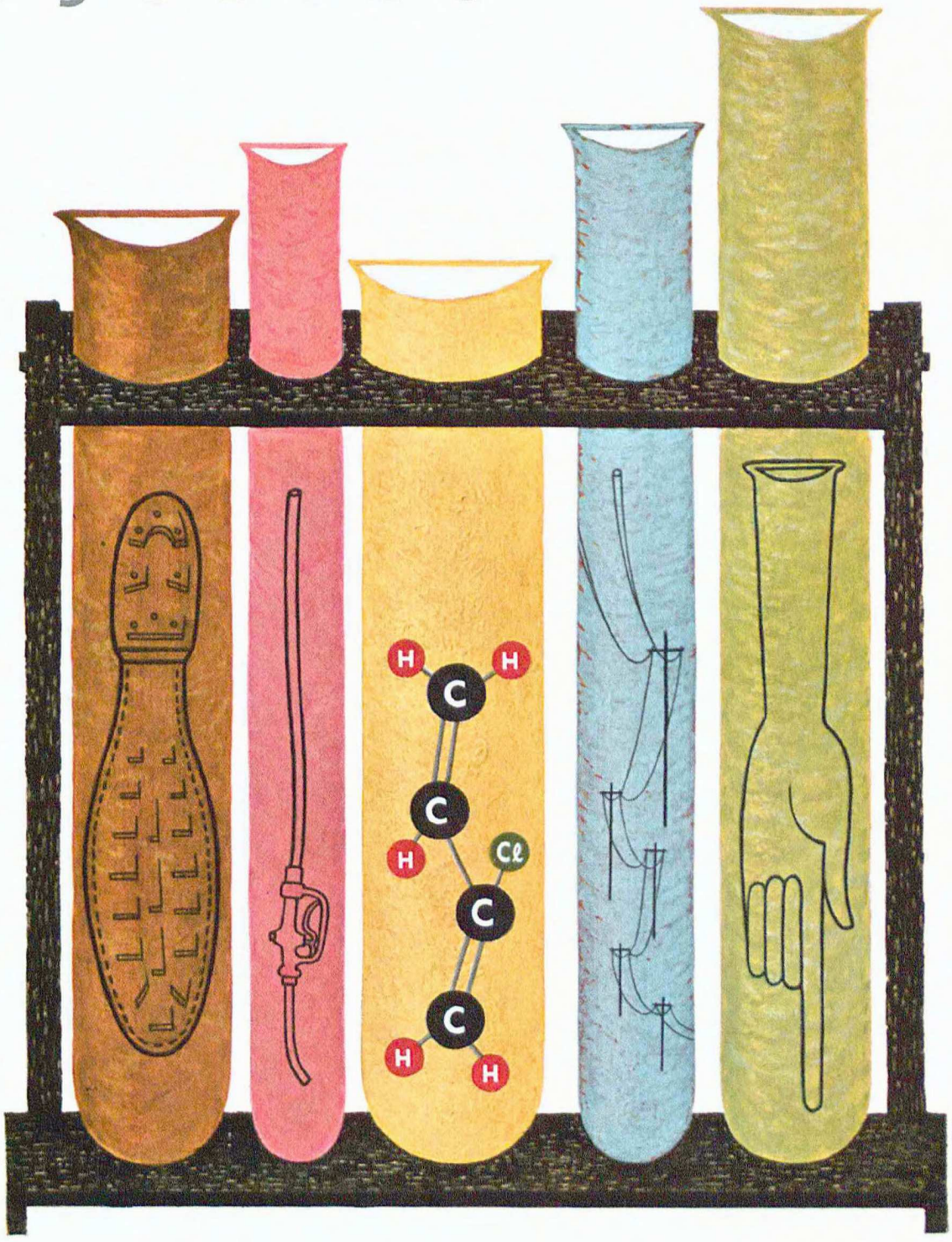
DU PONT magazine



DU PONT

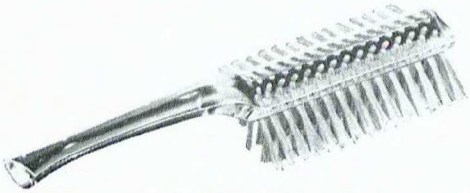
BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

Give a gift a personal ...

. . . and to be sure it's a gift of true quality—a brush with the finest bristles—look for the label "Bristled with Du Pont 'Tynex' nylon." These stay-lively bristles are easier to clean—do not get limp or soggy, even when sterilized—and never absorb odors. And, when brushes are bristled with "Tynex", you can be sure your gift will last.

Here are some of the many fine brushes bristled with Du Pont TYNEX® nylon

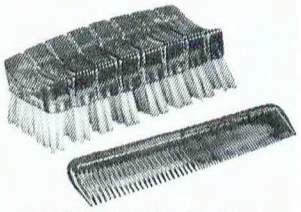
Why not select one for someone on your Christmas list?



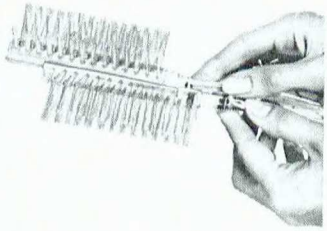
OWENS "Patrician" Brush. Raymond Loewy Associates designed this sparkling masterpiece. New, longer, natural-grip handle of LUCITE acrylic resin makes brushing a pleasure. Has efficient fan-flare shape—$2.50.

MOHAWK original de luxe Half-Round Ladies' Hair Brush, in clear, blue and pink LUCITE with extra-long, stiff, white *Krimpt* TYNEX nylon bristles . . . a perfectly wonderful aid for milady's crowning glory!

"HOWARD" Little Traveler Style K-41. Black handle of LUCITE—bristled with Du Pont TYNEX nylon—crimped for better hair brushing. Gift-packaged in simulated leather box.



TEK-HUGHES Single Military Flex-Action Brush and Comb Set. Finest, durable Du Pont TYNEX bristles in LUCITE. Gift-packaged. Crystal, Mock Tortoise—$5.00.



BETTER Magnetic Twin Hair Brush. Long, uneven, trim, white TYNEX nylon bristles. Magnetic qualities remove loose dandruff and dust! Brush slides apart to form *two* hair brushes.

STANLEY "Lifetime" Clothes Brush. Curved to fit your shoulders, to flip out dust and lint with each easy stroke. Carries a 25-year guarantee. Available through Stanley dealers at the famous Stanley Hostess Parties.

The finest personal brushes have this seal . . .

Bristled with Du Pont TYNEX® nylon
which has earned this seal.
Guaranteed by Good Housekeeping
REPLACEMENT OR A REFUND OF MONEY IF NOT AS ADVERTISED THEREIN

"TYNEX" is the registered trademark for Du Pont nylon bristles

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BETTER THINGS FOR BETTER LIVING
. . . *THROUGH CHEMISTRY*

DU PONT MAGAZINE
VOLUME 50 NUMBER 6

December 1956 - January 1957

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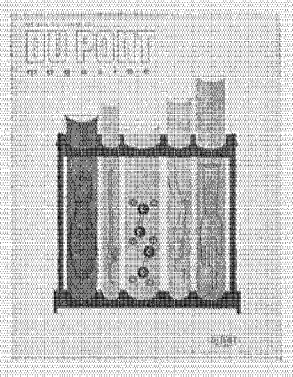
THE BABY'S STILL BOUNCING AT 25

Twenty-five years ago synthetic products were not nearly so well established as they are today. Many considered them poor substitutes for natural materials. The word *ersatz*, which was to gain currency a few years later, conveyed the low opinion most people had of these chemical pretenders.



Today all that has changed. No longer thought of as substitutes, synthetics are welcomed, by and large, for what they are: brand new materials with new potentialities for service to man.

One of the man-made materials that helped work this change is Du Pont neoprene, which bounced onstage just 25 years ago as the country's first general purpose synthetic rubber. Neoprene has been sold from the beginning as an elastomer that does certain things natural rubber cannot do. Its success has been part of the process that has earned the synthetics their respectability.

Vince Hoffman's cover art shows some of the finished products in which the Du Pont rubber has won laurels over the past quarter-century. A word picture of neoprene's 25 years of growth makes up our lead article.

OUR FIRST FICTION

It's taken us 43 years to get around to it, but the deed is finally done. We're publishing a piece of fiction. It's a Christmas story, one that appeared originally in *McCall's* and has been adapted for TV showing on *Du Pont Theater* Christmas night. You'll find it beginning on page 28, and we hope you'll agree that it was worth setting a precedent for.

WHERE THE MONEY GOES

Question: What happens to the income from goods produced during an 8-hour industrial work day?

Answer: It takes an average of nearly 4 hours' production to pay for supplies and materials, 2 hours and 19 minutes to pay wages and salaries, 43 minutes to pay taxes, 29 minutes for repairs and replacements, 14 minutes for research and less than 10 minutes to pay the owners their dividends. Income from the remaining time, less than 10 minutes, is reinvested in the business.

WHITHER THE IRONING BOARD?

The chore of ironing clothes eventually may be just a bad memory for housewives. Within ten years they will have 50 per cent less ironing to do, according to a forecast from the Midwest Research Institute in Kansas City.

The researchers, says the Associated Press, base their estimate on an accelerating trend to wash-and-wear shirts, dresses and suits made with synthetic fibers. Aiding the trend, they say, are washing machines designed to handle these wash-and-wear fabrics. New detergents and fabric finishes also can reduce wrinkling, they point out.

This is an optimistic picture. It's likely, though, that Mother will still find enough to keep her busy. Modern clothes may be easier to handle, but the kids who wear them haven't changed.

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GORDON H. KESTER
Editor

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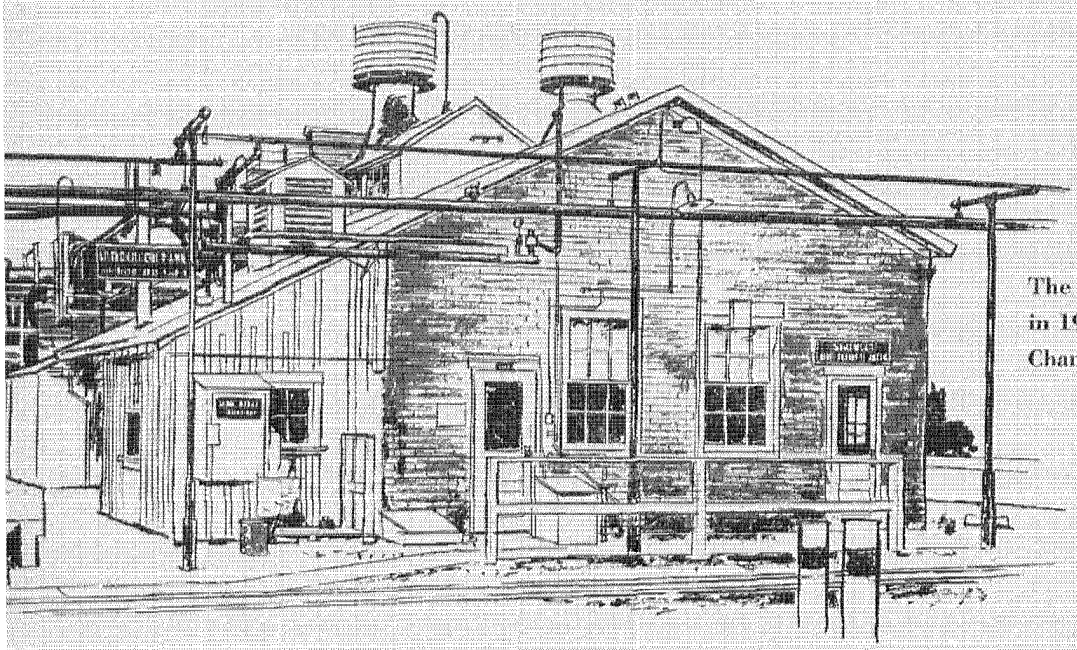
I Remember Rubber

A significant event in chemical history was the launching 25 years ago of neoprene, the first commercial man-made rubber



The Du Pont Rubber Laboratory in 1922. It was located at the Chambers Works plant, New Jersey.

By GEORGE S. ALBEE

If you are old enough to eat your cereal for the cereal, not the prizes, you remember rubber as a mixed blessing. You remember garden hoses wearing more bandages than a race horse's legs. You remember sports shoes with crepe soles that grew flatter and wider on hot pavements until, toward the end of summer, you were walking around on a pair of large, thin flapjacks.

Such annoyances, so far as thoughtful buyers were concerned, started to fade away just 25 years ago. It was then, in 1931, that the Du Pont Company made its first public disclosure of the synthetic rubber, neoprene.

Everything in this world—a business, a book, a bell—starts as an idea. Neoprene began as a chemical idea, based on the knowledge that molecules of acetylene gas, under certain conditions, linked together. If these limited molecules could be induced to polymerize properly, they might—they just might—behave like rubber.

Chemists the world over, for years, had been trying to make artificial rubber. During the first World War the Germans had done it, producing a gooey something they called synthetic rubber. But the known route to artificial rubber was beset with chemical reefs that indicated the need for taking another tack. The clue came in 1925 in a paper on acetylene and its polymers by Dr. J. A. Nieuwland of Notre Dame. Dr. E. K. Bolton, directing research for Du Pont, thought he detected in Nieuwland's report a chart for a new route to synthetic rubber. He put a small task force to work on the project. This group eventually included the father of nylon, Dr. Wallace H. Carothers, and his assistant, Dr. Arnold M. Collins.

On April 10, 1930, Collins was purifying some Nieuwland-type products when he distilled a liquid that set up into a rubber-like material. He and Carothers examined it, and concluded they had found a new chemical substance.

O. M. Hayden, then manager of the Company's rubber laboratory, recorded the occasion with a meaningful note in a diary that he still keeps. It read:

> April 10. Dr. Collins isolated chloroprene and observed its polymerization.

The search was over. It wasn't long before the new-found baby, later called neoprene, was formed into a sheet, a film, a ball. The sheet stretched, the film was pliable, the ball bounced. The new material was really elastic, something that couldn't be said of earlier artificial rubbers.

By 1931 Du Pont's little neoprene plant at Deepwater, N. J., which looked much like a small, crowded bakery, was "cooking" sizable amounts of neoprene in shallow metal pans under ultraviolet lights. More often than not things went wrong. The condensers either leaked or froze. There was a serious fire. One production problem after another had to be overcome. But samples were sent out to several companies interested in this new material that promised to beat rubber at its own game. Encouraged, the task force drew a deep breath, crossed their fingers and ordered a couple of 150-gallon, enamel-lined vats to replace the bread pans. They were in business—they hoped.

Optimism wavered, however, when a serious problem cropped up. Factories accustomed to natural rubber were having difficulty in fabricating neoprene into gaskets, hose, belts and other rubber goods. There was just enough difference between the two materials to cause trouble. So Du Pont chemists—there were more of them at work, now—had to develop modifications of the new material, one after another, in an attempt to solve the manufacturing problems that began to appear.

One problem proved to be universal. Neoprene was a wonderful new rubber, all right. It resisted oil and grease. It withstood sunlight and weathering as natural rubber never had done. But it stank. Literally. As a matter of fact, it smelled to high heaven.

Du Pont salesmen, lugging samples of neoprene to prospective customers, found fellow passengers in trains and buses staring at them in pain and moving far, far away. An automobile dealer, proudly taking his wife for a spin in a new car that had horn wires experimentally coated with neoprene, quarreled with the lady when she protested, "Charles, this car *reeks*." He lifted the hood and found a dead cat trapped behind the radiator, but the moral was plain: nothing in the world smelled worse than neoprene but a dead cat.

EXIT THE ODOR

Laboriously, the neoprene was traced back through its manufacture to locate the unpleasant odor. Its cause was found, finally, in an impurity. Production was altered and the impurity and odor vanished.

Looking back on the early, harassing days, E. R. Bridgwater, now sales director of the Elastomers Division, recalls the discouragement. "Many times we came close to calling it quits commercially and sending neoprene back to the laboratory," he says. "What prevented it was something unique in American industry. Almost all the men in our management were technically trained and, as chemists and engineers, they understood what we were trying to accomplish. They were willing to take a calculated risk that we would win through in the end."

It was patient money that Du Pont management was spending, for 15 years slipped by before neoprene returned a single dollar of profit to the Company. Nevertheless, development went on. In 1940 Hayden recorded in his diary, which had thickened by then to book size:

> January. Reduced price of Type GN neoprene to 65 cents a pound.

Failures went on, as well:

> June 28. Explosion and fire. Trouble was in the separator in No. 5 cell.

But successes outnumbered failures, and in the spring of 1941 the Company started construction of a full-scale plant at Louisville, Ky.

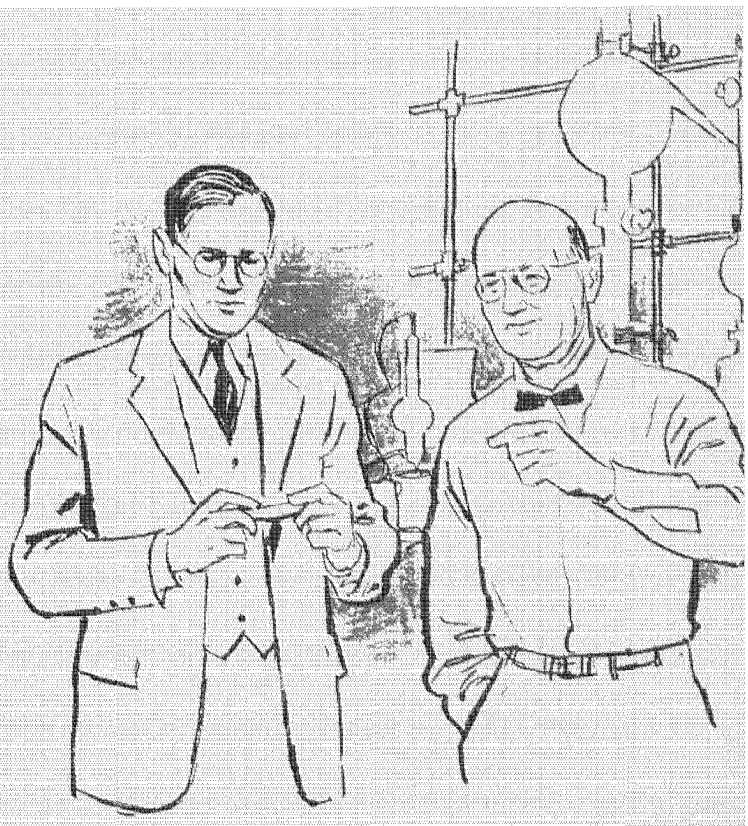
Then World War II intervened. The Government asked Du Pont to sell it the new plant at cost; to expand it fourfold, sixfold. For the next seven years the Company operated the efficient new plant for the Government, a plant that could make and sell neoprene at prices the Company's own, older plant could not meet.

Neoprene did yeoman service in the war, serving the armed forces in a thousand ways. The enemy had nothing to compare with it.

But it almost seemed that Du Pont's synthetic rubber, like the Egypt of the Bible story, was doomed to seven-year cycles of drought. It had taken seven years of experimentation and development to produce neoprene commercially. Seven war and post-war years without profit represented seven more years in which experimentation and development had to be pursued on faith alone.

Meanwhile, however, something new was added. The public, consumers as well as manufacturers, had learned by experience how good the new material was.

V. A. Cosler, sales promotion manager for neoprene, tells a story on himself which illustrates this. Shortly after



Moment of neoprene's discovery looked like this. Dr. Carothers examines polymer of new substance made by Dr. Collins at Jackson Laboratory, April 10, 1930.

the war, Cosler cautiously published laboratory data which indicated that neoprene, exposed to severe weathering, would last as long as six years. No sooner did his statement reach print than his telephone began to ring. A wire manufacturer guffawed: "Come up on our roof, and we'll show you how good your own product is. We've got samples that have been weathering for 11 years, and we can't see any change in them." A steel company called in to say: "We've had neoprene-jacketed cables underground since 1935."

Americans were learning at first hand that neoprene could put an end to a hundred and one petty annoyances. Gasoline station owners were buying new pump hoses once in five years instead of once every six months. Women discovered that neoprene household gloves didn't go to pieces in soapy, greasy dishwater. Neoprene-soled work shoes were saving workmen money; the shoe industry began using neoprene cements, as well. Trawlermen and firemen were wearing neoprene protective suits. Oil drillers were saving costly time with neoprene hose and other drilling equipment. The printing industry learned that neoprene printing rolls lasted longer and reduced the danger of swift-spreading fire. The public, in other words, was finding uses for the new rubber that Du Pont had never dreamed of, and finding them one after another.

"Our thinking," recalls Cosler, "had envisioned markets where resistance to oils and greases would be important. It was the manufacturers of wire and cable who taught us that neoprene's most valuable quality was its almost unbelievable resistance to sunlight and weathering. Almost overnight we found ourselves selling a large part of our neoprene output for use where weathering resistance was important."

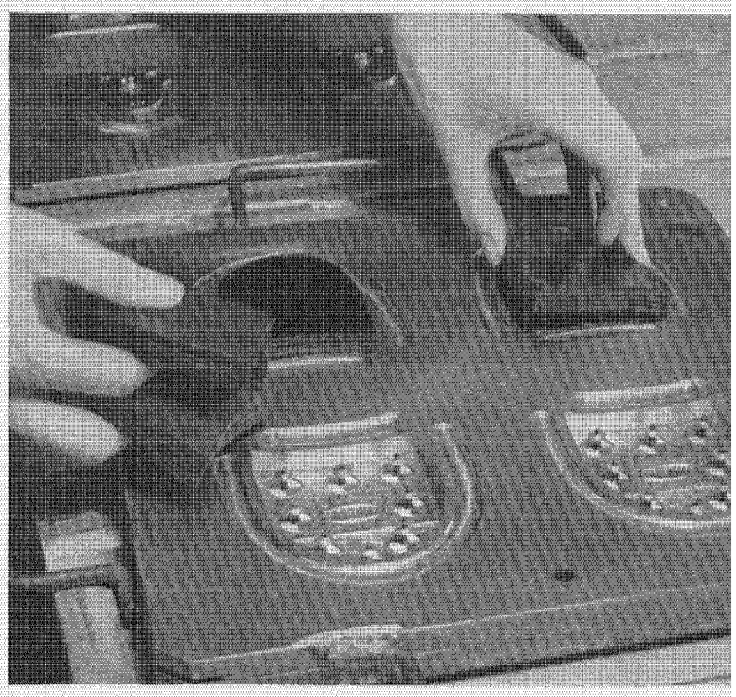
SALES FORECAST OVERMODEST

From that day to this, Du Pont's sales of neoprene have mounted year by year. In 1939, for example, the most optimistic prediction was that, with luck, the Company might sell 40 million pounds a year. In 1956, neoprene's 25th anniversary, sales will be over 200 million pounds.

A quarter of a century is a long time. The Du Pont men who served as baby doctors to neoprene have, in 25 years, grown more stately of walk, grayer of hair. What they think of their child was summed up by E. R. Bridgwater, long-time boss of the project. Leaning back in his swivel chair, hands behind his head in characteristic pose, he said thoughtfully, "Neoprene is a symbol of an industrial change that swept America in the 1930s, a realization that natural products—silk, shellac, camphor, rubber—were not the end of our resources, but only the beginning. Freed by this concept and by a better knowledge of chemical structures, scientists are now able to seek ideal materials that possess exactly the right physical properties to do the work required of them. Neoprene has been a valuable addition to our lives, true. But the importance of its discovery lies, not in the material itself, but in the new concept it helped pioneer.

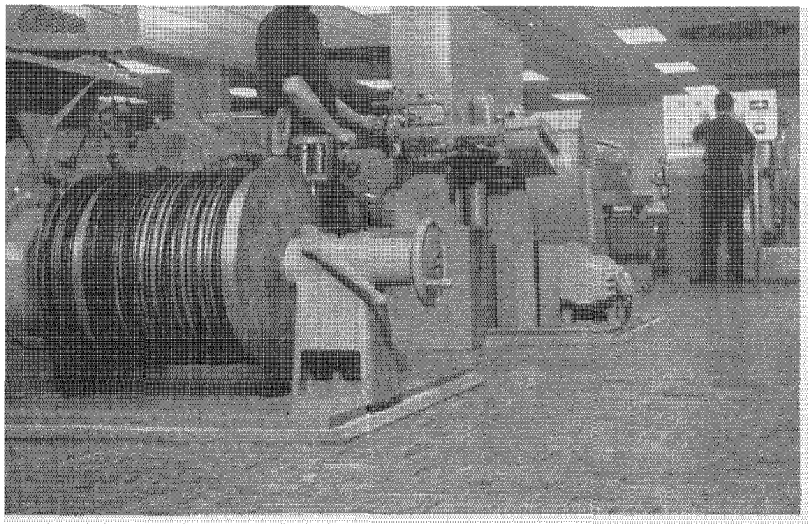
"Twenty-five years ago we realized that Nature had no monopoly on the making of polymers. Today the chemical industry makes them, too, and makes them better. Tomorrow it will make new and better ones, beyond the limits of our present thinking."

Descendant of tiny 1922 Rubber Lab is new Elastomers Laboratory at Du Pont sales service center near Wilmington.

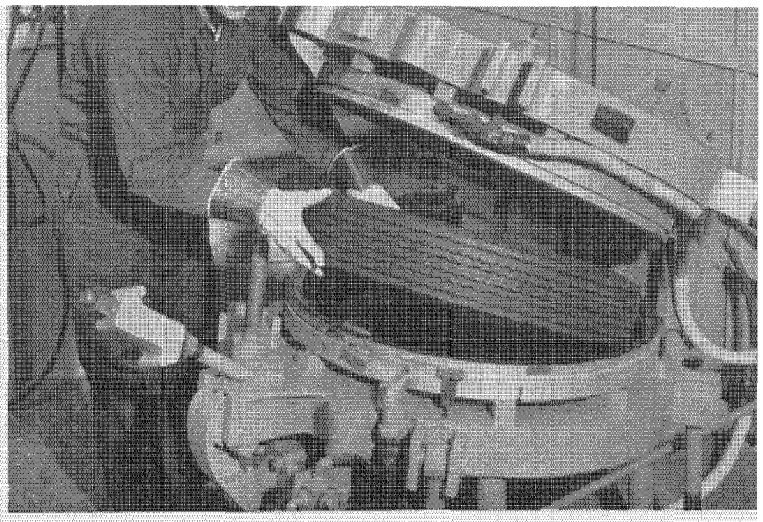


New elastomers, chemicals and manufacturing methods are evaluated to boost rubber quality. Here shoe heels are molded.

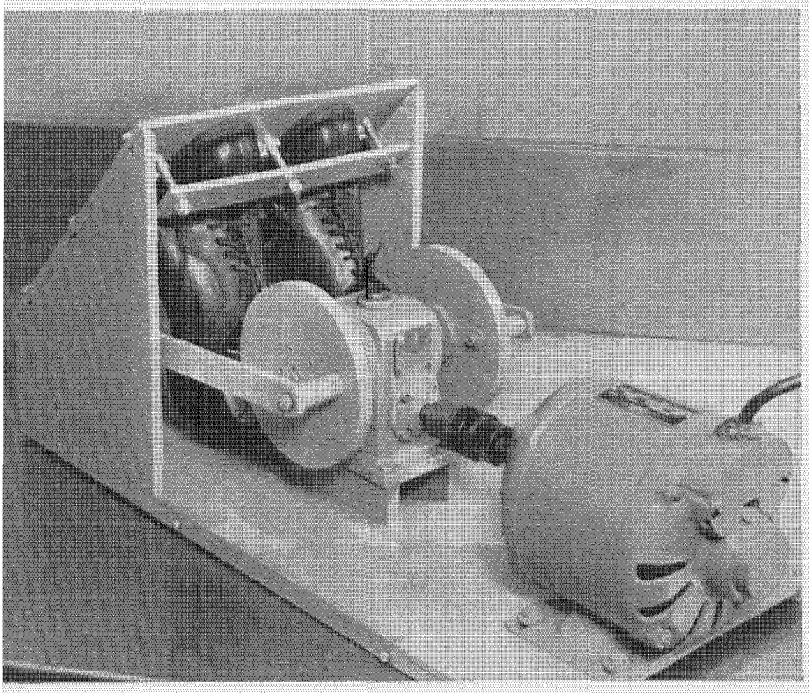
In latex section, dipped goods are manufactured on small scale for testing.



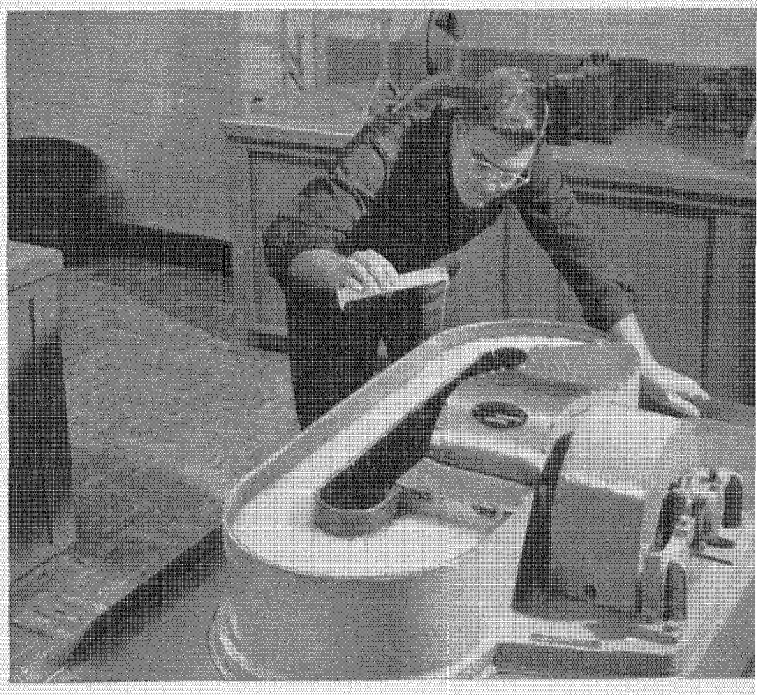
New laboratory contains wire covering equipment to help in development of products for the wire and cable field.



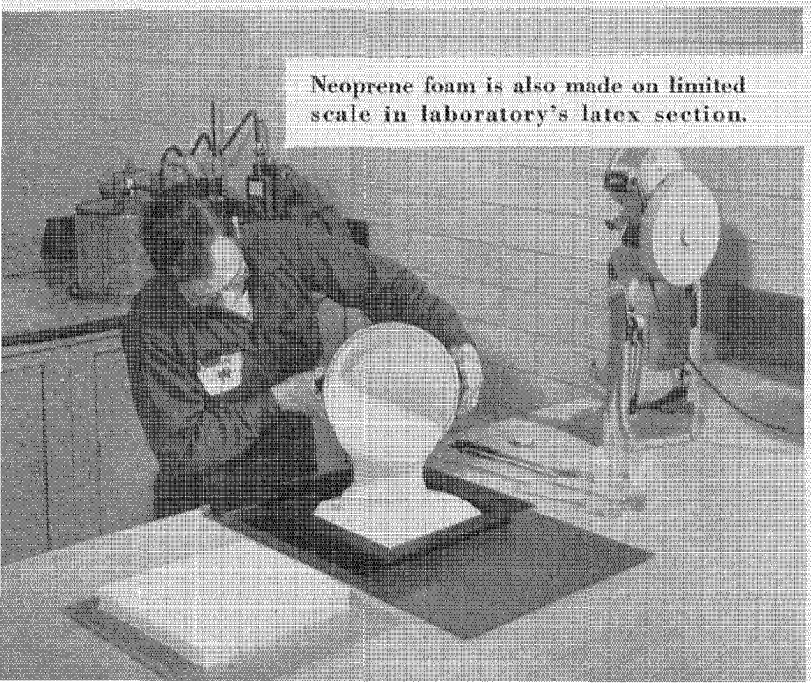
Elastomers Laboratory also fabricates and tests tires so that staff may provide tire industry with product data.



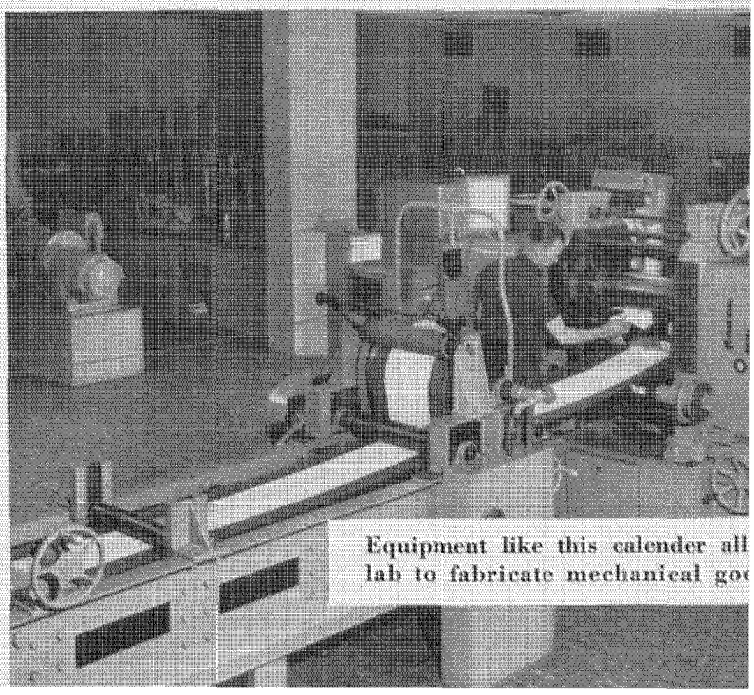
Soles made with both commercial and experimental compositions are wear-tested on this machine in laboratory.



Paper reinforcement with elastomers is also studied at new laboratory. Here latex is added to paper pulp at the beater.



Neoprene foam is also made on limited scale in laboratory's latex section.



Equipment like this calender all
lab to fabricate mechanical goo

National Association of Home Builders selected light fixtures of "Lucite" for its headquarters, center of housing activities.

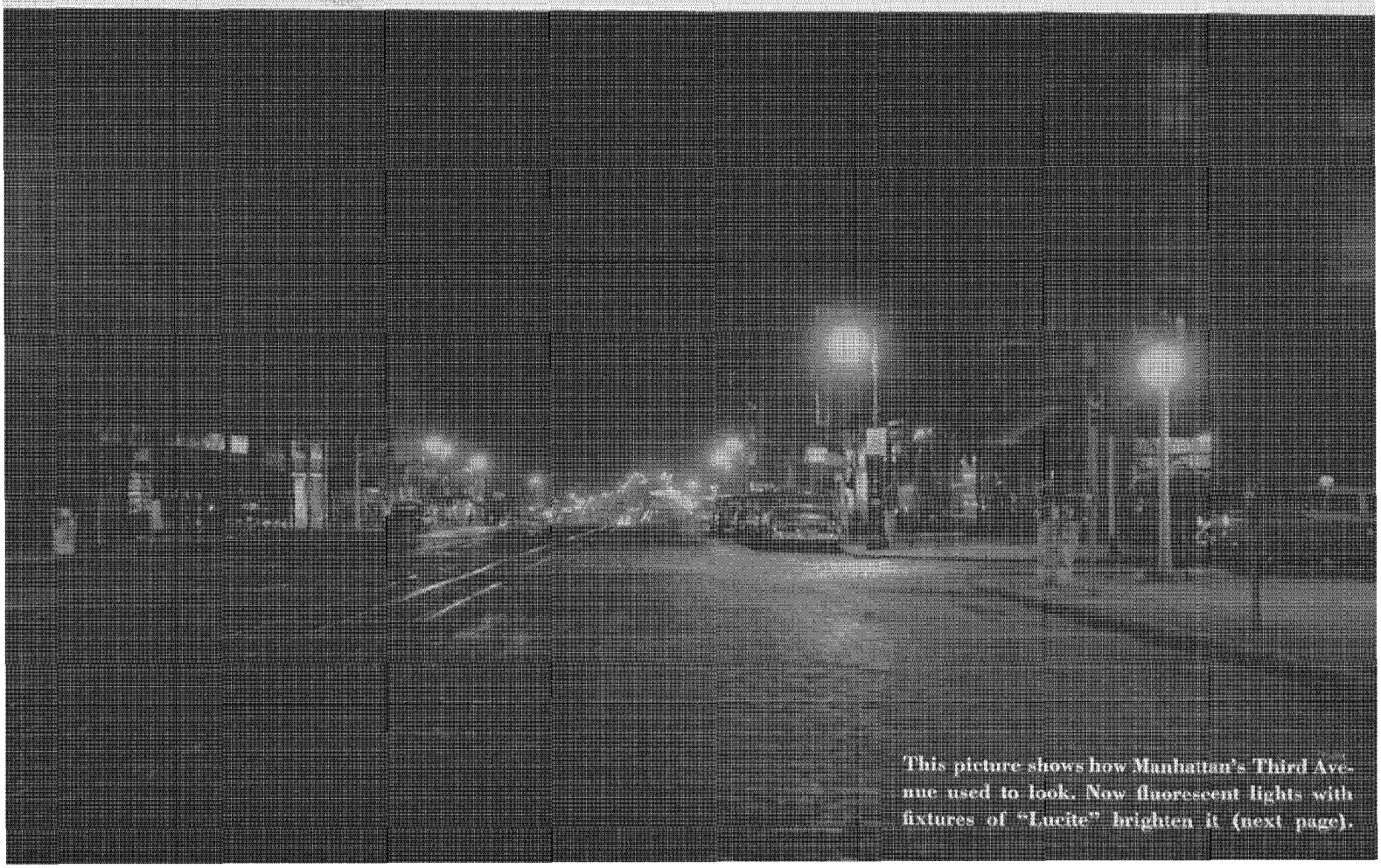
Lighting U

Some new assignments, both outdoo

For 78 years, New York City's Third Avenue saw little of the light of day. With the passing of its famed elevated railroad in 1955, however, the avenue came out of the shadows. New Yorkers could really see the street for the first time.

By the end of this year, it's scheduled to have better lighting at night as well. Seven hundred and fifty new fluorescent lighting units currently are being installed along the 7½-mile stretch between the Brooklyn Bridge and the Harlem River. Helping improve the distribution of light are luminaires of Du Pont "Lucite" acrylic resin. The fixtures are designed to illuminate the full 70-foot width of Third Avenue with an average of 0.8 foot candles —about 40 times the brightness of bright moonlight.

Similar lighting improvements on Euclid Avenue, hub of metropolitan Cleveland, are a major part of an urban renewal program aimed at making the downtown area



This picture shows how Manhattan's Third Avenue used to look. Now fluorescent lights with fixtures of "Lucite" brighten it (next page).

with "Lucite"

By R. T. ELDRIDGE

nd in, for the Du Pont plastic

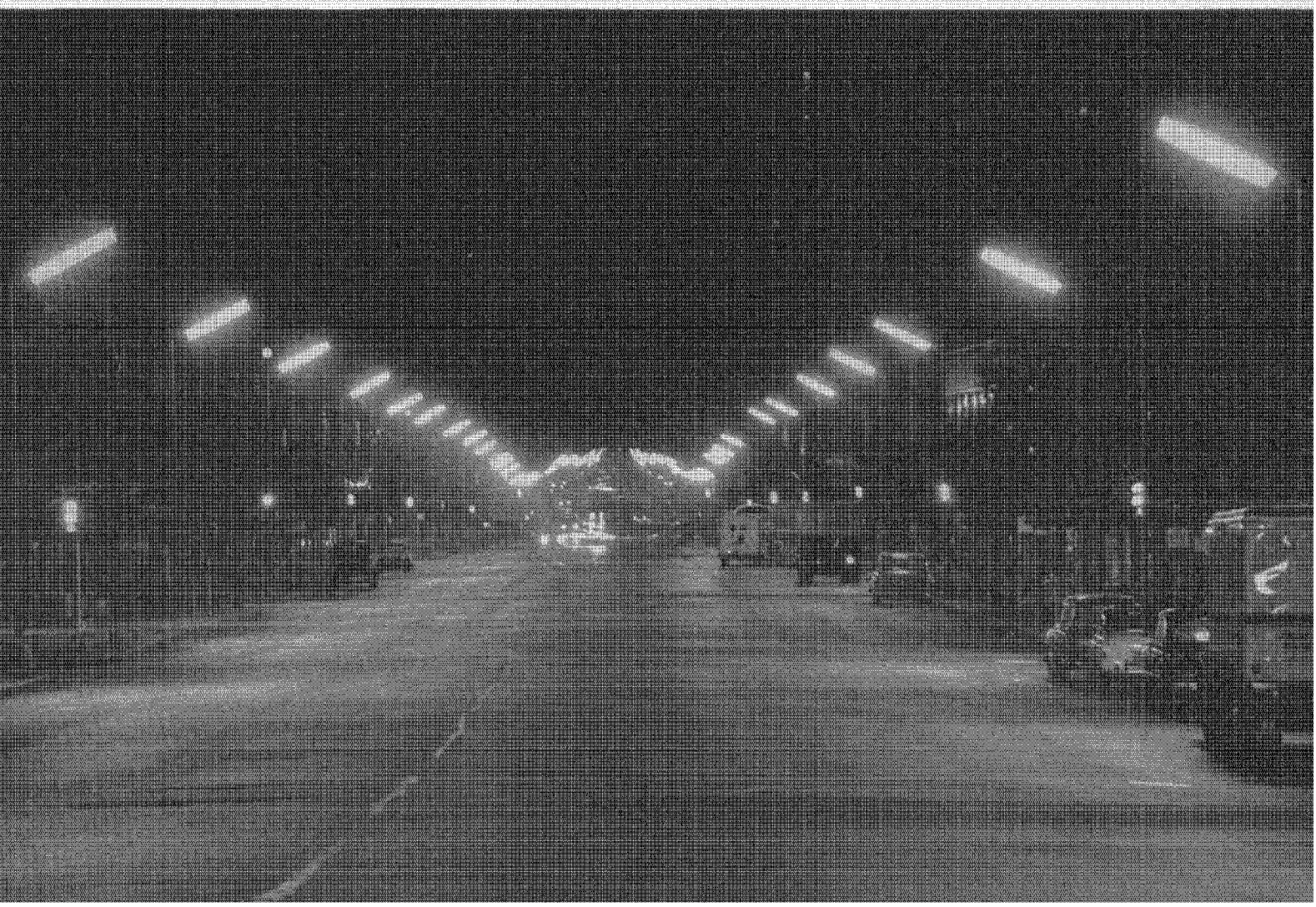
safer and more attractive. As one Cleveland businessman puts it, "A well lighted downtown, coupled with greater ease in getting in and out, ought to do a lot to offset the urge to stay home in the suburbs."

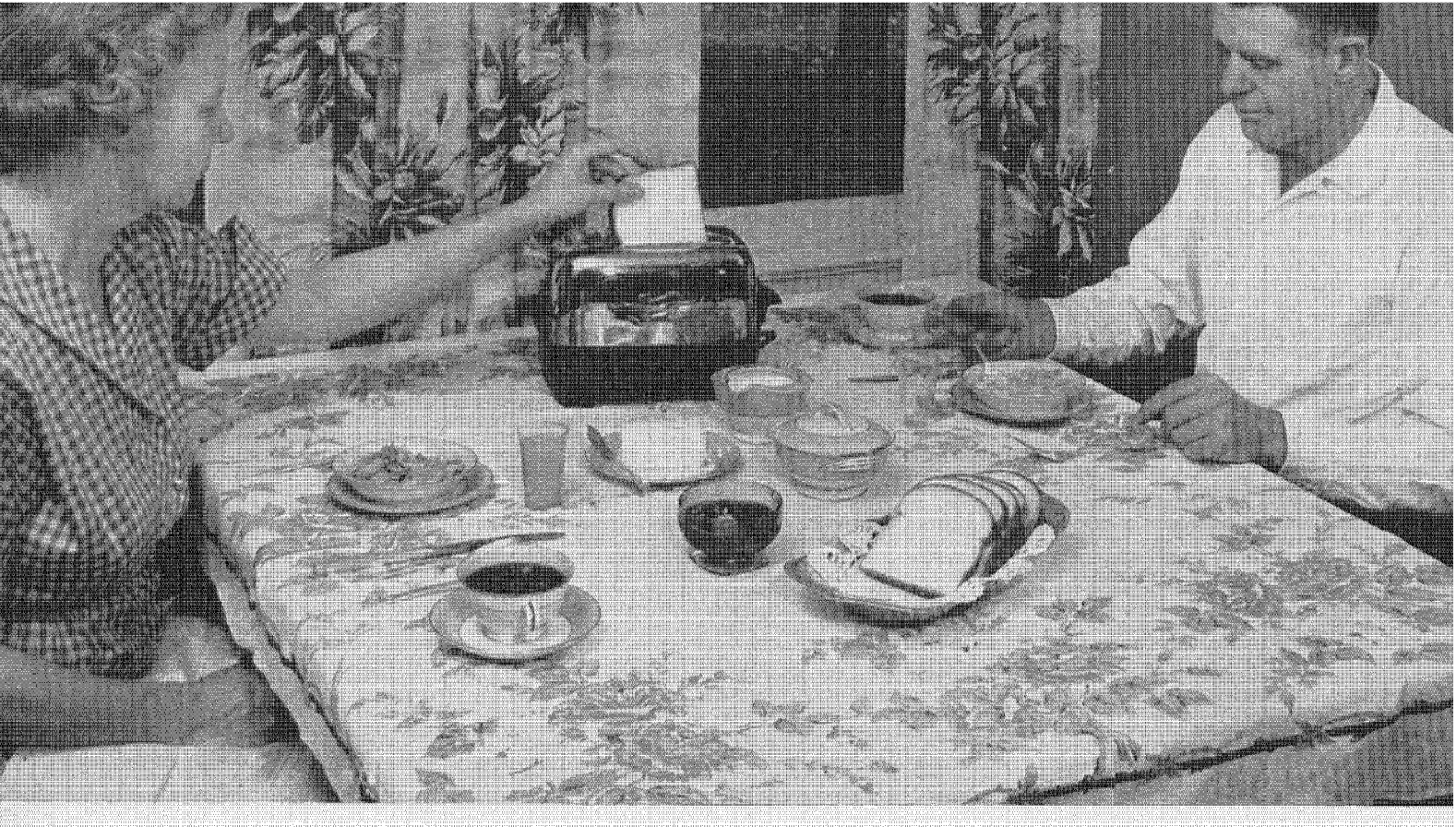
The new lights, formed from extruded sheets of "Lucite", provide an illumination level almost double that given by the replaced incandescent fixtures. What's more, the shatter-resistance of "Lucite" offers safety from vandalism and cuts down on the need for replacements. Cleveland city officials figure the fluorescent units will save about $5,000 annually through lower maintenance costs and reduced current requirements.

Anyone who thinks of a tunnel as a black hole should travel between Baytown and La Porte, Texas. Nearly two miles of luminaires of "Lucite" provide uniformly high light transmission that makes the tunnel a bright spot. Additional reasons why "Lucite" shines in tunnels: it doesn't discolor and it's practically impervious to the effects of fumes and vapors likely to be present.

Long a favorite for office lighting fixtures, "Lucite" recently won acceptance in the headquarters of the National Association of Home Builders in Washington, D. C. This eight-story, $2.5 million National Housing Center serves as a storehouse of knowledge on home building and as a focal point for major housing activities. Its rooms are illuminated without glare or shadows with fixtures of the clear Du Pont plastic.

You may also find "Lucite" throwing light on subjects as familiar as your post office, gas station or the highway on which you drive. But the most obvious place to look is in back of your automobile. Taillight lenses of the plastic mark one of its oldest lighting applications.





Coming: Better Protein from Cereal Foods

It's accomplished with essential amino acids, the building blocks of protein

Few informed persons realize that, even with our high standard of living, many Americans don't eat enough good protein to provide their minimum needs for top physical condition. This is particularly true of children, pregnant women and the aged.

Nature is bountiful in supplying meat, milk and eggs with high quality protein that is rich in essential amino acids and therefore capable of maintaining optimum growth, health and resistance to disease. Because cereal grains contain less of certain essential amino acids, however, they have a much lower protein value. In the case of wheat, lysine is the amino acid in short supply.

"Fortunately," Dr. N. W. Flodin, a Du Pont food chemist, reported to the American Association of Cereal Chemists, "it's now feasible to build high quality protein value into bread and other cereal foods. This can best be done by fortifying the cereal foods with essential amino acids, such as lysine." This amino acid, being introduced in limited quantities by Du Pont's Electrochemicals Dept., is sold to bakers and cereal manufacturers, as well as to the pharmaceutical industry for use as a dietary supplement.

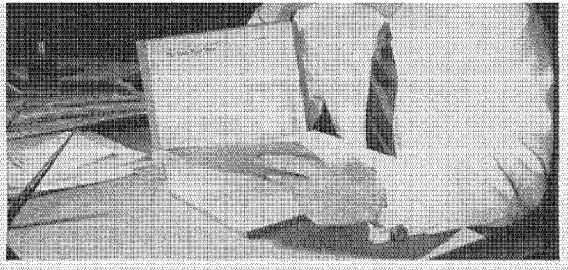
"Surveys of our eating habits clearly indicate that cereal foods are the logical choice to carry more and better protein to the people," Dr. Flodin said. For instance, it's a national habit to eat light meals and snacks based mainly on cereal foods—the beverage and toast breakfast, the coffee break with doughnuts or pastry, the jelly sandwich break of the school child or the munching of sugar-coated cereals or cookies.

Another aspect of the protein deficiency problem is our trend toward lower calorie intakes. Because machines do more of our heavy work, we don't have to work as hard. To keep down our weight, we don't eat as much. In turn, this often cuts down on the amount of essential protein we eat. On the other hand, many of us today are eating more luxury foods. While these are calorie-rich, they are frequently protein-poor.

"UNIQUELY SUITED" FOR FORTIFICATION

"To summarize, it is believed the basic purpose of fortification with amino acids such as lysine should be to improve the protein value of staple foods," Dr. Flodin added. "There is a need for more high efficiency protein not only in many foreign areas, but also in the United States, where inadequate protein nutrition is common among children, adolescents, pregnant women, the chronically ill, and the aged. Because of American eating habits, cereal foods are uniquely suited to bring more high quality protein to the individuals who need it. This can be done in two ways: by adding more good protein, such as milk solids, to cereal foods, and by building higher value into the cereal protein itself with pure amino acids, such as lysine."

Joe Katz, whose switch from stationery to gift wrap launched Kaycrest.



These paper profits are real

Pittsburgh boasts a block-long plant where 500 employes on three shifts work all year long to produce the beautiful stuff that will clutter America's living room floors Christmas morning.

This clutter was one of the reasons Joe Katz decided after World War II to lead his Papercraft Corp. into the gift wrap business. He was intrigued by the fact that Christmas night would see his products and those of his competitors burning in fireplaces or being stuffed into trash cans.

Katz, Papercraft's president, plunged into the gift wrap trade in 1945 with a healthy bank account, built up during the war through sales of a GI stationery kit. Despite a sputtering start, Katz says, Papercraft ranks today as the largest exclusive manufacturer of gift wrappings. Its products are sold under the Kaycrest label.

Katz pins much of his company's success on aggressive merchandising. He realized early that the best products can fail miserably if not dressed right, and specialists were hired to make each gift wrap package sell itself. Among the merchandising innovations was an overwrap of cellophane to glamorize the product and eliminate the fingermarks that had long plagued retailers. For ten years now, thousands of pounds of Du Pont cellophane have been used every year on millions of Kaycrest items.

Most of the cellophane reaches Papercraft's factory in rolls for use on automatic machinery. The film is fed to four-color gravure and flexographic presses for imprinting before going to automatic equipment that either makes it into bags or overwraps gift wrap paper and foil.

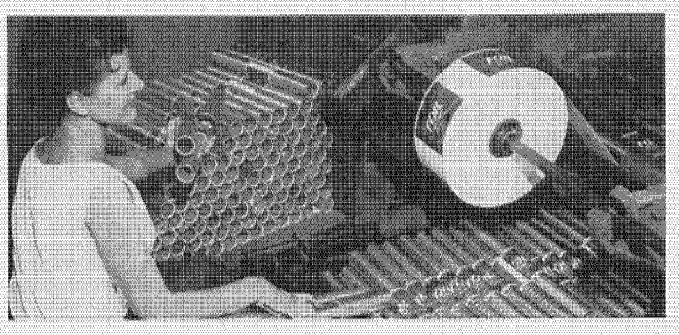
When Papercraft launched its foil paper wrap in 1949, it called on Du Pont for technical help with coating and decorating formulas. Many of the formulas developed seven years ago are still used by the firm's color matchers. The soaring popularity of foil gift wraps means that more Du Pont dyes and lacquers than ever before will be gulped this year by hungry batteries of Kaycrest printing presses.

Many of the ideas for products and production techniques come from European paper centers which Joe Katz and his staff visit at least once a year. Inspiration comes from other sources, too.

Last summer, for example, Katz met with top European fashion designers. "I watch changing fashions closely," he explains. "Design and color trends in clothes are carried over into our gift wrappings."

Christmas 1956 is almost forgotten at Papercraft. Gift wrappings for 1957 are now being sold, designs for paper, seals, tags and ribbons for 1958 have been completed, and freelance artists in America and Europe are submitting designs for the wrappings you'll see on store counters in 1959.

Rolls of foil are wrapped with Du Pont cellophane for protection.



The business economist, says Ellis, is an interpreter and adviser, not normally a policymaker.

ECONOMIC FORECASTERS

Today more and more economists are practicing their science off campus. Almost half hold down positions in government or business, and those in business are members of the fastest growing branch of the family. What do they do for their employers? What are some of the problems currently concerning them? Here are the answers of Ira T. Ellis, Du Pont's chief economist

Not long ago, while attending a conference of economists, I was confronted by one of my professional colleagues from a well known university campus.

"Ah, Ellis," he said, "I've been wanting to talk with you. You work for the Du Pont Company. Tell me, just what does a captive economist do anyway?"

There was a twinkle in his eye, of course, but there was no mistaking the seriousness underlying the question. The business economist—the one who uses economic theories, facts and figures to solve business problems—is still a relatively new phenomenon and, as such, excites the curiosity of his more traditional colleagues.

The question intimated that a business economist serves as a sort of court minstrel to sing the songs of progress his employer wants to hear. All I can say is that songs like that would never make the hit parade with any businessman I know. In fact, the singer would soon find himself without an audience.

A businessman has many questions he wants answered. Some pertain to his day-by-day activities: How should his firm be financed? Where should he locate? Through what channels or outlets should he sell? What prices should he charge? These are specific problems for every business, large or small.

There are many other questions, however, that have to do with the general atmosphere in which all business operates. How rapidly is personal income rising, for example? (Consumers purchase about two-thirds of the goods and services produced in the country.) Is business activity rising or falling? Are inventories high or low? What is happening to taxes, interest rates, prices?

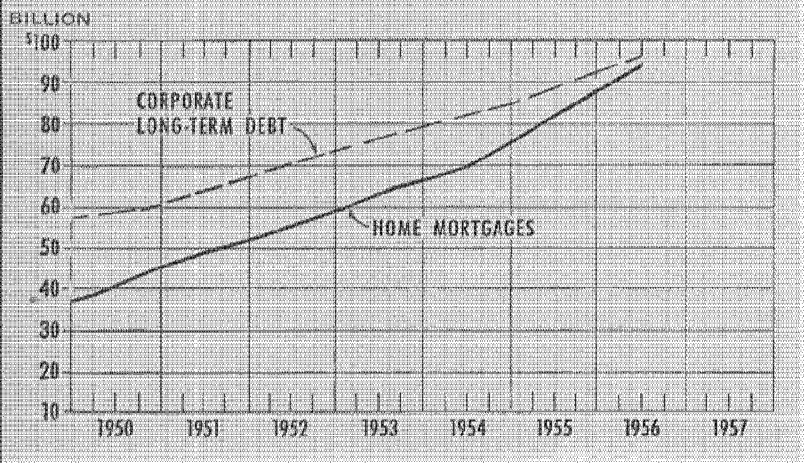
These are broad questions, but they are important because they determine the course of each and every business. Yet businessmen have little direct control over these outside conditions. These are the problems on which an economist concentrates. In studying them, he has three objectives: (1) to understand and explain these external conditions; (2) to forecast probable changes; and (3) to point out the meaning of these changes for specific industries or companies.

As an illustration, many businessmen are particularly concerned today about the rate of interest they must pay to borrow money and the signs of renewed inflation they see. They want to know why interest rates are so high and why industrial prices are still rising, 11 years after World War II. In the past, serious commodity price declines have occurred within a few years after the end of major wars.

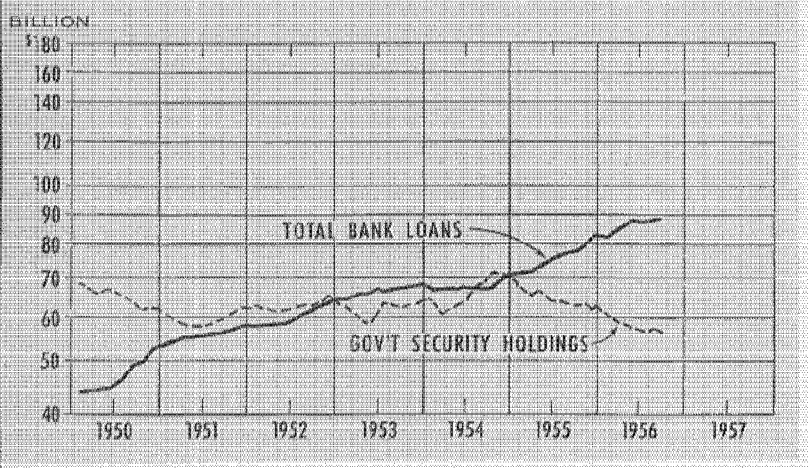
The basic cause of high interest rates today is that the demand for savings is greater than the supply. The demand for funds has been rising rapidly in the past two years, first from consumers to finance the purchase of homes and cars, and now from businessmen to finance plant expansion and equipment purchases. Demand from state and local governments is also rising, largely to finance construction of schools and roads. Since the available supply of new savings hasn't expanded fast enough to meet these upsurges in demand, the cost of borrowing has risen. This rise has been a clear example of the price-determining operation of a free market.

The Board of Governors of the Federal Reserve System could ease the present credit pinch by increasing the reserves of commercial banks, or reducing the required

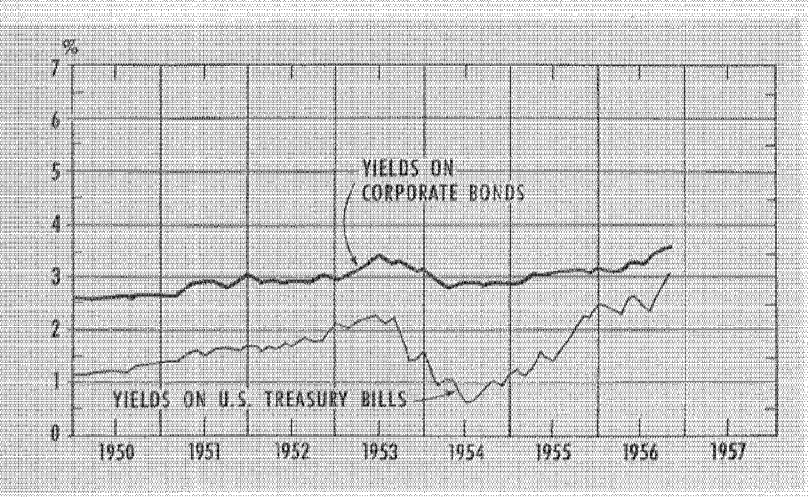
The cost of borrowing is going up—and money is more difficult to borrow—because . . .



. . . outstanding long-term and short-term debt and the demand for money are higher than ever before . . .



. . . and commercial banks, in order to make short-term loans, are selling their government securities . . .



. . . which depresses security prices and raises yields. Interest rates on new securities or loans must also go up unless savings are increased to meet the demand.

reserve to permit them to expand loans. But with production in the country at near-capacity levels, a substantial addition to our money supply would be, in my opinion, a powerful influence in bidding up prices. A repetition of the post-World War II inflationary spiral, which had its roots in the expanded money supply that occurred during the war, could take place. It is this fear of rising prices that restrains the monetary authorities today and explains why they have permitted interest rates to rise. They are attempting to keep the country's investment rate adjusted to its saving rate.

The trend of interest rates—the price of borrowing money—obviously is important to all businessmen. That's why I devoted more than half of a recent monthly report to Du Pont management to an analysis of the origins and implications of this facet of our economic life.

Commodity prices are rising today, too, either because costs are increasing or because the demand for certain goods and services is greater than the supply. In some areas, of course, both causes are operating. Widespread attempts to expand production capacity are helping to cause the tightness of credit, discussed in the paragraphs above.

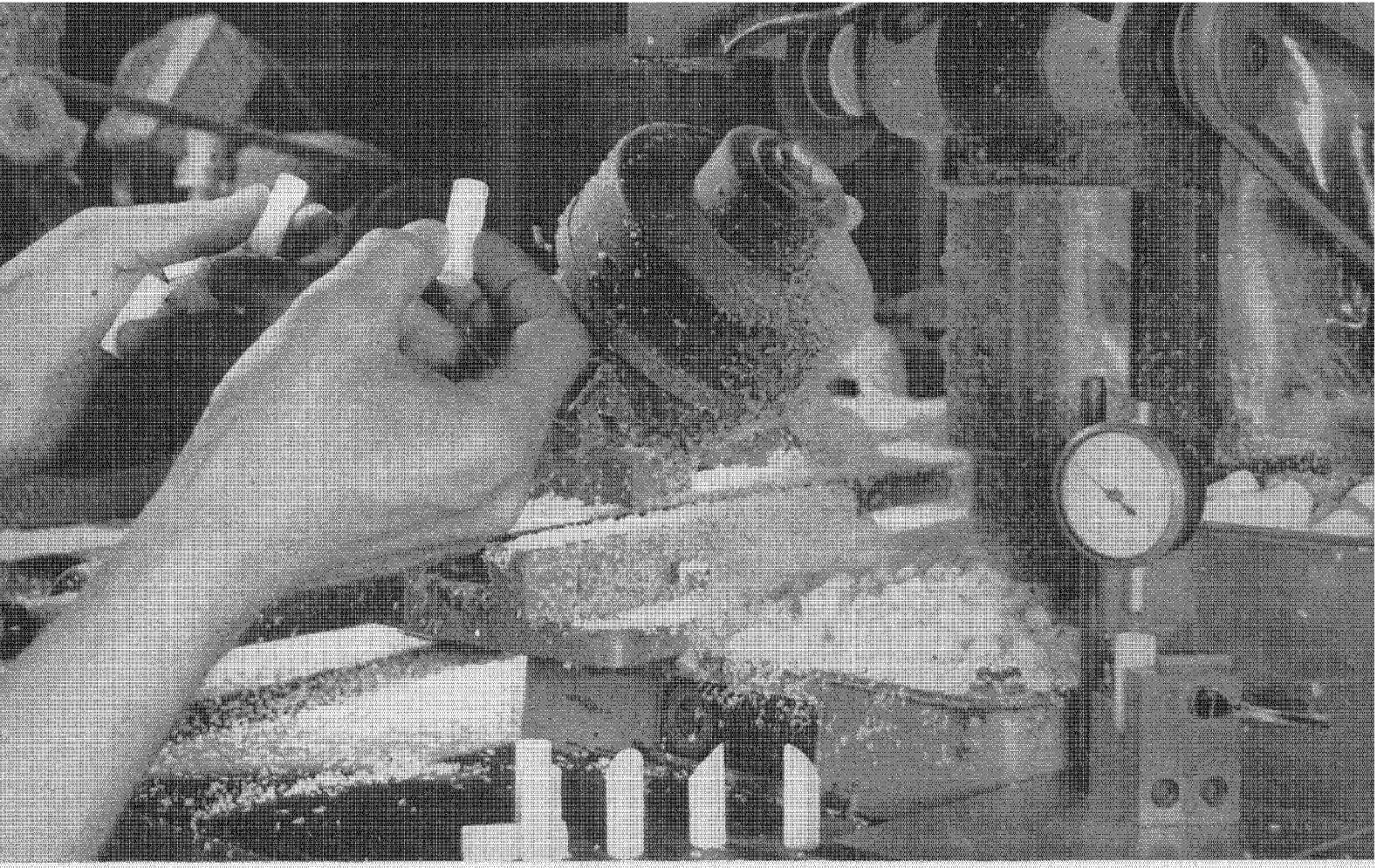
Economists sometimes find that the trend of business activity is likely to be downward, as occurred in 1949 and 1953, because of lowered inventories or less capital expenditures. Knowing what causes such declines will help to determine their probable extent and severity. Although the long-term trend of business activity in the United States is upward, growth will not necessarily be smooth from year to year. Periods of decline will alternate with periods of advance, and business plans must be made accordingly. Fortunately, the magnitudes of business declines since World War II have been relatively moderate.

In forecasting business changes, the economist has no reliable crystal ball or confidential sources of information. He must make a close study of the statistics of production, inventories, prices, wages, employment, income, spending, saving, investment, and many other aspects of the American economy. He must determine first what is going on, and then decide what the future may hold.

The economist's forecasts are based heavily on an analysis and projection of past trends, adjusted for the expected effects of new factors he may anticipate. He studies history to see what has happened and why, as a clue to what present trends may suggest for the future. But this analysis must be tempered with judgment, because history never repeats itself exactly. In the short run, forecasts of the business cycle can be made, but for the long run, the forecast is usually restricted to the probable trend.

At Du Pont, as at most companies, the economist's office serves an interpretive, advisory function. It is our primary job to serve as a lookout, to sweep the horizon for objects or signs of interest to the chemical industry. We try to maintain an objective point of view and not let ourselves become too enmeshed in arguments for or against a particular Du Pont policy. Often, we find ourselves functioning as a tempering influence on the extremes of optimism or pessimism that can assail management.

I know the job we are doing as economists in business is an interesting and challenging one. All of us in America, employers, employes and shareholders alike, are in the same economic boat. Keeping the craft seaworthy and on the right course is important to us all.



Machining electronic parts at Tri-Point Manufacturing and Developing Co., Brooklyn, N. Y.

Precision machining of "Teflon"

. . . in quantity was a job many called impossible. Alert processors are proving them wrong

Imagine trying to machine to precise dimensions a material so sensitive that temperature changes can cause parts made in Brooklyn to be oversize in Texas.

This is only one of the many problems involved in machining tiny parts of "Teflon" tetrafluoroethylene resin to .005 inch tolerances—problems processors and fabricators of "Teflon" have had to lick.

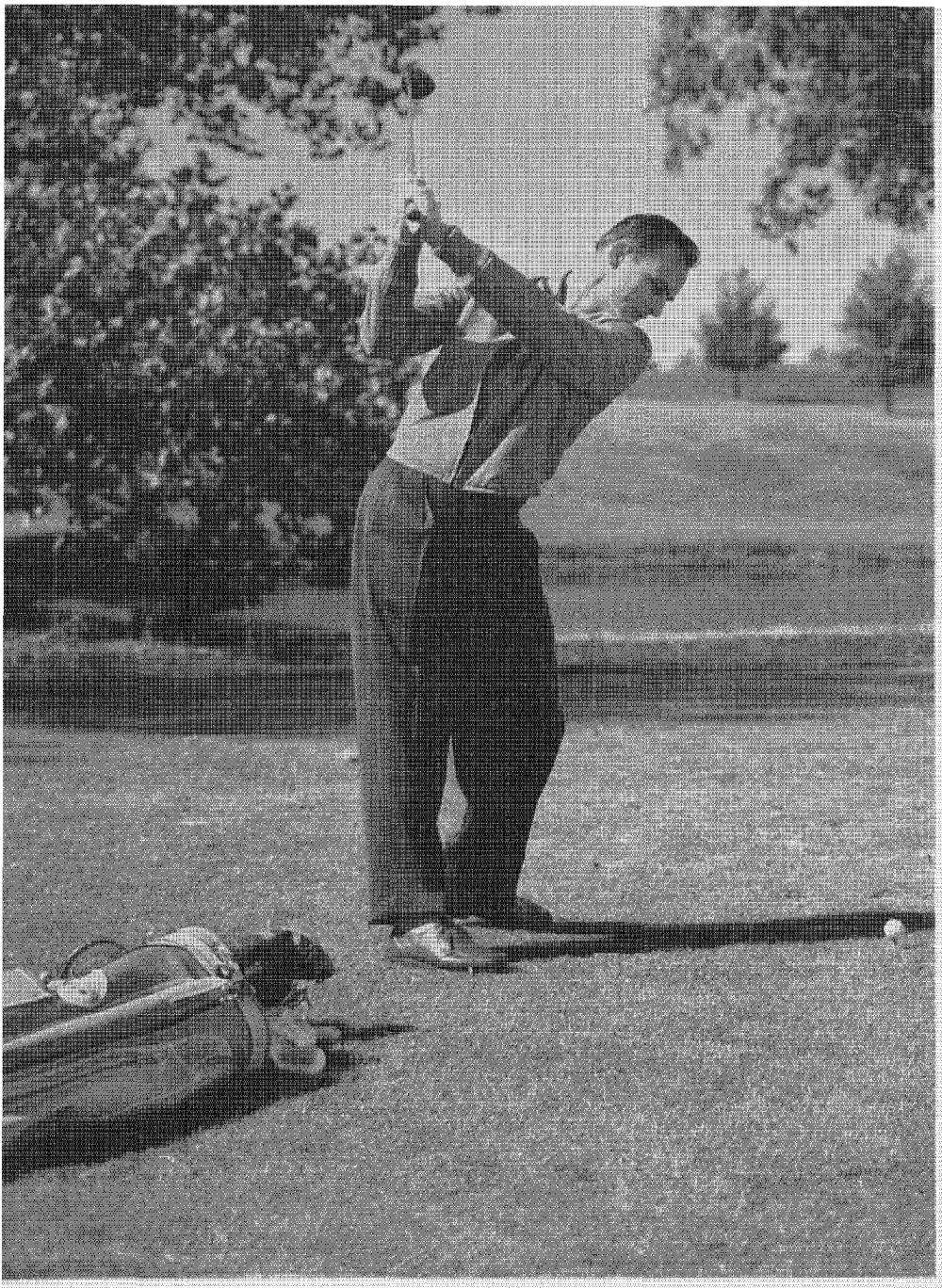
Because the Du Pont plastic is flexible, small diameter stock wobbles during machining and must be supported. Their "memory" causes finished parts to contract slightly toward their pre-machined shape, and in hot weather the material may exhibit a slight surface flow when machined.

Obviously, such drawbacks must be offset by application advantages. In the case of "Teflon", these plus values include toughness, outstanding low temperature properties and the ability to take continuous service up to 500°F. The plastic also is well known for its indifference to nearly all chemicals and for a coefficient of friction so low that in many applications no lubrication is required.

These combined properties fit machined parts of "Teflon" for a number of careers no other material can undertake as effectively. Military uses—in electronic components of guided missiles, for example—currently take a large share of precision machined parts of "Teflon". But civilian manufacturers of electronic and chemical equipment also are important customers. A typical job involves turning out accurate inserts for electrical connectors at the rate of 800 to 1,000 an hour.

Some companies also machine parts of "Zytel" nylon resin, "Alathon" polyethylene resin and other plastics to customers' specifications. To handle "Teflon", however, they have had to develop both new techniques and new equipment. Skilled machinists had to be retrained. Measuring gauges, considered the finest for metal working, had to be discarded for more precise instruments. To insure rod stock of high quality for machining, several companies now extrude "Teflon" for use in their own plants as well as for sale to outside concerns.

With the growing trend toward miniaturization of equipment, processors and fabricators of "Teflon" are expanding both research and production facilities to meet the new demand for these precision machined parts.



Fit For a

Leather's defenses against w

When Du Pont "Quilon" chrome complex was introduced a couple of years ago, one of its first jobs was in treating sheepskin suede. The treated suede's improved defense against damage by water and wear so impressed Du Pont researchers that they turned to the other end of the wear scale and subjected "Quilon" to a rough-and-tumble test in leather for shoes. In these equally successful results, they saw an opportunity to give leather goods added ruggedness for the sporting life.

The golfer at left exemplifies this. His golf bag, made by Henry Hotze & Sons Co., St. Louis, Mo., is made of leather that was processed with "Quilon". The bag repels water, retains its color and resists scuffing and staining. Since the chemical permanently lubricates the leather, the bag remains soft and supple, even after repeated soakings in water. The golfer is also wearing shoes, gloves and jacket treated with "Quilon". The gloves are by Sanville Gloves, Inc., Johnstown, N. Y. The shoes' manufacturer, Field

"Quilon" helps the fine leather in this golfer' gear resist water penetration and remain supple

"MYCOBAN" CHASES CHEESE MOLD

Cheese, traditionally a European favorite, is making big gains as a substantial food in the American diet. Casting about for methods to hold this upswing in popularity, cheese manufacturers recently asked for and got the approval of the U. S. Food and Drug Administration to add sodium and calcium propionate to processed cheese packaged as wedges and slices. Thus cheese joins bread as a food benefited by the mold-inhibiting propionates.

Under refrigeration, processed cheese normally stays mold-free up to two weeks; without refrigeration it begins to mold within three days. Tests show that the addition of Du Pont "Mycoban" sodium propionate more than triples these mold-free periods.

Cheese molds on its surface, along cracks and portions exposed to air. Hence sliced cheese gives mold a larger area to work in. And while mold isn't harmful—

Sporting Life

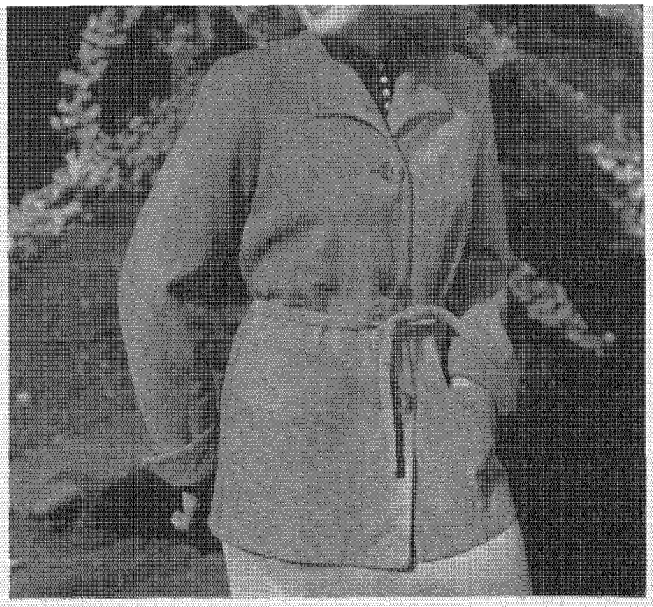
and water damage are strengthened by "Quilon"

and Flint Co., Brockton, Mass., says the treated leather's water resistance helps keep it more flexible.

What applies to the golf bag and shoes also applies to the sheepskin suede jacket, a product of Leathermode Sportswear, Inc., New York City. A graphic illustration of the water resistance "Quilon" gives suede was supplied by a test in which a treated and untreated jacket were immersed in water for several minutes. When they were taken out and weighed, it was found that the treated jacket had absorbed three pints less.

Treatment during tanning with the chemical also makes suede more readily dry cleanable. Handled by a competent cleaner, the leather comes out with its texture unharmed and its color undimmed.

Women's sportswear items, ranging from car coats to hiking jackets, are available in the treated leather, too. Potentially, the uses for leather protected by "Quilon" run the gamut of the industry—belts, watchstraps, footballs, hunting boots and upholstery for sports cars—any leather item that's expected to put its best face forward and still be ready for the rigors of the sporting life.



Women's jackets, such as this Zero King from B. W. Harris Mfg. Co., St. Paul, Minn., are treated with "Quilon", too.

Suede car coat by Leathermode Sportswear, New York, is good-looking enough for town, durable enough for sports.

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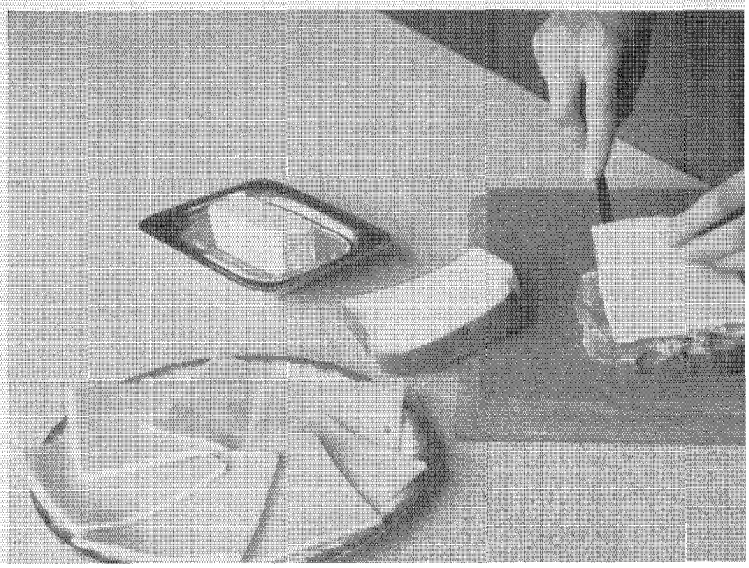
in fact, it gives some natural cheeses their distinctive qualities—it does lend processed cheese an unwanted odor and flavor when it proceeds too far. Protection against the spores means that the flavor will remain constant longer.

Satisfying the palate is reason enough for the growth in popularity of cheese, but to diet-conscious Americans there is another important reason. Cheese rivals two of nature's near-perfect foods—milk and honey—in its protein, vitamin and mineral content.

The addition of "Mycoban" to cheese offers one other benefit to the consumer. With the longer mold-free period, he can now stock a variety of cheeses simultaneously.



Drexel Furniture Company gets a bright, natural look in its Profile line by bleaching wood twice with hydrogen peroxide.

Bleached

Drexel Furniture keeps up with the deman

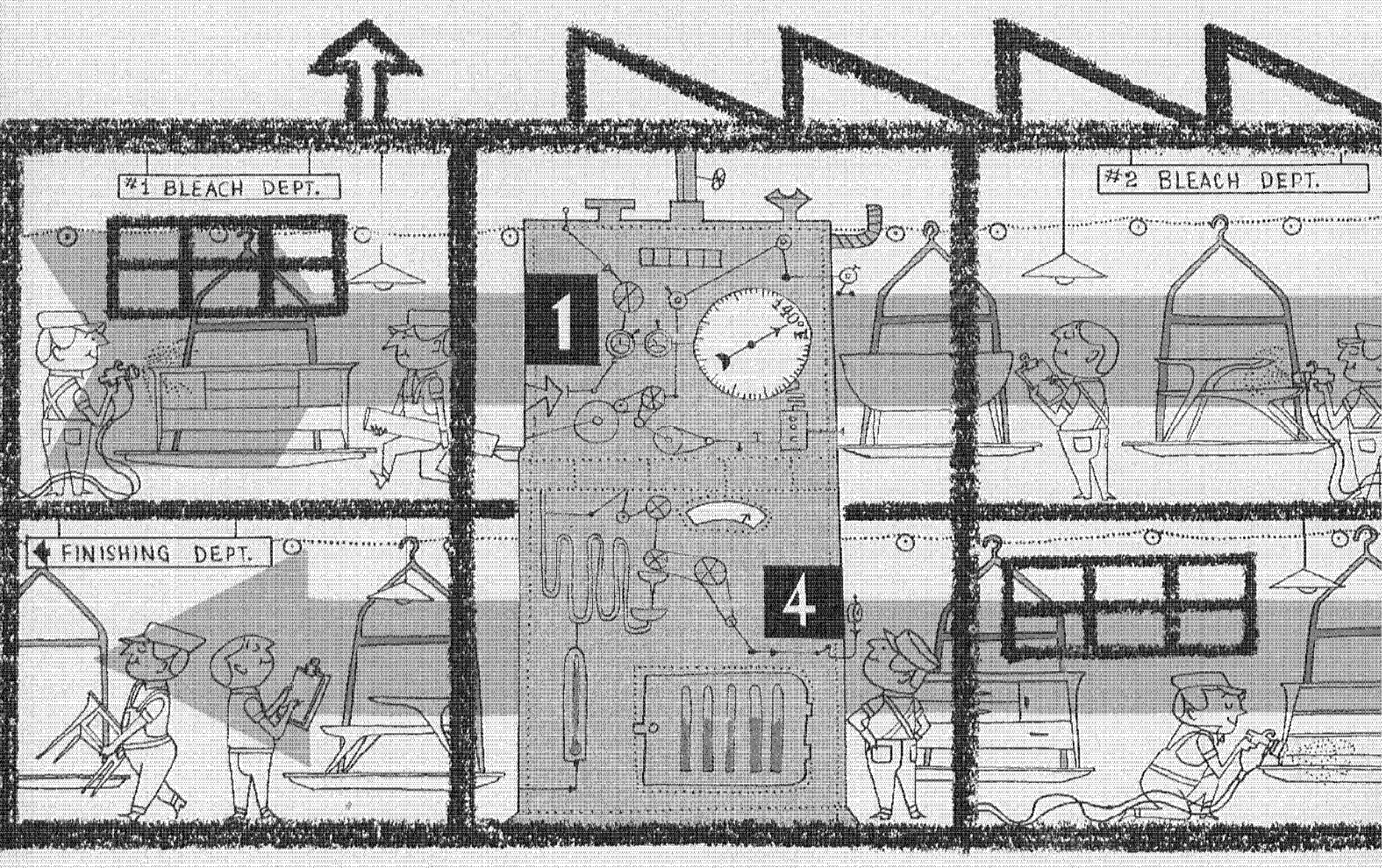
By KARL WERLINE

Just a little bit of Detroit has penetrated the hills of western North Carolina. There Drexel Furniture Co. pursues the business of making furniture with a vigor commonly associated with colder climes. Craftsmen still guide the work, but such production-line techniques as a continuous bleaching system help move an unprecedented amount of furniture from factory to consumer.

It wasn't always like that. Not so long ago assembled but unfinished furniture took over practically the entire floor space of Drexel's Marion plant. The old hand method of bleaching and moving furniture in batches was too slow to keep up with mounting orders for natural-finished wood.

Drexel engineers saw that the first step in uncorking the bottleneck was moving the furniture off the floor and into some type of line production. Since this never had been attempted before, chemists at Du Pont's Niagara Falls research laboratories pitched in and did a little preliminary chemical scouting. Yes, they said, continuous hydrogen peroxide bleaching would work, but it would take a major effort to figure out time cycles and a mechanical system to fit those cycles.

That was enough encouragement. Orders were piling up on a new design called Profile, and Drexel couldn't afford to wait for a more definitive judgment. The company



But Not Blond

for natural-finished wood by installing a conveyor bleaching system

plunged into the new process in the middle of winter, proving it as they went along, and by spring the first pieces of Profile were moving along the new line. About 200 furniture carriers, hung from a continuous overhead conveyor 1,700 feet long, wound in and out on three floors.

"What we once did in 24 hours now is done in three," says a Drexel engineer. "What's more, we get a better finish because each piece receives the same handling.

"Raw assembled furniture is put on the conveyor here and passes through that spray booth. The solution of hydrogen peroxide the operator is spraying on each piece really works fast. Let's step over to the other side of the booth about 20 feet and take a look at that night stand he's spraying now. It will pass by us in two minutes since the conveyor travels at ten feet a minute.

"Here it comes," continued the engineer. "It already has a definite bleached effect. Notice how the bleach not only lightens and brightens the wood but also evens out the color. From here it will go upstairs into an oven, dry for 12 minutes at 140°F. and then get a second bleaching.

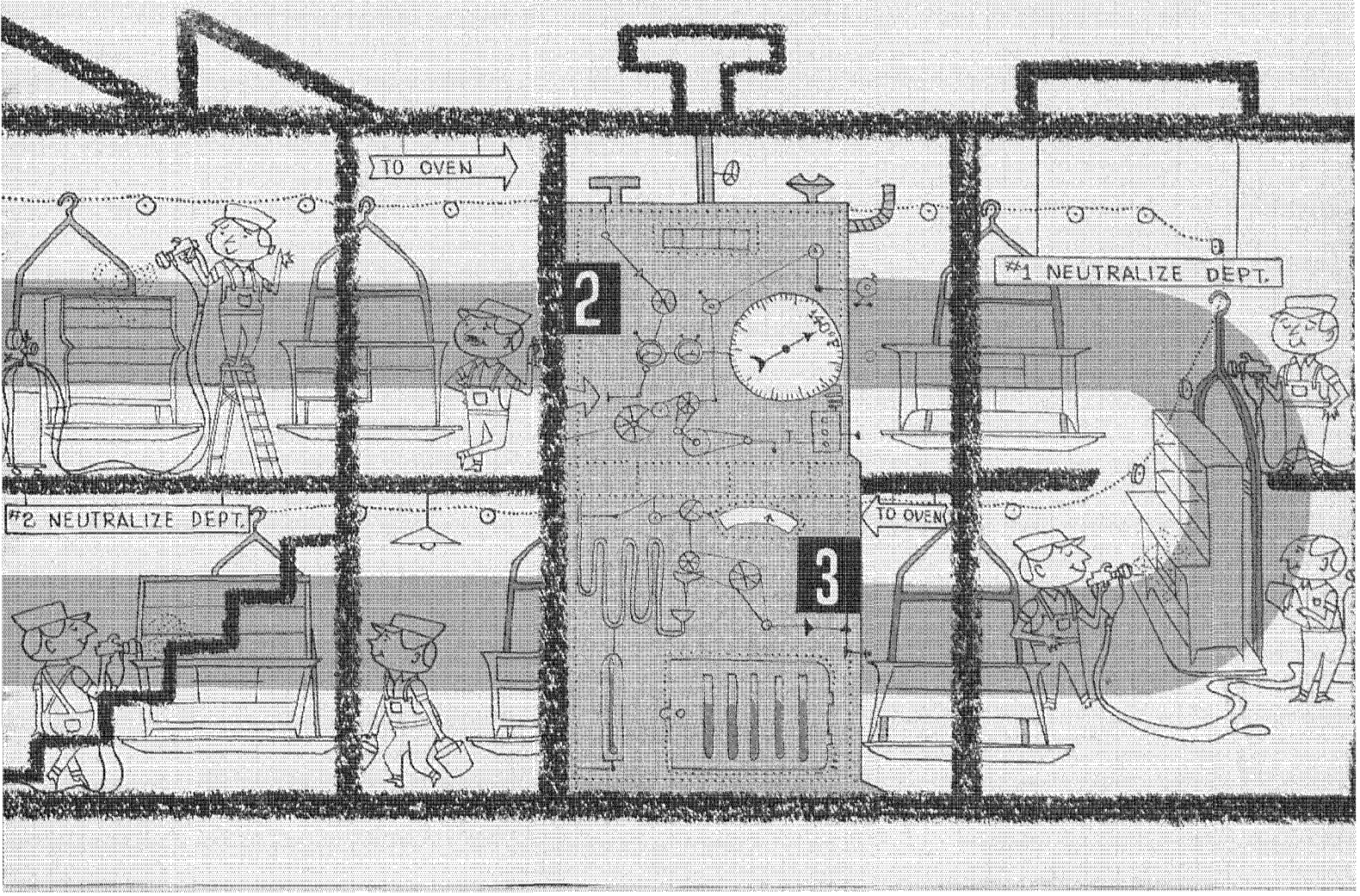
"After drying, it will move through that booth over there and be sprayed with a neutralizer to stop the bleaching action. You see, hydrogen peroxide left in the wood shows up as trouble soon after a piece is finished. Either a general discoloration takes place or the finish gets loose and mars easily. We neutralize our furniture a second time to insure against that.

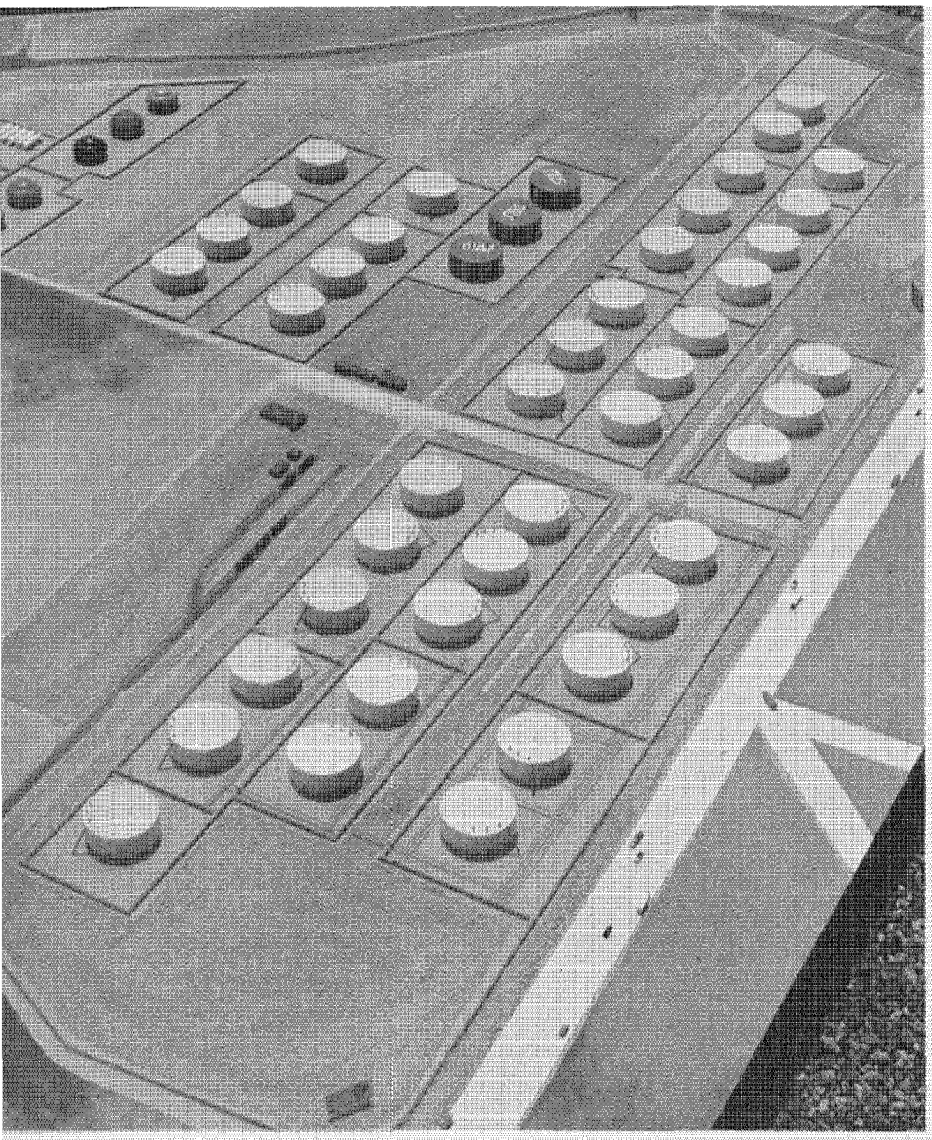
"This is the end of the line. The furniture is swinging down from upstairs where it has been in an oven for 41 minutes. That step table being lifted off the carrier now is ready for final sanding and finishing."

BLEACHED STYLES GAIN

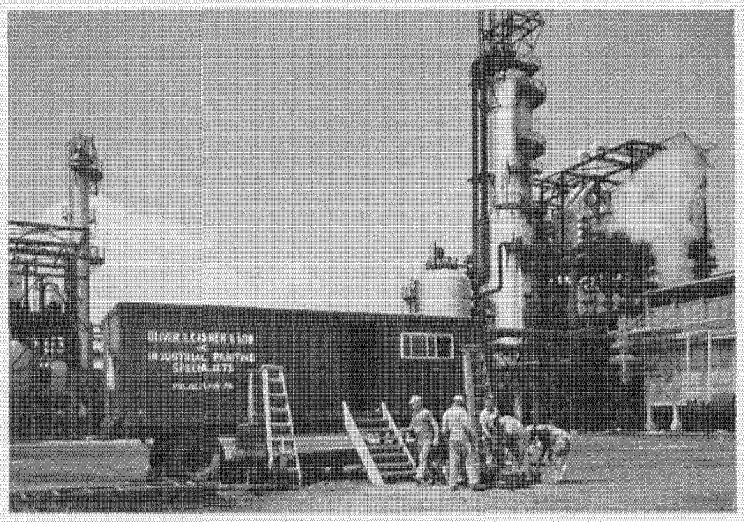
Bleached furniture, especially that which closely approximates the wood's natural color after it's finished, continues to make steady gains. Twenty years ago almost nothing was bleached; today Drexel estimates a third of its production consists of bleached styles such as Profile, Biscayne, Peasant Provincial and Compass. Styles like these have helped Drexel grow from meager beginnings as a small sash and blind mill to one of the largest furniture makers, employing some 2,600 persons in nine plants and doing about $30 million worth of business annually.

The people at Drexel don't intend to stop here, though. The new continuous bleaching process is so successful that they plan to install the same type of setup in another plant at Morganton, N. C. Eventually they hope to mechanize all their plants in the same way.





Model shows how tank park adjoining Gulf Oil Corp.'s Philadelphia refinery looks to air travelers. Passengers in 40,000 vehicles that daily use Penrose Ave. Bridge and the Industrial Highway also have fine view of Operation Rainbow.



Oliver B. Cannon & Son, Inc., crew gets ready for day's job on Gulf refinery. Cannon specializes in industrial painting.

OPERATIO

. . . that's what Gulf calls the curr

On the banks of Philadelphia's Schuylkill River and nearby Darby Creek, a pastel-colored plant is blooming. The 600-acre refinery of the Gulf Oil Corp. is getting a thorough repainting job aimed at beauty as well as utility.

First to get the color treatment were Gulf's two tank farms, known now as "tank parks." Twenty-nine of the huge storage tanks adjoining the refinery were transformed with shades of pink, yellow and blue. Another 32 tanks close by at Sharon Hill were painted pink, yellow and green.

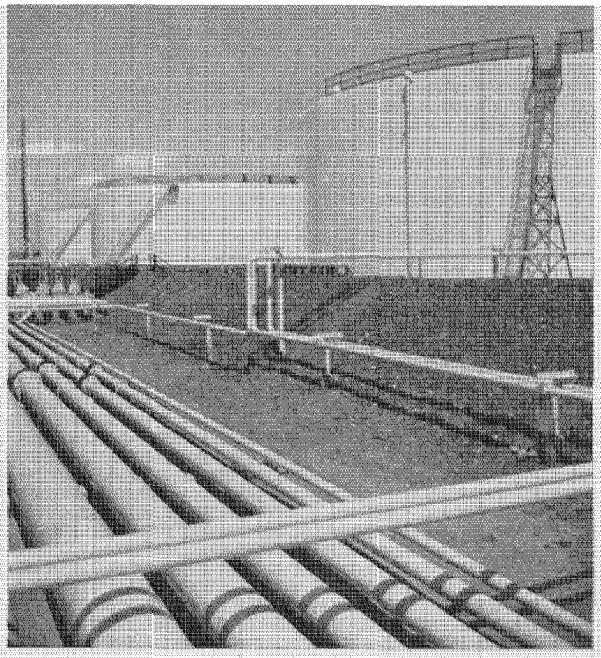
By next spring the refinery area will have sprouted 55 colored tanks. Soft pastels will predominate, although a cluster of smaller spherical tanks, for storing gases under pressure, will be decked out in brilliant blue, green, chartreuse, orange and red. Three "Tiger tanks" bear the bold orange and blue of Gulf and are topped with the Gulf emblem, visible clearly from the air. Passengers on the 300 flights that shuttle in and out of nearby Philadelphia International Airport daily have an excellent view of the refinery. So do those in the 40,000-odd vehicles that daily use the Penrose Ave. Bridge and the Industrial Highway. Night travelers won't miss the colorful display either, since floodlights will be on the area from dusk until dawn.

Arthur R. Cannon, president of Oliver B. Cannon & Son, Inc., industrial painting specialists, evolved the color plan in collaboration with the refinery general manager, J.O. Timms. Cannon figures his men will invest two-and-a-half years and 15,000 gallons of paint in the project. More than 700 buildings, tanks and refining units are involved. Du Pont is a major supplier of the finishes.

The idea of a colored refinery was born several years ago in lunch-table discussions between Cannon and Timms. An early step was painting three of the refinery's largest storage tanks white. The tanks were checked periodically to determine how practical the projected Operation Rainbow would be.

"Such a thing couldn't have been considered without the new finishes that start to chalk within a year and thus begin to clean themselves," Cannon points out. When the first tanks passed their test,

Gulf reports pastel shades have improved housekeeping by making spillage more evident.



RAINBOW

epainting project at its Philadelphia refinery. Here's why. . .

Timms and Cannon worked out a detailed color plan.

"Two things we didn't want were a circus appearance or a refinery that looked as if someone had walked from one piece of equipment to another dropping buckets of different colored paint," Timms says. "The colors had to harmonize."

Cannon recalls sitting down with Du Pont Finishes Division color specialists and going through some 5,000 paint chips to select just the right pastel shades. "I spotted the pink I wanted, though, on a 1955 Cadillac," he says, "and that's the shade Du Pont supplied."

Cannon, who this fall had 44 crews busy on industrial painting jobs, sees the Gulf project as the forerunner of others similar in conception. "The fact that an industrial unit is utilitarian doesn't mean it must be an eyesore," he says.

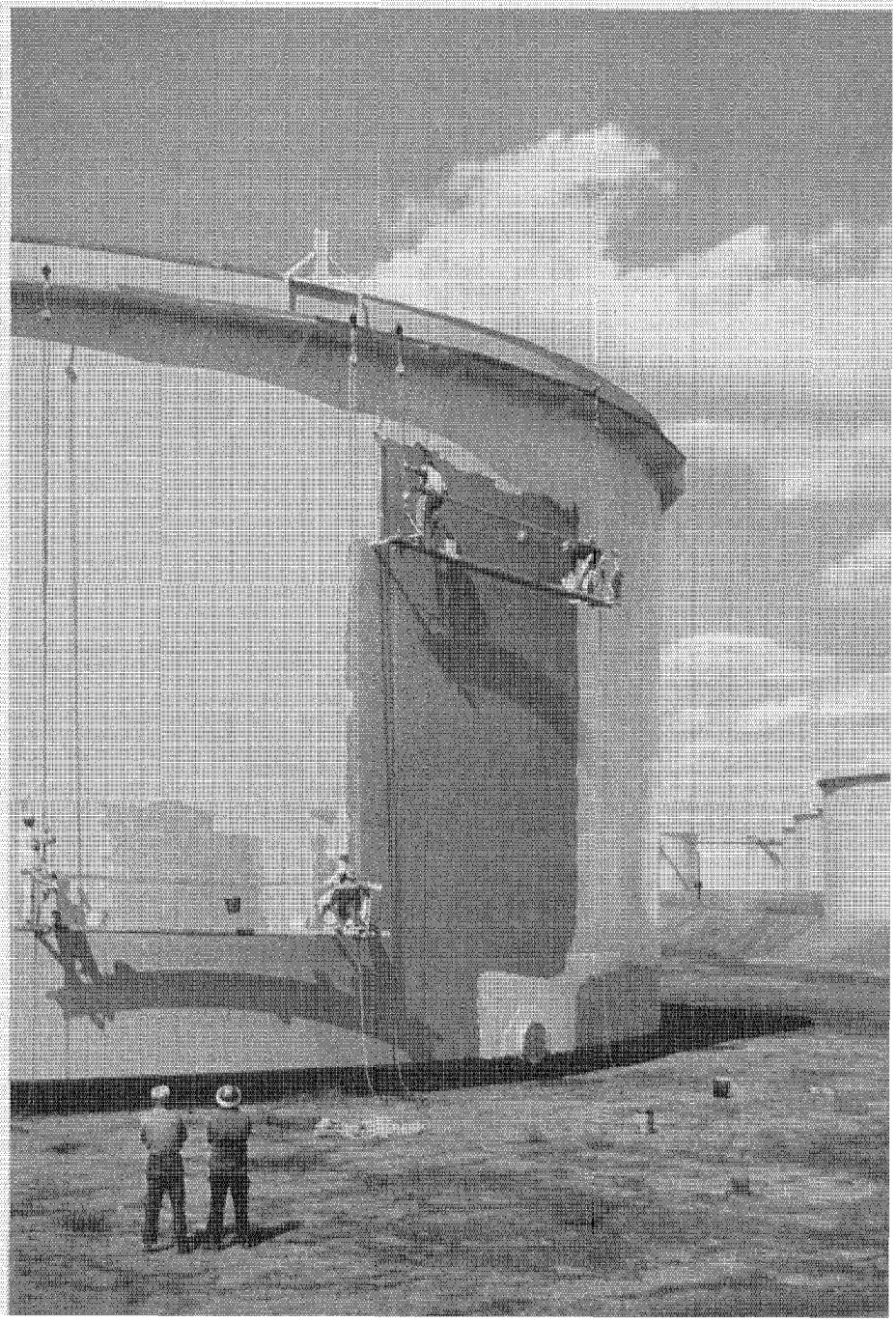
A COMMUNITY ASSET

Certainly, the public relations value of an attractive refinery is a major reason for Operation Rainbow. "We felt that here was an opportunity to be a definite asset to the community and, at the same time, become part of Philadelphia's 'new look,' " Timms explains.

Operation Rainbow also has important advantages for operation and maintenance, Timms points out. Self-cleaning paints, through weathering, will look freshly painted as chalking progresses. The heat-reflectance of the light-colored paint is high, too, holding down tank evaporation loss.

Gulf also has found that the light colors make for improved safety and more efficient housekeeping, since leaks or spillage are immediately noticed. Apparently as a result of the painting program, requisitions for cleaning rags from the company storeroom have quadrupled.

Summing up the reaction Gulf is looking for is this comment from the employe with the longest service record at the Philadelphia refinery: "Well, it may not look like a refinery anymore," he said, "but it sure looks pretty."



Painting schedule required completing one of giant storage tanks every day.

Safety in shadows

That's what the aircraft industry finds by sleuthing with portable x-ray equipment for structural defects

In air transport, safety is king. But it's a demanding monarch, requiring costly, time-consuming inspection and overhaul to keep equipment in shape.

Recently many airlines have adopted a technique that's giving them a quicker, cheaper and surer check on airworthiness: inspection with portable x-ray units that can see right through a plane's metal skin to ferret out fatigue and

operational cracks in structural members. The x-ray picture also brings to light loose bits of metal that could cause serious damage if left to roam freely within the plane's structure.

What prompted the switch? *Aviation Week* reports that to inspect a DC-6 fuselage, one airline used to rip out the lavatory, fuselage lining and half the flooring. This 300 man-hour job is now done in five hours by x-ray inspection, and done more thoroughly. Tear-apart checks of the tail assembly in a DC-4 or DC-6 cost about $15,000, while a nondestructive x-ray inspection comes to a fraction of that.

The x-raying is done either by the airline itself or by such independent firms as Industrial X-ray, Inc., of New Hyde Park, Long Island. Among Industrial's clients are Lockheed Aircraft Service International, a ground maintenance outfit, and such varied companies as LAV (Linea Aeropostal Venezolana); New York Airways, a helicopter line; and Flight Safety, Inc., an inspection service for the rapidly growing number of business aircraft.

X-RAY SPOTS ELUSIVE FLAWS

Industrial X-ray finds that its see-through technique is best for wings, landing gear and stabilizers. Besides cutting inspection costs, the method often catches flaws and fatigue failures that couldn't be found by other means.

Industrial's crews operate three mobile units, each carrying portable x-ray heads, cable and controls, plus a power generator and built-in darkroom. To check the wing of a DC-3, a crew takes about 80 x-ray films. In making an exposure, a sheet of Du Pont industrial x-ray film, held in a flexible envelope or cassette, is placed behind the part to be examined. The x-ray tube is raised into position, normally outside the plane, and a timed x-ray exposure is made.

The crews carry their own darkroom with them so that they can develop test shots as they go along. Average exposure is one minute, but the wing of an airplane is tapered, so actually no two exposures are of the same duration. It takes plenty of experience, plus occasional trial shots, to determine whether enough time is being allowed to get best results.

In ground maintenance work, time is a precious commodity. Lockheed International, for instance, is paid not for the hours planes spend in the maintenance hangar, but for their hours in the air. Hence, it expects Industrial to complete the x-raying expeditiously.

"We find the Du Pont film particularly suitable for this on-location work because it comes on a strong film base," reports George L. Becker, who's in charge of radiography for Industrial. "As a result, the film is less likely to tear and make retakes necessary."

Du Pont film saves Industrial's time another way, according to Becker. Because there's no interleaving paper to be removed from the sheets of 14 x 17 film when cassettes are loaded, extra motions are saved.

"This film really pays off for us, though, when it comes to interpreting the radiographs," Becker says. "Accurate reading would be much more difficult if you had to worry about whether you were looking at a tiny defect or merely the graininess of the film."

FILM'S UNIFORMITY VALUED

Becker points out that a crack around a rivet hole will often appear only as a thin line, something an inexperienced eye would probably miss completely.

"We have to depend on our film to be free of imperfections," he says. "That's why we especially value the uniformity and lack of grain in Du Pont film."

While safeguarding the lives of people in the air, Industrial also takes triple precautions for the welfare of its own men. The company ropes off an area extending 30 to 40 feet in the direction the x-ray tube is aimed, and then tests for radiation with a rate meter. In addition, each man wears both a pocket dosimeter and a film badge as further checks on the degree of radiation exposure.

X-ray picture of wing reveals loose cotter pin that might cause trouble. Big reason for inspection is to spot structural cracks

Industrial X-ray radiographer (left) x-rays airplane wing as a safety check while Du Pont man surveys area for radiation with a meter.

ELECTRICAL
CONDUCTOR
ROD, BAR
AND WIRE
PRODUCT
INFORMATION
DU PONT
The Autobiography
of an
American Enterprise
A TOWN AND A MILL
CASTING
"AS A MAN
THINKS..."
THOMAS J WATSON
UNITED STATES STEEL
USS
EXPORT COMPANY
CATÁLOGO GERAL

With the help of Du Pont bookbinding materials, volumes ranging from catalogs to a company history are . . .

Bound to speak well of your company

By LOUISE J. GRUBER

Not too many years ago, one of the thinner slices of published American history dealt with the growth of business and industry. The reason this is no longer true is chiefly because U. S. companies themselves have begun to examine their pasts—or have them examined by others—and publish the results.

The Dun & Bradstreet library lists more than 1,200 titles in its current bibliography of company histories. The subjects range from advertising, banking and chemistry to silver, timber and watches—a cross section that gives a good look at business's role in the growth of the nation.

Because American industries are comparatively young, it's possible to make detailed and comprehensive studies of their origin and growth. Although some of the histories are popular in style, there are more scholarly works that explain and interpret the many problems—manufacturing, financial and marketing—that companies have faced. Some of these volumes are researched and written by outsiders given access to company records. Others are written by the company's own people.

Also part of this broad field, sometimes referred to as "bookvertising," are educational books aimed at a specific public. These include behind-the-scenes reviews of a company or plant operation, elaborate product information books, and references on a commodity or industry prepared by an association or group. But company histories, often published in connection with anniversary celebrations, are a significant part of the business book field.

Why does a company undertake such a project and what does it expect to gain? The answer was stated rather clearly by the president of a large insurance company during the preparation of a centennial history:

"We have in mind the use of such a history in the indoctrination and training of future management people, agents and other employes," he said. "We believe it will be useful also in reminding management of the origin and reasons for policies of long standing. We expect the history to supply material we can use in public relations and even in sales promotion programs. We expect it to be of use to students. Finally, we hope it will show the impact of a particular financial institution on the nation and on the region in which it is located."

Even a hasty glance at the array of company histories is evidence that careful planning and the desire to publish a fine book did not begin and end with the text. Many of the volumes are so well printed, well bound and attractively illustrated that appearance alone would mark the books for permanent inclusion in a collection.

OVERTIME WORK IN LIBRARIES

But corporation histories also land in school and public libraries where the going is anything but gentle, and where they work overtime as the voice of a company.

How to combine the need for public library toughness with the desire for home library attractiveness? Du Pont "PX" cloth—tried and proved as a covering for school books—is one answer. Besides its ability to take rough wear, its appearance evokes pride. There are linen and solid surfaces, and the color range is extensive. "PX", a pyroxylin impregnated book cloth, is exceptionally receptive to ink stamping and offset or letterpress printing. Printers like it because it lies flat for lithographing.

Another selection might be "Fabrikoid" pyroxylin coated bookbinding material. This material is unusually resistant to scuffing and abrasion. It's available in a variety of colors, grains and finishes and, like "PX" cloth, is both water-resistant and cleanable.

Either of these materials is versatile enough to set the tone of quality for a business volume that's bound to speak well of a company for years to come.

Some examples of hard-covered volumes that serve a business purpose: catalogs, product information books, company histories and a businessman's philosophy. Binding is important to appearance.

Pharmaceuticals: new frontier for aerosols

Push-button packages offer a convenient way to apply medicinals—in measured amounts, if need be

By FRANK ZUMBRO

Which bothers *you* most—getting a small burn or having it treated? Cutting yourself or having the wound cleaned and dressed? Acquiring the sunburn or applying the balm you hope will ease it?

An accident often happens so quickly we don't have time to think about it. But, long or short, the period between accident and treatment usually is worry time. Our imaginations picture a simple swabstick as a red-hot gouge or a hypodermic needle as the barrel of a tank gun.

If you're with us, take heart. The pharmaceutical industry is taking a long and increasingly optimistic look at the push-button package that most of us have used to spray insecticides, paints or perfume. They see in the self-powered dispenser a new way of not only reducing the pain of treatment but, more important, making the administration of medicine easier, more efficient and safer.

Take a burn, for example. Applying antiseptic or salve with a swab and bandaging the area with gauze and tape can be a pretty painful process. Contrast this with what may soon be standard procedure: the gentle spraying of a burn palliative, with no hands or swabs touching the skin. This can be topped off with a plastic solution, again spray-applied, that dries to form a thin, protective bandage through which you can watch the healing. As in many aerosol products today, the pressurizing agent used in each case will probably be Du Pont "Freon" propellent.

But, aside from the ease of application and minimum irritation of treated areas, there are other reasons why the future looks so bright for push-button pharmaceuticals. Even though the aerosol package may be higher priced than conventional packages, its efficiency often makes the aerosol preparation more economical. Since it's a gas-tight package, an aerosol protects the contents from contamination, preserves the potency of the active ingredients and prevents evaporation during periods of non-use. Aerosols also give a uniform application, dry quickly, and offer a practical method of measuring dosage mechanically.

CONTROLLED DOSAGE IMPORTANT

This last advantage is more important than it might first appear. It's accomplished in the aerosol package through use of a metering valve that controls, independently of users' varying techniques, the amount of drug or medicament discharged from the container each time the valve is pressed. Where careful control of dosage is essential, the metering-valve aerosol promises to displace the traditional squeeze-bulb atomizer.

The metering principle already has been applied to pharmaceuticals like hydrocortisone for treatment of dermatitis, epinephrine or isoproterenol for relief from asthma, and octyl nitrite for the treatment of angina pectoris. In the asthma remedy, the aerosol principle has permitted such a sharp reduction in the size of atomizer equipment that the whole device, medicine included, fits in a plastic package a little bigger than a pack of cigarettes.

About 40 pharmaceutical items packaged in aerosol containers are now on the market, and one manufacturer predicts that more than 100 will soon be available in a wide list of drug types. Aerosol pharmaceuticals currently being marketed include such products as topical, or local, anesthetics for use in dentistry and for skin planing, spray bandages, burn sprays, athlete's foot remedies, poison ivy sprays, adhesive tape remover, and balm for application to the skin to minimize irritation of adhesive tape dressings.

Topical aerosol anesthetics have been marketed for some time now, but topical antiseptics and antibiotics are still in their infancy as push-button products. Many manufacturers believe, however, that because of the ease and speed with which a spray product can be applied, anesthetics, antibiotics, and antiseptics for topical applications may someday be converted largely to aerosol packaging.

Last year just short of a million and a half aerosol packages of medicinal and pharmaceutical items were turned out. With the many new products now being ushered onstage, total production should be even greater this year.

Metering-valve aerosol gives measured dosage, is expected to be widely useful in pharmaceuticals.

FAST PACE IN

. . . is set by supermarket chains in the Minneapolis

in cellophane boosts sales and cuts waste. Consum

By HERMAN C. KOCH

MINNEAPOLIS-ST. PAUL, MINN.

Minnesota's Twin Cities are known for their lakes, their hearty Scandinavian hospitality and their rivalry in matters of civic pride.

Citizens of the Paul Bunyan country are accustomed to doing things big. The big supermarkets that have sprung up in the Minneapolis-St. Paul area in the last few years are part of this tradition. These supermarkets are notable, too, for a pioneering step: They are among the first in the country to sell as much as 95 per cent of their fresh fruits and vegetables packaged in transparent films.

For the consumer, such packaging, most of it with Du Pont cellophane, ends the last major bottleneck in self-service shopping. For the store, it means bigger and faster produce sales.

But there are other reasons why such chains as Red Owl, National Tea Co., Super Valu Stores, Klein's, Cut Price Super Markets and Applebaum's Food Stores have gone over so completely to packaged produce.

"Our customers feel more confident they're getting the best produce when it's packaged," says William Ogden of Red Owl. "Its cleanliness and uniformity are more apparent in cellophane." This is particularly important to Red Owl because produce is displayed on the number one aisle in its new stores, where shoppers are more likely to buy it on impulse when they first enter.

Klein's considers the produce department the showplace of its stores, says A. Mort Paymar, director of store operations. Increased sales of produce by the chain indicate that fresh fruits and vegetables are showing up well in cellophane to Klein's customers, too.

Other supermarket operators in the Twin Cities agree on the benefits of packaged produce. Many stores in this area do 12 to 16 per cent of their total volume in the produce department. The national average is about 11 per cent. The fact that packaging of produce can cut spoilage and mark-downs to less than two per cent—half the national average—is another point given in its favor.

As recently as ten years ago, only a small volume of produce was packaged before sale. This year it's estimated that nearly one-third of the 56 billion pounds of fresh fruits and vegetables U. S. consumers buy will be prepack-

Supermarket operators can heave thankful sighs that such a chaotic scene exists only in the imaginative minds of cartoonists Stanley and Janice Berenstain.

PACKAGED PRODUCE

Paul area. Operators agree that packaging fresh fruits and vegetables

profit, too, because they save shopping time and get cleaner food

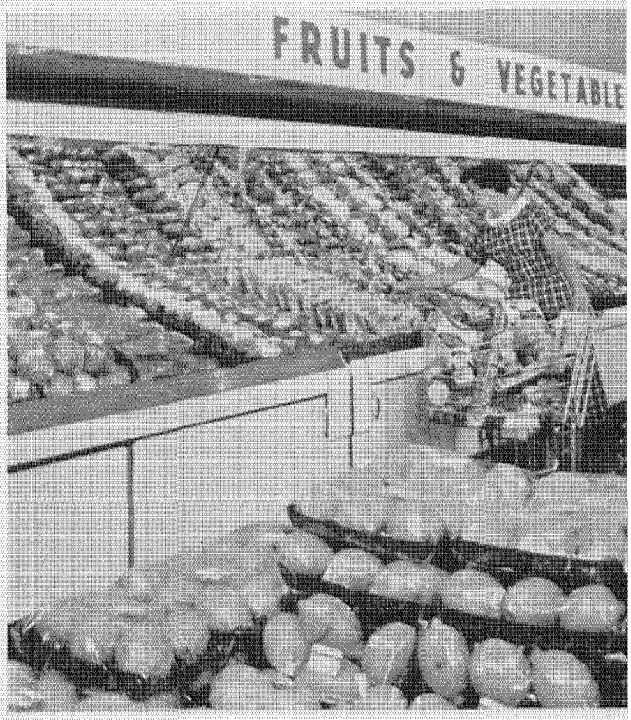
aged. Helping boost the popularity of cellophane for packaging is a type that Du Pont developed specifically for fresh fruits and vegetables. In addition to transparency and heat sealability, the film—known as LSAD—offers graduated moisture loss and keeps condensation to a minimum. Research teams in the Du Pont Film Dept. are working steadily to develop types of cellophane that meet the varied packaging requirements of particular products.

PACKAGED PRODUCE GAINS POPULARITY

What does the consumer think about packaged produce? A recent Du Pont study compares 1956 reactions of shoppers with results from a 1950 survey. A big change is the decrease in shoppers who prefer to buy loose produce. In 1950 half of the persons polled said they would rather buy in bulk. Today only one out of four prefers to do so.

The major reason consumers give for favoring packaged produce is that it's more convenient and saves shopping and preparation time. But more than half of them also stress the greater cleanliness of packaged items. "I like knowing that no other shopper has pawed over my vegetables," is a typical comment.

Final word on the subject comes from the vice president of one of the Twin Cities' large supermarket chains. "Cellophane-packaged produce persuades customers to stop and examine. And, after all, that's what we really want. The quality of our produce will do the rest."



Typical supermarket in Minneapolis-St. Paul area packages most fruits and vegetables in cellophane.

Load-from-the-rear produce counters (above) add convenience to many stores. Packaged produce saves shopping time, protects food, cuts waste and improves store appearance, operators agree.

"Eduardo, Ramoncito, Lázaro . . . at Christmas-time they played the parts of the Three Kings."

"The boys always had distributed gifts as I bade them. But last night they disobeyed."

HERE WE PRESENT a condensation of "Three Young Kings," a tender story of Christmas in a Cuban town that will be dramatized on the Du Pont Theater (ABC, Tuesday, 9:30 p.m., E.S.T.) Christmas night. Its author is George S. Albee, who has written a number of radio commercials and magazine articles for Du Pont, including the lead article in this issue • Among the millions of television viewers who will see "Three Young Kings" on Du Pont Theater, there will be some whose memories go back to the birth of the Du Pont Cavalcade of America program. The year 1935 was early in the hey-day of radio; Amos 'n Andy, Ben Bernie and Kate Smith were part of our daily lives when Cavalcade of America was introduced. Poetry and band music had a place in the early Cavalcade, but in the pattern finally evolved, stars of stage and screen brought to life the stories of men and women who had contributed to the nation's growth • The program built a following that in its peak season numbered about nine million listeners. It earned the respect of critics and a variety of awards. In its 781 programs, Cavalcade reminded a whole generation of Americans of their national heritage and linked Du Pont with the country's growth • In 1952 Du Pont launched Cavalcade of America on a national television network. In its new medium, Cavalcade's historical programs gained new friends and earned more awards for excellence. In 1955 the program was broadened to include stories of our own times • This season the Du Pont Theater continues to tell stories of fact, but good fiction has taken its place beside them. Promising talent and established stars are again appearing in the series • One thing, however, has not changed, and old friends of Cavalcade will recognize it: the emphasis is still on stories that delight, inspire and warm the hearts of viewers. Such is our Christmas program. We hope you enjoy it.

3 YOUNG KINGS

THE town of Cardenas, a hundred miles to the east of Havana on the north coast of Cuba, is an old dog—a small, taffy-colored dog that is learning new tricks.

Three times a week, nowadays, a ferry from Key West brings Cardenas a boatload of American tourists, and these Americans, all of whom have such white faces that they appear to have been sick, seem strange and wondrous to the people of the town.

Small boys follow them on the sidewalks and, when they speak, race around in front in order to watch their lips form the mysterious, incomprehensible foreign words.

As for the small girls, they clap their hands over their mouths and giggle, for the American women often wear hats, and, as everybody knows, a hat is a garment worn solely by men.

But this is the story of something that took place in Cardenas in the days before there were tourists or a ferry. At that time the young men sat all day on the iron rocking chairs in the park under the royal palms, talking excitedly about the day when they would make vast fortunes. The shopkeepers opened at ten in the morning, strolled home at noon for heavy dinners of rice and black beans, took two-hour siestas and returned to their stores to play dominoes until suppertime. The women mopped their white tile floors, cooked and gossiped. The children, when they had fathers who could pay the tuition, went to school. The boys, in white shirts and neckties of soft blue that is the Virgin's own color, attended the *Escuela Pias*. The girls, in blue pinafores with white stripes around the hems of the skirts, went to the *Escuela de las Madres Escolapias*.

Which brings us to three boys of the *Escuela Pias:* Eduardo, Ramoncito and Lázaro.

Eduardo was sixteen, while Ramoncito and Lázaro were a few months younger. They were the oldest boys at the *colegio* and the biggest. In fact, Eduardo's nickname was Elephant. He had a flat, snub-nosed face and a cubical skull on which his hair looked like a coat of glossy black lacquer because he soaked it daily in scented brilliantine. Ramoncito was finely made, with a headful of tight little curls and eyelashes half an inch long over eyes the color of clear green seawater. Lázaro was the shortest of the three, but that did not keep him from being the heaviest. He ate three huge meals a day, treated himself to custard éclairs on the way to school and fresh cocoanut macaroons on the way home, and devoted the recess periods to eating candy. Ramoncito's nickname was Monkey. Lázaro's was Macaroon.

The fact that they happened to be the three oldest students laid quite a few responsibilities on Eduardo, Ramoncito and Lázaro. When

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the school's 47 boys scrambled into the bus for the annual picnic at St. Michael of the Baths it was Eduardo, Ramoncito and Lázaro who served as monitors. And at Christmastime, because they were the oldest, it was their duty to play the parts of the Three Kings of Orient.

Jesus' birthday in Cuba is a day to go to church, not a day for gifts. Gifts are distributed later, on the sixth of January, not by Santa Claus but by the Three Kings who carried gifts to the newborn Christ child in the manger at Bethlehem. On the second of January, therefore, Father Miguel called Eduardo, Ramoncito and Lázaro into his office.

"Seat thyselves," he directed them.

Father Miguel, who was 82, was so frail that his white linen cassock appeared more often than not to be unoccupied. There was very little of him still in residence on earth. He had a small, poetically modeled head and a voice, and that was about all. His voice, too, was fragile—a faint, musical buzz, like that made by a small but energetic fly in the schoolroom on a hot afternoon.

"Children," he said, for he was so aged that he could no longer perceive the difference between sixteen and six, "I have done this many times, but it is new to you, so I must explain the procedure of the Three Kings. All of the gifts your schoolmates will receive from their families and friends are upstairs in the janitor's room. The gifts for the girls are here as well; Mother Superior brought them over to me from *Madres Escolapias*. I want you here two hours before dusk on Day Five to load the mules, saddle the horses and disguise yourselves in your robes and turbans. Do you ride well?"

"YES, Father," murmured the boys. All Cuban boys ride well, using neither saddle nor bridle but only a length of rope looped at one end around the horse's muzzle.

"*Bueno*; you will be handsomely mounted. Don Alfredo de la Torre is sending me three cream-colored mares from his farm, with silver-mounted Mexican saddles and pack-saddles for the mules. You will set out at dusk. It will take you three hours or so to deliver the presents; then you will return here and hand back the animals to Don Alfredo's foreman and hang away your robes. Understood?"

"Understood, Father," replied Eduardo when neither Ramoncito nor Lázaro spoke. He did not ask for leadership. It annoyed him, actually. But it was always thrust on him.

"Now go along to your homes," concluded the old priest, "and do not reveal to anyone that you are the Three Kings. We would not wish to sadden the hearts of the little ones."

During the next couple of days, as they discussed the roles they were to play, Ramoncito grew somewhat bitter about the "little ones." "What do we care if they find out the Kings aren't real?" he exclaimed resentfully. "*We* found out."

"That's no way to talk," replied Eduardo brusquely in his deep voice. "Before we knew the Kings did not exist, we thought they were marvels. We nearly went out of our heads waiting for them to come to our houses and bang the knockers. True?"

Fat little Lázaro offered no opinion one way or the other. Instead, he made a street map and planned the route they would take, so that they would be able to visit the houses on their list with the least possible amount of backtracking. Lázaro was efficient. Either that or he was lazy. Or it may be that efficiency and laziness are merely different names for the same thing.

With the school empty for the holidays, the playground seemed strange to the boys when they met there late on the afternoon of the fifth, a lonely square of red, grainy earth over which dry leaves skated.

They loaded the four pack mules one at a time, with Eduardo carrying out the heavier toys—the tricycles and the miniature automobiles—because he was the strongest, Lázaro arranging the boxes and parcels in accordance with his map and Ramoncito, who was a passionate fisherman and good at tying knots, filling the large burlap sacks that would serve as their saddlebags and lashing them to the mahogany packsaddles. With the mules loaded, the boys saddled the three small, beautiful mares, and then put on their costumes.

THE school had had the costumes for so many years that nobody remembered any longer who had made them originally—somebody's mother, probably. Whoever she was, she had used the same rich materials she would have used in embroidering an altar cloth for the church. Eduardo's robe was of turquoise satin belted with a gold cord and on his head he wore a multicolored turban. Lázaro's robe was of heavy silver brocade and his turban was of purple velvet. Ramoncito wore a mandarinlike coat of blue silk, ornately embroidered, and a wine-colored turban. Last of all, they attached their long white beards with liquid adhesive and, using an eyebrow pencil, drew the wrinkles of old age on their brown young faces.

Then, the horses ready, the mules waiting eagerly in single file on their lead ropes, the boys watched the sun go down behind the palm groves to the west. After it was below the horizon, the sky was filled with dazzling lime-green light, and then, with no interval, it was dusk. It had been a fruit punch of a sunset, complete with maraschino cherries and lemon sherbet, but the boys had seen it every night of their lives, and they supposed that the sun behaved as extravagantly in all countries. To them it was merely a signal that the time had come for them to start.

"Mount," ordered Eduardo, and they swung themselves into the highbacked saddles.

"The top end of Princess Street," directed Lázaro. "The Montoros live at Number 17."

"I believe thee," replied Ramoncito, whose secret intention it was one day to marry the middle Montoro girl, Gladys.

THE houses of Cárdenas, like the houses in most Latin cities, are invisible. That is, you see nothing of them from the street except the front wall, which joins the front walls of the residences on either side and is plastered over with the same golden stucco. Inside the wall, from front to back, each house is divided into two long, narrow strips, side by side. One of these strips, which has no roof over it, is a tiled garden with a fountain, stone flower boxes, lime and mango and papaya trees and an array of outdoor furniture. Here the family lives three hundred days in the year. The long strip on the other side, roofed over with faded vermilion tiles, contains the formal living room with its crystal chandelier and cumbersome mahogany furniture; the bedrooms, each of which has its own door opening into the garden; the dining room, with another chandelier and a big electric refrigerator from the United States standing in a corner; and the kitchen, where the food is cooked over square cast-iron baskets of fragrant, glowing charcoal.

But there is something about the houses of Cárdenas that is stranger still, and this is that the richest man in the block may live next door to the poorest. There are poor neighborhoods and rich neighborhoods, but often a banker lives in the poor one and a shrimp peddler in the rich one. For this reason, as the boys dismounted at the Montoro house they could not help but see the nine barefoot children of Emilio, the shoemaker, dressed in ragged shirts and nothing else, who stared at them hopefully as they took down the saddlebag containing the Montoro youngsters' gifts. Eduardo, whose voice was already so much deeper than many a man's, thudded on the door with the brass knocker and bellowed: "Do the good young ones of the Señores Montoro live here?"

Señor Montoro swung open the tall door, elegant in his starched white jacket of pleated linen. "Yes, sir, we have good young ones in this house," he replied. "May I ask who you are, gentlemen?"

"We are the Three Kings of Orient," boomed Eduardo.

"Enter, then. This is thy house."

The Montoro children, jabbering with excitement, accepted the presents that had their names on them as Eduardo and Ramoncito took them from the opened burlap sack. Hasty goodbyes were said, the Kings explaining that they had a great distance to travel before morning, and they mounted and rode on.

"The shoemaker's kids are all crying," said Lázaro over the clip-clop of the hooves. "I can hear them. They thought we'd leave something for them when we came out of the Montoros'."

"Maybe Jaime Montoro will give them his express wagon after he smashes it," said Ramoncito. "I'll bet there won't be a wheel left by noon tomorrow."

AT the Cabrera house on Shell Street they delivered a fifty-dollar French doll to Myriam Cabrera, along with a dozen other packages. Mounting again, they turned into Anglona Street. By now it was dark, the only light on the street falling from unshaded bulbs at the intersections. They were conscious as they rode along of people, grownups as well as children, watching them from the sidewalks. Everybody was out for an evening stroll in the cool bay breeze. Now and again somebody called out, "Look, the Three Kings!" and each time the voice was thrilled and reverent. There was mystery in the night. The mules felt it, pricking up their ears, and the horses, catching the murmurs of admiration, tossed their manes and lifted their forefeet higher than they really needed to, showing off.

On Saint John of God Street the horses shied at the peanut seller who was chanting, "Peanuts a little hot, peanuts a little hot," and again there were watchers in the darkness under the rustling palms. Distinctly the boys heard a little girl ask in a trembling voice: "Mama, will they come to us?" And they heard the mother's patient, desperate answer: "Who knows, soul of my soul? But if they do not come tonight you must be valiant, for surely they will come next year."

On the lead mare Eduardo, who knew a number of words which did not meet with Father Miguel's approval, muttered a particularly bad one.

"Now *she's* crying," exclaimed Lázaro, "because we've passed her house."

"If you think this is bad," said Ramoncito, "wait till we get down by the market."

"The poor are always with us," replied Eduardo gruffly. "Jesus says so in the Bible."

"He means they are always with us to

reminds us to do something about them, Elephant," said Lázaro. "That's what He means."

"What do you want?" Eduardo shouted back. "Am I to blame because there are families that can't earn a living? The cane crop is poor this year."

Eduardo's anger was something to be quenched promptly, it was well known. "No, Elephant, dear, you are not to blame," said Ramoncito. "We don't say you are."

"Then shut up, the two of you!"

"I just think," said Lázaro in the clear, sweet voice that permitted him, at 15, still to sing in the choir, "it's a shame to take gifts to rich kids like us when it's the poor kids that need them."

"Me, too. My father is giving me a bicycle," added Ramoncito. "What do I want with a domino set and a silly card game that's supposed to teach me how to spell?"

"Father Miguel told us what to do," said Eduardo grimly, "and we're going to do it."

But not a hundred yards farther on a small boy of seven or eight, in a shirt made of secondhand cheesecloth washed white for the holiday, ran hysterically into the street crying, "Oh, Kings, Kings! We live here, señores, at Number 22!"

EDUARDO reined in so sharply that he hurt his mare's dainty mouth. Leaning down from his saddle, he bellowed in a voice that frightened the boy nearly out of his senses: "What's your name? Is there light in your house so we can see? Then take us there. Monkey, gallop back and get that girl that was howling!"

In the one-room house at Number 22, where an entire family slept on the clay floor and the only light was that from the candle blinking in its ruby cup at the feet of the Virgin, they handed out half a dozen packages, Eduardo glowering, Ramoncito scared but resolute and Lázaro struggling to control the giggle that always assailed him at the wrong moment. The gratitude of the little boy and girl embarrassed them so terribly that they got away quickly, shutting the rickety door behind them with a slam.

"Well, anyhow," said Eduardo, "those two won't bawl all night. But now what? You know we ought to obey the Father."

"*Tu eres jefe*," answered Ramoncito with a shrug. "You're the boss."

"I'm *not* the boss," roared Eduardo. "You always make me the boss, and then I get into trouble. Do you realize the scandal it will be if we go down to the market and give all this stuff to the beggar kids?"

"Clearly it will be a scandal," responded Ramoncito. "It has never been done."

"We're wearing eleven-yard shirts now," protested Eduardo, as we might say: "We're in hot water now." He turned to Lázaro. "What do you say, Macaroon?"

When a person of Spanish blood does not know what other answer to give, he answers with a proverb. "That which does not kill us," quoted Lázaro, "will make us fat." The saying did not fit the situation especially well, but it conveyed his meaning.

"All right," said Eduardo, "but you're both in this with me. Don't you forget it, either!"

"For an elephant," said Ramoncito, "you do a lot of talking."

Dramatically Lázaro crumpled his map and flung it into the gutter. They turned the horses' heads and trotted toward the market. In the street approaching it, Colonel Hangman Street, with its reek of fish heads and rotten cabbage, they drew rein. Eduardo stood erect in his stirrups. "Hear me," he shouted. "Is this the town of Cardenas, in Cuba?" That was a fine imaginative touch. "Are there good young ones on this street who have behaved well this year? If there are, come you all to the market!"

The market, a maze of heavy stone archways, was brilliantly lighted. Curious, laughing butchers and vegetable sellers at once gathered around the Three Kings as they entered, dragging their bulky saddlebags. Even as the crowd formed a ring, dirty, barefoot children with uncombed hair and noses that badly needed wiping were pushing and wriggling and, where it was necessary, kicking their way to its center. Recklessly Eduardo, Ramoncito and Lázaro tore away tissue paper and ribbons, so that they could see what the gifts were, and passed them out. Arguments broke out in the crowd, but not among the children. They snatched their dolls and painting sets, their toy fire engines and scooters and raced away shrieking, carrying the greatest news of their lives to brothers, sisters and deserving friends.

In twenty minutes the saddlebags were empty. Not an all-day sucker was left. Even Ramoncito's white beard was gone, for it had fallen to the concrete floor and a youngster had snatched it in the belief that it was a toy. Streaming perspiration, and as hoarse as crows, the three boys thrust their way through the chattering, mystified, admiring crowd that jammed the sidewalk for a block, mounted and trotted back to the school under the late moon. The moon could not manage anything quite as spectacular as the sun, but it was doing its best. It turned the massed clouds over the sea into great clusters of white camellias, wrapping each cluster in shining aluminum foil.

SCIENTISTS say nothing travels more swiftly than light. This is not true; in a small town good news, bad news, any kind of news at all travels faster. By the time the boys had hung up their costumes and turned over the animals to Don Alfredo's foreman, furious, gesticulating parents were already haranguing the boys' fathers. And by morning the anger had solidified into a demand that all three of them be expelled at once from school. The movement was headed by Triunfo Anilina, a druggist, who sent notes to everybody's house by messenger, demanding that all parents meet at the *colegio* and put the matter to a vote.

At four that afternoon the outraged parents were at the school—not two hours late, nor even one hour late, as was the custom, but on the dot. Plump fathers with cigars, plump mothers with small, exquisite feet in high-heeled, patent leather shoes, they followed Triunfo Anilina into the large, cool room in which arithmetic was taught. There they squeezed themselves into the seats behind the students' small desks while the burly druggist arrogantly pre-empted the mathematics teacher's desk on the dais. As for the boys themselves, without anybody's ordering them to do so, Eduardo, Ramoncito and Lázaro ranged themselves before the blackboard, standing with their backs to it. In their own minds they were guilty, convicted and ready for the firing squad.

"We are here," stated Triunfo Anilina curtly. "Let us begin."

He presented a detailed account of the crime that had been committed, using a number of large and impressive words he had picked up from his brother, a lawyer.

After this the fathers of the culprits spoke for the defense, Eduardo's father offering to repay the cost of all the gifts, Ramoncito's father pleading that boys would be boys, and Lázaro's father volunteering to pitch Triunfo and all the other male members of the Anilina family, to whom he referred as cockroaches, through the window.

But Triunfo Anilina shouted down the defense, pounding the desk with his hairy fist and upsetting the inkwell.

"The thieves must be punished!" he cried.

"Then the truth of the matter," said Eduardo's handsome father, getting once more to his feet, "is that nothing will satisfy you—not honorable apology, not repayment, nothing. What you want is revenge."

"Yes, revenge!" gasped Triunfo Anilina, his linen jacket dark with perspiration. "What a scandal! It is the first time in the history of our *colegio* that this thing has happened!"

"Ah, Anilina," came a faint, musical buzz of a voice from the rear of the room, "you have a point there."

EVERY head turned as Father Miguel, pausing several times to gather strength along the way, came up the aisle in his long, tallow-colored gown. All the mothers and fathers had forgotten him.

Triunfo Anilina scrambled clumsily to his feet. "Take my seat, Father," he said.

"It is not your seat," replied Father Miguel. Standing on the dais, steadying himself with one small, dry hand on the edge of the desk, his bald skull reflecting the white light from the windows, he faced the parents. "Dear friends," he whispered, "it is so. For 50 years I have sent into the town, on the eve of Three Kings' Day, the three oldest boys of the school. And always they have distributed the gifts as I bade them, because they were good boys. Not until last night have they ever disobeyed me."

Behind the desk Triunfo Anilina jerked his head sharply in agreement.

"But these three boys are good boys also, since all boys are good boys," continued Father Miguel, "so, in fairness to them, we must examine their misdeed very closely. Exactly what, we must ask ourselves, did they do? They took rich gifts, provided by the bounty of our beloved island, and carried them to babes who sleep on straw pallets, if they are lucky enough to find any straw, in the streets around the market. Does the straw remind you of anything, señores and señoras? It reminds me of another Babe, swaddled in coarse cloth, who slept on straw in a manger because there was no room for Him in an inn. And with this in mind it becomes clear beyond doubt that these are not good boys. No, they are something more than ordinary good boys. In the generosity of their hearts, the sweetness of their spirit, the courage of their will they are, indeed, Three Young Kings."

At the blackboard, arms stiff at his sides, Eduardo spoke out of the corner of his mouth to fat little Lázaro, "Giggle one time," he said, "and I advise thee that it will be thy last giggle."

In the schoolroom there was silence. Then Ramoncito's mother began to cry and Lázaro's father burst into boisterous laughter.

Father Miguel raised a hand.

"Now," he said, "if you will kindly help me to my house next door, a delegation from the neighborhood of the market is waiting. They wish to thank you for your sympathy and kindliness, which have so deeply touched them. They wish also to know the identities of the three noble Kings, in order that they may kiss their hands."

Builders with a common bond

"Duco" cement, familiar for hobby and household uses, helps build yesterdays and tomorrows

Archaeologist Gus Van Beek reconstructs the past through ancient pottery, and Clarence McCullough visualizes the future in his models of proposed industrial plants. Although their work deals with different points in time, these builders have a common bond: Du Pont "Duco" cement.

Dr. Van Beek, research associate in the Oriental Seminary at Johns Hopkins University, uses "Duco" to put together pottery fragments gathered during Arabian expeditions of the American Foundation for the Study of Man, Inc., in 1951.

"Ancient man was much like us," Dr. Van Beek explains, "in that he sought to relieve the monotony of his surroundings by creating new forms and designs. Through careful study of changes in pottery, an archaeologist can learn much about ancient cultures."

The pottery Dr. Van Beek currently is reconstructing will form the backbone of the first pottery chronology of ancient South Arabia. It came from a 50-foot slice in a mound called Hajar Bin Humeid, and represents ten distinct layers, each from one major period of occupation.

The jar pictured is one of some 50 pieces Dr. Van Beek has reconstructed. "In one spot near the base I bridged a gap of about 15 inches, where sherds were missing, with three fragments held together with 'Duco'. This bridge carries the entire side of the vessel. Probably 'Duco' will support much more weight; in any case, it certainly has been adequate for my work," Dr. Van Beek reports.

Clarence McCullough works for Industrial Models, Inc., an organization that specializes in building three-dimensional replicas of proposed industrial plants. The company, probably the world's largest model group, has offices in New York City, Cleveland, Pittsburgh, Wilmington, Del.; The Hague, Netherlands, and Manchester, England.

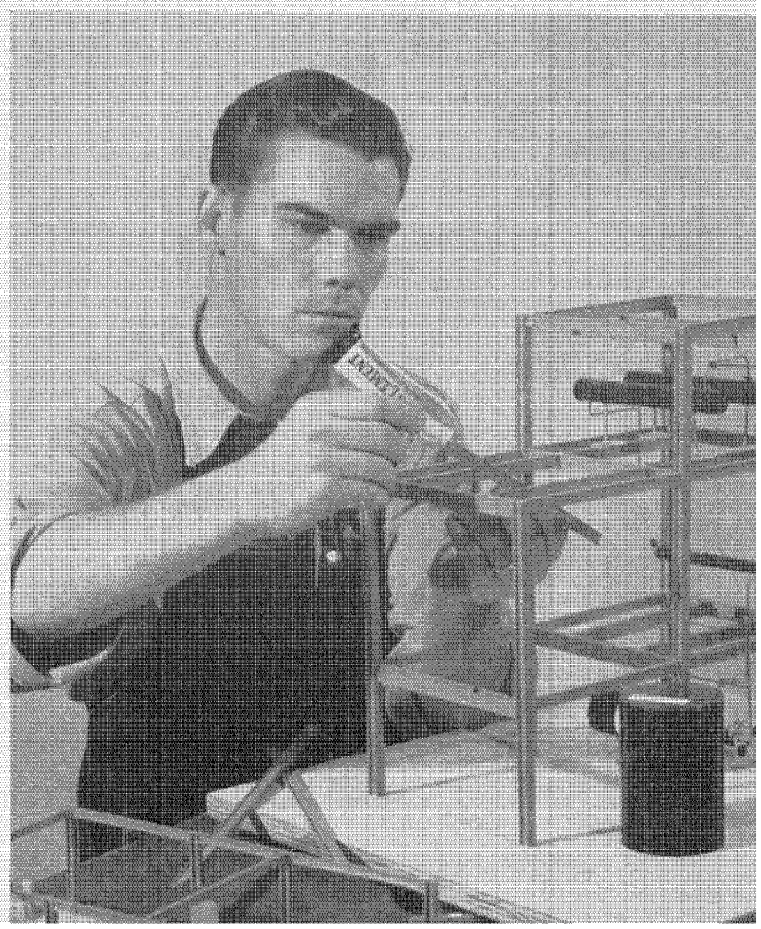
MODELS REVEAL DESIGN ERRORS

"By helping companies locate design errors in the planning stage, we can save them time, money and inconvenience later on," H. J. Bowen, Industrial Models' president, points out. "We've found that a model, made in advance of design, can save five to ten times its cost."

Model parts—built of wood, plastic and other easy-to-handle materials—require a flexible and fast-drying cement to hold them in place. In addition, a polyethylene applicator tip on the cap makes it easy to apply "Duco" neatly to small parts.

On the shelves behind Dr. Van Beek, boxes of pottery fragments wait to be restored and studied; the model McCullough is working on is only one of 100 or so made by Industrial Models every year. Each man has his work—on the past and the future—cut out for him.

Dr. Gus Van Beek of Johns Hopkins uses Du Pont "Duco" cemen in restoring ancient pottery. There are 165 fragments in this ja



Industrial model maker likes "Duco" cement. It's easy to apply and transparent, making for neat-looking job.

What's New

• **TWO NEW FINISHES** have been announced by Du Pont. "Dulux" Satin-Sheen varnish gives a low sheen, hand-rubbed effect to interior wood trim and furniture. "Duco" semi-gloss black enamel produces a wrought-iron effect on either a wood or metal surface.

• **PET-A-GROOM** pet brush may be sterilized safely because its Du Pont "Tynex" nylon bristles are set in a block of "Zytel" nylon resin. Distributed by Old Tappan Products, Inc., Old Tappan, N. J.

• **PNEUMATIC HOSE** made with fabric of "Dacron" polyester fiber and a silicone rubber liner is being used to start aircraft jet engines by carrying hot air at high speeds into the turbine. The lightweight hose fabric was developed by Quaker Rubber Division, H. K. Porter Co., Inc., Pittsburgh, Pa. Quaker says the material resists abrasion and heat degradation.

• **STRIPS OF METALIZED "MYLAR"** polyester film festooned on strings of Christmas lights make an effective street decoration. Metalized "Mylar" is available in silver, gold, red and green.

• **NEW ROBIN HOOD** booties, which have a suede-like finish anchored in Du Pont neoprene, can be worn outdoors as well as in. They are available with matching hats from the Sufix Shoe Manufacturing Co., 541 Shawmut Ave., Boston, Mass.

• **"FAIRPRENE"** pre-cured sheet stock is a new Du Pont product especially designed for lining chemical tanks, hoods and pipes where high chemical and abrasion resistance are required. "Fairprene" sheet stock and the materials needed for installation are sold as a package.

• **DU PONT SODIUM NITRITE** is now available in pellet form. Unlike the common granular product, the pelletized nitrite remains free-flowing even after months of storage, and its higher density saves space.

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

• **PRODUCTION BOOSTS** are planned for three Du Pont fibers and two packaging materials:

Nylon—A new plant at Richmond, Va., to make heavy denier industrial yarn.

"Dacron" polyester staple and tow—Production to be stepped up 25 per cent at Kinston, N.C.

"Orlon" acrylic staple—A new 40-million-pound unit to go in at Waynesboro, Va.

"Mylar" polyester film—New construction at the Circleville, Ohio, plant to increase capacity 50 per cent.

Cellophane—Production increase of 10 million pounds at the Clinton, Iowa, plant. Further increases under consideration at other locations.

• **NEW CATALOG** features Remington sporting firearms, ammunition, traps and targets, and includes prices, ballistics, firearm specifications and illustrations. You can get it by writing to Remington Arms Co., Inc., DM-5, Bridgeport, Conn.

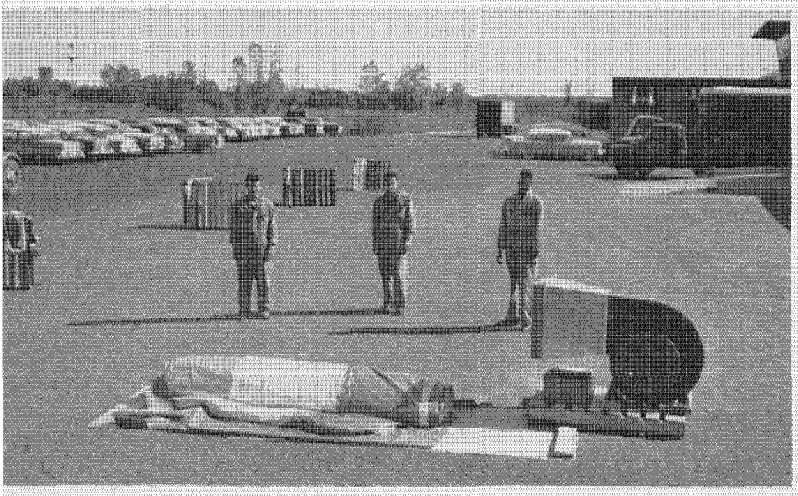
• **ELASTIC BANDAGE**, containing stretch yarn made from Du Pont nylon, maintains a strong, continuous compression regardless of moisture, body heat, or muscular movement. It's made by the Medical Fabrics Co., Inc., 10 Mill St., Paterson, N. J.

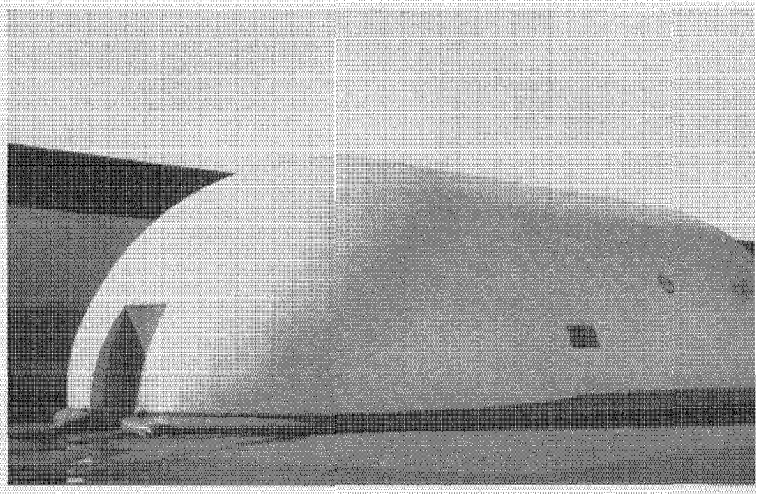
• **DU PONT "NITRAMEX" NO. 3** blasting agent, sold in watertight containers of 2½, 3 and 3½-inch diameter, now offers quarry operators using small diameter holes the increased safety and economy of the Du Pont blasting agent line. The blasting agents formerly were available only in containers of larger diameter.

• **SUN-POWERED PORTABLE RADIO** converts sunlight or artificial light to electricity with a power pack containing 32 light-sensitive wafers made from Du Pont silicon. Developed by Admiral Corp., Chicago, Ill., the radio works at night on six flashlight batteries. It sells for about $150.

• **ATTACHE CASE** made by Rexbilt Leather Goods, Inc., 151 W. 26th St., New York City, is covered with scuff-resistant "Fabrilite" vinyl material. The case is compartmented to keep papers and files separate from personal items.

• **GENTLE PLAYMATES** for the youngsters are made by Knickerbocker Toy Co., 401 Butler St., Brooklyn, N. Y., from crush-resistant plush of 300 denier Du Pont rayon. A cuddly lamb, tiger, leopard, snowman and Santa Claus are available in the fabric.





• **NEW PORTABLE WAREHOUSE** entirely supported by air at low pressure is designed for temporary, all-weather storage. Made of vinyl-coated fabric of Du Pont nylon, it contains 64,000 cubic feet of storage space, weighs some 400 pounds and costs about $2,000. The fabric is said to resist sunlight and weathering. To erect the warehouse, a 3 x 5-foot package is opened and spread flat; an anchor ring is filled with water, and air from a compressor or blower bulges the building into shape, keeping the fabric taut even when the door is open. The manufacturer, United States Rubber Co., New York City, plans to produce it in floor sizes of 3,000 to 100,000 square feet.

That big boom at Richards Spur

. . . was the mightiest vertical hole blast ever fired west of the Mississippi. Dolese Brothers used "Nitramon" blasting agent for maximum safety in this record-breaking quarry shot

Imagine a job that takes two months to prepare for and a fraction of a second to accomplish. That was the time split on last spring's record blast at the Richards Spur limestone quarry of Dolese Brothers Co., 90 miles southwest of Oklahoma City.

Workmen in three shifts spent 60 days drilling the 208 holes required for the blast. Finally the holes were loaded with 510,000 pounds of "Nitramon", and the "Primacord" detonating fuse was set off with a blasting cap. A few minutes later the dust and smoke cleared away to reveal 1¼ million tons of broken rock where there had been a saddle joining two hills.

This permanent alteration of the Oklahoma landscape, although on a larger scale than usual, is all in a day's work for Dolese Brothers. The 50-year-old firm operates four quarries, and Dolese sand, gravel and ready-mixed concrete go into houses and skyscrapers, highways and swimming pools throughout Oklahoma and Kansas.

The safety of "Nitramon" is the biggest argument in its favor, Dolese Brothers says.

"You can burn it, jolt it, do almost anything to it and it won't explode," says a spokesman for the firm. "Even outside electric charges won't set it off. Yet it still possesses the blasting qualities needed in a quarry. It was the safety factor that started us using the product, and we've never been disillusioned. There never has been an accident with 'Nitramon' since we began using it ten years ago."

Other advantages mentioned: Since it isn't classed as an explosive, "Nitramon" can be shipped more cheaply than dynamite. Because of the safety of handling it, it's easier to store. And its fumes don't cause the headaches that the oldtime "powderman" often suffered on the job.

Technical representatives of Du Pont's Explosives Dept. have helped Dolese work out its system of primary blasting, which the company says has served it well.

Blast holes are drilled 30 feet back from the quarry face—this chunk is called the burden by quarrymen—and up to 40 feet apart. The holes extend five feet below the quarry floor to assure a clean break at the bottom of the face.

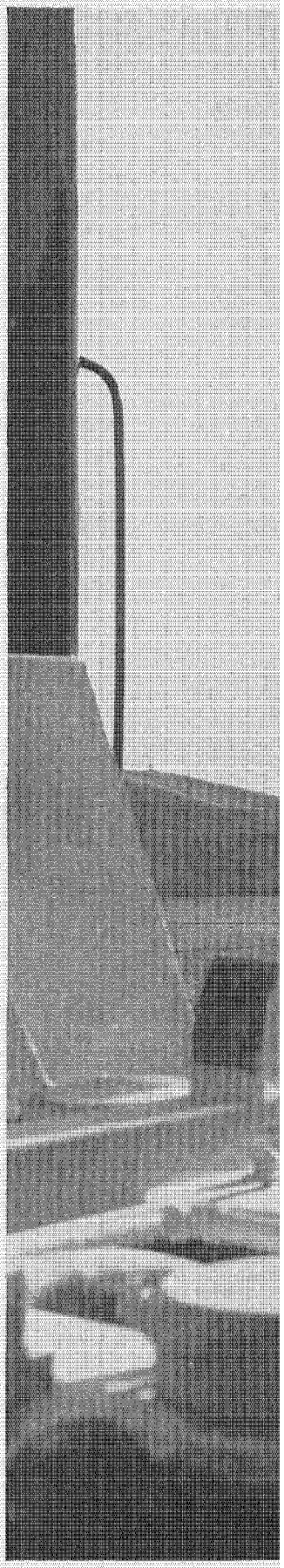
To give you an idea of just how big that record blast of 208 holes and 1¼ million tons was, the average shot at Richards Spur involves only 25 to 35 holes and knocks down 150 to 250 thousand tons of rock.

BOTTOM PRIMER FIRES FIRST

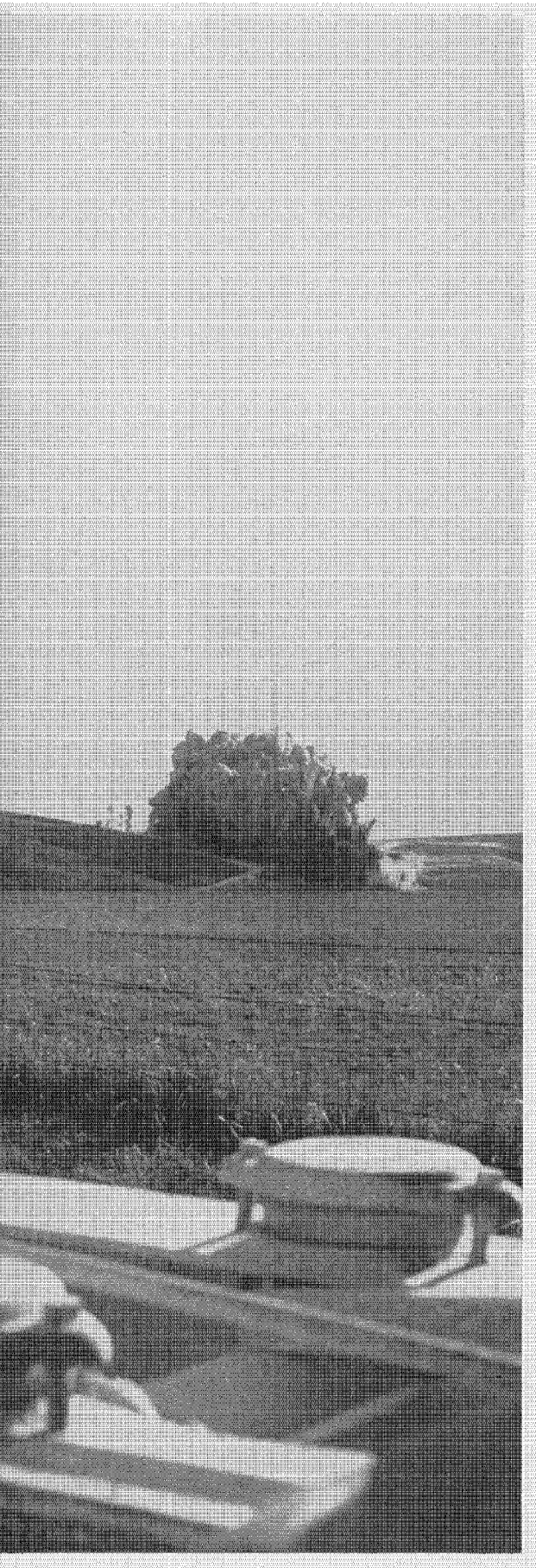
The "Nitramon" is loaded with three primers in each hole, one at the bottom, another in the middle and a third 16 feet from the top. The top 16 feet of the hole is filled, or stemmed, with broken rock. The "Primacord" fuse is hooked up to fire the bottom primer first. This again helps insure a clean bottom break.

Spliced to the fuse between holes are Du Pont MS-9 connectors, which introduce a split-second delay between the firing of each successive hole to reduce the shock wave, and control the direction in which the blast will throw the rock. When the rock is piled in one place, it's easily handled.

Once blasted from its age-old home in the southern Oklahoma hills, Richards Spur limestone is crushed and graded in a modern processing plant that can handle up to 750 tons an hour. It's then ready for shipment to Dolese Brothers' customers.



Loaders lowering the blasting agent into holes in preparation for the blast. Quarry crew spent 60 days drilling 208 holes required for the job.



Camera watches big explosion—more than half-million pounds of "Nitramon"—at safe distance.

Closeup of the blasted stone shows excellent fragmentation. Dolese Brothers also likes the safety of "Nitramon" in limestone quarrying operation.

Nylon cord tires *can* save you money

Here's how two cab companies proved the fact to their own satisfaction

By C. K. PAGE, Jr.

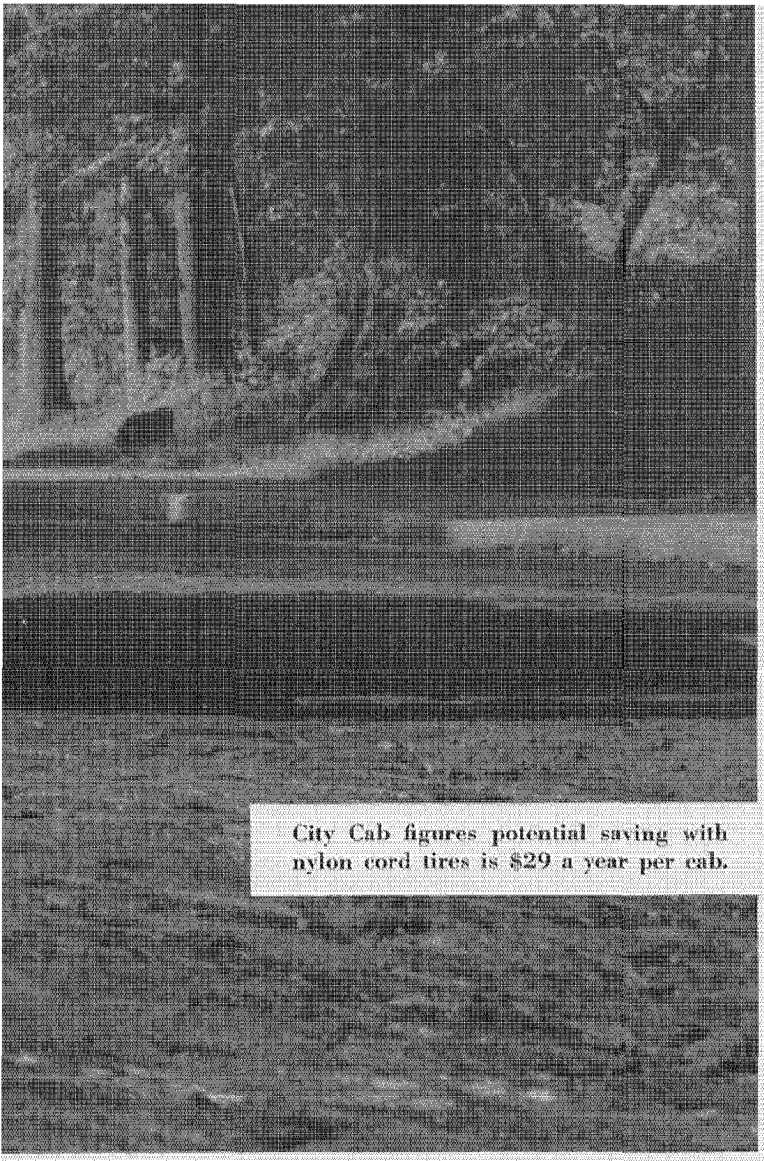
In past issues we've told how highway transport companies have saved money and reduced lost time on the road with truck tires containing Du Pont nylon cord. The latest article (April-May 1956) dealt with the experiences of Pacific Intermountain Express.

Now comes evidence that the same tire economies can be had by bakers, cleaners, taxicab operators and all the other businessmen who transport goods or people in passenger cars or light trucks. Testifying are two cab companies, one in Wilmington, Del., and the other in Jacksonville, Fla., whose cabs have rolled on nylon cord tires for two and four years, respectively.

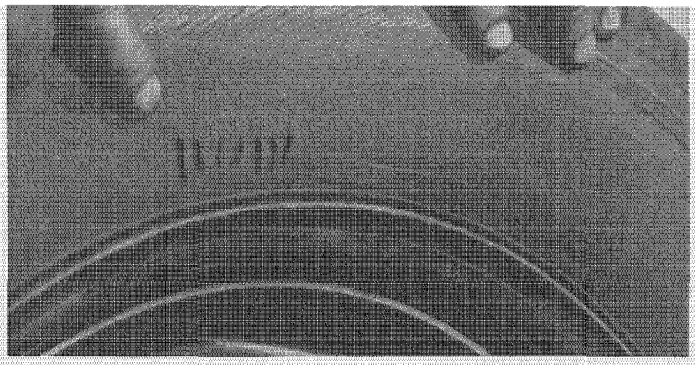
In January, 1955, Du Pont began a test with the City Cab Co. of Wilmington. City Cab started out with 27 new nylon cord tires and 28 made with rayon cord. All were four-ply 6.70 x 15 tires with conventional inner tubes.

Twenty-one months and more than 100,000 miles later, none of the original rayon tires was still in use. All had failed in service, more than half because of impact or flex breaks in the tire fabric. The others had succumbed to ply separation, cuts and repair failures.

In striking contrast, 19 of the original 27 nylon tires were still in service. All of these had rolled up more than



City Cab figures potential saving with nylon cord tires is $29 a year per cab.



Service stripes indicate that this nylon cord tire, one of those in the City Cab test, has been recapped seven times.

As demonstrated here, tire fabric is examined before each recap. Flaw disqualifies a tire from test

100,000 miles apiece and were still going strong after several retreads. Of the eight that failed, impact breaks had knocked out two, two more had suffered cuts, two had been victims of repair failure and two had failed after being run with too little tread remaining.

City Cab found that the rayon cord tires were good for an average of 2.1 retreads. So far the nylon tires have chalked up an average life span of 4.3 retreads. Since so many are still in use, the final average will exceed five retreads, according to those conducting the test.

At this writing, each nylon cord tire has cost City Cab 7.1 cents per 100 miles of service; the rayon tires cost 8.2 cents on the same basis. Projecting these figures, it's estimated that the use of nylon tires can save City Cab $29.42 per cab in a year's time. This is true despite the $3.68 higher unit price paid for the nylon cord tires when they were new. These cost figures stand to be bettered in favor of nylon, too, as the remaining test tires continue to clock more mileage.

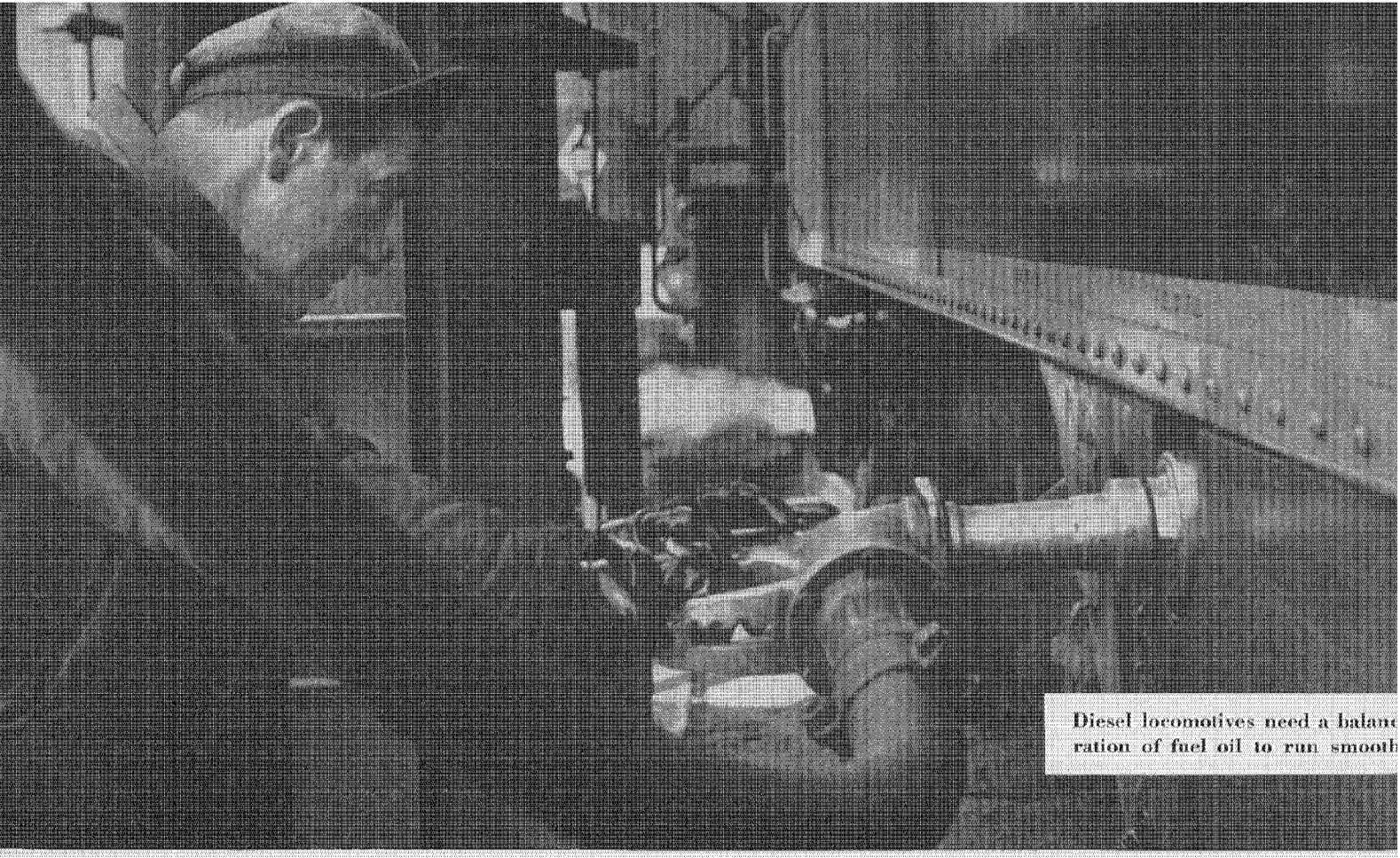
Further evidence in the same vein comes out of Jacksonville, where Guy Marvin's New Deal Cab Co. has rolled on nylon cord tires for the last four years. So severe are driving conditions, reports Marvin, that only four per cent of his cabs' rayon cord tires ever made it to the first retread without failing or requiring a major repair. With nylons, he's boosted the average to 90 per cent.

Marvin also operates a dozen airport limousines. They came equipped with six-ply rayon cord tires that seldom could be retreaded because of severe radial cracks. As they were taken out of service, Marvin replaced them with four-ply nylons. These have already been retreaded two or three times, the cab owner reports.

"Any limousine delivered to us in the future will have four-ply nylons," Marvin promises.

A number of other fleet tests of nylon cord tires are currently being conducted in cities around the country. Du Pont intends to publish the results as they become available. The main conclusion to be drawn, however, is already clear: it costs less to run commercial vehicles on nylons, and there are fewer annoying and costly tire failures on the road.

What's true for taxis also applies to the fleets of small delivery vehicles that pound the same rough pavement through the same foul weather as does the cabbie. For all of them it's the over-the-road price of a tire, not the rack price, that shows up in the books.



Diesel locomotives need a balan
ration of fuel oil to run smooth

Feeding time for diesels

. . . can account for half the cost of operating a freight locomotive. Now a chemical additive, Du Pont FOA-2, is making it possible for diesels to burn cheaper, lower-grade fuels

By PEG MINER

When diesels started rolling down the tracks of American railroads, they ran on a sirloin diet: premium quality diesel fuels. But after World War II, shortages of these straight-run fuels loomed as jet planes began gulping a big share of production. The high cost of standard diesel fuel darkened the situation even more when freight car-loadings—the chief source of railroad profits—started to dip in 1953.

Most roads were figuring fuel charges at more than half of the operating cost of a diesel freight engine. To a railroad using 180 million gallons of diesel fuel a year, a saving of only one cent a gallon could mean keeping $1.8 million in the treasury.

Many roads decided that their young diesels, like spoiled children, would have to eat hamburger and like it. They ate it and didn't like it. For the new diet they got was thermally or catalytically cracked instead of straight-run fuel.

Among the problems raised by these economy fuels, instability was the worst. An unstable fuel forms sludge deposits that plug filters and cause injectors to stick. In the office of W. T. Robinson at Du Pont's Petroleum Laboratory, a visitor can see photographs of filters, monotonously similar in their heavy coating of sludge.

"These are from field tests that we helped railroads and oil refiners run with economy fuels," Bill Robinson says. "The relatively clean filters in these other photographs came from engines in which Du Pont's Fuel Oil Additive No. 2 was used. FOA-2 coats the tiny particles so they won't clump together and form bigger ones that plug filters. And it cuts down the formation of residue in the first place."

A second difficulty with economy fuels is that they don't always get along with each other. Since most railroads buy fuel from several refiners and refuel locomotives from different tanks along the way, fuel mixing is inevitable. In the face of this incompatibility, FOA-2 acts as a peacemaker. It smooths over the chemical antagonisms between the fuels, and prevents the heavy sludge build-up that otherwise would occur.

Bill Robinson has logged thousands of miles studying economy diesel fuels in service on many of the major

railroads. An incident that still stands out in his mind dramatizes the effects of filter plugging from sludge.

The local freight that was being used for a test of an untreated economy fuel rolled smoothly until it was well out in the country, Robinson recalls. "Then, plunk, we stalled on the main line, miles from a town, with a crack passenger train due in 15 minutes. The flagman walked out as far as he could and placed signal flags. The conductor took off to find a telephone. By the time the dispatcher could send a tow engine, though, that passenger train was badly delayed."

Another reason for the popularity of FOA-2 hinges on a big concern of the railroads: engine exhaust sparks. Carbon deposits, which tend to build up in exhaust systems, are dislodged and thrown out when the engine runs hard and hot. A metallic additive is likely to increase the size and cohesiveness of these particles and decrease their glow temperature, boosting the chance of starting a fire. That's why some railroads now specify an ashless, nonmetallic additive like FOA-2.

RESIDUALS: NO TONIC FOR DIESELS

A new job for FOA-2 is in residual fuels, those low men on the petroleum industry's totem pole. Residuals, which smell like sulfur and run like molasses, are about as palatable to a diesel as sulfur-and-molasses was to our grandfathers. In addition, the impurities they contain are born enemies of engine parts. A few railroads are beginning to use dual-fuel systems, which save wear. Diesels start up and idle on economy-grade distillate from one tank, then are switched to residual blends when they move to full speed.

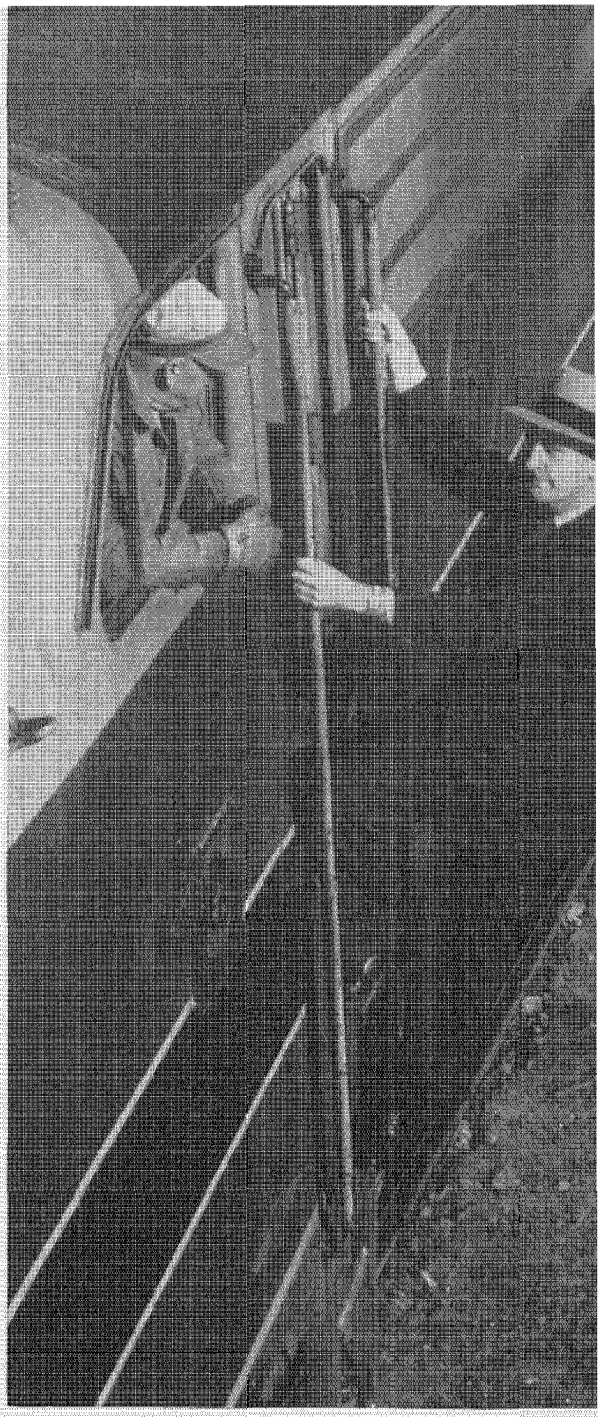
Pioneering still another approach, Missouri-Kansas-Texas Railroad Co. hopes to avoid the expense of converting engines to dual systems. The "Katy" wants to find one moderately heavy oil that will work under all conditions.

A few months ago, their fuel engineers sent samples to the Du Pont Petroleum Lab for study, as railroads often do. On the basis of tests, Du Pont technical men recommended that FOA-2, in sizable doses, probably would assure a smooth-running engine.

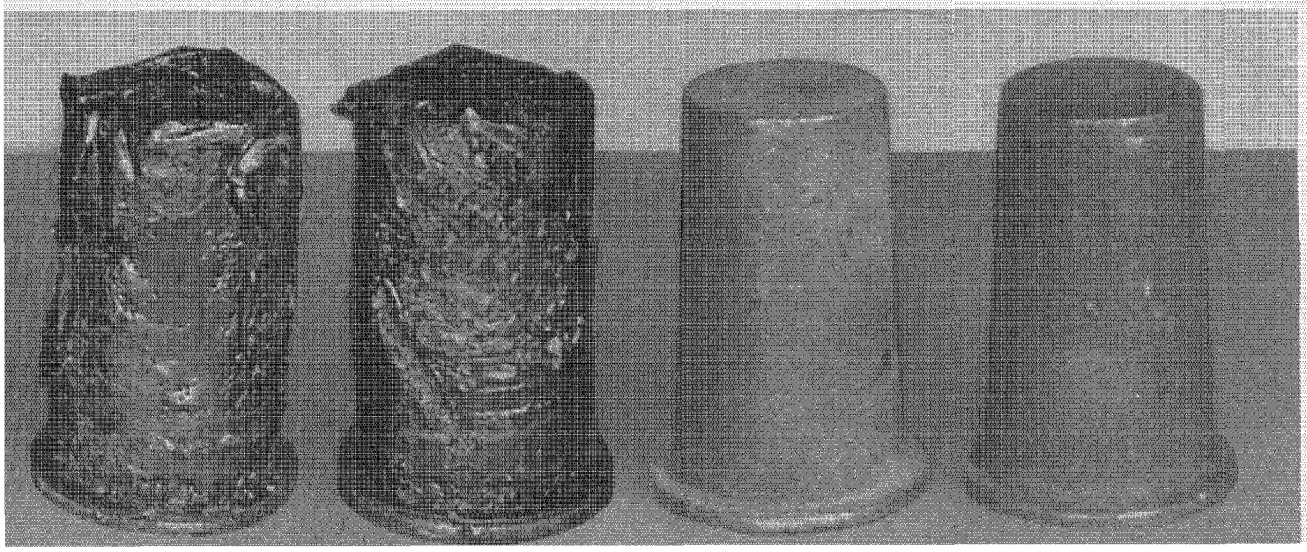
The results, according to Clay Lewis, the "Katy's" test engineer, far exceeded expectations. "The experiment has been a spectacular success," he wrote. "After three weeks of service, in engines fueled with a residual blend containing FOA-2, the filters were *cleaner* than would be normally expected with standard fuel." Filters used with an untreated residual blend were badly plugged in a week, he reported.

Further tests are necessary to discover whether a residual fuel, with its load of impurities, will cause more expensive engine wear than can be offset by its rock-bottom price. But, as far as the "Katy" is concerned, FOA-2 has proved its worth in keeping the diesels from getting indigestion on such a diet.

FOA-2 also is going into furnace oils for homes and industrial plants, but its biggest use to date is on the rails. The diesels, once churning along on their economy foods with, perhaps, a nervous "I think I can—I think I can—I think I can," are now concluding, with the little locomotive in the children's tale, "I thought I could!"



Du Pont's Bill Robinson (right) has rolled thousand of miles, helping roads study economy diesel fuels



Economy fuel clogge filters in "Katy" engi (far left) in one wee The cleaner pair serve for three weeks in fuel treated with FOA-

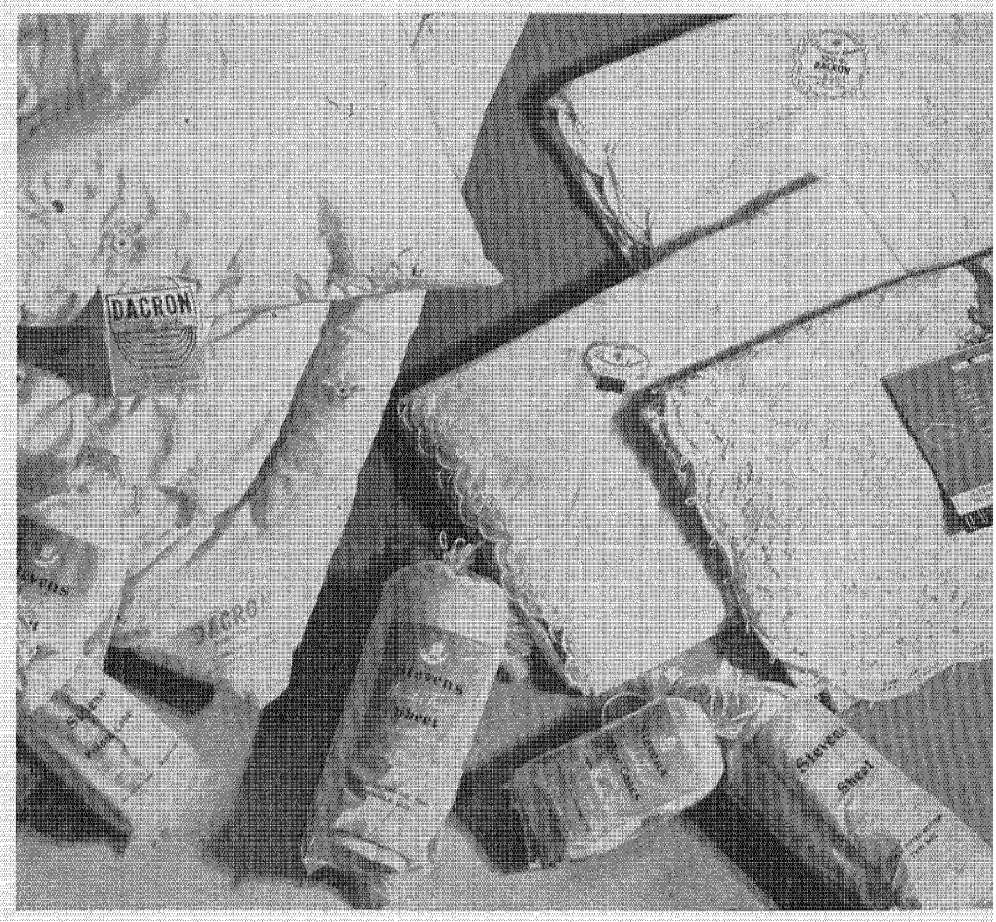
Blankets of 100% "Orlon" ($15) are light in weight yet warm. Machine washable, too. These by Chatham are at Wanamaker's, Kennard's, other fine stores.

PRACTICAL GIFTS...
more practical than ever

Home furnishings and apparel items like these are what people call "practical" gifts. But the ones we've picked for you here are more practical than ever before, thanks to the properties of Du Pont nylon, "Orlon" acrylic fiber and "Dacron" polyester fiber. With quality products made from these modern living fibers, you give a new level of performance and a new ease of care that make your presents doubly appreciated.

Delight your family by seeing that several of these gift items are waiting for them under the Christmas tree. And to make sure you aren't left out, leave this issue of the *Du Pont Magazine* where the others can't miss it!

NOTE: *Retail prices quoted in captions are approximate.*



PILLOW, COMFORTER and bolster (not shown) are filled with "Dacron" polyester fiberfill for unusual comfort and resilience. The pillow is $6, and the comforter $15.

SHEETS, PILLOW CASES are of nylon tricot in white, four pastels. Single bed sheet $3, double $4, pillow cases $1

LACE DINNER CLOTHS of "Orlon" ($29), nylon ($ and "Dacron" ($17) are lovely to look at, long wear, and outstandingly easy to care for.

NYLON
ORLON®
ACRYLIC FIBER
DACRON®
POLYESTER FIBER

Du Pont fibers open your home and your wardrobe to modern living.

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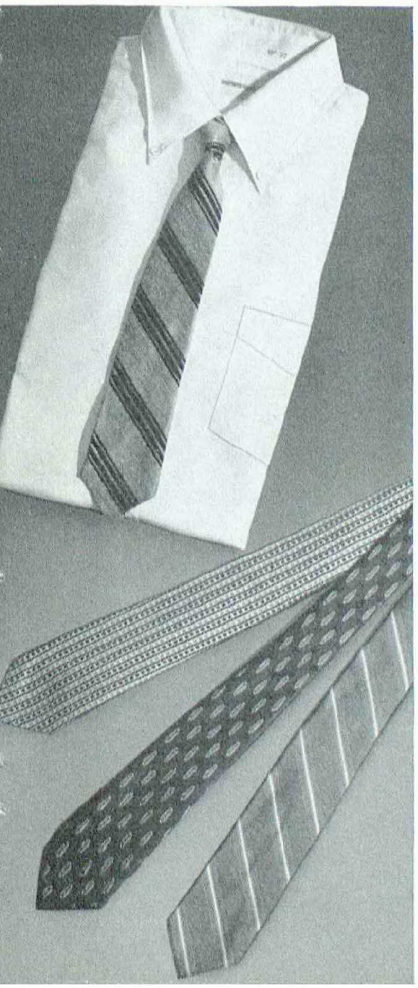
BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

She'll glow at this luxurious sweater that's so easy to care for. It's 100% "Orlon", costs about $15.

Ski sweaters of 100% tow-dyed "Orlon" ($8 to $13) wash without blocking. Socks of "Orlon" ($1 to $3.50) rate high in comfort.

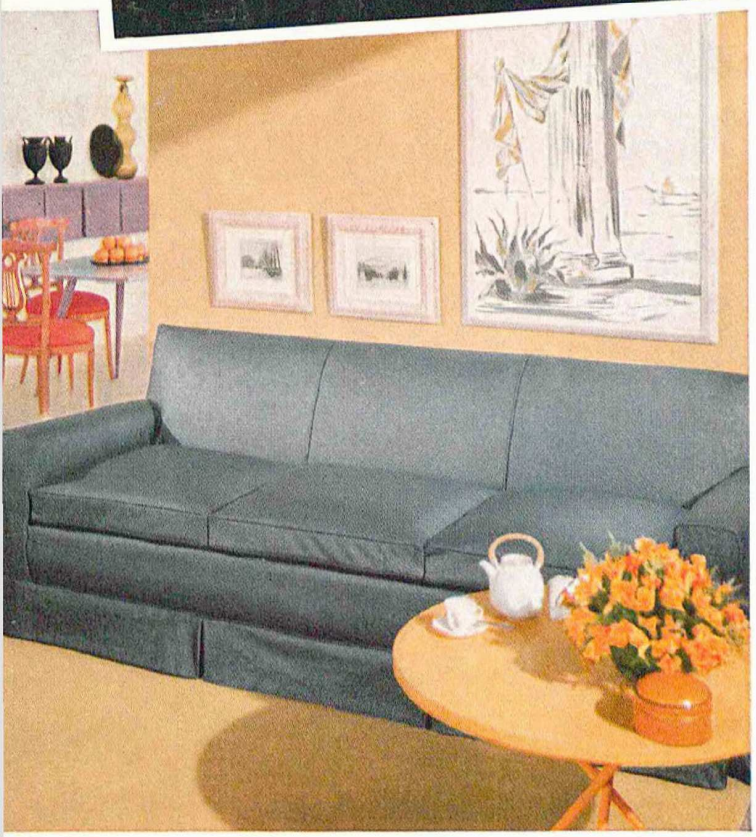
Young skier wears nylon jacket ($25), sweater of "Orlon" ($5), slacks of 65% "Dacron" and 35% rayon ($8), all wash 'n wear.



Shirt is of "Dacron" in "Taslan" textured yarn for comfort and all-day neatness ($11). These handsome ties of "Dacron" are washable.

Boudoir robe ($23) is softly feminine, can be washed repeatedly because it's 100% nylon.

ADD BEAUTY, SUBTRACT DRUDGERY WITH EASY-TO-CLEAN FABRILITE* FOR FURNITURE AND COLORFUL, WASHABLE TONTINE* WINDOW SHADES



Fashion-right Du Pont "Fabrilite" wipes clean in seconds

Spills don't matter when your furniture is covered with dependable "Fabrilite" vinyl upholstery material. It wipes clean with the whisk of a damp, soapy sponge. "Fabrilite" also has a dry, high-slip surface that collects less dirt from day to day. Thousands of invisible pores breathe for soft, airy comfort.

This Du Pont coated fabric is smart looking, too. You have a wide choice of patterns in deep tones and pastels. Better stores carry quality furniture in "Fabrilite"; leading upholstery shops recommend it for reupholstering. Mail coupon below for samples.

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BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

Watch "Du Pont Theater" on Television

Set your rooms aglow with shades in soft Sky Colors

Enjoy the lightness of spring in your rooms all year long! Window shades of "Tontine" shade cloth in air-fresh Sky Colors bathe your interiors in natural, flattering light in any season, diffuse glare into glow as they protect drapes and other furnishings from fading. Sky Colors complement the smartest of draw drapes, actually enhance the colors of walls, rugs and upholstery.

And shades of "Tontine" resist soiling, are completely washable. For free Sky Color swatches, mail coupon below, or look in the Classified Directory for the dealer nearest you who sells Du Pont "Tontine" window shade cloth.

*Registered trademarks

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Wilmington 98, Del.

Gentlemen:

Please send me . . .
☐ Free "Tontine" Sky Color swatches
☐ Samples of "Fabrilite" upholstery

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