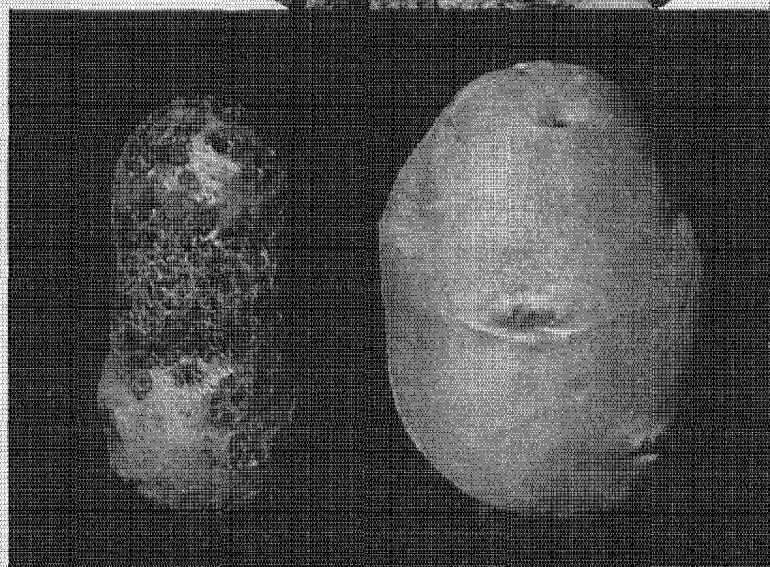
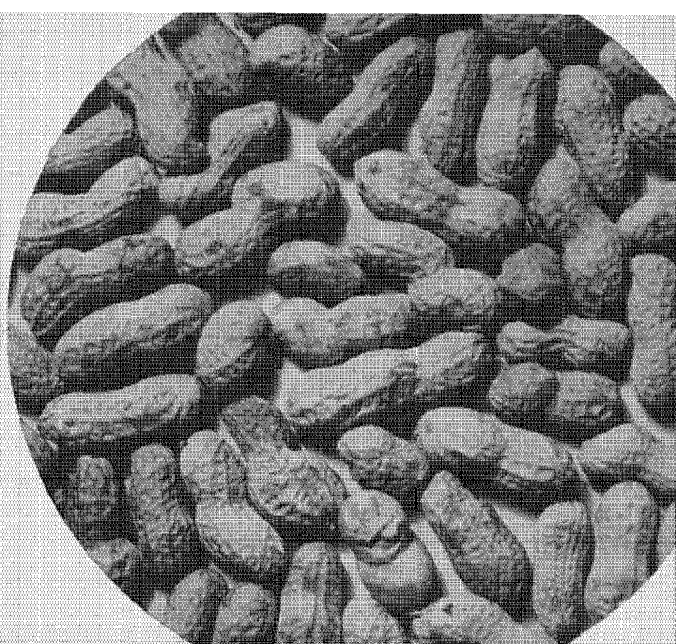


Healthy stands of new corn are usually the result of seed treatment before planting. Note fungous growth on the untreated seed corn in the Petri dish at the left.

have the equipment to render this service at low cost. Many of these processing plants are kept busy night and day supplying the demand for treated seed.

The advances made in chemical seed treatments during the past years are not attributable alone to new products and new methods of applying them, but rather to the educational and promotional work of many agencies in the field.

Particularly in fostering pest-control activities, official agencies exert a powerful influence in disseminating information regarding advances in seed treatment chemicals and methods. The U. S. Department of Agriculture, State Experiment Stations, Extension Service with its co-operating county agents, and teachers of Vocational Agriculture have all encour-



Applied to cotton seed, "Ceresan" reduces decay and damping off, checks other seed-borne diseases. This helps get ahead of the dread bollweevil.

Treatment or non treatment brings this result in potatoes. Tests on 49 southern farms showed treatment increased the average stand of peanuts 36.3 per cent.

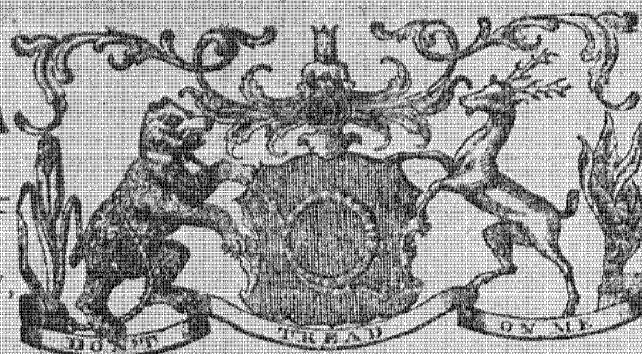
aged the use of seed treatment as a regular practice on American farms.

Year after year the research forces of the U. S. Department of Agriculture and the State Experiment Stations have continued their studies of fungicides, including seed treatments. They have examined the best offerings of commercial research laboratories. They have evaluated each new product and new method with care and impartiality. And when their findings have been favorable, the Extension Service specialists and county agents have not only reported new developments, but they have also been aggressive in educating growers to employ the latest and best methods. The sincerity, honesty of effort, and alertness of these official agricultural workers is the best assurance to the farmer that he is getting the latest and soundest seed treatment information.

Future advances in seed treatment look toward a broader extension of the practice. That is in line with agricultural progress. Looking ahead, too, it is almost a surety that more effective chemicals will be found and that better seed-treating methods will be developed. Furthermore, there are indications that seedsmen will treat their seeds in the fall to prevent infestation of insects during the winter storage period, thus prolonging the germinable life of seeds. With a little imagination one can envision the day when chemicals in trace amounts will be incorporated in seed-treating products to confer upon growing plants a greater resistance to the attacks of fungi, bacteria, and insects; but that happy day for the farmer will not come until we know much more than we do now about the likes and dislikes of these pests and the chemistry and physiology of plant life.

ULY 26, 1776.

VIRGINIA



GAZETTE.

ALWAYS FOR LIBERTY.

AND THE PUBLICK GOOD.

High HEAVEN to GRACIOUS ENDS directs the STORM!

IN COUNCIL, July 23, 1776.

Ordered, THAT the printers publish in their respective Gazettes the DECLARATION of INDEPENDENCE made by the Honourable the Continental Congress, and that the Sheriff of each county in this commonwealth proclaim the same at the door of his courthouse the first court day after he shall have received the same.

ARCHIBALD BLAIR, Cl. Con.

IN CONGRESS, July 4, 1776.

A DECLARATION by the representatives of the UNITED STATES of AMERICA, in GENERAL CONGRESS assembled.

WHEN, in the course of human events, it becomes necessary for one people to dissolve the political bands which have connected them with another, and to assume among the powers of the earth, the separate and equal station to which the laws of nature and of nature's God entitle them, a decent respect to the opinions of mankind requires that the causes which impel them to the separation should be explained.

tance, unless suspended in their operation till his assent should be obtained; and, when so suspended, he has utterly neglected to attend to them.

He has refused to pass other laws for the accommodation of large districts of people, unless those people would relinquish the right of representation in the legislature; a right inestimable to them, and formidable to tyrants only.

He has called together legislative bodies at places unusual, uncomfortable, and distant from the depository of their public records, for the sole purpose of fatiguing them into compliance with his measures.

He has dissolved Representatives repeatedly, for opposing his invasions on

He has refused to assent to such dissolution

der it at once an example and fit instrument for introducing the same absolute rule into these colonies?

For taking away our charters, abolishing our most valuable laws, and altering fundamentally the forms of our governments?

For suspending our own legislatures, and declaring themselves invested with power to legislate for us in all cases whatsoever.

He has abdicated government here, by declaring us out of his protection, and

ravaged our

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dear to the sense of justice and conscience. We must therefore acquiesce in the necessity which denounces our separation and hold them (as we hold the rest of

FACE LIFTING . . . *for old documents*

CELLULOSE ACETATE FILM "WELDS" HISTORICAL PAPERS, AND PROTECTS THEM FOR GENERATIONS

THAT'S THE END, you thought, as you gingerly unfolded that battered old family deed. The beige paper split right down the middle, in your hands. Oh, well, you couldn't decipher it anyway. Out it goes!

Just a moment, please. Take a look at the original draft of the Virginia Declaration of Rights (forerunner of our Federal Bill of Rights) or the front page of the Virginia Gazette, dated July 26, 1776, which scooped the colony with the first newspaper account of the signing of the Declaration of Independence at Philadelphia 22 days earlier. A pair of priceless historical treasures, if ever there were any! And there they repose in the State Library at Richmond, Va., with a new life expectancy of scores of years. They've been sealed snugly away in plastic, and chemically treated to halt attacks by micro-organisms, and the sulphur dioxide in the air—things that made *your* deed, over the years, fit only for the wastebasket.

The story of this chemical face lifting and face saving for old documents goes back to the early '30's when the U. S. Bureau of Standards was making exhaustive tests to find the best way to conserve our country's irreplaceable source material, and prolong its life. While the art of paper preservation goes

back over the horizon to the civilization of ancient Egypt, progress in preserving documents—even up to a decade ago—had been relatively snail-like.

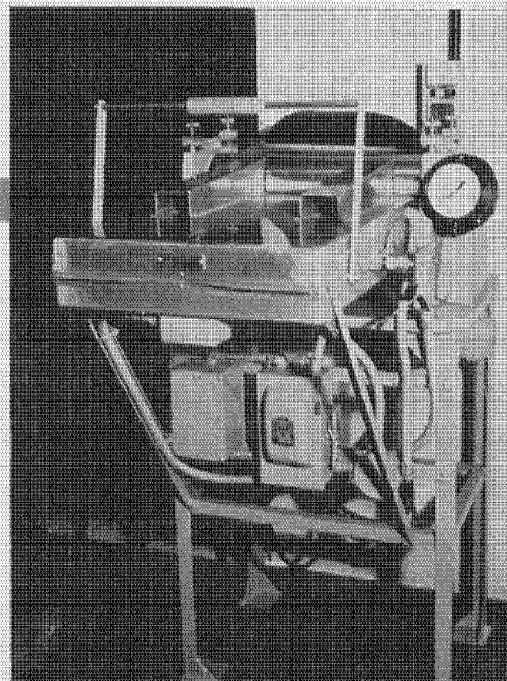
The Bureau's problem entailed sealing a document away in some kind of airtight, *transparent* envelope (after all, a document is meant to be read) that offered something better than current methods of lamination.

"Crepeline," a strong, coarsely-woven silk fabric, and Japanese tissue, which is tough, thin and transparent, had been used. They made a sort of sandwich of two sheets of the protective tissue, with the document as the filler, the whole pressed into a single unit with an adhesive as the binder.

The hitch here was that the best adhesive for the purpose was starch, which is very attractive to insects and fungi—great destroyers of old manuscripts. In addition, starch tends to cloud the finished work. This is no help at all to photographers who make facsimiles, or to historians using ultra-violet, or infrared rays to verify the authenticity of a document.

The Bureau experts worked with various types of cellulose sheetings, and cellulose derivatives. Cellulose film, (first cousin to the cellophane on your cig-

Mr. William J. Barrow (extreme right) shows two South American archivists visiting the Virginia State Library how the plastic lamination process works. Right, the Barrow press which adds years to ancient papers in one operation.



arete package) offered transparency, and was more resistant to the acids, fungi, and other impurities that work together to the disadvantage of an old record. This was a good lead, so they tried cellulose sprays, dips, and even went back to the old way of attaching cellulose sheeting to the document with adhesives.

For a time, cellulose nitrate sheeting looked promising. It withstood the stringent Bureau of Standards tests for resistance to tearing, folding, and to light rays and heat. But it was discovered that cellulose nitrate, over a period of time, had a decomposing effect on the paper.

Then cellulose acetate—which chemists thought would *not* decompose the old paper—was laminated on a document in a steam-hydraulic press built by the Bureau. Under heat, the cellulose softened to the consistency of chewing gum, and, when pressure was applied, the plastic was forced into the millions of tiny pores of the paper. When cooled, the paper and plastic became a homogeneous unit. After exhaustive tests the Bureau concluded that lamination with cellulose acetate was the “best and only feasible

means” of preserving old documents, and the process was forthwith made standard procedure for the National Archives of the United States.

This revolution (it amounted to that) in the art of document preservation had been watched with keen interest by William J. Barrow, of the State of Virginia's Archives Division, whose vocation was “written Americana,” and who had made some advances in the art of archive preservation in his own right. Both at the Virginia State Library in Richmond, and for a time at the Mariner's Museum at Newport News, Va., he had tried to find out why some old documents age faster than others, and how to start them all from scratch again, with an even chance of survival in generations to come.

He had discovered that some two-century-old papers were actually in better condition than others a mere hundred years of age. Chemical analysis showed that the former contained a small percentage of calcium carbonate (limestone is full of it), while the latter had a high acid content. He reasoned that the better preserved paper must have been made in a section where limestone in the terrain had made

This is cellulose acetate film, which provides the transparency, toughness and other requisites for protection of state archives and historical papers.



the water hard, and the hard water, in turn, was used to wash the rags from which the paper was made.

He was sure that if the acid were removed from old paper, calcium put in, and the whole thing sealed away against air, insects, fungi, and handling, the old document could be preserved almost indefinitely.

Barrow had already worked out his methods of putting calcium into a document by treating it with this solution. Now the results of the Bureau of Standards tests, nominating cellulose acetate as the best protective agent, fitted together the last pieces of the puzzle, as far as he was concerned.

However, the steam-hydraulic press used by the Bureau was a large, expensive affair, certainly hardly practical for state libraries, and historical societies. So, aided by engineer friends, he built a laminator press at half the cost of the Bureau press, which incorporated ideas he had been assembling while the Bureau tests were underway.

Briefly, Barrow's press consisted of a pair of aluminum plates, electrically heated, and a pair of calender rollers which provided pressure. In his first experiments with the new press, and in his early work with the State of Virginia's historic documents, Barrow used hundreds of square feet of Du Pont cellulose acetate foil, in combination with a purified tissue, the latter to add extra resistance against tearing and folding.

The itinerary of a document through the Barrow process is this: (1) Soaking in lime water to neutralize acids. (2) Bathing in calcium bicarbonate to "carbonate" the hydroxides in the paper, insurance against an acid condition at a later date. (3) Drying. (4) Placing the document between two sheets of cellulose acetate film, topped by two layers of tissue. (5) Placing the plastic sandwich in a "molding form" of cardboard and tracing paper; the latter merely goes along for the ride.

The "form" is then placed between the two heating plates, and "cooked" for about 20 seconds at about 320 degrees, Fahrenheit—the same temperature the housewife uses when baking a cake. Then the form is run once between the rollers at a pressure of 1,000 pounds per square inch, and is allowed to cool naturally. Out of the form comes the document, "welded" in transparent plastic.

All this bathing, soaking, baking, and pressing seems harsh treatment for a fragile old record, but no less an authority than the Bureau of Standards says it's the "best" way. And today replicas of the Barrow press are using hundreds of thousands of square feet of the Du Pont cellulose acetate film to make ageless the state records and documents of Georgia, Maryland, Delaware, and Mr. Barrow's home state, Virginia.

A final testimonial comes from a group of laboratory mice used in testing cellulose acetate film. Mice—notorious trenchermen where old documents are concerned—turned up their noses at paper set in cellulose acetate. Their consensus: "We hate it!"

What's New

BY THE UNANIMOUS vote of a committee of fifty leading educators in chemical engineering, the Atomic Bomb Project has received the seventh biennial award for chemical engineering achievement. The award was made in New York City on February 26. Sharing in the award were approximately 100 organizations which, in the committee's estimation, contributed most to the research, development, and engineering phases of the 2 billion dollar project. The Du Pont Company was cited for its work in constructing and operating for the Government the \$350,000,000 Hanford Works at Pasco, Washington. Previously, the Du Pont Company won the second of these awards in 1935 for developing synthetic rubber from acetylene, and campher from turpentine.

HERETOFORE the Du Pont Company's Electrochemicals Department has maintained facilities for research on formaldehyde and related products at the Niagara Falls, New York, plant. From now on this work will be carried forward in a new laboratory established at the Perth Amboy, New Jersey, plant. Consumers of Du Pont formaldehyde are requested to make note of this change.

TWO DIVISIONS of the Organic Chemicals Department have been consolidated into a single unit now called the Petroleum Chemicals Division. The merger brings together the former Alcohol Division and the Tetraethyl Lead Division.

THE SOIL TREATMENT for repelling termites, developed by the Grasselli Chemicals Department, makes use of an oil-soluble organic compound that discourages these insects from making a breeding ground of soils in the vicinity of wooden structures. Extended field tests in severely-infested locations have confirmed the effectiveness of Du Pont Soil Compound NC and indicate a longer period of termite control than is usually expected of a soil treatment. The concentrated product, which requires some processing to prepare it for use, is now available to professional pest control operators skilled in this type of service work. They may write to the Departmental Office in Wilmington for complete details.

DO YOU WEAR a wrist watch? If so, you'll be interested to know that better straps of molded Du Pont polythene are now being manufactured by the Pla-Safe Plastics Corporation of Buffalo, New York, for sale through regular retail channels. These straps are unusually serviceable; they are non-irritating to the skin, odorless and perspiration proof. They are made in one and two-piece styles of the usual widths in black, cordovan brown, white and crystal.

PAN AMERICAN WORLD AIRWAYS

'Ventube' carries air to a clipper wing compartment, making repair work easier, less dangerous.

The bilge compartment is no place for a prolonged visit. Ventube helps solve a problem here.

AIR FOR AIRPLANES

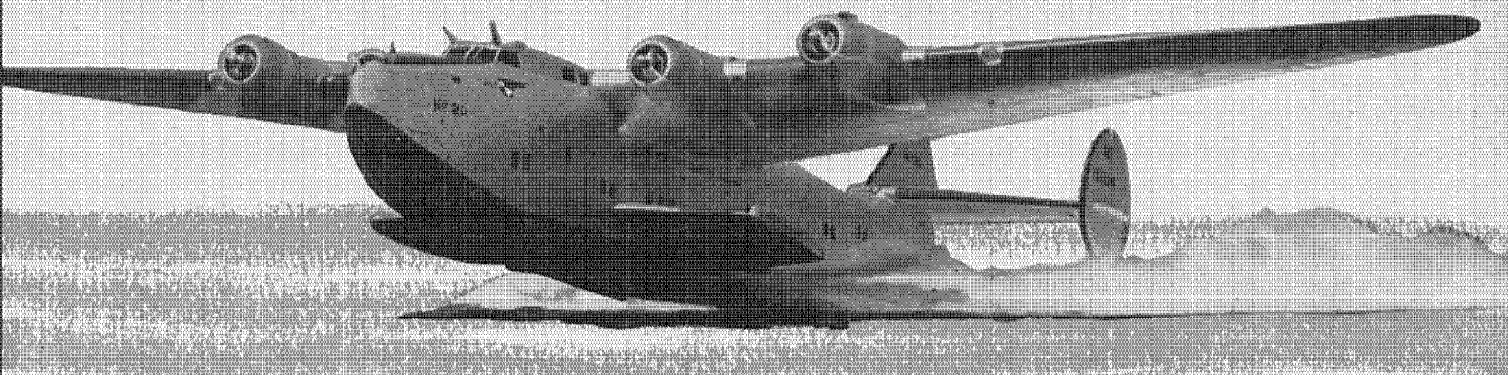
By GERARD S. GAREY

DUPONT "VENTUBE," flexible, rubberized ventilating duct, which has served so well in mines and tunnels by supplying fresh air from ventilating fans to men working in the murky depths of the earth, now has a new assignment—furnishing air to airplanes!

"Ventube," as you probably know, has been used in coal and metal mines and tunnels for over 25 years.

a flexible tube of chemically-treated, impregnated fabric—Du Pont "Ventube"—a giant air-hose. The entire hold of a ship under construction may be ventilated by mounting a power fan above-deck and dropping a length of "Ventube" down to the bottom of the ship. Or, an exhaust fan may be attached, and the foul air drawn out through the new-type tube.

Du Pont helical-type "Ventube" consists of a tem-



Miners were quick to recognize its value and soon grew to regard it as a trustworthy friend.

Others, too, have learned to look upon "Ventube" in that same way. During the war more ships were built than ever before. How to get fresh air down to men working inside a ship in dry dock or on the ways, how to remove the foul air, was long a troublesome problem.

Far down inside stuffy holds men worked amid the ringing slam and clash of great steel plates, in the deafening clatter of riveting. In winter the steel is freezing cold. In summer the confined space is a reeking furnace. Only one thing could make work at all bearable to human flesh and blood—fresh air!

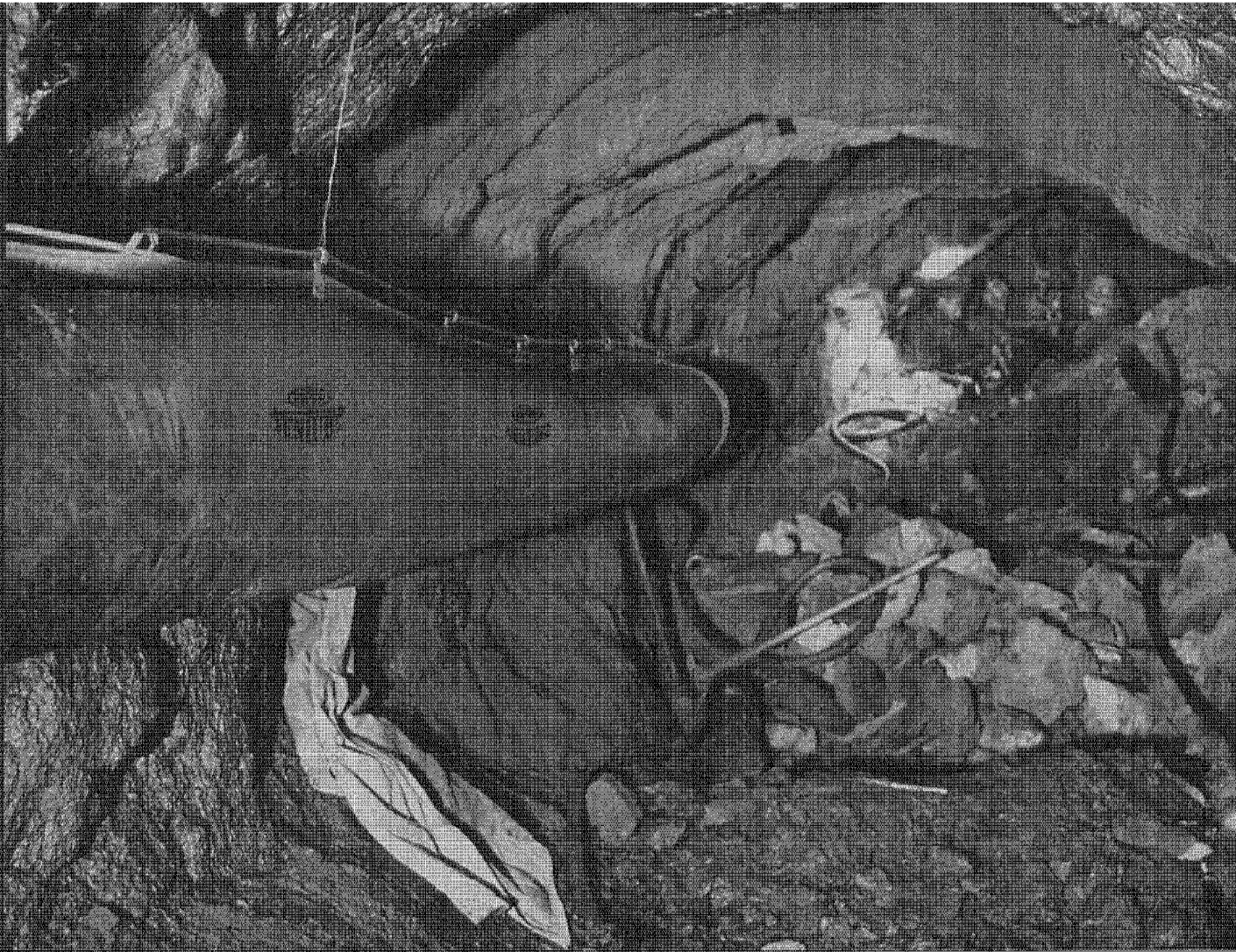
If "Ventube" worked so well in mines—Du Pont engineers asked—why wouldn't it work equally well down in the holds of ships? So they lowered a smooth grey tube into the bottom of a hold. Riveters and welders were shortly drawing into their lungs fresh, sweet air, generated by ventilating fans to which the "Ventube" was attached.

Now, no matter how dark and deep the below-decks compartments of a ship, even if a man has to crawl into one on his hands and knees, he can take a supply of fresh air along with him! For down to him is sent

pered steel helical spring mounted within an impregnated cloth sleeve. The spring framework maintains an effective airflow opening even when the tube is twisted, turned, or bent around corners.

The sleeve is made of cotton fabric treated with chemicals and coated to give it resistance against heat, moisture, mildew and decay, acids, alkalies and gases. The tubing is impregnated with a compound that helps keep air in and water out and gives it great toughness. Some "Ventube" has a diameter of eight inches; pieces of it may be coupled together like a fire hose; you can have any length you want if your blower fan is powerful enough. If, by accident, you burn a hole through it with an acetylene torch, the fabric can be repaired in the same way an inner tube of an automobile tire is patched. When not in use, this new-type "Ventube" is easy to handle and easy to store. It "accordion-folds" at the ratio of 15 feet to 20 inches, which means that it can be compressed and packed in small boxes for storage.

Men who labor underground or in the holds of ships will tell you how "Ventube" brings fresh, clean air into any space a man can enter. And aircraft maintenance men will back them up, for "Ventube" is now bringing air into airplanes.



*"Ventube" has been used in mines for 25 years,
and miners recognize it as a trustworthy friend.*



Repair men of Pan American World Airways use helical-type "Ventube" while working in wing compartments and in the bilge compartment of Clipper ships—close confined places where air-supply is a major problem. But their principal use for this new ventilating duct is in cleaning and repairing the clipper's sponson gasoline tanks. Fumes so heavy as to be almost mist once drove workers from the tanks in a matter of minutes. Work was delayed and health threatened. But with the help of "Ventube," maintenance men can remain in the tanks without danger until the job is finished.

Today, in addition to Pan American, many other aircraft firms, shipbuilders, and others are using helical-type "Ventube" to bring fresh, clean air to men at work in planes, ships, mines, factories or wherever ventilation is needed in a confined space.

*A smooth grey tube brings fresh
air into the dark holds of ships.*

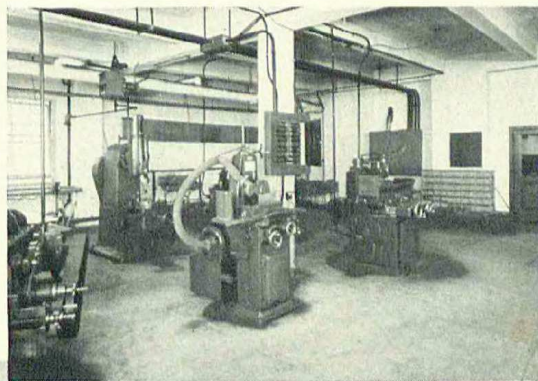
Improve operating efficiency in your plant with **DU PONT** Color Conditioning

Scientific use of paint increases employee efficiency and improves morale. Du Pont Color Conditioning is a comprehensive program for the selection of color in the maintenance painting of an entire industrial plant. It is practical, functional — not glamorized interior decoration. It helps you select and apply appropriate colors where they are needed — basing its specifications on over 17 years of successful results obtained in hundreds

of typical American plants in all types of industry.

Color Conditioning reduces eye strain and fatigue. It salvages waste light. It helps eliminate personal injuries and fosters better employee-management relations.

Act now to make your plant safer, more efficient, more productive with Du Pont Color Conditioning Paints. Write: E. I. du Pont de Nemours & Co. (Inc.), Finishes Division, Wilmington 98, Del.

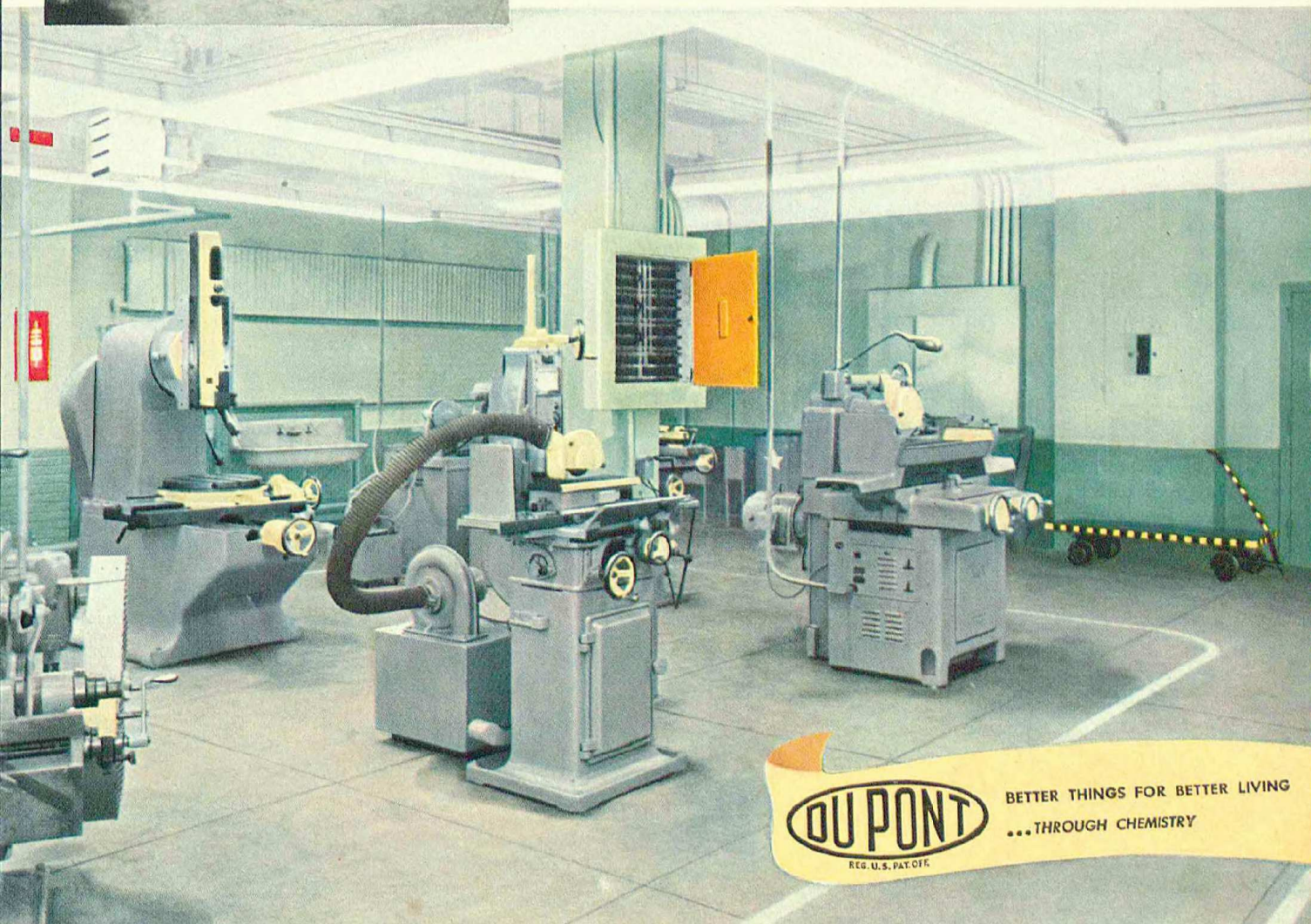


◀ BEFORE

Dark machinery silhouetted against glaring white walls causes eye fatigue among operators. Poor utilization of light results in bad seeing conditions. Unidentified danger hazards, pipes and switch boxes endanger employees.

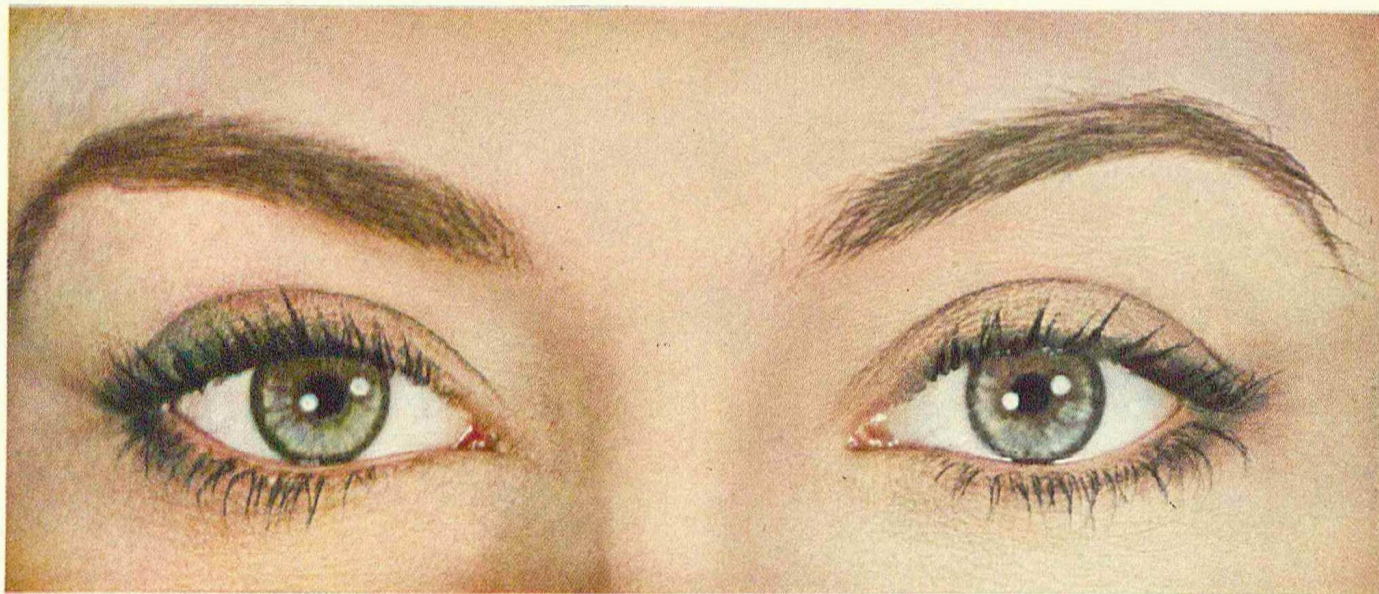
↓ AFTER

Color Conditioning eliminates glare and sharp contrasts between equipment and surrounding wall space. Color on working areas of machines "spotlights" material being fabricated (Three Dimensional Seeing). Hazards and safety devices clearly identified in accordance with Du Pont Safety Color Code. A pleasant, efficient atmosphere conducive to increased production and better employee morale.



REG. U.S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY



Use your EYES to find good buys

**GOOD THINGS ARE BACK AGAIN . . .
AND MANY ARE BACK IN CELLOPHANE**

Right now there is a special reason for keeping your eyes wide open when you shop. Lots of good things you couldn't get in war years are back on the counters. Many of them come in Cellophane to show off their points of quality.

During the war you had to "take what you could get." Now, more and more you can exercise your right to *inspect* and *select*. And Du Pont Cellophane lets your sharp eyes choose what you want . . . helps you get your money's worth.

For instance, quality baked goods are packaged in Cellophane—not only to show you their appetizing variety—but also to protect delicious freshness and flavor. Wherever you shop, whatever you shop for—remember that Cellophane *protects* what it *shows* and *shows* what it *protects*.

BETTER THINGS FOR BETTER LIVING
... THROUGH CHEMISTRY

A product of Du Pont research



Cellophane



**DU PONT
Cellophane**



shows what it *protects*