

PLAINTIFF'S
EXHIBIT

ETC-115

ROY N. CLOTHIER

ETC 28788

ETHYL NEWS INDEX—1955

AGRICULTURE

- Farming on Oil (Petroleum's many uses in agriculture) July-August
 Pattern for Plenty (Power farming is a big provider) September-October

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 Engineers of Progress (50th anniversary salute to the SAE) January-February
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 Made in Canada (New plant in Sarnia, Ontario) January-February
 Named to New Posts in Ethyl's Sales Department May-June
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 New Flock of Birds, A ("Roadbirds" help sell premium gasoline) March-April
 New Storage at Edge Moor (Tank added at field terminal) March-April
 Plus in Motor Plus, The (Added value in new "Ethyl" fluid) May-June
 Quality Reports (Improved gasoline surveys) March-April
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Problems Solved in Seconds (Electronic computers)	March-April
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Scientists in the Making (National Science Fair)	September-October
Teaming Up on Trash (The work of Keep America Beautiful, Inc.)	March-April
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Vacation Time, U.S.A. (It adds billions to the national income)	May-June
What's Ahead for Sodium	January-February

PETROLEUM

Consumer Looks at Federal Control of Natural Gas, A	January-February
Fabulous Fuel (How gasoline has changed our way of life)	January-February
"Much Ground for Encouragement" (Centennial of Silliman report)	May-June
Oil Roads Lead to Rome (World Petroleum Congress)	March-April
They're All Part of the Service (Free service station courtesies)	September-October

SPECIAL ISSUE

American Petroleum Institute annual meeting	November-December
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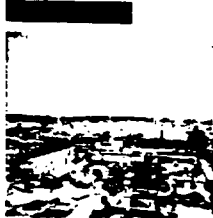
ETHYL NEWS



JANUARY—FEBRUARY 1955

ETC 28791

BEHIND THE NEWS



The color photograph of Ethyl Corporation's manufacturing plant at Baton Rouge, La., on the front cover relates directly to at least two articles in this issue. Together with Ethyl's antiknock manufacturing center at Houston, the Baton Rouge plant accounts for the consumption of billions of cubic feet of natural gas annually. See *A Consumer Looks at Federal Control of Natural Gas* (page 1).

The large red brick building in the picture's center foreground is where sodium, an essential element in the manufacture of tetraethyl lead and a versatile metal with many other present and future applications, is made by the electrolysis of salt. See *What's Ahead for Sodium* (page 8).

The term "high octane" has become such an accepted part of our mid-20th century vocabulary that it's no longer confined only to describing the quality of powerful gasoline. Sports writers, among others, have adopted the phrase and it's not uncommon to see it used to report the impressive performance of a football team, boxer, or other athletic participant displaying a powerful attack. Where and how the word "octane" came into widespread petroleum industry use, and Ethyl's part in introducing it, is told in *How the Octane Scale Was Created* (page 12).

Expansion of Ethyl Corporation facilities on two fronts is reported in two of this issue's articles. *Made in Canada* (page 15) announces the construction of a plant to manufacture "Ethyl" antiknock compounds for Canadian refiners at Sarnia, Ontario. *To Serve Refiners* (page 23) tells of the Company's plans to build a gasoline testing laboratory in Houston. The Canadian plant, to be owned and operated by Ethyl Corporation of Canada, Ltd., will be the third source of "Ethyl" fluid. Ethyl presently operates five gasoline testing centers throughout the United States to serve oil refiners.

ETHYL NEWS

Richard F. Cook, Editor

JANUARY-FEBRUARY 1955

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Opinions expressed in signed articles are the authors'. Ethyl News welcomes articles of timely interest submitted from outside sources. Upon request, the editors are glad to grant permission to reprint material appearing in Ethyl News.

Published by Ethyl Corporation, 100 Park Avenue, New York 17, N. Y., manufacturers of "Ethyl" antiknock compounds, used by oil companies to improve the antiknock quality of aviation and motor gasoline.

Edward L. Shea, President

William R. Perdue, Jr., Vice President and Treasurer

Herbert A. Savage, Secretary

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A Consumer Looks at Federal Control of Natural Gas*

By Edward L. Shea
President, Ethyl Corporation

IN THE TREMENDOUS postwar growth of America, one of the greatest expansions that has taken place has been in the natural gas industry. This phenomenal growth not only has made this efficient fuel available for more and more American consumers, it also has helped to lay the foundations for the great chemical empire that has grown up in the Southwest.

Ethyl Corporation, as an industrial consumer of natural gas, has benefited greatly from the availability of this fuel. Our Baton Rouge and Houston manufacturing plants together consume many billion cubic feet of natural gas a year. We are, therefore, keenly interested in the development of additional reserves of natural gas.

Speaking as a consumer, we are very concerned over the situation in which the producing branch of the natural gas industry now finds itself.

Previous Rulings

The problem concerns the Natural Gas Act of 1938. When it was originally enacted, the law stated that its provisions did not apply to the production or gathering of natural gas. In support of that declaration, the Federal Power Commission ruled on 11 separate occasions between 1938 and 1951 that it had no jurisdiction over sales of natural gas by independent producers and gatherers.

Even so, there was concern in some quarters that this intention of the Act could be misinterpreted—and there

was at least one effort to have the Act clarified. Unfortunately, this did not come to pass. Consequently, when the issue reached the Supreme Court last June, a 5 to 3 majority of the justices ruled that producers and gatherers of natural gas, whose product is sold in interstate commerce for resale, are subject to regulation and control by the Federal Power Commission.

Unfortunate Effect

This 5 to 3 decision, while concerned with a purely legal interpretation of the existing law, has had an unfortunate effect. For the first time in our history, it has brought the sale of natural gas by the producer under the control of the federal government. As matters stand, the terms on which a producer can sell his natural gas to interstate pipeline companies are subject to the decisions of a federal agency.

This turn of events has thrown the producing branch of the natural gas industry into a state of uncertainty. It has already had an effect upon several major projects which would have made natural gas available to more consumers throughout the country. Of greatest importance, it threatens the future growth and availability of this vital source of energy for homes and factories.

Under the new set of ground rules, natural gas producers have no real assurance of obtaining a reward corresponding to their great financial risks. Instead of competing and selling freely in an open market accord-



*An address before the Chamber of Commerce,
Baton Rouge, La., January 18.*

Ethyl Corporation is an industrial consumer of natural gas at its manufacturing plants at Baton Rouge, La., and Houston, Texas.

ing to the laws of supply and demand, producers' selling prices are now controlled by a government agency. Under these circumstances, the producers do not have the same incentive to risk their capital in seeking and developing new gas reserves.

It would be one thing if this problem concerned only the natural gas producers. Instead, it is something that affects the American public at large. The larger question is whether the best interests of the American consumer are served by federal regulation of natural gas or by our system of free competitive enterprise.

To those who have known and used natural gas for many years, it may be a little hard to appreciate how much this remarkable fuel has come to mean to the rest of the country. Within the last decade, it has grown to become one of our principal sources of energy. At the same time, it has been a major force behind the spectacular growth of the petrochemical industry, with about 40 percent of all petrochemicals today being derived from natural gas.

Millions of New Users

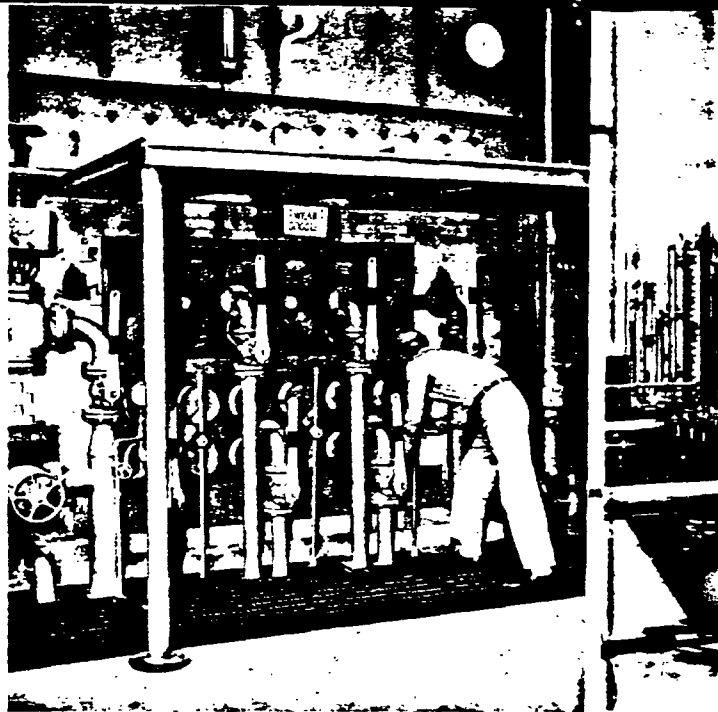
In this ten-year period, more than 12 million American families came to use natural gas for the first time in their lives, and to enjoy new comfort and convenience. Today, there are over 20 million homes using natural gas for heating and cooking while another four million homes use a mixture of natural and manufactured gas.

The number of commercial and industrial users has likewise more than doubled. Today, there are some 1,600,000 commercial establishments served by natural gas and some 82,000 industrial consumers like ourselves who use natural gas either as a fuel or as a raw material.

Besides the foregoing classes of consumers, there is still another group—the potential consumers who want natural gas but have not as yet been able to receive it. As an illustration, in four major cities alone there are

COPIES AVAILABLE

Reprints of the accompanying address, in booklet form, will be supplied upon request to the Public Relations Department, Ethyl Corporation, 100 Park Avenue, New York 17.



an estimated 270,000 householders on the waiting list for natural gas.

This remarkable growth in natural gas utilization didn't just happen. Instead, it came about because men with daring took a chance on the future—and put their money on their hunch. They went out looking for new gas reserves, developed their successful discoveries, and increased the production and supply of this valuable fuel. Other men laid long distance pipelines and built the greatest mainline transportation system ever seen in the world. A third group brought natural gas into homes and factories all over the country.

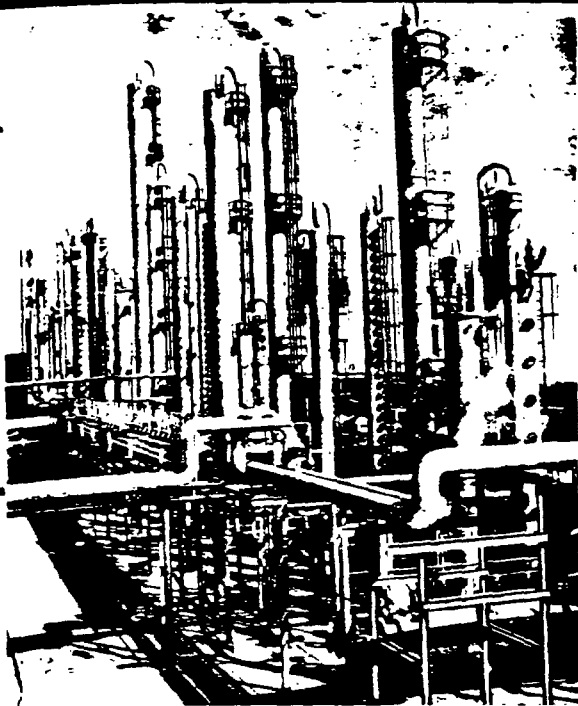
Two simple facts underscore this accomplishment. Natural gas today supplies nearly one-fourth of our nation's total energy requirements. Natural gas reserves have been increased to a level where they exceed our known reserves of liquid petroleum in terms of their energy content.

But even this does not tell the whole story. As natural gas was brought into their communities, people gained a new servant—doing everything from heating their homes and cooking their meals to drying their laundry and operating their air conditioning systems. In New York, New Jersey and Pennsylvania, there were four residential consumers of natural gas in 1954 for every single user in 1945. Industrial consumers likewise turned to natural gas to help them run their plants. In the Great Lakes area, for example, industrial consumers used about two-and-a-half times as much natural gas in 1953 as they did seven years earlier.

Natural gas, then, has played a significant part in

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In one of its effects on the American economy, the availability of natural gas helped build the chemical empire of the Southwest.

fuels—natural gas, oil and coal. In the process, natural gas nearly doubled its relative share of the energy market, oil also gained, coal lost ground. Without the availability of natural gas—and its competition with the other fuels—it is doubtful whether we would have come so far in so short a time.

This competition among fuels goes on every day in the week. There is a substantial group of industrial consumers who can use either natural gas or oil or coal in their plants—and can readily switch from one fuel to another. This very fact serves to make the prices of all fuels highly competitive at all times.

Two Considerations

So far as any consumer is concerned, there are two things he wants in a fuel. He wants to be assured of reliable and adequate supplies. And he wants to be able to obtain that fuel at reasonable cost.

Can the consumer be assured of either condition under a federally-regulated industry? I don't believe this is possible. Under present conditions, the consumer has no guarantee either of adequate supplies or of reasonable prices. If the present situation is allowed to prevail, the result will be less and less exploration for new gas reserves and a growing scarcity of available supplies.

The simple fact of the matter is that there is no good reason, from the standpoint of the consumer, for nat-

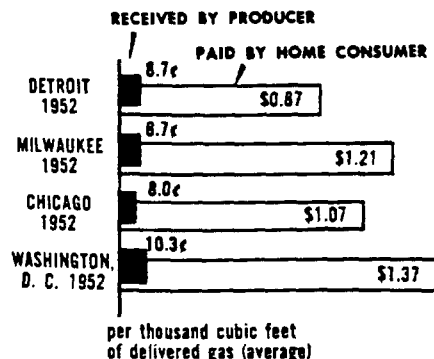
increasing our living standards in the last decade—both in helping to make our homes more comfortable and in helping industry to produce a broad array of products.

Our nation's postwar industrial expansion has brought many new and improved products to the American public. But this expansion was not accomplished only by tools and equipment. It was also made possible because of the availability of fuels to operate our industrial plants.

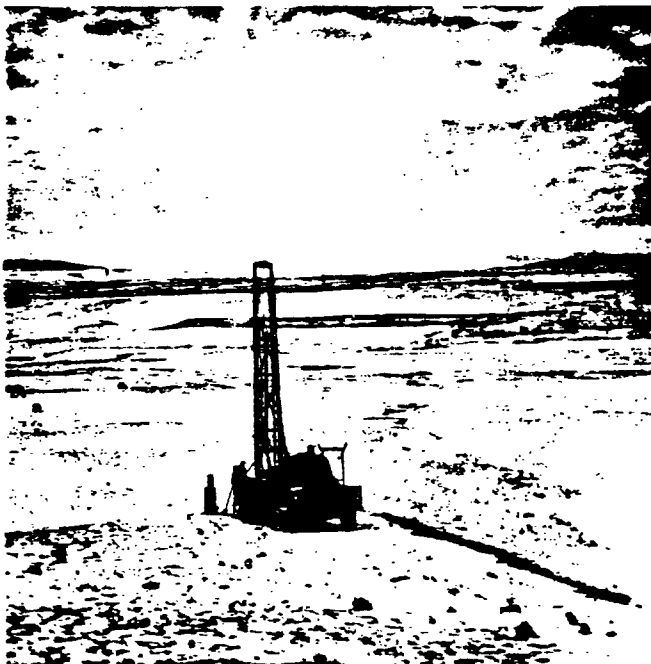
Thus, as we increased our industrial production, we required substantially greater amounts of energy, which resulted in strong competition among the three major

Below, a chart shows that only a small percentage of what consumers pay for natural gas goes to the producer. . . . Right, more than 20 million homes now use natural gas for heating and cooking.

PRODUCER'S PRICE IS VERY SMALL PART OF CONSUMER'S NATURAL GAS BILL . . .



ural gas prices to be regulated. The record since World War II shows that the retail price of natural gas rose far less for the average residential consumer throughout the United States than did the cost of living as a whole. Under these circumstances, natural gas continues to be an outstanding bargain. Nor does it make much sense, from a consumer's point of view, to control the price of natural gas and not control the prices of lumber or steel or any other commodity. The truth is that the consumer's best interests are served by free competition among all commodities.



Above, "men with daring took a chance . . . and went out looking for new gas reserves." . . . Below, "other men laid long distance pipelines . . ."



One thing that is not generally realized by consumers is that the price the natural gas producer receives for his gas represents but a small fraction of the delivered price to the householder. The farther away from the producing area the consumer lives, the greater is the cost of transporting and distributing the gas to him. Studies show that in 1953 the producer's price represented only about one-tenth of the average residential consumer price throughout the United States. The remaining nine-tenths of this delivered price was accounted for by the costs of transmitting and distributing the gas. Out of this one-tenth must come all of the producer's costs of doing business as well as his profits.

Again looking at this problem as a consumer, I fail to see any benefit from the federal regulation of the natural gas producers. Unlike the pipeline operators and the local gas distributing companies, the natural gas producers are not public utilities. They have no government franchise, no exclusive market for their product free of competition, and no assured fixed return on their investment. Instead, gas producers must take their chances all the way. They must, on the one hand, compete against other producers of natural gas and against producers of fuel oil and coal. On the other hand, they must take all of the risks involved in exploring for gas and its subsequent development.

Face Great Risks

As in drilling for oil, all of these thousands of producers face great risks in exploring for new gas reserves, with large investments required to drill exploratory wells and only about one chance in nine of finding anything. While the average exploratory well may cost around \$100,000 to drill, it is not uncommon for a producer to spend a million dollars and more in bringing in an exploratory well. With widely varying exploration costs and widely varying degrees of success, it is literally impossible to apply a pricing formula for natural gas that would be fair and equitable to all producers.

Another consideration is that natural gas frequently is produced in combination with crude oil. As a matter of fact, about one-third of all the gas now produced comes from oil wells. In view of the fluctuating oil and gas ratios from the same well and field, it is extremely difficult to segregate the relative costs.

At the same time, industry spokesmen warn that the increasing demands for natural gas cannot be met by accidental gas discoveries in the search for oil. Indeed, they point out that, under present conditions, federal

(Continued on page 24)

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Fabulous fuel



Through the magic of gasoline-propelled air travel, businessmen criss-cross the country in a matter of hours.

Gasoline is a tremendous force that has changed our entire way of life

AT AN AIRPORT in San Francisco, a businessman steps aboard an airplane. A few hours later he is attending an important sales conference in Chicago.

In the New Jersey suburbs, a housewife drives her husband to the railroad station, drops the children off at school, does her shopping and banking, attends a club meeting, and returns home in plenty of time to attend to household chores.

In Iowa, a farmer at the wheel of a tractor cultivates field after field in the time it took his father, behind a team of horses, to plow just part of one field.

In Homestead, Fla., a truck driver climbs aboard his semi-trailer and starts north on Route 1. A few days later, housewives in Baltimore have fresh, out-of-season vegetables on their dinner tables.

These seemingly unrelated episodes are closely connected. They are possible because of gasoline — the liquid that changed the face of the earth. Since it flows from pump hoses at 200,000 service stations throughout the country in prodigious quantities, gasoline has come to be regarded as quite ordinary. Actually, it is a tremendous force that has changed the entire texture of life.

Gasoline has provided mobility; it has put us on wheels. In this country, we have traded millions of front porches for enough automobiles to hold the entire population — and provide transportation for a few smaller nations at the same time. Gasoline permits us to live anywhere, work anywhere, buy anywhere.

In just one of its effects on everyday life, gasoline

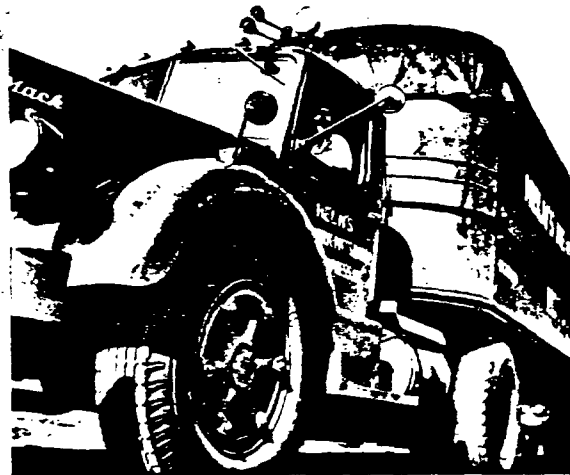


The automobile has enabled the suburban housewife to do lots more for her family and still have plenty of time for her own activities.



Efficient gasoline-powered tractors and other labor-saving machines have helped raise farm production to new heights.

Trucks are a mainstay of American transportation, moving everything that we eat, wear and use at least part of the way.



has remade rural America. We may cherish the memory of the little red schoolhouse—but it was not the best place in the world to get an education. Today, seven million children ride buses to well-staffed central schools. They are offered an education that was undreamed of in the country as little as a generation ago.

Similarly, gasoline created an entirely new concept of rural health. Not too long ago, swiftly moving sickness was a sentence of death for thousands of people in rural areas. Now, the doctor is there in his car, modern drugs in his satchel. In the case of accident or more serious illness, an ambulance is quickly available.

Replace Animals

Gasoline has changed the rural scene in other respects, too. In 1920, there were 25 million horses and mules on American farms. Today, there are about six million. Nineteen million animals have been replaced by some seven million trucks and tractors working tirelessly and efficiently raising agricultural production to new high levels.

The power produced by gasoline is staggering to the imagination. We take pride in Boulder Dam, Muscle Shoals, Grand Coulee and other great hydroelectric projects. But American automobile and truck engines in use today are capable of producing over 50 times the installed horsepower of all the central power plants in the United States. The gasoline-propelled horsepower on our farms exceeds the amount in use in all American factories. Gasoline and its related fuels supply over half of all the energy used by the entire nation.

Vitally essential in war and peace, gasoline is used by America at the rate of 50 billion gallons a year.

Gasoline-powered trucks are a mainstay of our trans-

portation system, moving 90 billion ton-miles of the nation's products annually. Everything that America eats, wears and uses moves at least part of the way by truck.

There is an automobile in nearly two out of every three families, each using between 600 and 700 gallons of gasoline a year and providing between 9,000 and 14,000 miles of transportation.

To a great degree, gasoline—and the industry behind it—are typically American.

Schoolbooks relate that the petroleum industry dates from 1859, when the first successful oil well was drilled. Actually, a handful of men in New York, Pennsylvania and elsewhere were refining petroleum long before it was found in commercial quantities. Step by step these men uncovered markets for the strange new product they had brewed. Such efforts expanded a hundred-fold after 1859, when it was proved that oil could be found by drilling holes in the ground.

In turn came the geologists and engineers who found scientific means of searching for oil in the earth and efficient methods of bringing it to the surface. Other men developed better ways of refining oil and transporting it. Still others created that remarkable American institution, the service station.

Scientists studied intricate petroleum molecules and rebuilt them more to their liking. They produced gaso-



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line, then more gasoline, and finally a superior motor fuel—and at a bargain price.

Why and how is this possible? Why did America outstrip the whole world in developing the great petroleum industry that was to give us this fabulous fuel called gasoline?

America has been blessed with unusually large deposits of petroleum, it is true, but geological evidence indicates that other parts of the world may have far greater reserves.

Here, though, we didn't shackle the industry with legal restrictions or decide that the government could do a better job than some dedicated man with a gleam in his eye. We encouraged wildcatters to seek oil—but didn't tell them where they should seek it. If a man wanted to drill a well in his own backyard or off in the wilderness, that was his own affair.

America smiled on competition—and the men who were attracted to the oil industry put on one of the fiercest economic dogfights the modern world has seen. When pipelines threatened to take millions in revenue away from the railroads, no legislation was passed to stop them. If one refiner was able to produce a gasoline clearly superior to that of his competitors, he was

cheered for his accomplishment. If there were two filling stations at an intersection, there was no law to prevent a third from opening up.

The gasoline-consuming public has been the greatest beneficiary of all. Aided by better gasoline, average automobile engine horsepower has increased from 60 to more than 170, while ton-miles per gallon have increased over 50 percent. These things have brought more powerful, more efficient, and more economical transportation to the motoring public. The gain in fuel economy is estimated to save American motorists several billion dollars a year on their gasoline bill and has conserved billions of barrels of crude oil for use in coming years by future generations.

Public Benefits

Meanwhile, the motoring public also has benefited from reasonable prices for gasoline. Virtually everything else we buy costs much more than it did 30 years ago. Yet the price of gasoline, exclusive of taxes, has risen only slightly.

Selling its product at a slight increase in price would be a major accomplishment for any industry. But throughout the last three decades, the oil industry has not only done this, it also has consistently improved the quality of gasoline until it is more than 50 percent greater than it was in 1925.

Such bargains don't just happen. Many men and many companies have contributed to the great progress that has produced this daily flow of millions of gallons of gasoline at a bargain price. #



Transported to modern schools by bus, children now get an education that once was undreamed of in the country.

Science has played a leading role in the development of modern gasoline, which in turn has done so much to change the fabric of everyday life in America.



What's ahead for SODIUM

By Stanton P. Nickerson

THE FORWARD MARCH of industrial technology requires three kinds of troops—veterans of successful campaigns, new recruits with promise of earning combat ribbons, and those with proven abilities ready to win still more honors.

Sodium belongs in the third classification. Discovered in 1807 and first made electrolytically on a commercial scale in 1891, sodium has found varied and useful applications ranging from hardening locomotive bearings to the manufacture of detergents, pharmaceuticals, nylon stockings and cosmetics.

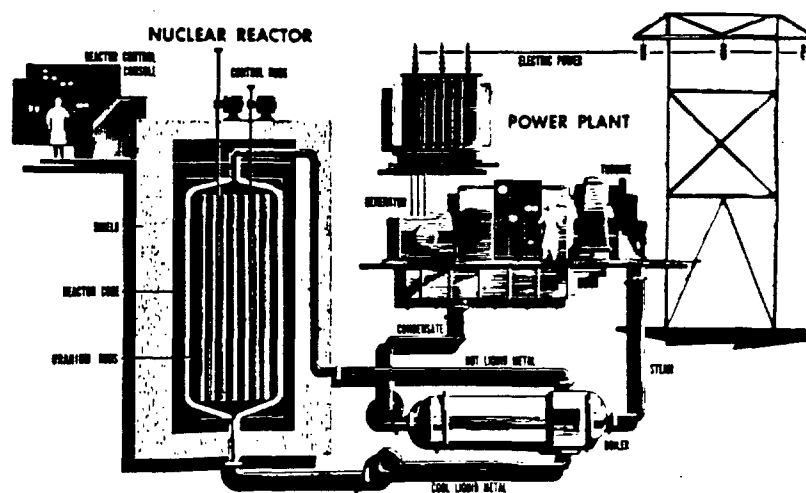
The soft, silvery metal, an element in common salt, helps speed motorized transportation as an intermediate in the manufacture of tetraethyl lead, as a valve-coolant, and as a component in non-glaring street lights. Few chemical elements are so versatile.

Still, the full potentialities of sodium are just beginning to be realized, evaluated and applied.

Investigations show that sodium has promise of significant application in petroleum technology and in

In one of its more spectacular applications, sodium is used in rockets and guided missiles.

Below, research has been carried out with sodium as a medium to remove heat from nuclear reactors used to produce steam and generate electricity.



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*The best years of its life may be in the
offing for this versatile metal as new
technology creates new uses*

certain petrochemical processes. Pilot plant experiments indicate that in liquid form it may some day be used to help convert atomic energy to constructive ends in nuclear reactors. The manufacture of a valuable new metal, titanium, may well depend upon the physical and chemical properties of sodium.

Sodium or materials made with it may even propel guided missiles and rockets—perhaps to the moon.

As the world's largest sodium manufacturer, Ethyl Corporation anticipates an increasingly important role in supplying the product in different forms and quantities for a variety of new purposes. At its plants in Baton Rouge, La., and Houston, Texas, Ethyl produces sodium and chlorine—both used in the manufacture of tetraethyl lead—by the electrolysis of salt. Both plants can easily produce more sodium than they require, however, and Ethyl makes it available to other consumers in tank cars, drums, and in bricks.

As one of its possible applications, metallic sodium has been added to the list of chemicals which can perform an ideal job of stability improvement in oil refining. Sodium treatment of oil samples produces desirable changes such as improvement in odor, color and color stability, storage stability and reduction of dissolved gum. It also is an effective desulfurization agent.

Unsolved Problems

Although there is little question about the unusually effective jobs which the element can do, certain unsolved problems have delayed a widespread use of sodium for many of its capacities in the oil industry.

In petrochemical operations, sodium can be used advantageously to remove impurities from hydrocarbon feed materials, and as a raw material in the manufacture of intermediates for new drugs and insecticides, to cite two general examples. Under suitable conditions, it also may be employed in the conversion of butadiene to unsaturated dibasic acids. These have good raw material potentialities in making plasticizers and synthetic lubricants.



Titanium, which can be made efficiently by a sodium process, may be vital in planes of the future.

Applying sodium for the reduction of a number of fats and oils yields fatty alcohols with a ready place in the manufacture of synthetic detergents. These alcohols also promise to be key raw materials for lubricating oil additives.

With the world moving closer to the time when atomic power will be utilized for industrial and related purposes, sodium may be called upon to help perform new miracles in still another field. Research has been carried out with sodium and sodium-potassium alloy as heat transfer media to remove heat from nuclear reactors used to produce steam for generating electricity. The Knolls Atomic Power Laboratory is convinced that the system is feasible, since sodium's heat transfer performance has agreed closely with predictions.

If recently published plans for utilizing atomic energy in aircraft materialize, sodium may take wings as a heat transfer medium in the air, too.

Ethyl already has supplied sodium to atomic laboratories for many studies, including those related to the Navy's new atom-powered submarines.



Left, the drying of salt is one of the first steps in the manufacture of sodium. . . . Above, some of the tanks where sodium is stored at Ethyl's plant at Baton Rouge.

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Successful application of sodium in such new and significant ways may well encourage similar attention in established industries. Other properties of the metal, including its reactivity, easy pumping in liquid form, low melting and high boiling points, and the fact that sodium conducts electricity even better than copper, offer interesting challenges to metallurgical research and development efforts.

Its untapped versatility is further underscored by the fact that greater and more efficient production of titanium, the valuable new material with the most remarkable weight-strength ratio of any well-known metal, will apparently hinge upon what sodium can do in a better manufacturing process.

Replaces Magnesium

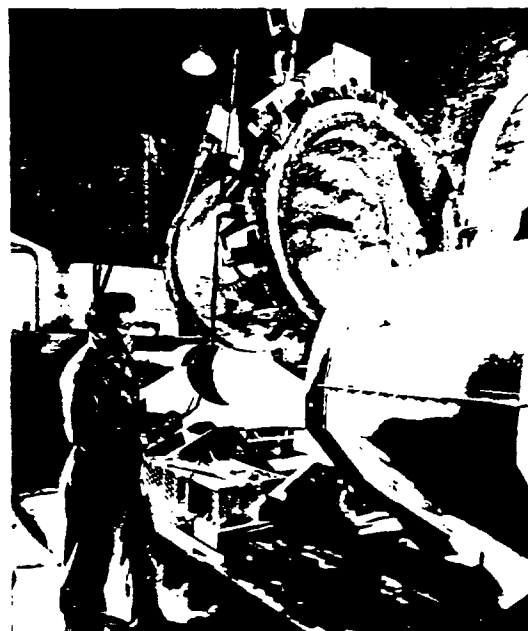
The first successful commercial titanium manufacturing process, developed by Dr. William J. Kroll of the Bureau of Mines, in his native Luxembourg just before Hitler's panzer divisions rolled across Europe, involved the reduction of titanium tetrachloride by magnesium. Now, however, the Electro Metallurgical Company has started building a \$31 million plant in Ashtabula, Ohio, where sodium will be used rather than magnesium. In England, Imperial Chemical Industries is constructing another large sodium-process plant.

This process is believed to have quality advantages

over the Kroll method, and should help pave the way for new and better titanium alloys capable of "fighting adverse conditions of heat, pressure, fatigue and corrosion." The new sodium-process plants being built and planned mean that more and better supplies of the important metal are at last in sight.

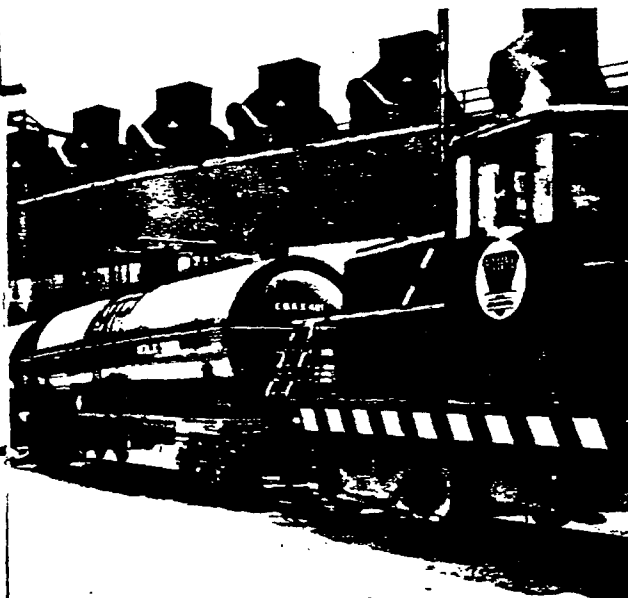
At present, titanium's high cost is a major factor in limiting applications. Prices stand at about \$4 to \$5 per pound of sponge, with forging stock and sheet metal

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As the world's largest sodium manufacturer, Ethyl makes the versatile metal available to industrial consumers in brick, drum and tank car quantities.

The greatest potential for strong titanium alloys in airplane manufacture is in structural applications, according to the Aircraft Industries Association. Many plane and engine companies also see a major place for the metal in engines and other non-structural parts. At least one manufacturer believes titanium essential for supersonic planes. Another maintains it can be used advantageously for a complete aircraft.

It is generally agreed that high speed jet planes of the future, both military and civilian, will require titanium. It withstands heat much better than aluminum and magnesium, and expands less.

National Defense Uses

Enthusiasm for titanium is shared by the Navy, not only for aircraft but also for wet-exhaust mufflers and snorkel and condenser tubes, where its high resistance to corrosion makes it invaluable. The Army recognizes the great potential value of titanium in reducing the weight of tanks and other equipment, and in making light, strong items for the individual soldier.

For these and other strategic reasons, the titanium industry is being encouraged by the Department of Defense, which foresees an annual demand for 150,000 tons within 5 to 10 years.

At the recent National Metal Exposition in New York, displayed articles made from titanium included a racehorse shoe, camera shutter leaves, a chemical filter screen, an arch support, and wire for artificial limbs. An experimental petroleum tank truck also has been built from titanium.

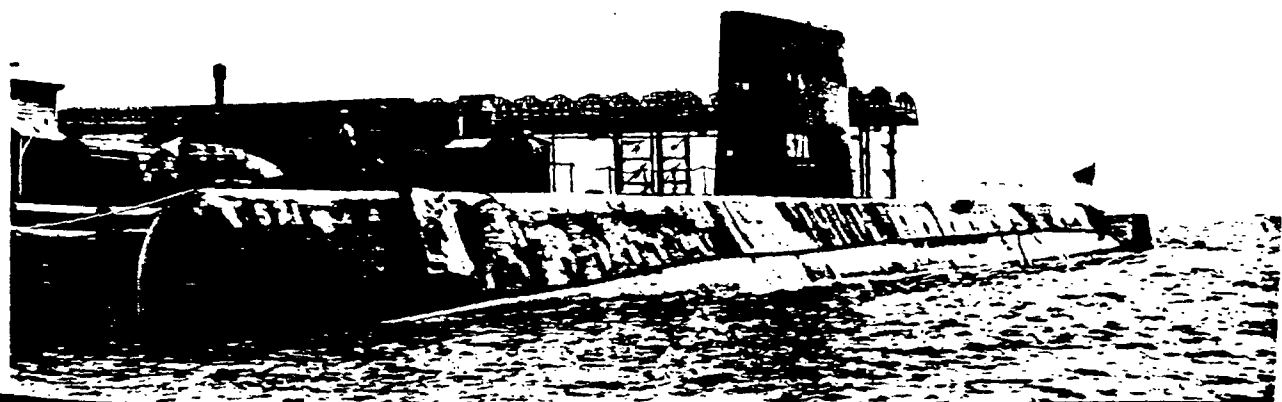
While it has many proven and potential civilian applications, stockpiling the metal for national defense will necessarily postpone the time when everyday products made with titanium are generally available. And government financial assistance may come to the industry for a few years, until it is more firmly established. Even so, an annual volume of \$1 billion has been predicted within a short time—giving mankind another invaluable product made possible, in part at least, by the unseen hand of sodium. #

running up to three times as much. Comparatively low prices for sodium and the application of other manufacturing refinements should help reduce costs.

Titanium quantity, quality and cost are important, especially in the aircraft industry. In general, weight eliminated in a plane's basic design can result in greater carrying capacity or greater range, higher speeds or a smaller aircraft for the same mission, and possible cuts in costs per plane.

As more and more of the new titanium metal is manufactured, its present high cost, a limiting factor in its widespread use, may be substantially reduced.

Atomic generating plants, in which sodium may be used, are destined to power ships of the future. The first atomic vessel, the submarine *Nautilus*, is shown below.



How the OCTANE-S

By Dr. Graham Edgar

THIRTY YEARS AGO, when the automobile was fast becoming a major part of the American scene, the need for a dependable method of determining and evaluating the knocking characteristics of gasoline was urgently apparent.

Chemists and engineers had attacked the problem on many fronts, and by the mid-1920's several methods of expressing the tendency of a fuel to knock were in use. But all had the common drawback of not being constant or truly reproducible, even from one test to another in the same laboratory. None provided absolute data on which to base a fuel rating.

What was needed was a uniform standard that would permit laboratories anywhere, anytime, to evaluate satisfactorily the antiknock quality of any gasoline.

Against this background the research laboratories of the newly-formed Ethyl Corporation undertook in 1924 the search for such a standard.

In those days, the standards we used to determine the knocking tendency of a test fuel was finished gasoline from a refinery in Lima, Ohio. To each gallon of the gasoline we added 3 cc. of tetraethyl lead. That was the "Ethyl standard." In rating a commercial fuel, we merely compared the fuel with the "Ethyl standard," adding up to 3 cc. of TEL per gallon to make it match the knocking characteristics of the "Ethyl standard."

Compared Samples

When our original supply of gasoline from the Lima refinery became exhausted, we ordered another carload to the same specifications. After adding the usual 3 cc. of TEL per gallon, we compared it with a sample from the previous batch of "Ethyl standard."

To our surprise—and dismay—the two were not equal. This made it clear that gasoline, even from the same refinery and to the same specifications, could not be relied upon as a satisfactory standard, or reference fuel.

On thinking the matter over, it seemed that only some pure hydrocarbon — always reproducible — could serve as a constant standard. Pure substances, such as benzol and alcohol, were available, but these belonged to the class of relatively nonknocking fuels and so could



Dr. Graham Edgar

only be used in connection with some nonreproducible "standard" gasoline.

At that time, it was generally assumed that the paraffin hydrocarbons produced bad knock. Therefore, it seemed that one of them treated with TEL might provide a promising standard. Since the average molecular weight of gasoline of that day corresponded to approximately C_8H_{18} , we decided to make one of the octanes the base for our standard. In the light of what we knew then, it did not appear to make much difference which one of the eight theoretically possible octanes we used.

We searched scientific literature for an octane that would be relatively easy and inexpensive to make, but found none. But Beilstein's *Handbook of Organic Chemistry* contained a reference to an octene that had been made by treating tertiary butyl alcohol with sulfuric acid (although the corresponding octane had never been prepared). Tertiary butyl alcohol had just been put on the market at a reasonable price by A. D. Little of Boston. We bought some, made the octene, and then hydrogenated it to form a liter of the corres-

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SCALE was created

Of the many petroleum industry trade words, none is more readily understood than *octane*. To the motorist and to the general public, terms such as "high octane" and "top octane" have come to be synonymous with power and top-flight performance. Accordingly, many oil companies use these terms widely in their advertising and in the educational materials that they distribute.

Ethyl Corporation is proud of the pioneer role it played in creating and perfecting the octane scale—the yardstick that is universally used to measure the antiknock quality of motor gasoline—and in popularizing the word *octane*. The accompanying article, in the words of the man primarily responsible for the octane scale, tells how it came into being.

The author, Dr. Graham Edgar, was Ethyl Corporation's director of research at the time he devised the octane scale, and was actively associated with the Company for 28 years. Upon his retirement as a vice president in 1952, he was appointed a senior consultant.

—The Editor.

ponding octane, which had the formula of 2,2,4-trimethylpentane.

Since we assumed that the new octane would knock badly in our test engine, we added 3 cc. of TEL per gallon to it. Much to our surprise, the new fuel would not knock. We tried it without TEL and still it would not knock. In fact, we could not make the new hydrocarbon knock by any means. We then made and rated some of the normal octane, with the carbon and hydrogen atoms arranged in a straight chain. This knocked

badly, as tradition and experience indicated it would.

We knew that we had made an important discovery.

It was clear now that the *structure* of a paraffin hydrocarbon had a profound effect upon its tendency to knock. [It is generally agreed that this discovery ranks in significance with creation of the octane scale. The work of Dr. Edgar in the synthesis and determination of the knocking properties of fuel components contributed much to early refining knowledge and pioneered the art of knock-rating as we now know it. Dr. Edgar's investigations of the branched chain paraffins not only resulted in the octane scale, but aided immeasurably in the development of the first 100-octane aviation gasoline.—The Editor]

Scale of Value

Upon discovering that the structure of a paraffin hydrocarbon strongly influenced its tendency to knock, we conceived the idea of broadening the "Ethyl standard" into a *scale* of antiknock value. The scale would consist of varying proportions of a nonknocking hydrocarbon, like our new isooctane, and a severely knocking hydrocarbon, such as normal octane. Unfortunately, normal octane was difficult and expensive to make.

Seeking a substitute, we noted a recent publication by the Forest Products Laboratory in Madison, Wisc., which pointed out that the sap of the Jeffrey pine tree upon distillation yielded pure normal heptane instead of the usual turpentine. We obtained a gallon of the normal heptane. When we ran it in the test engine, it, like normal octane, knocked badly. It therefore seemed to be an ideal low base for our projected knock scale.

We now were quite sure that we had the two mate-

The sap of the Jeffrey pine tree which grows in the High Sierras was distilled to obtain normal heptane, the material that was used to represent zero on the octane scale.



When Ethyl's new plant goes into production next year, it will mark the first time that antiknock compounds have been . . .

MADE IN CANADA

CANADIAN OIL REFINERS' increasing needs for "Ethyl" antiknock compounds will be supplied from within the Dominion by early next year, it was disclosed recently with the announcement that Ethyl Corporation will build a plant at Sarnia, Ontario. Owned and operated by Ethyl Corporation of Canada, Ltd., a subsidiary of Ethyl Corporation, the new manufacturing center will be located on a 100-acre site adjacent to the Canadian Oil Companies, Ltd., refinery and to the St. Clair River.

In announcing plans for the plant, E. L. Shea, Ethyl Corporation president, said: "We have known for several years that the Canadian government and many of the Canadian refiners are keenly interested in obtaining antiknock compounds from a domestic source. We are glad to be able to respond to this desire and to make a substantial investment in the future of Canada."

When the new Ethyl plant is completed and goes into

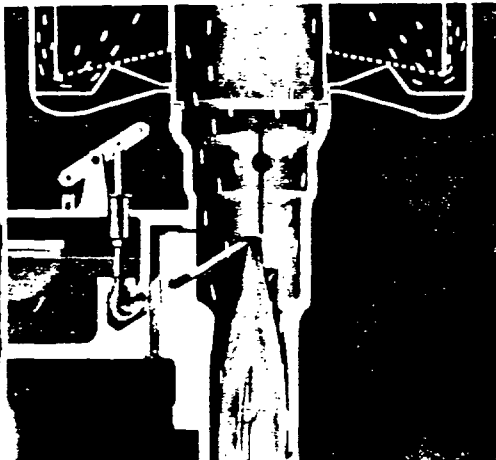
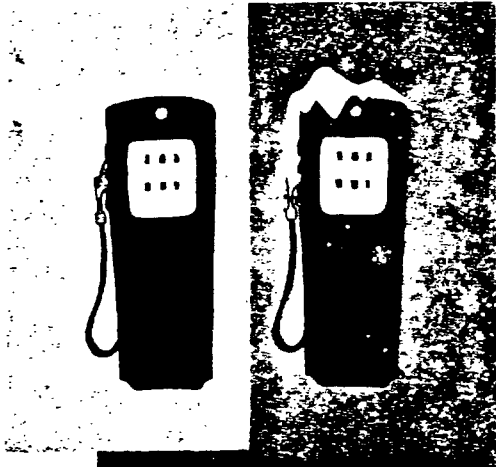
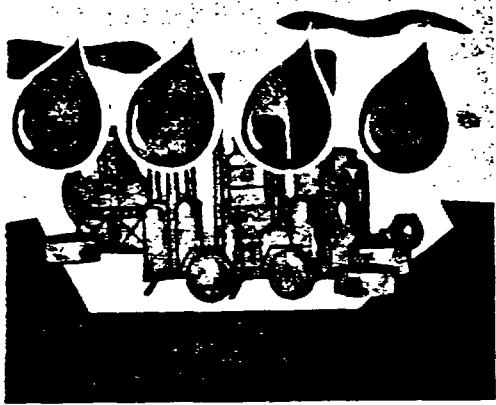
production in the early part of 1956, it will be the first time that tetraethyl lead, the active ingredient in "Ethyl" fluid and an important additive of gasoline, has been manufactured in Canada. At present, "Ethyl" antiknock compounds are imported from the United States, where Ethyl Corporation has manufacturing plants at Baton Rouge, La., and Houston, Texas.

It is anticipated that Ethyl of Canada will employ about 150 people at the new plant when it is completed. Present plans call for a small number of supervisory personnel from Ethyl's plants in the United States to be used on a temporary basis for initially staffing and launching production at the new installation. Subsequently, operations will be conducted as completely as possible by Canadian personnel.

The plant's production will be used to meet the requirements of Canadian oil refiners for "Ethyl" antiknock compound. #

The site of the new "Ethyl" antiknock compound manufacturing plant in Sarnia, Ontario, is adjacent to Canadian Oil Companies' refinery on the St. Clair River, just about opposite Stag Island.





For Better Performance

A new color movie produced by

Ethyl shows the importance of good

gasoline to engine operation



IN ITS EFFORTS to help oil companies train service station personnel, Ethyl Corporation has produced a new color movie depicting the basic ways gasoline affects the operation of a modern automobile engine. Entitled "For Better Performance," the 15-minute film is the first phase of the "T" (Training) half of Ethyl's R-T (Recruiting and Training) program, which was launched last summer.

Coupling the full freedom and flexibility of animation with the realistic rendering of color, the movie reproduces the combustion process that takes place in an automobile engine.

The film begins with the introduction of a young scientist, who serves as the narrator. He gives a brief description of the main steps in gasoline production, tells something of the many processes that are used to manufacture gasoline, and explains in non-technical language why blending of gasoline components is necessary to arrive at a high quality product.

X-ray Eye Provided

After this short explanation, the movie plunges directly into the main theme. Through the magic of animation, an X-ray eye is provided for the viewer to see in actual engine operation the effects of "balanced volatility" in gasoline on starting, warm-up, acceleration, power and mileage; how vapor lock occurs and how it is controlled by today's gasoline. The harmful effects that impurities in gasoline can have on engine performance are portrayed.

The four-stroke piston cycle is also accurately shown in colorful and detailed movement. It is portrayed during normal combustion and during combustion when "knock" is occurring. The necessity for the piston to get an even thrust from the burning of gasoline instead of a sharp, hammer-like blow is illustrated in the "knock" sequence. Higher octane

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Performance

gasoline is recommended by the narrator as the best remedy for engine "knocking."

The movie also covers the problem of preignition. It explains that preignition is largely the result of deposits in the combustion chamber and depicts the preigniting of fuel in glowing colors. The viewer clearly sees what preignition is and how it disrupts normal combustion. Additives or higher octane gasoline are given by the narrator as solutions to preignition.

As the film ends, the narrator summarizes the three gasoline qualities necessary for top engine performance: *well-balanced volatility, freedom from harmful impurities, and high octane rating.*

While the movie uses the animated "cartoon" method for telling the story, it steers clear of the fantasy generally associated with this technique. The treatment of the subject is realistic and convincing.

Has Wide Appeal

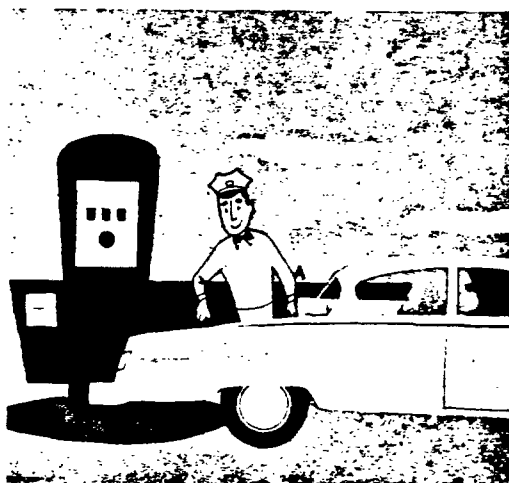
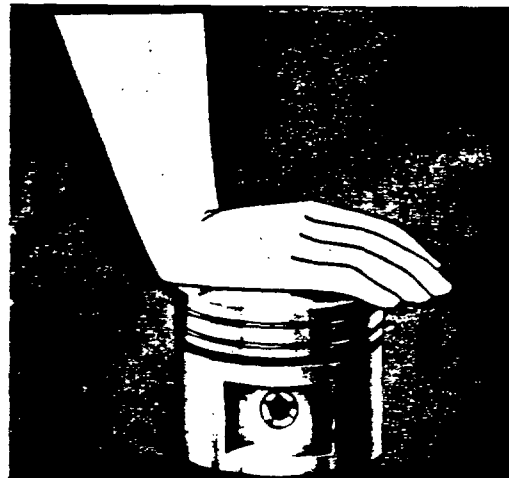
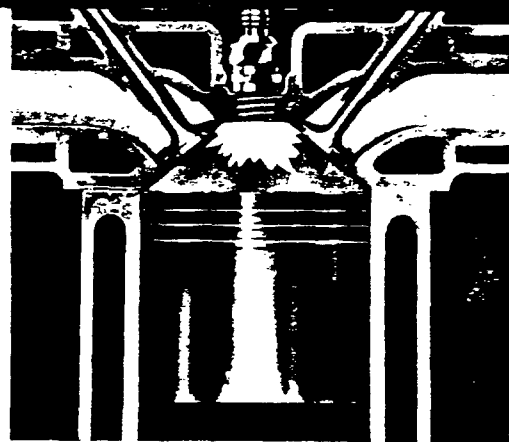
Since the film is neither oversimplified nor highly technical, it can appeal to a wide audience. Oil companies will find it is designed not only to help train service station personnel, but also for showing to newcomers to the industry and to the general public.

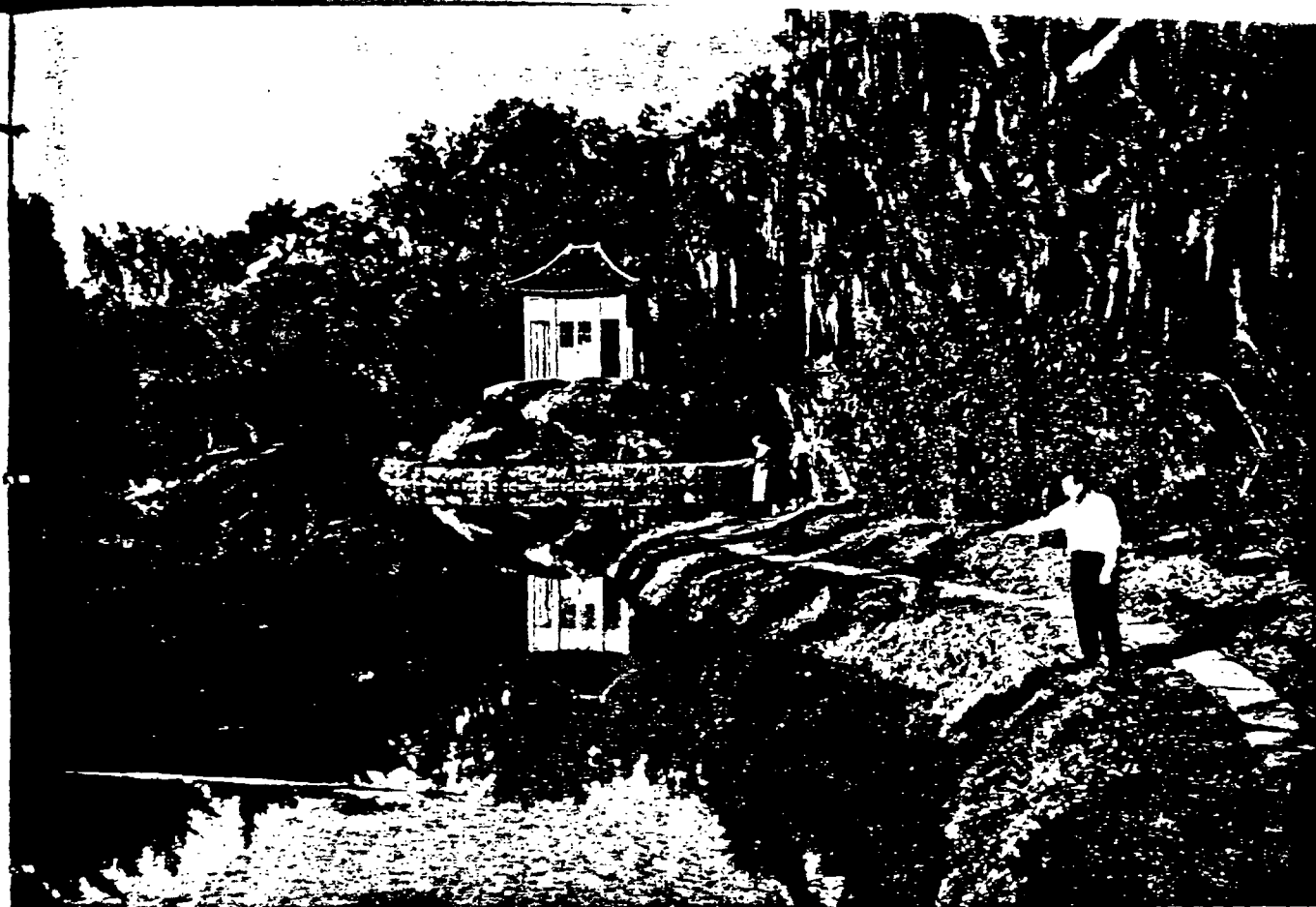
"For Better Performance" is the second color movie produced by Ethyl Corporation for its R-T program. The first, "Pick Your Tomorrow," depicts a young man in search of a line of business to choose for his life work. The movie tells the story of his investigation of several fields and shows why he picks service station work as the best business for him.

To understand better the personnel problems of service station work, Ethyl Corporation in 1954 made a nationwide survey of nearly 5,000 service station dealers. The survey revealed that while dealers themselves are enthusiastic about the service station business, fully half of them find it difficult to hire and train competent men. Ethyl has built its R-T program to help solve this problem.

The twofold design of R-T is to induce young men of high caliber to enter the service station field, and to help oil companies and dealers train these men into a better, more stable sales force.

"Pick Your Tomorrow" is tailored to help recruit these young men. "For Better Performance" is designed to help train them. #





The serene and placid beauty of this lush lagoon is untouched by the oil wells that add black gold to Avery Island's jeweled diadem.

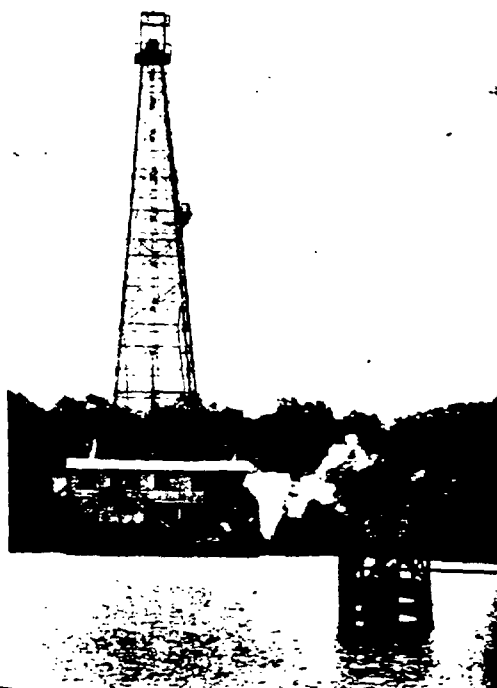
that are both red and hot. They are the basic ingredient of the famous Tabasco sauce which is made there.

Acre for acre the fabulous fields of Avery Island and the earth beneath them have yielded and still are producing more benefits for mankind, both esthetically and materially, than almost any others in the world.

Credit for Development

To the late Edward Avery McIlhenny, writer, explorer, business executive, naturalist and conservationist, goes much of the credit for the botanical and natural wonders on the Island that has been the home of Averys and McIlhennys for generations. To the International Salt Company goes credit for operating and expanding the salt mines whose rambling shafts honeycomb the underground sections of the Island. And to Humble Oil & Refining Company goes the credit for having added black gold to the jewels that make a fairy diadem for the island that is known as Avery.

It is the work of McIlhenny that was responsible for converting this part of the Louisiana marshlands into a Garden of Eden. McIlhenny was a man whose travels carried him all over the world. When in later years he



decided to settle permanently in his ancestral home, he did so with the avowed intention of bringing to its acres many of the beautiful flowers, plants and birds he had seen in his travels.

In addition to saving the snowy egret from extinction, McIlhenny's "Bird City" provides shelter and food for colonies of blue herons, parti-colored herons, black ibises, ducks, geese, sea gulls, terns and many other native and migratory birds. The sanctuary is a private adaptation of the federal game preserve theory, though many visitors are inclined to think that Avery Island goes Uncle Sam one better in this business of protecting wildfowl.

McIlhenny turned the development of the sub-surface kingdom he controlled over to private industry, but to

himself he reserved the rights and the privileges of developing the surface. Until his death only a few years ago, he worked untiringly to enhance its beauties. He poured vast sums into the creation of this island paradise and for a long time it was a one-way flow. Today, however, with oil flowing from many wells, salt being mined in vast quantities, and Tabasco sauce widely popular, the birds and animals who find refuge there need have little fear of ever going on short rations.

Just how much of the oil royalties accruing to the Avery and McIlhenny families is used to maintain the Island sanctuaries has not been made public. Suffice it to say that there is enough. The heirs of the late E. A. McIlhenny assume full responsibility for the welfare of the plant and animal life, but there is an interesting sidelight in this connection. The State of Louisiana collects a share of the oil royalties from the fabulous Avery Island oil field and some of this income is used to care for wildlife in other parts of the state.

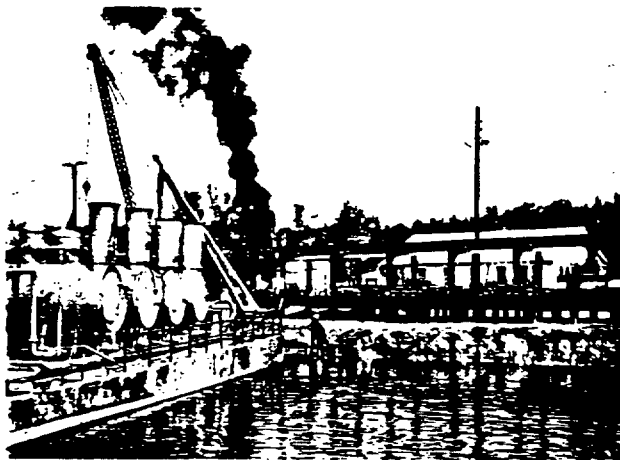
Oil Supports Wildlife

So the oil produced in the midst of Avery Island's natural beauty and from the very heart of one of the nation's outstanding wildlife preserves actually helps to pay for promoting the interests of wildlife here and elsewhere in Louisiana. In addition, some of the money needed for this purpose on Avery Island comes from the nominal admission charged the 30,000 visitors who call there each year.

Just as it took long experimentation to develop the best recipe for the famous Tabasco sauce, so also was a lot of preliminary effort necessary before Avery Island paid off as an oil field. The first well was drilled back in 1898, and many fruitless test wells followed. Finally, in 1942, Humble Oil & Refining hit pay dirt. Since then it has brought in some 65 producing wells. These now flow at the daily rate of about 7,250 barrels.

Humble has wrapped its equipment in felt and batting and its operations at Avery Island are carried through on tiptoe, so to speak. Every effort is made to leave the natural beauty undisturbed and to permit the wild things to live unruffled and untouched by the probing fingers of progress. Unless you know just where to look, the oil wells are hard to find. Neat, unobtrusive "Christmas trees" on equally neat platforms surrounded by trim, iron fences are all that remain to mark flowing wells. Tank batteries are nestled in out-of-the-way places so that they, too, don't jar the peaceful scene.

Avery Island has rightfully earned the name Wonder Island. For there, the lion and the lamb—industry and nature—lie down peacefully together. #



This power barge for a drilling rig can be quietly towed to new well sites throughout the "Island". . . Below, the interior of one of the salt mines that have helped supply the nation for over 100 years.





Engineers of Progress

The Society of Automotive Engineers Is 50 Years Old

OF THE MANY TRIBUTES that are being paid to the Society of Automotive Engineers in this its Golden Anniversary year, none speaks so eloquently as the new cars that are taking their place on the streets, roads and highways of the country. In the breathtakingly beautiful and highly efficient 1955 models, a half-century dream of superlative automotive transportation has become a reality.

During this year, more than six million cars and trucks will roll off the smoothly flowing production lines of America's automobile manufacturers. They will provide millions of miles of dependable automotive transportation for this country's people and its products.

Back in 1905, the year of the first formal meeting of the Society of Automotive Engineers, the automobile was just passing from toddling infancy to awkward adolescence. Over 125 different car builders made about 22,500 motor vehicles in factories that often were converted machine and carriage shops or barns. Thousands still doubted that horseless carriages ever would become workable machines that the ordinary man could afford to operate.

Worked Tirelessly

Many people have helped perform the automotive miracle of the 20th Century, but high on the honor roll of those who played a major part belongs the name of the automotive engineers.

It has been the engineers, working tirelessly at the drawing boards, in the laboratories, on the proving grounds, in the shops and on the production lines, who have transformed automobiles from balky sputtering horseless carriages to safe, dependable, comfortable motor vehicles. It is they who have changed motoring from a risky experi-

ence for a handful of adventurous pioneers to an everyday convenience for millions.

This January, in Detroit, the city that automotive engineers have helped make the automobile capital of the world, the SAE held its Golden Anniversary annual meeting. In many respects, this meeting was as different from the organization's first meeting in New York as the industry is from what it was 50 years ago.

Problems Discussed

The basic engineering problems discussed at the first meeting have long since been conquered. In sharp contrast, papers delivered at this year's meeting dealt with such forward-looking subjects as the "Effect of Fuel and Lubricant Volatility on Engine Octane Requirements" and "An Exploration of the Automotive Gas Turbine."

But if the subject matter this year was startlingly different than it was 50 years ago, the spirit that pervaded both gatherings was much the same. Now, as then, the SAE is anticipating with optimism its part in the development of the automotive transportation of the future.

By providing a forum of integrity and high purpose for the solution of automotive engineering problems, the SAE continues to abide by the ideals that were set forth by its founders.

All the while, too, its members are proud to be able to say, with James C. Zeder, SAE president in 1950: "The SAE serves no selfish interest. It encourages the interchange of engineering knowledge. The various cooperative activities which it has established have enabled a better product to be brought to the consumer at a lower cost. It is organized and operated for the express purpose of service to the automotive engineer, the automotive industry and the American people."#

ETHYL IN THE NEWS



W. R. Perdue, Jr.

W. R. Perdue, Jr., Elected Vice President;

F. P. Warne Named Counsel

WILLIAM R. PERDUE, JR., has been elected vice president, treasurer and a member of the board of directors of Ethyl Corporation, succeeding Stanley T. Crossland, who became vice president and treasurer of The Texas Company, January 1. Mr. Perdue joined Ethyl in 1950 as general counsel. He has been succeeded in that position by Frederick P. Warne.

A native of Yonkers, N. Y., Mr. Warne is a graduate of Dartmouth College and Harvard Law School. He has been engaged in the practice of law in New York City since 1941, except for four years' service in the Navy.



F. P. Warne

J. B. Macauley Appointed Deputy Assistant Secretary of Defense

J. B. MACAULEY, Ethyl's director of technical coordination, has been appointed Deputy Assistant Secretary of Defense (Research and Development), succeeding Dr. Daniel P. Barnard, research coordinator of the Standard Oil Company (Indiana), who is expected to return to his company in the near future.

In his new position, Mr. Macauley will assist Assistant Secretary Donald A. Quarles in coordinating and integrating the research and development programs of the Army, Navy and Air Force. He will be closely associated with the establishment, composition and activities of technical groups of outstanding scientists and engineers, making sure that their recommendations receive appropriate consideration in the planning and execution of military research and development programs.

Mr. Macauley is on leave of absence from Ethyl during his service with the Department of Defense in Washington.



J. B. Macauley

Three Promoted in Ethyl Corporation's Central Region

HARRY A. MACK, district manager of Ethyl's Dayton, Ohio, office, has been appointed marketing advisor to the Company's central region. One of Ethyl's senior employees in point of service, Mr. Mack has

been succeeded at Dayton by Robert R. Mead, formerly district manager at Kansas City, Mo. Lowell A. Dollahan, account representative in Michigan, has been appointed manager at Kansas City.



H. A. Mack



R. R. Mead

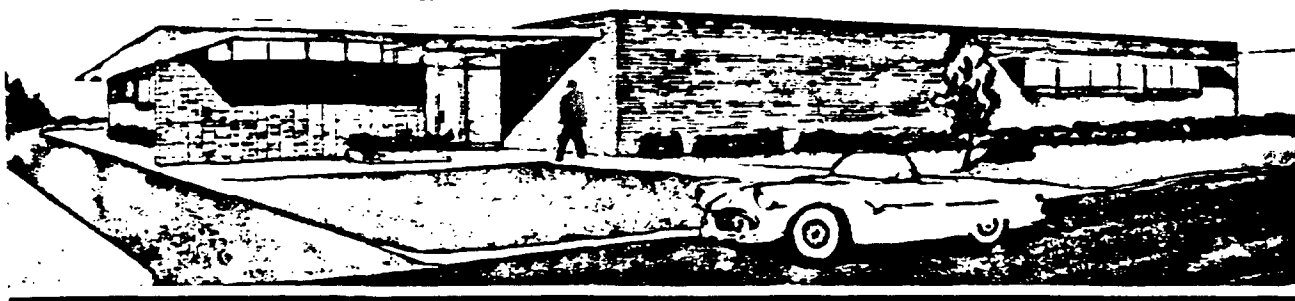


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To Serve Refiners

Ethyl will open a new gasoline testing laboratory in Houston this fall

IMMEDIATE GASOLINE TESTING service for oil refiners in and around the rapidly expanding oil center of Houston will be provided by a new laboratory that Ethyl Corporation will build in that city.

Scheduled for completion early this fall, the new laboratory will be equipped with the most modern gasoline testing devices, including an X-ray photometer. Under a technique developed by Ethyl Corporation, this instrument can be used to determine the tetraethyl lead content of a gasoline sample in about six minutes. This is less time than is required by other methods presently in use.

At present, Ethyl operates five gasoline testing installations strategically located to provide maximum service for refiners throughout the country. They are in Yonkers, N. Y.; Baton Rouge, La.; Tulsa, Okla.; Kansas City, Mo.; and San Bernardino, Calif.

Test Thousands of Samples

Each year these laboratories test more than 15,000 samples of gasoline from refineries, service stations and other sources to determine the Motor and Research octane numbers, gum content, tetraethyl lead content, distillation characteristics, corrosiveness, vapor pressure, sulphur content, gravity, color and oxidation stability.

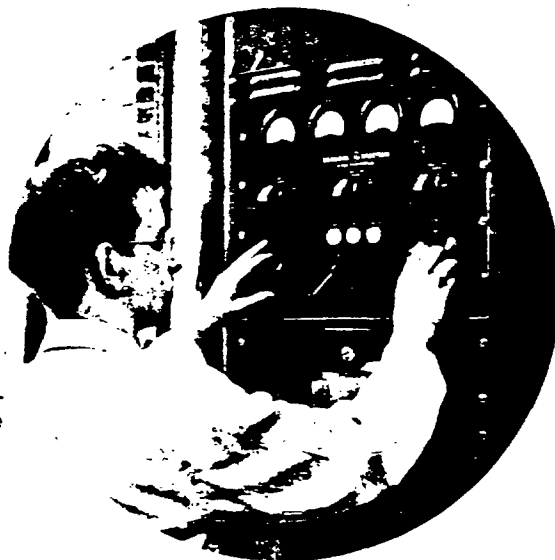
The results of the service station sample tests provide data for the regional and nation-wide reports of gaso-

line quality compiled regularly by Ethyl and distributed to oil refiners and automobile manufacturers. The findings of the refinery sample tests serve oil companies as an accurate check on the quality of their gasoline.

The Ethyl laboratories provide other services for gasoline manufacturers. Upon request, they run tests on special samples refiners wish to have rated and supply spare parts and equipment for knock testing engines, and emergency service in the event of a breakdown in a refiner's own gasoline testing facilities.

As a manufacturer of an important additive for gasoline, Ethyl Corporation is no stranger to the great oil refining area in and around Houston. One of the Company's integrated manufacturing plants where "Ethyl" antiknock compounds and other chemical products are produced is located on the Houston Ship Channel just outside the city limits. Ethyl also maintains a district office in Houston as headquarters for its representatives who serve refiners throughout the area. #

An X-ray photometer for rapid determination of the TEL content of gasoline will be included in the laboratory's equipment.

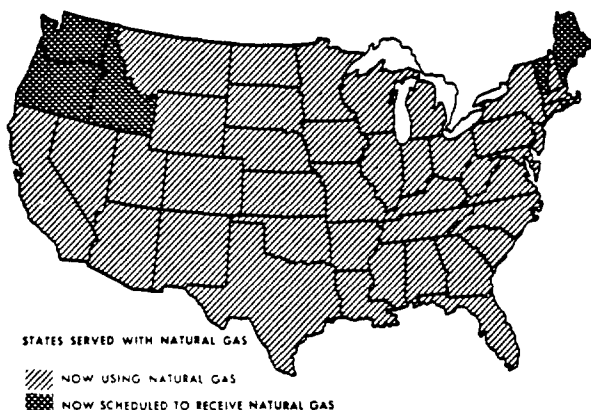


A Consumer Looks at Federal Control of Natural Gas

(Continued from page 4)

controls will compel the diversion, to intrastate use, of gas discovered in the search for oil, thereby lessening the available supplies for interstate consumers.

Furthermore, they foresee many areas of serious conflict between federal and state regulation of natural gas. There are, as you know, long-established policies laid down by the producing states regulating the production of oil and natural gas. These state laws are designed to promote conservation of our natural resources and to prevent their dissipation. Now, however, a federal agency has entered the picture with a completely different mission in life. If this competing and overlapping authority prevails, it is believed, there may be many cases where a gas producer will be told to do one thing by the state authority and to do the very opposite by the federal agency.



There is a final point about government regulation. Students of history know unmistakably that controls breed controls. A national government, for one reason or another, initiates the control of one commodity, but it soon discovers that in order to make the control effective, it must control a second commodity, then another and still another. Finally, matters reach the point where the entire economic life of a nation is administered and controlled by government planners. We have seen this very thing happen in nations abroad, to their very great misfortune. We have the beginnings of it here in federal control of natural gas.

Some people, in looking at this problem for the first

time, may unintentionally be taking a short-range view. With natural gas for interstate use restricted as a result of government control, they anticipate an accelerated movement of industrial consumers to the producing Southwest, where they can obtain their natural gas supplies without such limitation.

This most likely would bring a temporary advantage to the Southwest. But it would also mean that consumers in the East, North and West would suffer from a progressively growing shortage of this highly desirable fuel. It could result in a severe dislocation of industries throughout the country.

From the long-term point of view, there can be no question that the welfare of our nation can best be served by a non-federally-regulated industry.

New Exploration Needed

The urgent need for producers to continue exploring for and developing new gas reserves is self-evident. Since 1945, natural gas reserves have increased 43 percent, but in the same period of time, demand for this fuel has more than doubled. To keep pace with this growing demand, it has been estimated that producers must find substantially more gas than they have in the past, in order to maintain our reserves at a safe level.

Consumers, large and small, all want the same thing—adequate supplies of fuel at a reasonable cost. They are more likely to have adequate supplies at reasonable cost if our free enterprise system is allowed to work—if men are able to compete and sell the product of their efforts in the open marketplace at a price people are willing to pay.

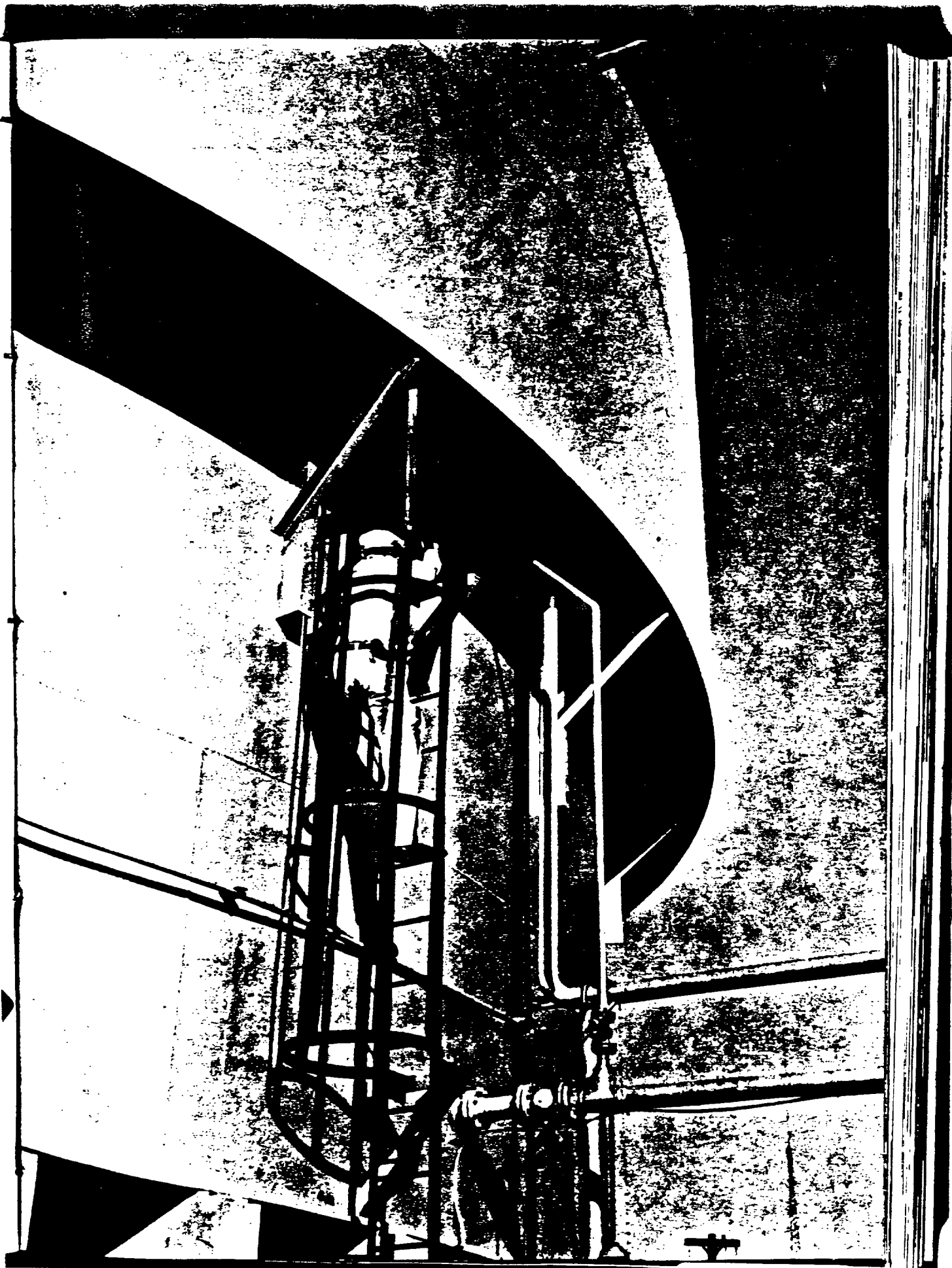
As a consumer, I am greatly interested in the continued growth, development and utilization of our natural gas reserves. I want to see their progress continue unabated to the lasting benefit of our national economy as a whole. Freedom to produce competitively is the best way to assure an abundant supply. #

A camera silhouette of one of the antiknock compound storage tanks at Ethyl Corporation's conveniently located West Coast terminal at Wilmington, California.

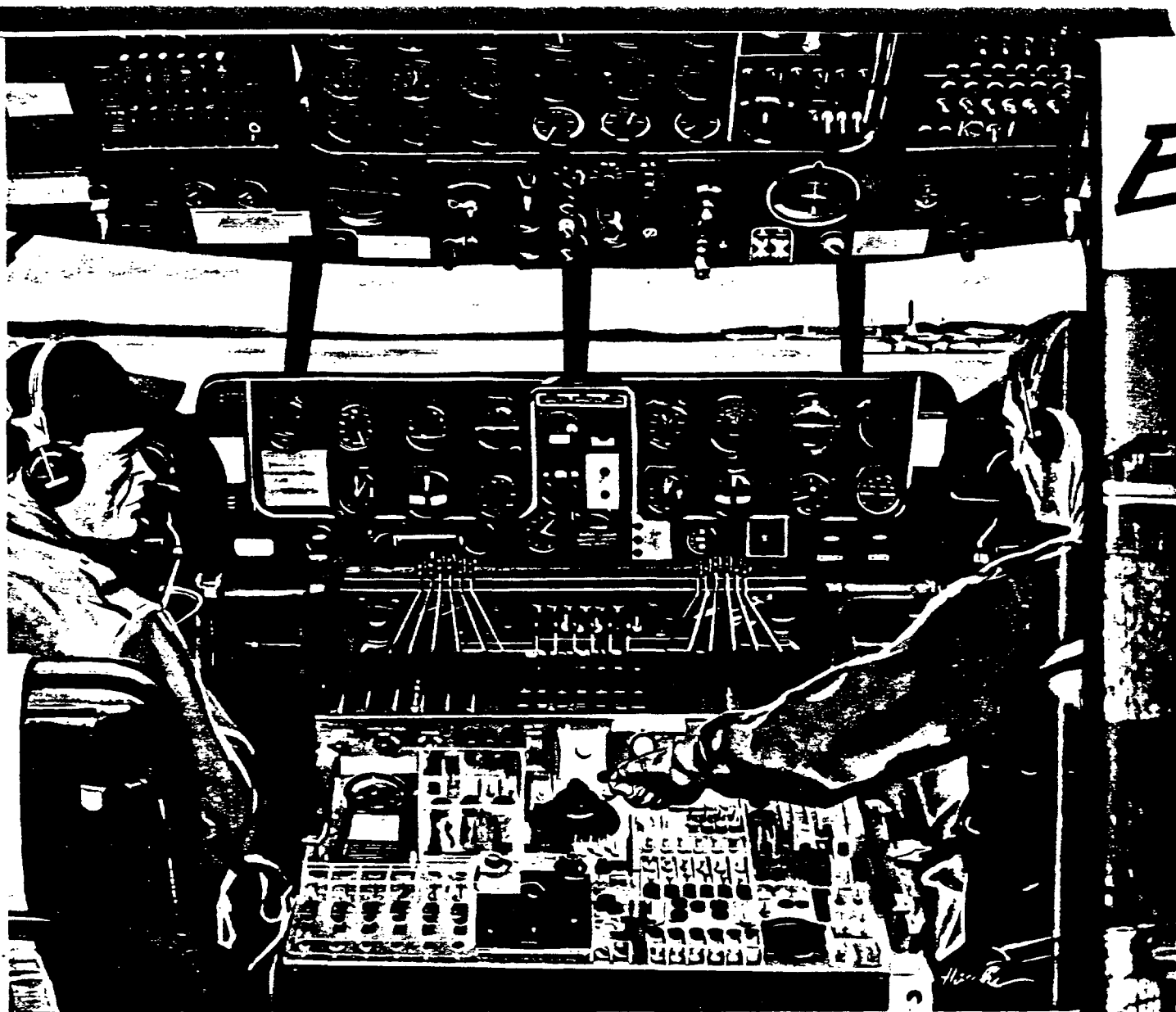
LAYOUTS AND ART DIRECTION: Carsten Grande.

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(bottom), courtesy Titanium Metals Corporation of America; page 11 (bottom), courtesy General Dynamics Corporation; pages 12 and 22 (top left and right), Pach Brothers; page 15, Jim Flynn through Sarnia Observer; pages 16 and 17, Lloyd Fromm through Chad, Inc.; pages 19 (bottom) and 20 (top), courtesy Humble Oil & Refining Company; page 22 (center), Bradley Studios, (bottom left), Commercial Photos, Inc.; Inside back cover, L. A. Todd.



ETC 28815



The secret of flying a B-36

The Strategic Air Command tells us the average age of the First Pilot on a B-36 is 32 years. (This would have made him an old man among World War II fliers.) He ranks captain, major, or better. And he has an average of 3,800 hours' air time to his credit in multi-engine aircraft. The "secret" of flying a B-36 is the good judgment that comes only from experience.

In this respect, we think it's interesting to note the similarity of flying such an aircraft to working on the intricate problems of relating fuels to engines. Here, too, there is simply no substitute for years of intensive and specialized experience.

That's why we think you will be interested to know

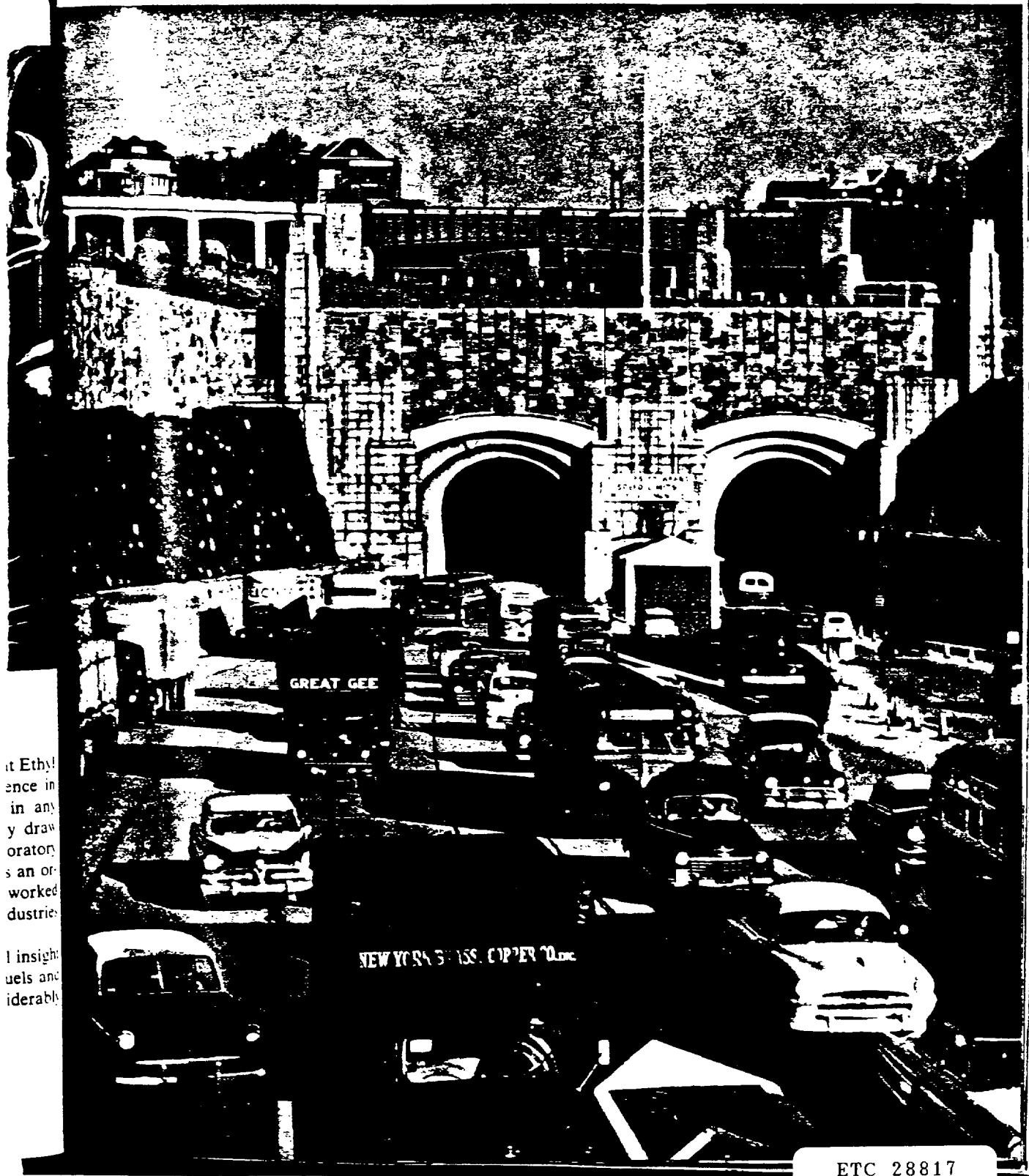
that the key men in charge of engine-fuel studies at Ethyl have an average of more than 19 years' experience in their individual specialties. When they engage in any cooperative work or consultation with you, they draw on a rich background of thousands of hours of laboratory work and millions of miles of road tests. And, as an organization, Ethyl Research Laboratories have worked closely with the petroleum and automotive industries for 32 years.

These years of experience give Ethyl a special insight into the complex problems of relating engines, fuels and lubricants . . . an insight we believe adds considerably to the value of "Ethyl" antiknock service.

ETHYL CORPORATION
NEW YORK 17, NEW YORK

ETHYL NEWS

MARCH—APRIL 1955



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NEW YORK'S ASS. COPPER CO. INC.

ETC 28817

BEHIND THE NEWS



Cars, trucks and buses stream from the westbound tube of the Lincoln Tunnel at the Weehawken, N. J., end of that sub-Hudson River thoroughfare in our cover photo. Related directly to *Underground Arteries*, starting on page 21, the color shot was taken from a precarious perch atop toll booths one bright day last winter by New York photographer O. Winston Link. Just to the right of the eastbound tube, which carries traffic into midtown Manhattan, work is now advancing on a third tube for the tunnel. When completed in 1957, this additional passage will make it possible to devote two tubes at a time to rush-hour traffic in one direction.

Electronic computers are answering more and more questions for American business and industry these days. (See *Problems Solved in Seconds*, pages 4, 5 and 6.) But these superhuman brains are no overnight development. As long ago as 1949, Ethyl Corporation joined with automotive and other industries to help finance an electronic computation laboratory at Wayne University, in Detroit, as a center for training operators of electronic devices. Although certain chemical, blending, payroll and other problems at Ethyl are handled by the Company's own electronic machines, projects undertaken at the Wayne training center have been of direct value to Ethyl and to the oil and automotive industries. These have included projects related to bearing pressures, compression ratios and other complex aspects of today's automobile engines.

Until recently, it had always been a lot like Mark Twain's alleged comment about the weather: People talked about the litter problem, but few of them did anything about it. Now, however, there's a concerted effort to put an end to the national carelessness that has been making our country America the Not So Beautiful. It is called Keep America Beautiful, Inc., and its work is described in *Teaming Up on Trash*, starting on page 13.

ETHYL NEWS

Richard F. Cook, Editor

MARCH-APRIL 1955

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Opinions expressed in signed articles are the authors'. Ethyl News welcomes articles of timely interest submitted from outside sources. Upon request, the editors are glad to grant permission to reprint material appearing in Ethyl News.

Published by Ethyl Corporation, 100 Park Avenue, New York 17, N. Y., manufacturers of "Ethyl" antiknock compounds, used by oil companies to improve the antiknock quality of aviation and motor gasoline.

Edward L. Shea, President
William R. Perdue, Jr., Vice President and Treasurer
Herbert A. Savage, Secretary

THIS is people's prerogative. The prices are not the same. The gas prices are not the same. The gas prices are not the same.



A NEW MOTION PICTURE PRESENTED BY
ETHYL CORPORATION HELPS TELL . . .

THE NATURAL GAS STORY

THE CASE AGAINST FEDERAL CONTROL of natural gas is being clearly and forcefully told to thousands of people throughout the country by a new motion picture presented recently by Ethyl Corporation. Entitled "You, the People," because it puts the decision as to whether or not the government will continue to regulate natural gas prices before the American public, the film takes just 14 minutes to get its effective message across.

The far-reaching effects that federal control of natural gas prices have on all phases of the industry and on the American way of life are simply explained in the movie by real-life people speaking for themselves. In turn, a natural gas producer, a pipeline superintendent, a farm-

er-consumer, a lawyer and an independent oil jobber tell why they oppose government regulation. The narrator, the only professional actor in the cast, tells why he too, as a private citizen, is for free enterprise.

Released only a few weeks ago, "You, the People" has been enthusiastically received wherever it has been shown. The Natural Gas and Oil Resources Committee, which is distributing copies, reports that the film has "sharpened public understanding" among individuals and groups to whom it has brought the facts about natural gas price-fixing.

More than 500 prints of the movie already have been circulated by the Committee through its state and re-



gional representatives and by oil and gas companies and Ethyl Corporation. These men and companies are showing the film to employees and to local civic, business, social and church groups.

Produced with television showings also in mind, "You, the People" so far has been shown by over 100 TV stations. Others are scheduled to screen it in the near future.

In telling the natural gas story, "You, the People" opens with a scene in which the producer tells the superintendent that under government regulation he cannot supply the line with natural gas. He no longer has control over the price of his product, he says, and cannot risk being burdened with a 20-year commitment.

The camera then switches to the narrator, William Cochran. He describes the production, transportation and delivery of natural gas and explains how federal control was stretched to cover the production of this fuel. As these phases of the industry are discussed, actual scenes from the field appear on the screen.

Narrator Cochran then asks how men both in and outside of the natural gas industry feel about government price controls. —

First to answer his question is John M. Kelly, former state geologist and now an independent producer of New Mexico. Kelly explains that he likes both ends of his label, "independent producer." "But," he says, "everybody knows you're bucking heavy odds—actually nine to one against you—every time you go after new gas or oil reserves. And you do a lot of searching and maybe risk your fool neck a few times a year.

Can't Afford Odds

"In this business you're free to win, free to lose. But if government controls are going to dictate the conditions I work under, I can't afford those one in nine odds—I'll have to get out."

Next to speak is Everett Woody, of El Paso, Texas, the pipeline superintendent. He tells the audience that if independent producers stop looking for new sources of natural gas, the result will be a serious shortage of this fuel, and an inability to supply both old and new customers.

"The producer is selling a commodity," Woody says, "not a public service—a commodity for which, incidentally, he gets only a very small fraction of the consumer's gas bill. Only 10 cents out of every dollar the consumer pays for gas, goes to the producer, for all his costs and profit. The other 90 cents of the consumer's dollar goes for service charges—transportation and distribution—that are already regulated. So any talk about saving

money for the housewife by regulating the field producer is ridiculous."

Following Woody, Daniel Neal McArthur, a farmer from Mason City, Iowa, voices his opposition to federal control over the producer. "I don't believe in federal price-fixing," he says, "when you already have a far better price regulator—competition.

"When you tell a man how much money he can get for his gas, that's going to have a lot to do with how much he can afford to produce . . . and how fast. Once you've got the government controlling his production and his prices, it might as well just step in and take over his whole business, officially. 'Cause that's what it would be doing anyway. That kind of interference doesn't belong in this country."



"As an American, freedom means something me. Let's hear what the freedom to produce without government control means to others."

WILLIAM COCHRAN
Narrator
New York, N.Y.

Narrator Cochran then asks New York City lawyer John Howley to explain how the natural gas situation got into its present tangle. Howley explains that the Natural Gas Act of 1938 was passed to supervise traffic in gas, which no one objected to since Congress was solely concerned with regulating the interstate transportation of gas—not its production.

"Unfortunately," Howley continues, "in spelling out the bill, somebody used a phrase about regulating all 'sales of gas in interstate commerce'—and that's where the trouble started.

"There are some people who simply believe in federal regulation and want more of it. They seized upon this phrase to try to bring the natural gas producer under regulation. They appealed to the Federal Power Commission to back them up. The Commission said



"Every time I go after new gas or oil reserves I'm up against nine to one odds. If government controls are going to dictate working conditions to me, I can't afford those odds."

JOHN KELLEY
Independent Producer
Roswell, N.M.



"If independent producers stop looking for new sources of natural gas, the result will be a serious shortage of this fuel, and an inability to supply both old and new customers."

EVERETT WOODY
Pipeline Superintendent
El Paso, Texas



"When you tell a man how much money he can get for his gas, that's going to have a lot to do with how much he can afford to produce. We have a far better price regulator in the form of competition."

DANIEL N. MCARTHUR
Farmer
Mason City, Iowa



"The Natural Gas Act of 1938 was passed to supervise traffic in gas. But in the bill someone used a phrase about regulating 'all sales of gas in interstate commerce,' and that's where the trouble began."

JOHN HOWLEY
Lawyer
New York, N.Y.



"I'm in direct competition with the local utility, and federal control over the producer might give me a temporary advantage. But I prefer a fair fight in the marketplace."

SAMUEL WILKES
Oil Jobber
Hartford, Conn.

'No' eleven different times. But this latest interpretation by the Supreme Court . . . not a unanimous opinion . . . was enough to bring all sales to interstate pipelines under federal control," Howley concludes.

The last man to be interviewed by actor Cochran is oil jobber Samuel Wilkes, of Hartford, Conn. Wilkes says in selling fuel oil he is in direct competition with the local natural gas utility, and that federal control over the producer might give him a temporary advantage. But he doesn't want it, he says. "I'd rather fight it out on equal terms with my competitors in the open marketplace."

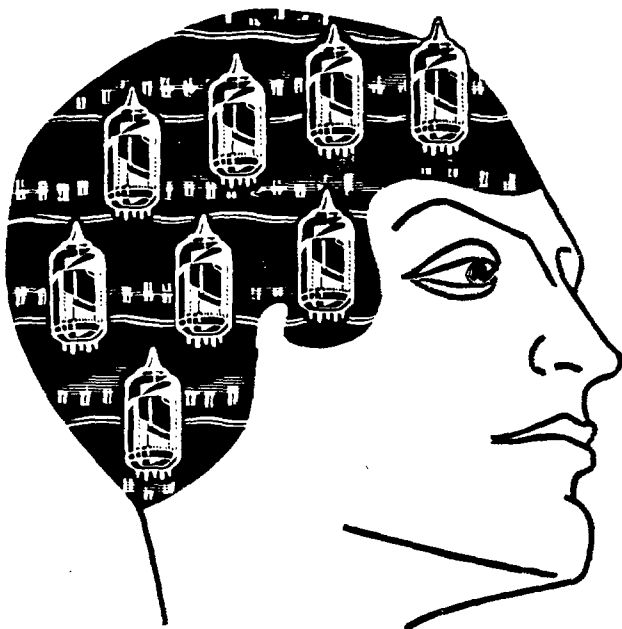
"I'm talking about free competition—the principle that's enabled us to build the strongest economy and the highest standard of living on earth! . . . If the government can control gas production in peacetime, it can control any commodity. Well, that's not for me—and I don't think it's for America!"

Whether or not it is to be for America is a decision it is left for audiences to make.

The American Way

"In so much of the world, things happen to people," the narrator concludes. "In America the people make things happen! You, the people, are the government. Your Congress, your officials exist only to carry out your orders. Whatever your opinion, make sure your voice is heard."

The spirit and the purpose of "You, the People" were eloquently expressed by Baird H. Markham, executive director of the Natural Gas and Oil Resources Committee when the film was shown at the annual meeting of Connecticut oil jobbers: "The men who made this film and those who appear in it are not the only people behind it. The people behind it include a great body of men like yourselves who share a common conviction and are willing to fight for a principle. That principle is that America's high standard of living and the success of its economic system are founded upon the initiative of its individuals and their liberty to compete freely in serving the public interest." #



PROBLEMS SOLVED IN SECONDS

Huge electronic brains help spur research, business and industrial progress

IT MAY NOT COME as heartening news to the school-boy struggling with his arithmetic, but it's a fact that many of the most complex and time-consuming jobs in American business and industry involve mathematics.

If this seems a dreary outlook to the teenager, it's quite the opposite in the business world. A growing number of big electronic computers and data processing machines are solving monumental mathematical problems with lightning speed and hair-splitting accuracy. As more and more of these electronic "brains" come into use, they will save millions of tedious man-hours and prodigious sums.

In the oil industry alone, these incredible devices can solve big problems in exploration, research and development, in financial, statistical and sales projects, and in refinery operations.

Big electronic digital computers have recently gone to work for two important refineries in the East and Southwest. The Eastern refinery's machine has coped successfully with such a variety and number of problems that its owners intend to apply it to many other jobs.

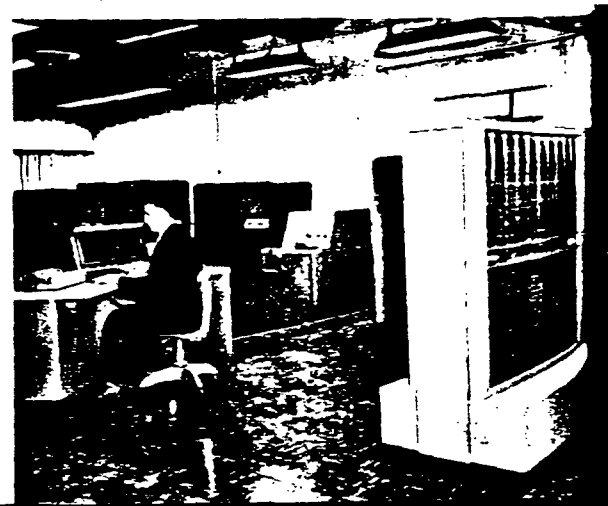
Equations used in "cat" cracking, reforming and other processing and blending operations are given to the computer and stored in its "memory." Punch cards with information on crude oils or other charge stocks, gasoline specifications, product commitments and related operating conditions and requirements are used. As crude oil is processed, data fed into the brain provides directions for obtaining desired quality and quantity realization.

Answers come up in minutes, compared with hours

The supervisory control panel of UNIVAC, foreground; right, memory tape units; in rear, central computer.



Arithmetical and logical parts of another electronic system can perform over 10 million operations hourly.



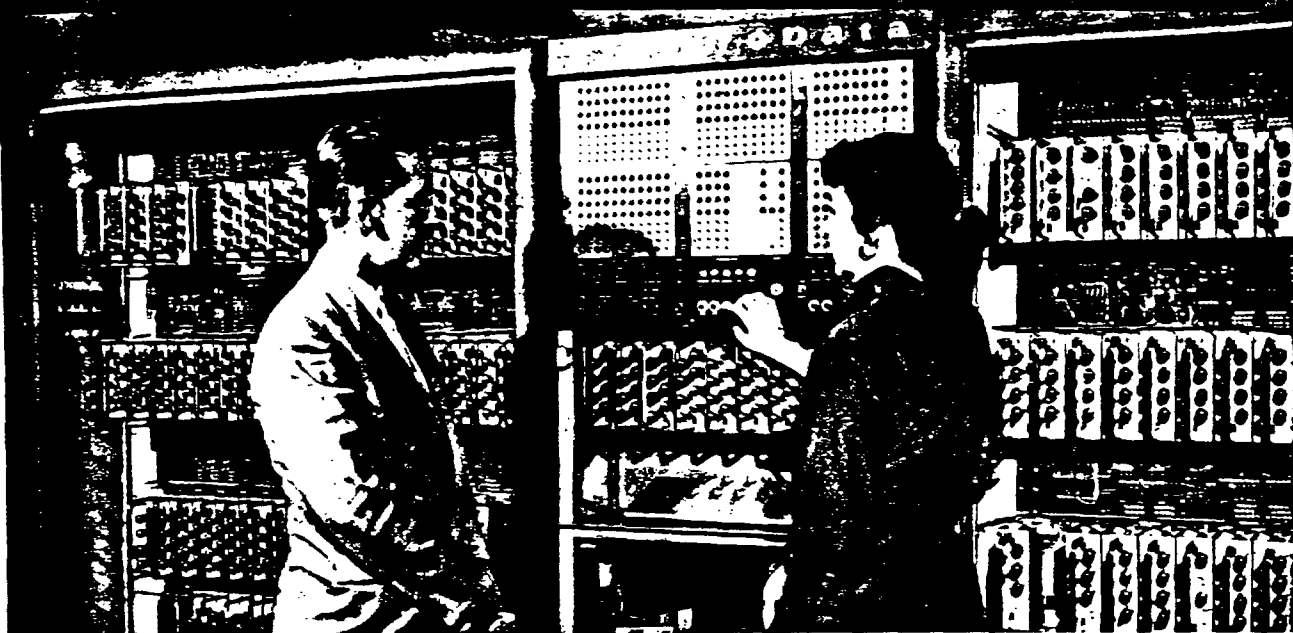
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The first oil company to use a big electronic brain installed this one for solving processing and blending problems.

of work by 250 to 300 technicians. In one second, the brain can add, subtract, multiply or divide hundreds of figures. Its memory can retain 4,000 ten-digit numbers indefinitely. Choices or decisions the brain makes are based with infallible accuracy on the results of its electronic calculations.

Another brain has just become part of an oil production research laboratory in Texas, to tackle exploration and production problems. Several other oil companies have successfully used new electronic devices to simplify and expedite applications of geological data to drilling operations. An even larger mechanical brain soon will be applying its wizardry at a huge Texas Gulf Coast refinery.

Alert oilmen and leaders in the electronic equipment field are convinced that these amazing brain systems will become "musts" for refineries of the near future. Remington Rand and International Business Ma-

chines, two of the largest manufacturers of such equipment, conduct extensive research, development and application programs in anticipation of such uses. Consulting, educational and training courses, and testing and service centers are available.

An idea of the scope of the largest of these super-human automats in the oil and other industries can be gained by mentioning typical applications—billing, delivery scheduling, design calculations, solution of engineering problems, general accounting, inventory studies, labor distribution, market analyses, payroll preparation, pricing and rate studies, production planning and sales reports. Processing voluminous data is the most widespread use of the brains.

More bizarre applications have included translating Russian into English, solving problems in Biblical research, figuring out complicated industrial, chemical and physical processes, and dealing with optical ray

Steel . . . oil . . . and automobile manufacturing are among the growing number and variety of industries

where mechanical Einsteins speedily and accurately cope with accounting, design and production problems.



tracing and problems in heart research. A near-future application may simplify and accelerate more accurate weather forecasting.

Three major oil companies have ordered IBM's largest electronic data processing systems. The multi-lobed brains will be applied largely to problems in blending, production planning, scheduling and accounting. These new installations, scheduled for operation in the near future, are in addition to 18 other systems of a similar size and type in use elsewhere. Chrysler, Ford and Monsanto Chemical are among other companies where giant data processing apparatus will be installed soon, out of about 100 on order. About 20 smaller electronic systems are also scheduled for oil company use before long.

Tremendous Capacities

A typical mammoth brain consists of interrelated segments housed in metal cabinets, with a central control unit. Calculations are performed in what IBM, for example, calls its arithmetic and logical unit. Here the brain's capacities are 504,000 five-digit additions or subtractions, 75,000 five-digit multiplications, 33,000 long divisions or over a million logical decisions per minute.

Data in the largest processing machines can be introduced or recorded on magnetic tapes at the rate of 15,000 letters, numbers or symbols a second. Information to be "considered" by the brain is also "remembered" by thousands of charges on the faces of cathode ray tubes or on magnetic cores.

Magnetic drums are used for handling additional data, putting down or picking up characters at a rate of 1½ million per minute. Machines also can be adapted to a punch card system to receive information or to record results. Computations can also be put down by high speed printers able to write automatically up to 78,000 characters per minute. The brains' work can be transmitted by wire to distant locations.

Of the king-size electronic computing machines, one of the best known to the public is Remington Rand's UNIVAC. This device won fame in its amazingly accurate prediction of the Eisenhower landslide in the 1952 elections.

Remington Rand has fifteen UNIVAC installations in use throughout the country, with more on order. Eight are operated by the federal government and the rest by business and industrial firms, including General Electric, Sylvania, Metropolitan Life, Franklin Life, United States Steel, and the Chesapeake and Ohio Railway. For government agencies, UNIVAC can be cred-

ited with such jobs as eliminating time-consuming calculations on jet plane research, assisting in atomic studies and speeding computations for retirement pay.

As electronic brains come into more widespread use, improved and even more complex models will undoubtedly be developed. One indication of what's ahead is seen in a special installation for the Navy, known as NORC (Naval Ordnance Research Calculator). This has been described by IBM as the fastest and most powerful electronic calculator in the world. It is being used in mathematical problems related to guided missiles, nuclear physics and sub-surface projectiles.

NORC multiplies 2368.912941062 by 867124.0510296 and comes up with the indisputably correct answer of 2054141385.9901255052174352 in 31 millionths of a second, automatically placing the decimal point correctly, too. Complete arithmetic operations follow each other at a rate of a billion in less than 24 hours. This is equal to what 1,000 people could do if they computed for their entire lives.

Although different in design, operation and purpose than these big computers and calculators, other electronic devices are being used to operate machinery and perform instrumentation work. A few elaborate systems are already here, with still more proficient ones on the way. Ford is now operating a virtually automatic plant in Cleveland. The nation's first refinery to employ complete electronic instrumentation and controls is Rock Island Refining at Indianapolis.

Operate Machinery

With more such automation in prospect, an increasing number of big computing and calculating devices may be connected with electronic instruments and controls to operate machinery and equipment in accordance with instructions provided by brain installations.

The cost of a big electronic brain, ranging up to a million dollars, is more than offset in relatively short periods by savings realized, their manufacturers point out. For companies not prepared to make large capital investments, there are computers of smaller types and sizes. The devices also can be rented for from \$12,000 to about \$30,000 per month or up to \$300 an hour when spot problems are taken to a service center by industrial customers.

With the solution of many of industry's mathematical problems achieved by electronic systems, the struggling schoolboy may not have to be as discouraged as he thought. In fact, he might even go down to his father's office or plant some night and turn the device loose on his homework. #

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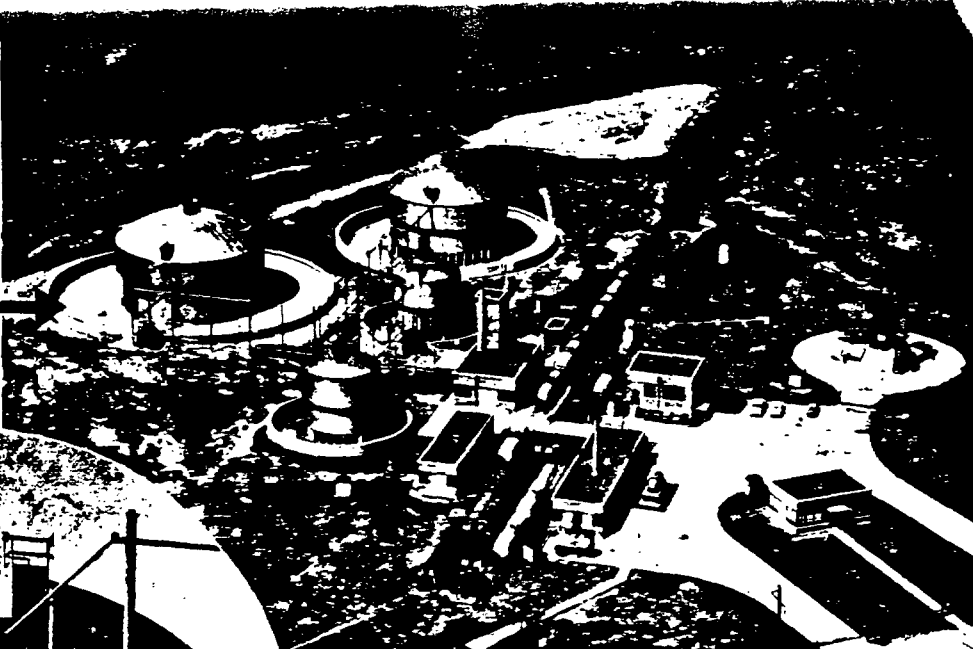
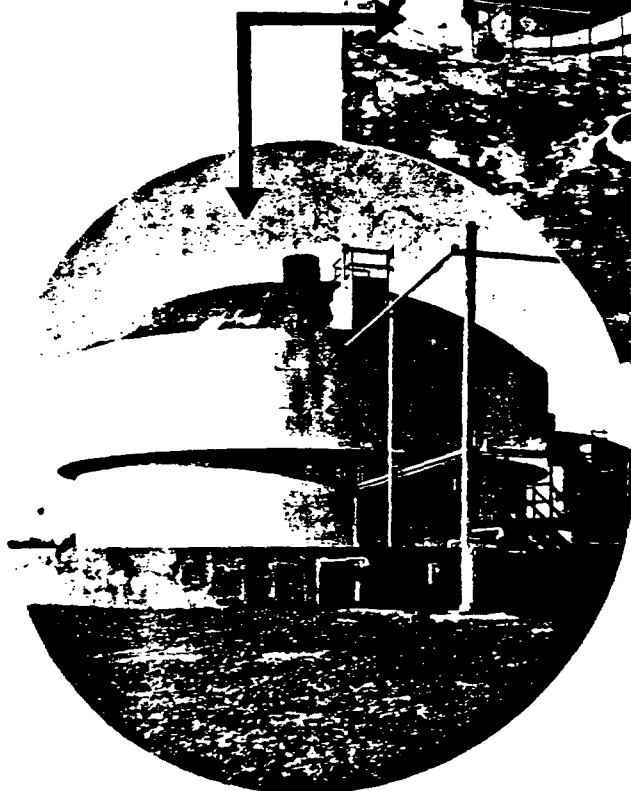
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A close-up of the new tank and an air view showing its location in the storage terminal at Edge Moor, Del.



New Storage at Edge Moor

A recently completed tank adds to the capacity of Ethyl's East Coast terminal

EVIDENCE of continuing expansion of Ethyl Corporation facilities and services in keeping with the growth of the oil industry is seen, among other places, at the Company's East Coast field terminal at Edge Moor, Del., where a large new antiknock compound storage tank was recently put into service.

Like its West Coast counterpart at Wilmington, Calif., the Edge Moor terminal was opened in 1948, when heavy postwar demand for high quality gasoline called for increased quantities of "Ethyl" antiknock compound. Initially, the two small tanks shown in the picture above represented the terminal's total storage capacity. Soon, however, with further demands for "Ethyl" fluid, a third tank with two-and-a-half times the capacity of the first two was added.

The new tank that has recently been completed has a storage capacity approximately three times that of the two original tanks. Its use brings total terminal capacity at Edge Moor to more than six times what it was when the installation was built and put in service there seven years ago.

The place of storage terminals in Ethyl's supply facilities and services is to provide additional sources of "Ethyl" fluid for refiners, especially on short notice. Strategically located near many refineries, the Edge Moor and Wilmington terminals dispatch deliveries by tank car and tank truck. Both terminals, in turn, are supplied from Ethyl's manufacturing plants at Baton Rouge, La., and Houston, Texas, which ordinarily serve refiners directly. #

Quality Reports

Ethyl's revised and expanded gasoline surveys provide oil refiners with up-to-the-minute information



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UP-TO-THE-MINUTE INFORMATION on gasoline anti-knock quality throughout the United States is being made available in expanded and improved monthly reports published by Ethyl Corporation as a service to the oil industry. Designed to help refiners evaluate marketing trends, the reports contain data believed to be the most comprehensive ever assembled on current gasoline quality.

Easy-to-read figures and charts tell at a glance the octane number and tetraethyl lead content of premium and regular grade gasoline and the octane number spread between grades. The information is presented on a national basis and individually for 53 major marketing centers.

Not only the current situation but also trends in gasoline antiknock quality are clearly portrayed. For the United States as a whole, current figures are accompanied by monthly averages for the previous two years. For each of the marketing centers, current and preceding 12-month data are presented.

Special features of the report include a monthly summary discussing current developments and a unique

"distort map" of the country showing each of the 48 states sized in proportion to its volume of gasoline sales.

The Ethyl surveys are based on approximately 850 gasoline samples purchased between the first and the tenth of each month at service stations in the 53 major representative marketing centers. To insure further wide representation, samples of any given brand are obtained at different stations in each center each month.

Results Soon Available

In the expanded and improved reports, results are made available to the oil industry in less than 30 days after samples are collected. This provides the most timely reports on gasoline quality that have thus far been possible.

As the originators of gasoline quality surveys, Ethyl Corporation has been gratified by their increasing usefulness to the oil industry over the years. In its efforts to assure their maximum effectiveness for refiners, the Company has made many improvements in its sampling, testing and reporting methods. The current expansion and improvement of the reports were initiated

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by Ethyl to provide the desired information on prevailing gasoline quality and trends in the form most useful to oil companies.

Under the new format, much more information will be available on individual brands of gasoline in each of the 53 marketing centers. Each issue presents individual data for approximately 850 samples covering from 5 to 13 brands, identified by code number, in each marketing center. In the report, tables show both the Research and Motor octane numbers and TEL content for premium and regular grade of each brand and the arithmetic average.

A companion chart, covering the current month and the preceding 12 months, shows the arithmetic average Research octane numbers of premium and regular gasolines sold in the center and indicates the octane number spread between grades.

By using the Ethyl reports, refiners are able every month to compare the quality of their own brand with

other gasolines—and with the average of all brands—in each area where they market and throughout the country.

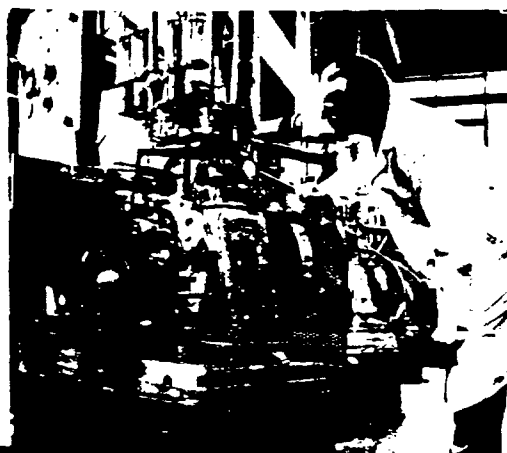
In preparing the reports, Ethyl bases octane number data for the individual marketing centers on simple arithmetic averages, but weights national averages according to the respective gallonages involved at the various octane levels.

For those interested in the subject, average data on vapor pressure and distillation temperatures will be included quarterly in the February, May, August and November reports.

Coming at a time when changes and trends in gasoline quality are particularly significant, the improvements and expansion of the Ethyl reports have been planned to provide an especially helpful service. Judging by the enthusiastic reception the first revised issues have received from many refiners, they are accomplishing their purpose successfully. #



Gasoline samples purchased monthly in representative marketing centers are tested in Ethyl laboratories for tetraethyl lead content (above) and antiknock quality (below). Results are made available to the oil industry less than 30 days later.



Major Marketing Centers

The 850 samples on which Ethyl's monthly reports on gasoline antiknock quality are based are purchased in 53 representative marketing centers throughout the United States. These centers are:

Albuquerque, N. M.	Little Rock, Ark.
Amarillo, Texas	Los Angeles, Calif.
Atlanta, Ga.	Louisville, Ky.
Bakersfield-Fresno, Calif.	Memphis, Tenn.
Baltimore, Md.	Metropolitan New York-New Jersey
Billings, Mont.	Milwaukee, Wisc.
Birmingham, Ala.	Minneapolis-St. Paul, Minn.
Boston, Mass.	New Orleans, La.
Buffalo, N. Y.	Northwest Pennsylvania
Casper, Wyo.	Oklahoma City, Okla.
Central Michigan	Omaha, Neb.
Charlotte, N. C.	Philadelphia, Pa.
Chicago, Ill.	Phoenix, Ariz.
Cincinnati, Ohio	Pittsburgh, Pa.
Cleveland, Ohio	Portland, Ore.
Corpus Christi, Texas	Richmond, Va.
Dallas-Fort Worth, Texas	Salt Lake City, Utah
Denver, Colo.	San Antonio, Texas
Detroit, Mich.	San Francisco, Calif.
El Paso, Texas	Seattle, Wash.
Fargo, N. D.	Shreveport, La.
Hartford, Conn.	Spokane, Wash.
Houston, Texas	St. Louis, Mo.
Indianapolis, Ind.	Toledo, Ohio
Jackson, Miss.	Tulsa, Okla.
Jacksonville, Fla.	Wichita, Kan.
Kansas City, Mo.	

Educated Truck D

THE HAND ON THE WHEEL of the trucks that roll across America must be a steady, intelligent hand. Wheeling ton after ton of freight millions of miles is a big and vital business. Farm, home, and industry count on trucks to deliver the goods day and night, in good weather and bad, through city streets and over the open highway.

Recognizing the importance of the men high in the truck cabs, most truckers make sure their drivers are well trained before they take to the road. In this connection, many companies have found that one of the more outstanding training grounds for their men is the Truck Driver Training School at North Carolina State College, in Raleigh, N. C.

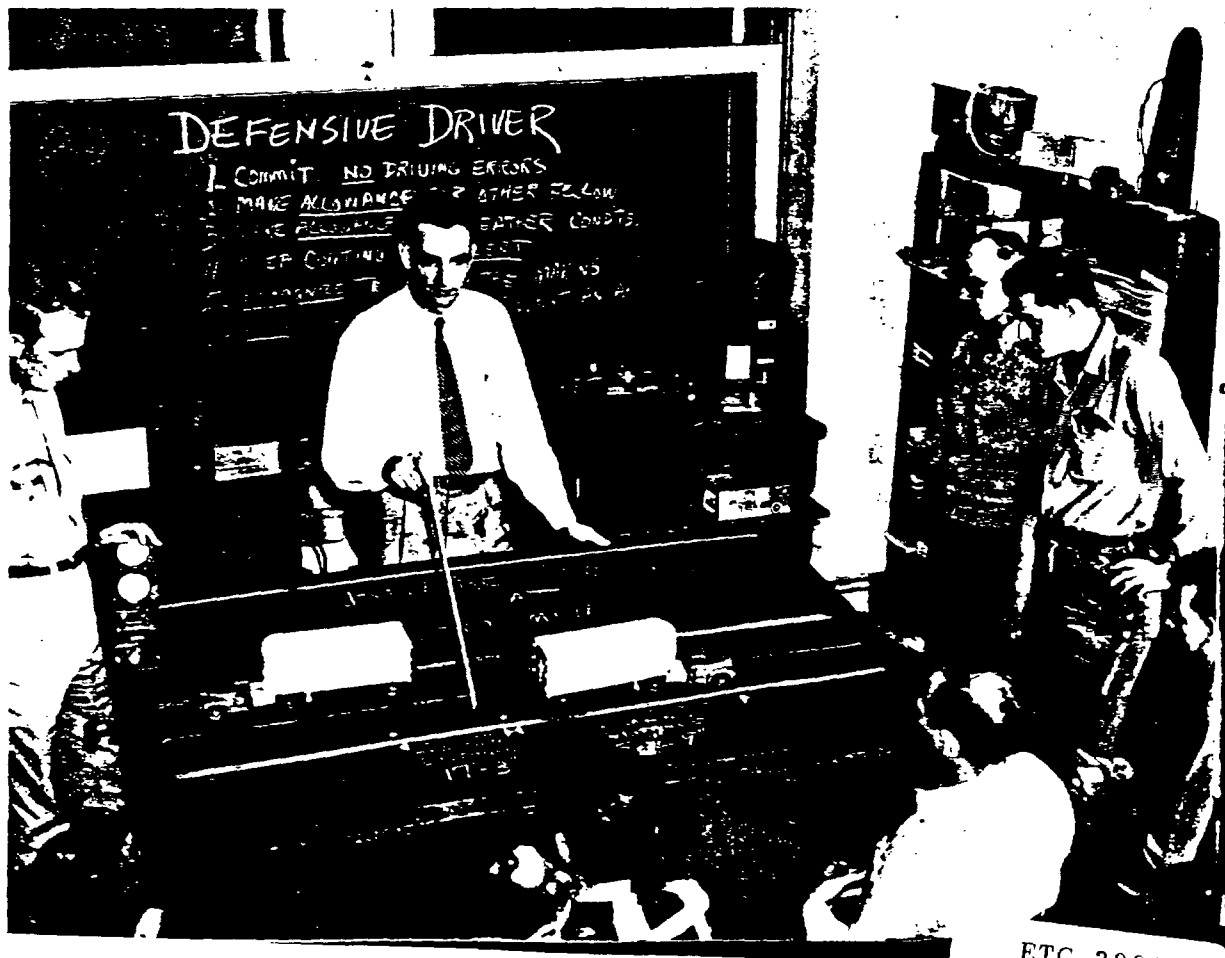
Under Russell M. Haynie, Jr., director of instruction, and George W. McAfee, field road instructor, students at this unique four-week school receive an intensive course of instruction in truck driving that keeps

them hopping from 8 a.m. to 6 p.m., with homework added to take care of their evenings.

The course is divided into four main categories: classroom instruction, fundamental driving skills, road driving, and city driving. Mornings are usually devoted to three classroom sessions, where the big word SAFETY is gradually built into a pupil's mind until it becomes a part of him. Lectures and discussions cover defensive driving practices, state and interstate laws and regulations, accident and insurance procedures, first aid, fire fighting, and truck maintenance.

Besides this well-rounded classroom training, students get hours of thorough instruction in basic driving skills. They learn the fundamentals of starting, stopping, turning, backing, alley dock parking, jack-knife parking, overhead clearance, serpentine maneuvering, nomenclature and inspection, and coupling and uncoupling. Since some trucks weigh as much as 20 tons loaded—

Using truck models, instructor Russell M. Haynie, Jr., discusses braking distances with some of the drivers-in-training.



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k Driving

The fundamentals of motor carrier operation are taught in a four-week college course

compared with the two-ton weight of a passenger car—all the fine points of skillful driving become doubly important.

With a solid foundation of "book learning," and basic driving instruction, the real task begins when students take to the highways in one of the school's tractor-semi-trailers. At first they stay on the lightly traveled back roads, but as they progress and grow more confident they graduate to the most difficult driving conditions truck drivers encounter—the close maneuvering in heavy city traffic.

During the last week of classes students take comprehensive tests on all areas covered in the course. It is a credit to both the students and the instructors at North Carolina State that 90 percent of those who enroll successfully complete the course.

Plenty of Job Offers

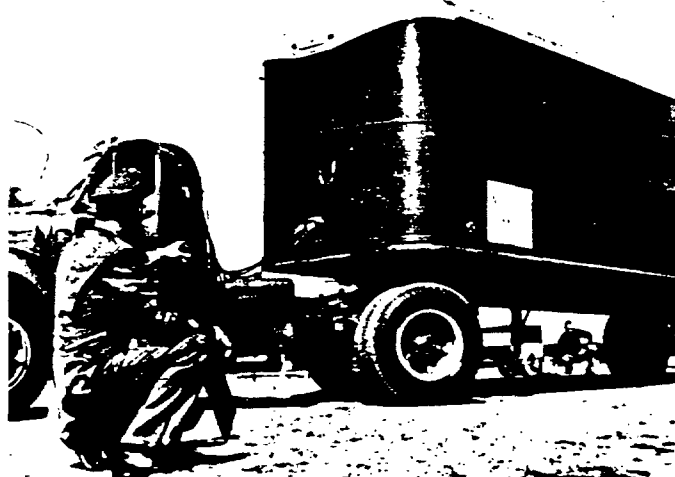
Just how much trucking companies themselves think of the school is pointed up by the fact that about 95 percent of the graduates receive offers of immediate employment. Even the old-time drivers who at first scoffed at the "college boys" frequently copy some of the new university methods.

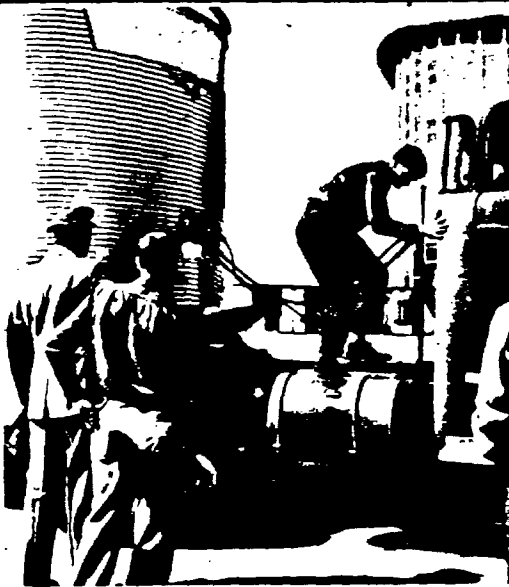
The school, of course, doesn't pretend to turn out finished drivers in four weeks. But the instructors do maintain that their pupils get an exceptionally solid foundation on which to build through actual driving experience. They point with pride to the safety record of their graduates and to statements of trucking companies that NCS men are easier to break in on the job. In as little as a year, the school's former students often mature into the best drivers on their respective companies' staffs.

The origin of North Carolina State's Truck Driver Training School dates back to 1939 when the Council



The course includes everything from correct rear-view mirror angles through tire changing and accurate backing.





Practice in coupling and uncoupling semi-trailers and tractors is an important part of the instruction.

of Safety Supervisors of the North Carolina Motor Carriers Association decided to turn to the field of education to promote greater safety in the growing trucking industry. World War II delayed opening the school until 1949. The first class enrolled in August of that year.

The first of its kind to be sponsored by a college, the North Carolina school is the only one of its type in the country in continuous operation. Twelve four-week classes, with an average of 25 pupils in each, are held every year. Other schools have operated a similar course, but only on a periodic basis.

The course is open to applicants who have a valid driver's license, the ability to read and write, and who can furnish two character references. It goes without saying that the applicant must also have a strong urge to get behind the wheel of a big truck and guide it across open prairies, over winding mountain roads, and through the hundreds of other places that trucks must go. Tuition is \$125, which students may pay on a deferred payment plan.

The school operates equipment valued at \$50,000. In addition, truck manufacturers such as Fruehauf, Trailmobile, Mack, International Harvester, General Motors and White often loan the school trucks, so there is no shortage of vehicles to drive.

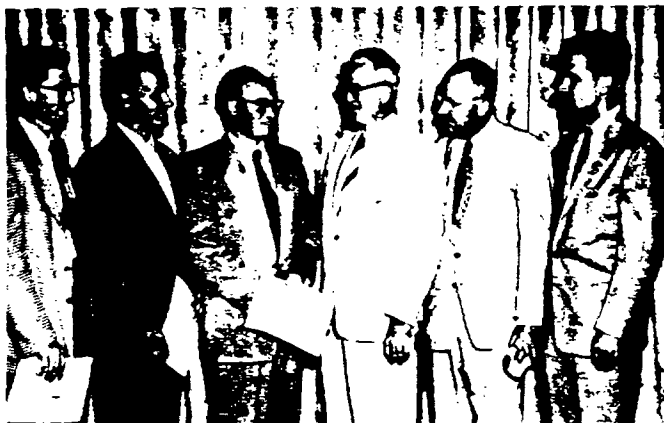
The results of the school's good training and its "Safety First" creed can be vividly seen in the fact that its students have driven over 500,000 miles while in training in the last five years, and been involved in only two minor traffic accidents with just \$200 worth of damage.

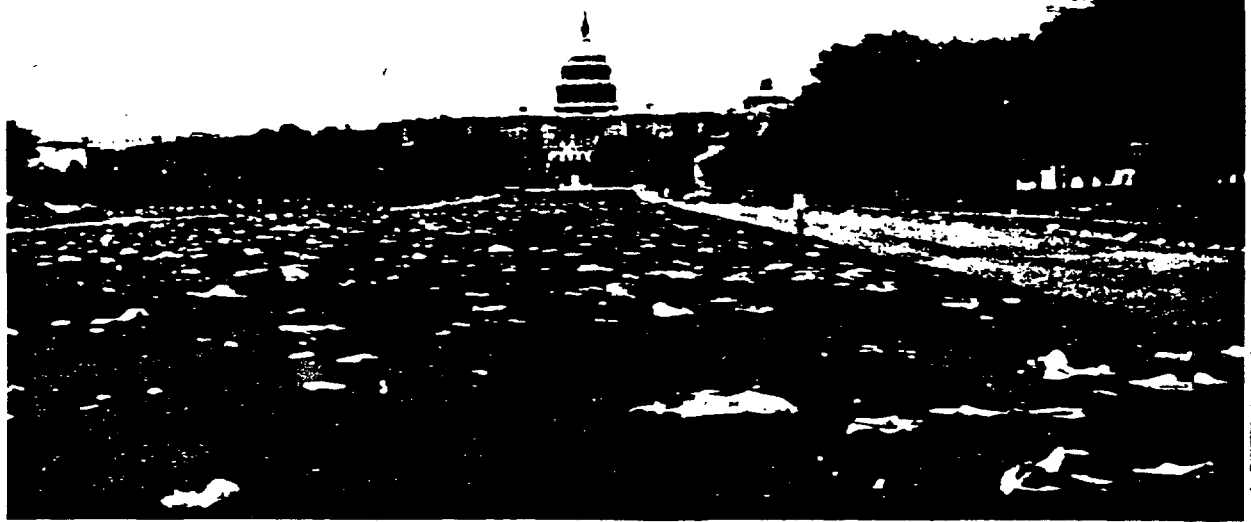
So far, about 2,000 students have entered the school, and about 1,800 of them have satisfactorily completed the course. About 87 percent were native North Carolinians and the remaining 13 percent came from other states and from six foreign countries.

By adapting the course to meet the needs of the times, North Carolina State hopes to help effect an even greater improvement in driving in the trucking industry. It also hopes to help fulfill the college's role of better serving industry and the citizens of North Carolina. Eighteen hundred skilled, courteous, and informed truck drivers will attest that North Carolina State is doing both. #



Classroom work is followed by actual highway driving. Below, with three honor graduates of a recent class (left), are Dr. C. H. Bastian, chancellor of North Carolina State; C. S. Lombard, of the Interstate Commerce Commission; and W. T. Mason, of Thurston Motor Lines.





Even the Nation's Capital has not escaped the unsightly scourge of litter.

TEAMING UP ON TRASH

Keep America Beautiful, Inc., sparks nationwide anti-litter campaigns

Motorists are urged to use "litterbags" and not throw debris from cars. . . . Right, "Parky" helps teach neatness in Los Angeles.



THERE'S AN UGLY BLEMISH on the beautiful face of America. It's litter. By the ton, a heedless citizenry is tossing paper, bottles, cans, wrappers, containers and other refuse helter-skelter on our streets, highways, parks, beaches and across the landscape. This monumental carelessness has created a national acne.

Applying an aggressive cure for this common disease is a master beautician, Keep America Beautiful, Inc. This volunteer, non-profit organization is backed by two dozen major businesses and industries in cooperation with state, city and over a score of national civic and patriotic groups. More and more companies and associations are sharing the responsibility for eliminating unnecessary debris. They all realize the job will be a long and tough one.

Although its treatment was started only a few months ago, the master face lifter already has made considerable progress. But with human shortcomings what they are, the work of Keep America Beautiful probably will have to continue indefinitely.



Because streets and highways are among the most popular litter depositories, industries and organizations concerned with automobile travel are some of Keep America Beautiful's most enthusiastic boosters. The American Petroleum Institute's Division of Marketing, for example, is among leading national organizations endorsing the litter-control drive. Support also comes from the American Automobile Association, state and local automobile clubs, and gasoline retailers.

One way KAB hopes to eliminate highway debris is by encouraging motorists to use a sturdy paper bag for waste materials accumulated on automobile trips. When full, the bags can be discarded in trash receptacles en route or at home. The AAA, its affiliates, several oil companies and some gasoline retailers' groups are among organizations voluntarily providing these handy "litterbags."

Although some gasoline retailers have installed trash baskets on their own initiative, where filled "litterbags" can be left at service stations, KAB and the API both agree that motorists should be responsible for properly disposing of their own travel trash. Unbelievable as it may seem, it costs \$30 million a year to pick up debris left by motorists everywhere.

Leaders Experienced

Since they are faced with curing a disease of such widespread virulence, it's fortunate that KAB directors are experienced businessmen used to dealing with difficult problems. Chairman of the Board is William C. Stolk, president of the American Can Company. The president of KAB is Smith L. Rairdon, vice president of Owens-Illinois Glass Company.

Mr. Stolk makes it clear that KAB takes no credit for alerting the public to the seriousness of the litter problem. The organization, he points out, is simply an

agency to do something constructive about "putting an end to what the public itself has long since realized is a national disgrace.

"People have been demanding action and are still demanding it. But with the increasing support of business and industry," he adds, "chances for realizing effective results have been increased tremendously." In this connection, Mr. Stolk has lauded the API Marketing Division's "statesmanlike stand" in the constructive stop-littering drive.

KAB is convinced education is the basic solution to the litter problem. Taking the same approach are more than 30 cooperating national organizations and hundreds of local groups, with KAB acting as a clearing house and coordinator. Represented on the KAB advisory council are such organizations as the National Recreation Association, Boy Scouts, U. S. Chamber of Commerce, Farm Bureau, American Legion, National Grange, General Federation of Women's Clubs and the National Council of State Garden Clubs.

Aimed at Children

Particular educational emphasis is being directed toward children. Through the efforts of schools, youth organizations, churches and civic and business groups, boys and girls are given anti-litter encouragement in school assemblies, by teachers and community leaders and on radio and TV programs and posters. Thousands of children wear the eye-catching National Council of State Garden Clubs cartoon button, "Don't be a Litterbug," with a sense of genuine civic pride.

The National Education Association has appointed a special committee to create a handbook for teachers. The book is to give them a sure way of developing in their pupils a lasting civic tidiness—a habit which can be carried over to adulthood.

The National Council of State Garden Clubs' "Litterbug," left, is rapidly becoming as familiar as any cartoon character. In many states, aggressive steps against careless trash-tossing include posting warning and penalty signs along highways.



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**RUBBISH
DISPOSAL
PROHIBITED
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THIS PLACE IS
PROVIDED FOR
YOUR USE
HELP TO KEEP
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A disgusted National Park attendant prepares to clean up a typical picnic mess.



This pointed exhibit reminds motorists in Delaware how highway debris accumulates.

On an educational level directed more toward adults than children. KAB citizens' committees have been organized or are being set up in about two dozen states. More states are expected to take a similar action as the tourist season approaches. This kind of education in good outdoor manners pays off. In Massachusetts, for example, newspapers, radio and TV, and a series of poster and slogan appeals brought a 25 percent reduction in roadside debris.

More state campaigns like "Keep Florida Beautiful," "Keep Maryland Beautiful," and "Keep Nebraska Beautiful" are gaining headway. In their support, KAB has prepared kits with plans, tools and procedures to help set up and conduct effective state-wide or community programs.

The magnitude of public disregard for natural beauty spots, and the need for more anti-strewing campaigns is seen from coast to coast. Every summer, carloads of debris have to be removed from Mt. Washington in New Hampshire, New England's highest peak. And in San Diego, the city has been obliged to install 800-lb. concrete receptacles on city beaches, because vandals battered wire trash containers or stole them outright.

Los Angeles is trying a novel way of stimulating public interest in its civic neatness campaign with prizes for the best song about Parky, its clean-up kangaroo, whose cartoon currently adorns city trash receptacles.

KAB also is cheered by more muscular efforts toward forcing adults to toe the no-littering line. In Georgia, an outraged legislature has provided penalties up to \$1,000 and six months in jail for let's-throw-it-anywhere people. Virginia has new highway signs announcing \$500 fines for trash tossing. There is a \$50 penalty in Vermont, and a county in Ohio offers rewards for litter convictions.

New York's Efforts

In New York City, 20,000 signs telling of fines for improper waste disposal have been put up, and a war is on against those who make the city "the most disgustingly filthy place in the world." Thousands of summonses have been handed out to offenders obliging them to pay for slovenliness. Other urban centers are taking similar action.

The KAB campaign requires an incredible amount of teamwork. But with the kind of public cooperation it deserves, and strengthened by the increasing help of business and industry, Maine's jingle may yet become as obsolete as the proverbial dodo bird:

"He loves to stuff himself with fruit
And strew the skins about . . .
Unmannerly Banana Ben . . .
A Grade-A Litter Lout." =

**50 FINE
FOR
THROWING
TRASH ON
HIGHWAYS**

**UNLAWFUL TO THROW
TRASH ON HIGHWAY
FINE UP TO \$500.00**



**\$100 FINE
THROWING
TRASH ON
HIGHWAY**



A New Flock of

*Ethyl's Road Birds teach better
driving habits and help oil companies
sell more premium gasoline*

THE SCREECHING TERN—There's always a lot of noise when this Road Bird is out. He recklessly flies into curves at high speed . . . with tires screeching all the way 'round.

A NEW FLOCK OF BIRDS turned up all over the country when the more familiar species flew north this spring. But unlike their feathered cousins, the newcomers weren't found preening their plumage in budding cherry trees or seeking new mown hay for their nests. Instead, they were prominently seen on the pages of leading national magazines helping oil companies sell more premium gasoline.

The members of the new species are quite varied, but they have a common name. They are the Road Birds of Ethyl Corporation's newest premium gasoline advertising campaign. They all sing in two-part harmony a song of better driving habits and better automobile performance with premium gasoline.

In Leading Magazines

The full page advertisements displaying the birds are appearing in choice spots in some of the country's most popular magazines. These include *Life*, *The Saturday Evening Post*, *Colliers*, *Time*, *Sports Illustrated*, *American Legion*, *Field and Stream*, *Outdoor Life*, *Sports Afield* and *Sunset*. More than 50 million people see these publications every month.

Most of these Road Birds are well known to motorists, although not in the colorful and attractive form in which Ethyl's new campaign shows them. They are distinguished for their bad driving habits.

The first of the Road Birds, the Nodding Nightin-

THE NODDING NIGHTINGALE—This Road Bird is recognized by his heavy eyelids and nodding head. He's usually found out late at night, half-asleep at the wheel, and trying to make "just a few more miles."

gale, appeared in the April 9th issue of *The Saturday Evening Post*. Identified by his heavy eyelids and nodding head, he's the bird who, half asleep at the wheel, tries to make "just a few more miles" on the road at night.

Below the attractive illustration of this sleepy bird appears a drawing of the Smart Bird, in the guise of a wise old owl. The Smart Bird is shown and described parking his car in front of an overnight lodging, preparatory to checking in for a good night's sleep. Prominently and unmistakably tied in with this eye-catching piece of better driving advice is another important tip for the motorist: "For wide-awake engine performance, it's smart to use premium gasoline!"

In another of the ads, the Darting Road Runner appears. This Road Bird gets his name from the way he darts in and out of traffic lanes. "A truck coming the other way doesn't even ruffle his feathers . . . and he never looks behind when he suddenly hops back into line."

By contrast, the Smart Bird in this case makes sure the road is clear ahead before he starts to pass. And



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he keeps one eye on the mirror when he moves back into his lane. The Smart Bird, it is pointed out, also plays safe with his engine. He uses premium gasoline, taking advantage of its higher octane rating to protect against overheating and engine knock and using the extra power for quicker, safer passing.

Also included in the series is the Screeching Tern. There's always a lot of noise when this Road Bird is on the loose, the advertisements report. He can be seen flying into curves at high speed, with tires screeching all the way.

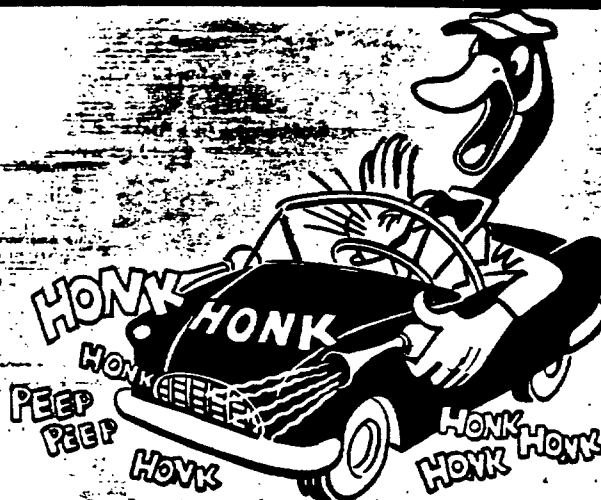
The Raucous Honker is featured too. He drives with his horn instead of his head. And then there are the Bent-Wing Thrasher, the Timid Titmouse, the Low-Flying Loon, the No-See Gull, and the One-Winged Lovebird. More of these clever caricatures are "in the works" for future Ethyl advertisements designed to help sell more premium gasoline.

Reach Three Groups

The psychology behind Ethyl's newest campaign is simple, but sound. At present there is a hard core of satisfied customers who use nothing but premium gasoline. The Road Bird advertisements are planned to help oil companies keep these people sold, to attract new customers to premium gasoline from that group of motorists who have been using regular, and most important of all, to help sell premium to the millions of new purchasers of gasoline.

During this year alone, over three million young people will reach the age of 19—and most of them will begin buying gasoline. At that rate there will be over 31 million new gasoline buyers in the next ten years. Ethyl has designed the colorful Road Bird advertisements to catch the eyes of the 19-year-old fledglings while they are at an impressionable age—to teach them to be Smart Birds.

Ethyl's current advertising is backed by the Com-



THE RAUCOUS HONKER—This Road Bird drives with his horn instead of his head. His mating cry is heard the moment a light goes green, or whenever a car or pedestrian holds him up for even a second.

pany's 28 years of experience in promoting the sale of premium gasoline for the nation's oil companies. Over the years, Ethyl has earned an enviable reputation for its successful campaigns, which have included the popular "Animalogues," "Trade Marks of Nature," and "What's In A Name?" The "Road Birds" constitute another advertising program designed to capture and hold reader interest over an extended period of time.

By combining its experience in advertising with an amusing, but hard-selling campaign, Ethyl continues to strengthen its efforts to help oil companies throughout the country sell more of their best gasoline. #



THE DARTING ROAD RUNNER—The Road Bird gets his name from the way he darts in and out of traffic. A truck coming the other way doesn't even ruffle his feathers . . . and he never looks behind when he suddenly hops back into line.



Oil Roads Lead to ROME

Oilmen from around the globe will meet this June at the Fourth World Petroleum Congress

JUST AS ALL ROADS of the known world once did, the roads of the oil world this year lead to Rome. From 34 free nations around the globe, some 4,000 oilmen will gather in the Eternal City, June 6 to 15, for the Fourth World Petroleum Congress. The first meeting of its kind in four years, the huge assembly of internationally prominent petroleum industry leaders has far-reaching significance in the worldwide oil picture.

For ten days, in the spacious modern Congress building at the Universal Exhibition grounds, seven miles from the center of Rome, the international oil forum will discuss scientific, technical and economic subjects related directly and indirectly to petroleum. For oilmen

in attendance and for the rest of the petroleum world, the Congress provides an opportunity to exchange ideas freely and to evaluate the great strides made in petroleum science and technology in recent years.

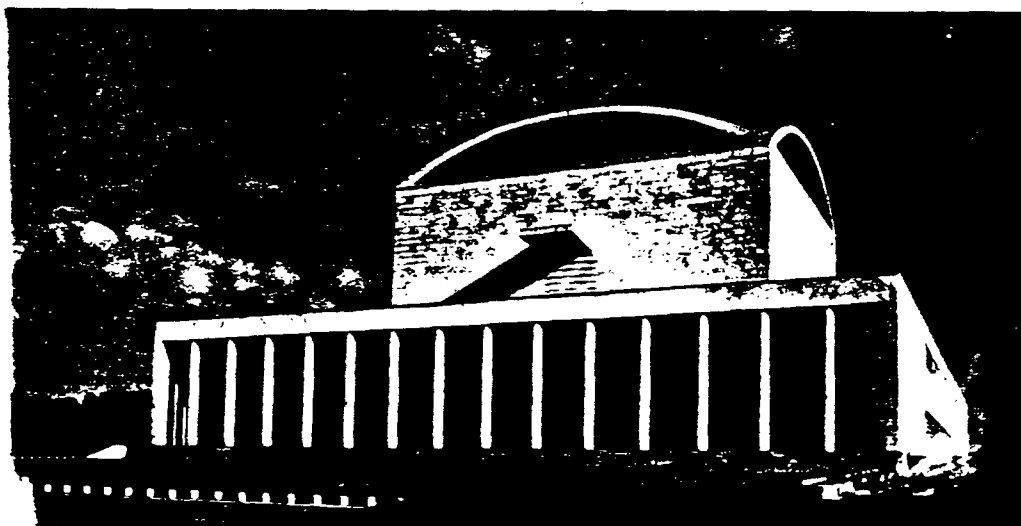
Divided into nine sections for the purposes of technical discussions, the Fourth World Petroleum Congress will hear more than 215 papers. These will be devoted to geology and geophysics; drilling and production; oil processing; petrochemical production; composition of petroleum; utilization of oil products; construction of equipment; transport, storage and distribution; and economics, statistics and education. About one-quarter of the papers have been prepared by oilmen from the

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France, Italy
countries

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Plenary and technical sessions at the world oil gathering will be held in the modern Congress building at Rome's Universal Exhibition grounds.



United States. Others originated in Great Britain, France, Italy, the Netherlands, Germany and the other countries represented.

In addition to those of a technical nature, there will be four plenary sessions. At each of these, subjects of general interest with an appeal to all delegates will be discussed. Plenary session speakers will be such outstanding authorities as C. A. P. Southwell, of London, managing director of the Kuwait Oil Company; Professor J. Jungers, of the University of Louvain, Belgium; Professor W. K. Lewis, of Massachusetts Institute of Technology; and Ing. (Engineer) E. Mattei, chairman of Ente Nazionale Idrocarburi, Rome.

Designed to encourage personal contacts between men with common interests from all over the free world, the Congress has been set up to facilitate meetings and the free exchange of ideas.

Special Events

Indicative of the enthusiasm with which Italy is playing host to the representatives of the worldwide oil industry are the detailed arrangements that have been made for the comfort and convenience of the visitors and the number of special events that have been planned. The latter include a reception in the gardens and palaces on Capitoline Hill by the mayor of Rome; a symphony concert in the Basilica di Massenzio; an official banquet; an international variety show; a special opera performance; an official reception by the ministers of Industry and Commerce and Education; a photographic exhibit of Italian oil installations and facilities; and an international exhibition of oil equipment at Naples.

The Universal Exhibition grounds where the Congress will meet is located in the southern part of the city on the east bank of the Tiber River. The buildings there were started in 1937 and were designed for use by Rome's annual fair and by international expositions. World War II interrupted the project, however, and some of the buildings were damaged when Nazi forces



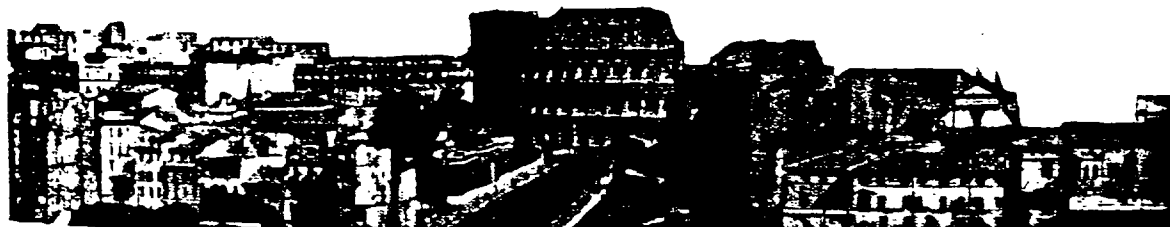
fought through the site on the way to occupy Rome after the Italian armistice.

The modern marble buildings are the work of several of Italy's outstanding architects. They were completed recently, after having served in the post-war era as housing for homeless Italians. Rapid transit facilities connect the grounds with the center of Rome.

While this year's is only the Fourth World Petroleum Congress, the meetings date back more than 20 years. The first in the series was held in London, in July 1933, and was attended by almost 1,000 oilmen from some three dozen countries. Sessions at that first meeting were devoted to geology, production, refining, and chemical and testing aspects of the petroleum industry.

The second world oil gathering convened in Paris in 1937 on schedule, but the third, originally scheduled for Berlin in 1941, was long delayed by World War II. It failed to become a reality until it was held at The Hague, Holland, in 1951.

Responsibility for perpetuating the World Petroleum Congress and general supervision over the meetings





Ethyl Men Prepare Paper on Deposits

AMONG THE PAPERS prepared for that section of the Fourth World Petroleum Congress devoted to the Utilization of Oil Products is "Combustion Chamber Deposits in Automobile Engines" by W. G. Lovell, H. J. Gibson and B. A. Jones, of Ethyl Corporation's Research and Engineering department in Detroit. This paper reviews the literature on the subject of engine deposits and summarizes published information on the subject up to the present. It discusses the several factors that affect the formation of these deposits, the operational difficulties they cause and the attempts currently being made to solve the over-all problem.

Combustion chamber deposits that accumulate in automobile engines have at least two harmful effects, the paper points out. First, they gradually increase the gasoline antiknock requirement to suppress ordinary knock. Second, they contribute to the occurrence of abnormal combustion phenomena such as surface ignition, or preignition, which in turn results in knocking noise and inefficient and erratic engine operation. These effects limit the full utilization of higher octane number fuels.



W. G. Lovell

H. J. Gibson

B. A. Jones

The two harmful effects can be significantly reduced by careful selection of fuels and lubricating oil, the paper continues. It also points out that a more recently introduced method of reducing the undesirable surface ignition effects is by modifying them with phosphorous-type additives. In addition to reducing the tendency toward preignition, phosphorous additives also inhibit spark plug fouling by modifying the deposits on spark plug insulators.

Because of the extensive research being devoted to the deposit problem by the oil and automotive industries, it is likely to be only a matter of time before improved commercial solutions will be forthcoming, the paper concludes. Future increases in automobile engine efficiency will be achieved through the use of engine compression ratios even higher than those current today, the authors predict.

rests with Permanent Council of the World Petroleum Congress, with its seat in London. At present, E. V. Murphree, president of Esso Research and Engineering Company, is chairman of this group. Other U.S. members are F. S. Clulow and H. G. Vesper, vice presidents of Shell Oil and Standard Oil of California, respectively. They serve on the Permanent Council with representatives of Great Britain, France, Venezuela, Austria, Belgium, Canada, Germany, Mexico, the Netherlands and Italy.

In many countries, national committees have been organized to coordinate and direct the work of their representatives to the World Petroleum Congress. In addition to Messrs. Murphree, Clulow and Vesper, the United States Committee is composed of Paul D. Foote, formerly of Gulf Research and Development; J. K. Roberts and J. W. Boatwright, Standard of Indiana; R. C. Alden, Phillips Petroleum; George Corless, formerly of Standard Oil Company (New Jersey); Morgan J. Davis, Humble Oil & Refining; Hugh W. Field, Atlantic Refining; William M. Holaday, Socony-Vacuum; J. Porter Langfitt, Pure Oil; A. C. Rubel, Union Oil; M. E. Spaght, Shell Oil; T. E. Swigart, formerly of Shell Pipe Line; K. G. Mackenzie, formerly of The Texas Company; and H. R. Tate, Esso Research and Engineering Company.

An enthusiastic booster of the World Petroleum Congress and the idea behind it, Mr. Murphree advocates all-out cooperation by U.S. oil companies.

Point Four Program

"The World Petroleum Congress is the American oil industry's own Point Four program," Mr. Murphree says. "Scientists, educators and businessmen join together in a spirit of technical cooperation. It is important for American oilmen to learn what scientists and industrialists are doing abroad. Also, America, with its vast resources for research and engineering, must demonstrate a willingness to share its knowledge with the nations of the free world."

Past Congresses have made many contributions. They have speeded progress in international petroleum science and technology; helped solve problems of standardization; aided in the development of raw materials and the conservation of resources; and helped develop a common terminology for oilmen everywhere.

With four eventful years having elapsed since the last meeting and with 4,000 oilmen from around the globe assembling together for free discussion, the Fourth World Petroleum Congress is expected to equal or even surpass the significant role of its predecessors. ■

UNDERGROUND ARTERIES

*Holing through mountains
and under river and harbor
bottoms, tunnels expedite
the flow of traffic*

IN ONE OF THE MORE SPECTACULAR of their many accomplishments, highway engineers conquer nature's blockades by tunneling under or through them. Tunnels eliminate road hazards, grades and curves, and reduce driving time and distances for automotive traffic.

Underground arteries have become so commonplace they often are taken for granted and their important contributions to quicker, safer, more economical and enjoyable driving forgotten. But to speed the flow of an increasing number of cars, trucks and buses, tomorrow's improved highways undoubtedly will call for still more engineering marvels, perhaps dwarfing many of today's tunnels.

As a reminder of the vital part tunnels play in automotive transportation, there are pictured on these pages some of the highway tunnels presently in use throughout the United States.

DEDICATED to the state's servicemen, Memorial Tunnel is a \$5 million feature of the 88-mile West Virginia Turnpike which was opened last fall through rugged mountains below Charleston. Traffic conditions in the half-mile tunnel are checked by four TV cameras and air is changed by forced ventilation.





THE BROOKLYN-BATTERY TUNNEL from the home of the Dodgers to downtown Manhattan is the longest and deepest underwater vehicular passage in America. Over 1½ miles long, it dips 115 feet below the bottom of New York harbor. It took \$80 million and seven years to build. Fifty-three huge fans change the tunnel's air every minute. Two two-lane tubes can each take care of 2,800 vehicles hourly. Tolls are used to amortize costs.



BOSTON'S SUMNER TUNNEL is a \$19½ million mile long under-harbor short cut North and East. Over 11 million vehicles used it last year, with summer traffic especially heavy.

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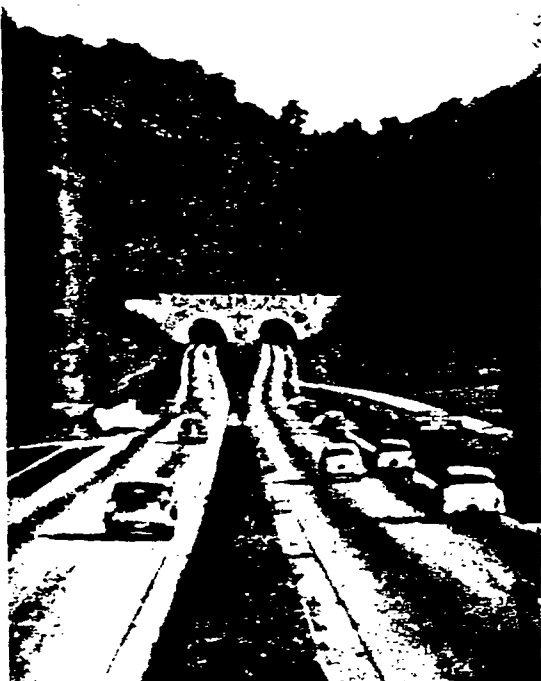
WHERE the Columbia River Highway runs today was once the Oregon Trail, route of pioneers heading for the Pacific Northwest in their covered wagons. Oregon State Highway Commission signs commemorate the historic migration. Tooth Rock Tunnel helps make driving on the key two-lane modern highway safer, quicker and easier.



SOUTH DAKOTA'S famous Mount Rushmore, with its sculptured heads of four famous U.S. presidents, is seen here through a short tunnel in the state's Black Hills vacationland.



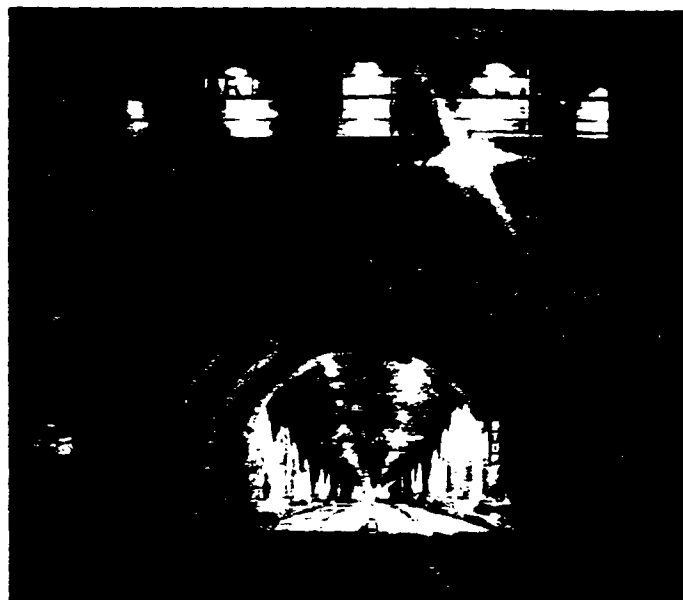
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WEST ROCK TUNNEL on the edge of New Haven helps do away with steep grades and curves on Connecticut's Wilbur Cross Parkway, an important New England artery. Costing nearly \$3 million, it was financed by toll receipts from the state's parkways. The twin two-lane tubes are 26½ feet wide and 1,200 feet long. Traffic volume averages 23,000 vehicles daily.

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RAYS HILL TUNNEL is one of seven on the Pennsylvania Turnpike through the Appalachian Mountains between the Delaware River and the Ohio line, averaging a mile in length. Originally dug 70 years ago for a railroad, they eliminate difficult grades and hazardous turns, and contribute to swift, safe and economical transit over the 360 miles of one of the nation's first big toll roads.

THE DETROIT-WINDSOR TUNNEL under the St. Clair River, linking the United States and Canada, is the only international tunnel in the world. Almost a mile long, it was completed in 1930 at a cost of over \$22 million. More than 200 million people have used it since that time. Automobile, truck and bus traffic totals more than 2½ million vehicles a year. In buses, over 5 million passengers now go back and forth annually.

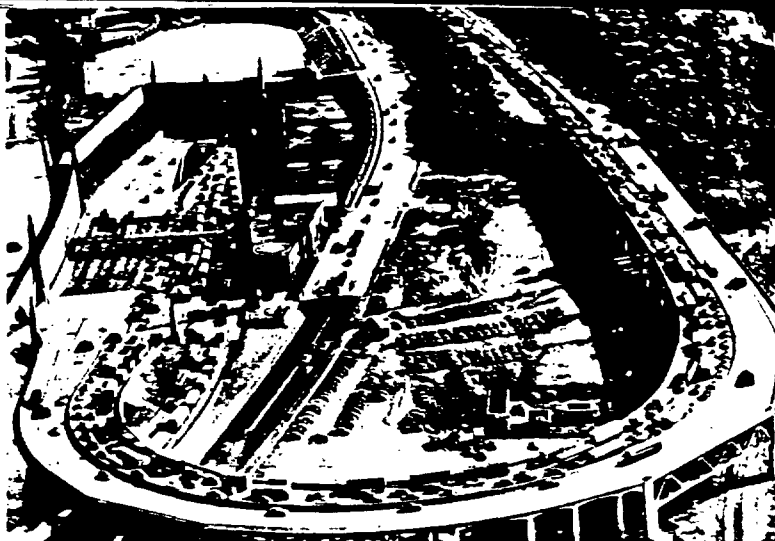
NOT TO BE OUTDONE by more mountainous states, Texas opened a tunnel under the Houston Ship Channel between Baytown and La Porte in 1953 at a cost of \$10 million. As in the Detroit-Windsor Tunnel, left, instrument detectors advise blower fan operators about underground atmospheric conditions.



ETC 28841



FATHER of all underwater arteries is the late Clifford M. Holland, chief engineer for the first New York-New Jersey vehicular tube under the Hudson River, which was opened in 1927 and named for him. Techniques he developed were so far advanced they never have been improved upon in subsequent tunnel building.



ALREADY HANDLING over 20 million vehicles annually, the 8,000-foot Lincoln Tunnel from New Jersey to New York is getting a third tube to be ready in 1957. This will increase the capacity of one of the world's busiest tunnels by 50 percent and raise total cost to \$188 million. A key link in metropolitan bridge, tunnel and highway systems, the tunnel's Weehawken, N. J., entrance is shown here, with the third tube's gateway to be to the right of the two now in use. Feeders connect the tunnel with the New Jersey Turnpike.



TRAFFIC over San Francisco's majestic Bay Bridge scuttles through a tunnel on Yerba Buena Island at a rate of 30 million vehicles per year. Cars use the tunnel's upper level, and trucks and inter-urban trains the lower one. The bridge-tunnel route connects the Golden Gate City with Oakland.

QUEEN CREEK TUNNEL in Arizona has a unique feature: with a 6.4 percent grade, an extra up-hill lane has been built to accommodate trucks. The slope also helps provide natural ventilation. Located in a region of scenic desert beauty, the tunnel is on U.S. Routes 60-70, about 60 miles east of Phoenix.

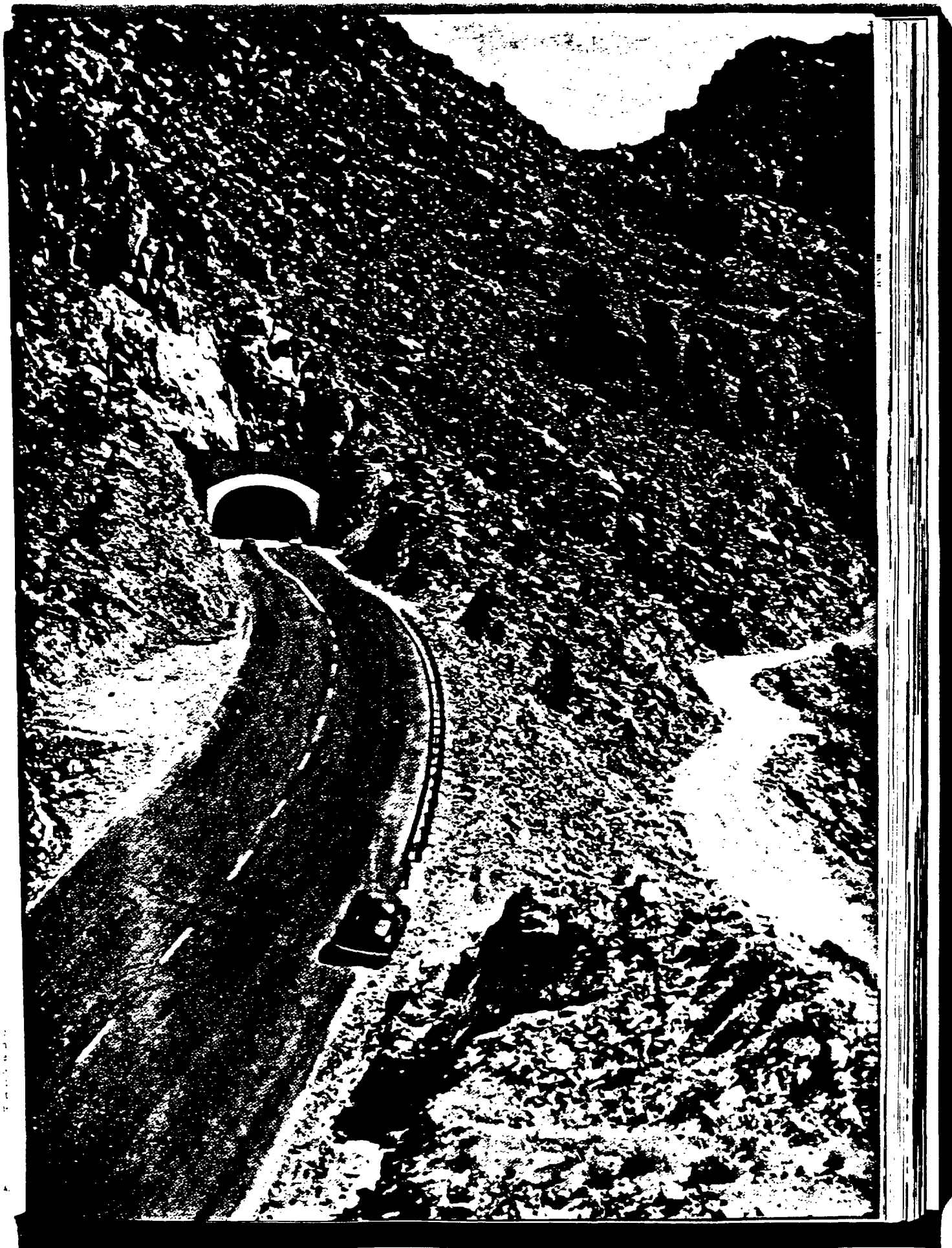
LAYOUTS AND ART DIRECTION: Carsten Grande

PHOTO CREDITS: Cover, Ektachrome by O. Winston Link; page 4, courtesy International Business Machines and Remington Rand; page 5, courtesy Socony-Vacuum, United States Steel and Chrysler Corp.; page 7, Brooks Studio; page 9, Camera Associates; pages 10, 11 and 12, courtesy North Carolina State College; pages 13, 14 and 15, courtesy Keep America Beautiful, Inc.; pages 18 (top) and 19 (bottom) Wide World; page 18 (bottom), courtesy *World Petroleum*; page 19 (top), courtesy Esso Research and Engineering; page 21, courtesy

West Virginia Turnpike Comm.; page 22, courtesy Oregon State Highway Dept., South Dakota State Highway Comm., Triborough Bridge and Tunnel Authority and Boston Public Works Dept.; page 23, courtesy Detroit & Canada Tunnel Corp., Connecticut State Highway Dept., Pennsylvania Turnpike Comm. and Texas Highway Dept.; page 24, courtesy California Department of Public Works and Port of New York Authority; inside back cover, courtesy Arizona Highway Dept.

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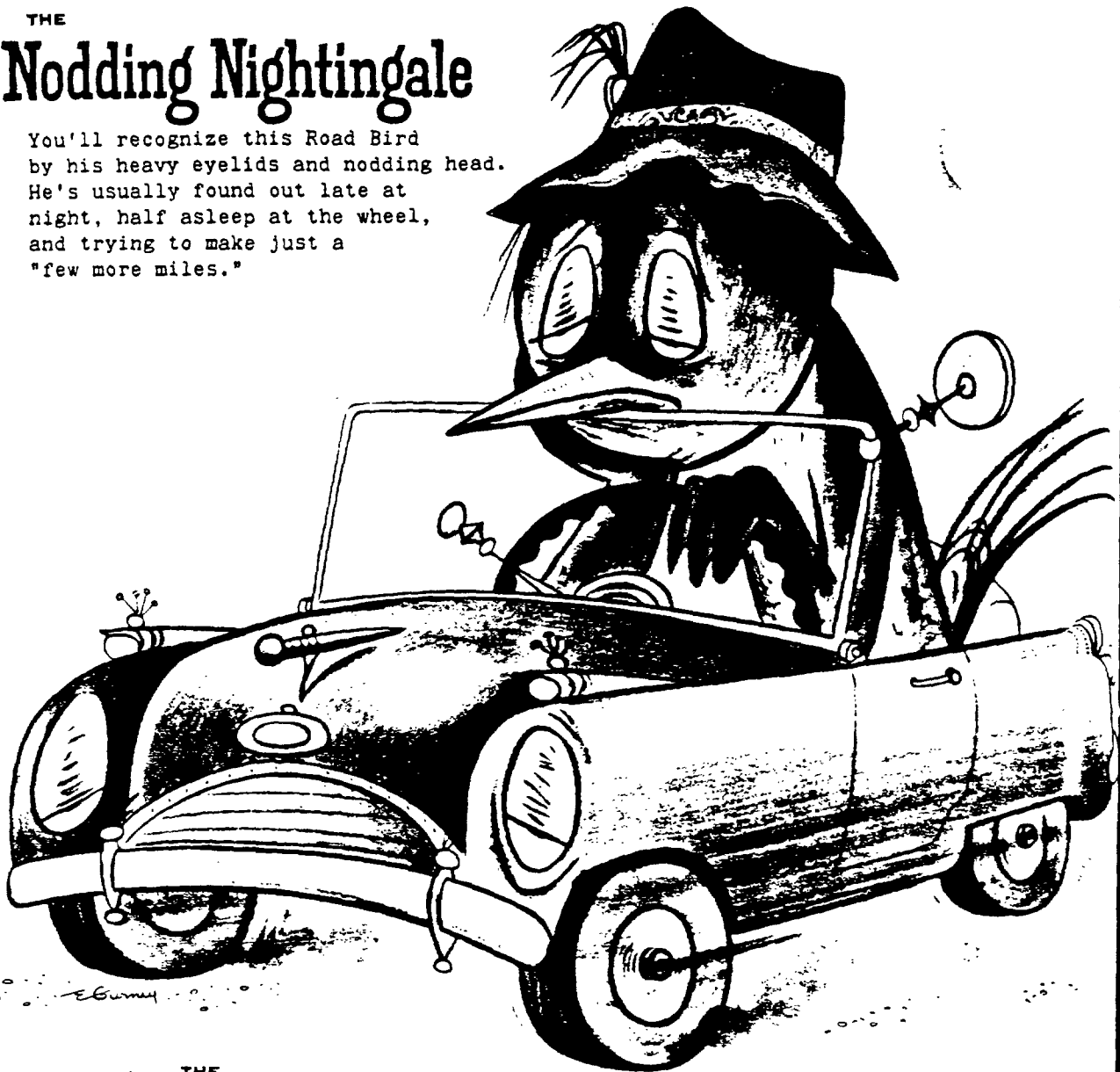
ETC 28842



ETC 28843

THE
Nodding Nightingale

You'll recognize this Road Bird by his heavy eyelids and nodding head. He's usually found out late at night, half asleep at the wheel, and trying to make just a "few more miles."



THE
Smart Bird

doesn't try to do all his driving in one day. He beds down for the night when he finds himself getting tired—or pulls off the road for a refreshing forty winks if he must go on.

The Smart Bird also gets wide-awake engine performance. He uses premium gasoline. He knows premium gasoline has a higher octane rating. That means greater protection against "knock"...more available power for added driving pleasure.

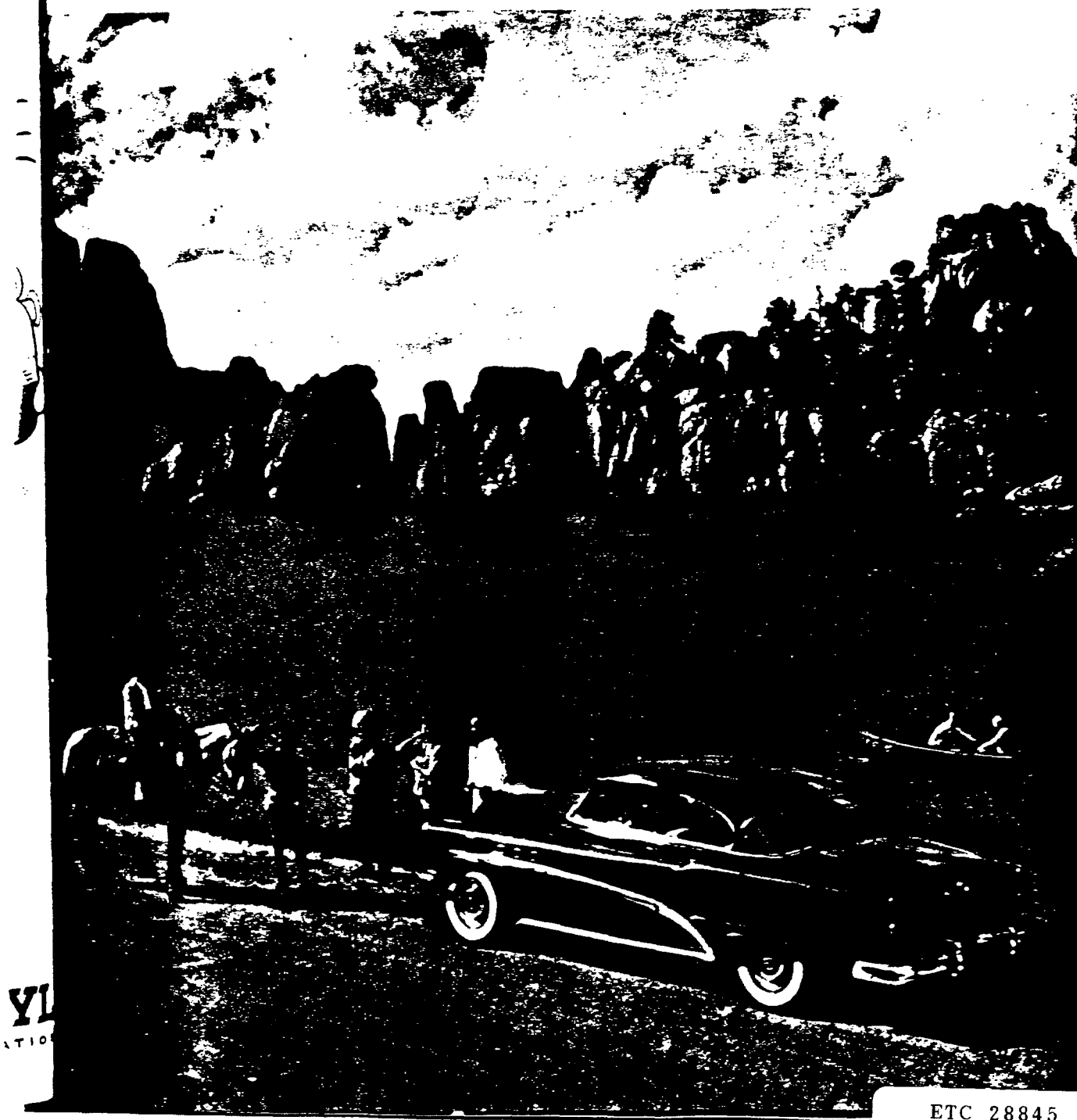
It's smart to use
premium gasoline!



ETHYL
CORPORATION

ETHYL NEWS

MAY-JUNE 1955



ETC 28845

BEHIND THE NEWS



ETHYL NEWS

D

Richard F. Cook, Editor

MAY-JUNE 1955

"Vacation by car. Cost per mile is so low that you can afford to take a long trip. And you can take side trips to enjoy beauty spots. If you leave your car at home you . . . miss a lot of vacation enjoyment." These words from the first advertisement in the new Ethyl Drive More program are brought colorfully to life in this issue's cover photo. It shows vacationers doing just what the advertisement suggests—using their car to find enjoyable recreation in beautiful surroundings. While this particular picture was taken at Sylvan Lake in the Black Hills of South Dakota, there are thousands of other beauty spots throughout the country that are within easy driving distance by car.

For more about the Drive More program and what it can mean to suppliers of oil and automotive products and services, see *Driving for Sales*, starting on page 1.

Andrew H. Hepburn, the author of *Vacation Time, U.S.A.*, starting on page 6, is an authority on the economic aspects of vacations and a recognized travel consultant as well. He is author of the American Travel series, creator of travel guidance literature and head of the Department of Travel Education and Research at New York University. Recently, his articles have appeared in *This Week* and *The American Weekly*, Sunday magazines that are read in millions of American homes.

Even the Chamber of Commerce won't be disturbed by our reports of sub-freezing temperatures in usually balmy Southern California. The freakish weather for that part of the country is completely under control. The icy blasts and any other atmospheric conditions that may be wanted for fuel and engine evaluations are confined to the new controlled-weather room at Ethyl's research laboratory at San Bernardino, Calif. How they're created and used is told in *Weather Made to Order*, on pages 16 and 17.

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Opinions expressed in signed articles are the authors'. Ethyl News welcomes articles of timely interest submitted from outside sources. Upon request, the editors are glad to grant permission to reprint material appearing in Ethyl News.

Published by Ethyl Corporation, 100 Park Avenue, New York 17, N. Y., manufacturers of "Ethyl" antiknock compounds, used by oil companies to improve the antiknock quality of aviation and motor gasoline.

Edward L. Shea, President

William R. Perdue, Jr., Vice President and Treasurer

Herbert A. Savage, Secretary

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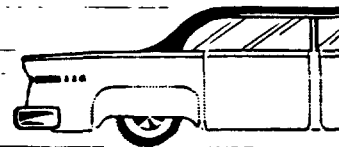
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DRIVING FOR SALES



*The Drive More program is designed
to stimulate the demand for
all automotive products and services*

SOMETIMES in the dull sands of statistics, a bright and valuable nugget can be found. One such nugget, buried deep in figures on the cost of operating an automobile, is the fact that the more a car is driven the cheaper the per-mile cost becomes.

Around this significant fact, Ethyl Corporation built the Drive More campaign—the nationwide program encouraging the public to use their cars more—which was launched this June.

Using the theme, "Drive More . . . it gets cheaper by the mile," the program capitalizes on the American urge to go places and see things. It is intended to appeal to the nation's car owners by showing them the pleasure and enjoyment and dollars-and-cents advantages that can be derived from greater car use. At the same time, the program is designed to help stimulate the demand for all automotive products and services.

The Drive More program is spearheaded by appealing advertisements in three leading national magazines—*The Saturday Evening Post*, *Collier's* and *Reader's Digest*—with a combined circulation of some 19 million copies. The initial advertisements are appearing in June, with the campaign continuing into October.

The national advertising is being supplemented by advertisements in a group of trade publications including *The Oil Daily*, *National Petroleum News*, *Petroleum Week*, *The Gasoline Retailer*, *Super Service Station* and *Automotive Dealer News*.



Increasing average annual car mileage by 500 miles would increase gasoline sales by 1.2 billion gallons.



Basis of the Drive More program—the fact that the more a car owner uses his car during the year, the cheaper his per-mile costs become—is found in the principle that basic costs of depreciation, insurance and license fees remain essentially the same, irrespective of annual mileage.

Referring to studies of average annual driving costs published by the American Automobile Association, Ethyl's introductory advertisements take an average family of three persons as an illustration. If this family drives 5,000 miles a year, the ad points out, it costs 5.2¢ a mile for each member. But if the car is driven 15,000 miles during the year, per-mile costs come down to 2.5¢ for each member of the family, or less than half.

The Drive More program urges motorists to enjoy the extra "bargain miles" by taking their families on vacations by car, going on picnics, and shopping and visiting by car, among other things. It points to the fun, comfort and convenience that can be derived from the family car, and shows that the family using its car more gets more for its money.

Any increase in annual car use, of course, can be distinctly beneficial to the oil industry and to service station dealers. If average annual car mileages were increased by just 500 miles, for example, it would mean

extra sales of over 1.2 billion gallons of gasoline—nearly equal to the entire annual consumption for the state of New Jersey. It would also mean extra sales of everything motorists buy—approximately \$427 million worth.

Many industries stand to benefit from increased automobile travel—automobile, tire, battery and accessory manufacturers, hotels, restaurants and stores, and manufacturers of luggage, sporting goods, camera supplies and clothing.

Merchandising Support

In addition to Ethyl's advertising, both *The Saturday Evening Post* and *Collier's* are putting their full merchandising power behind the program. *Collier's* is contacting leaders in the automotive field, and encouraging them to support the program. The magazine is carrying the Drive More theme and symbol in its Preventive Service editorial features. Posters adapted from this article are being offered free to automotive dealers and distributors throughout the country. *Collier's* also plans to make extensive contacts in other industries related to automobile travel.

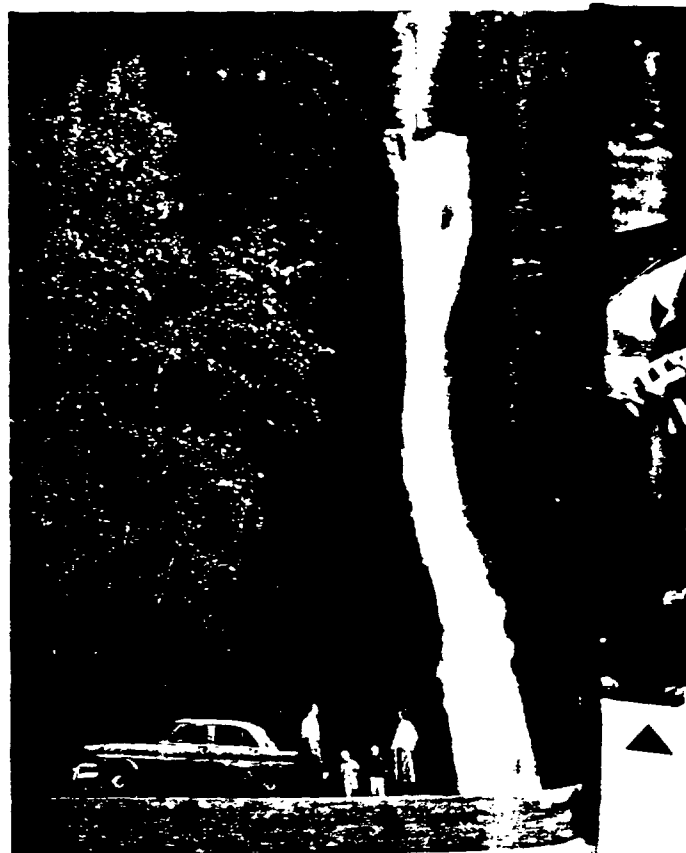
The Post is sending letters to top men in automobile and TBA companies, and making personal presentations to these companies and to important trade associ-

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Drive More advertisements point to the easier driving possible on some of the country's better highways.

They also emphasize that the cost per mile of vacationing by car is so low families can afford to take long trips and enjoy scenic and historic points of interest.

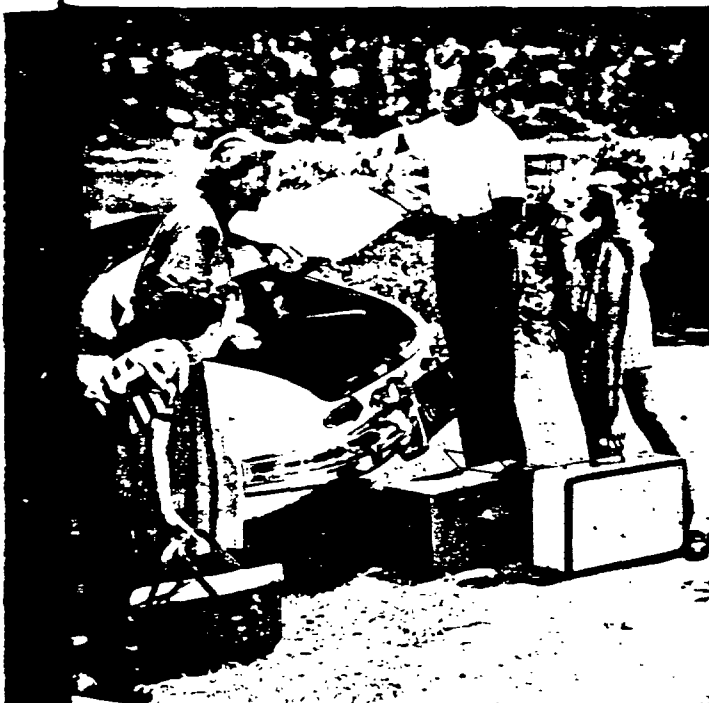


ations. It also is featuring Drive More in its widely read merchandising bulletins, and is publishing full page, tie-in advertisements in eight leading trade magazines.

Promotional materials embodying the theme of the Drive More campaign are being made available by Ethyl in quantity at cost to all groups interested in promoting greater car use. The principal device is a shield, resembling a highway marker, carrying the slogan, "Drive More . . . it gets cheaper by the mile!" This shield, which can be easily reproduced, can be readily incorporated in advertising and printed materials. Other suggested promotional materials include posters, streamers, banners, stickers, decals, and radio and television commercials.

In addition, an eight-page newspaper supplement containing editorial features promoting the Drive More theme is being distributed to over 10,000 daily and weekly newspapers throughout the country.

Overall, the Drive More campaign represents a new approach in Ethyl Corporation's continuing program of industry-support advertising. By promoting increased car use, it is believed, this national advertising can help oil companies, service station dealers and automotive and related industries increase the sales of many of their products and services. #



▲ The program encourages motorists to take week-end and day trips for fun and recreation in the open country.

These leading national and trade magazines are carrying Drive More advertisements starting in June and continuing throughout the summer and into October. ►

The Saturday Evening
POST

Collier's

**Reader's
Digest**

THE OIL DAILY

**SUPER SERVICE
Station**

**National
Petroleum
News**

**Automotive
DEALER NEWS**

The Gasoline Retailer

**PETROLEUM
WEEK**

The plus in Motor Plus

The new "Ethyl" antiknock compound offers several advantages to oil refiners

MOTOR PLUS, the improved antiknock compound for motor fuels introduced recently by Ethyl Corporation, promises definite economic savings to oil refiners. These savings will come as Motor Plus comes into general use. They can be achieved because the new "Ethyl" antiknock compound reduces the effects of engine deposits and thus makes it possible to satisfy the requirements of more cars at a given octane level.

Many late model cars currently in use require exceptionally high octane fuels because of either high knock or high surface ignition requirements. A part of this high requirement is due to the waste products of combustion which build up in the engine's combustion chambers as the car accumulates mileage. These deposits have the effect of increasing the octane requirements of the engine.

At today's level of antiknock quality, the octane numbers required to satisfy the increased requirements caused by deposits are large in their effect and expensive to produce. In making Motor Plus available to oil refiners, Ethyl is offering an antiknock compound that lowers the octane requirement of passenger car engines on the average of .5 octane number, and up to 1.3 octane numbers.

The primary purpose of the new fluid, like other "Ethyl" antiknock compounds, is to increase the antiknock quality of gasoline. But in helping to curb the increase in gasoline octane requirements of automobiles by reducing engine deposits, it offers another gain.

Reduces Surface Ignition

Motor Plus also reduces surface ignition, a phenomenon related to engine deposits, in which combustion is abnormal and uncontrolled.

Key to the improved product is a change in the proportions of the chemical scavenging agents which are added to tetraethyl lead to form the complete antiknock compound. The change—increasing the amount of ethylene dibromide while holding the amount of ethylene dichloride at its former level—results in more effective scavenging action. Scavenging, of course, is the process through which the waste products of combustion are removed from an engine's combustion chambers.

The new scavenger formulation is the result of a thorough research and testing program covering a wide range of bromine and chlorine concentrations. It represents the most effective formulation for today's automobile engines.

Over the years, more than 850,000 hours of engine work have been devoted to antiknock compound improvement at Ethyl's research laboratories. The background information accumulated in this work contributed to the development of Motor Plus. In addition, 10,000 hours of single- and multi-cylinder engine tests in the laboratory and 3,750,000 miles of road tests were devoted to evaluating the performance of Motor Plus.

Increases Valve Life

In these tests, the effectiveness of Motor Plus in reducing deposits and thus reducing the octane requirement increase was fully proved. At the same time, it was found that Motor Plus gives an increase of up to 35 percent in exhaust valve life. Otherwise, there is no difference in passenger car engine durability between Motor Plus and Motor Mix. The new fluid also was found to be effective in commercial vehicle engines.

Ethyl Corporation, for some time, has been concerned with the refiner's problem of the increasing manufacturing costs brought about by the demand for higher octane fuels by modern engines. In the post-World War II years, Ethyl has directed its research to finding an antiknock compound that would help reduce the effects of engine deposits and thus cut down on the need for fuels of extremely high antiknock quality.

Motor Plus, with its one-half or more octane number advantage, represents a real economic gain in the manufacture of high-quality gasolines. The cost of adding octane numbers, of course, is a matter of economics at individual refineries. However, it is generally agreed that they can be added more economically by antiknock compounds than by additional refinery processing. Motor Plus, by reducing deposits, enhances the recognized value of antiknock compounds to refiners.

The introduction of Motor Plus presents no problems for refiners. Handling and blending procedures for the new product are exactly the same as those for other

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MOTOR PLUS

"Ethyl" antiknock compounds. During a changeover to the new "Ethyl" antiknock compound, a mixture of the new fluid with "Ethyl" Motor Mix merely dilutes the effectiveness of Motor Plus in its control of deposits.

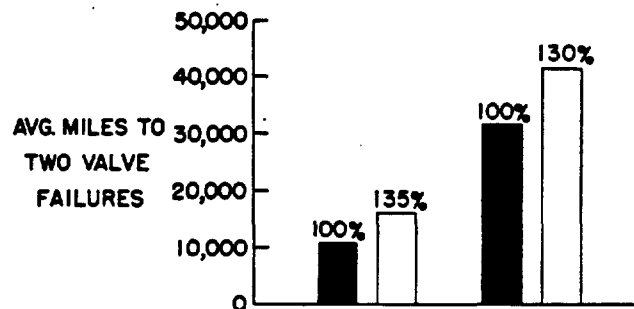
In offering Motor Plus to oil refiners, Ethyl Corporation makes it available at the same price that prevailed for the Motor Mix of "Ethyl" fluid. At the same time, the prices of both Motor Mix and Aviation Mix are reduced one cent per pound of tetraethyl lead content. This is the fourth price reduction since March 1954.

The changed formulation represented by Motor Plus marks the eighth time that Ethyl Corporation has altered the composition of its antiknock compound for motor fuel since it was first made available to refiners more than 32 years ago. This change, like those in the past, was made to give refiners additional value in every pound of antiknock compound and to keep pace with changes in automotive fuels and engines.

Tetraethyl lead still is the active ingredient and continues as the most efficient and economical antiknock agent. With the changed formulation, Ethyl offers knock control together with reduction of combustion chamber deposits, octane requirement increase and surface ignition—all in a single additive. #

EXHAUST VALVE LIFE SEVERE DUTY-PASSENGER CAR-ROAD TESTS

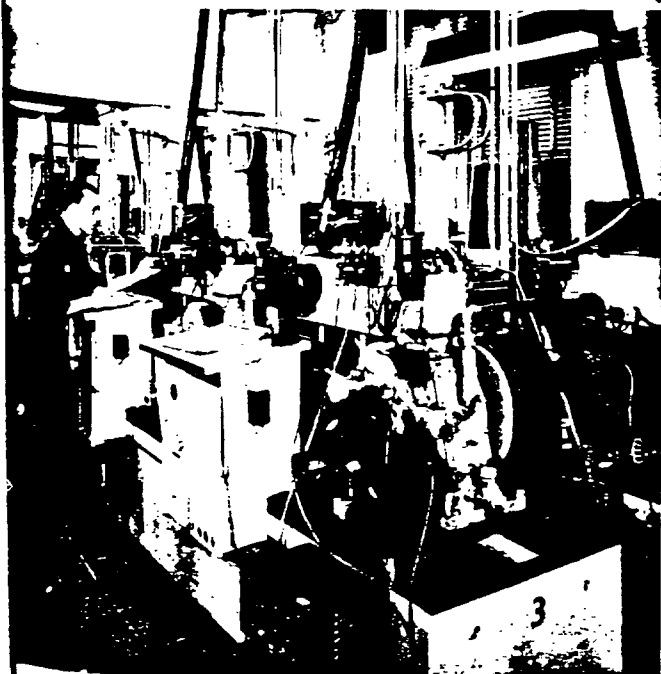
■ MOTOR MIX □ MOTOR PLUS



As shown by the results of tests on two popular makes of cars, the use of Motor Plus gives an increase of up to 35 percent in exhaust valve life.

The 850,000 hours of Ethyl laboratory-engine work devoted to antiknock compound improvement research contributed to the development of Motor Plus.

Before Motor Plus was offered to refiners, its performance was thoroughly evaluated in the laboratory and in more than 3,750,000 miles of road tests.





Vacationers spend money for camera supplies . . .



food . . .

VACATION TIME, U.S.A.

By Andrew H. Hepburn

BETWEEN MEMORIAL DAY and Labor Day, in a period of three months, millions of American families are engaging in a unique American phenomenon called a "summer vacation." Until a few years ago, only a small part of the population took regular vacations. Now almost everybody does. The results in money spent and economic influence are staggering. Vacation statistics all are king size; many are astronomical. They touch every facet of our economy, every corner of the country. This year they will be bigger than ever before; next year probably bigger than this year.

Here are a few examples: This summer about 75 million people will take over 20 million vacation trips and spend between \$10 and \$14 billion en route. Most of the trips (83 percent) will be by automobile and within the continental limits of the United States. Miles traveled will be more than 18 billion.

The growth of this huge vacation business has come swiftly and its impact is widely felt. But it is hard for the resort owner in California, the service station operator in Ohio, the automobile dealer in Georgia, or anyone else for that matter, to grasp fully its meaning.

A simple way to dramatize and clarify the vacation

*Once again, the vacation boom is
contributing billions of dollars
to the national income*



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Vacationers spend money for camera supplies . . .



food . . .

VACATION TIME, U.S.A.

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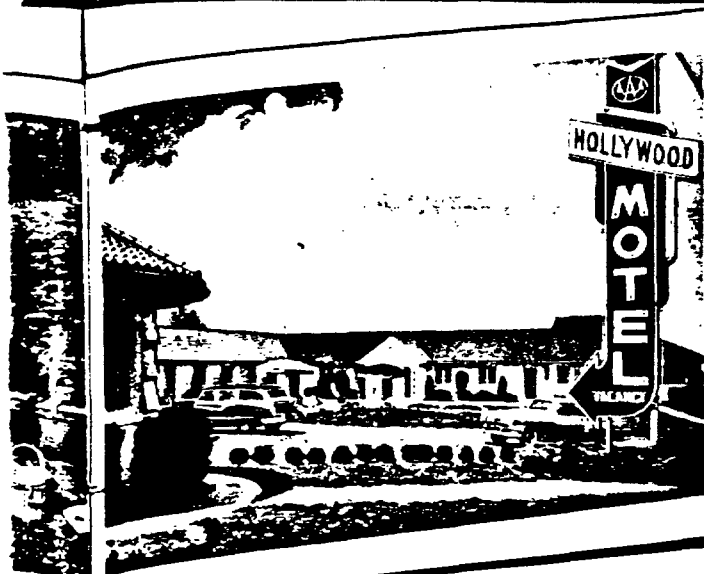
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The growth of this huge vacation business has come swiftly and its impact is widely felt. But it is hard for the resort owner in California, the service station operator in Ohio, the automobile dealer in Georgia, or anyone else for that matter, to grasp fully its meaning.

A simple way to dramatize and clarify the vacation

*Once again, the vacation boom is
contributing billions of dollars
to the national income*





accommodations . . .



and fishing equipment.

A picture is to view it in terms of a typical trip. Assume that Bill Johnson, his wife Dorothy, and two children, Bill Jr., age 14, and Ruth, age 9, take a summer vacation. In each instance what they do is typical of the national pattern.

The Johnsons live in Columbus, Ohio. (*More than half of all who take vacation trips come from a five-state area in the Midwest.*) After talking with friends, collecting maps and assorted free literature offered in national advertising (*\$13 million is spent annually advertising vacation places and vacation trips*), they decide that their vacation target will be Great Smoky Mountains National Park. (*Last year 2,500,000 visited there, more than at any other national park.*) They proposed to go by family car (*so do 83 percent of the people*); go by one route and return by another (*75 percent of all vacationing motorists do*).

Their vacation was for two weeks, but by starting Friday and coming home a day late, they could squeeze in 17 days. (*The national average is 17.2 days.*) They

planned a leisurely trip, about 1,000 miles (*national average is 978*). They budgeted carefully, planned to spend about \$500. (*This is just under the national average, while the national total is over \$10 billion.*)

They traveled south over main roads, through Kentucky and into Tennessee, staying at motor courts on the outskirts of smaller towns (*55 percent of all motorists do*). In the area of the Great Smokies they stayed at two resort hotels and a city hotel. They followed the mountains, returning as far as Roanoke, Va., along the Blue Ridge Parkway. (*Last year 4,500,000 travelers did so too.*)

From Roanoke they headed home across the mountains. When they got there Dorothy toted up all their expenses item by item. Here are the results:

Daily Average Cost

The daily average cost of the trip for the whole family was \$29.30 (*almost the national average*). Of this, only about \$2.06 a day, a small fraction, went for gasoline, oil, lubrication, tires and automobile maintenance. (*The national total for the 18 billion vacation miles is \$630 million. Only the family car enables vacationers to see and do so much at such a low cost.*)

The average daily expenditure for accommodations, motor courts and the resort and city hotels was \$8.33, or \$125 for the trip (*national total \$2.5 billion*). They ate in cafeterias and restaurants and had a number of wayside picnics, for a total of \$152, or \$9 a day (*national total about \$3 billion*).

Dorothy lumped the balance, about \$170, under mis-





Scenic and historic spots rank high on the list of attractions for vacationing American families.

cellaneous, but kept track of all items. She was astonished to discover the many different things they bought. These included souvenirs, postcards and postage, camera film (*vacationing families spent about \$50 million on camera supplies last year*), admissions to attractions and entertainment. Also included were magazines, sun glasses (*vacationers spent about \$10 million for them last year*), fishing tackle (*the vacation market is \$25 million*), bait, boat and outboard motor rental. Bridge tolls, parking lot fees, tips, cosmetics and drug sundries (*vacationists en route bought \$30 million worth last year*) were other items. Clothing bought just for the trip accounted for about \$25. (*Nationally that means about \$500 million for vacation clothes.*)

Projecting the figures of the Johnsons' representative trip hints at the impact of vacations on the whole economy. It would take the master statistical mind of Univac to sort them all out and compute their implications. Think of the jobs involved in harvesting and distribut-

ing the food eaten, for example, and the capital invested in such highway facilities as motor courts. (*More than 10,000 of them cost more than \$50,000 each, or a total of \$500 million.*)

Then there are the factories kept humming to provide the sports clothes worn, the cameras purchased, the outboard motors built. Beyond these are the deeper and broader implications of vacation travel impact on basic materials—steel and cement, wheat and lumber, oil and coal, paint and chemicals.

What made the Johnsons take the trip they took? What lures, incentives and motivations controlled their decision? No one knows exactly.

A recent informal limited survey showed specific categories of travel interest and the amount of interest in each. Most important considerations, it was found, were accommodations and places to eat. Other specific interests were (2) recreational facilities such as beaches, parks, fishing, golf courses; (3) scenic and historic spots; (4) institutions such as schools, colleges, state capitols; (5) unusual factories and craft centers, particularly where tours were offered; and (6) unusual crops, especially if typical of a region.

But as huge and varied as vacationing is, it accounts for only a fraction of passenger car use. The average car owner drives about 9,500 miles a year but accumulates only 11 percent of this on his vacation.

The Drive More Program

The extension of recreational travel—showing America's car owners how they can go farther and enjoy more trips offers a challenge.

Americans have a natural urge to go places and see things. And today more Americans own more cars than ever before. The Drive More program recently introduced by Ethyl Corporation is designed to get every motorist to use his car more—for recreation and enjoyment. In doing this, it can increase the demand for all automotive products and services and have far-reaching effects on many phases of the national economy. =



Some of the money spent by vacationers goes for gifts, souvenirs, drugs, sundries and the many other things there are to buy at resort areas.

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Thanks to educational institutions, Ethyl has a rich heritage of scientific know-how, inspiration and guidance stemming...

FROM THE HALLS OF IVY*

FEW PRODUCTS have an historical taproot more deeply imbedded in American universities and colleges than antiknock compounds. Without the help of professors and university laboratories, "Ethyl" antiknock fluid undoubtedly would not have been ready for initial sale in gasoline to the public in February 1923. Nor would the product have achieved general acceptance in such a relatively short time.

From institutions in the North, East, South and Midwest, the men involved in the search for and the development of an effective antiknock compound obtained inspiration, guidance, cooperation and technically trained personnel.

Ohio State and Denison were the university pioneers. They gave impetus to the long search for an antiknock agent as early as 1917. This was just a year after the first comprehensive exploration of knock was started by Charles F. Kettering, Thomas Midgley, Jr., T.A. Boyd and others associated with them. The faculty representatives of these two Ohio schools made useful contributions to exploratory work these men were doing. Initial help also came from other institutions, but progress was frustratingly slow.

In fact, the entire project was scheduled for the scrap heap until Kettering learned about work being done with selenium oxychloride at the University of Wisconsin. Although the compound proved impractical for a number of reasons, its remarkable ability to suppress knock gave the discouraged men what they most needed—fresh interest and encouragement.

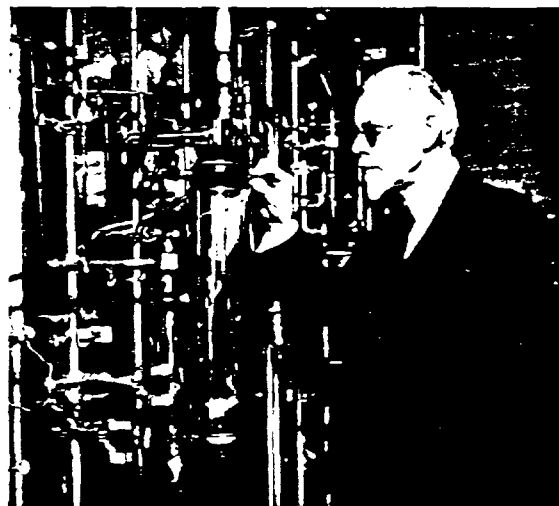
*This article is adapted from "TEL: A product of American Research," copyright, 1954, by the Division of Education, American Chemical Society, for publication in the Journal of Chemical Education. It appears here by permission of the copyright owner.

The spark which at last touched off the flame of success came from Dr. Robert E. Wilson, now chairman of the board of Standard Oil Company (Indiana). At that time he was director of the Research Laboratory of Applied Chemistry at M.I.T.

Dr. Wilson recalls that he "showed Midgley a new chart of the periodic system I had drawn up . . . bringing out certain relationships which had not generally been appreciated. Tom was greatly interested in this since he believed . . . the antiknock effect of an element varied predictably with its location in the periodic system. The use of my chart of the elements was largely responsible for his trying tetraethyl lead."

On December 9, 1921, this guiding beacon helped establish beyond any doubt that tetraethyl lead was the

Dr. Charles A. Kraus, college chemistry professor, from whom the antiknock compound industry got its efficient tetraethyl lead manufacturing process.





The Chevrolet above, dubbed "The Goat," was the first automobile used to road-test antiknock agents, mostly odorless ones. . . . Above right, Dr. Robert E. Wilson, now Standard of Indiana board chairman, was on the M.I.T. faculty when he contributed to the discovery of the antiknock properties of TEL. . . . Below right, tetraethyl lead was first made experimentally with this crude equipment.



elusive rainbow at the end of the trail. But a long and baffling maze lay between the laboratory discovery and the production and marketing of the finished product.

A sound commercial tetraethyl lead manufacturing process was discovered by Dr. Charles A. Kraus of Clark University in Worcester, Mass. Kraus' interest in the properties of metals in solution had originated during his student days at the University of Kansas, and had continued for 25 years at half a dozen other universities. With Dr. Conral C. Callis, also of Clark, he teamed up on the challenge of tetraethyl lead.

"We first made tetraethyl lead in experimental quantities by reacting sodium-lead alloy and ethyl iodide," Dr. Kraus recalls. "It therefore seemed logical to us that we would do well to attempt to make it more economically with sodium-lead alloy and some other member of the alkyl halide family. Inasmuch as bromine and iodine were scarce and expensive, the reaction of sodium-lead alloy and ethyl chloride seemed the only practical solution."

Dr. Kraus made two significant contributions to commercial tetraethyl lead production. He proved the practicality of the low-cost ethyl chloride process, and developed a more economical alloy containing a smaller amount of sodium.

Within six months Drs. Kraus and Callis were reasonably sure of the commercial applications of their process. "Thereafter," Dr. Kraus concludes, "a small pilot plant was constructed and we worked out further details for larger scale operation."

The process was so fundamentally sound that all

tetraethyl lead manufactured today uses the Kraus-Callis reaction.

With a practical method for manufacturing TEL developed, an independent company was organized to take charge of the new business. This company was incorporated in August 1924, and is now Ethyl Corporation.

A complete health investigation of the new company's product was made by a committee of eminent authorities in clinical medicine, physiology and industrial hygiene appointed by the Surgeon General. On this committee were faculty members from Johns Hopkins, Yale, Vanderbilt, Harvard and the University of Chicago. After seven months, during which time representatives of the U. S. Public Health Service conducted broad investigations, the committee reported that "there are at present no good grounds for prohibiting the use of 'Ethyl' gasoline . . . provided that its distribution and use are controlled by proper regulations."

This opinion set the stage for self-regulation and the introduction of highly effective safety programs.

Controls were developed largely through the College

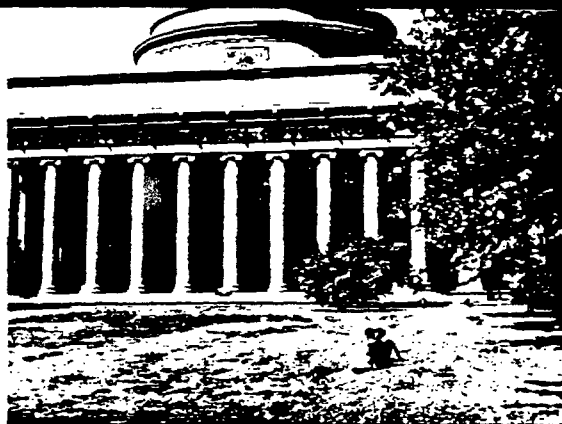
of Medicine at the University of Cincinnati, where Ethyl financed an extensive experimental program. The Kettering Laboratory was established in due course at the University's medical school, in which many industrial health problems have been and are being solved.

Dr. Robert A. Kehoe, director of the Kettering Laboratory, has been medical director of Ethyl Corporation since 1925. The tremendous importance of the contributions made by Dr. Kehoe and his associates at Cincinnati is seen in the fact that the antiknock compound industry owes much of its enviable health and safety achievements to their work.

As early as its first year, Ethyl Corporation was aware that a continuing research and development program would always be highly essential. Dr. Graham Edgar, former professor of chemistry at the University of Virginia and California Institute of Technology, was asked to take charge of these activities.

Dr. Edgar, who was vice president of Ethyl Corporation in charge of research when he retired in 1952, was a leader in many important research projects. Among these were development of a process for obtaining bromine from sea water for use in "Ethyl" fluid, and under-

In contrast to the picture of the first TEL production equipment at the left, is this view of some of the buildings at one of Ethyl's modern manufacturing plants.



M.I.T. is one of the institutions of higher learning where research related to antiknock compounds continues.

standing of the mechanism of combustion of pure hydrocarbons. He is best known, perhaps, as the man who created the familiar octane scale for expressing the antiknock quality of gasoline.

In spite of results achieved at General Motors, M.I.T. and elsewhere, the new company was aware that tetraethyl lead was not being utilized to maximum efficiency. Certain aspects of these problems appeared extremely formidable.

Work on overcoming utilization and related obstacles was therefore undertaken at M.I.T. in 1923-24 under the supervision of Robert T. Haslam. Mr. Haslam is a former director of Ethyl Corporation, an industrial chemical consultant in New York, and a life member of the M.I.T. Corporation.

Officers of Ethyl became convinced that tetraethyl lead would be accepted more readily if they assisted the automotive industry in solving problems created by its use. So they turned once more to a university for help.

Two Lines of Attack

An instructor in mechanical engineering at Harvard, Earl Bartholomew had conducted investigations for an automobile company and had developed an interest in controlling combustion by chemical means. He joined the research staff of Ethyl Corporation in 1926 and with others probed deeply into the complexities of engine design and construction, until coordination of these two lines of attack—on the product and on engines—was successful.

Although the antiknock compound industry has conducted most of its own research since the close of the 1920's, Ethyl has turned to Purdue, the University of Illinois and the University of Michigan for fundamental work on the Kraus-Callis process. Combustion studies still are being undertaken at M.I.T. Still other assistance has come and continues to come from other academic and commercial research centers. #



At some fields where pilots may need directions, like this one at Brussels, jeeps marked "Follow Me" guide incoming planes to unloading ramps.

Gasoline refueling trucks are among any airport's most essential ground equipment. A huge airliner's big wing tanks can be pumped full in 30 minutes.



Mobile gas-
powered gener-
ators are used for sup-
plying electric-
ity to air-
craft on the
ground. These
also serve as

Flight Service

A variety

EVERYONE KNOWS that it takes lots of high-quality aviation gasoline to lift big commercial airliners off airport runways and send them winging swiftly through the sky. But what many people don't realize is the big part motor gasoline plays in powering an amazing number and variety of essential ground vehicles at air terminals around the world.

These gasoline-powered workhorses contribute immeasurably to passenger comfort, safety and convenience. They expedite air cargoes. They maintain and service modern airplanes for maximum usefulness. For plane service itself there are jeeps, tractors, fork lifts and many kinds of trucks. For keeping the airports well groomed and at peak operating condition, there are snowplows, lawnmowers and sweepers. Cars and station wagons shuttle key personnel to and from runways, shops, hangars and offices. And all commercial airports have special motorized equipment for use in emergencies.

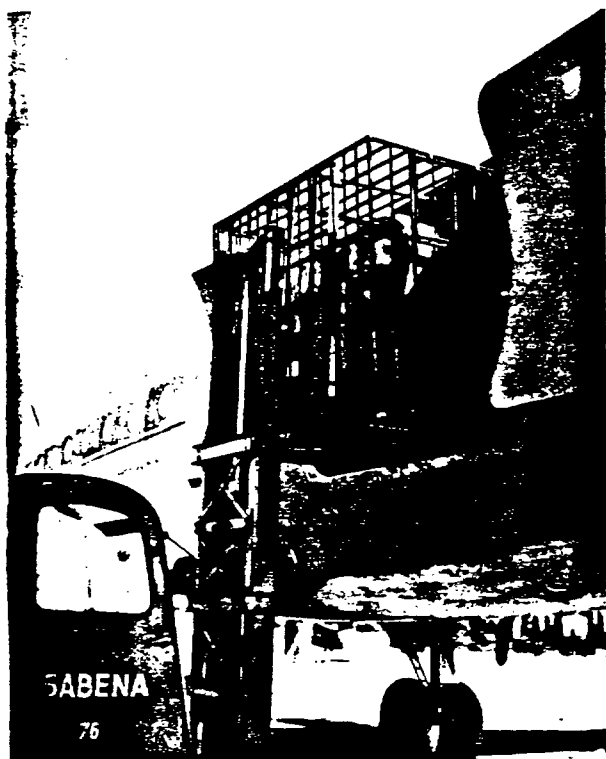
In fact, the speed, convenience and flexibility of modern air travel, it seems, depend as much on ground vehicles as on airplanes. Some of the essential units of airport ground fleets are pictured on these pages.

SABENA

76

Service on Wheels

A variety of specialized ground vehicles contribute to the success of air transportation



A continuous conveyor belt driven by a jeep's engine simplifies and speeds up cargo loading. It does away with slower and more exhausting hand methods.

◀ Unloading a zoo-bound elephant is only a routine chore for a versatile airport fork lift truck.



Mobile gasoline-powered generators are used for supplying electricity to airliners on the ground. These units can also serve as tow trucks.

ETC 28860

A station wagon helps George E. Schaefer, an operations supervisor at the Port of New York Authority's big International Airport, make a regular check of all runway lights.



Passenger comfort is assured by this motorized unit. It provides air-conditioned cooling for planes in summer and heat in winter before take-off time.

Hailed for its versatile military and commercial uses, this seven-ton unit tows, starts, supplies compressed air, checks instruments and air-conditions planes.



In Europe as in this country, buses take people between airline terminals and cities. TWA and Swissair passengers use this bus in Geneva.





Ground vehicles used to expedite air cargoes include a truck with a power-lift body, background, and a tow tractor and trailer.



Pre-cooked meals served on international and domestic flights reach airlines by catering vans. Facilities on board keep passengers' food at proper temperatures.

Four important airport housekeeping vehicles: from left, a runway plow-blower for removing snow, a tractor used in landscaping, a road and ramp sweeper, and a street snowplow. All are powered by gasoline engines.



WEATHER MADE TO ORDER

They don't have to wait for nature at Ethyl's San Bernardino laboratory

CONTROLLED WEATHER CONDITIONS which can be returned to time and time again, regardless of the natural weather outdoors, are now available to test engineers at Ethyl Corporation's research laboratory at San Bernardino, Calif. They can be created with push-button simplicity on the "indoor highway" recently put into operation in a new addition to the laboratory.

The new testing facility is a proving ground under one roof for evaluating the performance of fuels and engines under controlled conditions. Instead of driving thousands of miles and waiting countless days to find just the desired road and weather situations, the controlled-weather room brings these as close as its own control panel.

In spite of weather, traffic conditions or topography, the octane number requirements of passenger cars, light trucks and farm and truck tractors and the road octane numbers of fuels can be measured accurately. On the new indoor highway, standardized conditions of temperature, humidity, road gradient, load and wind velocity can be achieved for test purposes. Furthermore, any given set of conditions can be exactly reproduced at a later date. This has the advantage of permitting accurate

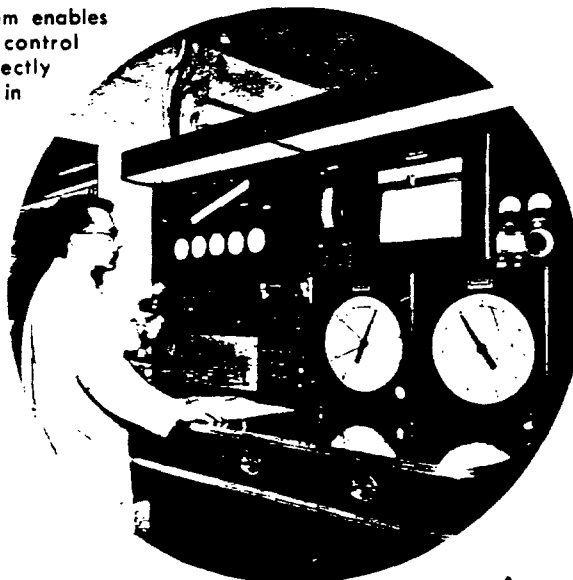
comparisons of newer vehicles and gasoline stocks with older ones.

The new installation—the only one of its kind in Southern California—was demonstrated before a large group of oil company representatives from Los Angeles, San Francisco, Salt Lake City and other points early in June.

It is built around a chassis dynamometer. This is a power absorption device in which the rear wheels of vehicles being tested rest on rollers so they can be operated indoors under actual driving conditions. Specially designed refrigeration, heating and water spray units are coordinated with the dynamometer. Controlled from an adjoining room, they cool, heat, humidify and dehumidify as required to attain the desired atmospheric conditions.

Special electrical equipment actuates a cooling air

An intercom system enables engineers at the control panel to talk directly with those in cars in the controlled-weather room.



When oilmen visited the San Bernardino laboratory recently, operation of the controlled-weather room was explained by Harry Manning, of Ethyl. Looking on are Roy Cheney and Milton Sperling, Richfield; Henry



Stevensen, Hugh McCl. Bowers, Ge The Texas Oil; Ben Ber

ORDER

blower located in front of the vehicle being used in any given test. The blower is powerful and flexible enough to generate winds ranging from gentle breezes to howling gales. The wind speed is varied automatically according to the speed of the rear wheels and it thus creates under-hood temperatures similar to those which would exist if the car were being operated on the open road.

Reproduces Road Grades

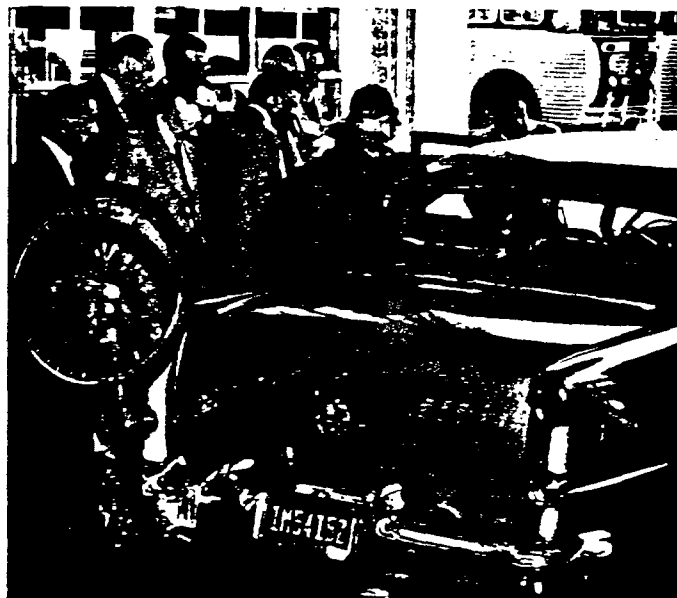
The controlled-weather room dynamometer also is equipped to reproduce accurately road grades and vehicle acceleration.

The new installation at the laboratory at San Bernardino is modeled after similar equipment at Ethyl's central research laboratories in Detroit. It incorporates more than 25 years of experience by Ethyl engineers in the design, construction and use of chassis dynamometers for the precise evaluation of gasoline quality.

Even before the new controlled-weather room came into use, road tests conducted by the Ethyl research

laboratory at San Bernardino had made many contributions to increased information about the performance of fuels and engines. The laboratory is located in an area where natural temperatures, altitudes and road gradients like those found throughout most of the United States are within short driving distance.

Naturally cold weather does not generally occur in Southern California, however. So the new controlled-weather room, in addition to its other advantages, will prove to be especially valuable in cold-starting and engine warm-up studies and carburetor icing tests. #



Equipment in a test car is explained by Albert Caputo, of Ethyl. Listening to him are M. F. Weill, Ethyl; H. T. Hutchinson, Richfield; Herbert Peters, Ethyl; James Fleming, Signal Oil; L. E. McCampbell, Seaside Oil; C. E. Emmons, The Texas Company; Glen Queen, Santa Fe Railway; James Glanville, Automotive Dealer News; and Virgil Anderson, Caminol.

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Stevens, Caminol; Russell Ridout, Hancock;
Hugh McClean, Utah Oil Refining; Donald
lowers, General Petroleum; George Roark,
The Texas Company; Henry Meiner, Union
Oil; Ben Berry, Standard of California.



In this group watching a demonstration by Gilbert Way, of Ethyl, are C. C. Moore, Union Oil; Newcomb Taylor, Hancock; Charles Becker, Tide Water; Jack Case, Wilshire; E. J. Case, Bankline; Russell Weston, Ethyl; G. A. Lofquist, Ethyl; H. C. Zweifel, Richfield; R. P. Corlew, Richfield; John Ouding, Wilshire; Donald Harger, Standard of California; Rupert Brown, General Petroleum; and Herbert Miller, Sunset Oil.





S. T. PRUITT
Domestic Sales Manager



H. R. BERG
Sales Coordinator



STUART FORBES
Manager, Central Region

Named to New Posts in E

FOLLOWING THE FORMATION of Ethyl Corporation of Canada Limited, the new company which will handle the manufacture and sale of "Ethyl" antiknock compounds throughout Canada, several organizational changes have been made in the Ethyl Corporation Sales department.

Designed to improve and expand the Company's services to the oil industry, the changes involve a number of experienced Ethyl personnel in several parts of the country. They include the appointment of a domestic sales manager, a sales coordinator, a regional manager, two assistant regional managers, three district managers and an account representative. In another appointment, a sales promotion manager also has been named.

Heading the list of changes is the naming of S. T. Pruitt, formerly manager of the Company's Central region, to the new position of domestic sales manager. Mr. Pruitt has been put in charge of all domestic sales of "Ethyl" antiknock compounds. His headquarters are in New York.

Mr. Pruitt has been associated with Ethyl Corporation for 25 years in various sales capacities. He is a native of Benton, Ala., and a graduate of Georgia Institute of Technology. In World War II, Mr. Pruitt served with the U. S. Army Air Corps, and during part of 1953 acted as director of the Rubber, Chemicals, Drugs and Fuels Division of the Office of Price Stabilization.

In another appointment in the general sales offices in New York, Harold R. Berg, who has had wide experi-

ence in executive sales capacities in several parts of the country, has been named sales coordinator.

In Ethyl's field organization, Stuart Forbes, assistant manager of the Company's Central region under S. T. Pruitt, has been promoted to manager of that region, with headquarters in Chicago. Ellis K. Locher, who has been district manager in Los Angeles, has been transferred to Chicago and promoted to assistant manager of the Central region.

Changes in Southern Region

In other departmental changes, Leonard L. Huxtable, previously district manager in Tulsa, has been promoted to assistant manager of Ethyl's Southern region, with headquarters in Tulsa. Mr. Huxtable fills the vacancy created by the election of Alan C. Tully to the presidency of Ethyl Corporation of Canada Limited (see page 23).

Laurence Reis has been appointed district manager in Tulsa, succeeding Mr. Huxtable.

In filling other vacancies created by the changes, T. S. DuBose, formerly district manager in New Orleans, has been named manager of Ethyl's district office in Los Angeles. D. P. Jeppe succeeds Mr. DuBose as district manager in New Orleans. Kerney J. Hurst, who has been a field engineer in Little Rock, Ark., has been promoted to account representative in Oklahoma City.

William McK. Spierer has been appointed sales promotion manager of Ethyl Corporation. Mr. Spierer.



E. K. LOCHER
Assistant Manager, Central Region



L. L. HUXTABLE
Assistant Manager, Southern Region



LAURENCE REIS
District Manager, Tulsa

n Ethyl's Sales Department

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who has had extensive experience in the sales promotion field, will be in charge of Ethyl's sales promotional activities, including its cooperative programs with oil refining companies.

Before coming to Ethyl, Mr. Spierer was associated with the advertising agency of Fuller & Smith & Ross, Inc. Previously he had been sales promotion manager of Metro Sunday Newspapers, Inc., for nine years. His work has won many awards, including "Best of Industry" of the Direct Mail Advertising Association.

Mr. Spierer was born in New York City and was graduated from Syracuse University in 1934. During World War II, he was director of the U. S. Army's Information and Education Division and a member of the general staff. #



W. McK. SPIERER
Sales Promotion Manager

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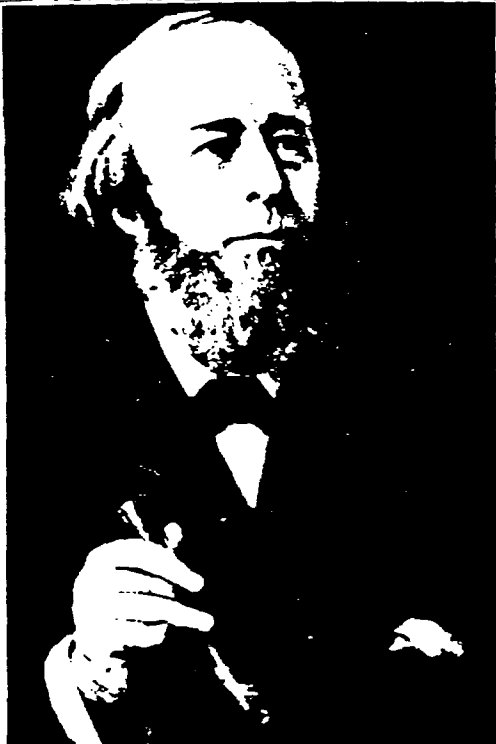
T. S. DuBOISE
District Manager, Los Angeles



D. P. JEPPE
District Manager, New Orleans



K. J. HURST
Account Representative, Oklahoma City



Benjamin Silliman, Jr.

“Much Ground for Encouragement”

*In concluding his significant report with these words a century ago,
Benjamin Silliman, Jr., gave men the confidence to drill for oil*

BENJAMIN SILLIMAN, JR., was one of those chosen few who left a lasting legacy to the world.

He was an outstanding scientist, educator and lecturer; the author of popular textbooks on chemistry and physics; editor of the *American Journal of Science*, the first successful scientific publication in the United States; and founder of what later became Yale University's renowned Sheffield Scientific School.

But even if he had accomplished none of these things, Benjamin Silliman, Jr., still would have won enduring fame because of a single act. That was his preparation 100 years ago of a searching analytical report on Pennsylvania crude oil. It was Silliman's report—so thorough, so enthusiastic and so prophetic—that gave men the courage and confidence to risk their money to try to unlock petroleum from its hiding place.

In his way then, “young Ben Silliman” had as much to do with the birth of the oil industry as any other man.

To mark the 100th anniversary of Silliman's chemical classic, the American Petroleum Institute has presented to Yale University a bronze plaque for mounting in the Sterling Chemistry Laboratory at the New Haven institution. The plaque, crediting the Silliman report with leading to “the drilling of the first successful oil

well by Edwin L. Drake at Titusville in 1859 and the founding of the modern petroleum industry,” was given May 11 during the API Division of Refining's midyear meeting in St. Louis.

Harold G. Osborn, vice president of Continental Oil Company, made the formal presentation at a meeting of the Division's General Committee presided over by E. B. McConnell, vice president of The Standard Oil Company (Ohio) and API vice president for Refining. The plaque was accepted by Prof. Barnett F. Dodge, chairman of Yale University's Chemical Engineering department and president of the American Institute of Chemical Engineers.

Qualified to Conduct Analysis

If anyone in this country a century ago was qualified to conduct an exacting scientific analysis of crude oil, it was Silliman. Thirty-eight years old at the time, he was the famous son of a famous father. Among countless other achievements, the elder Silliman had become Yale's first professor of chemistry and natural history when only 23 years of age.

Soon after graduation from Yale in 1837, young Silliman began to assist his illustrious father in the

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THE SILLIMAN PETROLEUM REPORT

DURING THE WINTER MONTHS OF 1855, BENJAMIN SILLIMAN, JR. PROFESSOR OF GENERAL AND APPLIED CHEMISTRY AT YALE, CONDUCTED A SERIES OF PIONEERING EXPERIMENTS ON THE PROPERTIES AND USES OF PETROLEUM GATHERED FROM SPRINGS NEAR TITUSVILLE, PENNSYLVANIA. HIS DETAILED AND OPTIMISTIC REPORT, COMPLETED APRIL 16, 1855, LED TO THE DRILLING OF THE FIRST SUCCESSFUL OIL WELL BY EDWIN L. DRAKE AT TITUSVILLE IN 1859, AND THE FOUNDING OF THE MODERN PETROLEUM INDUSTRY.

THIS MEMORIAL IS PRESENTED TO YALE UNIVERSITY
BY THE AMERICAN PETROLEUM INSTITUTE
IN OBSERVANCE OF THE
100TH ANNIVERSARY OF PROFESSOR SILLIMAN'S REPORT.

1855

1955

This plaque, presented by the American Petroleum Institute, has been mounted in the Sterling Chemistry Laboratory at Yale. It tells the story of the historic Silliman report.

laboratory and before long he, too, became a professor of chemistry. In his early years on the Yale faculty he wrote a memorandum which resulted in formation of the school of applied chemistry, the forerunner of Sheffield Scientific School. He also became one of the school's first professors.

Silliman was persuaded to make the study of Pennsylvania petroleum by a young New York lawyer, George H. Bissell, and his business partner, Jonathan G. Eveleth, who held oil property near Titusville. James M. Townsend, a leading New Haven banker, was enthused by Bissell's bubbling accounts of how petroleum could take the place of coal oil as an illuminant but requested a scientific analysis of the crude before investing any money. It was natural that Bissell and Eveleth should ask Silliman to undertake the assignment since no name was more respected in the entire field of chemistry.

To develop their property along Oil Creek, Bissell and Eveleth had organized the Pennsylvania Rock Oil Company of New

York. But the stock was not selling. Times were bad and people were hesitant to invest in any new enterprise. The company organizers had only one glimmer of hope—the favorable report they expected to receive from Silliman. Letters that Silliman penned while conducting his study had given a hint of the tenor of his forthcoming report.

In his historic report, Silliman wrote that the oil he examined possessed high value as an illuminant, had "important qualities" as a lubricant and could be used for still other purposes.



Participating in the Silliman plaque presentation in St. Louis were Prof. Barnett F. Dodge, chairman of Yale University's Chemical Engineering department; E. B. McConnell, API vice president for Refining; and Harold G. Osborn, vice chairman of the API Division of Refining General Committee.

ETC 28868



Above, a portion of the Yale campus in New Haven, Conn., as it appeared about the time Benjamin Silliman, Jr., made his scientific analysis of Pennsylvania rock oil. . . . Left, it was in this whitewashed brick building that the well known professor did his research work.



"In conclusion, gentlemen," he stated, "it appears to me that there is much ground for encouragement in the belief that your Company have in their possession a raw material from which, by simple and not expensive process, they may manufacture very valuable products. It is worthy of note that my experiments prove that nearly the whole of the raw product may be manufactured without waste, and this solely by a well directed process which is in practice one of the most simple of all chemical processes."

But even with such a glowing report by one of their respected fellow-citizens, many New Haven men of means refused to invest. The hitch was that under New York State law the property of stockholders was liable for a company's debts. Would-be investors were not willing to run that risk on an untried venture. Bissell and Eveleth overcame this by reorganizing their firm as the Pennsylvania Rock Oil Company of Connecticut, since that state had no such law.

With this change, many prominent New Havenites bought stock, and Silliman, who had been given 200 shares, became president of the revamped company.

Just as they had risen, however, the fortunes of the Pennsylvania Rock Oil Company of Connecticut fell, and Townsend, the banker who originally requested the scientific study of crude oil that Silliman made, formed a new firm. This was the Seneca Oil Company, under whose auspices Colonel Drake actually drilled his historic discovery well.

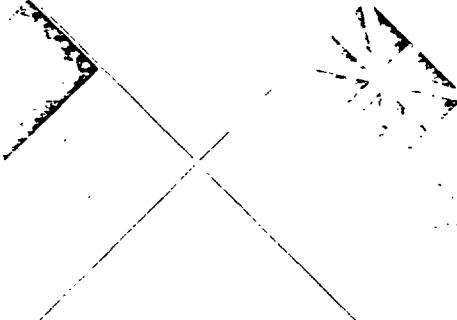
Neither time nor subsequent events have dulled the lustre of Silliman's study of Pennsylvania oil. His "Report on the Rock Oil, or Petroleum, from Venango Co., Pennsylvania" was a thorough scientific investigation of petroleum by an American scientist. Its detail and accuracy are all the more meaningful when it is remembered that Silliman's conclusions were reached at a time when man knew next-to-nothing about petroleum.

Silliman pointed out that crude oil contained several distinct products of different boiling points. He noted that the different oils, or products, could be separated by "fractional distillation." The very products that he had indicated could be derived from crude became the industry's chief products for decades. Silliman not only described these products and their uses, but told how they could be obtained.

His report, as oil historian Paul H. Giddens has termed it, was truly "a turning point in the establishment of the petroleum industry." #

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Ethyl Grows with Canada

North of the border: a new company and a new plant

GROUND HAS BEEN BROKEN for the new "Ethyl" antiknock compound manufacturing center at Sarnia, Ontario. When it is completed next year, this plant will provide the Canadian petroleum industry with a supply of this important gasoline additive from a domestic source for the first time.

Initially, production will be at a rate sufficient to meet current needs of Canadian refiners. But the plant has been designed so that capacity can be readily increased to meet greater future demands. At present, of course, the oil industry in Canada is supplied with "Ethyl" antiknock compounds made in the United States.

The plant will be operated and its output marketed by Ethyl Corporation of Canada Limited. This newly-formed company succeeds Ethyl Antiknock, Ltd., which has been the Canadian sales organization for "Ethyl" antiknock compounds for the past five years. Headquarters of the new company is in Toronto.

Alan C. Tully has been named president of Ethyl Corporation of Canada Limited. He has been with Ethyl Corporation for more than 25 years in both domestic and foreign sales operations. In addition to positions in several American cities, most recently the Ethyl regional office in Tulsa, Mr. Tully was for several years in charge of the company's sales operations in Australia and the Far East. Vice president of Ethyl Corporation of Canada Limited is Oscar B. Lewis, who held a similar position with Ethyl Antiknock, Ltd.

Resident manager of the Sarnia plant is Robert T. Edgar. He is one of the few key supervisory people being assigned to Sarnia from Ethyl's manufacturing plants at Baton Rouge, Louisiana, and Houston, Texas. All other employees, numbering about 150, will be Canadians.

As pointed out by E. L. Shea, president of Ethyl Corporation, in a recent address before the Sarnia



Alan C. Tully, left, and Oscar B. Lewis, center, are president and vice president, respectively, of Ethyl Corporation of Canada Limited. Robert T. Edgar, right, is manager of the Sarnia plant.



J. G. Church, Sarnia alderman; E. L. Shea, Ethyl Corporation president; and W. J. Miller, Sarnia Chamber of Commerce president, at the Chamber's annual banquet. Mr. Shea spoke on Ethyl's plans for the new Sarnia plant.

Chamber of Commerce, "The plant we are building here confirms Ethyl's belief in Canada and the soundness of the country, as well as our desire to grow with Canada."

Noting that this will be the first time that gasoline antiknock compounds have been manufactured north of the border, Mr. Shea said that the plant thus represents "to Sarnia, to Ontario and to Canada as a whole, another new industry in your rapidly expanding economy. While Ethyl Corporation of Canada Limited is not a large company as such," he explained, "we will offer steady and gainful employment to a group of citizens of the area, we will purchase as many materials and services in Canada as possible, and we will do our utmost to be a good industrial citizen."

"Ethyl's growth over the years has been largely influenced by one important policy," Mr. Shea said. "That is, to give the customer more value in the product than the price he pays for it. We sincerely believe that we should do more than just manufacture and sell a product. Accordingly, we are constantly at work on a variety of efforts all designed to help the oil refiner make the fullest possible use of 'Ethyl' antiknock compounds so that the gasoline-consuming public in turn may benefit."

Initial investment of the Sarnia plant is presently es-

timated at \$14 million. There will be two buildings, plus storage and handling facilities for raw materials and the finished "Ethyl" antiknock compounds. One of the buildings will house the various administrative offices and shops. The other will be a five-story structure where the product will be manufactured. The plant site, adjoining the Canadian Oil Refineries, Ltd., property on the southern outskirts of Sarnia, consists of 100 acres. Thirty-five acres will be used at the outset, leaving ample room for any necessary expansion in the future.

Will Purchase Intermediates

Initially at least, the plant will purchase the chemical intermediates used in the manufacture of "Ethyl" antiknock compounds and not make them, as do Ethyl's two manufacturing centers in the United States. It will, however, produce its own tetraethyl lead, which is the active antiknock ingredient.

The finished antiknock compounds will be the same products that Canadian refiners, like those in the United States and other countries of the world, are employing to make their good gasoline even better from the antiknock quality standpoint. The only difference is that, starting next year when the Sarnia plant goes into operation, they will bear a "Made in Canada" label. ≡

LAYOUTS AND ART DIRECTION: Carsten Grande

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A. Devaney, Inc.; pages 7 (top right) and 8 (top), courtesy Shell Oil Company; pages 12, 13, 14 and 15, courtesy Pan American World Airways, United Air Lines, American Airlines, Sabena Belgian World Airlines, Trans World Airlines and Consolidated Diesel Electric Corp.; pages 16 and 17, L. A. Todd; pages 20 and 22, courtesy Yale Univ.

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A new Ethyl program...



HERE's the symbol and slogan for a new nation-wide program designed to increase car usage and the demand for all motoring products and services.

Ethyl is spearheading this program with advertisements throughout the summer and fall in The Saturday Evening Post, Collier's and Reader's Digest reaching more than 50,000,000 people . . . and is backing it up with an elaborate publicity and promotion program. In addition, The

Saturday Evening Post and Collier's have organized an all-out merchandising campaign to enlist the support of all industries that can benefit from increased automobile mileage.

We believe this "Drive More" program can become one of the best-known and most rewarding promotions yet devised.

We invite your active participation. For full information and suggested tie-in materials, please write us.

ETHYL CORPORATION

New York 17, N. Y.



ETHYL NEWS



JULY—AUGUST 1955

ETC 28874

BEHIND THE NEWS



ETHYL NEWS

Richard F. Cook, Editor

JULY-AUGUST 1955

Farming on Oil, the article on pages 4, 5 and 6, really starts on our front cover. The color transparency reproduced there shows a scene that is repeated with slight variations millions of times a day the country over — a petroleum-powered tractor helping with farm work. More than any other piece of equipment, the tractor is the farmer's biggest asset. It has been 20 years since Ethyl Corporation helped pioneer in the development of the first high compression gasoline tractor. Those 20 years have seen improved tractors powered by ever-better gasoline take over an increasing number of farm chores. And now petroleum products, not only in gasoline, but in myriad forms, have shortened the work day and lightened the work load for the farmer.

Marvels of engineering that they are, modern highways, thruways, turnpikes and parkways speed heavy loads of traffic from city to city at a rate once undreamed of. But for more leisurely and enjoyable automobile traveling, for more historic and beauty sights, there's a whole network of opportunity in back roads. In a return writing engagement (he authored *Vacation Time, U.S.A.*, in our May-June issue), travel expert Andrew H. Hepburn tells of some of the joys of byroad motor adventuring in *Don't Follow the Crowd*, starting on page 1. As this issue went to press, Mr. Hepburn was following some of his own advice. He was "back home in Indiana" for a restful vacation.

Among the many ethnic groups that go to make up America, none perhaps has a more tragic history nor has found a happier home than the Acadians of Louisiana. Expelled from their beloved Acadia (Nova Scotia) over two centuries ago, these truly were men without a country. When they finally settled in what is now Louisiana 20 years before the outbreak of the American Revolution, they put down roots that have held them fast for 200 years. There's something of their life and times, past and present, in *Acadian Bicentennial*, starting on page 16.

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Opinions expressed in signed articles are the authors'. Ethyl News welcomes articles of timely interest submitted from outside sources. Upon request, the editors are glad to grant permission to reprint material appearing in Ethyl News.

Published by Ethyl Corporation, 100 Park Avenue, New York 17, N. Y., manufacturers of "Ethyl" antiknock compounds, used by oil companies to improve the antiknock quality of aviation and motor gasoline.

Edward L. Shea, President

William R. Perdue, Jr., Vice President and Treasurer

Herbert A. Savage, Secretary



Maps and directions for byroad journeys are available at service stations.

Don't Follow the Crowd

Secondary roads offer a wide network of opportunity to the motorist

By Andrew H. Hepburn

WARY of a virulent condition that might well be described as "clogging of the traffic arteries," millions of Americans are missing lots of the fun, comfort and convenience that should go with car ownership. Neither are they able to take advantage of the cheaper per-mile costs of car operation that result if they "Drive More."

Discouraged from traveling by traffic congestion on main highways, these people aren't enjoying the pleasure and dollars-and-cents advantages of increased car use. Instead, they are staying at home.

If they only knew, there is a way they can use their automobiles, have fun, avoid traffic and learn more

about their country—all at a cost of only a few cents a mile. Skipping most major highways, this travel-for-pleasure method involves the planned use of secondary roads, country lanes and minor streets, which offer a national network of opportunity to the motorist. If used more, this method would create more automobile travel—not merely divert it from main highways.

Consider for a moment the pattern of roads and highways. Main highways link important centers and carry heavy traffic loads. Throughout the country, there are about 300,000 miles of what are classified as primary roads. They carry 73 percent of all traffic. But there also are 2½ million miles of local roads (88 percent of all roads in the country). They carry only 27 percent of all the traffic.

Road maps show clearly the relationship between main roads and rural roads. But curiously enough, the average motorist using a map is conscious only of the main roads on it—generally heavy red lines. He tends to disregard entirely the spider web of minor roads. Rural roads curve and jog, following the bank of a river or twisting around a hill. They are not direct routes: they are links in a vast chain. The trick in using them is to fit the links together.

All that is required are a good map, a little imagination, some curiosity and a resolve to be relaxed and leisurely. Most motorists who discover the joys of by-road browsing become addicts. They often get more pleasure from their cars than people who stick to the more heavily traveled main roads and highways.

Added Advantages

In addition to the joy of relaxed motoring, the use of rural roads provides all sorts of satisfying by-products: the discovery of out-of-the-way places to eat; the chance to indulge a hobby such as photography or collecting, or to have a family picnic in an uncrowded spot; the opportunity to fish, boat or swim in quiet lakes and streams, and to see many historic and beauty spots.

Back road adventuring can be pursued around any community, and can provide beguiling off-beat interludes on a cross-country trip. Possibilities are everywhere. A few examples will be suggested here. Imagination and ingenuity will provide hundreds of others.

First might come the discovery of the country around any city. On a map, it is easy to chart a proposed route

One of the joys of a drive along back roads is a stop at a roadside market for farm-fresh fruits and vegetables.



with a colored pencil. One way is to plan a circuit around the city, entirely by back roads.

Here is an example based on a trip around Hartford, Conn. It is a ragged circle of turns and corners, made entirely on rural roads, except for an occasional dash across a main highway. To make the circuit requires 145 miles. The largest town through which the route passes is of less than 10,000 population, though along the quiet roads are many charming small villages.

With plenty of time for all sorts of stops, this motor trip could pleasantly fill a Saturday, Sunday or holiday. Here are some of the things to see and do: Pass through the heart of the famed shade-grown tobacco country. Follow the banks of three rivers—the Connecticut, Scantic and Farmington. Visit a state park and a state forest where there are excellent picnic grounds. See two lakes, each offering fishing and boating. See some fine old homes and several beautiful churches. Explore two picturesque river gorges. See a famous boys' school. See two historic quarries which supplied stone for New York's brownstone era. See an historic Indian burying ground and a 30-acre greenhouse full of roses.

On this particular byroad journey the motorist can discover several country inns that offer excellent food. With slight deviations from the circuit, he could add two more state parks, the birthplace of Nathan Hale, an additional state forest and four more lakes.

Two Possibilities

Cross-country travel offers even greater variety and reward for the byroad follower. Generally there are two basic possibilities. One is the brief detour from a main route to a particular place. The other is the alternate route roughly parallel to a main highway where a succession of rural roads offer a more interesting and uncrowded itinerary.

The possibilities of the brief detour are suggested by two examples, one in New York State, the other in Tennessee.

The main route traveled in New York is the superb new Thruway. But if a motorist leaves the Thruway at the town of Herkimer (Interchange 30), drives south over Route 28 for 27 miles, he comes to Cooperstown. Here are two notable attractions: Baseball's Hall of Fame, with mementoes of the diamond sport from Cy Young to Joe DiMaggio. Nearby is the equally unique Farmer's Museum, full of historic agricultural implements and oddities.

If time permits, Cooperstown has other things to offer—the grave of James Fenimore Cooper, for example, and a lake for boating and fishing. So a detour

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In addition to offering uncrowded and unhurried automobile travel, back roads are a treasure place for early American scenes and beautiful views.



of 54 miles by minor roads provides a diverting half day of discovery and pleasure.

Or take the other example. The main road across northern Tennessee is busy US 70, linking Knoxville and Nashville. Any traveler will be rewarded if, on approaching Nashville from the east, he cuts north over rural roads, about 15 miles from Nashville, to discover the Hermitage on the banks of the Cumberland River. This was the home of Andrew Jackson, a gracious pillared mansion, surrounded by old and charming grounds. The graves of the president and his wife are there. The whole visit might add 20 miles to a journey and two hours of time, but it will be remembered long after the drive across the state is forgotten.

In Indiana, for Example

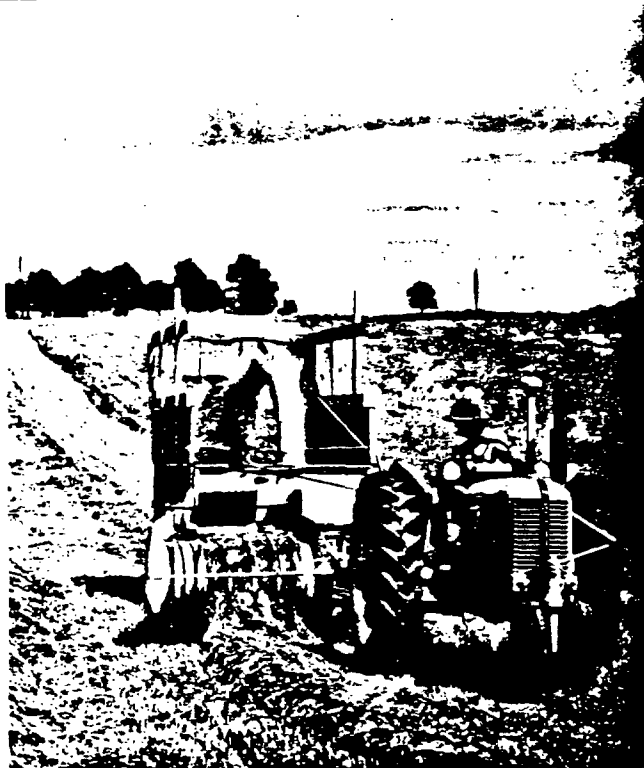
Byroad adventuring reaches its full flower in contriving alternate cross-country routes, using rural roads instead of main highways. Here is an example based on two routes across southern Indiana. Both go in the same direction, reach the same destination. One is a main, heavily traveled road, reasonably scenic US 150, from Louisville northwest cross the state. The distance is 115 miles.

The alternate route is a paved rural road which starts from Louisville as US 460, changes its route number and direction a dozen times before it joins US 150 at Vincennes on the Wabash River. The distance via the alternate route is 145 miles, 30 more than the main, more heavily traveled highway. But the difference is far more than the distance. On US 150, there are few sights worth remembering. But on the friendly, wandering low traffic route to the south there are many things to be discovered.

First is the quaint village of Corydon, first capital of Indiana, where the original capitol building has been restored. A few miles west is the famous Wyandotte cave where guides help visitors explore miles of caverns. West a few miles more, the roads climb to a high point overlooking the majestic Ohio River valley. Thirty miles further, St. Meinrad's monastery lifts its towers over well kept fields and monks proudly show visitors their beautiful chapel.

A few miles beyond, is the fairyland of Santa Claus, with a giant statue of the jolly old man and an enchanted forest. Seven miles further, in a forest grove now maintained as a state park, is the grave of Abraham Lincoln's mother, Nancy Hanks. The ruins of the wilderness log cabin nearby are all that is left of a home the boy Abraham knew for 13 years. Finally, just where the road joins the main route at Vincennes, are two sights: a superb memorial to the frontier soldier George Rogers Clark, and a memorial to the boy Lincoln, crossing the Wabash on his way to Illinois.

From these few examples, it is easy to see that byroad adventuring has many rewards. For the individual motorist it provides a new and pleasant way to use his automobile, not just occasionally or on a formal holiday or vacation, but any time—on long summer evenings, week-ends, or for a Saturday or Sunday jaunt the year 'round. Once indulged in, it is likely to be pursued with increasing zest. If it is, and by a number of car owners, it will add hundreds of miles and dozens of hours of extra use to automobiles throughout the country. An annual increase of 500 miles per auto would result in the sale of over one billion gallons of gasoline and \$427 million of automotive products and services. #



"The American farmer uses more petroleum power in his tractors, trucks, automobiles and self-propelled implements than all other industries combined". . . . Below, driers are valuable in crop harvesting and preservation.



4



*In using petroleum and its
products in so many forms,
the modern agriculturist is . . .*

FARMING



IF TODAY'S FARMER needs any reminder of petroleum's impact on his life, he has only to recall conditions of 100, 50 or even 30 years ago.

Back in 1859, when the oil industry was born, just three basic differences in agricultural techniques distinguished the American farmer from the soil tillers of Biblical times. These were the farmer's use of horses—and horse collars—instead of clumsily yoked oxen; his acceptance of the steel moldboard plow; and his increasing use of wheeled reapers (although sickles and scythes equipped with cradles still were common).

Fifty years ago? Only those who have experienced the sensation can relate what a tiresome, all-day chore it was to haul produce to the county seat in a jolting wagon.

And 30 years ago? Hard as it is to believe now, America's farmer of three decades ago spent almost half his working life on the unproductive job of tending and feeding the horses and mules. There were more than 26 million of them at the peak—supplying power for field tools. Then, too, some 70 million acres that now grow cash food crops had to be given over to grain or pasture for the work animals. Now, of course, the petroleum-powered tractor has all but displaced the horse. Today's farmer is able to devote almost his entire workday to



◀ Time-consuming chores connected with tending horses and mules disappeared when power equipment came into use.

producing the crops and fibers that feed, clothe and shelter a growing population.

Like the city-dweller, the farmer is apt to think of petroleum almost solely in terms of the gasoline that powers his motor vehicle and the fuel oil or gas that heats his home. Both, of course, are important. But by no means are they the full measure of oil's significance.

Petroleum products may not be recognized in their many different forms, but they are everywhere on the farm. Petroleum provides fuel for the cookstove, refrigerator, heater and air conditioner; energy for the water pump; insecticides for the house, barn and field; power for the car, truck and tractor. Petroleum is in many of the clothes the farmer and his family wear. Drugs, soaps, shaving supplies and cosmetics contain petroleum. The jelly on the dining room table would run like syrup without synthetic pectin made of petroleum. The breakfast food would be soggy if its container had no moistureproof petroleum-derived waxed paper wrapping. Even newspapers and magazines are printed with inks made from carbon black, a petroleum product.

Long List of Contributions

The list of petroleum's contributions to the farmer's better life is almost unending, but these few examples indicate the versatility and scope of petroleum.

More dramatically, petroleum is chiefly responsible for the fact that medical, fire and police protection are no farther away than the few minutes it takes the doctor, firemen and policemen to drive to the farmer's home. Petroleum—in gasoline, oils and lubricants—enables the farmer to haul his produce greater distances and meet price fluctuations by choosing any of several marketing centers. And, of course, petroleum has eased the farmer's workload and shortened his workday by performing miracles in the field.

The American farmer uses more petroleum power in his tractors, trucks, automobiles and self-propelled implements than all other industries combined. He uses approximately 88 horsepower per farm worker as compared with only 2.2 horsepower in his father's day. Most are mechanical horses that feed on petroleum.

In becoming a power farmer, he has piled up some impressive statistics. Since 1920, farm output is up 51 percent; production per acre is up 14 percent; and out-

◀ In his truck, the farmer can haul produce to any one of several marketing centers, regardless of distance.



ON OIL

put per man-hour is up 146 percent. Even more impressive is the fact that supplies of food for human use have increased tremendously as the petroleum-powered tractor replaced the horse and Dobbin's pasture was converted to his master's garden.

This is just the beginning. Power farming still is in its infancy so far as many crops like grasses, cotton and peanuts are concerned. Despite a hundredfold increase in jobs profitably performed by mechanized equipment, many new uses lie ahead.

The more extensive use of farm machinery plus indicated new uses of oil for agricultural purposes are bright spots in the challenge that confronts the farmer of the future. He will be called upon to feed America's estimated 200 million population in 1970 with far fewer farmhands than he employs today and perhaps with fewer acres of *good* land under cultivation than he has at present.



Petroleum products for use in his home and in his truck, tractor and other power equipment often are delivered directly to the farmer in tank truck quantities.

Just two of the relatively new trends in the use of oil—chemical farming and crop drying by heaters—promise to stretch farm acres to an extent that seemed impossible a decade ago.

Agriculture now uses more than two and a half times as much fertilizer as it did in 1940, with the result that farmers may see the day when they'll be building rich topsoil faster than they lose it through erosion. Liquid fertilizers being used increasingly in irrigated areas are derived from petroleum products.

Amout 75 million gallons of petroleum products are required in compounding the various types of agricultural and household sprays used each year. Petroleum-base sprays have banished the nuisance of flies on many farms. They also control several thousand other forms of insect life that attack crops, livestock, poultry and humans. They provide effective weed killers, including recently-developed means for eradicating sagebrush, mesquite and other woody plants. Petroleum products

are being used in defoliants to speed the day when mechanical cotton pickers will take over the harvesting of much more of this crop.

As fuel, petroleum is rapidly changing many production and harvesting practices. Flame weeding, first developed as a practical method for eliminating weeds and grass in cotton, is coming into similar use with corn, sugar beets and sugar cane.

In corn harvesting, to cite one example, crop driers lower the moisture content of cribbed corn, help avoid spoilage and at the same time improve the corn's keeping qualities and market value—all at a cost of only a few cents a bushel. Methods also have been perfected for drying shelled corn in the bin with petroleum fuels. This may bring a shift to picking and shelling in the field, with drying done on the way to the bin. Similar changes also may not be far away in the case of peanuts and tobacco. The artificial drying of grasses of various kinds, of course, already is a practice on many of the larger farms throughout the country.

Aside from helping the farmer to grow and harvest his crops, petroleum-powered farming also assists him in saving the soil. Present water control practices and many other soil conservation measures would not be possible without the tractor and heavy earthmoving equipment. The threat of erosion was recognized by the founders of our country. Patrick Henry said that "he is the greatest patriot who stops the most gullies." But contour-plowing, terracing and the digging of drainage ponds was only a dream before the tractor and bulldozer came along. Just 20 years ago the idea that whole farms might be graded for gravity irrigation would have seemed fantastic. Yet that idea is reality today.

Oil Makes the Difference

In many ways, petroleum has brought the farmer out of the darkness since the kerosene lamp was introduced less than 100 years ago. It has multiplied his "hands" and strengthened his "arms." He can now perform in weeks work that once took a full season. Because he can do his work—and more of it—faster and easier, he is able to enjoy more leisure hours and a life that is far better than that of farmers anywhere else in the world.

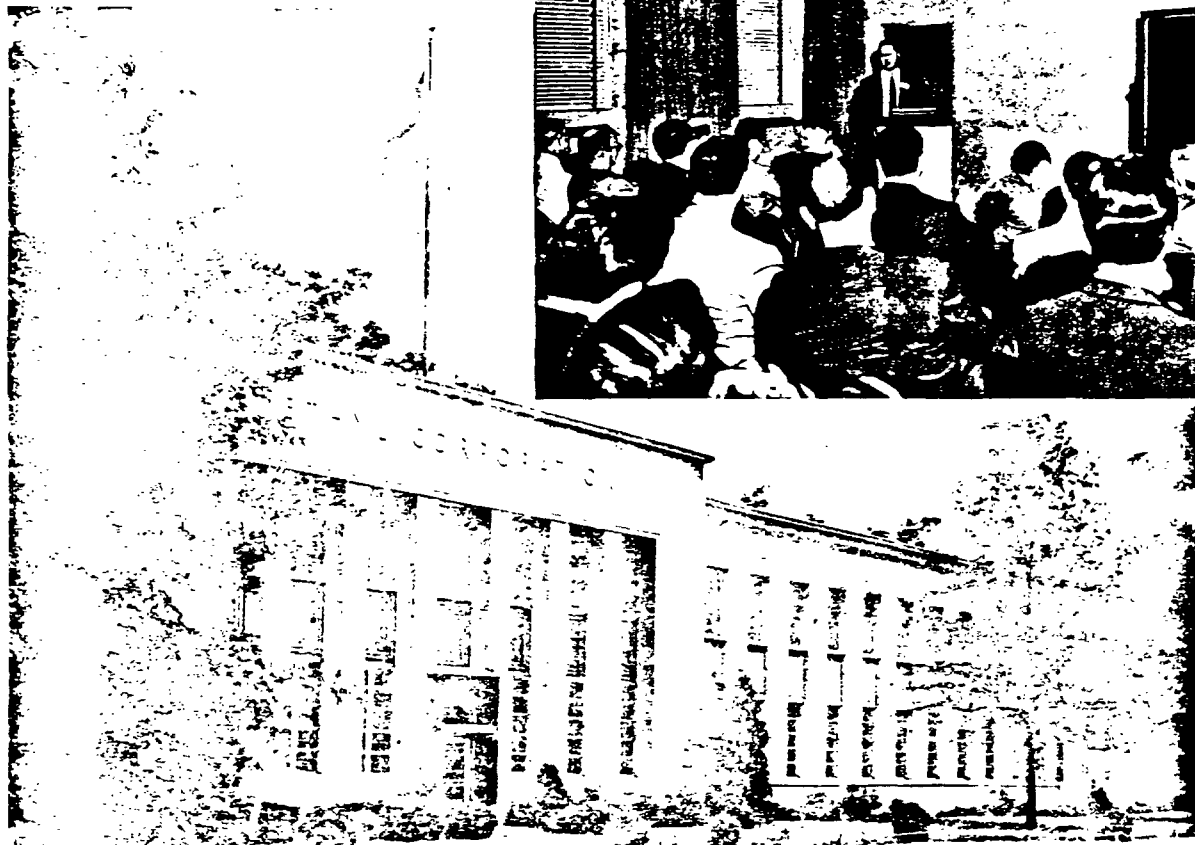
Petroleum has helped bring greater progress in agriculture and farm life in the last 50 years than occurred in the previous 5,000 years of recorded history. #

Research on Review

Ethyl's work with automotive fuels and engines is displayed to oilmen visiting the Company's Laboratories in Detroit

WORKING CLOSELY with oil refiners and engine manufacturers, Ethyl Corporation's Research Laboratories, over the years, have made many contributions to improved engine design and performance and to the development of better and more effective fuels and fuel additives. As a part of this work, Ethyl has always kept in close touch with the developments in both industries and has conducted extensive research studies of its own. Thus, the Company has been able to contribute to the cooperative efforts of the oil and automotive industries and also has been able to serve as a connecting link between them. Indeed, with its modern research laboratories in Detroit, and its many contacts

R. K. Scales, general manager of Ethyl's Research Laboratories in Detroit, welcomed the visiting oilmen and described the nature and scope of the studies that are conducted there.



Research on Review

with the oil industry throughout the country, Ethyl enjoys a unique position.

In serving as liaison between the two industries, Ethyl welcomes representatives from them to its Research Laboratories in Detroit to explain some of the studies being made on the problems of fuels, engines and lubricants. At the same time, it often can share with them information relating to recent trends in oil and automotive research and manufacturing.

Such an opportunity presented itself early this summer when oilmen from the United States and Canada visited the Laboratories. Touring the installation in small groups, each accompanied by an Ethyl guide, the visiting oilmen made stops at predetermined "stations."

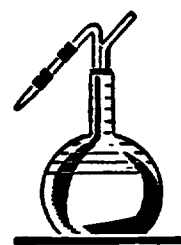
At each of these, an expert in the research carried on there explained the equipment in use, the nature and scope of the studies being conducted, something of the results obtained and their significance to the oil and automotive industries.

The visitors witnessed, among other things, work on preignition, radioactive piston rings, the experimental 12:1 compression ratio XO-121 tractor engine and spark plug fouling. They saw test cars in fuel rating studies on a chassis dynamometer in the Laboratories' controlled weather room, the pilot plant where experimental fuels are made, and single-cylinder test engines with specially designed combustion chambers.

The pictures on these pages show some of the oilmen as they studied these and other research projects. #



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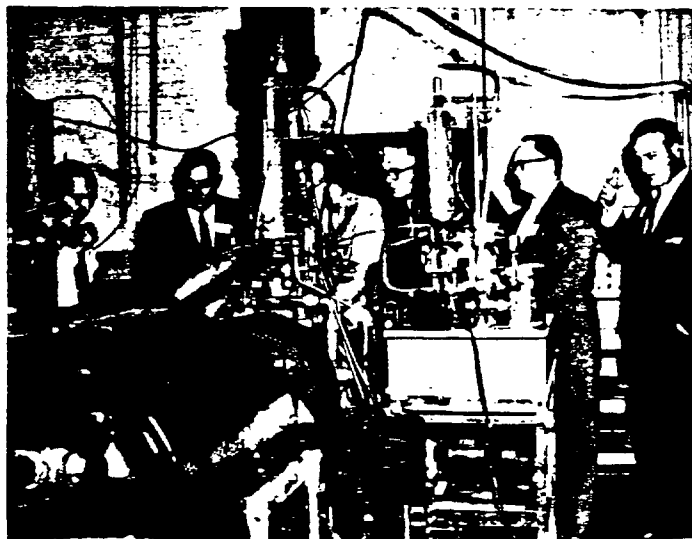
Listening to A. E. Felt describe special high-compression single-cylinder test engines are H. E. Brandli, Cities Service Oil; W. J. Rusher, Ethyl; T. C. Lockhart, Socony Mobil Oil; S. T. Pruitt, Ethyl; J. G. Jimenez, Tide Water; and H. E. Hesselberg, Ethyl.



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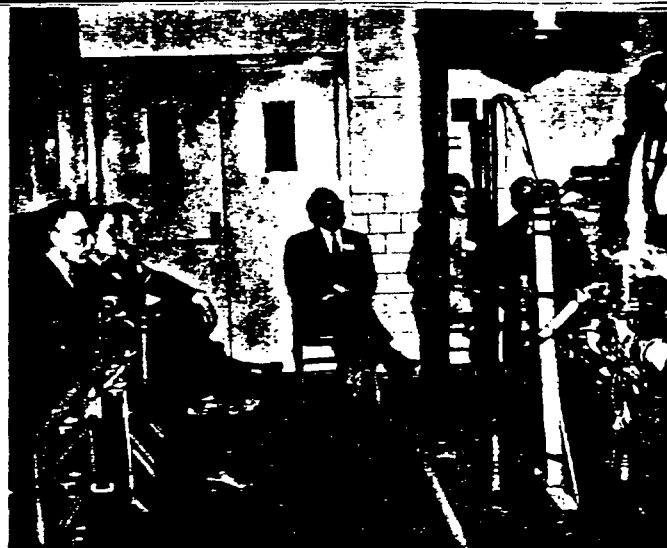
E. B. Rifkin describes equipment used in pre-flame reaction studies to R. G. Arner, Sinclair Refining; R. D. McCrum, Cooperative Refinery Association; C. Z. Hardwick, Ohio Oil executive vice president; and L. A. Dollahan and E. K. Locher, both of Ethyl.



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J. A. Warren demonstrates single-cylinder engines and instruments devoted to preignition research. Listening attentively are A. L. Wilson, vice president of Shell Oil of Canada; H. J. Philp, Ethyl Corporation of Canada Limited; W. W. Stewart, Imperial Oil; H. S. French, McColl-Frontenac Oil; and R. B. Sneed, Ethyl.



H. T. Mueller explaining new procedure and instrumentation for measuring friction in the 12:1 compression ratio XO-121 tractor engine to M. P. Murdock, Ethyl vice president; A. J. Kelly, Esso; M. A. Remondino, Ethyl; H. R. Snow, American Oil vice president; M. D. McDorman, Ethyl; and T. A. Aldridge, American Oil vice president.



Pilot plant equipment is described by O. G. Gilbert, Jr. (left), to J. M. Doss, The Texas Company; S. D. Breitweiser, Vickers Petroleum vice president; S. L. Roberson, El Dorado Refining vice president; R. A. Young, M.F.A. Oil and Delta Refining; and Stuart Forbes, Ethyl.



G. A. Ball (right), recounts Ethyl's procedure for investigating TEL decomposition in a single-cylinder engine to R. C. Murphy, Ethyl; L. J. Hoar, Sinclair Refining vice president; A. H. Boulton, Shell Oil; and C. J. Skidmore, Socony Mobil Oil.

R. C. Beaubier describes spark plug fouling test procedures for R. E. Luton, Ohio Oil vice president; E. A. Desmond, Jr., Ethyl; R. A. Whealy, Ashland Oil & Refining; O. H. Cunningham, M.F.A. Oil and Delta Refining; and H. A. Mack and R. R. Mead, both of Ethyl.



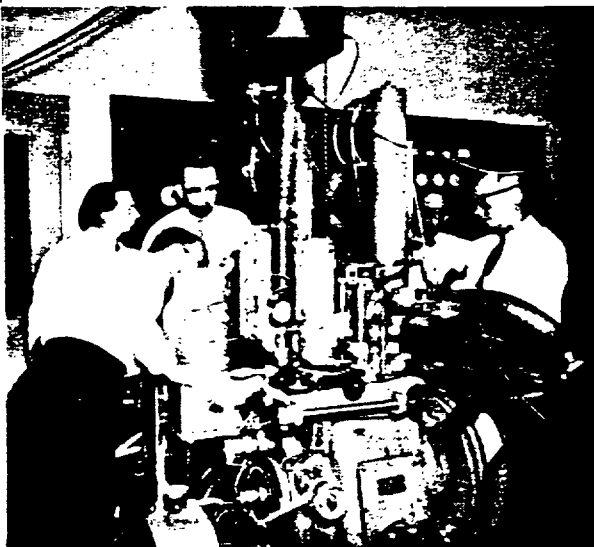


Observing a single-cylinder engine equipped with radioactive piston rings for investigation of wear are D. J. Winter, British American Oil vice president; C. H. Tew, Canadian Oil Companies; O. B. Lewis, Ethyl Corporation of Canada Limited vice president; C. E. Carson, Imperial Oil director; and D. W. Simmons, also of Imperial. Benjamin Brewster (left) explains tests.



The operation of a fuel-rating car on a chassis dynamometer in the controlled weather room is explained by H. A. Toulmin, Jr. (left). Observers are H. L. Smith, Pure Oil; A. H. Bingham, Ethyl; and R. E. Preston, Standard Oil of Ohio. E. L. Vaile, an Ethyl technician, is seated in the car.

Equipment on instrumentation used in pre-flame reaction studies is demonstrated by E. B. Rifkin (left foreground). Viewing the installation are Baron P. de Haulleville, consultant, Canadian Petrofina; D. L. Campbell, British American Oil vice president; E. A. Desmond, Jr., Ethyl; and A. C. Tully, Ethyl Corporation of Canada president.

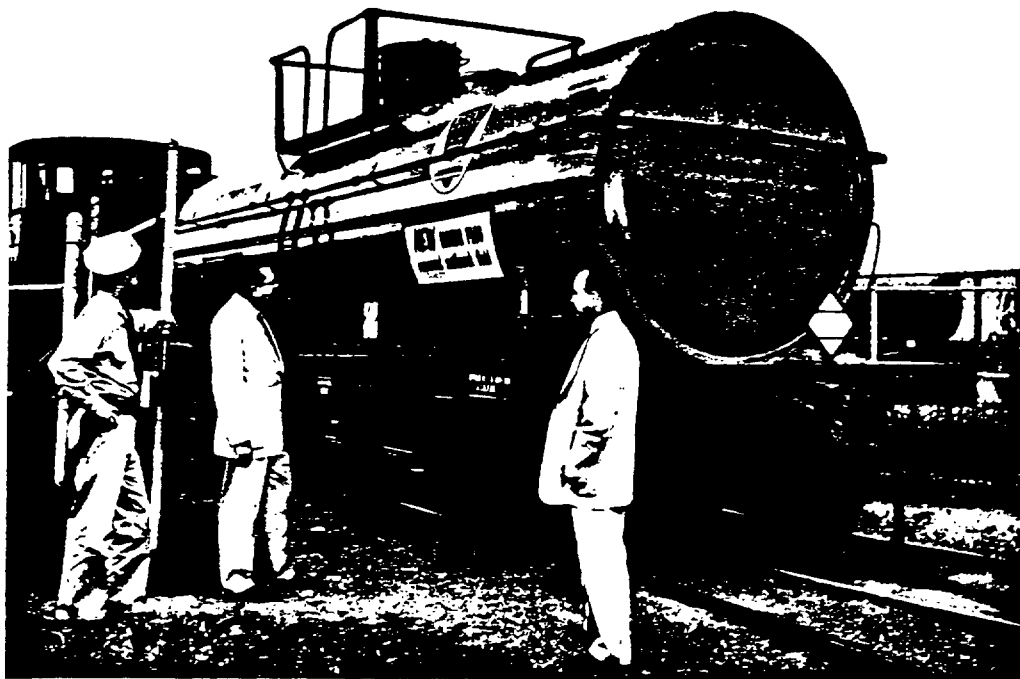


W. E. Kuhn, The Texas Company; C. E. Allen, California Oil vice president; W. G. Pulliam, Cities Service Research and Development vice president; and R. D. Bushell, Ethyl, listen to R. C. Beaubier describe spark plug fouling tests.



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C. W. Bond and W. F. Armstrong, general manager and assistant general manager of manufacturing, and a plant guard watch the tank car carrying the four billionth pound of TEL start on its journey.

The Four Billionth Pound

A historic milestone is passed with the shipment of a car of Motor Plus

A SIGNIFICANT MILESTONE in service to the oil industry was passed by Ethyl Corporation in mid-July with the shipment of the four billionth pound of tetraethyl lead, principal ingredient in "Ethyl" antiknock compounds.

The four billionth pound was contained in a tank car of Motor Plus dispatched to a West Coast refinery. Motor Plus is the improved "Ethyl" antiknock compound for gasoline, introduced late in May, which acts to curb the increase in gasoline octane requirements of automobiles by reducing engine deposits.

In marking the historic milestone, Ethyl noted that since its introduction 32 years ago, tetraethyl lead is more widely used today by the oil industry than ever before. In the last seven years, consumption of this

important additive for gasoline has just about doubled.

To keep pace with the growing demand, Ethyl has repeatedly expanded the capacity of its Baton Rouge plant, the world's largest, and also has enlarged the capacity of its Houston plant, built in 1952. In addition, Ethyl Corporation of Canada Limited currently is building an "Ethyl" antiknock compound manufacturing plant in Sarnia, Ontario, to supply the requirements of the Canadian oil industry.

One-Fifth Original Price

Meanwhile, tetraethyl lead today sells for only about one-fifth of its original price in the 1920's, as a result of numerous process improvements and manufacturing economies over the years.

Ethyl statisticians estimate that, at average TEL usage, the four-billionth-pound milestone means that well over 520 billion gallons of motor and aviation gasoline have been improved with "Ethyl" fluid since it was first introduced. #

The Gas Turbine

AND
FOR

By John S. Wintringham
Ethyl Corporation Research Laboratories
Detroit, Michigan

IN ITS NEVER-ENDING RESEARCH EFFORTS, the automobile industry is constantly searching for new developments that may contribute to future progress in automotive transportation. As a part of these efforts, the industry in recent years has been exploring the possibilities of small gas turbines as engines for passenger cars, buses, trucks and other automotive applications. While work in this direction is still in the experimental stage, it is of great interest. Adoption of a new type of engine could lead to marked changes in automobile manufacturing, automobile supply and servicing, and fuel and lubricant requirements.

Basically, the gas turbine is a device for producing a large volume of high-temperature, high-velocity gases and putting their energy to work. It produces these gases by taking in and compressing several times the volume of air required to burn the fuel that is used to power its air compressor and also to produce usable excess power.

The turbine's compressor draws in and compresses air, which is mixed with fuel and burned in the combustion chamber. Air intake and fuel combustion are

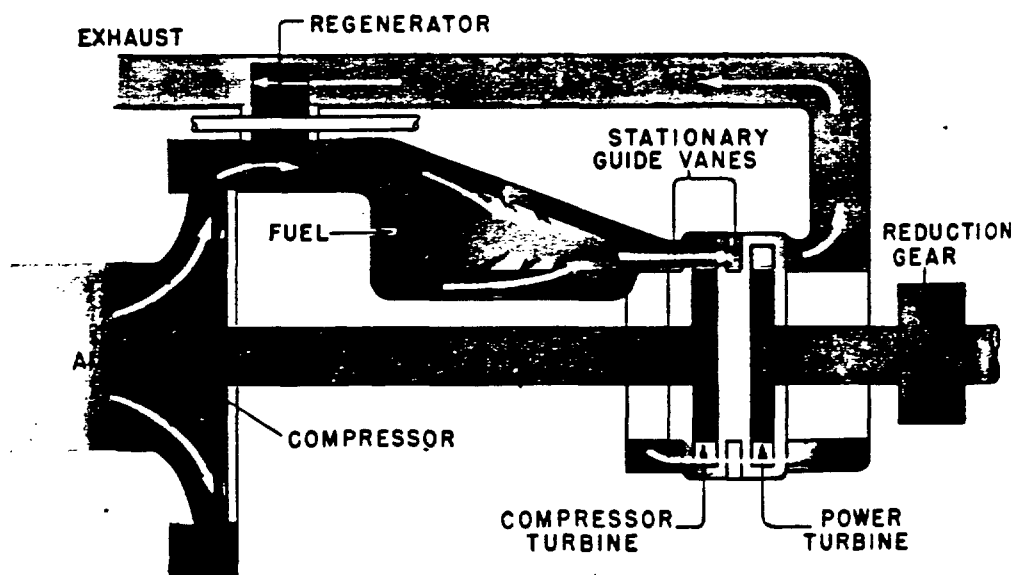
continuous after starting the turbine by rotating the compressor shaft with an electric motor and igniting the fuel-air mixture by a spark plug. The hot gases from the combustion chamber pass into the blades of a turbine mounted on the compressor shaft, rotating the turbine and powering the air compressor.

For automotive purposes, a second turbine, with no mechanical connection to the compressor turbine, is driven by the gases discharged from it. The second or "power" turbine turns a shaft which, through reduction gears, powers the vehicle. This "free-turbine" design permits the compressor section to be started while the car remains at a standstill, without the use of a clutch.

Heat Exchanger Provided

A simple power turbine cannot extract enough energy to give practical fuel economy to an automotive gas turbine. Even with the best possible burners, and the most efficient compressor and turbine wheels likely to be built, the automotive gas turbine would not convert to useful power more than about 13 percent of the heat supplied by the fuel, compared to about 30 per-

This schematic drawing of an automotive type gas turbine engine shows the flow of air, fuel and gases in the engine and the essential operating parts.



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MILES PER GALLON

AND ITS POSSIBLE APPLICATION FOR AUTOMOTIVE USES

cent for a modern automotive gasoline engine. A heat exchanger is provided to reuse the heat still in the combustion gases before they go out the exhaust.

One type of heat exchanger is a regenerator. In it, a rotating porous disc picks up heat through its contact with the hot exhaust gases and transfers this heat to the compressed air on its way to the combustion chamber. The regenerator acts as an air preheater.

During its lifetime, the average automobile consumes fuel having total cost greater than that of the vehicle itself. From the standpoint of economics, as well as petroleum resources, fuel economy is one of the most important considerations involved in the future of vehicular gas turbines. No data are available on the fuel economy of a passenger car driven by a gas turbine. However, since it is possible to predict the economy of gasoline engines on a theoretical basis, the same can be done for the gas turbine.

In order to have an optimistic view of the efficiency of small gas turbines, all component efficiencies in the following discussion were chosen to be higher than is expected to be obtained for many years to come. In this regard, advice was obtained from engineers working on automotive turbines in England and this country.

Take, for example, an output of 140 horsepower for

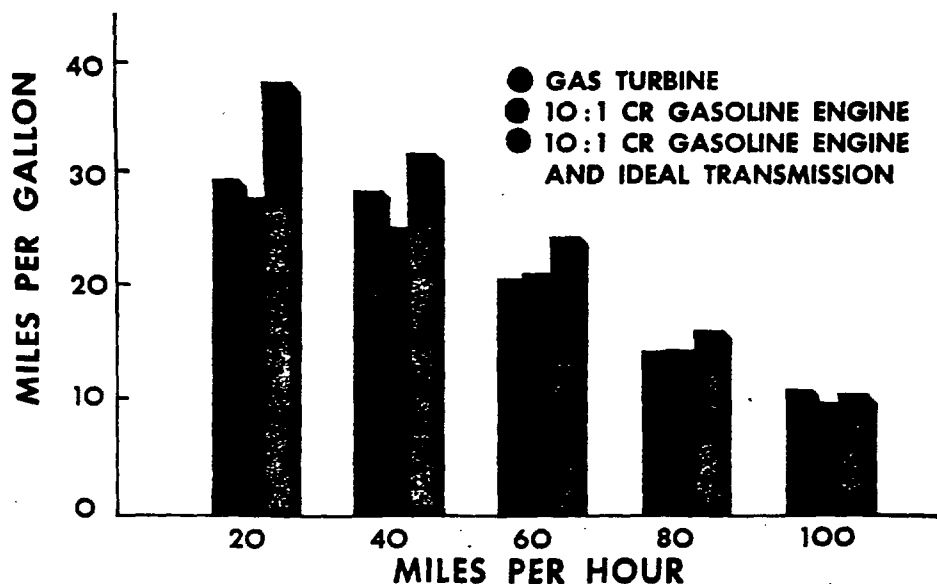
the automotive gas turbine, since extensive data on the fuel economy of 140-horsepower gasoline engines of 4.5 to 1 and 10 to 1 compression ratios are available. A gasoline engine of 140 horsepower is capable of driving a 4,800-pound car at a top speed of 100 miles per hour.

In comparing the economy of these gasoline engines with the computed fuel economy of an automotive gas turbine without a regenerator, it is found that even at 100 miles per hour the turbine's fuel economy is less than half that of the gasoline engine with a 10 to 1 compression ratio. As engine speed and developed power are reduced, the comparison becomes more and more unfavorable to the gas turbine.

Theoretical vs. Measured Economy

If, however, it is assumed that 90 percent efficiency could be maintained by a regenerator over the entire speed range, the turbine compares much more favorably with the piston engine of 10 to 1 compression ratio. However, it must be realized that these comparisons have been between the *theoretical* economy of the turbine and the *measured* economy of the gasoline engine of today.

Since the gains realized by regeneration are large, the



The relative fuel economy of a gas turbine fitted with a regenerator and a 10 to 1 compression ratio gasoline engine are seen in this chart. When equipped with an "ideal" transmission, the gasoline engine shows a marked increase in economy.

The Gas Turbine

adverse effect on fuel economy of a small reduction in the efficiency of regeneration is also quite large. If the regeneration efficiency is reduced only 5 percent—from 90 percent to 85 percent—the fuel economy would be reduced by nearly 20 percent at a speed of 20 miles per hour.

In comparing the potentialities of the gas turbine with those of diesel or gasoline engines, it should be remembered that a great deal of improvement is still expected in the fuel economy of vehicles with piston engines. This improvement will be brought about by development of more efficient engines, and by perfecting better engine-transmission combinations. Indeed, it has been estimated that a further improvement in fuel economy of 45 to 60 percent might be obtained from combined engine and transmission developments.

It, therefore, appears likely that even the best automotive gas turbine that can be developed will not equal the fuel economy to be expected of gasoline engines in the future.

In estimating the future application of the gas turbine, it should be borne in mind that, in order to supplant the piston engine, the gas turbine must have at least one compelling advantage, and should have no major disadvantage. Here is a balance sheet of its possible advantages and disadvantages.

Advantages of the Gas Turbine

1. *Engine size.* A basic automotive turbine unit is smaller and lighter than a corresponding gasoline engine. However, when necessary regenerator, duct work, and other auxiliary equipment are added, it is not certain that the gas turbine will be smaller and lighter than a gasoline engine of comparable power.

2. *Transmission simplicity.* Since the automotive gas turbine is in effect its own torque converter, it probably will need but one speed change in its transmission. In other words, two gears for forward operation and one gear for reverse probably will suffice.

3. *Fuel quality requirements.* The gas turbine does not, of course, need octane numbers in its fuel. However, there undoubtedly will be other problems of fuel quality which may restrict the hydrocarbon types usable. Turbines developed to date are sensitive to deposits on all surfaces contacted by the hot gases. These deposits can cause serious problems if they lower regenerator efficiencies.

4. *Simplicity of ignition system.* Ignition is required only when starting the gas turbine engine. This means that the ignition system can be quite simple and should require little service.

5. *Simplicity of lubricating system.* Precision bearings with provisions for satisfactory lubrication are required as a result of the high rotative speeds of the turbine. The two gear systems—one between the compressor shaft and accessory equipment such as the generator, and the other between the power turbine and the drive shaft of the vehicle—may require the use of synthetic lubricants. However, the smaller amount of lubricant needed—much smaller than in the equivalent gasoline engine—may more than balance the higher cost of such lubricants.

6. *Cooling system.* The conventional gasoline engine cooling system is not needed in the gas turbine engine.

7. *Minimum vibration.* The high rotative speeds of the gas turbine make precise balance of rotating parts a basic requirement. However, since this engine has no reciprocating parts, over-all vibration will be considerably lower.

8. *Minimum number of parts.* The basic gas turbine has fewer parts than the comparable gasoline engine. Auxiliary equipment is still required, however, so this supposed advantage may turn out to be smaller than anticipated.

9. *Sure starting at low temperatures.* Gas turbines can be started at very low temperatures. However, substantial improvements have been made in recent years in the starting characteristics of conventional automotive engines, so that this may not prove to be much of an advantage.

Advantages of the Piston Engine

1. *Fuel economy.* A comparison of the possible ultimate economy of the automotive gas turbine with the measured economy of existing piston gasoline engines having a compression ratio of 10 to 1 shows no advantage for the gas turbine. Since future improvements in the piston gasoline engine are expected to be at least comparable with those which have been anticipated on a theoretical basis for the gas turbine, the piston gasoline engine should maintain its superiority.

2. *Lower rotative speeds.* Rotative speeds of gas turbines are in the range of 40,000-50,000 rpm, or 8 to 10 times the speeds of piston engines. It is possible, therefore, that some sort of protective covering would be necessary for the turbine engine, in the interest of safety of occupants and bystanders in case of failure of any of the high-speed parts.

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3. *Lower noise level.* There are two major sources of noise in the automotive gas turbine. The first source is high-speed movement of gases—intake of air and exhaust of combustion gases. Since the volume of air and exhaust gases to be handled is 4 to 5 times that of the comparable piston engine, additional silencing is necessary to reduce the resulting noise to the level considered acceptable by today's motorists. The second source of noise is the rotating parts themselves, particularly the reduction gearing in the drive trains. Present technology can provide means to muffle and insulate these noises, but the required devices entail space and cost considerations.

Don't Require Critical Materials

4. *Less critical materials needed.* In present piston engines, there is very little use of critical and, therefore, scarce or expensive materials. On the other hand, aircraft turbines require sizable quantities of such materials. Scarcity alone may militate against the use of some of these materials in automotive gas turbines, so that substitutive materials—and construction features which minimize the need for critical materials—must be developed to make automotive gas turbines practical on any mass-production basis.

5. *Less manufacturing development required.* Manufacturing processes for gasoline engines are already highly developed, whereas in the case of the gas turbine wholly new techniques will be required to bring manufacturing costs down to levels that are practical.

6. *Use of engine in braking.* The gasoline engine provides a considerable part of the braking during deceleration. In gas turbine engines, however, other means—such as over-sized brakes—must be relied upon to provide the necessary deceleration.

7. *Less vehicle acceleration lag.* When a gasoline engine is idling and the driver wants to accelerate the vehicle, he gets immediate response upon opening the throttle. In the case of the turbine-equipped car, however, several seconds are required for the compressor and its turbine to go from idling speed to the speed necessary to furnish the large volume of hot gases required by the power turbine to develop sufficient torque for reasonable acceleration.

8. *Less necessity for heat insulation.* Except for its exhaust system, the liquid cooling system of gasoline engines provides an adequate heat barrier. In the turbine, the combustion chamber and passages for the hot gases have no such heat jacketing, so that insulation may be required. This can be provided, but again it raises cost and adds to the bulk of the insulation.

9. *Rapidity of starting.* The gasoline engine is able to start, even in severe weather, in a matter of a few seconds. The gas turbine must be brought up to speeds of about 5,000-6,000 rpm before starting is possible; the time required is approximately 15 to 20 seconds.

This is the balance sheet for the gas turbine versus the piston engine for passenger-car use. As mentioned previously, a compelling reason must be developed to swing the automotive industry from piston engines to turbines. As yet, this compelling reason is not apparent.

For car, bus and truck uses, it does not appear possible for gas turbines to approach the fuel economy expected to be achieved in gasoline reciprocating engines. Three other important problems which do not appear easy to solve are: (1) the acceleration lag, which occurs while the compressor and turbine are speeding up; (2) the maintenance of highly efficient heat regeneration when combustion deposits accumulate on the regenerator surfaces; and (3) reducing the cost of materials and manufacturing processes for turbines to a low and competitive level.

Moreover, the necessary fuel specifications for automotive gas turbines have not yet been determined with any precision. In general, it is expected that such turbines would be less sensitive to fuel type and quality than are present-day gasoline or diesel engines. A wide-range petroleum cut, including most of the gasoline and kerosene fractions, might ultimately be adopted. Fuel deposits, which collect on fuel nozzles, stationary guide vanes, turbine blades, and regenerator surfaces, might be problems. Today's knowledge does not permit specification of limits on aromatic content, gum or sulfur.

Lubrication Requirements

Insofar as lubricating oil is concerned, the quantity required for gas turbines probably would be considerably less per vehicle than is now the case for the gasoline reciprocating engine. With regard to quality, there is a difference of opinion among those working on turbines as to whether present premium oils would be adequate, or whether synthetic oils would be required in their operation.

Opinions on the prospects for the gas turbine's use in automotive vehicles vary tremendously, even among technical men. One thing is certain, however. Development will be evolutionary; there will be no overnight production of gas turbines in a large volume of passenger cars. If gas turbines eventually find substantial use, their introduction will necessarily occur in a progressive fashion, and adequate signals of trends will be given. #

Acadian Bicentennial

*A year of festivities underscores
the colorful French heritage of Louisiana*

RECALLING THE TRAGIC HISTORY, the traditions and the unique culture of the Acadians, Louisiana this year is commemorating the arrival of these people in the Mississippi River delta country two hundred years ago. A series of colorful celebrations from January through December, is linking the Acadians with the growth and prosperity of the deep mid-South.

Louisiana has long been known for its 100 annual fairs, pageants, and festivals, most of them scheduled during the early fall. This year the emphasis is on the Acadians, in cooperation with the Acadian Bicentennial Association and other state agencies and local groups. A number of special events are being held too.

The first Acadians to reach Louisiana were victims of 18th century wars between England and France. The French had lost Canada and neighboring territories by 1755, including the land called Acadia—Nova Scotia today. In the aftermath of the fighting, and con-



St. Martinsville, where this statue of Longfellow's Evangeline rests in a churchyard, is the center of the 1955 Acadian celebration.



These tricky boats, called pirogues, are built and raced on the bayou at Lafitte each spring by Acadians for the world championship title.

Handicraft skills handed down from one generation to the next include plaiting bleached palmetto strips into various useful articles.

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Re-enactment of a fabulous wedding of the early days, with a gold-dusted spider web arbor overhead, marked recent typical pageantry.



trary to instructions from the British Crown, Acadians saw their rich farms confiscated and burned, families hopelessly divided, and lifetime friends separated. The populace was either imprisoned or forcefully deported.

Heartsick exiles were packed aboard ships and scattered. Unwelcome no matter where they landed, they were often banished again. A handful finally reached New Orleans, where warm hospitality was extended by the French and Spanish.

More Acadians arrived soon afterward, as word spread about how the first ones were received, and as reports of the fertile soil, prospering farms and individual freedom became more widely heard.

The story of the Acadians and their travail is perhaps best known through Longfellow's epic poem, "Evangeline." The story of how the girl Evangeline was separated from Gabriel, the man she loved, it concludes with their reunion in Louisiana. On the banks of the Bayou Teche in St. Martinsville, under a moss-draped

tree, is the legendary spot where they finally met after months of hopeless separation.

By 1780, there were about 2,500 Acadians in Louisiana, and nearly twice that number by 1800. A century later, 40,000 to 50,000 descendants of the original settlers were there. Today, some half million people in the state have Acadian or "Cajun" forebears. It is said that one out of six people in Louisiana has at least partial Acadian ancestry.

Live in Southern Parishes

The lush country where most of the state's Acadians live is in the southern tier of parishes (counties), studded with towns, villages and hamlets with French names—Napoleonville, Thibodaux, Delcambre and Lafayette. Bayous like the Teche and Lafourche, thoroughfares for Acadian immigrants, were named by these 18th century displaced people. Churches, schools, parks and other landmarks honor saints, leaders and features of the old mother country.

For the most part, Acadians have always preferred rural areas to life in cities or larger towns, although most urban businesses and industries in Louisiana have a sprinkling of adaptably efficient "Cajun" employees. In addition to their success with farming, cattle-raising, hunting and trapping, they are leaders in the profitable shrimping industry and are found in large numbers among the state's rice-growers and sugar plantations. Oil is found on much of their land.

Nor are they strangers to such fields as the clergy, law, medicine, banking, education, retailing, manufacturing or refining, and many other professions and occupations. Any Louisiana roster of people well known in civic life would include numerous Acadian mayors, key officials, legislators and at least three governors.

Generally, Acadians are vivacious, talkative and ex-





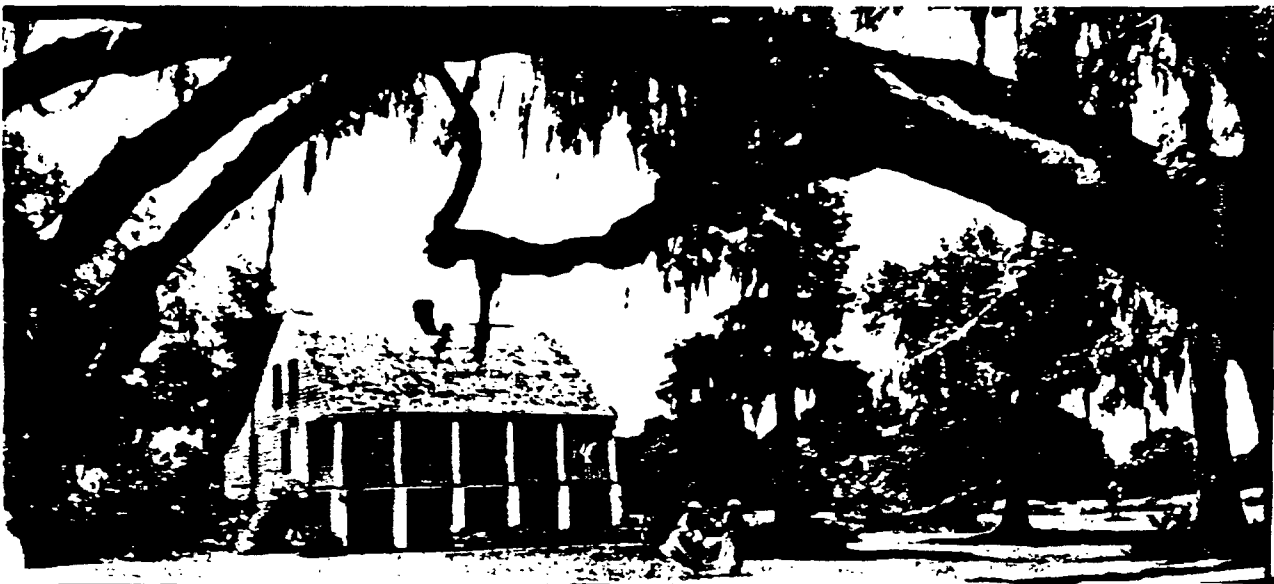
Gourmets to the core, Acadian tastes run to unique dishes, highly seasoned, like this bouillabaisse being prepared.

pressive. In certain sections, French is still their everyday language, but a majority are bi-lingual. Large families and close family relationships are enjoyed, with seven to a dozen children not unusual. Although intermarriage with other Caucasians is common, Acadians somehow retain their identity.

The people combine a willingness to work hard with an ability to enjoy life to the full. They have given the state a treasury of humor, music and dances, unusual food, handicrafts, distinctive sports and recreation.

The state's well known hot sauce industry stems from the Acadians' love for brisk culinary seasoning. Their special dishes are numerous, garnished with onions, peppers and exotic sauces. Two Cajun sporting events are especially unique—paddling tricky hand-fashioned

Longfellow-Evangeline State Park contains the restored home of Gabriel, distraught victim of the Acadian exile in the poet's epic verses. The bicentennial will reach its climax with an historic pageant at the park in October.



boats known as pirogues at races in Lafitte, and the annual tournoi lancing competition at Ville Platte.

Shrimp festivals and blessing of the shrimp fleet in late August and early September reflect the devout religious beliefs of Acadian pioneers. These will be followed by sugar cane, cotton, dairy, yam and rice festivals, and by state and local carnivals. An oil exposition is scheduled for November at Jennings, in the heart of the Cajun Country.

The climax of the year's activities will take place in St. Martinsville during October. An historic pageant at the Longfellow-Evangeline State Park, with a cast of hundreds, will dramatize the Acadian migration.

Canadian Tour

For Louisiana's Acadians and others who may want to probe at first hand into early French heritages in North America, a 15-day tour has been arranged from New Orleans to the Canadian province of Quebec and to Nova Scotia. The trip ties in with Canada's own Acadian bicentennial observance, and follows a goodwill visit of prominent Acadians from Canada to Louisiana last January.

This year of recognition of a once-unfortunate people serves as a reminder of this country's continuing role in providing freedom and opportunity for the distressed. The inscription on the Statue of Liberty, significantly a gift from France, tells the world to "... send these, the homeless, tempest-tossed, to me ..." Even though it was written long after the Acadian he-gira, the Statue's message has never been more graphically demonstrated than in the reception Louisiana gave the newcomers in 1755, to the mutually happy advantage of the state and its Acadian citizens. #

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Clear the Desks of TENSION

If allowed to go unchecked, excessive tension can lead to reduced efficiency, fatigue and physical disorders



IN THE CONDUCT OF MODERN business, a factor that is limiting the effectiveness of many men and women who hold responsible positions—though it often goes unrecognized—is excessive tension. With the cares and responsibilities of a job and a family in our accelerated and complex society, the career of the average businessman is often a living example of high tension. If he is successful, he usually is stimulated to greater achievements. If he is in difficulty, he often tries even harder to achieve security.

All during the day, everyone engages in a series of activities that involves the contraction of muscles throughout his body. If these muscles are maintained in a state of abnormal tone (tension) for any reason, the output of effort in the conduct of the day's work is correspondingly increased and may be excessive.

The fatigue that results from overstimulation sometimes is not apparent until many people find themselves

in a state of general fatigue. Tensions built up during the day continue, and often the cares of business are taken home.

If allowed to go unchecked, excessive tension can result in reduced efficiency, irritability, chronic fatigue and a number of other physical disorders. The ability to recognize excessive tension and control it, on the other hand, can contribute to the productivity, health and happiness of the modern businessman.

Ethyl Recognizes Problem

Recognizing the importance of tension control, Ethyl Corporation two years ago began to investigate the possibilities of doing something about it under its industrial relations' program. Since that time, Ethyl has provided instruction in tension control for some of its executives and supervisory employees with promising results.



Some of the external evidences of tension are demonstrated in the photograph above. When a man's brow is wrinkled, his neck tense and his shoulders hunched, his hands clenched and his legs crossed, he is not relaxed as completely as possible.



In contrast to the photograph at the left, the same man now shows a desirable lack of tension. Note how his feet are placed on the floor, his arms resting comfortably on the desk, his neck and shoulders relaxed and his face in repose.

The method that Ethyl has employed has been used for more than 35 years to control tension. It was developed by Dr. Edmund Jacobson, of Chicago.

Doctors and laymen have been trained in the use of Dr. Jacobson's method, and he and these men have taught it to men and women of various ages and occupations. In addition, U. S. Navy air schools have used the method in training cadets.

Air Cadets Helped

Naval air cadets who took the course reported help in their ability to sleep longer and more soundly; to do better in academic and physical training; to be more relaxed before and during competitions; and to do a better job of flying. At the same time, the total number of days lost from injuries among cadets receiving the tension control training was reduced 38 percent.

The system of tension control requires full participation in developing new habits, but if followed faithfully it can bring gratifying results. The more exactly it is followed and the longer it is pursued, the greater are the potential benefits.

In approaching the subject, it is pointed out that tension control is achieved through muscular control. When the businessman learns to relax all of his muscles except those needed to perform the task at hand, he is able to accomplish more work and will be less fatigued at the end of the day. He will be happier in his job and in his home life. He will sleep better and his entire life should be better.

Ethyl Corporation first examined Dr. Jacobson's methods and their possible application for its employees in 1953. As a part of this study, ten of the Company's executives took Dr. Jacobson's course in tension con-

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In approaching the problem of tension control and its application to the modern businessman, it is explained that the ability to recognize excessive tension and control it can contribute to his effectiveness, health and happiness at work and at home.



tol. The results were favorable, and it was decided to make the program available to more Ethyl personnel. Accordingly, Ethyl's manager of training was trained as a qualified instructor. Since then, he has conducted courses in tension control for selected supervisory employees in Ethyl's New York offices.

High Interest in Courses

The interest in these courses is evidenced by the answers to questionnaires sent to participants at the conclusion of each. Almost without exception they reported beneficial results. The degree of skill in relaxation which they acquired varied considerably, depending upon natural ability to relax, which varies between

individuals, and the amount of practice which each individual devoted to learning the subject.

Some reported that the mere ability to recognize tensions, which they had not realized existed before, was beneficial to them. Others reported ability to sleep more soundly, greater efficiency in their work, and some reported less frictions and better relationships with others both in their business activities and family life.

Although this was an abridged training program devised especially for Ethyl Corporation, its simplicity and ease of application are such that it can readily be extended. Just how far the tension control program will be extended throughout Ethyl Corporation in the future is now under study. #

Appointed to Staff of Ethyl Corporation of Canada Limited

Five appointments to the staff of the recently formed Ethyl Corporation of Canada Limited have been announced by Alan C. Tully, president. J. P. Moran has been named comptroller of the Company, and C. S. Harris has been named chief accountant. E. F. Diedrich has been appointed assistant manager of the antiknock

compound manufacturing plant the Company is building in Sarnia, Ontario. He will serve under R. T. Edgar, who is plant manager. C. L. Weeks has been named engineering supervisor of the plant, and W. E. Hill, Jr., will be its operating supervisor. The plant is scheduled to go into production in 1956.

HANDY K



*Versatile and expanding, this
division of the paper industry depends
on Ethyl for a vital chemical*

Of all kraft products, paper bags
are the most common. About 50
billion are used annually.

OF THE MANY DIFFERENT TYPES of paper used every day, none has more versatile utility than the kind known as kraft. This sturdy material appears in hundreds of forms. They range from delicate tissues to bags, wrapping papers, rugged boxes, frozen food cartons, drinking cups, milk containers and magazine covers, and include scores of glamorous as well as strictly practical applications.

Research and development have made kraft usage so widespread, in fact, that the paper and paperboard industries are producing close to 10 million tons of kraft products annually. Two decades ago, only three million tons were made. Kraft pulp represented about 55 percent of all pulp used in 1954. Of this, nearly seven million tons was the unbleached or brown kind, and about three million tons the lighter toned varieties.

The familiar brown bag still represents the most common use of kraft paper. Over 50 billion were used last year, with a trend toward the heavier types. A single Southern mill turned out some nine billion kraft bags—35 million a day, or 250 for every family in the United States.

Kraft paper first came into its own in this country some 50 years ago. The word *kraft* is from the German, meaning strength. A zoom in the material's success story came during the late 1930's, when a process for pulping cheap Southern pine was developed and kraft shipping sacks gave fresh impetus to an already

well established industry. It was found that multiwall paper bags, made of three to six plies fitted together into one sack, could be used to package and ship hundreds of products more economically than wooden boxes or fabric bags.

Technical improvements have led to desirable characteristics like strength, flexibility, retention of flavor or moisture, protection from outside contamination, and fire, water, heat and cold resistance.

Bags Have Many Uses

Today, some 400 different products are shipped in these multiwall bags, usually in quantities of 50 to 100 pounds, including potatoes, feed, flour, sugar, cement, fertilizers and chemicals. Over 750,000 tons of shipping sacks found varied uses in 1954. The St. Regis Paper Company's kraft center at Pensacola, Fla., the nation's largest multiwall bag plant, makes over 1¼ million per day. When filled, they would tightly pack a freight train of 1250 boxcars.

The rise of kraft paperboard is surpassing the increased use of the paper itself. Paperboard now accounts for about 51 percent of all kraft products. The rugged material is used largely to make shipping containers for thousands of items, ranging from cosmetics and dresses to beverages and building materials.

So much kraft is going into boxes, cartons and containers that it has practically taken over the nation's

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KRAFT PAPER

packaging field. The once-familiar slatted wooden crate for citrus fruits, for example, is being rapidly displaced. Even bulky and heavy merchandise like refrigerators and furniture are shipped in crates that have wood only in their frames. The paneling is light, strong and durable kraft fibreboard.

Oil and automotive uses of kraft are legion. They include tough multiwall sacks for drilling mud, wrapping for tires, cartons for service station supplies and automotive parts, and paper for "masking" parts of car bodies during painting operations. Some types of car seat covers are made of twisted kraft paper. Posters, banners, signs and pennants at service stations and automobile show-rooms are usually kraft.

Motels are potential users of many newer kraft products. Paper bed sheets and pillow cases have been made and tried experimentally. Nearly as soft as cloth, they are, of course, disposable after one tenant's use, and their purchase price is far less than standard cotton bedding. Even paper washcloths are distinct motel possibilities, following the now widely used kraft paper towels, bath mats and curtains. In the anti-litter campaign of Keep America Beautiful, Inc., motorists are

Modern packaging and shipping require rugged paper-board, consuming over half of all kraft production.

urged to carry kraft paper bags in their automobiles as trash receptacles.

Ethyl Corporation has been contributing to the growth of the kraft paper industry since World War II. The company supplies salt cake, known technically as anhydrous sodium sulfate, an important chemical in the manufacture of kraft or sulfate pulp. Shipped from Ethyl's plant at Baton Rouge, La., 60,000 tons of salt cake a year go to 15 kraft paper mills throughout the South, among them mills of the International Paper Company, leading kraft producer.

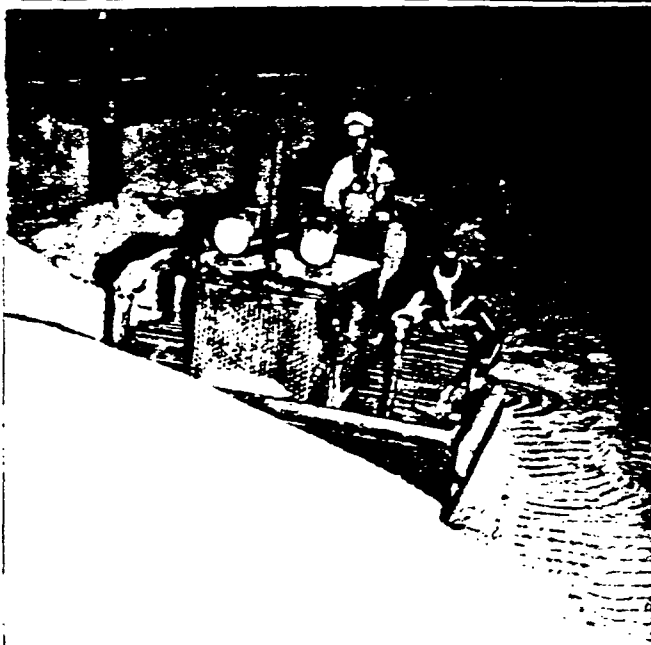
Shipped Daily

Salt cake originates at Baton Rouge as a co-product of Ethyl's hydrogen chloride production. In this process, common salt and sulfuric acid are heated to high temperatures in special furnaces. Resulting HCL gas is used to make ethyl chloride, which is required in tetra-ethyl lead manufacturing. Salt cake is a white, crystalline substance stored under cover before it is shipped daily in boxcar lots.

A few typical applications of kraft in various forms indicate the nature and scope of its manifold uses. The

When a two-tone automobile paint job is under way, kraft paper protects one area while another is sprayed.





Large inventories of salt cake are maintained at Ethyl's Baton Rouge plant. Daily shipments go to kraft mills.

Familiar product and parts cartons, tire-wrapping, signs and posters at service stations are made of kraft.



building and construction fields are important customers. Waterproofed paper, which protects against dampness and moisture, is used for insulation and in curing concrete. Kraft paper is also used for wrapping coins at banks, for gummed tape, window shades and industrial toweling, as locker room slippers, and as the bottom layer or for all of some types of floor covering.

Mushrooming to new output records, the frozen food industry depends upon kraft cartons for packaging its products. Waxed papers for bread and butter are of treated kraft. So are milk and ice cream containers.

A challenging field for expansion is newspaper, magazine and book papers, because of kraft's inherent toughness. This asset is especially valuable for magazine covers and for children's books.

The future outlook for kraft is promising, according to the Kraft Paper Association. With some uses geared to population increases, others to economic conditions and still more to ingenuity in developing new applications, an expanding market ahead seems assured.

Big Kraft Year

This year should see the largest output of kraft products and their most widespread uses, in the opinion of J. L. Ritchie, executive director of the United States Pulp Producers Association. The Stanford Research Institute concludes the nation's wood pulp production will double by 1975, and that a major part of this increase will be in kraft.

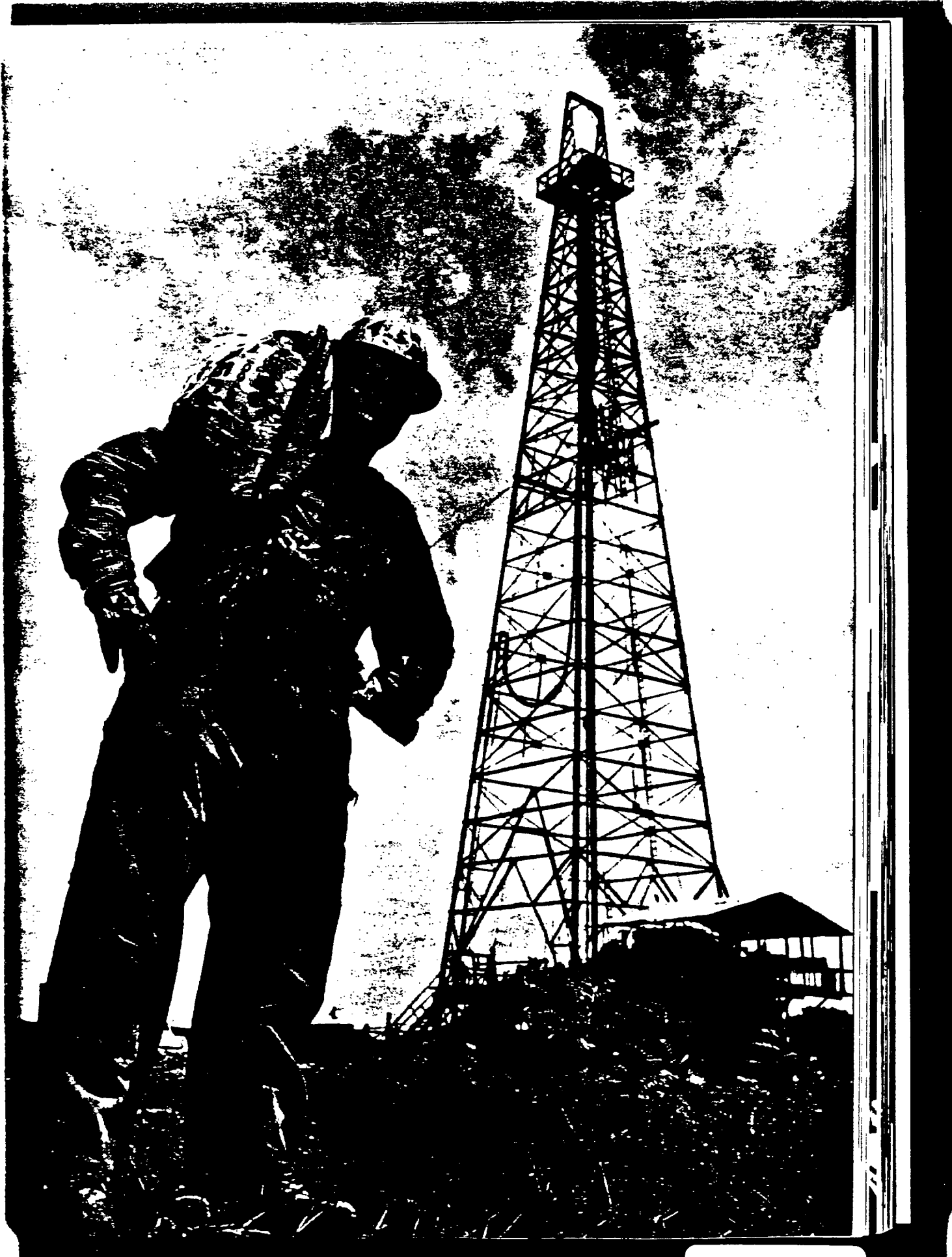
Strategically located in the heart of the principal kraft manufacturing belt, Ethyl Corporation's Baton Rouge plant is of increasing value to that branch of the paper industry. Salt cake is made there by a continuous process, and substantial inventories are maintained. In its production of this important chemical, Ethyl looks forward to making further contributions to the growth of an industry which has become so important to the economy of the South and whose products are finding wide use throughout the country. #

Over 400 products are shipped in multiwall kraft sacks, including drilling mud. Over three-quarters of a million tons of these bags were used during 1954.

LAYOUTS AND ART DIRECTION: Carsten Grande

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ETC 28900



Ethyl's two national advertising

campaigns are working to build

oil-company sales. One is the

"Road Bird"



campaign

to help sell more top-quality

gasoline.



The other is

the new "Drive More"



campaign, spearheading a broad

program to increase the sale of all

service-station products.



Ethyl advertising appears in leading

magazines



reaching

50,000,000 people a month.

ETHYL CORPORATION

NEW YORK 17, N. Y.



ETHYL NEWS



ETC 28902

BEHIND THE NEWS



Even the most stodgy stay-at-homes find it hard to sit still when autumn brings invigorating crispness to the air, and October foliage gives new splendor to the most beautiful highway scenes. Our cover shows Pinkham Notch, N. H., with early snow dusting White Mountain ridges above scarlet maples and flaming beeches. The picture helps explain why Ethyl's "Drive More" campaign is being continued beyond the normal peak summer motoring months. *Drive More Goes to Work*, beginning on page 6, highlights the nature and scope of effective promotional efforts to date.

The Department of Defense, other government agencies and leaders in business, industry and education often deplore the scarcity of technically trained young men needed for key positions related to national security and scientific progress. Unique stepping stones toward filling this basic manpower shortage are described in *Scientists in the Making*, starting on page 9. In *The Hand of Fellowship*, page 15, Ethyl reports on the Company's financial aid to advanced technical students.

No term in the oil industry is more richly deserved than "service station." Some of the many helpful courtesies which station owners and operators offer their customers gratis are covered in the picture feature. *They're All Part of the Service*, appearing on pages 12-14.

Specialized applications of the camera, of interest to businessmen, are described in two articles. *Industry Tunes in on TV*, beginning on page 16, reviews some of the ways in which television is finding important applications beyond the entertainment field. *Reel Files for Records*, page 22, explains how tiny pictures are proving an easier, more economic and space-saving way of preserving important information for business and industrial use.

ETHYL NEWS

Richard F. Cook, Editor

SEPTEMBER-OCTOBER 1955

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Opinions expressed in signed articles are the authors'. Ethyl News welcomes articles of timely interest submitted from outside sources. Upon request, the editors are glad to grant permission to reprint material appearing in Ethyl News.

Published by Ethyl Corporation, 100 Park Avenue, New York 17, N. Y., manufacturers of "Ethyl" antiknock compounds, used by oil companies to improve the antiknock quality of aviation and motor gasoline.

Edward L. Shea, President
William R. Perdue, Jr., Vice President and Treasurer
Herbert A. Savage, Secretary

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PATTERN for PLENTY



The Romans laid the foundations for modern farming when they learned the advantages of using animals to plow.

Thomas Jefferson's contributions led to the production of steel plows.

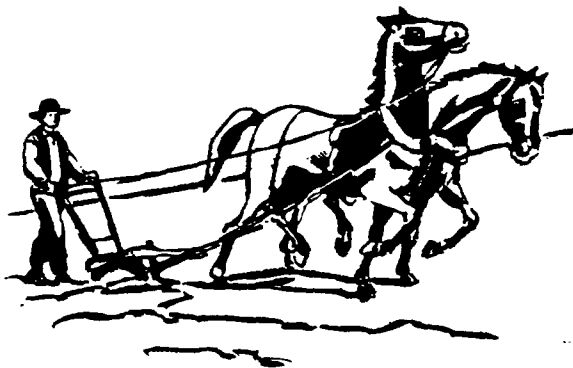


The nation's full market basket and food sent abroad come from power farming

EVEN FARMERS THEMSELVES may not realize it, but freedom from famine is pretty much the exclusive property of modern-day America. In many countries throughout the world millions of people are without proper or adequate food. But here in the United States, there is enough for everyone—and then some.

What's the answer? Why and how has the American farmer been able to rid this country of the spectre of famine and at the same time produce enough food to send to underfed peoples abroad? The answer—or at least a big part of it—is found in two words: *Power farming*.

History provides a classic comparison. In many respects, the farmer of the early days of the Roman Empire was not unlike his American counterpart of today. He owned and worked his own land. Farming was a highly esteemed occupation. In an atmosphere of economic and political freedom, Roman agriculture built the foundation of modern farming. Romans recognized the value of legumes in preparation of the ground for wheat. Their methods of growing corn, grapes and olives were so sound they were emulated with little change until a century ago. Their stock breeding was advanced and they were learned enough to yoke oxen and let animal power help till the fields.



Yet for all its advances in agriculture, Rome in 476 B.C. experienced one of the greatest famines of all time. Thousands of hungry people threw themselves into the Tiber rather than wait for the slow death of starvation.

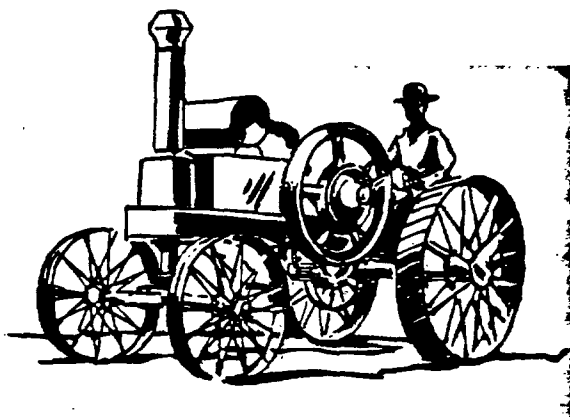
As the Roman Empire fell apart, the man on the land entered the long bleak imprisonment of medieval feudalism. No significant agricultural progress was made until resourceful Americans began applying their inventive genius, engineering aptitude and scientific ability to the task. Then came the fabulous, miraculous agricultural revolution of the 19th and 20th centuries and the promise of even greater progress.

First Steel Plows

Thomas Jefferson was one who helped launch the mechanical revolution on the farm. He designed the first American moldboard on sound mathematical principles. This made it possible for plowwrights to produce moldboards of a common model. Before long there evolved better plows of cast iron and then steel. These cut animal requirements by one-third.

The reaper's development brought further progress. With the hand sickle of 1800 a good man might cut half an acre of wheat a day. Thirty years later the cradle in competent hands could reap two acres a day.

The first powered tractors were driven by steam. Heavy and expensive, they were found to be impractical.



By 1840 mechanical reapers were cutting five or six acres daily. Later a moving platform device did away with the grueling labor of gathering up the grain and binding it into sheaths. An automatic wire binder was followed in a few years by a twine binder.

With the two-wheel sulky of the middle 1860's the farmer rode on the plow for the first time. Soon came the three-wheeler to give him greater safety, stability and control. The chilled steel plow of the late 1860's answered the tough tillage problems of the prairie farmer. Threshing machines came in during the Seventies. In the 1880's the combine appeared to reap, thresh, clean and bag grain. Pulled by teams of from 20 to 40 horses, it could work 70 or 80 acres a day.

Meanwhile the discovery of oil in 1859 had an effect on farming such as nothing before or since. Within four years kerosene replaced almost every other form of illumination. Sunset no longer ended the day for the farmer and his family. Gone were the days when the farm youth had to seek an eye-straining education by firelight or tallow candle after long hours in the fields.

In the decades of the kerosene age, farmers brought more land under cultivation than in all previous United States history. Between 1860 and 1910 the number of farms trebled to 6.3 million. Acreage of improved farmland also trebled. Production of wheat rose from 173 to 635 million bushels. Corn shot up from 838 to 2,886 million bushels and cotton swelled from 3.8 million bales to 11.7 million. The back of famine's historic threat was broken in this country. But that was only the beginning of the agricultural revolution.

Steam-Propelled Tractors

The first traction engines (tractors) in commercial use appeared in 1876. They were steam-propelled. But with plenty of petroleum available and the internal combustion engine invented, it was only a matter of time before ingenious Americans wed the two to make the farmer's job less burdensome and more productive.

The tractor powered by the internal combustion engine made its debut about 1890. Its acceptance, however, was by no means rapid or widespread. By 1906, there were only about 500 in use in the United States and Canada. But in that year the large-scale tractor industry was born, and 11 companies began to manufacture petroleum-powered tractors. Four years later came the final surrender of steam power and the emergence of kerosene as the universal tractor fuel.

The World War I period marks the birth of power farming as we now know it. Tractors did not replace horses entirely but did take the place of many that had

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been shipped to the European war front, helping with the plowing, disking and other heavy farm duties.

Tractors of that time were heavy and costly and only slight progress had been made in the standardization of parts. Soon, however, competing companies were designing and engineering tractors in accordance with mass production practices. From that time on, the parade of achievements has never ceased.

In 1919 a built-in power takeoff from which to operate a binder was introduced. That device opened the door to the development of many specialized and efficient power-driven machines, an entirely new application of tractors. A year later starters and lights began to appear on tractors.

First of Three Cornerstones

Then in 1924 the first of three cornerstones in the foundation of modern power farming was laid. That was introduction of the all-purpose, or tricycle-type, tractor. This modification combined the ability to do row-cropping with drawbar and beltpower usefulness. It also served as an efficient carrier for many types of mounted and semimounted implements.

Next came the introduction of rubber tractor tires. This stepped up tractor performance and speeded most field operations from 25 to 50 percent.

Finally in the mid-1930's came what many authorities call the most outstanding tractor development. This was the introduction of the high compression tractor

engine. It came after years of missionary efforts by Ethyl Corporation engineers who had been demonstrating the advantages of gasoline over distillates as tractor fuel.

Today four of every five tractors on American farms are gasoline-powered, indicating the decided preference of farmers for this fuel. One value of the high compression engine is that it permits tractors to take full advantage of the ever-improving gasolines produced by the oil industry.

There have, of course, been other notable improvements in tractor design and engineering but upon these three cornerstones—the all-purpose tractor, rubber tires and gasoline power—agriculture now rests.

A quick review of statistics shows how the American farmer has been able to hold the hard-won victory over famine. Since 1920, when power farming really hit its stride, output per man hour on the farm has increased 173 percent. The result has been a jump of 51 percent in total agricultural production. During the same period, farm crop production per acre has climbed as much as 14 percent.

It is not luck or coincidence that American farmers have scored substantially more progress in a few generations than was recorded in all the centuries of civilization previously. In America's unique climate of political and economic freedom, initiative and competitive enterprise, agriculture, industry, commerce and science move forward hand-in-hand. #



B.B. Turner and G.F. Kirby Named to

Former Research and Engineering head

elected executive vice president.

Others in department fill key posts.

THE ELECTION of an executive vice president of Ethyl Corporation, a new vice president in charge of research and engineering and promotions in Ethyl's Research and Engineering department were announced by Edward L. Shea, Ethyl president, in October.

B. Bynum Turner, vice president in charge of research and engineering since 1951, has been elected to the newly created position of executive vice president. The new research and engineering vice president, succeeding Mr. Turner, is George F. Kirby, Jr., formerly general manager of the department's operations at Ethyl's plants in Baton Rouge, La., and Houston, Texas.

Francis J. Sergeys has been promoted from director of chemical engineering to general manager of the plants' research and engineering operations. Dr. Paul A. McKim, previously assistant director of process development, now holds Mr. Sergeys' former post.

At Research Laboratories

Ethyl's research laboratories in Detroit, one of the nation's most complete centers for continuing studies of fuels, fuel additives, lubricants, engines and related problems, will remain under the supervision of Richard K. Scales, general manager. He was promoted to this post last year.

Mr. Turner, a Texan, came to Ethyl in 1946 as special assistant to the resident manager at the Baton Rouge plant. He was named general manager of manufacturing in 1949. Coordinator for the Company's \$100 million expansion program, he directed extensive additions to manufacturing and research facilities at



B. Bynum Turner
Executive vice president

Baton Rouge, and was in charge of construction of Ethyl's new Houston plant, finished in 1952.

Mr. Turner was placed in charge of the Research and Engineering department when it was organized four years ago. He is a director of Ethyl and of Ethyl-Dow Chemical Company.

After his graduation from Rice Institute in 1933, as a chemical engineer with a B.S. degree, Mr. Turner became associated with research activities in the oil industry. During World War II, he was head of the butadiene-from-petroleum section of the Rubber Reserve Company for the government's synthetic rubber program.

Dr. Kirby, the new vice president in charge of research and engineering, has been with Ethyl for 15 years: A graduate of Louisiana College with a B.A. degree in 1936, he received his M.S. degree in chemistry in 1938, and his Ph.D. degree in 1940 from Louisiana State University.

At Ethyl, Dr. Kirby has risen from chemist at Baton Rouge through various supervisory positions.

Appoint
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to New Executive Positions



George F. Kirby, Jr.
Vice president, Research and Engineering

Appointed director of chemical products research a year ago, he was later named general manager of research and engineering operations for Baton Rouge and Houston.

Mr. Sergeys, a graduate of the University of Detroit with a B.S. degree in 1939, received his M.S. degree in chemical engineering from the University of

Francis J. Sergeys



Richard K. Scales



Paul A. McKim



Michigan in 1940. He came to Ethyl in Baton Rouge as a chemical engineer, later becoming special assistant to the vice president in charge of manufacturing in New York. After being the Company's director of economic evaluation, he was appointed director of chemical engineering last year.

Process Design Engineer

Dr. McKim studied at Louisiana State University, where he received his B.S., M.S. and Ph.D. degrees in chemical engineering. After starting with Ethyl as a process design engineer, he was appointed supervisor of process development with a promotion to assistant director of process development at Baton Rouge last year.

In continuing as general manager of Ethyl's Research Laboratories in Detroit, Mr. Scales is completing his 27th year with the company. He was employed in 1929, the year he was graduated from Cornell with a B.S. degree in chemistry.

After working on fuel and carbon problems, and as a sales field representative, he spent three years in Australia with the Ethyl Export Corporation before returning to Detroit. In 1942, when the technical service department was organized, Mr. Scales became an assistant director and then manager of the passenger car and automotive accessories division.

He was named director of technical services in 1947. Since then, Mr. Scales has become successively director of product application, director of automotive products research, and general manager of the Research Laboratories at Detroit. #

"DRIVE MORE" goes to

Ethyl's national campaign to increase automobile use reaches the motoring public through all mass media

ALL SUMMER LONG and throughout the fall across the nation, a new kind of promotional program has been going to work for the oil and automotive industries. Wrapped up by a catchy, eight-word slogan, "Drive More—it gets cheaper by the mile!" the program has been carried to the motorist through virtually every means of communication.

Ethyl Corporation has taken the "Drive More" theme to the general public through three of the nation's leading magazines, through newspaper supplements and with scores of publicity stories. *Collier's* and *The Saturday Evening Post* have also thrown their full merchandising weight behind this program, using both editorial features and personal contacts.

In addition, many oil companies have enthusiastically endorsed "Drive More" and have helped promote it on television and radio, through newspapers,

house magazines, letters to marketers and dealers and special presentations at meetings.

Basically, the nugget of gold "Drive More" contains for the motorist is the appealing message that the more an auto is driven, the cheaper its operation becomes by the mile. The reason for this, verified by official American Automobile Association figures, is that such costs as depreciation, license fees, and insurance remain essentially the same if the car is driven 150 miles or 15,000 miles.

There is good reason to believe that the repetition of this simple thought can increase automobile use, creating more sales and profits for the oil and automotive industries. Ethyl estimates that an increase in travel of 500 miles a year per motorist, for instance, would mean an additional sale of well over one billion gallons of gasoline.

The campaign stresses all-year potential for increasing fun and usefulness of driving, as for fall hunting.



Advertisements urge regular "week-end-vacations" including family reunions, to mass magazine readership.



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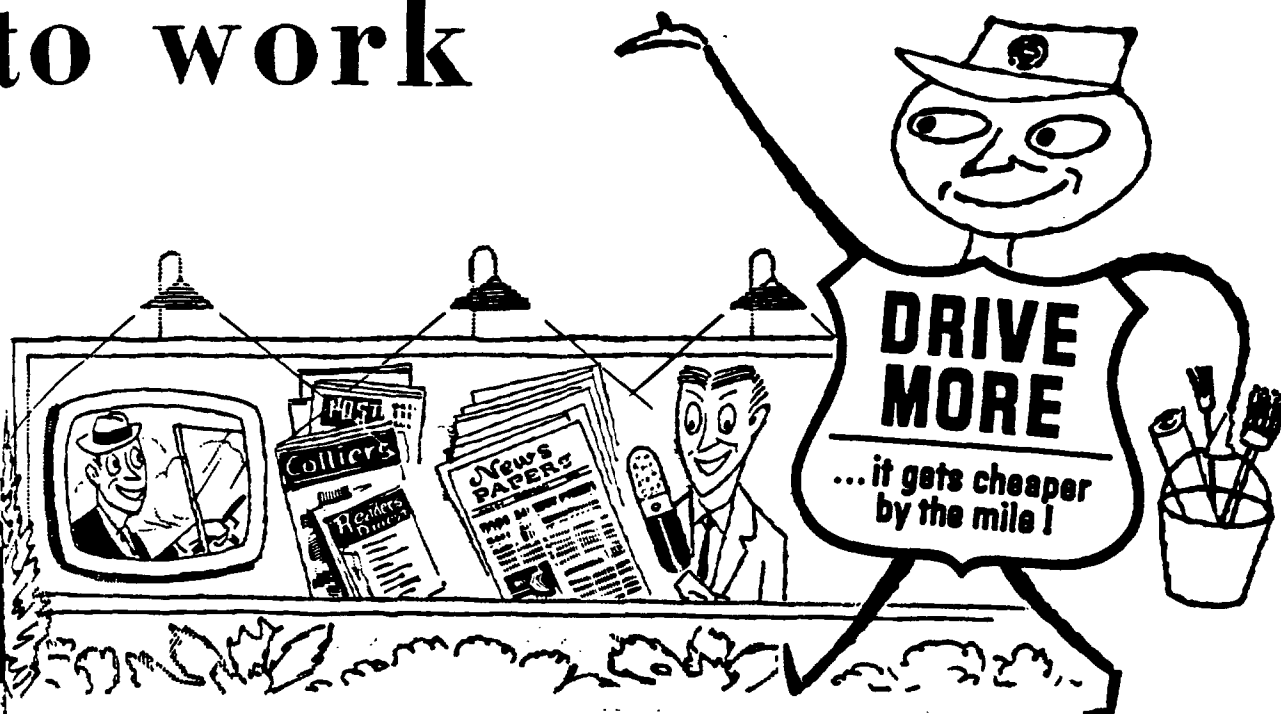
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In its advertising support of this program Ethyl Corporation has stressed the luxury, comfort and convenience of today's auto and the accessibility of so many places of interest. It offered the "cheaper by the mile" theme as an extra inducement to the motorist to take advantage of the bargain miles that accrue with increased auto use. The ads have appeared in the *Post* and *Collier's*, and *Reader's Digest*, reaching an estimated total audience of 50,000,000 people.

Just how well these ads have been accepted by the general public is indicated in a survey made recently in Syracuse, N. Y. In this survey 200 persons were shown a reprint of one of Ethyl's two-page "Drive More" ads, and were asked to comment on it. More than 70 percent of the respondents rated the ad good. They felt that it was logical, clear, eye-catching, and informative, and made them want to travel more.

Trade Press Advertisements

In the trade press, "Drive More" ads have appeared in such widely read journals as *The Oil Daily*, *Super Service Station*, *National Petroleum News*, *Automotive Dealer News*, *The Gasoline Retailer* and *Petroleum Week*. Ethyl has published twenty-four advertisements in these magazines.

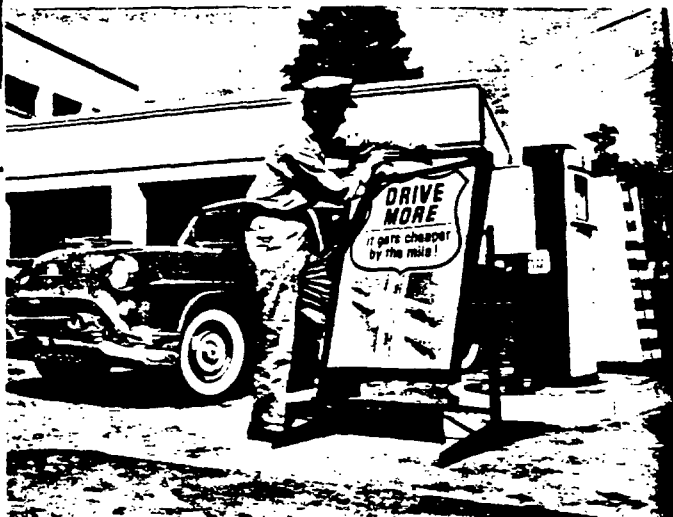
As there are two sides to a coin, so there are two sides to a promotion of this nature. There are the national and the local. Both are equally important, and neither has been neglected.

To foster better publicity at the local level, Ethyl prepared a special eight-page "Drive More" supplement suggestion for newspaper use. The supplement was distributed to daily and weekly newspapers throughout the country, with mats and other materials supplied upon request.

Supplement Widely Used

Tabulations are not complete on this unique form of advertising, but first returns show that many newspapers have made use of the supplement giving the "Drive More" program local impetus and color. In addition, the supplement can be picked up and used for many months.

To aid participating organizations, Ethyl prepared a series of posters, banners, streamers, stickers and brochures. To date more than 200,000 pieces of this material have been distributed. All of these display pieces bear the slogan, with varying methods of presentation. The most popular method of presenting the "Drive More—it gets cheaper by the mile!" theme



Posters, banners, streamers and stickers help put the "Drive More" message across at service stations.

In a survey of the general public, it was found that the advertisements made people want to travel more.



is on a shield which resembles a highway route sign.

Backing up the advertisement and promotional material of this program have been scores of news releases and tailor-made publicity stories which have appeared in leading publications of the oil industry. Press response to the program has been excellent and editorial comments overwhelmingly favorable.

Commenting on the program, *The Oil Daily* said: "There are indications that the basic thought here is so appealing to members of the industry that the principle of it may be put to use by many industry people." *National Petroleum News* said: "One of the biggest institutional ad programs in years, 'Drive More' is designed to get more motorists on the road more often." Roger Stafford, managing editor of *Super Service Station*, in his signed column, stated: "... don't overlook this chance to make profitable use of this advertising campaign ... it's smart to use it to help you profit more."

One of the best facets of "Drive More" is that it is not a seasonal promotion. Continuing in autumn, it points out that while the largest amount of auto driving is done during the summer months, there are still many other months during the year when an auto trip is an exciting experience. Fall especially is a splendid time for drives through the countryside, family reunions, hunting trips, or even short evening rides to break the household routine.

Encourages Weekend Vacations

Another approach is to encourage families to take "weekend vacations." By using their car more, a family can have as many as 52 vacations a year, instead of only one. There are many variations on this theme, and none of them has been exhausted.

The success of a promotion of this nature cannot be easily measured, and the length of time required for the full impact of it to be felt is indefinite and varies with individual reactions. Some may respond quickly, some slowly, but regardless of the time required, Ethyl feels that the "Drive More" program will continue to bear fruit.

Someone has said that the task of forming public opinion must be approached from the viewpoint of a gardener and not the viewpoint of a mechanic. A seed has been sown and oil industry response has been overwhelmingly in favor of the program. With the experience acquired from a year of spearheading "Drive More," Ethyl feels the program will continue to grow and remain one of the most rewarding promotions ever devised for the oil and automotive industries. #

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scientists in the making

National Science Fair encourages youngsters to pursue technological careers

IN AN AMERICA that is fast becoming dependent on jet-propulsion, atomic energy, miracles of chemistry and countless other scientific and technological wonders, one of the great needs is for a continuing flow of technically trained men and women. Interesting and training young people in such careers presents a challenge to science, industry, education and to the national defense establishment. Prominent men in virtually every field recognize the importance of the problem and often express concern about it.

An excellent summation on the need was recently made by Admiral Arthur W. Radford, chairman of the Joint Chiefs of Staffs, at the fifty-third annual meeting of the National Petroleum Association in Atlantic City. Admiral Radford declared: "We are ahead in the technological race with the Soviet Government, but we must avoid our national bent toward complacency and self-satisfaction. We must help others understand the significance of this technological race, and we must encourage an increasing proportion of our youngsters to become scientists and engineers."

Vie for Recognition

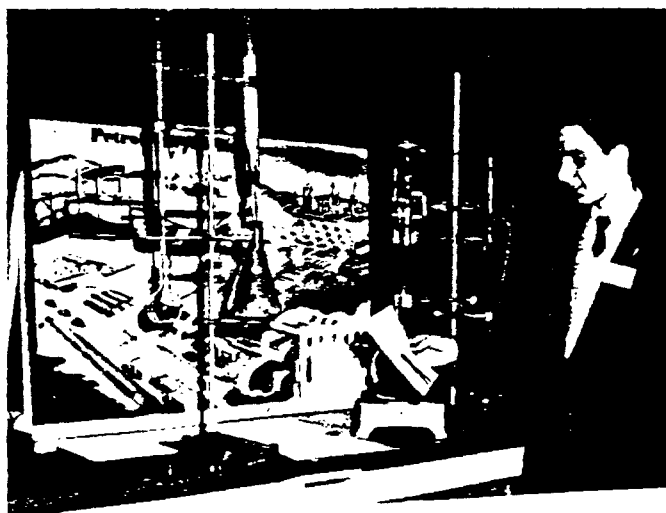
One activity that is doing much to allay complacency and encourage young people to enter scientific careers is the National Science Fair. This event is sponsored yearly by the Science Clubs of America, which in turn are administered by Science Service, a non-profit organization with headquarters in Washington, D. C. Each year, the National Science Fair

enlists the cream of scientific talent of young America in an exciting and rewarding three-day competition for recognition.

The word recognition is used because the awards given to the finalists do not come to much money. Judging from the remarks of the young participants, this does not matter. The chance to develop their scientific interests, to meet and talk with leaders in scientific fields, and the educational trip involved are more than enough to justify the hours of work devoted to their projects.

Actually, the National Science Fair is a culmination. Its beginning takes place months before it is held. Its contestants are drawn from scores of regional

A high school youth interested in chemical sciences demonstrates his bubble-plate fractionating tower.



fairs held throughout the country. The workshops for the projects exhibited at these fairs are schoolrooms, homes, libraries, seminars and the inside of some young scientist's head, where his intense curiosity drives him to solve a scientific puzzle.

That these projects are not simple little affairs put together in a week or so is amply shown by a listing of a few of the exhibits entered in this year's National Science Fair.

A 16-year-old Lyons, Ohio, boy titled his exhibit "The Nature of a Magnetic Field." Lest anyone think it sounds like an easy subject to demonstrate, consider the fact that the boy got his idea for the project from reading about Einstein's Theory of Relativity.

By combining his talent in wood carving with research in comparative anatomy, a 16-year-old Little Rock, Ark., youth, presented a display that was both artistic and scientific. His exhibit was a series of hand-carved balsa wood models of five classes of vertebrates in cross section, to show the different organs.

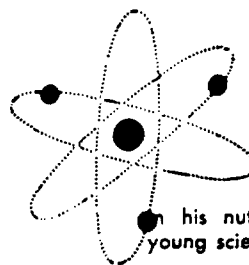
Girls Show Equal Talent

Girls, too, have a scientific bent, the Fairs show. One project, created by a 17-year-old Tucson, Ariz., maid, demonstrated how heat is transferred through various building materials. Thermometers were strategically placed in her exhibit to tell the story clearly.

Possibly to prove that women really are smarter than men, a Madison, N. J., miss built a mechanical brain that she defies anyone to outsmart. For the record, the young lady stated she developed her project "to show the principles on which most computers and electronic calculators are based."

The list of projects is nearly endless. Broadly speaking, there are two general categories in which a student may work. These are biological and physical, but they include all the sciences and mathematics. Eligibility for the National Science Fair is confined to students in the 10th, 11th, and 12th grades, but many local fairs take contestants much younger to interest them and prepare them for later competition.

Local fairs are sponsored by colleges, scientific and technical institutions, educational and civic groups and industry. Often the community newspaper joins in, finding the fairs a source of news material as well as a valuable civic function. Two oil companies which have been instrumental in supporting fairs are Standard Oil



In his nutritional and dietary studies, this young scientist worked with white mice.

Right, a student shows departments of the "human factory" in a biological project.

Far right, a might-be planet hopper plumbs the relationship of space with the time factor.

of California area, develop. Obj forms this massive (10)... promix

Two the nat selectec roned t being b at local hibit, w given a distribu sue scie The first hel sented a then the

of California and Lion Oil Company. Standard of California initiated the fair held in the San Francisco area, and Lion Oil has contributed generously to the development of the Arkansas State Science Fair.

Objectivity in judging exhibits is insured by a uniform system of grading, applied at all local fairs. Using this method, points are computed on the basis of creative ability (30); scientific thought (30); thoroughness (10); skill (10); clarity (10); and dramatic value (10). Judges for the local fairs are chosen from among prominent thought-leaders of the community.

Winners See Science at Work

Two winners are picked at each fair to compete on the national level. Usually, one girl and one boy are selected to take the all-expense paid, properly chaperoned trip to wherever the National Science Fair is being held that year. Generally, the only prizes won at local fairs are certificates for having entered an exhibit, while the two runners-up (boy and girl) are given a plaque. The real purpose of the fairs is not to distribute prizes, but to stimulate young people to pursue scientific careers.

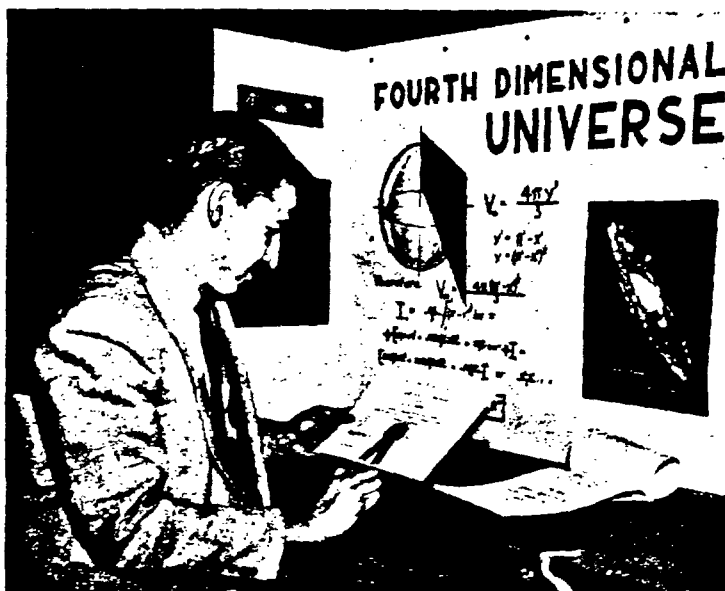
The National Science Fair began in 1950 and was first held in Philadelphia. Thirteen areas were represented at that time and 30 finalists competed. Since then the Fairs have grown as fast as a contestant's

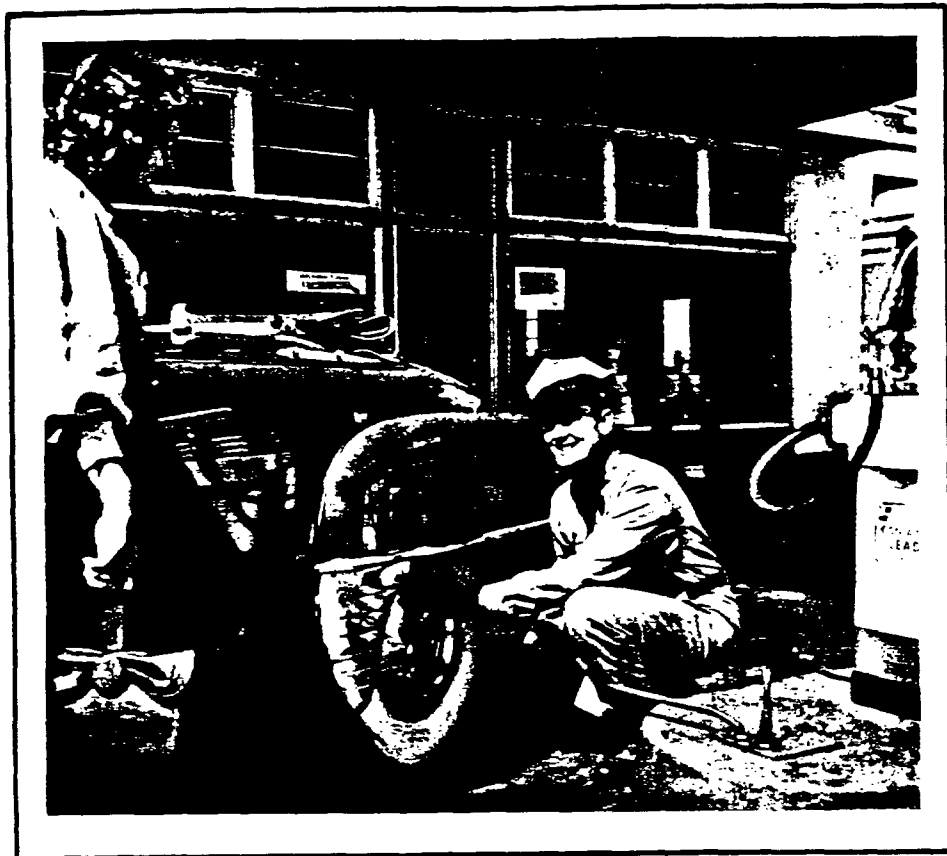
hand-watered plant in specially prepared soil. This year's Fair was held at Case Institute of Technology in Cleveland. Seventy-one districts from all parts of the United States sent 136 finalists to this, the biggest event so far.

Next year, for three exciting days in Oklahoma City, the Fair will take the young competitors on a whirlwind round of events certain to leave their heads spinning with wonder. In addition to the exhibition, they will visit the research laboratories at the University of Oklahoma, see the world's longest (5,000 feet) engineering line for the modification and maintenance of aircraft at Tinker Air Force Base, tour the Oklahoma Medical Research Foundation, visit the West Edmond oil fields, see a television station operate, and view the latest development in communications at the Southwestern Bell Telephone Company.

From all of this, youths representing every region of the country will get a broader view of the role of scientific achievement and a deeper insight into the part they can play in the drama of creating the tools of modern living. They will see for themselves the ever widening need for scientists, and the necessity to develop their own powers of intelligence so that they may wisely choose the field that is best suited for them.

The National Science Fair, then, is helping America meet the challenge to produce more scientists. #





Free air for tires is one of the most common services all stations offer. The correct pressure is recommended by thoughtful dealers and attendants.

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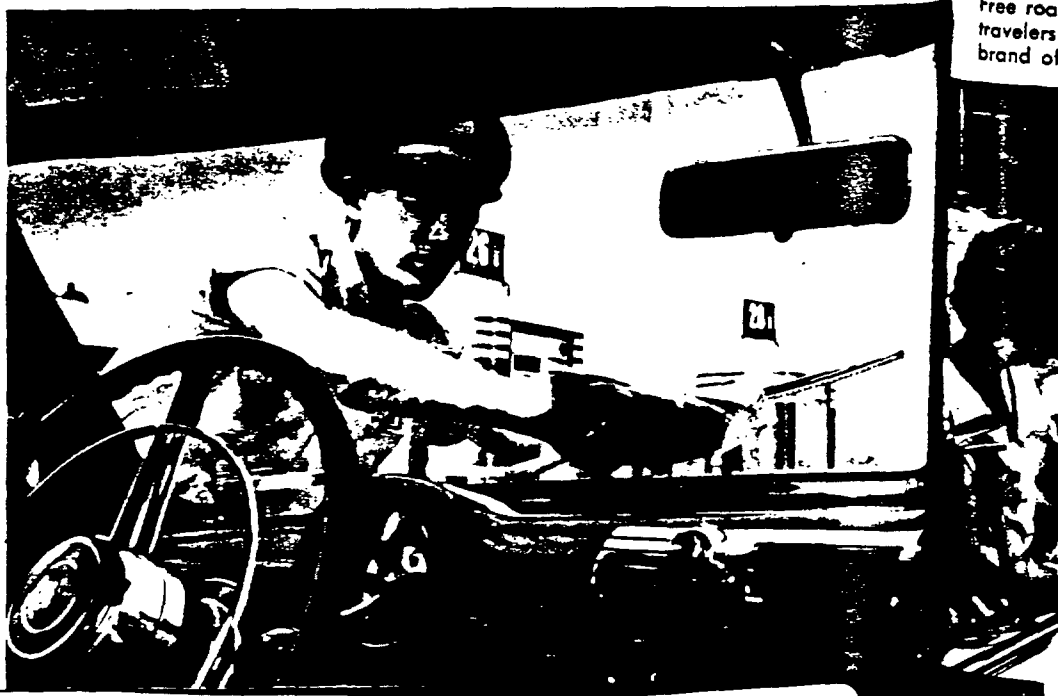
Pion operate stations mercha to win parking extras ti

Pictu free ser of moto them th stations

THEY'RE ALL PARTOI

Clear visibility is a "must" in highway safety. As a part of the courtesy to customers, splashes, bugs and mist vanish under the nimble hands of the service station man.

12



Free roac travelers brand of

ETC 28915

A wide variety of courtesies increases business and develops good will

THE PENDULUM of service has swung a long way since the days when "filling" station operators charged ten cents for battery water and a nickel to inflate sagging automobile tires. Today, it has been estimated, the average "service" station provides free services which cost nearly \$600 a month. In so doing, the station has become more than a pleasant and convenient place to buy gasoline, oil and TBA items. It has become a highway haven and a noteworthy example of the human side of American business.

Pioneered by the independent businessmen who operate the majority of the country's 200,000 service stations, these courtesies have set a pattern for retail merchandising. Following their lead, retailers anxious to win public acceptance in other fields provide free parking, free gift wrapping and countless other little extras that customers appreciate.

Pictured on these pages are some of the many free services which are taken for granted by millions of motorists. Yet it is these services and others like them that have made retail gasoline outlets service stations in fact as well as in name. #



The free parking service that is offered to drivers in urban centers is a popular one. Many dealers find that their parkers become regular customers.

OF THE

SERVICE

Free road maps and helpful road information encourage travelers to stop at other service stations where the same brand of petroleum products is sold.



Clean modern rest rooms rank high on the list of reasons why motorists patronize some service stations regularly in preference to others.





Filling a radiator is one of the basic services that has done so much to build up the good will which pays off in the long run.



This salesman's car will be neat and clean inside when he picks up an important customer—clean sweeping is another extra offered free by many dealers.

A gallon of distilled water costs more than a gallon of gasoline, but still the battery fluid is provided without charge.



An elderly lady has a loose bolt tightened on her almost equally elderly car by a thoughtful service station attendant. Minor adjustments and repairs are another free extra.



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The Hand of Fellowship



NINETEEN GRADUATE STUDENTS at colleges and universities throughout the country are furthering their research studies in the 1955-1956 academic year with an assist from the Ethyl Corporation. As one phase of its continuing aid to education, the Company has awarded fellowships for advanced work in chemistry, chemical engineering and mechanical engineering—fields related directly to the petroleum, chemical and automotive industries. This is the nineteenth consecutive year that Ethyl has awarded such fellowships under a program that originated in 1937.

Total value of current awards is about \$45,000. Each fellowship provides the recipient with \$1,500 or living expenses plus an allowance for tuition and other fees. In addition, the college department in which he is studying receives \$500 for expenses in connection with the fellow's research work.

As are similar programs of other companies, the Ethyl fellowship program is intended to encourage university graduates to continue their professional training to an advanced degree so that they can qualify for research positions in industry.

Included in the current list of institutions are five in which Ethyl Corporation is awarding fellowships for the first time. They are Florida State University, Georgia Institute of Technology, University of Kansas, North Carolina State College and Tulane University.

The complete list with the fellow's name and department is:

University of Delaware—Alan S. Foss, chemical engineering.

Florida State University—Wayne E. Wentworth, chemistry.

Georgia Institute of Technology—W. M. Ligon, chemical engineering.

Harvard University—Herman G. Richey, chemistry.

University of Illinois—George S. Dawkins, chemical engineering.

State University of Iowa—Lothar E. Geipel, chemistry.

University of Kansas—Donald Sobocinski, chemical engineering.

Louisiana State University—William K. Averitt, chemical engineering.

Massachusetts Institute of Technology—Leon J. Slutsky, chemistry.

University of Minnesota—William Henry Gumprecht, chemistry; Raymond E. Kaufman, mechanical engineering.

North Carolina State College—Arthur A. Armstrong, chemical engineering.

Ohio State University—Thomas F. Corbin, Jr., chemistry.

University of Oklahoma—Lyndon D. Boyer, chemical engineering.

Princeton University—Eugene Bradford, chemical engineering.

Purdue University—Julius J. Kristoff, chemistry.

Tulane University—Alfred F. Daech, chemical engineering.

Wayne University—Morton E. Munk, chemistry.

University of Wisconsin—Marshall C. Burrows, mechanical engineering.

INDUSTRY TUNES IN ON

TV

Finds it of great value in administration, production, technology and promotion

FROM PHILADELPHIA this June, the Sun Oil Company introduced a new gasoline via a network of TV cables. Sending its message to hotel ballrooms and theaters in 30 cities, the company reached 14,000 dealers at once.

To Frank R. Markley, Sun Oil vice president, this meant that, "In the space of one hour we presented a program that something over a year ago required forty days to complete."

The program also cost 60 percent less than that of the year before, in which Sun salesmen met face to face with dealers. It gave Robert G. Dunlop, Sun Oil president, Mr. Markley and Clarence H. Thayer, another vice president, a chance to tell about the new product personally.

This use of TV is but one of many to which the medium is now being put by business and industry.

In origin, the word television means far vision. Having established itself for broadcasting entertainment and news, television seems on its way to becoming an extension of vision in the full sense. Under the name industrial television or "ITV," it is being put to work in industry, government, medicine and education. It is taking on more and more jobs, big and small, in administration, production, technology, promotion and training.

Among its feats, besides overcoming distance, industrial television nullifies danger and beats fatigue. It stares into places beyond human reach. It picks up impulses of light beyond the sensitivity of the human eye. It funnels pictures of scattered activities into single observation centers, notably in the auto

industry. And in portentous new applications, ITV hook-ups respond to what they see in such a way as to provide automatic control.

In the sky over Air Force bases such as Dayton's Wright-Patterson Field, robot planes twist through frame-wracking test flights which no human pilot could stand. TV cameras record every reaction from fixed positions over the instrument panels.

Near Calumet, Mich., a TV camera operates 1,200 feet down a copper mine shaft. It gives the engineer's station at the surface a constant view of the position of the elevator cables on their sheaves. This assures safe operation of the elevator and does away with the cost of a watchman.

In Continuous Flow Controls

In one particular way, TV may have wide applicability in industries with continuous flow operations. As it has been worked out in theory, a camera would observe a moving liquid, powder or solid. Any variation in the proper proportions of the components in the product under observation would affect the gray scale of light picked up by the camera. At this, a signal would be transmitted to a control unit and the required correction would be made automatically. In this type of automatic control by TV, either a black-and-white or color camera could be used.

As did atomic energy, industrial television moved a long way from theory to practice under the pressure of World War II. Military research centers were among the first to put ITV to work for technical uses.

In private industry, utility companies took the lead.

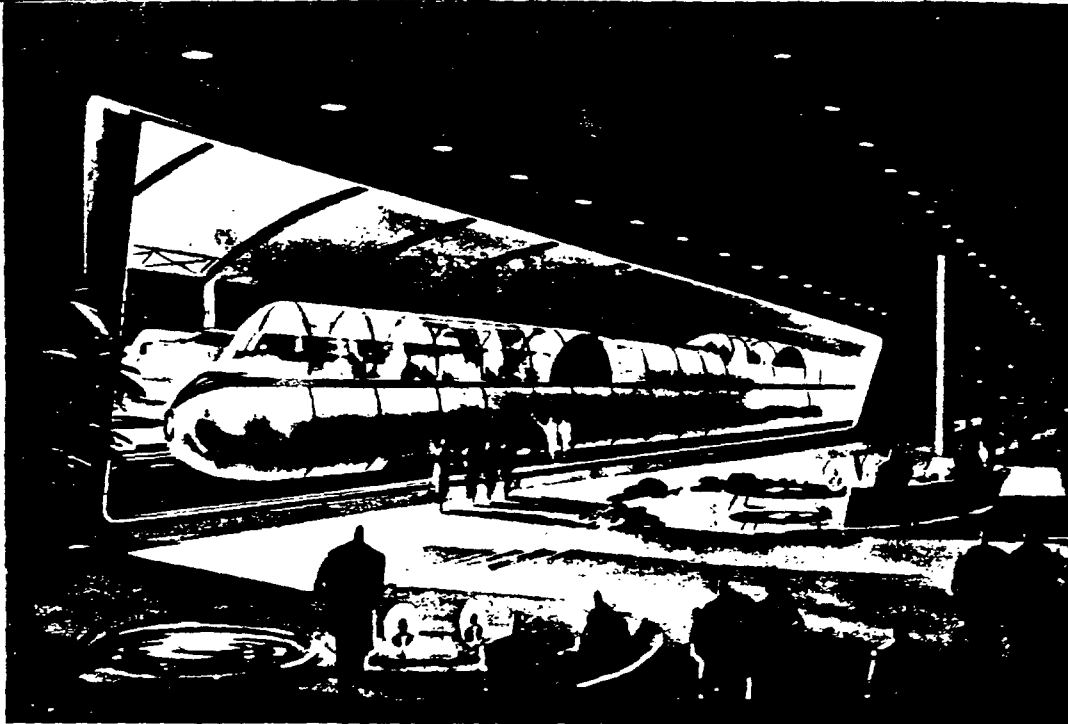
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Buyers who come to New York's proposed Palace of Progress will be able to inspect heavy machinery in plants across the country by television.

For seven or eight years now, many of them have used television to mount guard on the water levels of boilers, read meters, peer into furnaces and watch the output of smokestacks.

The spread of ITV to scores of other industries has been paced by improvement in equipment. Today, compared to the standard studio unit or "chain," the typical industrial type chain has become a "streamlined midget."

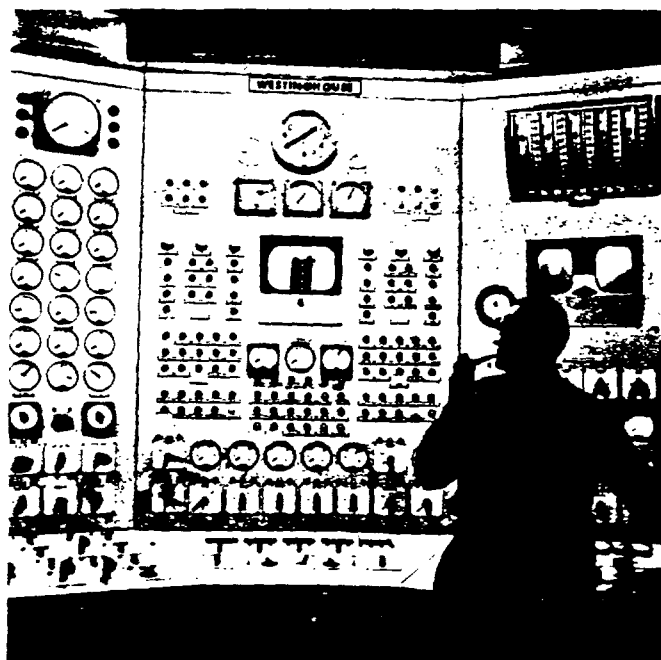
The basic ITV chain consists of a camera, receiver (monitor), connecting cable, power supply, and controls for the camera and the receiver. An ideal unit would be cheap, simple, durable, compact, portable, and protectible, as well as highly sensitive and reliable in performance. The importance of each factor would depend on use.

Many ITV cameras now weigh less than ten pounds. Most industrial chains range in price between one-twentieth and one-fourth that of a standard broadcasting unit. The lowest-priced type of chain known at present has a suggested dealer net price of \$995.

By 1960, it is anticipated, the economies of standardization and mass production may allow prices to cut sharply.

Among applications of ITV drawn up for potential users, one list for "industry" includes: plant inspection and supervision, material flow, remote operational

On the control panel of an electric generating station, television screens keep watch on smokestack output and boiler flame burner conditions.



control, remote observation, safe view of dangerous operations, and plant security.

An impressive example of overall supervision recently went into round-the-clock service at the Taylor yard of the Southern Pacific railroad at Los Angeles. Remote controls operates 13 outdoor cameras to help in the coordinating of car-movements. Eight of the cameras combine to give the yardmaster a view of the entire two-mile length of the yard. Five of them provide close-up views of the cars. Other railroads use TV for a variety of individual jobs.

In connection with material flow, U. S. Steel started a precedent at its plant in Gary, Ind., several years ago when it set up a camera over a hot strip of steel moving into a coiling machine. The strip had been too hot for a man to watch closely. Previously, when something went wrong with the flow, it was seldom possible to prevent a pile-up requiring a temporary shutdown.

Water-Cooled Camera

With a water-cooled TV camera on the job there's plenty of time to "iron out" any trouble. Similar installations have been put in at a number of other foundries.

One variety of remote observational control may be seen in Douglas Aircraft's big plant at Santa Monica, Calif. Here ITV lends a hand to optical tooling. A camera looks into a microscope, magnifying reference points for the positions of jigs for new DC-7C transports. The operator, enabled to see the reference points enlarged 300 times, fits the jigs into place in five seconds. Previously he needed five minutes.

Another kind of remote observation by TV goes on inside the Memorial Tunnel near Charleston, W. Va. Four cameras hang above the roadway, one covering the entire length and the others individual sections. When a car stalls, a tunnel operator sees it on his TV screen and switches on stop lights at both ends of the tunnel immediately. This prevents a tie-up and keeps the way clear for removing the disabled car. A number of other examples of traffic observation by TV could be cited.

Among the industries expected to make use of ITV, some have evinced little need for it as yet. The oil industry is an example. If the use of cathode ray tube oscilloscopes for ignition analysis is not counted, a few cases of smokestack observation and meter reading, and of national "tele-sessions" make up the only known applications.

Modern instruments used by the industry are effective enough to preclude much of the utility of direct visual observation which TV affords. In any case, television manufacturers speak optimistically of the day when the oil industry will be using their equipment in exploring and drilling.

In oil refineries, TV men expect their cameras and screens to serve for production control, material handling, dangerous viewing, process control, work coordination, centralized record viewing, general action monitoring and protection of property. One TV manufacturer is thinking of putting a camera inside a cat cracker to view the flow of a catalyst.

Further uses and fields for TV run from astronomy to zoo operations. For instance, if Air Force scientists are not doing it already they may soon be fixing TV cameras to guided balloons to view the stars free of atmospheric interference.

In another facet of navigation, whaling ships are using TV cameras to help the man in the wheelhouse

From an observation post on a highway bridge's superstructure, a TV camera is focused on the automobile traffic passing below.



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Sales, dealer and stockholder meetings are one of the most popular uses of closed circuit TV.

shift his craft's after-section alongside its victims.

Along other lines, naval men and ichthyologists operate television underwater. Police are using it to scan line-ups of suspects. The Army is using it to view practice maneuvers. Banks are using it to check signatures. Doctors are using it to examine X-rays at separate locations, as well as for watching operations and microscopy.

Librarians use it to speed research. Forest rangers will soon use it to watch for fires. Schools are using it for hundreds of purposes and will use it a great deal more as educational TV comes into its own.

One of the many ways TV is being used for safe viewing of dangerous operations is that of the Umatilla Ordnance Depot in Ordnance, Ore. Workers there renovate World War II bombs for possible future use. With television it is possible to dismantle a bomb mechanically from inside of bomb-proof shelter.

For Plant Communications

The number of fixed industrial TV installations probably does not now exceed 2,000. But according to one fairly conservative manufacturer, "It is no idle dream that ten years from now, or less, there will be few industries, if any, not using television equipment in their operations."

As for the overall prospects for TV in business and industry, some crystal-gazers see the biggest part of TV's future in serving management for inter-plant-

and intra-plant communications, as well as for dealer relations.

Perhaps the most ambitious single scheme for putting television to uses managerial is the Palace of Progress. This is the huge merchandising center planned to be built above Pennsylvania Station in New York City. In an entrance area, scores of closed-circuit screens will depict activities throughout the building. Mobile TV "eyes" will play over goods at close range to save walking time. As an inspiration to executives generally, buyers' offices will be equipped with TV screens the size of picture windows.

Tie-in with Automatic Systems

Some, in looking ahead, believe the major contribution of TV in the next ten years will be in direct uses for production and control. This is the way engineers see it. They emphasize the tie-in of television with automatic computer and control systems, which themselves will do much to change the methods of production.

A prominent systems engineer serving the TV manufacturing industry holds that, "In a sense, present use of computers requires plugging the human into the machine. One of the objectives of TV in the next decade is to replace the human connection with an electron connection. Human eyes, ears and brains can be replaced by super-eyes, audible and supersonic ears, and instantaneously exact brains."#

*Sodium is used to study the atmosphere
and in operating an atomic submarine*

THE EARTH'S TWO OCEANS—the air above and the seas on the surface—will soon become more accessible and better understood, thanks in part to new applications of sodium. The versatile metal is being used in rockets probing the upper reaches of the atmosphere and in a submarine that within the next year will dive to great salt water depths.

New roles for this silvery-white metal, one of the two elements in common salt, are overshadowing the deeds and dreams of Buck Rogers, Superman and Jules Verne. As the world's largest manufacturer of sodium, Ethyl Corporation has a particular interest in its capacities and potentialities in many fields. (*What's Ahead for Sodium*—ETHYL NEWS, Jan.-Feb. 1955).

Sodium into Ionosphere

In mid-October, the Air Research and Development Command of the Air Force wrote a fresh chapter in the scientific library on conditions where the air is too thin to support human life. A powerful Aerobee rocket, zooming aloft at a speed of about a mile per second, sprayed vaporized sodium high into the ionosphere at twilight over the Holloman Air Development Center in New Mexico.

The full story of what took place will not be known until official Air Force reports are completed. This much is known, however. Thermite in a cylinder with sodium pellets was ignited by electricity. The sodium "boiled" and was released from the rocket as a hot vapor under great pressure.

Zooming 70 miles up at a mile per second, a 20-foot Aerobee rocket leaves a spectacular smoke train as it prepares to spray sodium into the ionosphere.

Probing the Sea and Sky

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The misty sodium discharged from 40 to 70 miles aloft created two luminous yellow clouds, glowing like sodium-vapor street lights and resembling extended meteor trails. They could be seen from about 130 miles away. The rocket carried a moving picture camera to photograph the sodium clouds, and radio and radar equipment for sending information back to the development center.

It has been known for some time that there is a natural layer of sodium in the upper air, with a faint luminosity detectable only by delicate instruments. It may originate from the salt in evaporated sea spray, or from meteors. By intensifying a section of this stratum to a point where it becomes brighter and therefore easier to study, Air Force scientists hope to increase their knowledge of the outer atmosphere.

The increased knowledge is expected to prove useful in defense efforts related to improved aeronautical equipment and techniques, and in solving the mysteries of cosmic rays and possibly other phenomena at the threshold of outer space. Within the limits of national security, information obtained from the sodium experiment will be available to colleges, universities and scientific organizations, as well as to American industry.

There is a relationship between the sodium-discharging rocket and the first earth-encircling artificial satellite which the United States will launch within the next two years. Although the two projects were planned separately—the sodium rocket long before the satellite—both are designed to extend man's eyes,

ears and brains into realms he now knows little about.

The \$20 million satellite will be part of this country's participation in the International Geophysical Year, scheduled from July 1957 through December 1958. Information obtained via the sodium rocket may help the more elaborate satellite project in respects as yet undetermined.

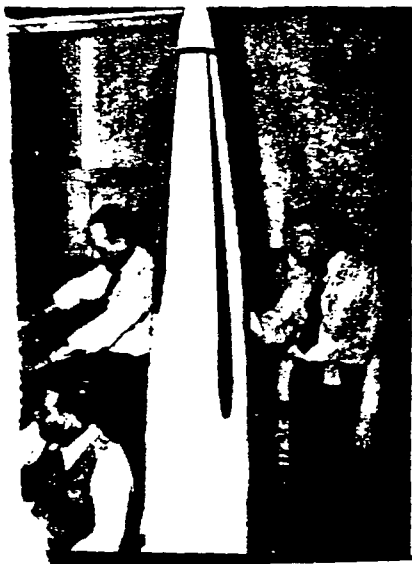
A somewhat less startling but no less important role in sodium's versatile career is the part it will play in the power plant of the *Seawolf*, the Navy's newest atomic submarine. The craft's nuclear intermediate reactor is to be cooled by sodium, thereby teaming the metal with the tremendous potentials of the atom at work. Built by the Electric Boat Division of General Dynamics Corporation and launched last July, the underwater vessel is being completed for her trial runs off New London, Conn., next year.

To Evaluate Advantages

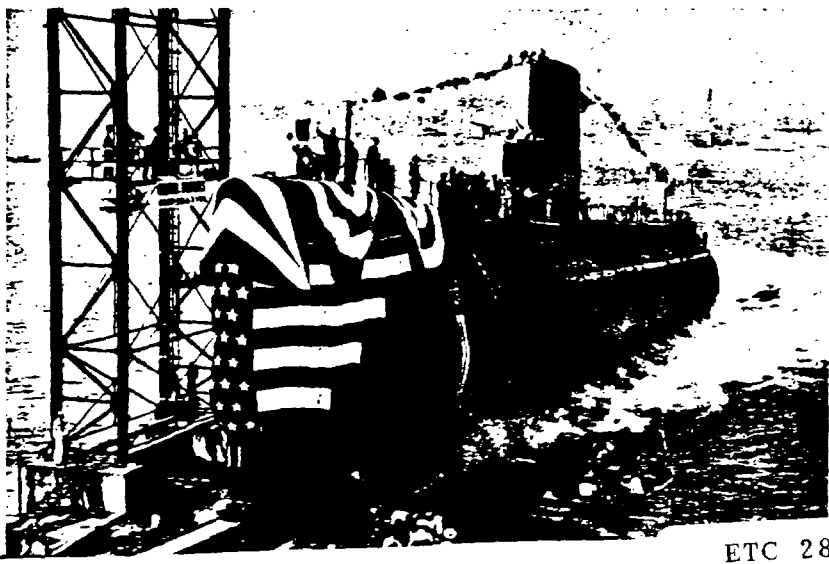
Numerous innovations and improvements have been introduced aboard the *Seawolf*, with the liquid sodium cooling apparatus a contributing factor. It will be compared with the water cooling system used in the *Nautilus*, the world's first atomic powered submarine, for evaluation of operating advantages.

The new 3,000-ton undersea craft is expected to develop a speed of over 20 knots. Because her nuclear reactor can operate without fresh air, she can remain submerged for long periods of time, and undertake much longer and more venturesome cruises than any conventional submarine. #

Scientists check complex rocket instruments carefully before firing the missile aloft to conduct research on the thin upper air.



The Navy's newest atomic powered submarine *Seawolf* being launched. Sodium will be used to cool her intermediate thermal reactor when the undersea craft is finished.



Reel Files for Records

Business is saving time, money and storage space by using film instead of

BY FOCUSING THE CAMERA'S infallible eye on the written records of business, industry and government, mountains of cumbersome documents and hours of time-consuming paperwork are quickly and easily being reduced to compact handy files. It's all done by microfilming.

Basically, microfilming is the process of taking minute pictures of original material with special equipment, and preserving these pictures on safety film.

Billions of records are currently being kept in this way. They cover almost every phase of human endeavor. The process has four principal objectives: to record basic data, to duplicate this information as needed, to condense it for storage, and to protect valuable original documents.

Over 100 different kinds of businesses and industries use microfilming, ranging from banks, department stores and insurance companies to manufacturing, transportation and research organizations.

Realizing the importance of preserving its valuable records, Ethyl Corporation uses microfilming widely. The Company has a continuing program of photographing essential financial, legal and administrative documents. These papers—some 80,000 a month—are processed daily. So far, over five million microfilmed images have been prepared by Ethyl's New York headquarters. They are stored for protective security in a remote vault.

Research Records on Film

Similar operations are carried out at other Ethyl localities, including its Baton Rouge manufacturing plant and its Research Laboratories in Detroit. Since it would be impossible to replace records of the Company's detailed studies of fuels, fuel additives, engines and lubricants, these valuable data are put in safe storage on film, where their preservation is assured. The availability of this information for use in Ethyl research can benefit the entire motorized transportation field.

Microfilming's popularity can be traced to its economic advantages. The initial low cost of the units, the ability to make a film copy for as little as 1/80th of a cent, the accuracy of the process, its simplicity and the small amount of storage space needed for film are assets most frequently cited.

Companies using microfilm equipment report that it is among the easiest business machines to operate. No training in photography is required. In some models, the operator simply inserts the documents—like dropping letters in a mailbox—and the machine does the rest.

Subject matter is recorded on either 16 mm. or 35 mm. rolls. Lighting, exposure and other technical measures can be taken care of automatically. Dark room conditions are not required for loading or unloading. The film can accommodate two rows of pictures side by side. For smaller jobs, short strips are available, which can be mounted in card frames.

The use of microfilming makes it possible to cut down space required for files by as much as 99 percent, resulting in major savings in cabinets as well as

This compact, dual-purpose model makes microfilm copies of papers, and has a viewing screen for reading them.



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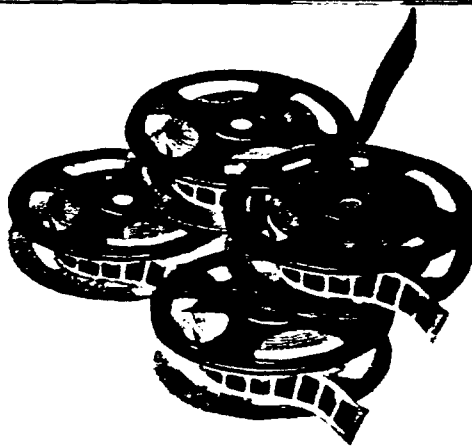
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floor space. This feature is especially appealing when elbow room is at a premium, or when a company wants to make the best use of high rental quarters.

A dramatic example of how microfilming has conserved space is the case of a state motor vehicle bureau, where a million records formerly were kept on paper. Since the introduction of microfilming, enough square footage once taken up by filing cabinets has been released to accommodate two other entire state departments.

Big insurance companies, whose vast rows of files often cover acres of space have launched "destroy-the-papers" programs via microfilming, sometimes releasing whole buildings for other uses.

Other features of microfilm processing and usage combine economies with additional features. Firms such as Burroughs Corporation, which distributes and services Bell and Howell equipment, Remington Rand and microfilm pioneer Recordak point out that their equipment and services all offer speed and flexibility.

In one type of machine, for example, 60 letters or 10 smaller documents can be put through a micro-

film unit by hand per minute. With an automatic feeder, over 500 check-sized papers can be copied in the same time. Automatic controls make allowances for handling sheets of assorted size or thickness.

One of the most remarkable developments in the microfilming field has been the evolution of methods to find a single thumbnail-size picture in a roll containing thousands of other images. Today this can be accomplished in a matter of seconds.

In providing security for rare, irreplaceable and highly important material, microfilming is especially valuable. Scores of firms have invested millions of dollars in such programs, among them major oil companies. In scholarly fields too, microfilm reproductions of fragile historical papers, original records and ancient manuscripts can be examined freely, without damage to the originals. The Bureau of Standards estimates modern safety microfilm will last about 500 years.

Has Military Beginnings

Microfilming has military origins, beginning with the Franco-Prussian War of the 1870's, when miniature French maps and battle plans tucked into a capsule were delivered by carrier pigeon. In World War I, German ingenuity put secret data on a tiny celluloid disc under a period in an otherwise innocuous document. An officer in our own Navy once carried by hand complete plans for a battleship on microfilm, the equivalent of tons of blueprints.

Commercial microfilming dates from 1928, when banks used the process to record checks. The technique was then tried with business and industry's equally important papers.

Oil, automotive, aviation, farm equipment and TBA firms are among microfilm's customers. Some oil companies use it in handling credit card purchase records. Transportation agencies speed shipments by making pictorial copies of waybills and essential shipping data. Engineering departments photograph valuable drawings for protection against loss or damage. Hospitals

stalls of engineering drawings or other technical data can be studied easily on enlarged microfilm images.

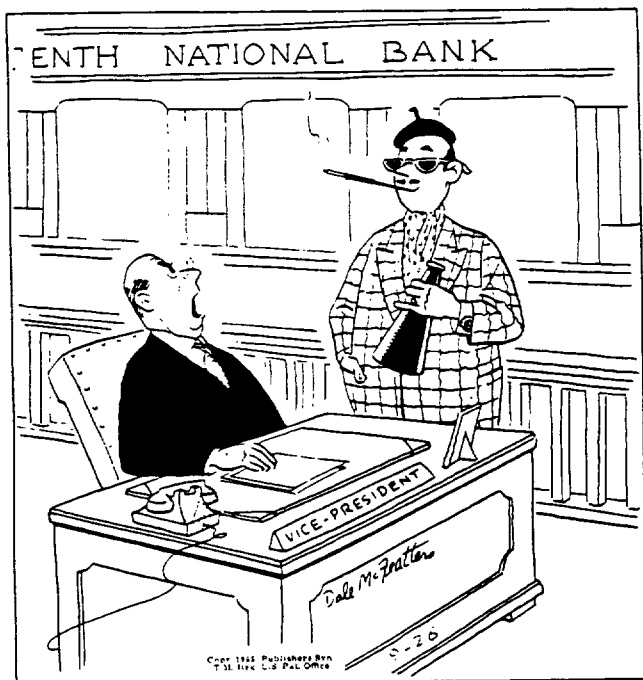


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Endless rows of filing cabinets and warehouses full of papers are giving way to more efficient film.



"Come, come, Jones,—after all, you're just taking charge of our microfilming!"

keep medical records in the same way. Deeds, wills and mortgages are often preserved pictorially.

As business and industry expand and decentralize, there is an increasing need for duplicate files at various locations. Microfilming can provide the required copies. Whenever necessary, paper facsimile prints, enlarged from microfilm records, can be prepared in any quantity and size. Other expanding horizons for this modern medium include what microfilm companies call "micro-accounting"—integrating film techniques with conventional accounting machines and procedures.

Twenty-four Hour Service

Several firms involved in the microfilm business are national in scope, selling or renting machines and servicing them. Work can be done "on location" at offices, plants or laboratories, or at service centers. Exposed film can be developed and delivered within 24 hours or less, expediting access to records needed promptly.

In a sense, the familiar saying that "one picture is worth 10,000 words" can be adapted to microfilming. In this case, one roll of pictures is worth many times ten thousand words on paper. #

LAYOUTS AND ART DIRECTION: Carsten Grande.

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Ethyl Opens New Laboratory and Service Center in Houston

UTILIZING THE LATEST EQUIPMENT and methods for the precise measurement of gasoline characteristics, Ethyl Corporation opened its newest gasoline testing laboratory and service center in Houston, Texas, late in October. It is offering refiners in the area the fastest service on tests of their gasoline samples, and comprehensive field program help.

Laboratory facilities at the new center are bringing refiners still better assistance in measuring gasoline quality. For some refiners, the laboratory will supply facts to supplement results obtained in their own laboratories. For others, Ethyl is equipped and staffed to provide desired test data.

As an integral part of the Company's nationwide gasoline testing operations, the streamlined Texas center will supply information for current Ethyl surveys of gasoline antiknock quality. Together with other strategically located Ethyl laboratories, it will have the broad additional objectives of contributing toward faster and better gasoline tests, on behalf of the oil industry.

Besides octane number determination, the Houston laboratory will perform other standard gasoline inspection tests, including distillation, vapor pressure, TEL

content, color, gravity, oxygen stability, dissolved gum, corrosion and sulfur content.

The latest equipment and procedures include many refinements in CFR engines, such as console panelboards for instruments, a powered way to change compression ratios, and an electric pump-operated reference fuel system. The TEL content of a gasoline sample can be determined by X-ray photometry as well as by chemical analysis. There is a modern vapor pressure apparatus, a more sensitive balance for weighing gum, and a newly designed TEL hood.

Technicians are on call to help refiners train their testing personnel, to review knock-testing methods and equipment, and to solve operating problems with CFR engines, utilizing many of the techniques developed by Ethyl's experience. A supply of knock-testing engine replacement parts will also be kept on hand at the new Houston laboratory for loan to refiners in an emergency situation.

Located at 3910 West Alabama, the new building will also house the Company's district offices. All Ethyl field services available to area refiners will be coordinated by the district office, ranging from education and safety to technical help. #

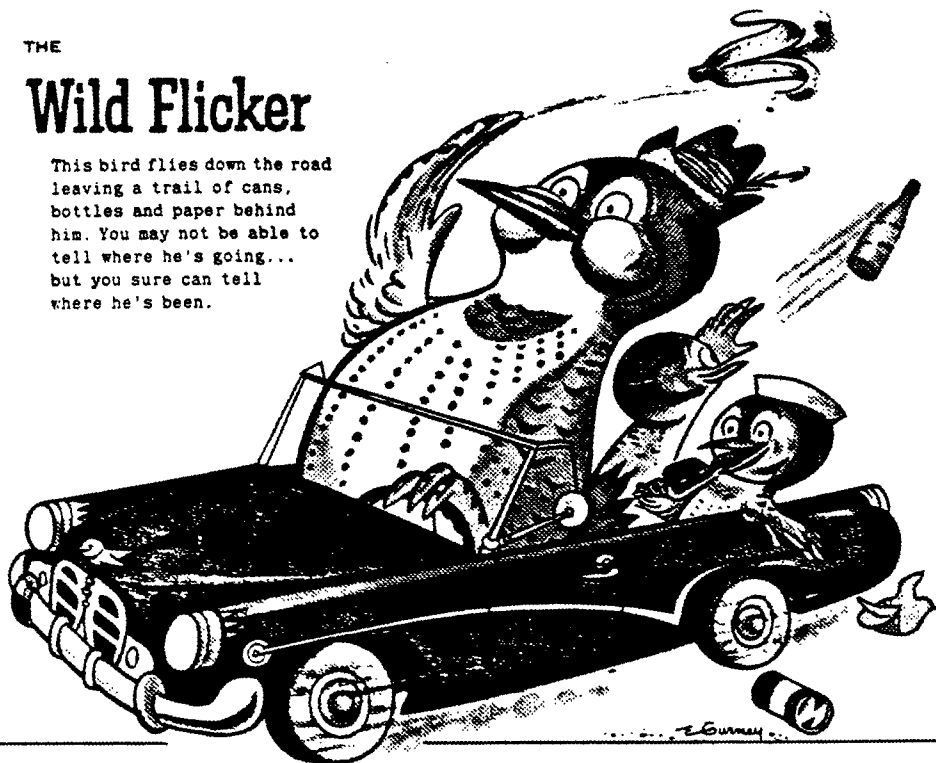


ROAD BIRDS... a series by Ethyl Corporation

THE

Wild Flicker

This bird flies down the road leaving a trail of cans, bottles and paper behind him. You may not be able to tell where he's going... but you sure can tell where he's been.

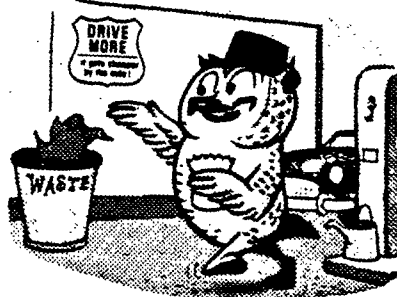


THE

Smart Bird

uses the trash baskets at road stops or waits till he gets home to get rid of refuse. He's considerate of roadside beauty... knows, too, it's dangerous to throw things from a car.

The Smart Bird doesn't "throw away" engine power, either. He uses premium gasoline. Its higher octane rating lets him enjoy all the power his engine can deliver. He gets more pleasure... more value every mile.



It's smart to use
premium gasoline



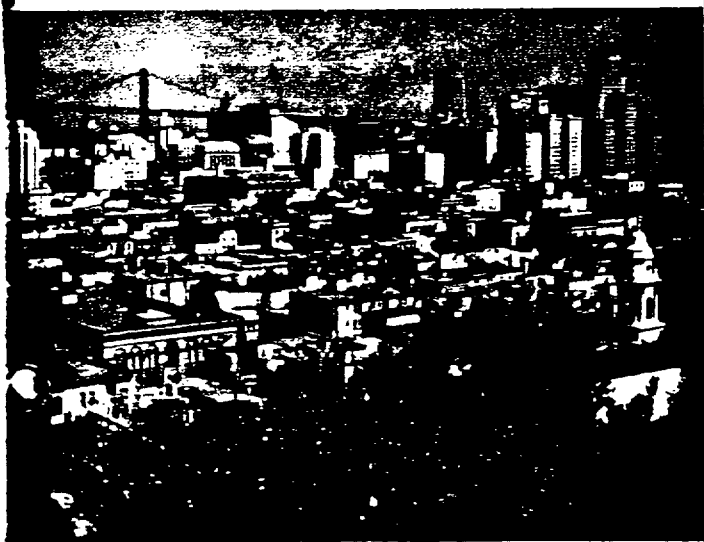
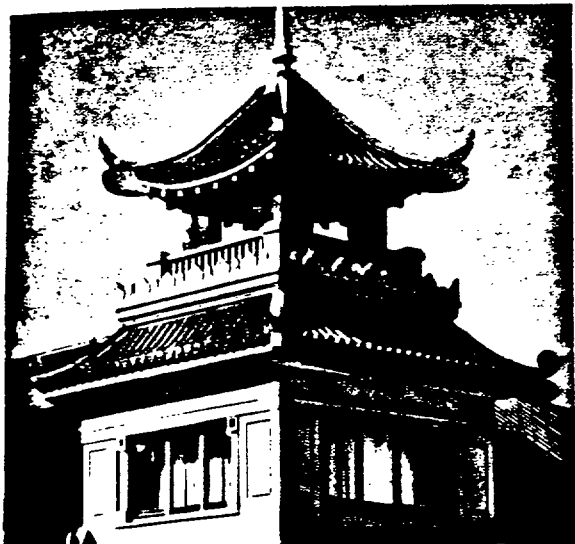
ETHYL
CORPORATION

In addition to selling premium gasoline, the popular "Road Bird" series encourages more courteous driving. The "Wild Flicker," for instance, points a finger at uncourteous motorists who litter the nation's highways. Organizations waging war on the litter problem paid tribute to the effectiveness of this advertisement by requesting reprints to use in their own drives.

ETHYL CORPORATION, New York 17, N.Y.

ETC 28929

ETHYL NEWS



API ANNUAL MEETING ISSUE

**NOVEMBER
DECEMBER 1955**

ETHYL NEWS

Richard F. Cook, Editor

AMERICAN PETROLEUM INSTITUTE ANNUAL MEETING ISSUE

NOVEMBER-DECEMBER 1955

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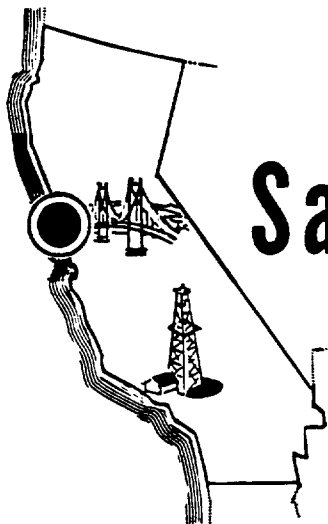
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Edward L. Shea, President
William R. Perdue, Jr., Vice President and Treasurer
Herbert A. Savage, Secretary

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Once again, the American Petroleum Institute's annual meeting was held in San Francisco. The return of oilmen to the Golden Gate City, November 14-17, was an anniversary not only for the industry but also for ETHYL NEWS. For it was after the 1941 annual meeting—the last held in San Francisco—that our first special API issue was published. Except during the war, this issue has been a regular follow-up feature of the meeting. The giant strides made by the industry in the 14 intervening years were sharply reflected in the increased attendance and in the number, variety and subject matter of this year's sessions. For exploration, production, refining, transportation, marketing, research and administrative oilmen, there were many profitable official gatherings and informal get-togethers. Continuing its established practice, ETHYL NEWS is happy once again to devote its concluding issue for the year to a photographic report of the 35th annual meeting.—*The Editors*



San Francisco, HERE WE COME

Returning to California for the first time in five years and to San Francisco for its first visit since a few weeks before Pearl Harbor, the API annual meeting attracted a total of 5,542 oilmen. Although registration fell about 1,000 short of the record-breaking number that signed in for the 1954 gathering in Chicago, it set a high mark for West Coast meetings. Drawn by the worthwhile program, annual-meeting-bound travelers poured into the City-on-the-Bay over the week-end and on Monday, the first day of the assemblage. Colorful San Francisco provided an attractive backdrop for the official proceedings and afforded an opportunity for sightseeing and entertainment between and after sessions.

Right, the Oakland end of the bridge-bound all points pictured in San crossing



Above, an early arrival in the Golden Gate City, J. B. Bellamy, of Sinclair Refining, locates a friend through the central information service. . . . Checking meeting literature, above right, are Clarke L. Coldren, Shell Development, and Peter J. Schoenmakers, Royal Dutch Shell. . . . Right, two oil company presidents check in at the Fairmont: R. L. Tollett, Cosden Petroleum, and S. D. Johnson, of his own producing firm.



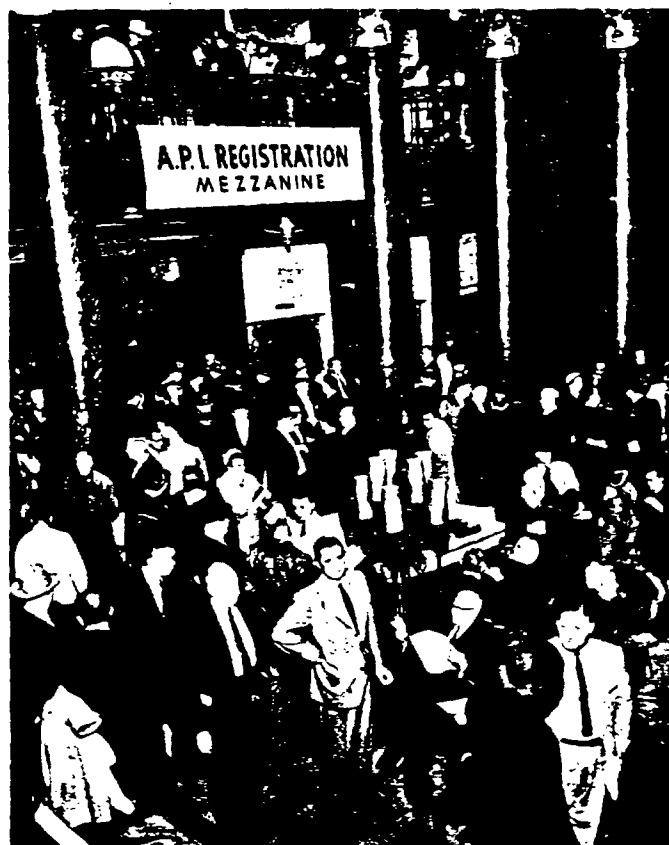
ME

trains arriving at
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brought annual-meet-
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oints. Here, a crowd is
red leaving the ferry
San Francisco, after
ing the bay.



◀ Sunday arrivals included C. H. Barre, Republic Oil Refining, and W. G. Tierney, president of Derby Refining, shown signing in at the registration desk in the mezzanine of the St. Francis Hotel.

◀ By Monday morning, just before the group sessions began, the St. Francis lobby offered little elbow room to late comers. In fact, G. H. Hemmen, of Union Oil, below left, filled out his registration card against a mirror.





HER

Sunday or
Howard C.
B. Lawrence

HERE WE COME

Richard A. Wotowitch, well known retired oilman, who organized the API train caravan, and W. C. Burns, Hartal Petroleum president, picking up their baggage at the ferry.



Greeting each other in the St. Francis lobby are James B. Smith, D-X Sunray vice president; F. M. Simpson, vice president of Petroleum Chemicals; and Thomas H. Riggin, Wilcox Oil.



HERE WE COME

Sunday arrivals at the Mark Hopkins included Howard C. Briggs, of Continental Oil, and Arthur B. Lawrence, F. S. Smithers & Co. partner.



Oilmen were three and four deep at the annual meeting's registration desks on Monday morning, where programs and other information were available.

Many an oilman saw familiar faces soon after arriving. Here Joe B. Woods, president of *The Petroleum Engineer*; F. C. Hilker, of *Eastman Oil Well Survey*; Howard F. Stover, *Gasoline Pump & Burner* executive vice president; and Abbott Sparks, vice president of *The Petroleum Engineer*, welcome John D. Reilly, of *The Oil and Gas Journal*.



HEALTH



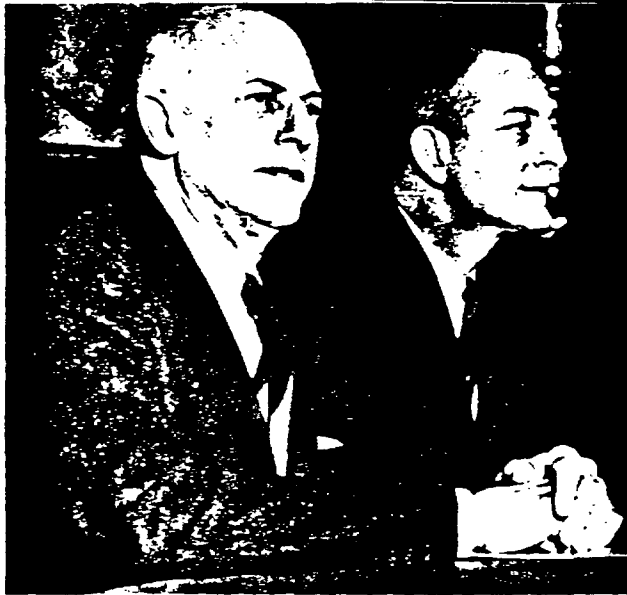
James W. Hammond, of Humble Oil & Refining, who spoke on "Industrial Hygiene in the Petroleum Industry," goes over his notes before delivering his talk.



M. J. Rathbone, Standard Oil Company (New Jersey) president and chairman of the API Medical and Health committee, presided at the group session.

Right, two interested members of the audience were Gordon B. Wooster, of Cities Service Refining, and Victor H. Luneborg, of Arkansas Fuel Oil . . . Below, photographed at the rear of the meeting room was Dr. Clark M. Miller, of Tide Water . . . Below right, in this Standard of California threesome are Lee Laird, Warren E. Lovejoy and James C. Benjamin.





Two speakers at the Monday morning group session were A. J. Becker, president of Becker Marsden Co., and Charles R. Holloway, vice president of Liberty Fuel.

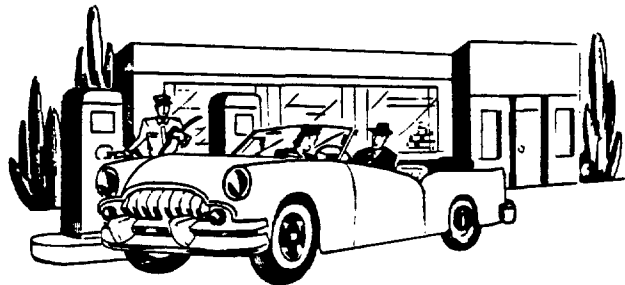


M. N. Vining, Diesel Oil Sales Company, presided at the morning session Monday.

J. G. Jordan
API vice pr
ided at tw



Above, B. L. Ray, Esso Standard vice president, also spoke Monday. . . . Below, Robert Gray, Fueloil & Oil Heat magazine, introduced Monday morning speakers.



M A



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Below, a

MARKETERS predicted a bright future for the oil industry at their four group sessions and numerous committee meetings. Demand for petroleum products may rise to a total of between 13 million and 14.5 million barrels per day within the next decade, John G. Winger, petroleum economist for The Chase Manhattan Bank said.

R. L. Minckler, president of General Petroleum Corporation, told a session that "competition is the force which has made our industry and our nation great." He declared that a public utility status for the service station business would result in the public paying a higher bill and getting poorer services.



Division of Marketing

J. G. Jordan, Shell Oil vice president and API vice president for marketing, presided at two of the division's sessions.



At Monday afternoon's group session are Maj. Gen. Levin H. Campbell, Jr., and Joseph O. Mattson, of the Automotive Safety Foundation; and speakers J. E. Buchanan, president of The Asphalt Institute, and Edwin J. Thomas, Goodyear Tire and Rubber president.

MARKETING



Right, Robert L. Minckler, General Petroleum president, speaking.

Below, a view of a group session audience.



MARKETING

MA



Above, Stanton K. Smith, president of Smith Oil & Refining and chairman of the Marketing Committee on Awards (right), presents a certificate of appreciation to Dayton P. Clark, of Gulf . . . Left, John Harper, Harper Oil president, was another certificate of appreciation awardee.



P. W. Zumbrook, of Sinclair Refining, chairman of the API Lubrication committee, who presided at the group session devoted to that subject.



Two company vice presidents from the Midwest are I. L. Goldman, of Aurora Gasoline, and L. W. Sweet, of Pure Oil . . . Below left, Thomas E. Fitzgerald, D-X Sunray executive vice president; Jess Knowles, Skelly Oil vice president; and Charles Z. Hardwick, Ohio Oil executive vice president . . . Below, E. J. Webster, Phillips Petroleum, and R. S. Williams, Gaseteria president.



Shell Oil
cisco pho
are Purdo



MARKETING



Above, Howard G. Vesper, Standard of California vice president, and S. H. McAllister, of Shell Development, spoke at the Wednesday afternoon Marketing group session devoted to Lubrication . . . Left, H. L. Moir, of The Pure Oil Co., presented the division's Nominating committee report at the Tuesday afternoon open meeting of the Marketing General committee.



Shell Oil men from New York and San Francisco photographed in a happy get-together are Purdom C. Thomas and Herbert S. Haight.

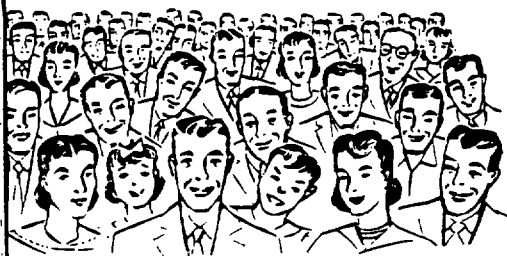


Enjoying their pipes before the start of a session are T. B. Rendel, of Shell, and J. C. Geniesse, of Atlantic Refining.



Left, Adam J. Rumoshosky, director of the Marketing division, and John F. Cummins, Cumberland Oil president . . . Below, these session-goers are James P. Dunnigan, secretary-treasurer of the Independent Refiners Association; Harry B. Hilts, secretary of the Empire State Petroleum Association; and Don W. Woods, General Petroleum.





PUBLIC RELATIONS

W. R. Huber, chairman, and the industry's Rollins,

An impressive report of the past year's accomplishments, and a message urging the industry to continue its public relations activities characterized the Public Relations group session in the Gold Ballroom of the Fairmont Hotel on Monday.

The OIIC reached millions of Americans this year with the story of oil, according to W. R. Huber, of Gulf, 1955 national OIIC chairman. He credited much of the program's success to the work of over 30,000 volunteers participating in nation-wide efforts. The last Oil Progress Week was more successful in getting oil's story to the public than any other, Mr. Huber reported.

Governor Arthur B. Langlie, of Washington, urged oilmen to renew their drive to tell the story of free enterprise to the public. He praised the OIIC for its past achievements, but emphasized the importance of continuing its work aggressively.

Arthur B. Langlie, governor of the state of Washington, giving the keynote address at the Monday Public Relations group session.



Shell president of the Board of the Fairmont Hotel attendees



Certificates of appreciation for OIIC work were presented to Haines Finnell, Union Oil of California; J. L. Dupree, public relations counsel; H. E. Brandli, retired Cities Service Oil president; Roy M. Stephens, Humble; J. H. Sembower, Shell Oil; T. F. McGarey, Cities Service vice president; L. R. Kamperman, Leonard Refineries vice president; and Stanton K. Smith, president of Smith Oil & Refining. In absentia, three certificates went to Willard H. Burnap, Direct Service Oil Co.; Calvin Houghland, Direct Oil Co. and J. S. Morrison, American Oil Company.

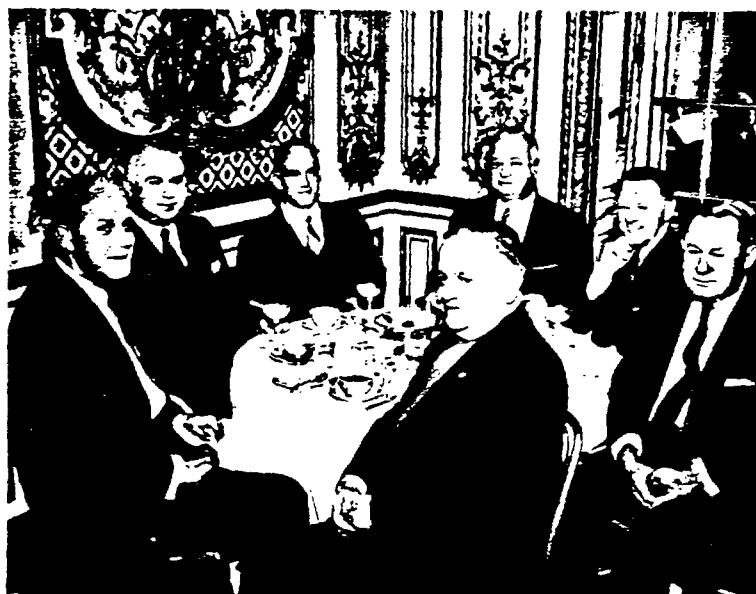
So many at the group the Fairmont obliged to



W. R. Huber, of Gulf, retiring OIIC chairman, who reported on that group's work, and the newly elected leader of the industry's information committee, Richard Rollins, of Atlantic Refining.



Shell president H. S. M. Burns, chairman of the Public Relations committee of the Board of Directors, presided at the well-attended conclave.



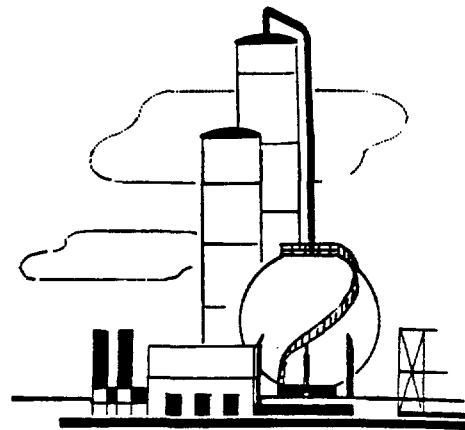
many oil companies were well represented at the group session in the Gold Ballroom at the Fairmont that part of the audience was obliged to stand.



This group at the Monday luncheon of the Public Relations committee of the Board includes J. H. Sembower, of Shell; Franklyn Waltman, of Sun; J. L. Dupree, public relations counsel; R. Lloyd Wheelock, Wheelock Oil; L. L. Aubert, president of Bankline Oil; B. A. Hardey, independent; and John S. Cooke, of the API (center foreground).



Lt. Gen. James H. Doolittle, Shell Oil vice president, discussed the fuel requirements of today's military aircraft and those of the future.



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Presenting the division's Nominating committee report is F. L. Craise, of Standard of California.

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C. E. Headington, of Atlantic Refining, reported to the Refining division's General committee on work being done in analytical research.

At a Gen
William T.
Division c
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E. B. McConnell, Standard of Ohio vice president and API vice president for Refining, who presided at the session, is shown with Dr. J. E. Wallace Sterling, Stanford University president, a featured speaker.



REFINING

An alliance between business and industry on one hand and universities on the other was described as both "natural and necessary" by Dr. J. E. Wallace Sterling, Stanford University president, at the Monday afternoon Refining group session. The gathering in the St. Francis' Colonial Room heard Dr. Sterling predict that many of tomorrow's leaders will come from our universities.

Refiners further heard Lt. Gen. James H. Doolittle, Shell Oil vice president, point out that strictly hydrocarbon fuels will not always satisfy aircraft designers' and operators' requirements as they strive for higher speeds, higher altitudes and longer ranges.

Right, two Phillips Petroleum refining department men from Bartlesville, Okla., attending the session are shown in a pre-meeting huddle. They are C. R. McCullough and C. C. Tate.



Howard G. Vesper, Standard of California vice president, receives a certificate of appreciation from Robert E. Wilson, chairman of Standard of Indiana's board of directors.



At a General committee meeting are William T. Gunn, director of the API Division of Refining, and William Waden, Esso executive vice president.



A balcony view of those who gathered to hear the group session speakers.





Pictured informally at the 35th annual meeting are Harry W. Ferguson, vice president of Humble Oil & Refining . . .



Maj. Gen. Walter I. Miller, United States Air Force . . .



M. P. Paret, Jr., vice president, Standard Oil of Texas . . .



and Ted Martin, Lion Oil president.



AT



Taking a break between sessions are O. H. Cunningham, Delta Refining; R. A. Young, M.F.A. Oil; C. D. Read, Wood River Oil & Refining; and L. A. Dollahan, of Ethyl Corporation.

Gentry Lee, Cities Service Oil vice president, getting the latest news from the ticker in the lobby of the Mark Hopkins.



This happy group is composed of Malcolm McDuffie, vice president, Mohawk Petroleum; and G. A. Olsen, president, T. F. Thompson, and W. E. Osburn, all of Sunland Refining.



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AT RANDOM



John W. Newton, vice president of Magnolia Petroleum, presiding at a meeting of the Smoke and Fumes committee.

Fayette B. Dow, of the NPA, and Reid Brazell, president, Leonard Refineries, talk over the meeting while seated on one of the comfortable sofas in the lobby of the Mark Hopkins.



At the Board of Directors meeting Wednesday were Harry D. Collier, a director of Standard of California, and T. Rieber, president of Barber Oil.



Discussing a subject of mutual interest are Sinclair refinery managers J. D. Seifer and R. J. Self.

Pausing in the lobby of the Fairmont Hotel are Lloyd F. Thanhouser, vice president, and James J. Cosgrove, chairman of the board, Continental Oil.



AT RANDOM

D. J. Chapman, of Ethyl, and Texaco's S. C. Osborn, S. C. Bartlett, vice president, and D. E. Beaton, stop to talk in a hallway of the St. Francis.



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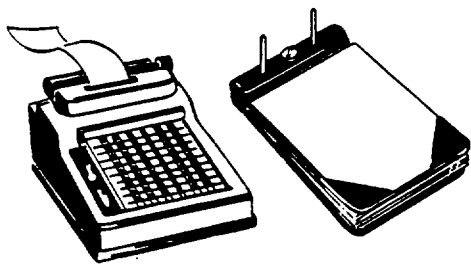
Arthur C. Stewart, vice president, Union Oil, and John C. Sample, vice president, General Petroleum, pause for the cameraman at a Marketing group session.



Listening intently at the joint meeting of the committees for Fire Protection and Accident Prevention are W. H. Gates, Mine Safety Appliances Company, and J. M. Ivy, of Carter Oil.

Smiling cheerfully during a break from business are Russell K. Schulze, and Hugh E. Dischinger, both of Shell Oil.





FINANCIAL and ACCOUNTING

BANKS have become more aggressive in seeking borrowers in the oil industry, with more and more of them adding special departments staffed by engineers and technical men, Lyon F. Terry, vice president of The Chase Manhattan Bank, a Financial and Accounting speaker, reported. Discussing education for financial and accounting management, J. Hugh Jackson, dean of Stanford's Graduate School of Business, emphasized the need for training in human relations.

The newly-created API Division of Finance and Accounting elected its first General committee on Monday, the day before the group session.



Above, P. C. Salman, Socony Mobil, and Foster Parker, Houston Oil treasurer, chairman and vice chairman of the API Financial and Accounting General committee, and speakers Lyon F. Terry, vice president of The Chase Manhattan Bank, and J. Hugh Jackson, dean of Stanford's Graduate School of Business.



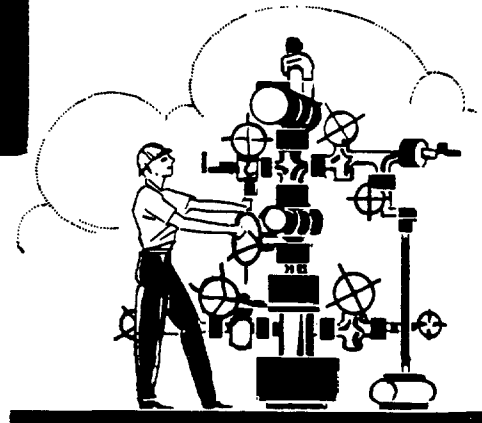
Left, standees at the session included Harold O. Schneider, of Delafield & Delafield; Dixon H. Cain, president of Fifteen Oil; and Albert W. Gentry, of Monterey Oil.

An overall view of the audience that assembled in the Sheraton Palace's Concert Room for the session.





Speakers Reese Taylor, president of Union Oil; and C. V. Roseberry, Westinghouse Electric; and presiding chairmen Harold Denton, of Sun Oil, and Milan G. Arthur, of Union Oil, just before the Tuesday session was called to order.



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H. W. Ladd (right), of Stanolind Oil and Gas, presented John R. Suman, retired vice president of Standard of Jersey, with a plaque in recognition of the latter's work for the industry. The award was made on behalf of the Central Committee on Standardization of Oil-Field Equipment.

Receiving certificates of appreciation are: J. R. Mahan, National Supply Company; T. H. Acres, Sunray Mid-Continent; A. W. Thompson, API vice president, who presented the awards; A. W. Breeland, Lone Star Gas; T. H. Wallace, vice president, Western Gulf Oil, for Lot Bowen (deceased); C. A. Dunlop, Humble; and H. O. Hill, Bethlehem Steel.

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Three of the speakers Wednesday were O. C. Roehl, vice president, Keystone Custodian Funds; T. L. Lenzen, Standard of California vice president; and T. V. Moore, Esso Research and Engineering.

PRODUCTION

TECHNOLOGICAL advances over the past 25 years now make it possible to recover about half of the original oil reserves, and new laboratory tests show that almost complete recovery of oil reserves is not impossible. This statement was made by Thomas V. Moore, of Esso Research, at a Production division group session. Mr. Moore said that during the 30's, only about one-third or less of the oil reserves was being brought out of the ground.

T. L. Lenzen, Standard of California vice president, declared at a group session Wednesday that the phenomenal growth of the oil industry in this country "came about because oil companies were not unduly restricted by government regulations."



Co-chairmen at Wednesday's session were Samuel C. Oliphant, above, vice president of Tennessee Gas Transmission Co., and Earle Hellums, president of Gracey-Hellums Corporation, Houston.



Another recipient of a certificate of appreciation was Dr. Frederick H. Lahee, Sun Oil (ret.), who was cited for his work on petroleum reserves. L. Laskaris, Atlantic Refining (right), made the presentation.



PRODUCTION



Paul Andrews, of Signal Oil and Gas, was a speaker at the General committee luncheon on Wednesday.



Other speakers at the luncheon were Frank H. Willibrand, Sohio Petroleum, above, and George P. Bunn, of Phillips Petroleum.



T. C. Stauffer, Sun Oil, gave the report of the Production division's Nominating committee at the group session Wednesday.



A general view of the audience at the group session Tuesday in the Gold Ballroom of the Sheraton Palace Hotel.

Three production men who attended the meeting of the Advisory Committee on Fundamental Research on Occurrence and Recovery of Petroleum are F. L. Johnson, Sun Oil; Hugh B. Barton, Humble; and Lincoln F. Elkins, Sohio Petroleum.



BOARD of DIRECTORS



Convening on several of the days of the annual meeting, the Board of Directors transacted many items of business concerned with the operations of the Institute. Among other matters, the Board elected Jake L. Hamon, an independent oil producer of Dallas, as its chairman, succeeding P. C. Spencer, Sinclair Oil president, whose term of office expired. Re-elected API officers included Frank M. Porter, president of Fain-Porter Drilling, president; E. B. McConnell, vice president of Standard of Ohio, vice president (Refining); A. W. Thompson, of his own firm, vice president (Production); J. G. Jordan, vice president of Shell Oil, vice president (Marketing); Lacey Walker, of the API, secretary; and B. Brewster Jennings, Socony Mobil Oil board chairman, treasurer. Frank O. Prior, Standard of Indiana president, was elected API vice president (Transportation), succeeding Charles S. Jones, Richfield Oil president.

◀ Jake L. Hamon, independent oil producer of Dallas and new API board chairman, as he was photographed at the Division of Production's General committee luncheon.

Below, at the head table at the Board business sessions were Lacey Walker, API secretary; P. C. Spencer, Sinclair Oil president and retiring API board chairman; and Frank M. Porter, API president.



BOARD of DIRECTORS



Enjoying a pre-luncheon visit are two oil company board chairmen, K. S. Adams, of Phillips Petroleum, and J. Sayles Leach, of Texaco.



Paul Endacott, Phillips president (right), listens as Frederick H. Robinson, Panhandle Eastern Pipe Line vice president, makes a point.



Interest in API affairs is reflected in the faces of these members of the Board of Directors at one of that group's several meetings.

These four company presidents include, right, Roy J. Thompson, Apex Motor Fuel, and Singer B. Irelan, Cities Service Oil, and, below, Robert G. Dunlop, Sun Oil, and J. E. Dyer, Sinclair Refining.



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BOARD of DIRECTORS



One of the caucus groups selecting candidates for the Board of Directors at the Board of Councillors' meeting, and right, Joseph H. Russell, Gulf Oil vice president, who presided at the Councillors' gathering.

Deeply absorbed in conversation are H. B. Gernert, of Trigood Oil, and M. H. Robineau, president of Frontier Refining.



Below, looking up for a minute from the booklet he had been reading is Augustus C. Long, president of The Texas Company. . . . Below right, in this smiling threesome are Bert C. Mattei, Honolulu Oil president; William M. Vaughey, Independent Petroleum Association president; and William H. Garbade, Crescent Corporation president.





New officers of the Association of Petroleum Writers (APW) are Clarence F. Mantoath, Tulsa World, secretary-treasurer; Wanda Jablonski, Petroleum Week, vice president; and LeRoy Menzing, Fort Worth Star-Telegram, president.



Among those at the head table at the APW dinner Sunday evening were Eloise Michel, of the API; Russell R. Palmer, of Petroleum World, retiring APW president; and Helen Brown, The Oil and Gas Journal, the Association's assistant secretary-treasurer.



A camera study of Herbert A. Yocom, editor of Petroleum Week. . . . Right, Cecil W. Smith, and Don E. Kliever, both of World Oil; and Jay W. Curtis and Grady Triplett, both of Gulf Publishing Co., in the press room.



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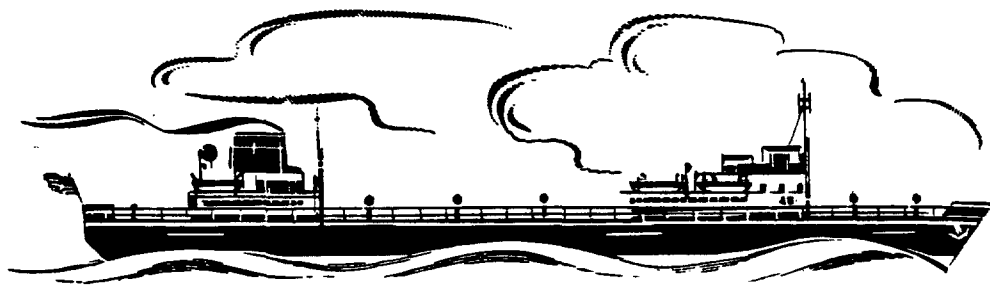


Appearing on Jane Todd's radio program over KCBS is Edgar Kraus, manager of exploration for Atlantic Refining.

FOURTH ESTATE

Right, Frank O. Hall, Wichita Falls Record; J. Richard Shaner, API publicity director; and Henry D. Ralph, *The Oil and Gas Journal*, at the APW reception. . . . Below right, the Monday press conference with Frank Porter, API president. . . . Below, Conger Reynolds, Standard of Indiana public relations director, and Milburn Petty, of *The Oil Daily*, enjoying a visit.





TR



Receiving certificates of appreciation at the group session Monday are Calvin T. Thomas, General Petroleum; William M. Rust, Jr., Humble Oil & Refining; Lee R. Cowles, Standard of Indiana; Munger T. Ball, Sabine Transportation president; Clyde F. Dowd, Tide Water Associated (ret.);

P. C. Spencer, president, Sinclair Oil; Charles S. Jones, president, Richfield Oil, who made the presentations; Carl H. Gompf, Ohio Oil; Josiah A. Polhemus, Jr., Standard of California; and John W. deGroot, Tuscarora Pipe Line. Awards were for outstanding work in transportation.

Left, Chairman
Frank O.
president



Speakers at the group session on Monday were: Above, Val Peterson, Federal Civil Defense administrator . . . Above right, Owen Clarke, Interstate Commerce Commission. . . Right, Professor Robert D. Gray, California Institute of Technology.



TRANSPORTATION



Left, Charles S. Jones, president of Richfield Oil and retiring API vice president for Transportation, presided at the group session. . . . Right, Frank O. Prior, president, Standard of Indiana, the incoming API vice president for Transportation, who succeeds Mr. Jones.

One group session and fifteen committee meetings were devoted to the vital subject of transportation at this year's meeting.

Speakers at the group session were Robert D. Gray, professor of Economics and Industrial Relations, California Institute of Technology; Owen Clarke, Interstate Commerce commissioner; and Val Peterson, Federal Civil Defense administrator.

Ten men were given certificates of appreciation at the group session Monday afternoon.

Officers for 1956 were elected at the annual Transportation club and Pipe Liners club dinners.



Left, in the audience at the group session was Rear Adm. H. C. Shepherd, United States Coast Guard. . . . Right, at the head table of a joint meeting of transportation committees on Monday were R. H. Lynch, Keystone Pipe Line vice president, and Albert E. Pecore, Humble Pipe Line vice president.



Left, Wendell N. Damonte, Sinclair Refining, gave the report of the division's nominating committee at the group session. . . . Right, buying tickets for the Pipe Liners club dinner from John C. Klinger, publisher of *The Pipeliner*, are H. O. Rockhill, of Socony Mobil Oil, and C. S. Mitchell of Cities Service.



TRANSPORTATION

Seated at the rear of the Gold Ballroom in the Fairmont Hotel at the group session were K. V. King, Standard of California; Addison Outwater, president, Royal Southwestern Oil Co.; Harry G. Schad, vice president, Atlantic Refining; and William McEldowney, Department of the Interior.



Newly elected officers of the Pipe Liners club are: secretary-treasurer, Oliver C. Klinger, Jr., publisher of *Pipe Line News*; president, J. L. Burke, *Service Pipe Line* president; vice president, J. H. Wood, Jr., *Atlantic Pipe Line* vice president.



Three Atlantic Refining men at the Transportation club dinner were Frederick M. Neall, A. G. Anderson, and J. D. Schofield, Jr.



Speakers at the Central Committee on Highway Transportation Tuesday were A. B. Gorman, Esso Standard; Miles E. Woodworth, National Fire Protection Association; and J. W. Sinclair, Union Oil.

Paul J. Bond, Pure Oil, new Transportation club president; Ray R. Hooper, Cities Service, the club's secretary-treasurer; and outgoing president Clyde F. Dowd, of Tide Water Associated.



Philip C. Compton Transp meeting

Thurland Clair Ref address Water 1

Glenn spoke on the same

TRANSPORTATION



Philip C. White, American Oil Company, spoke at the Water Transportation committee meeting Monday.



Thurland T. Wilkinson, Sinclair Refining Company, also addressed the meeting on Water Transportation.

Glenn A. Marsh, Pure Oil, spoke on tanker corrosion at the same session.

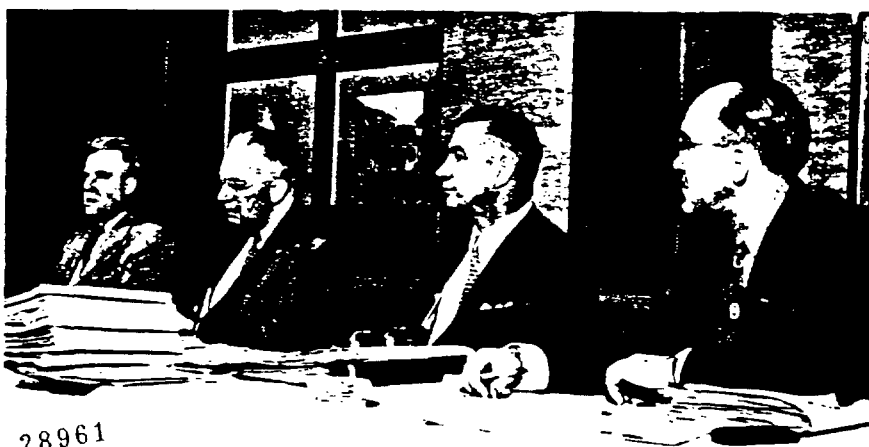


A friendly foursome at the Water Transportation committee meeting were Gordon W. Colberg and Reginald C. Warner, both of Standard of California; William J. Condon, Tide Water Associated; and Willard F. Jones, retired vice president of Gulf Oil, who presided.



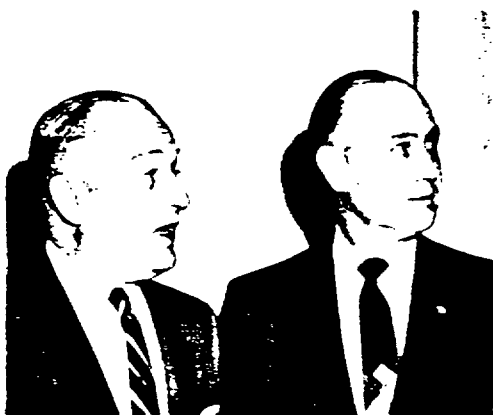
In the audience at the group session were Clarence R. McKay, W. F. Tegtmeier, Stender Sweeney, vice president, Cleve B. Bonner, secretary, and H. Safford Nye, treasurer, all of Richfield Oil.

At the head table at the Central Committee on Highway Transportation were Fred Hague, Sun Oil; J. J. Powelson, Esso; M. E. Nuttala, Cities Service, chairman; and Calvin Thomas, General Petroleum.



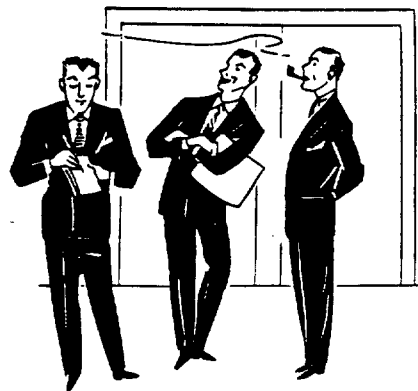


Members
on Tuesdc



Top left, W. K. Warren, board chairman of Warren Petroleum, was elected president of the 25-Year Club.

It was "eyes left" for M. H. Nolan and E. H. Hausner, of Sinclair Refining, as the camera shutter snapped.



HE



Two vice presidents in a Fairmont Hotel lobby visit are Kenneth A. Covell, of Pure Oil, and Robert H. Lynch, of Keystone Pipe Line.

J. B. Saunders, Triangle Refineries president, and J. B. Smith, D-X Sunray vice president, at a Marketing session.



APlers on a tour of San Francisco's Chinatown listen to a young guide explain the intricacies of worship in an Oriental temple.

One of th
the ladies



Members of the 25-Year Club gathered for their 16th annual banquet on Tuesday evening.

HERE AND THERE



One of the highlights of the entertainment that was provided for the ladies was a fashion show which this group attended.



Above, enjoying a hearty laugh are F. O. Koontz, Quaker State vice president, and M. P. Murdock, Ethyl vice president. ▲



W. H. Creel, of Phillips Petroleum, and L. L. Huxtable, of Ethyl, take time out of a busy schedule for a chat.

M. E. James, of Midland Cooperatives, checks his hat and coat.



HERE AND THERE



Two San Franciscans get together: Charles B. MacGlashan, of Shell, and Arthur L. Lyman, California Research Corp. president.



Three oilmen interested in research are F. P. Richter, Socony Mobil; E. P. Oke, British Petroleum; and W. L. Thompson, D-X Sunray.

These two camera closeups show Roland P. Hargis, Premier Oil Refining president, and, right, Bruce K. Brown, Pan-Am Southern president.



In this threesome are W. H. Claussen, California Research Corp.; E. H. Nelson, Magnolia Petroleum; and L. C. Kemp, Jr., Texaco.



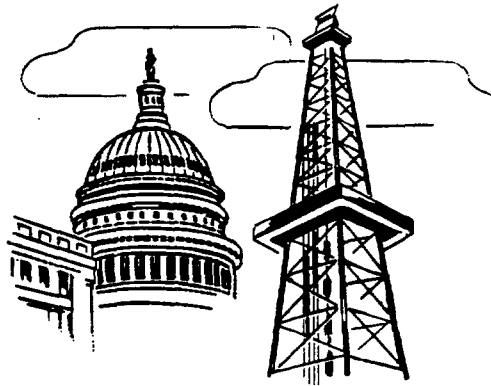
L. E. Fitzjarrald, of Phillips, was a Production committee chairman.



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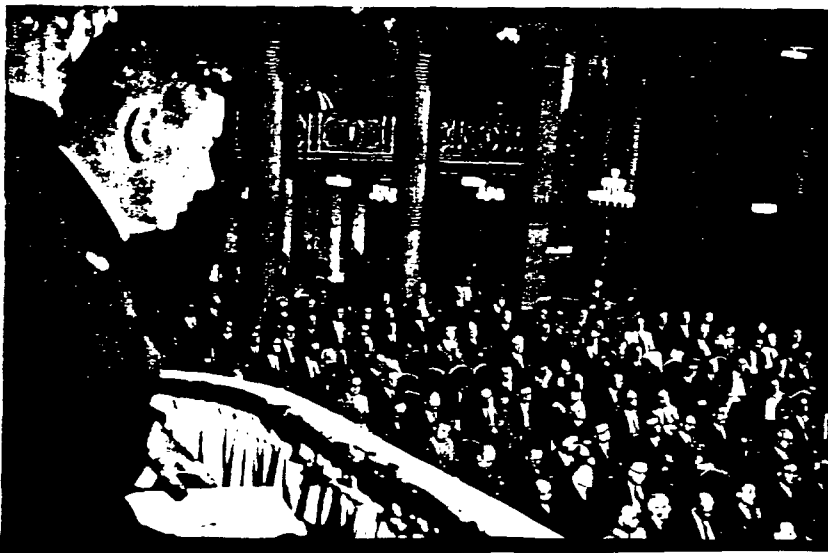


Claude Child, Mid-Continent Oil & Gas Association, and Ray C. Hinman, Socony, at the APIC session Tuesday.

Two speakers addressed the American Petroleum Industries Committee. Both spoke on the relationship of business and industry. T. S. Petersen, president of Standard of California, advocated the use of businessmen in government because they "have skills and knowledge needed to meet the problems of the day." John M. Peirce, director of finance for the State of California, advised businessmen to be forthright in presenting their views to public officials.



A general view of the audience at the session. Lt. Col. J. T. Martin, U. S. Air Force, is in the foreground.



At the head table were T. S. Petersen, Standard of California president; Robert H. Scholl, Esso, who presided; John M. Peirce, California's director of finance; and John H. Bivins, director of the APIC.



Joseph H. Russell, vice president of Gulf Oil, gave the report of the Board of Councillors at Wednesday's session.



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P. C. Spencer, retiring chairman of the API Board of Directors, presided at both general sessions.



Goodwin J. Knight, governor of California, addressing the first general session.

En route to
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Some of the capacity crowd
leaving the Curran Theater
after one of the sessions.



GENERAL SESSIONS

The annual meeting's two general sessions, held in the Curran Theater, were presided over by retiring API Board Chairman P. C. Spencer. Frank M. Porter, president of the API, gave his annual address Wednesday. He discussed the problems of better education, and government control over the producers of natural gas.

At the same session, Goodwin J. Knight, governor of California, warned the oil industry that it should be alert to combat the forces which would destroy the spirit of independence and enterprise. J. Howard Marshall, Signal Oil & Gas vice president, speaking for Walter S. Hallanan, president of Plymouth Oil, praised the work of the National Petroleum Council.

On Thursday, George M. Humphrey, Secretary of the Treasury, told the audience that the economic policies of the Eisenhower administration are making "have nots" into "haves" with a stake in free enterprise. H. S. M. Burns, president of Shell Oil, and S. Clark Beise, president, Bank of America, addressed the same session.



Frank Porter, API president; Rev. Karl Block, Bishop of the Diocese of California, who delivered the invocation; and J. Howard Marshall, who spoke for Walter S. Hallanan.

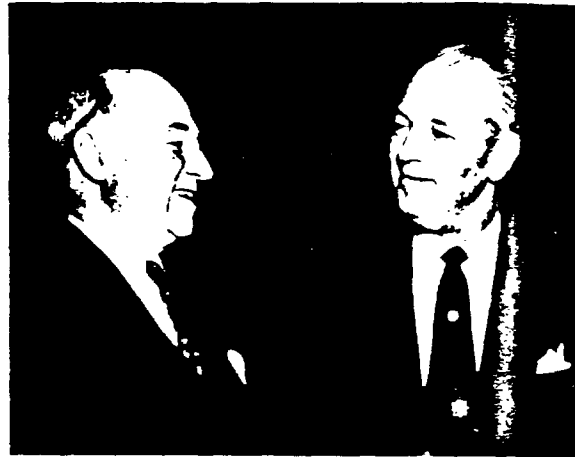
En route to the second general session on Thursday were E. H. Wellemeyer, vice president, and R. V. Whetsel, both of Cities Service.

Stopping for a minute in the lobby of the Curran Theater are M. A. McNulty, M. G. Paulus, vice president, and S. A. Montgomery, all of Standard of Indiana.





▲
S. Clark Beise, Bank of America president, who declared that business management has proved itself competent to cope with the problems and complexities of progress.



▲
George M. Humphrey, Secretary of the Treasury, who addressed the Thursday session, and Jake L. Hamon, independent producer of Dallas and newly elected chairman of the API Board of Directors.

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Left, two Texaco men at the Wednesday session were Frank Hamlin, of Santa Cruz, Calif. (retired), and M. Halpern, senior vice president.

Below left, two Mexican oilmen at Thursday's session were J. J. Merino and Sen. Antonio J. Bermudez, both of Petroleos Mexicanos. . . . Below, Shell Oil men F. S. Clulow, vice president, and J. G. Wilson.



SESSIONS



Father John Connolly, of the Archdiocese of San Francisco, gave the invocation Thursday.



Left, H. S. M. Burns, Shell Oil president, spoke on "Industrial Fission". . . . Right, seated in the front row Wednesday were C. S. Teitsworth, Socony director and vice president, and W. L. Stewart, Jr., senior vice president of Union Oil Company of California.



The 1,800 seats in San Francisco's Curran Theater were "sold out" at both of the sessions.





Above, this trio provided entertainment at one of the suites . . . Below, in an informal mood are G. J. Peterschmidt, Eldorado Refining vice president; C. A. Elmborg, vice president, K-T Oil Corporation; and L. M. Woodward, treasurer, and R. N. Cooper, vice president, of Derby Refining.



At the Dresser luncheon are Frank B. Burns, and Eddie G. Kessler, of Kerr-McGee, and Harold M. Smith, of the Bureau of Mines.



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Below, at the Union Oil suite, relaxing between sessions, are Darrell T. Stuart, of his own firm; Ralph Glass and W. H. Jamieson, both of Union Oil; Thomas Roberts, of West Covina; R. E. Robbins, of Union Oil; D. L. Dunn, president, Dunn Oil Co.; and Boyce R. Clark, Clark Tank Lines.





R. S. Stewart, vice president of Standard of Ohio, is greeted at the Dresser luncheon by J. B. O'Connor, Dresser executive vice president.



Gathered in the Sinclair Oil suite for a brief respite are Gelston Howell, of Ethyl; P. G. Pollard, of Sinclair Oil & Gas; and C. F. McGoughran, secretary, and E. L. Steinger, vice president, of Sinclair Oil.

Three of the hosts at the Youngstown-Emsco-Continental reception are J. W. Schmid, vice president, Youngstown Steel Products; F. I. Brinegan, executive vice president, Continental Supply; and J. A. Crawford, president, Youngstown Steel Products.



Looking over a selection of oysters are R. J. Villagrana, Standard of California, and Donald F. Harnar, Republic Steel.



At Standard of Ohio's suite in the Fairmont, are T. E. Morton, and R. C. Sauer, vice president, both of Sohio; Frederick S. Lott, Department of Interior; C. E. Spahr, executive vice president of Sohio; and J. D. Harnett and C. E. Curry, Sohio Pipe Line vice presidents.

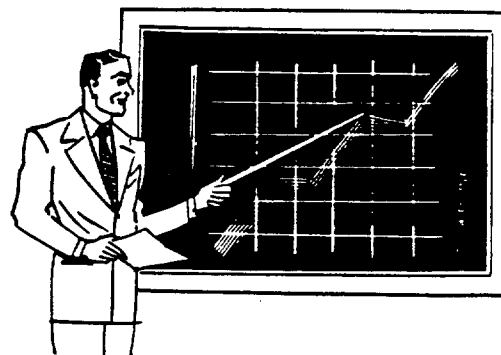




At the head table of the Committee on Tank Cleaning were J. A. Price, Phillips Petroleum; F. G. Wilson, API staff; Henry K. Ball, Ethyl Corporation, who presided; and M. J. Neterer, Sinclair Refining.



F. G. Wilson of the API (standing), presided at the Joint Meeting on Accident Prevention and Fire Protection on Thursday morning. Seated are R. A. Randels, Shell; J. Howard Myers, Atlantic Refining; and J. F. McKenna, also of the API.



Service Station Advisory committee chairman Dwight T. Colley, vice president, Atlantic Refining.

The Research Project 52 Advisory committee met on Sunday. Seated directly in front of the mirror is George R. Lake, Union Oil, who presided.



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G. S. Dunham, Socony Mobil, and Dean S. Turner, Standard of Ohio, chairman, at a meeting of the Committee on Training.

COMMITTEES

Beginning as early as the Tuesday prior to the formal opening of the 35th annual meeting, and continuing through Friday, one day past the formal closing, hard working committees convened to discuss scores of topics important to the oil industry.

Both divisional and non-divisional committees met on such subjects as the History of Petroleum Engineering, Unfired Pressure Vessels, Service Stations, Pipeline Hydraulics, Liquefied Petroleum Gas, and Off-the-Job Safety.

In all, there were more than 140 committee meetings in connection with the annual conclave.



Sidney A. Swensrud, Gulf Oil board chairman, calling the Economic Processes Study committee to order.

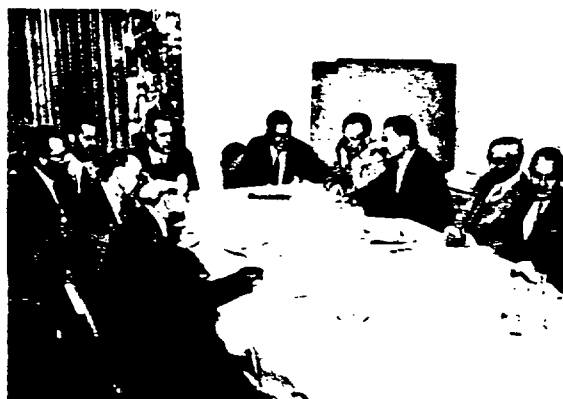


Above, the Jobber Advisory Committee met on Monday. Standing is John Harper, president of Harper Oil, who presided. . . . Left, co-chairmen of the joint meeting of the Automotive Research and Petroleum Products committees were C. E. Davis, vice president, Shell Oil, and R. C. Alden, Phillips Petroleum.



COMMITTEES

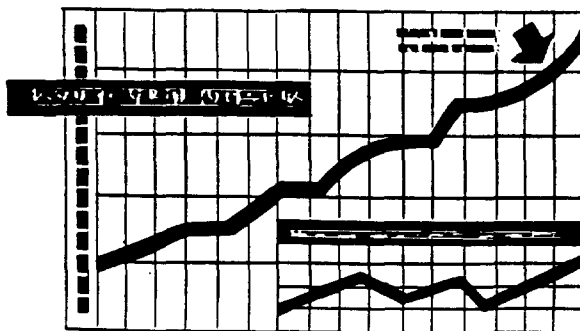
Right, the Marketing Personnel Training committee, with Chairman Frank Markley, of Sun Oil, standing. . . . Below, the Research Committee of the Board at luncheon. Chairman Robert E. Wilson, Standard of Indiana board chairman, is at the head of the table. Hugh W. Field, vice president of Atlantic Refining, is addressing the group. . . . Below right, the Research Project 50 Advisory committee. R. R. Brattain, Shell Development, presided.



The Agricultural Advisory Committee met on Monday in the Hawaiian Room of the Fairmont Hotel. W. W. Vandevener, of Vanson Production, presided.

Conferring on a point is the Defense Services Committee, which met Tuesday. W. R. Boyd III, assistant to the president, Cities Service, was chairman of the group.





PETROLEUM STATISTICS



Markets for gas and oil will continue to expand during future years, but 1956 will bring more moderate demand increases than 1955. This means competition will be keener, and selling efforts will have to be stepped up aggressively by companies wanting to keep their share of the business.

This general outlook for the petroleum industry was seen by leading economists at the Committee on Petroleum Statistics' open session in the Italian Room of the St. Francis Hotel.

Among those who followed the proceedings of the Committee on Petroleum Statistics with particular care were Fred Van Covern, API statistician, and Neil Buckley, Delhi Taylor Oil.

The statistical group session audience included Capt. A. S. Miller, director of Naval petroleum reserves, and J. S. Blanton, of Scurlock Oil.

Participants in the Committee on Petroleum Statistics meeting on Wednesday included Henry N. F. Schwall, of Shell Oil, who presided; and Walter E. Hoadley, Jr., Armstrong Cork treasurer; John G. Winger, The Chase Manhattan Bank; and Nathaniel B. Guyol, of the UN, speakers.





BUYERS



Above, John R. Guynes, Magnolia Petroleum, was chairman at the meeting. . . . Right, speakers Jake L. Hamon, Austin Cadle, and W. H. Bratches.

Although the Buyers' meeting on Tuesday afternoon was listed as a non-divisional committee session, it filled the large Concert Room at the Sheraton Palace Hotel to capacity. Jake L. Hamon, independent oil producer of Dallas, spoke on "A Look at Greener Pastures." Austin Cadle, Standard of California, gave "An Appraisal of Future Energy—Demand and Supply in the United States." W. H. Bratches, Shell Oil, delivered "A Report of the Petroleum Industry Buyers' Pipe Committee."



Left, Martin Newell and Harold Black, both of Tidewater Associated, and Joseph Abeling, Neal Supply Company. . . . Right, R. H. Anders, Sun Oil, and E. H. Weaver, Union Oil vice president, at the Buyers' meeting Tuesday.



Many a lively informal discussion took place, like this one between Frank B. Vandegrift, Hudson Van Oil president, and John H. Case, Wilshire Oil.

Freshening their perspective on the annual meeting as a whole by looking over the fall issue of the Institute's quarterly are G. Stewart Brown, Standard of California, and Henry Fondu and John S. Cooke, hard-working API staffmen.



This Sinclair quarter helped entertain guests at the company's Sheraton Palace headquarters: W. D. Cross, Jr., vice president; V. R. Tomlinson; J. A. Ahearn, vice president; and D. R. McCallum.



OFFSTAGE

OFFSTAGE

En route to Wednesday's sessions are J. W. Taylor, National Cooperative Refinery Association treasurer; Frank W. Adams, Mellon National Bank & Trust Company vice president; and Joseph F. Adams, Washington oil consultant.



OFF

Laurenc Henry, L as Robe a point evening



In these candid photos are George A. Welch, Big West Oil . . .



Perce E. Allan, Tide Water Associated vice president . . .



Marc F. Braeckel, vice president of Sinclair Refining . . .



Suntide Ref at the St. F

Roy W. Francis, of the Berry Asphalt Company, receiving a souvenir from a Midwest Oil Register representative. ►

Russell M. Riggins, Texas Gas Corporation president, during an offstage moment with J. O. Balzer, of Ethyl.



Robert H. C Ohio, in a p



V. A. Fogg, president, res

OFFSTAGE

Laurence D. Reis, Ethyl, and R. Paul Henry, D-X Sunray vice president, listen as Robert A. Douglass, of Ethyl, stresses a point he is making during their early evening hotel corridor discussion.



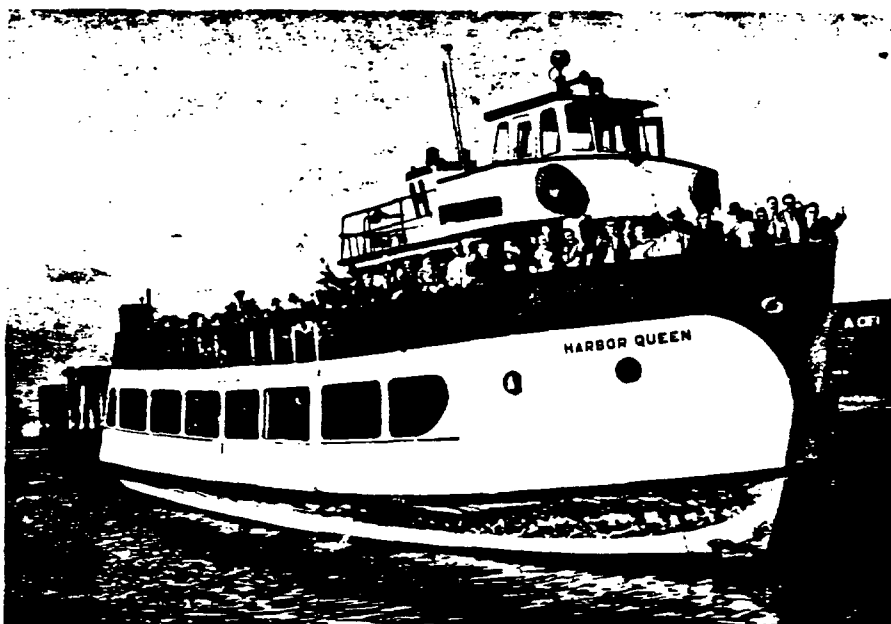
Suntide Refining's E. W. Patterson at the St. Francis . . .



Robert H. Collacott, Standard of Ohio, in a pensive mood . . .



A. Fogg, Texas City Refining president, rests a moment.



Sightseeing trips around San Francisco Bay aboard this roomy excursion boat were among the popular extra-curricular attractions.

Thomas W. Phelps, assistant to Socony Mobil's board chairman, and Alfred Jacobsen, board chairman of Amerada, meet informally.



OFFSTAGE



This Fairmont lobby twosome is Charles E. Webber, of Sun Oil, and Gulf vice president Philip E. Bohart.



Evelyn Martin and Edward C. Belefski were among the API staffers whose behind-the-scenes efforts helped make the 35th annual meeting a success.



Two Continental Oil vice presidents, Charles A. Perlitz, Jr., and Theodore A. Van Griethuysen in a brief visit toward the end of the meeting's second day.



Victor H. Bowman, of Pure Oil, and Frank C. Havens, Platte Pipe Line vice president, review some of the highlights of the annual meeting.

Interesting and diversified spare time activities were arranged by a host committee of the Western Oil and Gas Association which included Barbara Sage, Honolulu Oil; Gardiner Blackman, Tide Water; and F. T. Garesché, Standard of California.



NEXT STOP, CHICAGO 1956

MOST oilmen attending the annual meeting were sorry when it drew to a close. The sessions had been interesting and profitable, the arrangements well handled, and the city attractive. Even those planning vacations in Southern California, Mexico or Hawaii seemed reluctant to be on their way. But as bags were being packed, travel plans completed, and before the exodus began by car, rail, air and sea, industry leaders were looking forward to next year's gathering in familiar Chicago, where the largest numbers have always registered for API meetings in past years.



Arranging their return trips, above left, are Armand H. Masiran, president of his own oil company in nearby Sacramento, and F. B. Loomis, of Shell, sending appropriate wires. . . . Above, right, Harold M. Geller, Commercial Oil Refining vice president, checks on his train reservations. . . . Below, oilmen enjoy a farewell social hour at the Sheraton Palace late Thursday afternoon. . . . Right, taking a last look at San Francisco's steep hills and the bay and bridges beyond are Harold D. Brennand, of The California Company, New Orleans, and J. Howard Barksdale, Triangle Refineries executive vice president, who is about to go back to Houston.





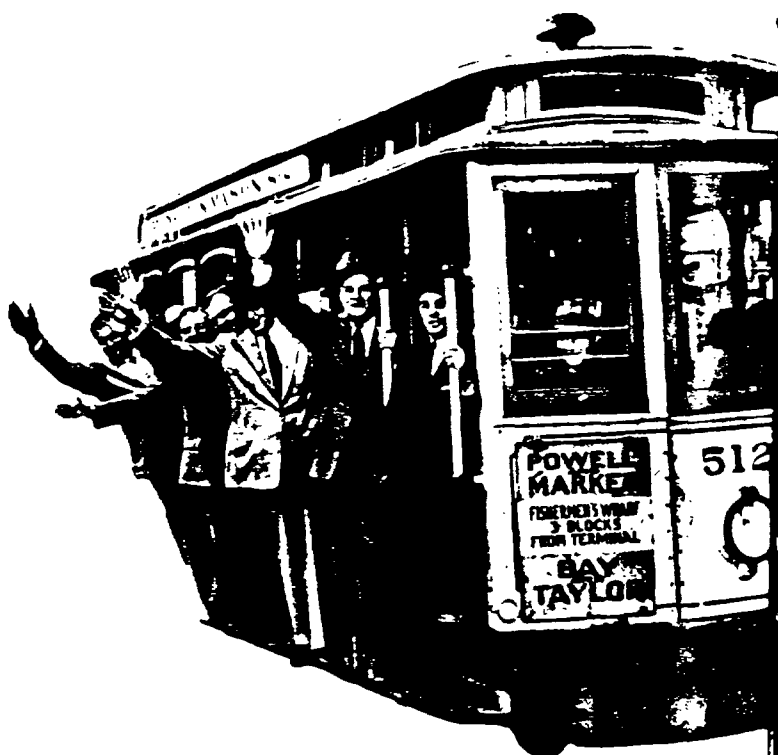
Packing is no problem for L. W. Moore, American Oil executive vice president, upper left, with his wife on hand. . . . Above, E. D. Brockett, Gulf Oil vice president, and Mrs. Brockett, taking a taxi at the Palace.



Above, Clarence Ludwig, of Lane Wells, paying his hotel bill. . . . Below, Charles L. Severy and Paul G. Benedum, president, both of Hiawatha Oil and Gas, leaving the Mark Hopkins.



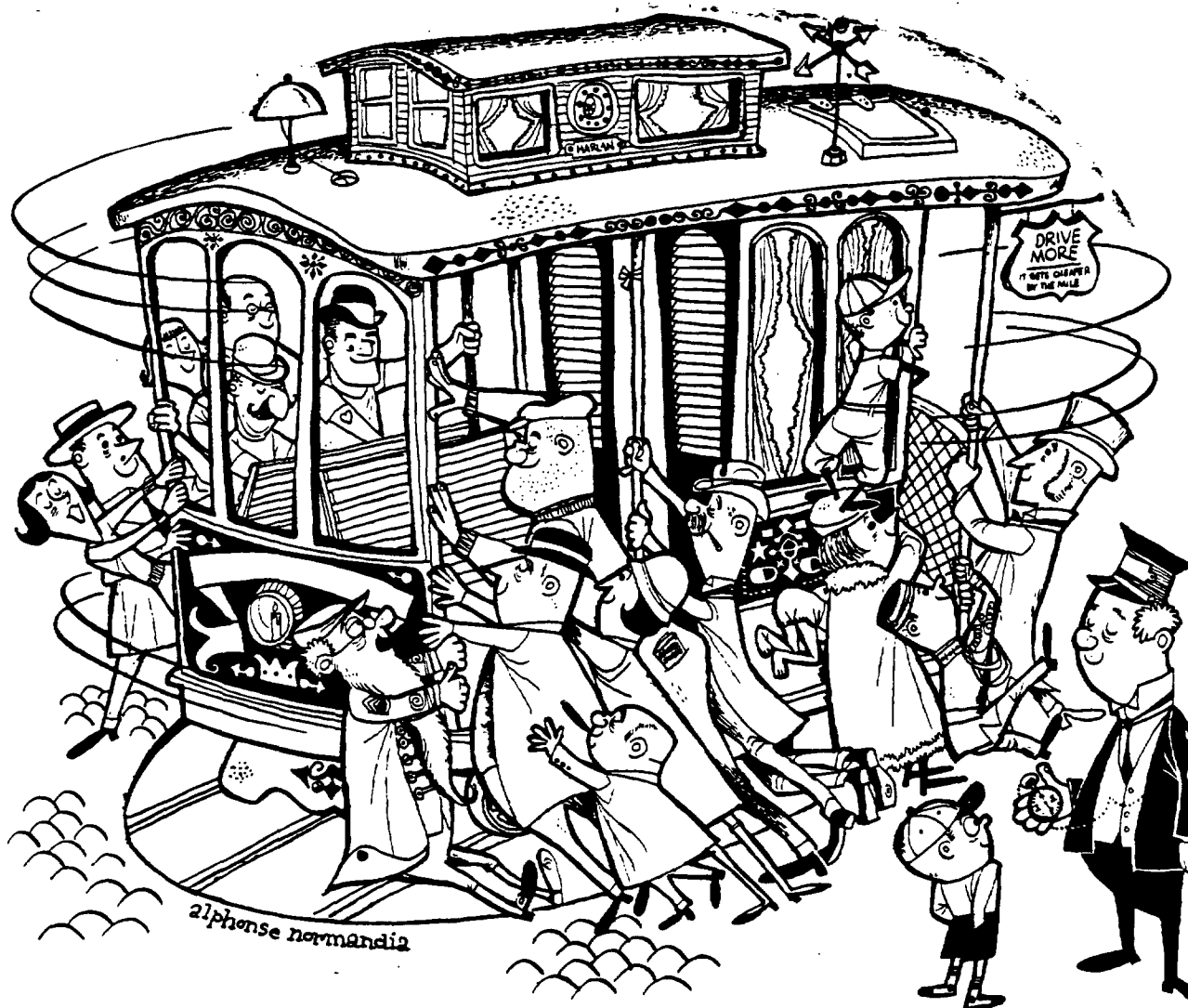
NEXT STOP, CHICAGO 1956



Like any other visitors to the Golden Gate City, APlers enjoyed the novelty of traveling by cable car. Here a group of oilmen is taking a final clanging trip up Powell Street.



ETC 28983



There's nothing like working together

Whether it's turning a cable car or having an API meeting, things are certainly more successful when everybody works together.

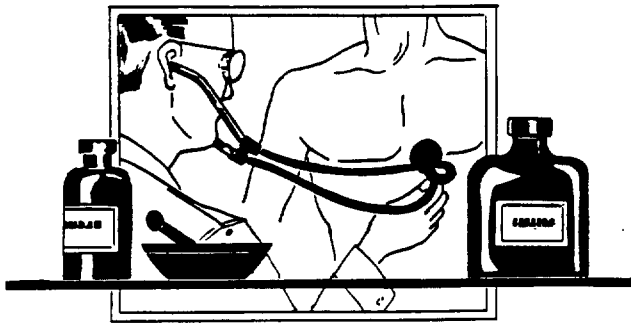
You might say the same thing of Ethyl Corporation. All of the various departments—manufacturing, safety, research, sales and the others—are continually working together toward a common goal.

All of the united effort we can muster is directed toward expanding and improving our facilities and services—so that we can be of even greater assistance to the members of the petroleum industry.

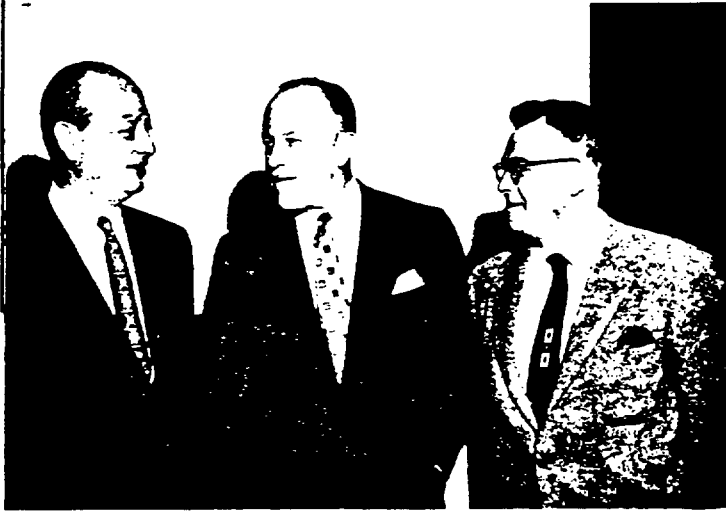
We're proud to be part of this industry.



ETHYL CORPORATION
New York 17, N. Y.



MEDICAL and HE



Speakers included Dr. Howard P. House, of University of Southern California, and Dr. George M. Saunders, Socony Mobil medical director. They are shown with Dr. Douglas E. Wheeler (right), of the subcommittee on noise in industry.

FIRST of the 1955 annual meeting's group sessions and a newcomer to the program this year was the Monday morning gathering devoted to the health of petroleum industry employees. Oil company medical directors and industrial relations and safety men were among those who gathered in the Fairmont's Terrace Ballroom to hear four speakers. They heard talks related to API medical activities, industrial hygiene in the industry, the noise problem and truck drivers' ailments. Lead-off speaker was Dr. George M. Saunders, Socony Mobil medical director and chairman of the API Medical Advisory committee. He pointed out how the industry as a whole, through the API, is giving increasing attention to the health of both oil workers and consumers of petroleum products. "Modern industry, especially the petroleum industry, accepts the responsibility for the health of the employee on the job," another speaker said.

Right, Dr. Melvin N. Newquist, of The Texas Company, who discussed "The Aging, Ailing Truck Driver," and Dr. L. E. Curtis, of Standard of California.

Among those attending the session were Murray Hamilton and Gerald Fisher, of General Petroleum.



James W. "Industrial notes before

Right, two Wooster, of Arkansas the meeting Below right Laird, Wa

