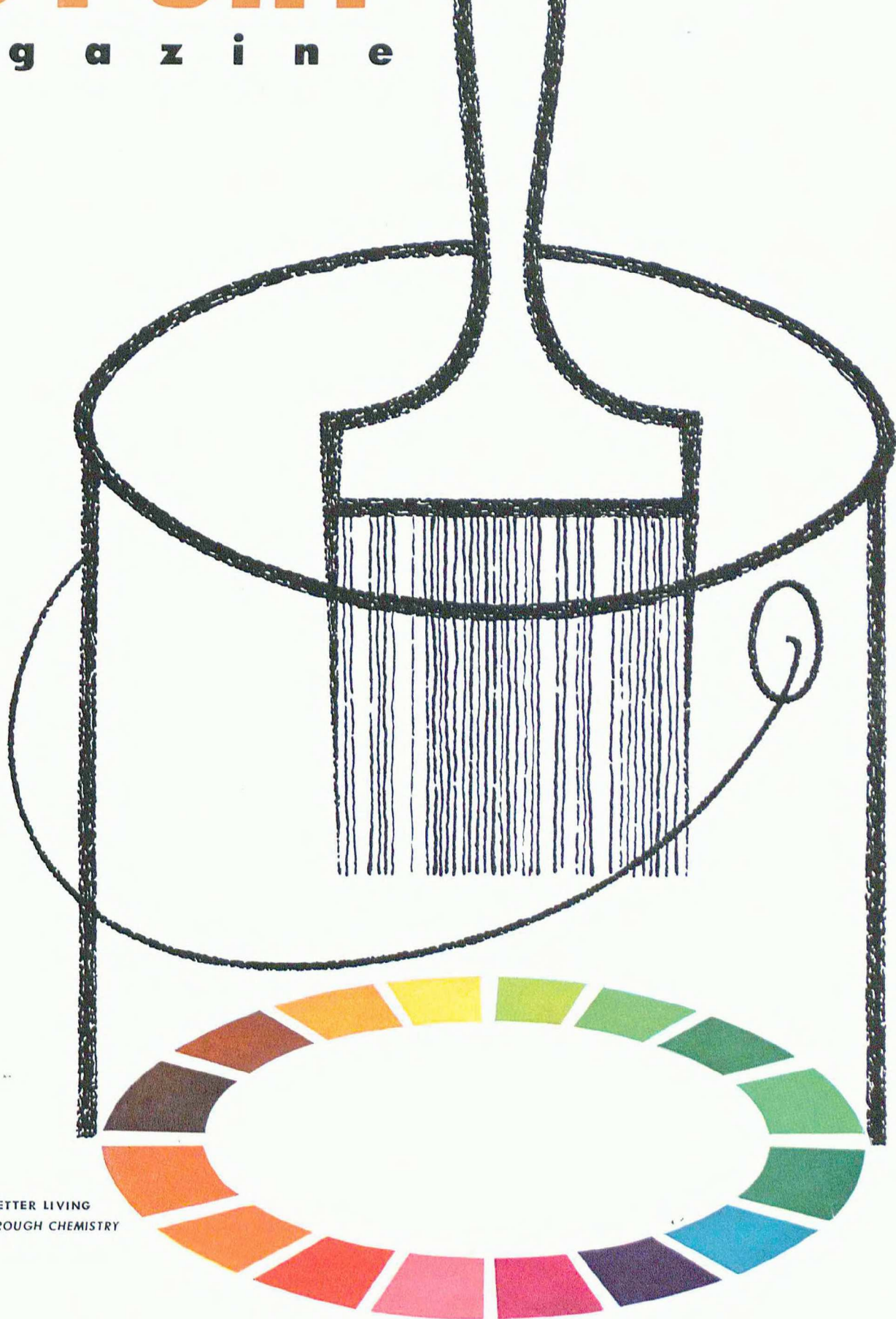
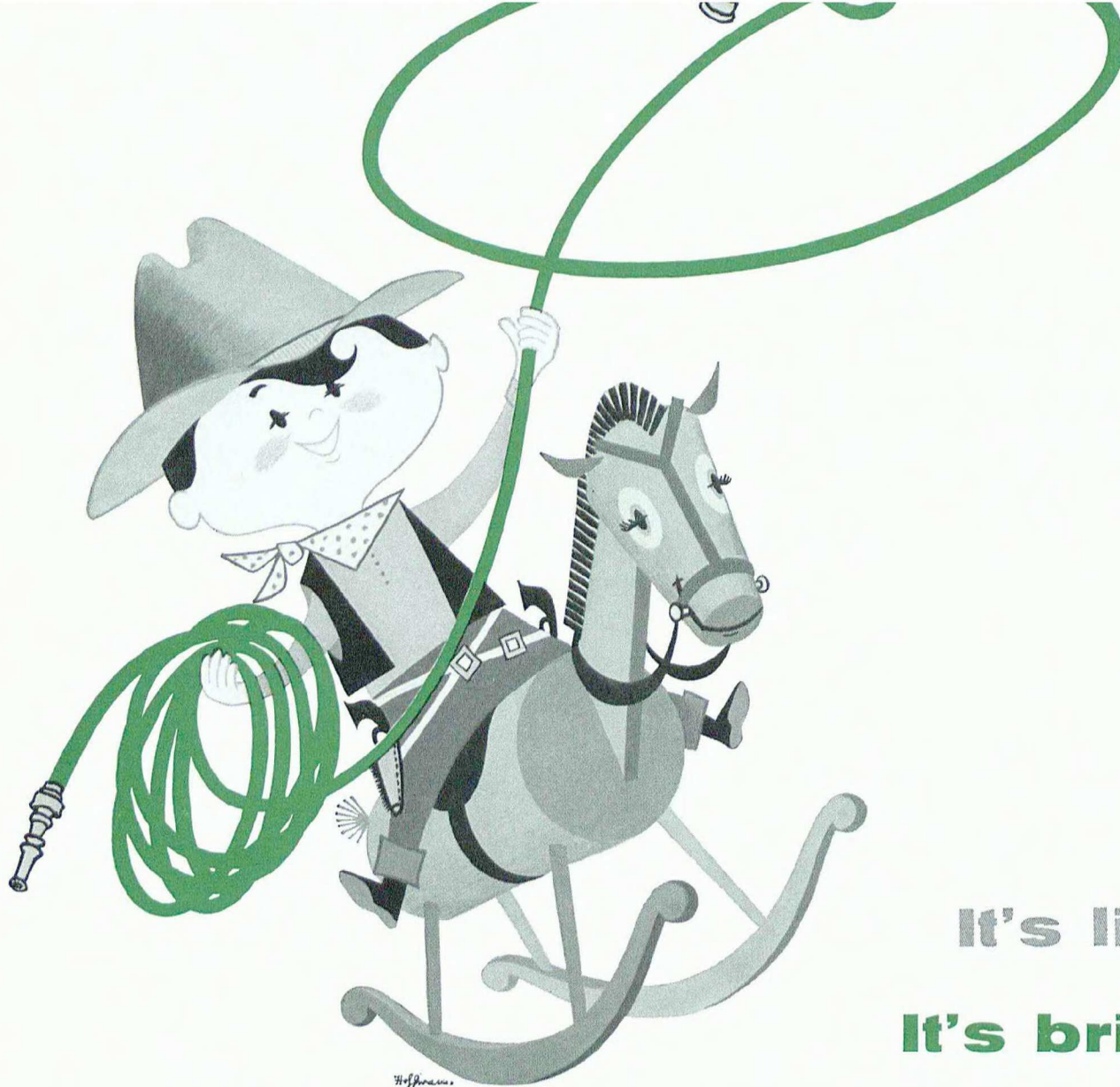


magazine



BETTER THINGS FOR BETTER LIVING
... THROUGH CHEMISTRY



It's light!

It's bright!

It lives outside!

A REALLY NEW TYPE OF GARDEN HOSE

Artists sometimes exaggerate, but ours happens to be playing it pretty straight. This new type of rubber garden hose *is* light enough for a four-year-old to handle . . . and it *does* stay flexible. Even on those chilly spring and fall days it doesn't stiffen and become hard to handle.

You can forget about reeling up this hose after every

watering, too. It's built for outdoor living . . . takes sunlight and weathering without a crack. There's no danger from too much pressure, either. Shut off the hose at the nozzle and answer that phone—this hose won't swell or burst.

A rugged neoprene cover protects the strong rayon-cord reinforcement . . . gives this hose a long outdoor life. Remember the name *neoprene* when you buy garden hose. You'll see and feel the difference when you use it.

NEOPRENE

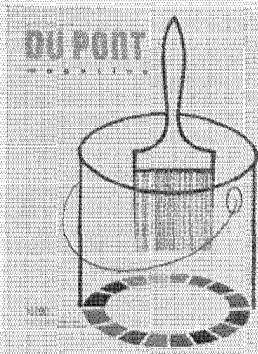
The rubber made by Du Pont since 1932



REG. U. S. PAT. OFF.
**BETTER THINGS FOR BETTER LIVING
... THROUGH CHEMISTRY**

OUR COVER

Our paint cover speaks for itself, we feel, as paint and the beauties of spring go hand in hand toward making this world lovelier and more livable. In addition to the lead article on a new concept in industrial finishing, there are two more on paint in this issue. A story of colored appliances begins on page 22. This is followed by a report on Du Pont finishes the householder can select to match those pretty new kitchen appliances.



Last spring our cover pictured "Telvar" weed killer and "Karmex" herbicide. Inferentially, that brought in the thought of gardening. Now the subject is painting. Understandably, it could get us in Dutch with a few male readers. "In the spring," we can imagine them writing us, "our thoughts turn to fishing and golf, not to work around the house."

We'll be sorry, of course, if our spring camping holds up our answer.

... "ADVANCING TECHNOLOGY"

"Our population is growing more than 1.5 per cent per year. Advancing technology has permitted a rise of about 2 per cent a year in our standard of living. This means that in order to keep up, we need a growth rate of production of at least 3.5 per cent per year for the indefinite future."

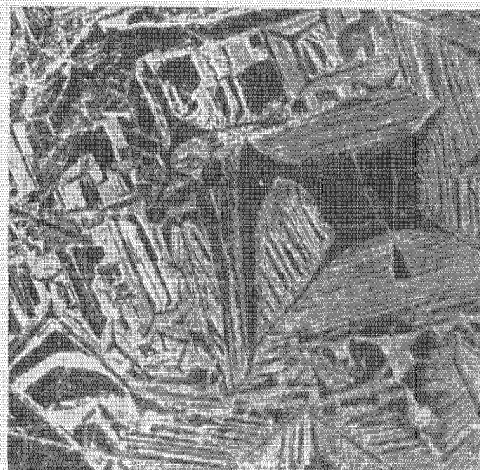
—Ira T. Ellis, Du Pont economist, in a 1956 speech

FLASHBACK—THE DODO BIRD

Still in the process of reviewing material in the 1939 files of our former editor, we ran across the picture below and this memorandum:

"This is an unretouched photograph of an etched sample of metal, an experimental alloy made at the Du Pont Experimental Station in Wilmington. The intricate pattern shows what has been nicknamed a dodo bird and indeed resembles Indian art of Central or South America. The magnification is about 50 times."

We thought the illustration not only intriguing in itself, but also a good commentary on the wide scope of Du Pont research. While the Company is primarily a manufacturer of chemicals and closely related products such as fibers, films and plastics, for many years it has been interested in metals to which chemical technology can make a contribution. The report of titanium metal's transition to an industrial life, beginning on page 6, is an example of what we mean.



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* * * * *

JAMES H. McCORMICK
Editor

GORDON H. KESTER
Associate Editor

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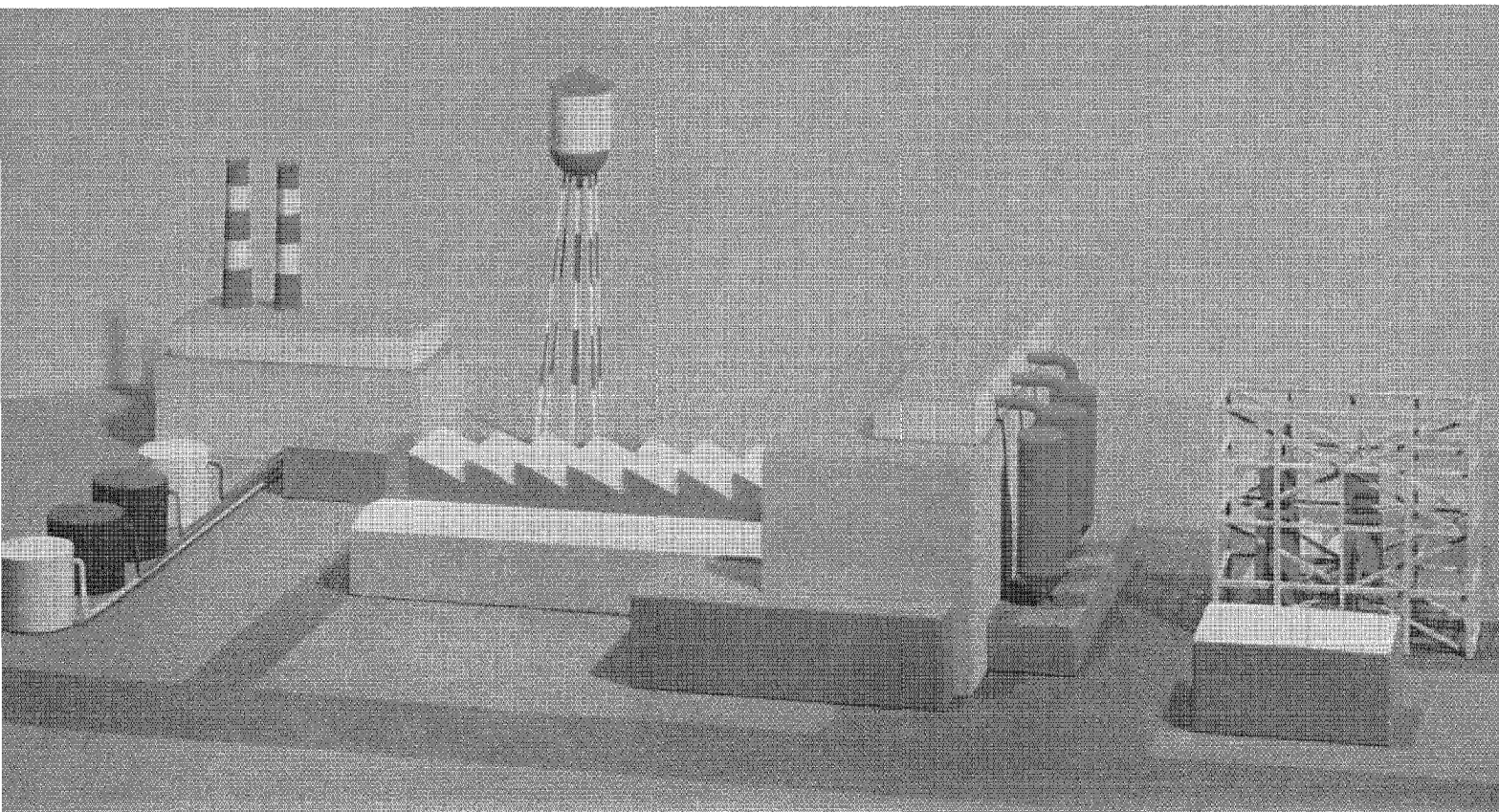
Page 6: Courtesy General Motors Corp. and *Business Week*; Page 7, top: Courtesy Douglas Aircraft Corp.; Pages 8 and 9: Courtesy Pacific Intermountain Express; Page 19, top left: Courtesy Chas. Pfizer & Co., Inc.; Page 22, top: Courtesy Tracy-Kitchens, Edgewater Steel Co.; bottom: Courtesy St. Charles Mfg. Co.; Page 23, top: Courtesy American Kitchens Div., AVCO Mfg. Corp.; bottom: Courtesy General Electric Co.; Page 28: Courtesy Allison Div., General Motors Corp.; Page 29: Courtesy Resistoflex Corp.; Page 30: Courtesy Armstrong Cork Co.; Page 32, top: Courtesy John Bean Div., Food and Chemical Corp.; second from top: Courtesy Funk Bros. Seed Co.

CHANGE OF ADDRESS

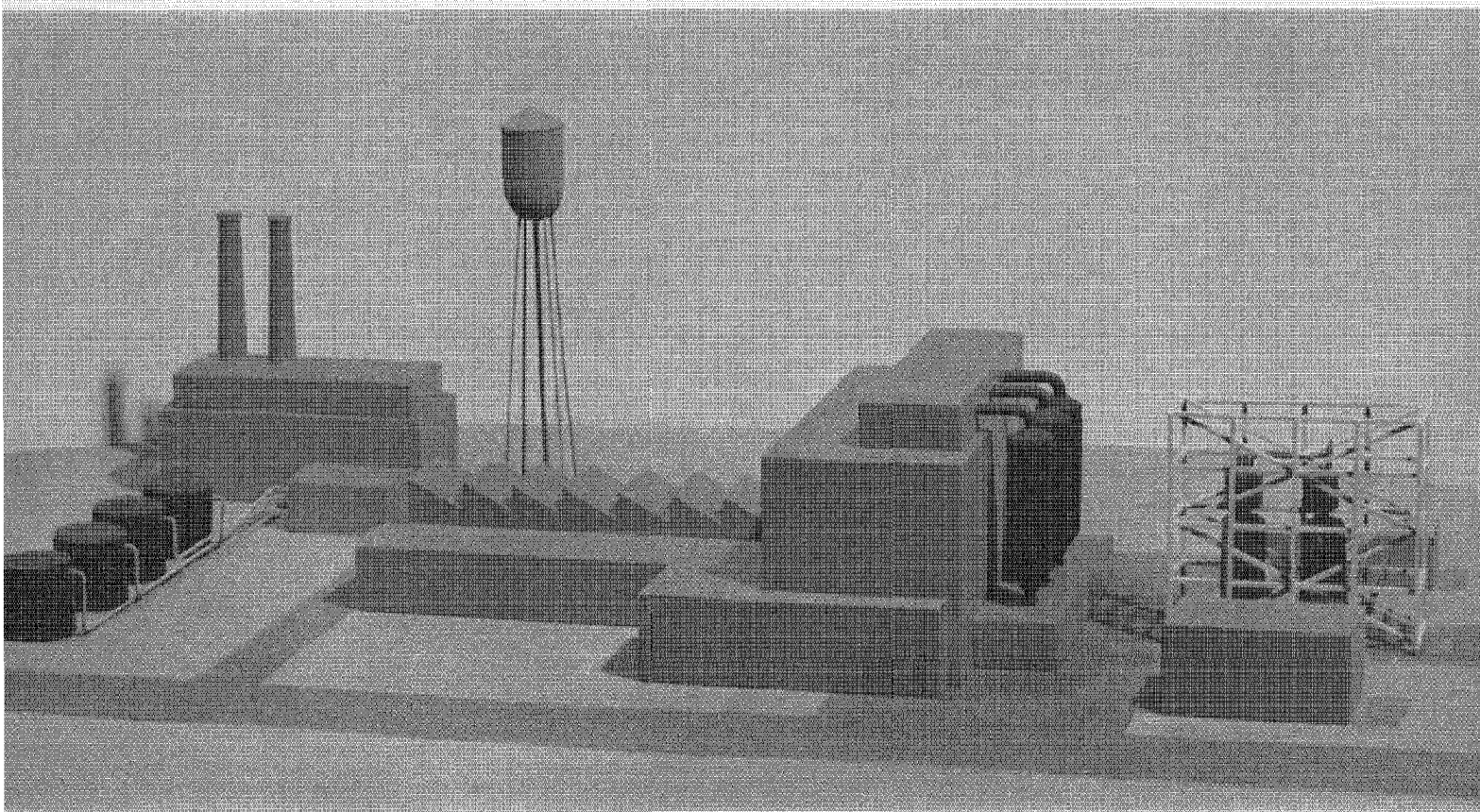
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Mail to: Editor, Du Pont Magazine
Wilmington 98, Del.

Send old address with the new, enclosing if possible your address label. Post offices will not forward this Magazine unless you provide extra postage.



Model of typical plant before (below) and after Focal-Point painting. International orange required by law on water tower, stacks, is used as focal color. Light and dark green help break up building mass. Office is painted contrasting color. Colors on pipelines and tanks serve a functional purpose.



FACE LIFTING FOR INDUSTRY

Du Pont Focal-Point painting aims to make plants attractive enough to win neighborhood friends and influence employees

By HOWARD S. KARNES

An idea born where most of us were born—in a hospital—is setting out to give the drab industrial landscape a face lifting many people think is long overdue.

The idea is that color, used with imagination and an eye to certain established rules, can make the places we work more pleasant, as well as safer and more efficient. Du Pont originally applied the idea to hospital operating rooms, supplying an eye-soothing green wall finish to replace the glaring white formerly used. Under the name of Color Conditioning, the Du Pont Finishes Division has applied the principle to interior painting in general for the past 20 years.

Now, as Du Pont Focal-Point painting, the idea of using color scientifically is being applied to industrial plant exteriors. The beauty of the plan is that using paints of the correct color costs no more than painting according to whim. On the contrary, the dividends are many.

First of all, Focal-Point painting can transform a plain collection of industrial buildings into a visual asset to the community. Local people are quick to appreciate a gesture of this kind. To them, it's proof that plant management has as much pride in the town as they do. As the mark of a good neighbor, an attractive plant is a definite community relations asset.

... HELPS IMPROVE HOUSEKEEPING

Focal-Point painting is likely to have the same beneficial effect on employees. Pleasant surroundings can increase a man's pride in his job and in his company. Other things being equal, his efficiency and morale improve. And because people tend to live up to their environment, he is apt to treat his housekeeping chores in the plant more conscientiously.

There are more obvious benefits traceable to Focal-Point painting, too, because color is also used functionally to help the plant operate more smoothly and safely.

Esthetically, these are some of the things considered in making a plant more attractive to passers-by and employees through Focal-Point painting:

1. What are the best looking features of your plant,

the elements you want outsiders to see? Dramatic, forceful colors are used in these areas to focus attention on them. In addition, less interesting areas are painted in subdued colors to divert attention from them. From these ideas Focal-Point painting gets its name.

2. Maybe advertising value can be added to the paint job by using company colors in the scheme. Phillips Petroleum did this in painting a Kansas refinery (*Du Pont Magazine*, April-May 1953), and Standard Oil uses its familiar red, white and blue on petroleum storage tanks.

3. Darker tones are used near the ground and lighter colors in higher areas to give a pleasing architectural balance to the building group.

FUNCTIONAL POINTS, TOO

The tangible benefits Focal-Point painting can bring include greater safety and operational savings. Here are some of the practical ways in which paint helps achieve these things:

1. Color is used to identify piping and tanks, to trace supply lines and to distinguish manufacturing processes from one another. On a new plant, especially, this color coding can help in the training of employees.

2. White or other light-colored finishes are used to reduce heat and consequent evaporation in storage tanks. White roof coatings also are used on buildings to reflect the sun's heat.

3. The Du Pont safety color code—red for fire fighting equipment, black and yellow diagonal stripes to indicate safety hazards are examples—helps cut down on accidents and wasted man-hours.

Every specified paint and color is chosen for its durability under the conditions to be encountered as well as for eye appeal. Fortunately, durability and color both can be expected of modern finishes.

There is no such thing as a standard Focal-Point painting plan. Each plan is drawn to fit an individual plant. Before a brush is dipped or a spray gun lifted, a Du Pont Finishes representative weighs the plant's peculiar needs and submits his recommendations.

It's ready to "sing" on anyone who comes under its unwavering eye. It's the latest bane of bank robbers, whose activities may be crippled by ...

The canary camera

By PAUL GIGUERE

A Boston bank is trying out a new kind of bandit trap that shoots film instead of bullets. It's an automatic movie camera that operates silently and invisibly from behind a one-way mirror, never blinks and has absolutely no nerves. It can capture on film everything that happens during a holdup.

Little the bandit can do will interfere with the mechanical eye. The one-way mirror, only slightly larger than a peep hole, is bullet-proof. Disguise wouldn't do much good, either. The bandit could wear a diver's helmet, but FBI experts studying the film later quite probably could get telltale clues by the way he walks and moves his arms, by his general appearance and his clothing.

For good measure, the film would show just where he stepped, so that detectives possibly could pick up heel marks on the floor. A heel impression has proved as helpful as a fingerprint in the solution of several famous crimes. Within a short time, the bandit's performance also could be released to television as a real-life drama that someone in the audience might solve. Once the hoodlum is captured, the movie record will continue as a relentless foe. He'll need a persuasive lawyer to talk away the recorded evidence.

More than this, however, the criminal might be tripped up by the camera patrol before he even stages the holdup. Films taken daily would be checked routinely by law enforcement officers; and since most robberies have to be cased in advance, known thugs entering the bank could be spotted and placed under surveillance. Masks, of course, cannot be worn during casing. Suspicious behavior by anyone entering the bank during business hours might also become apparent in routine examination of what the camera saw. Evidence of odd actions could serve to alert the bank.

FBI LIKES CAMERA TECHNIQUE

The development of the camera technique comes at an excellent time, because banks all over the country, particularly at new suburban branches, have been plagued by the worst rash of robberies on record. Special FBI bank robbery conferences have been held with local law enforcement agencies throughout the nation. The effectiveness of the automatic camera patrol was extolled at a recent forum of Massachusetts police chiefs by Edward J. Powers, special agent in charge of the Boston office of the Federal



Chief H. J. Pelletier and Sgt. T. B. Kane of Cohasset, Mass. show how police screen film from hidden camera.

Bureau of Investigation. Both the FBI and the Massachusetts Bankers Association have encouraged study of the camera method.

Behind the introduction of this new idea, however, is something more than a camera and special techniques. It became a practical possibility with the perfection and production of remarkable light-sensitive motion picture films such as Du Pont High Speed Rapid Reversal Pan, Type 931A. The high speed of this film makes it possible to take good movies under the subdued lighting conditions usually found in banks.

Experts of Smith's Photographic Store in Boston, who have worked closely with federal and state agencies on the use of special cameras for bank protection, report that they have had good experience with the super-sensitivity and stability of such films. Illumination from a lamp

post or ordinary light bulb suffices to capture detail on the film, the store says.

Most of the cameras tried for bank protection have not been operated continuously at full motion picture speed, although this is possible with a sufficiently large magazine. Smith's has had good results with its own revised motion picture apparatus that takes sequence frames every three seconds. It can be shifted instantly into full-motion action by triggering an alarm electronically or manually. Little motion is lost in the three-second frames, and 200 feet of film is enough for an average day of bank business. Total film cost is only a few dollars a day, and it's thought this cost might eventually be written off by reduced robbery insurance premiums. In one type of camera, a fixed-focus, wide-angle lens sweeps a bank more than 100 feet long and almost as wide.

Once enough banks install the film sentinels, and their existence becomes known, stick-up men will operate under a heavy psychological handicap.

TOUGH ON THE NERVES

"Imagine not knowing whether your hand was tipped during casing," commented one prominent bank official. "This beats any kind of psychological warfare I ever heard of. The robber's nerves can go to pieces before he even decides to go ahead with his violent venture. And even if he doesn't case the bank—a psychological disadvantage to him in itself—he will worry whether the actual robbery is being recorded on film."

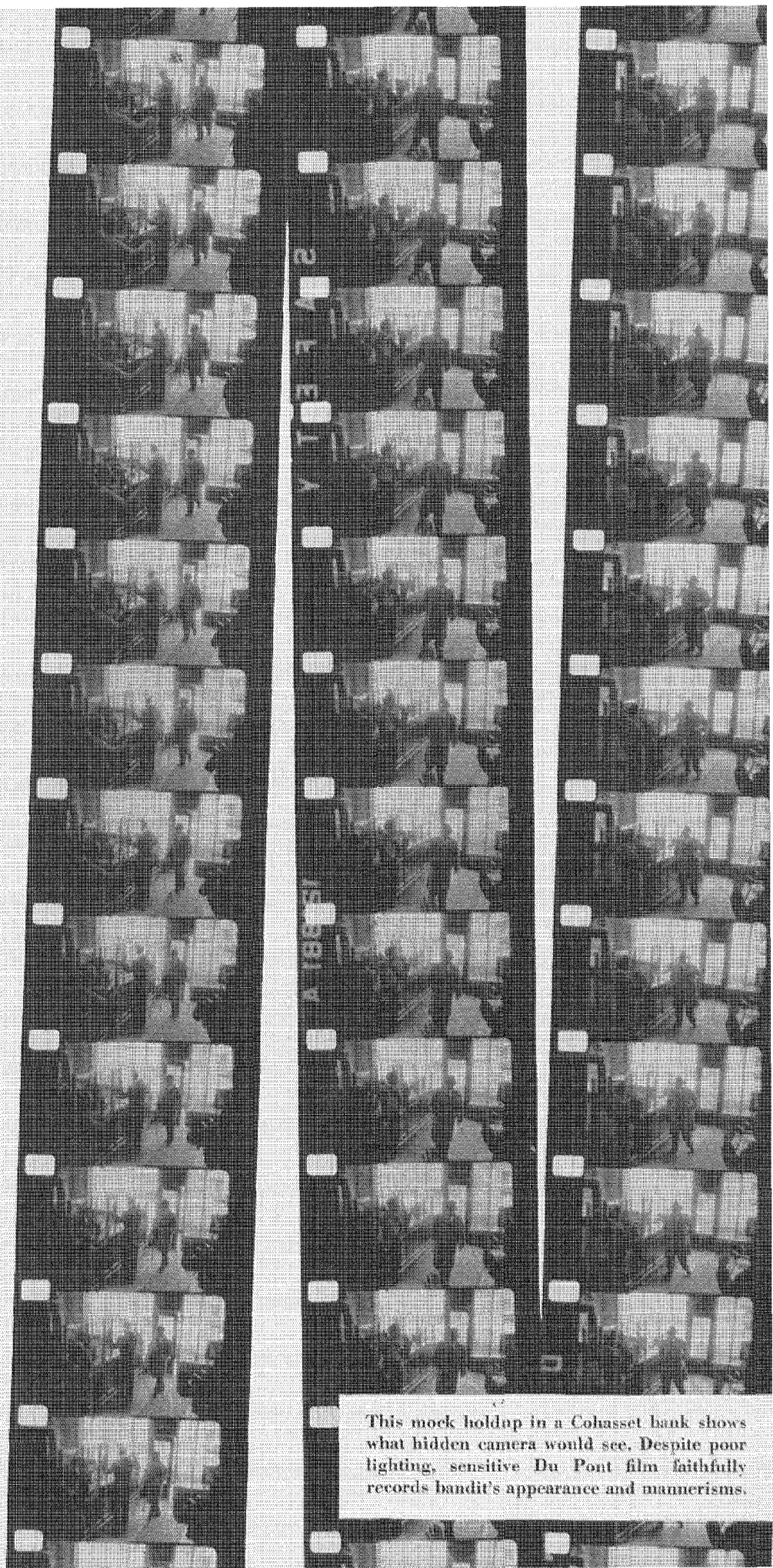
The hidden camera is destined to worry more than bandits alone. Banks also are interested in the camera to help identify bad-check passers and those devoted to other forms of illegal artistry.

Some law enforcers believe that widespread adoption of the "canary camera" might lead to the establishment of a central FBI library of micro-motion pictures where head-to-foot moving scenes of known rogues could be matched against shots taken during the actual commission of a crime.

OTHER USES FOR AUTOMATIC CAMERA

The automatic camera is being considered for many other uses: studying buying habits in stores; watching over safes and vaults at night with only a night light for illumination; patrolling defense establishments, docks and vital military installations; making traffic control studies; and spotting shoplifters, pickpockets and embezzling employees.

And in all this the old cry, "Lights, action, camera!" is no longer apropos. Instead, say, "Camera, action!"—and add, "Just a little light on the subject, please."



This mock holdup in a Cohasset bank shows what hidden camera would see. Despite poor lighting, sensitive Du Pont film faithfully records bandit's appearance and mannerisms.

Titanium's down to earth now

By WILLIAM E. LUSBY and LEO J. BARRON

Titanium metal is reaching out toward industrial fields in a rapid and impressive swords-to-plowshares fashion.

Previously used almost solely by the military, the metal is now available to private industry. Although

general use as a household metal is still some years away, titanium equipment currently is producing or preparing everyday items such as chemicals and food.

Du Pont's Pigments Dept., which pioneered the commercial operation to extract the metal from its ores in 1948, inaugurated an extensive program several years ago to explore and develop the logical civilian markets for titanium.

The prime attraction of titanium for such military uses as supersonic aircraft is its light weight, 44 per cent less than steel, combined with a strength comparable to that of stainless steel. But the industrial entry of the metal is based chiefly on its phenomenal resistance to many corrosive environments.

The food processing industry, plagued by corrosion that imparts or impairs color, odor and taste, has found titanium corrosion resistant. Titanium equipment will be used to process a variety of foods, including pickles and tomatoes.

LESS CONTAMINATION

Manufacturers of pharmaceuticals have always worried about corrosion because it meant contamination. Titanium's superior resistance to many complex organic chemicals used and prepared by this industry has resulted in the installation of several large pieces of process equipment, and others are in the planning stage.

Use of titanium in the chemical industry promises to be widespread. It is already contributing toward smoother production and lower costs in the manufacture of nitric acid and many basic intermediates used in resins, plastics, synthetic fibers, films and explosives. Reaction vessels, welded fittings and fabricated piping made from the metal are now available from several process equipment fabricators.



Strength and light weight open automotive field to titanium metal. General Motors' new experimental gas turbine-powered car, the Firebird II, sports an all-titanium body.

is used in nacelles and firewalls of this Douglas DC-7.

Sufficient time has not elapsed to determine just how superior titanium is in comparison with other metals for a particular job. For example, a number of steam jet diffusers, operating with dilute HCl entrained in high pressure steam, have proved titanium to be 20 times better than the next best metal. Since the diffusers are still in excellent condition they may out-last the metal previously used by even hundreds of times.

TITANIUM IN TRANSPORTATION

In the field of commercial transportation, all three of titanium's strong points, corrosion resistance, strength and light weight, are of importance. The new General Motors experimental gas turbine car, the Firebird II, sports an all-titanium body. Engine parts such as mufflers, rocker arms, head bolts and push rods are under consideration for automotive use.

In marine service, valve trim, piping and sea water condensers have been tested and promise to outperform all comers. Hardware and fittings have been evaluated on Star Class racing sailboats and are now being specified by some enthusiasts. Marine tests indicate that it would take 1,000 years to corrode titanium .001 inch.

The use of titanium in commercial aviation has been accelerated by the tremendous development in military aircraft. Application of it in the engine nacelles of the Douglas DC-7 transport has resulted in a saving of 200 pounds per plane. As the jet age reaches commercial aviation, titanium will play an important role in whisking passengers from breakfast in New York to lunch in Los Angeles.

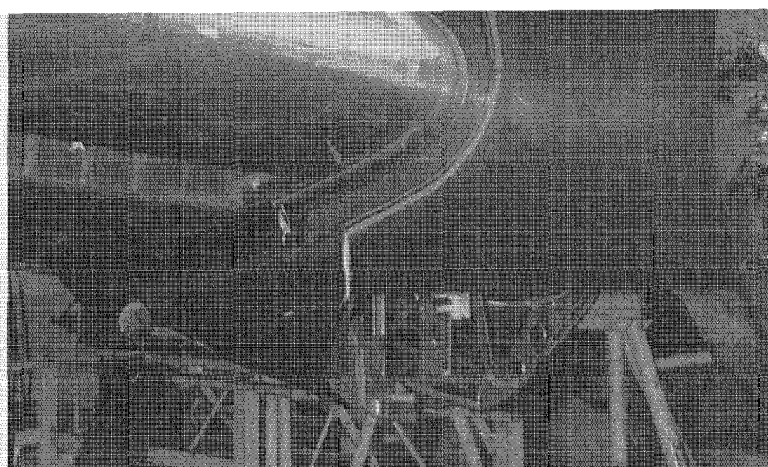
ALSO AS ALLOYING AGENT

One of the most unusual applications of high-purity titanium is as an addition agent in the manufacture of certain stainless steels, super-alloys and cast irons. The high purity addition has resulted in quality improvement of product, shortened melt cycles, more uniform efficiency and greater economy in the production of these alloys.

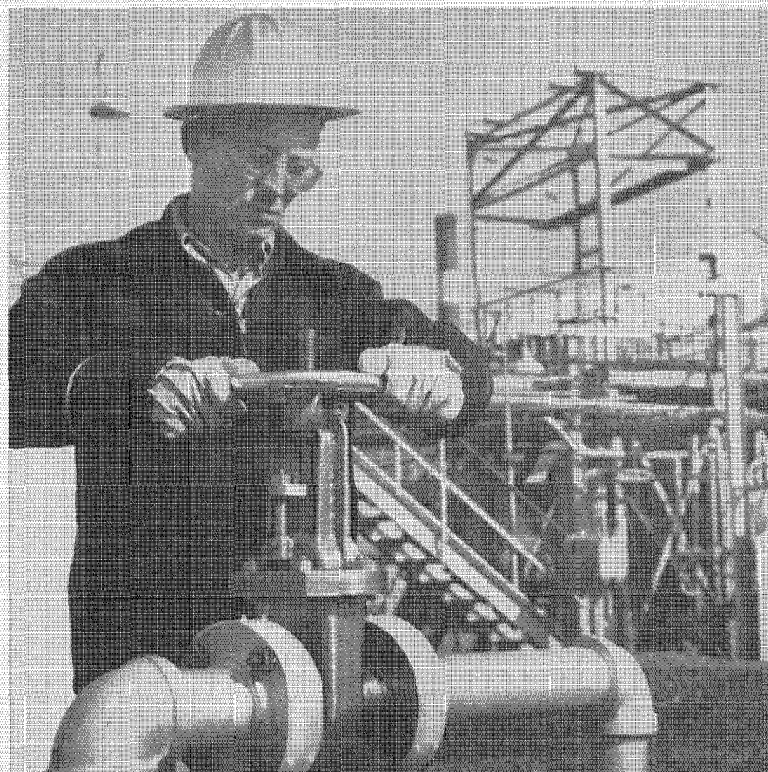
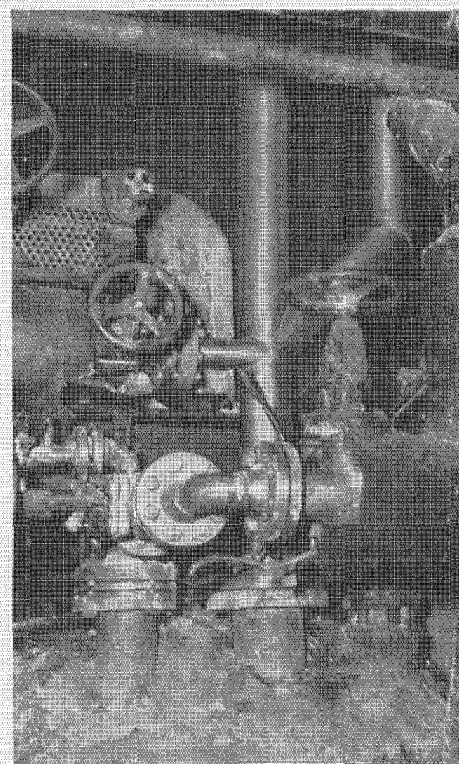
A major expense item in anodizing aluminum articles, such as ice trays, grids and tumblers, has been replacing the racks from which the parts were suspended during the anodizing process. Titanium racks have been found to resist the cleaning, etching, brightening and anodizing solutions used. Although these racks are more expensive than those of conventional materials, the increased life, estimated at more than 100 to 1, justifies their use.

Even in this early stage of its development, titanium process equipment costs only two to four times as much as comparable stainless steel units. As the industry grows up, the price difference should narrow. Day by day, Du Pont technical sales specialists bring that time nearer as they explore titanium's further possibilities and work with companies interested in new tasks for this versatile metal.

This 3-inch gate valve is typical of complex shapes into which titanium is welded, forged, rolled and machined.



Titanium resists many corrosive chemicals. Piping exposed to hot vapors of nitric acid showed no sign of attack in 2 years, but next best metal failed in 6 months' time.





At high speeds and under heavy loads, nylon tires help get the goods through—on time.

1000-MILE NYLON TIRES

...and how they are helping one of America's largest truckers to get the goods through on time

By ERIC BOGEDAL

One morning last summer a huge refrigerated truck slipped through Los Angeles' predawn traffic, picked up speed and headed for Denver, 1,200-odd miles away. Inside the 35-foot trailer was a cargo of frozen strawberries worth more than \$25,000. The load was scheduled to be in Denver some 40 hours later.

At Barstow, the truck picked up Route 91 and headed out across the Mojave Desert. As it rolled along at open-road speeds, the thermometer stood at 116°F. With night the air cooled, but the truck's whirling tires stayed hot.

The next evening, the truck strained up 8,300-foot State Line Hill, dropping into lower and lower gears with the effort needed to lift 27 tons over the Continental Divide. Most of that day the truck climbed up mountains and wheeled down again, and arrived in Denver on schedule a little more than a day and a half out of Los Angeles.

What's unusual about that? Nothing. Trucks of Pacific Intermountain Express do it every day. Their service is reliable and fast, and tires containing Du Pont nylon cord help make it that way. Problems caused by road failure of tires have been greatly reduced since P.I.E. decided to use only nylon cord tires.

P.I.E. trucks operate under extreme conditions. Furnacelike desert heat, heavy loads, constant speeds and high mountains put a strain on tires that used to limit their life to something in the order of 150,000 miles, even with retreading. By that time they either weren't sound enough to retread again, or had failed on the road.

TIRE LIFE INCREASED BY ONE-THIRD

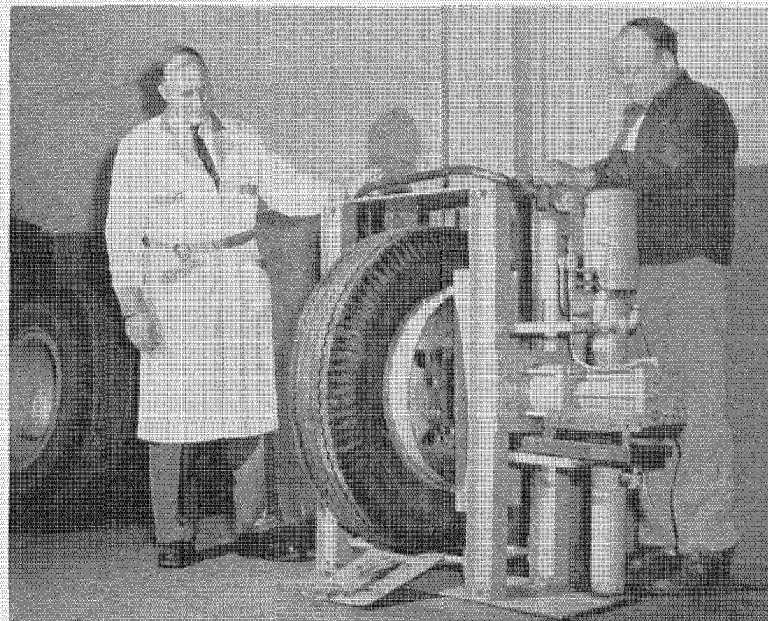
Nylon cord tires used on Pacific Intermountain's same interstate runs go as far as 80,000 miles before retreading, can be retreaded three or four times, and give about 40,000 miles on each retread. The total life of such a tire may average up to 200,000 miles or so.

One of the major reasons for switching to nylons, P.I.E. officials say, is because they can absorb abnormal punishment. For example, the cords of a heavy-duty tire are subjected to tremendous shocks during operation. The heat built up in ordinary cords weakens them. Occasional bruising and constant flexing under heavy loads strains them. Eventually they fail, and the truck halts while customers wait for their freight. Nylon cord tires can take all of this grueling treatment and retain their strength for previously unheard-of mileages. Then, too, fewer plies can be used, making cooler running tires and less tire trouble. Most important, their reliability helps truckers build reputations for speed and service.

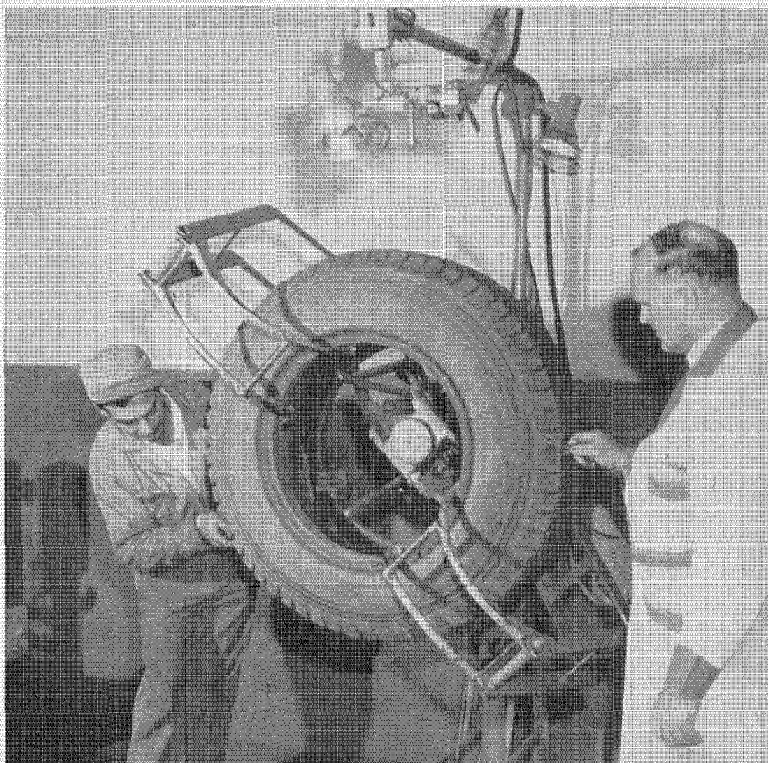
The original cost of nylon cords is more than for ordinary tires, but with nylons Pacific Intermountain Express, while reluctant to tell competitors its exact tire

costs, speaks of potential savings of thousands of dollars a year in maintenance and tire replacement costs. For example, the use of nylons has already reduced replacements for tire failure from impact breaks by 90 per cent.

Like P.I.E., many trucking firms have found tires made with Du Pont nylon cord best for heavy-duty work. In low-speed, off-the-road operation and at higher speeds under heavy loads, they are helping the nation's truckers get the goods where they're needed—on time.



Pacific Intermountain Express tire maintenance stresses thoroughness. Nylon cord tires need no babying, but thorough checking adds to life.

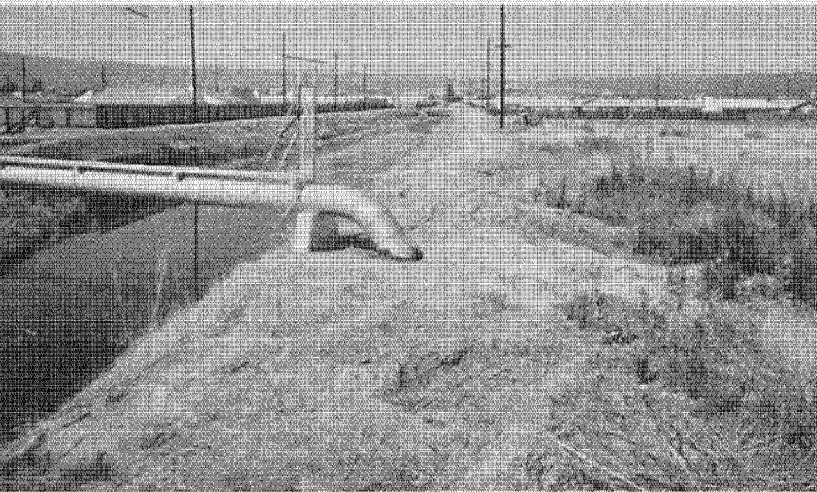


With normal maintenance and barring bad cuts, P.I.E. has found, nylon cord tires can be retreaded 3 or 4 times.

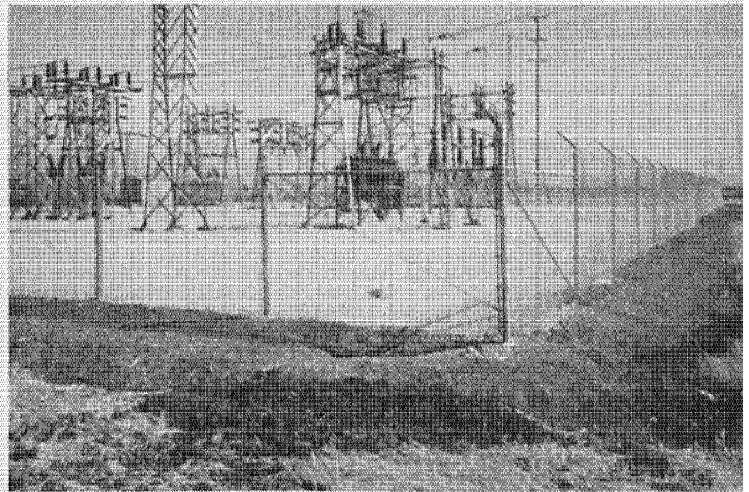
Weeds are their dish

*... chemical weed killers such as "Telvar" are saving time,
trouble and money for industry and business*

Self-interest is at the heart of the rapid acceptance by industry of chemical weed killers that provide long-lasting control. A pioneer in this group are the Du Pont urea herbicides. Depending on the climate and vegetation problem, one treatment with 20 to 60 pounds an acre of "Telvar" monuron or diuron weed killers, for



Weeds, which can greatly reduce the efficiency of drainage ditches, are checked for a year or more with one "Telvar" application.



Six months after one application along this California substation in November, treated area was still bare of growth.



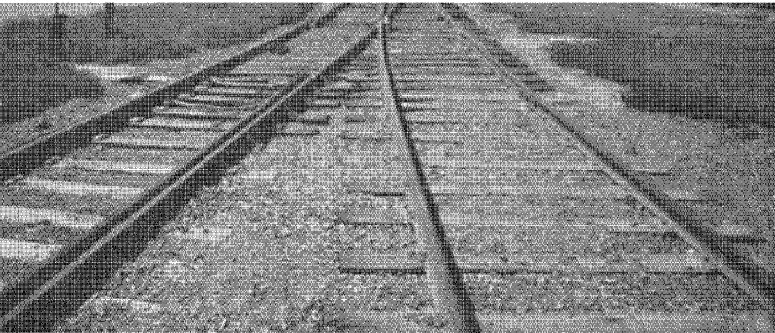
Note how "Telvar" has kept the curb area free of vegetation. Such treatment reduces maintenance, improves drainage and visibility.



In this western tank farm, treated area stayed weed-free for entire season. "Telvar" remains in soil to prevent regrowth.

example, will keep down weeds and grasses for a full season or longer. For such results, the cost is low. "Telvar" is easy to apply because it is a wettable powder, yet the chemical remains in the soil to prevent regrowth. Important, too, is the fact that "Telvar" is nonflammable, nonvolatile, noncorrosive and low in toxicity.

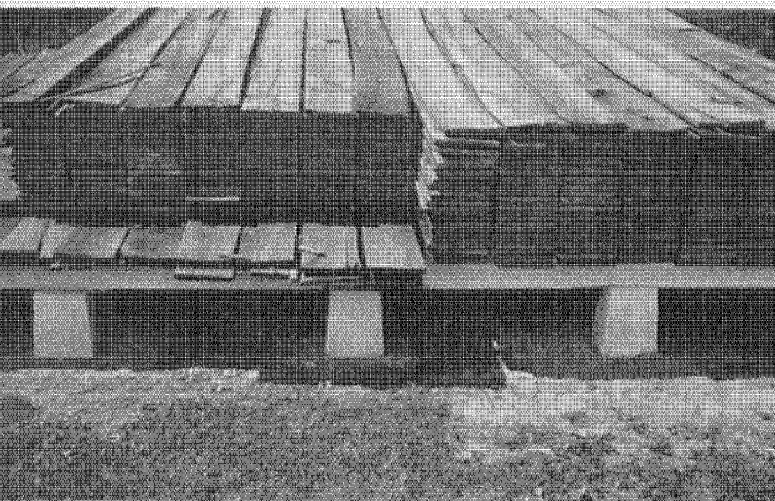
The pictures and captions highlight the story of how industry is freeing itself of unwanted vegetation that can be a fire and safety hazard as well as an eyesore.



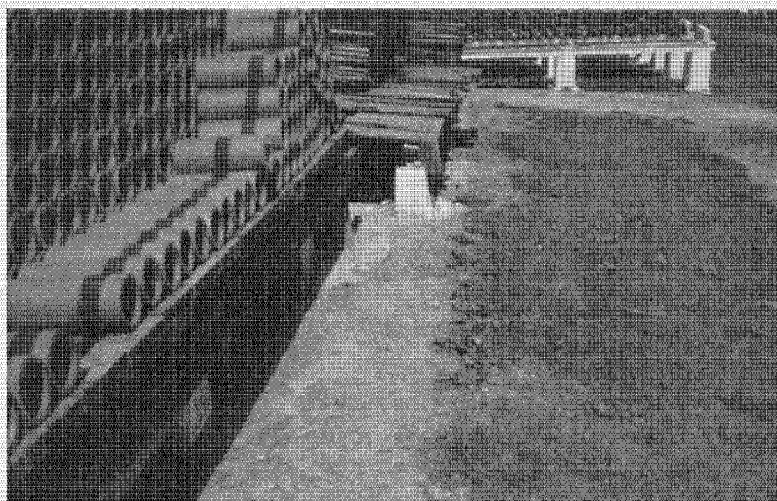
Typical example of weed and grass control on a railroad spur. Photographed 2 years after application of "Telvar" weed killer.



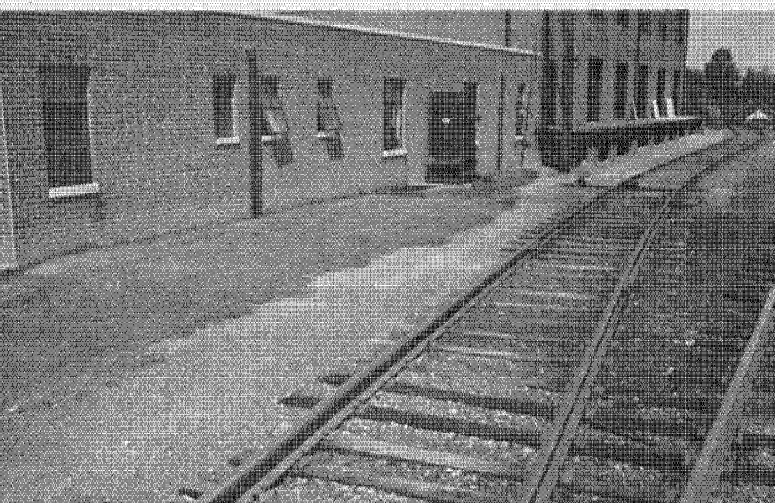
Picture taken 4 months after application of "Telvar". Product is nonflammable, noncorrosive, nonvolatile and low in toxicity.



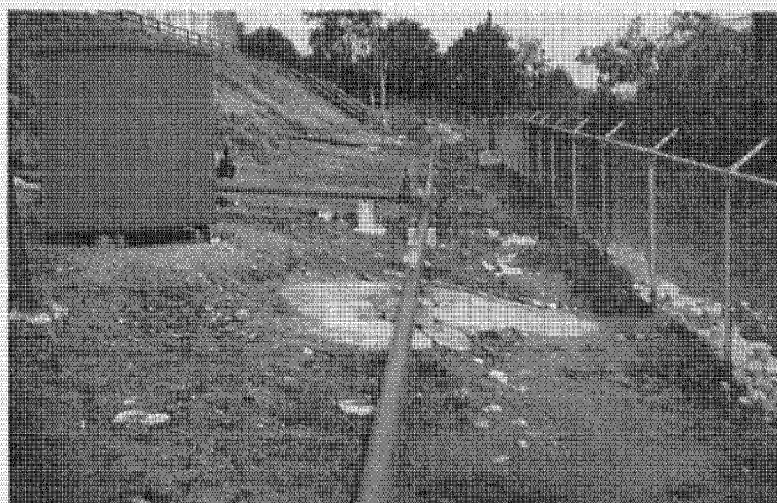
Fire hazards are greatly reduced when area is free of weeds. Best time to apply "Telvar" herbicide is before growth starts.



Weed-free storage areas are easier to work in as well as better looking. Note effectiveness of just one application of "Telvar".



Treatment in June; picture taken in October. Single-dose weed control emphasizes "Telvar" costs little for results obtained.

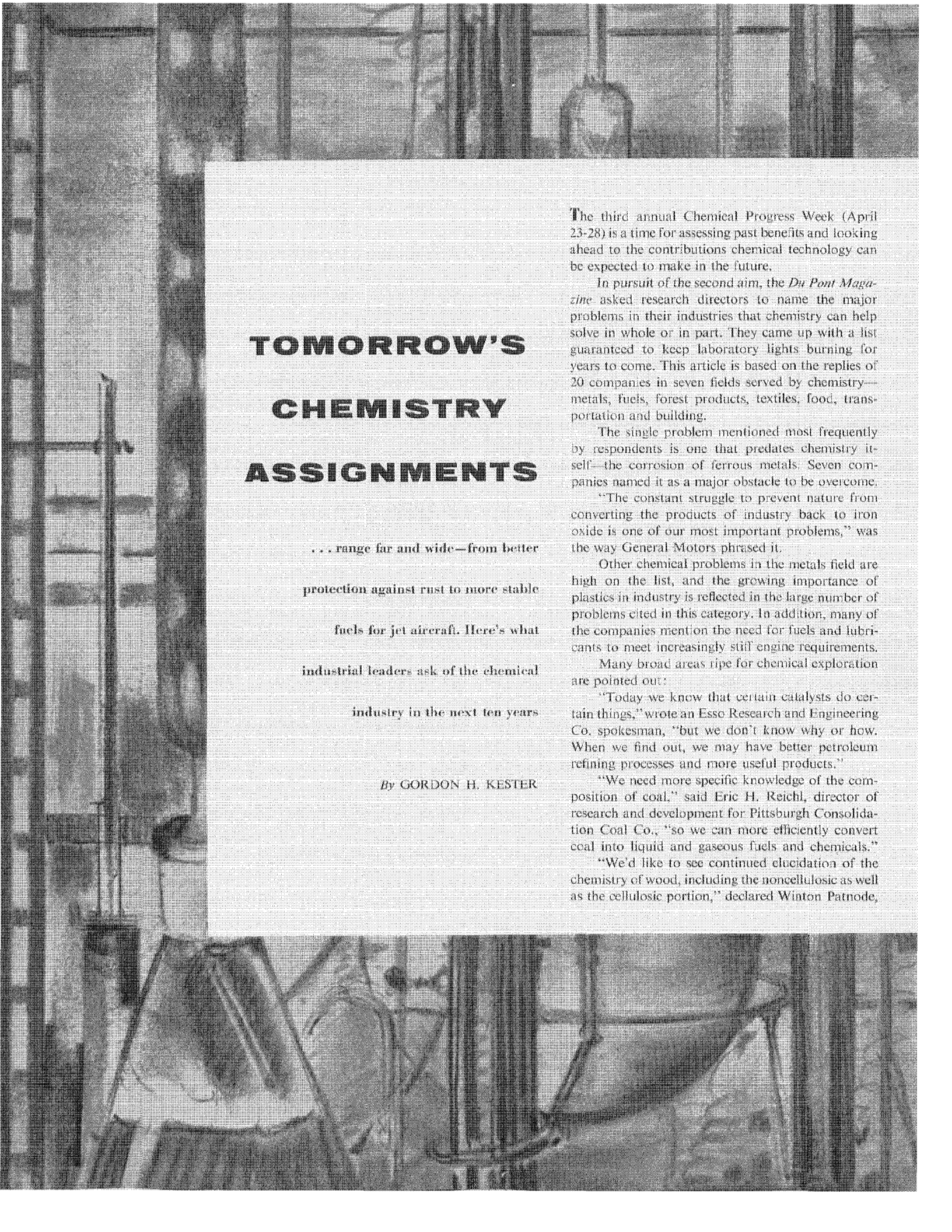


More than two years after a "Telvar" weed killer was applied, the treated area along pipe and fence still looked like this.



IF IT'S BRUSH THAT'S BOTHERING YOU . . .

Brush is often an expensive nuisance along rights-of-way, pipelines, fences and roads. For killing such growth, "Ammate" X weed and brush killer is recommended. When a spray job is properly done, brush can be controlled for long periods with only occasional spot spraying. "Ammate" X is safe to handle and store. With ordinary precautions, it can be used close to valuable farm crops, such as cotton shown in this picture.



TOMORROW'S CHEMISTRY ASSIGNMENTS

... range far and wide—from better
protection against rust to more stable
fuels for jet aircraft. Here's what
industrial leaders ask of the chemical
industry in the next ten years

By GORDON H. KESTER

The third annual Chemical Progress Week (April 23-28) is a time for assessing past benefits and looking ahead to the contributions chemical technology can be expected to make in the future.

In pursuit of the second aim, the *Du Pont Magazine* asked research directors to name the major problems in their industries that chemistry can help solve in whole or in part. They came up with a list guaranteed to keep laboratory lights burning for years to come. This article is based on the replies of 20 companies in seven fields served by chemistry—metals, fuels, forest products, textiles, food, transportation and building.

The single problem mentioned most frequently by respondents is one that predates chemistry itself—the corrosion of ferrous metals. Seven companies named it as a major obstacle to be overcome.

"The constant struggle to prevent nature from converting the products of industry back to iron oxide is one of our most important problems," was the way General Motors phrased it.

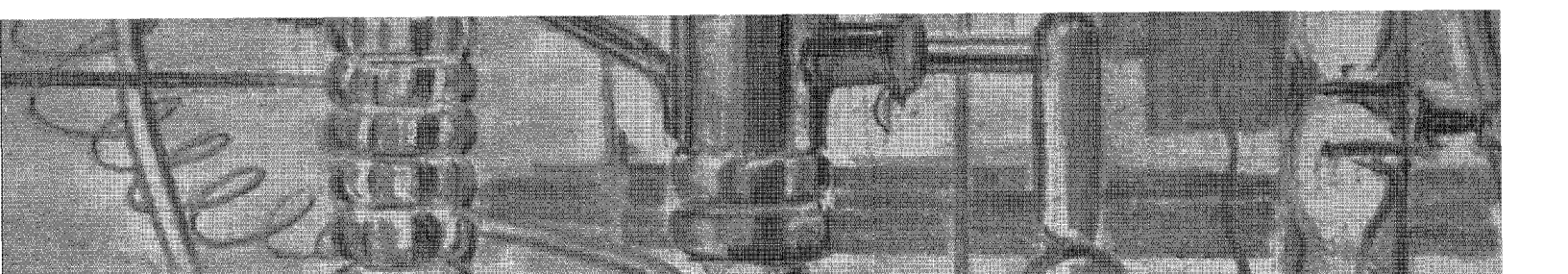
Other chemical problems in the metals field are high on the list, and the growing importance of plastics in industry is reflected in the large number of problems cited in this category. In addition, many of the companies mention the need for fuels and lubricants to meet increasingly stiff engine requirements.

Many broad areas ripe for chemical exploration are pointed out:

"Today we know that certain catalysts do certain things," wrote an Esso Research and Engineering Co. spokesman, "but we don't know why or how. When we find out, we may have better petroleum refining processes and more useful products."

"We need more specific knowledge of the composition of coal," said Eric H. Reichl, director of research and development for Pittsburgh Consolidation Coal Co., "so we can more efficiently convert coal into liquid and gaseous fuels and chemicals."

"We'd like to see continued elucidation of the chemistry of wood, including the noncellulosic as well as the cellulosic portion," declared Winton Patnode,



director of research for Weyerhaeuser Timber Co.

"One of the major challenges in air conditioning is a practical, economical means of controlling odors," wrote Randolph Stenerson, director of Carrier Corporation's materials and processes department. "Underlying the problem is the need for a better understanding of the chemistry of odor control."

"The development of synthetic flavors has been confined largely to imitating natural flavors," pointed out Alex Herro of National Dairy Research Laboratories. "There are unlimited opportunities for the imaginative and talented chemist to create new flavoring materials and to give us flavors different from any which we now know."

Here, broken down by product classes, are some of the specific problems assigned to chemistry by the industrial research men who answered our question.

METALS AND PLASTICS

Some of the steel industry's major problems are in raw materials, declared T. F. Olt, Armco's director of research. They include the concentration and upgrading of low-grade iron-bearing minerals, and development of a simple process for altering non-magnetic materials to permit their separation magnetically. A way of recovering scarce manganese from low-grade ores and industrial slag also would be welcomed, Olt said.

H. S. Turner, Jones & Laughlin vice president for research and development, asked for development of "a coating, applied in the processing line, to both prevent rust and replace tin as a coating for the thin iron plate used to make food containers." This call for a tin substitute was echoed by H. E. Robinson, director of laboratories for Swift & Co., who added that "economic reasons point to the treatment of iron to prevent corrosion."

John P. Magos, Crane Company's director of engineering, wants refractory materials in which titanium and zirconium metal can be melted without contamination. He also calls for the development of less expensive inert atmospheres for heat treating and other metallurgical processes.

Better adhesives for metal-to-metal and metal-to-plastic bonding are also desired by Crane, Jones & Laughlin and General Motors. GM would like to use adhesives in places where they now "weld, rivet, screw, bolt, tack or solder."

In plastics, General Motors would like to have a scratch-resistant, clear plastic for car windshields. Crane would like

plastics with improved abrasion resistance and greater resistance to temperature and pressure extremes. Carrier is after "practical, economical foamed-in-place plastic insulation," and Westinghouse wants "plastics with a strength-weight ratio exceeding even that of titanium over a wide temperature range, plastics either transparent or opaque to nuclear radiation, plastics of graduated electrical conductivity."

L. R. Sorenson, vice president of Newport News Shipbuilding and Dry Dock Co., asks for a "truly waterproof foam plastic for floats," and a "durable, fireproof and trustworthy plastic pipe in a competitive price range for shipboard use."

In plastic films, Swift would like to see materials that would form a film coating on foods by dipping. R. H. Walters, vice president for research and development at General Foods, looks to chemistry for "containers that will do all the things cans and jars do today."

"If I might be allowed one trip into the wild blue yonder," he writes, "I expect to see many food items (meats, vegetables, dried packaged foods) some day put up in continuous films—no seams or joints—just one continuous, uninterrupted film."

FUELS, LUBRICANTS AND FOREST PRODUCTS

The auto industry wants to see large quantities of high octane gasoline available at reasonable cost. This will enable the industry to boost still further the compression ratio of car engines for added efficiency.

Similarly, the Reading Co. would like to see developed an "economy grade" diesel fuel of uniform quality. Such a fuel would be "the greatest advance since the inception of diesel locomotives," writes E. P. Gangewere, the railroad's vice president in charge of operation and maintenance.

Esso cites the need for jet fuels that will remain stable at the temperatures generated in supersonic aircraft, and for better synthetic lubricants that will operate in a jet at temperatures from -65°F. to more than 450°F.

Carrier also wants improved high and low temperature lubricants for its equipment. For example, the company's letter says, in many cases no satisfactory lubricant is available for refrigeration equipment operating at -100°F.

Problems listed by Weyerhaeuser's Patnode include the need for a chemical that will stimulate trees to bear seed quickly for rapid forest propagation, systemic agents for protecting



tree seeds and seedlings against wildlife, and systemic insecticides and fungicides. Patnode would also appreciate a cheaper method of extracting water from lumber than the present evaporation by heating. "And the perennial need—more uses for lignin," he adds.

R. H. Savage, vice president in charge of research for Mead Corp., offers these "typical" problems of the pulp and paper industry: the need for a cheap, high strength opacifying agent, a new chemical approach to increasing the pulp yield from wood, and chemicals that will solve economically the problem of "hygroexpansivity of paper and paperboard."

Like many other industries, this one is concerned about air and stream pollution. Mead wants a better masking agent for the odors of kraft pulping and a way of removing color economically from mill effluent. Weyerhaeuser puts in a bid for "pulping processes that avoid pollution of air and water."

FOOD AND TEXTILES

Armour & Company's vice president for research, Victor Conquest, cites two problems "always facing" the meat food industry: new uses for meat by-products and improved processing and handling of meats. Both Swift and National Dairy are anxious for better methods of controlling food spoilage, preventing discoloration, less or change of flavor and other problems associated with aging.

Swift also wants improved antioxidants for animal fats, better dyes for food coloring and an improved depilatory for removing wool from pelts.

"The chemical industry has done a tremendous amount of work in developing emulsifiers for fats," writes Walters of General Foods. "How about emulsifiers—or whatever they might be called—that would make starch more efficient? Or sugar? Or any of the other food ingredients?"

We know the tremendous effect of milligram quantities of an amino acid, a vitamin or a mineral in the food we eat, points out Herro of National Dairy. "Is there not, then, reason to expect that there may be

other factors, still unrecognized but vital to health, growth and resistance to disease, needed by the body in only micro-milligram quantities?" he asks.

"Our past thinking about fibers has been confined to carding and spinning to produce yarn for weaving," says M. Earl Heard, vice president in charge of research for West Point Mfg. Co. "Today the fastest growing thing in textiles is nonwoven fabrics. Its full potential will not be realized until the chemical industry can supply products that will bond fibers into a fabric that has all the desirable cloth-like properties of a woven fabric."

This from Werner von Bergen, director of research for Forstmann Woolen Co.: "I would like to see a method of improving the quality of wool grease recovered from the neutral scouring process, a satisfactory continuous piece-dyeing process for wool, a more durable water repellent for woolen fabrics, and especially a cheap, practical method of segregating blends of synthetic and natural fibers to upgrade the value of waste yarn."

BUILDING

"The primary requirement for the commercial architectural products we make is permanence," writes R. E. Parkinson, of Kawneer Company's research and development division. "We are not satisfied with a life of five years, but must insist on 25, 50 or 100 years. Adhesive bonds, plastic cores or porcelain finishes in a metal curtain wall must last as long as brick, mortar and stone.

"Selection of the right material for the application is the biggest job to be done. More data on the physical and chemical properties of materials should be made available to potential users," he concludes.

These are probably less than half of the chemical problems cited in the letters we received; we've tried to pick those that seemed to us most significant.

The more progress there is, we have concluded, the more room there is for progress. Also, the more need there is for more scientists and continued chemical research to keep things rolling.



A month after receiving "Uramite", test strips on golf course were a richer green than others. Strips still showed after 6 months, even though the whole fairway got 3 treatments with conventional fertilizer.

The nitrogen with built-in control

A new kind of beauty treatment for turfgrass and ornamental plants in the form of a concentrated, long-lasting nitrogen fertilizer is on the market in more areas and increased quantities this spring.

The Du Pont product, known as "Uramite" fertilizer compound, was introduced last year. It gives strong evidence of being the nitrogen fertilizer that nurserymen and golf course superintendents have dreamed of finding. "Uramite" releases nitrogen to plants as their growth

sium, can be added easily to soil lacking them. But nitrogen, necessary to produce the lush, velvety green that is a mark of plant health, is more stubborn.

The commercial grower all too often has found that there were two kinds of nitrogen—too much and too little. If he fed his turf nitrogen in the form of a concentrated, easily soluble compound, the sudden over-supply was likely to burn the grass brown.

Less concentrated doses, on the other hand, had to be repeated frequently to provide enough nitrogen. Such small, regular applications proved laborious, expensive and time-consuming.

Research during the 1930s led to Du Pont's interest in production of synthetic insoluble nitrogen fertilizers based on urea. World War II forced the Company to shelve this work, but since 1947 both Du Pont and the U. S. Department of Agriculture have carried on field evaluation programs.

The result is "Uramite", a mixture of methylene urea compounds, containing 38 per cent nitrogen. In the soil, the polymerized methylene urea molecules dissolve gradually at a speed related to their size. Since "Uramite" is a mixture of molecules of varying sizes, nitrogen is released slowly enough so that plants are fed safely and uniformly for long periods. An additional bonus is the fact that, unlike natural organic fertilizers, "Uramite" is odorless.

Physically, it is a yellow, granular solid, two or three times coarser than sugar. It is free flowing and easily applied by hand or fertilizer spreader. "Uramite" is available in 25 and 50 pound bags and is now sold through distributors serving commercial growers. While it is of prime interest for commercial uses—ranging from greenhouses and nurseries to parks and golf courses—the economy and efficiency of a single application also is expected to appeal to the home owner.



Plant at right got one application of "Uramite". Note its larger leaves, richer color and compactness.

requires it and one application is sufficient for the average growing season.

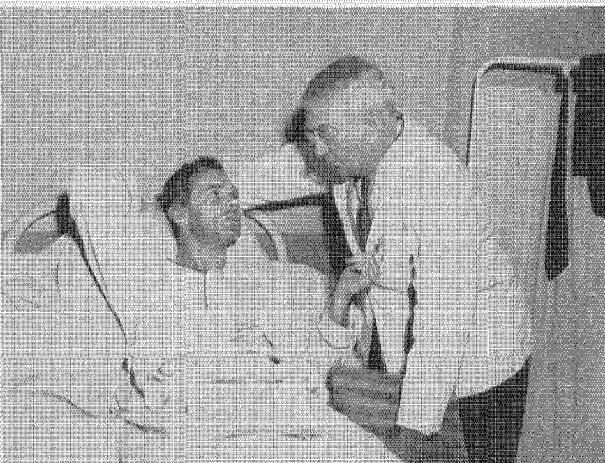
This feat, although simple in the telling, required some 15 years of research and testing to accomplish. Two of the essential plant growth elements, phosphorus and potas-

"Cavalcade's" afterlife

Secondary showings keep "Cavalcade Theater" films

busy long after the television show goes off the air

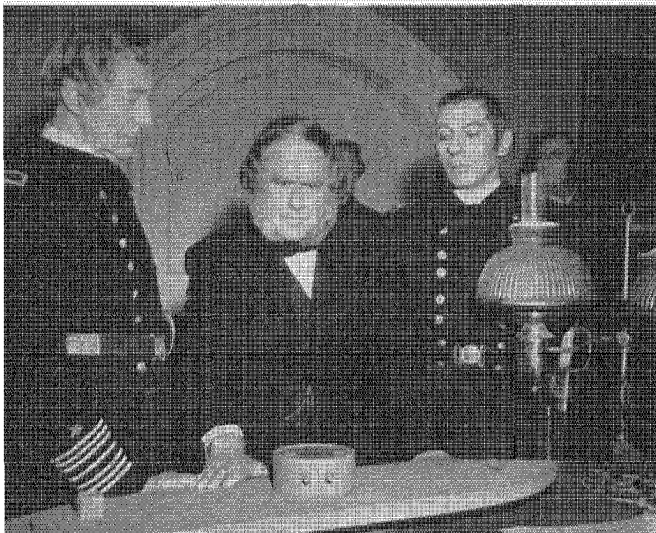
"Take Off Zero," story of new plane's test flight, has been shown widely by Marines.



"One Day at a Time" tells of founding of Alcoholics Anonymous. This picture has brought all-time high in requests.



National Park Service uses "Sunset at Appomattox," story of Lee's surrender to Grant, in publicizing the shrine.



The sign-off of a Du Pont "Cavalcade Theater" television show is often the sign-on of a new life for the filmed program. Chances are that someone in the viewing audience will see a use for the film to inform or entertain others, and will ask to borrow a motion picture print from Du Pont.

Take "Disaster Patrol," for instance, the "Cavalcade" story of a typical Civil Air Patrol Squadron. C.A.P. officials say they detected an increase in recruiting activity soon after the story appeared on television. Now several squadrons are using prints of the film in their recruiting and public relations programs.

"Ordeal in Burma" is another example. This inspiring story about American missionaries in Burma has been used by more than 300 churches throughout the country to stress the importance of missionary work and the need for its support.

The telecast of "Man on the Beat" brought requests for the "Cavalcade" film from many police departments and police schools. The head of one school called it "one of the best films from a police public relations standpoint I have ever seen."

Prints of "Cavalcade's" salute to the American farm family, "How to Raise a Boy," have been used extensively by state 4-H Clubs and Future Farmers of America groups since the telecast a year ago. Agricultural leaders have praised the program as a service to farm groups.

90 FILMS AVAILABLE FOR LOAN

Since "Cavalcade" started on television in 1953, there have been more than 27,000 individual, off-the-air showings of the 90 films available for loan. More than 1.5 million persons have seen them. Civic groups, schools and business associations are among the most frequent borrowers.

Probably no "Cavalcade" film has generated as many requests as "One Day at a Time," the true story of the founding of Alcoholics Anonymous. The film is in such demand by A.A. groups, hospitals and clinics that all of the available prints are booked for months ahead. The following reaction is typical of letters that have been received: "Your sponsorship of this program has made it possible for millions of people to receive a message of hope for recovery which otherwise might never have reached them."

Almost every "Cavalcade" film brings its share of requests. Someone, somewhere, sees a way of using it to help him in his work or to help his community. To borrow "Cavalcade" 16mm sound films for showing to clubs or organizations, write to "Cavalcade" Films, Du Pont Advertising Dept., Wilmington, Del., for a catalog. There is no rental charge for the films; the borrower is asked only to pay return postage. Du Pont is glad that its films can work overtime to help bring interesting information to more people.

Navy has borrowed prints of "The Ship that Shook the World," "Cavalcade Theater" story of the Union warship, the *Monitor*.



President Crawford H. Greenewalt (left) talks over subjects covered in the Company's annual report with Board Chairman Walter S. Carpenter, Jr.

HIGHLIGHTS OF 1955

Facts of special interest
to Du Pont customers and friends from
President Crawford H. Greenewalt's
annual report

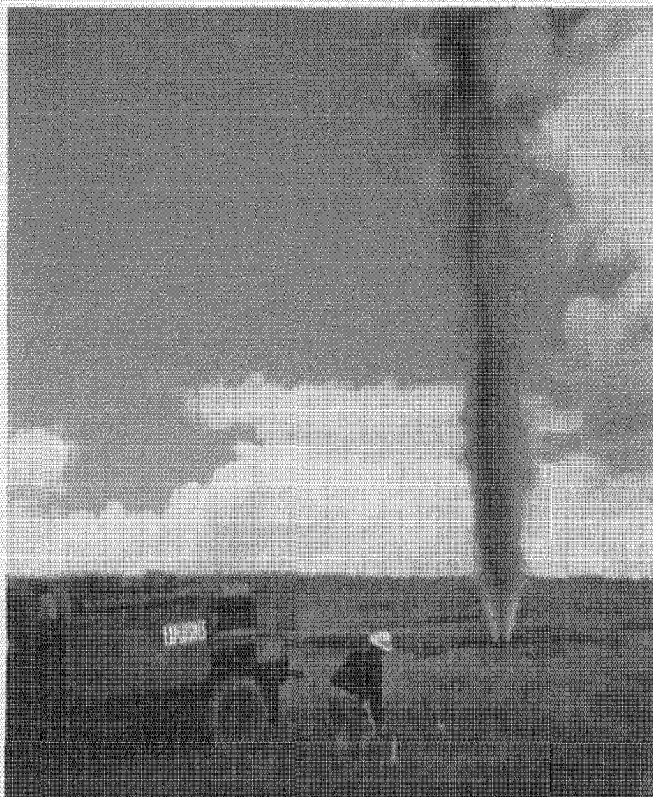
During 1955 additional manufacturing capacity and increased demand for Du Pont products resulted in record sales, earnings and dividends.

Average gross operating investment advanced to \$2,112 million for 1955, an increase of six per cent. Sales were at a new high of \$1,909 million, nine per cent over the previous high of \$1,750 million in 1953. The increase was general throughout the Company and resulted from a larger physical volume of goods sold.

Earnings from Du Pont sources *after taxes* were \$6.51 a share, a record high. Comparable earnings the previous year were \$5.30 a share. The year-end dividend for 1955 was the 205th consecutive quarterly dividend paid on the common stock.

EXPANSION OF PLANTS

Expenditures for new plants, for increased capacity at existing plants, and for service and laboratory facilities totaled \$119 million. This figure compares with the 1954 total of \$120 million.



New facilities are now producing "Nitramon" blasting agent.

Sizable expenditures were made on projects for:

- "Hylene" organic isocyanates • Sulfuric acid
- Neoprene synthetic rubber • Titanium pigments
- "Cronar" polyester photographic film base
- Tetraethyl lead antiknock compound • Nylon
- "Butacite" polyvinyl butyral resin • Cellophane
- "Teflon" tetrafluoroethylene resin
- "Orlon" acrylic yarn and staple
- "Elvanol" polyvinyl alcohol
- "Nitramon" blasting agents
- "Freon" fluorinated compounds

Four new plants are under construction. The plant near Antioch, Calif., for making tetraethyl lead and "Freon" refrigerants, is scheduled to begin operations late in 1956. A large integrated unit to produce sodium, ethyl chloride, trichlorethylene and perchlorethylene also is being designed for that location.

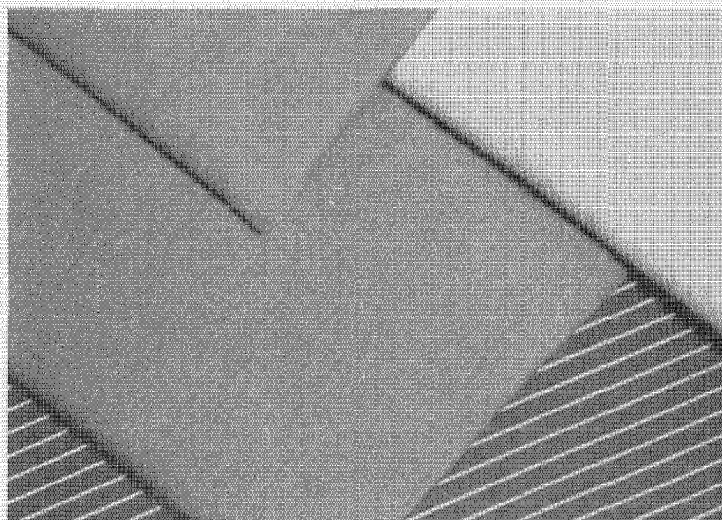
A plant to manufacture paints, enamels and thinners is being built at Tucker, Ga., 13 miles northeast of Atlanta. Production is expected to begin in mid-1956.

A new sulfuric acid plant is being built about 20 miles south of Cincinnati, Ohio. The plant, scheduled to start up the latter part of 1956, will replace an older plant now operated at Lockland, Ohio.

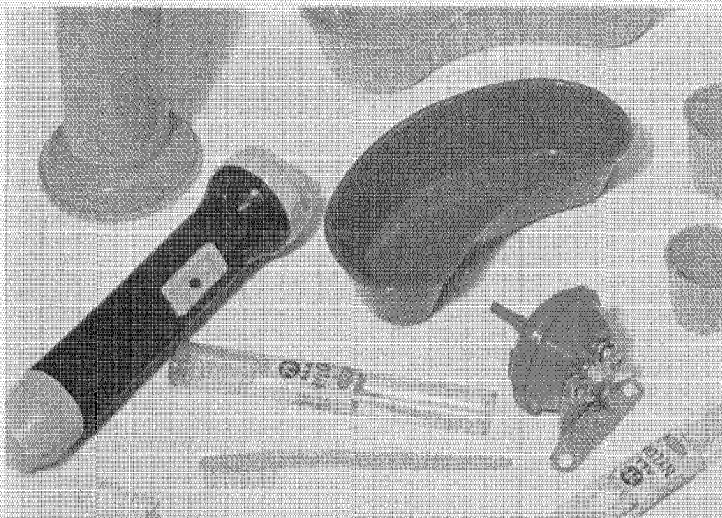
Construction is well advanced on the new plant at Montague, Mich., to produce neoprene synthetic rubber. This plant should start production sometime during the last quarter of 1956.



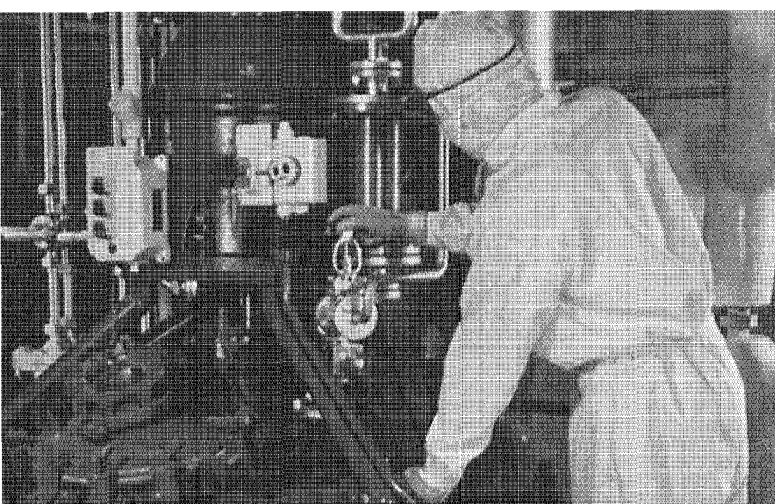
Sizable expenditures were made to increase the production of neoprene synthetic rubber. Well-known uses for this product range from hose for home and industry to conveyor belts.



Production capacity for "Orlon" acrylic yarn and staple was also increased during 1955 to satisfy customer demands for this ease-of-care fiber. It is woven into fabric of many kinds.



Durability of nylon, as illustrated by these products molded of "Zytel" nylon resin, is one reason for increased demand for the product. Use of nylon fiber also continues to grow.



Sulfuric acid, here used to make drugs, is one of Company's oldest chemicals. Like the other products on these two pages, increased demand led, in 1955, to new production facilities.



Unloading Du Pont tetraethyl lead at refinery. This antiknock compound increases the octane rating of gasoline, thus helping motorists get better power and performance from their cars.



These are typical products made by companies using new Du Pont "Hylene" organic isocyanates. A plant for manufacturing isocyanates was completed in 1955 at Chambers Works in New Jersey.



Sales of Du Pont cellophane film for packaging such products as these have grown steadily. To supply this demand, Du Pont and its competitors have upped their manufacturing capacity.



Growing list of new uses for "Elvanol" polyvinyl alcohol led Du Pont to build a new plant for making the powdery polymer. It improves the appearance of paper, such as these labels.



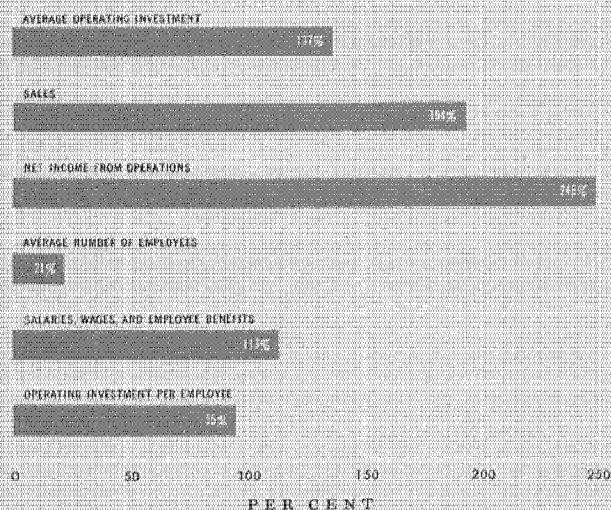
In 1955, "Freon" was another product for which Du Pont made sizable expenditures to increase production. "Freon" compounds are well known as propellents for aerosol products.

POSTWAR GROWTH

The year 1955 completed a decade of postwar growth and progress for the Company. During this postwar period, production capacity was greatly enlarged by a \$1,200 million modernization and expansion program. Fourteen new plants, besides the four now being built, are included in this growth.

The Company's enlarged productive capacity enabled it to meet increased demand for Du Pont products. During this period, sales rose 194 per cent, from \$649 million in 1946 to \$1,909 million in 1955, or an annual growth rate of 13 per cent. Physical volume of 1955 sales was 121 per cent greater than for 1946.

PER CENT INCREASE • 1955 OVER 1946

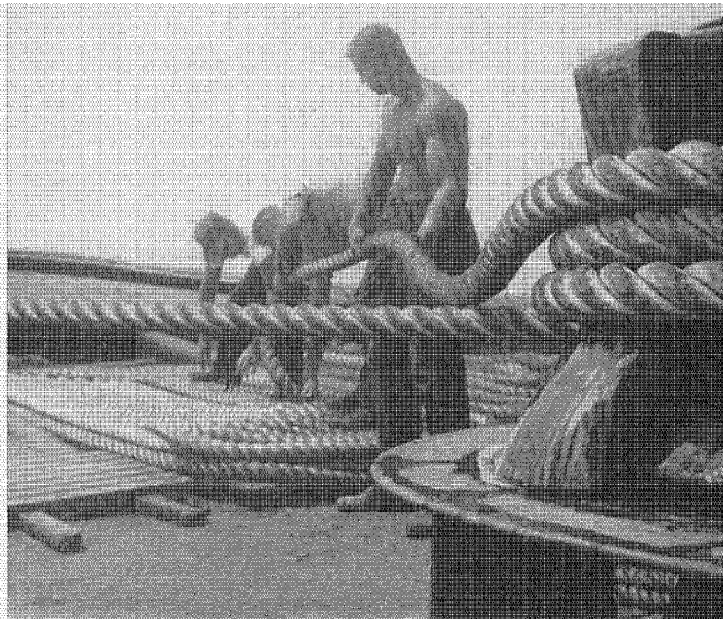


Sales in 1946 were \$649 million. Sales in 1955 of those 1946 products that Du Pont still manufactures amounted to about \$1,400 million, or more than twice as much as 1946 sales. Major expansion of productive capacity included facilities for nylon fibers, nylon plastics, neoprene synthetic rubber and agricultural chemicals.

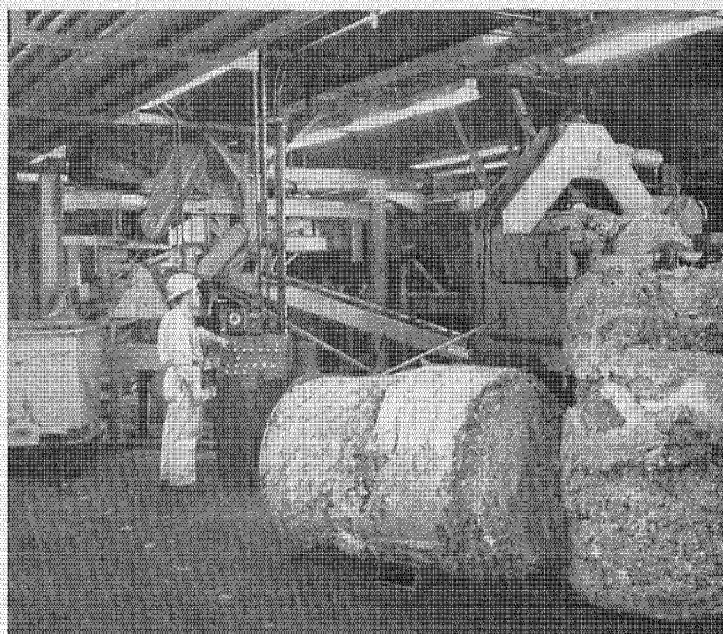
About 27 per cent of 1955 sales, or more than \$500 million, resulted from postwar additions to Du Pont product lines. Such additions include "Dacron" polyester fiber, "Orlon" acrylic fiber, "Mylar" polyester film, titanium metal, urea herbicides, "Ludox" colloidal silica, silicon, and certain new photographic papers.

Net income from operations was \$292 million in 1955 or 248 per cent greater than the \$84 million in 1946. The \$208 million increase includes income resulting from an increase of \$1,220 million in operating investment.

The average number of employees, excluding those at Government-owned facilities, increased 21 per cent, from 72,000 in 1946 to 87,450 in 1955. Salaries, wages and



Sales last year of 1946 products Du Pont still manufactures were about \$1,400 million, more than twice the '46 figure. Major expansions of productive capacity included nylon fiber facilities.

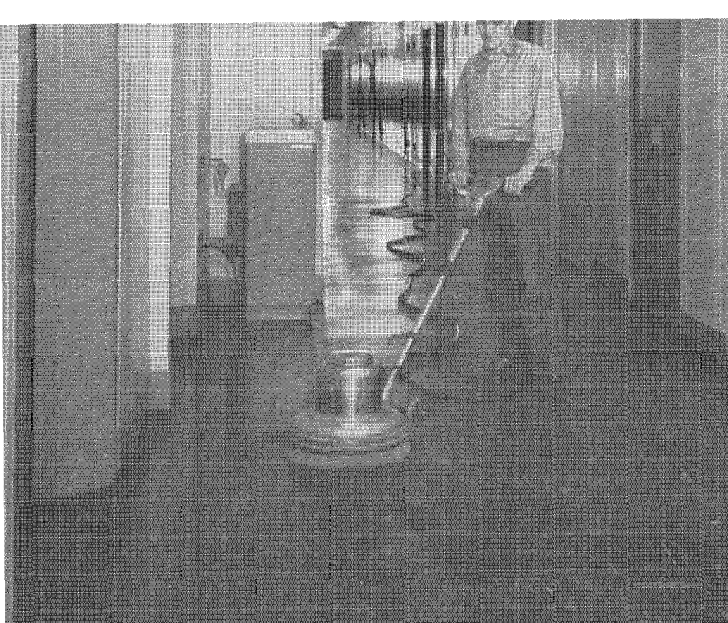


About 27% of '55 sales, some \$500 million, resulted from postwar additions to Du Pont product lines. Such additions include titanium metal. (For a story on metal's new uses, see page 6.)

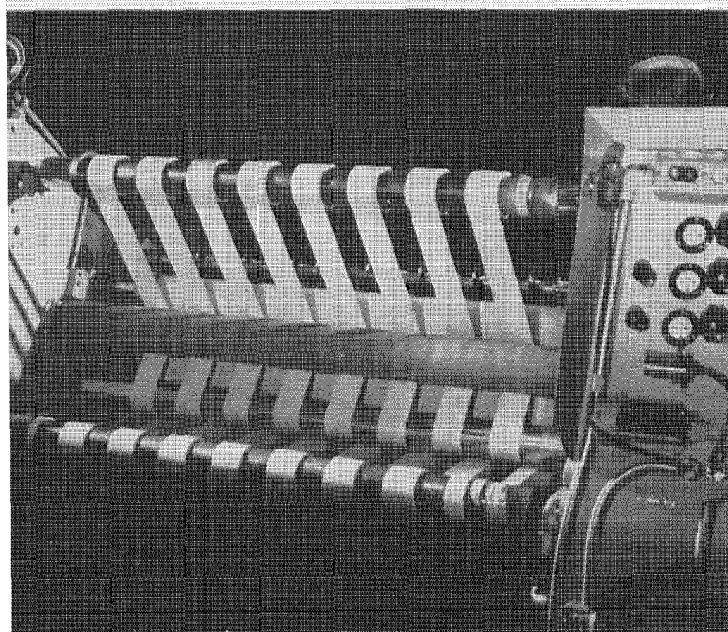
employee benefits for 1955 amounted to \$543 million, more than double those in 1946. During the period operating investment per employee nearly doubled. It rose from \$12,400 to \$24,200.

DEFENSE ACTIVITIES

Atomic Energy Project—In 1950 the Company, at the request of the Government, agreed to design, construct, and operate the Savannah River Atomic Energy Plant near Aiken, S. C. In 1955 all production facilities scheduled



Other products are included in the list swelling postwar sales. Grasselli Dept.'s urea herbicides and "Ludox" colloidal silica are examples. "Ludox" adds antiskid property to floor waxes.



Dacron" polyester fiber, "Orlon" acrylic fiber, "Mylar" polyester film, silicon and new photographic papers (shown being manufactured) are other additions to Du Pont's postwar roster.

in the original billion dollar project were in operation.

The construction force, once nearly 40,000, had been reduced to 2,000 by the end of the year. More than 8,000 persons are employed in the operation of the Savannah River Plant and Laboratory. Nearly 1,000 other persons operate the smaller Dana, Ind., plant, also built and operated as a part of the over-all Savannah River program.

In addition to producing for national defense, the plants are engaged in two programs involving peacetime applications of atomic energy. Radioactive cobalt is being produced in the Savannah River reactors. Principal

interest in this material is for hospital treatment of cancer, but it has other potential uses as a strong source of highly penetrating radiation. The heavy water extraction plants at Dana and Savannah River are producing this effective neutron moderating material for research and power reactors for users at home and abroad designated by the Atomic Energy Commission.

Other Defense Activities—An expansion of facilities to make titanium metal, begun in 1952 and completed in 1954, was undertaken as a defense activity at the request of the Government. The Government advanced funds for the additional facilities. In 1955 Du Pont felt the facilities could be operated as a commercial activity. All outstanding Government advances were repaid during the year.

The Company continued to operate the Indiana Ordnance Works at Charlestown, Ind., for the Government in accordance with production schedules prescribed by the Department of the Army. The plant's principal product is military smokeless powder.

BRIEFS

- During 1955 approximately 2,100 technically trained Du Pont people were engaged in research. This was to support the Company's present business, to develop new products and processes, and to do fundamental research. About 40 per cent of the research personnel are located at the Experimental Station near Wilmington, and the remainder are principally in laboratories at plant sites.

Apart from laboratory construction, research expenditures in 1955 were \$66 million.

- Generally harmonious relationships with employees continued throughout the year. There was, however, a production stoppage of nine days at one plant, the first in three years.

- Du Pont received for 1954 its eleventh National Safety Council Award of Honor. No other company has achieved the Council's highest award as many as 11 times.

Its safety record in 1955, the second best in its history, was .39 lost-time and disabling injuries per million man-hours worked compared with the all-time Company low of .33 for 1954. This compares with the latest available rate of 4.12 for the chemical industry and 7.22 for all industry.

- In the ten-year period ending December 31, 1955, the number of different owners of Du Pont stock increased by 71,073 to a total of 159,009. Included is an increase of 9,595 in the year 1955 alone. The total at the year-end included 143,941 owners of common stock and 21,418 owners of preferred.

Of the 159,009 owners, 86 per cent, or 137,507 were individuals in all walks of life. This figure includes 68,229 women, 54,692 men, and 14,586 joint accounts.

The remaining 21,502 direct owners, or 14 per cent, were various types of institutions and groups. These owners represent an indeterminate but vast number of persons who have an indirect but very real interest in the progress of the Company.

This aspect of the widespread ownership of the Company, while often overlooked, is nevertheless a matter of far-reaching consequence to millions of persons.



Yellow cabinets finished with "Dulux" enamel give fresh look to this Tracy kitchen, typical of new color units.

THE KITCHEN COLORS UP



*Colored kitchen appliances and
steel cabinets are adding
new beauty to a busy room*

By EMILY HEINE

This week a Dubuque, Iowa, housewife is happily shifting her pots, pans, dishes, silver, linens and gadgets to the waiting shelves of a colorful new kitchen designed and built especially for her.

The soft green shade of the cabinets matches her new refrigerator, dishwasher, freezer, clothes washer and dryer to form a unified kitchen that's certainly every bit as attractive as it is convenient.

Convenience and beauty are goals in St. Charles' kitchen design. Choice of "Dulux" in 15 colors is offered.



Stressing natural texture, American Kitchens finishes cabinet doors with Du Pont lacquer sealer and furniture "Dulux".

The thing worth noting about this performance is that it will be repeated thousands of times during the year, as women all over the country move into new or redesigned kitchens planned around colored appliances and cabinets.

Most manufacturers admit that the current trend toward color in the kitchen has skyrocketed far beyond their forecasts. Just after World War II, American magazines launched a determined campaign directed at beautifying the kitchen and again making it a center of family living. Housewives proved receptive to the suggestion that their kitchens, while efficient, were cold and clinical-looking. Cautiously feeling out the potential market, General Electric watched consumer demand for

Manufacturers report pink, here used on G-E dryer, gaining in popularity. Green and yellow are other favorites.



color in the kitchen cabinet from five per cent in 1930 to more than 50 per cent in 1954.

Today one steel cabinet maker, St. Charles Manufacturing Co., reports that 90 per cent of its business is in color. St. Charles, which specializes in custom-built kitchens like that bought by the Dubuque housewife, started offering its cabinets in four standard colors in October 1948. Then, as now, Du Pont "Dulux" enamels were used exclusively. The original pastel shades—pink, green, yellow and gray—were chosen as colors people could live with happily for a long time, because St. Charles expects its cabinets to keep their good looks for many years. Later, when standard color offerings were broadened to 15, a St. Charles color stylist worked closely with Du Pont paint chemists to choose other appealing shades.

Since it produces cabinets on a custom-built basis, St. Charles has had few problems in offering a range of colors. Appliance manufacturers, on the other hand, have had good cause to regard color as a bugaboo. Inventory and storage of complete lines in a variety of colors, for example, is complicated not only for them but for their distributors and dealers as well.

Nevertheless, appliance manufacturers began to enter the color market in a big way two years ago. Frigidaire brought out colored refrigerators and ranges in January 1954, adding freezers, automatic washers and dryers in color later that year. General Electric introduced a full line of major kitchen appliances and cabinets in five colors in January 1955. Admiral Corporation started selling refrigerators, freezers and ranges in yellow, green and pink last year. Westinghouse Electric Corporation finishes

its appliances in six pastel colors. General Electric's color choice is offered by ten shades of removable plastic panels used for door decoration. Thus 50 color combinations are possible. "Dulux" enamels are used on many of these major appliances except ranges, where extreme heat makes porcelain enamel finish preferable.

"DULUX" HELPS IN COLOR MATCHES

Steel cabinet manufacturers have made efforts to match appliance colors offered by the various companies. Tracy Kitchens Division of Edgewater Steel Company, for example, uses "Dulux" in yellow, pink and turquoise to produce cabinets that go with G-E appliances. St. Charles has matched both Frigidaire and G-E appliances, but prefers to pick its own standard shades and do this appliance matching on a special order basis.

Another cabinet manufacturer is betting on still a different answer to the question of kitchen beauty. American Kitchens Division of AVCO Manufacturing Corporation reports that half its sales are in its "Pioneer" kitchen, which features natural birchwood cabinet doors, finished with Du Pont lacquer sealer and furniture "Dulux", and antique copper appliance color.

How do manufacturers explain the success of the shift to color in the kitchen? Some say it's because the homemaker wants her kitchen to be a little different from her neighbor's, and color helps make this individuality possible. G-E sees it as part of the growing appetite on the part of the American public for color in all things. And Frigidaire, like others in this field, gives part of the credit to paint manufacturers for finding ways to make appliance colors that have durability, beauty and quality.

Color-picking time

calls for skillful mix'em and match'em to keep harmony in the kitchen



When she buys a green refrigerator or a yellow range, Mrs. A. has to pay more attention to her choice of harmonizing wall paints than she did when all major appliances were white.

Fortunately, the tremendous color range available in modern paints makes it possible to choose wall colors to match or complement almost any appliance. Du Pont Custom Colors, for example, come in hundreds of shades to provide almost any tint of any color desired. In addition, Du Pont paint dealers have special instructions for mixing colors that are close matches for the shades in most major appliance lines. After a customer decides on an individual color, it's only necessary to mix the proper Du Pont colorants with a white flat, semi-gloss or gloss alkyl enamel. The exact shade needed is ready in a few minutes.

Besides these Custom Colors, the Du Pont interior finishes lines offer dozens of ready-mixed colors that harmonize or contrast with appliance shades. With that green refrigerator, for instance, a housewife might like walls painted with "Duco" semi-gloss enamel in Cherokee red, with jade green trim. Or perhaps she would prefer moss green walls accented with walnut brown, or jonquil yellow walls with touches of Chinese red.

Carefully chosen colors for kitchen walls and trim not only set off new appliances and cabinets attractively but contribute to the eye-appeal of the whole kitchen.

What makes a good paintbrush?

A mechanical painter that strokes white stripes tirelessly on endless rolls of brown wrapping paper is providing objective answers to a question that long has prickled the brush industry: What makes a good paintbrush?

Although the machine looks like a Rube Goldberg contraption, it goes efficiently about its business in a corner of the sales service laboratory run by Du Pont's Polychemicals Dept. The paintbrush evaluations that it is piling up are scheduled for presentation this month before the convention of the American Brush Manufacturers Association. Du Pont hopes to convince the manufacturers that they themselves could well use such machines to test performance of their own brushes.

The Du Pont experiments so far have been directed chiefly at setting up a method for study of the several questions that a painter must ponder when he selects a brush: How much paint will it pick up? How much will it paint out? How well will it spread paint? How many strokes will be necessary to cover a surface? And, most elusive of all, how will the brush feel and handle? Details of the testing method, along with specifications for building the painting machine, are available without charge to brush manufacturers.

Du Pont supplies manufacturers with wedge-shaped bundles of tapered nylon filaments. First made in only one taper ratio, 12 to 8 mils, they now come in three ranges, since tests showed that more efficient brushes could be made with a mixture of bristle sizes.

What brush manufacturers do with "Tynex" nylon bristles after they get them is a more involved story. Brushmaking is a highly competitive industry, and individual manufacturers have been known to dissect their competitors' brushes bristle by bristle to find out what gimmicks they were using to better painting performance. An early improvement by brushmakers, based on Du Pont-

sponsored studies, was tipping the nylon filament ends by sanding or grinding them so that both paint pickup and flow were bettered. Another effective device called flagging involves splitting the ends of the bristles so that they look like crow's feet.

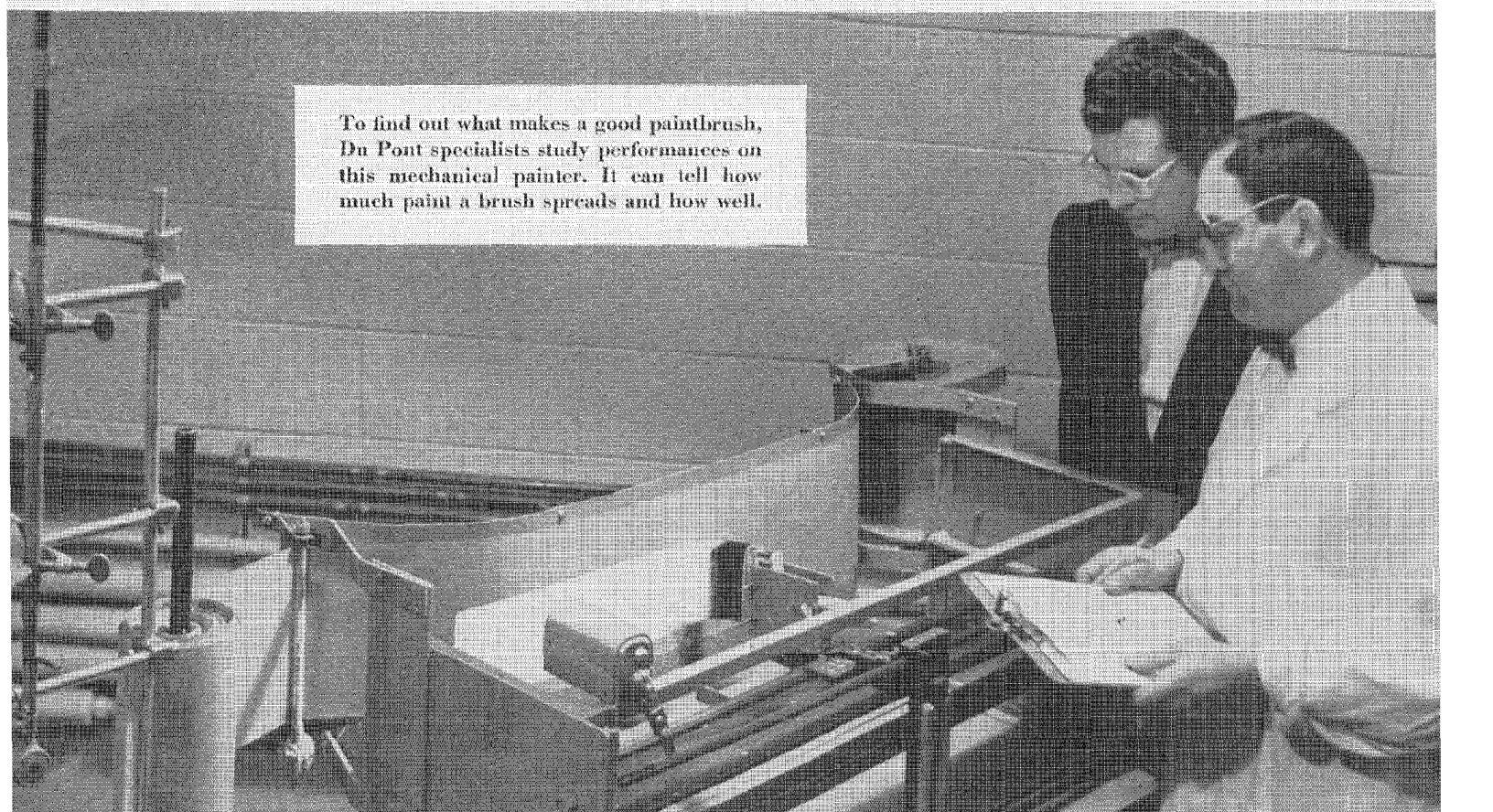
Endless combinations of tipped and flagged filaments in varying lengths and diameters are possible in assembling a good brush. There is no general agreement in the industry as to which combination is best and manufacturers have been evaluating performance by asking the opinion of painters. Such testing is not only highly variable, depending as it does upon weather, paints and surfaces as well as individual preferences, but it's also difficult and costly to arrange. An effort to put testing on a more scientific basis is back of Du Pont's use of the painting machine.

70 BRUSHES TESTED

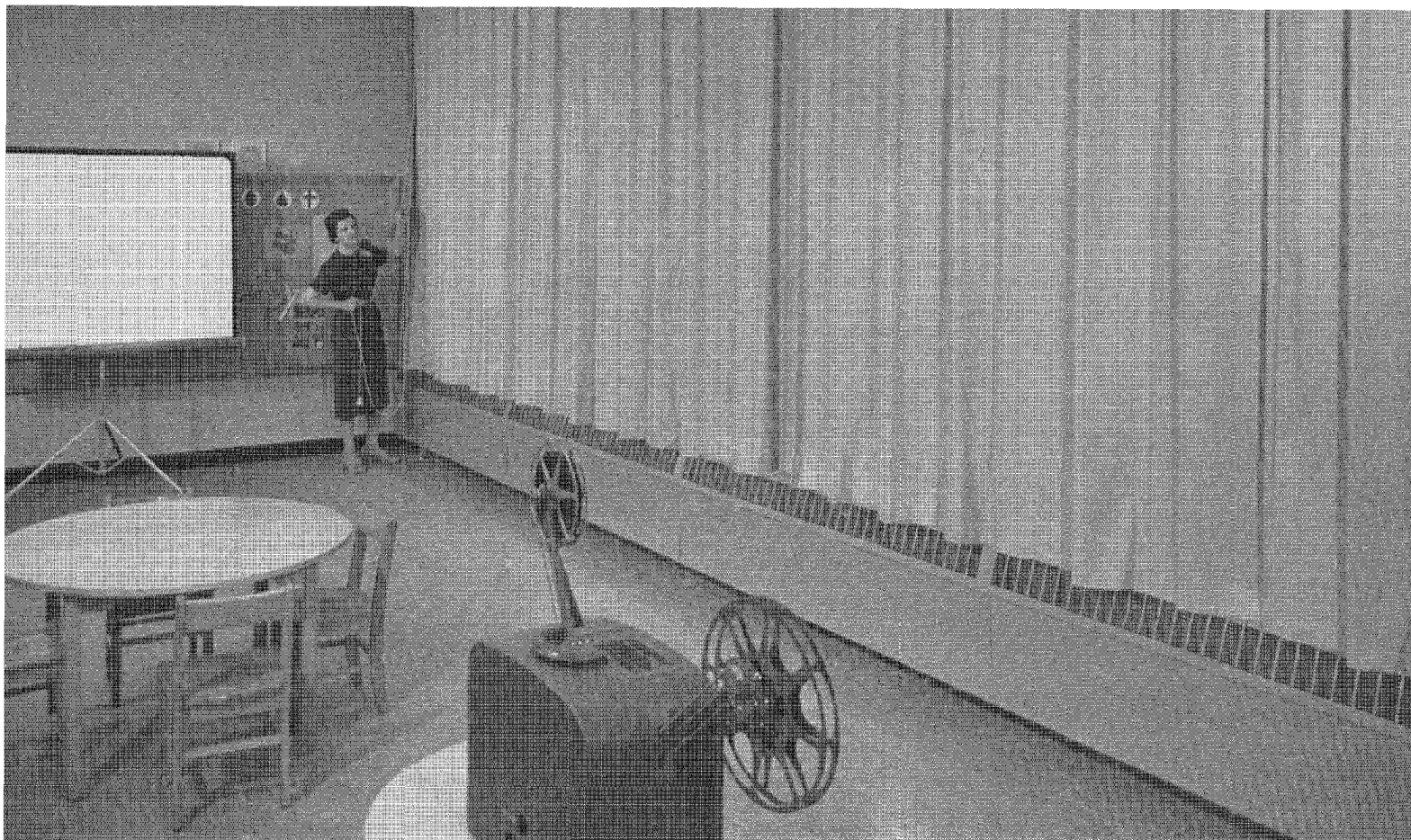
Since last September, more than 70 brushes have been made up to Du Pont specifications and checked by the machine. In the tests, well-made brushes with "Tynex" nylon bristles were consistently as good as or better than test brushes made with hog bristles in such important qualities as paint pickup and paint spread.

A new machine that is being built to measure wear and abrasion resistance of brushes will tackle other questions that are still unanswered.

Meanwhile, more professional and more do-it-yourself painters are switching to brushes with "Tynex" nylon bristles for all kinds of jobs. There is no question about the advantages of "Tynex" bristles from the standpoints of performance, durability, economy and ease of cleaning. But specialists such as the men who direct Du Pont's paintbrush studies will continue to search for ways of further refining one of man's oldest tools.



To find out what makes a good paintbrush, Du Pont specialists study performances on this mechanical painter. It can tell how much paint a brush spreads and how well.



A new drapery material

*Designed for use in classrooms and auditoriums, the opaque fabric
comes in a choice of colors and patterns*

A new drapery fabric that will darken large window areas and still satisfy decorating requirements will be available in a few months from Du Pont's Fabrics Division at Newburgh, N. Y. It's called "Tontine" flame-resistant vinyl drapery material.

With greater accent on audio-visual work in schools, daytime darkening of classrooms and auditoriums is a must. Equally important is the selection of a fabric that blends in with a modern decorating scheme of pastel and multicolored walls. The new fabric does not compromise on either point.

Drapes made from the opaque material are patterned on one side and plain on the other. The decorated side, which is embossed, comes in four colors—green, gray, beige and brown—and in four patterns. Lorient pattern consists of gently waving vertical lines; Barony has a tweed effect; Linen Crash looks like a bold treatment of linen; and Shetland consists of a straight line geometric pattern. The side of the drape designed to face the window is a neutral cream shade that fits well with exterior architecture and colors.

Besides being opaque and patterned, the new fabric

is soft and lightweight. It will draw up into the minimum width of the clips used to hang a drape, and do so gracefully. Because of its light weight, the new fabric can be hung in sections big enough to cover large window areas and long spans with a minimum number of separate drapes. A 30-foot-wide span of windows, for example, has been covered floor-to-ceiling by one pair.

SOFT . . . BUT RUGGED

Hanging, the "Tontine" drapery material appears so soft that its ruggedness is not apparent. Yet, over the years, vinyl materials of this type have proved excellent at retaining their original properties. Its flame-resistance is equal to that of "Tontine" triplex window shade material. This has passed every federal, state or municipal flame-resistance test to which it has been exposed.

Almost anything that can be done with ordinary drapery material can be done with the new fabric. It sews easily, and takes any kind of pleating, such as cartridge, box or pinch pleats. In addition, dust shakes off easily because the non-porous surface finish is unusually dry, a characteristic that enables it to resist soiling.

What's New

- **HI-FI TURNTABLE CABINET** made by Gray Research and Development Co., Manchester, Conn., is covered with easily cleaned "Fabrilit" vinyl material.



- **CHILDREN'S SWEATERS** of "Orlon" acrylic fiber knit in brightly colored designs that resemble Scandinavian ski patterns are available from several manufacturers.

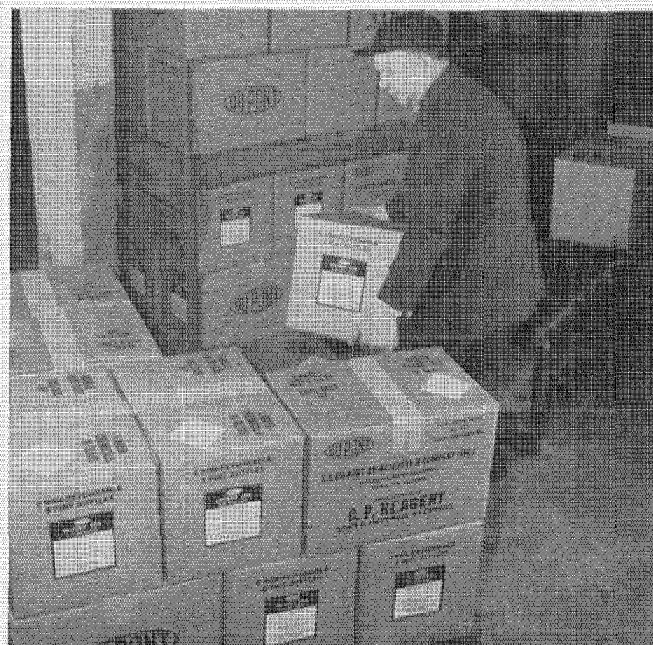
- **NOW IT'S FIFTY PER CENT FASTER** than before. New Du Pont Seismo-Writ, a photographic recording paper used in geophysical exploration, comes packed in a water-proof polyethylene bag and sealed in a newly designed canister that is easily resealed for storage or mailing.

- **FASTEST, MOST POWERFUL HANDGUN CARTRIDGE** is the new 44 Remington Magnum cartridge, made by Remington Arms Co., Inc., Bridgeport, Conn. The flat-nosed revolver bullet is driven at a muzzle velocity of 1,570 feet a second with 1,313 foot-pounds of muzzle energy.

- **TWO NEW BOOKLETS** describing properties and possible uses of specialized Du Pont products are now available. A technical bulletin on tetrahydrofuran as a powerful solvent for resins and plastics may be obtained from Du Pont's Electrochemicals Dept., Du Pont 3142, Wilmington 98, Del. Information on two new substituted ureas that form useful decomposition products will be supplied by Grasselli Chemicals Dept., Nemours 2539-DM-2, Wilmington 98, Del.

- **AQUEOUS DISPERSION** of "Zytel" nylon resin will produce a film that is tough and flexible. Its manufacturer, General Dispersions, Inc., 165 Third Ave., Paterson, N. J., reports that "Genton" 110 aqueous dispersion is effective as a surface coating, as an adhesive, or as a bonding agent.

- **DU PONT'S NEW ISOCYANATES PLANT** at Deepwater Point, N.J., geared to make 25 million pounds of the chemicals annually, is now in production. These organic isocyanates, in combination with other compounds, form a variety of rubber- or plastic-like materials with wide potential use.



- **NEW THROW-AWAY** corrugated cartons developed by Du Pont's Grasselli Chemicals Dept. for shipping reagent chemicals are lighter in weight and easier to handle than previously used containers. Now being shipped in the new cartons are throw-away five-pint bottles of Du Pont reagent grade sulfuric, hydrochloric and glacial acetic acids, and ammonium hydroxide.

For additional information on products or services mentioned in any issue of the *Magazine*, write to Gordon H. Kester, Editor, *Du Pont Magazine*, Wilmington 98, Delaware.

Resistant hose of "Teflon" by Resistoflex is back in action again

after an attack of process-itis. The attending physicians are mightily relieved as . . .

A crisis is weathered

By GERALD KING

A crisis that threatened to choke off supply of a vitally needed hose assembly for atomic energy installations and the makers of jet planes, rockets and guided missiles has been eased under the concerted attack of chemists and engineers at Du Pont and at one of its customers.

The critical product is "Fluoroflex-T" R500, a wire braid reinforced hose of "Teflon" tetrafluoroethylene resin with exceptional resistance to corrosion, pressure and temperature extremes. So far it is the best product designers have found for the life-and-death job of carrying fuel, lubricant and hydraulic fluid to the engine and controls of a jet plane. It performs equally important tasks in other vital areas.

The problem arose last November when Resistoflex Corporation, now of Roseland, N. J., developer and manufacturer of these hose assemblies, reported that powdered resin from the Du Pont Polychemicals plant at Parkersburg, W. Va., was processing differently from the "Teflon" it had been buying before. Extrusion of the material was more difficult, Resistoflex reported. The difficulty seemed to lie in the character of the powdered form of the material, not in the strength or toughness of the extruded hose.

It seemed logical to relate the change in properties to the fact that Du Pont had just gone on stream with new manufacturing facilities for "Teflon", more than doubling production to meet a rising demand for the resin. The new production apparently differed in some undefined way from the old. Defining the points of difference and

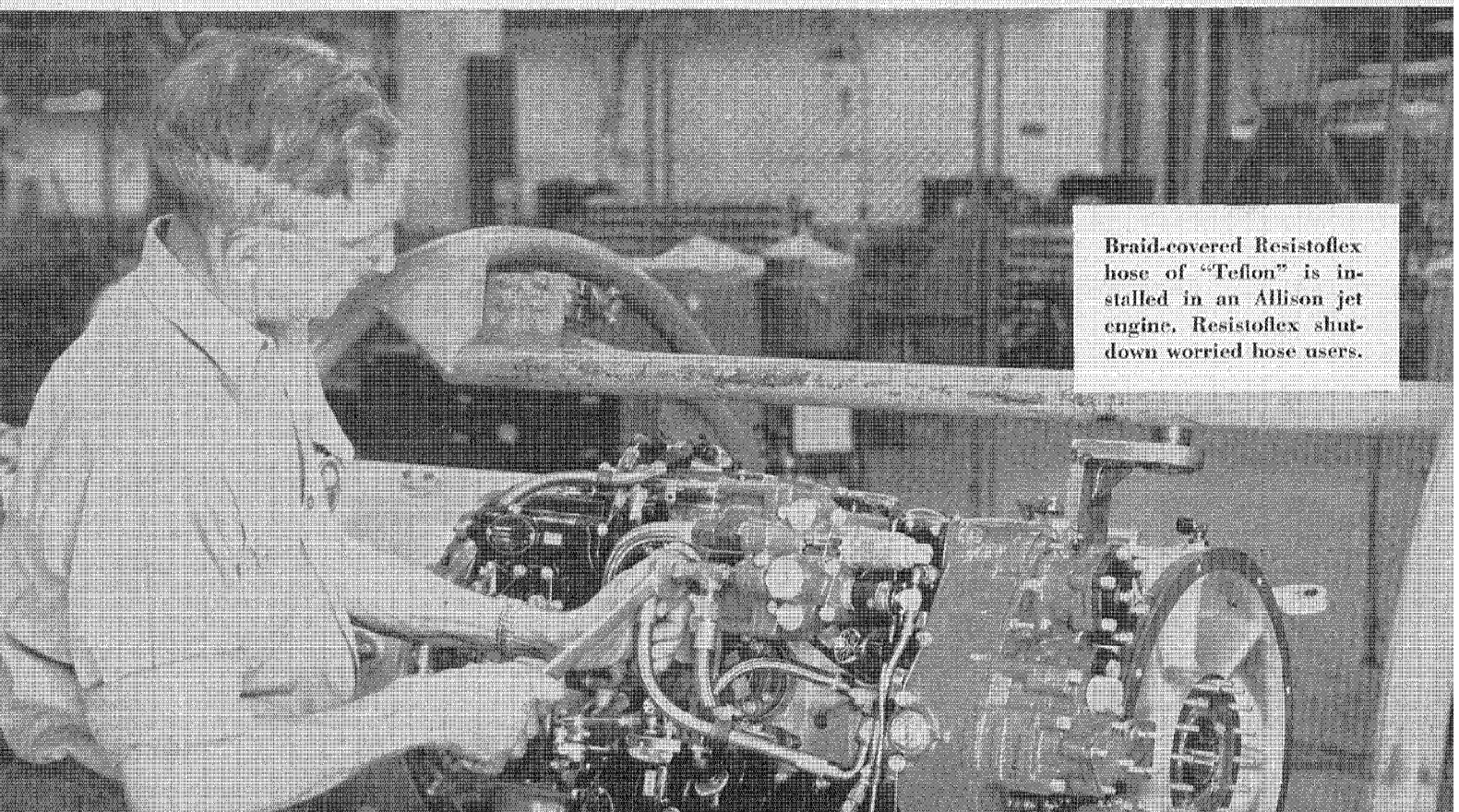
relating them to the requirements of Resistoflex became the crux of the problem.

The plant laboratory at Parkersburg swung into action. Samples of "Teflon" in 18- and 36-pound lots began winging their way to Newark, N. J., where Resistoflex men picked them up, often in the small hours of the night, and drove them to their plant for early-morning extrusion tests. Polychemicals researchers at the Du Pont Experimental Station outside Wilmington were alerted. Twenty men there were assigned to search for the answer. The ripples spread to other groups in the Company. A piece of needed test equipment, for example, was shipped to Wilmington on a half day's notice from a Du Pont fibers plant in the South. Men also went into action at Polychem's new sales laboratory at Chestnut Run, Del.

PHONE CALLS, POW-WOWS

Phone calls flew back and forth between Wilmington and the Resistoflex plant, between Wilmington and Parkersburg. Du Pont task forces made a number of trips to New Jersey for day-long conferences on the problem and firsthand inspection of the products; Resistoflex groups joined pow-wows at Wilmington. The next day's work plans were talked out during the train rides back.

Meanwhile, Resistoflex had a difficult decision to make. The demand for "Fluoroflex-T" R500 hose was growing rapidly in defense industries. Should Resistoflex continue to supply hose assemblies—some apparently

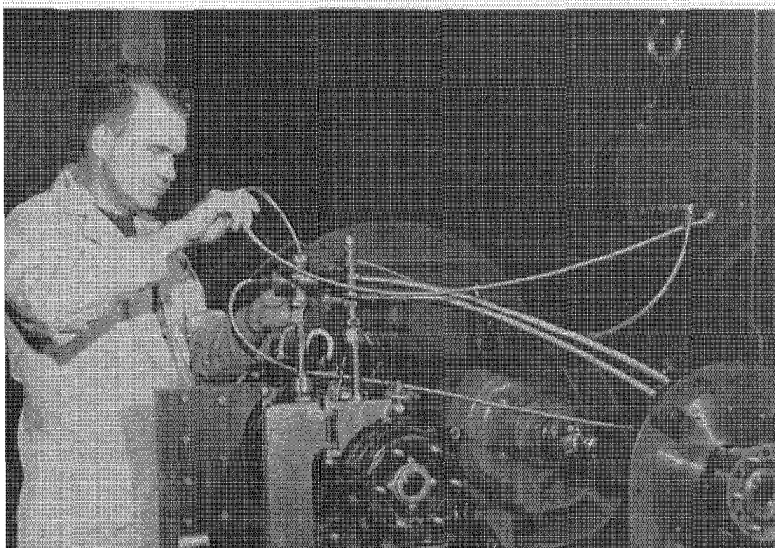


Braid-covered Resistoflex hose of "Teflon" is installed in an Allison jet engine. Resistoflex shut-down worried hose users.

satisfactory tubing of "Teflon" was still being extruded—or should they halt production until the problem was ironed out?

"Shutting down production of 'Fluoroflex-T' hose was one of the most difficult decisions we've ever had to make," said Edgar S. Peierls, one of the founders and president of Resistoflex. "Our hose might well have continued to perform satisfactorily, but even a single doubt in our minds was one too many. It was our duty to protect our customers. We could not compromise the quality of our products, our integrity, or the reputation of 'Teflon' as a product."

As it turned out, production continued on a limited scale thanks to Superflexit, Ltd., British firm licensed by Resistoflex to make "Fluoroflex-T" hose in the United Kingdom. Apprised of the crisis, Superflexit agreed to release practically all of the "Teflon" shipped to it earlier from this country. This was pre-November material with none of the processing problems of the newer resin.



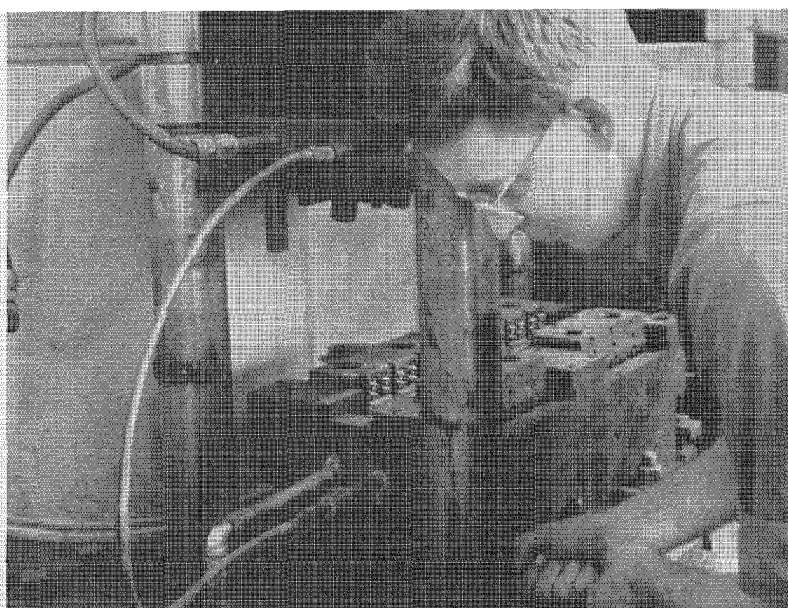
Resistoflex hose with a tube of "Teflon" leads a civilian life, too. Here it carries hydraulic fluid in test stand installation.

Resistoflex arranged for the "Teflon" to be air-lifted back to this country. Hose made from this recalled resin, plus the inventory accumulated to cushion its move to new factory quarters, enabled Resistoflex to meet some of the most pressing requirements of their customers during the critical period.

While Du Pont scrutinized every ingredient and processing step in its manufacture of "Teflon" in attempts to solve the problem, Resistoflex evaluated each new sample of material under controlled extrusion conditions. Resistoflex engineers and chemists put in as many as 80 hours a week at their plant right through the Christmas and New Year holidays.

By early January the clouds began to roll away, and by the middle of the month Resistoflex was able to announce that the problem was on the way to being solved. Full production of "Fluoroflex-T" hose was resumed late in February to the relief of its anxious users.

As it turned out, the trouble with "Teflon" was unrelated to the Parkersburg plant expansion. Du Pont researchers finally fixed the blame on one of the raw



Steam hose on this molding press used to fail in three months. Resistoflex hose was adopted, is still in use after three years.

materials for the resin. Paradoxically, this ingredient's fault lay in the fact that it was being made purer than before. The plant's operation was adjusted to accommodate it. The results: a "Teflon" better than any made previously, thanks to the same raw material change that had caused the disruption, and a "Fluoroflex-T" hose of continuing high quality for critical applications.

LESSONS LEARNED

In retrospect, Resistoflex and Polychemicals Dept. officials agree that a valuable lesson has been learned through this mutually anxious period. The lesson will stand both of them in good stead as "Fluoroflex-T" hose continues a move, already begun, to uses in non-defense industries. It will answer calls for a lightweight but rugged and flexible conduit for transporting corrosive or reactive liquids and gases under conditions of extreme heat or cold.

First of all, Polychem says, necessity once again proved a powerful incentive. The two-month period of intensive work gave Polychemicals Dept. researchers a better picture of what happens to "Teflon" during its various processing stages than they have ever had before. This added knowledge has led to improvements in manufacturing control that will assure a more uniform product.

The experience also proves that Du Pont is meeting a real need in building its Chestnut Run customer service laboratory center. Three such laboratories, one of them built by Polychemicals, have been completed, another is going up, and more are planned. As much as possible, problems like the one encountered by Resistoflex will be anticipated well ahead of time and solved by technologists in these new laboratories.

The Resistoflex case also proves the value of close liaison between Du Pont and its industrial customers. Ninety-five per cent of Du Pont's sales are in products that are not sold directly to the public; they go to manufacturers who use them in processing or fabricate them into something else. By intimately knowing customer problems, Du Pont can give increasingly effective service.



Better pigments have helped linoleum establish itself in many areas of the house.

Resilient flooring, once relegated to the work areas of the house, is now enjoying a more glamorous life. Better pigments have helped popularize these . . .

Cinderella floors

More than 90 years ago, linoleum came in through the kitchen doors of America and settled down to stay. It soon became almost as familiar a fixture as the wood-burning range, the singing kettle and the dozing cat by the sitting room hearth.

Invented by an Englishman named Frederick Walton, the new floor covering was made of oxidized linseed oil filled with wood flour, pigmented, and laid on a felt or burlap backing. It was the first hard-surfaced floor cover-

ing cheap enough for the working man to buy. It made floors easier to clean. And most important of all, it brought bright colors and an air of style to the kitchens of people hungry for these amenities.

The years since 1863 have seen improvements in linoleum itself and the emergence of its modern cousins in the resilient floor covering field—tile of asphalt, vinyl resin, rubber and cork. Aided by the postwar boom in concrete floor-slab construction and changes in home

decorating ideas, tile and linoleum have moved out from their beachhead in the kitchen to occupy the bathroom, playroom, bedrooms and sometimes even the living and dining areas of modern homes. Along the way, they have dropped much of their identification as floor coverings. In many cases they are considered permanent flooring. Quality—and price, too—have gone up. Resilient flooring is going into expensive houses, offices and public buildings as well as into ordinary homes.

Some things about resilient floors haven't changed, however. They are still outstandingly easy to maintain, and they still depend on color and style to a large extent for their sales appeal. Buyers tend to take their durability for granted.

"People expect our floors to look good and to stay looking good despite being doused with oils, greases, solvents, soaps and detergents," one manufacturer told us. "Among other things, this means we are demanding more of pigments and using higher quality pigments than ever before."

STUDY IN RED

Red pigments offer a case history. Twenty years ago Du Pont was selling lithol reds to the floor covering trade. These colors had poor resistance to fading from light, heat and alkaline materials, but they were among the best reds to be had at the time.

In the late '30s Du Pont introduced "Watchung" red pigments. They had markedly improved heat and light fastness, but were still lacking in alkali resistance; a one per cent caustic solution would burn out the color completely. Yet the improved "Watchung" reds replaced lithol reds almost overnight in floor covering.

More recently, "Watchung" red has been replaced in turn by alkali-resistant red pigments, the best red colors to find their way into the field so far. They cost about \$3.60 a pound, compared with the 65 cents a pound manufacturers once paid for lithol reds. But performance, more than price, is what floor covering makers are after nowadays.

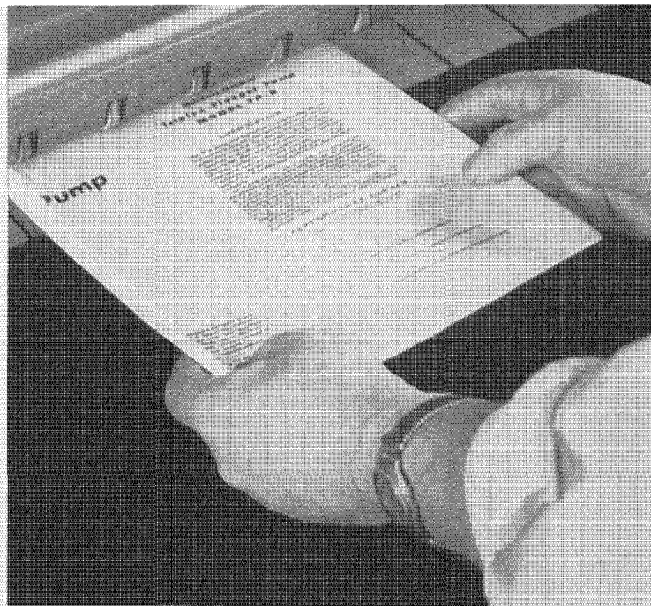
Present-day yellows in flooring materials are often a blend of alkali-sensitive chrome yellow pigment and light sensitive benzidine yellow. The result is a compromise that generally performs satisfactorily, but doesn't give floor covering stylists all the latitude they might like.

There's room for improvement in both red and yellow pigments, the floor covering industry maintains, and pigments research at Du Pont remains geared to that fact.

Blues and greens, on the other hand, are now almost completely trouble-free. Responsible are phthalocyanine blue and green, which Du Pont sells as "Monastral" blue and green pigments. They have taken the place of iron blue and ultramarine blue pigments once used exclusively in linoleum. Iron blue was sensitive to alkali, ultramarine to acid. Phthalocyanine colors are stable to both.

Most colored tile and linoleum also contain a liberal measure of titanium dioxide, the whitest of all whites—in the popular marbleized patterns, for example. This durable, non-yellowing material is represented in the Du Pont line by "Ti-Pure" titanium dioxide pigments.

Better pigments rank with more durable resins, backing materials and adhesives in the list of contributors to floor covering improvement. Together they have helped make the one-time kitchen slavey welcome just about anywhere throughout the house.



A tough, transparent photographic paper, "Litho" T, is used to make many precise copies of drawings and plans.

A line on quicker line reproductions

Required to copy engineering drawings quickly and in large quantities for use in filling defense contracts, a major aircraft corporation found itself hunting for a new photocopying technique.

Normally, the few copies required were easily made on photo-duplicating equipment. But such reproduction, technicians discovered, became a problem when as many as 75 copies were needed. The heat process involved in making the copies was likely to stretch or wrinkle the original tissue drawings enough to make them inaccurate after nine or ten uses.

Du Pont "Litho" T (transparent) photographic paper provided an effective solution. Each drawing was copied on "Litho" T, and the copy used as an intermediate. Even after 75 reproductions were made from it, this intermediate was in good condition.

Two "T's"—toughness and transparency—sum up the particular advantages of "Litho" T in making fast and precise line reproductions for lithography, blueprinting, map reproduction and other jobs.

Because of their transparency, master copies made on "Litho" T make quicker repeat prints. This transparency, greater even than that of lightweight document papers, also makes possible sharper reproductions.

"Litho" T is made from paper stock notable for its size-holding properties, an advantage of particular importance in making duplicate masters. This characteristic makes it suitable for checking register in photoengraving. Since "Litho" T is camera speed, it also can be used to make quick paper negatives.

Easily processed, quick drying and tough enough to take rough handling, "Litho" T photographic paper is especially suited for rush jobs.

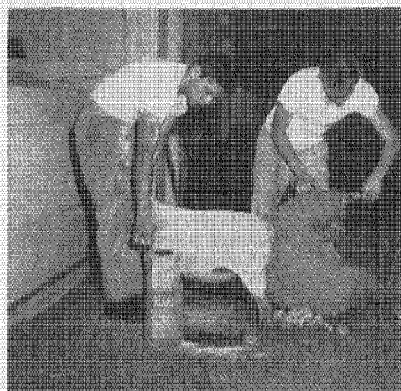
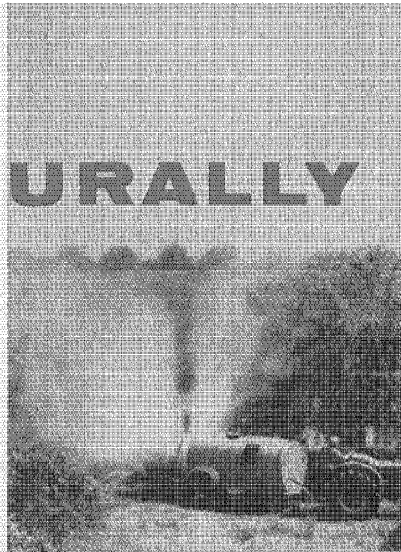
AGRICULTURALLY SPEAKING

An exterior paint suited to a variety of farm jobs is "Dulux" stucco, shake and shingle paint. It is formulated especially for rough masonry surfaces, wood shakes and shingles, and for asbestos shingle siding. In addition to being decorative, it seals and protects porous surfaces against moisture penetration.

A corn yield of 304 bushels an acre, highest ever recorded and three times what most farmers consider excellent, was achieved last summer by a 16-year-old farm boy. Lamar Ratliff, Baldwyn, Miss., planted an acre in Funk's G-711 hybrid seed corn treated with Du Pont "Arasan" SF-X seed disinfectant. He thinned the stand to an estimated 25,850 plants, which yielded 19,776 pounds of ear corn.

Here's another test showing the economy of feeding broilers according to the Du Pont methionine-energy concept: Berlin Milling Co., Berlin, Md., raised 267,298 birds on high-energy rations containing methionine, a body-building amino acid. Cost of feeding them to market weight was 15 per cent less than for an earlier lot of about the same number, raised under the same conditions but fed a less efficient ration.

Most farmers have been told of the many uses of lightweight, flexible plastic pipe in permanent or temporary water systems. Now, help in picking the best kind of pipe for service under rugged farm conditions is offered by a plastic pipe manufacturer who recently studied performance of pipe made from polyethylene resins recommended by five major suppliers. Pipe made of "Alathon" 25 polyethylene resin outlasted all others in burst-strength tests at pressures of 172 pounds per square inch. It had not failed when the test was discontinued after 1,200 hours. The second best pipe ballooned and burst after seven hours at this pressure.



A new Du Pont all-variety apple fungicide that controls both rust and scab is ready for the 1956 season. Known by the name of "Thylate" thiram fungicide, this white-colored product has produced a fine-quality fruit finish on all major varieties, including the sensitive Golden Delicious.

Du Pont is offering three new "Ceresan" liquid mercurial seed disinfectants for treatment of wheat, oats, barley and cotton. The products are convenient to use and have the added advantage of dye-marking seed red to avoid possible feed and food use of treated grain.

Arkansas rice fields fertilized with diammonium phosphate and a urea top-dressing yielded an average of 137 bushels per acre, 74 bushels more than test acres that were left unfertilized. Cash returns, as figured by the University of Arkansas' Rice Branch Experiment Station, were an extra \$115 per acre from an investment of about \$19 for the phosphate and urea. Urea for such applications is sold by Du Pont as "NuGreen" fertilizer compound.

Hand-dusting sheep for ticks with "Marlate" 50 methoxychlor insecticide can be done quickly and conveniently at shearing time. One tablespoonful, costing about one and one-half cents, prevents reinfestation of an animal for as long as a year when treated animals are kept away from infested animals.

Many farm construction jobs can be done easier and faster with a cartridge-powered tool. The models 450 or 455 stud drivers made by Remington Arms Co., Inc., use blank cartridges to drive special fasteners into concrete, steel and other hard materials. The tools are also handy for fastening wood, sheet metals, insulation, fixtures and the like to concrete or steel base materials.

the oil companies serve us better by always being . . .

Johnny-on-the-spot

Deep under the New York shore of the Hudson River a sandhog smelled gasoline. Safety engineers confirmed the sniff—gasoline was seeping through many feet of rock and dirt and was dripping into the pressurized tunnel. The explosion hazard was serious.

Where was the gasoline coming from? On the streets above there were at least five service stations and several distributors' bulk tanks. They couldn't

neers entered the deserted area. The gasoline was still dripping, and an ultraviolet lamp was aimed at the liquid which glowed with an unearthly light.

"That's it," said one of the chemists. "This tells us where the leak is." Now it was a simple matter to dig up the faulty tank and replace it. No more gasoline dripped into the tunnel, and work on this vital interstate link was resumed.

... "THE WORK IS NEVER DULL"

"That was an unusual case," says David M. Rickard, sales service representative of the Petroleum Chemicals Division. "Our representatives don't usually have such dramatic duties, but the work is never dull and benefits both the petroleum industry and the consumer."

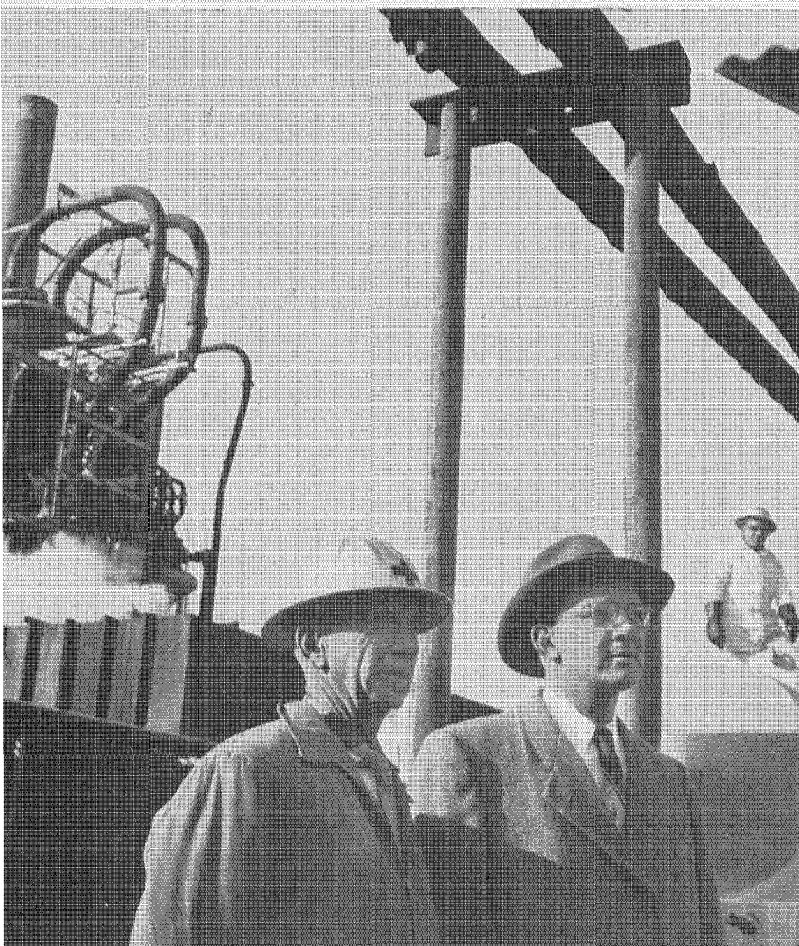
Dave Rickard himself is typical of Petroleum Chemicals representatives. He joined the division after finishing his war-interrupted education at Rensselaer Polytech (B. Ch.E., '49). His Du Pont training gave him a wide variety of practical experience. In 1950, for instance, Dave was assigned as marketing and safety service representative in Denver. His territory included five neighboring states and Alberta and Saskatchewan in Canada. Refineries throughout this vast area depended on him for technical information, safety consultation, marketing services and news of Du Pont petroleum chemicals.

In 1952 Dave was made a technical assistant in the Operations Section in Wilmington, Del. Here he worked on design, construction and safety problems involved in adding tetraethyl lead to gasoline in precisely controlled quantities.

Other assignments followed, and his duties today include liaison between the Petroleum Chemicals Division and two major oil companies, and the coordination of services to these accounts at all their locations throughout the country.

Tetraethyl lead or TEL, which Du Pont manufactures, is used to raise a gasoline's octane number to meet the requirements of today's most modern engines. But it's a tricky compound to work with, and in its concentrated form it's toxic. Petroleum Chemicals men provide the oil industry with techniques for handling TEL safely, and for making sure the right amount goes into every gallon. Petroleum Chemicals laboratories periodically check the octane rating of gasoline from typical gas station pumps, and report their findings to the refiners concerned. If customers complain about gasoline performance in a certain area, Petroleum Chemicals men help the oil company track down the trouble and correct it.

Such are the everyday tasks of Du Pont's Petroleum Chemicals servicemen to help make work easier and safer for the petroleum industry and to give consumers more for their oil and gasoline dollar.



Dave Rickard (rt.) is typical Du Pont Petroleum Chemicals representative. His job: to assist and give technical aid to customers.

be put out of business. All their tanks couldn't be dug up and examined. After filtering through dirt and sand, one brand of gasoline couldn't be told from another. Yet work on the tunnel had to stop until the source was found and sealed.

Chemists from Du Pont's Petroleum Chemicals Division suggested adding to the various tanks minute quantities of different chemicals that would show different colors under ultraviolet rays. The next day, oil company men and tunnel safety engi-

Acres

Half a pound of mushrooms for each of us is raised
are grown that we can sympathize with the

If you're fond of puns, you might say that the mushroom industry has mushroomed into a pretty big business in the last few years. Americans now eat about 70 million pounds of this fungi a year. Ten years ago they ate only about half that many.

There is a twofold reason for the tremendous growth in the mushroom business—better distribution and better growing methods. An increased demand for mushrooms is of little value unless the fungi can be produced and distributed in large enough quantities to satisfy consumers.

Mushrooms are not by any means easy to grow. For one thing, much tedious hand labor is involved in preparing and seeding the compost beds in which they are raised. Furthermore, this work must be done in the dark. The crop also is plagued by a number of insects and diseases. For many years growers tried unsuccessfully to get rid of the large (sciarid) and small (phorid) mushroom flies. The larvae of these insects hatch in the warm, moist compost of the growing beds and quickly eat the young mushrooms. Entire crops have been lost in this way. Formerly, control measures consisted of dusting the mushroom houses with pyrethrum dusts to kill the adult flies. This had to be done two or three times a week.

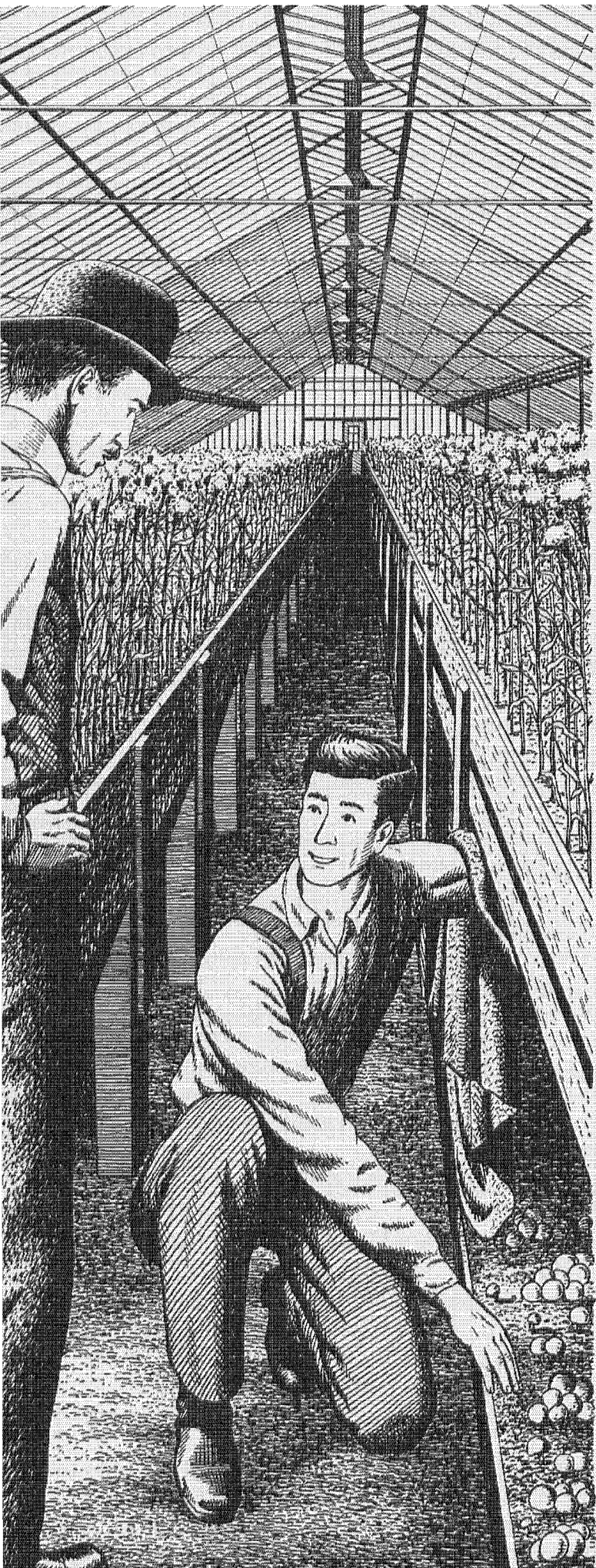
NOW FEWER DUSTINGS

Now many growers use Du Pont "Marlate" 50 methoxychlor insecticide in a ten per cent dust and are able to reduce the number of dustings to one or two a month because of its good residual properties.

Another Du Pont product improving yield and quality of cultivated mushrooms is formaldehyde. It is used to disinfect mushroom houses, equipment and compost beds to control "bubbles" and other fungus diseases that can quickly run through a mushroom house.

Keeping growing mushrooms the right temperature is as important as pampering tropical fish. An increasing number of mushroom houses are being refrigerated to get the 45 to 60°F. temperature considered optimum for growing firm, top-quality mushrooms. Du Pont's contribution here is the virtually nontoxic "Freon" refrigerant used in

In 1890s a thrifty Kennett Square, Pa., florist thought he could grow mushrooms under greenhouse benches. With spawn from England he then launched this new industry.



of mushrooms

By ROBERT W. TUNIS, Jr. and
EDGAR M. HOOPER

in the United States every year. But most of us know so little about how they
man who asked a grower how many acres he had planted in mushrooms

the more modern refrigerating equipment available today.

Like most other commodities, mushrooms have profited from the packaging revolution of recent years. They used to be sold in three-pound packages that were both unattractive and bulky. The mushrooms lost their snow-white color and turned brown a day or so after picking, thereby decreasing their eye-appeal still more.

When transparent plastics came into wide use for packaging, mushroom growers thought that at last they had a solution to their problem. But something was wrong! The mushrooms still turned brown and, worse yet, they now dried out quickly.

PROBLEM TO SOLVE: BROWN, DRY MUSHROOMS

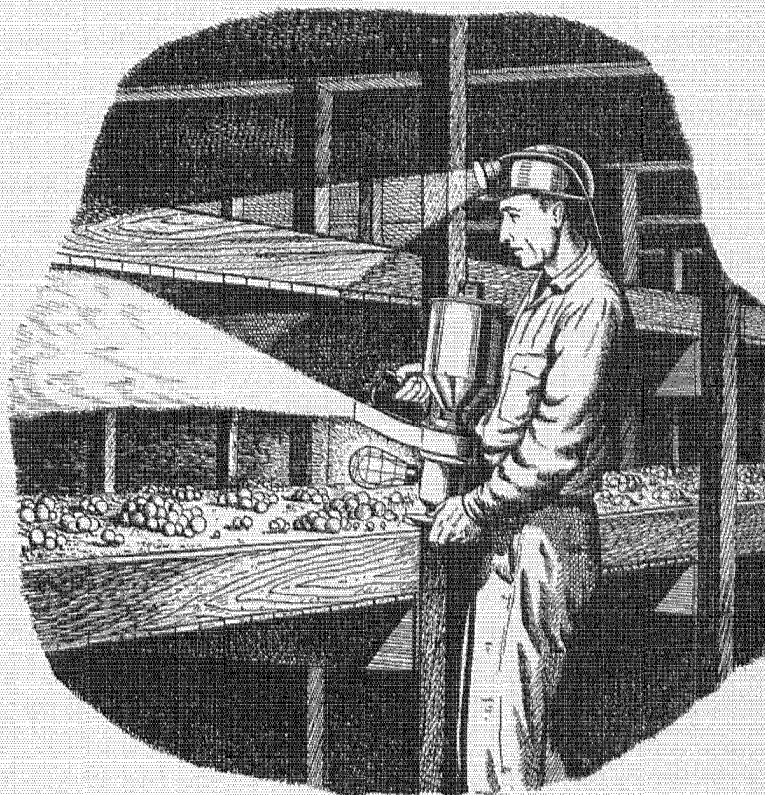
About four years ago some mushroom packers took their problem to Du Pont. Researchers investigated and discovered that the new film wraps were keeping the mushrooms from "breathing." They recommended one of their own products, acetate film, and after careful testing this material was found to overcome the difficulty. Now the mushroom packers have expanded their fresh market distribution and hope eventually to serve still wider areas.

The mushroom capital of the United States is the little town of Kennett Square, Pa., a few miles west of Philadelphia. In some 450 two-story, windowless buildings about 60 per cent of the nation's supply of mushrooms is grown.

The town early won its top role in mushrooms. Back in the 1890s if you wanted mushrooms, you went out in the meadows and woods and started looking. At that time Kennett Square had a number of flower growers who produced their crop on raised greenhouse benches. One day a thrifty florist realized he could use the waste space beneath the benches to grow something. The shaded, moist soil, he reckoned, would be just right for mushrooms. He sent to England for some mushroom spawn and launched a new business. In a short time, it was clear that nearby cities, including Philadelphia and New York, would provide a ready market for all the mushrooms the florists could produce.

By the early 1900s the florists had almost given up flowers and were growing mushrooms in houses six or eight beds high, thereby literally getting their business—and themselves—off the ground.

The growers are only unhappy about one thing right now. Try as they will, they can't persuade housewives that it's no longer necessary to peel mushrooms. To do so,



Growers use Du Pont "Marlate" methoxychlor insecticide for long-lasting control of destructive mushroom flies.

they claim, destroys some of the most flavorful part of the mushrooms as well as the more nutritious area.

Mushrooms have nutritional value? Yes, indeed. They contain both niacin and riboflavin in sufficient quantities so that the government during World War II gave mushroom growers a priority to continue raising the food. Calorie-wise they are very low, and if it's protein you're looking for, just eat about five pounds of mushrooms. They'll give you an amount equivalent to about one pound of porterhouse steak.

Most mushroom eaters don't worry too much about food values, however. They just like the taste. Delicious, they claim, just plain delicious.

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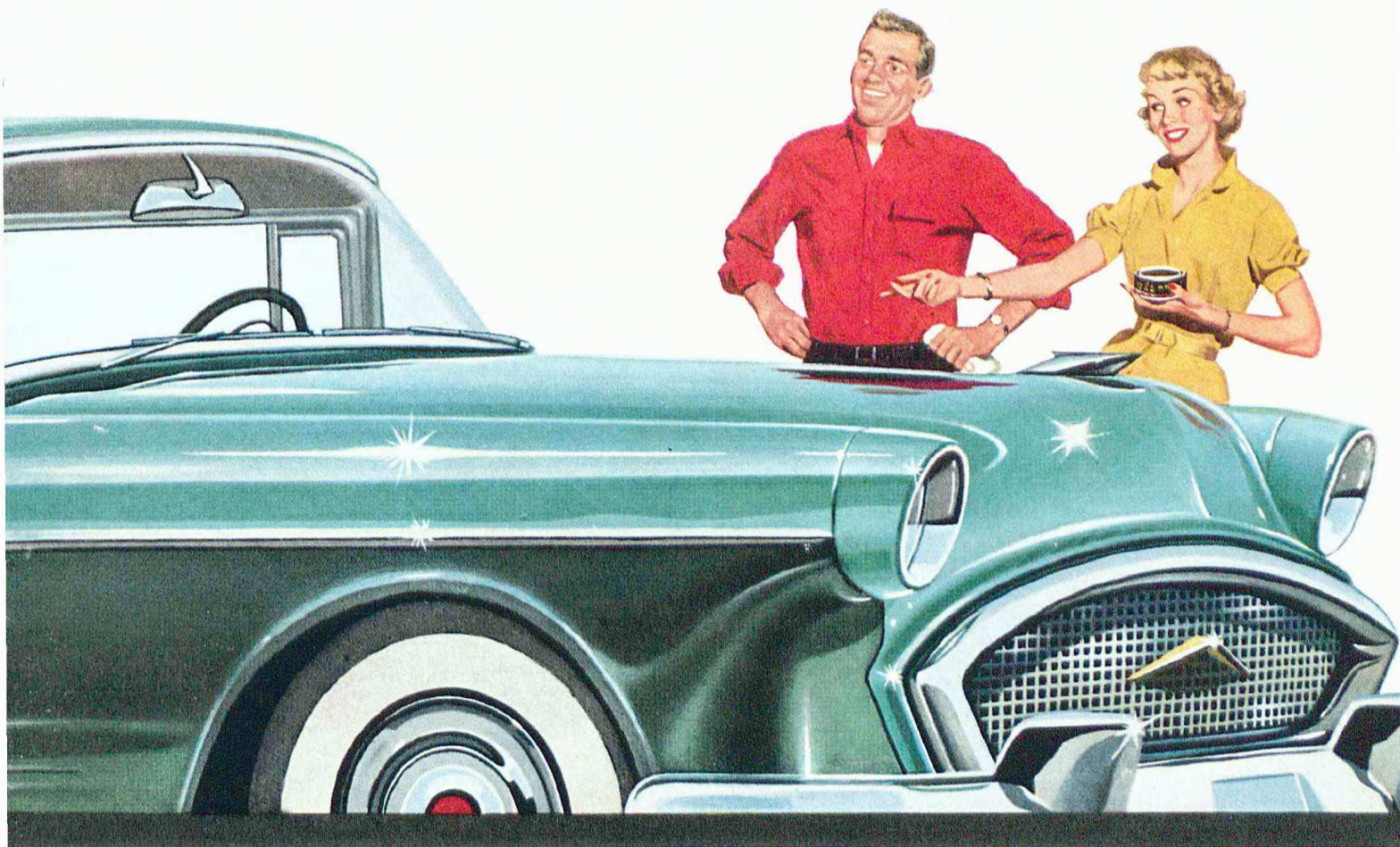


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