PLAINTIFF'S
EXHIBIT
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ETHYL NEWS

1942

ETC 22833

PUBLICATIONS OFFICE

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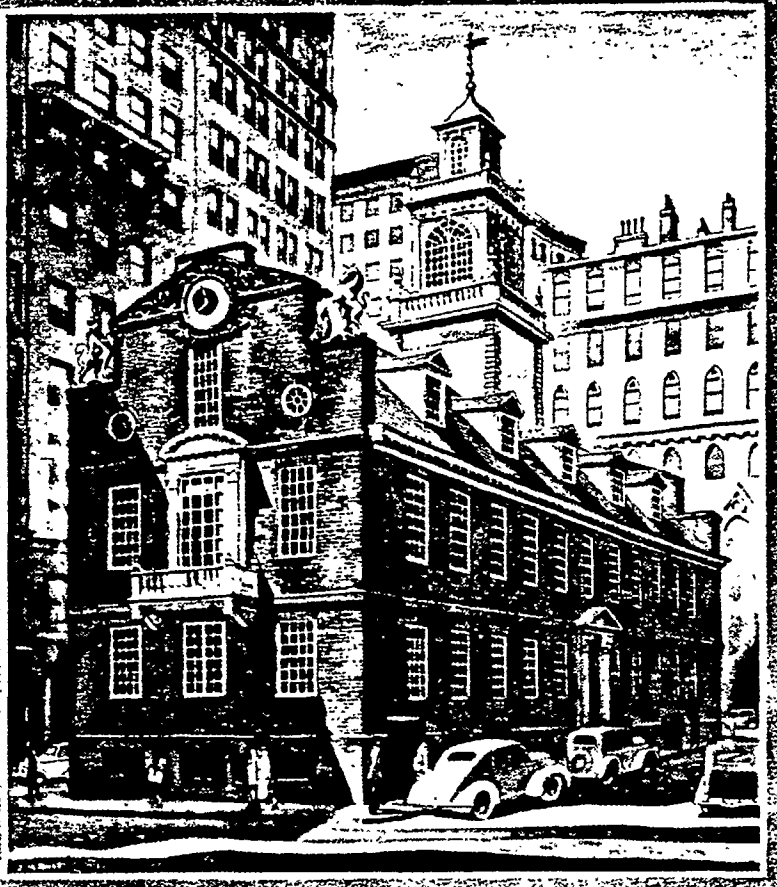
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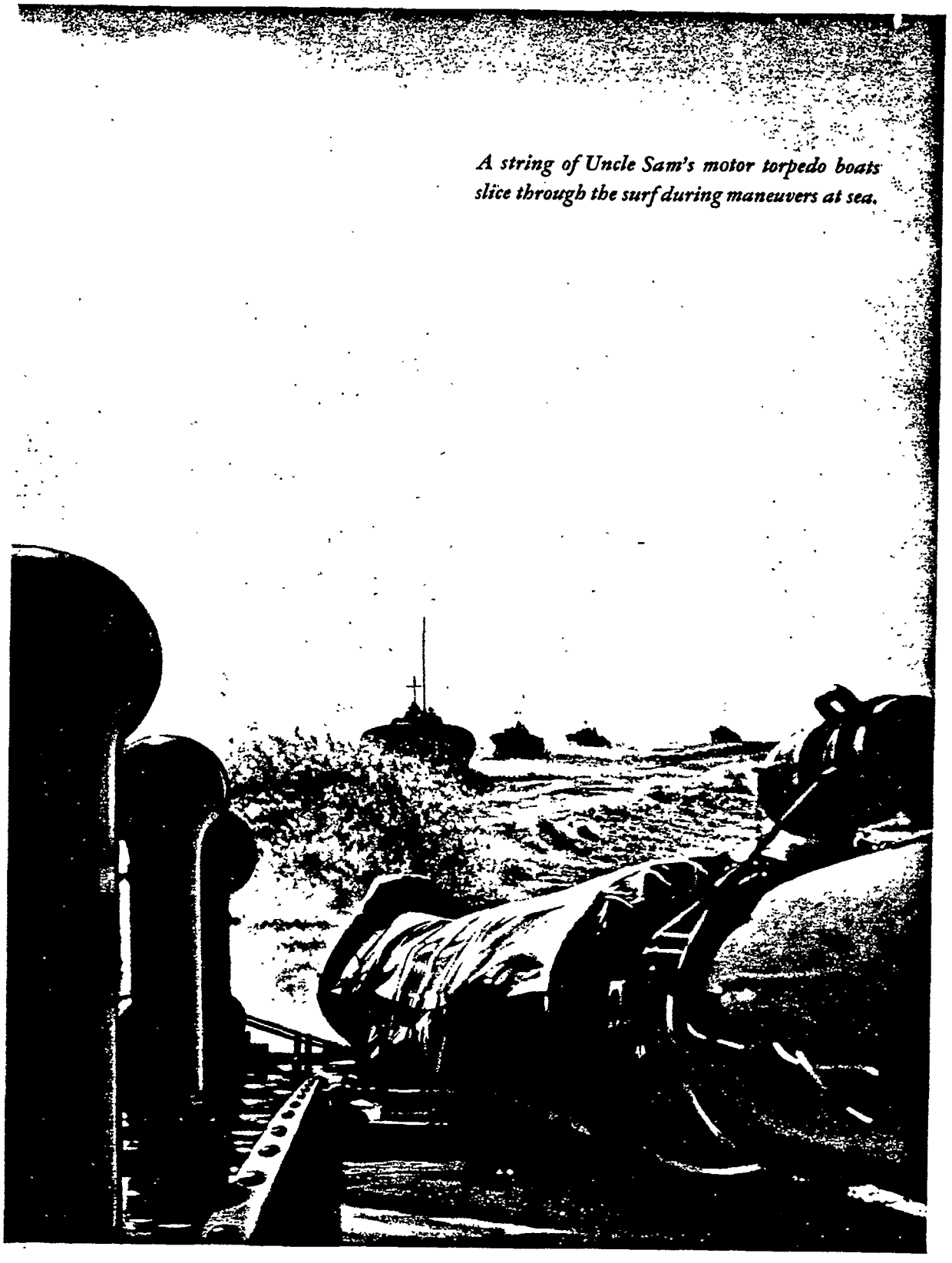
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A string of Uncle Sam's motor torpedo boats slice through the surf during maneuvers at sea.

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Southern Cow Country

Famed for Sunshine and Orange Groves, Florida Also Has Cattle Ranges Rivaling Those in the West.

By J. FRANCIS COOPER

FLORIDA, oldest and yet youngest among the important cattle states, is a cow country of vast proportions. Its cowboys with their 10-gallon hats are as colorful as any to be found, and its rodeos and round-ups are rip-roaring events spectacular enough to satisfy the fans who want their thrills fast and furious.

Although the tourist still sees the "hatracks of the highways" as he rolls along, recent years have seen the quality of the cows advance by leaps and bounds and the number on the roads decrease proportionately. For Florida cattlemen are fencing thousands of acres of land and starting improved pastures by the hundreds of thousands of acres. Better cows must have better feed and are too valuable to let run loose on the sparse grazing of unfenced range lands.

Oldest because cattle were first introduced to America through Florida more than 400 years ago, Florida's cattle industry may be called the youngest because it is only in recent years that improvements have been made which bid fair to place the industry on a plane equal to that of Texas or the Midwest. The old man who sought the Fountain of Youth brought heifers to Florida on his second trip in 1520, and these were the first cattle to set foot on the American continent, so far as authentic records go. Other Spaniards who followed Ponce de Leon brought other livestock, some of which fell into the hands of the Indians. Thus the blood of Spanish cattle has coursed through the veins of Florida's cows to this day.

Small cow kingdoms began to spring up in the Sunshine State as long as 200 years ago, and ranching has brought wealth to cow families since that time. Vast acreages, ranging up to 150,000 or more acres, are the rule rather than the exception. Often part of the land is owned, considerable of it leased. In recent years the tendency has been towards ownership.

In his book, Four Centuries of Florida Ranching, George H. Dacy says that in the cow country around Kissimmee everything possible is done by the cattle families to hold their sons in the business. When a boy is born, his rancher-father immediately designs an appropriate brand, purchases a branding iron and starts a herd for the newest arrival by branding a couple of heifer calves. The ceremony is repeated on the lad's birthday, at Christmas, and on other occasions. As soon as the youngster is big enough he is bedecked in a pair of juvenile cowboy boots. Doting relatives teach the lad to shoot, throw a lariat, cook a meal in the open, ride herd, and how to brand, mark and handle cattle. And all the while, his little herd of beeves is on the grow. By the time he attains his majority he is imbued with the spirit of the ranch and is the owner of several hundred cows and heifers.

Dacy also relates the story of wild and wooly events in the sun-drenched peninsula and tells how cattle thieves who had the misfortune to be caught were meted swift and primitive justice, without benefit of law. When cattlemen began to fence range lands, fishermen and moss gatherers who figured that their rights were being taken away—even though they had no claims on the land—often laid miles of new fence low on nocturnal forays.

A source of diversion for the bucka-

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A palmetto cutter prepares acres of flatwoods lands for cattle pastures.

roos who ride the ranges are annual rodeos, held in several different Florida towns, in which cowhands prove their ungrammatical jingle: "There ain't no horse which can't be rode; there ain't no rider which can't be throwed." Best known among them are those held annually at Arcadia and Kissimmee, rivals for the title of cow capital of Florida. Most of the rodeos are staged near holidays, such as the Fourth of July and Armistice Day, or in connection with fairs and other celebrations. In both color and crowds they rival similar and better known events at Cheyenne and other cities of the West.

Each spring students in the University of Florida College of Agriculture in Gainesville stage a rodeo and "Little International" Livestock Show, which plays before 15,000 spectators in the University's football stadium. Organized primarily to give the students experience in fitting, training and showing animals from the College herds, the event includes rodeo attractions for entertainment. Although it is staged entirely by students, who are the only performers, it is lent cooperation by cattlemen and professionals throughout the state, who furnish wild cows, steers and broncs and other requisites.

Oldtime cowboys in Florida had plenty of riding in line of duty, since it often was a long trail to the range, and too, until less than a half century ago most of Florida's cattle were marketed in Cuba and had to be driven to coastal loading points. But nowadays motor trucks carry horse and rider to the point on the range where he is to work and move many of the cattle to nearby markets.

When the Cuban market disappeared Florida cattlemen found themselves under many handicaps, many of which persisted until quite recent years. Because of the quarantine against the cattle fever tick, Florida's cattle had to be marketed in the South. As long as the country was infested with the tick, attempts to introduce purebred bulls for breeding up Florida cattle herds met with failure, because the bulls soon succumbed to tick fever. But beginning in 1906 the United States Department of Agriculture, launched a drive to eradicate the tick from the South, and after 35 years the tremendous task is nearly complete.

The tick is making its last swamp stand in a few counties of southern Florida, and complete eradication from the state has been delayed by refusal of Secretary Ickes to permit slaughter of deer on the Indian Reservation. The eradicators found that the tick failed to disappear after the cattle had been dipped the required number of times. They finally placed the blame on ticky swamp deer, and Florida Live Stock Sanitary Board officials then undertook to slaughter the deer, with intentions of later restocking.

A malady known locally as "salt sick" plagued the Florida cattle industry for decades. Animals grazing on certain ranges became gradually weakened and emaciated, and had to be moved to healthy grazing lands. Animal research workers at the University of Florida Agricultural Experiment Station, attacking the problem in recent years, found that the difficulty was due to a lack of minerals—mostly iron, copper and cobalt—in the vegetation being grazed and devised a mineral mixture which alleviates the trouble.

Another plague, the screwworm fly, descended on the industry subsequent to 1934, attacking open sores on cattle and laying its eggs. But, to a certain extent at least, this proved to be a blessing in disguise, since it forced the owners to give closer attention to their animals and accelerated a vast cattle advance-



These Florida-bred steers of T. D. Matthews defeated the best Texas entries for grand championship honors at the Florida Fat Stock Show.

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nent program that in 10 years has brought more improvement to the Florida industry than had 400 years of previous efforts.

For the past several decades scientists from the United States Department of Agriculture have been searching the far corners of the earth for better grasses adapted to this country, and most of those brought here have been especially suited to the South. The Florida Experiment Station, cooperating, has tested the grasses and determined which possessed merit and which did not. Thousands of acres of Florida's flatwoods lands have been rid of their saw palmettos, galberry bushes and other undergrowth and sown to grasses which provide a carpet of green throughout three fourths of the year. Special disc harrows, rotary cutters, and pasture mowing machines have been designed for the work. Some cattlemen are even using airplanes in seeding their acreages, so vast are the expanses and so desirous of speed are the sowers.

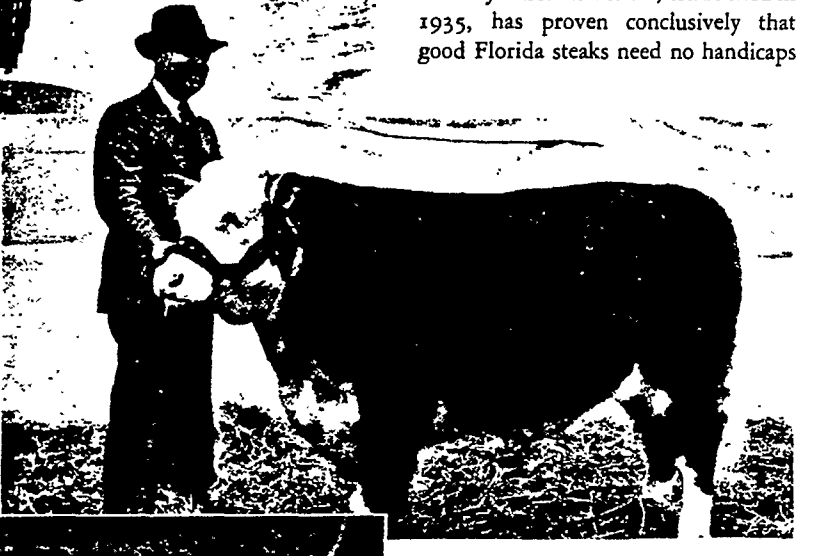
The University of Florida's Experiment Station, at the main farm in Gainesville and at branch stations scattered throughout the state, has made an intensive study of feeds for beef cattle, giving particular attention to sugarcane, Napier grass, sorghum and other crops that grow better on Florida's sands than does corn, the universal feed. With better cattle and improved feeds, Florida's ranchers and farmers are now producing beef that rivals the best steaks from Kansas City, Omaha or Chicago. If proof of this is needed one has but to visit the Florida Fat Stock Show in Jacksonville or the Southestern Fat Stock Show in Ocala any February. Here the royalty from the Florida feedlots are on parade, and when they are slaughtered their carcasses grade prime, choice and good instead of medium and common.

The Jacksonville show, established in 1935, has proven conclusively that good Florida steaks need no handicaps when placed in competition with those from elsewhere. Purchasers fortunate enough to obtain some of this fine beef, including hotels in the ritzy East Coast resorts, clamor for more. The Ocala show was held for the first time in 1941, and is a clincher to the argument.

Old yet ever young, the Everglades State's cattle industry—with its estimated 1,500,000 cattle on the ranges—bids fair to make its more famous rivals look to their laurels.



Trucks carry well-fed cows to the Gainesville auction market.



RIGHT: *George Duke proudly exhibits his grand champion steer at the 1941 Florida Fat Stock Show at Jacksonville.*



A student bulldogger wrestles a wild steer at the University of Florida's annual livestock show and rodeo.

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Secretary of Agriculture Claude R. Wickard is a frequent speaker on the National Farm and Home Hour.

FARMER'S BULLETIN

"Everything of Importance to Agriculture" is the Program Policy of NBC's National Farm and Home Hour.

By ANTHONY J. KOELKER

NBC Farm Editor

"FOR a special broadcast of the national corn husking contest, we take you now to the scene of action in La Salle County, Illinois."

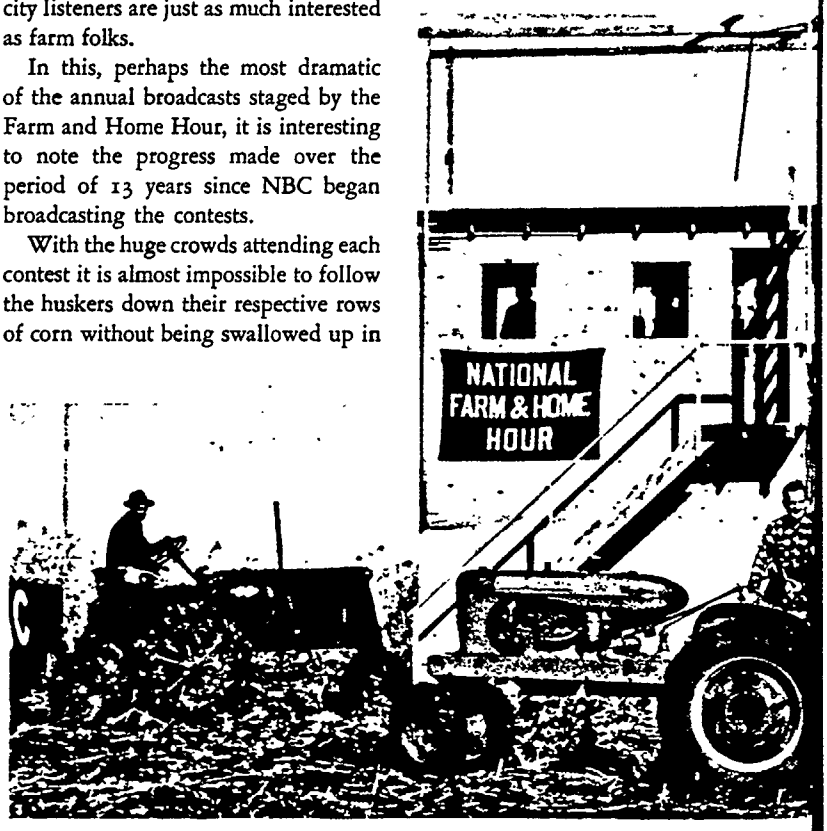
When those words rang out over the National Broadcasting Company's coast-to-coast Blue network last November 3 the nation's attention was focused on the thrilling "battle of the bangboards" about to start. While thousands of persons were on the scene to witness the colorful corn belt derby, countless others (an estimated 7,000,000) witnessed the farm sports spectacle through the eyes of Everett Mitchell and several other NBC announcers who described the contest on the National Farm and Home Hour program.

In their farm homes, city apartments, business offices and in their automobiles radio listeners all over the nation stopped to listen to the thrills and excitement that always surrounds this event. While there are millions, too, who listen to an important football game of a Saturday afternoon, for the most part they are football fans—fans who know something about punts and forward passes. But in the case of a corn husking contest there are a good many listeners who have never laid hands on an ear of corn and haven't the slightest conception of what a nubbin might be. There is something about it that mystifies them. Perhaps it's the novelty of the idea. Maybe it's the mystery of how things grow out of the soil. At any rate the remarkable fact is that city listeners are just as much interested as farm folks.

In this, perhaps the most dramatic of the annual broadcasts staged by the Farm and Home Hour, it is interesting to note the progress made over the period of 13 years since NBC began broadcasting the contests.

With the huge crowds attending each contest it is almost impossible to follow the huskers down their respective rows of corn without being swallowed up in the mob and imprisoned in a jostling sea of humans. In the early days NBC's announcer and engineer rode horses to follow the contestants. Frequently, that proved risky business, what with a cagey horse "acting up" and threatening to un-horse the engineer or announcer and his sensitive equipment.

Now the latest model rubber tired tractors are used to pull specially



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BOARD OF THE AIR



Everett Mitchell announces Farm and Home Hour programs.

equipped rubber tired wagons housing the newest of short wave broadcasting apparatus. These unique mobile units have no difficulty in getting around the field to give the announcers a close-up view of the action. Tractors have proved safer and far more adaptable.



The corn husking contest, of course, is only one of the special events broadcast on the Farm and Home Hour. "Everything of importance to agriculture" has long been the program policy of NBC in connection with the program. In conforming with this long established policy it was a simple matter to decide to do a broadcast from the Kane County, Ill., farm of Clarence Dauberman last July 31 when that pioneer farmer was honored for the part he played in the development of the high compression tractor. Here was an event of "national importance." Here was a farmer who had contributed greatly to the development of power farming. Here were the makings of an interesting broadcast. So the National Farm and Home Hour took its microphones right out to his farm and broadcast the ceremonies over more than 100 radio stations throughout the country.

The same policy on the part of NBC dictates broadcasts from such famous events each year as the International Live Stock Exposition; the National Dairy Show; the annual conventions of the National Grange, Farm Bureau, 4-H Congress, Future Farmers of America; various outstanding harvest festivals, etc. Likewise, the annual meeting of the National Farm Chemurgic Council is broadcast annually because it qualifies under the heading of "national importance." The National Plowing Contest also has been broadcast because farmers throughout the country are interested in knowing all they can learn about new developments in plows and plowing technique, about gasoline tractors and the results they record in this test.

The latest in mobile broadcasting units is used to put the national corn husking contest on the air. A blimp floats overhead.



Whoever coined the phrase, "The Nation's Bulletin Board of Agriculture," to describe the Farm and Home Hour certainly made a direct hit. The slogan has been identified with the program for more than 13 years, but it is perhaps even more accurate now than back in 1928 when the first broadcast was aired over a small network of 17 stations. Evidence of that was found recently when farmers from every state in the nation were meeting in Washington, D. C., to consider their problems and to prepare a national farm program for the coming year.

Over a period of three days a farmer from each of the 48 states spoke on the program. Each gave a concise summary of farm conditions in his own state and also outlined what producers are doing to meet the defense and war challenge.

Periodically the United States Department of Agriculture releases its official

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pig crop report, a survey that is always anxiously awaited by farmers. The report is officially released at noon in Washington, but if you'll tune in on the Farm and Home Hour on the day it is scheduled for release, you'll hear a summary of the report on the broadcast. That's another sample illustration of how the program serves agriculture. "The Nation's Bulletin Board of Agriculture" is no misnomer.

The year 1941 will go down in history as one of the most eventful periods in American agriculture. The watchword of the year—Work and Produce—has been applied by the farmers of the nation as well as by the workers in industry. And in setting in motion the new food for freedom campaign, American farmers have found themselves up against a test of efficiency in production.

Here again NBC, through the Farm and Home Hour, has performed yeoman service in helping to launch the various "action" programs to mobilize American agriculture and to acquaint farmers with the job at hand. Throughout the year, the keynote of the program has been national defense.

Early in the year a complete daily report to the nation on the progress being made in national defense was started on the broadcast. The reports were designed to give a rounded picture of the day-by-day developments in national defense, both in private industry and in governmental projects.

Another series of programs dealt with "Nutrition in Defense." The whole question of proper nutrition was discussed in the series by the foremost authorities in the fields of medicine and nutrition.

As this is being written the Farm and Home Hour is launching another weekly series, titled "American Agriculture Mobilizes." It presents the story of agriculture's biggest job of all time. Each week a group of farmers and defense board members discuss the problems, specific goals and plans of farmers in different sections for increased production of food to aid in the war effort.

On Tuesday, December 16, a group of Iowa farmers appeared on the program to discuss the subject, "Keeping Farm Machines in the Front Lines." Participants were Albert J. Loveland, chairman of the Department of Agriculture Defense Board in Iowa; Fred A. Cahalan, chairman of the defense board in Cerro Gordo (Iowa) County; and Earl M. Dean, a farmer living near Mason City, Ia. In the course of the interviews with Everett (It's a Beautiful



Back in the early 1930's an announcer at a corn husking event had to ride horseback.

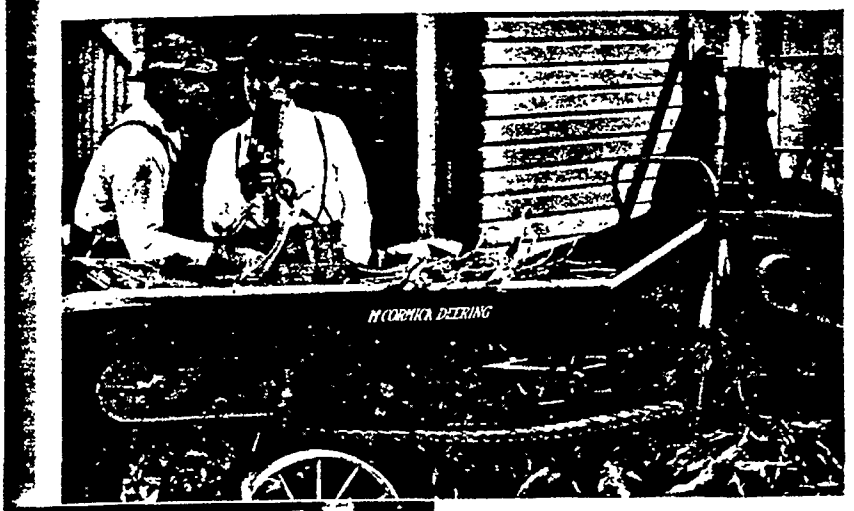
Millions of listeners hear how prize sheep are groomed for a livestock show.





William Drips, NBC's director of agriculture, asks a blue ribbon winner at a stock show to "moo" for the radio audience.

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Everett Mitchell interviews a farmer in the latter's own barnyard.



William Drips studies the poultry situation at first hand.



Walter Blaufuss and his Homesteaders orchestra are a popular entertainment feature heard regularly on the National Farm and Home Hour.

●

Day in Chicago) Mitchell, it was pointed out that "under conditions where corn is grown mainly by hand labor it requires about nine hours of labor to produce a bushel of corn. And now better farmers in Iowa are able to produce a bushel of corn with six minutes of labor with the use of modern machines."

Dean told a nationwide audience that "I know for a fact that my farm produces about 25 percent more now than it did in 1920, when I started farming. I figure about half of that is due to liming, growing clovers and generally taking better care of the soil. And about half of it is due to power farming." He also reported that he is using a tractor that's over 10 years old, but expects to use it another five or six years by taking good care of it. Actual farmers telling their stories to their fellow farmers across the country is an effective way of mobilizing agriculture for the task ahead.

Secretary of Agriculture Claude R. Wickard is a frequent speaker on the programs. On July 28, 1941, the Farm and Home Hour presented its 4,000th broadcast—a record unequalled in the history of radio. Speaking on this anniversary program Secretary Wickard said: ". . . But whatever comes, I know that these programs will continue to serve farm and city people—and serve them well. Whenever we have some facts that need to go out nationwide, we always turn to the National Farm and Home Hour. It's one of the Old Reliables in our business of taking information to the American people. I know we'd be lost without it, and I think that millions of farm and city homes would too."

Agricultural information, however, doesn't fill the entire program. William E. Drips, NBC director of agriculture who supervises the programs, strives to maintain a balance between information and entertainment. Included in the entertainment portions are such features as the music of Walter Blaufuss and the Homesteaders orchestra; a dramatic sketch titled "Uncle Sam's Forest Rangers"; tips on "Party Plans" by Helen Stevens Fisher; and songs by the most talented NBC staff artists. A daily feature is the comment of H. R. Baukhage, ace NBC newscaster, direct from the nation's capital.

It has been said that the Farm and Home Hour is the farmer's own ticker tape. Whether or not you're a ruralist, you'll find it educational if you tune in any week-day at 12:30 p.m. EST (11:30 a.m. CST; 10:30 a.m. MST) over your nearest NBC-Blue network station.

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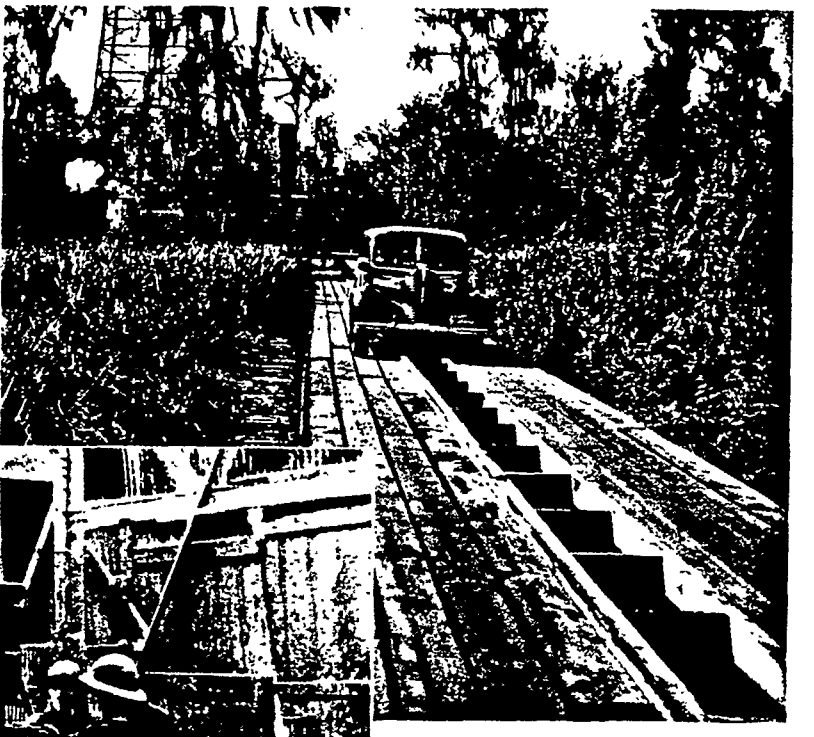
Directional Drilling

Oil Deposits Which Were Formerly Out of Reach Can Now Be Tapped by Slanting Wells.

OIL DRILLERS are now drilling crooked holes on purpose! From 1859 when the first oil well was completed until quite recently the driller's objective has been to penetrate to the oil sands with a minimum of deviation from the vertical. Now, however, he has developed a new technique of directional drilling. With this technique he is able to penetrate to oil reservoirs that do not lie directly below the point at which the drilling rig is set up. He can drill up to 44% off the vertical. If he chooses he can go down thousands of feet in one direction and then point the drilling tools in another direction. As a result oil today is being recovered through well heads on shore from sands that lie under the sea and also the drills have penetrated to sands that lie below buildings and parks and other deterrents to the placing of a rig.

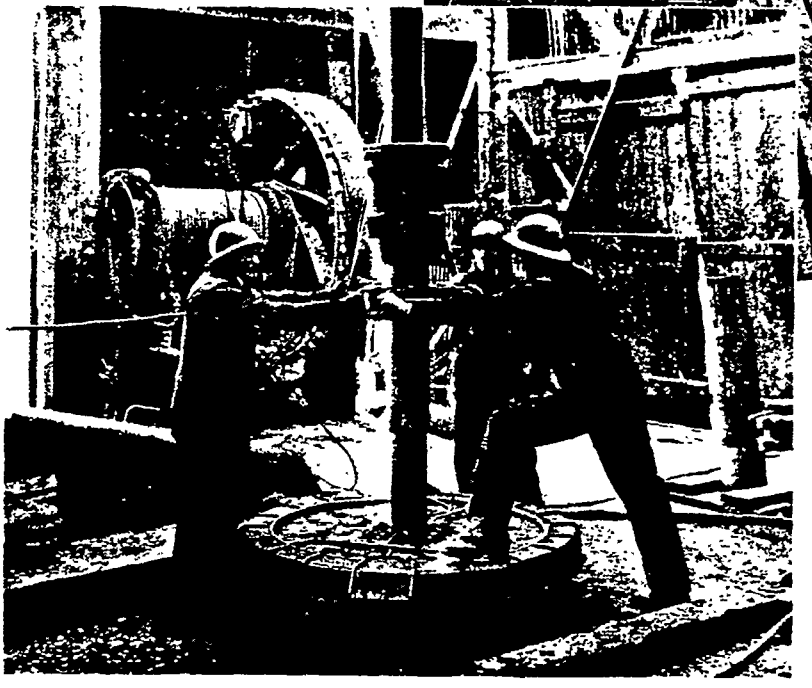
Strangely enough directional drilling is an offshoot of the elaborate techniques developed during many years to hold wells strictly to the vertical. The drilling rig always has a tendency to stray from the vertical. Equipment and methods that were developed to hold it straight can now be used to guide it away from the vertical when so desired.

With tools developed that would hold a bit to a vertical course the question naturally arose, why could tools not be devised to guide the bit off at any desired angle and so the "whip stock" came into being. It is about five



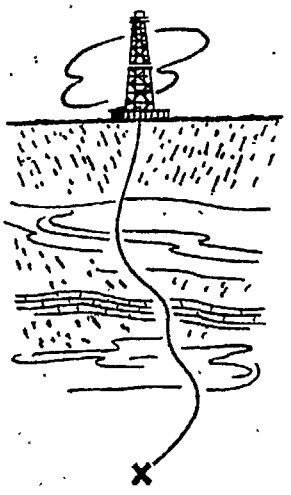
When a directional drill is used, drillers can avoid swampy country like this.

Courtesy of The Texas Company



"Roughnecks" couple up the drill stem at the beginning of drilling. The drill is rotated by the turntable on the floor.

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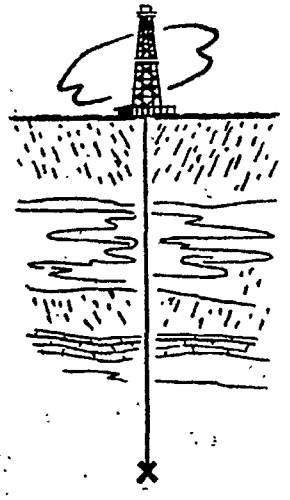
Before oil men found ways to keep the bit under control a cross-section of an oil well might look like this. As the drill pipe lengthened, the bit would tend to follow paths of least resistance.

feet long and looks like a grooved banana with a sharp point. When it is desired to direct the bit away from the vertical the whip stock is lowered into the hole in such as way that the groove turns the bit off onto the desired direction.

The same instrument which determines if a well is being drilled straight is used in directional drilling to make sure that the bit is boring in the right direction. This tool consists of a metal cylinder in which there are batteries, a compass, a plumb-bob and a camera loaded with special graph film. It is lowered into the hole and at regular intervals photographs of the face of the compass and of the plumb-bob are taken. These photographs indicate the direction in which the bit is heading and the degree to which it has deviated from the vertical.

Directional drilling has made possible the development of new oil fields which were hitherto practically inaccessible. Marine drilling is one instance of this. On the ocean front in California, Louisiana and Texas, where oil fields extend for thousands of feet under the water, wells now go down and out under the bed of the ocean. The heavy expense of drilling from piers, piles and barges is saved.

In Louisiana, directional drilling was called on to develop the oil fields under the lands of a university, without disturbing the university's normal activities. From one site, where the disturbance would be at a minimum, three wells were drilled. The first was drilled straight down to the oil formation. The second went slantwise in one direction, ending up 2,000 feet away horizontally and thousands of feet deep, under the livestock farm. The third was drilled in the opposite direction, hitting the oil sand under the university campus. On the surface the wells are only a few feet apart. Underground, in the oil formations, they are separated by thousands of feet.



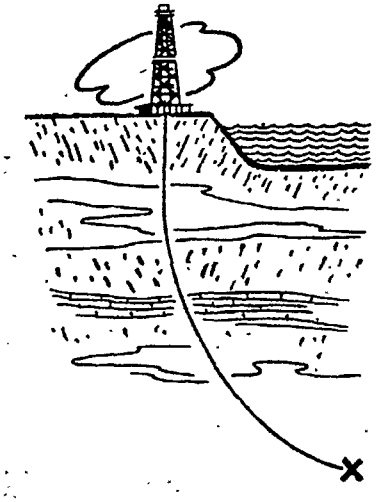
The straight, deep holes drilled to-day are results of instruments devised to chart the course of the drill and to keep the bit on its proper path even at two or more miles below the surface.

Directional drilling has been called upon to combat oil field fires. In the Conroe field near Houston, Texas, directional drilling was given a spectacular test. Here a well had blown up from a subterranean gas explosion, forming a huge crater 200 feet across and as deep, boiling with oil and throwing off fumes as dangerous as dynamite.

The inventor of directional drilling, H. John Eastman, was called in and told that if he could hit within 50 feet of the well's bottom the flow could be checked. Eastman promised to do better than that—to go within 25 feet.

Setting up his derrick behind a fireproof screen about 400 feet from the crater, Eastman began to shoot at his invisible target. He drilled straight down for 1500 feet, then on a slant which took the hole 300 feet southerly and 300 feet westerly, and then straight down again. Six weeks later, he figured he was within six feet of his target. Water under 1800 pounds pressure was pumped into the slanting hole, and within six minutes, a fall in pressure showed that the water had broken through into the bottom of the well. For 24 hours tense oil men watched the gauges. At 600 pounds the flow of the wild well suddenly ceased, checked by the column of water.

Buildings, canals, lakes, are no longer a barrier to the oil man's drill. Obstacles, man-made or natural, now rest undisturbed, yet the oil formations beneath them are tapped easily and exactly by directional drilling.



"Crooked" holes are now drilled on purpose. An off-shoot of the method developed to keep drill holes vertical permits the driller to slant his well in search of oil deposits hitherto considered inaccessible.

ETC 22845

Masters of the Soil

Ethyl's new sound motion picture is designed to show how the modern farmer makes use of science in agriculture.

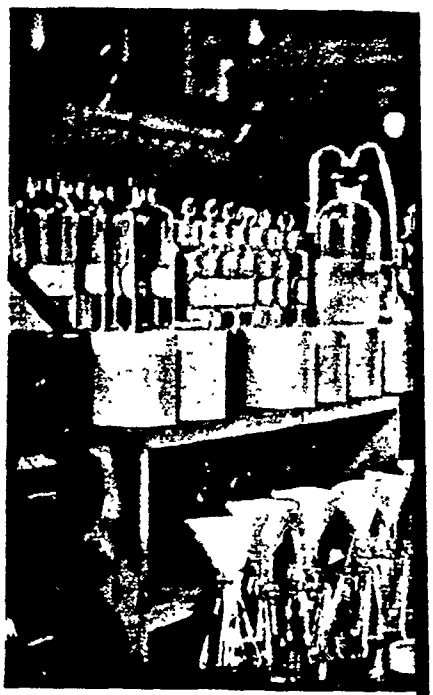
THE Ethyl Gasoline Corporation's latest sound motion picture, "Masters of the Soil," has educational value for all farmers and everyone connected with farming. Produced by Audio Productions, with the cooperation of the Soil Conservation Service of the Department of Agriculture and the Agricultural Engineering Department and Soil Technology Laboratory of Pennsylvania State College, it tells the story of the problems facing the American farmer and how he overcomes them through modern methods and the use of modern equipment.

Although there are approximately 1,900,000,000 acres in the United States, only about 415,000,000 of these are suitable for cultivation as crop land. Only 342,000,000 acres can be classed as really good, of which less than one-sixth now in crops is free from erosion. That portion of the country not suitable for cultivation is forest, mountain, under water, barren or used for commercial purposes. The farmer has learned how to get the greatest yield from this comparatively small amount of land by careful selection and rotation of crops to maintain the soil's fertility, contour farming where it is required, and conserving soil and rainfall by planting cover crops.

Aiding the farmer is the local farm advisory or county agent, the agricultural chemist and the agricultural engineer. The agricultural chemist tests samples of the farmer's soil and tells him its good qualities and its deficiencies—what he should plant in it for best results. A sequence of the picture, photographed in the laboratory at Pennsylvania State College with the assistance and advice of chemists of that institution, shows some of the tests made on a sample of soil.

The comparatively new employment of certain plants such as lespedeza and vetch as so-called cover crops forms the basis of another interesting sequence. These cover crops keep the soil in place and prevent run-off by rain in addition to being profitable.

Throughout the picture various makes of tractors are shown working the fields with the multitude of tools now available to the farmer. In every case these modern tools are hitched to modern high compression, gasoline burning tractors, which give approxi-

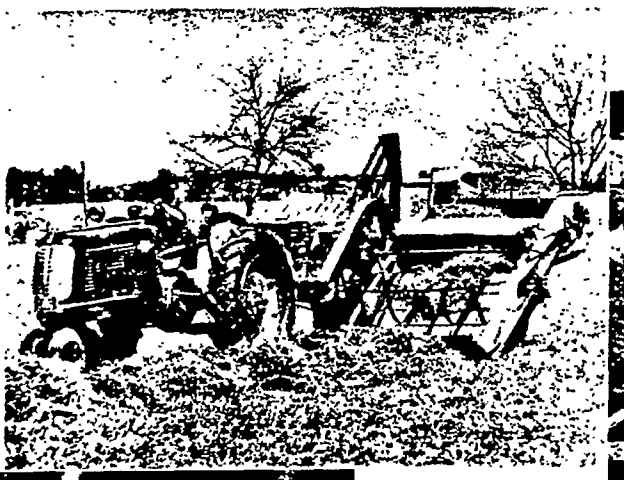




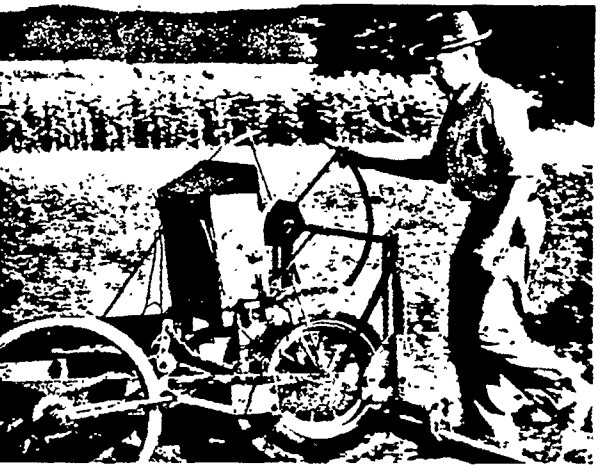


The old familiar checkerboard appearance of farms in many parts of the country is rapidly changing. Modern farmers are making their land more productive by strip farming and other up-to-date methods.

ETC 22846



BELOW: *A. W. Clyde, professor of agricultural engineering at Pennsylvania State College, watches the tillage meter, which determines the various forces acting on a plow.*





Dr. F. G. Merkle, professor of soil technology at Pennsylvania State College, tests soil samples in the laboratory.

ABOVE, LEFT: *A tractor draws a one-man automatic hay baler, a newly developed labor saving tool.*

mately 25 percent more power than low compression tractors of the same size and weight and permit the farmer to plant and harvest his crops in less time. The fact that low compression tractors can be converted to high compression is brought out by the agricultural engineer in the picture.

The saving of fuel accomplished by the high compression tractor is pointedly illustrated by the University of Nebraska tests which show that in 1935 one hundred acres of ground could be plowed with a given quantity of fuel, whereas today that same amount of fuel will plow 140 acres, a 41 percent increase since the introduction of high compression.

The improvement in tractors has run parallel with the improvement of existing farm apparatus and the development of new tools. Two of the most interesting of these new tools, the one-man automatic hay bailer, and the stop-hitch plow, are shown in the picture.

Despite all the advances which have been made over the course of years, progress has not stopped in the mechanical equipment used on the farm anymore than it has in agriculture itself. Research men in both the petroleum and automotive industries are working continually toward better fuels and better engines. And the farmer, through his agricultural organizations and the many services available to him, is making advances in the parent strain of both seed and live stock and in the distribution of farm products.



Changing a tractor from low to high compression is described.

ETC 22847



Our Forefathers Liked Beer

The Brewing Industry, a Big Business Today, Got Its Start Shortly After Noah Came Out of the Ark.

By

FRANCIS V. V. ADRIANCE

I TURNED on the radio to listen to the football scores. With joy I heard the glad tidings that my alma mater had trounced her keenest rival by a 28 to 6 count. I didn't pay much more attention to the broadcast until the announcer began the advertising plug for the program's sponsor.

"This evening why not visit your favorite tavern and drink a tall glass of Blank's rich amber beer with a collar of creamy white foam on it? . . ."

Beer? The name sounded familiar. Come to think of it, lots of people talked about this drink often. I decided I would like to find out what it is and how it is made, so I started to do some investigating.

Beer, I learned, is the all-inclusive term for fermented malt beverages such as lager, ale, porter, etc., and may be brewed from any starchy grain, though malted barley, with corn grits or rice as a malt adjunct, is generally used in the United States.

The first record of brewing, a drawing baked in pottery showing two brewery workers using long poles to stir the contents of a vat, was found in Mesopotamia and dates back more than 5,500 years to the 37th Century B.C. The Egyptian Book of the Dead, more than 5,000 years old, mentions beer made of barley. The beverage was known to the Chinese in the 23rd Century B.C., and in 2100 B.C. the Code of Hammurabi set forth certain rules and regulations which the tavern keepers of Babylon must obey—or else!

Excavations indicate that the Romans were brewers of merit, and during the Dark Ages the industry was kept going by monks in their monasteries and feudal lords in their castles and manor houses. By the 14th Century commerce in beer was important in the foreign trade of Hamburg, Austria, the British Isles, and the Scandinavian countries.

The American Indian knew about this malt drink, too, as Christopher Columbus discovered in 1502 while exploring the coast of Central America. According to an account by Hernando Colon, son of the explorer, when Indians visited the ship with "a sort of wine made of maize, resembling English beer," Columbus bought a quantity for his crew and ordered his bos'n to see what the boys up in the fo'c's'le would have.

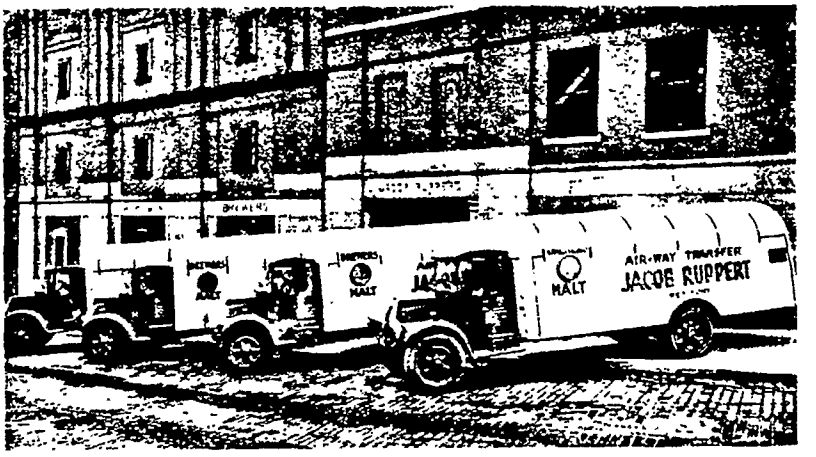
Although the *Mayflower* landed many years before a Governor of North Carolina made his famous remark to a

ETC 22848

LEFT: *A group samples the finished product at a party in the luxurious bierstube on the sixth floor of the Ruppert Brewery.*

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A line-up of some trucks which bring malt to the Ruppert Brewery.



Governor of South Carolina, historical record indicates that one of the reasons the Pilgrim Fathers put in at Plymouth was because it was getting to be a long time between drinks. The early manuscript states: "For we could not now take time for further search or consideration, our victuals being much spent, especially our beer . . ."

During the Colonial period owners of large farms and plantations ran their own breweries. General James Oglethorpe's establishment at Jekyl served the Georgia colonists. The brewery William Penn built at Pennsbury Manor in what is now Bucks County, Pa., remained standing until after 1884 and has recently been restored by the state. Many of the leading figures of the Revolution, among them George Washington, Thomas Jefferson, Samuel Adams, Patrick Henry, Israel Putnam and Dr. Benjamin Rush, were brewers or advocates of brewing as an incentive to moderation.

On the floor of a brewery in Baltimore the flag was made that flew over Fort McHenry in the War of 1812 and inspired Francis Scott Key to write "The Star Spangled Banner."

In the latter half of the 19th Century the discoveries of Louis Pasteur brought about revolutionary advances in brewing. It was Pasteur who first demonstrated the role of yeast in fermentation and the fact that yeast organisms can be controlled. Other discoveries and improvements aided the industry to build up to its peak in 1914, when 1,392 separate brewing concerns with a total capitalization of $72,914,000 and employing 75,404 persons in the breweries alone produced 66,189,473 barrels of brew.

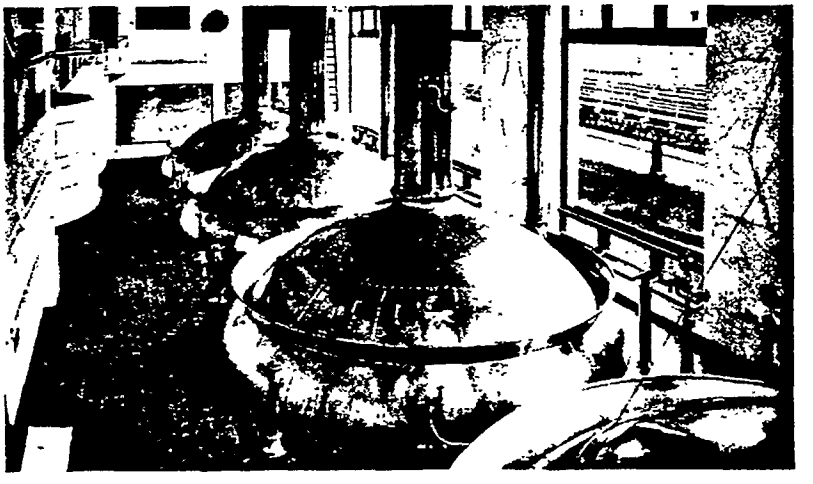
And then, on January 16, 1920, this entire industry was blotted out of existence by the 18th Amendment to the Constitution.

During those years of the speakeasy and the bootlegger when gang violence flourished, many brewers ceased operations entirely. Others, in an effort to salvage their large capital investment, made soft drinks or cereal beverages of less than one half of one percent alcohol. Still others changed their plants into creameries or manufactured ice cream, candy, cheese, malt syrups and other products.

The industry didn't begin its comeback until March 22, 1933, when President Roosevelt signed the Cullen-Harrison bill, legalizing 3.2 beer. Four years later, in 1937, the peak year since the death knell of National Prohibition was sounded, 720 breweries produced a total of 58,748,087 barrels. Laws have been enacted to correct the abuses of the pre-Prohibition era, one of the most important being the regulation which prohibits a brewery from having any financial interest whatever in any retail establishment.

The beer business is now an important cog in our national economic machinery. It contributes more than $300,000,000 in taxes yearly to the federal government, a large slice of which is used for defense purposes.

Over 55,000 wage earners and salaried employes of breweries are paid



Wort and hops are cooked in four 700-barrel copper kettles.

ETC 22849



Fermentation begins in these open tanks.



Beer is thoroughly aged in hundreds of glass lined storage tanks.

about $105,000,000 annually, while payrolls for the 980,000 wholesale and retail proprietors and employes are estimated by the United Brewers Industrial Foundation to exceed a billion dollars a year. In addition, hundreds of thousands of persons are employed in businesses which derive substantial benefits from the brewing industry, such as building, real estate, advertising, printing and lithographing, transportation, restaurants and hotels, petroleum, and manufacturers of barrels, bottles, cans, machinery, crowns, labels, fibre and wooden cartons, and many others.

Truck transportation is especially important. Reliable estimates place the number of trucks required for moving beer and empty containers at 15,000, representing an investment of $30,000,000. The gasoline and oil consumed costs more than $3,000,000 a year.

The farmer has a large market at the breweries, as the latter require the cultivation of more than 3,000,000 acres of American farm land to supply them with raw materials.

The Jacob Ruppert Brewery in New York is the largest beer plant east of the Mississippi and therefore an ideal place to learn how this popular drink is made. I received a cordial welcome there and was told something of the brewery's history, before setting out with a guide to explore it.

Founded in 1867 by Jacob Ruppert, father of George E. Ruppert, president of the concern, and of the late Colonel Jacob Ruppert, famed owner of the New York Yankees, it will soon mark its 75th anniversary. All this time the Ruppert Brewery has been at the same location, and the office of George Ruppert on the sixth floor of the main building is directly above the former site of the old Ruppert homestead where he was born.

In this age of specialization a man intending to start a brewery would enter into negotiations with bankers, architects, contractors and engineers, but in those days of rugged individualism Jacob Ruppert did none of those things. He simply acquired a tiny piece of land at 91st Street and Third Avenue, then took off his coat and went to work. With his own hands he cleared the ground of timber and erected a small building 50 feet square.

The first year's output of this tiny plant was only 5,000 barrels. From this beginning the Ruppert Brewery has grown to its present size, covering the better part of four New York City blocks, employing 1,800 persons, and with a daily production capacity of 6,500 barrels. Its garage houses more than 200 trucks and its power plant can furnish enough electricity to light a community of good size. Over twenty floors in the various buildings, some of them underground, are given over to glass lined storage tanks which have a capacity of 400,000 barrels of beer. There are 316 such tanks with an average capacity of 41,850 gallons each—the equivalent of almost 250,000 eight-ounce glasses. The largest is 100 feet long and holds 1921 barrels.

The various steps of beer making were explained to me by my guide as we went through the brewery. The main ingredients of the beverage are barley and either corn grits or rice, he told me, but the Ruppert Brewery uses corn grits exclusively as the secondary ingredient.

First the barley must be malted, which consists of steeping the grain in water and allowing it to sprout, after which further growth is stopped by heating. The malt then starts its travels, passing from a big hopper through the cleaning

ETC 22850

reel and then through the malt mills which crush it thoroughly and make it ready for cooking.

The cooking is done in a huge oval mash tun with a capacity of 850 barrels. The necessary amount of water is added and the mixture is brought to the proper temperature for the enzymes to act on the starch, while two propellers agitate it to insure even heating for one hour. While this is going on the grits are being cooked for an hour in a large pressure cooker.

The corn mash is then pumped into the converter tun containing the main malt mash, and there the gelatinized starch is converted into fermentable as well as non-fermentable sugars by the action of the diastase in the malt. Later a pure culture yeast containing the enzyme zymase breaks up the sugars and fermentation sets in. Alcohol, carbon dioxide, and other by-products of fermentation, such as ethers, esters and aldehydes, are formed. These highly complex substances are responsible for the zestful flavor which makes beer such a popular drink.

The converted mash is next pumped through electrically operated mash filters. Filter cloths between each section of the filter separate the mash from the liquid, which is known as wort. The wort flows by gravity to one of four big, brightly polished copper kettles, each of 700-barrel capacity, while the spent mash falls through a chute to the basement, where it is loaded on trucks and sold to farmers, who consider it an ideal cattle feed.

Hops are added to the wort in kettles at regulated intervals, and in carefully measured quantities, through large copper conduits which lead from the hop storage rooms on a floor above the kettles. This operation requires considerable skill.

The type of hop used is of particular importance. Hops are grown in various parts of the country, New York, Oregon, and California producing especially good grades. The hop flowers grow in cluster form on grape-like vines and contain a highly aromatic substance called lupilin, which imparts to the wort and subsequently to the beer a fine flavor and aroma commonly referred to as "hop flavor."

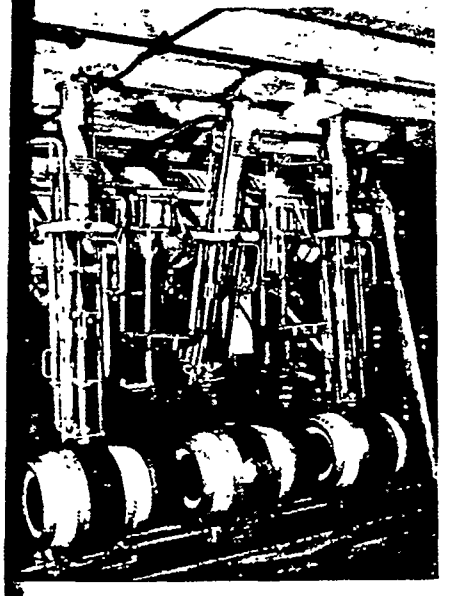
The mixture in each of the 700-barrel kettles is cooked an hour and a half at 212 degrees Fahrenheit. This boiling process concentrates the wort and completely sterilizes it.

The hop flowers are strained off when the liquid leaves the kettles and the clear wort is pumped into the cooler on an upper floor. The cooler has eight units, each containing six pipes and each pipe in turn containing 25 copper coils. In it the brew is cooled gradually to a minimum of 41 degrees and then pumped into open fermenting tanks, where the yeast is added.

A brewer's yeast, incidentally, brings out the individuality of his product. The yeast used in Ruppert's beer was brought over from Europe more than 50 years ago. As the culture multiplies far more rapidly than it can be used, the surplus is sold for vitamin extraction purposes.

At the conclusion of 24 hours in the open fermenting tanks, the brew goes to closed fermenting tanks for from eight to ten days, while the yeast does its work. During this period a considerable quantity of natural carbon dioxide gas is released, giving to the beer its creamy collar of foam. Then the brew goes to the closed storage tanks for a minimum of two months.

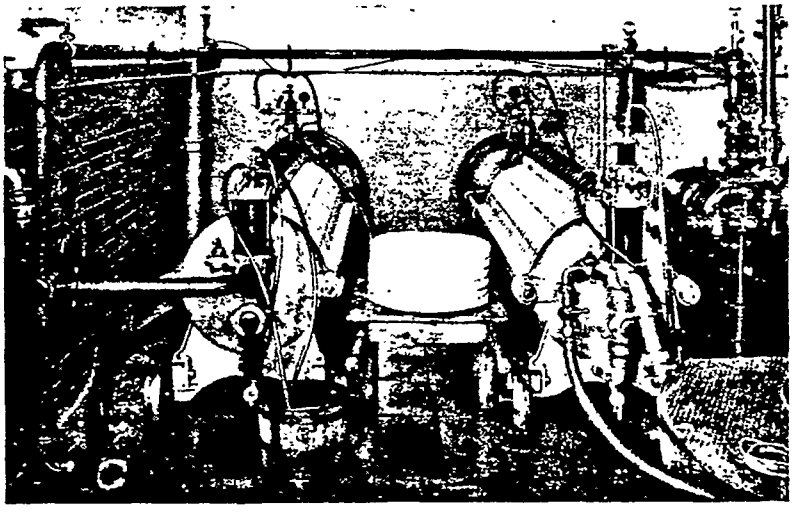
When thoroughly aged and mellowed in these cool, dark tanks, the



This machine fills and places the bung in four half-barrels at once, 160 per hour.

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In the filter Ruppert beer is forced by pressure through 65 pads like those in the center of the picture.



ETC 22851

beer is ready for its final filtering and clarification. Ruppert's beer is crystal clear and no wonder. There are 65 compartments in each filter machine and in each compartment there is a thick pad of cotton fibre. The beer is forced under 35 pounds pressure through all 65 of these pads, which remove every particle of foreign matter from the pale amber fluid.

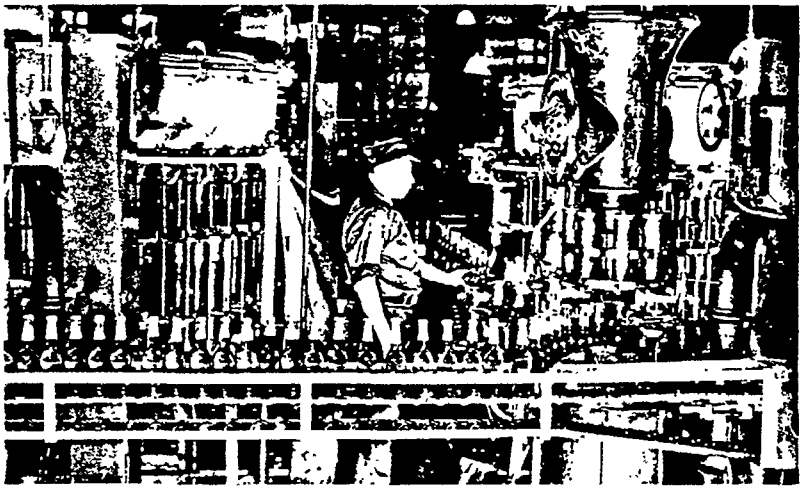
Our next stop was the building in which beer is made ready for distribution to the retailer. Both metal and wooden kegs are used for draft beer, the advantage of the metal kegs being that they are much lighter than those made of wood. Six large racking machines fill and put bungs in 160 half barrels an hour each. The date on which the beer goes into the keg is stamped on the bung. Empty kegs returned from taverns and bars are carefully inspected for defects and then are washed by one of five washing machines, each of which can wash 200 barrels an hour. Those kegs that need it are relined with liquid rosin which is sprayed on in the brewery's cooperage plant.

Machines with 50 spouts apiece each fill and cap 250 bottles of beer a minute. The bottled beer is then pasteurized. To insure absolute cleanliness, returned bottles are subjected to 12 different washings and thoroughly sterilized before they are refilled. Another machine pastes labels on the bottles, every label bearing the number of the machine which put it on and the date.

Beer cans are also filled by machine at the rate of 220 cans per minute per machine. The full cans pass through a pasteurizer, then a drying machine, and finally must pass inspection by an electric eye, which will detect and automatically kick out of line any incompletely filled cans. After passing the eye the cans are packed in cases by a machine which, like an adding machine, records every case packed.

In fact, the Ruppert method of putting up beer for shipment is a perfect example of mass production methods in action.

No visit to the Ruppert Brewery is complete without looking in on the bierstube on the sixth floor across the hall from the executive offices, where one has the opportunity to sample the finished product. Enough tables and chairs to accommodate several hundred persons and a long mahogany bar at one end constitute the furnishings of this big room. And the executives aren't the only ones who can enjoy a foaming glass of brew, for downstairs in the brewery is the working man's bar, attended by a bartender, where the men who do the mechanical work can relax for a few moments over a beer or two if routine work becomes too monotonous.



A conveyor belt carries bottled beer from the bottling and capping machine to the pasteurizer.

"Someone once told me beer was fattening," I remarked, as I blew the foam off a tall one.

"Not at all!" my guide replied emphatically. "Chemical analysis shows beer to have no more fattening ingredients than milk. Of course, anything is bound to be fattening if a person consumes an excessive amount."

He told me about a test conducted by a well-known physician who used ten girls from the Radio City Music Hall chorus as "guinea pigs." Each girl was given three bottles of beer a day for 18 days. She was weighed daily and her blood pressure and general condition checked.

In no case was there a gain in weight, and one girl who was considerably overweight lost eight and a half pounds. The doctor's statement gave as the reason for this loss the discontinuance of her habit of consuming sandwiches and sodas between meals. All the other girls lost weight slightly, but improved in general health and in the haemoglobin or red blood corpuscle content of their blood. In two cases a sub-normal blood pressure was returned to normal.

According to this doctor, the results indicated that a moderate use of beer is not fattening and is beneficial to indoor workers whose occupations tend to produce an anemic condition unless their diet is scientifically regulated.

Backing up this medical man's belief is Health Commissioner Fronczack of Buffalo, who said in a recent statement:

"People get the idea beer is fattening because those who drink it get large appetites and eat immoderately. Beer is a bitter tonic. It causes a desire for food. Naturally, when you drink and munch you will get fat. But the drink isn't doing it—it's the food."

"Have another?" my guide queried, after telling me these facts.

"I don't mind if I do," I replied, convinced by this time that beer is a first rate drink. I think I'll try it again some time.

ETC 22852

No Place For Diplomacy

Harvard Graduate Deserts American Embassy in Mexico City to Try His Hand at the Dangerous Sport of Bull Fighting.

By MARTIN SHERIDAN

THIRTY thousand people jammed El Toreo, Mexico City's largest bull ring. Mexico's President, in the Presidential box, raised his hand and the bugler sounded a call signifying the opening of the bull fighting season.

All eyes were fixed upon the entrance gate in expectation of the usual colorful entrance march. Instead, a chugging tractor tore onto the field with an American picador seated upon it. Cries of "Corby! Corby" arose. In a moment 30,000 throats were laughing heartily at the "gag" performance of Hugh Corby Fax, United States Embassy official.

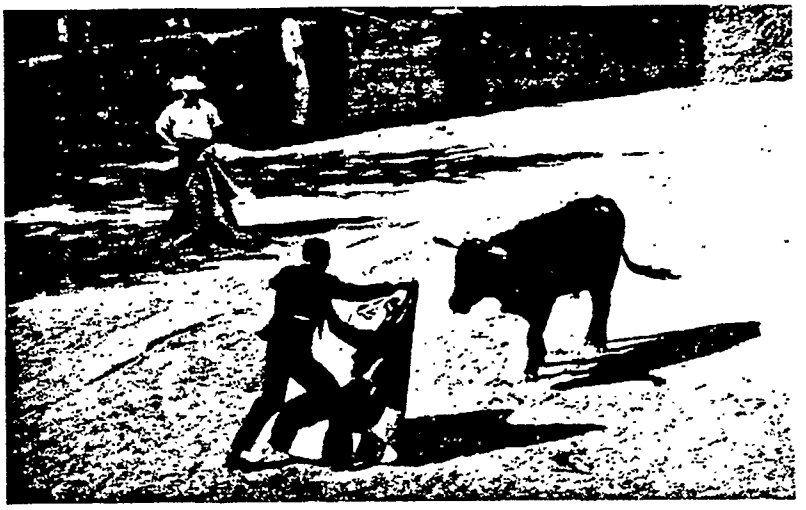
A week later, the 32-year-old Harvard graduate appeared again before the bull fighting crowd. This time he leaped upon the back of Jesus Gonzalez, noted Mexican matador, and lanced the snorting bull from this highly unorthodox position. All Mexico roared again.

When Fox saw his first bull fight, he decided immediately that this was a sport which would satisfy his thirst for thrills. He began to visit the small practice bull rings in the outskirts of the city to watch professional matadors train and to study the sport.

"First I practiced with calves to learn about cape work and foot work," he explained. "Then followed long hours on horseback, while I sharpened my eye for lancing the bull."

Later, when Fox resigned his post at the embassy, reports circulated that Ambassador Josephus Daniels strongly disapproved of his bull fighting activities and made no bones about it to Fox. The latter denied, however, that this had anything to do with his resignation. At any rate he celebrated his retirement from the field of diplomacy by staging an amateur bull fighting party for about 200 of Mexico City's prominent socialites at San Isodoro Ranch, a small club and practice ring which he took over for the occasion.

The bulls used for the event belonged to a special breed, remarkable for its extraordinary strength and ferocity, "Ferdinands" being unpopular in the bull ring. The animals were between four and six years old and weighed at least 1000 pounds. Each, as required by the rules, had sharp horns, uniform in all respects and without defects. These fighting bulls are not allowed to breed, in order to conserve their strength. Likewise they are always well fed, not only on grass, but also on special foods.



Cape work is one of the early stages of a bullfight.

Following a bugle call, all the participants and helpers in the fight paraded through the ring. A second bugle call was sounded and the torilero, or man in charge of the bulls, opened the door of the box in which the first bull was confined. As the animal moved out, the assistant of the torilero stuck into the bull's back a small barb which carried short ribbons of the colors of the breeder.

From the moment the bull is separated from his companions, in a place strange to him, he charges anything in his path, even the wooden barriers. The peones de brega, or assistants of the matador, throw down their capes in front of the animal to see how he charges. Ninety-nine percent of the bulls follow the cape; only on rare occasions do they go after the man. Should this occur, it may be considered certain that the bull has been used for practice or has fought before and is therefore exceedingly dangerous. Bulls learn by experience and soon realize that their enemy is not the moving cape but the man holding it.

When the helpers leave the ring, the matador enters to perform his first feat with the cape. Young Ferdinand Martinez Gallardo, an M.I.T. graduate in the class of 1935, advanced towards the bull, then waited for the charge. When the animal was about to reach him, he extended the cape in front with his arms lifted and the bull passed near him, but without touching him. This feat, the veronica, calls for the matador to stand

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still, keeping his body erect to preclude any impression of fear.

When the bull was brought to a standstill by six or seven veronicas, Hugh Corby Fox, the picador, entered the ring on his blindfolded horse. His mount was protected by pads, since as many as six unprotected animals have been killed during a single performance. Fox wore a thin, quilted padding under an iron shin guard known as a "mona," which completely covered his right leg, while his left was protected as far as the knee with padding. His breeches were of thick leather and his heavy shoes had thick soles.

Fox's job was to lance the bull three times with a barb two to three centimeters in length on the end of a long pole. This forces the animal to lower his head. When a bull refuses to charge and receive the three lances, he is considered too tame and is removed. Substitution is allowed only twice during any one bull fight.

Fox made two lances, then the bull charged angrily and knocked the horse to the ground, carrying the amateur picador with it. While matadors attempted to attract the bull's attention with their waving capes, Fox was hit in the right shoulder by the bull's horn. He wasn't gored, but suffered a long black and blue mark extending from his shoulder blade almost to his armpit.

The guests cheered wildly as Fox picked himself up and remounted his horse for the third thrust at the bull. Then he left the arena. Once more the bugle sounded. This time the banderilleros entered the ring to place the darts decorated with colored paper in the back of the bull, near the shoulder blades.

This feat creates the greatest excitement among the spectators, since the men have nothing in their hands with which to divert the rush of the bull. In placing the darts, the fighter must be close enough to the head of the bull to give the impression that he has missed being gored by only a fraction of an inch. Three sets of two darts each are inserted.

Following some more fancy cape work, the bull's head was down and the bugle sounded for the sword thrust of the matador. This is the most dangerous part of the performance, as well as the most emotional. Eighty percent of bull ring fatalities have been caused by goring while the matadors were attempting the first sword thrust. The bull fighter who does not expose himself to danger when killing is considered a coward and the crowd expresses its displeasure in no uncertain terms. It is not necessary, however, for the bull to be killed by the first sword thrust. Sometimes the matador may make a perfect movement, but the point of his sword hits a bone of the animal and cannot enter.

The first amateur matador killed his bull with rapid movements and finesse, and helpers dragged it out of the arena to make way for the second fight.



Fox dons the armed boots or "bata de fierro" before entering the ring.



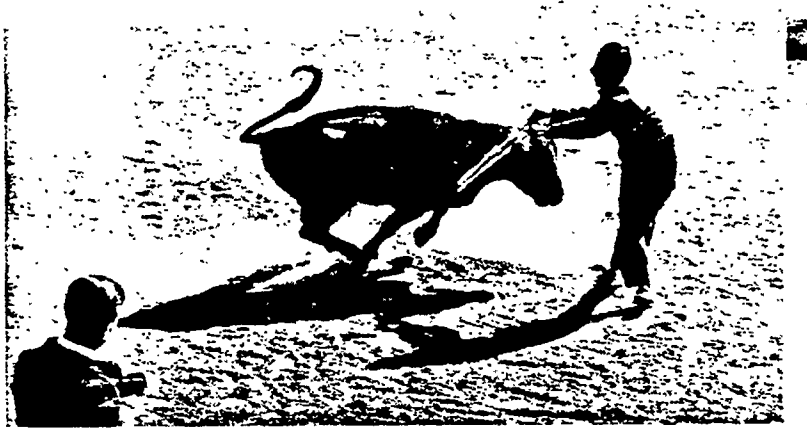
Acting as a picador, Fox lances a bull.

ETC 22854



Going up! A bull gets his revenge on a banderillero who failed to move fast enough.

A novice banderillero shows dangerously poor footwork in placing darts in the bull's shoulder.



The entire procedure was followed for two more bulls. When the fourth bull entered the ring, the men left and two girls maneuvered with the capes. Although the bull was younger and smaller than the average, it was full of life and knocked both young women to the ground several times, but they gamely followed through from the placing of the darts to the final sword thrust.

After the performance Fox revealed to the writer some interesting facts about bull fighting. It is Mexico's most expensive sport, seats costing anywhere from six pesos ($1.00) in the bleachers to 30 and 40 pesos ($5.00 to $6.50) in the first three rows on the shady side. Every Sunday crowds of 30,000 persons fill the huge arena to watch six complete performances.

If the professional matador is applauded after his performance, he tours the inside of the ring, his cap in hand. He is accompanied by two or three assistants who help him throw back the hats, canes, overcoats and other articles which the excited fans throw into the ring as a sign of individual appreciation.

If the ovation continues, the fighter makes a second circuit. The spectators do not throw hats this time. If his work has been brilliant, the public may request that he be awarded an ear of the bull as an expression of further satisfaction. This fact is made known to the judges by the waving of handkerchiefs.

If the performance has been extraordinary, the public may demand that the judges award both ears. If the performance has been even better, the judges may give the matador the tail, in which case they wave a green handkerchief. The maximum reward, the hoof of the bull, has been awarded only once in Mexican history—to Armillita, Mexico's greatest bull fighter, who receives 25,000 pesos or $4,300 for each performance. And he fights at least twice a week!



Astride the back of Jesus Gonzalez, noted matador, Fox burlesques a bullfight.

ETC 22855

This Month's Cover

BOSTON'S old State House, one of the few pre-Revolution buildings still standing in the city, was built as a Town House in 1748 to replace the one which had burned the previous year. During its long history the structure has housed the Colonial Legislature of Massachusetts, the General Court of the Commonwealth of Massachusetts, the Boston City Hall and the Boston Post Office.

In front of the State House angry Boston citizens burned the stamped clearances as protest against the Stamp Act. Within a few feet of the east porch the Boston Massacre occurred on March 5, 1770. British Generals Howe, Clinton and Gage held their council of war in the building before the Battle of Bunker Hill.

From the balcony the news of the Declaration of Independence was read. In its hall the convention was held which drew up the state constitution. Later, the convention which ratified the United States Constitution met there before adjourning to the Federal Street Church.

In 1882 a group of citizens decided to restore the State House to its original condition. Standing in a busy part of the city amid towering office buildings, it is a mecca for thousands of visitors to Boston's historic spots.

The Following

★ Service Awards ★

have been made as of

January 1st, 1942

TEN YEARS

ELLIS O. JONES Sales, Los Angeles

GUY KELLER Gasoline Testing, Baton Rouge

LEONARD L. HUXTABLE Sales, Tulsa

FIVE YEARS

JAMES V. CARLISLE Research, Detroit

VINCENT F. HNIZDA Research, Detroit

VERNA RAHE Medical, Cincinnati

YVONNE GUERTIN Sales, Boston

ETHYL NEWS

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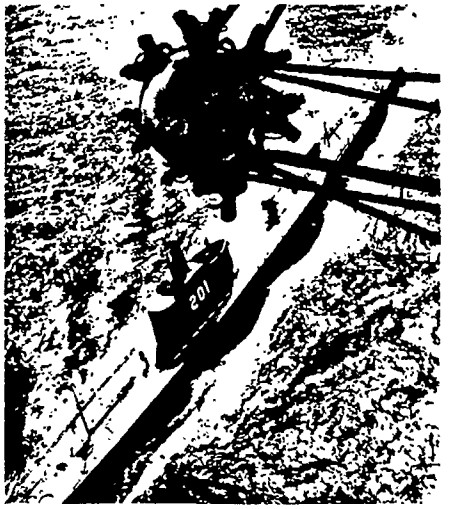
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ETC 22856

★ Ethylmen in Military Service ★

Corp. Dayton C. Bolin, Coast Artillery, Fort Jay, N. Y.
Lieut. Arthur S. Brown, Aberdeen Proving Ground, Md.
Private Redgnald Bushell, 45th Material Squadron, Manchester, N. H.
Private Everett M. Clough, Fort Sill, Okla.
2nd Lieut. William W. Downer, Augusta Arsenal, Augusta, Ga.
Lieut. T. S. DuBose, Academic Dept., Fort Benning, Ga.
Edward G. Duffard, New Orleans, La.
Lieut. Idan E. Flaa, Detroit Ordnance District, Detroit, Mich.
Lieut, Levan R. Fleck, Fort Crockett, Tex.
Seaman Donald Forsdick, Coast Guard Depot, St. George, S. I., N. Y.
Private Wilford E. Frazier, Camp Hulen, Tex.
Lieut. Benjamin W. Fridge, 191st Field Artillery, Camp Forrest, Tenn.
Private John P. Giffing, Camp Hulen, Tex.
Lieut. Hamilton B. Greenup, Sacramento, Calif.
Lieut. J. Robert Greenwood, Coast Artillery, Fort Hancock, N. J.
Lieut. Howard E. Hesselberg, Camp Roberts, Calif.
Private Daniel A. Hirschler, Fifth Signal Company, Fort Custer, Mich.
Private H. J. Holdridge, Camp Lee, Va.
Private Phebus N. Hotard, Camp Livingston, La.
Lieut. Howard B. Hudiburg, Fort Winfield Scott, Calif.
Private Rufus M. Jackson, Fort Bragg, N. C.



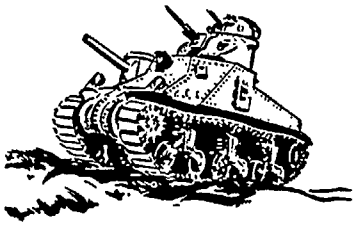
Courtesy of Popular Photography Magazine



Courtesy of Popular Photography Magazine

Private Bernard Jones, Fort Bragg, N. C.
Private Edward J. Kukla, Jr., Fort Sill, Okla.
Ensign Kenneth G. Lee, Arlington, Va.
Ensign James M. Mason, Jr., Naval Air Station, Jacksonville, Fla.
Ensign Fritz Y. Mercer, Submarine Base, New London, Conn.
Ensign George T. Mercier, Naval Ordnance, Hamilton, Ohio
Lieut. Arthur H. Middleton, Louisiana State University, Baton Rouge, La.
Lieut. A. D. Miller, 69th Coast Artillery, Camp Hulen, Tex.
Lieut. John W. Miller, Armored Force School, Fort Knox, Ky.
Lieut. Leo A. Miller, Camp Beauregard, La.
Corp. George B. Noland, 47th Field Artillery, Fort Bragg, N. C.
Private Andrew L. Pallay, Fort Custer, Mich.
Lieut. William J. Ryan, Service Co., 11th Infantry, Fort Custer, Mich.
Lieut. Paul F. Straub, Navy Yard, Mare Island, Calif.
Lieut. Wayland W. Sweeney, Jr., 12th Engineer Battalion, Fort Jackson, S. C.
Lieut. Irvin Trowbridge, Aberdeen Proving Ground, Md.
Lieut. A. E. Vallier, Detroit Ordnance Division, Lansing, Mich.
Lieut. John F. Wallis, 57th Coast Artillery, Camp Pendelton, Va.
Lieut. Stonewall J. Warner, Quartermaster Motor Transport School, Fort McPherson, Ga.
Captain M. F. Weill, Presidio, San Francisco, Calif.

DEFENSE BONDS BUY TANKS



THE TANK is to the Army what the tackle is to the forward line of a football team. It is the "break-through." Head-on, it crashes timber, houses, enemy fortifications. Once it has opened the way, the attacking force follows for the "mopping up."

The Nazis, using these great steel pachyderms which they produce in vast quantities, have been able to break through every fortified line in 14 conquered countries.

In America, the medium-sized tank is the popular size. A medium-sized tank weighs 30 tons. To make it takes as much steel as would be used in 500 refrigerators, as much rubber as goes into 87 average automobile tires.

The planning of a tank takes as great skill as a large-scale construction job. One recently converted automobile plant, faced with retooling for tank production, had to put 200 engineers to work in day and night shifts for one month, mapping out machinery requirements and plant layout.

To match the mechanical might of aggressor nations today, America needs thousands of these tanks. They're rolling off the assembly lines now. They cost real money. Every time you buy an $18.75 Defense Savings Bond or a 10¢ Defense Savings Stamp you give your country money enough to buy a vital part for another new tank.



Buy DEFENSE SAVINGS BONDS and STAMPS

AT ALL BANKS, POST OFFICES, AND SAVINGS AND LOAN ASSOCIATIONS

ETC 22858

Printed in



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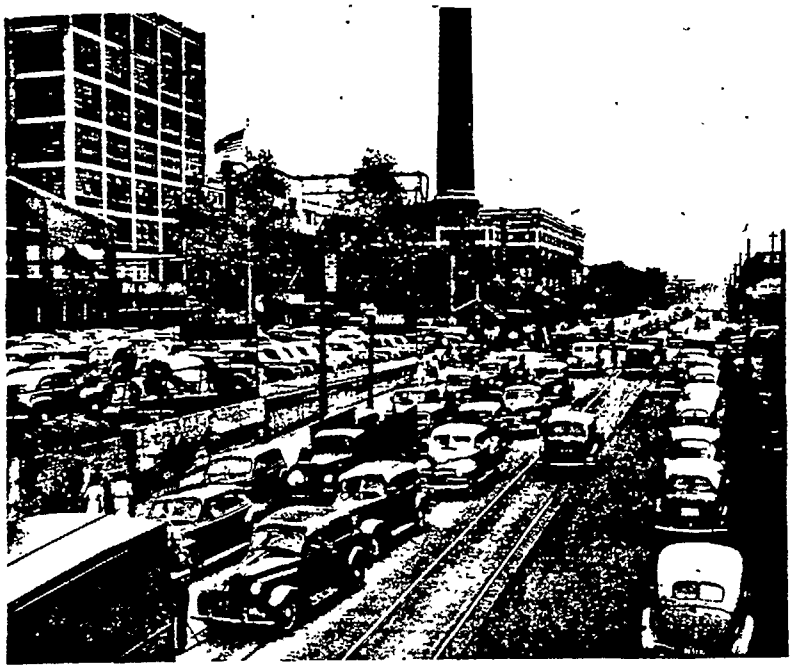
ETC 22859

FEBRUARY 1942



One of the prize-winners in the black-and-white class of Popular Photography magazine's 1941 International Prize Picture Contest

ETC 22860



Factory workers need cars to go to and from their jobs.

The Automobile in Your Life

Thirty Years Ago Comparatively Few Persons Owned Motor Cars; Today the Gasoline Vehicle Plays a Vital Part in the Business of Living.

(Photos courtesy of Automobile Manufacturers Association)

WHAT is the work cars do?

Anticipating the problems in civilian transportation that the defense effort would bring to the automobile user, to business and to Government, the Automobile Manufacturers Association in 1940 undertook a survey of the actual use of passenger cars by their owners. The objective was to assemble information that would help all agencies dealing with the subject.

A report of the major findings has been presented to appropriate departments of government.

It shows that over city streets and the network of roads and highways covering the United States, automobiles in a normal year make approximately 15 billion round trips, for a total of 498 billions of passenger-miles of travel.

More than half of that mileage, and three-fourths of those trips, are for purposes connected with earning a livelihood, or closely related economic pursuits, classified as "necessity driving."

Ninety-six out of every 100 cars on the road today are engaged in such necessity driving.

On the basis of 1940's total travel, private car owners amass 274 billion passenger-miles of necessity usage a year, in more than 11 billion round trips.

The data was obtained primarily from official government sources through the U. S. Public Roads Administration and the highway authorities of several states. The Automobile Manufacturers Association obtained permission to analyze in detail questionnaires on which many thousands of car owners had supplied specific information as to where they drive, how far, how often and for

The average doctor drives almost 13,000 miles a year.



ETC 22861



Driving the children to school is an important function of the passenger auto.

•

what purposes. This data was supplemented by a later similar study undertaken on a national basis specifically for the Association.

•

Wage earners devote more than half their mileage to necessary driving.

Passenger car driving records are like fingerprints, in that no two are exactly alike.

White collar man and defense plant worker, doctor and salesman, housewife and farmer — all have different objectives for their automobile driving.

Each car at the end of a year has its own different speedometer reading of miles traveled, its own individual record of trips made—reflecting the varying distances from each other of home, job, school, church, shopping centers and other community institutions as selected by each automobile owner.

It is difficult to single out any one group of owners to say they have more or less need for their cars than the others. Yet significant facts are now available, showing the effects of occupation on car use:

The traveling salesman's average annual mileage, surveys show, is 18,791 miles, or more than double the average per car of all drivers.

But the average for medical men also is very high—12,932 miles—and doctors top the analyzed occupations in the number of round trips, having an average of 947 trips yearly per car.

Total yearly mileage, though, doesn't tell the whole story.

Farmers, industrial workers and construction men make up the largest occupational groups of car owners. Drivers in these groups make short trips, piling up relatively little annual mileage per car. What driving they do, however, is of high economic significance to them.

Farmers, according to the 1940 Census, operate 4,731,159 passenger cars, or 17 per cent of the total registered. Of every 100 miles of driving, the farm car puts in 66.8 miles on business and other necessity purposes.

A sample covering of cars in five states showed that 98 farm cars out of 100 are used for purposes connected with earning a living. The typical farmer rolls up only 12.5 miles per trip on the average. This total annual driving amounts to 5,750 miles.



Traveling salesmen lead all other driver groups in mileage.

•

A study of wage earners' cars in the same five states showed they devoted slightly more than half their mileage to necessity uses. Drivers making up this occupational group were unskilled as well as skilled factory workers and building tradesmen of all types. Two-

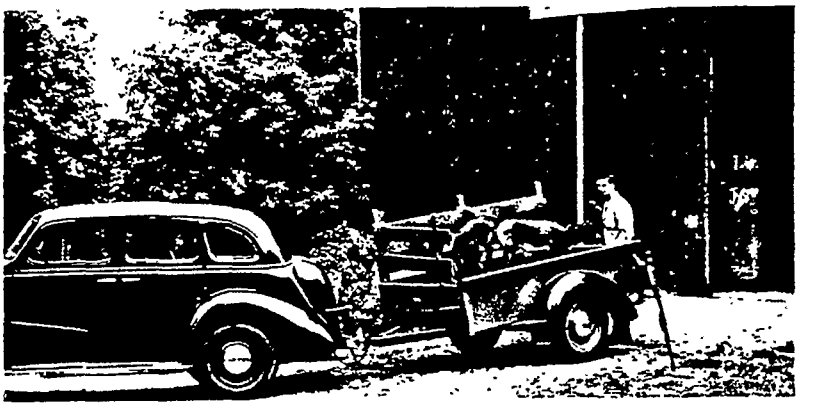


ETC 22862

Farmers operate 17 percent of all registered passenger cars.

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The automobile simplifies the family marketing.





thirds of these cars were used primarily for driving to places of employment.

Of interest is the fact that farmers' cars and those of wage earners have parallel driving experiences.

While farmers average twelve and a half miles per trip, the wage earners average just under ten. More than a third of the drivers in each group required less than 2,000 miles a year for their necessity driving; another third required between 2,000 and 4,000 miles a year. Sixteen per cent in each group travelled between 4,000 and 6,000 miles per year on necessity purposes and virtually all the remainder was accounted for below the 15,000 mark.

•

One car out of every four is used for driving to church.

The reports for wage earners' cars also were analyzed to determine the age of car driven, and the effect of car age upon its mileage. The survey showed that 36 per cent of the cars were two years old or less, 31 per cent were three to six years old, and 32 per cent were seven years or older.

The newer cars ran up far more total mileage, averaging 9,147 against 7,577 for the middle bracket and 5,479 for the oldest cars. Yet the "driving to work" mileage showed relatively little change, being 2,002 annual average for the younger cars and 1,922 and 1,608 for the other two groups.

A special study on shopping reveals that six out of seven family automobiles are needed for this task. Virtually all of these are so employed at least once a week and two-thirds of them more often.

Social uses of the automobile, too, are significant.

One car out of every four is used for driving to church. More than 70 per cent of the church goers' cars were found to average fifty or more round trips to church during the year.

Driving children to school still represents an important social function. Farmers lead the list, 10 per cent of them driving their children to class, while lawyers, artisans, insurance agents, real estate men and salesmen also report such uses of their cars to varying degrees.



ETC 22863

For Better Gasoline

Ethyl's Testing Laboratories Help Maintain a High Fuel Standard by Checking Thousands of Samples Annually.

WHEN a motorist stops at a service station and buys a supposedly high grade fuel, how can he be sure that it is really high grade? How can he feel guaranteed against contamination, either by accident or design? Or how can the gasoline refiner be certain that all pumps advertising his product are actually selling his product and not an inferior substitute?

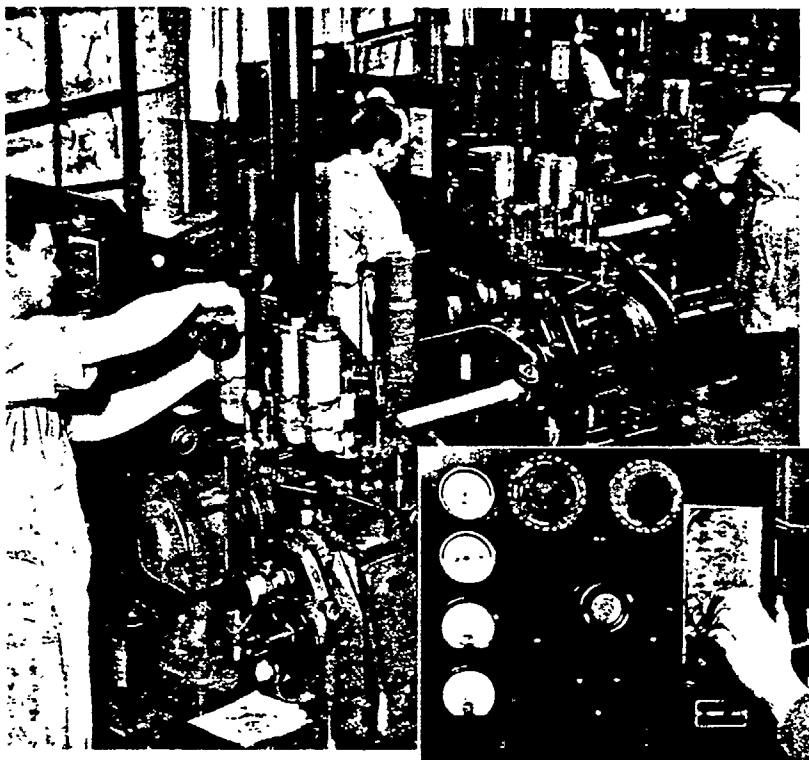
The answer is: neither can be one hundred percent certain, but each can be a lot more certain than he could be if the Gasoline Knock Testing Department of the Ethyl Gasoline Corporation wasn't rendering a valuable service to the oil industry and the general motoring public through its six gasoline testing laboratories.

Geographically scattered throughout the United States, these laboratories are located at Yonkers, N. Y.; Baton Rouge, La.; Tulsa, Okla.; Kansas City, Mo.; San Bernardino, Calif., and Detroit, Mich. Some idea of the work done in these centers can be gained from the fact that 25,000 samples of gasoline are tested each year and from one to eight different tests are made on each sample.

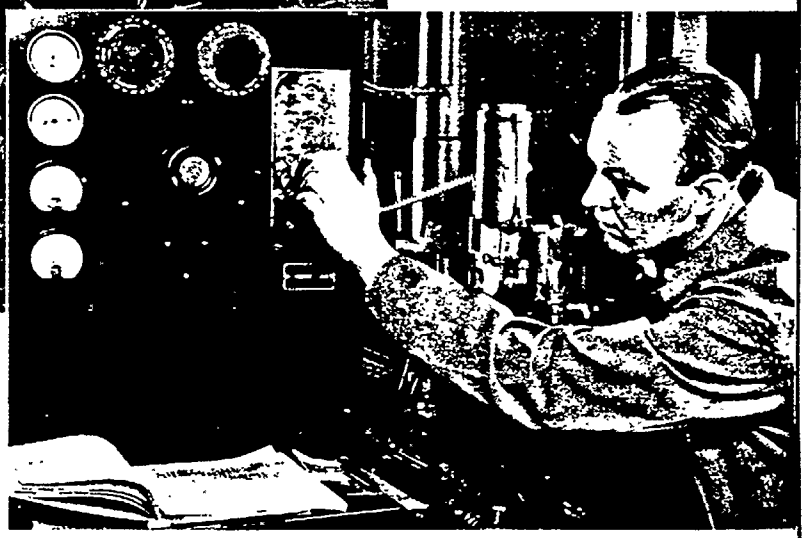
The analysis of samples can be broken down into two general groups. The first group comprises the refinery samples on which tests are performed as a service to Ethyl's refining licensees. The second is the testing of field samples in order to maintain the high quality of gasoline to which tetraethyl lead had been added.

Many licensees who do not have complete facilities for gasoline testing are aided by the Ethyl laboratories, which carry on this work for them. In cases where the refiner has testing facilities the Ethyl laboratories serve as a helpful check on the results obtained.

Refiners who are new Ethyl licensees send in samples of their base stocks before the addition of tetraethyl lead. The samples are tested to determine the amount of tetraethyl lead needed to raise the fuel to the octane rating de-



In this battery of knock testing engines the octane numbers of gasoline samples are determined by checking against reference fuels of known antiknock rating.

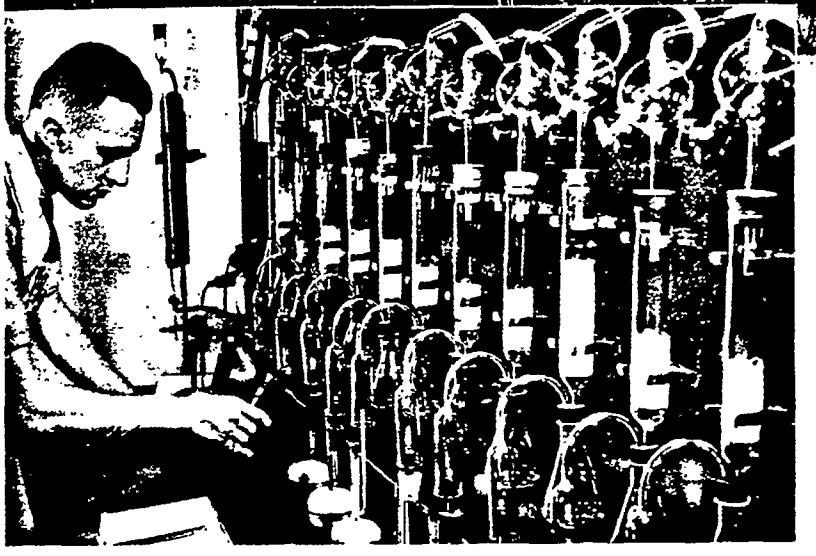


A special knock testing engine is used to determine the octane rating of aviation fuels.

ETC 22864



Ethyl's Yonkers laboratory is located amid sylvan surroundings on the outskirts of the city.



An Ethyl chemist puts an array of high grade gasoline samples through a test for sulphur content.

sired by each refiner. Then, after the Ethyl fluid has been blended in the proper amount with gasoline at a refinery, another sample, the finished product this time, goes to an Ethyl laboratory for another series of tests to make sure the blending process has been carried out correctly.

Samples from refining companies are tested on the day they are received and the results are telegraphed to the refiner on that same day. This speedy service enables the refiner to distribute his finished stocks without delay.

Tests are performed to determine octane number by both Motor and Research methods, distillation lead content, gum both preformed and potential, corrosion, color, vapor pressure and gravity.

Representatives of the company are picking up samples daily at filling stations and bulk plants throughout the United States. These are for the purposes of a general survey of fuel quality, but they also serve to uncover contamination or substitution. Ethyl field men also pick up samples in response to complaints. Contamination or deterioration due to slow turnover and consequent loss of volatility is often the basis for a complaint on knocking. Where any defect is found, immediate steps are taken to secure its correction.

Most field samples are collected by Ethyl representatives to show the overall quality of gasoline being sold to the motoring public. This information is of considerable importance to car manufacturers, as it serves as a guide for them in determining the kind of gasoline available in various localities to drivers of their cars.

The testing laboratories work in conjunction with Ethyl's Refinery Technology Department in checking the gasoline of new refining licensees in order to assist them in producing the best gasoline blends. In this work lead sensitivity charts are drawn for the refiner so he can tell easily how his various stocks can be blended together to yield the best gasoline for the addition of lead.

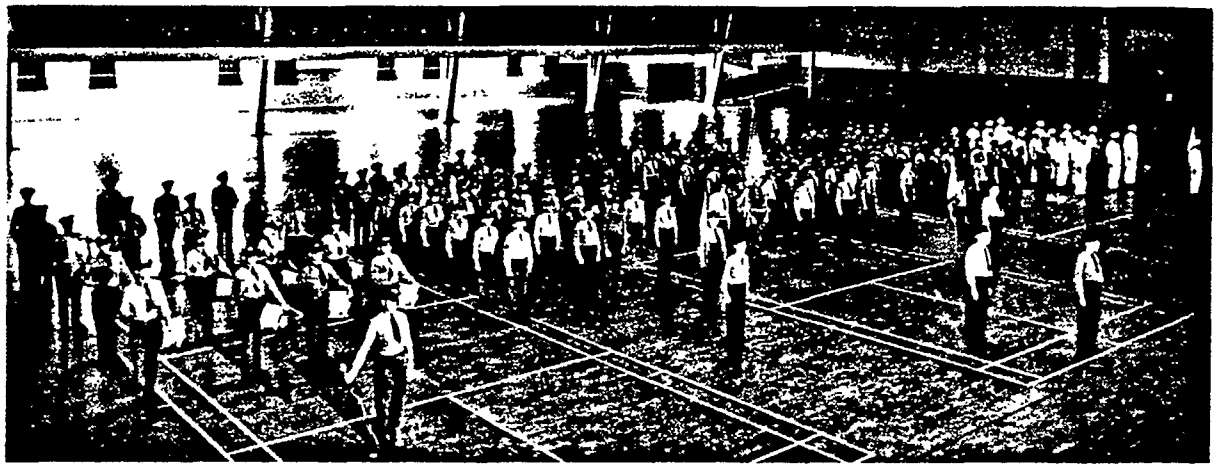
The Gasoline Testing Department, through its Central Office at Yonkers, cooperates in the work of the C.F.R. Committee, besides carrying on independent devolpment work in the improvement of existing methods. Experience and information collected on knock testing is passed on to the oil industry by means of knock testing forums which are being held in various centers throughout the country. These forums, which are a recent innovation, give the personnel of Ethyl licensee laboratories and other interested persons the opportunity to discuss their knock testing experiences and problems.

The work of the Ethyl testing laboratories, conducted with the cooperation of the oil industry, has played a large part in bringing about a steady improvement in the quality of gasoline sold in the United States.

ETC 22865

Coast City has Bus Army

Seattle Transport Workers Organized Into Motor Reserve Battalion for National Defense.



Members of the Seattle Motor Transport Battalion drill in an armory. Men in white at extreme right are in the maintenance company.

TWENTIETH Century Minute Men, for whom "blitz" has been a by-word for years—such are the members of the Seattle Motor Transport Reserve Battalion.

An old tune, played to a modern tempo — a martial tempo at that — is swinging through the motor transportation industry, reawakening the strong spirit of American patriotism which has arisen in decades long past to lead the fight for the preservation of all that is American.

Leading the parade—yes, even setting the pace — is the Seattle Battalion, a closely knit, well-disciplined, well-equipped organization of bus drivers, dispatchers, maintenance crews — and their equipment. It is a group of men who have found time to devote to the serious matter of national defense and national morale, while at the same time performing their normal civil functions.

Father of the idea—an idea five years older than the battalion—and organizer of the unit is Lieut. Col. Marmion D. Mills, Quartermaster Reserve, United States Army. Colonel Mills is general manager of the municipally owned Seattle Transit System. Drawing on his experience in France during the World War in moving large bodies of men by motor transport; aware of the necessity of organization far in advance of an emergency, Colonel Mills in 1935 drafted a plan for the organization such as that now created in Seattle. The plan was submitted to the Chief of Staff, United States Army.

Actual creation of the Seattle battalion began in December, 1940, after Mayor John F. Carroll of Seattle asked organization of a transport unit to be ready in the event of some local emergency requiring the evacuation of civilians or rapid movement of a military force into the city for its protection.

Response to the first call for volunteers — volunteers who were promised nothing but drill and work — was so great that Colonel Mills had to revise his original plan of organization.

The framework was to have been somewhat on this pattern:

A company would consist of twenty-four 40-passenger buses, accommodating 960 passengers, organized in two platoons of twelve buses, each platoon comprising two sections of six buses, with each section comprising two squads of three buses. This basic unit, or company as it is termed, would be capable of transporting dismounted elements of an infantry battalion. Minimum personnel for the company would be 24 operators, 10 noncommissioned officers and three commissioned officers. The operator personnel could be doubled, if men were available, to provide two drivers for every bus.

In the original plan of organization, the company would have included a maintenance section. However the heavy response to the call for volunteers resulted in organization on this basis:

Three operating companies, without a maintenance section, and one mainte-

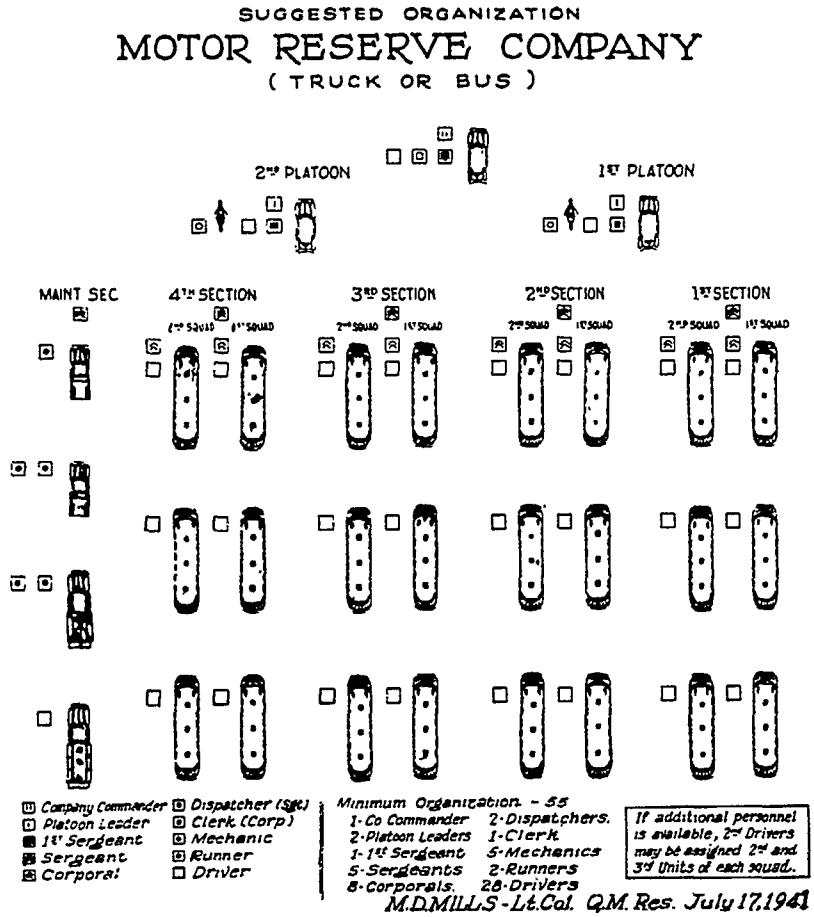
ETC 22866

nance company, consisting of one platoon of three sections for automotive maintenance, and one platoon organized as a road-repair unit.

Prior to issuance of the call for volunteers, Colonel Mills received assurance of officers of Local 587 of the Amalgamated Association of Electric Railway and Motor Coach Employes of America of cordial union support.

And so the men, whose working hours are spent giving Seattle residents the best possible transit service, turned, in their spare time to military drill, study of entrucking tables and march graphs and other means of controlling the movement of large units. From the ranks of the men were selected corporals and sergeants. Commissioned officers were selected from the supervisory staff of the transit system. These included a major, the battalion commander and a captain adjutant; four captains to serve as company commanders and eight lieutenants, serving as platoon leaders.

Basic military instruction was directed by Regular Army personnel, and a regular training schedule was adopted. The operators' gray uniforms, worn daily in transit service, were adopted as uniforms for the battalion. Shoulder patches, marked "motor reserve" were purchased and now are worn by members of the battalion, even while on duty. Chevrons to match the gray uniforms were adopted to designate corporals and sergeants. White coveralls were chosen as the uniform for the maintenance company, while commissioned officers adopted a blue uniform similar to that worn by inspectors of the Transit System.



"Inasmuch as the battalion comprised trained operators and mechanics," Colonel Mills explains, "it was unnecessary to give any basic motor-transport training, and such training as has been given to date has consisted in the operation of

●

Seattle Transit System buses take part in Army maneuvers.



ETC 22867

motor transport companies upon a text prepared under the direction of the chief of Field Artillery in 1939."

The battalion participated in Seattle's blackout last March, transporting guard units to parts of the city, while part of the battalion remained as a mobile police reserve in the event of some disorder.

In mid-April, when the battalion already was three months old, it received its first field training, in a movement of fourteen buses. A number of subsequent field operations have been conducted, some carrying equipment and men as far as Fort Lewis, where additional instruction, or demonstration in use of modern military equipment was given by the Regular Army.

Colonel Mills' contagious enthusiasm for the motor reserve has created interest in other transit companies and the organization has attracted the attention of national-defense leaders.

In urging organization of similar outfits elsewhere, Colonel Mills said:

"It is my belief that organizations such as the Seattle Transit Motor Reserve Battalion should be organized on a national scale in the transit industry under a plan developed by the government as units of a civilian defense corps. Such units would not be called up except in case of great emergency, and then only to carry out the required mission or to remain in service until relieved by Regular Army units."

And where would the motor-trucking industry fit into the picture? Colonel Mills has pointed out that this branch also can be organized for emergency service.

"A civilian defense corps should be established comprising not only motor bus transportation units but also truck units for cargo-carrying purposes organized from large commercial truck fleets, communication units from the telephone and telegraph companies, and evacuation units from the Red Cross and various veterans' organizations to handle the actual evacuation, classification, hospitalization and reception of refugees."

There is a place in such emergency organization for nearly every piece of equipment that rolls, Colonel Mills pointed out. Road-building and repair equipment, wreckers, gasoline transports, all would fit into the reserve outfits, all have their place in this modern day of lightning attack and lightning defense, Colonel Mills declares.

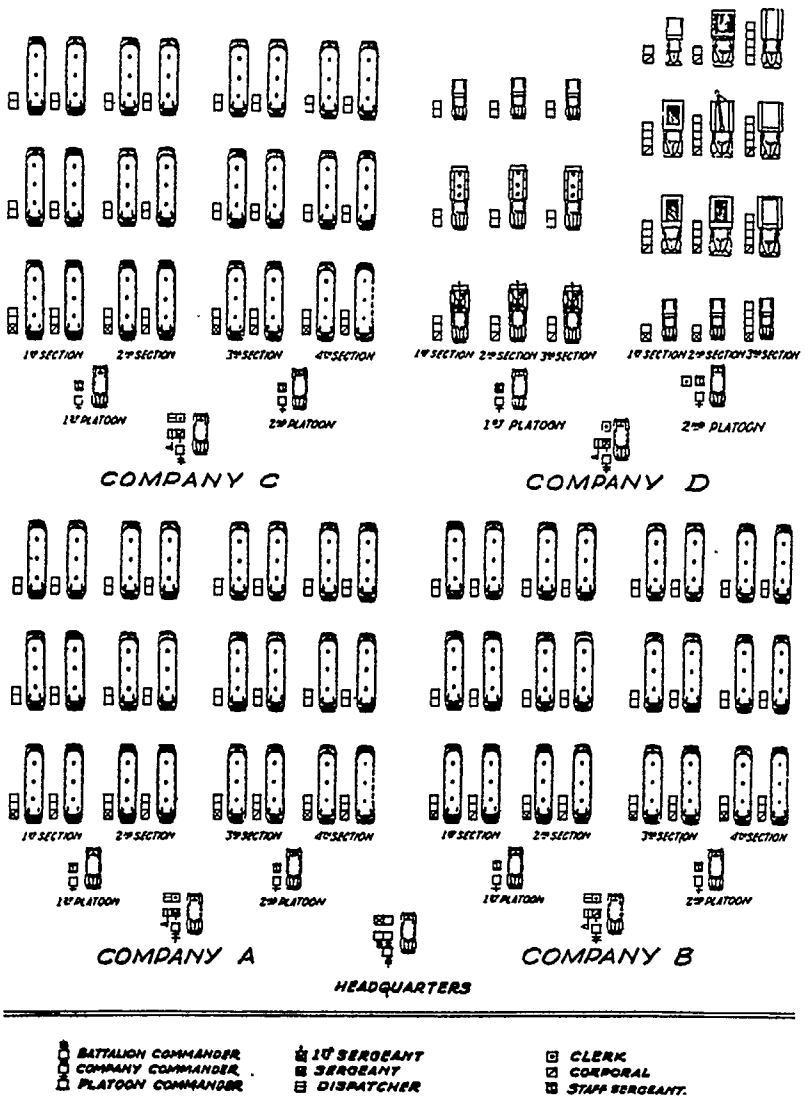
Some evidence of the widespread interest already shown in the motor reserve corps is given by the imposing and ever-growing list of companies which have written Colonel Mills asking details of organization. Inquiries have been received also from the I.C.C. Bureau of Motor Carriers, New York office, the Public Utilities Commission of Kitchener, Ontario, the Mack-International Motor Truck Corporation and from national defense offices.

Creation of the battalion, Colonel Mills said, demonstrates the flexibility of modern motor transportation and reemphasizes the importance of the industry in both normal and emergency periods. Seattle has drawn the blueprints, now it is up to the rest of the industry to provide additional working models of the 1942 Minute Man.

(Courtesy of Motor Transportation)

ORGANIZATION

SEATTLE TRANSIT MOTOR RESERVE BATTALION.



ETC 22868



Mr. Midgley Awarded Gibbs Medal

Discoverer of Tetraethyl Lead is Honored by the Chicago Section of the American Chemical Society

THOMAS MIDGLEY, JR., vice-president of the Ethyl Gasoline Corporation and internationally known for his discovery of tetraethyl lead, the antiknock compound which has made possible spectacular advances in automotive and aircraft engines, recently was awarded the 1942 Willard Gibbs Medal of the Chicago Section of the American Chemical Society, one of the highest distinctions in chemical science.

This honor is one more addition to the impressive number which Mr. Midgley has received in recognition of his accomplishments in scientific research. Included among his previous awards are the Priestly Medal of the American Chemical Society, the William H. Nichols Medal of the Society's New York Section, the Perkin Medal of the Society of Chemical Industry, and the Longstreth Medal.

Mr. Midgley was cited by the Society for "discoveries which are outstanding both from the standpoint of pioneering in new fields and from the standpoint of commercial importance." The development of safe refrigerants, and contributions to synthetic rubber research and to methods of extracting bromine from sea water were described as some of his other achievements.

"His attainments," the citation said, "include the development of the Midgley indicator, the first satisfactory indicating device for determining what took place in high speed internal combustion engines. He then worked on the detonation characteristics of various types of fuels and developed a series of chemical antiknock agents culminating in the discovery of tetraethyl lead.

"He worked out methods of manufacture of this compound and has been active in solving many problems connected therewith, including the removal of lead deposits which formed with the straight tetraethyl lead. He has contributed largely to the knowledge of the chemistry of rubber and the methods of synthesizing rubber. He developed the organic chlorofluorides which have become so widely used as non-inflammable non-toxic refrigerants. He was associated with the important developments connected with the recovery of bromine from sea water."

The performance of modern military and transport planes is due in large part to the development of high octane gasoline, a development in which tetraethyl lead played a vital role. Without the added power obtained from fuel of high antiknock quality, the huge bombers and airliners of today wouldn't be able to get off the ground.

The Gibbs Medal, of which Mr. Midgley is the 31st recipient, was founded in 1911 by William A. Converse, secretary of the Chicago Section of the American Chemical Society from 1901 to 1909, and was named for Josiah Willard Gibbs, professor of mathematical physics at Yale University from 1871 to 1903, who was called "America's greatest man of science."

Others on the list of distinguished scientists who have received the award are:

Dr. Vladimir N. Ipatieff, Svante Arrhenius, Mme. Marie Curie, Sir James Irvine, Dr. Richard Willstaetter, Theodore W. Richards, Leo H. Baekeland, Ira Remsen, Arthur A. Noyes, Willis R. Whitney, Edward W. Morley, William H. Burton, William A. Noyes, F. G. Cottrell, Julius Stieglitz, Gilbert N. Lewis, Moses Gomberg, John Jacob Abel, William D. Harkins, Claude S. Hudson, Irving Langmuir, Phoebus A. Levene, Edward C. Franklin, Harold C. Urey, Charles A. Kraus, Roger Adams, Herbert N. McCoy, Donald Dexter Van Slyke, Robert R. Williams, Dr. Edward A. Doisy.

ETC 22869

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The Famous Po
Talented a Grou
as You Will

DON'T look now, but that pretty girl with the shiny, patent leather hat box on her arm is probably a Powers model. The hat box, which every Powers model carries, is the kit containing the clothing and make-up she will need for the particular job to which she is going.

Beautiful? Well poised? Intelligent looking? Right! She has to be all those things to work under the Powers banner.

John Robert Powers has succeeded the late Florenz Ziegfield as the glorifier of the American girl. There is a difference, however. While the Ziegfield girl depended almost entirely on her beauty and the glamour associated with the stage to put her across, the Powers girl must be able to show a variety of attainments. Above all she must be natural and intelligent. The "beautiful but dumb" theory does not apply to Powers models.

Albert Edward Wiggam, well known author and professor of psychology at Columbia University, not long ago visited the Powers offices on New York's fashionable Park Avenue and conducted an intelligence test with a representative group of models. The 100 young ladies who took the test were found to rank with the top six percent of college graduates. Margaret Johnson, a Texas beauty who is a college graduate, daughter of a clergyman, and a wife and mother, had the highest grade, with a standing in the "genius" class.

Most Powers models are graduates of colleges and finishing schools. Many have Social Register backgrounds. Others come from the ranks of beauty contest winners, from offices and farms, from jobs as airline hostesses, from the Virginia hunting set. Some are Phi Beta Kappas, others are Junior Leaguers. In short, they are a cross section of lovely American girlhood.

Why, you ask, such high type girls for modeling? The answer is that most modeling work is concerned with selling, and to put across an article or an idea to the best advantage, the model who displays or publicizes it must be the type of girl other members of her sex admire and wish to be like. Therefore she must be a natural girl, for the majority of women are not impressed by artificial types.



Josephine Caldwell, a graduate of the University of Pennsylvania and member of Phi Beta Kappa.

Although John Robert Powers has interviewed thousands of girls during the many years he has been in business, he finds that only about one in a thousand has what it takes to be a Powers model. Startling beauty is not essential, but a tall, slender figure and balanced features which photograph well are necessary qualifications. A well known illustrator called the Powers models "long stemmed American beauties," a name which stuck. A height of five feet six inches is the minimum except for hat models, who sometimes are permitted to be as diminutive as five feet four inches

A model must be a lady in fact as well as in appearance. It wouldn't do at all for a girl who looked like a beautiful aristocrat to startle a prospective customer with a sales talk like, "Ain't this here dress a honey?" Her speech must match her looks.

Modeling is nice work, girls, if you can get it. A model is strictly a free lance operator, and if she doesn't like a specific job, she can pass it up. There is none of the nine-to-five routine which is the lot of the average office or shop girl. What's more, a model gets around a great deal on the job, going to the most interesting places and meeting the right people.

Models are in great demand at social functions and to publicize important events—events like the Orange Bowl



Helen Bennett specializ for such magazines as An accomplished musi into modeling th

ETC 22870

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Models Are as Young Ladies Anywhere.



Maurine Zollman of Louisiana, who is considered the ideal American college girl type.



...high fashion modeling ...and Harper's Bazaar. ...medy actress, she came ...the stage door.

•

football game in Miami, for example. Marion Whitney, a Powers model, toured South America by plane as part of an airline promotion stunt and was royally entertained wherever she went. It is not unusual for a big department store to advertise its wares by furnishing a model with a complete wardrobe and sending her on an ocean cruise. Twenty-one models paid a visit to the Quantico, Va., base of the United States Marine Corps and were entertained by officers and men, which is undoubtedly one of the reasons the moral of Uncle Sam's leathernecks is so high.

There are jobs which are more or less routine, too, and these comprise the greater part of the work of the Powers girls. Fashion work and posing for illustrations are the two main divisions. The former is sub-divided into high and low fashion, department store, wholesale and catalogue modeling, while the latter consists mainly of posing for advertisements of most of the products marketed today, which appear in magazines and newspapers and on billboards.

High fashion models do most of their modeling for magazines like Vogue and Harper's Bazaar and for the big metropolitan stores. Since the appeal there is to a sophisticated clientele, the girls who do this work are of an exotic and highly sophisticated type, with sculptured faces and coiffures. They are extra long stemmed American beauties, averaging five feet nine inches or more in height and wearing only a size 12 to 14 dress.

The model presents a different type when she poses for the pictures in the Sears, Roebuck and Montgomery Ward catalogues. These media reach mainly the small towns and the rural regions, where an ultra-sophisticated lady is often regarded with suspicion or made the target of feline verbal shafts by the womenfolks, so the catalogue girl is always the natural, outdoor type, conservative in make-up and hair-do.

The girl who poses for illustrations must have imagination and some acting ability in order to dramatize the picture in which she appears or the product she is advertising. If she is posing for a headache remedy advertisement, she must be able to register convincingly for the camera the devastating effect of such an ailment. Or if she is extolling the virtues of some miraculous mouth-wash, she must exhibit extreme anguish at being shunned by the men before its use and radiant joy at her sudden popularity afterward.

There is an interesting paradox in modeling, however, in that a girl may do all her work as a certain type and yet in real life be an entirely different type. Sandy Rice is known in modeling circles as a typical outdoor girl, yet her favorite sport is bridge. Olive Cawley, who models clothes for people in the lower income brackets, is a society girl. Eleanor Bice, who wanted to be a glamour girl when she came to New York from Syracuse, was sidetracked into posing for domestic scenes by a photographer who called her the perfect "young mother" type.

Modeling isn't all crams and jams—there are plenty of aches and pains thrown in. As fashion pictures are made up about six months ahead of the season, models often find themselves posing in fur coats in sweltering July weather or shivering on the beach in bathing suits in the middle of winter. Not infrequently a model must hold an uncomfortable pose until it becomes positively painful, while the photographer tinkers with his apparatus.

Coming to the rather important matter of earnings, models are classified in three groups. One group receives

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Betsy Nehf of Phoenix, Ariz., stops at the Powers call board to examine her chart of appointments. She is photographed for an advertisement of ladies' fur coats.



$5 for an hour and a half; the second, $5 an hour, and the third, $10 an hour. For fashion shows each girl receives a flat fee of $15, regardless of rating. Then there are the especially popular models who receive anywhere from $25 to $100 an hour.

The average model, according to Mr. Powers, makes about $75 a week, out of which she must provide her wardrobe. The latter is a big item for the illustration model, unless she has a flare for dressmaking, but the fashion model has most of her clothes furnished her by her employer.

Many Powers models have other talents which bring in additional income. Several are artists, actresses, musicians and writers. Others have won movie contracts. Mr. Powers encourages his girls to develop their various abilities. He warns them not to think of modeling as a life work but rather as a stepping stone to something better. A happy marriage is the goal of most of them, he says.

A Powers model sounds like something extra special in femininity, doesn't she? Well, let's take a peek into the background of a few young ladies who do this sort of work.

Josephine Caldwell comes from an old Philadelphia family—an ancestor of hers was the chemist who brought medicines to the dying Alexander Hamilton after his duel with Aaron Burr. She is a graduate of the University of Pennsylvania, where she was a member of Phi Beta Kappa honorary scholastic society and president of her sorority. The wife of a young Philadelphia doctor, she doesn't let her modeling interfere with her housekeeping duties.

Elaine Bassett, a graduate of Baylor University and the daughter of a Dallas, Texas, clergyman, combines modeling with writing a syndicated newspaper column and poetry for magazines. She has also entertained on the radio.

Miss Bassett's sister, Margaret Johnson, the girl who received the "genius" rating in Dr. Wiggam's intelligence test, was studying to be a concert pianist when a photographer persuaded her to take up modeling. She is considered the ideal "young housewife" type in professional circles, though in her private

BELOW—*John Robert Powers, outstanding glorifier of the American beauty.*



ETC 22872

Six models depart via plane for Jacksonville, Fla., for a fashion show and opening of a new store.

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Powers models arriving at Quantico, Va., where they were guests of the Marine Corps.





life she has too many other interests to settle down to housekeeping exclusively. She continues her interest in music, is a radio artist and sings, plays a guitar, and arranges the music for her programs, most of which introduce little known folk songs to the public.

The story of Georgia Carroll, probably the most publicized of all Powers models, is the story of the little country girl who came to the big city and made good in a terrific way. Born on a Texas ranch, she began modeling in a Dallas department store. McClelland Barclay, the artist, saw her when she was Queen of the Texas Centennial Exposition and suggested she go to New York to see Mr. Powers. She earned $50 the first week she worked as a Powers model, but inside of two years she could command almost any price she cared to ask, her blonde beauty being equally well suited for fashion or illustration work. Not long ago she signed a movie contract and left for Hollywood.

Other Powers models who have gone to Hollywood and later seen their names illuminated in shining mazdas are Kay Francis, Barbara Stanwyck, Norma Shearer, Joan Bennett, Rosalind Russell, Gene Tierney, Betty Furness, Paulette Goddard, Joan Blondell, Anita Louise, Dolores Costello, Helen Vinson, Jean Carrol, Madge Evans, Katherine Aldrich, Elise Knox, Nancy Kelly and Marguerite Chapman.

Helen Bennett reversed the usual process and came into the modeling field through the stage door. As one of the top high fashion models, she gets $25 an hour, yet she continues to dance in one musical comedy a year.

The above are only a few typical examples picked at random. There are many more talented young ladies who work out of Mr. Powers' Park Avenue office.

John Robert Powers got his start by accident, more or less. Born on a farm near Easton, Pa., he attended Lafayette College before embarking on a stage career. According to his own admission, he wasn't too good an actor and one day found himself in New York, broke and out of a job.

While searching through the "Men Wanted" columns of the newspapers, he ran across the advertisement of a commercial photographer who was looking for models. Although the field was entirely new to him, young Mr. Powers applied for the job, only to be told that the photographer needed not one model but eight. He immediately thought of several actor friends of his who were also out of work, and while he was rounding them up, the idea of an agency to meet the demand for suitable models occurred to him.

At present Mr. Powers considers thousands of applications for modeling jobs from lovely creatures throughout the nation. Most of these come in by mail, accompanied by a photograph of the applicant and giving her background, modeling experience if any, and measurements. Other applications are made in person, and Mr. Powers spends his days interviewing the pick of the nation's feminine pulchritude.

It's awfully nice work if you can get it!

ETC 22873



Assistant Secretary of State Breckinridge Long, Edward A. O'Neal, president of the American Farm Bureau Federation, Senator John H. Bankhead of Alabama, and Representative Clarence Cannon of Missouri have lunch before the Federation convention opens.

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Stephen C. Munson, president of the St. Mary Parish, La., Farm Bureau, confers with Puerto Rican delegates De Antonio Rodrique Geigel, Miguel A. Martorell, Peregrin Terrasa, and Manuel Gonzales Quinones.

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Organization Aids the Farmer

The American Farm Bureau Federation Has Become a Dominant Factor in Agriculture Since the First World War.

FIVE thousand delegates, representing over 500,000 farm families, attended the 23rd annual convention of the American Farm Bureau Federation in Chicago last December. The size of the convention is indicative of the power in American life the farmer has become since the Federation was organized shortly after the first World War.

Farm organizations, as expressions of the farmer's desire to be banded together in a common cause, are not new. They can trace their beginnings back to Colonial times before the American Revolution, when there was the Philadelphia Society for Promoting Agriculture. Among the charter members of this group were George Washington and Benjamin Franklin.

The early farmer associations were primarily for social or educational purposes. Organizations seeking economic betterment didn't come until after the Civil War. One of the latter attempted to strengthen agriculture by legislation limiting special non-agricultural interests and by establishing cooperative grain elevators. Another sought government warehouses and government loans to farmers without interest. Several made a union with labor on a political basis. Others were interested mainly in the cooperative marketing of agricultural products and in the buying of goods used by farmers.

It is difficult to pin down the exact date of the beginning of the American Farm Bureau Federation. Officially the date could be March 1, 1920, when permanent offices were set up following ratification of a plan for a national organization by state Farm Bureaus. Actually, the Farm Bureau Federation has its roots in activities of two decades previous.

The nub of the idea of demonstration work springs from the south. It was in

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Representative Clarence Cannon of Missouri confers with Earl Smith, Farm Bureau Federation vice-president.



Assistant United States Attorney General Thurman Arnold drives home a point during his address to the Farm Bureau Federation convention.



Millions of farmers look for guidance to Edward A. O'Neal, president of the American Farm Bureau Federation, and Albert S. Goss, master of the National Grange.

1902 that Dr. Seaman A. Knapp, just returned from agricultural studies in Porto Rico, turned his years of educational experience on the problem of the Mexican boll weevil in Texas. The next year Congress appropriated $250,000, and Dr. Knapp was put in charge of the Farmers' Cooperative Demonstration Work and the adapting of agriculture to the boll weevil situation. Farmers were taught better farming methods by demonstration in which fields were set aside and crops grown under the care of a "country agent." This method flourished in the South and later spread to the North.

In 1909 a former Secretary of Agriculture, James Wilson, was traveling in New York and observed the large number of abandoned farms in the southern part of the state. His statement on this situation made upon his return to Washington was noted by Byers H. Gitchell, then secretary of the Binghamton, N. Y., Chamber of Commerce.

Mr. Gitchell and his associates realized that a city depending upon the surrounding farm community cannot prosper unless agriculture prospers. Acting on this basic fact, the Binghamton Chamber of Commerce appointed a committee to study agriculture in the surrounding counties. Representatives of the U. S. Department of Agriculture and state agricultural interests participated.

The committee members and affiliated representatives decided the time was opportune for aiding the farmer. The U. S. Department of Agriculture was consulted at Washington, and it was recommended that county demonstrations be tried. Funds were provided and a graduate of the New York Agricultural College was employed, starting work as the first county agent on March 20, 1911.

The county agent soon became a permanent part of the agricultural scene in the East and the Middle West. In West Virginia the work branched out and sought the farmer's active cooperation to bolster the support that came from institutions in the city. Farmers were asked to take out memberships, at one dollar a year, in a "county farm bureau."

It was from this background that a meeting was held in Ithaca, N. Y., in the spring of 1919 by representatives of twelve state Farm Bureaus to plan a national organization. Tentative organization of a national group was completed at a meeting that fall in Chicago, and following ratification of the plan the national organization came into being the next spring.

The next year the Farm Bureau Federation's first president, James R. Howard, conferred for over an hour with President Woodrow Wilson, and in 1921 President-elect Warren G. Harding called the Farm Bureau Federation to his home for consultation. The Farm Bureau Federation had arrived as an important factor on the national scene. The immediate years ahead were devoted to the development of leadership, culminating in the Federation playing a most active part in the activities of agriculture during the past decade.

ETC 22875



Winter in the Clouds

Weather Observers Atop Mount Washington Brave Temperatures Rivaling Those in the Arctic.

By NORMAN STUART

THE first crippling snowstorm of the season struck Mount Washington in mid-December and the three young weather observers—they're only 25, 23 and 21—were snowed in for the duration. That is for the duration of the winter. And on Mount Washington winter isn't unofficially declared over until sometime in June! The young men were fortunate because the road is usually snowed in tight by October.

Bleak and desolate Mount Washington, Monarch of New Hampshire's White Mountains, is the tallest peak in the northeastern United States. The three observers are college men employed to man the weather observatory at the summit, 6288 feet above sea level.



TOP: *Behind the snow-capped summit of Mount Washington, foreground, rise lesser peaks in the Presidential Range.*
Photo from the New England Council

ABOVE: *Not an invader from Mars but an observer dressed for dirty weather on top of Mount Washington.*

ETC 22876

The observers draw this first aid toboggan behind them when they go out on a rescue expedition.



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With the United States engaged in a war for our very existence, weather plays an important part since our navy and air force are bearing the brunt of the defense.

Ask any professional meteorologist what he considers the most important weather observation post in the country and invariably he'll tell you, "Mount Washington." Scientists rank this outpost as one of the most difficult assignments a man can get and classify the weather at the summit as the world's worst.

The weather is bad! The writer can vouch for that and exhibit a frost spot on the side of his nose. During his three-day visit snow fell continuously although it was blown away by winds ranging from 60 to 95 miles an hour, winds that tore at his clothes and sought to lift him from the slippery summit. The temperature dropped from zero to 20 degrees below and remained there.

Unless a visitor ties his parka tight over his mouth and nose, leaving only his eyes exposed, he's bound to have trouble. Struggling to reach the observatory from the old stage coach office the writer met Old Man Winter in person. The cold wind filled his nose and forced its way into his lungs with so much pressure that it was almost impossible to draw a breath. Rime (frozen fog) formed on his eyebrows and exposed hair. Tears ran from his eyes and froze. Is it any wonder that the Mount Washington Observatory is highly pleased when a man lasts two years?



John A. Brown, 25, of Watertown, Mass., is spending his second winter on the summit. He's a Harvard graduate and a civil service employee listed in charge of the weather station.

John B. Blackwood, 23, of Concord, N. H., was employed in the United States Forestry Service last summer. He is a graduate of the University of New Hampshire and received his master of forestry degree at Yale.

The youngster of the trio, Robert W. Elsner, 21, of South Weymouth, Mass., attended Brown University, worked at the Pinkham Notch Camp last summer. He and Blackwood are spending their first season on the mountain. They are non-commissioned airways observers paid in part by the United States Weather Bureau and the Mount Washington Observatory.

•

John Blackwood uses a flashlight to check the barograph.

All three young men are expert mountain climbers and skiers, know their way around the White Mountains. They alternate in their work every two days. While off duty they conduct scientific research, repair apparatus and sleep. Every 24 days they are given an eight-day furlough. Although the auto road is sealed to motor traffic for at least six months, the weather observers can ski down the eight miles and ski back about halfway with seal skins tied to their skies to aid traction.

The observatory work day begins at 6:30 when an alarm clock awakens the man who is on duty. He dresses hastily in near freezing temperatures, pulls on heavy boots, a sweater, a parka and heavy gloves. His first duty is the collection of three rain and snow gauges, located on the north, west and south sides of the summit. These are always frozen and must be melted before the reading can be taken.

At seven the observer again goes outdoors to read the wet and dry bulbs and the psychrometer. Indoor readings are made of the maximum wind velocity for the past six hours along with current wind velocity and direction. A

ETC 22877

glance at the sky—if clear—discloses the character of the clouds and their direction.

The readings must be computed for sea level and recorded on the proper weather bureau forms. At twenty minutes past 7 and 10 A.M., 1, 4, 7 and 10 P.M., and 1 A.M., the weather conditions are broadcast on a 2.5 meter circuit beamed to the Portland, Maine, weather bureau. There the report is placed on the teletype for transmission to weather stations throughout the country.

On most days the men forego breakfast, eat lunch at noon and dinner at 5. Supplies for the winter are brought up the mountain sometime early in October and include 500 pounds of beef, pork, ham, lamb and chicken, five cases of eggs, two tons of assorted canned goods, flour, sugar and potatoes. Peanut butter and marshmellow fluff are the two most popular items on the food list.

"Most of all we miss sweet desserts," John Brown admitted. "But we don't have to go without cakes and pies. John Blackwood knows his way around a kitchen and can turn out first class pastry. Unfortunately a cake doesn't last very long around here."

Until last summer these young men of the mountain had to melt snow and ice for their drinking water. A pail of snow, contains only a pail of water and requires much heat energy to melt. Finally the water doesn't taste very good.

One of the observers climbs the bleak and icy steps to the observatory.



When the Yankee Network began to construct a frequency modulation radio transmitter at the summit engineers decided they would require a supply of water at all times. Geologists who have probed the entire mountain predicted they would never find aqua pura. Undaunted, Al Sise, chief engineer in charge of FM for the network, rounded up an aged Jackson, N. H., character named Joe Tole and drove him to the summit with his divining rod. Tole pointed to a spot within an hour, collected a five-dollar fee.

"It was as good a place as any to start boring," Sise explained, "so we began in June with a 100-mile an hour wind blowing."

Sheets of tin nailed to the well rig blew away, as did a pile of coal for the forge. A ten-inch drill pounded away at solid rock for 20 feet then hit a ledge. The drillers changed to an eight-inch bit, then at the 40 foot level to a six-inch, the size of the present hole through the very heart of rugged Mount Washington.

Days passed. Down, down, down bit the drill, fighting its way through mica

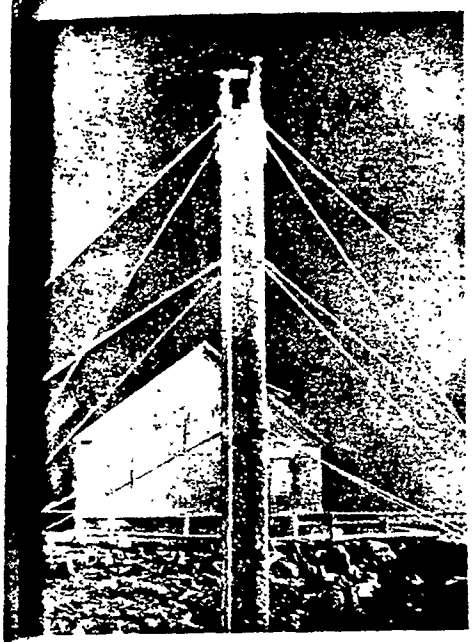


Observer John Brown inspects a snow gauge.



Icy conditions on the mountain call for shoes with specially designed soles.

ETC 22878



On top of this 30-foot tower is the heated wind gauge or anemometer.

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strata and granite. Weeks passed. Still no sign of water. Finally last September the drillers hit 1075 feet and reported some moisture. They continued to 1110 feet from where the water rose to the 250-foot mark. Amid loud cheers a pump brought the liquid to the surface.

"Fortunately for us the temperature of the water ranged from 32½ to 33 degrees," Sise continued. "Had it been one-half degree colder we wouldn't have had water but ice. And the work of those 14 weeks would have been in vain."

The present observatory, perhaps the strongest wooden building in the world, was completed in 1937 and stands 22 by 44 feet with the frame consisting of 9 by 10 inch railroad ties securely mortised. The entire foundation is fastened to ten four-foot bolts extending into solid rock or blocks of cement. If the observatory ever blew off the mountain you can be reasonably certain that it would carry away a part of the summit.

Two layers of boards, two layers of paper and shingles, a layer of insulated padding and another layer of celotex comprise the walls. Soft coal provides hot air heat. Double-paned plate glass windows (like those in air-conditioned railroad cars) were gifts of a leading glass manufacturer.

Despite this solid construction a visitor can get plenty of proof that nature is greater than man when the wind blows more than 95 miles an hour. At that velocity the building begins to shake and rattle. Chairs and dishes move. Rime forms on the interiors of the windows, seeping in through the tiniest cracks. Terrific drafts fan the furnace. A particularly high gust of wind will force open the furnace door, throwing out a long tongue of flame.

The idea for the Mount Washington Observatory originated in 1932 with Joseph B. Dodge, known to skiers everywhere as the manager of the Appalachian Mountain Club at Pinkham Notch, N. H. Dozens of people on wooden slats began to dot the White Mountains on weekends. Several summer hotels remained open during one winter and prospered. Dodge decided that a weather station reporting the weather conditions in this area would be of invaluable service to winter sports enthusiasts and to other weather bureaus.

Salvatore Pagliuca, an experienced mountain climber, Robert Monahan and Alexander McKenzie volunteered to spend the winter of 1932-33 at the summit of Mount Washington in the old stagecoach office. They arranged for contributions of food, winter clothing and fuel for the non-profit enterprise. Instruments were lent them by the Blue Hill Observatory of Harvard. And for two years the trio served the public without pay in this mile-high exile. The highest wind in the world was recorded there by Pagliuca—hitting 231 miles an hour. While colder temperatures have been recorded elsewhere, the 46 degrees below zero blast atop Mount Washington has a more rapid cooling effect because of the continuous strong wind.

The present observers estimate a half-hour is time enough for a normal person to freeze once he stops moving in a high wind and ten below zero temperatures. In addition to serving their country on this desolate outpost by observing and reporting the weather, the three young men of the mountain are subject to calls for aid by foolhardy skiers and mountain climbers. Not a season passes without several rescues.

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The observers built this game, called "Sockey," to enliven their free periods.



ETC 22879

This Month's Cover

A NEW NATION was born when a little group of farmers, armed with crude squirrel guns, looked across the Lexington village green at a company of soldiers who were the equal of any in the world.

"Stand your ground, men," came the calm voice of Captain John Parker, their leader. "Don't fire unless fired upon. But if they mean to have a war, let it begin here."

Later the American eagle was selected as the national emblem of the nation by Benjamin Franklin, John Adams and Thomas Jefferson. It was adopted by Congress as a symbolic feature of the Great Seal of the United States.

Since that time the tiny nation in the New World wilderness has grown into the world's greatest, while the spirit of Captain Parker and his men still lives and will continue to live.

The Following

★ Service Awards ★

have been made as of

February 1st, 1942

FIFTEEN YEARS

FRANKLIN FRICKER Eng. Detroit

OSCAR B. LEWIS Sales, N. Y. General

CLEVELAND WALCUTT, JR. Eng. Detroit

CHARLES WASSERMAN Mfg., Deepwater

TEN YEARS

MILDRED E. JONES Gas. Test., K. C.

MICHAEL J. MAROLDY, JR. Adm.

HOWARD W. PEARSALL Chem. Res., Detroit

WILLIAM M. TURNLEY Sales, N. Y.

FIVE YEARS

RALPH C. CHAMPLIN Adm.

JOHN P. DOOHER Adm.

THOMAS J. KEENAN Adm.

ETHYL NEWS

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One of the prize-winners in the black-and-white class of Popular Photography magazine's 1941 International Prize Picture Contest

ETC 22881



Delivering the goods for Uncle Sam

HE'S BEEN delivering the goods for you and the folks next door for years. The lumber, stone, metal, glass of which homes are built; the furniture that goes into them; the clothing you wear; the food you eat; the things you sell—all are part of the cargo he carries. There's hardly a thing you use that somewhere along the line—from farm to market, factory to warehouse or store tc you—is not delivered by a truck driver.

Today he's got another even bigger job to dc—delivering the goods for Uncle Sam The vast defense production program calls for the constant movement of raw materials, parts and finished products. It has placed a tremendous burden upon the country's transportation facilities. In some sections new factories—whole new towns—have sprung up in areas not served by other means of transportation, and their very existence depends upon the fleets of trucks and buses that serve them.

The trucking industry to a man is rolling up its sleeves. It is preparing to carry more tons more miles, and to carry them more quickly, more economically than ever before.

Ethyl is privileged to help in this vital work in three important ways: First, through our products—anti-knock fluids containing tetraethyl lead which are used by oil refiners to improve gasoline. Higher anti-knock gasoline leads to improvements in engine power and efficiency, savings in weight per horsepower and gains in performance. Second, through our laboratories in Detroit and San Bernardino, we work with the technologists of *both* the automotive and petroleum industries in coordinated research programs and contribute the results of our own tests with fuels and engines. Third, through our field engineers, who assist commercial operators in taking advantage of the latest fuel and engine developments.

We welcome every opportunity to cooperate with technologists in every field of automotive development and use and extend to them an invitation to avail themselves of our research facilities.

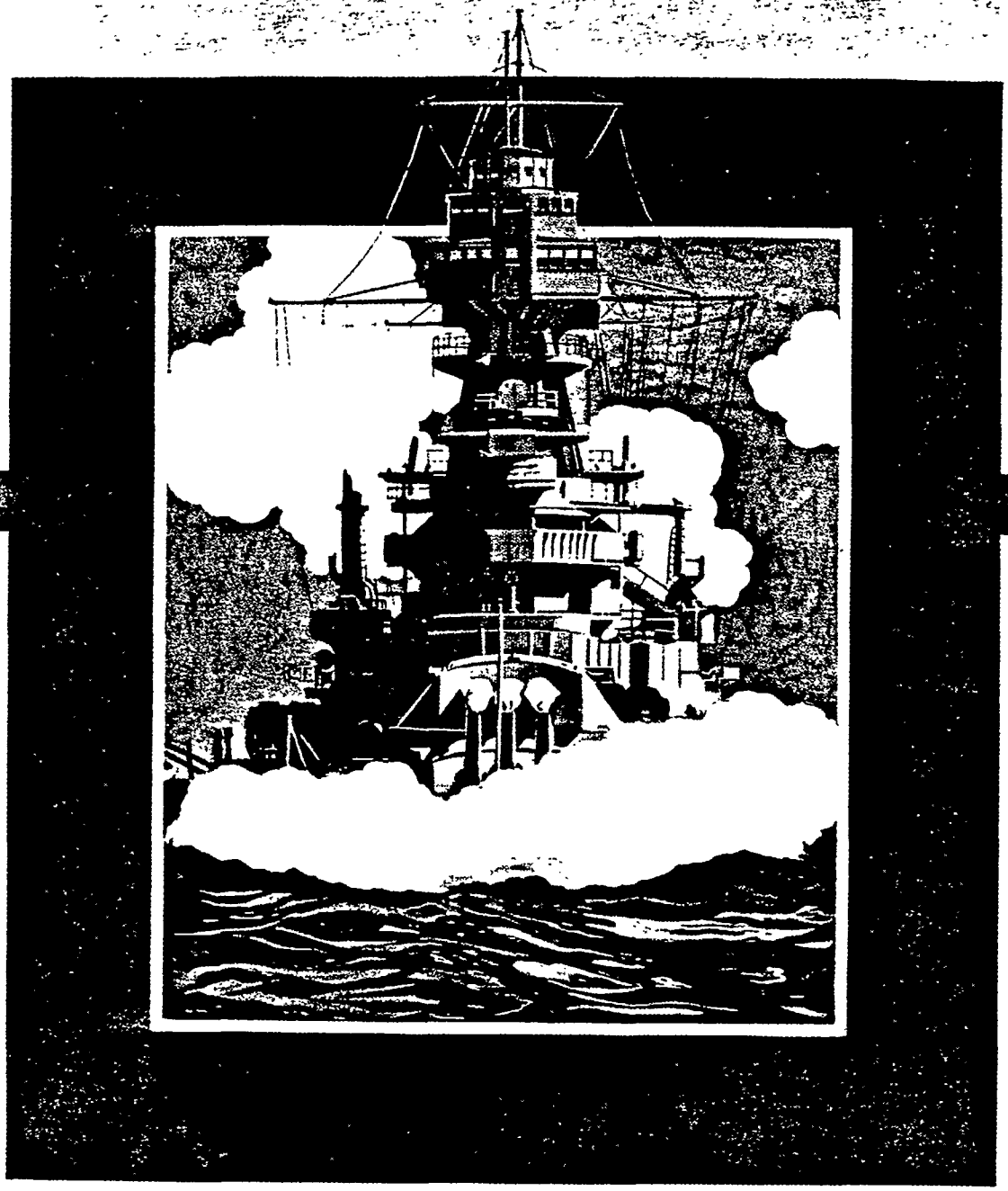
ETHYL

ETHYL GASOLINE CORPORATION

Chrysler Bldg., New York, N. Y.

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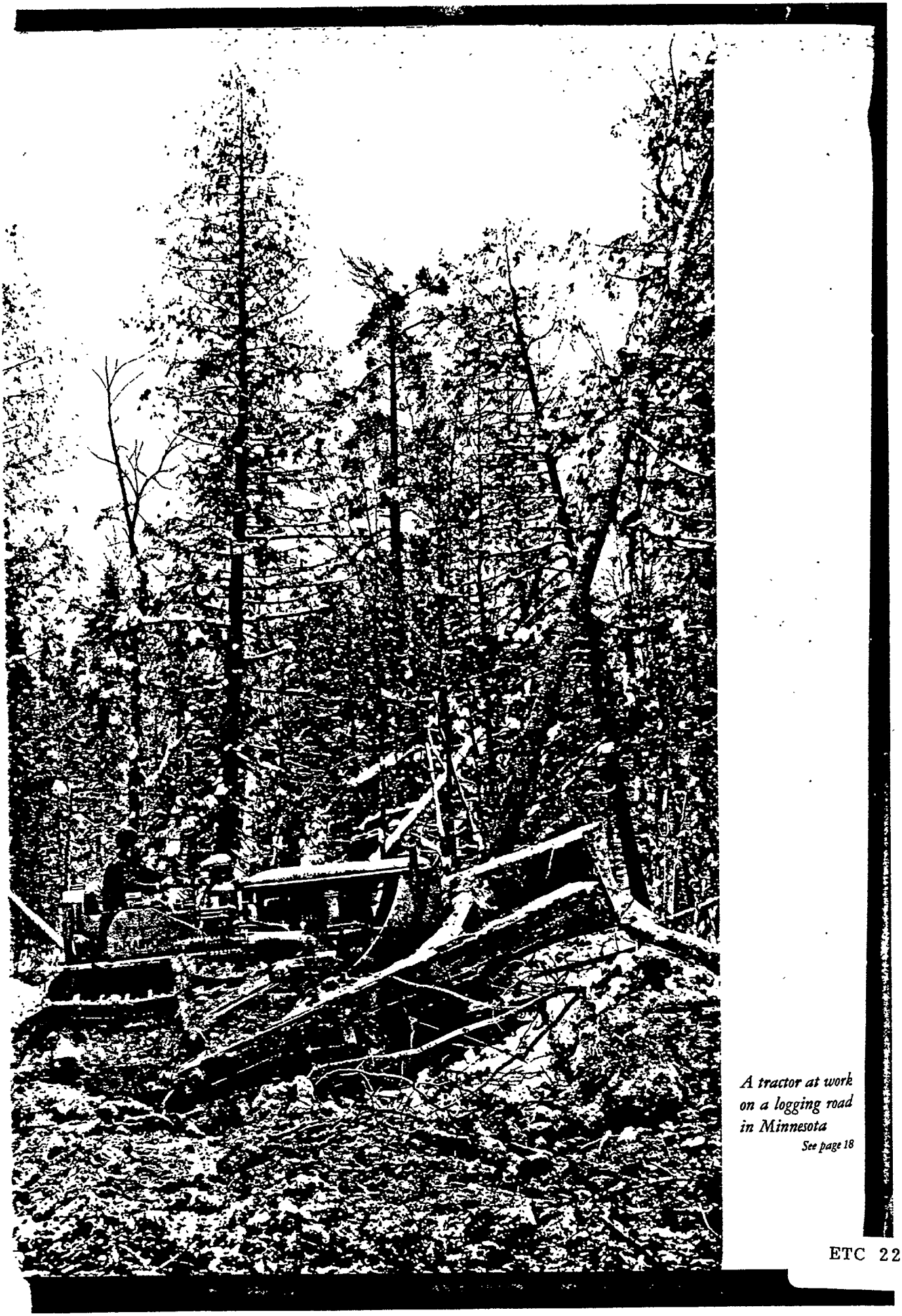
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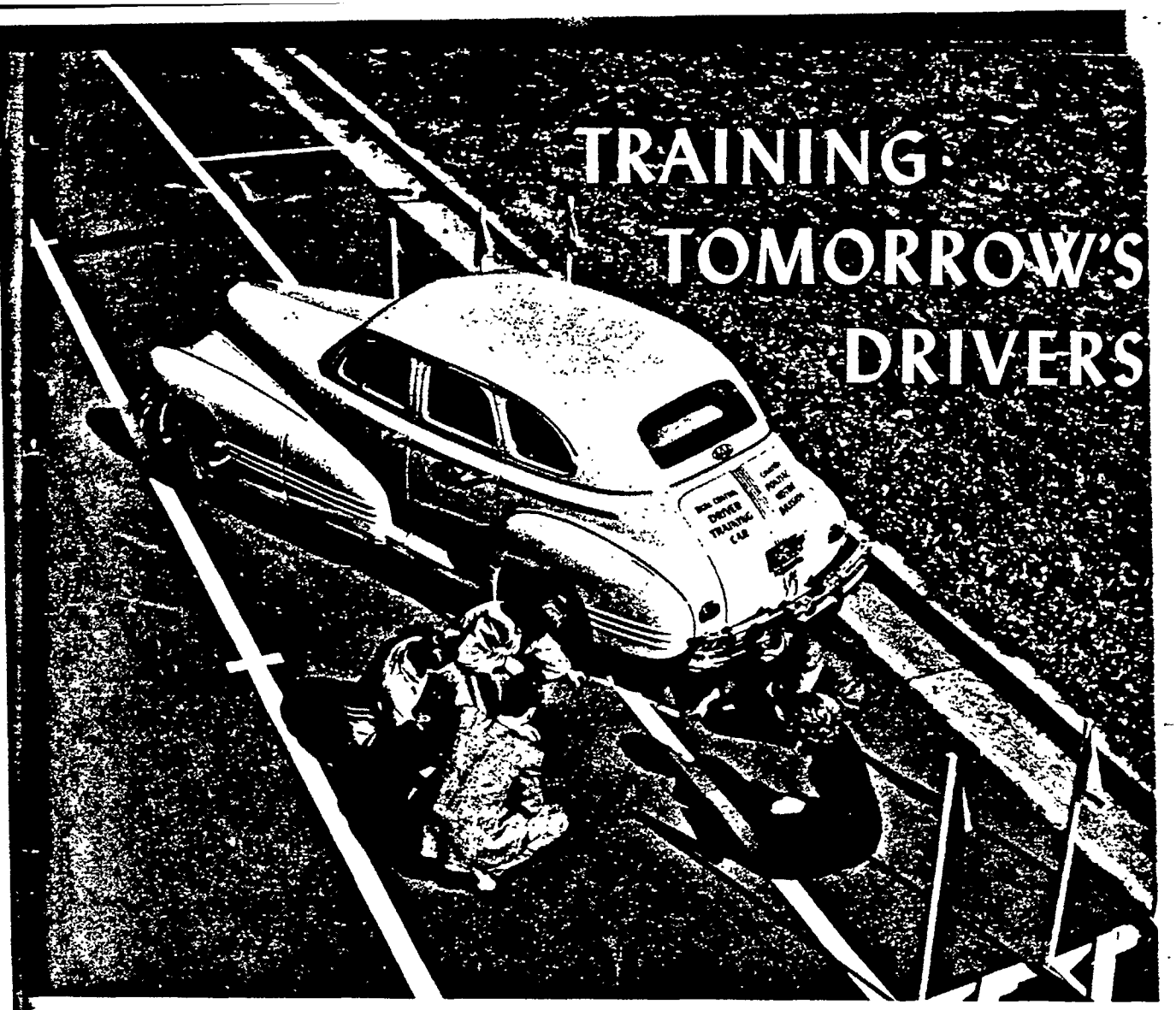


A tractor at work on a logging road in Minnesota

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TRAINING TOMORROW'S DRIVERS



Students are shown when to start cutting the wheels to back into a parallel parking space.

SINCE modern armies move not only "on their stomachs" but on treads and wheels, America is fortunate that the Motor Age has produced familiarity with motorized vehicles among millions of men. This familiarity is not enough, however, either to pilot safely an automobile or truck on today's congested highways or to operate a tank or other Army vehicle in convoy or combat. Highly developed skill is necessary.

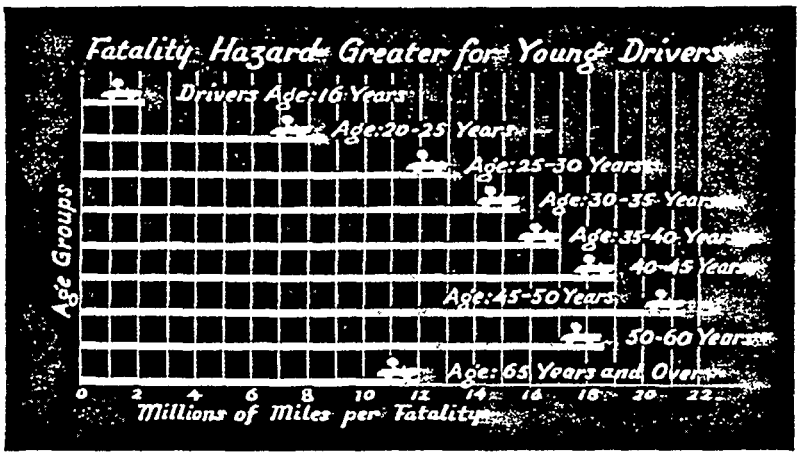
In the high schools of America during the past six years a new movement for the proper training of beginning drivers has spread across the country. Thousands of high school girls and boys are being prepared to take their places behind the wheel of the family car as safe, sportsmanlike drivers or to replace in industry thousands of truck drivers now in the Army. The high school boys, too, form a vast reservoir of skilled drivers capable, as they become of service age, of piloting Army vehicles with but comparatively little further specialized training.

AMERICAN AUTOMOBILE ASSOCIATION DEVELOPS PROGRAM OF BEHIND-THE-WHEEL INSTRUCTION FOR HIGH SCHOOL STUDENTS

by

BURTON W. MARSH

Recent studies of accident experience indicate that drivers 16 years of age had about nine times as bad a traffic fatality record per million miles driven as drivers 45 to 50 years of age, who had the best record. Worried parents, high school principals and teachers, youth workers and traffic specialists realized for a long time that the trend of traffic accidents involving youthful drivers had been increasing rapidly. To help improve this situation, the American Automobile Association in 1935 began development of a program of teaching



This chart shows the average fatality record per million miles of driving for various age groups.

"sportsmanlike driving" to beginning drivers of high school age.

Few developments have been so rapid in the history of the high school as the amazing acceptance of the need of instruction in traffic safety. Already such instruction is required in 20-odd states, either by law or regulation. Some high schools give credit toward graduation to students satisfactorily completing the instruction.

The course includes two important phases: (1) classroom instruction and (2) behind-the-wheel instruction and practice under guidance of an experienced teacher who has received special training in teaching the step-by-step AAA plan to the beginner.

One of the first items stressed in the classroom is the relationship of physical characteristics to safe driving. Vision, ability to withstand glaring lights, distance judgment, reaction time, effects of temporary and permanent disability, and effects of intoxicants are discussed and tested, either by borrowing driver testing devices developed by the AAA, or building them in the school shop from blue prints made available for this purpose.

Every student is keenly interested in his own test results and the instructor helps those with deficiencies to compensate for them. For instance the color-blind boy is cautioned to watch other traffic carefully at traffic lights. Those who have so-called "barrel-vision" are advised to keep a sharp lookout to the sides, especially when passing parked cars or side streets.

Sometimes the test result brings a surprising reaction. A young lady was found to have deficiencies in vision so serious that it was dangerous for her to drive, so she was advised to have a complete eye examination by a specialist. She appeared disturbed and asked the instructor to telephone her father, who turned out to be a well known physician. His reaction to the information was not a placid one, but several days later he apologized. "Like the shoemaker's children who go about half shod, those of a physician often fail to receive the medical attention they should," he said. A pair of eyeglasses solved the young lady's problem and made it possible for her to drive.

The classroom instruction also deals specifically with driver and pedestrian responsibilities, sound driving practices, society's responsibilities, and how beginners learn to operate an automobile efficiently. Conservation of tires and proper maintenance of all parts of the car are stressed because of today's conditions. Sportsmanship, courtesy, and the basic rules for handling the modern automobile, in addition to safety, are taught during the minimum of 20 clock hours of classroom work recommended in AAA standards.

Training cars have dual clutch and brake pedals so that both instructor and student-driver are safeguarded. First lessons in steering, starting and stopping, shifting gears, turning around, parking, etc., are given either on an off-street practice area, or on little used streets in the vicinity of the school. As the student acquires skill, he is permitted to drive in light traffic, and then



An instructor explains the AAA brake reaction detonator which tests both reaction time of drivers and braking efficiency under actual road conditions.

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in heavier and heavier traffic until he feels at home under all traffic conditions.

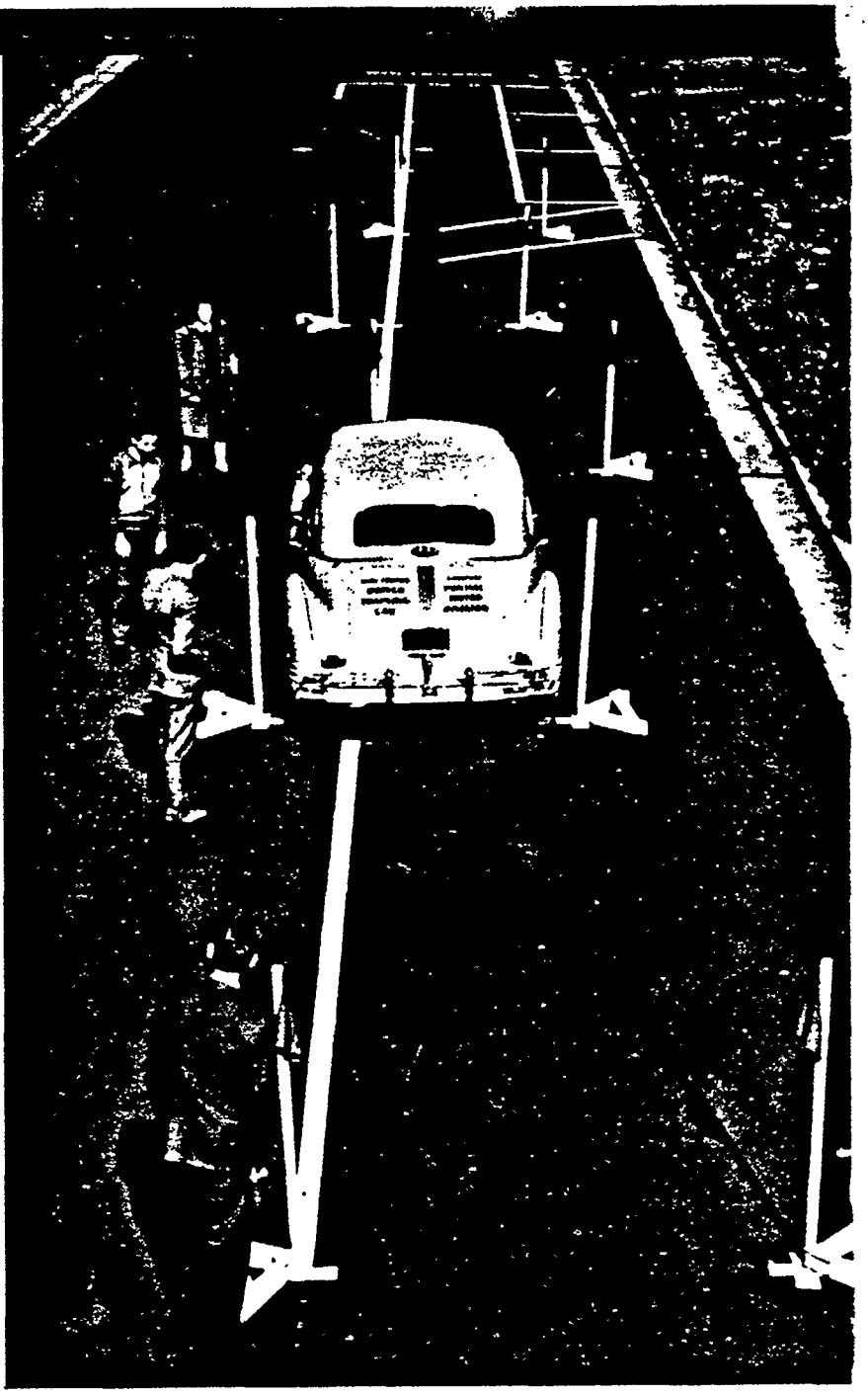
Four students accompany the teacher at a time. Behind-the-wheel instruction is given to each in 15-minute periods while the other three sit in the back seat, watching and listening. Eight hours is the minimum behind-the-wheel instruction and practice time recommended in AAA standards.

Stiff road and written tests follow the period of training. Many adult drivers would have difficulty passing the 15 driving skill tests which have been carefully developed by AAA specialists. Tests are more rigid than those required by any state examination for operator's license, yet they are almost always passed with flying colors. Reports from state licensing examiners declare that the high school trained drivers are much better than the average applicant for an operator's license.

More conclusive evidence has been the accident record of trained drivers compared to that of those who are untrained. A study of the Pennsylvania State Motor Police records of 250 drivers trained at State College (Pa.) High School and 250 untrained youths of the same age and driving experience showed a much better record for the trained drivers over a three year period. Five reported accidents involved trained drivers, while the untrained group had 13. Of the 13, nine drivers involved were at fault. In not one of the five accidents involving trained drivers was the driver declared at fault. In addition, untrained drivers caused 11 injuries, while the trained drivers caused none.

Recent surveys indicate that some 8,000 high schools in all parts of the country now include classroom instruction in "sportsmanlike driving" in their curricula, with an increasing number, estimated between 400 and 600, also giving the road training in dual-control driver training cars.

The American Automobile Association has had generous assistance from the Pontiac Division of General Motors in helping schools obtain cars. During the past six years, Pontiac has made available 202 new cars for loan to schools which met AAA requirements.



The student must drive both forward and backward between these pairs of stanchions. This test checks ability to judge position of fenders and to steer correctly.

During the 1941-42 school year, 45 cars were assigned to some 83 high schools for training approximately 6,500 high school students, while two cars were used by AAA staff educators for teacher training and demonstration. Ten of the 45 cars were used by colleges also for the training of approximately 250 teachers. During the summer of 1941, 23 cars were assigned to colleges for teacher training courses.

Model cities in connection with driver training are Cleveland and St. Louis. In Cleveland, each of 14 high schools has a dual-control car and a trained teacher who devotes from half to full time instructing driver education and training classes. A similar city-wide

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program is under way in St. Louis. In many smaller communities, two or three high schools cooperate, making joint use of one car with a trained teacher in each school.

Teacher training has been an important part of the AAA program. The first course for teachers was presented at Pennsylvania State College in the summer of 1936 by Professor Amos E. Neyhart, who became Consultant on Road Training to the AAA. Dr. F. R. Noffsinger, an experienced educator, a few months later became educational consultant to the AAA. Since then these two specialists have traveled the United States conducting teacher and professor training courses and stimulating activities in the field.

To date there have been 159 college summer session courses for high school teachers. Dr. Noffsinger and Professor Neyhart have personally conducted 64 intensive one-week training courses for in-service teachers—all at the invitation of city, county, or state school authorities. As a result, some 3,266 teachers have been presented with AAA teaching certificates, and 146 college professors have received special training at professors' seminars to prepare them to pass on the training to high school teachers.

The AAA "Sportsmanlike Driving" text, now widely used throughout the country, was produced by the Association to fill the need for a comprehensive, popularly-written, profusely-illustrated text which would be interesting and instructive to high school students. Over 700,000 copies of the five text units have been distributed. In addition, many teaching aids, including a teacher's manual, tests, informative pamphlets, etc., have been produced to help make the course well-rounded and complete.

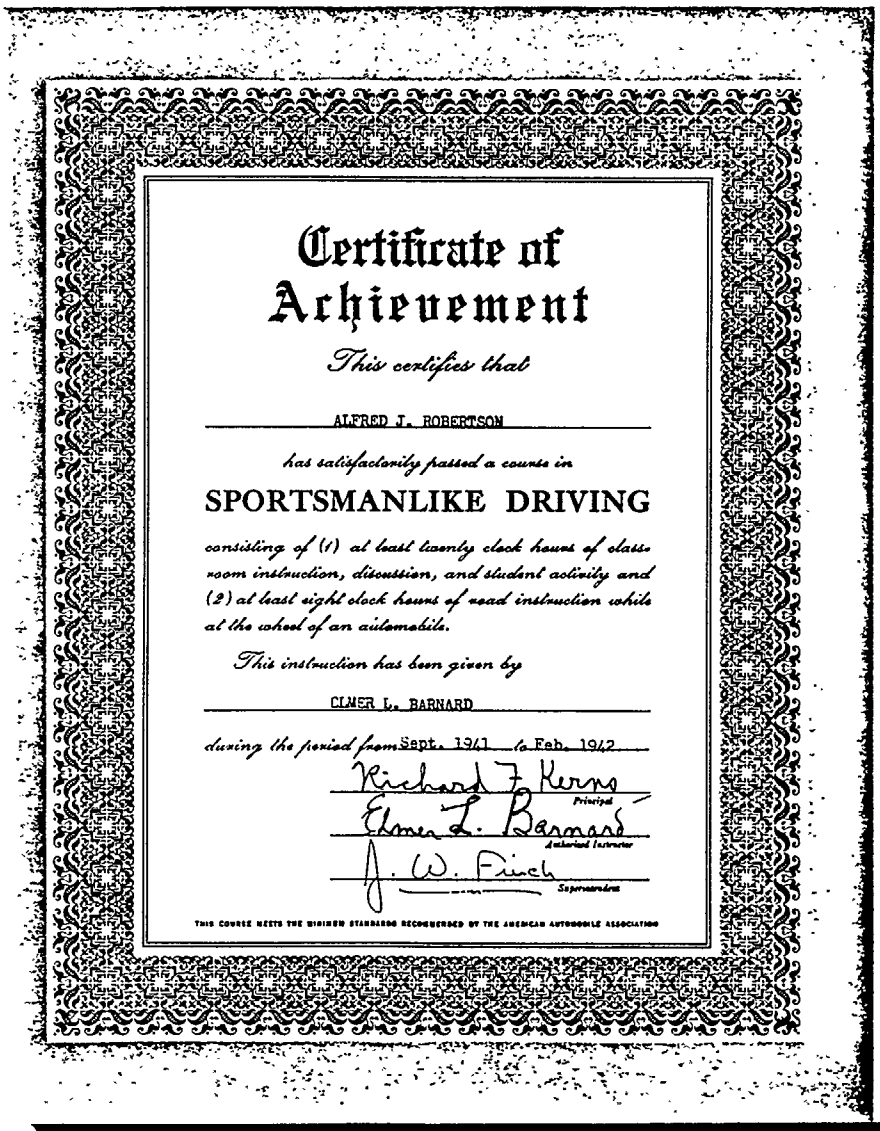
Wherever such instruction has been instituted, parental approval has been enthusiastic. When Johnny or Mary drove the family car, parents used to worry until it was safely back in the garage. Not so now where high school training is given! Scores of parents have written or told school authorities that they now have confidence in their son's or daughter's ability to handle the car properly and safely. Best proof, revealed in several surveys among students who have taken the course, is that Johnny and Mary now say they have much less trouble getting the family car!

Johnny and Mary are telling their instructors other stories, too, of how they are passing on newly-developed skills to parents who have driven for years. For instance:

"Mother and Dad feel that the course is very worthwhile," said Johnny. "They even admit that I have taught them some good points about safe driving practices. My dad's worst habit is approaching turns too fast. Although he forgets once in a while, I am bringing him around to my way of driving."

From Mary: "Mother had a habit of driving a block in first and then skipping second in shifting. I've taught her to use all three gears. Now she shifts quickly and smoothly."

The drivers to be met face to face on the highways of tomorrow are the high school students of today. From the 25,000 high schools of America there could be turned out annually, through widespread adoption of driver training courses, a million and a half well trained, careful, and sportsmanlike drivers. Whether our annual highway traffic death toll remains high or not in the future depends largely on what kind of a start today's young drivers have!



Certificate of Achievement

This certifies that

ALFRED J. ROBERTSON

has satisfactorily passed a course in

SPORTSMANLIKE DRIVING

consisting of (1) at least twenty clock hours of classroom instruction, discussion, and student activity and (2) at least eight clock hours of road instruction while at the wheel of an automobile.

This instruction has been given by

ELMER L. BARNARD

during the period from Sept. 1941 *to* Feb. 1942

Richard J. Kerns, Principal

Elmer L. Barnard, Authorized Instructor

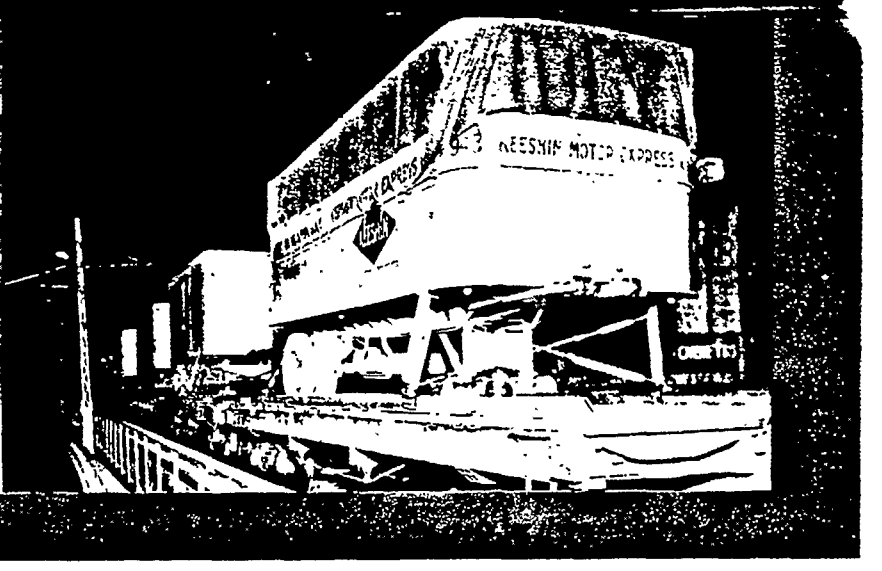
J. W. Finch, Superintendent

THIS COURSE MEETS THE MINIMUM STANDARDS RECOMMENDED BY THE AMERICAN AUTOMOBILE ASSOCIATION

A certificate is awarded to each high school student who completes the course.

ETC 22888

TRUCKS VIA RAIL



COORDINATED SERVICE SAVES WEAR AND TEAR ON EQUIPMENT AND EFFECTS A SAVING OF LABOR

THE Chicago North Shore and Milwaukee Railroad has established a coordinated rail-truck service which trucking companies have found saves not only wear and tear on equipment but labor as well. This electric interurban railway, commonly known as the North Shore Line, carries loaded trucks and trailers on specially equipped flatcars between its terminals at Chicago and Milwaukee, also serving the intermediate city of Racine, Wis.

One of the first practical plans adopted in the Midwest for bringing about a coordination between motor truck carriers and a railroad, the service does not crowd the truck operator out of the picture. Instead, it benefits the truckman in that it not only saves time and equipment but also provides a stabilized basis on which to compute charges.

The North Shore Line's service permits the handling of fully loaded trucks. The operator loads his truck or trailer and drives it to the railroad loading platform in Chicago, where it is run under its own power up a ramp onto a special flatcar and fastened into position for transit by rail.

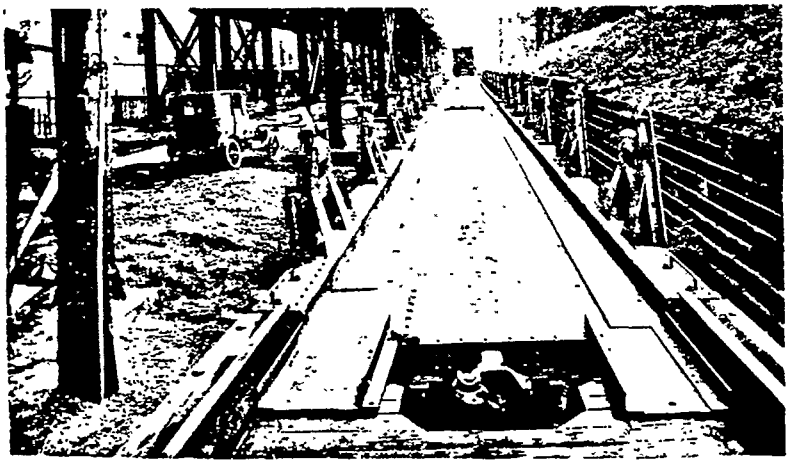
Upon arrival of the train in Milwaukee another driver wheels the truck away and delivers the shipment. He then collects a return load, brings the truck back to the loading platform at Milwaukee and ships it again by rail to Chicago, where the first driver picks it up and makes deliveries.

Some trucking concerns ship only trailers, which are hauled away by tractors at the other end of the line.

When this rail-truck service was inaugurated, railway rates were figured on a basis of 10 cents per 100 pounds for a minimum weight of 15,000 pounds. Later a flat rate was adopted and loaded trucks and trailers not exceeding 18 feet in length were carried for $12, over 18 feet but not exceeding 25 feet for $15, and over 25 feet but not exceeding 32 feet for $18.

The railroad found still later that it was able to handle this business profitably at an even lower cost and passed the saving along to the truck operator by a flat rate of $10 for all loaded trucks or trailers and a rate of $5 for empty vehicles. Following publication of this lower charge there was an increase in patronage which has continued upward with only occasional fluctuations.

Trucking companies report that the service offers a high degree of dependability which is difficult to attain when operating under congested traffic conditions. They value the saving of time gained through avoidance of breakdowns, tire trouble, and slow driving in stormy weather.



A long line of the special flatcars used in the rail-truck service.

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ETHYL ORGANIZES FOR WAR

NEW TECHNICAL SERVICE DEPARTMENT HEADED BY JULIAN FREY, COMPOSED OF FIVE DIVISIONS; ADVERTISING AND PUBLIC RELATIONS DEPARTMENTS COMBINED

ALL technical services of the Ethyl Gasoline Corporation have been merged to provide maximum cooperation with the oil and automotive industries and with the armed forces during the war emergency.

Julian J. Frey of Detroit, Manager of the Company's Technical Sales Division since 1930, heads the new Technical Service Department, established for this purpose. The department is composed of five divisions and divisional managers have been named as follows:

Refinery Technology Division, William H. Hubner; Gasoline Testing Division, John Clifford Pope; Agricultural Division, C. G. Krieger; Truck, Bus and Fleet Division, Errol J. Gay; Passenger Car and Automotive Accessories Division, Richard K. Scales.

In response to requests from automobile manufacturers for assistance on service programs, the Passenger Car and Automotive Accessories Division has turned from work on technical advancements in engines to aiding owners to conserve their cars. This division will tie in with motor company service departments on educational programs to keep engines tuned up for best performance on available fuels and parts.

ABOVE LEFT: **JULIAN J. FREY**
Manager of the Company's Technical Sales Division since 1930, he has been appointed director of Ethyl's Technical Service Department. into which are merged all technical service activities of the company.

●

BELOW RIGHT: **RALPH C. CHAMPLIN**
Ethyl's new director of advertising and public relations has been director of public relations since 1939. He was associated with Ethyl advertising at Batten, Barton, Durstine & Osborn for seven years before joining the company in 1937.

●

An important new phase of the unit's activities will be contact work on advancements in substitute materials for engine parts, such as pistons, rings, and valves, as well as work with the technical staffs of parts manufacturers.

George Krieger, who was primarily responsible for the use of high compression engines in farm tractors, acting in a consulting capacity with the engineering and sales departments of practically all the leading tractor manufacturers, is head of the Agricultural Division, which has as an immediate function the coordination of work in the



Ethyl laboratories with that of the technical personnel of the tractor industry. The division is now arranging field programs for tractor dealers and farmers, which manufacturers agree will be a real contribution to the life extension of the farm tractor and to the conservation of fuel.

Mr. Krieger, through many years of experience in the farm field, has acquired considerable knowledge of markets as well as technical facts on tractors, and his services are being

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sought by oil companies in developing agricultural market programs. A. F. Wilt of the Agricultural Division at present is spending a large part of his time with oil companies specializing in the farm field.

Plans are being made for expansion of the services of the Refinery Technology Division, Mr. Frey announced, through additional contacts with oil companies. The personnel will be in constant touch with the technical staffs of large refineries to supply information on work being carried out in the Ethyl laboratories and on the utilization of antiknock compounds in fuels for bus, truck, farm tractor, and passenger car engines. T. H. Risk and C. B. Kass will be in charge of this work.

W. H. Hubner, head of the division, will continue contacts with small refiners with a view to obtaining the most economic utilization of tetra-ethyl lead and on the treatment and blending of base stocks.

The Gasoline Testing Division, headed by John Clifford Pope who is chairman of the Engine Operation and Maintenance Group of the Motor Fuels Division of CFR, will continue its work of analysis of gasolines for refiners, Mr. Frey explained. The unit has six laboratories strategically located in oil refinery centers. Refiners send gasoline samples to the nearest laboratory for determination of the amount of antiknock compounds to be added to bring the fuel to the refiner's specifications.

Errol Gay, in charge of the Truck, Bus and Fleet Division, has been acting in the capacity of consultant to the armed forces on motor vehicle problems and is dividing his time at present between Washington and Detroit. The division's personnel, said Mr. Frey, will vary the nature of their work to meet changed conditions. Close association with manufacturers, large national fleet accounts, and the technical personnel of oil companies will be maintained by the fleet group in the handling of engineering and service work.

Mr. Frey pointed out that, due to this unique position, the field staff, together with C. E. Smith, E. C. Paige, and H. T. Mueller of the Detroit office of the division, can aid fleet operators in tune-up and parts changeover for the maximum utilization of available fuels.

In another organizational change, Ethyl advertising, publicity and publications have been merged into a single unit under Ralph C. Champlin, Director of Public Relations since 1939. Mr. Champlin's new title will be Director of Advertising and Public Relations.

●

C. G. KRIEGER

Mr. Krieger is a pioneer in the development of the high compression tractor and is widely known among manufacturers of tractors and farm machinery.

●

JOHN CLIFFORD POPE

Mr. Pope was one of the first Ethyl employes in a technical capacity, having started in 1926 at the original chemical laboratory in Yonkers, N. Y. He has been manager of Ethyl's gasoline testing laboratories since 1938 and is chairman of the Engine Operation and Maintenance Group of the Motor Fuels Division of CFR.

●

RICHARD K. SCALES

Mr. Scales has been with Ethyl since 1931. Starting as a chemist in the research Department, later holding several positions in the Sales Department, he went to Australia as assistant manager for Ethyl Export Corporation. He returned to Detroit in 1937 to join the Technical Sales Division.

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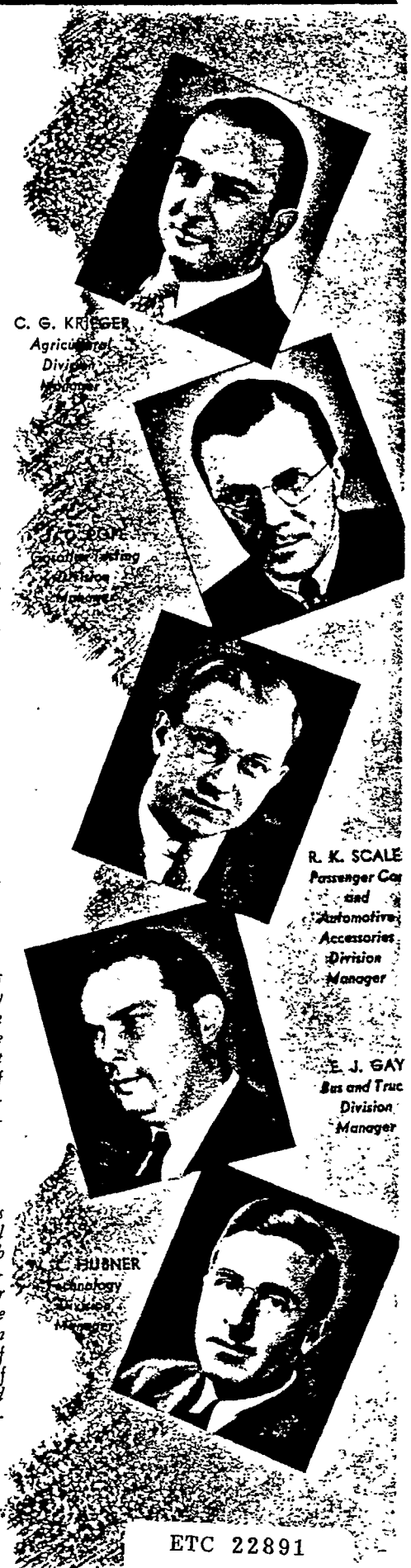
ERROL J. GAY

Mr. Gay is nationally known for his work with manufacturers of heavy duty engines and operators of bus and truck fleets. He is a member of the Executive Committee of the American Transit Association, chairman or member of committees of the Society of Automotive Engineers and the National Association of Motor Bus Operators.

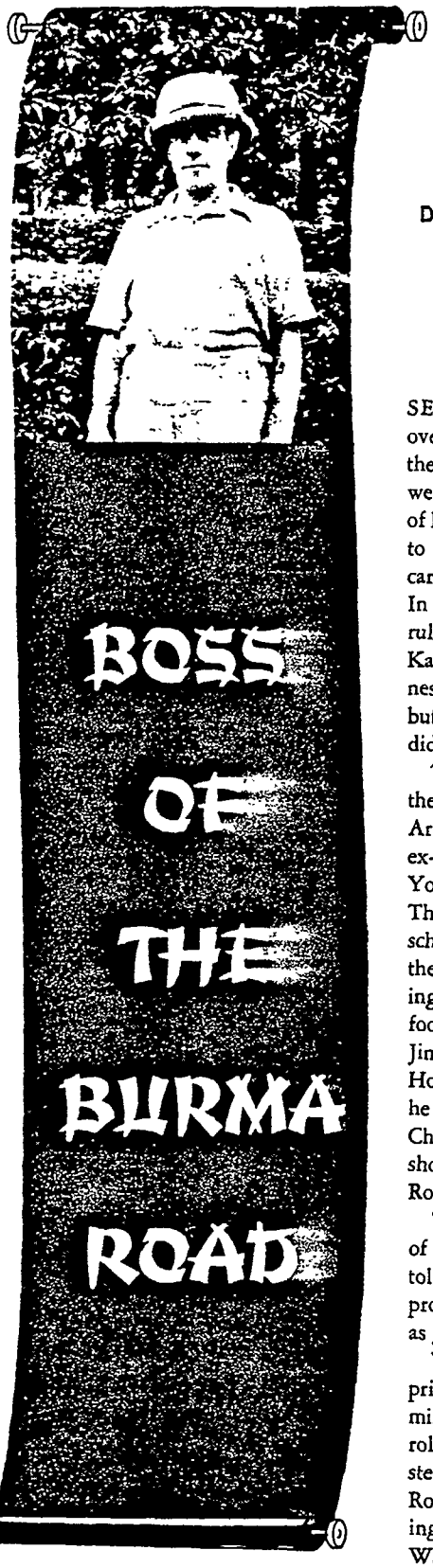
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WILLIAM H. HUBNER

Mr. Hubner is the author of numerous papers on motor, aircraft and Diesel fuels which deal particularly with source, methods of evaluation, and specifications. He is a member and former secretary of the Chicago Section of the Society of Automotive Engineers, an Associate Fellow of the Institute of Aeronautical Science, and a member of the American Petroleum Institute and of the Cooperative Fuel Research Committee.



ETC 22891



DAN ARNSTEIN, EX-CAB DRIVER, UNTANGLES THE TRAFFIC SNARL ON CHINA'S LIFE LINE

By EDMOND S. FISH

SET back from the brink of a high cliff overlooking the city of Chungking is the White House of Free China. It is a weather beaten gray, wood frame house of less than a dozen rooms, and the path to its front door is made of 345 steps carved out of the rock face of the cliff. In this house on August 19th, 1941, the ruler of China, Generalissimo Chiang Kai-Shek, offered an American businessman more than a million dollars, but the American turned it down. He didn't want a million dollars.

This distinguished contradiction of the traditional American was Daniel G. Arnstein, beetle-browed, hard-fisted, ex-cab driver, who heads one of New York City's largest taxi fleets today. This rugged individualist of the old school, who fought his way up through the bloody taxi wars of Chicago meeting force with force as he did on the pro football field with Knute Rockne and Jim Thorpe, is a close friend of Harry Hopkins and on that August day when he rejected the million dollars was in China as President Roosevelt's trouble-shooter on the world-famed Burma Road.

"Nobody should make money out of this war or any other way," Arnstein told Chiang Kai-Shek in declining the proposal. "What's more you'll get just as good a job for nothing."

With all her seaports gone, China's principle supply line has been the 726-mile, mountainous, narrow, twisting, roller-coaster Burma Road. After Arnstein's visit last August tonnage over the Road "more than quadrupled," according to official reports cabled weekly to Washington.

In history the Burma Road is as full of mountains and valleys as it is in topography. Shorter but no less tempestuous has been the career of Daniel G. Arnstein. As the author of a detailed report on the Road, Arnstein became something of a transport St. James when Chiang called the report his "Bible of the Burma Road" and adopted all the recommendations. This is the closest Arnstein has ever come to piety.

Before Arnstein reached this eminence on the Chungking cliff-top, a lot of trucks and cabs had gone over the road, any road. For Dan Arnstein is a shining product of the gasoline age. Now 51 years old, he lives on Park Avenue, runs four associated businesses, and is as much part of the metropolitan scene as a Broadway lamp post. He's got a face that might have been carved out of the Black Hills and muscles that threaten the seams of his tailored suits. He is confident if not cocky, and there are those close to him who say: "He is an awful braggart, but he always comes through."

One day last April, Arnstein and a couple of New York cronies were fishing at Key Largo, Florida, when a telephone call came from the White House; Harry Hopkins asked him to nominate a traffic expert for an extremely important mission.

The President, Hopkins explained, had received an urgent appeal from Chiang Kai-Shek for help in speeding up traffic over the Burma Road. Food, medicine, supplies and war materials of all kinds had only one route into China, and that route was furnishing only a trickle. Under frequent bombing by

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Japanese planes, the Road was intermittently blasted out of use. The rest of the time trucks were breaking down, washouts and other hazards were interfering. Could the United States send over a traffic expert to straighten out the transport snarls and make a stout hawser of the slim thread that was China's life-line?

Running some 726 miles to cover half that, in crow line, the Burma Road begins at Lashio, Burma, and ends at Kunming in China. It is an extension of the highway that begins at Rangoon, the seaport where all American Lend-Lease materials were unloaded, and where British war materials arrived for the defense of that section of the Empire. If American aid to China, voted by Congress and implemented by money and materials, was to be effective, some solution had to be found for the vexing problems on the Burma Road.

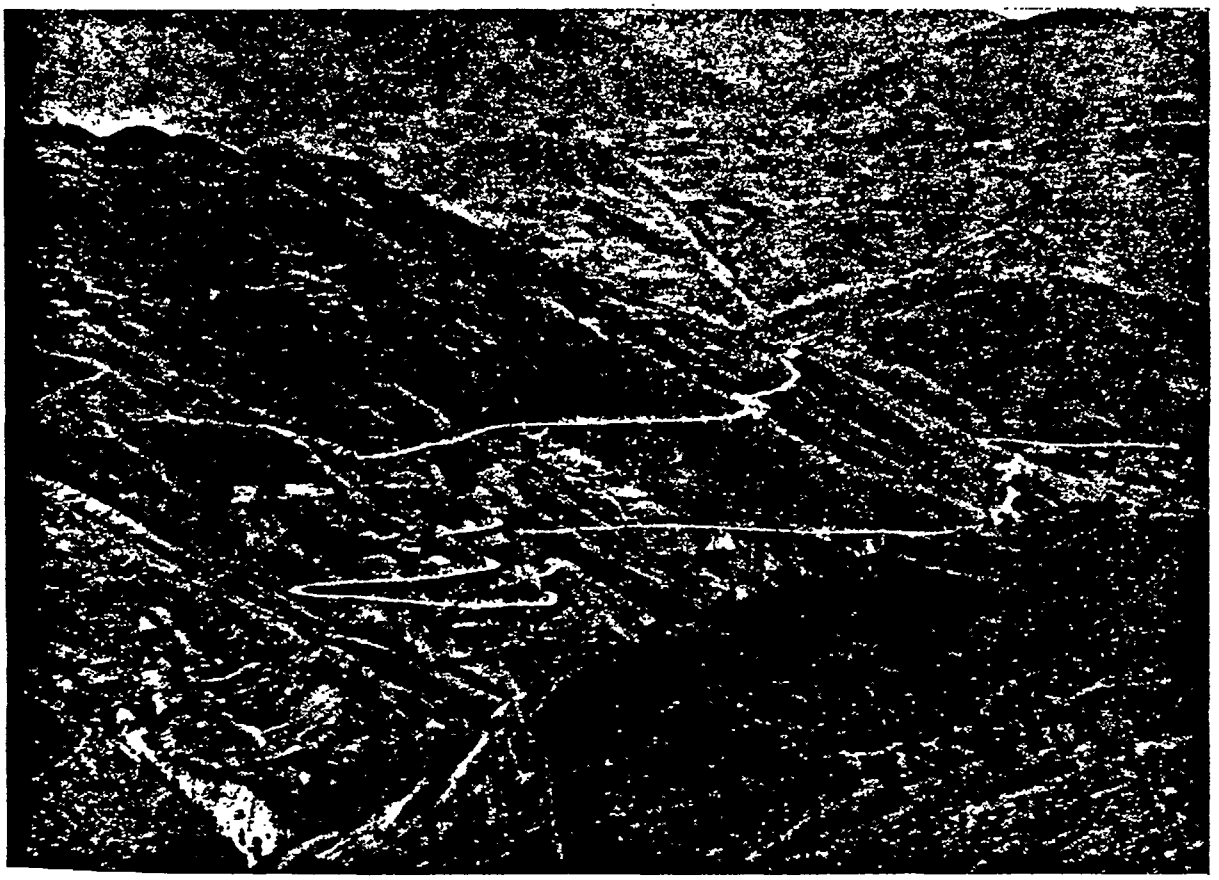
Part of this Hopkins told Arnstein on the Washington-Key Largo telephone, part of it Arnstein already knew. He behaved characteristically. He nominated the best man he could and within a few days was ready to go. First, he enlisted Marco (Mickey) Hellman, transport expert of the banking house of Lehman Bros. and scion of the family that dominates California's Wells Fargo Bank, and Harold C. Davis, president of the Consolidated Motor Lines, of Hartford, Conn., who is also vice president of one of Arnstein's businesses.

"I'll guarantee that we'll move more freight than they're moving now," Arnstein said. "I'm going to take my own gang with me, and believe me, they're two-fisted experts, real experts, who didn't learn the trucking business out of books." Arnstein had already dug into his job. He had studied China's history, government, taxation and customs. He had visited Chinese merchants, consuls embassy attaches.

Easy it may have been, but the Far East chore was so extensive Arnstein spent six weeks studying it. Then he wound up his business affairs and departed.

Wasting no time his first day in Chungking, Arnstein and his aides conferred with Chiang Kai-Shek; General Yu Fei-Pang, quartermaster-general and chairman of the Yumman-Burma Highway Commission, later the China-Burma Highway Commission; General Ho Ying-Chin, minister of war; Director General Francis Pan, of the National Highway Transport Administration. They saw movies of the Road, inspected the inadequate garages and shops of the government's South West Transportation Company; saw two Chinese mechanics removing a flat tire from its rim with nothing but a hammer and two

Like a gigantic serpent the Burma Road winds along the sides of lofty and precipitous mountains.



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Millions of Chinese coolies—men, women and children—hewed the Burma Road by hand out of the rocky mountain sides.

screw-drivers; gaped at lathes powered by a hand-operated wooden wheel; witnessed men getting a wooden plank for a truck floor by sawing it by hand from a huge log, this at the China Transport Company Terminal; and learned that the number one lesson all Chinese had to learn was the lesson of lubrication. No one ever bothered to shoot grease into grease cups on axles, engines or anywhere. Ignoring "face," Arnstein gave a biting lecture on the virtues of oil and grease to the Chinese officials in the reception party. About fifty Chinese truck drivers nearby interpreted Dan's tones, if not words, and enjoyed themselves hugely.

It proved that Arnstein was not joking when he outlined his case in his first meeting with Generalissimo Chiang. After Chiang bespoke the gratitude of China, Arnstein replied: "I'm not here to help China; at least that's not the major idea. I think I can help my own country by doing a job here, and I want to say I'm going to do and say what I think best. I don't know how to pull my punches and I don't want to; we want to get this job done, that's all," and this unprecedented mode of speech apparently impressed Chiang. From then on, "he never doubted anything I told him," says Arnstein.

When he peered into the offices of the transport companies, Arnstein found a muddled state of affairs. On the books of the South West Company were records dealing with seven separate government agencies. One agency paid personnel, another bought all materials and supplies, etc. Other figures, such as the vital tally of tonnage over the Road, were not available at any government agency. Only the Asiatic Petroleum Company, a private firm, had these figures.

After flying to Kunming, gateway to the Road, Arnstein and his party of Chinese officials set out early on July 22 in five automobiles to tour the roller coaster road that eclipses the Gothard in Switzerland and the Caracas in Venezuela. At no more than 15 miles an hour the motorcade covered the trip to Lashio in five days, and Arnstein saw the road that is 12 to 23 feet wide, thick with yellow dust in the lowlands when monsoon torrents do not turn it into a morass of mud, granite-hard on the miles of mountainous curves and dips that were hand-hewn from the rocky slopes. They saw 10,000 barrels of American asphalt waiting with oriental placidity for American engineers to pave low lying sections.

Their first village was Locfong, a single, narrow street alive with dogs, chickens and pigs. Trucks lined the street, and those on the go often had to reverse to the outskirts to let another pass. Fenders clanged and bumpers clashed, with whining Chinese billingsgate or silent acceptance of destiny accompanying these incidents. Lunching on cans of sardines from their cars, the Arnstein party saw this bottleneck function. Harold Davis says the Chinese officials in the party probably spent the most wretched five days of their lives, cooking in the wrath of Arnstein who lost no opportunity to drive home transport fundamentals.

Not far out of Locfong that first afternoon, the party saw a truck graveyard, with 300 wrecks rusting on both sides of the road. When Arnstein saw brand new tires and batteries rotting, he beefed up his remarks. The Chinese looked relieved when bedtime arrived, though the stopping place was swarming with fleas and gnats, and it was two-to-one the beds would be alive and hostile.

Next day Arnstein was quieter and as the cars rolled along, he permitted the others to tell him a thing or two. The Burma Road has about 500 hairpin curves, and nowhere is it level for more than an eighth of a mile. Sheer drops of 7,000 feet reach up to the shoulders of the road in many places. Hundreds of culverts and small bridges were installed during construction, although there are only two big ones, those over the Mekong and Salween Rivers, both wide enough for one way traffic only. These bridges are flimsy and sway with the breeze and sag in the middle. They are difficult targets for the Jap raiders who must release their bombs from 12,000 feet or higher on these 14-foot wide targets. Pontoons and makeshift ferries are on hand in case of a lucky hit.

When China was losing heavily to Japan, Chiang ordered the old silk trader routes of Marco Polo days to be built up enough for truck traffic and the Burma Road was "literally scratched out with the fingernails of Chinese men, women and children," in seven months. Farmers volunteered and other were conscripted. Hatchets and hoes and big stones smashing smaller ones, these were the only tools. Children with baskets carried dirt and stone. In the lowlands, mosquitoes swarmed out to infect workers with malaria and four of every five workers there died.

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Crawling at ten miles an hour, on the left of the road as in British Burma, Arnstein's car was almost nudged into a 9,000-foot abyss from the summit of the road just south of Paoshan, but the truck that rolled around a curve and hooked fenders was also just crawling, so this story does not end here. With some careful inching back and forth, the vehicles proceeded. Soon afterward a quick cloudburst helped to round out Arnstein's picture of the Road. Then there was a flat tire to be repaired while highway behemoths thundered past in gathering darkness. Moving again, the party came to a bridge where 150 trucks were halted. On the far side of the one way span two trucks had skidded on the muddy surface, blocking the way. Rather than risk a night outdoors in this malaria area, Arnstein okayed his driver's suggestion to try a shortcut he knew. They reversed a couple of miles, then darted off into trackless underbrush. Mired, he decided he had picked the wrong spot, so the car was pushed back to the Road, where the driver tried again, this time finding the little car road that led to the river's edge and the fordable part of the stream.



The rear of Arnstein's inspection caravan, which consisted of four sedans and one truck.



The Salween River Bridge is strong enough to support heavy loads but is only nine feet wide. It is protected by mountains which keep attacking bombers above 12,000 feet.

Typical traffic congestion scene at Wantung, on the China border, with tax collectors halting trucks.

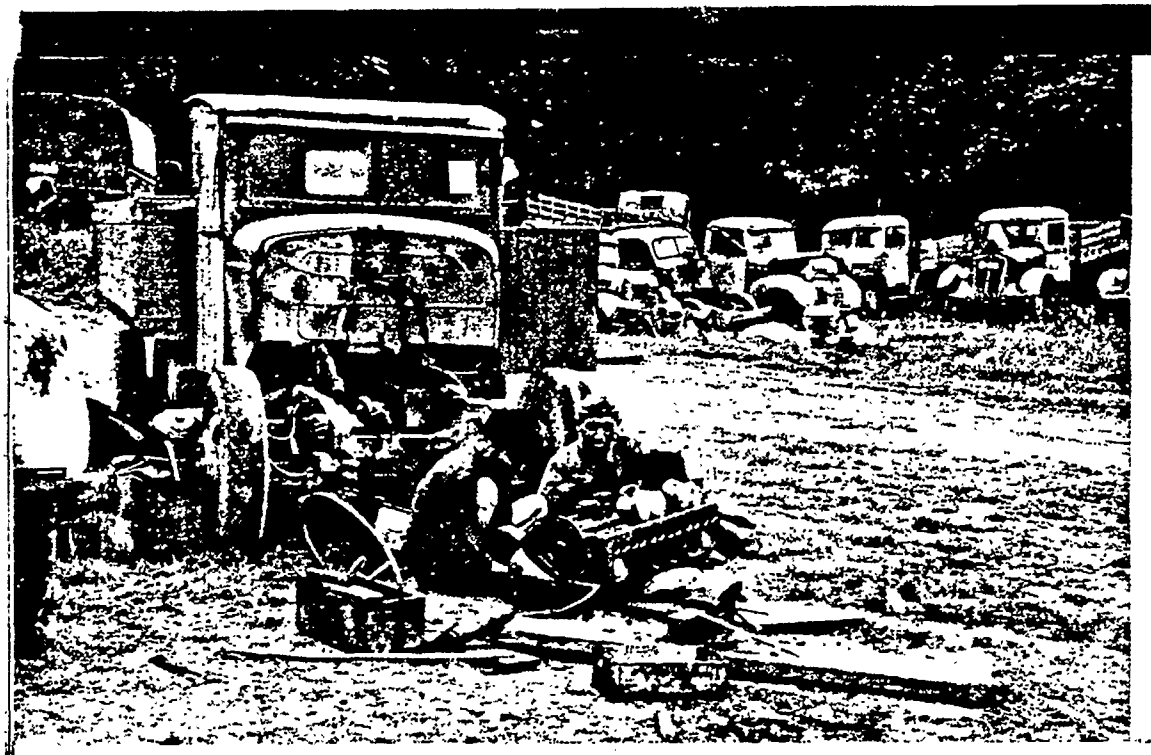


Late for dinner and ravenous, the Arnstein party spent the evening with the native civil governor at the next town. In the morning, the governor cheered his parting guests with news that the coming portion was the worst on the whole Road. However, authorities at Kunming had sent word ahead and 500 laborers were out fixing holes and scattering dry gravel. At Chiafong, residents were out in force, shooing livestock and sweeping the street with housebrooms.

Wanting, on the Chinese border, was the scene of the greatest tie-up Arnstein ever saw. For miles on both sides of the border there were trucks of every description carrying a variety of loads—including the famed "yellow fish," illicit human passengers. Waiting for clearance papers and relief drivers at this point was always a matter of a day, sometimes a week, Arnstein found out. While English speaking customs inspectors read American pulp magazines, truck drivers were often late in returning and their trucks would block the way. Arnstein had to lead his party afoot across the border and walk a mile and a half to find new cars and new drivers. The Chinese drivers were not allowed to cross.

Two days later the party reached Lashio, where Arnstein visited the Control officer of transport, the civil governor of the northern Shan States, the firm of Watson & Son which operates 263 trucks over the Road.

"The more I talked to those fellows who knew how to be efficient, the madder I got at the Chinese who were messing things up," Arnstein recalls. "When I got back to the hotel I gave those officials a talking to that could be heard a block away. I was so mad I couldn't eat dinner and I took some bicarbonate—



With sand an clay blowing int delicate engin parts, Chines drivers and me chanics make roa side repairs.

just about the first time in my life."

Arnstein lost 20 pounds during that wearisome tour of the Burma Road, the more fatiguing job of drafting a comprehensive report for Chiang and a subsequent long stay in a raid shelter back in Chungking.

The road tour ended, Arnstein, Hellman and Davis flew from Lashio the 500 miles south to Rangoon, "headwaters" of the flow of materials into China. More inspections of docks, warehouses, the GM assembly plant and shops and garages; more conferences with Burmese, British and American authorities took up the next few days. Then Arnstein became an eight-day author. With two stenographers on the job and their Strand Hotel rooms locked, Arnstein, Hellman and Davis took turns dictating. After three rough drafts, Arnstein said the report "hasn't got enough punch" and they started another. Finally they chopped their 150 pages down to forty and they had finished the report "that indited everybody connected with the Road," the report that Chiang later called "my Bible of the Burma Road" as he adopted every single suggestion.

Major items included complete lack of maintenance for trucks; inefficiency in traffic control; absence of trained mechanics; improper loading of trucks; failure of repair shops to carry supplies of parts; lack of a dispatch system; absence of control over drivers; no communication system between drivers and road stations; overlapping or absence of jurisdiction among the sixteen governmental agencies connected with the road; multiple tax and tribute stations at local boundaries; and failure to furnish gasoline stations so trucks need not cut payloads to carry drums of fuel for the round trip. For each defect a specific cure was recommended, and in the case of mechanics it might be noted here that 46 American mechanics left the United States early in November after Arnstein hired them to go over at $300 a month under Lend Lease.

The report for Chiang urged six control stations, at strategic points along the road, and they have been set up. Police patrols were established. Systematic dispatching was installed, and short-wave radio now provides communication. Supplies of spare parts, gas, oil and grease are now kept at the six control stations. A single station was set up to collect taxes, and all payment of tribute to local warlords was stopped. Drivers who used to pile loads up front to prevent them from bouncing out, now load evenly and broken axle cases are fewer. To eliminate "frozen" cylinders and jammed crankshafts, Arnstein reiterated the lubrication lesson in al-



LEFT TO RIGHT: *Harold Davis, Harold Davis, Jr., Mrs. Davis, Toni Arnstein, Dan Arnstein, and Mrs. Arnstein at LaGuardia Field on the return of Arnstein and Davis from the Orient.*

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most every chapter and verse of the "Burma Road Bible."

The Arnstein threesome enjoyed the company of many notables in Rangoon, including Sir Reginald Dorman-Smith, governor of Burma, and sometimes wonder what he thinks of them now. They let fly a critique that "pinked" him if no worse.

Burma was collecting a one percent tax on all goods shipped over the Burma Road, and Arnstein roared a denunciation: "Fine way to treat your neighbor and ally!" But both British and Burmese said nothing could be done. Burma was self-governing in tax matters. "Wait till this story breaks in the papers back in the States!" bellowed Arnstein in a voice meant to be heard around the would. Just to be sure, he sent a cable to Washington. It was relayed to London, with a powerful signature. "In 48 hours that unconscionable tax was gone," said Arnstein.

Back in Chungking, Arnstein reported to Chiang and cracked down hard on multiple taxes, official chiseling and other practices not always confined to the Orient. "I told the Generalissimo that if I wasn't making any money out of the Burma Road nobody else was going to," snapped the dollar-a-year man.

Apparently Chiang could not believe his ears. He told Arnstein he would give him unlimited power if he would remain in China and take charge of the Burma Road. He did not care what tribute Arnstein might levy on each truck of the 2,000 traversing the Road, or the 10,000 expected before Christmas. Arnstein could set the figure, then collect from the drivers, the government or the fleet operators. "It would have been worth a million in a very short time," said Arnstein afterward. But he told Chiang he would get "just as good a job for nothing," and he saw to it, by long distance from Washington.

Arnstein likes to feel that he did something to answer an embarrassing question asked him by Madame Chiang Kai-Shek at dinner one night. It was the day that 700 Chinese had perished in a single shelter in Chungking, and she asked why America was providing gasoline for planes and scrap iron for bombs to Japan, when America was obviously trying to help China. "I interrupted her," said Arnstein. "I begged her to withdraw her question. I said I had no answer, and I still haven't." Later, when the gracious wife of the Generalissimo apologized, saying she thought she might be complaining too much, Arnstein had an answer that would have done credit to an older hand at international and dinner table diplomacy. "Madame," he said, "in my business we have a saying, 'The squeaking wheel gets the grease.' You keep right on."

During this late August stay in Chungking, Arnstein and his associates were under air attack for 72 out of 100 hours, and for two days of the time hardly ventured out of the shelter to which they were assigned. "That kind of stuff isn't war, it's just target practice for the Japs," according to Arnstein. "The Chinese haven't anything to fight back with, no anti-aircraft guns at all. Of course the Chinese have a gag about it; they say it costs the Japs a thousand dollars to drop a bomb, and only costs them 8 cents to fill up the hole. But those continuous air raids over Chungking are the most criminal thing I ever saw. Sitting in a cave, with a couple of candles throwing shadows, and then they go out when a bomb hits near the opening—you get the most helpless feeling in the world."

Even with lights out, Chungking is an inviting target from the air, located just at the mouth of the Yangtze River, and moonlight nights are pledges of attacks for the river is an arrow of silver pointing. In one raid, shortly before the American party left, their Chailing House ("Palace of bedbugs") was wrecked, doors and windows were blasted away, and a 50-pound boulder lay in the center of Arnstein's bed after the raiders left. Not far away, the house of General Yo Hing-Chin, their host at dinner one night, was gone and a hole was in its place. But the Jin-Bows, air raids, were not dampening Chinese morale in the least.

When the job in the Far East was nearly done, Arnstein told his confreres: "I haven't worked this hard in ten years. When I get home I'm going to retire from business, Washington or no Washington." He was partly right. Nowadays he is virtually retired from business, working in Washington every Tuesday, Wednesday and Thursday, negotiating for trucks, merchandise, road-building machinery and other things which will help China.



Jap bombers did this to Arnstein's room in the Chailing House, Chungking.

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THE INFANTRY RIDES

ASK the man in the street to define infantry and it is quite likely that the description will be "foot soldiers." Such a definition gives scant value to the infantry as customers for petroleum and automotive products, yet this branch of the U. S. Army is becoming increasingly dependent on motor transports to move men as well as supplies.

Time was when the infantry measured all its hauling energies in terms of jackass power, in the days of the famed Army mule. Hauling then was confined to bringing up supplies and ammunition when the troops left the post for maneuvers. The men marched.

The infantry now is dealing in horsepower, as measured in engines under the hoods of trucks and jeeps. The Army mule has not been relegated entirely to pasture, for there still are places where the mule is definitely superior on account of the terrain, but the infantry, like other branches of the service, is taking advantage of technical advancements and is using trucks whenever possible.

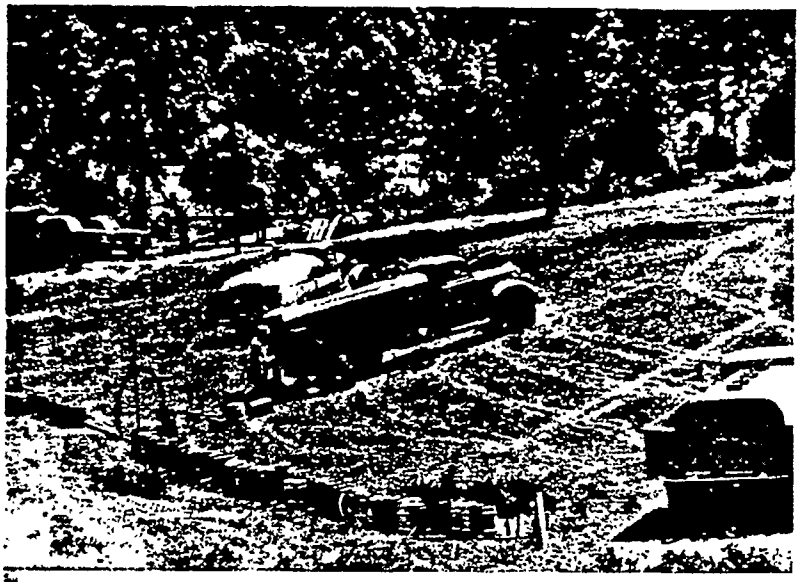
The degree of motorization is illustrated by the equipment attached to an Infantry unit stationed in the Middle West, which used trucks in shuttle service to move men south last fall for maneuvers in Louisiana. The unit's motor pool contained about 250 units, including the jeeps and trucks up to one and a half tons capacity.

By means of this equipment, the thousands of officers and men of the unit have twice rolled south during the past year to take part in the army maneuvers. This motorized equipment consumes large quantities of gasoline, supplied to the trucks and jeeps by adaptations of the petroleum industry's present distribution methods.

When at the home motor pool the unit's equipment requires about 8,000 gallons of gasoline a week. This is used in the handling of trucks within the Post, and during nearby maneuvers and field problems. The motor pool is the outdoor parking lot. Nearby is a garage building with several pits for lubrication and crankcase draining, service bays for the replacement of parts, and the gasoline filling station. Fuel is requisitioned through the Quartermaster Corps, and deliveries are made by oil company trucks from nearby company bulk plants.

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Consumption of gasoline really zooms when the equipment takes to the highways for the big war games. On days when the infantry unit is idle, trucks and jeeps are kept on the hop hauling supplies, and up to 2,000 gallons of gasoline a day are required. While on such maneuvers the motorized equipment is kept fueled from five or ten gallon containers. The gasoline flows from refineries to permanent distribution establishments, such as bulk plants and terminals, and then is hauled by oil company tank trucks to refueling points in the field. The truck tanks are drained into the smaller containers, and the Army trucks either pick up the fuel at fill points or a load of containers is trucked to the combat zones.



ABOVE: *Oil company trucks fill small containers with gasoline for use by mechanized units during war games.*

BELOW: *An infantry regiment, accompanied by some of its motorized equipment, passes in review.*



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HUGE BUILDING PROGRAM TO MODERNIZE THE NATION'S 3,000,000-MILE HIGHWAY SYSTEM IS PREDICTED BY EXPERTS

"WE pay for good roads whether we have them or not, and we pay less if we have them than if we do not."

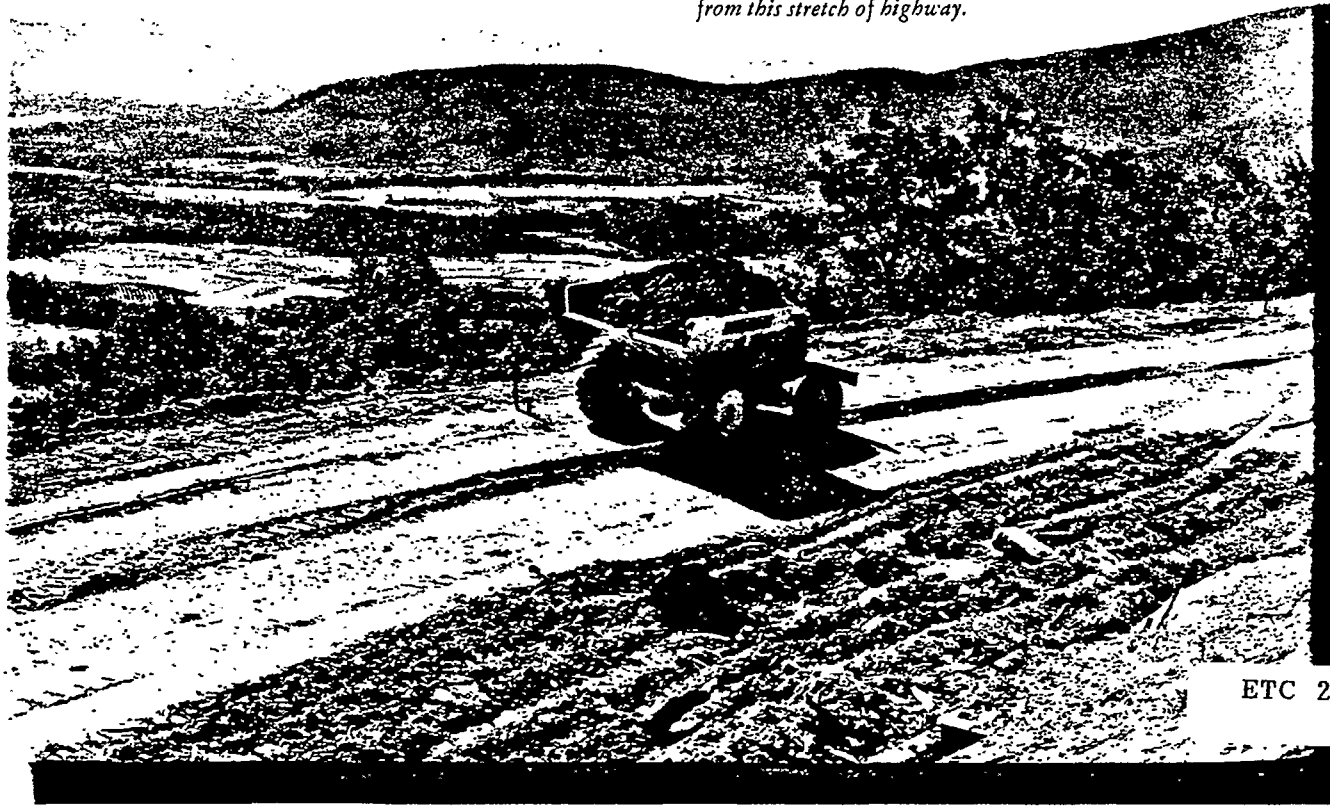
This thought, expressed by Thomas H. MacDonald, U. S. Commissoner of Public Roads, assumes even greater significance when it is realized that the far-flung system of American roads represents an investment since 1900 of over $18,000,000,000. To extend, improve and maintain these roads, local, county, state and federal authorities expend approximately $2,000,000,000 per year.

But those who pay for good roads and receive them not are paying an additional $2,000,000,000 to cover a property loss to society of 35,000 persons killed, over a million injured and several hundred thousand cracked up vehicles. To this bill can be added the miscellaneous economic losses of traffic delays caused by inadequate roads — New York City's bill on this count being estimated at more than a million dollars per day.

Translated from dollars into miles, the roads of the United States amount to 3,065,000 as compared to the world total of 10,084,000. Russia with 1,682,000 miles of roads to its credit is the only other nation which exceeds the million mark.

Americans like to believe that their roads make up the world's finest system. But traffic experts and the record brand over 80% of the roads of this country as being inadequate for the requirements of modern traffic. In many

Green valley and hills lend enchantment to the view from this stretch of highway.



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sections we have eighty-mile-an-hour automobiles with twenty-mile-an-hour drivers struggling to adjust themselves to thirty-mile-an-hour roads, and the bloody trail of accidents following in their wake is testimony that our traffic problems are far from a final solution.

Travel along America's highways and you may drive over the $6,000,000 per mile Pulaski Skyway or a $1,000 per mile back country road. You will also find impressive six and eight lane concrete highways suddenly bottlenecking into two lane bridges; a vast unrelated checkerboard of dirt, gravel, macadam, asphalt and concrete highways with a grade crossing for each mile of railway. You will find that but 160,000 miles of our highways are paved, only 10,000 being multi-laned and all too many of these being the dangerous three-laned roads along which such terrific head-on collisions occur.

You will note the lack of great superhighways between the Atlantic and the Pacific and Canada and Mexico. Recently, considerable agitation was made for a gridwork of six of these roads to cover the country. Investigation by the Bureau of Public Roads showed that the 14,336 mile system would cost $202,270 per mile to build. This first cost was out of the question in view of the fact that only 300 passenger vehicles per day by actual count are engaged in transcontinental travel.

What then has been the background of this great heterogeneous system of roads whose very quantity makes up to a certain extent for what it lacks in quality and uniformity? To go back to early colonial days, the principal highway engineers were cows and buffalo. New York's Wall Street district, for example, was laid out by bovine trailmakers. The cow, a methodical animal, travelled daily over the same path from pasture to barn, and the farmer soon followed the path of least resistance with his wagon and a road was born. As the first white settlers moved out from the colonies to open up the Middle West, they followed buffalo trails which later were known as the Cumberland Road, the Oregon Trail and the Erie Canal.



Heavy equipment speeds up work on Washington highway above Grand Coulee Dam.

Rocky terrain is encountered in the Kiamichi Mountains in Oklahoma.

The Pennsylvania Turnpike is the latest in modern road construction.

These trails were followed with good reason for the buffalo sought out easy grades and direct courses; they laid their trails along high land since forests there were thinner and winds tended to sweep the high trails clear of leaves in the fall and snow in the winter. In fact, this tendency of animals and primitive races to travel close to the ridges is the origin of the term highway.

As the colonies grew and prospered, the volume of traffic which developed between towns and colonies made necessary the development of some method

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of highway maintenance and building.

The forced labor system gave to government the power to compel able-bodied citizens to work on the roads a certain number of days per year in lieu of taxes. Although this practice persists in certain American communities to this day, the increasing demands of traffic out-distanced such amateurish methods of road building, and in 1790 a Pennsylvania corporation was chartered to construct a toll road from Philadelphia to Lancaster. It was surfaced by throwing stones of all sizes upon it and is claimed to have been the first well designed hard surfaced road in America.

The corporation proved to be ideally suited to this job of road building, and by the early 1800's the number of turnpike companies in existence had grown into the thousands, making the turnpike one of the principal corporate institutions of the time. But farmers and pioneers found toll gates placed every few miles along the roads an unequal burden and in 1806 President Jefferson approved the construction of the Cumberland Road as a Federal project. Sixty-six feet wide and surfaced with stone, the road cost almost $7,000,000 and stretched from Cumberland, Maryland, on the Potomac to Steubenville, Ohio, on the Ohio River.

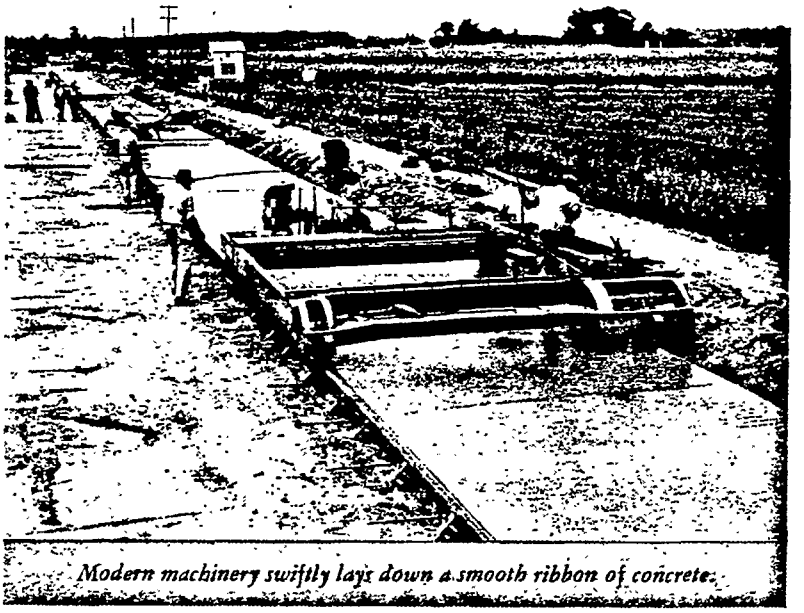
However, by 1838 the tremendous public interest in canals and railroads as more economical means of transportation completely arrested both federal and corporate road building. The thousands of miles of well-built roads were taken over by various units of local government and for the most part allowed to fall into disrepair. This situation continued for over fifty years. With the Gay Nineties came the bicycle, and with the bicycle came the demand for good roads. The teeth rattling jouncings administered to touring cyclists by the rutted roads were far from being a joking matter, particularly if one was in a hurry.

The national League of American Wheelmen literally got behind the wheel and initiated a tremendous campaign for good roads which swept the country with many independent groups joining the movement for their own ends. U. S. Postmaster-General John Wanamaker at this same time began the rural free delivery system to provide daily mail deliveries to three and a half million widely scattered rural inhabitants, and the need for adequate roads to perform this service proved a powerful force in the campaign.

Before the advent of the automobile a nation-wide movement had begun the construction of good roads, that is, good for bicycles and horse-and-buggy rigs. But the automobile presented a new problem, one that was not really tackled until after the World War I. The first highways built in what may be called the modern period of highway construction were constructed by local communities to meet their own individual requirements. The states, by 1920, entered into extensive road building programs to connect the local and county roads into state-wide systems of arterial highways, and the federal government then stepped in to articulate the state systems into a nation-wide highway system for the improvement of commerce and for national defense.

Today highway mileage is approximately twelve times that of the railroads. Its development is contrasted to that of the railroad system in that it has not been financed by borrowing. Vehicle, driver and fuel proved to be tremendous sources of funds. Gasoline taxes alone have provided over a billion dollars a year in revenue. Yet the mere payment of the bill does not necessarily insure good roads. And the reason for many of the difficulties of the United States is clear when her highway history of cows and buffalo, forced labor and turnpike companies, bicyclists and rural mailmen is considered.

All over the United States traffic experts have been seeking the solution to the problem and they have discovered that traffic is a fluid thing, that the laws of hydraulics apply to it. They have reduced the cause of highway accident to four factors: The crossroad or intersectional friction; the road edge or marginal friction; cars moving in opposite directions or medial friction and cars moving in the same direction or internal-stream friction. The Holland Tunnel is pointed out by these experts as one bit of highway construction which for its 1.7 miles reduces these friction elements to a minimum. When this will



Modern machinery swiftly lays down a smooth ribbon of concrete.

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have been accomplished on all our highways, then our accident rates will be controllable in fact as well as in theory.

Traffic theory, however, is dependent for its execution upon the ability to build roads, and it is in this realm that American roadbuilders excel. With curves, grades, sight distances, shoulders and traffic lanes standardized for various types of roads, the main problem is that of surveying and forecasting traffic needs. The actual construction work involved in building these roads has been standardized and mechanized over the past few years to a very high degree. Soils have been studied for moisture and load bearing characteristics, resulting in a great new development of soil stabilization.

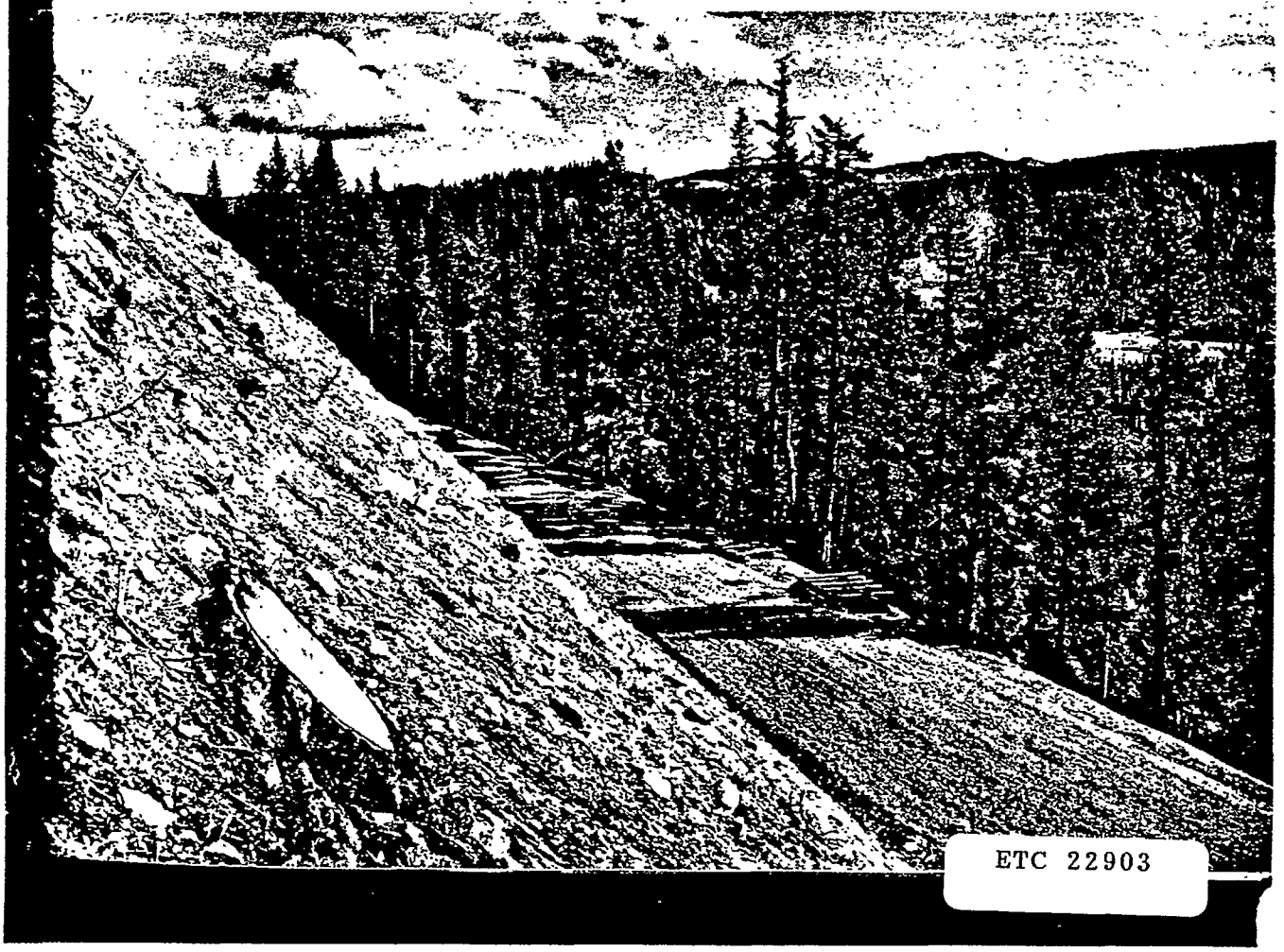
Briefly, this amounts to mixing sand, clay or various chemicals into the local soil to provide adequate abrasive resistance, shear strength and ability to withstand disintegration due to excessive dry or wet weather. This process has made possible the low-cost construction of more than a million miles of rural roads and has provided an excellent base for concrete and bituminous pavements.

This is important because pavement costs do not constitute the major portion of highway costs. The bulk of this expense is represented by excavation and preparation of subgrade, purchase of right of way (the high cost of which is one of the greatest obstacles to modern road construction), engineering and administration. These costs would be about the same irrespective of the size and weight of the vehicles carried. Revolutionary new methods have been developed for excavating and sub-grade work. Where a few years ago, large cuts and fills were made with the aid of power shovels and dump trucks, today, the same work is done in less time at about half the cost with tractors, scrapers and bulldozers.

Tractor drawn graders have been designed which unaided can build a ten foot road complete with drainage ditches and crown in two round trips. Huge scrapers not only scrape earth but also economically carry loads of up to thirty-five cubic yards on their huge rubber tired chassis for considerable distances. Ten good sized dump trucks would be required to move the same amount of dirt. Rugged machinery has been developed to mix, spread and finish cement, asphalt and bituminous materials so efficiently that surfacing costs are greatly reduced.

With the know-how and the equipment necessary for great modern road building projects readily at hand, it is predicted by highway experts that once World War II is out of the way, the United States will embark on the greatest road modernization program of all time. Then those who pay for good roads will get them and having them will actually pay less in losses of life and in property.

White Pass Highway in Washington offers a wealth of scenic beauty to the tourist.



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THIS MONTH'S COVER

THE battleships, with their huge guns and heavy defensive armament, are the heavyweights of the Navy.

Shipyards of the United States are working at top speed to produce more battleships. Recently the 35,000-ton *Alabama* was launched, nine months ahead of schedule. This 680-foot war vessel, capable of a speed of more than 27 knots, is the sixth battleship to be launched under the defense building program. Even as the giant left the ways workmen made ready to lay down the keel of a still mightier ship, the 45,000-ton *Kentucky*.

This month's cover shows a typical battleship plowing her way through the waves. The painting was made especially for Ethyl News by the artist, Jack Manley Rosé, from a picture obtained through the courtesy of the U. S. Navy Recruiting Service.

The Following

★ SERVICE AWARDS ★

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March 1st, 1942

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J. G. MARTIN Sales, N. Y. General

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TEN YEARS

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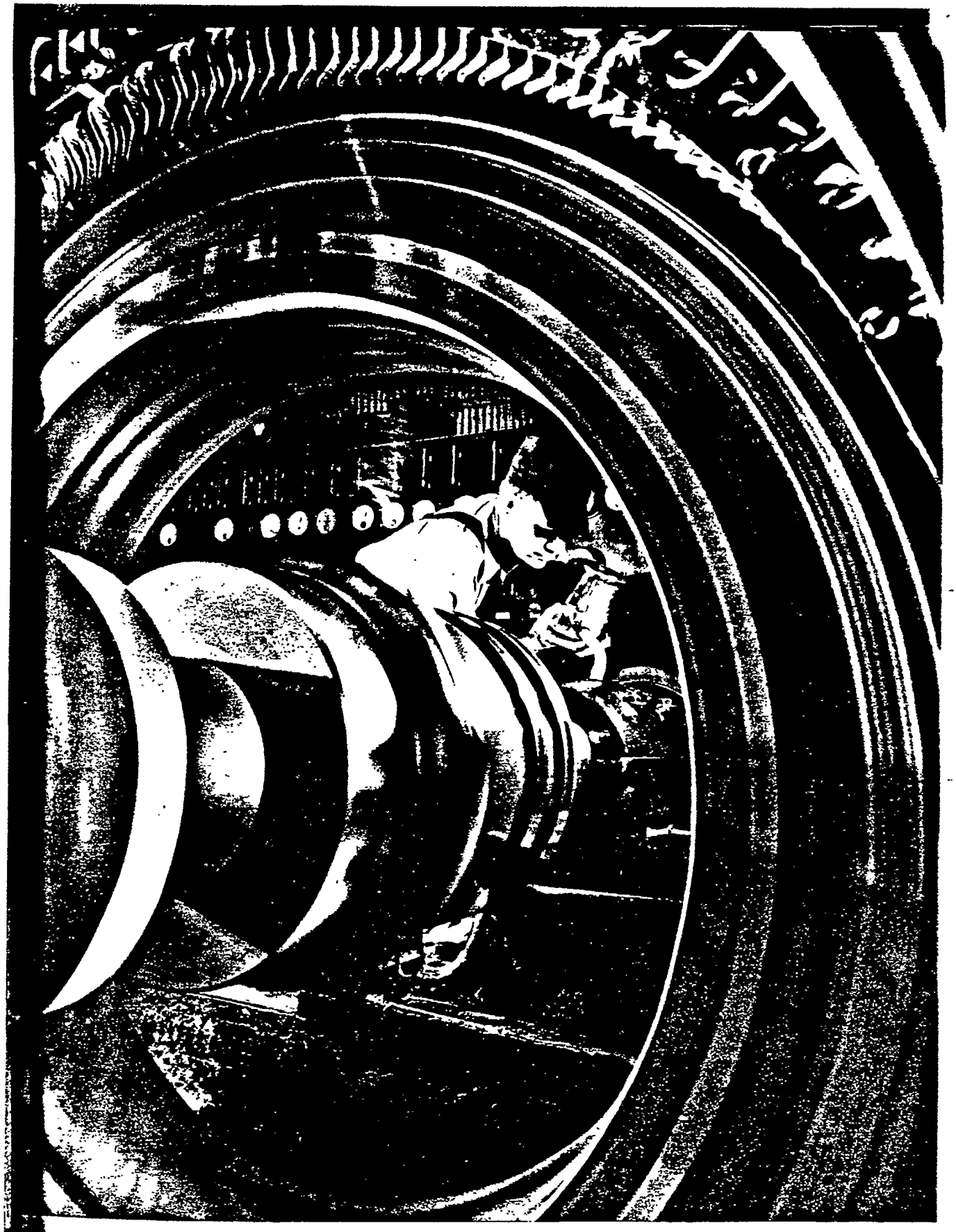
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ETC 22904



Courtesy of Popular Photography magazi.

"Oil not, neither will ye spin"

ETC 22905



ETC 22906

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ETHYL NEWS

APRIL ★ 1942



VARIATIONS ON YELLOW NUMBER ONE

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IN THE

ETHYL NEWS

APRIL ★ 1942

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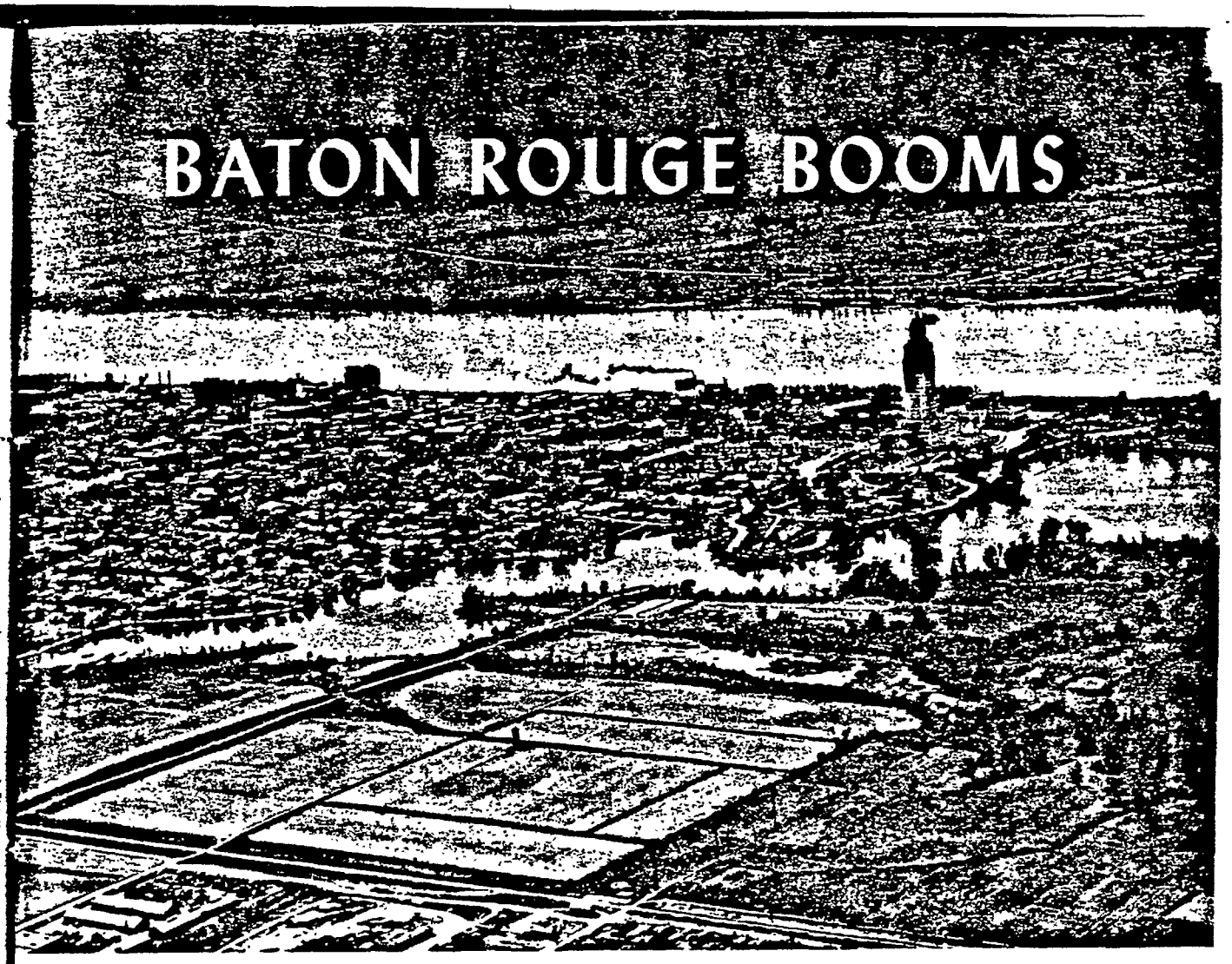
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A hard-headed answer: He's you and me, and our way of living

Published by **ETHYL GASOLINE CORPORATION, CHRYSLER BUILDING, NEW YORK CITY**

THIS MONTH'S COVER — Seventeen samples showing some of the gasoline colors that can be developed with Yellow No. 1 motor fluid. Need for flexibility in our manufacturing operations makes it necessary for us to ask refiners to order motor fluid in this one color, but the cover picture shows that it is still possible to make finished gasolines in a wide variety of hues. Yellow No. 1 (center bottle in the front row) meets the requirements of the U. S. Surgeon General's office for dye concentration yet introduces the fewest possible complications when dyes of other colors are added to obtain former color standards. See story on Page 21.

ETC 22908

BATON ROUGE BOOMS



HOME OF ETHYL FLUID IS THE WONDER CITY OF THE MISSISSIPPI

•

BATON ROUGE is a place where miracles happen.

Thirty-three years ago, as a modest agricultural town, it was stricken with a depression. Boll weevils had devastated the vast fields of cotton that surrounded the town. When the Mississippi River boats nosed up to the Baton Rouge landing they took a few passengers and went on their way without the heaping cargoes they once had carried. Workers who knew no other trade but cotton were boarding up their homes and moving away.

NEW INDUSTRIES TODAY

Today, where those fields of ruined cotton stood, acres upon acres of busy manufacturing plants are working overtime. Alongside them, with a heartening clatter, rise the orange skeletons of new buildings. Workmen are moving into town, buying new homes. New industries are being founded. Millions of dollars are going into Baton Rouge this year for new construction alone.

For Baton Rouge, in 1942, is one of the key centers of the South's new chemical empire. Half a hundred important industries have settled near there.

Call this a miracle. But it has not been an overnight change on the wave of a "war boom." The pattern of modern industrialization had begun to take shape far back in that unhappy summer of the boll weevils, 1909, when a group of prominent citizens persuaded Colonel Weller to build his Standard Oil of Louisiana refinery there. The metamorphosis that followed is well described in a letter written ten years later by one of those citizens, Alexander Grouchy, who had then become mayor of the city:

THE MAYOR TESTIFIES

"This enterprise picked us up at the period of our worst depression, following the advent of the Boll Weevil. . . . Then came the company with its construction experts and technical heads, and things began to look up in Baton Rouge. Since then we have been blessed with a season of prosperity unequalled throughout the South. . . . We have seen the extraordinary impetus which a great industry . . . can bring a community. . . . Baton Rouge is intensely inter-

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ested in its development, and is as much interested in its prosperity as are its directors themselves."

This attitude — doing much to encourage industry and attract new enterprises — has been a key factor in the growth of Baton Rouge. Important companies have settled there — Solvay, du Pont, Consolidated Chemical, Mengel wood veneers, Gulf States Utilities. Another name known the country over is that of the Ethyl Corporation, which first broke ground there in 1936 for an antiknock plant which today employs over a thousand men and represents an investment of more than twenty million dollars.

HOME OF ETHYL FLUID

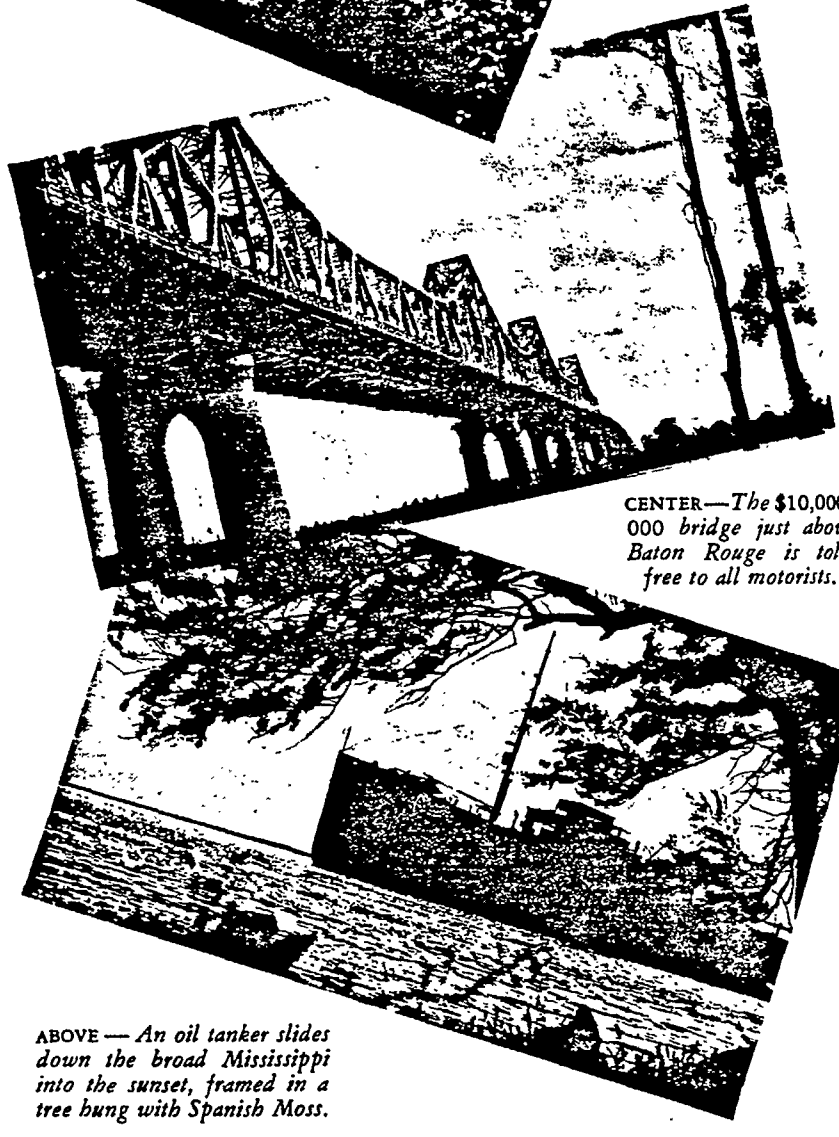
This Ethyl plant is located in the industrial section north of the city proper, near the Mississippi. The buildings are of red tile; the plant itself is orderly, well groomed. It is here that pig lead, salt, and petroleum gases are united each day in the test-tube miracle of making tetraethyl lead. And as the antiknock fluids based on "lead" have become more important to the oil industry and the automobile industry, the original plant has grown in size. Expansions usually have been completed in advance of the actual need — such as the fifth tetraethyl lead building, completed last year just to be ready when the need might arise. One new unit rapidly taking shape at the moment is a plant for making hydrochloric acid — the largest single installation of its kind in the country — which will supply enough "HCl" to release over 90 tons of liquid chlorine a day which other industries need in the war effort. Further, by financing and building this plant as soon as the possibility of critical shortages first appeared, Ethyl put itself in a position to be a net producer rather than a net consumer of chlorine.

ONE HELPS THE OTHER

Construction of the plant has been directly reflected in the business life of the community. Periodic expansions of the tetraethyl lead industry have more than once made it possible, even necessary, for other industries in the



TOP — *The* $5,000,000 *capitol building rises* 34 *stories above the city of Baton Rouge.*



CENTER—*The* $10,000,000 *bridge just above Baton Rouge is toll-free to all motorists.*

ABOVE — *An oil tanker slides down the broad Mississippi into the sunset, framed in a tree hung with Spanish Moss.*

neighborhood which supply raw materials or services to grow also. Such reciprocal advantages are one of the happy features in Baton Rouge's community of allied chemical industries. Often some unwanted-by-product of one company can be recovered and used by another one nearby, with an economic gain to both. To take a case, a certain low-grade residue from the local refinery is burned as a fuel in the local power plant. The power plant can thus give the refinery a lower rate on its electricity, as well as on the high-pressure steam which is exhausted from the turbo-generators. As the French so neatly put it, "One hand washes the other."

POPULATION UP 800%

But such advantages, even though they are numerous, are not the primary reason for the mushrooming industrial growth of Baton Rouge — a growth attested by an 800% increase in population since the turn of the century. The amazing wealth of natural resources in the district and in the state of Louisiana as a whole are such as to attract many industries, especially chemical industries. Louisiana furnishes more sulphur than any state but Texas, one fourth of all the industrial alcohol in the country, vast stores of lime, tung oil, petroleum products. Its proven oil reserves are larger than those of any other state except Texas and California; it is likewise the third-ranking state in production of natural gas and carbon black. Even at present levels of production, it ranks fourth among salt-supplying states.

MODERN CHEMURGY

Through modern chemurgy, Louisiana's impressive agricultural produce becomes a second significant source of raw materials — they can be grown on trees! Baton Rouge is not only the capital of the state, it is also the capital of this new science which is now being developed under forced draft, at the state university.

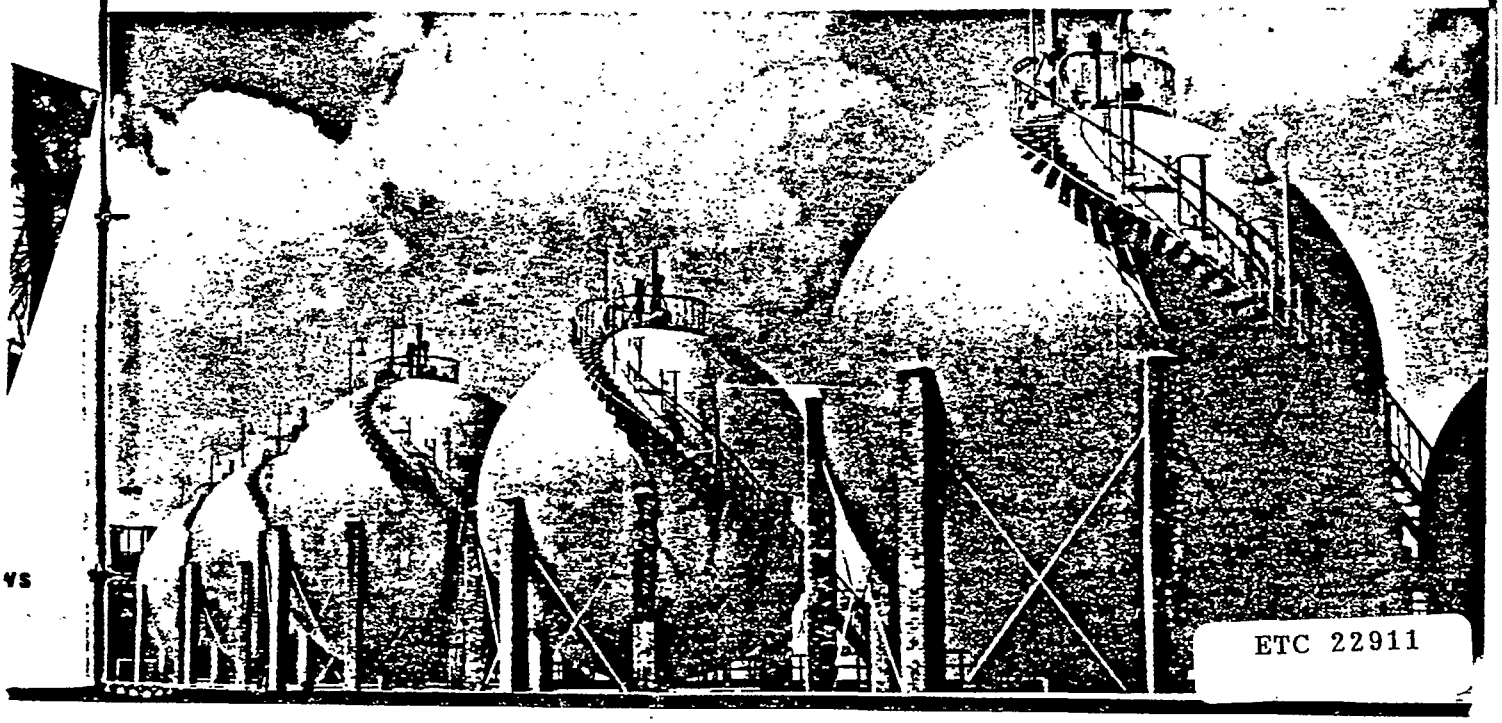
Louisiana State University, incidentally, has been one of the best paying investments in the state budget through its agricultural and industrial research alone. Beyond that it's an extremely practical school where they teach a generation of young Louisianians how to raise their standard of living as well as how to appreciate the literary — and political — subtleties of Caesar. There is a somewhat inspired quality about the University which is characteristic of the city itself, such as the ingenious device of incorporating spacious but low-cost students' dormitories in the waste space beneath the great football stadium, making life easier for the scholar with little money and converting a financial handicap on the treasurer's books into a source of revenue.

Truth is, there's a quality about Baton Rouge that makes it the land of Never-Never: it's the home of the amazing Huey Long and the 34-story capitol building he erected, the site of his ten million dollar bridge over the Mississippi that stands as high as a 36-story office building at the central piers and stretches nearly four and a half miles with its approaches. Baton Rouge is the place where the water is so soft (somewhere around 99%) that it will barely rinse soap off your hands. It is the blighted cotton town that was on the rocks one generation ago, and now is one of the key cities in America's chemical industries. It is, we repeat, a place where miracles happen.

ADVANTAGEOUS SPOT

But the industrial boom there today is based on practical advantages of the dollars-and-cents kind rather than any razzle-dazzle sideshow wonders. Until recently there was a state tax exemption for the first ten years on any new industrial installation. There are two large railroads which cover the manufacturing area with a spiderweb of tracks. The city itself is located at the head of deep water navigation on the Mississippi, just 13 miles above the Intra-coastal Canal which feeds into the sugar bowl of Louisiana, the rice

Petroleum and chemical industries have found Baton Rouge a congenial home, close to raw materials.



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district in southwestern Louisiana and east Texas, the oil area of Texas, the cotton concentration centers of Galveston and Houston, and the sulphur district of Texas. And the city government's attitude is that same spirit of cooperation which was expressed years ago by Mayor Grouchy — what helps industry helps Baton Rouge. Even the city's physical location has counted heavily, for it influenced old Colonel Weller to pick that spot for building a refinery which is now one of the world's largest. At a point where the Mississippi will rise 44 feet above the low water level, Baton Rouge stands safely above flood waters with an elevation of 51 feet. It is on the first piece of high ground above the river mouth.

Back in the days when Louisiana was Indian territory, a settlement stood on these protected bluffs. Pierre Le Moyne, Sieur d'Iberville, the adventurer commissioned to assert the French claim to the territory, found a settlement there in 1699. "There are on the bank," he wrote, "many cabins covered with palmetto leaves, and a May pole without branches, reddened with several heads of fish and beasts attached as a sacrifice." Accordingly, when the French settled there they called the place *Baton Rouge* — Red Pole, or Red Stick. The first of seven flags to fly over the spot was the fleur de lis of France under Louis XIV, for whom the territory and the state were named. Since that time, in conquest and counter-conquest, men have proudly planted there the colors of Great Britain, Bourbon Spain and the West Florida Republic, the State of Louisiana, the Confederacy, and finally the United States. Where those flags waved on the bank of the Mississippi, Louisiana State University was first erected. The school has since been moved; today the capitol grounds are on that piece of land. The very shadow of the modern skyscraper capitol, moving around the clock with the sun, sweeps slowly over the same land where history has been made and made over — land soaked in the blood of patriots who fought under the banners of seven sovereign countries, but who all fought for the land where now stands the miracle city of the Mississippi.

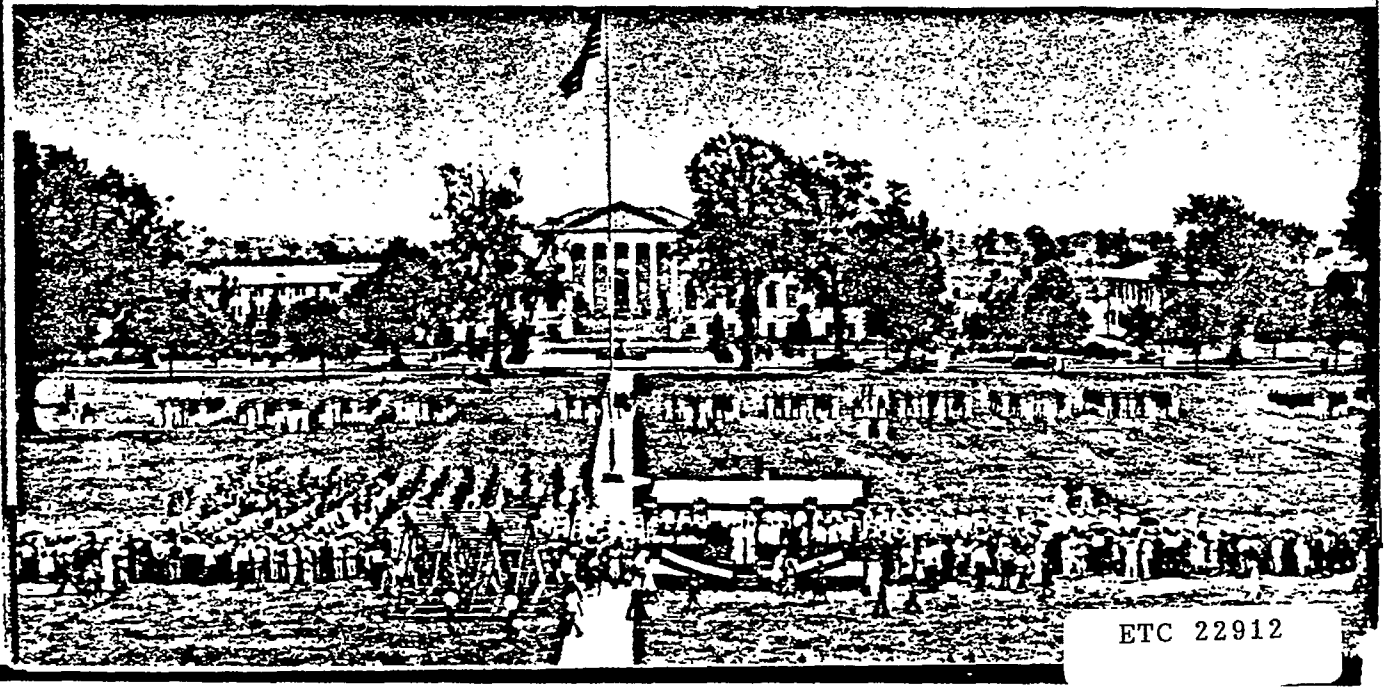
BATON ROUGE RUBBER

Today another battle is being fought there — the battle of a united America striving to produce "to the limit" the goods and tools of war needed by the armies of the Allies. Baton Rouge, like other cities, has rolled up its sleeves and spit on its hands. It means business. The extent of the district's expansion for preparedness in 1941 (this was before Pearl Harbor, remember) may be gauged by the fact that fifty million dollars were spent in Baton Rouge for industrial additions. Solvay, Consolidated Chemical, Standard of Louisiana, the Ethyl Corporation, and Gulf States Utilities all increased their installations. At the refinery a buna rubber plant, a butyl rubber plant, and a government-financed plant which will produce some of the materials for this "Victory rubber" were built or begun.

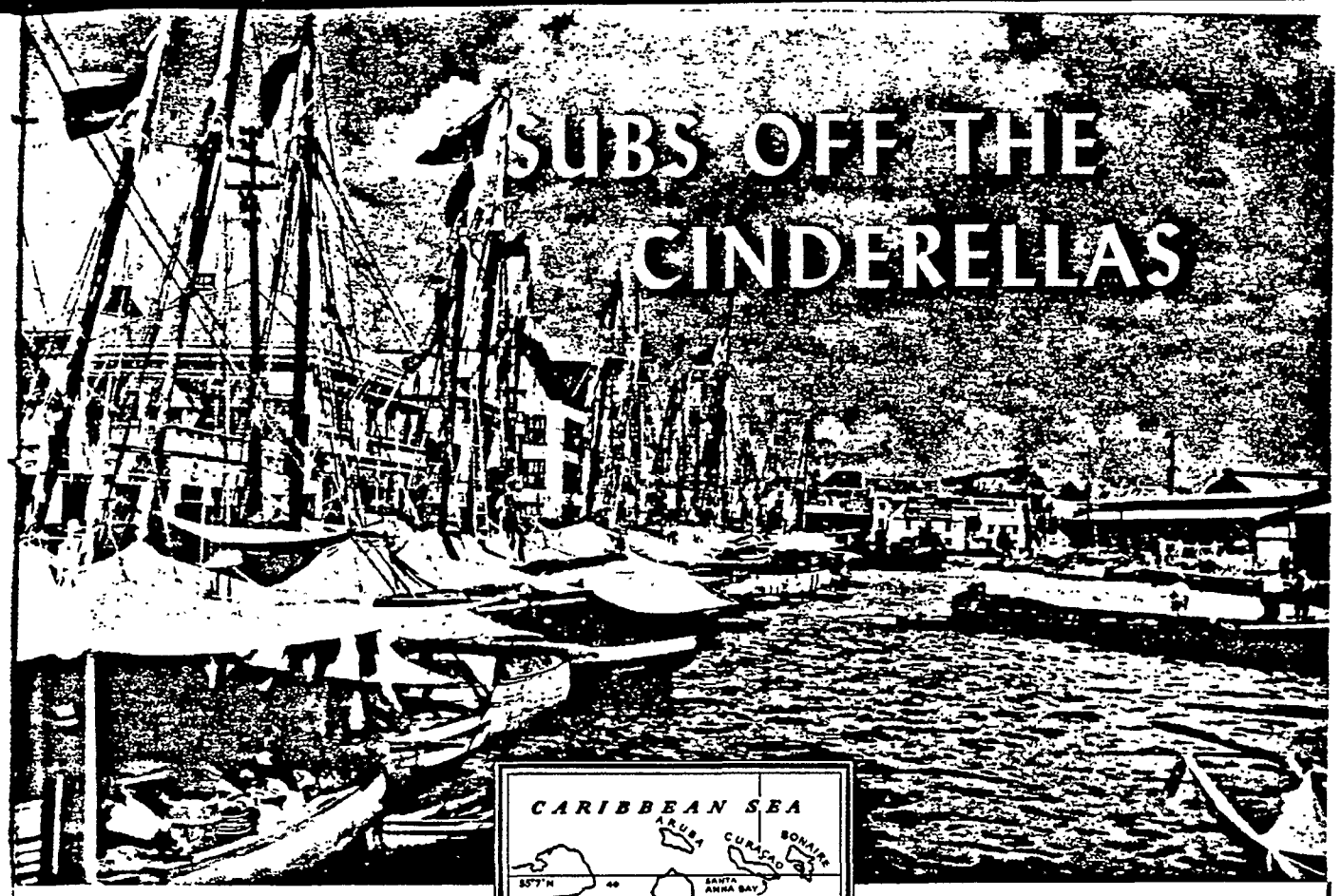
These rubber plants derive one of their ingredients from the same refinery cracking process which supplies an ingredient for making tetraethyl lead. A black, asbestos-cased pipe snakes its way through the jungle of refinery structures, climbs a little trestle over the tracks of the Louisiana and Arkansas Railroad, then continues until it reaches the Ethyl property. Through it flows the by-product refinery gas, which is reacted with other gases to form ethyl chloride, an ingredient in manufacturing "lead."

Pretty neat, you say? Yes indeed — but it's only one of the many ways in which a community of loosely allied industries can be of direct and valuable aid to each other, and to the community which serves them. Baton Rouge, by making service to industry its business, has boomed as a manufacturing center. It is not located at one of the great crossroads of world commerce as is Chicago, New York, or San Francisco, and thus is not destined to become one of the nation's great trading posts. Its function is to supply rather than sell. But today we need supplies.

Military training is compulsory for at least two years at L. S. U.



ETC 22912



SUBS OFF THE CINDERELLAS



Map above showing Lake Maracaibo found to have fabulous stories of oil buried beneath it.

ZUYDER ZEE PORT — *Dutch flags floating from the mainmasts of vessels at Willemstad's market quays on Curacao show what nation rules it now.*

BETTER MEN THAN THE NAZIS HAVE RAIDED ARUBA AND CURACAO BEFORE

UNTIL SHELLS from an Axis U-boat screamed in a recent dawn, few but oil men had ever heard of Aruba. Newspaper pictures of flaming tankers off the coast of Curacao reminded most people only of a liqueur by that name.

Enemy submarines off these islands taught millions that they are important oil centers a few miles off the Venezuelan Coast. But only an occasional historian was aware that Aruba and Curacao were no new theatres of battle, but sister isles that in their rags-to-riches history have for centuries rocked to every major international conflict.

For these seagirt sites of the world's two largest oil refineries twice witnessed the slaughter or enslavement of all their inhabitants, were four times captured by three different European nations — and once were ruled by despotic Peter Stuyvesant, who lost his leg in line of duty there, raised Curacao to vast wealth, and by the courage and craft he displayed, won his appointment as governor of New Amsterdam, later New York.

Columbus and cannibals, Stuyvesant and slaves, gold and greedy Spaniards make the history of the two islands read like a tale from the Arabian Nights . . . but the Cinderella touch, the El Dorado ending that today makes their barren acres of international importance and brings Axis subs to prowl in the blue waters around them is oil. Long before plumed Spanish conquistadors, sailing in Columbus' wake, plundered and pillaged most of the West Indies isles, Aruba and Curacao were inhabited by the peace-loving Arawak Indian. But the fierce Carib Indians swept up the coast in their war canoes and attacked the islands, killing all the male Arawaks and taking their squaws.

Previous to the discovery of the New World, most maps of the Middle Ages had shown a legendary island in the Atlantic labelled "Antilia," supposed to be a Western Elysium. But when Columbus returned to tell of a great

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PETER STUYVESANT

Despot and iron man, the famed Peter Stuyvesant governed the Dutch possessions in the West Indies, lost a leg while leading an attack on San Martin, raised Curacao to international importance as a slave market.

archipelago in the western waters, Antilia assumed its present plural form to designate the West Indies. Somewhere among them, the Spanish believed, lay El Dorado, a land where gold abounded.

Thus four years after Columbus' first voyage to America, Alonzo de Ojeda pushed on to the northeast trade winds into the Caribbean in search of El Dorado, and claimed in the name of the Spanish Crown a number of islands, including Aruba and Curacao. On his return to Spain he reported that a race of giants inhabited Curacao, and in a gift in 1528 to Juan de Ampues, a Don high in court favor, the Crown threw in both Aruba and Curacao.

ENSLAVED AGAIN

A Spanish expedition to the two islands in 1529 was so disappointed at the utter absence of giants on Curacao and the scarcity of gold to be taken from the indians of Aruba that the majority of the aborigines were carried off as slaves to Venezuela and most of the remainder murdered. Except for a handful of the conquerors who remained to mine Aruban gold, Curacao and Aruba were abandoned to sea-birds and lizards and the constant song of the northeast trade winds across their rocky wastes.

The avaricious trade policy of the Spanish led early to buccaneer dominance of the Caribbean, and for almost 100 years of the 16th and early 17th centuries there came to the shores of Aruba and Curacao the greatest names in corsair and privateer history, including Sir Francis Drake, Sir Henry Morgan, Jacques Cassard, Captain Bartholomew Roberts, and Edward "Blackbeard" Teach. The celebrated Captain Kidd was commissioned by Lord Bellamont of Barbados to hunt down in the Caribbean the very pirates of whom he later became one.

All traffic by foreigners with her colonies in the New World, Spain asserted, was contraband. When the natives refused to trade the French replied by sacking Havana twice. British buccaneers followed on their heels. But it was the Dutch smugglers, who long had prowled about the Spanish settlements from their headquarters on the island of St. Eustatius, who saw potentialities in Curacao and Aruba.

BUCCANEER HAVEN

The Dons had scorned Curacao as an upheaved coral reef almost barren of gold, with no natural water to speak of and native Caribs hardly worth looting or slaughtering. Dutch smugglers noted the natural harbor entrance, so narrow that it could be defended by a single fort. Aruba, just as meagerly endowed, had a coral strip protecting the harbor channel, accessible again only by a narrow opening. So under Captain Van Walbeck the Dutch seized Curacao and Aruba in 1634 . . . and in the snug harbors of these desolate isles, Dutch, British, and French buccaneers fore-gathered to harass and rob the Spanish Main, returning with their booty to Willemstad, Curacao capital, where the Dutch flag fluttered at the harbor mouth above tiny Fort Amsterdam.

Curacao became the haven for Venezuelan exiles as well as a rendezvous



PRINCE OF THE CINDERELLAS

Early drawing of Alonzo de Ojeda who sailed in Columbus' wake seeking to discover in the Caribbean an El Dorado of honey-colored gold. Claiming for the Spanish Crown the islands of Curacao and Aruba he died . . . but 400 years afterward both isles proved El Dorados beyond his wildest dreams.

ETC 22914

for smugglers. Up from the harbor edge sprang a city of red-tiled roofs, chimney pots, gables and dormer windows — as typically Dutch as any town along the Zuyder Zee. Into the deep, landlocked harbor, the *Schattegat*, sailed the prize-laden ships of the picturesque buccaneers, whose principal business was marine maurauding, and whose common hatred for the Spaniard led to their calling themselves "Brethren of the Coast." With their pantaloons dyed and stiffened with the blood of bulls and pigs, their rawhide belts stuck full with deadly knives, these men owed their long success to the fact that their attacks on Spanish trade and settlements were made with the countenance of English and French authorities, from whom they sometimes even carried letters of marque.

Meanwhile the Dutch West Indies Co., incorporated in 1621 with serious colonizing as well as trading purposes, sent hard-bitten Peter Stuyvesant to Curacao in 1643 to govern its possessions in the Caribbean. The scheme Peter rapidly hatched brought to Curacao and its sister isle a new era of prosperity, transformed overnight the former into the slave market of the world, and resulted in Peter's appointment a few years later as governor of New Amsterdam.

To the thriving port of Willemstad bluff-bowed Dutch slave ships now pushed up the *Schattegat* with blacks for the slave market, where they were sold to Spanish, French, and British colonists from the mainland and nearby islands, who crowded to Curacao to buy.

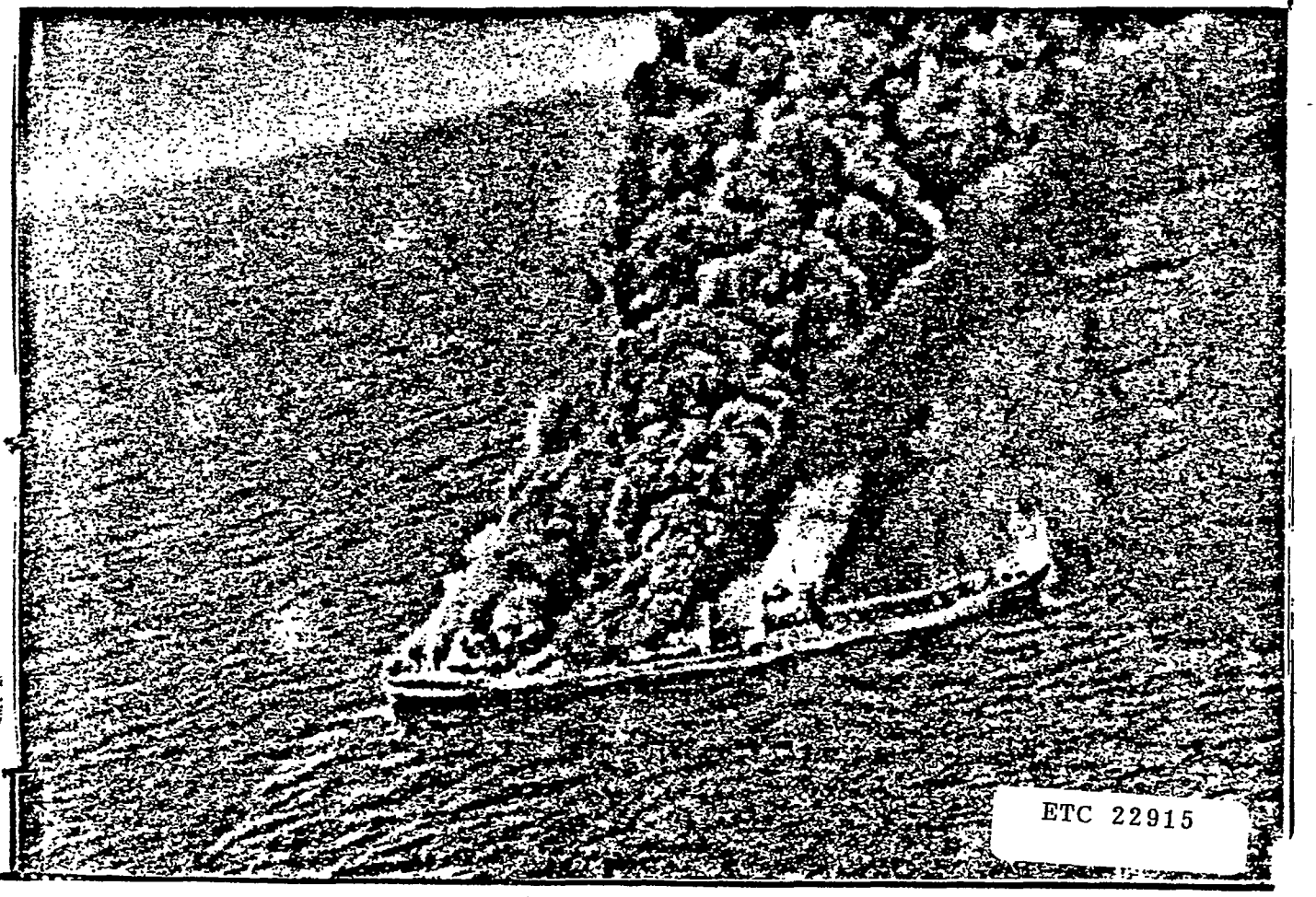
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SPANISH GALLEON — AUTOMOTIVE AGE

Off cinderellan Curacao where Buccaneers once boarded and fired Phillip II's unwieldy merchantmen, an American oil tanker goes up in flames — one of the earlier victims of Axis submarine attacks in the new world.

Soon Peter cast a covetous eye on San Martin, across the Caribbean in the main arch of islands. No armchair general, he led an expedition in 1644 to expel the Portuguese from it, but was shot in the leg during the unsuccessful two month siege, the limb being amputated on his return and buried on Curacao. Of the "silver" leg he wore while governor of New Amsterdam much has been written.

But with Peter's departure, the prosperity he had brought to Curacao and Aruba dwindled rapidly. The slave market had gradually moved north, as the demand for blacks to work the tobacco regions of Virginia and the cotton fields to the south increased. And although Curacao remained the seat of government for the six Dutch possessions in the West Indies, the three islands in the group off Puerto Rico assumed the limelight, and the golden age of Curacao and Aruba was apparently closed. Saba, St. Eustatius, and the Dutch portion of St. Martin were nearer to the center of Caribbean



ETC 22915



ARUBA, TARGET OF U-BOATS — *Army officers examine the dents in an Aruba oil tank, caused by the shells of an Axis submarine which attacked the island refinery, largest in the world, at dawn on February* 18.

activity and now came into their own.

Reduced to the status of unimportant names in treaties of war, Aruba and Curacao passed from one European power to another, together with Bonaire, 20 miles northwest of Curacao.

Curacao and its sister isles fell to the French in 1713, who after wholesale plundering sailed off, convinced like their Spanish predecessors that neither Curacao nor Aruba had any value. Again in 1800 Curacao fell to the French, who left on the approach of a British fleet summoned by the Dutch. The English then took possession of the island for themselves, retaining it until 1802 when the Treaty of Amiens restored it to Holland. In 1805 the British captured Curacao a second time, holding it for ten years before it was again awarded to Holland by the treaty of Paris.

After the opening of the century, oil scouts moving south from Mexico discovered oil in the great Maracaibo basin of Venezuela. The Dutch Shell Co. led the way leisurely and a few big companies trailed after. In 1922 production was almost 7,000 barrels a day.

Then it happened.

R-2 well in Maracaibo basin "blew in" and spouted 100,000 barrels of oil a day skyward.

Operators, lease takers, concession hunters, gamblers, and tropical tramps raced to the peaceful jungle basin, and overnight Maracaibo became an El Dorado beyond the fondest dreams of the conquistadors.

Lying on the north rim of South America, its area greater than that of Belgium, the Maracaibo saucer holding the city and lake of the same name proved one of the great oil fields of the world. It is 14 miles nearer New York than Tampico, where the Mexican fields were confined to an area of 50,000 acres, and its great petroleum pools could be tapped in an area 300 times as large. By 1925, approximately 16 million acres containing nine of these gigantic oil pools had already been located, and soon afterward Lake Maracaibo itself was found to have other fabulous stores of petroleum buried beneath it.

But the problem of shipment had to be solved.

Across the mouth of Lake Maracaibo nature had placed a bar, cut only by a continuously shifting channel, 30 miles long and hardly 12 feet deep at points.

So to put the oil within reach of sea-going tankers, the Carib Petroleum Company, subsidiary of Royal Dutch Shell, decided to build a refinery somewhere beyond Lake Maracaibo. The logical site for a refinery might have been the west coast of Paraguana, the Venezuelan peninsula that jutted north into the Caribbean. But the firm picked Curacao. It was farther away, but 400 years as a Dutch colony had proved it a place where government was stable.

Thus to the shore of Curacao harbor to which privateers and buccaneers and men of war had sailed, came strings of squat, shallow-draft tankers that had crossed the bar of Maracaibo. Each carried more potential gold than any Spanish galleon of the El Dorado days or any of Peter Stuyvesant's slaves.

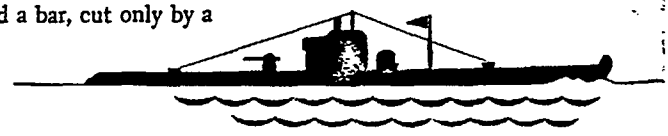
Then Lago Oil Corporation selected Aruba for a similar terminal, and the refinery and tank farm it built became the largest in the world.

THE CLOCK STRIKES

To the all but deserted *Schattegat* of Curacao and the reef-screened harbor of Aruba flocked more and more vessels annually, until in 1939, 7,000 ships with a gross tonnage of 27,000,000 tons entered Curacao harbor. In the same year water freight traffic entering New York harbor from foreign ports was 2,871,498 cargo tonnage, one tenth the Curacao figure.

In 1931 the little lake tankers ferried about 38,000,000 barrels of crude oil to Aruba. Since Standard Oil Co. (N. J.) purchased the properties from Pan American in 1932, this figure has increased.

Once it was a peaceful Arawak Indian looking up from his rows of maize to see canoes racing shoreward filled with spear-armed Caribs. Yesterday it was a periscope poking insidiously from the blue stretches of water. The Cinderella story of Curacao and Aruba has a new chapter. Tomorrow the clock may strike twelve — again.



BEATING THE BOMBERS

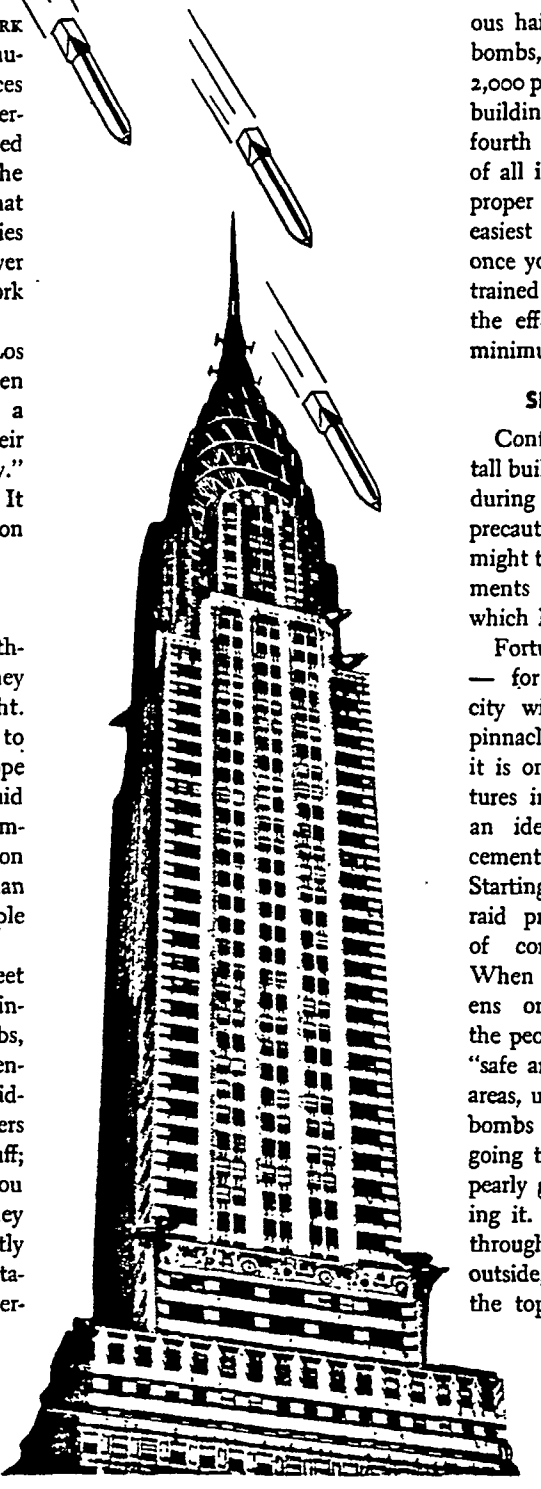
"LUFTWAFFE BLASTS NEW YORK CITY!" the story declares. Other manuscripts filed alongside it — in the offices of Goebbels' propaganda bureau at Berlin—describe the slaughter in crowded Manhattan streets, the great fires, the smoke, the smashed skyscrapers that had once been landmarks. These stories are all written, waiting to be read over the German radio the day New York is bombed.

For New York is earmarked, like Los Angeles and Washington, for a token raid whenever the Axis can spare a squadron of planes to provide their propaganda networks with a "victory." It will not be a devastating raid. It probably will not be repeated soon again. But bombs will fall.

IT COULD COME

— So say many students of Axis methods in war and propaganda. . . . They may be wrong, but they may be right. New York's only sensible course is to prepare itself for the worst and hope for the best. If and when this raid comes, bombs *will* fall, fire and screaming death will drop from the skies upon the densest concentration of human beings on the earth — and those people will have to be prepared.

They will have to be ready to meet the four terrors of an air raid — incendiary bombs, fragmentation bombs, demolition bombs, and panic. Incendiary bombs start fires and act as guiding lights for the high-flying bombers that come over later with the big stuff; one plane can carry 2,000, and if you don't get them under control, or they don't explode, they can burn brightly for as long as 40 minutes. Fragmentation bombs fill the air with a murderous hail of jagged metal. Demolition bombs, weighing anywhere from 50 to 2,000 pounds, blow things apart, smash buildings, snuff out lives. Panic, the fourth menace, is the most dangerous of all in a crowded city — but with proper discipline and training it is the easiest to combat. As a matter of fact, once you have disciplined crowds and trained wardens you have reduced the effectiveness of the bombs to a minimum.



SKYSCRAPER PREPARES

Contrary to popular belief, a modern tall building is one of the safest refuges during a bombing. Curious to see what precautions a representative skyscraper might take, we looked into the arrangements planned by the building in which Ethyl has its New York offices.

Fortunately for its 8,000 tenants — for the Chrysler Building is a city within a city — the 77-story pinnacle offers a slender target. And it is one of the most fireproof structures in the world; just to give you an idea, the floors are reinforced cement from 18 to 24 inches thick. Starting with these advantages, air raid precaution is mostly a matter of common sense and training. When the first alarm sounds wardens on each floor will shepherd the people into previously determined "safe areas." These are *relatively* safe areas, understand — if one of the big bombs comes anywhere near you it's going to blow you right through the pearly gates without your even knowing it. To outsmart those that come through the roof or land in the street outside, every one will be vacated from the top and bottom three floors —

ETC 22917

THE CHRYSLER SPIRE — Most Distinctive Landmark Along the Skyline of Manhattan

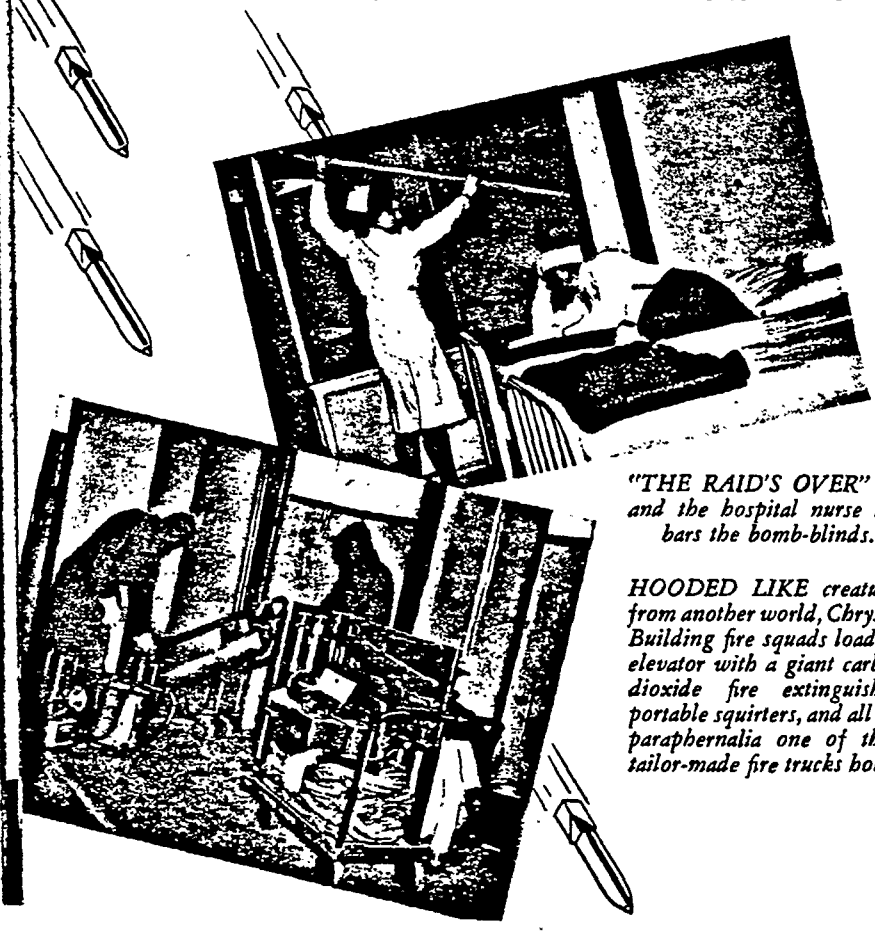
but if one should land against the side of the building it would crash through the walls. Bombs don't fall straight down; they slant like rain in the wind. And they gain such terrific speed during the long drop that they won't be deflected by a vertical wall; they'll plow right through. The only protection from a heavy demolition bomb is to be somewhere else when it hits.

Against fire or fragmentation bombs, though, you can take fairly sure precautions. Several thicknesses of wall are all you need — hence the designated safety areas throughout the building. Air raid wardens on each floor have memorized the offices which are to empty into each safety area, and have coached their people on what to do —

"When you hear the alarm, fling all windows wide open. Open all hallway doors — a nearby hit would wrench the building enough to pinch a lot of them shut. Since a strong draft will blow through with all the windows and doors open, put all papers on your desk into a drawer. Grab your hat and coat and cigarettes and head for the safe area where you belong — probably one of the alleyways or elevator corridors. Grab any chair cushions in sight, because the wardens are going to see that you lie down on the floor. This is to keep from being blown off your feet if a big fellow lands in the neighborhood."

While you're lying there, sharing cigarettes and nervous jovialities with fellow-workers you never really knew before, the wardens will be on the alert for any trouble. Panic is the most likely trouble, but if a fragmentation bomb should cause injuries on their floor or if an incendiary bomb should start a fire, there are three separate sets of telephones by which they can call the building's staffs for help. Any such "SOS" goes through the central station of the building's own communication system.

If it's fire, any one of three specially built fire trucks can be rushed to that floor on an elevator, together with an array of portable spotlights and hand equipment. Men specially trained in fire work will be there in heavy fire-proof hood-suits with asbestos gloves. Dark goggles will protect their eyes from the brilliant flare of thermite, or thermite and magnesium, which the fire bombs carry. These men are also trained in first aid — as are the building's floor porters and most of the cleaning women.



"THE RAID'S OVER" — and the hospital nurse unbars the bomb-blinds.

HOODED LIKE creatures from another world, Chrysler Building fire squads load an elevator with a giant carbon dioxide fire extinguisher, portable squirters, and all the paraphernalia one of their tailor-made fire trucks holds.

VOLUNTEER SQUADS TRAINED

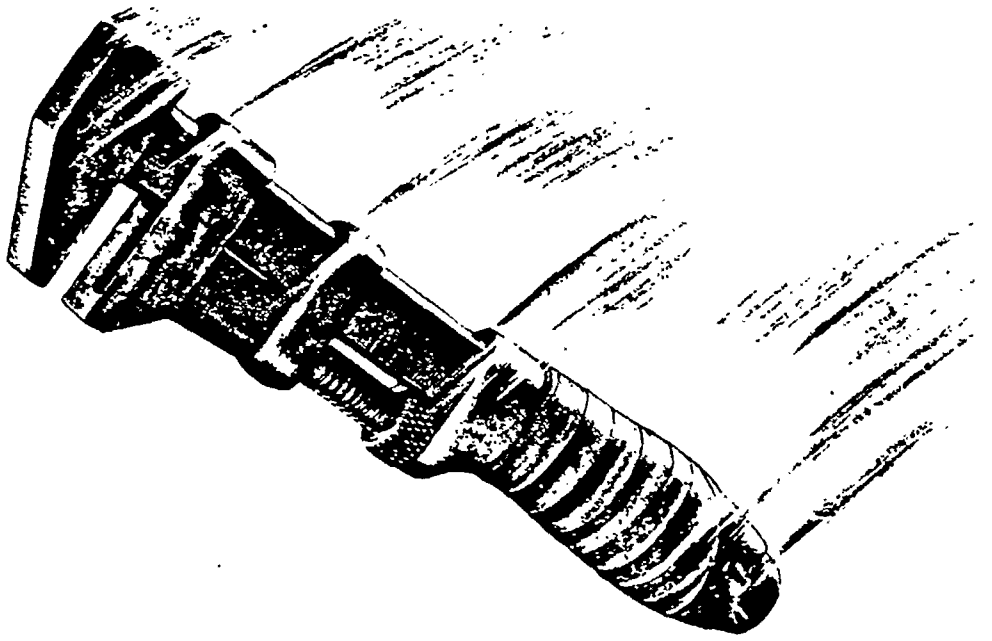
For it has been a principle in training the 200 employees of the Chrysler Building that they should learn special duties outside the regular line of their work. Movies taken in England during some of the worst air raids, shown to most of the employees, greatly stimulated their interest in the A. R. P. courses. They have volunteered for first aid work, for fire and demolition work. Every floor porter has been trained in anti-sabotage precaution, with periodic inspection of all electrical, water, steam, and communication controls on their floors now added to their daily routine.

Should injuries occur too serious to be handled by the floor wardens — many of whom have taken extensive Red Cross training on the side — the wardens would call for stretchers and first aid squads. Within a few minutes the victims would be on emergency tables in the building's hospital on the fourth floor. The hospital is a suite of spic-and-span rooms with separate wards for men and women, fully equipped treatment room, and a spacious lounge which could handle a large overflow. All these chambers are fitted with ingenious blackout blinds that shed bomb fragments.

All these defense measures, thorough as they are, actually are precautions over and above the extensive preparations of the city itself. Firemen and policemen, with squads of volunteer first aid, fire, and rescue workers, would quickly converge on any building which was hit.

We are now a country at war, and war these days is directed at civilians as well as at soldiers. Fire and screaming death may soon drop from the skies upon the people of New York — but if it does, those in the Chrysler Building will probably thank their lucky stars for being where they are.

ETC 22918



HANDCUFFING THE SABOTEUR

WITH AMERICAN INDUSTRY GEARED to top speed production, the word sabotage has an ominous sound, yet it was heard frequently last summer in the plant of the Glenn H. Martin Company, a large producer of military aircraft. Bombers under construction for the Army Air Corps had been damaged, apparently to delay their completion.

Wires and cables in the electrical system of the bombers had been cut. Hydraulic tubing had been crushed and pieces of rubber tubing stuffed into gasoline tanks. Rigid inspection by company and government inspectors disclosed the damage in every case, but valuable time and material were lost in replacing damaged parts.

The Federal Bureau of Investigation was called in. Examination showed that 34 acts of sabotage had been committed on 24 bombers between the latter part of June, 1941, and September 13 of the same year. On one occasion a small printed sign was found in one of the planes, which read in part, "B-26, Martin's Death Trap — Heil Hitler!"

All employees who had worked on the damaged planes were investigated and questioned. Tools and parts were given a thorough scientific examination. As a result one Michael William Etzel, aged 22, was accused of the crimes.

●

SEEKING EVIDENCE of sabotage, laboratory technicians of the FBI often resort to the microscope.



SABOTAGE NOT WIDESPREAD

Confronted with the conclusive evidence which had been piled up against him, Etzel confessed. Although he had been born in the United States of German parents, he said he had relatives in Germany and did not want Martin bombers to be sent against the German people. At his trial he pleaded guilty to all 24 counts in the indictment against him and was sentenced to 15 years' imprisonment by Federal Judge William C. Coleman.

Etzel's activities are one of the few cases of actual plant sabotage which have occurred so far in this war. In this our war industries have been very lucky, judging from the reports on a survey of the protective facilities of 2,300 industrial plants turning out products considered vital to the nation's war effort, including the Ethyl-Dow plant and Ethyl's manufacturing

THE F.B.I. GOES TO WORK ON THE PROBLEM OF KEEPING ENEMY AGENTS OUT OF WAR PRODUCTION PLANTS

ETC 22919

plants. This survey, which was begun by the FBI in 1939 and continued by that Bureau until January 5, 1942, when it was taken over by the War and Navy Departments, showed that American industry, before it adopted the FBI's safety regulations, was a sucker for the saboteur and the spy.

Let's take a look at a few examples of extreme laxity.

THE HOLE IN THE FENCE

It has always been FBI policy to recommend the use of identification cards and badges for plant employees. Some factory officials, however, called such measures unnecessary in view of the rule requiring each employee to punch a time clock on entering and leaving the plant. They believed that time cards were a sufficient defense against unauthorized persons entering the premises, but their theory was shot full of holes by an incident which occurred during the survey of an eastern plant. An employee, so the president informed the FBI agent making the survey, had been absent a week, yet his time card showed perfect attendance. His absence would have gone unnoticed if a stranger had not appeared to collect his pay.

At another plant an FBI agent entered in succession through its three entrances without being questioned by anyone, though he wore nothing by which he could be identified. He made a leisurely tour of the entire factory, mingling with workers and technicians, poking around among highly confidential activities, and asking questions about operations, yet nobody wanted to know who he was or by what authority he was there.

During the survey of a midwestern ordnance depot a hobo was discovered on the government reservation. Under questioning he admitted that he had been on the property for three days, roaming about at will. He said he had crawled through a very obvious hole in a fence. If he had been a saboteur, he could really have gone to town.

To keep people who don't belong out of defense plants the FBI recommended that each employee and official be issued an unalterable credential card bearing his name, employment number, physical description, assignment in plant, and photograph. In addition, it was recommended that badges carrying employment numbers and of different colors and shapes to designate various shop assignments be worn at all times on plant property. These recommendations have been followed in all Ethyl plants.

Petty thievery can amount to sabotage. Recently a photographer wished to snap a picture of employees going through the gates at quitting time. So that he could get the most effective shot, the camera man requested that the gates be locked until the workers were ready to leave. This started a wild rumor that everyone was going to be searched as he left the plant, with the result that, after the workers had departed, plant guards found they had disposed of enough tools, pieces of machinery and other articles they were planning to take out with them to fill several barrels.

The FBI survey revealed considerable laxity in proper precautions against fire. An eastern concern was using water buckets located at strategic points in the plant for fire protection, but closer inspection revealed that most of the buckets were empty or almost empty and several had holes in their sides and bottoms.

FIRE A WEAPON

A machine company on the west coast had been experimenting for five years on a secret invention, in which large sums of money had been invested. At the time of the FBI survey a working model had been constructed and success loomed just ahead. But all plans and records of five years of research, as well as the model, were kept in a small, one story building, which was neither fire nor burglar proof. The only fire fighting apparatus in this building consisted of two carbon tetrachloride extinguishers, which had a specialized use and would have been worthless for fighting flames fed by wood, paper, rags, or other common combustibles. Furthermore, employees in the building were in the habit of washing their hands in the filler of these extinguishers, as carbon tetrachloride is an excellent solvent for oil and grease. Luckily the FBI got there ahead of the men from Nippon.

Enemy agents whose primary aim is espionage are particularly interested in obtaining facts and figures on production, including methods and quality, present rate and potential capacity,



IF THESE FBI agents need Tommy guns to subdue spy rings, they will know how to use them.

RIGHT — *Many plants take fingerprints of all employees and send copies to the FBI. If a worker has a record as an enemy agent, these experts will discover it.*

BELOW — *Blackouts are no obstacle to the FBI. In this picture a group of special agents is shown blasting a target with tracer bullets.*



OLD TIME western sheriffs had to be able to shoot from a galloping pony. Today the G-Men have to be just as good with a tommy-gun in a speeding automobile.

quantity of material on order, new formulae, and plans, specifications and test records of munitions and war equipment. They are ingenious in collecting this data. Sometimes they become employees of a plant, sometimes they purchase information from supposedly trustworthy employees. One of their pet schemes is to put the squeeze on a loyal employee by threatening relatives of his who reside in an enemy country. Espionage rings are often disguised as commercial concerns, scientific organizations, and engineering societies.

Sabotage, though not as old a form of activity as espionage, is closely related to the latter, and where you find one you will almost invariably find the other. Generally speaking, the saboteur's physical acts of destruction may be split into three primary groups — arson, explosions, and mechanical sabotage. Breaking it down still further, the best known forms of sabotage include:

SABOTAGE TECHNIQUES

1—Damage to machines by chemicals, abrasives, or breakage.

2—Destruction of machinery or buildings by explosives.

3—Damage to power stations, switchboards, or other key points in the power system.

4—Injury to materials, including raw materials.

5—Arson, including the creation of fire hazards and undue negligence.

6—Bacterial infection of water and foodstuffs.

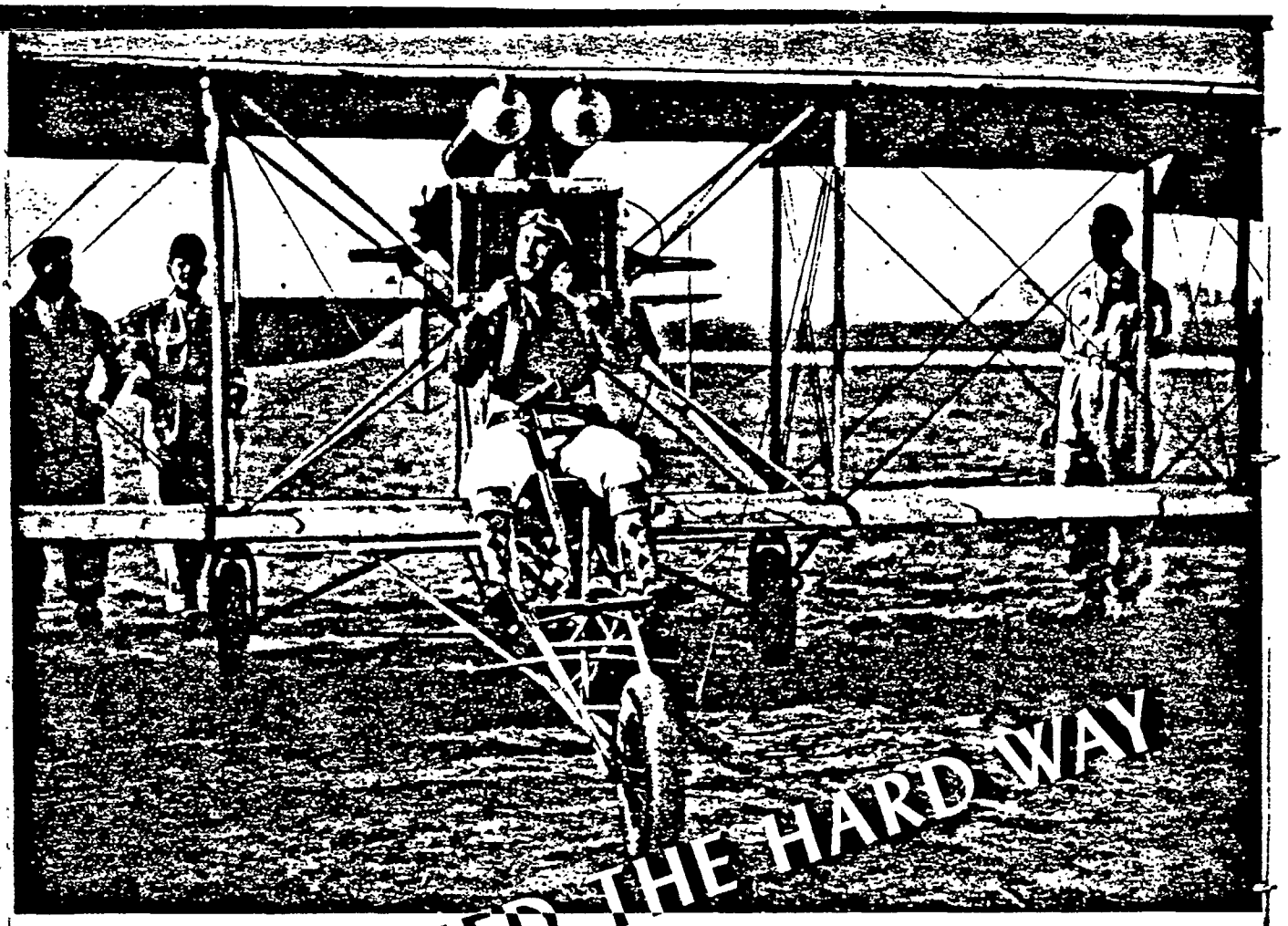
7—Theft of or damage to blueprints, formulae, or other confidential material.

8—Damage to main transportation routes.

9—Damaging or delaying finished products at the plant or in transmission.

10—Injury to precision tools or technical mechanism.

While there have been several instances of espionage and sabotage throughout the country, most of them have been the work of individuals rather than of organized spy rings. In this connection, the FBI urges the public not to become hysterical and cry sabotage every time an accident occurs in an industrial plant, as mass hysteria is exactly the sort of reaction the saboteurs are seeking.



WE LEARNED THE HARD WAY

AL WILSON, Hollywood stunt artist, appears at the National Air Races of 1930 in a pusher plane of 1911 vintage. About the only difference between this plane and the type Lincoln Beachey flew is the 90-horsepower OX-5 engine, which packs lots more punch than the power plant of the 1911 model.

By TRANSPORT PILOT 10374

THERE ARE few natural obstacles severe enough to keep the planes of today on the ground. Modern bombers, for example, take off with ceiling zero and fly long distances with no visibility. All bomber pilots ask is a hole in the soup over their destination big enough so they can see to lay their eggs.

But it wasn't always like this, for not long ago the forces of nature conspired against the airman and added to his perils. Many a daring young pilot, flying mainly "by the seat of his pants" because he couldn't trust the few elementary instruments on his dashboard panel or because his plane lacked a safety device, crashed to his death before the multitude of modern instruments and safety devices were developed.

Let's go back to the winter of 1930, when the personnel of a small commercial flying school in Gulfport, Miss., was having its picture taken. There were a dozen or so of us in the group, sitting there and trying to look like flyers, when Joe Marr, a veteran pilot, remarked cheerfully:

"In a couple of years some of us will pick up this picture and point to one or more guys in this outfit and say, 'He was a nice fellow.'"

We all laughed, though we realized the truth of Joe's words. Aviation in 1930, although it was almost 27 years old, was still a baby and a dangerous baby at that. Most of the developments of the past few years, which have made flying one of the safest methods of travel, were then little more than ideas in the back of some inventor's brain. Sure, the Grim Reaper was bound to clip some of us with his scythe, but each of us thought, "It won't be me! No, it couldn't be me!"

About two weeks later three of us took off from Gulfport for Chicago in a six-place Travelaire monoplane powered with a Wright Whirlwind

ETC 22922

300-horsepower engine. Jim Temple, a Kelly Field graduate with about a thousand flying hours to his credit, was the pilot, I was the co-pilot, and a University of Mississippi student named Rutland was our only passenger. Weather reports gave us clear skies all the way. But weather reports can be wrong!

At 6 A.M. we roared down the runway into the south wind blowing in from the Gulf, banked around in a climbing turn toward the north, and started to climb. The sky was a deep blue, except for a few small scattered clouds which floated like big tufts of cotton at 2,000 feet. We climbed a thousand feet above them and headed north.

The sun came up soon and changed the cloud islands to patches of golden fleece. Between them we could see the swamps, pine woods, red dirt roads and scattered farms of lower Mississippi. Before long the irregular skyline of Jackson loomed on the horizon.

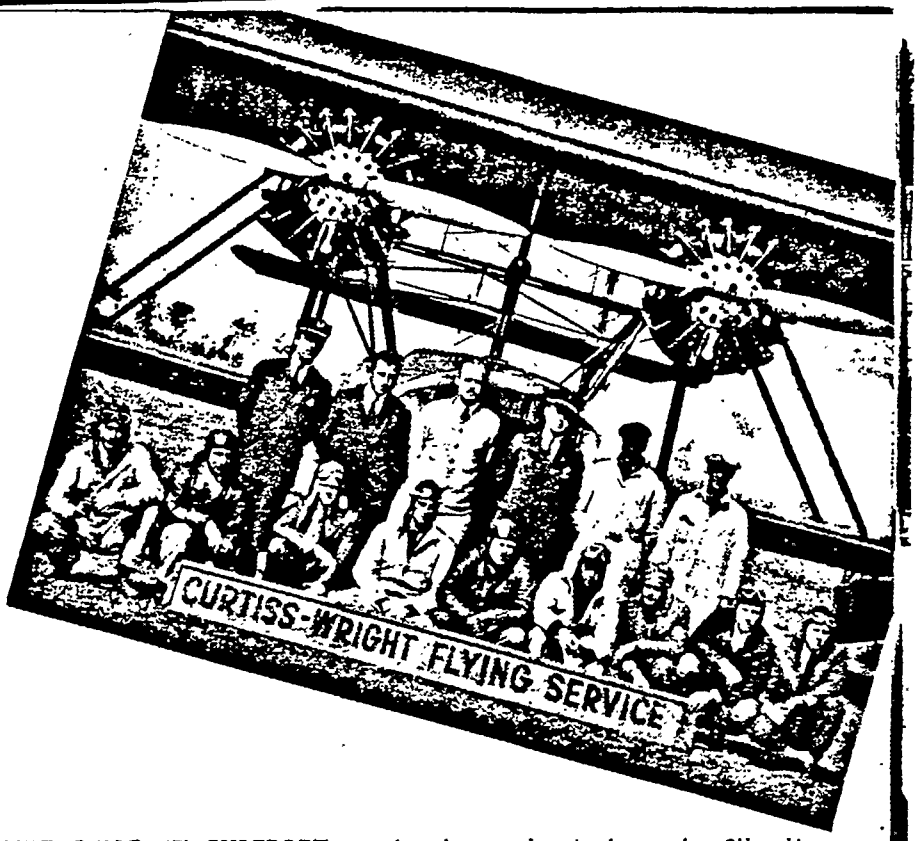
Mississippi's capital city had faded behind us when the cloud islands began to get higher and closer together. In some spots they towered into the sky like rocky towers and battlements or the tall buildings of a great city. Below us was a golden sea of clouds, broken only by occasional holes through which we could see the ground and check our course.

MISTY MENACE

We had just checked on Carrolton, Miss., when a particularly high mountain of cloud loomed in front of us. I was flying the ship at the time, and I nosed the plane into the cloud, expecting to emerge soon on the other side of it. But we didn't come out that easily. Instead, raindrops began to spatter on the windows of the cabin. Jim took over the controls.

"You shouldn't have come in here," he shouted above the engine's roar.

He banked around and tried to escape from the gray mist the way we had come in, but the compass spun crazily. He then eased back on the control and tried to climb above the soup. The air-speed fell off as the engine labored and struggled.



THE GANG AT GULFPORT gets its picture taken in front of a Sikorski amphibian. Those engines are 450-horsepower Pratt and Whitney Wasps. The author is in the center of the front row. Directly behind him is Jim Temple.

Suddenly it happened. The engine sputtered and the propeller bit vainly into the cloud. The big plane hung by its nose for an instant. Then it whipped downward in a terrifying tail-spin.

Jim shoved the stick forward and we were out of the spin. Out of the frying pan into the fire! We went into a thundering power dive which hurled Jim and me out of our seats and against the top of the cabin. The plane quivered and shook like an electric vibrator. Gray mist swirled around wingtips and propeller blades. The airspeed indicator went up — up — up! We were plunging earthward at better than 300 miles an hour. Rutland dragged himself forward.

"Are we going to crash?" he asked, his voice surprisingly calm.

"Not yet!" snapped Jim, his face grim. Below the nose of the diving plane the clouds were getting blacker and blacker, reflecting the darkness of the earth.

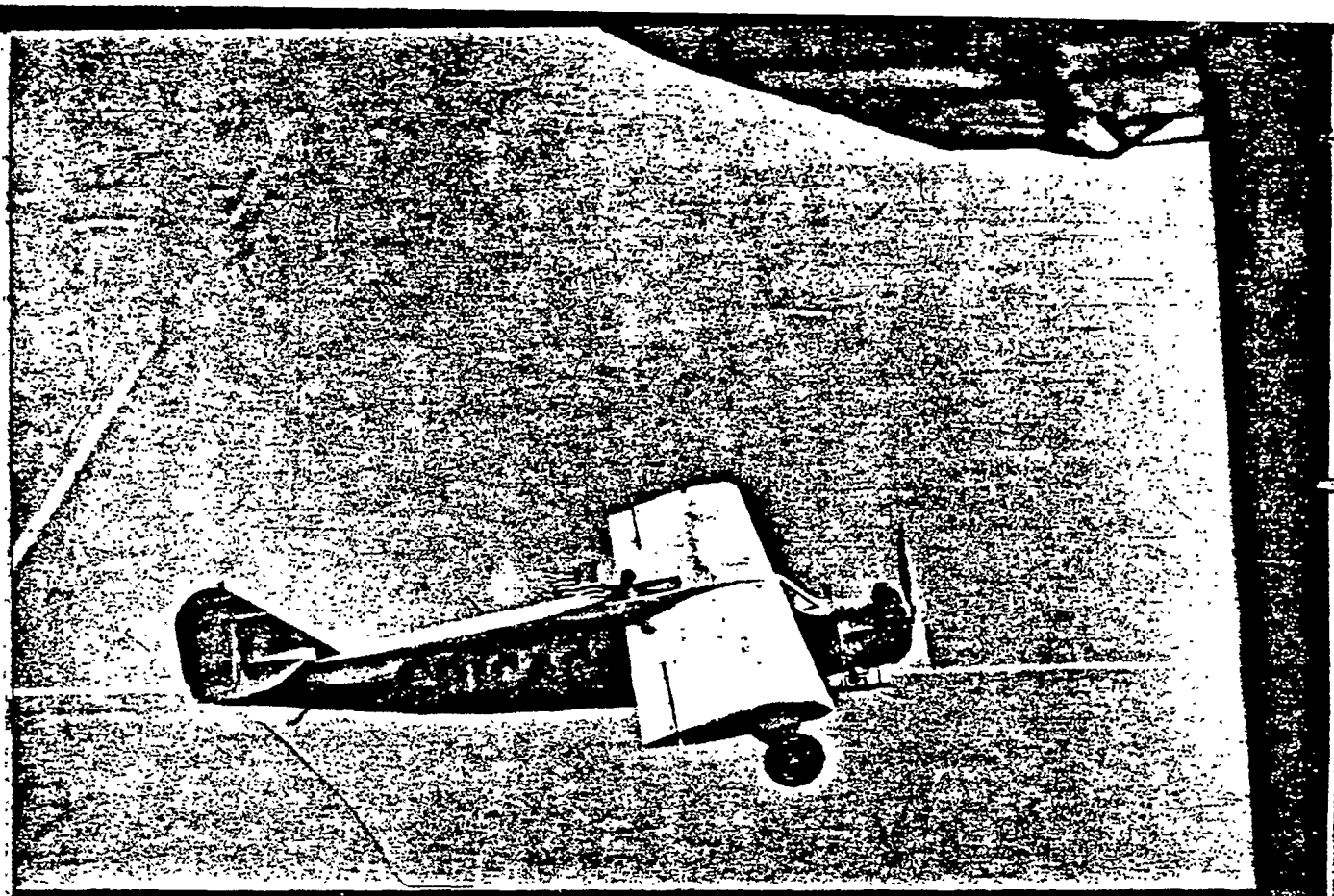
CLOSE CALL

I stared out the window at the wings. At such a speed the wings were in imminent danger of being sheared off. And if the wings went —

All at once we were out of it. Below us was the gray earth, bathed in a gentle rain. The altimeter read a

MANY DARING YOUNG PILOTS WENT ON THEIR LAST FLIGHT BEFORE AVIATION REACHED THE ADVANCED STATE WHERE IT IS TODAY

ETC 22923



John and Kenneth Hunter, Sparta, Ill., farmer boys, hoist Old Glory on their endurance plane *City of Chicago*, a second hand Stinson Detroiter which remained in the air for 553 hours 41 minutes. This record flight, lasting from June 11 to July 4, 1930, was made from Sky Harbor Airport, Glenview, Ill.

thousand feet when Jim leveled off. I smiled at him, feeling like a condemned man who has gained a last minute reprieve.

"That was a close one!" I offered. But Jim's face was still grim.

"Take a look out your window at that right wing," was all he said.

I obeyed and what I saw chilled my blood. Through a hole a yard wide in the wing I could see daylight. The speed of our dive and the abrupt leveling off had ripped off a big piece of fabric. We were going to have to land and the tiny fields below us looked no bigger than postage stamps.

A crash was ahead and we had about a minute to think it over. In that minute I thought of many things. I thought of Joe Marr's remark during the picture-taking and also what a lady had said to me just two evenings previous. "Oh, so you're a flyer," she'd exclaimed. "Well, I guess we won't be seeing you around much longer."

Jim gunned the engine and fought the controls all the way down to keep the plane level. The trees came closer, their bare branches reaching up toward us like grasping arms. At last they were brushing our landing gear.

PICK THE SOFTEST TREE

Jim steered the Travelaire's left wing into a tree to slacken our speed — the ship had a landing speed of 60 miles an hour, and coming in cross wind as we were, we would get the full force of this speed. With a sound like the cracking of many twigs the wing went off. I braced myself for the head-on crash that was to come. Then — darkness!

I was only out a minute or two, but when I snapped out of it there was a crowd of farmers around the broken plane — this despite the fact that we were almost a mile from the nearest house. The sound of our engine, roaring through the clouds, had been heard over a five-mile radius.

They pulled Jim and Rutland out of the wreckage and took them on a jolting auto journey over 32 miles of rough red dirt roads to the King's Daughters Hospital in Greenwood, Miss. Jim's jaw was fractured and his hip was broken in five places. Rutland's arm was broken in two places. I walked away from the crash with only two deep cuts, one in my arm and another in my leg.

The plane was a total wreck. Pictures were taken for a crash report to the Department of Commerce and then the remainder of the wreckage

ETC 22924

which couldn't be salvaged was set afire.

Just a year and a week later a plane carrying the great Knute Rockne ran into the same kind of trouble, the difference being that Rockne's plane lost a wing in its plunge, which resulted in the death of all on board.

Blind-flying in those days was in its early stages, and blind-flying instruments were rudimentary and rarely found in any but experimental planes. Without instruments a human being is practically helpless when he has no horizon to guide him, as man has no special senses for flight. Strap a man tightly in a whirling chair such as formerly was used for testing prospective flyers, spin him around a few times with a blindfold over his eyes, and he won't know whether he is upright, horizontal, or upside down until the blindfold is removed. Even the birds rarely fly on a foggy day, as they, too, depend mainly on their eyesight.

"HE WAS A NICE FELLOW"

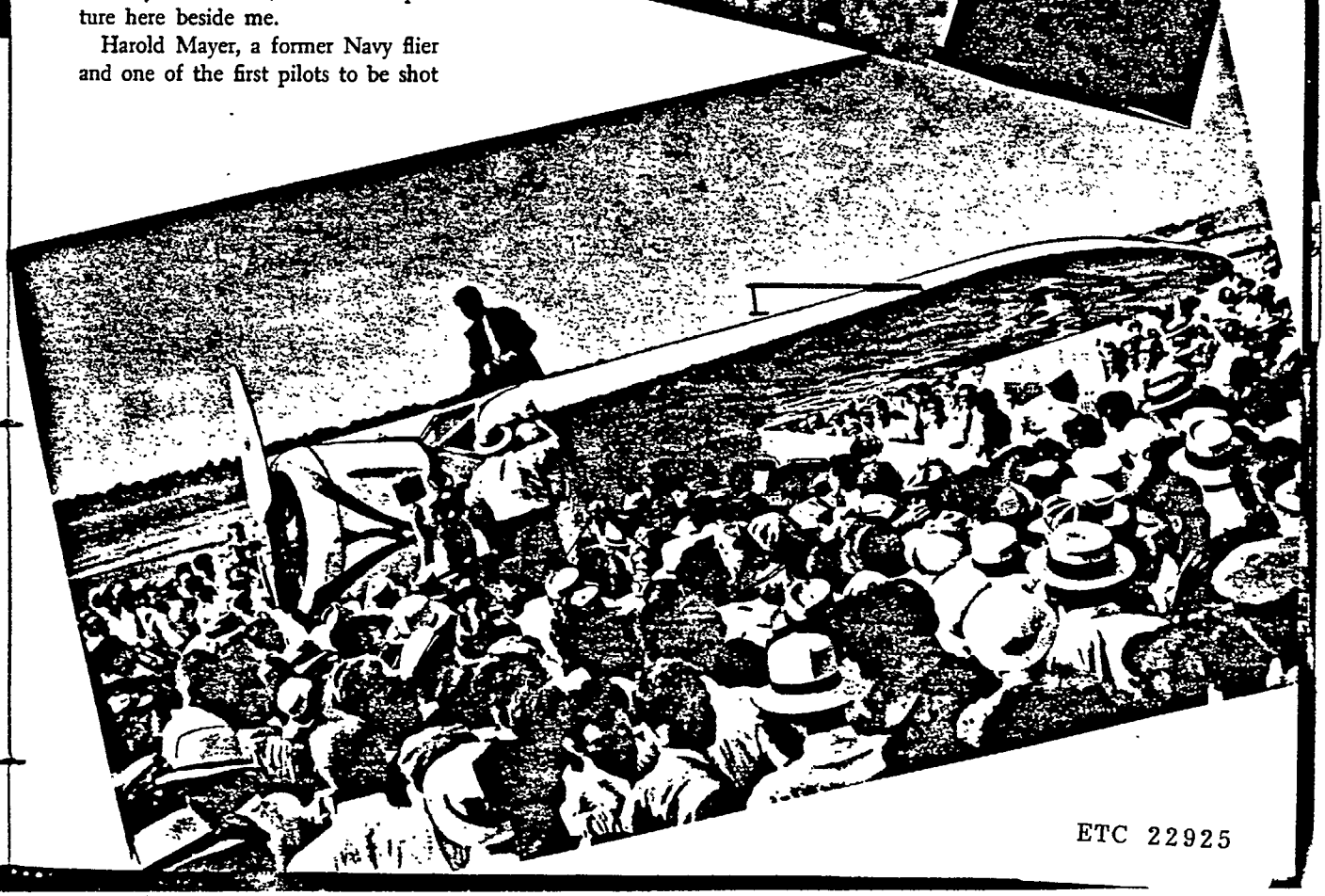
We had had a very lucky escape. But others in the Gulfport picture ran into various hazards and weren't so lucky. As I write, I have that picture here beside me.

Harold Mayer, a former Navy flier and one of the first pilots to be shot

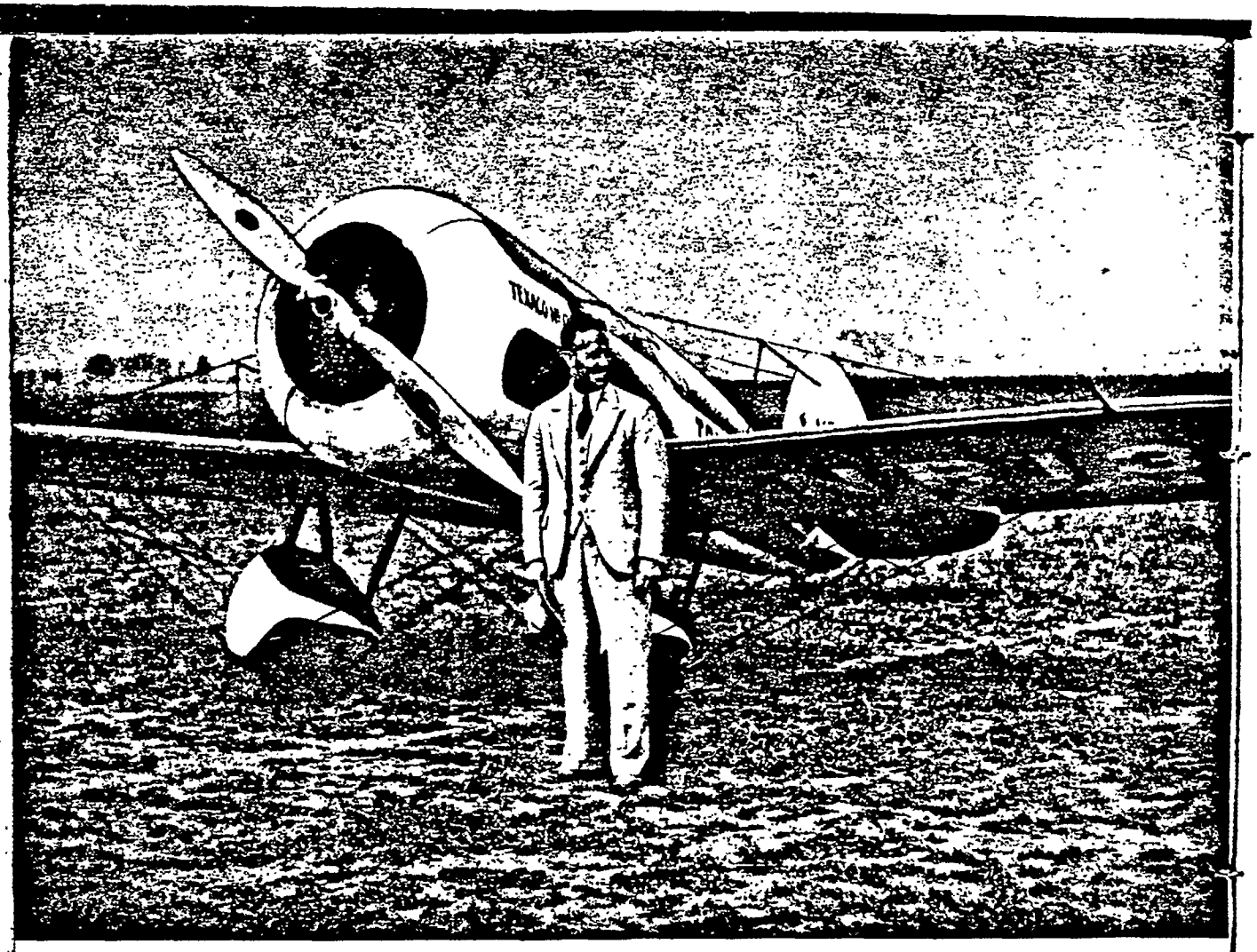
TOP — *Lieutenant Al Williams as he appeared back in* 1930, *when he was the Navy's outstanding test pilot and one of the world's foremost acrobatic flyers. His daring aerial research resulted in many improvements.*

BOTTOM — *Wiley Post climbs out of the cockpit of his famous* Winnie Mae *at the Cleveland Airport in the summer of* 1931. *He and Harold Gatty landed here to refuel before taking off for New York on the last leg of their record smashing eight-day flight around the world.*





ETC 22925



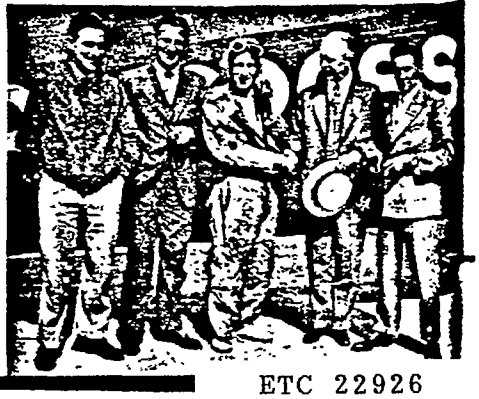
CAPTAIN FRANK HAWKS standing in front of the Travelaire mystery ship in which he set a coast-to-coast record of 12 and a half hours in the summer of 1930. Note the bracing wires and the non-retractable landing gear, both of which added greatly to wind resistance and cut down the potential speed of this early racer.

off a warship in a catapult, was killed while gliding into an emergency landing field in the dark. George Morgan, a born daredevil, perished when his tiny plane crashed on a take-off and burst into flame. The manager of our Gulfport base, Lieutenant "Mac" Moore, Navy pilot and son-in-law of Rear Admiral Moffet who was lost when the dirigible Akron plunged into the Atlantic, was drowned when a Navy plane dove into the Pacific off California. Joe DeCesaro, a close friend of mine, died in San Francisco Bay, when the big air transport of which he was co-pilot plummeted into the water.

None of these fellows I flew with were research men or famous aviators. Most of them were just young pilots flying in the line of duty — young fellows who got quite a kick out of shooting dice with the Grim Reaper. But their crashes and the crashes of others brought up the big question — why? — and when the whys had been determined or at least surmised, somebody generally tried to figure out a way to keep such an accident from happening again.

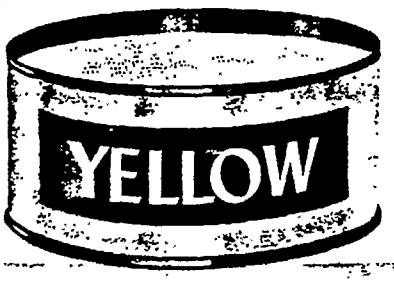
The pilots who are flying our fighters and bombers in this war have a much better chance of coming through alive because the pilots of an earlier day didn't shrink from giving their lives for something in which they believed. The men at the controls have brought aviation up the hard way.

BELOW — *Sir Charles Kingsford-Smith, California to Australia air trail blazer, and his crew land at the author's home airport in Glenview, Ill., in July 1930 on the last leg of an 85,000-mile globe girdling journey which began in June 1928. Left to right are Captain J. Patrick Saul, navigator; Evart Van Dyck, co-pilot; Major Kingsford-Smith, pilot; Earle Reynolds, president of the Chicago Air Race Committee, and J. W. Stannage, radio operator. In the background is the* "Southern Cross."



ETC 22926

VARIATIONS ON NUMBER 1.



AS ILLUSTRATED IN COLOR PHOTOGRAPH ON THE COVER

A P-40 FIGHTER "peels off" at 12,000 feet to attack a Japanese invasion fleet . . . a British Hurricane dives on a Dornier 217E above the Straits of Dover . . . a formation of tanks races to attack over shifting sands of Libya . . . trucks and "jeeps" swarm over Louisiana roads as the army goes on maneuvers . . . a Nazi "wolf pack" closes in on a straggling freighter in the Atlantic. . . .

Separate events, thousands of miles apart, but all part of a world-wide pattern — a pattern that means many things to many individuals and many companies engaged in America's gigantic war effort. To the Ethyl Corporation the sinking of a freighter in the Atlantic, stepped-up aerial activity in Russia or the Far East, or an accelerated training program may mean a quick shift to meet new demands for antiknock fluids. Such shifts call for the utmost flexibility in manufacturing operations.

To help us attain this flexibility we have asked our customers to cooperate with us in a necessary manufacturing change. In the past the Ethyl Corporation, as a service to customer companies, has supplied motor fluid in a variety of colors to enable them to obtain more easily the color standards desired in finished gasoline. It is necessary now for us to manufacture fluid for all motor gasoline in a single color — Yellow No. 1.

MANY COLORS POSSIBLE

The thought uppermost in our minds since the change was first contemplated has been to cause as little inconvenience as possible to our customers. There was never any question of refiners being unable to produce all the gasoline colors they have produced in the past. Heretofore refiners have ordered fluids in colors which were the same or which closely matched the hue desired in the finished gasoline, or which would permit blending in cases where refiners wished to market gasolines of more than one color. Additional dyes were added at the refiner's blending installation to produce the intensity of color desired.

In standardizing on a single color for motor fluid our problem was to select one as neutral as possible, yet one which would comply with the requirements of the U. S. Surgeon General's office. At the same time it had to be a color which would cause least complication when dyes of other colors were added to obtain former color standards. Laboratory experiments established that of all the hues in Ostmark's famed chromatic color scale Yellow No. 1 best served this purpose.

Using Yellow No. 1 as motor fluid color our laboratory has worked out more than two dozen hues, most of which are shown on the front cover of this issue of the Ethyl News. The colors are close enough to each other so that intermediates would be superfluous, yet far enough apart to be easily distinguishable. Each sample as made up contains a yellow dye concentration equivalent to 0.5 gram of yellow dye per 100 gallons of gasoline, or the amount of dyes that would be obtained by using a lead treatment of 1.5 cc. of tetraethyl lead per gallon of gasoline with Yellow No. 1 fluid. This is represented by Sample Y.

DYE TREATMENTS VARY

The amount of lead treatment, 1.5 cc., does not, of course, apply to all customer uses. This particular figure was selected because it represents approximately the national average of lead concentration in motor gasolines. Greater or lesser concentrations will require different dye treatments. Gen-

ETC 22927

erally speaking, it can be said that lesser concentrations of fluid containing Yellow No. 1 dye offer fewer problems in dye blending to obtain former color standards than do higher concentrations but in neither case is the problem insurmountable.

We have reproduced an outline drawing of the colored picture on the cover of this magazine. Keyed to the following table, it shows dye concentrations and color combinations used to make up the various samples. Any yellow dye noted in the table is an addition to that contained in the fluid. While the colors represented on the cover may not be perfect, they are reasonably accurate — as exact as the inexact arts of printing and engraving will permit.

The Ethyl Corporation supplies the industry with a large proportion of the dyes required for additions at blending plants in the field. There are, of course, other dyes used which we do not stock. However, our laboratory can be of assistance in solving color problems involving yellow No. 1 motor fluid regardless of the source and type of dye used.

ETHYL COLOR SERVICE

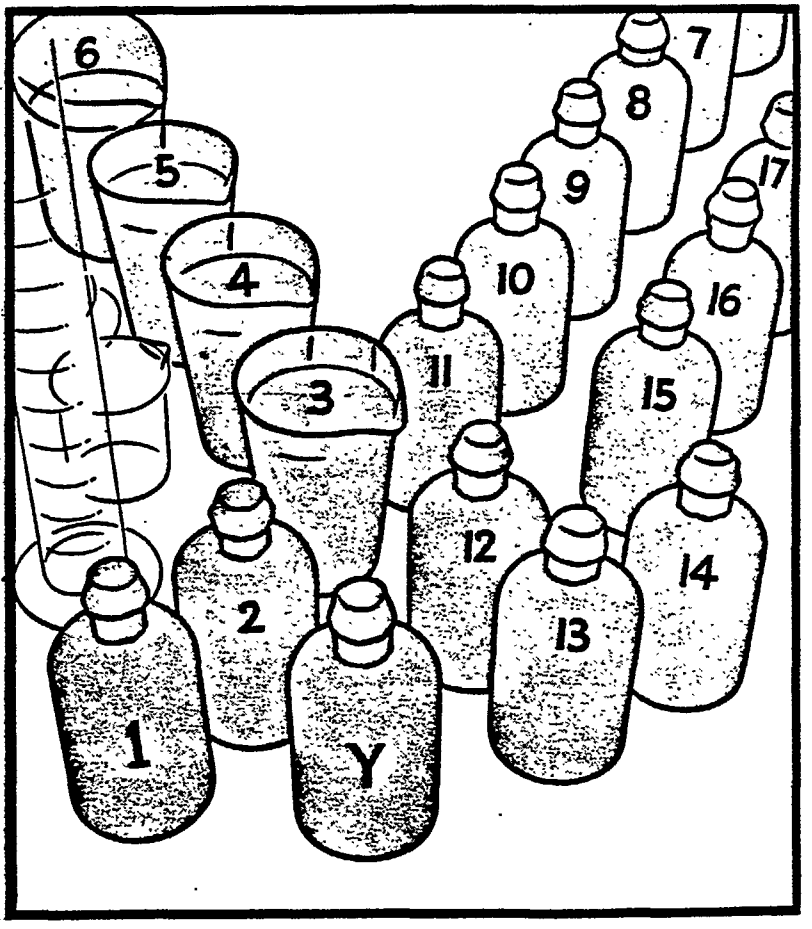
In 1933 our color laboratory began an exhaustive study of oil soluble dyes suitable for use in gasoline — a study concerned mainly with the solubility, tinctorial strength and light stability of these dyes as well as their adaptability to requirements of customers interested in marketing gasolines of a given color standard. As a result we were able to make recommendations to customers on dye colors and concentrations. We again wish to offer our services in assisting in the solution of color problems.

Our color laboratory at Penns Grove, New Jersey, will be glad to give assistance in determining proper dye concentration to obtain customer's color specifications with Yellow No. 1 fluid. To do this the laboratory needs a five gallon sample of the undyed base gasoline and a gallon of the finished gasoline dyed to the desired color specification. Other information needed: (1) color of fluid used; (2) cubic centimeters of lead per gallon; (3) quantity, color and source of all dry dye used in addition to what is in the fluid.

Refiners wishing this assistance should send requests, together with the above information, to Mr. Charles Wasserman, Box 1271, Wilmington, Delaware. Samples should be sent by express to Penn's Grove, N. J.

SAMPLE • ADDITIONAL DYE ADDED

- Y — No additional dye
- 1 — 2.0 grams Purple #4
- 2 — 1.5 grams Blue plus 0.34 gram Red
- 3 — 1.6 grams Copper plus 0.1 gram Red
- 4 — 0.53 gram Blue plus 0.77 gram Yellow N
- 5 — 1.5 grams Purple #4 plus 0.5 gram Blue
- 6 — 1.6 grams Blue plus 0.12 gram Red
- 7 — 1.1 grams Blue plus 0.4 gram Yellow N
- 8 — 0.25 gram Red O plus 0.8 gram Orange
- 9 — 1.6 grams Blue
- 10 — 2.0 grams Purple RX
- 11 — 1.0 gram Blue plus 1.5 grams Purple
- 12 — 0.8 gram Blue plus 0.4 gram Yellow N
- 13 — 2.0 grams Red O
- 14 — 1.5 grams Yellow
- 15 — 1.2 grams Blue
- 16 — 0.025 gram Red O plus 0.75 gram Orange
- 17 — 0.73 gram Blue plus 0.77 gram Yellow N





JUST WHO IS UNCLE SAM?

UNCLE SAM wants men!

Uncle Sam wants money!

Uncle Sam wants this, that and the other thing — those tires and cars you can't get, those dollars in the pay envelope that won't go into your own pocket, the young men from your block or your home who are told to forget the plans they've made and put on a uniform.

Ever ask yourself who "Uncle Sam" is?

He isn't the Army, the Supply Board, or the Tax Collector. He isn't the President or the Man in the Street. He is a lot of people, living and dead — and something that lives in them.

Uncle Sam is the fellow who thumbed his nose at the redcoats and dumped a boatload of tea into Boston Harbor. Uncle Sam is a bandy-legged youth named Ben Franklin who walked into Philadelphia with the dogs yapping after him, and stayed there to establish a reputation as scientist and statesman which sent him to the court of Louis XV as United States ambassador. He is the homely, unhappy boy from the woods of Illinois who wrote the Gettysburg Address, the puny lad from New York who grew up to be Colonel of the Rough Riders.

Who is Uncle Sam? He is the dreamer who first made a boat propel itself by steam, the farmer boy who put together the first reaper, the visionary who drove a pair of rails through Indian country into California. He is Ford and Kettering and the spirit of Walter Chrysler — men with strong hands and tough, clever brains, who have made Detroit a name to frighten little dictators.

Uncle Sam isn't any one man. He is a spirit, a will, a way of doing things that marks us Americans and our country. He is what makes us Americans, not just the descendants of those English, Irish, Polish, or Swedish wanderers who came here generations back. He is proud, two-fisted, full of enterprise. He is a distillation of all the divine purpose, the deviltry, the dollar worship or what have you, that moved our ancestors away from their homelands years ago and over the oceans to the unexplored New World. He is a compound of Irish cockiness and Dutch determination, of English fortitude and French ingenuity, of Balkan shrewdness and Nordic self-reliance. He has the German talent for mechanics, the African's and Italian's ear for melody, the Gallic urge to dream, to create.

Out of this has come a drive, a gusto, an energy which marks us as Americans — a wayward strength which makes us do the foolish things, the mighty and the beautiful things we have done as Americans.

Uncle Sam is simply the best of you and me, and the way we want to live. He is what we want this land to be — free, and tough and tempestuous . . . and tender. Yes, tender. He is the Red Cross, and relief ships, and free planes, guns, tanks he might have kept for himself last year but sent to hard-pressed friends around the world who needed them worse. When someone else is in trouble, he is the most open-handed sucker in the world. Lots of people, between wars, call him Uncle Sap.

They don't call him that now. He has his coat off and his sleeves rolled up — and a look in his eye that means business. He isn't the quaint old hill-billy with the chin whiskers and tight pants any more. He is hard-boiled Donald Nelson, wading through a mess of alphabet soup in Washington to get our war production rolling. He is Colin Kelly, diving out of the clouds in a burning plane for one more crack at the Japs. He is a line of young fellows waiting quietly outside the recruiting office with their jaws set — and a line of mothers, sisters, and older folks waiting at the Defense Stamp windows in their post offices. Waiting quietly, with their jaws set.

He is you and me, neighbor. You and me, and a hundred and thirty million more Americans who are willing to give up their new cars and luxuries and leisure time, willing to pay a staggering tax and higher ones yet to come — willing to spill some blood, sweat, and tears of their own to keep Uncle Sam's country a land where the free and the brave are still free to live by their own beliefs, to worship, to quarrel, to love and build as free men — so help us God!

●

By NORTHROP CLAREY, Jr.

(This editorial, by a member of the Ethyl News staff, first appeared in Liberty Magazine for March 21.)

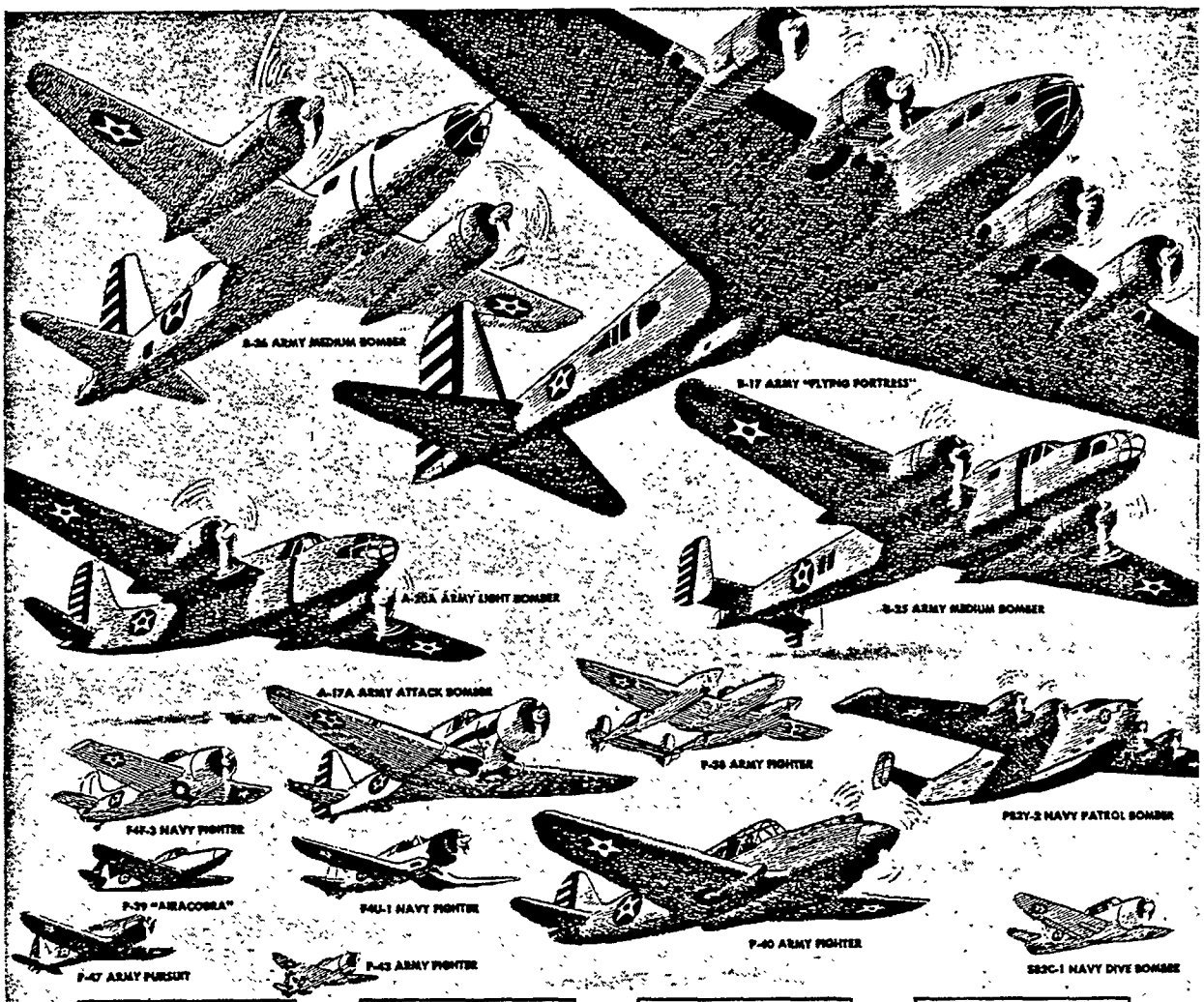
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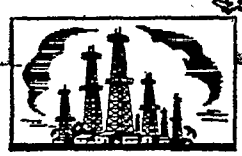
In ONE way all these American war planes are alike

★ All American fighting planes have one important feature in common: their engines are designed for high-octane gasoline. That's the basic reason why they have more power than similar enemy planes. And because they have more power, they will—plane for plane—outfly and outfight our enemies'.

We alone have *all three* things needed to produce high-octane gasoline—and plenty of it: *one*—vast resources of high quality crude oil; *two*—superior refining processes, developed by America's petroleum industry; *three*—adequate production of anti-knock fluid to improve octane ratings of military gasolines.

The makers of Ethyl brand of anti-knock fluid have geared their plants, laboratories and technical staffs to meet the oil industry's war needs. Until victory is won, our Army, Navy and Allies have first call on Ethyl fluid to make fighting fuels for planes, tanks, armored cars and other mechanized equipment.




AMERICA'S VAST RESOURCES OF HIGH QUALITY CRUDE OIL

plus


SUPERIOR REFINING PROCESSES DEVELOPED BY OUR PETROLEUM INDUSTRY

plus


ADEQUATE PRODUCTION OF ANTI-KNOCK FLUID (*containing tetraethyl lead*)

=


SUPERIOR FIGHTING FUELS

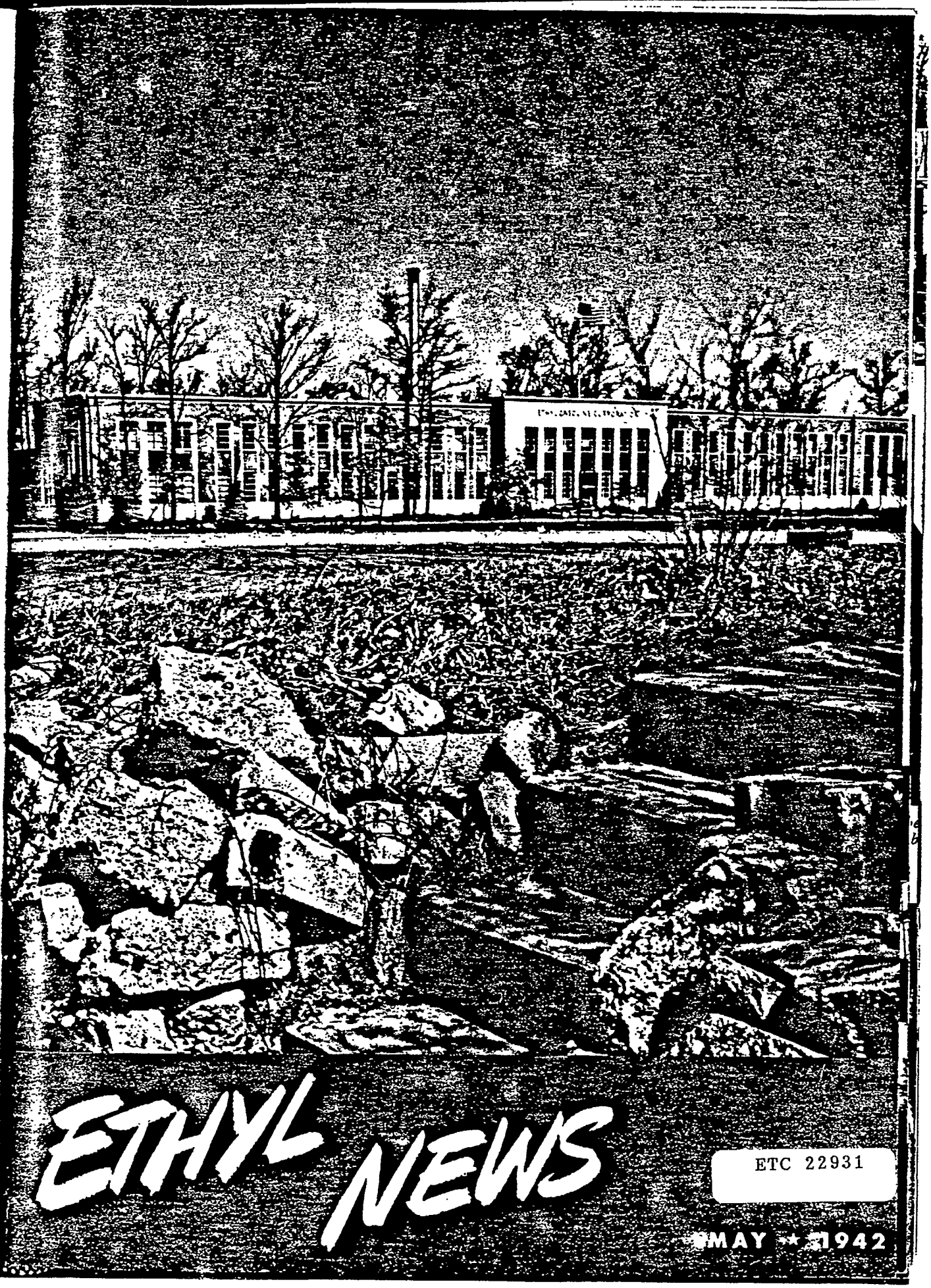
ETHYL BRAND OF ANTI-KNOCK FLUID

ETHYL

REG. TRADE MARK

MADE BY ETHYL GASOLINE CORPORATION

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ETHYL NEWS
ETC 22931
MAY 1942

OUR NAME . . .

New Name
New Trade Mark

On April 9, 1942, the Ethyl Gasoline Corporation dropped the word "gasoline" from its name and became Ethyl Corporation. This involved, of course, changes in the Ethyl "emblem" which has stood for nearly twenty years as the trade mark for Ethyl fluid and has been the pump identification of high quality gasoline treated with Ethyl brand of antiknock compounds.

Incidentally, Ethyl Corporation is the third name under which we have sold antiknock fluids to the oil industry. The first gallon of Ethyl gasoline was sold under the name of General Motors Chemical Company back in 1923. Then, in 1924, the name was changed to Ethyl Gasoline Corporation. After eighteen years another change — Ethyl Corporation.



In the

ETHYL NEWS

MAY * 1942



Ethyl Research has a new workshop in which to explore fuel and engine mysteries — see ***Better Tool Shed Opens, Page 3***



Oil the Japs sacrificed armies for — gone up in smoke! Read ***The Oil That Slipped Through Hirohito's Fingers, Page 10***



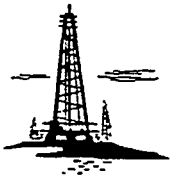
The Allies invented the plane, the tank, the sub . . . now they menace our lives. Read ***We Taught Them How to Fight, Page 14***



Here's a prediction: In five years the soya bean will replace the "pork-and" type. Turn to ***Soybean, War Baby, Page 18***



Kamchatka and the Aleutian Islands point to Japan like fingers — or daggers. Study ***Spring Geography Lesson, Page 23***



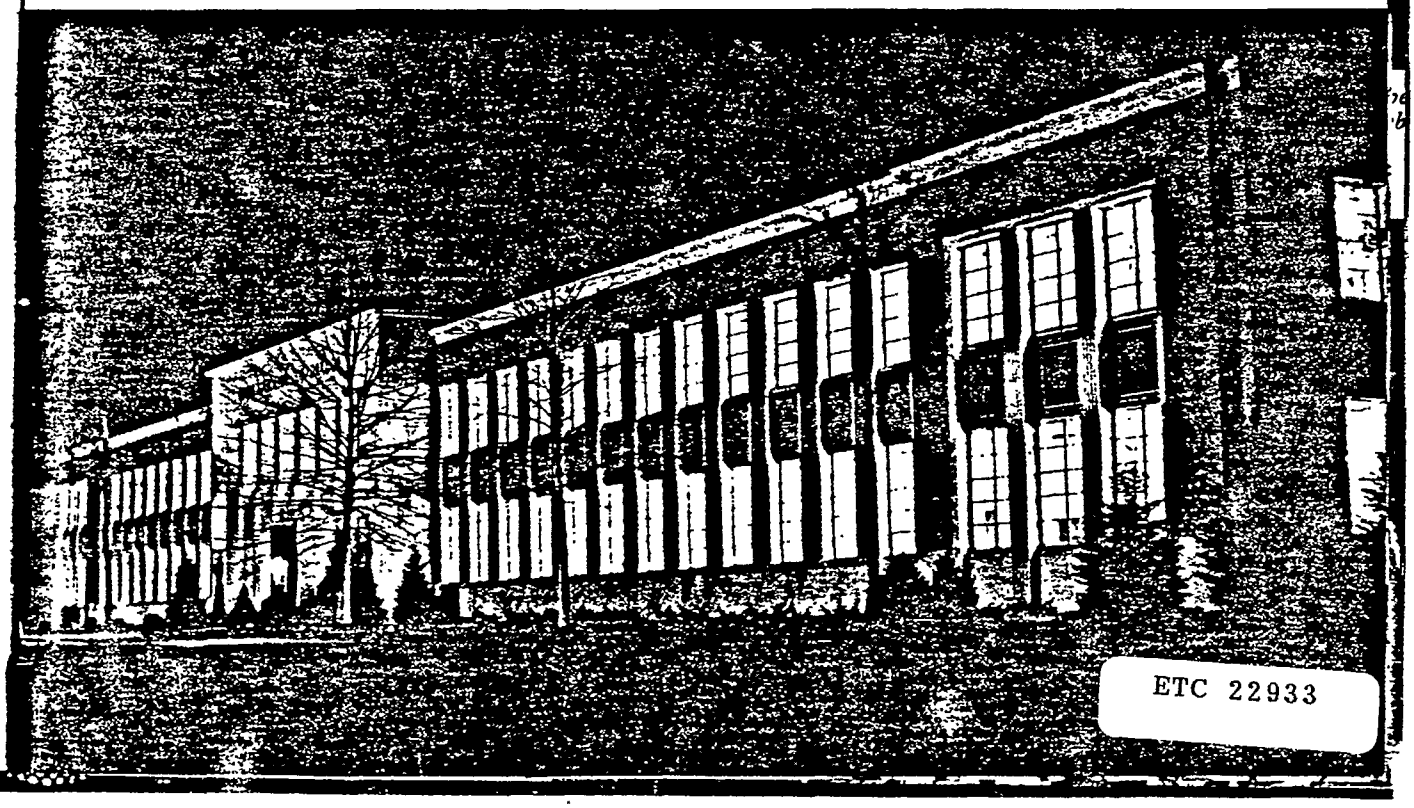
Figures (except in those bathing suit ads) can be pretty dull — but you'll enjoy the oil statistics in ***Shop Talk, Page 26***

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"BETTER TOOL SHED" OPENS

WHEN the half-dozen men charged with Ethyl research duties were housed in a converted garage in Yonkers, N. Y., some years ago, Charles Kettering, god-father of the antiknock idea, said: "Research is a state of mind." It is a good remark to recall when you visit the new Ethyl Laboratories on Eight Mile Road in Detroit. For the excellence of planning, the clean, efficient design of the test rooms and equipment might lead you to think that this thoroughly organized plant might run itself.

A well-intentioned friend who visited the San Bernardino laboratory when it was first opened said: "This is a monument to Ethyl's faith in the future progress of engines and fuels." That sounded well to some of us in the corporation, but later Earl Bartholomew declared: "It is no such thing. It is an efficient shed for the tools and the labors that are needed for the development of fuels and engines on the road, situated in a section of the country that affords year-round work and unusual variations of elevation, climate, and road



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condition for such work. It was designed as such and will be used as such."

Research is a state of mind that tolerates no make-believe.

Seven Ethyl Fluids

The new buildings at Eight Mile Road, Detroit, and the apparatus installed in them have been designed and constructed because the demands and opportunities for Ethyl research called for better tools than were available before and because the rewards for successful completion of only a reasonable part of projected research work promise to justify the cost of building the more efficient workshop required.

Ethyl was born of research and has lived close to the test tube and the experimental engine all of its short but eventful life. Seven times since 1928, as engine designs and base fuels have developed and operating conditions of automotive equipment have changed, research has produced new mixtures to meet current conditions. Eight different mixtures, not counting aviation fluids, have been sold under the trademark of Ethyl Brand of Antiknock Compound. Another variation of fluid mixture now in the development stage shows great promise for the near future.

One of the strangest facts is that the result of the original research project — tetraethyl lead — is still being used. It is still the best knock inhibitor known, in spite of years of exhaustive search for something better by Ethyl and by many other laboratories.

But of peace-time research problems, more later — the new laboratories opened just in time to enlist. Nearing completion when the United States entered the war, the 26-acre plant designed for research in civilian transportation was offered immediately to the government for solution of the problems of military fuels and engines.



All of the Ethyl Corporation's personnel and facilities in Detroit are now in the new laboratories, with the five units of the plant devoted to the Engineering, Chemical, Aeronautical, Gasoline Testing, and Technical Service Departments.

Service facilities include an auditorium and library; machine, carpenter, and electrical shops; forge and paint rooms; blue print, photostat, and photographic sections.

Research Engines

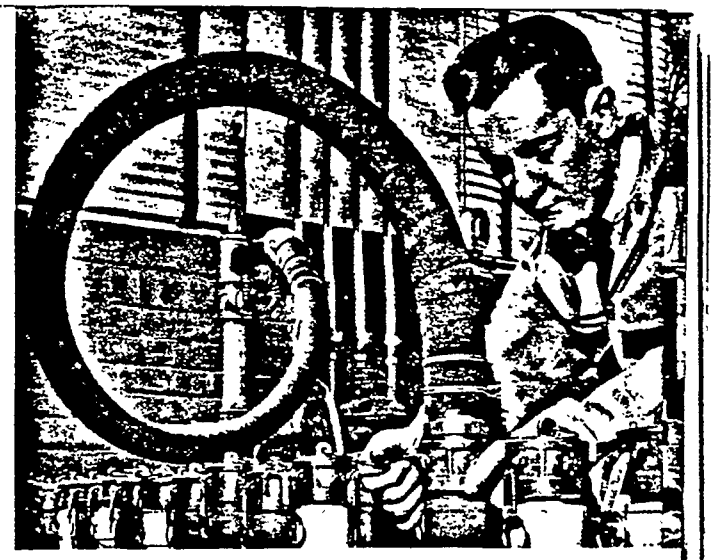
Single-cylinder engine research can be conducted on 29 motors, most of which are used for studies on deposits, wear of parts, or other projects requiring long operation. Two standard CFR engines are located in individual rooms for studies requiring isolation. Knock ratings on experimental fuels are made on engines in another room. Two of these engines side by side allow simultaneous use of the Motor Method and the Research Method, thus eliminating the need to change operating conditions to make ratings by the two test means. In two other rooms, CFR engines are mounted so that they may be connected either to inductor motors or to direct current dynamometers. This arrangement allows them to be run at either variable or constant speed, as needed for special studies of pre-ignition, combustion chamber design, ignition-timing, flame-propagation, research fuels, and antiknock compounds.

The Dynamometer Section has 16 dynamometers with power absorption capacities ranging from 75 to 700 horsepower as well as two chassis dynamometers in temperature-controlled rooms. Control panels of all these engines were designed

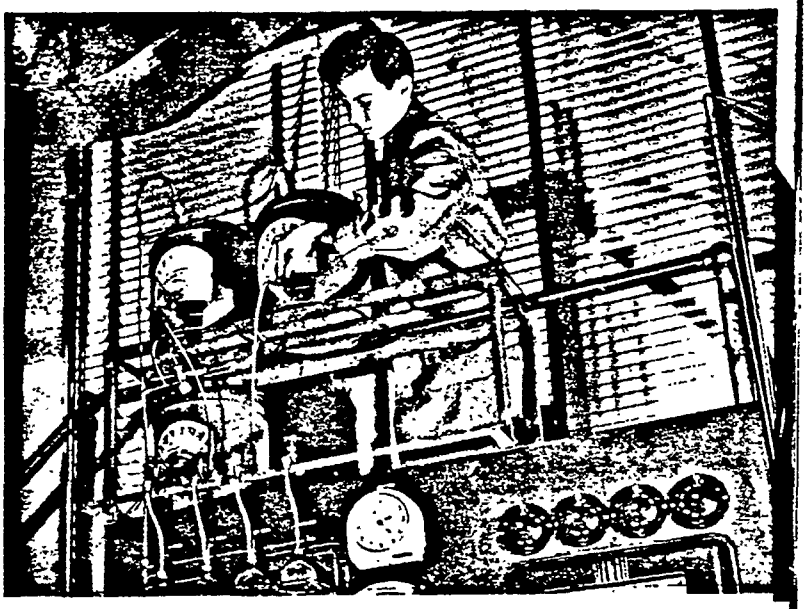
and assembled in the laboratory shops, and incorporate improved provisions for the precise manual and automatic control of the variables of engine operation. With all instruments before him on the panel, the operator no longer has to keep his eye on several parts of the room. Through the cooperation of engineers of the Toledo Scale Company, even the dial scale has been placed behind the control panel, instead of on the dynamometer itself. Also on the board are manometers for measuring pressures and vacuums at eight points, and potentiometers indicating both high and low temperatures at any one of ten places on the engine. In the panels are indicators for crankcase oil and jacket water temperatures, with controls operated either manually or automatically. There is also equipment for testing the resistance and minimum primary firing current of spark plugs, as well as indicators for oil pressure, fuel, and air consumption and air fuel ratio. Control of throttle opening and ignition timing is accomplished through hydraulic mechanism operated from the panel board.

Speed-Load Unit

To adapt dynamometer test conditions to variations of speed and load encountered in normal road operation, four portable "SALUK" units have been designed. These "speed load unit controls" may be connected to any dynamometer so that the speed and load of the engine will be varied throughout the duration of a test to reproduce the exact conditions recorded in operating a truck over any given section of the test road selected. The record of actual road conditions experienced is recorded on a tape by holes

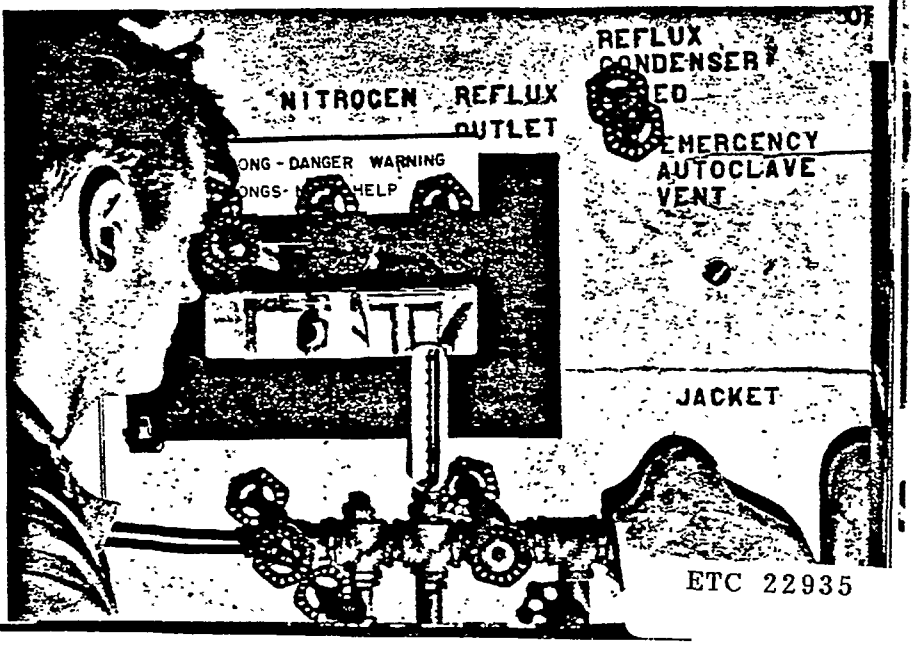


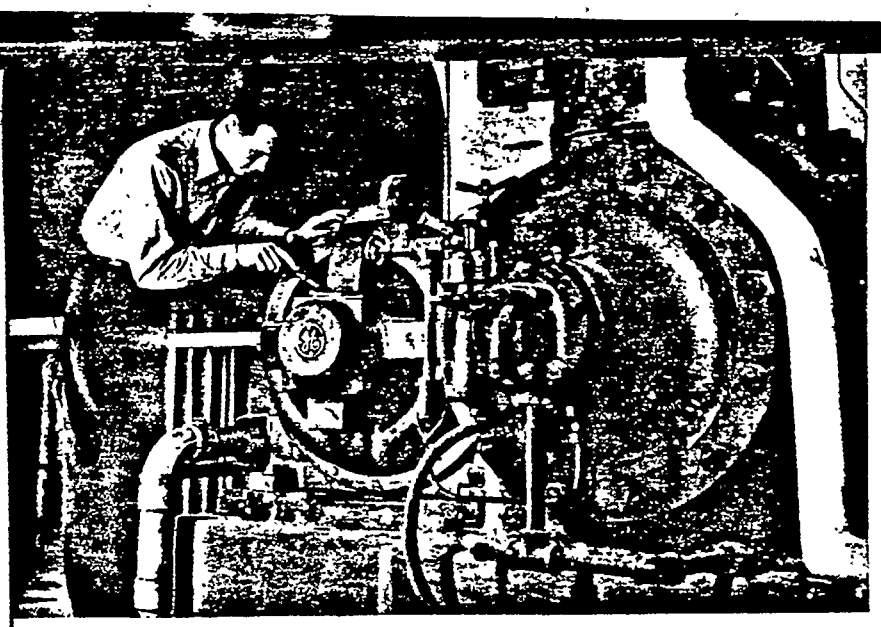
Fuels for tests may be drawn from any of 34 tanks



Catalytic gasoline desulfurization control panel

Controls of scale model tetraethyl lead autoclave



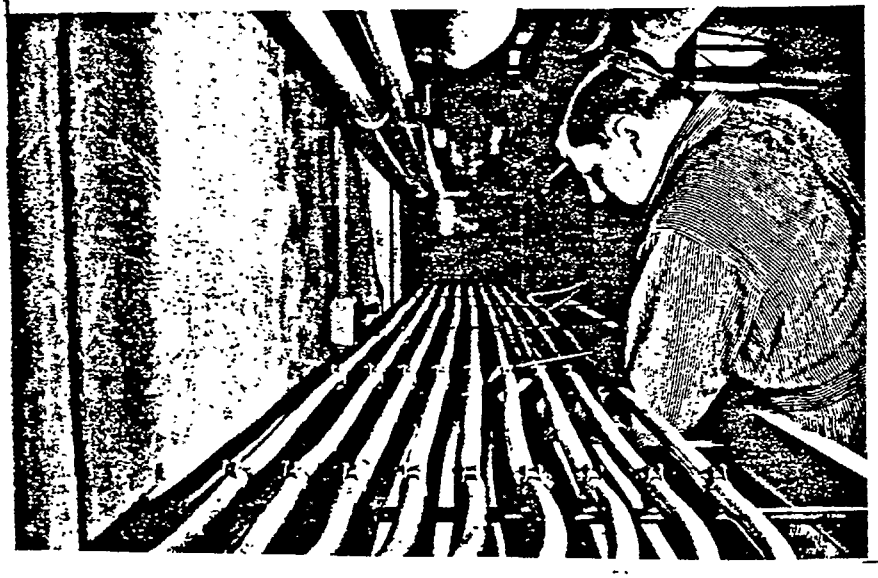


An Ethyl technician inspects the ice machine which refrigerates the chassis dynamometer cold room



Available to oil, automotive, and military engineers are millions of dollars' worth of "Ethyl Research"

Fuel lines from the "world's largest filling station" beneath the laboratory serve the engines above



and in the "SALUK" unit this tape causes variations in engine speed and load, just as the paper rolls of a modern player piano vary the tempo and modulation of the recorded music.

Between each pair of dynamometer rooms is an acoustically treated calculating room.

Heat, Sound Barred

Also in insulated rooms are two chassis dynamometers used for knock-tests of fuels and measurement of vehicle economy and performance. In one room, temperatures can be provided from minus 50 degrees Fahrenheit (for cold starting research) to plus 150 degrees for studies of vapor lock, cooling, etc. The refrigeration capacity of this room is equivalent to that required to produce 100 tons of ice a day. The capacity of this chassis dynamometer is 400 horsepower. The other chassis dynamometer, of 225 horsepower capacity, is used for conventional work.

Control equipment in these rooms automatically reproduces at the rolls the load and speed which would result from similar operation of the accelerator pedal on the road. Blowing equipment is governed by the speed of the rolls so that air velocity always equals rear wheel speed.

In the basement under the chassis dynamometer rooms are the rolls and dynamometers, the refrigerating equipment, the motor generator sets with which all electric dynamometers are operated on the Ward-Leonard principle, and the Cutler-Hammer Unitrol equipment used for starting the alternating current motors for these motor generator sets. Because of the heat generated in this room by the

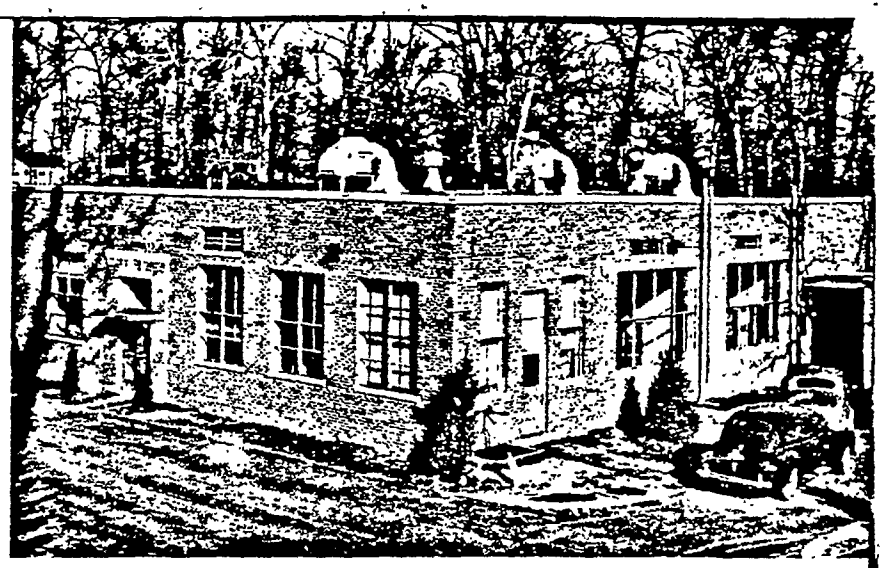
motor generator sets, transformers and other electrical and ventilation equipment are installed to provide automatically controlled heating to maintain the temperature within safe limits.

Throughout the laboratories, the main ventilation system provides automatically controlled heating and ventilation to all rooms used for engine testing, the handling of chemicals and similar work. Air heated by engines on the test stands is picked up by fans mounted above the engines on universal standards and projected toward grills in the ceiling above the dynamometers. In winter, when the temperature at the grill reaches 110° F, dampers open and blowers above the dampers start automatically to exhaust the heated air. In summer, a lower temperature setting is used for this automatic exhaust. Fresh air is brought in from the outside by blowers and heaters, which proportion fresh and re-circulated air according to the size of the room and the temperature present.

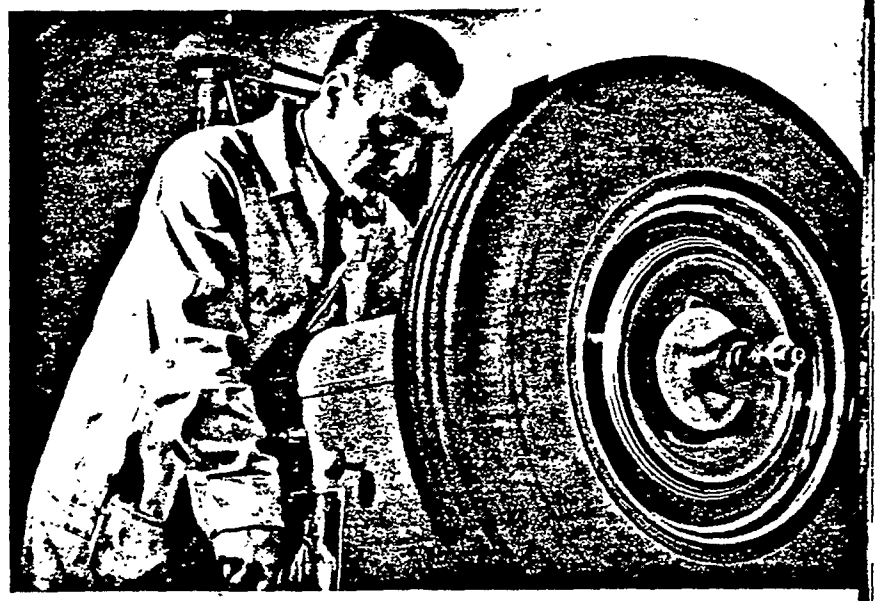
Road Testing Too

The main volume of road test work done by the engineering laboratories is based at San Bernardino, Cal., but a substantial amount of road testing is based in Detroit, partly because of the many tests that are conducted in cooperation with automotive and oil companies nearby. Most of the west wing of the main buildings at Eight Mile Road is used by the Road Test Section. Complete equipment for servicing, weighing, adjusting, and repairing test vehicles is installed in this garage.

Several unusual features, not needed in ordinary garage and maintenance buildings, facilitate the spe-



The emphasis in Ethyl aeronautical research, now in this new building, has shifted to military work



A wheel assembly is checked for balance in the garage of the Road Test Section at the new lab

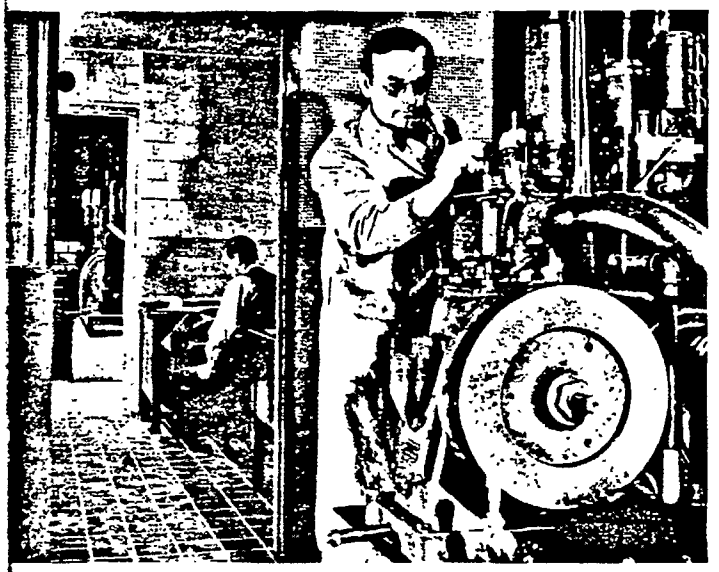
Through this "switchboard" any dynamometer can be "plugged in" on any one of several fuels

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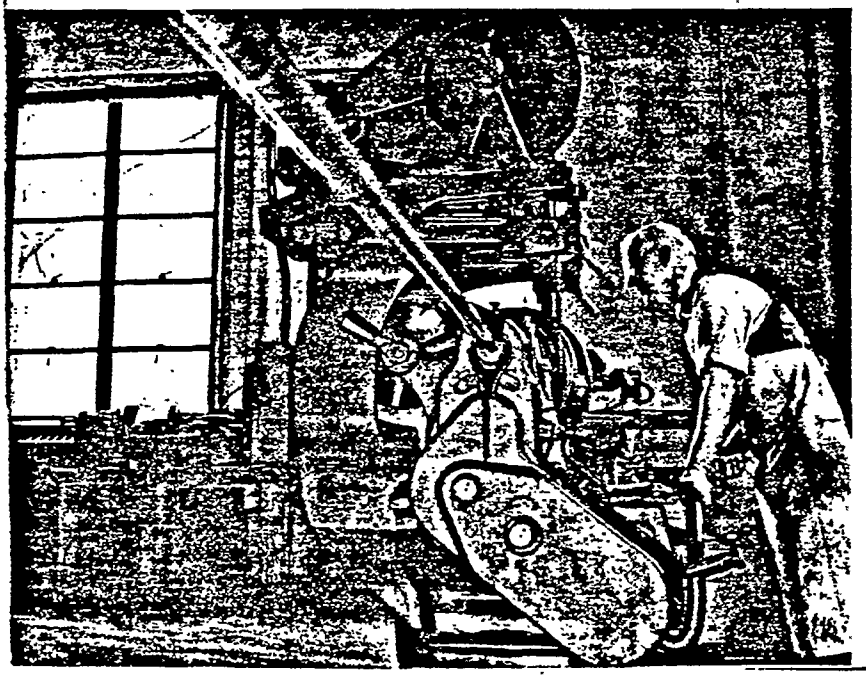


Road-testing new developments requires a fleet of cars



Single-cylinder test engines are busy in the Fuel Research and Rating Section

A well-equipped machine shop turns out special parts or assemblies on order



cial functions of road test work. Among these are rear-wheel motoring rolls, which provide automatically controlled speeds of 2.5 and 5 miles per hour for measurements of compression pressure, and either forward or reverse speed of one mile per hour for ignition timing. Remote controls make it possible for one man to operate the motoring rolls and to make engine adjustments and observations simultaneously.

Test vehicles may draw gasoline from any one of eight service station pumps, each of which furnishes a different fuel. A ventilated hood near the pump island is used to blend small quantities of special fuels.

The platform scale sunk in the floor is long enough to accommodate large trucks and has sufficient capacity to weigh a tank. Exhaust gases from cars which must be run in the garage are removed, without connection, by suction from a high-vacuum exhauster.

Fuel Facilities

Since large quantities of many types of fuel are needed by the engine laboratories and road test sections, a separate building houses unique equipment for blending and distributing fuels. Thirty-four underground tanks ranging in capacity from 500 to 10,000 gallons store the gasoline, the total storage capacity being 75,000 gallons. The fuel sheds can hold 260 drums as well as several thousand one and five gallon cans.

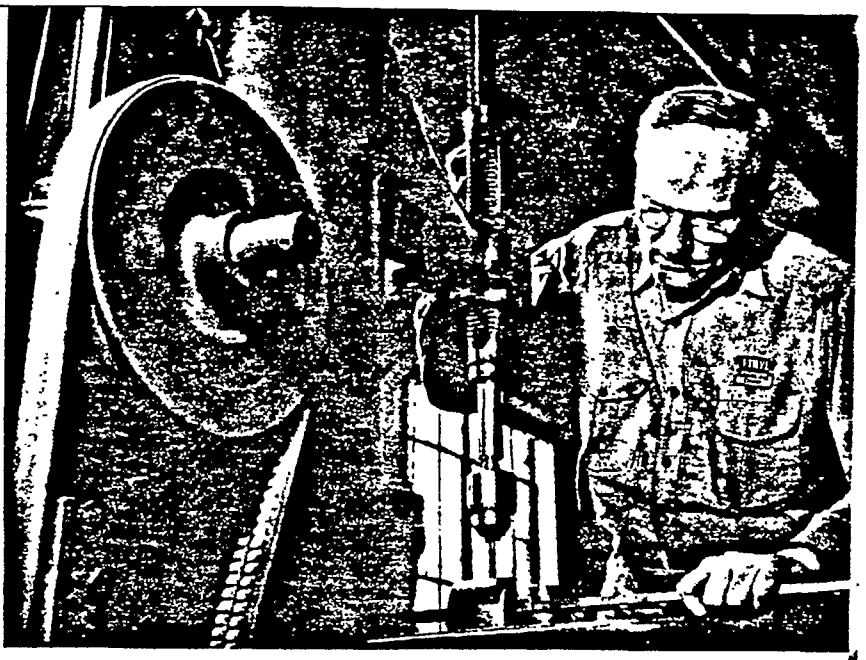
From each of the buried tanks two lines lead to the fuel building. Antiknock fluids may be blended with gasoline in any underground tank and the fuel may be trans-

ferred from any tank to any other tank. Thirty-five small fuel pumps connected to suction lines from the underground storage tanks automatically maintain constant level in small five gallon tanks in the top of the fuel building. Fuel from any two of these small tanks may be piped directly to any dynamometer in the laboratory through an arrangement of flexible hose connections in the fuel building similar to a telephone switchboard. When extreme accuracy is required, batches of fuel (of 100 gallons or less) can be blended by weight instead of by volume.

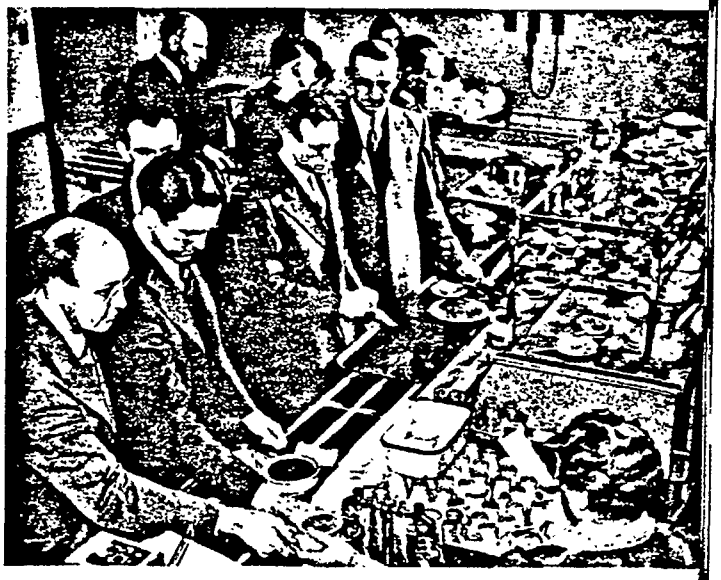
Just in Case —

Throughout the fuel building safety precautions have been taken. All electrical connections — lights, motors, telephones, switches, ventilators — are explosion proof. The ventilating fan at the roof operates constantly, discharging air sucked in through louvers at floor level. One of the buried tanks is sufficiently deep to permit the draining of the entire fuel distribution system.

The new laboratories represent the second move since the establishment of research facilities in the early days of the corporation. Originally located in Yonkers, N.Y., the laboratories were moved later to Milwaukee Avenue in Detroit. The quarters there became inadequate as the problems of automotive, fuel, and antiknock development grew in number and complexity. Fortunately, the construction of the new laboratories, incorporating the advantages of 15 years of experience, was started early enough to permit completion at this time when the national war effort needs the very facilities which they offer.

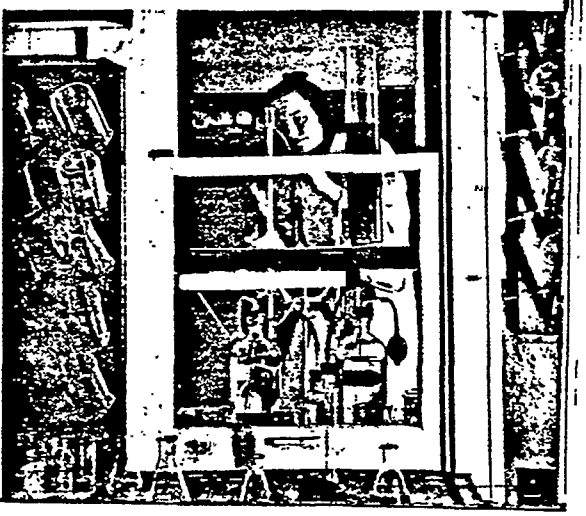


Precision work calls for the patience and craftsmanship of veteran machinists



The cafeteria is a popular spot at lunch hour

The lead analysis laboratory is handy and well equippe



ETC 22939



THE Oil THAT SLIPPED THROUGH Hirohito's Fingers

Balik-Papan burns in a mighty funeral pyre of Japanese hopes for oil

TANTALUS, Lydian king of mythology, was plunged up to his chin into a river in Hades. A tree hung with clusters of luscious fruits was just out of reach overhead, and as he would incline his head to drink from the river, the waters receded from him. Thus, he suffered the agonies of thirst and hunger and unfulfilled anticipation.

Tantalus, the ancient Son of Zeus, and Hirohito, the modern Son of Heaven, have much in common. For what denial of food and drink did to Tantalus, the more prosaic "scorched earth" war policy of the United Nations is doing to Japan today. The lustful Japanese thrust through the Netherlands East Indies and into Burma so far has won Hirohito's savage legions none of the most important commodity they came so far for and paid so dearly to get.

The rich oil fields have been put to the torch. They will not flow again for a long, long time. The welling holes have been plugged with solid concrete, the refineries blown to bits, and pipelines, machine shops, storage tanks sledge-hammered or dynamited into uselessness.

Palembang, in Sumatra, was Nippon's last chance of getting oil in any important quantities from the Dutch East Indies' lush fields, and Palembang is now gone up in billowing smoke and flaming debris. Yenangyaung in Burma only recently followed Palembang; before that, Borneo's Tarakan, Samarinda and Balikpapan.

The tragic story of the destruction of the Palembang works by the men who labored for years to build them, is one of careful planning, dramatic execution, and high courage in the face of enormous odds. As told in Batavia by a refugee employe of a Palembang oil com-

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pany, the $540,000,000 demolition job required months of painstaking preparation.

An oil installation is no easy thing to blow up. Wells may be scattered over a tremendous area. Machinery can not be disposed of by a single explosive charge. Each unit of the complicated chain of condensing and distilling apparatus would need almost individual attention to be destroyed thoroughly.

So it was at Palembang. The method by which the oil installations around Palembang could be so quickly and utterly destroyed involved the placing of incendiary bombs as long ago as a year and a half. At 22 different places among the oil tanks, such bombs had been planted, equipped with two main and one emergency detonators.

The Batavia narrator relates that on February 14th, Palembang had its sixth actual bombing. In this raid as in all previous ones, the Japanese carefully avoided dropping their bombs on the oil installations, and so work had continued normally. During this sixth attack, however, it was noticed that the Japanese were dropping parachutists, who came down in three groups, the first in the marshes behind the oil refinery, the second on the Palembang airport, and the third in the suburbs. Immediately the fight against the parachute troops began, and it continued until most of the Japanese had been killed.

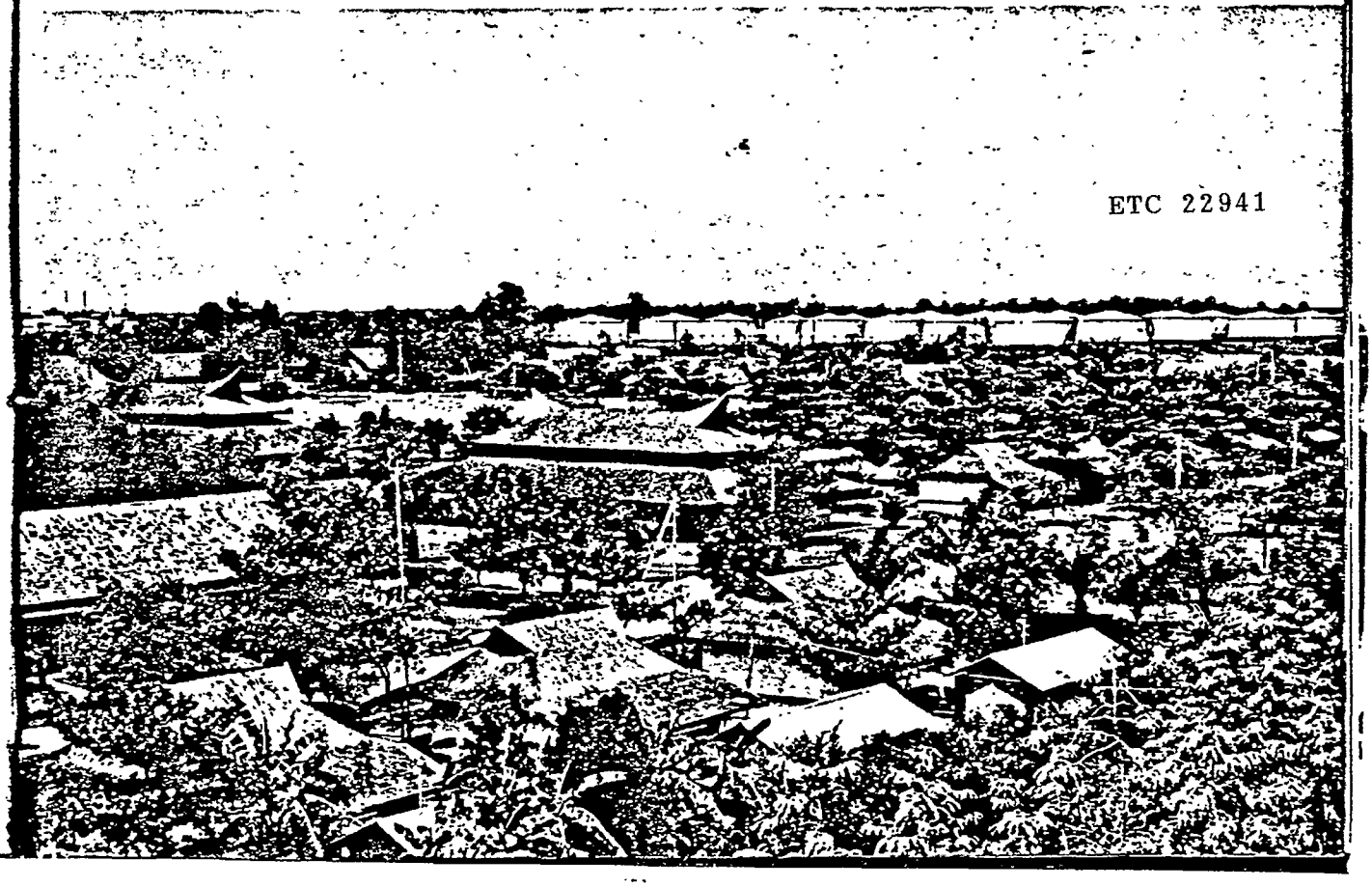
That night the order was given to destroy the oil installations and all equipment, since Japanese transports had arrived in the estuary of the Musi river, which leads to Palembang proper. Promptly and effectively, the scorched earth orders were carried out, although these operations often were the target of heavy machine gun fire from the invaders.

One demolition squad with sledge-hammers smashed every-



Hirobito, Son of Heaven

Storage tanks and a peaceful village at Palembang were scorched earth when the Japs arrived



thing that could thus be destroyed, while another emptied boilers and kindled fires under them. A third group set the turbines running and then threw sand into them.

Roaring Flames

Oil was allowed to flow from the tanks and incendiary bombs were then set off. One of the main electrical detonation points was near the refinery and could not be reached because of the fierce enemy shelling. The other main detonation point had been put out of order by several days of heavy rainfall. However, the emergency system worked, justifying the thoroughness of the preparations. This was set off, and immediately enormous flames leaped high into the air with a roar. The fire became so fierce that the Dutch even on the far side of the Musi river, half a mile wide at this point, were barely able to endure the intense heat.

Tanks and Diesel engines blew to pieces or melted into shapeless masses in the fire. The beautiful Palembang region became one of great ruin. Everything was destroyed as far as the Dutch knew, including the 90-mile pipeline to the oil field at Pendopo. But to make sure, troops fired mortar shells into the various oil properties. The size of the fire was beyond comprehension, and the charges of exploding dynamite could be heard many miles away.

Nearly a billion guilders (about $540,000,000) in work shops, installations, rubber works, warehouses, business offices, social halls, radio and telephone stations, printing works and private residences were thus destroyed.

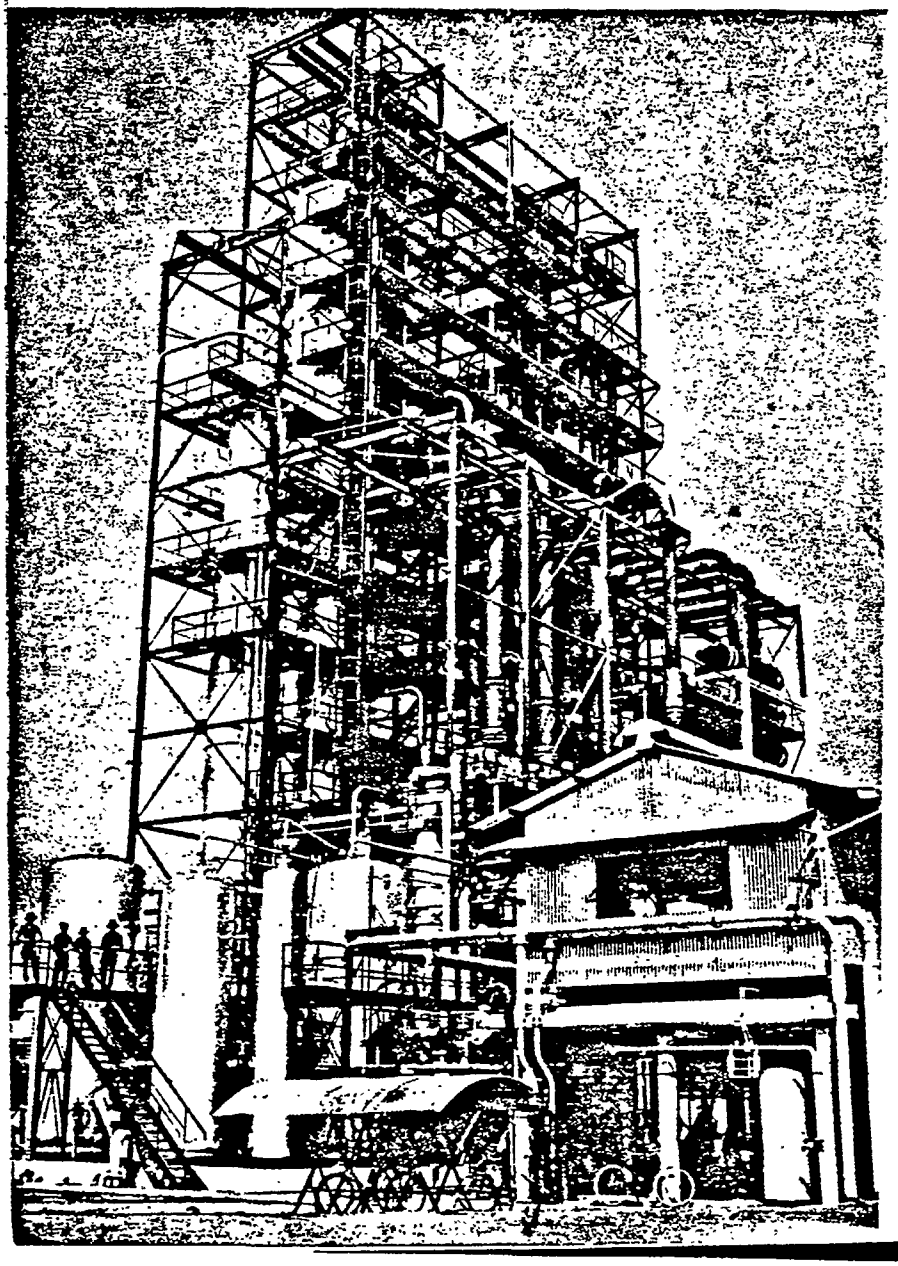
Magnificent Loss

The destruction of the Palembang oil fields was the largest voluntary property sacrifice in the history of the world, with the possible exception of the demolition of the great Dnieperstroy Dam by the Russians.

The Netherlands East Indies' major oil fields are in Sumatra, where production had been growing for the past 15 years until stopped by the war and loss of markets. In 1940 it totaled about 40,685,000 barrels, which was equivalent to 65% of all Dutch East Indies oil. In addition, more than 50% of all refining capacity was located in Sumatra, near Palembang, the three refineries there being rated at close to 120,000 barrels daily. Two of these refining plants were owned by Royal Dutch-Shell interests, and the third by a subsidiary of Standard-Vacuum Oil Company.

Had the Japanese been able to get the Indies' oil installations intact, the Axis powers would have scored their first major acquisition of sorely needed petroleum supplies since extension of the war to the Pacific. It would have assured them of considerable oil resources

Modern refinery equipment at Palembang was melted into scrap



for a war of indefinite duration. Now, however, their mere possession of the fields, which extend from northwestern Sumatra to New Guinea, does not necessarily assure them use of the oil. So thorough has been the destruction, that petroleum authorities estimate it would require up to two years of intensive development to return the fields to normal production.

An authorized Dutch spokesman recently declared in London that the Japanese will get little or no oil from the conquered fields for a long time to come. He pointed out that practically all the machinery for oil production is complicated and massive. The Dutch had to import it from the mother country, Great Britain, and the United States, and it took years to obtain it and put it into operation. Even if such new equipment were made immediately available, it is doubtful whether the Japanese could transport and erect it without the Allies being in a position to stop the process somewhere along the line, either on the seas or in bombing the installation work on the site.

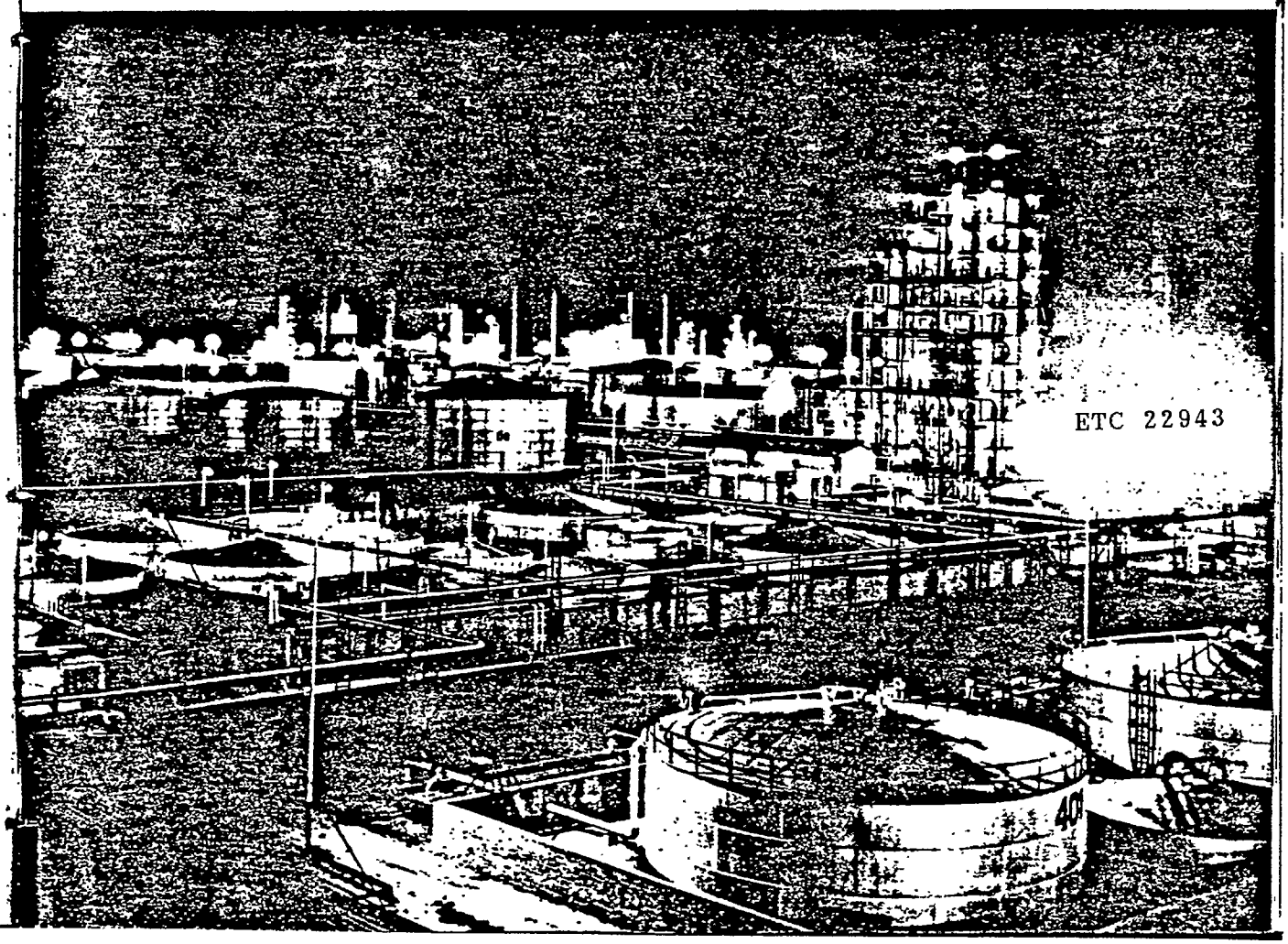
Hirohito Checkmated

Drilling oil wells takes a long time, and the same applies to construction of pipelines. Japan has not had enough experience in oil production to hope to send a sufficient number of trained technicians into the occupied islands. But even if she could get the personnel, and even if she obtained the help of the German technicians, it is doubtful whether she would get a chance to restore the devastated wells as long as an Allied air force operates in the south Pacific.

Pictures . . .

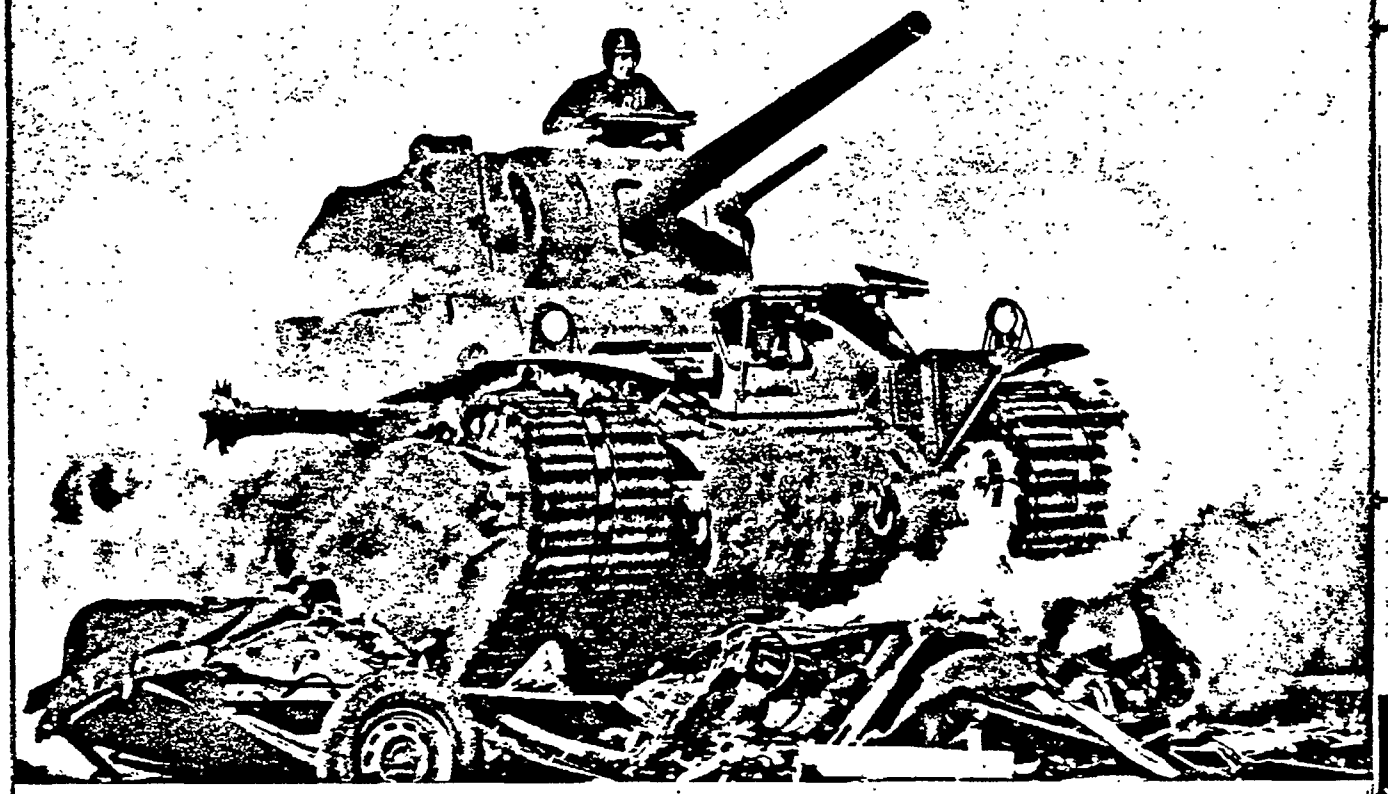
PHOTOGRAPHS in this issue of the ETHYL NEWS are from the following sources: Interphoto — page 10; Keystone — page 11; Netherlands Information Bureau — pages 11, 12, 13; OEM Defense Photos — pages 14, 17; Aero Digest — pages 15, 17; N.Y. Public Library — page 17; Nabisco Magazine — pages 19, 22; Decatur (Ill.) Herald & Review — pages 19, 20, 22; Ford Motor Company — pages 21, 22; Black Star — pages 24, 25.

The refinery that committed suicide — now a ruin of charred and twisted junk



We Taught Them

HOW TO FIGHT



Uncle Sam's new 57-ton tank crushes a truck — in practice for pillboxes

IT IS commonplace to believe that Germany has a monopoly on military genius. The plain fact is that the German contribution to military science has been mostly that of perfecting devices invented by others. All of the major contributions to modern warfare have had their origins outside Germany.

The United States has been more prolific in invention than any other nation. We are an inventive people. The list of our firsts includes the airplane, the carrier, the submarine, the torpedo and the depth bomb, the machine gun and barbed wire. The tank is a British development, inspired by the American farm tractor. Tactics like dive-bombing and dropping troops by parachute also are American ideas – first thought of here but developed by others.

It was an American invention, the undersea boat, that dragged us into the last war, and it was also American inventions, the airplane and its carrier off Pearl Harbor, that plunged us into this one.

Thus we find ourselves in the curious position of having to develop better machines and devices in greater numbers to offset the ef-

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fects of our own inventive genius. At the moment we are building tens of thousands of airplanes — 60,000 in 1941; 125,000 in 1942 — to overwhelm the planes our enemies have made into such a devastating war weapon in World War II.

Super-Fuels Ours

But as usual we are a step ahead. Our planes will outfly and outfight the Axis machines because U. S. engines are designed for high-octane gasoline, another American invention. This is an advantage not likely to be overcome quickly. Only America has plenty of the three things needed to produce high octane gasoline: vast resources of high quality crude oil; superior refining processes developed by the American petroleum industry; and adequate production of antiknock fluids to increase antiknock ratings of military gasolines.

The history of experiments with the airplane in America goes back more than half a century. Long before the Wright brothers made their epochal flight at Kitty Hawk an American scientist, Professor Samuel Pierpont Langley, was tinkering with heavier-than-air flying machines. He tried out several kite models and then built a tandem monoplane powered by a one horsepower steam engine which was a failure because it was too heavy. In 1894 his sixth model achieved a measure of success and actually flew for a few seconds. But Langley's dream was to build a plane which would carry a man and in this he was not successful. Our first aircraft carrier, the converted collier Jupiter, was named for him. It was recently sunk off Java.

Eleven years before the Germans set out to conquer the world the first time, the Wright brothers sailed into eternal fame by demonstrating that a heavier-than-air machine could be made to fly. But our military men of that day saw little of value in it except for scouting purposes. Before the United States entered World War I, we gave it scant attention. Some bombing experiments were tried, but it proved difficult to drop explosives anywhere near the target. We made fairly large numbers of planes for Britain, mostly for training purposes.

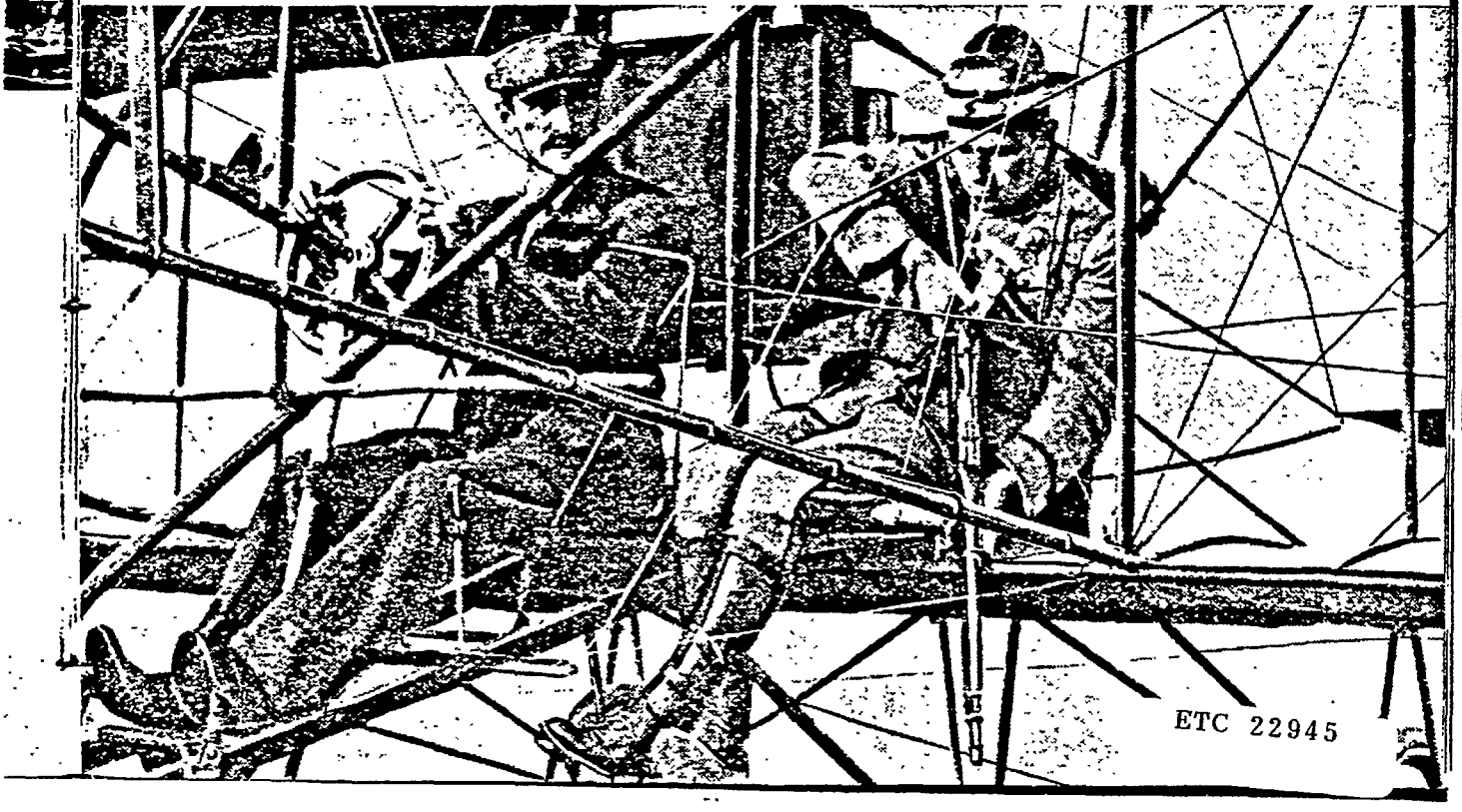
It remained for the Germans to develop the airplane into a crushing offensive weapon which played a leading role in battering nearly all Europe into submission in a matter of weeks.

We Build the Sub

Two other great inventions that made World War I different from any ever fought were the submarine, which carried the war to far seas, and the machine gun, which forced huge armies to burrow underground for protection.

The submarine was known to America as far back as revolutionary days. The first man to build a successful submarine was David Bushnell, who, in 1775, built the "American Turtle" at Saybrook, Connecticut. Made of oak and weighted with lead, the "Turtle" had a time bomb attached to its topside. The idea was to get underneath a ship, attach the bomb by a hand screw operated from inside,

Strafing in 1910: Glenn Curtiss takes an army sharpshooter up to wing 'em from the air



and then get away before the explosion. The "Turtle" was tried out several times against British brigs, but it never succeeded in sinking any boats.

After Bushnell, other Americans contributed to the knowledge of submersibles — Robert Fulton, Simon Lake, and John P. Holland. Fulton became better known for his steamboat and canal engineering activities, but he also built a submarine, the "Nautilus" in 1789, which could go under and come back to the surface safely. Lake built his first undersea boat, the "Argonaut," in 1898. Holland's famous "Fenian Ram," built in 1881 and launched in that same year, embodied all the principles of modern submarines. It weighed 19 tons, was 30 feet long, and in trial runs once dived 60 feet and stayed down for an hour. In German hands the submarine was almost a decisive factor at times in World War I and has been troublesome in this war.

Britain Builds a Tank

The third great invention used in the first World War was the machine gun, which forced trench warfare and a deadlock for long, tedious months. Hundreds of new ideas were developed, but the deadlock was not broken until a traveling fort was brought out by the British. The first tank was inspired by an American invention. We had brought the farm tractor to a high degree of usefulness, and it was from the peaceful tractor that the British developed the tank. In September, 1916, the monster took the field and the Germans by surprise, slaughtering them right and left as it lumbered along, heeding neither gun nor trench nor barbed wire. The last named, also an American invention, was up to then the most important defense of the trench. But in World War II the Germans improved the tank, added to its fire-power, and made it the spearhead of a type of mobile warfare the like of which the world had never seen.

U. S. Gun at Sarajevo

The machine gun widely used by American troops in the last war was the Browning, developed by John M. Browning, of Utah. Before him other Americans had worked out means of rapid fire, Hiram Maxim, Samuel Colt, Richard J. Gatlin, and Benjamin B. Hotchkiss. Another rapid fire gun that came into prominence in World War I was the famous Lewis gun, developed by Col. I. N. Lewis of the U. S. Army. Curiously enough, it was a Browning pistol that was used by the assassin at Sarajevo.

The inventions America gave the world were developed marvelously in conspiratorial hands. Besides the most important offensive weapons enumerated above, there are many techniques in their use that first originated in America and were later utilized and improved by others. The idea of the aircraft carrier is American. The modern aircraft carrier is the outcome of years of development beginning with the U. S. Navy's first carrier, the Langley. The United States was first to land an airplane on the deck of a ship (U.S.S. Pennsylvania, 1911). Interest revived when our first carrier put to sea in 1922, nearly four years after completion of HMS Argus, the first British carrier on which aircraft could land. On December 7, 1941, the Jap bombers which smashed at Pearl Harbor were based on carriers.

Dive bombing, first effectively shown to the world by the German Luftwaffe in crushing Poland and France, is not a German invention. Major Al Williams, as a young Navy lieutenant, thought of aiming his *plane* at bomb targets while diving for speed records. The Bureau of Aeronautics was cold to the idea — but a spectator, Ernst Udet, who later was Goering's right hand in building the Luftwaffe, saw the deadly possibilities in it.

Glenn L. Martin built the first twin-engined bomber. Claire Chennault, founder of the Flying Tigers in China, demonstrated parachute troop attack to the Russians. The Nazis copied it from them. Before Chennault, chutes were merely emergency equipment.

The world's first plane-carrying submarine also is American, and the first torpedo was the "spar torpedo" of the American civil war. It was a long ram with a bomb on the end of it. A Scotsman later built the first self-propelled torpedo from plans drawn up by an Austrian.

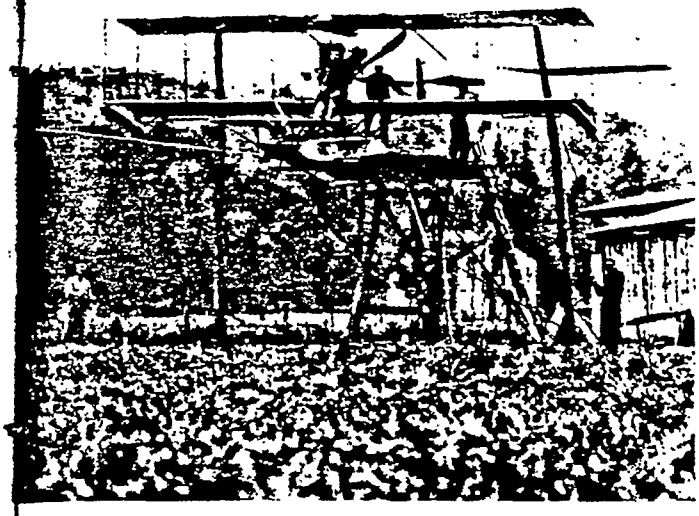
One German Idea

As far back as 1910, Lieut. Jacob E. Fickel and Glenn Curtiss demonstrated sharpshooting on the wing, the forerunner of present-day strafing.

In our Civil War, Lincoln insisted on using a balloon when his generals demurred. As usual, there was a German Embassy attaché on hand — young Count Zeppelin, who took the idea home and developed it for his Kaiser.

The Germans *did* develop, on their own initiative, one idea that was of major importance during the first World War — poison gas.

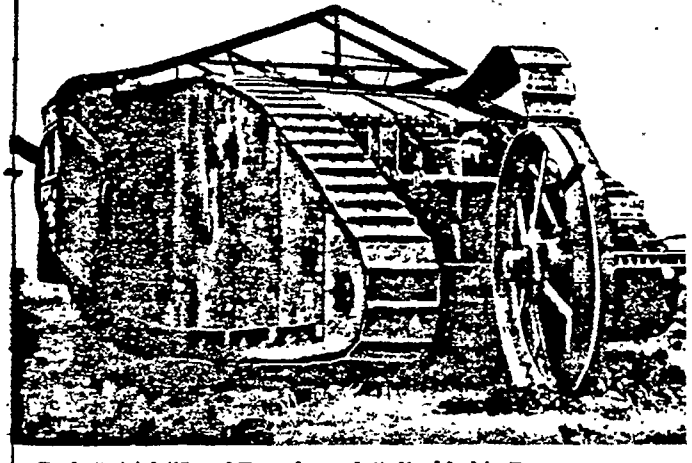
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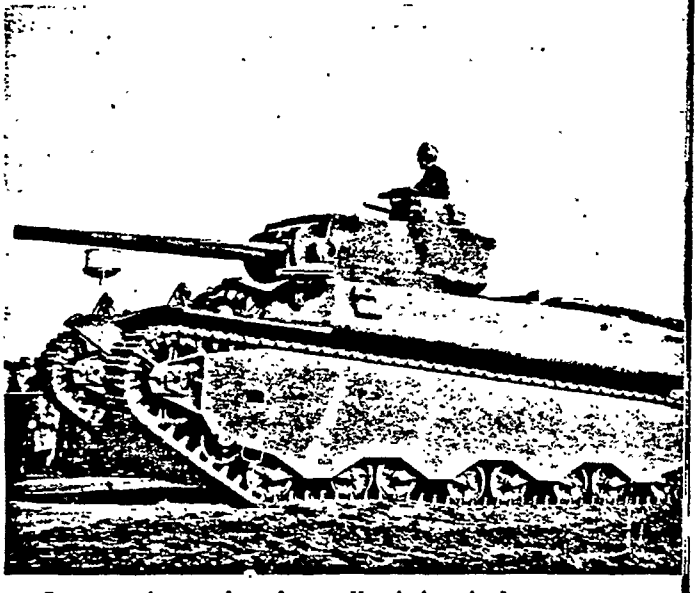
Contact! . . . and the Navy launches a flying boat from dry ground in the pre-catapult days of 1911



Today's super-bomber carries 11,000 *gallons of fuel, enough to fly from Los Angeles to China via Tokio*

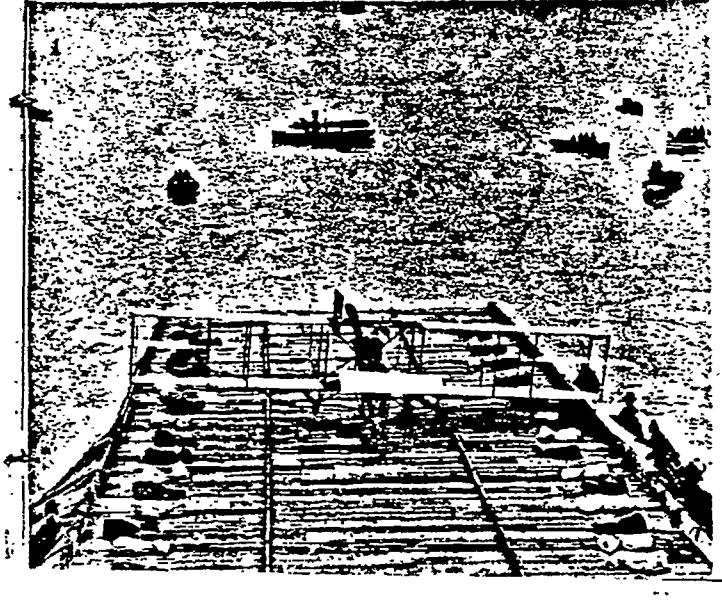


Early British "Land Dreadnaught" disabled in France

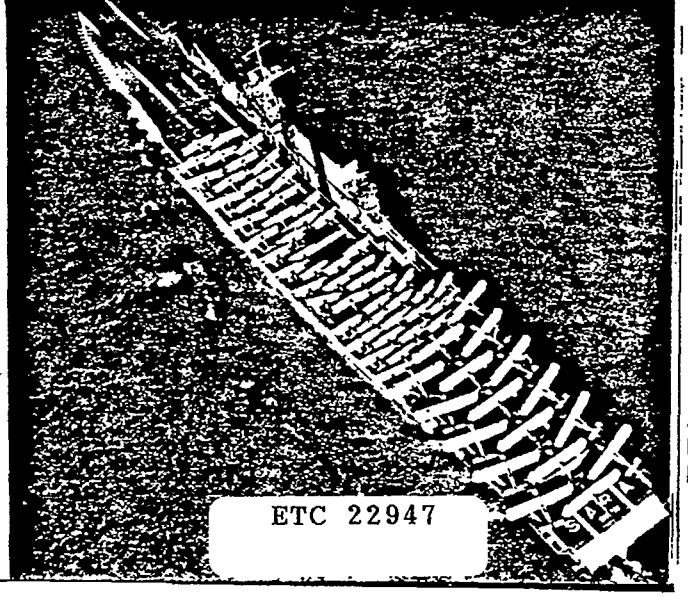


Our new giant tank packs a wallop in its 3*-inch gun*

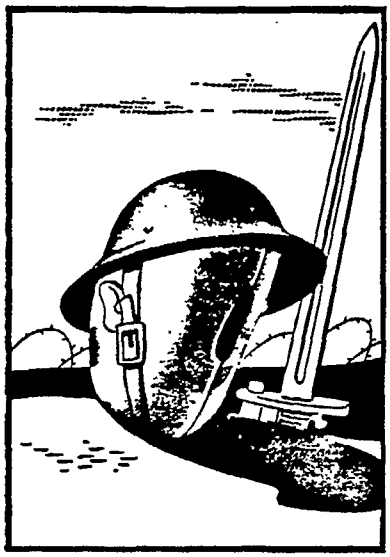
Plane lands on the Pennsylvania's deck in 1911



The U.S.S. Saratoga with its brood on deck



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SOYBEAN WAR BABY

AMERICA has just begun to "discover" the soybean. We have read that Henry Ford makes steering wheels of it, that midwestern farmers look on it as a promising money crop, that diet and health practitioners are starry-eyed about its protein, calcium, and iron content.

Dig deeper into the subject and you'll read that the little bean is a capital meat substitute; that coffee, cheese, candy, salad oil, lubricating oil, printer's ink and celluloid and glue, airplane bodies and rubber substitutes, are made from it. It's good for cattle, they say — good for dog food and linoleum and paint and rayon panties, good for explosives, good for building bone and muscle in fighting men. It's a fine forage crop, and like alfalfa it will enrich the soil.

But five years from now, when the present war has made the soybean as familiar an institution in American life as cellophane and synthetic rubber, it will be well to remember that our "discovery" was known to the Chinese thousands of years before the birth of Christ. The emperor Shen Nung speaks of it in his "Materia Medica," written in 2838 B. C. Whole ages before this — before man had learned to scribble on stone walls or papyrus — a legend was current which has been handed down in northern China and Manchuria to the present day, telling how man first became acquainted with the soybean.

A caravan of merchants, says the legend, was homeward bound loaded with gold after a successful trading expedition when it was attacked by bandits. Taking shelter in an easily defended ravine, the traders held off the attackers for several days until their food ran low. Starvation threatened — until one of the servants returned to camp with a sack of beans he had found on a vine-like plant the animals were eating. They mashed up these beans to a paste with a little water and baked them — and on this crude biscuit the famished men regained enough strength to hold off the attackers until help arrived.

The Cow of China

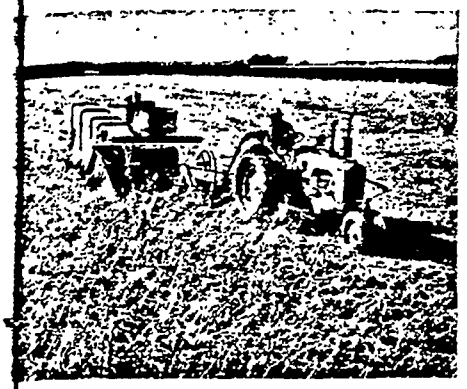
The Chinese have looked on the soybean as their staff of life for ages. Many of them have never tasted any milk but that of the soybean, which costs a quarter as much as cow's milk but contains food values that are amazing. Long has it been called the Cow of China. The Orient uses it not so much as a vegetable as for making cheese, sauce, bread, and meat substitutes. For thousands of years it has been the basic protein food in Manchuria, China, Korea, Japan, and the Malay Peninsula.

Soybeans first came to America in 1804 on a clipper ship whose Yankee master had ordered several bags tossed into the hold in case his provisions ran low. Admiral Perry brought home two different varieties from Japan in 1854 — but until the Department of Agriculture began a systematic study of the soybean shortly before 1900, it was regarded merely as a botanical curiosity in this country. William J. Morse, now senior agronomist of the department, is the man who has worked for 34 years with the quiet fervor of a missionary to bring the miracle bean prominently into the agriculture of this country.

$100,000,000 *Bean*

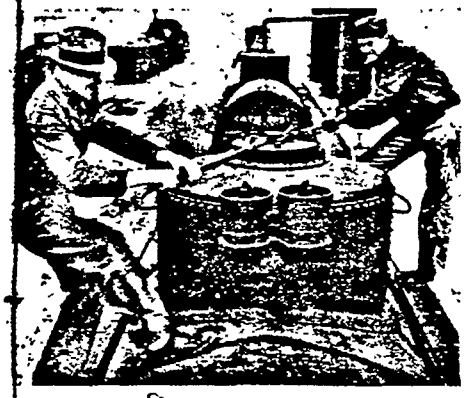
And his efforts are bearing fruit. In 1929 we grew 9 million bushels. In 1939 we grew 91 million bushels. It's our fourth ranking cash grain crop; we grow as much as Manchuria. The Cow of China has become a hundred-million-dollar American industry that is changing the landscape of the middle west.

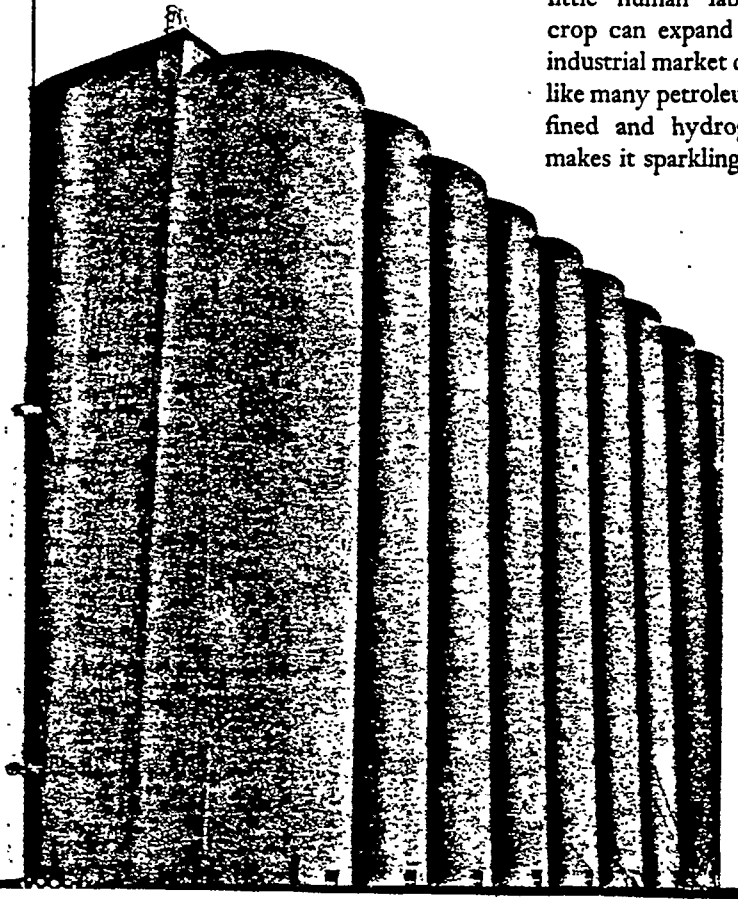
Why? Because the little bean really *is* remarkable. It actually *does* all those different things you hear about. The plant itself makes excellent fodder for animals, or a wonderful soil-enriching crop. It attracts and deposits nitrogen, and gained its first real impetus in Illinois, now America's biggest soybean region, when farmers planted it to revitalize the land after the reckless forced growth of corn there during the last war. But it is the bean itself, the actual fruit of the plant, which has turned out to be the microscopic treasure chest from which today's scientists are extracting foods and industrial products.



Beans — 91 million bushels!

Tons of soy oil for margarine





The secret of the soybean's versatility lies in its chemical composition: 40 per cent of it is protein, highly digestible, and another 20 per cent is fat, which can be squeezed out or chemically extracted as oil.

Baby Food, Paint, Glue

More than three-fourths of the oil now goes into food products, with the bulk of the rest going into paint, lacquers, and soaps. What's left after the oil has been extracted makes soybean meal, almost all of which is used at the moment in feed for livestock. Out of the five per cent that does not go into animal feed we get plastics, flour for baking, glue, fertilizer, dog food, breakfast cereals, macaroni, baby foods, reducing diets, and diabetic foods — for which soybeans are admirably suited, having a very low starch content.

Soybean oil is now an economic rival of cottonseed oil and peanut oil in the commercial vegetable oil market. It has one great advantage here. Grown on mechanized farms with little human labor, the soybean crop can expand as rapidly as the industrial market demands. Soya oil, like many petroleum products, is refined and hydrogenated; refining makes it sparkling clear and almost tasteless, while hydrogenation stiffens it to the consistency of cooking shortening — into which many tank carloads of it now go.

It has an overwhelming advantage as a protein food also. Usual sources of protein, you know, are meat, fish, milk, and eggs — all of which need refrigeration. But soybean meal contains a great amount of protein — and it can be shipped dry, with no cooling. This fact plus its high nutritive value are two reasons why the Army is using it in its new super-pemmican, Paraation. They account also for the fact that although our national demand for soybeans in recent years has run only about 25 million pounds a year, in 1941 Lease-Lend to Britain took 40 million pounds.

One proof of the value of soybeans in a wartime economy is the importance the Germans attach to them. When Hitler and Stalin were still "friends," Germany siphoned a steady stream of beans from the Orient across the trans-Siberian railway; there were all sorts of disappointing delays, but enough beans got through to give the Germans a four-year supply. The Russians also were growing a fine crop of beans for Hitler but somehow the harvest went into Russian bins instead of railroad cars headed for the German border. This was just as well for the Allies, because the two dictators had a misunderstanding shortly afterwards and Hitler put his chemists to work on the task of making a super-explosive out of soya oil.

Nazis Make Soy Bombs

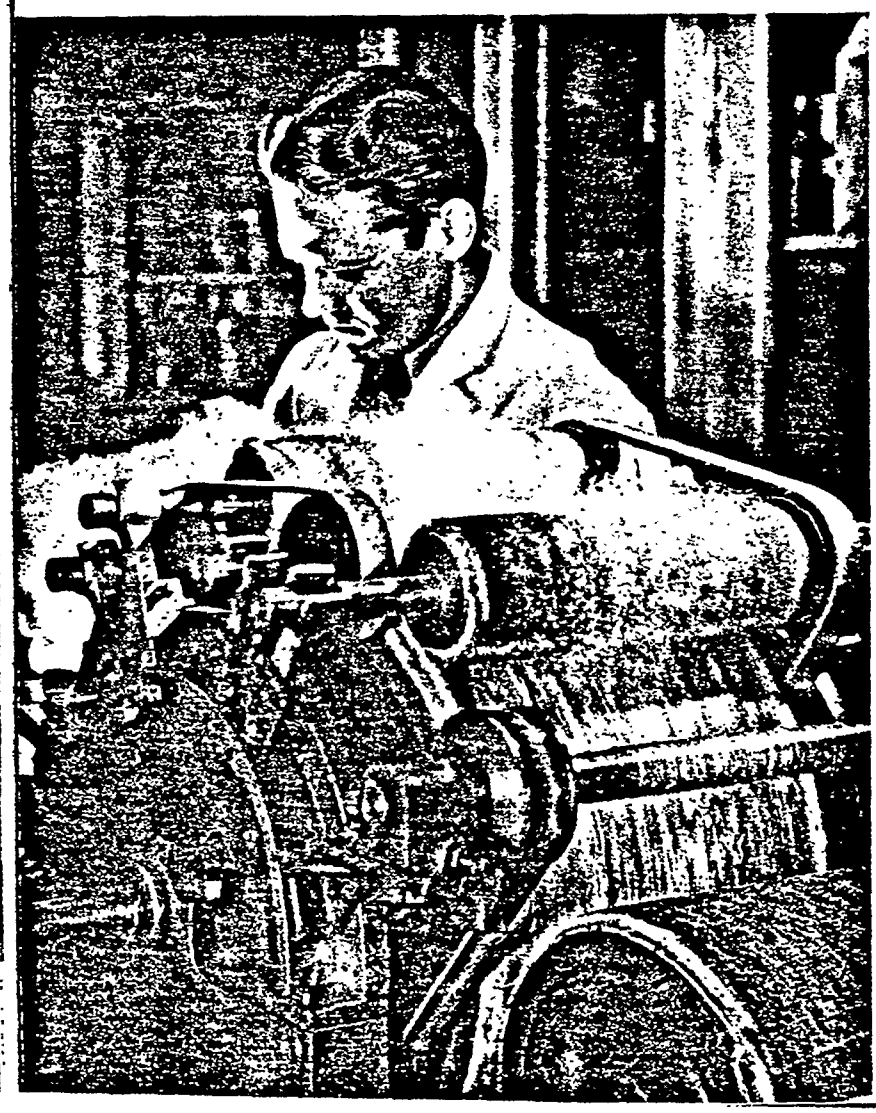
To show how versatile a vegetable it is we're considering, look at a list of the other things Hitler could make from soya oil besides explosives. He could produce (and we're

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Bean markets are choked at harvest

Spinning fibre



doing all this in the United States today) glycerine, printer's ink, waterproofing for umbrellas and other fabrics, leather dressing, paper coating and sizing, lubricating oil, lighting oil, enamels, varnishes, paints, soap, rubber substitutes, and lecithin. What is lecithin good for? Well, it makes an excellent coating for chocolate confections – keeps them fresh and adds a certain nutlike flavor. It's used in the manufacture of linoleum for your kitchen floor, and rayon for eking out the country's supply of silk. And it's used a good deal as an anti-sludge stabilizer in gasoline.

— and Soya "Wool"

Most of us recall a newspaper picture some months back of Henry Ford whanging an axe into the rear of one of his cars. He was demonstrating, dramatically, the toughness of a trunk door made of soya plastics as compared with a similar door made of standard sheet metal, in which a similar axe-blow left a gaping wound. Such pictures and stories have done a lot to make the public realize how much pioneer work Ford has done in finding industrial uses for the soybean and other products of the farm. In the past few months alone his laboratories have developed water paints from soybeans which stand up under a lot of abuse from the weather and which photograph poorly from the air. They are thus excellent for camouflaging buildings, an important phase of defending our industries from attack – and have the further advantage of being easily washed off after the need for camouflage has passed, provided they are applied over the proper preparatory base. Soybean meal, made into a protein solution, can be coagulated into thread for

fibre; this fibre has possibilities of replacing wool, which is now on the priorities list. It resembles wool in its general characteristics, has a natural crimp, and is about 80 per cent as strong, with good possibilities that the strength will be increased. Ford fibre has been used by commercial mills to augment the supply of wool; apparently it will eventually make satisfactory felt blankets, hats, sweaters, and suits. Henry Ford has a suit made of 25 per cent soybean fibre. His Highland Park mills, set up originally as a pilot plant, produced 1,000 pounds of fibre a day at half the cost of sheep's wool before they were moved to Dearborn to go into increased production. Robert Boyer, his brilliant young soya research chief, points out that two acres of land used as grazing pasture for sheep will produce eight to ten pounds of wool a year. Two acres planted in soybeans will produce 400 pounds of protein suitable for fibre.

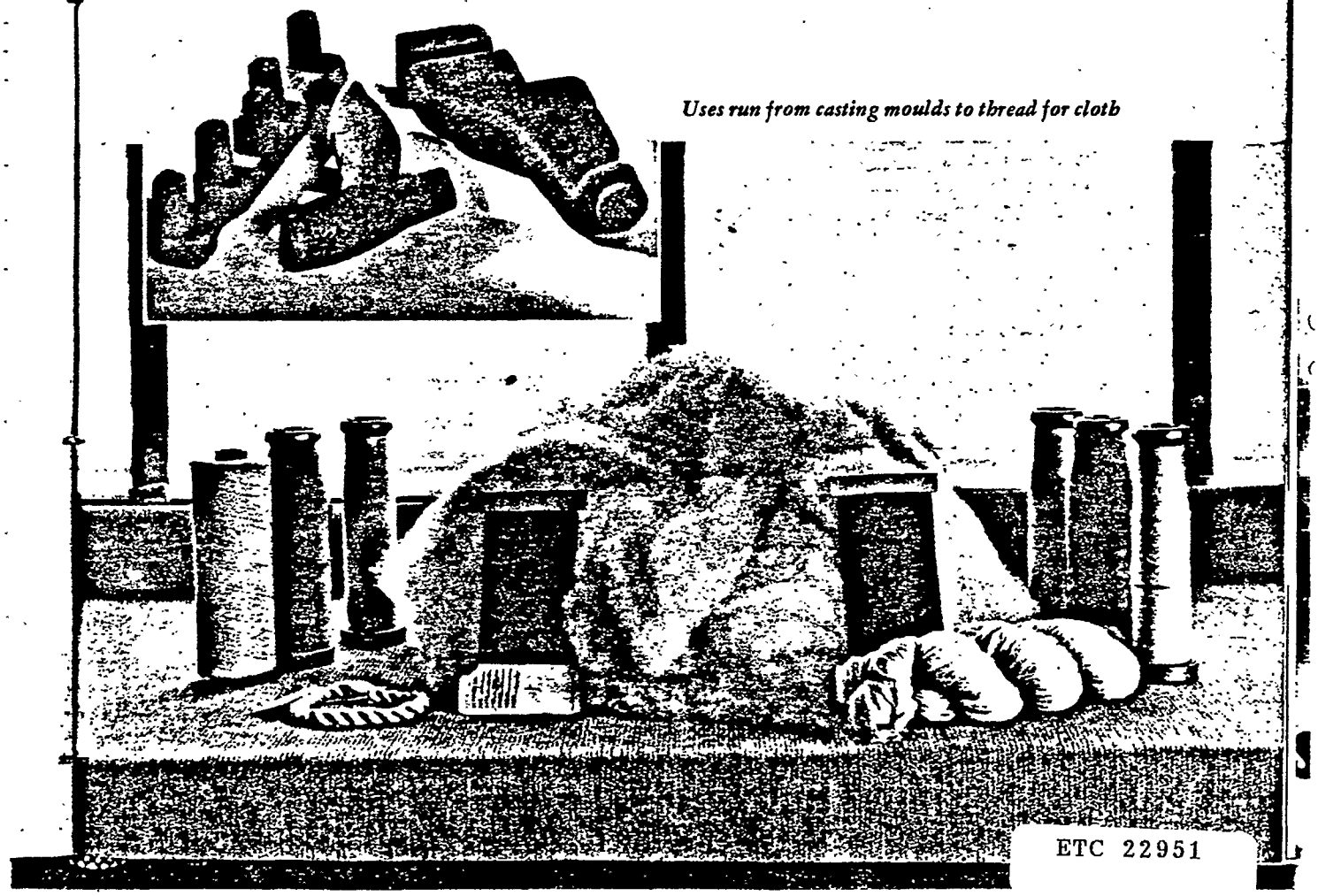
Plastic Plane Bodies

Boyer's most interesting contribution, however, has not been soybean cloth or even the plastic dashboards and instrument knobs he casts in such bright colors. He has devised tough, lightweight fibre-and-plastic sheets suitable for moulding into automobile, jeep, or airplane bodies — tough enough to resist even an axe, as Henry Ford demonstrated for the newspaper photographers.

In these structural sheets, soybean meal furnishes the bonding resin rather than the actual fibre. (Experiments with soya fibre show that it produces very hard but very brittle sheets.) Long and short fibres of hemp, flax, and ramie are mixed and floated in water into a mat which is roughly the shape of the mould to be used. This mat is dried and impregnated with the soybean resin binder, then placed in a mould where heat and pressure shape it to the proper form — tough, polished as smooth as the mould itself, already colored without painting, and practically impervious to heat or moisture.

6 to 1 Compression

Since this moulding process took six times as long as stamping out steel sheets for bodies, Boyer developed a method of stacking six moulds simultaneously in the same



Uses run from casting moulds to thread for cloth

ETC 22951



Pies, plastic, protein bread, pork, and beans — all soya

press, so the output was the same. And since the plastic sheets had only half the tensile or "tearing" strength of steel, they were made doubly thick — and turned out to have collision-proof qualities ten times superior to those of steel. No jagged edges, no permanent dents. The post-war automobile body, as Ford envisions it, will be made of these plastic forms bolted in place to a tubular steel framework which will replace the conventional chassis. The body will weigh only half as much and the car as a whole will weigh only 85 per cent as much as the 1942 models did.

One company is now making military aeroplanes with moulded bodies in which soybean resin is used as the waterproof binder. Controls and ignition parts on many planes are cast of soya plastics — and the sand cores used for castings, both metal and plastic, in many defense plants are held together with a soya binder. This war has truly been an incubator for the soybean, giving it new life in a hundred new uses which would have been beyond the conception of those besieged merchants who first ate the bean in desperation so many centuries ago.

It's Still Food

But let us not lose our perspective, and succumb to the popular misconception of soybeans as being primarily grown for industrial uses or for sauce in Chinese restaurants. Only five per cent of the soybean meal produced and only fifteen per cent of the oil extracted go into industrial use. Soybeans are still primarily a food crop, for animals and for us. If we have to feed half another continent after this war, we could not ship any other food as nutritious, as full of minerals and vitamins, as rich in protein, as versatile in such a variety of dishes and forms, as the soybean — and this is worth noting, since we may find ourselves the Granary of Democracy after we get through being its Arsenal.

ETC 22952

Spring Geography Lesson

North Pole view: Kamchatka and the Aleutians point at Japan



STRETCHING SOUTHWARD FOR 750 miles from the eastern end of Siberia like an accusing finger is the bleak and desolate Kamchatka Peninsula, owned by Soviet Russia. The southern tip of the dagger-shaped peninsula is separated by only seven miles of water from the northernmost of Japan's Kuril Islands. Its foremost settlement and naval base, Petropavlovsk, is 1,440 miles from Tokio.

Reaching toward it like stepping stones from the southwest corner of Alaska are the American-owned Aleutian Islands, about 80 of them in all. These inhospitable volcanic isles extend westward into the Pacific for 1,600 miles, reaching a point about 600 miles from Kamchatka. Between them and the peninsula are two additional stepping stones, the Soviet Komandorskie, or Commander Islands.

Nine-Month Freeze

The Kamchatka Peninsula has an area of approximately 105,000 square miles. It has a reputation as one of the most inhospitable and desolate of Nature's regions. Chilled by a cold ocean current at a position between the 50th and 60th degrees of latitude, the peninsula has a frigid winter which lasts for nine months, during most of which time the rivers are frozen solid.

Menacing Volcanoes

Blinding snowstorms, terrible in their violence, often prevent any sort of travel in winter, and in the summers there are frequent fogs. Swarms of mosquitoes add to the discomforts of life during the brief season of mild weather.

Mountains and tundra waste cover much of Kamchatka. Dense

ETC 22953

Alschovnik jungle, growing to a height of seven feet in summer and so tough it is difficult to cut with an axe, flourishes close to the settlements and makes penetration into the interior difficult. Offshore reefs are a source of peril to mariners.

Fishing by Consent

Earthquakes are frequent in this region, which claims many of the world's most active volcanoes and counts among its outstanding features both hot springs and glaciers. The chain of volcanoes on Kamchatka is part of the great Pacific ring of volcanic activity, which begins in Java and extends through the Philippines, Japan, the Kuril Islands, Kamchatka, and the Aleutians to North America. Highest of the peninsula's volcanoes is Kluchevskaya, which towers 16,130 feet above sea level and is the loftiest active volcano in the Old World.

On the other hand, Nature has been generous in certain respects with this little known section of the earth. Tremendous natural wealth in the form of teeming fisheries, extensive mineral deposits, vast stands of forest, and abundant animal life which provides valuable furs and skins for distant markets, is found here.

Cod, salmon, herring, and prized giant crabs rank high among the fishing catch. In offshore fishing grounds the Japanese have been sharing in the take under an annual lease arrangement. Gold, petroleum, iron, coal, and copper are among the mineral deposits of this part of the Soviet Far East, which Russian authorities have blueprinted for more intensive development.

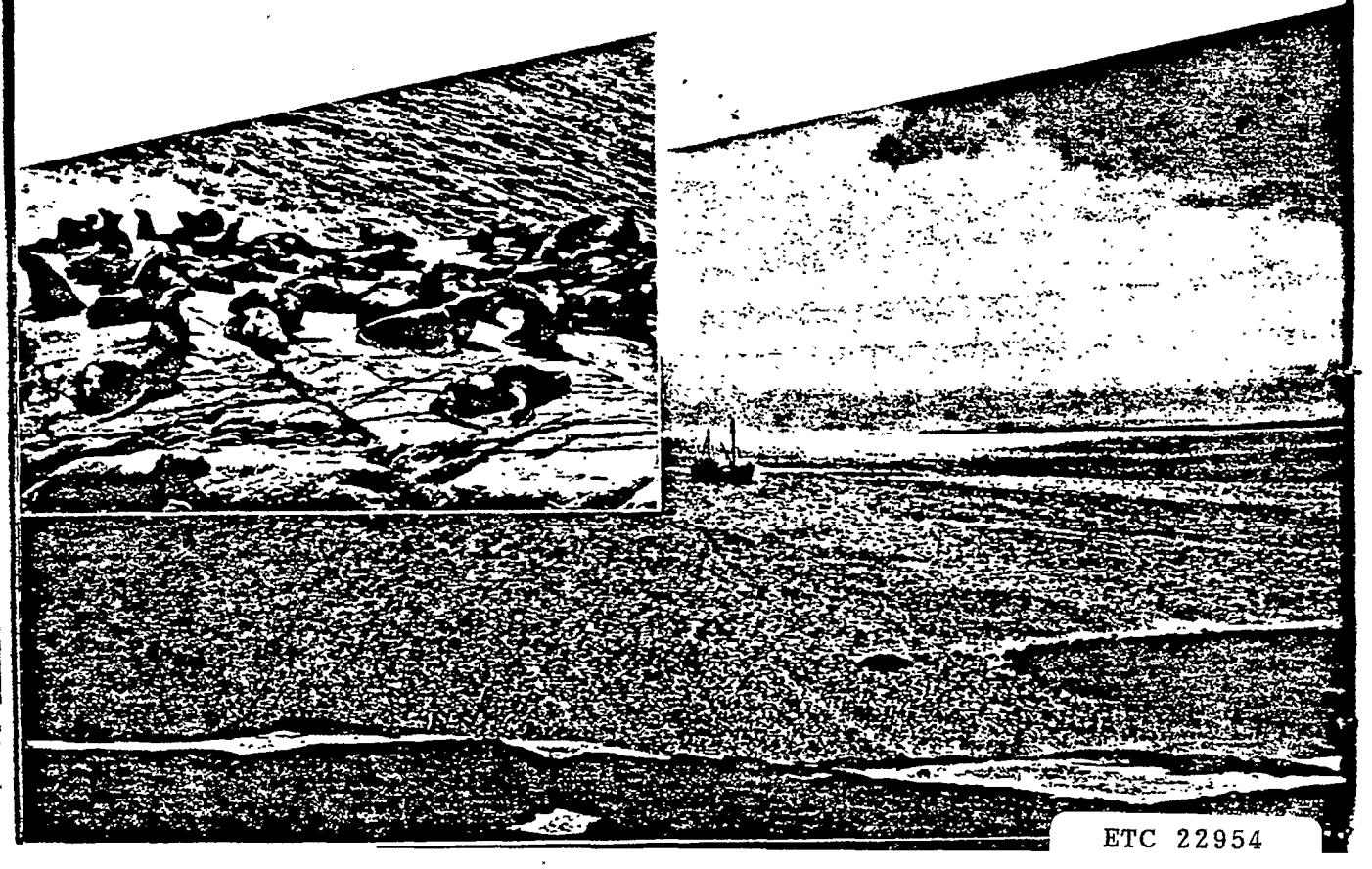
In recent years the Russian Government, in accordance with its long-term policy of developing once remote and unpeopled districts, has reported considerable pioneer activity in Kamchatka. Before the first World War the peninsula was inhabited by an estimated population of less than 12,000. Most of these were reindeer-raising tribes of nomads and primitive hunters and fishermen.

By 1935, however, this figure was reported to have nearly trebled. In one three-year period, Soviet authorities stated, some 15,000 settlers were transported to the area and provided with housing, educational, and other facilities, as well as farm machinery and factory equipment.

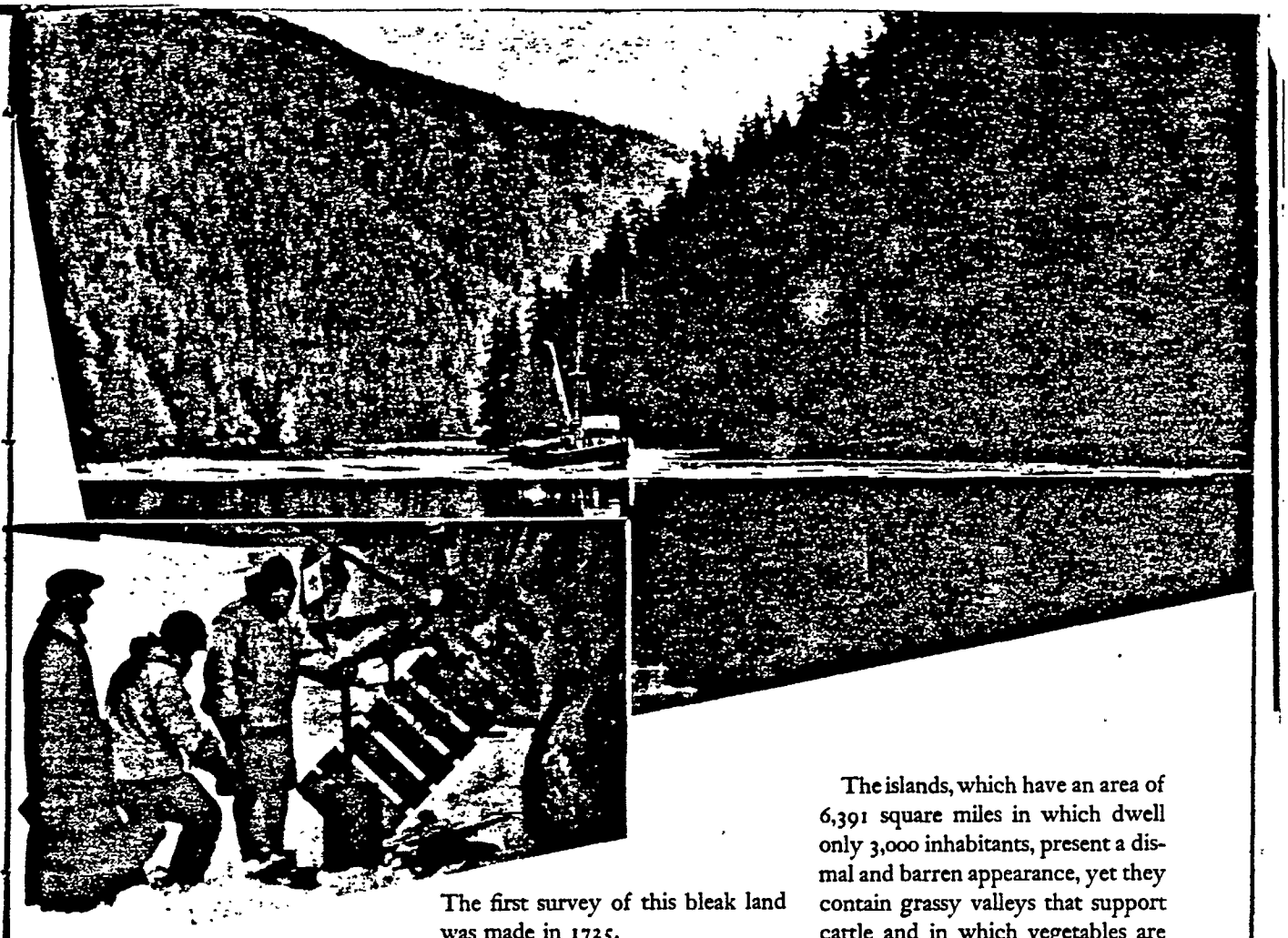
Vegetable and grain farms were set up, following experiments in producing plant life hardy enough for that climate. Livestock stations were established and new methods undertaken for the rearing and conservation of fur-bearing animals. A number of canning factories was built and new fisheries equipment provided. Air service has been inaugurated.

Russian Corregidor

The chief city and port of Kamchatka is Petropavlovsk, which has a population of about 2,000. Located on the southeast coast, it maintains regular sea and air communications with other Russian territory across the Sea of Okhotsk. In normal times regular sea lanes



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link this port with Vladivostok on the Siberian mainland, Russia's Corregidor in the Far East. These communications, however, would be virtually impossible in the event of war between Japan and the Soviet Union, as Vladivostok is almost completely screened by Japanese islands which lie between the two ports.

Russian Naval Base

Both Kamchatka and the Aleutians were first discovered and exploited by the Russians. The Cossack Dezhnev discovered the Anadir region of northern Kamchatka in 1648. In 1706 revolting natives burned the Russian settlements and forts, but they were rebuilt in 1707. The first survey of this bleak land was made in 1725.

In 1850 Petropavlovsk, because of its excellent harbor, became the main base of the Russian Pacific naval squadron. From this base the Russian fleet sallied forth in 1855 to drive off attacking French and English vessels. Seventeen years later, in 1872, the chief center of Russian military and naval defense in the Far East was shifted to Vladivostok, its present location.

Shortly before his death, Peter the Great of Russia drew up a program for the exploration of Alaska, which resulted in the discovery of the Aleutians by Russian hunters in the middle of the 18th Century. The terrain of these islands is similar to that of Kamchatka and the population is of the same racial stock.

The islands, which have an area of 6,391 square miles in which dwell only 3,000 inhabitants, present a dismal and barren appearance, yet they contain grassy valleys that support cattle and in which vegetables are raised on small farms. Like Kamchatka, they have an abundance of fish and of fur-bearing animals. On the 25 major islands there are 48 volcanoes, many of them active.

Verdant Valleys

The United States acquired title to the Aleutians in 1867 as part of the bargain in the purchase of Alaska from Russia. The total sum paid for this entire vast area was only $7,200,000, a tiny sum compared to the billions and billions which are being spent today.

Kamchatka and the Aleutians, remote and little known now, may become household words in the months ahead. A look at the map will tell you why.

ETC 22955

DOWN WE GO!

THE DEEPEST WELL ever drilled is Continental Oil Company's number KCL A-2, out in Wasco field, California. They hit oil at 13,175 feet, but had ambitious ideas and pushed the bit down to 15,004 feet before they stopped. And brother, 15,004 feet is *way* down!

That's further down, for instance, than the average depth of all the oceans in the world — two and three-quarters times the depth of Grand Canyon. The air pressure at the bottom of such a hole would be two-thirds again as great as it is in your office — enough to send any barometer reading up "through the top." When the drill churned its way past the 15,000-foot mark, the string of tools behind it weighed twice as much as Uncle Sam's new giant tank pictured on page 14.

Just to see how far down that hole actually goes, suppose you took the fastest elevator in the world to the bottom of it. This would be one of the breath-taking "lifts" that whisk you up to Rockefeller Center's famous Rainbow Room in just 20 seconds. You'd have to ride one of them down — if your ears could stand the pressure — *more than ten minutes!*

SHOP TALK



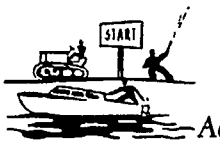
Over 50 million cubic feet of wood were treated last year with petroleum preservatives. Our friend in the Statistical Department estimates for us that this is enough bug-proof wood to starve the combined termite population of Arkansas, lower Tennessee, Saskatchewan and the Orkney Islands.



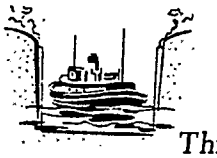
Over 22 million barrels of oil last year came from Indian territory.



In 1940 the oil industry drilled 93,937,717 feet of "holes" in search of oil — 17,791 miles of wells. If they kept on drilling at this ambitious rate, and put all their effort into one well instead of a couple of thousand, as they did, it would take them only 444 years to reach China.



Add together all the motor boats of every kind in this country — yes, counting all the outboards, too. How do you think that figure stacks up against the number of tractors in the land? Wrong again — the tractors outnumber 'em 7 to 4.



Thirteen cents out of every dollar in tolls collected at the Panama Canal used to come from oil tankers passing through.



Illinois, in the space of only four years, has jumped from 14th to 4th place on the list of oil-producing states. Number one is still Texas, which accounts for more than a third of the total.

ETC 22956

Can you identify this industry?

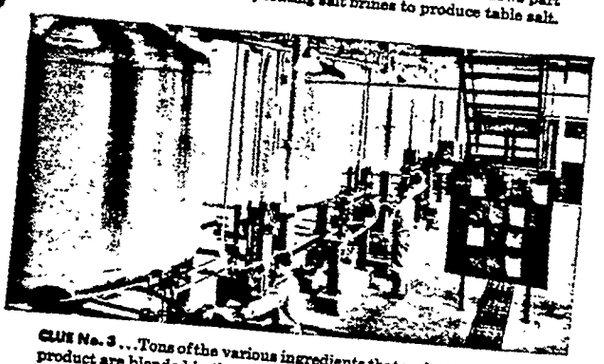
(IT HELPS GIVE EXTRA POWER TO AMERICA'S WARPLANES)



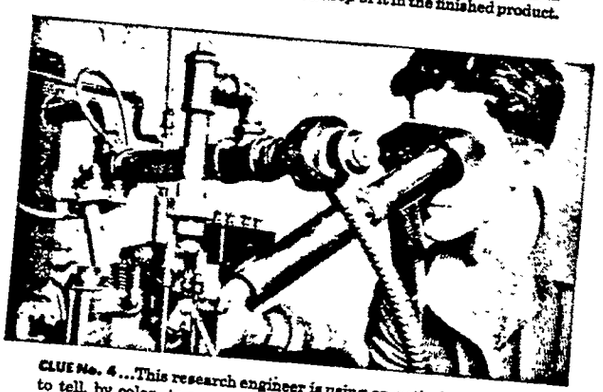
CLUE No. 1...The basic raw materials used are—salt, sulphur, sea water, molasses, lead and petroleum gas. This picture shows part of the equipment for evaporating salt brines to produce table salt.



CLUE No. 2 . . . The battery of compressors above is used to compress petroleum gases to make ethyl chloride. This chemical is very necessary—but there is not a drop of it in the finished product.



CLUE No. 3...Tons of the various ingredients that make the finished product are blended in these weigh tanks at one time. They measure the ingredients accurately to within one part in ten thousand.



CLUE No. 4...This research engineer is using an optical pyrometer to tell, by color, temperature of an exhaust valve in an engine running "wide open." Research is very important in this industry.



CLUE No. 5 . . . Painting a drum to ship the product overseas for war use. Each drum is cleaned and painted gray each time used, so the least leak of brightly colored product would show immediately.

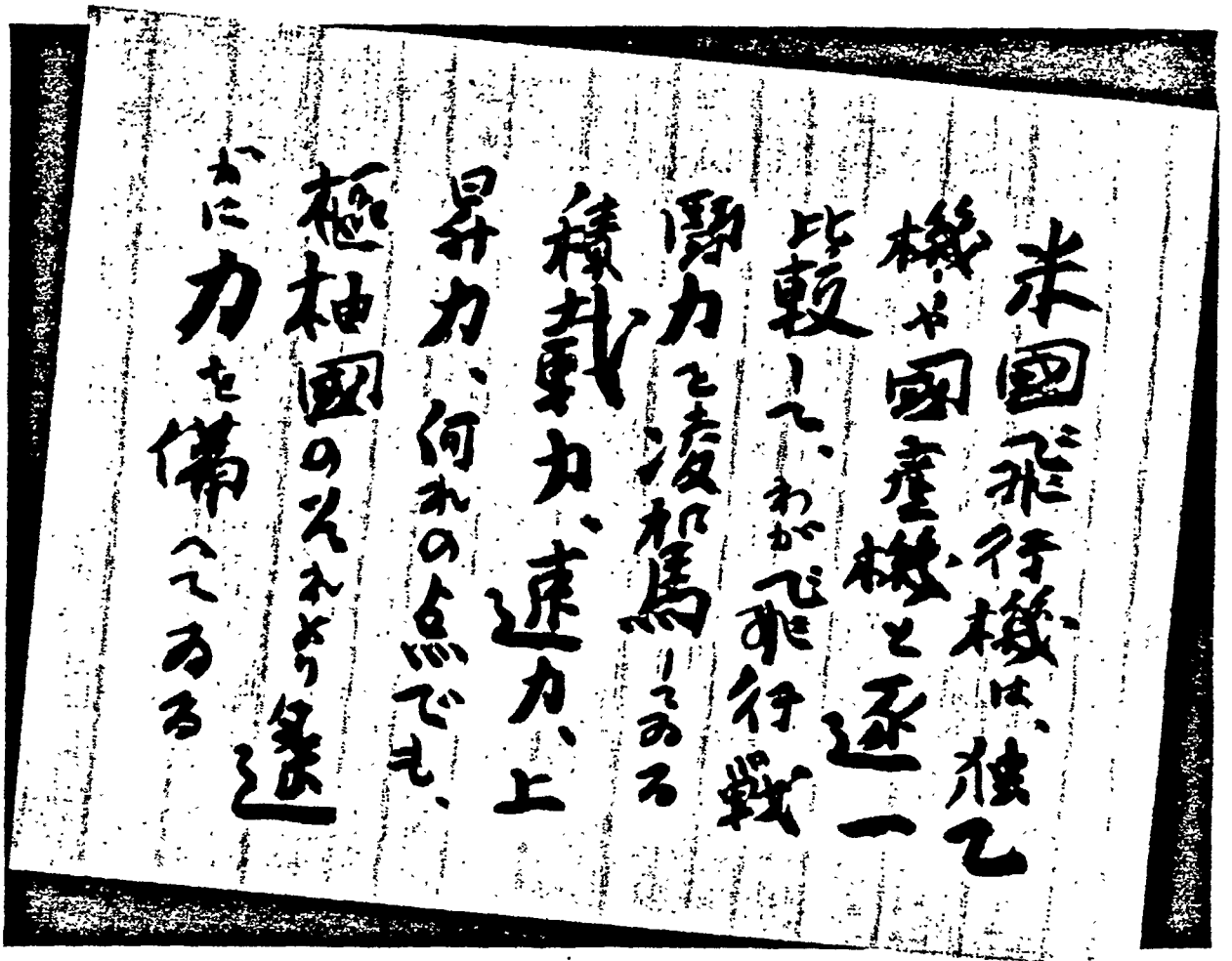


CLUE No. 6...The final clue is an easy one—if you're an automotive or petroleum engineer. These machines are "C.F.R." knock rating engines which are used in the six gasoline-testing laboratories.

It's probably no secret to you by now—these are a few pictures of the company that produces Ethyl brand of anti-knock fluid. Oil refiners use Ethyl fluid to produce the high-octane gasolines that give extra power to America's warplanes, tanks and other motorized equipment. Fortunately, the Ethyl Corporation has sufficient plant capacity to supply all war needs without delay and still produce anti-knock fluids for improving gasoline used in the tractors, trucks, buses and passengers cars of our motor transportation system.

ETC 22957

TOKIO PAPERS PLEASE COPY



Translated, this means:

"American warplanes—plane for plane—can outfly and outfight Nazi and Jap machines. They pack more power, speed and climbing ability in every pound."

That's bad news for the Japanese, particularly since it is something they can't do much about.

The basic reason American planes are superior is that their engines are designed for high-octane gasoline. And only America has plenty of the three things needed to produce high-octane gasoline:

1. *Vast resources of high quality crude oil.*
2. *Superior refining processes, developed by the American petroleum industry.*
3. *Adequate production of anti-knock fluid to increase octane ratings of military gasolines.*

Today our nation reaps the benefit of the petroleum industry's many years of effort in developing better fuels for peacetime transportation.

From the very beginning, the makers of Ethyl brand of anti-knock fluid have engaged in research work to improve fuels and have assisted in the development of engines to take advantage of these better fuels. It is our privilege today to offer our product and our technical experience to the cause of American victory.

ETHYL BRAND OF ANTI-KNOCK FLUID  **IS MADE BY THE ETHYL CORPORATION**

ETC 22958



ETHYL NEWS

JUNE ★ 1942

ETC 22959

In The June, 1942

ETHYL NEWS



Women Man the Machines 3

The "man behind the man behind the gun" today may be a woman worker in overalls



Things to Come 7

Shortages, scarcities, restrictions: how are they going to change your life?



Gibbs Medal to Midgley 12

The man who found tetraethyl lead says we could have grown our own rubber



Lead . . . Ugly Duckling 15

Just "bad tin" to the ancients — but more important now than gold



Streamlined Job Training 20

TWI is Industry's answer to the problem of training new hands in war work

ON THE COVER . . . With Ethyl-trained technicians being called to Washington or the fighting forces, women step up to take their places in Ethyl laboratories — doing their bit in this war, as we describe it on Page Three ▷

ETC 22960





WOMEN





MAN THE MACHINES

BY NEXT CHRISTMAS one third of the working population of America will be engaged directly in war production. By Christmas of 1943 the figure will rise to 20 million or more. Yet the Army is requisitioning the nation's manpower on an unprecedented scale, and agriculture is facing a 40 per cent shortage of labor. Who will man the tools of industry?

At the Rivet Guns

You've seen the answer already, in the newspapers and the newsreels. Women are moving into manufacturing plants, taking their places at the drill presses, the rivet guns, the towering machines on assembly lines now forging a mighty mailed fist for the Allies. At the beginning of this year half a million women were working alongside the men in our war plants, carrying an increasing share of the load in the greatest production program ever conceived. Today the figure is 1,000,000 – and this is only a beginning. By the end of 1942, it is estimated there will be 2,500,000 to 3,000,000 in war industries. Thousands of other women are learning to handle jobs hitherto regarded as "man's work," and still others who have worked before in factories are now learning to do

ETC 22961

women's jobs faster, surer, better.

"Women in industry" is not a new story. At the end of the first World War there were 2,250,000 active in war production, out of a total labor force of 9,000,000. Women today constitute over a fourth of the workers in manufacturing establishments; they dominate the clerical and teaching fields, and have made their mark in professional and managerial work. But women riveters, test pilots and shipyard engineers strike a new and colorful note in the production picture . . . and we're going to see a lot more of them before this thing is over.

Women to Take Over

Some of Uncle Sam's 1942 war aims are listed as 60,000 planes, 45,000 tanks, 30,000 anti-aircraft guns and 8,000,000 tons of shipping. More than six million Americans are already engaged in that great program; this number must be boosted to 15 million before the year is out, 20 million before the end of next year. This is nearly half the nation's working population — out of which several millions of the sturdiest and most capable young men have been taken to serve the country in uniform.

But war production will not pause; the tools of victory will not stand idle for lack of men. Women will fill the breach. Already they have taken the place of male chemists who have gone to the service from the Ethyl Corporation; they have been called by the Washington Navy Yard as mathematicians and engineers; they have brought their deft fingers and their skill at precision work to the great aeroplane plants of the country.

Many industrial centers already are experiencing shortages of labor; the entire West Coast faces a scarcity of qualified workers. The labor force of the aircraft factories is made up chiefly of young men from 21 to 31. Aeroplane making must continue 24 hours a day, seven days a week for the duration, and will need thousands of additional women workers as more men are transferred from production lines to active military duty. Aircraft production in March employed 14,000 women workers for light assembly work in 34 principal plants. This was an increase of 43 per cent over February. This total is still less than five per cent of all productive workers, but new jobs that can be satisfactorily done by women are being found almost daily.

It is estimated that women could handle a third of the work in airplane assembly. In Britain they comprise 40 to 50 per cent of the "manpower" in aeroplane production. As machine operators, American women handle drilling, reaming and countersinking on single, multiple or pneumatic drills; they run small milling machines, turret lathes, small and medium punch presses, angle bending machines and brakes, light grinders, riveting and dimpling machines; they do spot welding. In bench work they show a high aptitude for burring and filing of all kinds, hand forming over template and blocks; tube cutting, bending and assembly; also in doing electrical assemblies with complicated wiring and bending, and sub-assemblies in jigs and at benches.

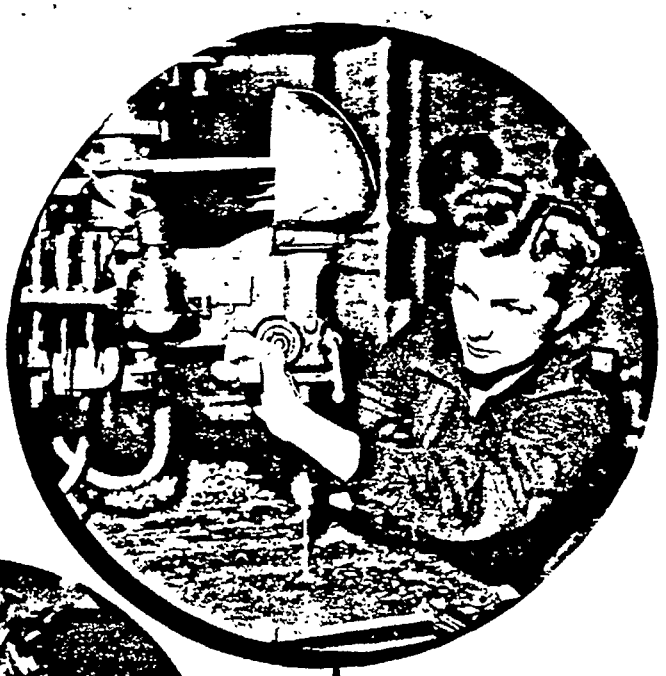
Aircraft work is not the only kind prominently being performed by women. In electrical plants they are assembling radios and winding armatures. Some girls work at engine lathes and milling machines; others are core makers, some are painters. Still others are employed in the "hammer houses" — in the noise and din of hydraulic presses, high-speed trip hammers, and other such equipment. Among experts it is conceded that women make better inspectors than men do, and in small-arms plants women inspect cartridges and polish small parts for rifles. In a factory making bandage shears for the government, women do all the shaping, sharpening, assembling, testing and chrome plating. In rubber factories, they work on bullet-proof gas tanks. Needle and thread have been women's tools for centuries, but cutting and stitching silk parachutes is a new departure.

Women have a special value in small-arms production, which includes hand and shoulder weapons, machine guns and automatic guns of all kinds up to .50 caliber. Ammunition for these weapons is of major importance in the air. In firing action, an airplane equipped with eight machine guns pours out 1,200 rounds of bullets a minute from each gun. Tens of thousands of airplanes carrying machine guns call for millions and millions of bullets. Because their product is standardized in operation and machining, and because women are particularly well fitted to give the work the alert attention, caution and detailed accuracy which it must have, small-arms plants already are employing large numbers.

There are nearly 50,000 women on the production lines in 30-odd ammunition plants, loading bags or shells — and it is estimated there will be over twice this number before the end of summer. In Canada last January, women totaled almost two-thirds of all factory employes in rifle manufacture, and in the new Royal Ordnance plant in Wales, 80 per cent of the workers are women.

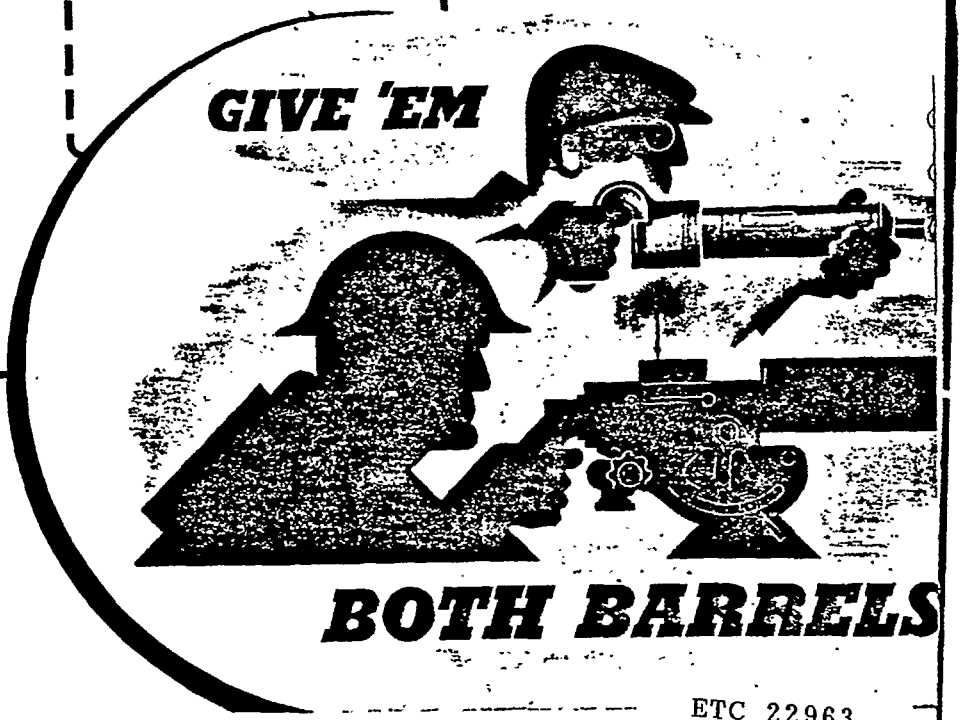
ETC 22962

She remembers Pearl Harbor . . . left a widow by the sneak-punch attack, she carries on her private war against the Japs in a California plane plant. Her sisters in industry, at punch presses or on assemblies of delicate electric controls, also "give 'em both barrels"









ETC 22963



No laundry, but a plant where ailerons for Army wings are covered

The same story can be repeated in various operations of almost every major war industry, even in making tanks or anti-aircraft guns. Uncle Sam says this story *must* be repeated, to achieve our production goals . . . but there still exists a prejudice against women workers in many places where they are considered a safety hazard, or where their mechanical ability is underestimated.

Studies made by research groups show that women excel men in operations that involve the use of light machinery and which require repetitive skill, finger dexterity or accuracy. The average woman's lifting strength, says the Department of Labor, is about half that of a man; her pulling strength about two-thirds. It is pointed out, however, that the wider use of mechanical lifting and positioning devices will make it easier to extend the work of women in the heavier industrial occupations. As to the safety hazard, the government believes this is a generality that is not borne out by the facts. Actually, it says, women in industry have a better safety record than men. But as more of them go into industry, it may become necessary to require certain work clothes on the job to reduce the possibility of accident. Caps, for instance, would go far to prevent long hair from tangling in the machinery, and long or loose sleeves should be avoided.

Women's machinery experience is limited, but the British have found women apt in mechanical lines when given the opportunity for training and experience. In many cases it is possible to adapt tools and machines so that women are not barred from using them. Benches may be made lower for women assembly workers, and tools scaled to their needs. These are minor obstacles in the face of the dire need for arms production today. So also are state protective laws which set the working conditions for women, limit their hours, and restrict the operations they may undertake. Most of the states already have made provisions for modifying these standards where necessary for war production. British experience with women in industry has shown that the snags and difficulties in their employment can be largely overcome, and that women can make a tremendously valuable contribution to war production.

"Get into the Fight"

Years ago the Germans used to insist that woman's place was in the home. *Küche, Kinder, Kirche* was an autocratic Prussian slogan. But like so many other Germanic principles it had no application except in repression. In the United States our traditions are those of opportunity rather than repression. The door is open to men and women alike in any field. Women need no longer sit home rolling bandages or knitting socks when their hearts and fingers ache to "get into the fight." They can do men's work. They are *doing* men's work. And before this world has been freed of the menace it faces today, it is going to feel the feminine touch in a surprising new way — in a new and vitalizing lift which our women will give to the all-important program of arms for the armies of freedom.

Power machines, weapons of victory for us, feel the feminine touch



ETC 22964



THE REVERSES the United Nations have suffered in this war and the prospect of further setbacks before the pendulum swings, means a new design for living for the 132,000,000 people of the United States. Up to very recently, too many of us have given too little thought to what the successive Axis victories have meant for us. The time is not long past when it was widely and mistakenly believed that the United States could win this war without doing much fighting. Our job was simple – we were to be the arsenal. More realistically, new viewpoints and new attitudes now dominate the domestic scene. It is increasingly being realized that the business at hand is grimmer than was at first thought.

More and more as a result, we may expect new basic rules for our conduct in the war to emanate from the Washington hub. These will penetrate ever deeper layers of American life until there cannot possibly be man, woman or child in the country who will not have a first hand knowledge of what "total" war means. It is no more a question of whether we can do "business as usual." It has now become a question if we can "live as usual." The plain answer to that is definitely that we cannot.

Living as Usual?

America, the land of plenty, is short of virtually everything. There are many reasons for this seemingly paradoxical situation, but chief among them is that we did not prepare in time for the stupendous task of waging a global war. The aggressor nations did. Germany started gearing her industrial machine for this war as far back as Versailles. Italy has been in a state of war almost continuously since World War I. The Japanese actually have been at war since 1931 when they invaded Manchuria, and their industrial production has been accelerated for war since then. The Democracies, on the other hand, have been reluctant to encroach on the living standards of their people, preferring to believe right up to the opening of hostilities that they could have both their guns and their butter at the same time.

That this was a mistaken notion is now evident to everyone. But there is an old-fashioned American saying "there's no use crying over spilt milk." Our job now is to catch up. Speed is the watchword in this lightning war, and the problems are many. When this conflict was forced

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upon us, we were in the position of the boxer who had not trained sufficiently to meet a dirty and menacing fighter. The opening round is now over, and we are warming up. We had, of course, heeded the warning signs to some extent. Our expenditures for armaments at the start already were at as high a level as at the close of World War I, although it is well to remember that in that conflict the United States provided only a mere trickle of munitions even for our own troops. For the most part they fought with guns and ammunition supplied by the Allies.

In this war, the positions are reversed. We not only have to supply our own men with equipment and food, but a large part of the necessities of our allies as well. And this we must do with the utmost speed. Ten tanks or airplanes on the firing line today are worth a thousand a few months from now. It has been estimated that the war already has been lengthened by many months because of early reverses as a result of our shortage of matériel.

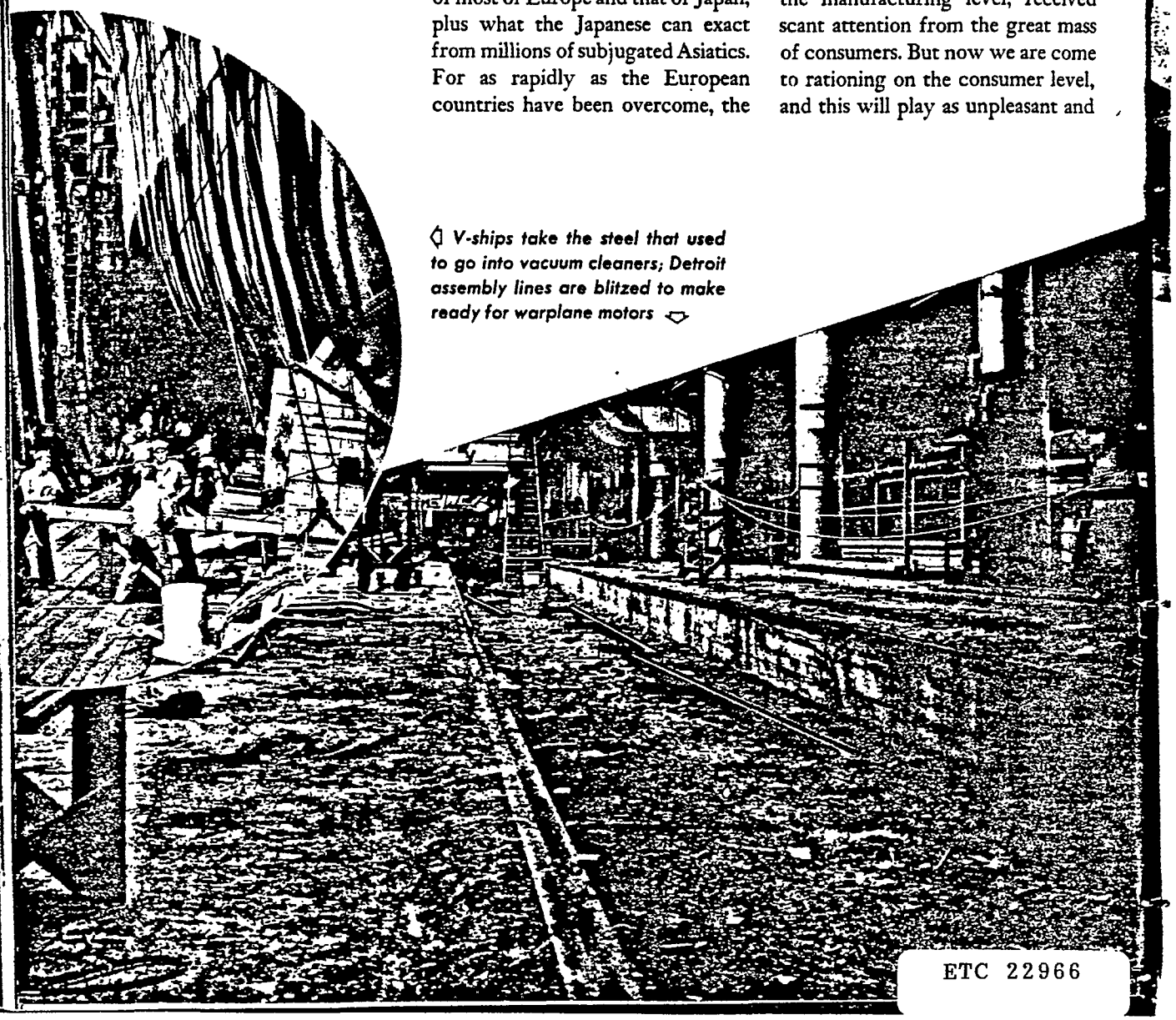
Speed, Speed, Speed

It would be a mistake to believe that we are confronted with only the productive capacity of Germany, Italy and Japan. We face much more than that. We must compete with a productive capacity of most of Europe and that of Japan, plus what the Japanese can exact from millions of subjugated Asiatics. For as rapidly as the European countries have been overcome, the Nazis have applied their version of the principles of total warfare to the conquered territory. Men, women and children are fed only if they contribute to the war effort, and the amount of their effort determines their food allowance. The measure of that contribution is all that counts in the conquered countries, and the measuring stick is applied with a ruthlessness hitherto unknown in the world.

We cannot go far wrong if we look at World War II as a struggle for and with basic raw materials. It is this phase of the war that first registered on our own home front.

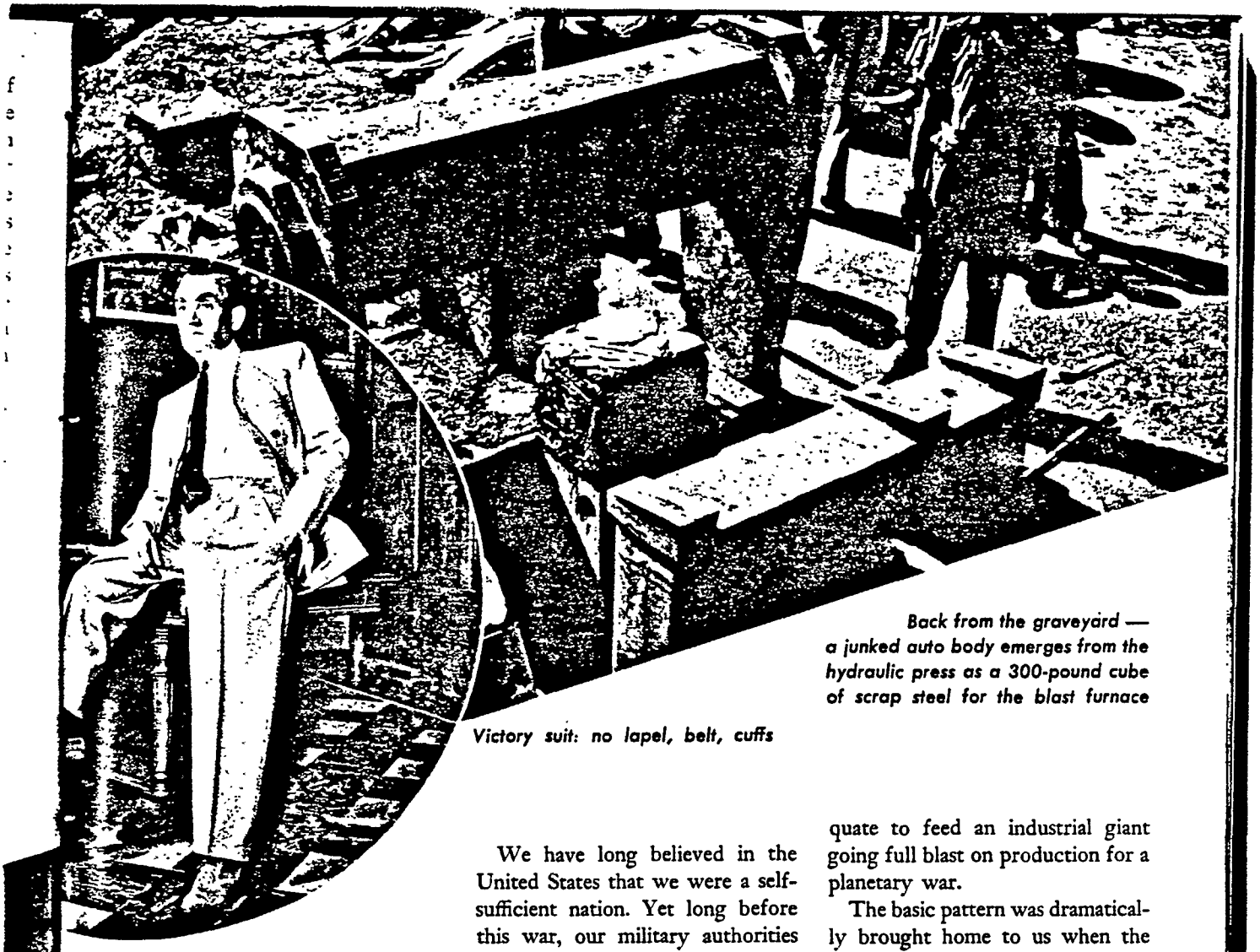
We Feel the Squeeze

Priorities, which is rationing on the manufacturing level, received scant attention from the great mass of consumers. But now we are come to rationing on the consumer level, and this will play as unpleasant and



V-ships take the steel that used to go into vacuum cleaners; Detroit assembly lines are blitzed to make ready for warplane motors

ETC 22966



Back from the graveyard — a junked auto body emerges from the hydraulic press as a 300-pound cube of scrap steel for the blast furnace

Victory suit: no lapel, belt, cuffs

far reaching a part with the average person as did priorities with the manufacturers.

Feeding the Giant

Priorities and rationing are the international way of waging this war. And just as we have to meet airpower with greater airpower, blitz with greater blitz, so too must we meet the Axis mobilized economy with a better-organized total mobilization of our own economic resources.

We have long believed in the United States that we were a self-sufficient nation. Yet long before this war, our military authorities had drawn up a list of some 30 raw materials for which we relied on foreign sources of supply. Rubber and tin are familiar, quinine not so well recognized by the layman. Yet 90% of the world's supply of quinine was furnished by the Dutch East Indies, and the shortage of it when the Japs cut us off was a factor in our loss of Bataan and Corregidor. When our defense production began to demand huge quantities of raw materials for which we relied on foreign countries, not only did *these* deficiencies become acute, but it was found that our supply of other raw materials was not adequate to feed an industrial giant going full blast on production for a planetary war.

The basic pattern was dramatically brought home to us when the Japanese sliced through our rubber and tin supply line. We could not get rubber and tin and consequently what we had in stock had to be reserved exclusively for war use. The situation was aggravated further because the British need rubber too. From having been the largest importer of rubber, the United States overnight was forced into being an exporter, for we must now supply Britain and other allies what we can from our meagre store until we can remedy the situation.

Shortages develop subtly in many cases, as in shipping. Ships are sunk and the tide of war lengthens supply

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No more novelty items . . . juke box plants make tools to Keep 'em Flying

routes. Our facilities dwindle. At the same time, the vast needs of the war machine demand greater quantities of raw materials. As these essentials are given priority on cargo ship space, coffee and such like must be left behind on the docks, and the need for rationing coffee to consumers develops. These shortages tend to spread to other commodities. Tin is cut off and canners look for substitutes. The substitutes become scarce and must be rationed. And thus the search for substitutes widens.

An example of the shortages problem is oil. Tanker losses have forced rationing of gasoline along the Atlantic seaboard. The loss of Dutch East Indies oil places further restrictions upon us, for we now must divert tanker space to supplying our forces in the far Pacific. From rationing in certain areas that require long haul we now may have to spread the practice more widely until we can build more tankers or pipelines. These in turn require steel that is sorely needed for military uses, and may not be available for civilian projects for some time.

Made in Germany

In broad terms, the problem of shortages is being fought by building up supplies, cutting down on non-essential use wherever possible, and directing available supplies into war channels. That's where the average citizen enters the picture. Actually, there are two standards of living in the country today, and this unsatisfactory state of affairs was made in Germany. First things first in this war means that the fighting forces and those engaged in essential war work receive the best of everything available first. What is left over is then distributed as evenly and as widely as possible among the general public. There is about 25% more purchasing power in the country than available goods. Unless controls were imposed, prices would rise to the purchasing power levels. But by draining off the excess 25% purchasing power in taxes and war bonds, prices are held down. And to insure an even break for everyone in the distribution of available goods, rationing is resorted to.

One way of stretching available supplies is to strip them of non-essential frills and doodads. This will increasingly become a prominent feature of the daily scene. It already has come home to the general public in Victory model clothing where pocket flaps, trouser cuffs, lapels and similar decorative features are eliminated. Two inches will be cut off tucked-in ends of shirts, and nightgowns and underclothing will be regulated under rules similar to those for outer clothing. Expect a

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further curtailment in civilian production of shoes because of a difficulty in obtaining sole leather; and shoes may not have eyelets. Copper jewelry is out for the duration. As the need arises, these efforts to save material of all kinds will be extended into practically all phases of our daily life.

The War Production Board's simplification branch is pushing for a sharp reduction in the number of sizes, shapes, colors and grades of various products. Thus, bottle manufacturers and glass container makers have been requested to simplify bottle sizes, shapes and finishes. Standardization in manufacture saves man-hours and machinery for vital war needs. New inventory is being streamlined to the Victory model in virtually all goods and services of every-day use. The ordinary citizen not in an essential war industry must be prepared to get along without many of the things he heretofore thought indispensible to the American way of life. Certain hardware and kitchen ware already has disappeared from store shelves, and this trend will continue as present supplies are depleted. New automobiles, gasoline and tires, refrigerators, typewriters, bicycles, already are denied him, and if necessary in the winning of the war, fancy colored enameled bathtubs and other such hitherto considered essentials will likewise become unobtainable for the duration.

Drug Stores Again

Does your chocolate ice cream or malted taste less chocolatey? Blame it on restricted shipping. Cocoa beans are getting scarce because of it, and WPB orders have cut supplies to makers of chocolate syrup, candy and other confections. Drug stores may become *drug* stores again; shortages are cutting down gadgets and non-medicinal articles. Services that the average citizen took more or less for granted up to now are no longer available. While the emergency lasts, he will have to manage without store deliveries, airplane travel, easy bank credit and installment purchases. Fast and luxurious non-stop express train service is being curtailed, and unnecessary travel in general discouraged. The emphasis is more and more on stay at home, work hard, get along with as little as possible and buy war bonds. It is the new "thin" economy.

So far in our war effort, the M-Day program has concentrated on production. Priorities, conservation and curtailment have been converting the nation's productive capacity to war material and basic civilian needs. Now, price, profit and wage, rationing and distribution control are being riveted onto our economy to prevent the explosion that otherwise would occur under pressure of *full* war production.

The President outlined the shape of the things to come in his recent radio talk to the American people. The pill may be bitter, but it must be swallowed, and without the usual sugar coating. It is not all bad medicine. It might even be a tonic.

—BY JOHN P. KNAPP

Name? Address? Occupation? What is your minimum need? Sorry — too much!



GIBBS MEDAL TO *Midgley*

MORE rubber can probably be grown in the United States than could possibly be consumed, declared Thomas Midgley, Jr., discoverer of tetraethyl lead and vice-president of Ethyl at a meeting of the Chicago section of the American Chemical Society on May 22.

The occasion was the presentation to him of the Willard Gibbs Medal, one of chemistry's highest honors, in recognition of his distinguished work in applied science. This is Mr. Midgley's fifth medal. For several years he has been chairman of the board of the American Chemical Society. At the annual meeting of the National Academy of Sciences last April 28 he was elected to honorary membership with fifteen other famous men, including Professor Albert Einstein.

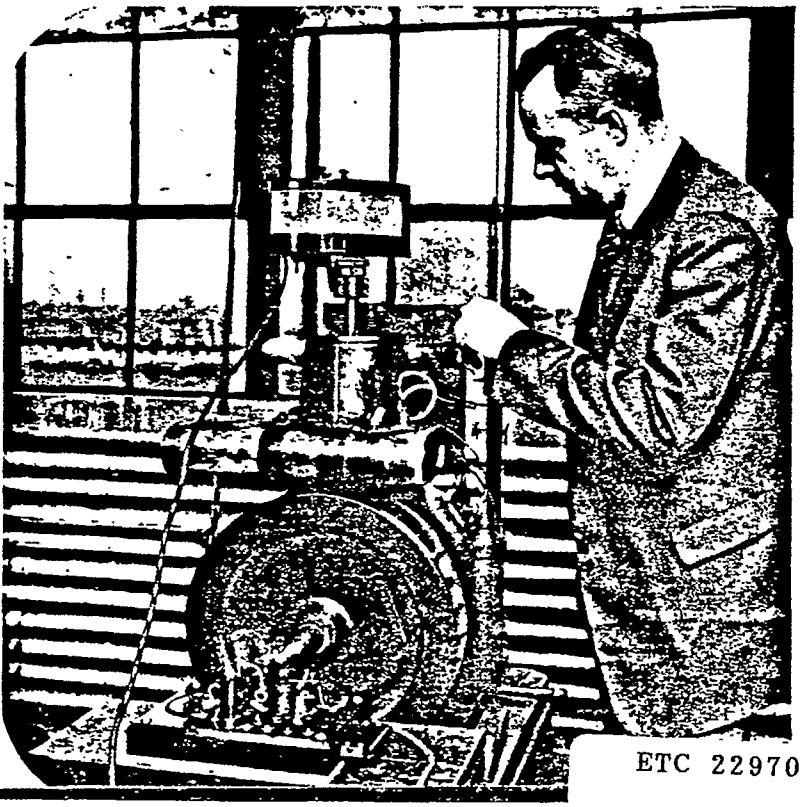
Self-made Inventor

Mr. Midgley, originally trained as a physicist, educated himself in chemistry until he is regarded today as one of the nation's foremost research chemists. Among his better-known achievements outside the discovery of tetraethyl lead and the compounding of it with other ingredients to make a practical fuel anti-knock compound, are the Freon refrigerants — non-toxic and non-inflammable refrigerating gases which form the basis of much of today's air-conditioning and refrigerating industries. He also had a major part in developing a process by which bromine could be extracted in commercial quantities from sea-water, and has made several contributions to the search for synthetic rubber, on which he holds a number of patents.

In accepting the Willard Gibbs Medal, Mr. Midgley took the occasion to deliver what he titled "A Critical Examination of Some Concepts in Rubber Chemistry." Although we could grow rubber enough to fill our national needs right within the boundaries of our own country, he said, rubber production has been confined to the tropics because of the ease with which it can be obtained from the hevea tree by cheap labor. He warned against the delusion that American ingenuity or a scientific miracle will save the nation from the "sad day of reckoning" by suddenly supplying a huge volume of rubber or a satisfactory substitute from nowhere.

Speaking of natural rubber, Mr. Midgley posed seven questions dealing with fundamental aspects of

Thomas Midgley, Jr., with the engine in which tetraethyl lead was first tested. On top is mounted the Midgley Optical Indicator

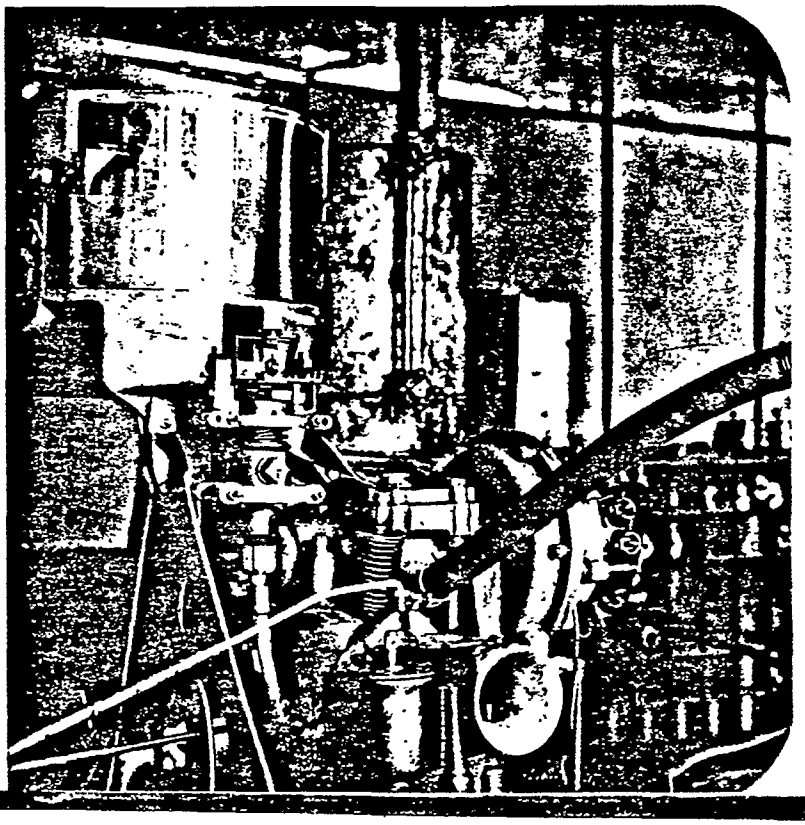


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"Shorty" Wells with the quickly-constructed apparatus which made tetraethyl lead in one-gallon batches. First run was 0.9 gallon

One-cylinder Liberty engine used by Midgley in his 1917 search for high-octane plane fuel. His answer: 70% cyclohexane, 30% benzene



rubber which cannot be answered yet, although scientists and technologists have been studying rubber for more than a hundred years. The purest natural rubber consists of four principal components, he stated: sol rubber, gel rubber, resin, and a sulfur-free protein.

Simple but Confusing

"Sol and gel rubbers seem to be chemical identities so far as can be determined by chemical analysis, but the difference in physical properties contradicts such a conclusion," he explained. "Sol rubber disperses (dissolves) completely in benzene and similar solvents, gel rubber merely swells; sol rubber vulcanizes to a useful product, gel rubber, to a leathery inelastic product that is quite useless.

"Gel rubber, however, 'breaks down' by mastication (milling) in air to give a material quite like sol rubber and which when vulcanized yields a product, in all known respects, the same as that obtained from sol rubber. To fail to differentiate between these two forms of rubber is certain to lead to confusion.

"In my opinion much of the confusion which has existed, and still exists, in rubber chemistry is due to a lack of appreciation of this simple fact by many rubber chemists and technologists."

Three of Mr. Midgley's "unanswerable" questions were described as being of technical interest: What happens when rubber is "breakendown," that is, masticated by kneading in air? What happens in vulcanization? Why does rubber retract or shrink after being stretched?

His four other questions, it was pointed out, are primarily of scientific interest, but the answers, if

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found, may have important bearing on technology of rubber: Are all molecules of sol rubber occurring in nature of the same size or is sol rubber a mixture of molecules of different sizes?

As yet, technologists do not even have pure sol or pure gel rubbers to work with, he continued. If the molecules are all of the same size, what is their molecular weight? What is the structural formula of rubber, that is, how are the atoms assembled that make up its molecules? If rubber molecules are open chains of atoms, what are the groups of atoms at their ends?

"The detailed chemical reactions which are involved in the breakdown of rubber are not at all understood," Mr. Midgley said, "yet the conditions which produce breakdown and the results have been studied by many investigators with fair agreement.

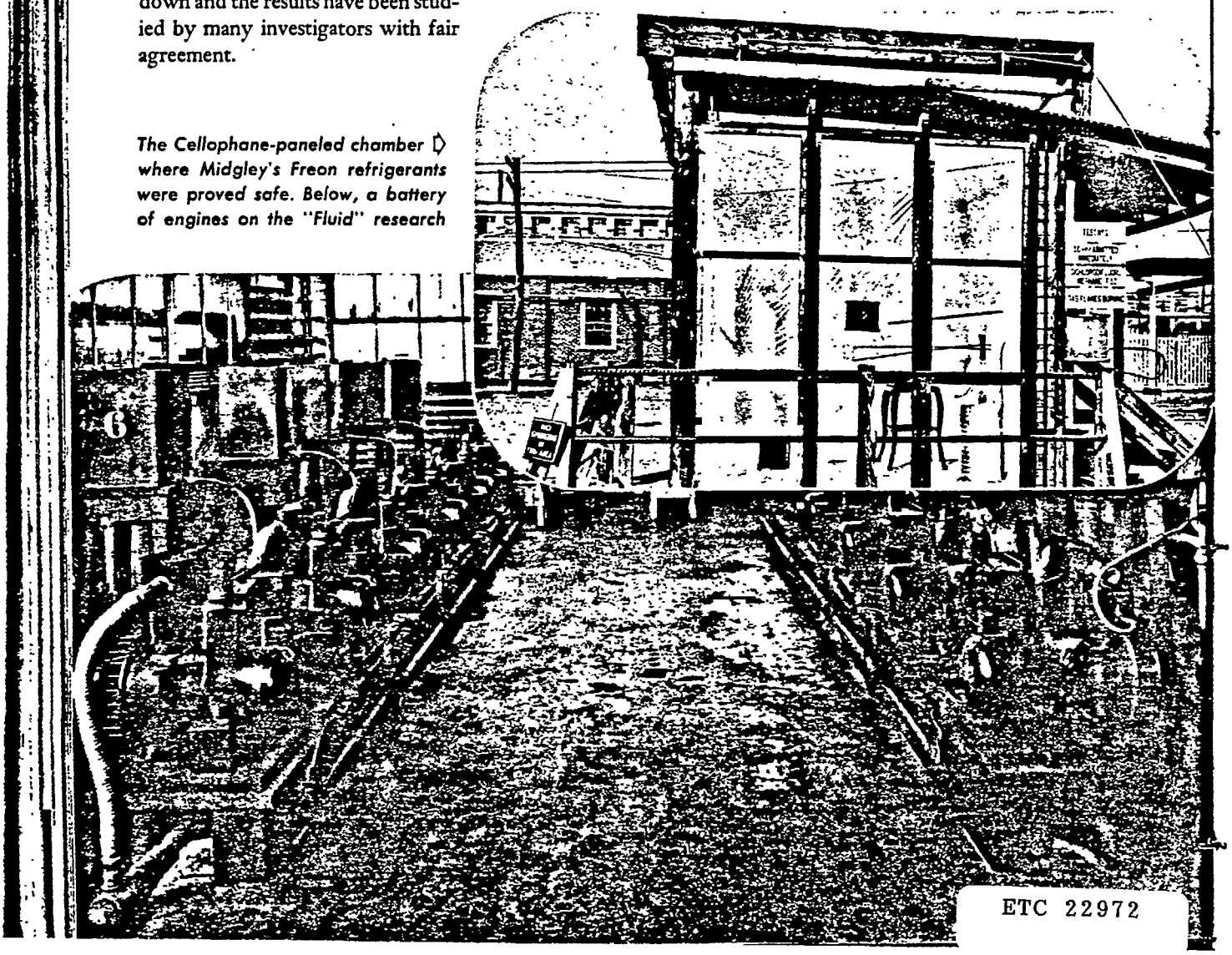
"It is now over one hundred years since Goodyear discovered vulcanization," he pointed out. "Broadly speaking, vulcanization is a process whereby a semi-useless vegetal product is converted into the most amazingly versatile raw material the world of industry has ever known.

Mysterious Molecules

"And yet, after a century, rubber chemists are in less agreement on the nature of the chemistry of vulcanization than Goodyear's neighbors were that he was crazy. Nor has a Hall of Fame jury yet been selected with brains enough to honor Goodyear's memory as it deserves. It is all most astounding but so also is vulcanization.

There are several theories to explain vulcanization and also the elastic quality of rubber, Mr. Midgley declared, but pointed to weak spots in most of them. He mentioned both Shecklock's and Mack's explanation of why rubber molecules may retract although molecules of paraffin, similar in structure, do not have this quality.

"I am not qualified to criticize either of the above theories," he concluded, "but I do feel qualified to criticize both rubber chemistry and chemists for not having mastered either of them more thoroughly. That they are difficult to master is no excuse, for the rubber chemist who expects to serve humanity well must be prepared to master things more difficult than either of these theories."



The Cellophane-paneled chamber ▷ where Midgley's Freon refrigerants were proved safe. Below, a battery of engines on the "Fluid" research

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LEAD



UGLY DUCKLING

THE APHORISM that time brings many curious changes is well exemplified by the history of lead. From what has been called "the vilest and most abject of metals," lead has steadily grown in importance until today it can rightly claim classification among the "precious" metals. Throughout the centuries until the advent of modern chemistry, mankind generally entertained a mean opinion of lead. Yet today many of our important industries would be severely handicapped if lead were not available, and the character of this blitz war would be vastly modified without this dull metal.

The alchemists, who considered lead the oldest of metals, were concerned primarily with turning it into gold by means of a "philosopher's stone" which they never found. The wiser chemist of a later day is more practical. He has learned how to turn lead into gold by making it serve mankind in hundreds of important ways. A small lump of gold could always buy a large load of lead, but the mere economic law that set the price of gold higher simply because of scarcity value has no validity in this day of value measured by use.

Lead has been of practical value to human progress for centuries, both in war and in peace. Few realize how much we depend on it today. But it did not achieve this prominence "over night." For hundreds of years little use was found for it, and even in recent times, lead was considered a waste product in the extraction of the more highly prized silver.

"Kuranga" — Bad Tin

The history of lead reaches far back into the mists of antiquity. It was known to the early Egyptians, Hebrews, Phoenicians and others. It bore at least 30 names in Sanskrit, some of them in common with tin. Tin in Sanskrit sometimes is called "kurupya," meaning bad silver, while one of the names of lead is "kuranga," or bad tin. The method of separating gold and silver from other metals, and of refining them by use of lead are described in the Old Testament.

Today lead plays a vital role on the fighting fronts. Modern armies, navies and air forces employ lead in numerous forms and for numerous purposes day in and day out. The most obvious and perhaps indispensable wartime use of the metal is for bullets. No other material or metal serves as satisfactorily in that capacity. The heaviness of lead, a property not possessed by other common, low-cost metals, enables a bullet to retain its initial velocity, and is a factor in its accuracy at long range. The amount of lead consumed in bullets totals many thousands of pounds. Nearly 30 pounds are required for each 1,000 rounds of .45 caliber ammunition, and about 16 pounds per thousand rounds for the .30 caliber ammunition used in our new Garand rifles. In World War I, when the fire power of the fighting forces was much less than it is today, the United States alone produced nearly three billion rounds of cartridges.

The usefulness of lead in ammunition does not end with the bullet. It also has a function as a detonator in the cartridge primer which ignites the powder that propels the bullet. But important as bullets are, modern armies require more than ammunition. Military strategy today is based on mobility and speedy concentration of men and matériel at desired points in large force. Essential are planes, tanks, trucks, warships, torpedo boats, submarines—a vast array of massive and complicated machines of war. Lead enters into the building and operation of all of them.

100-Octane Lightning

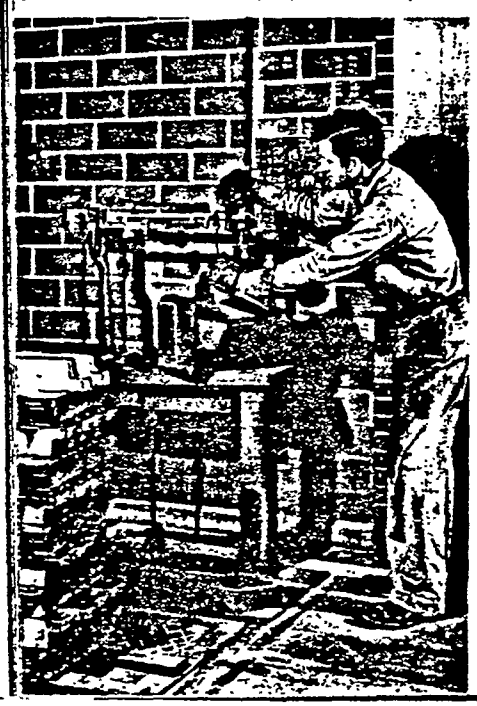
In World War II lead plays a new and extremely important role — as an ingredient of high octane gasoline. All of America's fighting planes today are designed for 100 octane gasoline, which means that they will outfight and outfly anything the Axis powers can put in the air. Put in the simplest possible terms, 100 octane aviation fuel is made up of a superior base gasoline, a high octane blending agent or mixture of blending agents and tetraethyl lead, a compound produced by the reaction of

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Lead, in Ethyl antiknock fluids, helps our planes outfly, outfight Nazi-Jap warbirds



These little lead pigs went to war — and gave some American boy's plane more power



ethyl chloride with an alloy of sodium and metallic lead. Tetraethyl lead, or just plain "lead" as it is called in the petroleum industry, is an important component of all high-grade gasolines; it is indispensable to 100 octane aviation fuel. It provides the final boost which pushes an already high grade fuel up the octane scale to the 100 mark. Those extra octane numbers enable our engineers to design planes that will fly faster, further and carry larger loads than those of our enemies.

From the standpoint of tonnage, lead's most important war function is in storage batteries, which are indispensable in today's military operations. Batteries propel submerged submarines, operate lights, signals and other electrical devices on surface vessels and in airplanes. They "turn over" the motors of torpedo boats, tanks, trucks and auxiliary field equipment.

Undersea Batteries

The quantity of lead required to supply this nation's armed forces with storage batteries is not easy to determine, but some idea can be gained from the character of the batteries used. The average automobile storage battery contains three cells, and from 20 to 25 pounds of lead. The battery room of a submarine contains from 200 to 260 cells and from 200,000 to 260,000 pounds of lead. Each cell has approximately 100 times the capacity of the average automobile battery cell. Some of the bigger submarines contain as much as 500,000 pounds of lead. So-called standby batteries on battleships and other large naval vessels are somewhat smaller in size, having cells about an eighth the size of those on submarines. Next in weight and size are those on torpedo boats, large tanks, trucks and other Diesel-powered vehicles. Airplanes are fitted with a 6-cell battery.

Less impressive in terms of tonnage than storage batteries, but equally important in the operation of military equipment is the use of lead in the alloy linings of engine and machinery bearings. Lead is practically a self-lubricant. The amount of it in bearings varies widely, ranging from fractions in some silver and tin alloys to 10% or more in bronzes, and to lining materials made principally of lead hardened with tin, antimony, copper or arsenic. Because lead "conforms without breaking," it is widely used along with tin in a class of babbitt metal for automobile engine crank-shafts and connecting rod bearings.

Lead also plays its familiar role in the protection against rust and the elements as a paint pigment. Practically all war equipment needs a protective coat of paint. In war as in peace, paints containing red lead and white lead are a frequent specification where metal surfaces must be preserved. Lead compounds such as red lead and white lead are standard protection for iron and steel. Red lead, particularly, has a peculiar ability to stick to metal.

The tonnage of lead turned paint, as red lead and white lead, is perhaps greater than that for any other use. Lead covered cables require up to 200,000 tons of lead a year, and the making of insecticides takes about 16,000 tons yearly.

Protective Wrapping

No use of lead in its metallic form is more essential to modern life and industry than its employment in sheets, pipes and coatings on other materials. In the chemical industry, lead plays a leading part in the han-

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dling and manufacture of sulphuric acid, that chemical reagent that has such wide and important industrial uses. This efficient combination of hydrogen, sulphur and oxygen lies at the very foundation of most of our chemical arts and industries. We live increasingly in a chemical age, and without lead, our progress in that age would be seriously impeded if not entirely halted. Here are just a few of the various businesses important to our industrial fabric that are chemical in their essential processes: the making of dyes, paper, ceramics, fertilizer, cement, soaps, paints, foodstuffs, perfumes, glass (good glass often contains as much as 75% lead), drugs, explosives, petroleum products, storage batteries, leather and artificial silk, smelting and refining of metals and the manufacture of different kinds of steel.

If sulphuric acid is not used directly in all these industries, it is used indirectly in the preparation of materials that are essential to them including even the manufacture of a great many other useful acids.

Jailer for Acids

Sulphuric acid owes its wide serviceability to the readiness with which it attacks all sorts of chemical substances and breaks up family relations. With such an active and undiscriminating agent to deal with, it becomes a question how to handle it while it does its useful work. Platinum, glass and lead have been found best suited to hold this fiery liquid. But to two of these there are objections. Platinum is too expensive, and glass is not practicable for the great chambers used in large operations of modern industry. Upon lead, consequently, falls the task of playing jailer to the acid.

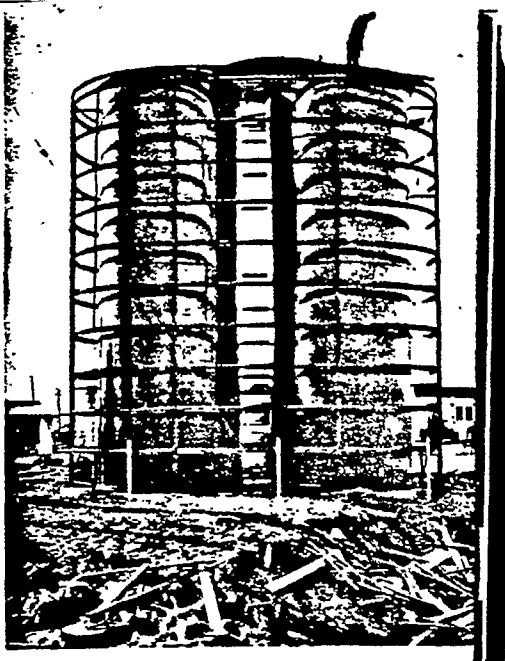
In printing, lead is used in the type, the plates for the press, in the inks and in paper making. For covering broad surfaces, it is either rolled into sheets of varying thicknesses, or coated in one way or another upon sheets of steel or other metal. Where the utmost of the metal's characteristics is desired, sheets of pure lead or antimony-hardened lead are used, as on roofs, in X-ray rooms, in the chemical chambers mentioned above, and in pumps and piping that carry corrosive liquids. Poison gas shells in World War I were lead-lined, else the gases would have eaten the steel.

A Raw Material too

In the great oil refineries, lead is used not only in pipes and tanks and for linings because sulphuric acid is present, but the metal also enters into manufacturing processes as well. The crude oil in most regions contains sulphur compounds and tarry substances that the distillation process does not remove. Therefore, the distillates must be refined, and in the refining process, sulphuric acid is used, thus requiring lead-lined tanks holding thousands of gallons, and lead piping. In another refining process, sodium plumbite is used. This, as its name implies, is a combination of sodium and lead.

Oil yielding sand in nature's rocky underground often is sabotaged by bottom water leakage. In such emergencies, flood control thousands of feet underground is accomplished by quick plugging with ropes of hairy textured lead wool. In a wire cartridge, this lead is plugged down the hole and tamped to fill every crack and crevice of water-leaking cavity. No more efficient or faster method of sealing off the unwelcome water has been devised.

In the rubber industry, the use

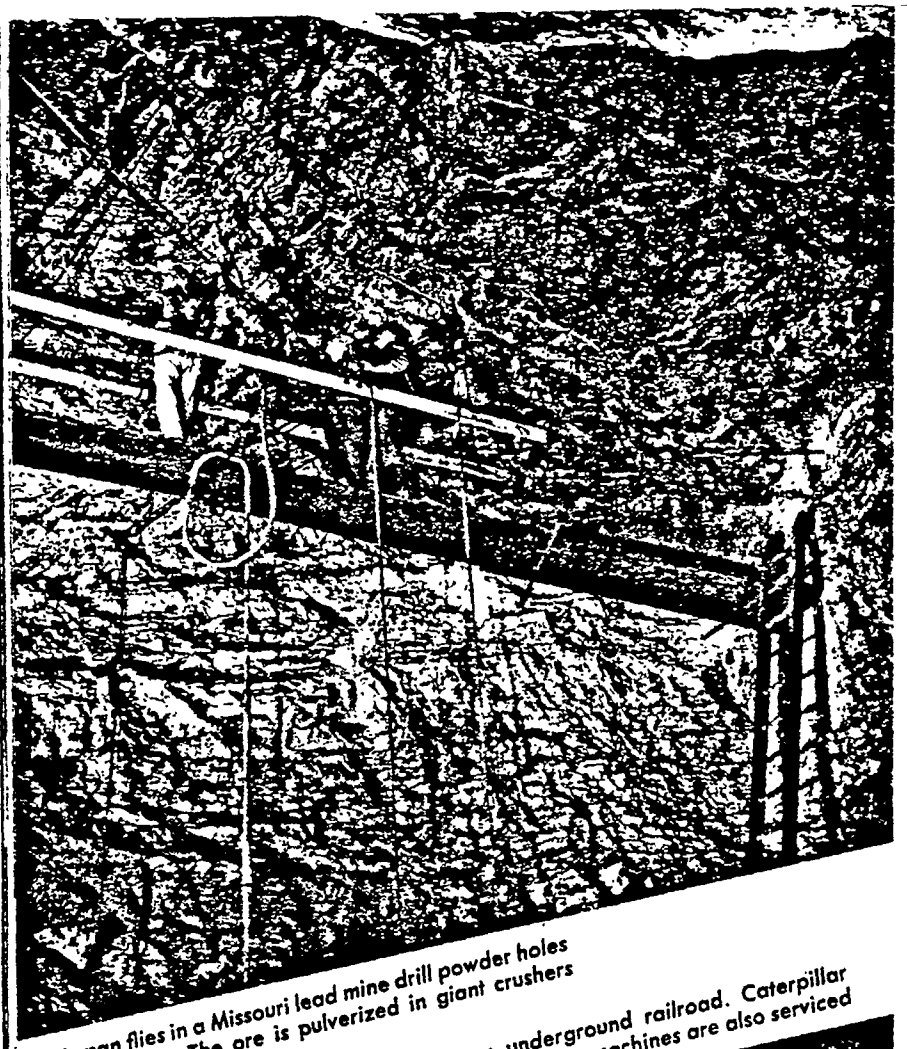


Oil companies and others use lead-lined tanks to keep acids, unruly chemicals under control

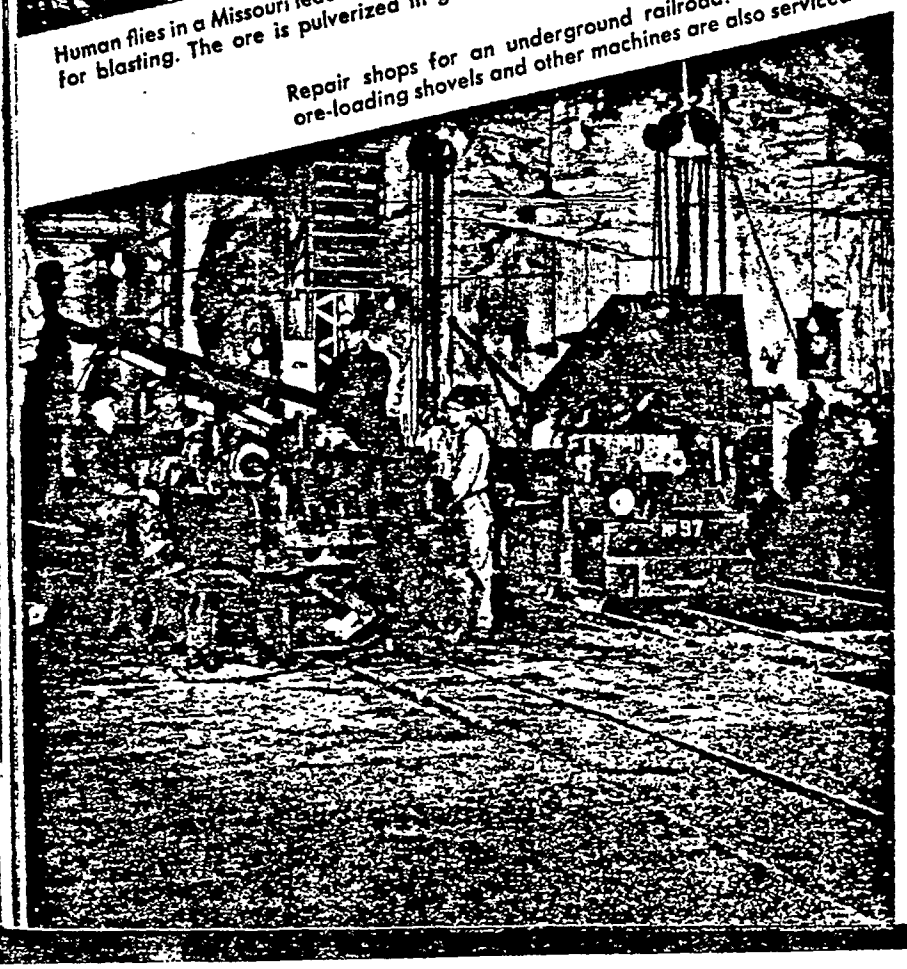


Familiar street scene: multi-strand telephone cable, encased in lead, being fed into a duct

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Human flies in a Missouri lead mine drill powder holes for blasting. The ore is pulverized in giant crushers



Repair shops for an underground railroad. Caterpillar ore-loading shovels and other machines are also serviced

of lead is important in the vulcanizing process and to strengthen such rubber goods as hoods, gloves and aprons for use by persons who work with X-ray. These goods contain as much as 60% lead. Ordinary rubber clothing like over-shoes, raincoats, boots, hose, etc., usually contain from 10% to 15% lead.

Dig Most, Use Most

The United States normally produces a quarter to a third of the total world production of lead, which in 1939 amounted to 1,900,000 tons. Of the other countries, Spain, Germany, Australia, Burma, Canada, and Mexico have the most important deposits. For many years the world looked to Spain for the greater part of its lead supplies. In 1897, Spain was caught and passed by the United States as a lead producer, but even as late as 1913, Spain was still second only to the United States. We produce more because we use more than any other country. Fortunately, we have an abundant supply.

In the United States, Missouri is the banner lead state, with Idaho second. Utah and Oklahoma stand in next position. These four states furnish 85% of the United States lead production. Although the other states are not in their class, virtually all western states furnish some lead.

In Missouri, where the great St. Joseph Lead Company mines are located, the ore is usually found from just below the surface to down around 600 feet. Deposits are discovered by test borings, and where these borings indicate commercial quantities of lead ore, shafts are sunk, and in time tunnels push out in every direction. Dynamite hollows out great chambers, and the lead-bearing ore is hoisted to the surface where it is put through a series of revolving

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crushers and broken up into tiny bits. When the mass has been crushed to particles as fine as sand, it is fed down a long table with water where lighter rock particles are separated from the heavier lead-bearing pieces.

Man-made Mountains

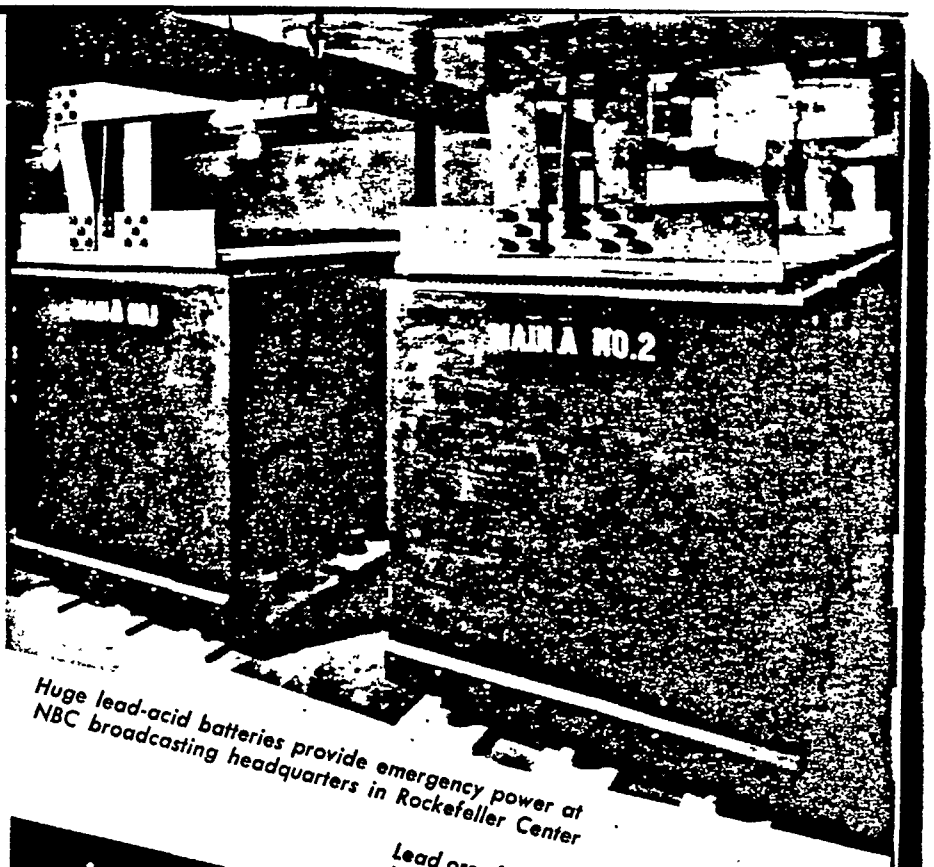
This separating process is called concentrating, and after passage through the table, the ore particles are called concentrates. The rejected rock particles are called chats in Missouri, and huge mountains of them are a familiar part of the landscape in every active mining area.

There is another kind of separating process called jigging. This consists essentially of carrying the bits of rock upward on a stream of water. The rock bits float more easily in this rising current, and are drawn off over a dam too high for the heavier ore to reach. After this operation, the concentrates are ready for the smelter where refining operations further purify the metal.

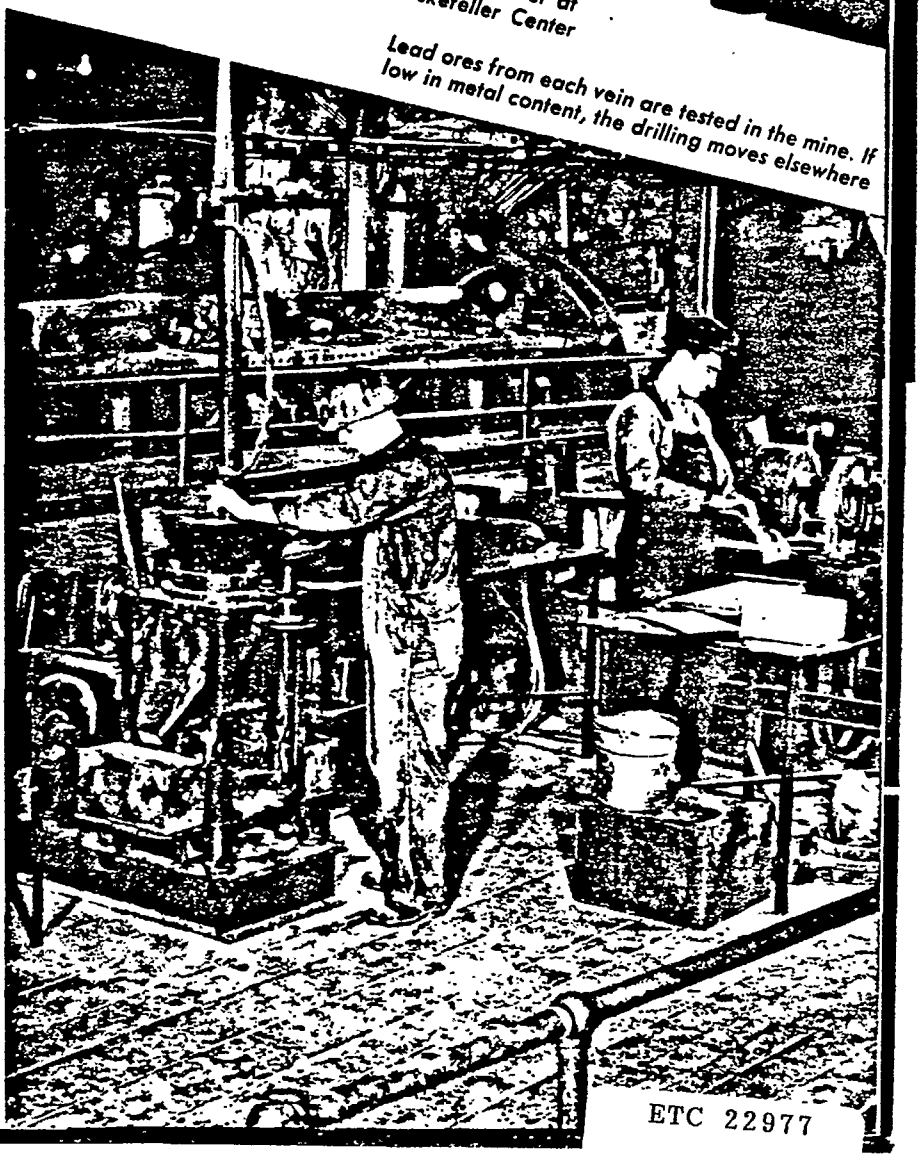
Substantial Citizen

Lead is one of the most durable of metals. This is so because it forms a protective film (lead oxide) on its surface in a union with oxygen, and "rusting" stops there. If scraped away, the chemical action repeats and again stops with the thin film. In the National Lead Company offices in New York is a two-foot long piece of lead piping dug up in old Roman ruins, which today is as good metal as when first laid down, some 1,800 years ago. It shows no further corrosion below the first thin coating of oxide.

So the Ugly Duckling of the metal family has become — not a graceful swan — but a leading citizen, on whose virtues are based many of the institutions of today's civilization.



Huge lead-acid batteries provide emergency power at NBC broadcasting headquarters in Rockefeller Center



Lead ores from each vein are tested in the mine. If low in metal content, the drilling moves elsewhere

ETC 22977



STREAMLINED JOB TRAINING

AT A MIDWESTERN machine plant one afternoon not long ago, the president called one of the foremen to his office.

"Buck," he said, "I want you to meet Mr. Smith here. Mr. Smith is one of a group of men who's taking time off from his own job to help the War Production Board with their TWI program."

"TWI?" asked Buck. "Isn't that an airline?"

No, answered the president. TWI stands for Training Within Industry, he explained – a program originated by industrial men to increase war production through better training of workmen.

New and Better Way

"That's fine," answered Buck, "but

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where do I come in? I'm a foreman already."

Mr. Smith entered the conversation. "Buck," he asked, "do you regard teaching as a part of your work here?"

"No sir. I'm more a pusher. If a man comes to work for me he's got to know how. If he can't produce he goes out."

"How do you break a new man in, Buck?"

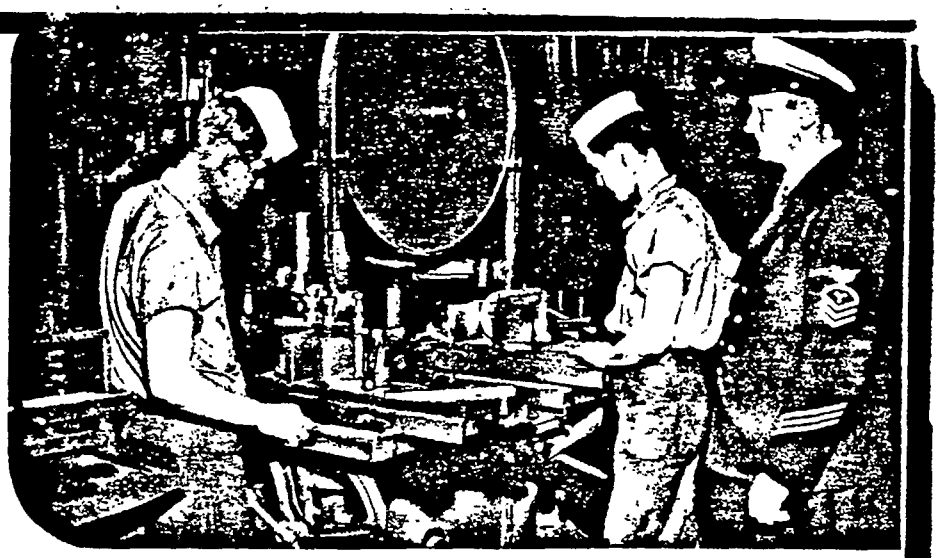
"Well," said the foreman, "when he comes in I look him up and down and tell him 'There's your machine. The last guy stayed there ten days. See how long *you* can last.' Then he breaks his neck trying to catch on."

The president and the man from TWI exchanged a look. The president turned to the foreman again.

Learning a New Skill

"Buck," he said, "we're going to see a lot of new men coming into our plant these days. We won't be able to pick and choose from a number of skilled hands as we used to. We'll have to take green men and half-seasoned men and train them right here. You and the other foremen in our plant are going to be their instructors – and to make it easier for you to break them in the TWI has worked out a short course in the art of instruction . . . the ABC's of how to put a man on a new job and get him broken in to it. The course takes ten hours. Mr. Smith is here to arrange that program for you fellows."

So Buck McBride and the seven other foremen from the different branches of the plant took the training program to learn a new skill – that of instructing. So did the job setters, the lead men and other old timers, all of whom were to have a hand in breaking in the new men



TWI job-training principles are used in Ford's cadet training school



TWI short cuts help inspectors learn their trade at Watertown Arsenal

A leadman shows how jigs make an intricate wiring assembly manageabl



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who came through the gates every day for the new shifts, for replacements, or to staff the new wings on the plant. At first the old timers sniffed at the idea among themselves. Was this fellow from outside going to teach the old hands how to set up a job, or turn a better piece of work on a lathe?

Not at all, he told them. He was there to help them get the hang of passing on their skill to the beginners — who formerly had learned the trade by watching and asking questions while they made mistakes, injured themselves or machines, and wasted material. There is no time today for mistakes or personal injuries, he explained, no machines to spare, no material to waste. He enlisted their craftsmen's pride and their patriotism in the chore of teaching themselves to teach others — and they took hold with a will.

They learned how to break down each job into a series of separate operations so the novice could see how it was done. They learned to highlight the things they had long since taken for granted — the key points of a job, the little knacks and short cuts involved, the timing, the "feel" of a tool or machine that enables a man to turn out finished work. When new men were put under their tutelage, some of the old hands showed such aptitude with them that as the plant expanded they found themselves in line for advancement.

But the greatest enthusiast for the plan is Buck McBride himself. He no longer greets a newcomer with a shot of tobacco juice and a challenge to "see how long *you* can last." He has a step-by-step program that gets better results. He has a time table on how much skill the average man should develop, and how soon. He shows the learner his work step by step, so that no single operation is done incorrectly. He sees that the right tools, the right equipment and materials are ready, and that the machine or assembly bench where the worker will spend his time is properly set up and arranged just as he will be expected to maintain it.

When the newcomer arrives he finds a gruff but friendly tutor. "Call me Buck, son. Tell me what you know and we'll go on from there. I'll start you off and when you know the job we'll put you on your own. You can always ask questions from Jerry here at the next bench. Keep your eyes open, learn the job *right* — and we'll have our eyes on you to see how soon you're ready for the next step. Up-grading is the new rule here. As soon as you can move up the line there's a new job, with higher pay, waiting for you."

For Old Hands too

Such are the results of the Job Instructor Training work of the TWI — but they show only one phase of a broad program. In a number of shops TWI has materially helped in solving such problems as errors in parts manufacture, breaking in old men on new type equipment or new jobs they have not handled before, re-training those who have learned the wrong way, or fitting workmen to the tasks for which they have the greatest aptitude and interest so that square pegs won't be stuck in round holes. "JIT" promotes safety practices, helps men learn the correct handling of equipment and principles of good shopkeeping, such as proper piling of material stocks, elimination of unnecessary scrap, reducing the number of reworked jobs.

But "Training Within Industry" covers more than shop routine. It shows the old hands in several different departments how to analyze their own jobs so they can pass along their know-how to the juniors who will be working alongside them. And as the job is re-appraised new efficiencies are often developed, new methods of cooperating with other departments, in everything from bookkeeping to the broader problems of management. Wherever the principles of Job Instructor Training will apply to the streamlining of our war production, there you will find a program and skilled volunteers ready for the asking. It is one of industry's own contributions to efficiency — and to the men who work within industry.

To Channing Dooley, of Socony-Vacuum, goes the credit for sparking off the whole program. He and a few men who knew its possibilities, and are now devoting their full time to developing them, first carried the idea to the War Production Board. WPB said "Fine—go ahead!" They went ahead, basing the training techniques along the lines of job instructing which old "Skipper" Allen first developed at the Hog Island shipyards during the last war. The present plan is a condensed and hard-hitting version of what worked then — and has worked wherever industry has used it since.

Fifty of the nation's leaders in industrial training, loaned by their companies to WPB for the purpose, are now busily explaining the possibilities of this streamlined method of "how to get a man to do a job better." And they are getting results — as Buck McBride and 70,000 of his fellow foremen in 2300 war plants across the country will tell you with hearty enthusiasm.

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WHAT IMPORTANT WAR MATERIAL ARE THESE MEN MAKING?

Look at the pictures carefully. We'll give you some hints, but we're ready to bet that few men—even though they may use the product daily—can identify the product being manufactured without reading the bottom of the page.



1. That's just pure table salt you see dropping into the bin, but in this business they call it "sodium chloride."



2. These gentlemen are concerned with reconcentrating "hydrochloric acid"— another one of the chemicals necessary in making our product.



3. There is no natural gasoline in this "Hortonsphere." It's one of our storage tanks for "ethyl chloride."



4. This is almost a dead give-away. That's pig lead being weighed out.

You've probably guessed it by now, but if you haven't . . . The product is Ethyl brand of anti-knock fluid, used by oil refiners in the production of the high-octane gasolines which today are giving extra power to America's planes, tanks and other motorized fighting equipment. That is the most important job for Ethyl fluid today, but sufficient plant capacity exists to supply all war needs and still have tetraethyl lead for improving gasoline used in the tractors, trucks, buses, and passenger cars of our motor transportation system.

ETC 22981

Please don't keep this confidential—



1. "I have it from an absolutely reliable source that this country...



2. has plenty of all *three* of the things needed to produce large quantities of...



3. high-octane gasoline for warplanes and other mechanized equipment.



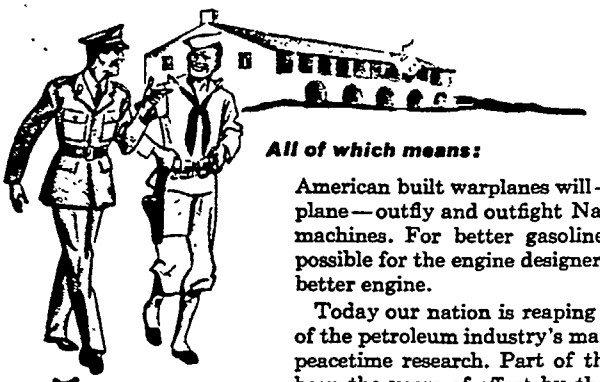
4. We have adequate resources of high quality crude oil and...



5. superior refining processes that were developed by America's petroleum industry and...



6. adequate production of antiknock fluid containing tetraethyl lead.



7. Put those three things together and you know why we and our Allies have the best fighting fuels."

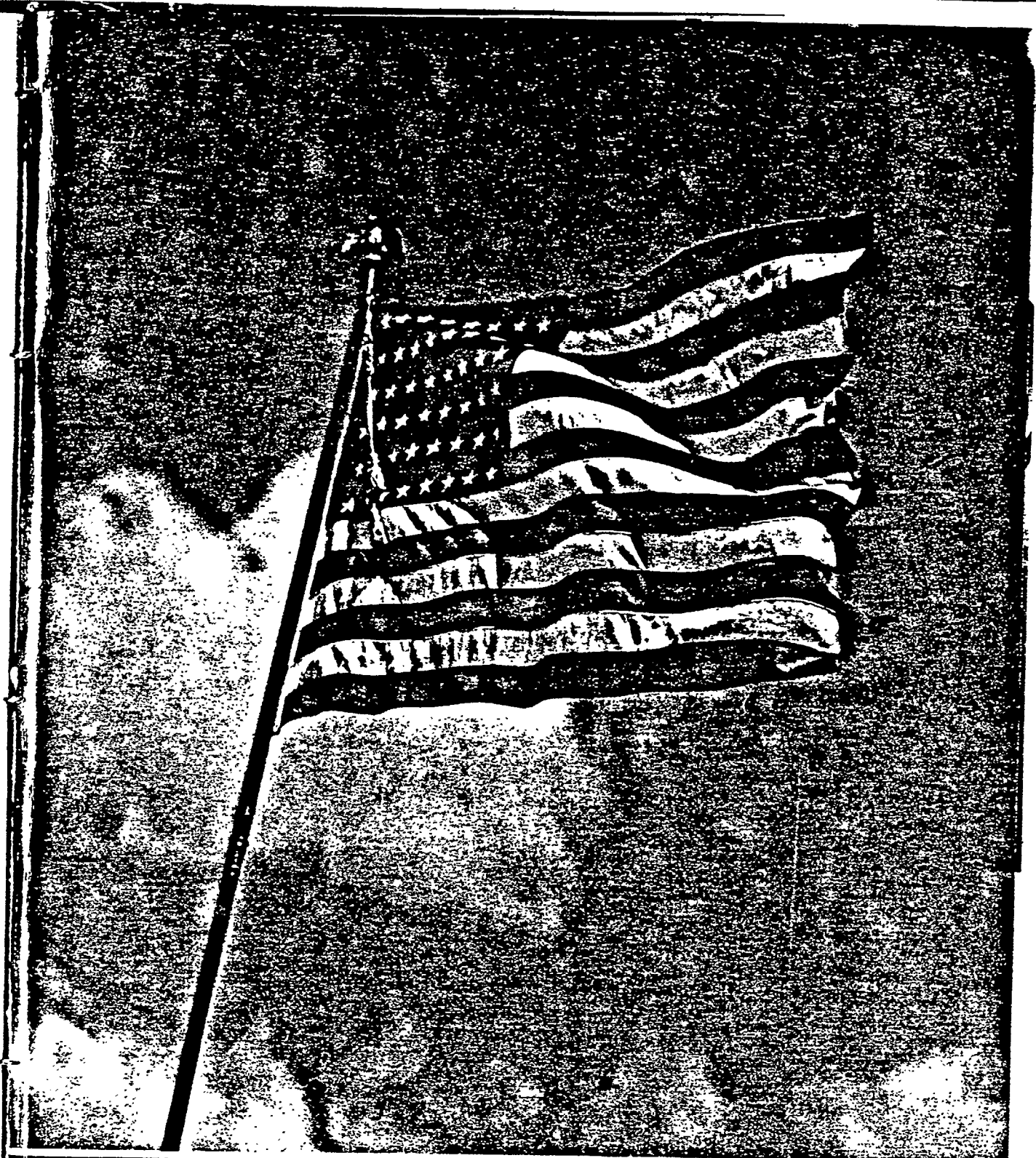
All of which means:

American built warplanes will—plane for plane—outfly and outfight Nazi and Jap machines. For better gasoline makes it possible for the engine designer to build a better engine.

Today our nation is reaping the benefit of the petroleum industry's many years of peacetime research. Part of this job has been the years of effort by the technologists of the Ethyl Corporation in helping to develop better fuels and engines. It is our privilege today to offer our product, our technical experience and our research laboratories to the cause of American victory.

ETHYL BRAND OF ANTIKNOCK FLUID IS MADE BY THE ETHYL CORPORATION

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ETHYL NEWS

ETC 22983

JULY & AUGUST ★ 1942

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What will cars and fuels be like after the war? A prudent examination by Dr. Graham Edgar of some probabilities and possibilities in design, engineering, and octane specifications

* * * * * *

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Manufacturers of Ethyl Fluid, used by oil companies to improve the antiknock quality of aviation and motor gasolines

July & August • 1942

ETHYL NEWS

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THOSE WHO DENY the practical possibility of a direct aerial attack on America are lulling the American people into an utterly false sense of safety which may prove as disastrous to us as the 'Maginot Line mentality' proved to France. . . .

"As soon as hostile air power can strike across oceans as readily as it now does across narrower waters, the United States will become every bit as vulnerable as England. Broad oceans will then be just so many English Channels, Skagerraks, and Sicilian Straits. . . .

"We need only make the assumption of a vastly expanded aviation range – an assumption fully justified by the scientific aeronautical facts – and instantly the exposed position of America becomes evident.

"The range of military aviation is being extended so rapidly that the Atlantic will be canceled out as a genuine obstacle within two years, the Pacific within three years. After that, in five years at the outside, the ultimate round-the-world range of 25,000 miles becomes inevitable. At that point any nation will be able to hurl its aerial might against any spot on the face of the globe without intermediary bases."

— *So Says Seversky*

The paragraphs quoted above were picked at random from the best selling book, "Victory Through Air Power," by Major Alexander P. de

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Seversky. Major Seversky is an expert. A Russian ace in World War I, he was later an associate of General "Billy" Mitchell and a consulting engineer to the War Department. He is a leading designer of military aircraft and in 1938 set an east-to-west speed record of ten hours across the United States in a plane of his own design.

Seversky's predictions, startling as they are, have proved to be accurate in the past. In June 1941, he wrote that our projected two-ocean navy would be completed "just in time to have all of its battleships scrapped." On June 17 of this year the battleship construction program was revealed to have been scrapped in favor of aircraft carriers. And two days after this announcement, commenting in a newspaper article on the vulnerability of aircraft carriers as revealed in the Coral Sea and Midway engagements, Seversky wrote again:

"Long-range land-based aviation is advancing with such rapid strides that the remaining margin of usefulness for the carrier is certain to be wiped out soon.

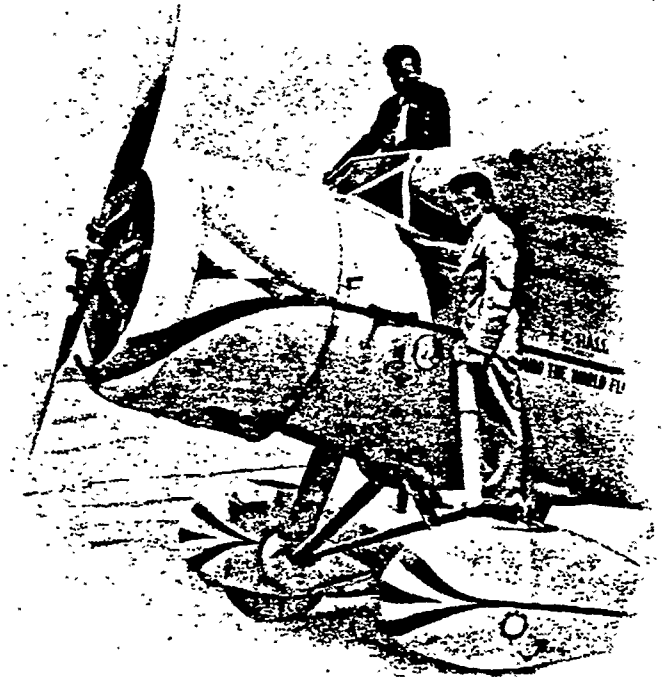
"It makes sense to convert unfinished cruisers into carriers. But carrier construction now undertaken from scratch will be completed just in time to be scrapped.

"Big bombers and torpedo planes with thousands of miles of operating range can be built faster than the carriers earmarked for annihilation by land-based air power. Such air power is the only force that can adequately protect our navy."

Let's take a look at the facts on which Seversky bases these significant predictions. Let us look at some of the highlights in the history of long-range flight.

In 1919 the oceans which divide this little planet of ours into continents began to shrink. On May 16 of that year three U. S. Navy flying boats hopped off from Newfoundland. Two of them were forced to land in the sea, to be picked up by the warships lined up along the course, but Lieutenant Commander A. C. Read brought his NC-4 safely to the Azores, then on to Lisbon and London. He was gone two weeks; actual flying time was only 56 hours and 42 minutes.

Around the world in eight days — Post and Gatty



Two weeks later, on June 14, two British officers, Captain John Alcock and Lieutenant Arthur W. Brown, took off from St. Johns, Newfoundland, on the pioneer nonstop flight across the bleak Atlantic. After 15 hours 57 minutes of flying through blinding fog and icy gales over 1,936 miles of open ocean they came down on the Irish coast.

In 1924 America, the birthplace of aviation, appropriately enough sent the first aerial expedition around the globe. On April 6 of that year four U. S. Army Air Corps planes roared into the air at Seattle, Wash. Major Frederick L. Martin, in command, was forced out by a crash before leaving the American continent but the other three planes made their way safely across the Pacific by way of the Aleutians and Kamchatka to Japan – a route that may become popular soon for American war planes.

On May 9, 1927, Captain Charles Nungesser, famous French ace of World War I, and Captain Francois Coli took off from LeBourget Field in Paris in their monoplane *White Bird*, bound for New York on a nonstop dash across the Atlantic. They were never heard from again.

"Spirit of St. Louis"

While the world was still wondering about their fate and while other pilots were preparing feverishly for trans-oceanic hops, a young airmail pilot glided into Curtiss Field, Long Island, after a speedy trip from the Pacific Coast. Charles A. "Slim" Lindbergh made his preparations quietly but carefully, and on May 20, 1927, he took off alone, Paris bound, in a Ryan monoplane powered with a 200-horsepower engine. Just 33 hours and 30 minutes later he landed at LeBourget Field, after a solo flight of 3,610 miles

which thrilled the entire world.

The first east-west non-stop flight from Paris to New York was carried out successfully in September, 1930, by Captain Dieudonne Coste and Maurice Bellonte in their single-engine sesqui-plane, *Question Mark*. The Frenchmen covered the 4,100-mile distance in 37 hours and 18 minutes.

A year previous to this flight, Coste and Bellonte had flown the *Question Mark* to a distance record of 4,877 miles from Paris to Tsitsihar, Manchuria, in 51 hours and 39 minutes.



Pangborn and Herndon—Japan to U. S. non-stop

Round the World in 1931

A flight that stirred popular imagination more than any since Lindbergh's feat was the round-the-world journey of Wiley Post and Harold Gatty in 1931. Leaving Roosevelt Field in a drenching rain on June 23, Post pushed his Wasp powered Lockheed Vega monoplane *Winnie Mae* to Berlin, then across Russia and Siberia to Alaska and back to New York in the astounding time of eight days 15 hours and 51 minutes, including all stops for refueling and rest.

Not long after Post's return, America regained the non-stop distance record when Russell Boardman, former cowboy, and John Polando, ex-auto mechanic, spanned the 5,012 miles from Floyd Bennett Field, New York, to Istanbul, Turkey, in 49 hours and 20 minutes in their Whirlwind powered Bellanca, *Cape Cod*.

Only a few minutes after the take-off of Boardman and Polando on July 28, 1931, Hugh Herndon Jr., New York socialite, and Clyde Pangborn, veteran barnstormer, sped down the runway in their Wasp powered Bellanca, *Miss Veedol*, in a round-the-globe shot at Wiley Post's record. They ran into many difficulties en route and by the time they reached eastern Asia were many hours behind the mark, so they decided to try for the $25,000 prize offered by the Tokyo newspaper *Asahi* for the first successful non-stop Pacific flight from Japan to the United States.

They telegraphed for permission to land in Japan, but started for the island empire before they received an answer. On the way to Tokyo they flew over and photographed, without malice aforethought, many areas forbidden to foreigners by the Japanese military. Our little yellow "brothers" were evidently plotting some deviltry even back in those days, for they were exceedingly touchy about the incident. As a result, Herndon and Pangborn were detained for a long time by the authorities and narrowly escaped a lengthy stay in the local bastile.

The year 1931 also saw the first mass flight over the Atlantic when ten Savoie Marchetti S-55 flying boats, commanded by Italy's General Italo Balbo, flew in formation over the 1,864 miles of water from Bolama, Africa, to Natal, Brazil, on the last of a seven-hop 6,450-mile flight from Orbetello, Italy. The ocean trip took 17 hours and 10 minutes.

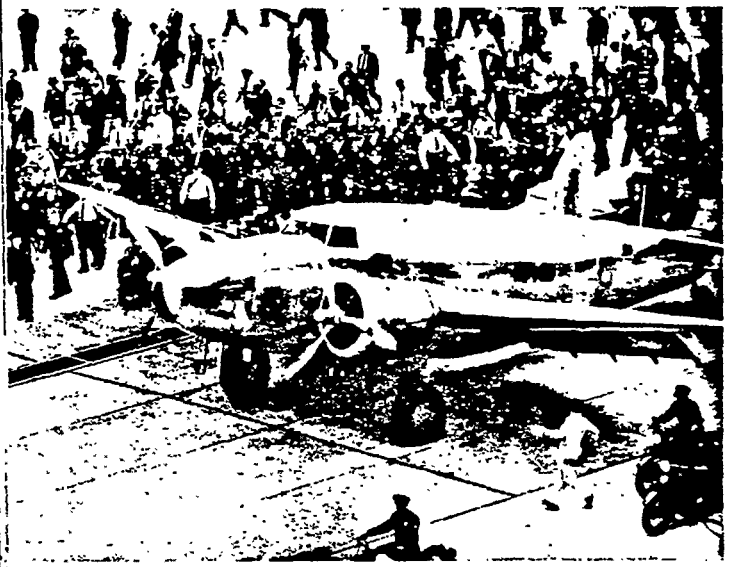
In 1933 Post and Balbo bettered their earlier records. On July 22 the redoubtable Oklahoman landed his famous *Winnie Mae* in New York, after a solo dash which cut to seven days 18 hours 49 minutes the round-the-world mark he and Harold Gatty had hung up two years before.

On July 1 of that same year Balbo led away from Orbetello, Italy, a squadron of 25 Savoie S-55 twin-hull seaplanes, manned by 100 officers and men, on a 6,100-mile mass flight to Chicago. They reached the mid-western metropolis, via Amsterdam, Ireland, Iceland, Labrador, and Montreal, on July 15 in

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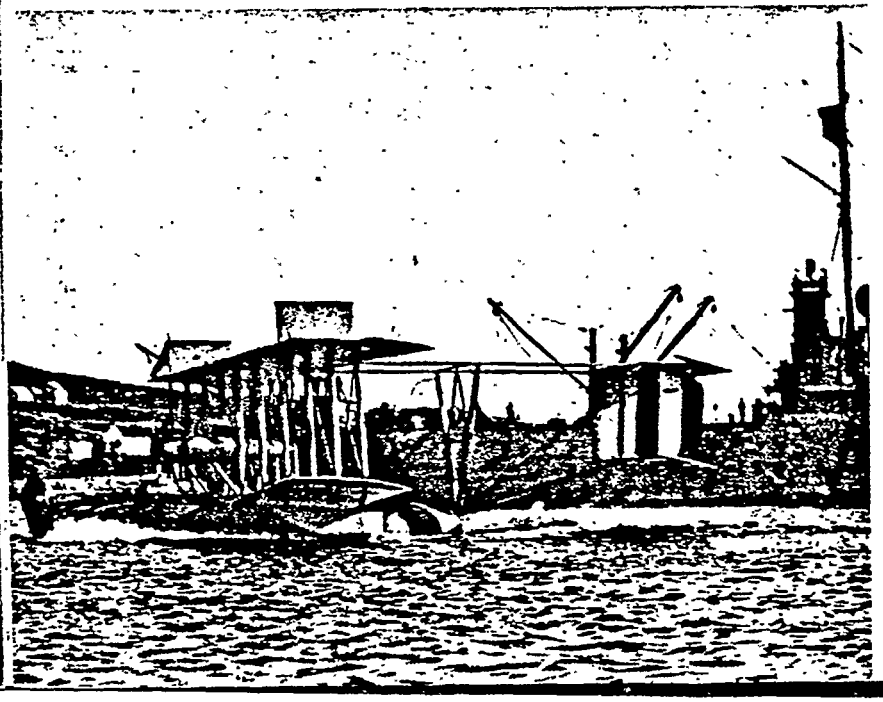


Coste and Bellonte, first Paris-New York flyers



Howard Hughes circled the earth in less than four days

The Navy's old NC-4, first plane to cross the Atlantic



the total flying time of 47 hours and 50 minutes, after maintaining formation, despite heavy fog, on the 1500-mile ocean hop from Iceland to Labrador. One plane was lost in Amsterdam on the westbound flight and another on the return trip, but 23 of them completed the 12,000-mile round trip and gave a startling demonstration of the future possibilities of long distance military flying.

2400 Miles in Formation

The U. S. Navy outdid Balbo in January, 1934, by completing the longest mass flight yet made. Six Consolidated flying boats under Lieutenant Commander Kneffler McGinnis flew from San Francisco's Golden Gate to Pearl Harbor in 24 hours and 45 minutes. This overwater hop of 2400 miles in military formation surpassed by almost 600 miles the longest single hop of Balbo and his men.

By 1935 long trans-ocean flights had become so commonplace that Pan-American Airways inaugurated a regular service to the Orient.

An aerial epic was written in June, 1936, by three Russian flyers, Valeri Chkaloff, Georgi Baidukoff and Alexander Beliakoff, who made the first non-stop flight from Moscow to the United States over the North Pole. Their plane, powered with a single 950-horsepower engine, landed in Vancouver, Wash., after navigating a great circle course of 5,288 miles over the pole in 63 hours and 17 minutes.

The last record-shattering long distance flight of importance occurred in July 1938, when Howard Hughes, Pacific Coast millionaire, and four companions circled the globe in the total time of 91 hours, thereby smashing to smithereens all previous round-the-world marks. Hughes' trip was a triumph of sci-

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entific flight and his plane, a Lockheed transport powered with two Wright Cyclone engines, was a flying laboratory.

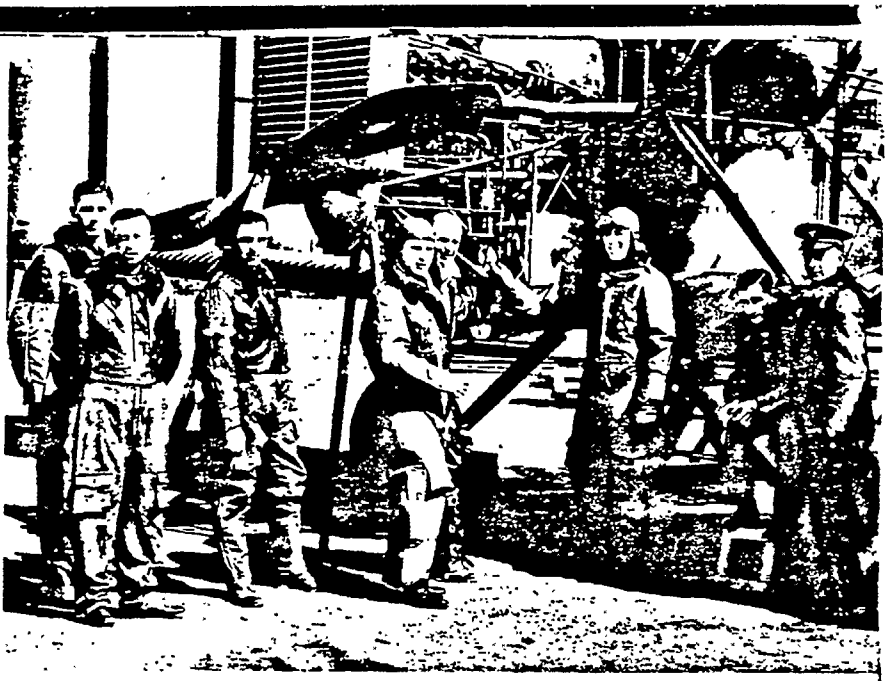
Aviation had come a long way since 1919!

Most of these long distance flights were made in the interests of peace and good will by airmen of America and her allies. Will not their purpose be perverted by our enemies to bring death and destruction to our cities? In regard to this, Major Seversky writes:

"Americans are the natural masters of the new aerial weapon, if only they become conscious of the fact and act without delay. What enemies can do to us across the oceans, we can do to them even more thoroughly and more decisively, because we have more of what it takes in materials, inventive skills, and the natural technological psychology of our people. Given the appropriate equipment . . . we can impose a suffocating tridimensional aerial blockade on the enemy. After defeating his air forces, we can smash his economic conduits on the high seas, and at the same time sever the arteries of his life inside his own frontiers."

Peace on Earth—by Air

Judging from the opinions of Seversky and other experts, air power would seem to be the key not only to victory in this war but to the maintenance of peace after the victory. If America, a peace-loving nation, has the world's most powerful air force, she could enforce peace throughout the globe. With the threat of destruction by American airmen hanging over his cities, what potential aggressor is not going to think long and carefully before plunging the world into another maelstrom?



First Army aviators to fly to Japan — April, 1924

Seversky, super-bomber prophet, with Jacqueline Cochran



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WHAT ARE THE JAPS FIGHTING FOR?

By Roger C. North

IT is a safe guess that the Japanese had no thought of conquering or subjugating America when they blitzed Pearl Harbor. Any talk about "dictating the peace from the White House" is for home consumption. Neither were they committing hara-kiri. They wanted economic *lebensraum;* they had calculated the cost, down to the last yen and the last soldier, and the gains appeared worth the sacrifice. So they chose the time and place and started shooting.

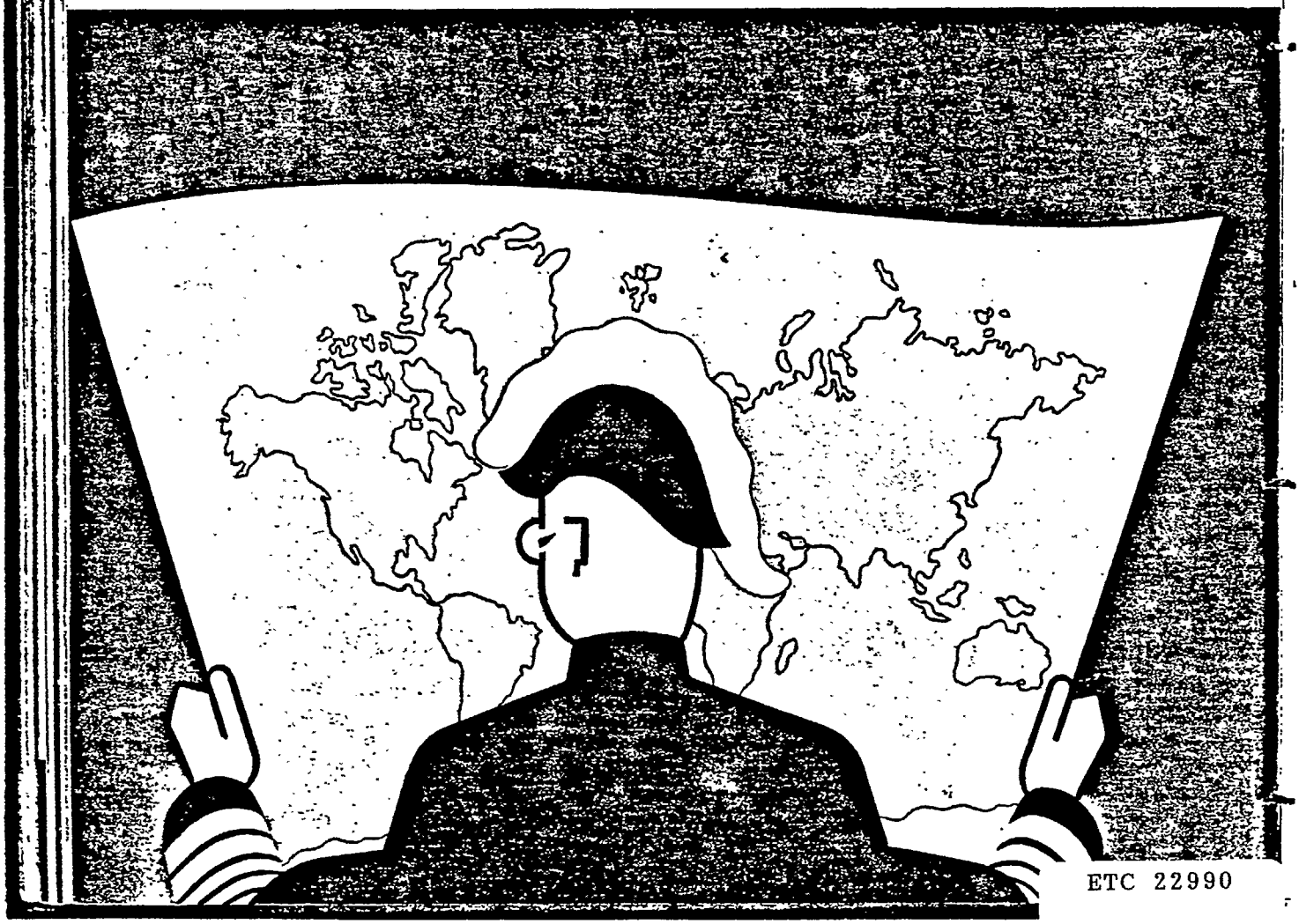
What "gains" did Japan expect, and how was she to get them?

Primarily, the Japanese wanted to throw the white man out of Asia and run that half of the world for themselves. They would then control the world's basic supply of rubber, tin, silk, pyrethrum, and such medicines as quinine, camphor and menthol. Their monopoly of Asia's oil would be a stranglehold, giving them absolute control over industry and transportation.

From the subjugated countries they could import all the raw materials they would need; with subjugated labor they could manufacture finished articles at a trifling cost. They would be the sole suppliers to all the people of Asia, and as their industry grew they would also flood the markets of the world with goods at prices too low for competition, yet high enough to insure a profit of several hundred percent. Such was the dream behind the bland, saturnine eyes of the sons of Nippon.

Coolly they estimated their strength. They had so many ships and planes, so many fighting men. What key spots should they attack to neutralize American fighting power? Could they knock out these armed bases sufficiently to win the territory they wanted before we recovered from the blow, built and equipped a strong fighting force and hurled it upon them?

They added up their figures on



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American strength, which had been gathered by a vast, semi-professional spy system – the most industrious in the world. They compared their navy with ours, and the relative speeds of the shipbuilding program in each country. They plotted world-wide strategy in Berlin and brought German technical and military experts back to Tokio.

On paper it all looked good. Through quick and daring actions they could take the objectives they needed, and consolidate their holdings before America could unseat them. As they visualized it, they would then be in a position to negotiate a peace with us by giving us back the Philippines and other possessions whose integrity we had underwritten, in return for our vacating Asia.

But they were overlooking certain things which did not show in their statistics.

For one, they did not count on the electrifying effect of Pearl Harbor on the American people – welding 130 million contrary-minded individuals overnight into one united nation, fighting mad and determined to build an army and a navy, guns and planes, no matter what the cost. They thought we would go right on hampering our own war effort by indulging in the luxury of argument, criticism and contention. We didn't. In six months we got our war plants actually producing the goods in awsome quantities, our training camps turning out soldiers and sailors at a rate unprecedented. We didn't give the Japanese time to consolidate what they had taken while we sat groggily on the canvas wondering what hit us.

They're Good—We're Better

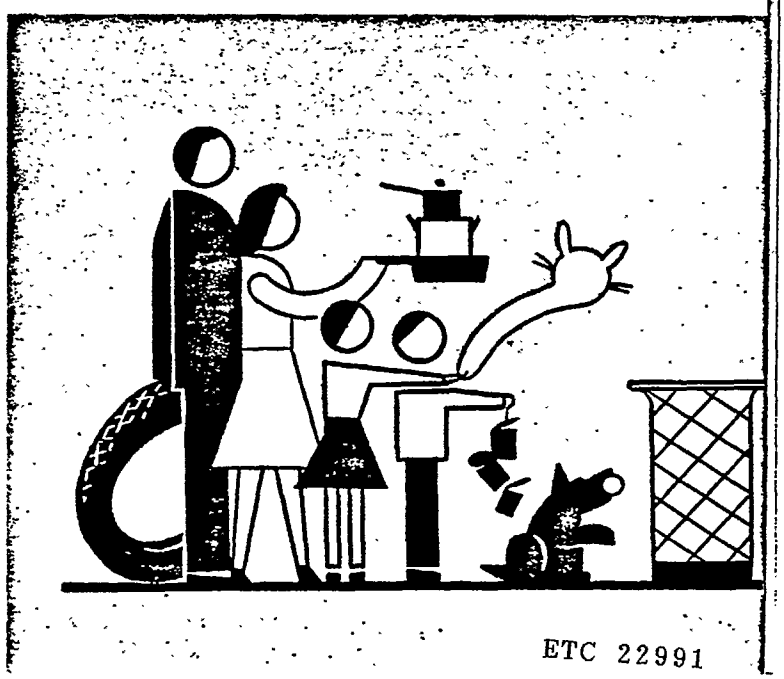
Secondly, they overlooked an important item in our fighting strength which didn't show in their spies' reports. Man for man, plane for plane, ship for ship, Americans can fight better than the Japanese. Contrary to our cocky notions of 1941, Japanese soldiers *are* well equipped, well trained, and brave. They are good fighters, but they are no match for Americans. This is not patriotic braggadocio, it is a matter of record – the heroic record of the Marines on Wake Island, the foxhole fighters of Bataan, the Flying Tigers of Major Claire Chennault – all of whom have taken a terrible toll of the Japanese, fighting on a shoestring without reinforcements. It is the record Americans made in the Coral Sea, at Midway Island and in the Aleutians.

Our democracy is not so decadent as Axis propagandists would have people think. In six short months we have sunk half the Nipponese navy and most of their aircraft carriers.

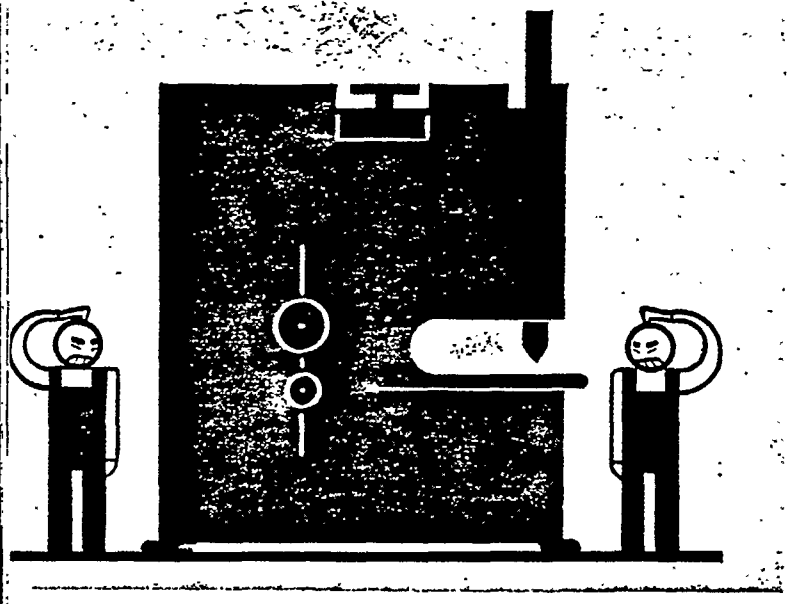
Aside from American unity and aside from our fighting prowess, there is a third point which did not count heavily enough in the reckonings of the war leaders – the character of the Japanese people. It is hard for Americans to understand the Japanese mind: it is such a confusing compound of servility and boldness, of fatalistic calm and fanatical drive, of selflessness combined with cocky swagger, of inscrutable subtlety and ingenuous gullibility, that we Westerners look on the Japanese as a people of mystery. One point especially that has escaped us – and this point seems also to have escaped the military leaders when they laid their plans – is that under the placid, fatalistic calm of the Japanese there is a tremendous excitability. Given a great enough stimulus, they are as volatile as the Italians.

When things start happening too fast for the Japanese to comprehend, they go to pieces. Doolittle's air attack on Tokio produced as much panic as a similar attack on Rome might have – indeed, he declared afterward that the frantic reports of the devastation which the Japanese radio poured onto the air, before the authorities got a grip on themselves and censored the news, were the best index he had of the damage his men had accomplished. When an American "mosquito boat" flitted into a Japanese-held harbor in Bur-

Every one in the family can spare some rubber or metal



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America will develop substitutes for necessities controlled by Japan

ma some months ago and sank a small warship in the dark, Japanese newspapers afterwards gave great space to describing a monstrous secret weapon which the Americans had employed – "a giant flying thing, firing in all directions, with great flapping wings." In the battle of Macassar Strait Japanese gunners got rattled and fired on their own ships . . . . What havoc would be raised in Japan by a four-figure bombing raid such as the RAF has made on Cologne and Essen? We have the planes to do it – and there are still some airfields within striking distance in both China and Siberia.

But the main thing the Japanese warlords overlooked, when drawing their blue-prints for this war of economic self-betterment, was that in cornering the world's primary supplies of rubber, tin, quinine, camphor and menthol, they might be killing the geese that were to lay the golden eggs for them. How much good did Japan's monopoly on silk do, after we decided to do without it last year?

When they sliced through our rubber supply we doubled up on transportation, began to treat whatever tires we had with kid gloves, collected and reclaimed used rubber, and launched into the manufacture of synthetic rubber – undertook it with such gusto, in fact, that sales managers and scientists are already noisily debating which is the best *kind* of synthetic rubber and which is the best raw material, the best process, for making it. By 1945 the South American rubber crop will ease our problem somewhat. Meanwhile, research uncovers the fact that everything from the rustic milkweed to the sophisticated poinsettia can make a patriotic contribution in the form of natural rubber – grown right in our own back yard. Thomas Midgley, Jr., Ethyl vice-president who grew up in the tire business and who holds several patents on synthetic rubber, declared only a few weeks ago that we could have grown all the rubber we need if only we had started some years back.

The Japs have put us in a hole, sure – but we can climb out of it.

How about tin? We can import it from South America – not all that we'd like to have, but enough so that by salvaging soup cans and toothpaste tubes, making our containers largely out of plastics, we can get along very nicely. Daily discoveries, and improvements over yesterday's discoveries, point the way to an economy with a low tin content.

We Invent Substitutes

Chemical research, a field in which American ingenuity has produced such marvels as Nylon, plastics, quick-drying enamels, Cellophane, and the world's most powerful high-octane fuels, may be expected before long to announce the discovery of substitutes for camphor, menthol and quinine – as it already has for pyrethrum. This substance, not long ago considered indispensable in making insecticides, has been supplanted by synthetic materials produced in American laboratories, fully as economical and effective as the world's finest.

So even according to their own plans – which of course were predicated on victory – the Japanese would not win the economic benefits they are fighting for. Mr. Moto miscalculated, it seems. It is too early for us to crow about victory, when he still has some victories of his own up his sleeve – too early to pat ourselves on the back, when thousands of fine American boys who are laughing today are marked for death before the fight comes to an end.

But it is not too early to size up the situation for ourselves, and check our estimate of the outcome against Mr. Moto's estimate. By *our* figures the Japanese have outmatched themselves. *We* will dictate the peace – from the White House.

INVASION TAXI for the LEATHERNECKS



OUT OF THE Florida swampland has come a new breed of alligator – formidable in size, tough-skinned, fast-moving on land or in the water – which nothing short of cannon fire will stop. It is a roaring, fire-spitting demon that slices through tangled jungles, claws its way through mudholes, crashes hell-bent into the toughest trees and leaves a swath of broken timber in its wake – but to Uncle Sam's Marines it's a docile steed they look forward to riding up hostile shores on Invasion Day.

This "Alligator" is a tank that swims. Open topped, it runs on caterpillar treads fitted with projecting blades which carry the thing across the land at nearly tank speed or "dog paddle" it through the water at a fair clip. These blades are made of duralumin to carry the weight of the tank and to cut through trees or dig into rocky terrain without breaking.

It was devised and constructed, after years of hard work behind closed doors, by wealthy young Donald Roebling. Roebling, scion of the family of philosopher-engineers who spanned the gorge below Niagara Falls in 1850 and later built the Brooklyn Bridge, could have joined his brothers in the famous Roebling cable and wire rope business, but chose instead to follow a project suggested by his father. In the Florida hurricane of 1933 his father

had been unable to rescue a number of people marooned in the Everglades and other marshy spots. He asked Donald to devise a rescue vehicle that would travel successfully on both land and water. Young Roebling buried himself in a workshop on the family estate for six years, to emerge finally with what he called his "Alligator." When the shop doors opened one afternoon and the strange creature lumbered forth for a test run, the easy-going Floridians were startled. At first it waddled like a real 'gator. Then Roebling gave it the gas — and his alligator leaped forward across the Florida landscape at a lively clip. It turned about, headed for the beach and waded into the water without a pause. The crowd gasped and held its breath.

But no one had to rescue it. The Alligator paddled about, very much at home and maneuvering with surprising sureness. When the splashing fins got a good bite in the water they moved the floating monster at a creditable speed.

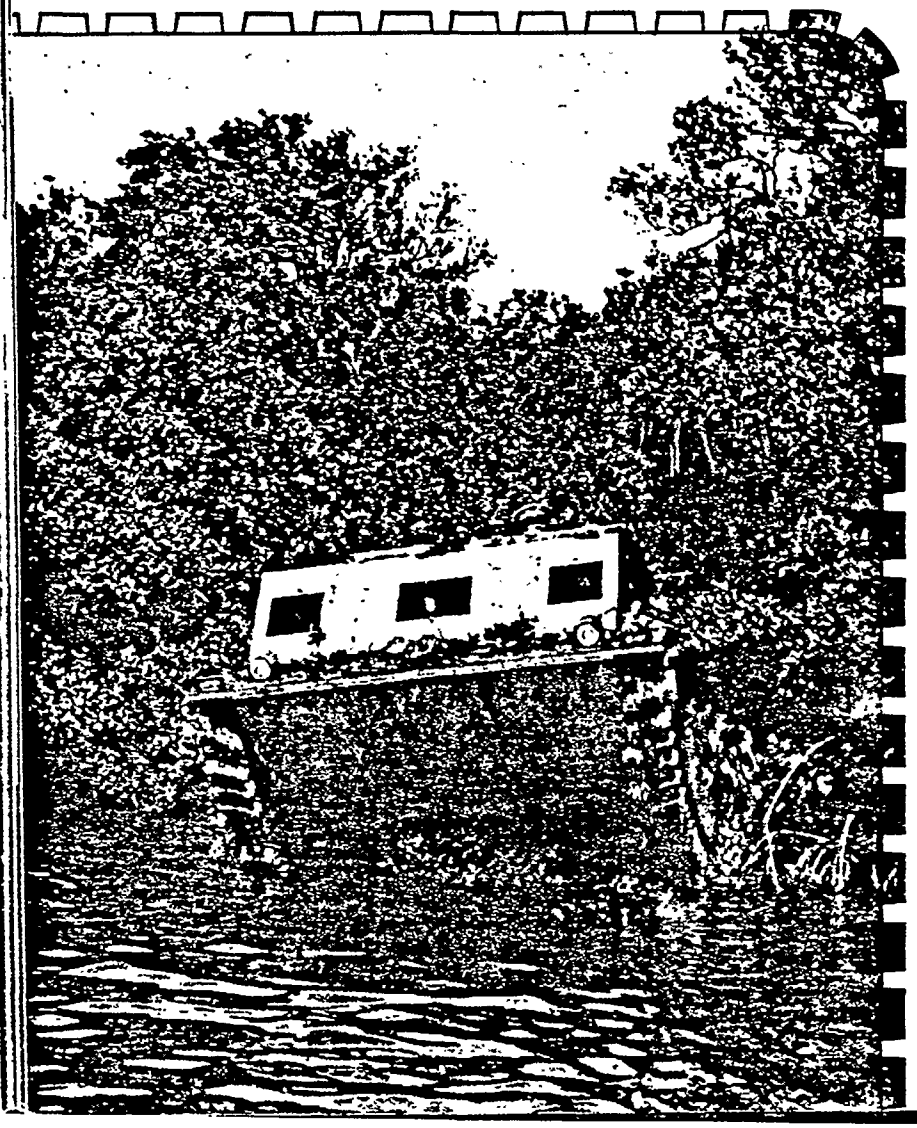
The Alligator Enlists

So Roebling, calm but happy, headed his obedient monster for home and set to work on further improvements. His humanitarian rescue vehicle was a success.

But a larger destiny was waiting for it. War was fast approaching. The inventor offered his Alligator to the Navy.

Navy officials were interested. Here, they suspected, might be the landing barge they had been seeking. They tested it under every possible condition. They watched it leap from a six-foot seawall into the Gulf of Mexico without capsizing, and without even wetting any of its 30 passengers with flying spray. They watched it crawl out of the water, climb a steep bank and cut its way through heavy jungle growth, its endless chain of sharp fins chopping a path like so many machetes. They noted how easily it turned. They found it could be slung aboard a ship with a crane and as easily dropped over the side. The Navy took the Alligator to its heart.

Gangway! An Alligator crashes through the jungle and into the water



Proudly they compared it with the invasion barges of other navies. The Alligator was the only one powered by a stock model automobile engine. It was propelled in the water by the churning blades on their endless belts, instead of the outboard aeroplane propellers, so clumsy and dangerous, or the underwater propellers, so vulnerable in shallow water, which drive all other types of landing barges. They compared it with the British Commando barge which drops its armored bow piece to let the troops ashore or to land the baby tanks it sometimes carries. But the Alligator, they said, is a tank in itself. It can ferry the troops to shore, carry them up the beach to the enemy and give them a mobile fortress to fight from.

The Navy invited young Roebling to demonstrate his tank for the Marines along the Virginia shore. The Alligator went through all its paces like a well-trained seal, and as the Leathernecks watched it perform they began to grin. Here was their Invasion Taxi, complete with whiz and zip. All it needed was armor plate and guns. They ordered

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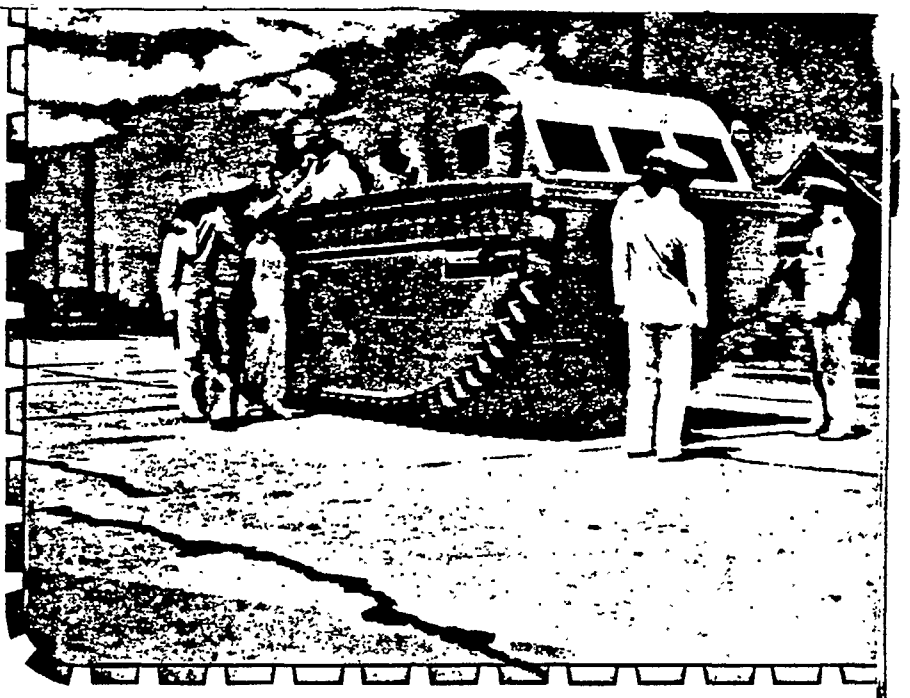
a number of them built – rush.

Roebling returned to Florida to begin production in a small plant. Since then further orders have come in and he has recently opened a new plant in the interior of Florida, where he builds the improved model as revised by the Navy. New orders are still coming in. He expects he will have to expand these plants or build additional ones to care for needs of our own forces and those of our allies as well. The British see in it a mighty handy weapon for the contemplated push against the Hitler continental coastline.

This splashing, sure-footed, "get outa my way" Alligator grew out of a little trial model made of a cheese box by Noyes Collinson, a friend of Roebling who first worked out the basis of the land-and-water propulsion device. Collinson schemed up the combination of paddle wheel and caterpillar tread – the endless belt with fins on it – and constructed a working dummy out of an oblong wooden cream cheese box, four spools, scraps of leather and canvas, a dry cell battery and a toy electric motor. The first proving ground was a lily pond. When the contraption waded into the pond, paddled across and climbed out on the other side, the inventors held a celebration – including a christening, when Roebling gave it the name of Alligator. Had he then visualized the finished model of his swampland rescue craft he might have dubbed it an amphibian ambulance, an aquatic armadillo, or just a boat that climbs mountains. The times have made it a sea-going tank.

Built of Stock Parts

What improvements the Navy has made along the lines of size, power, and speed over the "pilot" model is of course a secret we don't want the Axis to know about – but we're glad to have them learn that the original Alligator which won the heart of the Marines with its sturdiness and its fighting possibilities was powered with an ordinary automobile engine of only 95 horsepower; and it was built, except for its watertight duralumin body, of stock automotive or mechanical parts such as could be ordered by mail from Detroit.



The amphibian tank will swim ashore and carry soldiers into combat

Here is where the particular genius of young Roebling shines. Not only did he dream up the design in his head; he worked out the "bugs" by foreseeing them in his imagination instead of discovering them later in elaborate drawings or scale models. He worked out the problems of waterproof power transmission and submersion-proof engine room; he devised crawler tracks which would chew their way through jungle and yet permit a smooth ride over a hard road at passenger car speed without injuring either the machine or the road. And he did this, as we said, using standard assembly-line parts throughout the machine.

While Goebbels was raising such a din over Hitler's "secret weapons" – which still have not been revealed by the modest Fuehrer – Roebling was quietly putting standard automobile parts together to make the first completely new vehicle to appear in ten years. Now see what this means!

It means that as fast as he shapes his duralumin bodies he can have the "works" to make them go. They're on the shelf in Detroit, waiting. No elaborate tooling-up for special parts, no assembly line that must be built from scratch. No great capital investment is needed; there will be no vast one-purpose plants standing idle after the war because they can not turn out the goods of peacetime. Best of all, there is no need to train an army of specialists in new methods of construction, new techniques, or new machines. The Alligators can be

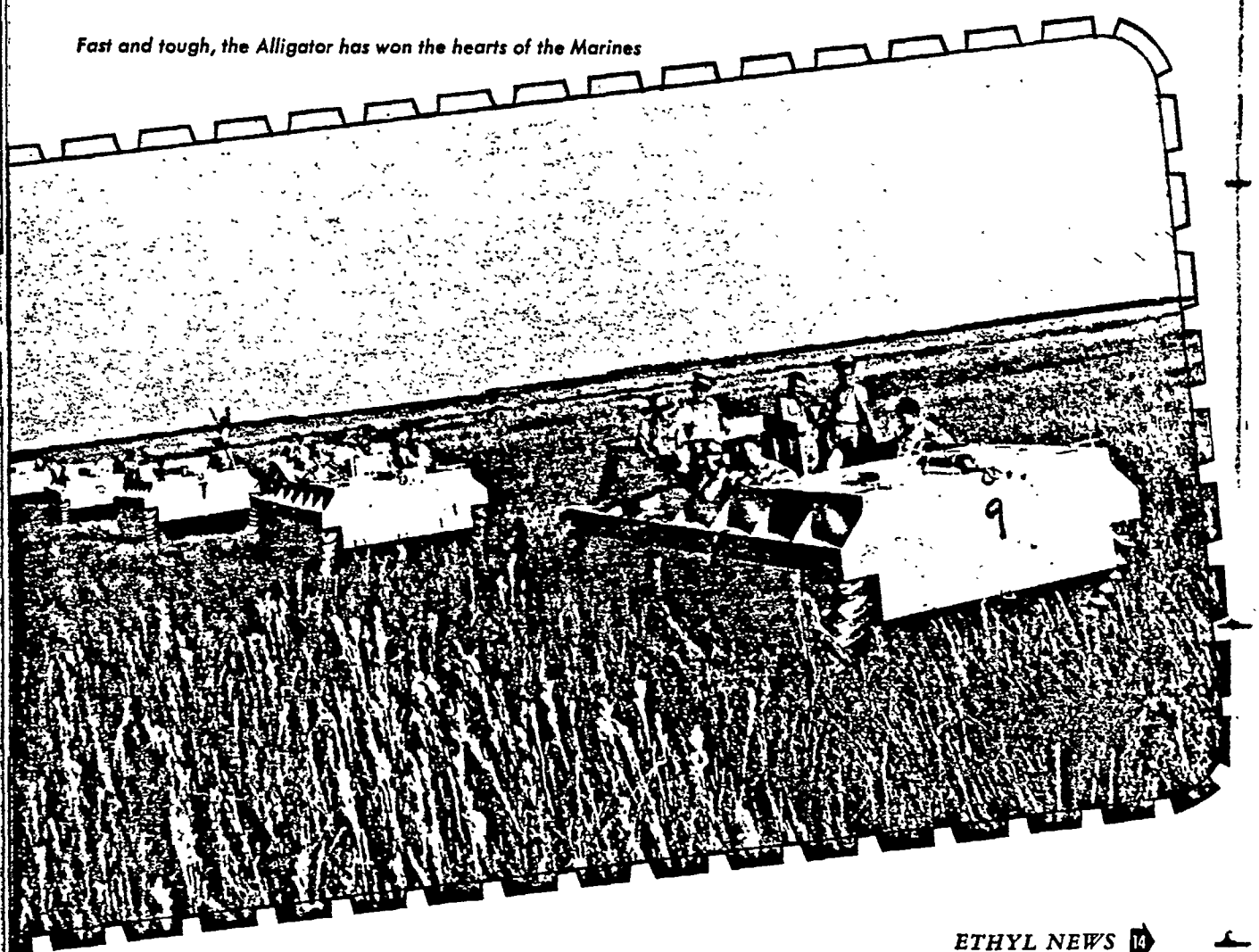
spawned in great numbers — ominous numbers, perhaps, to the Nazis nervously watching for shapes in the mist off thinly-held coasts.

Post War Job Waiting

But when the war is over — and this is the happiest speculation of all — the Alligators will not just be useless, rusty reminders like tanks or field guns, fit only for town memorials or scrap metal. Draw the sharp teeth of the Alligators — remove their guns — and you still have the splashing Saint Bernards of mercy that Roebling and his father dreamed of long before the war came. After the war they can be shipped home and turned over to the Coast Guard, state police or National Guard units for use in saving lives. They can reach families marooned by flooded rivers or isolated by washed-out roads. They can churn their way through mud, ice and snow that would block any other vehicle. On the shoreline, think of the rescues they will aid in. Off the reefs of the Carolinas a ship has run aground and is going to break up — a 'gator swims out to it, crawls over any reefs that would sink other boats trying to reach the wreck, and paddles alongside to take off passengers. Off the sandy coast of Long Island or the rocky shore of Maine a fishing party is swamped in high seas and sends up a distress rocket. Today, alert Coast Guardsmen trundle a high-sided dory into the pounding surf, try to keep it from capsizing as they clamber aboard and drive it through the combers, then fight their way to the survivors and take them aboard the little boat for the precarious journey back through the surf. Tomorrow, with a fleet of demobilized Alligators at their disposal, they can jump aboard their sea-jeeps in a heated garage, open the doors and roll right through the combers while they fasten windbreakers and pull on boots, with nothing more drastic than a couple of high waves coming over to daunt them.

The Alligators now have a job to do in rescuing democracy. After the war they can go right on rescuing lives.

Fast and tough, the Alligator has won the hearts of the Marines

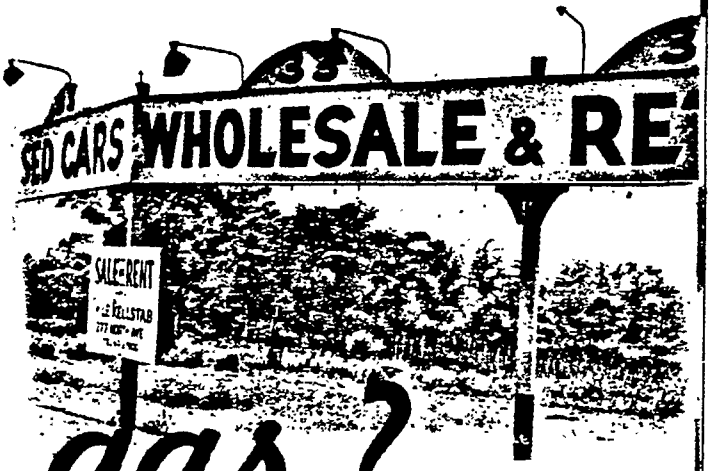


ETC 22996

Where do we go without gas?







CURTAILED AUTO TRAVEL is going to upset more people than just the Sunday drivers of this country. It's going to throw a good part of our economic system seriously out of joint — above and beyond what the war has done to it.

Because America — unlike England, France, Germany, or any other country in the world — has grown up and taken form, assumed its present social and economic structure, on the basis of easy transportation for all men. In no other country do the majority of people live at such a distance from their work as we commonly do. The basis of America's "transportation system" is the average citizen's private automobile. Buses and trains carry far less people, even on business travel, than the "pleasure" car does.

Brookings Institute estimates that unless 20 million passenger cars stay on the road, the civilian economy will be threatened with serious disruption. The resulting extra load that will fall on public carriers would overtax and break down the commercial transportation system of the country. We will no longer be a mobile populace. Workmen will be unable to reach their jobs in many sec-

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tions; farm crops will be ruined for lack of hands to cultivate and harvest them; and all the millions of ordinary people whose money comes partly from the free circulation of other people going someplace will feel a drastic pinch in their income. The "tourist business" is a major source of income in several states in this union—even such states as Louisiana, rich in an abundance of minerals, food, fish, and every kind of industrial raw materials.

Every car that is kept off the road will have far-reaching effects – on state revenues, real estate values, business at resorts, roadstands and restaurants, garages, used car lots, parking lots and filling stations, picnic parks and play spots. In the months ahead, the squeeze will get tighter. It already has seriously depressed real estate values and decided the fate of thousands of filling station operators along the eastern seaboard where gasoline is now being rationed.

The present East Coast oil shortage affects more than 11,000,000 motor vehicles, 140,000 retail gasoline outlets, and upwards of 1,500,000 home oil burners. The value of real estate in the 17 states under gasoline rationing is figured at about 110 billion dollars, out of a total for the country of about 200 billion. Real estate authorities estimate there already has been a depreciation of around ten percent in the value of this 17-state property because of the threat to the motor car.

East Coast Statistics

The populous eastern industrial area has 36 percent of all the motor vehicles operating in the United States, and 63 percent of all domestic oil burners. Many oil burners are now being removed in favor of coal, but many furnaces cannot be changed over. About 34 percent of the country's retail gasoline outlets, including 82,000 service stations and 59,000 other stores with pumps, are in the eastern shortage area. Gasoline dealers, with deliveries to their pumps already reduced 50 percent before rationing, figured their incomes were cut from 30 to 40 percent, with the future certain to drag this down farther – perhaps to the vanishing point.

Millions of motorists are at this moment hopefully trying to discover ways and means to spend their vacations away from home this summer without using their cars. But rail and bus service for non-essential mileage also has been restricted. The effect of the loss of this motorist purchasing power on all lines of business is tremendous.

Up to the start of the war, the United States was producing and consuming as much petroleum in one year as the total for the first 40 years of the industry up to 1900. We have invested millions upon millions of dollars in great motor highways, and other millions have been lavished upon auxiliary services for the automobile user in roadside eating spots, camps and playgrounds, vacation spots, hotels and retail stores whose main revenue comes from tourists or transients.

There is no easy solution to the problem. We can't simply pull in our belts another notch, Spartan fashion, and live like the Germans, for the reason that America has developed an automobile economy. Our 34,000,000 motor cars are evidence of this, compared with Germany's 2,000,000 – and we average about 8,500 miles a year per car, at least half of it necessary mileage. The United States Public Roads Administration estimates 58.6 percent of passenger car travel is for business purposes, as is all truck driving. This doesn't even take into account transportation to and from rural schools, which is classified as "pleasure driving." The Automobile Manufacturers Association says two-thirds of all car-owning workmen in the country use their cars in driving to and

Curtailed travel has hurt even the farmer



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from work. The problem of getting these workers to our vital war plants is beginning to assume important proportions.

The National Highway Users Conference states that some 2,300 American cities and towns, representing 12,500,000 people, have no form of public transportation; 872 have no mass transportation except buses; and 48,000 (or 29 percent of all communities in the country) must depend on motor cars for both passenger and freight transportation. They have no railroads.

The automobile accounts for ten times as many passenger miles as trains do in this country — nearly four times that of all other means combined.

Those are the cold statistics on automobile usage. They give us some idea of the place of the automobile in American daily life. But there is another aspect besides the matter of convenience — the financial side of the picture. Highway revenues now constitute the largest single source of funds for all 48 states, and almost the only source for a large number of special authorities and districts. In 1941 they accounted for 37 percent of all state revenues. Motorists have been paying about one tax dollar out of every eight collected in the United States. Gasoline taxes alone have constituted almost half of Florida's state income, for instance, 13 percent of New York State's, about half for Tennessee, and almost 60 percent for Nebraska. The Public Roads Administration computes the taxes paid by motor vehicle users in 1940 at more than $1,800,000,000. These funds are now shrinking — and in the months ahead are expected to shrivel.

The significance of any material loss in this state income is more than merely a decline in road building and maintenance, for highway revenue has habitually been used for other purposes. In recent years it has gone not only to build roads, but also for balancing budgets, servicing non-highway, county and road district bonds, financing unemployment relief, providing aid to counties, municipalities, school districts, and other uses. Where will the money come from to replace these funds — at a time when the war has sent other taxes climbing in sky-rocket fashion?



Loss of the tourist trade has thrown many properties back on the banks

State Incomes Slashed

Not only do state budgets depend on income from car travel, but highway revenues and in some cases sales taxes are pledged or earmarked for highway bonds and some obligations of local governmental units. The direct highway obligation of the states, including debt for rural highways, exceeds $4,800,000,000. To service this huge total will require some lengthy head-scratching if substitute sources of revenue are to be found. It is estimated a drop of 25 percent in income from motor fuel, motor license, and general sales taxes would leave a gap of nearly half a billion dollars to be filled. Where is this to come from?

Although the cumulative record of gasoline taxes for the first three months this year compares well with 1941, the future months hold no such promising prospect, because of severely curtailed driving.

Any lengthy motorless period obviously would affect bank credit in the restricted areas, but it is difficult to determine to what extent at this stage. Bankers fear it may become necessary to freeze loans on properties dependent on highway travel,

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such as the better grade chain restaurants or wayside cabin establishments. This situation would not be entirely new to the hard-pressed banks, who for years have had to contend with a similar unsatisfactory condition. Several states, including New York, have had mortgage moratorium laws for years, and a more serious contraction in motor travel that would affect businesses dependent on the motorist would simply be an intensification of a condition that has existed since the depression started. Wholesale foreclosures for lack of mortgage service are not likely, inasmuch as the banks would much prefer tenancy and its resulting property maintenance. They would take what they could get for the next few years, and hope for better conditions after the war.

Aside from gasoline supply problems, one unbreakable bottleneck in the whole automobile driving situation is rubber. Only one-tenth of the 1941 world supply of rubber is now available for *all* the United Nations, and bare war needs are five times that amount.

The military needs for rubber are tremendous. The eight tires on a 4.7-inch motorized anti-aircraft gun use 2,240 pounds of crude rubber, enough for 45 ordinary passenger cars. Next to tires, the greatest amount of rubber goes into insulated wire. A battleship uses miles of it. All the rubber ordinarily built into an automobile and on its wheels will make only five of those small life-rafts used by our Navy fliers. Seven automobile tires could be made from the rubber for one bomber tire. Fighting planes must have rubber for bullet-proof gas tanks. The Medical Corps is said to use 250,000 pounds a year for adhesive tape alone.

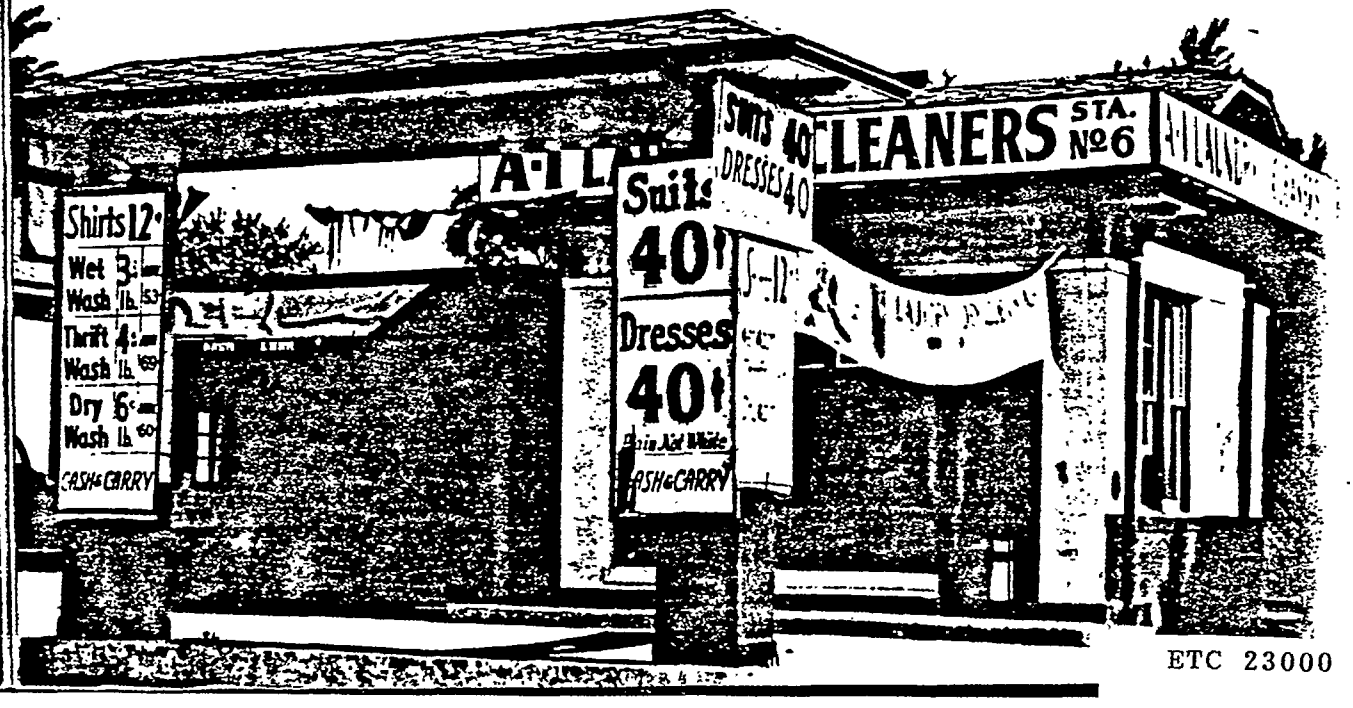
Because of the rubber shortage we may be set back in our war production program, and our vaunted high standard of living may take a nose-dive. Synthetic rubber is our best hope, but it will not be here in quantity for over a year. Research projects for "miracle rubber" to ease the immediate stringency still are "birds in the bush" with production problems to follow any such discoveries.

So far only 17 states along the eastern seaboard have been affected by gasoline rationing. The plan for the rest of the country has been postponed until the results of the intensive scrap rubber drive could give an indication of possible reclaimed rubber sources.

Regardless of the results of the drive, the amount of rubber now in the United States is all that we have for many months to come, and there is little reason to believe that we can afford to use up the stockpile of tires on cars on the road at the rate we used to.

President Roosevelt's phrase, "War of Survival," best describes what the shrinking segment of non-war business is now up against. Gasoline rationing, car-pooling and the 40-mile-an-hour speed limit are plans designed to keep as many private automobiles as possible on the road so that industries and revenues will not be entirely killed. Stretching the life of the tires now in use is the easiest way of combating our rubber shortage. Used with care, these may last. If not, there'll be severe hardships coming to every man, woman and child.

A filling station is converted to a laundry collection depot in Tulsa, the "Oil Capital"



Sell Your Gas to the Farmer!

THERE WILL BE no gasoline rationing for farm tractors and probably no real rationing for farm trucks or automobiles. Not only is this farm market a huge one today, but there is a possibility that it will expand. To harassed petroleum sales managers, gloomily contemplating the shrunken market on the eastern seaboard and the threat of rationing throughout all 48 states, there may be a ray of hope in this thought.

Why is the farm market expanding? Because Uncle Sam has told farmers to grow 25 percent more than they used to – grains for the raw materials of war industries, foods of all kinds for Lend-Lease shipments and our own armed forces.

And the farmer has to produce this extra 25 percent with less manpower than before. Something like 40 percent of the farm labor supply has been drained off into war industries or the Army and Navy. Lost manpower will have to be compensated for in large part by increased use of mechanical horsepower – and that takes motor fuels. That's why the farm market for petroleum products is due for expansion – and it suggests that the tractor, the farm truck and the passenger car which does so much of the hauling for the farmer will *not* have to go without fuel.

But is this farm market large enough to be significant?

It is. Before Pearl Harbor it was estimated that farmers bought about 25 percent of all the gasoline, heavy fuels, motor oils and greases sold in this country. This year that percentage is scheduled to jump for two reasons – the general market is contracting, and the farm market is expanding.

5,750,000,000 Gallons

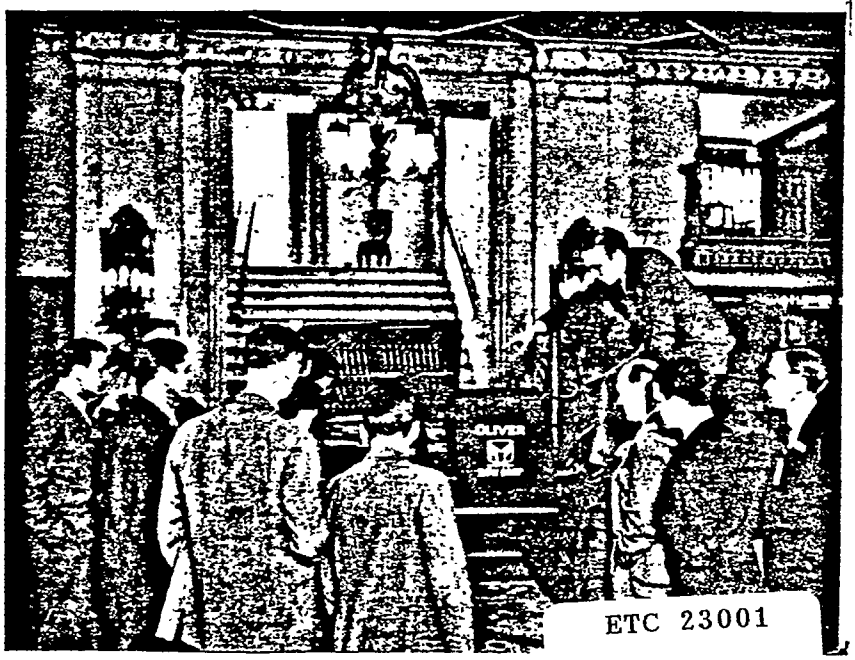
Farmers in this country own approximately 5,000,000 passenger cars and 1,250,000 trucks; the number has been slowly increasing during the last six or seven years. But the real growth in the farm market has been due to the astounding increase in the number of tractors. In 1930 there were some 900,000 in use; today the figure is well over 2,000,000. A survey conducted by the Ethyl Corporation in conjunction with more than 40 farm publications shows that even in normal times the average tractor consumed slightly over 1,000 gallons of fuel a year. Compared with these 1,000 gallons, the farmer bought an average of 910 gallons for each truck and 520 for his automobile. There were also a half million stationary engines to consider in the over-all picture – but the tractor is the key to the farm market.

Computing the total vehicles on American farms today, even at the old rate of fuel consumption, the over-all demand comes to something like five and three-quarter billion gallons. Add to that millions of pounds of lubricants and greases and you get some idea of the size of the farm market.

In recent years there has been a marked increase in the use of gasoline in farm tractors – partly because of the introduction of the high compression, or automotive type, engine in tractors, and partly because of a growing appreciation by the farmer of the many practical advantages which gasoline offers in added pulling power, easier starting, lessened crankcase dilution, more dependable operation and longer engine life.

Another argument for gasoline today is that all new tractors will be leaving the factory on steel wheels instead of the easy rolling rubber tires which were featured on 95 percent of those sold last year. This will affect the performance of these trac-

1935 — Ethyl's George Krieger, who fathered the modern gasoline tractor, shows the first model to the press



tors in a number of ways, but the most important will be a substantial reduction in power available at the drawbar at a time when every ounce of power is needed. Use of gasoline will help offset this power loss.

A still more potent argument is the fact that distillates are becoming increasingly difficult to get and farmers today are not in the mood, nor do they have the time, to shop around for inferior fuels.

Krieger—Power Prophet

The Ethyl Corporation has been one of the pioneers in the development of the farm market for gasoline in tractors. An Ethyl engineer, C. G. Krieger, saw the possibilities as early as 1930. He argued that farm tractors of that day, all of which were designed for low grade fuels, were cumbersome and inefficient. Why not a tractor engine as efficient as the automobile engine – a tractor with a self starter, lights for night work, even a radio for catching farm news bulletins?

Not only would such an engine provide a more useful tool for the farmer, he reasoned, but it would make possible the manufacture of compact, lightweight tractors which could be sold at a price within the reach of thousands of farmers who had never been able to afford the benefits of mechanized power. It would thus open up a vast new market for petroleum products. Customer companies would sell more fuels and lubricants. The Ethyl Corporation would sell more lead. It would ease the drudgery and increase the productiveness of the American farmer.

With the backing of Ethyl executives Krieger began one of the most unusual campaigns in the annals of business. He set out single-handed to convince a group of uninterested tractor manufacturers that they ought to scrap their current models and methods, re-design and re-tool for the manufacture of high compression tractors. Four years he traveled up and down the country preaching and pleading – in vain. Then in 1935 a leading farm implement company capitulated and called him in to help design a high compression tractor.

Once the ice was broken the new type of tractors were enthusiastically received. Farmers saw them and demanded them. Within a short time every manufacturer was making high compression tractors. Today there are hundreds of thousands of them on American farms. Under the stimulus of high compression the tractor market has almost doubled since 1935.

It was in that year that Ethyl first began active promotion of leaded gasoline as a tractor fuel. From 1935 to the present day, Ethyl has persistently proclaimed in farm publications the benefits of housebrand – *not* Ethyl! – gasoline as a tractor fuel. They have prepared and distributed thousands of booklets, charts and other informative material designed to build up this market. Ethyl tractor engineers have held thousands of meetings, usually in conjunction with customer oil companies, for jobbers, tank wagon drivers, tractor dealers and farmer audiences. During these years the corporation has thus built up a corps of engineers familiar with the agricultural market and its problems, who devote the major part of their time to cooperative work with oil companies.

These men stand ready today to help customer companies in developing their own farm programs.

Housebrand, regular-grade gasoline has been advertised as the ideal tractor fuel in Ethyl ads ever since 1935



Our Pictures . . .

THANKS – to the Marine Corps for letting us show their blitz buggy on pages 11 through 14 – and to Black Star, whose men spent a weekend on U. S. Route 1 (while we held the presses) to find the pictures on pages 15, 16 and 17. Photos on 4, 5, 6, 7 & 18 are from Press Association.

POST WAR FUELS

THE WAY will be open after the war for abrupt and substantial advances in motor transportation, according to Dr. Graham Edgar, vice president of the Ethyl Corporation. Whether such changes come about will depend on the extent of cooperation between technologists of the oil and automotive industries.

Speaking before the annual meeting of the American Society of Testing Materials at Atlantic City as the 17th Marburg lecturer, Dr. Edgar declared that because of conditions brought about by the war both industries will have unique opportunities to cover in a single stride the technological advances in transportation which would formerly have required years of gradual improvements.

In his paper, "Gasoline — Past, Present and Future," Dr. Edgar pointed out that any predictions concerning post war gasoline, or any other phase of the post war world, must be made with very considerable reservation. However, he said, what post war gasoline *could be* is by this time fairly well established.

It seems fairly obvious, Dr. Edgar said, that aviation gasoline will be much more important after the war than before, and that 100 octane number aviation gasoline, or better, will be the quality generally employed.

80 Octane Housebrand?

"But what of the future of motor gasoline?" Dr. Edgar asks. "The tremendous demand for high octane aviation gasoline together with the program for synthetic rubber has brought about the erection of greatly increased catalytic cracking capacity, and this capacity undoubtedly can and will be used after the war to produce motor gasoline of high antiknock quality. Plants for producing the alkylate so necessary for aviation gasoline will have capacities probably much greater than the post war demand for aviation gasoline, as great as they may be expected to be. Plants for producing toluene and other aromatics will probably be available. Futhermore, the research and development laboratories of the petroleum industry, always alert, have been profoundly stimulated by the war effort, and can be counted on for processes which are improvements over what we have today. I believe it to be conservative to say that the petroleum industry will be in a position to produce motor gasoline of much higher effective antiknock value than that which was produced in 1941. One might guess that gasoline approximately equivalent to the premium grade of 1941 (say, 80 octane number) could be produced as a housebrand gasoline, and that premium gasoline having an effective antiknock value of between 90 and 100 octane number could be produced.

"Will such gasoline be produced and marketed? The answer to this question depends largely upon the automotive engineer. The automotive industry finds itself at present in a position unique in its history. Heretofore, under the continued pressure of getting out yearly models, desirous of re-using as many tools, dies, etc. from previous models as might be feasible, and doubtful of public acceptance of too radical a change in car design, the automotive industry has made all changes conservatively and gradually. In fact, the saying is that the only reason that engines are still in the front of the car has been that no one could figure out a way to move them to the rear gradually. Now, the situation is that there are no yearly models, or cars of any kind, which give the design engineer a breathing space in which to plan far-reaching improvements.

Revolution in Design?

"Tools and dies will have been largely scrapped long before automobile manufacture can begin again. Metals, such as aluminum and magnesium, will be available in enormous quantity and at reduced price. New and better plastics will be available. Coupled with this will be a car-hungry public. What will the answer be? As far as body design goes, one can look forward with confidence to radical changes, but what of the engine? Will we have an engine of extremely high compression ratio, and consequent high thermal efficiency? Will there be a small supercharged engine capable of producing the necessary power with savings in weight and size? Will there be an engine of very moderate speed range equipped with automatic transmission? Will there be an engine embodying principles quite different from the conventional engine of today? No one can answer these questions, but it appears certain that no real developments along

ETC 23003

these lines can be expected unless the petroleum industry does its share by improving gasoline quality."

Abrupt Advances Possible

As in the past, Dr. Edgar said, improvements in the engine of the future depend upon the gasoline of the future. The two industries have always advanced together and must continue to do so. The only difference is that heretofore progress has been made by a steady series of small advances, made first by one industry and then by the other, or by both together; now, the war has brought about the possibility of fairly abrupt and quite substantial advances in technical progress.

In the course of his lecture, Dr. Edgar pointed out that there are no ideal properties of gasoline except insofar as particular gasoline engines are concerned and there are no ideal properties of internal combustion engines except as related to the fuel which they are to use. The characteristics of the engine must be adapted to the characteristics of available gasoline and the characteristics of gasoline must be modified to meet the needs of engines.

Of the various characteristics of gasoline perhaps the most important, as far as the ultimate development of the internal combustion engine is concerned, is the tendency to knock, Dr. Edgar said. Limits imposed by this tendency have gradually lifted over a period of many years as the petroleum industry has produced gasolines of higher and higher antiknock value. This has come about through the use of knock inhibitors such as tetraethyl lead and an increasing knowledge of gasoline chemistry.

The last 15 years, Dr. Edgar said, have seen tremendous advances in our knowledge of hydrocarbon chemistry. It has reached a point, he declared, where the petroleum refiner is approaching more and more the position of a synthetic organic chemist and the gasoline of today is approaching more and more to the status of a blend of specific hydrocarbons synthesized for various specific purposes.

A Vital War Material

The impact of the war on the petroleum industry has been great, Dr. Edgar said. It has been necessary to expand enormously the production of high octane aviation gasoline, and this has meant not only the building of new plants designed to produce the isoparaffins and aromatics so necessary for 100 octane aviation gasoline, but the stripping of much motor gasoline of those constituents useful in aviation gasoline. At the same time the necessity for curtailing motor gasoline consumption has made it necessary for refiners to alter their operations markedly, so as to produce sometimes as little gasoline as possible instead of as much as possible. As a result, he declared, the antiknock quality of civilian gasoline has dropped in six months from about 75 to 72 octane number, and may drop further.

"In this war," he declared, "gasoline has largely replaced smokeless powder as a propellant for high explosives and has largely replaced the army mule and the human foot as a means of transporting supplies and manpower. No single raw material appears to be as vital to the prosecution of a modern war as gasoline."

Dr. Graham Edgar, vice-president of Ethyl and inventor of octane scale



Can you identify this industry?

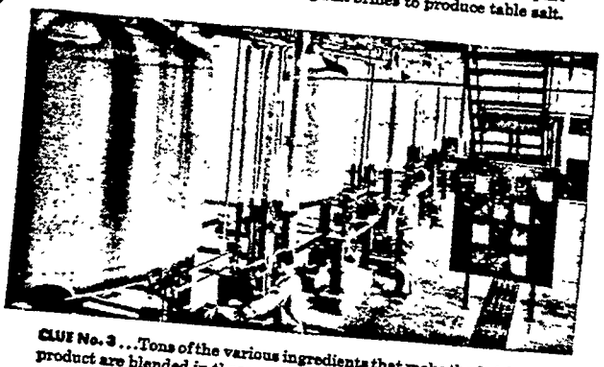
(IT HELPS GIVE EXTRA POWER TO AMERICA'S WARPLANES)



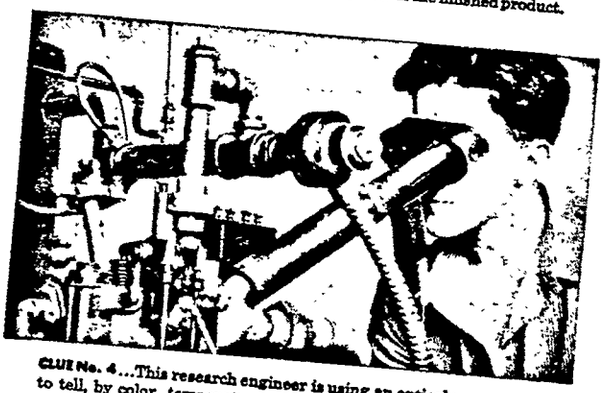
CLUE No. 1...The basic raw materials used are—salt, sulphur, sea water, molasses, lead and petroleum gas. This picture shows part of the equipment for evaporating salt brines to produce table salt.



CLUE No. 2 . . . The battery of compressors above is used to compress petroleum gases to make ethyl chloride. This chemical is very necessary—but there is not a drop of it in the finished product.



CLUE No. 3...Tons of the various ingredients that make the finished product are blended in these weigh tanks at one time. They measure the ingredients accurately to within one part in ten thousand.



CLUE No. 4...This research engineer is using an optical pyrometer to tell, by color, temperature of an exhaust valve in an engine running "wide open." Research is very important in this industry.



CLUE No. 5 . . . Painting a drum to ship the product overseas for war use. Each drum is cleaned and painted gray each time used, so the least leak of brightly colored product would show immediately.



CLUE No. 6...The final clue is an easy one—if you're an automotive or petroleum engineer. These machines are "C.F.R." knock rating engines which are used in the six gasoline-testing laboratories.

It's probably no secret to you by now—these are a few pictures of the company that produces Ethyl brand of anti-knock fluid. Oil refiners use Ethyl fluid to produce the high-octane gasolines that give extra power to America's warplanes, tanks and other motorized equipment. Fortunately, the Ethyl Corporation has sufficient plant capacity to supply all war needs without delay and still produce anti-knock fluids for improving gasoline used in the tractors, trucks, buses and passengers cars of our motor transportation system.

JOIN THE

U.S.

TRUCK CONSERVATION CORPS

ETC 23006

ETM NEWS

SEPTEMBER ★ 1942



ETC 23007

In this issue—

PAGE

ON THE COVER

Two small planes perch on the wings of the 70-ton *MARS*, grand admiral of all Navy planes, to demonstrate the size and capacity of this 8,000-horsepower aerial dreadnaught. We reproduce this picture on the Ethyl News through the courtesy of Collier's magazine.

Such a plane, or the 125-ton airships planned by the builders of the *MARS*, will carry men to Europe. The new ones will carry 40 tons of tanks, guns, food and fuel to Europe. A fleet of them will carry Victory to Europe — if we build them soon enough.

On the page opposite this you'll find a discussion of how such planes could swing the tide of war next year — and leave us, after the peace, with an important, ready-made new postwar industry.

Flying Boxcars 3

Quickest, cheapest and most effective answer to the problems of global warfare — Victory Ships of the Air

Caucasus — War Prize 8

Facts and figures on the Grozny-Baku wonderland, pot of gold at the end of Hitler's Russian rainbow

Louisiana, Stockbin State 12

Mountains of raw materials for war and industry are dug, dredged, picked or pumped from the Pelican State

Gasoline Wears Better 16

Startling research statistics on engine life . . . new light on gasoline as "fighting fuel" for tractors

Ankle Deep 18

Headlines of 25 years ago show us "muddling through" on the home front then much as we are doing today

4,000,000,000 New Passengers 22

Can our bus, trolley and transit systems handle the biggest boom in their history — and for how long?

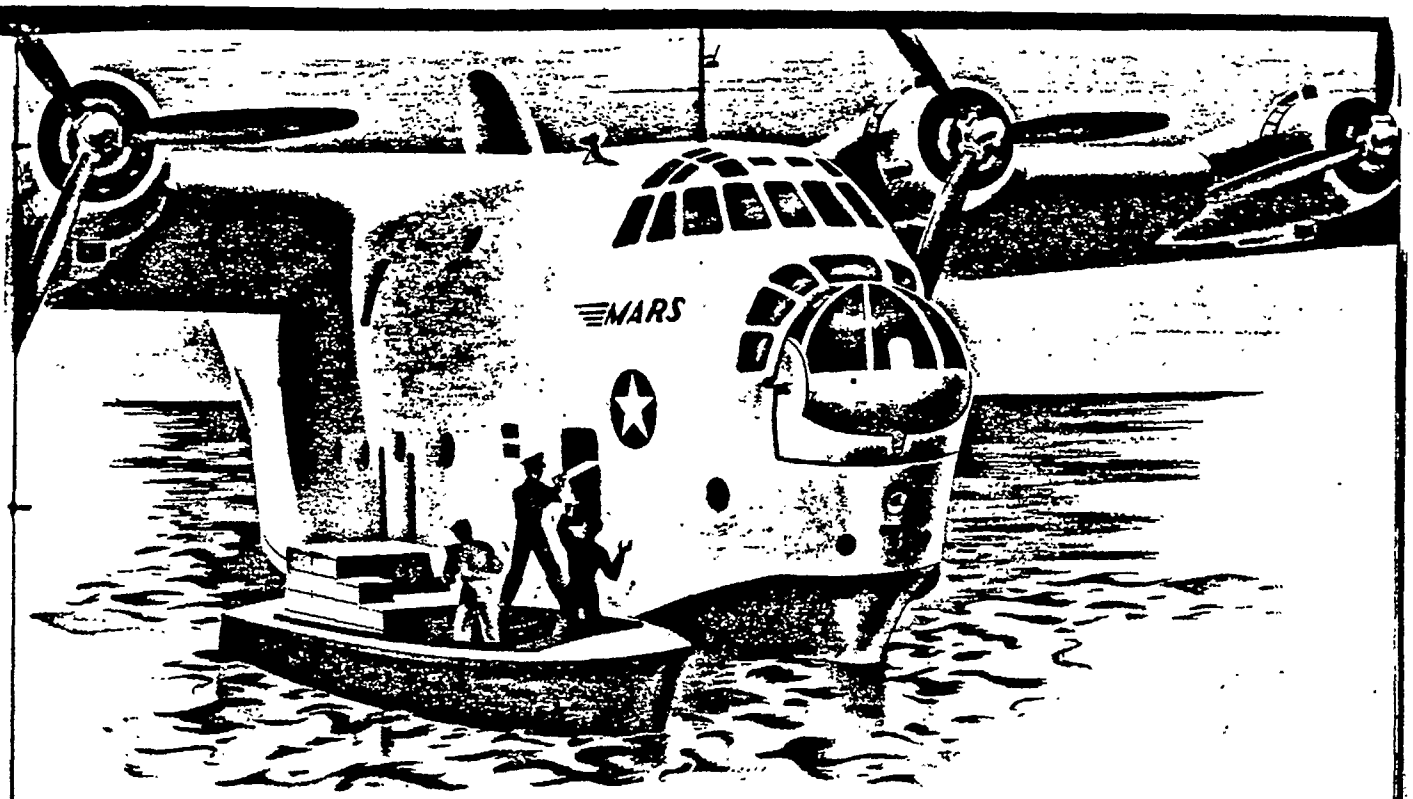
September • 1942

ETHYL NEWS

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Manufacturers of Ethyl Fluid, used by oil companies to improve the antiknock quality of aviation and motor gasolines

ETC 23008



FLYING BOX CARS

A Prophecy by Northrop Clarey, jr.

ONE DAY THE SKY over England becomes black with planes, and the earth shakes with their thunder. A farmer and his son, plowing in a field, stare up at them. "Germans?" asks the boy.

"No—they're from the west." The farmer squints under his hand. "Them are Yankee planes, son."

"*Yanks!*" They both wave their caps fiercely, cheering above the roar of the planes overhead. On and on come the planes, uncountable numbers of them—giant four-motored transport ships, with fighter planes and light bombers as an escort. At a certain point near the coast the armada breaks up into many smaller groups, each flotilla heading for a different airfield to the south, to the north of England, or in Scotland.

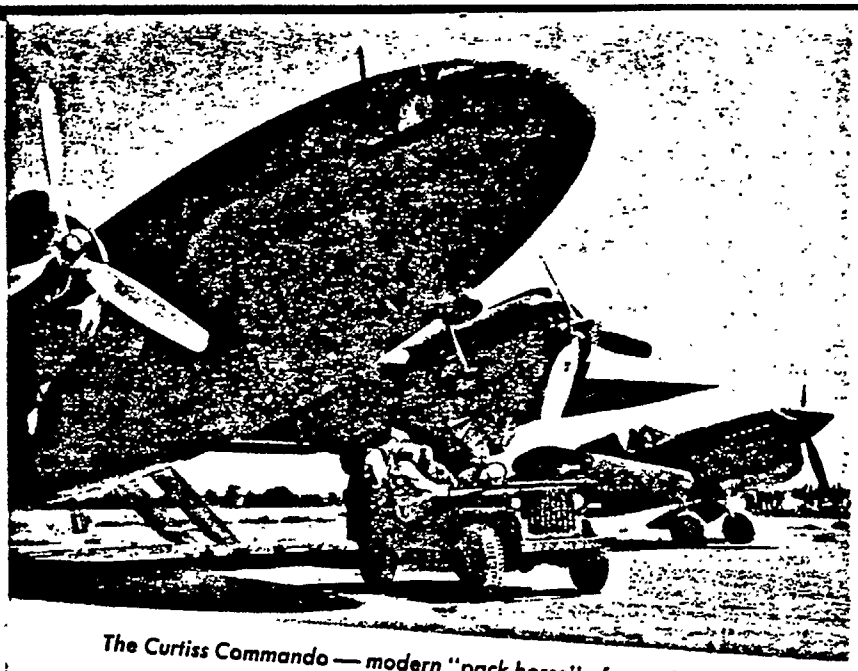
At each field the planes land and discharge an army of soldiers with their equipment—200 men to a plane. The Americans stretch their legs, look briefly around at the scenery, then flip their cigarettes away and go into action. Every move has been rehearsed. Some unload a dozen jeeps with trailers and cart off the guns and packs which have been stacked up. Others erect a village of tents, with camouflage stretched over it. Kitchens are rolled out of the big planes; frozen meat and vegetables, coffee and cigarettes are carted off to the tent city. Many of the soldiers are ground crews for the planes. They check over the mighty air transports, refuel them from underground tanks, and spend a busy hour getting them ready to take off again.

There is a warning siren. "Ten minutes!" Fresh pilots check their watches, take a last look at charts and weather reports. They step into their planes, wave, and lift the big fellows into the air again—heading west. The fighter planes, rigged with auxiliary fuel tanks, also take off to escort them 100 or 150 miles out to sea.

Unsinkable Tankers

And there, at a 200-mile-an-hour rendezvous, they pick up a second great fleet of planes, turn around and escort them to the airfields they have come from, while the original armada sails on home. This second wave of huge planes is identical with the first, from the outside—but the interior of each is a honeycomb of neoprene rubber fuel tanks. They

ETC 23009



The Curtiss Commando — modern "pack horse" of a modern army

have flown over from the oil regions of America, carrying tons of oil and 100-octane fuel for the great reservoirs buried near each field.

These too spend a busy hour on the ground, with field crews servicing them for the flight back—then, at a certain stroke of the clock, they roar into the air again. Once more the escorts follow far out to sea; another rendezvous is made with a third mighty fleet of planes, and *these* are escorted back to the fields, unloaded, and sent home. The latest group, similar to the others in design, carries a stupendous freight of guns, scout cars, radios, explosives, medical equipment—everything an army needs to maintain itself in the field.

By now, of course, the sun is getting low in the sky. Weary crews at the dozens of airfields get their last jeep under cover, stretch their final bit of camouflage, and call it a day.

But two days later the entire performance is repeated. Another two days and it is again repeated—*and yet again*—until a vast American army is camped in Britain, equipped with every need and maintained by an unending shuttle system of supplies, even down to the fuel for planes and cars.

Invasion — by Air

But they don't camp there long. Hardly is the last load over, each airfield in smooth running order, when —on a certain hour of a certain day— the men climb back into their big transports wearing parachute packs and fighting gear, and take off into the sky again. At the same moment the RAF also rises into the air with its huge bombers and carrier planes loaded with paratroops, Commandos, and doughty infantry. High over the heavily-armed coast of France they fly, high above the little guns spitting up at them from the ground.

Yes, high above *any* guns — in France, in Belgium, Holland, Germany itself . . . wherever this invasion fleet is bound. Disregarding Maginot and Siegfried lines, overwhelming the outnumbered Luftwaffe, caring for neither mountains, swamps nor rivers, this army in the air roars irresistibly on to its destination — an area already bombed into impotence, in a sky where every Nazi plane is checkmated by one and two Allied planes.

Thus would an Allied army turn Hitler's "vertical flank" — strike at his softest spot with one mighty blow, crushingly.

You call this a dream?

What keeps it from becoming a reality next Tuesday? *Only the fleet of giant planes!* We have the men. We have the equipment for them. We have the fuel for their machines. We lack only some way of swiftly moving them where they can strike the blow the world is waiting for.

But, you ask, would airplanes be able to carry this load? Most assuredly they would. Look at some of the figures.

For purposes of comparison, look at the Lockheed Constellation, a large plane planned originally as a passenger ship with pressurized cabin. One of these ships is now about ready for flight-testing; Lockheed has undertaken to manufacture 40 of them. They were designed by no less a figure than Howard Hughes, now the partner of the fabulous Henry J. Kaiser in a scheme to build 500 cargo planes. Seven years ago Hughes designed and flew a plane from Los Angeles to New York in seven hours and 20 minutes — a record which still stands in 1942. In 1938 he piloted another plane of his own design around the world in three days and 19 hours — another record no one has yet touched. Now he has produced another plane which, if given the chance, may earn a brighter immortality. Data on Hughes' new ship is of course a se-

cret, but it has been published that the plane's four motors will give it a cruising speed of 290 miles an hour and a load-carrying capacity of something like 150 tons.

To understand the significance of this, let's say we want to rush aid to Egypt. If we sent it by an average 10,000-ton steamer, we can load 6,000 tons of cargo aboard and if mines, submarines, surface raiders, warships, or airplanes do not sink the boat its cargo will arrive there in three months. The return journey takes three months, allowing two round trips each year – a total of 12,000 tons carried in a year.

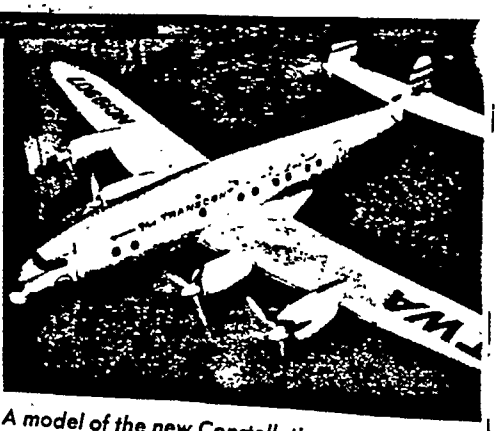
90 Days vs. 36 Hours

But if we take two of the 40 Constellations that Lockheed is working on, they can get through in a day and a half, allowing for one stop en route. If you figure, on each trip, a little under two days lost through delays, weather, or servicing, you come out with 20 trips for each plane in three months. In that time they will have carried 6,000 tons of fighting equipment (and fighting men) right to the base camp in Egypt where they are needed – the same amount as the freighter which threaded through all the menaces of the sea. And while that freighter spends another three months picking its way home through mines, submarines, surface raiders, warships and airplanes, the two Constellations have shuttled another 6,000 tons of equipment – or men – over to the battle.

There are other advantages, significant ones, besides speed. You are not putting all your eggs in one 10,000-ton basket. You have no menace to overcome except enemy planes—and if you've read the newspaper accounts of our Flying Fortresses you'll know that even without fighter escort, a large plane with plenty of defensive fire-power can take care of itself even against nimble single-seater planes.

Another advantage is point-to-point delivery. If a load of propellers is to be carried from Connecticut to Egypt, you now put them into box cars, pull the box cars to New York, unload them onto lighters, unload the lighters into a freighter, then assemble a convoy in which the freighter has a better chance of getting through to Alexandria, unload the propellers on the docks at Alexandria, cart them over to a railroad, take them as far as the train will go toward the battle, then truck them the rest of the way – if the planes that needed these propellers are still there. If you could load those crated propellers into a Lockheed Constellation instead, they would take to the air from the landing-field at the back door of the propeller plant and arrive on the battlefield in Egypt *thirty-six hours later.*

Another advantage is the flexibility of operation. If a new airport is being held up by a lack of cement, the propellers can be held back a week while bags of cement are sent over instead.

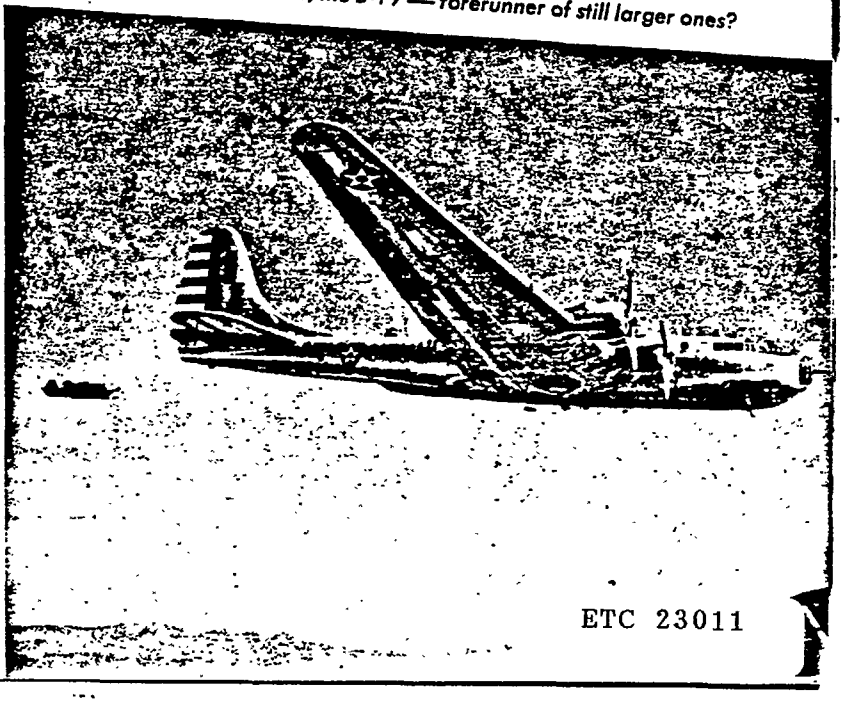


A model of the new Constellation — Two will outcarry a 10,000-ton ship

Can airplanes really operate as freight carriers? If we forget our conception of aircraft as sleek, luxurious, super-Pullmans of the air or flashing, tricky interceptors that can outfly a shooting star, then we can see that a fleet of lumbering aerial box-cars, stripped of niceties, could be used to wonderful advantage. Today air freighters are saving weeks of time by carrying ship-borne goods from west Africa to the Red Sea over 5,000 miles of jungle and mountains.

When the Burma Road was closed and its 17,000 tons of freight a month cut off, a few big airships making two round trips a day proved

Gargantua of the bombers, the B-19 — forerunner of still larger ones?



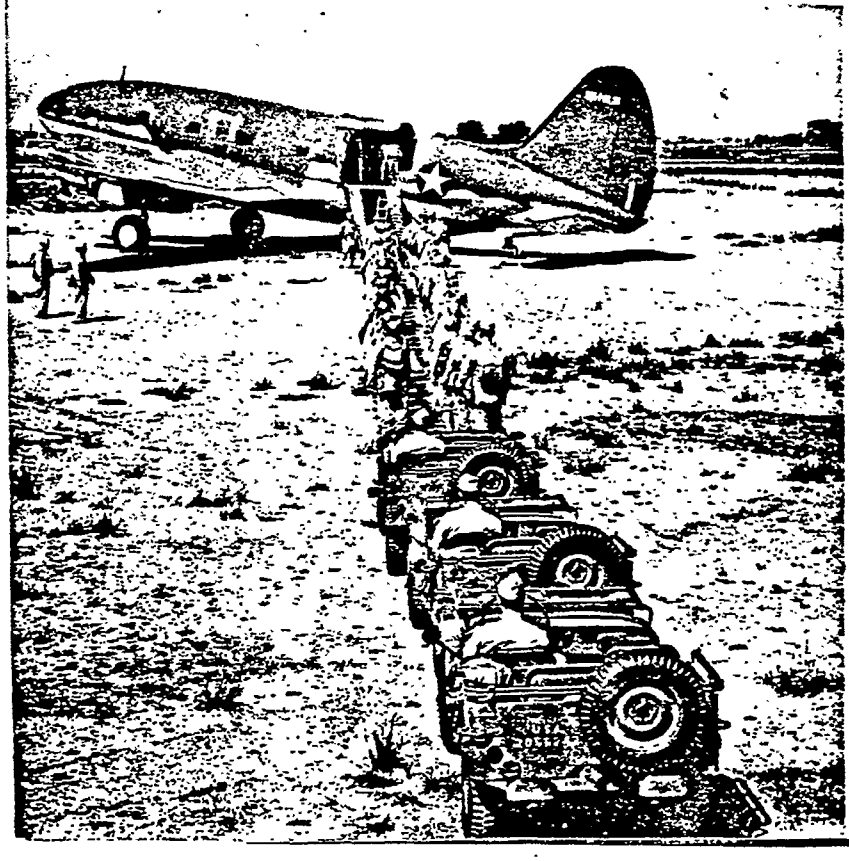
able to carry a surprisingly high percentage of the load. Only a few dozen of the new twin-engine Curtiss-Wright C-46s would have more than supplanted the Road. One of the best indications of the practicability of commercial air transport is the fact that several railroad companies – traditionally conservative and slow-moving–have applied for airline certificates. The Army, which has become America's biggest operating airline, is now hauling more than a million pounds of material a month inside this country. Thousands of tons of vital war materials are being flown to China, India, Africa, Australia, Alaska, Iceland and England by Pan American Airways in conjunction with the Army Ferrying Command.

In the Mediterranean, while the British are still pushing convoys through to Malta at the great cost of one or more warships and several cargo ships lost with each convoy, the Germans are steadily reinforcing Rommel's equipment with big Junkers freight-planes – sometimes referred to as the "most dangerous planes in the Luftwaffe."

And you can't bomb an airport out of existence the way you can blast docks and railroad yards. After the bombers are through you patch up the holes in the field and go on about your business. If you use flying boats–and they are a likely possibility in any air cargo-ship program–the enemy has a still harder time trying to bomb holes in the water.

Materials? Every time you cancel an order for one 10,000-ton steamship you free the metal necessary for a good number of 180-ton super airships. Or, if you don't want to upset anyone's steamship plans, you can listen to talk in responsible quarters about aircraft made of wood – as some of our training planes now are – with furniture factories doing much of the fabricating. Another possibility advanced by Vance Breese, test pilot and outstanding aircraft expert, was described in *Collier's* recently by Colonel R. B. Lord, a prominent figure on the Board of Economic Warfare and on both the Requirements Committee and the Committee on Cargo Planes of the War Production Board.

Troops, fuel, food, equipment to the front by air overnight



Iron Airplanes by June

Breese wants to make planes of low-carbon steel, the metal used in old fashioned stovepipes. We could build 200 air freighters a month of this material with a yearly requirement of only 24,000 tons of steel out of our annual production of 86 million tons. Proper sized sheets could be rolled in plants now standing idle, the parts and sections could be fabricated in refrigerator, stove and automotive plants accustomed to handling the metal but now doing nothing. The sections would be assembled by the simplest of all methods–spot welding.

Colonel Lord advances these arguments: "Wing sections can be pressed into shape like automobile fenders, internal construction will be much simpler, and because of the steel's greater strength, the planes will weigh very little more than those made of dural. The welded, stiff steel is smooth, cutting wind drag and making the plane more efficient; and if a hole is blown in the skin or if a wing tip is knocked off in a ground loop, a patch can be smacked on the wound and welded in a short time with portable welding equipment in the field."

Such a ship, he adds, would be cheap; it would use three standard 1,800 horsepower engines now in production; it would carry more than ten tons for three thousand miles at a hop, flying at almost 200

miles an hour. And, omitting the elaborate head-scratching, testing and redesigning which takes a year or more to squeeze another 2% of performance out of critical combat planes, the Breese "stovepipe" transport could be in mass production in well under a year – some think in eight months.

Let's look at "air cargo" possibilities from another angle. The United Nations, all together, can muster about 25,000,000 tons of ships. Normally loaded and traveling at convoy speed they can move 225,000,000 ton-miles of freight per hour. It would take only 5,173 of the Hughes Constellations to take over all the shipping now handled by all these vessels. *Two thousand of them would swing the war our way.* The cost would be high, of course. But what is the cost of a half-million-dollar plane if it carries mighty guns to stop Rommel – or the cost of two dozen airplanes if they save Suez? One hundred of these planes could carry over enough explosives so that American bombers, flying from China or Russia, could blast Tokio into a pile of rubble. Would *that* be worth $50,000,000? Looked at in this light, it would be costly beyond all measure *not* to build these planes.

What would we do with them after the war? Transport planes are long-lived. Commercial planes built 15 years ago are in use today. Glenn Martin Clippers have flown over five million miles for Pan American since they were built in 1935. If we build a fleet of cargo planes now – a mobile, easily-shifted fleet that might prevent another tragedy such as Crete, Dunkirk, Bataan or Wake Island – we will still have this fleet after the war.

How about the operating cost? You can ship goods by water for ½ cent a ton-mile, whereas it costs more than five cents to fly them. But you go fewer miles by air, and you eliminate several handlings because the load is picked up and finally delivered in the same vehicle. Large gliders – picked up and dropped off non-stop at various cities, a manoeuver already tested—will double and triple the carrying-power of each plane. These facts begin to bring the costs down. It is not likely that iron ore or coal will ever be flown about the country or across the oceans—but cloth woven in New Hampshire might be flown direct to factories in Iowa or California; coffee grown in Brazil might be flown straight to Illinois. Moreover, a vast system of air cargo service would soak up the extra planes, the 300,000 trained pilots, the millions of mechanics and maintenance men we will have after the war – as well as the billions of gallons of aviation-fuel capacity our petroleum industry will be left with.

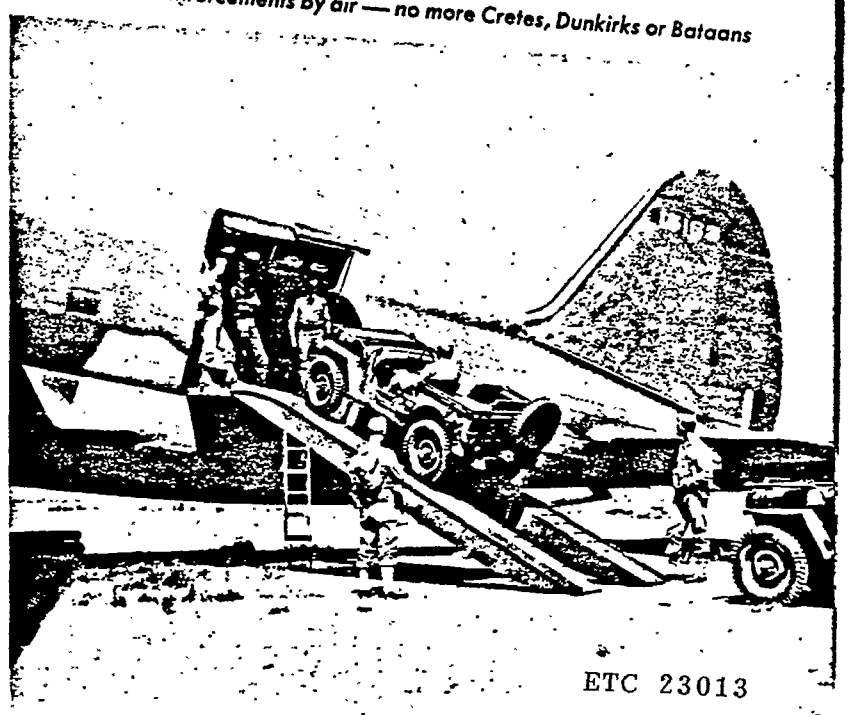
For these big planes use a lot of fuel. To cover 4,000 miles, an 80-ton plane flying at 200 miles an hour will burn one-fourth its weight in gasoline. A fleet of such planes, flying 180 to 200 days out of the year, will require miniature oceans of gasoline. The Constellation is estimated to carry 100,000 pounds of fuel and crew. Some experts, even the down-to-earth ones, advance the theory that "eventually all freight of any nature will be air-hauled *if we solve the problem of getting sufficient fuel for the planes.*"

Such a problem is a challenge the American oil industry would take up happily. It has the oil underground. It has the high-octane capacity. It has the tetraethyl lead capacity. Best of all, it has the men with know-how—men who have "done it before" and would like nothing better than to take off their coats and "do it again."

Know-how plus Wings

That kind of know-how, that kind of "let's get at it" spirit, is going to be equally important in the aircraft industry. And when the two industries have produced the planes and fueled them, that same American spirit is going to make itself felt on fighting fronts all over the world. With a fleet of "flying boxcars" that day will come before long – long before Hitler thinks!

Reinforcements by air — no more Cretes, Dunkirks or Bataans



ETC 23013



CAUCASUS—WAR PRIZE

By John P. Knapp

THE QUESTION OF balance between Russian oil supply and the needs of the Red army in the next few weeks is one that will increasingly concern the American petroleum industry. As the German armies move upon the Russian oil capital of Baku, the urgency of the question becomes underlined by the loss of the East Indies oil fields to the Japanese. At present, the Nazis are on top of an important part of the Russian oil supply. That in itself will cause no debacle, but it is serious enough both in itself and in its implications. Loss of Krasnador and Maikop in the North Caucasus removes only a moderate share of Russia's oil reserves, and is not necessarily a catastrophe. The scorched earth policy has been applied there as elsewhere in overrun Russian areas, and the price to the Nazis has been high.

But the threat to Batum on the Black Sea shore south of the mountains and Maikop, and the threat to Baku on the Caspian in the east is an alarming development because Batum is the outstanding oil shipping and pipeline terminus center, while Baku wells produce upwards of 70% of the total Russian oil output. Of course, it will take far greater penetration of Russia by the Nazis to wreck the Soviet oil supply system, but each additional mile of invasion tends to throw that system into more precarious balance, and

ETC 23014

brings sharply into focus the problem of supplying Stalin with oil to keep his country in the war . . . a problem which might fall into the lap of the American petroleum industry.

Hitler's Pot of Gold?

What is the Caucasus? And why has Hitler ordered his generals to take the region "at any cost"?

The Caucasus is a prize of the first rank. It comprises that strip of land between the Black Sea on the west and the Caspian on the east. It borders on Turkey and Iran in the south, and extends almost to the Ural Mountains in the north. In area it is about 138,000 square miles, out of a total for the Soviet Union of approximately 8,820,000 square miles, and its population is around 13,000,000 out of more than 190,000,000 for all of the Soviet Union. Its richness in oil and food resources are legendary. The high Caucasus Mountains form a ridge extending from the Black Sea to the Caspian, and within this range are many sheltered, rich valleys, mountain rivers, and one historic swamp, the Clochis, in Georgia, now being drained and made productive.

North and South of this range and foothills, the land lies flat and is well watered. The northern steppes comprise one of the richest agricultural areas of the Soviet Union, while the climate of the southern slope is sub-tropical, and abundant rainfall makes possible the growing of many exotic fruits and plants.

As the center of the Russian petroleum production, the Caucasus, comprising the North Caucasus District and the Trans-Caucasian Republics (Georgia, Azerbaidzhan, and Armenia) of the south, is of supreme importance to Russia. Accounting for 80% or more of the Soviet's total oil output, the value of the Caucasus area is out of all proportion to its size and population.

The oldest and largest industry in the Caucasus is the extraction and refining of petroleum from the huge reservoir that underlies not only the Caucasus region, but is believed to extend in a belt northward as far as the Arctic Ocean. Known since the dawn of history, the oil wells of the Caucasus have been producing steadily for more than 80 years, with no signs of depletion in sight.

The largest producing area lies along the western shore of the Caspian, north and south of Baku where also the biggest refineries are located. This is still hundreds of miles from the point of deepest German penetration. The Baku region's wells turn out approximately 450,000 barrels of oil daily, which is about 70% of all Soviet production. West of Baku, other wells are producing, and some have even been drilled into the bottom of the Caspian itself, off Apsheron Peninsula. The northernmost coastal field of the Caucasus on the Caspian is at Makhach Kala. West of this is the Grozny field which produces about 37,000 barrels daily, and still farther west is the Maikop field which turned out about 40,000 barrels a day, and which reportedly has already been fired by Red Army specialists. There also is a field under development in the Shirak Steppe of Georgia.

Baku is connected by a double pipeline with Batum on the Black Sea. Makhach Kala, Grozny and Maikop, north of the mountains, formerly piped their oil to Tuapse on the Black Sea, and northwestward into the eastern Ukraine via

Oil springs burning at Baku . . . pyres of German hopes?



ETC 23015

the towns of Krasnador and Rostov.

Soviet geologists claim for the Soviet Union, on the basis of estimates of potential resources of areas not yet fully explored, the largest oil reserves of any country in the world. They place immediately accessible reserves (as of 1939) at 4,680,000,000 metric tons, and of this total a large part was assigned to the Caucasus fields.

Russia's Ten Percent

According to the Bureau of Mines, total production of petroleum in the Soviet Union in 1939 was about 212,500,000 barrels, and this compares with other large producing areas as follows for 1939: all of the United States, 1,264,200,000 barrels; Texas, 484,527,000; California, 224,354,000; Venezuela, 205,900,000; Oklahoma, 160,072,000; Netherlands East Indies, 61,600,000; and for the entire world for 1939, 2,076,800,000 barrels. For 1941, the Soviet Union's total oil production reached a record top of around 240,000,000 barrels, or more than 10% of the world total.

Although the Germans are still several hundred miles from the main Soviet oil fields at Baku, they have cut the pipeline outlets from the oil fields northward. There remain the water routes through the Caspian, and these are not inconsiderable. One of them is north to Astrakhan, a railroad junction on the Caspian at the mouth of the Volga, and connecting with Moscow, Kuibyshev and other sections of western and eastern Russia. It is far enough east of Stalingrad to permit of present shipments from the south without disturbance. Another Caspian water route is from Baku to Gurev, from which point a pipeline runs to Orsk, an oil refining center in southern Russia hundreds of miles east of the present battle line. Through these two routes, the Soviets should be able to continue oil shipments from the Baku district indefinitely, unless of course, the Germans are able to cut the Caucasus through to Astrakhan.

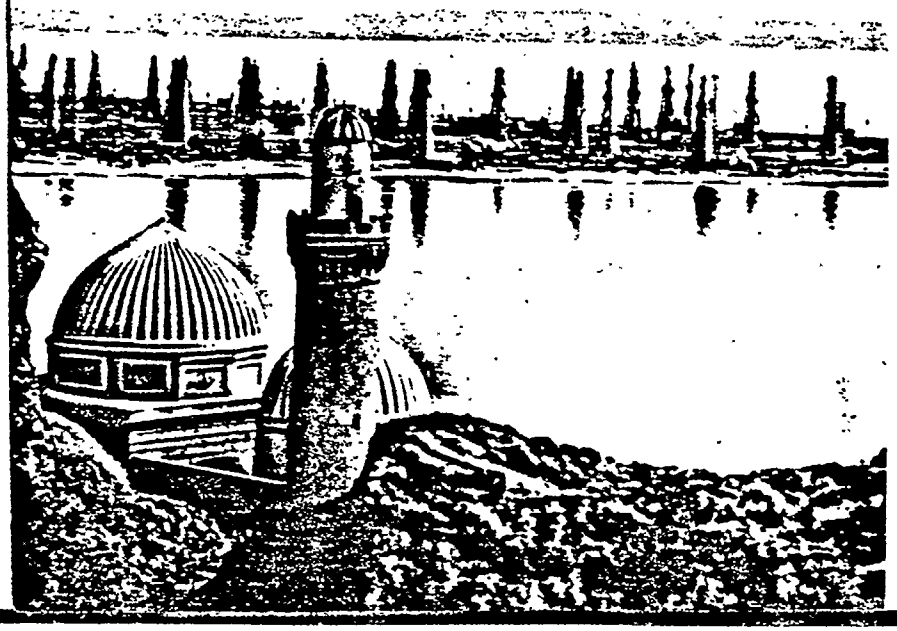
But even in that event, the Russians would not necessarily lose the war for lack of Caucasus oil. Northeast of Astrakhan, on the Caspian, are the Emba fields which produce about 12,000 barrels daily, and more important and much more remote from the scene of hostilities are the scattered Ural-Volga fields, the first of which was discovered in 1929 310 miles east of the Volga in the western Urals. In 1932, oil also was discovered in the Ishimbayev area, and later on at Krasnokamsk, Tuimaz, Bugurouslam, and near Sizran on the Volga and in the Chelyabinsk district, east of the Urals. Production of the Ural-Volga fields is estimated at about 75,000 barrels daily, with a potential far in excess of that amount. Ten refineries east of Moscow, most of them built within the past decade, provide capacity that might be able to meet military requirements, even if Germany succeeds in grabbing the Caucasus, although this capacity probably is not sufficient for military operations on the scale heretofore seen.

Avalanches, Amazons

But grabbing the entire Caucasus oil production will not be easy. Since earliest times, the Caucasus region has been described as a perilous area where Nature conspired with the inhabitants to repel a hostile invader. Snow avalanches, giant women with bulging muscles, and men who rose from beneath the ground are some of the fanciful tales told to warn would-be conquerors away. Early historians believed that the Amazons — those legendary hard-hitting women-warriors who wielded double-headed battleaxes and claimed to be daughters of Mars — lived there. (In later times, an explorer returned to Europe to report a tribe of fighting women in northern South America, and because of this report, the Amazon's name was bestowed upon that great Brazilian watercourse.)

The area is served by two principal railroads, one running from Baku northwest to Rostov via Grozny and Armavir, north of the ridge, and the other from Baku westward

Baku wells overlook the Caspian Sea at Azerbaidjan



to Tiflis and Batum on the Black Sea, south of the mountains. There are also several extension and connecting lines.

The total planted area in the North Caucasus in 1938 was 19,939,000 acres, of which 13,677,000 acres were sown to grain. Large stock farms dot the Caucasus region.

Ores and Industries

Next to petroleum, the most important Caucasian natural resource is manganese ore from the mines near Chiatury, near the Black Sea in Georgia. Production of these mines in 1937 amounted to 1,650,000 metric tons of 50% manganese ore. Copper is extracted from the old mines at Alaverdi and Zangezur in Armenia. Other minerals and metal deposits being worked include magnetite, bauxite, pyrites, molybdenum, arsenic and barites. There are also a few coal mines.

Some of the newer industries recently developed in the Caucasus area include the manufacture of carbide of calcium and from it synthetic rubber at Yerevan in Armenia, and steel and cement.

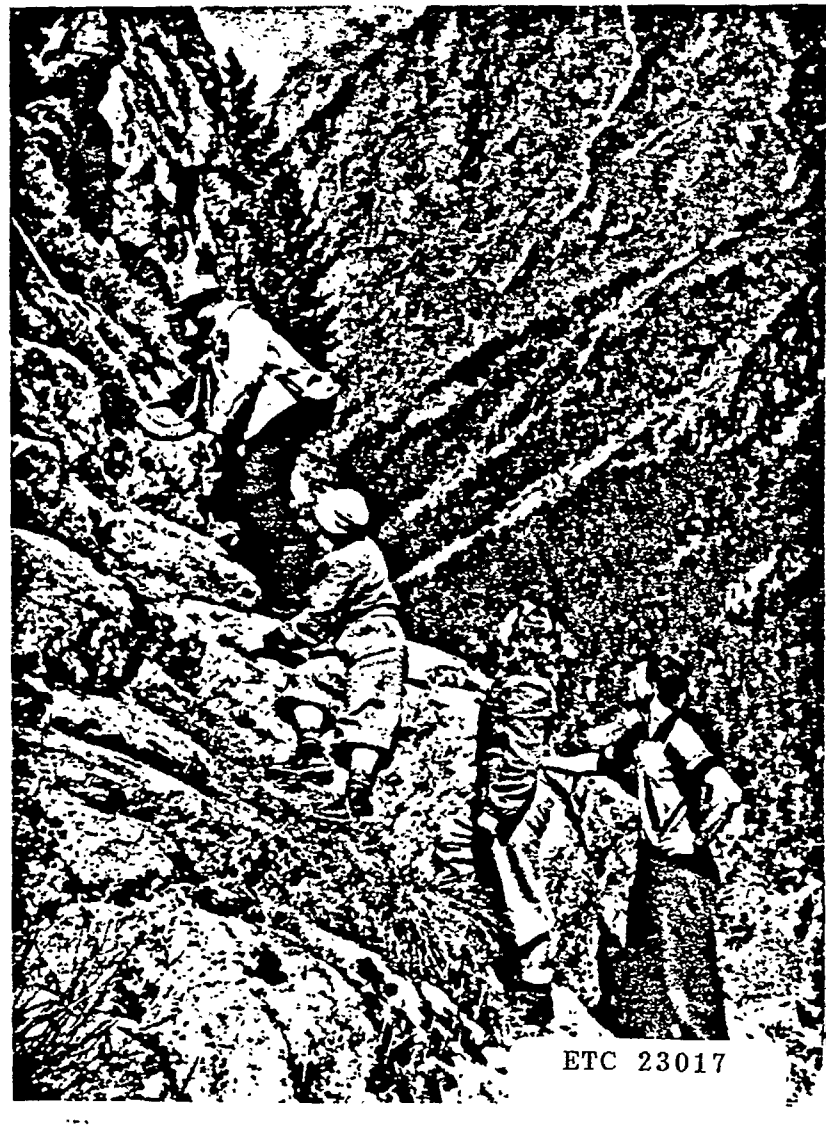
The Caucasus Mountains are the source of many rivers and streams that rise in the glaciers and snowfields and flow into the Black or Caspian seas. These waters have been increasingly developed for power.

It has been said that Hitler hopes to be able to drive down along the railroad and pipeline from Maikop to Baku via the Grozny field, and to cut through from beyond Rostov to Astrakhan on the Caspian. This accomplished, he would have cut the Caucasus oil outlets to the north. His aim then would be, according to this strategy, to hole up for the winter on the Astrakhan-Stalingrad line of the comparatively warm Caucasus country.

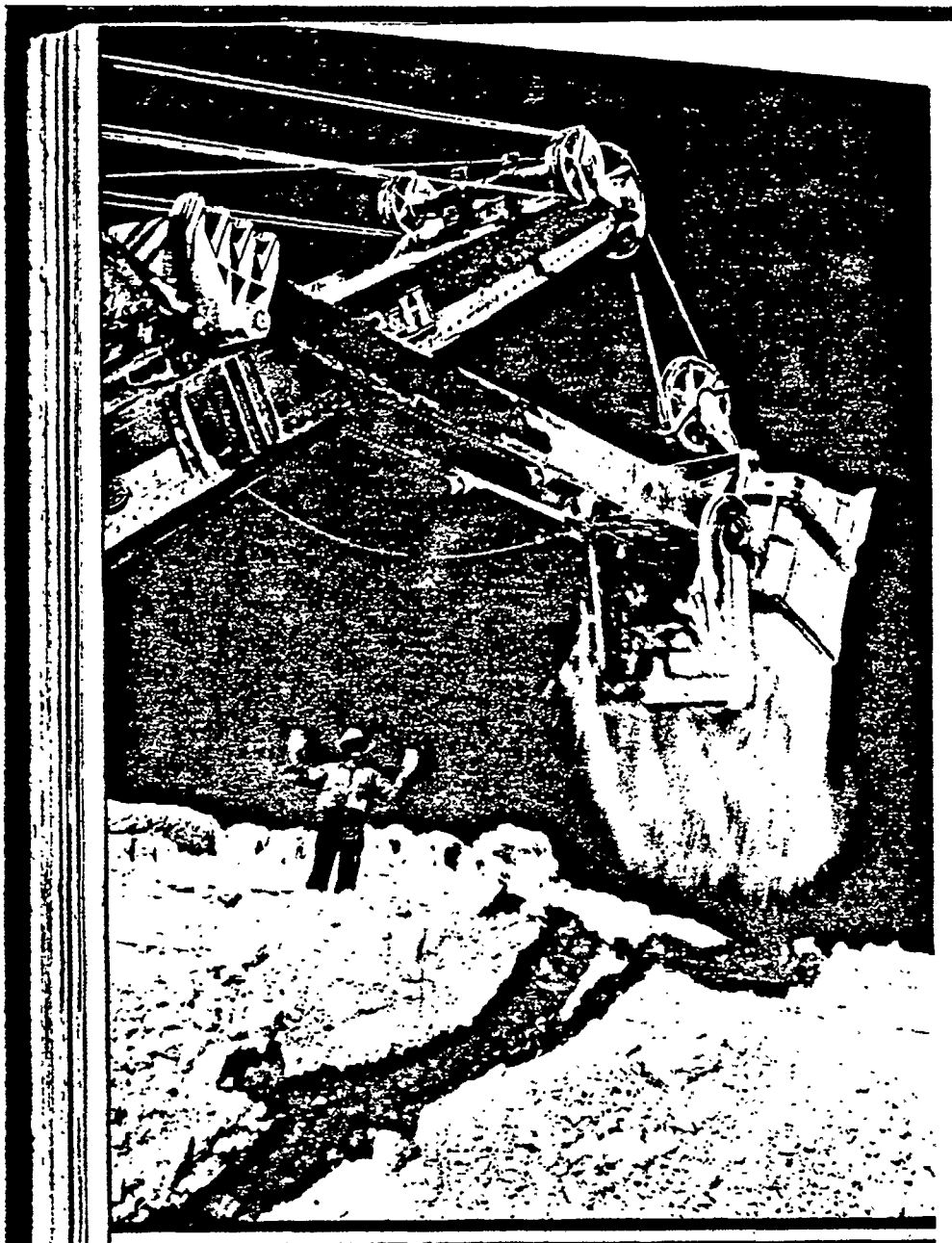


Mining and refining Caucasus minerals uses lots of power

Caucasus slopes are sub-tropical and verdant



ETC 23017



LOUISIANA
STOCKBIN STATE

TAKE A LOOK AT Louisiana! Rich in the things America needs today, the pelican state has become an important front in our Battle of Production. Food, timber, fabulous mineral wealth make it a vast storehouse of raw materials for the factories turning out our tools of war.

No other like area of the United States offers so much in natural resources to the chemical manufacturer. Take petroleum, the largest one. Proven oil reserves in Louisiana are greater than all but the two giant states of Texas and California. A partial exploitation of the natural gas fields there – the world's largest, they say – brings in 12 million dollars a year. Natural gas, natural gasoline and other petroleum products such as carbon black brought the total revenue from oil fields last year to 125 million dollars.

Gold Dust Underground

Today America needs sulphur too. This gay-colored but otherwise prosaic, workaday chemical is another treasure stored in the underground vaults of Louisiana. Sulphur is highly important to us now because it is the basis of sulphuric acid, the "oil of vitriol" of the ancients which today finds its way into almost every chemical manufacturing process on which our economy and our war effort depend. Five million dollars' worth was the annual production figure *before* the present war spurt. Like oil, sulphur is brought to the surface in pipes – but unlike oil it can't be coaxed forth by simple pumping. When the "well" has been drilled to the sulphur dome three pipes are sent down to it, one inside the other. Boiling water is forced down one pipe, compressed air down another. The pressure and heat thus exerted on the sulphur melt it to a fluid state, in

ETC 23018

which form it comes bubbling to the surface with the hot water, over 99% pure.

What else does Louisiana have locked up in its basement? Salt is the next most important item — and it is an important one, because that's where chemical industries go when they want sodium, chlorine, hydrochloric (or muriatic) acid, caustic soda, soda ash, sodium sulphate, and a number of other materials they couldn't do without. There will be no rationing of salt in this country. Any one of several Louisiana wells could supply the world's needs by itself.

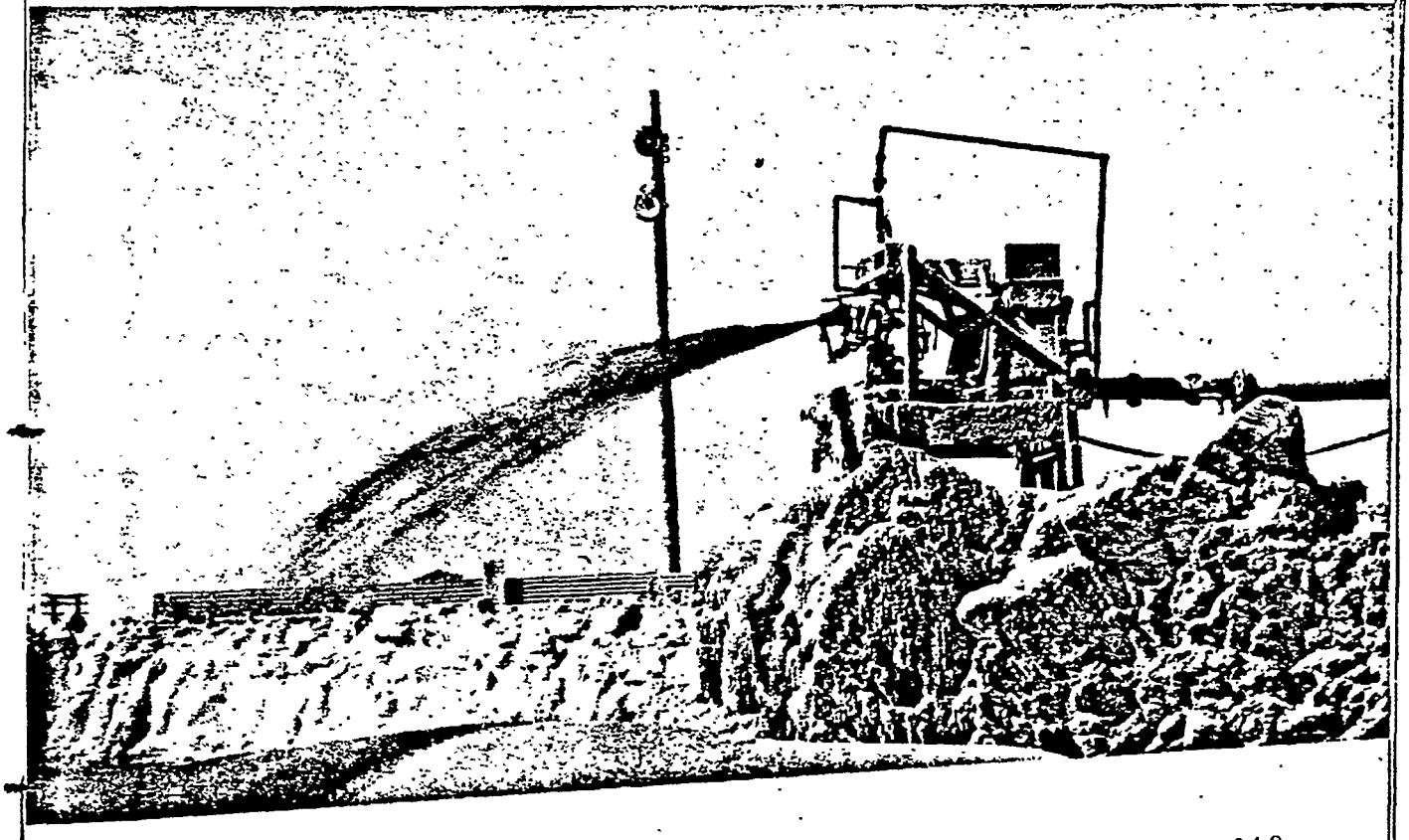
Louisiana's basement, if it were in Europe today, would be a major military objective. The people are aware of this, proud of it. A wag recently observed that when this war is done, they will have "pumped out so much down below, the ground level will sink a half-mile."

But not all the resources of the land can be pumped. Much sulphur is mined with pick and shovel. There is also silica, limestone, lignite, gypsum, sand and gravel. There is clay, one type of which has recently become the basis of a flourishing business in petroleum drilling mud. And there is the soil itself — much of it low alluvial ground enriched by centuries of river deposits. Today America and her allies need food and farm products. Something like a million bales of cotton are raised every year. Four hundred million pounds of Louisiana sugar, 5 million gallons of cane syrup and 15 million gallons of molasses went to appease the nation's sweet tooth last year and to provide a quarter of the nation's industrial alcohol — alcohol which is going into smokeless powder, rubber tires perhaps, and a dozen defense industries this year. The present shortage of imported sugar only underlines the fact that 95% of our domestic supply comes from Louisiana.

Rice is the third big crop — the biggest in the nation, in fact. Others are perique tobacco, soybeans, corn, both sweet and Irish potatoes, grain, hay, peanuts, tung nuts, oats and citrus fruits. Do you like strawberries? Hammond, La., is the largest strawberry packing center in the country. These are very special berries, in a way. Strawberry plants when young usually have a protective nest of straw spread underneath to keep them off the ground. Hammond berries, grown in the heart of southern pine country, have pine-needle bibs tucked under their chins instead.

"Dat's why dey's so good," explain the negro field hands. "Dese yere ain't straw-strawb'ries. Dese is *pine*-strawb'ries!" — and the white teeth gleam proudly.

Sulphur geyser, man-made by the Frasch process. On opposite page, dry sulphur



ETC 23019



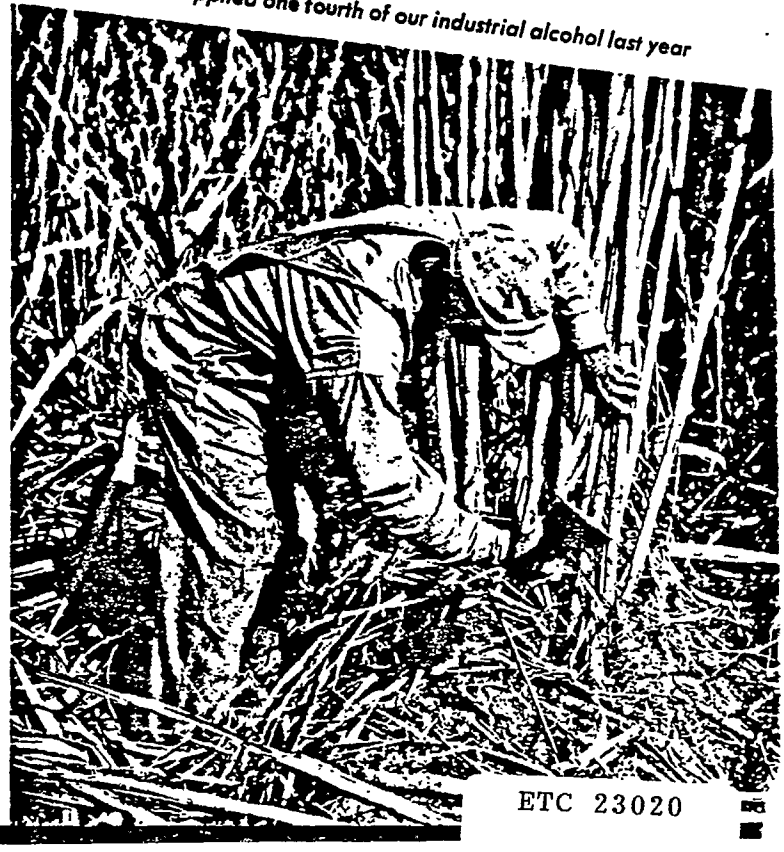
Louisiana salt, an Ethyl ingredient, helps fly bombs over Berlin

The modern science of chemurgy has been cultivated at the state university in Baton Rouge in an effort to benefit that 40 per cent of the state population which lives on farms. And it has turned out a couple of miracles. One is the development of a fibre building-board industry from "bagasse" – the dried crushed stalks of sugar cane which formerly were just waste. Tung nuts are another. Easily grown in much of the state's cut-over forest land, they now flourish in more than 20,000 acres of the state. Tung nuts yield an oil which turns out to have an amazing diversity of uses. As a paint dryer it adds a glossy finish; it tends to make varnishes water repellent and crackproof; it is used in waterproofing everything from concrete to fabrics and fish nets. It finds its way into oilcloth, linoleum top dressing, leather softeners and soap. It is the basis of an electrical insulating varnish that saves silk for Army parachutes. They make India ink and lampblack of it. Tung oil goes into materials for lithograph printing, for brake linings, wood preservatives, medicines and insect sprays. It does a lot of jobs the Army and the Navy want done.

The Sweet Potato Fights

So does the homely sweet potato now – thanks largely to the chemurgic researchers at L. S. U. They have learned to recover starch from sweet potatoes at a cost of 3¢ a pound. And after the extraction there remain quantities of dextrin, as well as thousands of gallons of alcohol – which is enough to make anybody happy. Anybody who isn't at war with us, that is. Alcohol helps make smokeless powder, tetraethyl lead, and a dozen other ingredients of war that will help to turn the tide of battle in 1943. What's left of the

Louisiana sugar supplied one fourth of our industrial alcohol last year



ETC 23020

original sweet potato after all this extraction turns out to be a first class dairy feed. And that's very fine indeed, for scientists of the University are trying to improve the dairy, stock and poultry farms of the state – and the state grows 30% of our national sweet potato crop.

Much as it owes the land, however, the pelican state – and especially its key cities of New Orleans and Baton Rouge – owe a lot to the water too. Straddling the deep-water end of the mighty Mississippi where it meets the Gulf of Mexico, Louisiana has the country's most complete system of inland waterways, totalling some 5,000 miles. From beneath the surface of these waters are taken fish enough to supply whole armies – 13 million pounds a year, plus a fantastic tonnage of shellfish. Three and a half million bushels of oysters are harvested annually. Oyster and clam shells available as a source of lime for industrial use run to 1 million cubic yards yearly. Twenty-five hundred *tons* of crabmeat are produced. More than half the nation's supply of shrimps comes from these waters – fifty thousand tons is the figure. Little wonder that Creole cooking leans heavily on shellfish!

It leans heavily on aromatic spices such as Tabasco sauce, too. Tabasco is based on cayenne peppers, the native district for which is Iberia parish. (The counties of Louisiana are known as parishes – an oddity held over from the days of French occupation.) Next time you see a bottle of hot pepper sauce, look for "New Iberia, La." on the label.

Even the delta marshlands of this fairy-story state are an economic asset – not as prime Florida real estate, but as the home of the muskrat. The muskrat hasn't much musk (although the University is investigating that possibility, now that Nazi conquests have cut us off from a lot of the musk our perfumes need). And the muskrat isn't even impressive as a rat. But as the source of "Hudson Bay Seal" he's worth 5 million dollars a year to the 20,000 trappers who account for a fur industry which produces more fur than Alaska and Canada combined. They also catch opossums, otters, raccoons – and raise mink on mink ranches!

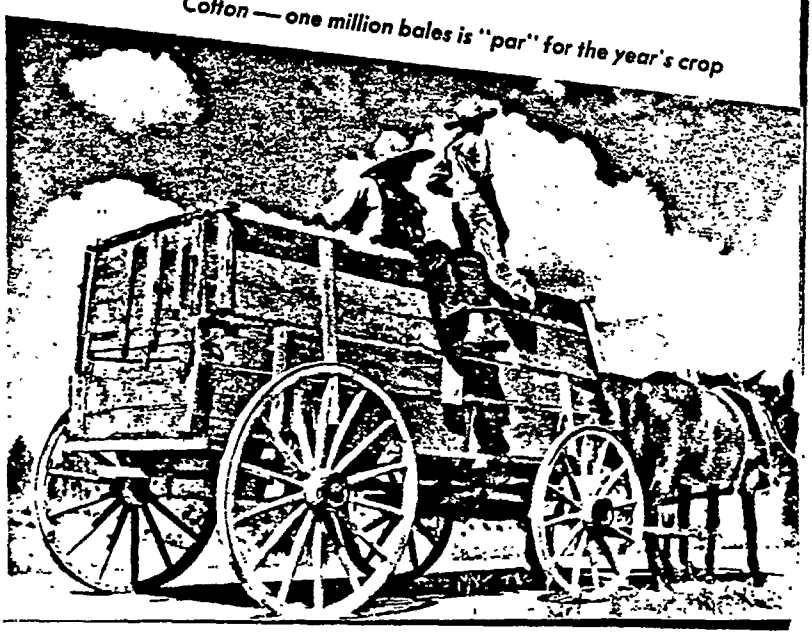
Truth is, once you've been to Louisiana you realize that all along it's been a piece of the little things that make up your daily life. The shrimp cocktail you buy in New York, the Hudson Bay Seal your wife admires in Washington, the paprika you dusted over your omelette in California (for paprika, smuggled out of conquered Austria, has become established as a refugee industry in Louisiana) – even the crap game that cost you twenty dollars in Reno originated in Louisiana.

Craps is not a new game, of course. Betting the baby's shoes on a pair of dice is a pastime so ancient as to go back beyond the horizon of history. But it came to America in its present form through the good offices of a wealthy colonial planter, Bernard Marigny de Mandeville, who introduced it to the town of New Orleans. And it was probably in that same charming city, somewhere in the region below Canal Street, that the sport acquired some of its modern refinements such as the Slow Roll, the Round Edge, and the Load for Seven. One other contribution New Orleans has made to the art of genteel living is Oysters Rockefeller, originated at Antoine's. The city also claims – as do some half-dozen other cities or countries – to be the place where the cocktail was born; a local apothecary stirred it up, they say.

Small wonder that more than one and a half million tourists visit New Orleans each year. Tourists, incidentally, are the second most important industry in the Believe-It-Or-Not land of Louisiana. And believe us or not, we haven't yet mentioned one industry so vast it literally covers more than a third of the state – lumber! They cut 1,000,000,000 – yes, a *billion* – board feet of hard and soft wood a year: wood for paper, for barracks, for the decks of battleships. Other wood products such as turpentine, acetic acid and so on ran to a figure above $35,000,000.

Yes, look at Louisiana! Rich in the things America needs today, it looms importantly in the picture of our war effort. It is truly a vast and busy stockbin – for the Arsenal of Democracy.

ETC 23021



Cotton — one million bales is "par" for the year's crop

Gasoline Wears Better

THE FARM TRACTOR can't fly or even move very fast on the ground. But it's a war machine for all that — indispensable in the production of food for our armies and our people; for our allies; for the conquered peoples who will one day be freed. Tractor production is not one of the immediate concerns of Donald Nelson — actually tractor production is being sharply curtailed — but if ten thousand tractors broke down simultaneously on American farms a new crop of gray hairs would sprout in Washington and lights would burn far into the night at the Department of Agriculture. Therefore, anything that will improve the efficiency of the tractor or make sure it lasts longer comes under the heading of "war effort."

What are the factors that influence top efficiency and wear in a tractor? A good many tractor engineers will tell you that fuel is probably the most important. For example, a tractor burning gasoline will deliver approximately 12% more power than the same tractor burning distillate or kerosene. That isn't a monumental gain, but farmers trying to meet an increased demand for food and fiber of 25% can use all the power they can get. If a distillate-burning tractor is converted to high compression, a relatively simple operation, the power gain may run up to 30%. Fuel, obviously, has a decided effect on the efficiency of a tractor.

But what about wear? Does the type of fuel used have any effect on the wear and tear on a tractor? The answer is emphatically yes. Research engineers have just completed a project which proves that a tractor engine burning distillate wears out about twice as fast as a similar engine burning gasoline. Two tractors of the same make and model were tested under the controlled conditions of the laboratory and in the field under actual operating conditions. The laboratory test was run for 1384 hours and the field tests lasted 2064 hours, a total of 3448 hours. At the end of the tests the engines were torn down and the vital parts carefully weighed and measured for wear. The distillate burning tractor engine showed 89% more wear on piston rings; 135% more wear on pistons; 81% more wear on crankshaft journals; 66% more wear on cylinder walls; 147% more wear on main bearings; 78% more wear on connecting rods.

Some interesting and significant things developed during the tests on the distillate-burning tractor. The engineers' report was filled with quotations like this: "Oil consumption became very heavy in the last 500-hour period and power began to go down," or "In the last few hours the engine ran very hot and at one time the oil on the outside of the engine caught on fire," or "Operators dislike running the tractor."

After slightly more than 1000 hours of operation the cylinder head of the distillate-burning engine was found to be cracked and leaking water into the combustion chamber. A new head with valves, steel head gasket and manifold gaskets had to be installed. At 1472 hours the manifold gaskets had to be replaced again.

The importance to farmers of this information is obvious. In the first place gasoline-burning tractor engines develop more power, run and idle more smoothly and use less oil. Secondly, gasoline-burning tractors are less likely to break down at a time when every tractor hour counts and tractor parts are becoming scarce. Thirdly, wear is a more important factor than ever before because of the indications that tractors will have to last for the duration of the war.

From the viewpoint of gasoline marketers this situation holds definite possibilities. It enlarges a principal market for house brand gasoline when nearly all other markets are dwindling. With distillate becoming increasingly scarce and gasoline stocks piling up it is a welcome development.

Farmers Need Help

The big job ahead of oil marketers is to get the facts to the farmers. In addition to meeting increased demands for food and fiber these men are faced with a growing labor shortage. Both men and machines will have to work longer hours and any information that will keep tractors operating day in and day out will be welcomed.

The Ethyl Corporation is attempting to help do this with an extensive advertising program for Fall publication in farm papers and sales promotion activities built around booklets, wall charts showing the fundamentals of combustion, sound and silent slide films and other material.

It was felt that next to facts on fuels, information on ways and means of keeping tractors in the

field would be most helpful to farmers. Consequently especial emphasis has been laid on preventive maintenance tips. For example the booklet entitled "Wartime Tractors," which has been enthusiastically received throughout the industry, contains 32 tips on maintenance, all of them illustrated. In addition there are sections on common complaints and their solution, combustion facts, as well as tractor maintenance and tractor expense records. Every effort will be made to put these booklets into the hands of the farmer himself. More than a million of these booklets are being printed.

Supplementing the booklets is a series of sound and silent slide films which can be shown to farmers at meetings. Sound slide films such as "An Ounce of Prevention" and "John Ross Gets the Facts" have been available for some time. A third film of this type called "The A B C of Good Tractor Operation" is now being prepared. In addition, a whole series of silent slide films, the so-called "quickies," will be available shortly. Each of these films cover a specific subject – spark plugs, manifolds, carburetors, air cleaners, lubrication, variable speed governors, valves, guides, springs, etc. Each film will be accompanied by a suggested talk, which, together with captions on the frames, will make it quite simple for anyone to make a presentation.

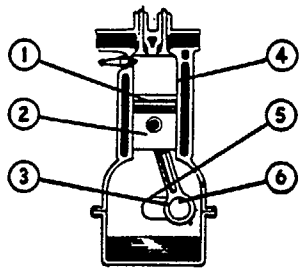
Two wall charts showing pictorially certain fundamental principles of the internal combustion engine are being made available to certain types of high schools and colleges for classroom work. The charts, attractively done in color, are entitled "Factors Affecting Engine Performance" and "Converting Gasoline Energy into Power." They are accompanied by syllabuses which will greatly facilitate classroom presentation.

A great many of the tractors on farms today are more than 6 years old and consequently were manufactured during the depression period when it was the practice to design tractor engines for the worst fuels it was possible to buy. For some reason the tractor engine was considered a thing apart and manufacturers did not keep abreast of progress in automotive engines or fuels.

In 1935 a progressive tractor manufacturer brought out a high compression tractor designed to burn 70-octane gasoline. The machine was well received by farmers and soon other manufacturers followed suit. Within a short time nearly all manufacturers were making compression models.

However, there are still thou-

COMPARISON OF WEAR ON TRACTOR PARTS—GASOLINE VS. DISTILLATE —3448 HOURS OF OPERATION



With distillate there was—

1. **89% MORE WEAR on piston rings**
2. **135% MORE WEAR on pistons**
3. **81% MORE WEAR on crankshaft journals**
4. **66% MORE WEAR on cylinder walls**
5. **147% MORE WEAR on main bearings**
6. **78% MORE WEAR on connecting rod bearings**

TRACTOR PARTS LAST LONGER WITH GASOLINE

sands of low compression tractors in the country, the power of which could be stepped up enormously by modernization – that is, by converting them to high compression. The process of converting most tractors to high compression is simple. It consists largely of replacing standard pistons with high compression, or "altitude," pistons, installing "cold" type spark plugs, and adjusting the heat control on the manifold to the "cold position."

Because of the shortage of materials for replacements, such as pistons and cylinder heads, this changeover is not recommended in Ethyl's promotion campaign unless the farmer plans an overhaul and intends to replace such parts anyhow. The high compression parts cost no more and the result is a substantial increase in power. The power can be used in two ways: it enables the farmer to work in a high gear, thus permitting him to get over the field faster; or it may enable him to pull an extra implement.

In view of the farmer's need for all possible power, Ethyl has prepared a booklet called "High Compression Overhaul and Service" intended primarily for distribution to our own staff, tractor dealers and repairmen. It lists nearly all the makes and models of tractors now in operation together with information necessary for converting them to high compression.

Our Services Available

All the material discussed above, within the practical limits of numbers, is available to customer companies, as well as the services of agricultural engineers in laying out farm programs that will build a lasting farm market for gasoline, as well as help to keep vital tractors running for the duration.

"Ankle deep" Then and Now

THIS Labor Day finds America busily buying war bonds and winning "E" pennants for production . . . one-tenth of the bonds we ought to buy . . . one-twentieth of the pennants we should be winning.

On Labor Day exactly 25 years ago we were likewise in the midst of another war. And in those days the general picture was much the same as it is today — the air was full of patriotic slogans, posters exhorted our young men to join the Marines, women were asking for uniforms and a share in the war, taxes were going up and up, and optimists were lifting toasts to a quick victory as soon as our boys went into action, while their pessimist friends gloomily prophesied that the war might last for years and years.

We were then just 14 months short of victory.

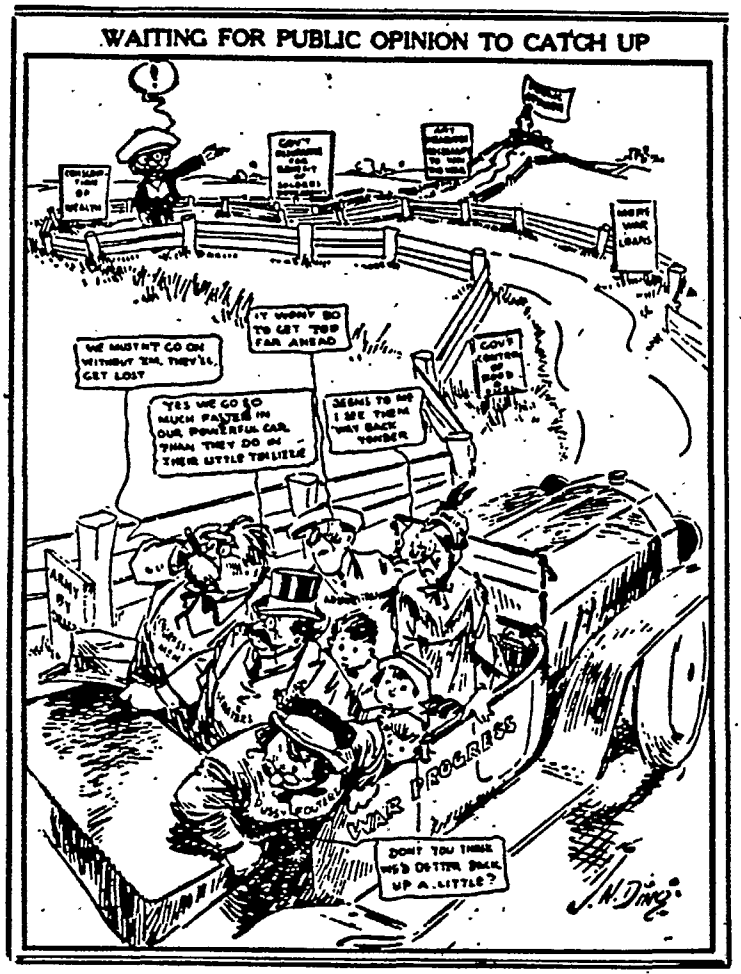
How far are we today from victory — or defeat? How does our outlook, on the military front and on the home front, compare with our outlook on Labor Day of 1917?

Let us go back in the files of a well-known newspaper, the *New York Times*, and see what was in the news on that September day 25 years ago.

The war was quiet — there were no "big" headlines. We had a number of AEF boys in France, but they were not yet ready to go into battle. General Pershing warned against sending untrained, ill-equipped men into action, but said he expected to hammer the Huns "next year." This year finds us with a large AEF in Ireland — the bottleneck this time is shipping — but we're talking about hammering Hitler "next year."

On the home front there is more unity than before — thanks largely to Pearl Harbor. In 1917, to take an example, the pacifist element was so strongly organized as a group that Big Bill Thompson, mayor of Chicago who burned the English history books and had once threatened to "punch King George in the snoot," sanctioned a national pacifist convention in his city and threw a cordon of police around the meeting to protect it from angry citizens. Frank Lowden, governor of Illinois, dispatched soldiers of the National Guard to break it up, but they did not arrive until after the meeting. In New York the "Friends of Irish Freedom" held an anti-British rally and were chased home by the police.

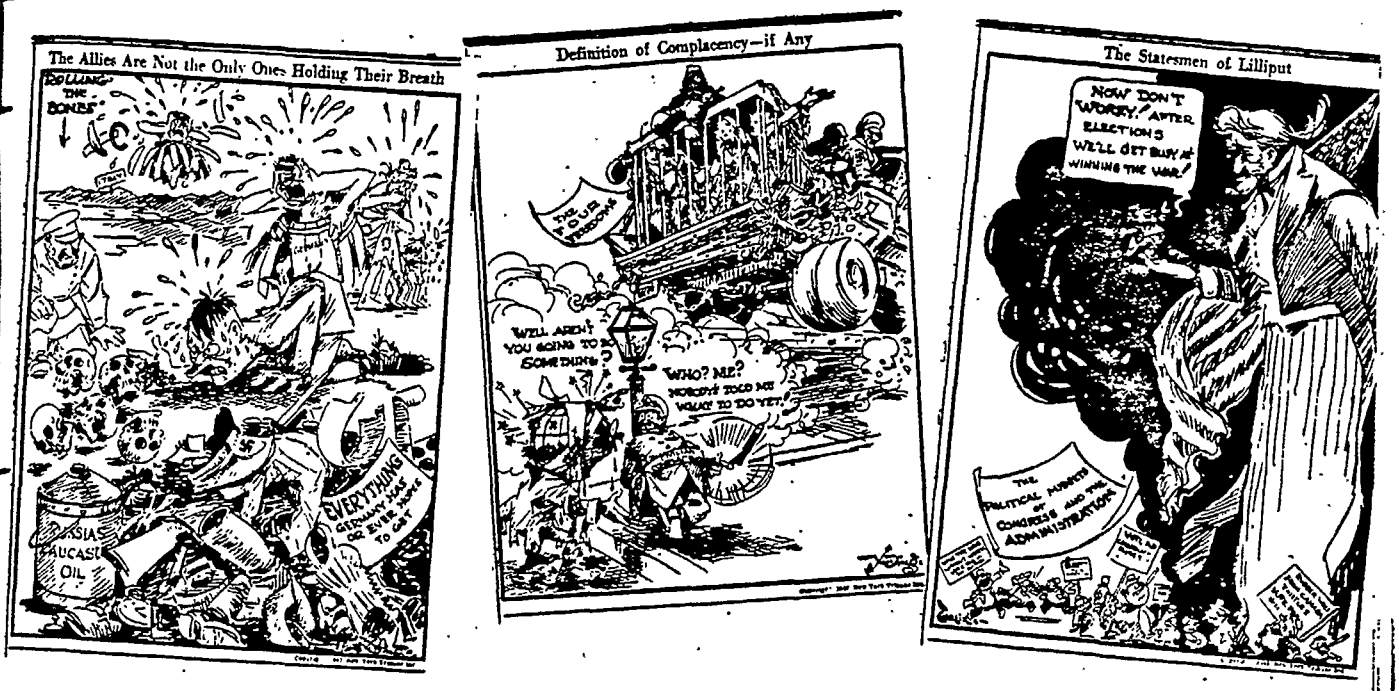
In 1917 "Ding" caricatured the same foolishness he finds today



This Time We're Together

You don't see this today. Mass sentiment was crystallized into flaming resentment by the shock of the sudden, and to many, almost incredible events of December 7. Loss of the Philippines and other Pacific islands together with other defeats

ETC 23024



Three "Ding" cartoons from the New York "Herald-Tribune" today

and humiliations have served to keep resentment smoldering. More thoughtful and less emotional citizens are genuinely concerned over the prospect of an axis-dominated world. Others just want to get back to the comforts and joys of peacetime living. Whatever their reasons, most Americans want to win the war as soon as possible.

Our opponents, however, are likewise better united than they were in 1917 — at least on the surface. Germans may be apathetic about the war but they do not openly oppose it. They dare not. Freedom of speech had not been outlawed 25 years ago. The Berlin *Vorwärts*, organ of the Social Democracy party, in an editorial on President Wilson's peace plan, asserted that they derived "considerable comfort" from Wilson's note to the Pope. And the Reichstag, in those days something more than a sounding board for Hitler oratory, passed a majority resolution in favor of peace. Of course there was violent reaction among the saber-scarred barons at court, but no one was kicked up against a wall before a firing squad as they would be today if they dared argue the policies of their inspired, unbalanced Fuehrer.

What did that old Labor Day newspaper have to report on the submarine menace? Well, the Germans had us really worried. Their "unrestricted" submarine campaign, a very mild forerunner of the present campaign in which lifeboats are shelled and hostages taken aboard, accounted for enough ships so that the Germans claimed a total of six million tons of Allied shipping . . . and that was in the days when we had the French, Japanese and Italian navies on *our* side. In the first eight months that we have been in this war, according to the count kept by a world-wide press service, we *acknowledge* a loss of 400-odd ships. Our admitted losses then (to compare with the 1917 German claims) may be roughly estimated at three and a half million tons since Pearl Harbor. There is little cause for optimism here. With shipping the worst bottleneck in this war, it does not look as though we had only 14 months to go.

History Doesn't Repeat

There are two news items in this Labor Day newspaper which are ironically amusing today. One tells how the Italians were beating the Austrians so badly at Carse that the Germans had to rush aid to their allies to save them from a complete rout. The other describes a Japanese military mission then visiting the United States to further our military cooperation against the common enemy.

ETC 23025

Air raids are different today also. A 1917 raid over East Kent injured a few people and rated a few inches of type. More space was given to a flight of German planes over France which were reported to have dropped poisoned candy which killed many children. These "atrocity" stories of the last war seem like mere fairy tales compared to the routine reports of this struggle, when whole countries such as Greece are systematically starved and villages like Lidice are obliterated.

All Quiet Everywhere

Early September in 1917 was a period when all was quiet on the Western Front. It was too quiet — the lull before the great storm, when the German army was preparing for the "big push" (now known as a "summer offensive") which nearly won the war for them. Today there is no Western Front — to the despair of our mysterious allies in Russia.

On the home front you could say "All Quiet" also. As today there were speeches and patriotic songs; advertisements keynoted their sales messages to the war effort; but the people generally were apathetic. They were more interested in the impending World Series than in World Peace. John McGraw's Giants were romping away with the pennant in the National League, and the Chicago White Sox "wonder team" was far out in front in the American circuit—while the Brooklyn Dodgers and the now mighty Yankees were just a couple of steps above the cellar in their respective leagues. You could read all about it in your regular paper for one cent — five cents on Sundays.

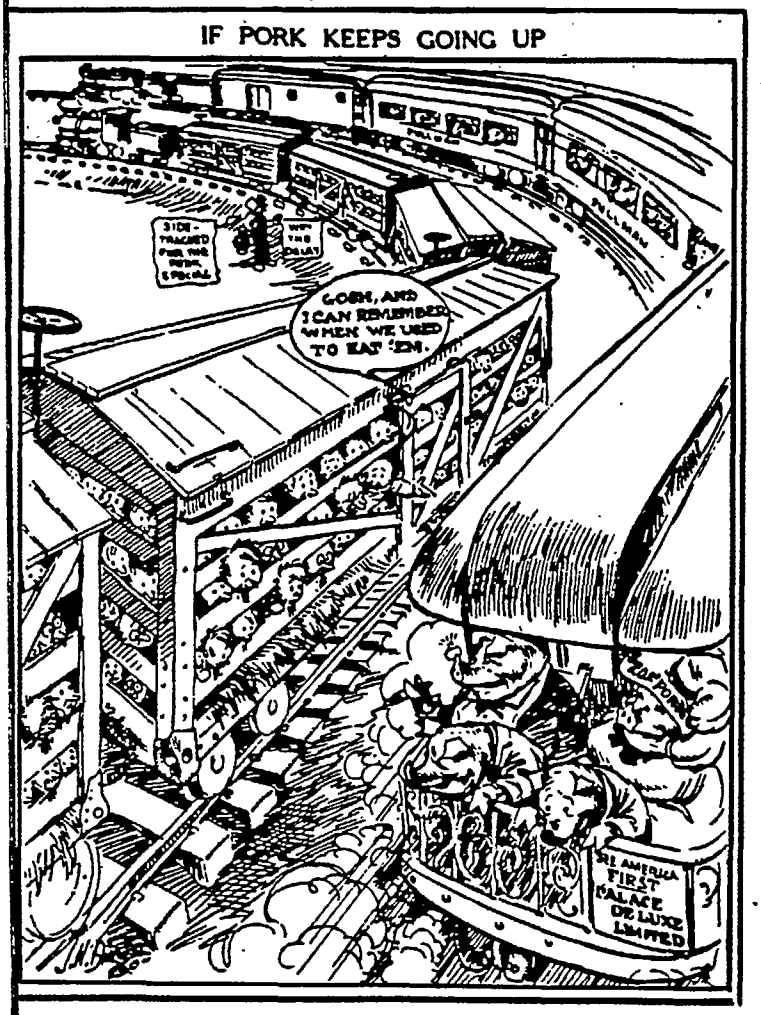
Heatless, meatless and gasless days had not yet come then. Sugar prices had not begun to skyrocket. We had more excuse than we have now for complacency. Samuel Gompers, head of the American Federation of Labor, was urging workers to "get busy and back up the fighting men." Labor leaders today say much the same thing although the loss of thousands of hours of work through "wildcat" strikes has hampered the war effort.

In the papers today you read of ceiling prices being clamped on consumer's goods in an effort to forestall inflation. The need for such measures is generally accepted although certain groups have tried and are still trying to "cut corners" at the expense of the public welfare. Government spending in 1942 makes that of 1917 seem like an economy wave. Money is being spent at the rate of $105,400 a minute, with legislators voting huge appropriations for NYA, WPA, and other make-work or social-benefits agencies; but with elections only a few weeks away, they are reluctant to vote the taxes needed to pay the bill for them. Politics change little from war to war.

"On Strike" as Usual

Commentators on the military front today point out that Allied strategy in this war is still defensive. Even the Australian-American action on the Solomon Islands, which

Familiar? It's from the New York "Tribune" of September, 1917



ETC 23026



"Ding" drew this 25 years ago — but it could be used tomorrow

thrilled us as the first really offensive action where our troops took the initiative, was a move, they say, to forestall Japanese exploitation of the harbor at Tulagi and to create a diversion which would throw their plans for an attack on Siberia off schedule. These same commentators say we can't take a large-scale offensive yet because we've been delaying as usual, squabbling as usual, striking as usual until a 1942 offensive to start pushing the enemy back is no longer possible. They contend that we're still *losing* this war in a way that few people, especially in Washington, seem to realize.

How long before we start to win it?

Formula for Defeat

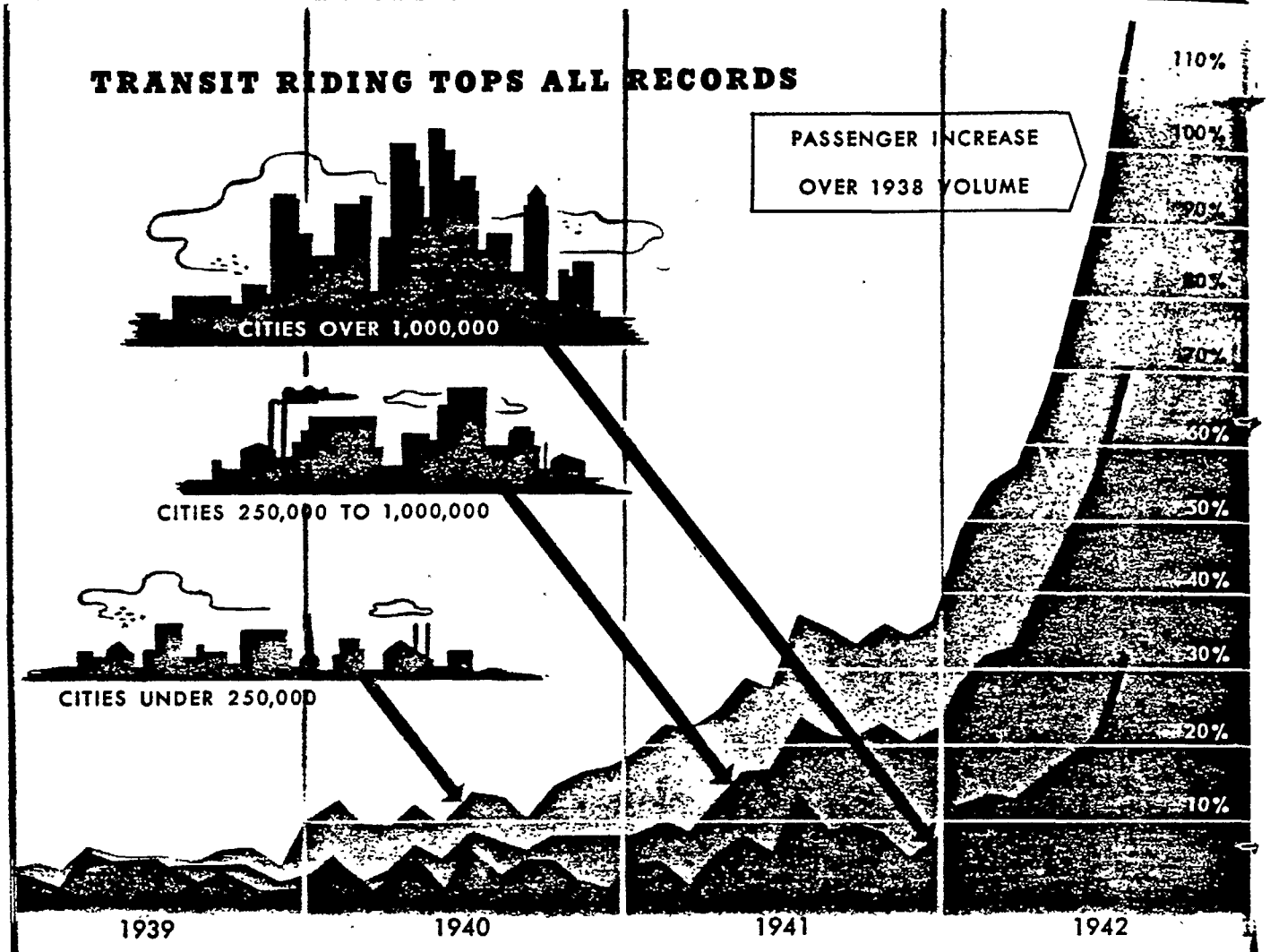
The Office of War Information reports that we are only "ankle deep" in this war psychologically. Headlines tell us of war plants at General Motors shut down by a grocer's union picket line, of unending series of "investigations," "inquiries" and lawsuits that take time of busy men who are trying to deliver the weapons and supplies our soldiers and sailors need. The realists, the common-sense commentators in our press, cry out against our soft living, our soft thinking, our soft leadership. We can't win any war, they say, while we let wildcat strikes go unpunished—while housewives scramble for disappearing canned goods to hoard with their sugar — while we kid ourselves that a few stamps and bonds now and then are going to make any real dent in the approaching juggernaut of inflation — while we find ways of dodging taxes and rationings—while we let big and little people alike make a "gravy train" of quick money and soft jobs out of the war. They point to a queer sort of half-and-half patriotism — the mixed attitude of wanting to win the war yet hoping it doesn't end before their pockets are well lined, their "financial future secure."

Ankle Deep—in Blood

Today's headlines are those of today, but in many ways they echo those of 1917. The ominous note is there for those who can read between the lines — who can see us Americans smirking over our little bursts of patriotic accomplishment, dawdling while men die, letting time slip by while we stand only "ankle deep" in the stream of war.

On Labor Day, nine months after the war began, President Roosevelt had to issue an ultimatum to Congress: "Curb farm prices and wages by October 1 or I will." The farm bloc, which is after 110% of "parity" prices, and the labor blocs, who wish the upward spiral of wages to rise unchecked, apparently don't yet know the meaning of total war. Total war means that every man and woman has to accept sacrifice, has to get in the fight right up to their necks — in order to save their necks.

ETC 23027



FOUR BILLION NEW PASSENGERS

THE TRANSIT INDUSTRY in the United States is face to face with the most serious problem of its entire existence. According to all the evidence accumulated during the past few months, 1942 will be the year of greatest traffic in its history. Still larger looms the number of passengers it may be called on to carry in 1943 and 1944.

Not only multitudes of war workers must be shuttled to and from their jobs, but throngs of persons who formerly depended entirely on their motor cars are packing the streetcars and the motor buses. The shortage of rubber for tires, gasoline rationing, shortage of repair parts and consequent delays in repairing cars which break down are among the reasons why auto owners will use mass transportation.

Instead of thinking up ways to meet the competition offered by the automobile, transit officials have had to reverse their usual procedure and figure out how their industry can fill some of the gap caused by the reduced use of motor cars.

Overload in Sight

In 1941 the transit industry transported a total of 14 billion passen-

gers. In 1926, its biggest year so far, seventeen and a half billion were carried. This year, however, the American Transit Association predicts that 18 billion passengers will ride buses and streetcars, and in 1943 the figure will be 20 billion.

New All-time High

Greatest increases have occurred in centers of war activity. In Washington during the first four months of 1942 there has been an increase of 84 percent over the corresponding period of 1938. In Seattle transit system riders are 61 percent more numerous than in 1938; in Wilmington, Del., 79 percent, and in San Diego, Calif., 156 percent. Passenger totals are rising also in cities which have no war industries. Transit riding reached a new all-time high in July, normally a slack month, when rapid transit, streetcar and bus lines carried 1,500,000,000 passengers. Cities of less than 250,000 in population showed increases in traffic volume of 216 percent in July as compared with the same month in 1938.

The increase in the number of bus and streetcar riders varies with the size of the city. In New York, for example, the change is small, because the majority of persons use the public transit systems habitually, regardless of rubber or gasoline conditions. In small cities, however, the automobile has long been the favorite method of transportation; therefore, in these cities, particularly those with populations of 50,000 or less, the transit systems are having an unprecedented rush of business.

There are exceptions to every rule, however. Some few cities, notably Kalamazoo, Mich., have been going against the trend, with their transit systems showing a decrease in the number of passengers carried. The War Transportation Board of Kalamazoo believed the reason was a mistaken idea of the purpose of the Share-the-Ride plan for car pooling. They sent a letter to the city's industrial plants, reading in part as follows:

"There seems to be some confusion in connection with the 'Swap-Ride' Program which this Board is recommending to be set up in Kalamazoo's industrial plants.

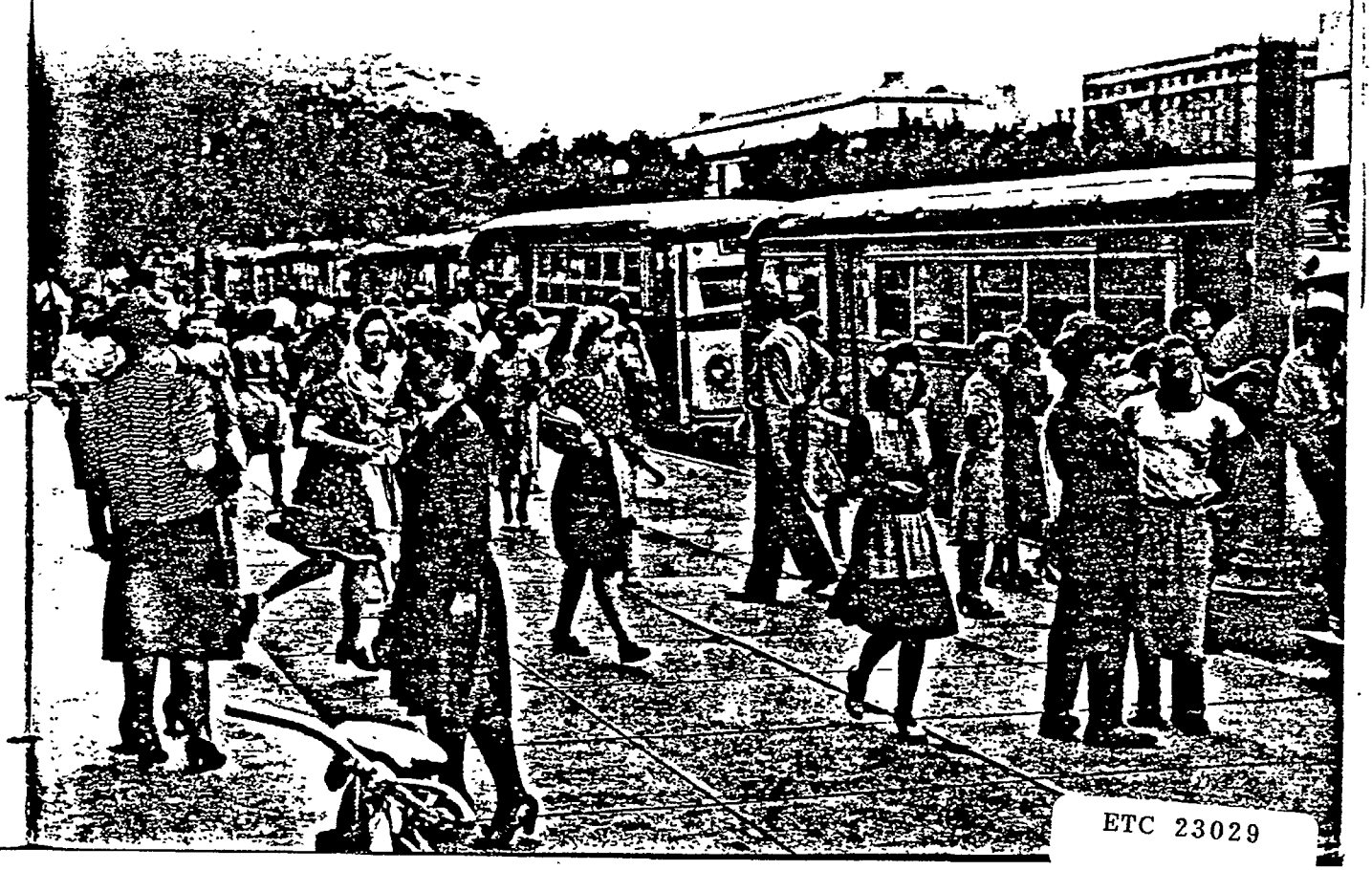
"It is only when cars stay home, as the result of 'Swap-Ride,' that tire savings are effected.

"We bring these points to your attention because of a curious situation which has developed locally; bus loads have decreased almost 20 percent during the last three weeks, yet there was no corresponding decrease during the same period last year.

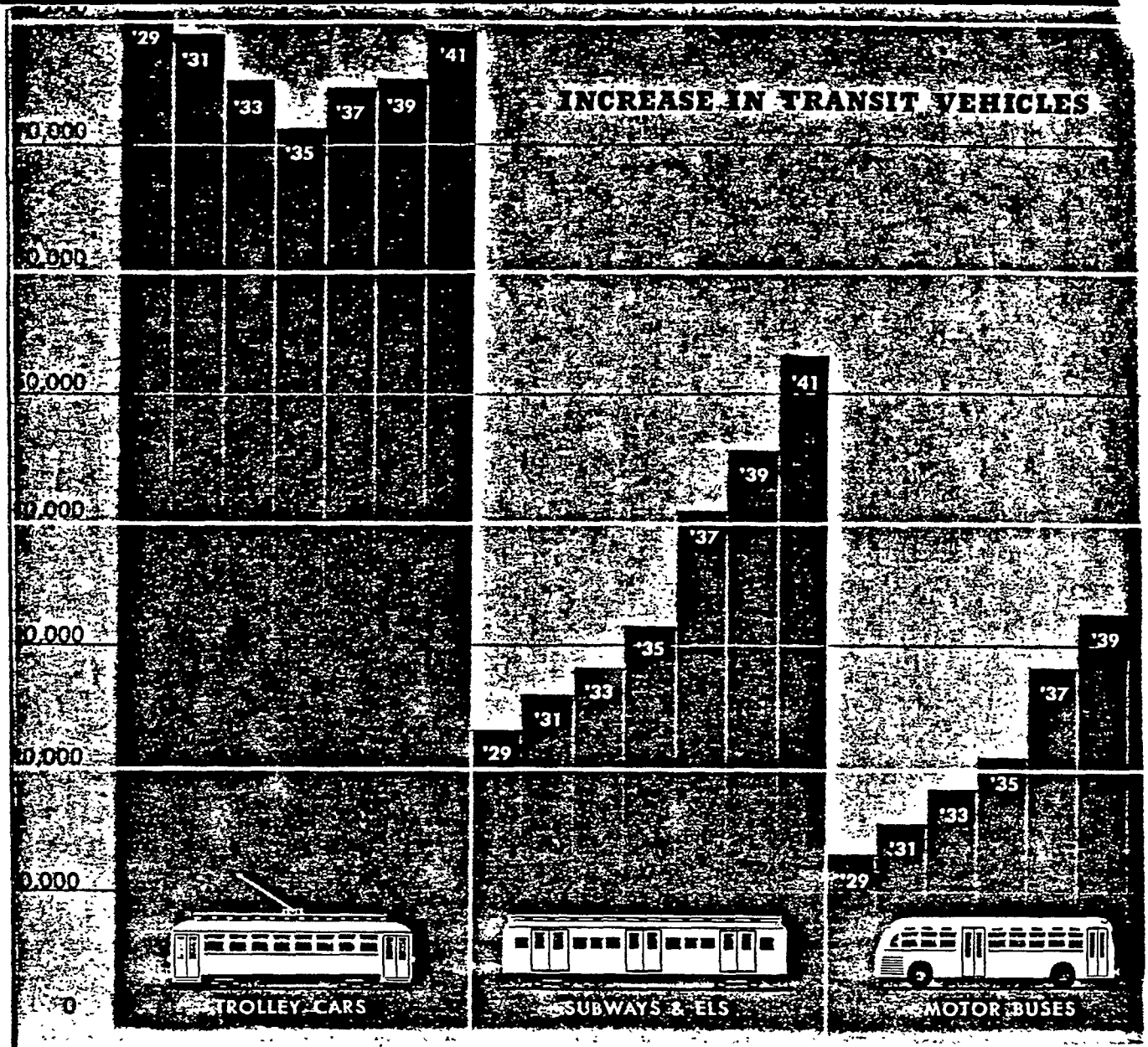
Kalamazoo Quandary

"This situation leads us to wonder if many workers are not considering 'Swap-Ride' as a plan to decrease

Just before the rush hour in front of the Munitions Building in crowded Washington



ETC 23029



Transit systems have grown by leaps and bounds in the last 12 years

bus traffic by inviting fellow workers (who formerly used the bus) to ride to and from work with them. . . . As we see it, 'Swap-Ride' is the answer only for those employees who can't walk because of distance and for whom bus transportation is not accessible."

The clearing up of such confusion regarding the share-the-ride plan will undoubtedly boost still higher the number of transit system riders. Their total will also be swelled as tires wear out, forcing cars out of service.

The Problem Can Be Met

Can the transit industry meet this serious problem of a tremendously increased business? The answer is yes only if certain conditions can be met.

The transit industry is one of our largest and most essential businesses. The revenues from all its lines are approximately equal to the postal revenue of the United States Government. In dozens of cities the local transit company is the largest employer of labor. In cities of a million

ETC 23030

or more population the number of transit rides per day is equal to from 75 to 85 percent of the total population of the city.

"Staggered" Rush Hours

Yet, despite its size and importance, transit officials say they cannot beat this problem without cooperation. It is essential that cities follow the recommendations of the Office of Defense Transportation for staggering working and school hours. Without such staggering there will be the inefficient situation of many streetcars and buses jammed to the doors during the few hours of the rush periods only, while the greater part of the day they sit idle in garages. With passenger traffic zooming, the present supply of transit vehicles soon will not be able to take care of the rush hour crowds unless a feasible stagger system is worked out. Business and industrial management also is being urged to cooperate fully with the War Transportation Committees in their areas in working out stagger-hour plans to insure maximum utilization of transit facilities in moving workers to and from plants.

Another difficulty is the uncertain outlook for new vehicles to accommodate the growing crowds and to replace those that wear out. Transit systems at present are about equally divided between those electrically operated and those powered by gasoline or Diesel engines. In recent years the number of motor buses has been increasing rapidly, while electrically operated vehicles have been declining.

Equipment is Scarce

In the first five months of 1942 manufacturers produced 5,000 buses. As of June 1, they had orders for 7,000 more. The demand for new streetcars and trolley coaches was also heavy.

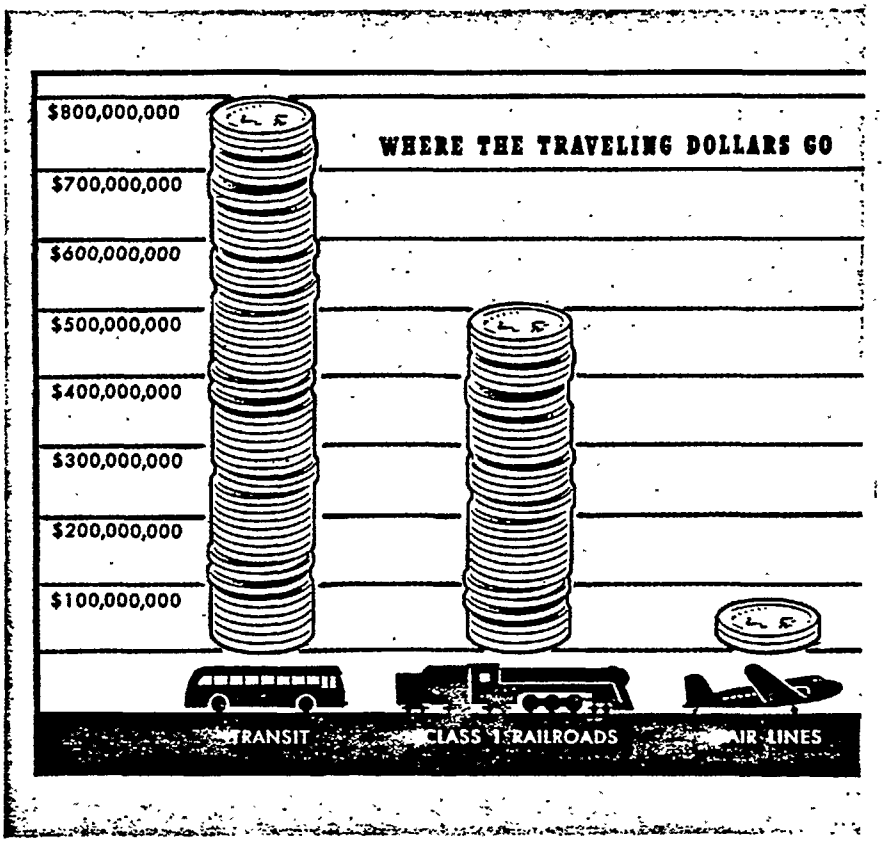
The Office of Defense Transportation recommended to the War Production Board that 12,000 city buses, 800 streetcars and 600 trolley coaches be authorized for 1942. The War Production Board, however, ordered the production of new buses to stop on August 1, but after reconsideration, permitted production to continue at a restricted rate. Nine thousand buses will probably be produced this year, although 12,000 are badly needed. Nobody knows what will happen in 1943.

The American Transit Association is convinced that its problem will continue for some time after the war ends. There cannot be a quick return to normal, because, if 15 million of the 28 million motor cars registered in 1941 are still operating when the war is over, the full production of all the tire factories for two years will be necessary to equip them, even if no new cars are built and there is a supply of rubber immediately available.

Many Problems Ahead

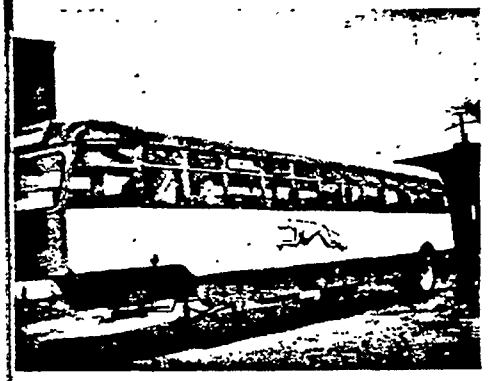
According to conservative estimates, a transportation problem of from three to five years duration lies ahead. The transit companies are putting forth all their energies to solve it. They believe that with reasonable public and governmental cooperation the crisis can be met successfully.

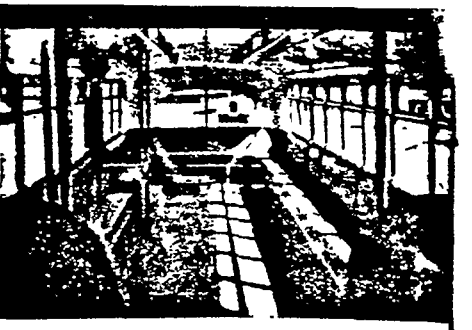
Local transit collects more money than rail and air lines



ETC 23031

Stretching the Bus





Left — the semi-trailer bus Greyhound has built on car-conveyor trailers, no longer needed to haul away new cars from Detroit.
Right — the roomy interior holds 100 people.

A STEP FORWARD in the solution of the transit problem has been taken by the Greyhound Corporation. Officials decided that if the rubber supply couldn't be stretched, perhaps buses could. After careful consideration, they drew up plans for mammoth 100-passenger semi-trailer units and submitted them to several midwest body builders. Olson and Sons Company of Minneapolis was one of the first to take on the job of building these super-carriers and completed two in about four weeks.

The Greyhound Corporation hopes to have 150 of the big buses in operation within a short time and, unless priorities interfere, looks for an increase in this fleet to more than 200 during the coming year.

To save valuable materials needed in the war effort, semi-trailers formerly used to transport new cars from the assembly lines of the automobile manufacturers to the showrooms of the dealers will be remodeled for carrying passengers.

These big buses will not be used for long distance hauls, as they have been designed primarily to carry large numbers of workers to and from their jobs in plants engaged in war work. In this way they will relieve the pressure on the smaller overland buses, so that the latter will be able to maintain their regular long distance schedules.

Our Pictures . . .

THANKS—to Curtiss-Wright for the Commandos on pages 2, 4 and 5 and to TWA for the Constellation on page 3; to Freeport Sulphur Co. for the photos on pages 13 and 14; to Capital Transit for the picture on page 25 and to the Greyhound Corporation for those on page 26. Other credits: Acme furnished the B-19 on page 3; Sovfoto the wells on page 10 and the climbers, page 11; Black Star, page 9 and the power lines on page 11; Atlas, page 15, and Frederick Lewis, sugar cane on page 14.

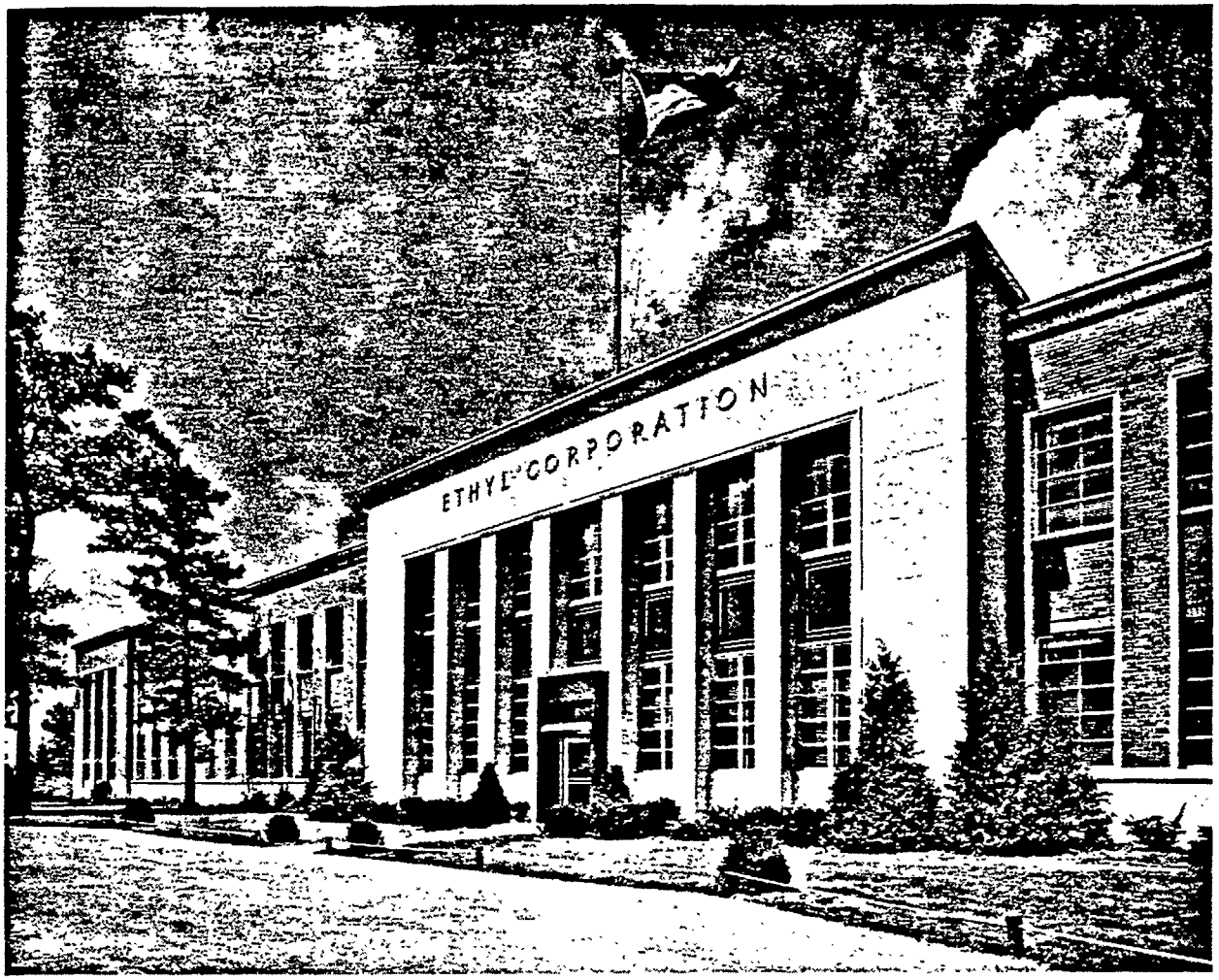
PROMOTION FOR R. K. SCALES



Appointment of Richard K. Scales as assistant director of Ethyl's Technical Service Department is announced by Julian J. Frey, director of the Department. Mr. Scales will continue as manager of the Passenger Car and Automotive Accessories Division, with which he has been associated since its organization.

Mr. Scales entered the service of Ethyl Corporation in 1929 following his graduation from Cornell University. For a time he worked with Dr. Thomas Midgley in research on chemical compounds used in the antiknock industry and participated in the research which developed a carbon remover compound. Subsequently he was placed in charge of the manufacture of this compound.

For three years Mr. Scales represented the Ethyl Export Corporation in Australia. In 1937 he joined the Technical Sales group at Detroit and subsequently helped Julian Frey in maintaining Ethyl's contacts with passenger car manufacturers and accessory companies. Upon the formation of the Technical Service Department early this year Mr. Scales was named manager of this division.



FUEL AND ENGINE RESEARCH IS NOT "AS USUAL"

AT THE TIME when the new Ethyl laboratories were planned, the clouds of war were but a tiny speck on the horizon—too small to be noticed by the great majority of Americans. But as construction proceeded it became more and more apparent to its builders that the 26-acre plant at Eight Mile Road, Detroit, might soon have to devote some of its facilities to problems of military fuels and engines.

Then came Pearl Harbor.

Immediately all plans for research to improve civilian vehicles and fuels were shelved and all the facilities of the then nearly completed plant were offered to the Government. Today, in cooperation with the technologists of the automotive, aviation and petroleum industries, Ethyl engineers are working to help give American motorized equipment the extra power, efficiency and dependability that are all-important in modern warfare.

We believe that winning the war is the prime job of every American. But, because we have an unbounding faith in the ability of our country to crush aggression, we are trustfully looking forward to the days when the grim lessons of war can be translated into progress in peacetime transportation.

* * *

ETHYL CORPORATION
Chrysler Building, New York City

* * * *Manufacturer of antiknock fluids used by oil companies to improve gasolines* * * *

ETC 23033





EMILY
means "a nurse"



PHILIP
means "lover of horses"



BERTHA
means "bright, famous"



DOUGLAS
means "dark, swarthy"



ETHYL
is a trade mark name.

It stands for antiknock fluid made only by the Ethyl Corporation. Oil companies put Ethyl fluid into gasoline to prevent knocking.

The Ethyl trade mark emblem on a gasoline pump means that Ethyl fluid has been put into high quality gasoline and the gasoline sold from that pump can be called "Ethyl."

What does your name mean?

The meanings and origins of over 700 masculine and feminine names are given in the fascinating illustrated booklet, "What's in a Name?" It's free—no obligation—just mail coupon.

FREE ILLUSTRATED BOOK OF NAMES



ETHYL CORPORATION, Room 3501, Chrysler Bldg., N. Y. C.

Please send me a free copy of "What's in a Name?"

Name _____ (PLEASE PRINT)

Address _____

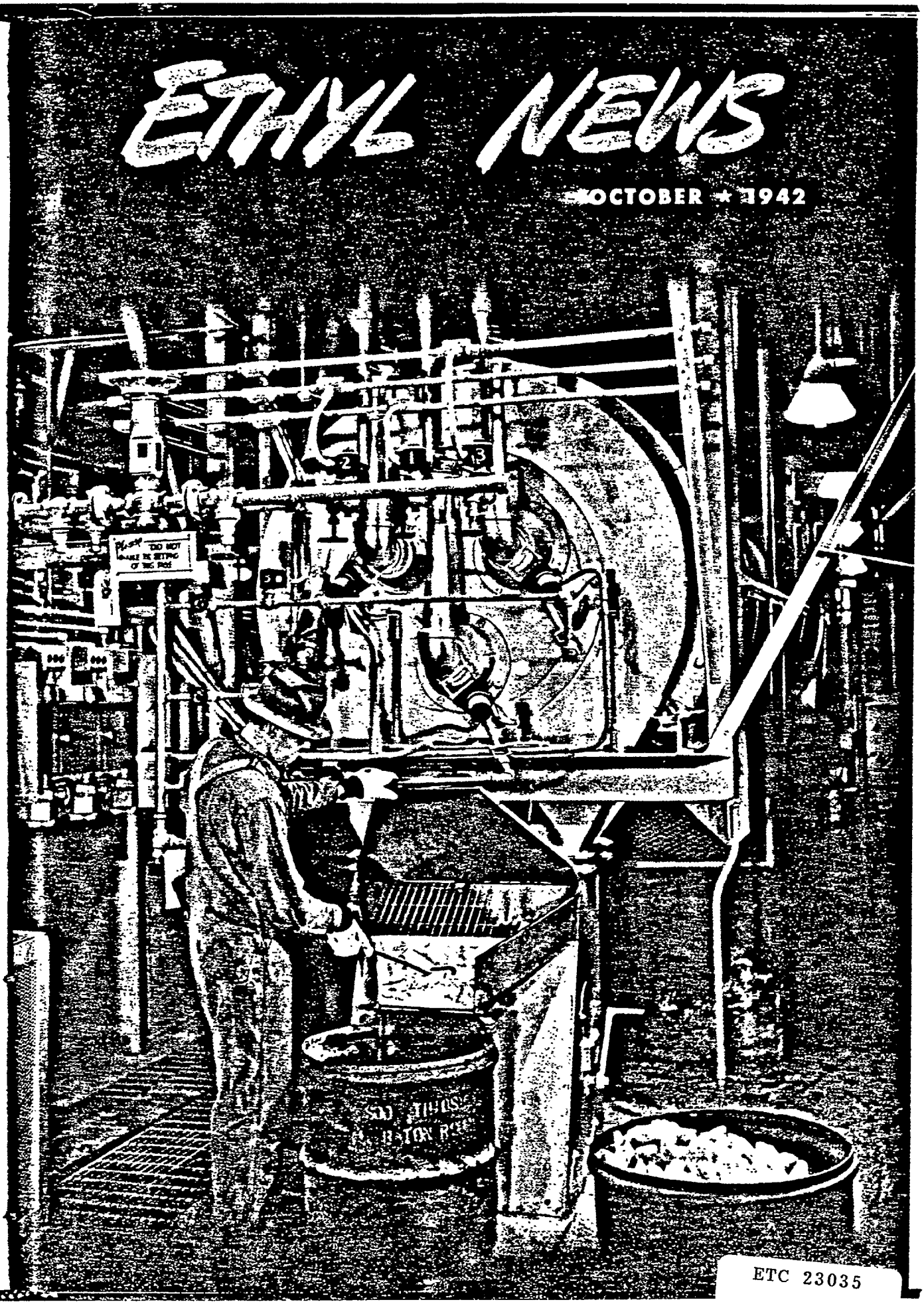
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ETC 23034

ETHYL NEWS

OCTOBER ★ 1942



ETC 23035

THEY DON'T PAY OFF ON STATISTICS!

RECENTLY the newspapers carried an account of an important professional football game. The statistics showed that team A had made 15 first downs, 123 yards by rushing and 113 yards by passing; team B had made no first downs, one yard by rushing and 50 yards by passing. The score — 14-7 in favor of team B! A little luck, alertness in grasping every opportunity and a skillful, desperate defense carried the statistical underdog to victory.

And the Cardinals! All the statistics had the Yankees winning the series.

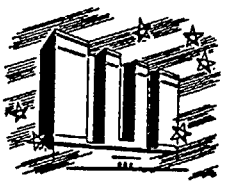
Perhaps we count *too much* on statistics! We read of tens of thousands of planes, tanks and guns, of thousands of tons of high explosives, of hundreds of ships, and we tend to sit back with a comfortable feeling that the statistics are all on our side.

Sorry, but wars are not won by statistics. They are won by skill, daring and imagination on the part of leaders, and by courage and stamina on the battlefield. They are won by an entire nation's will to win, by its willingness to put aside selfishness, prejudice, intolerance, and to make every effort, every sacrifice in the interest of the common good.

This is no time for complacency — they don't pay off on statistics!

IN THE ETHYL NEWS

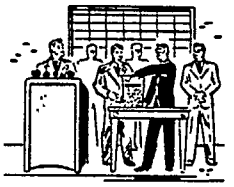
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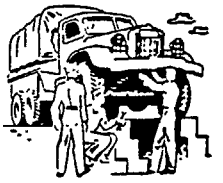
What's going on at the Stevens Hotel? Furniture moved out by night . . . armed sentries on guard. Why? Read **Biggest Hotel Enlists — page 3**



In two years soap may be scarcer than tires are. Petroleum executives aren't worried, for they have an answer: **Super-Soap from Oil — page 8**



Washington and Lincoln both had to use draftee armies. For the history of "Selective Service" in this country, read **Call to Arms — page 11**



The Army is turning thousands upon thousands of Sunday drivers into skilled maintenance and operation men. See **Jeep Drivers — page 15**



*We flim-flammed the poor Osage Indians onto one of the richest bits of land in the country. How? Where? See—***and Sudden Wealth!—page 18**

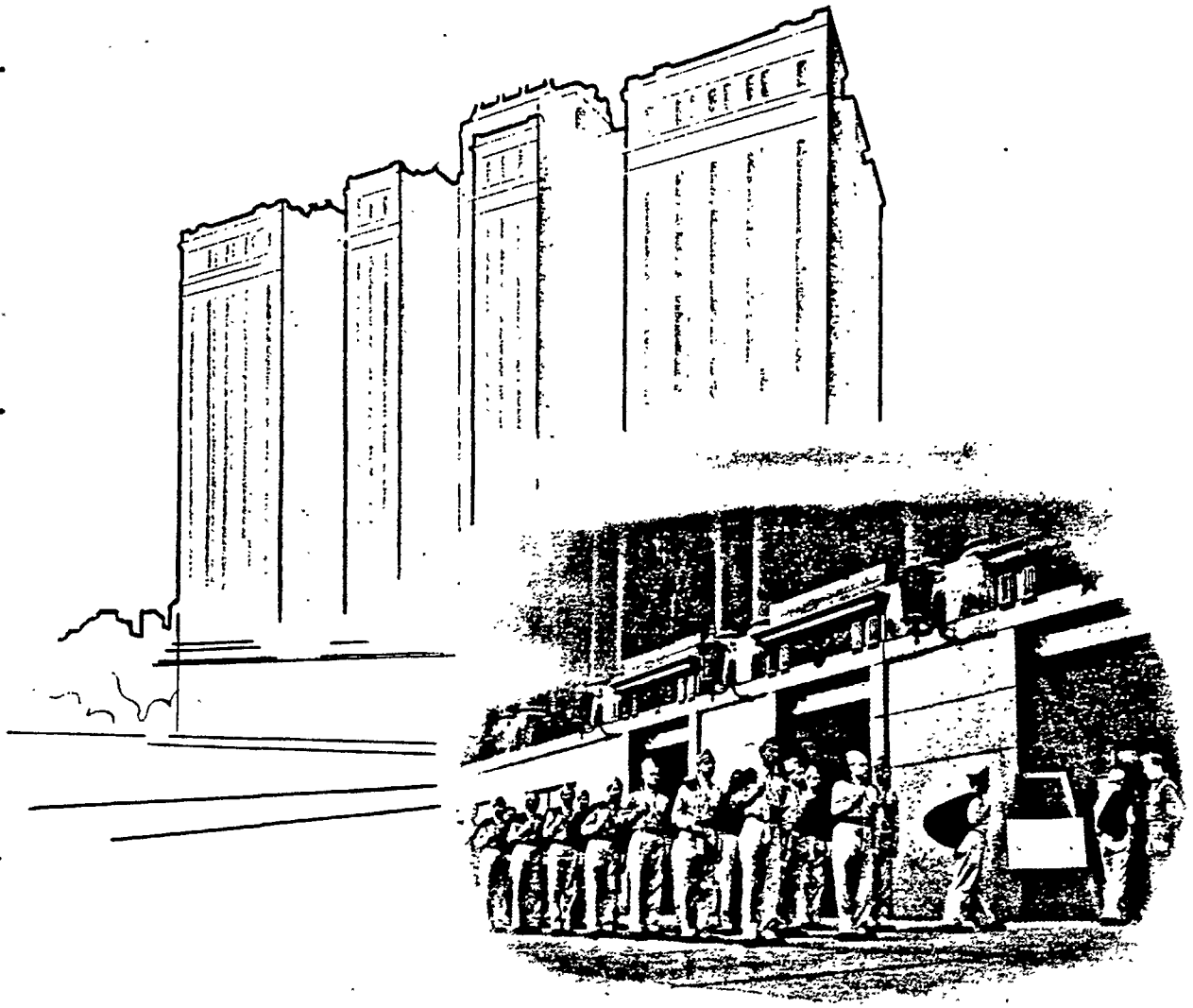


What happens when salt gets electrocuted? Read how Ethyl's sodium plant turns brine into — **Salt for a Jap Warbird's Tail — page 21**

Published by ETHYL CORPORATION, Chrysler Building, New York, N. Y.

Manufacturers of Ethyl Fluid, used by oil companies to improve the antiknock quality of aviation and motor gasolines

ETC 23036



BIGGEST HOTEL ENLISTS

by Francis V. V. Adriance

"You gotta have a pass"—or you can't get in the Stevens. API's old Chicago convention hotel is now a radio school

LOOK AT YOUR calendar. Time to make reservations again for the API Convention – but if you've ever had reservation trouble at the Stevens Hotel before, you just haven't seen anything yet!

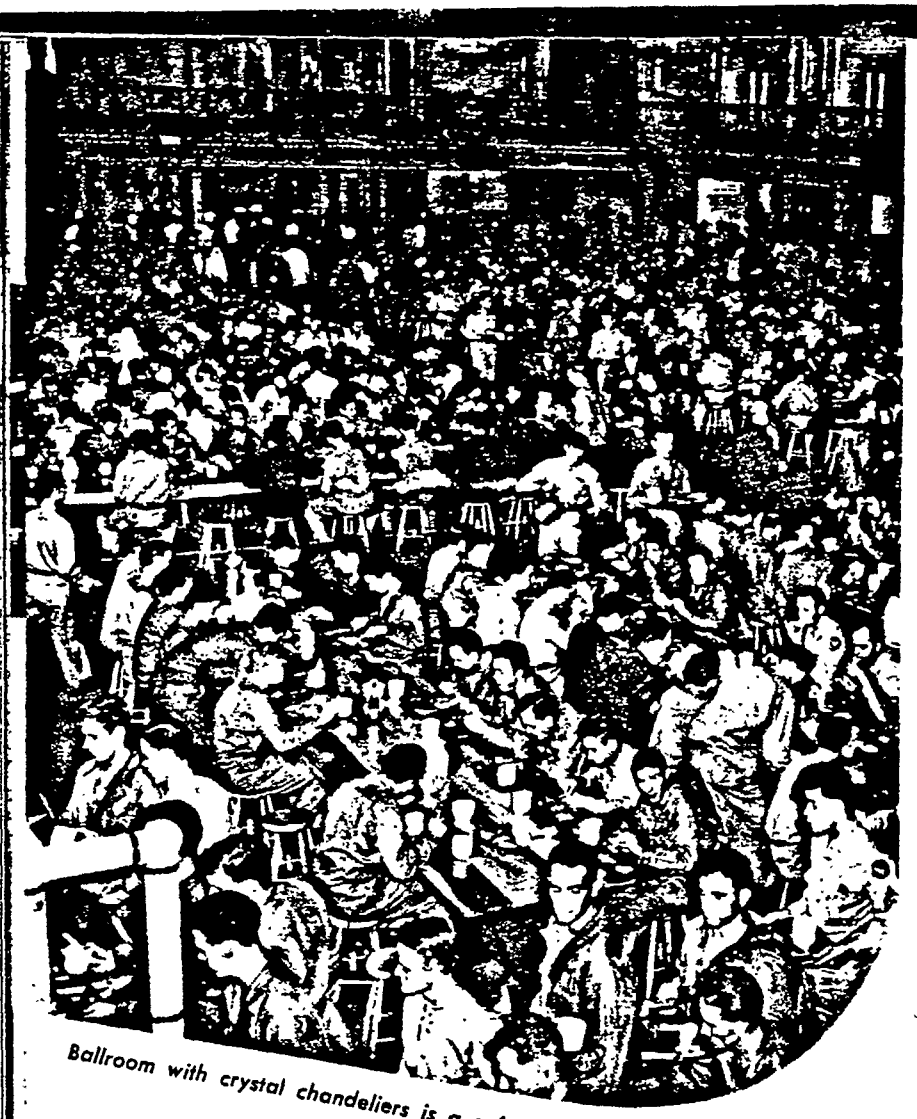
The Stevens is the biggest hotel in the world, but they haven't a bed for you. If you climb out of a cab at the door with your bags an M. P. will stop you. Who are you? What do you want? You can't get in here, mister, unless you have a pass. And you have to have important business with the Army to get that.

For Chicago's famous Stevens Hotel, known to oil men the country over as convention headquarters for the API and other oil groups, is in the Army now. At midnight on the last day of July it was the world's biggest hostelry. One minute later it was just a gigantic barracks, camp and training school – simply "Unit No. 1, Chicago Schools, Army Air Forces Technical Training Command." For the duration it is a training center for radio operators and mechanics.

You Wouldn't Know It

The Grand Ballroom is now the B-19 Mess hall. The elegant North Ballroom, on the third floor, is par-

ETC 23037



Ballroom with crystal chandeliers is a cafeteria

titioned into four rooms where radio mechanics are trained. The drug store where you stopped in for a Bromo is the post exchange — if you're in uniform, cigarettes are only 13 cents a pack. Remember the flower shop? It's the provost marshal's office.

Moving Day — at Night

Converting the Stevens Hotel into Unit No. 1 was a task of tremendous proportions. Before the plain military mess tables and double-deck iron cots could be moved in, one thousand van-loads of over-stuffed, upholstered couches, chairs, beds, box springs, drapes, window shades, carpets, radios, bureaus, pianos, lamps and typical hotel *objets d'art* were carted off to storage. It was a bigger task than moving the furnishings from the stricken *Normandie*, lying on her side in the mud of the Hudson River. Had the material traveled by rail, the beds and mattresses alone would have filled 65 freight cars.

Why did the Army suddenly decide to take over so many hotels? Because Uncle Sam needs trained men — and quickly! They say that besides the pilot it takes at least one hundred other men to keep 'em flying. That is probably an understatement.

Before Pearl Harbor the only Air Forces school that specialized in training radio operators and radio mechanics was located at Scott Field, Illinois. This was sufficient for our lackadaisical peacetime training program, but for total war — no! Instead of the thousands of radio men turned out by Scott Field, the Army Air Forces need hundreds of thousands. Huge new schools were needed in a hurry.

The Army could build them or take over suitable hotels. It decided on the speediest and least costly method.

But taking over the Stevens, although it was carried out smoothly and efficiently, was no easy job. The giant hotel had been furnished with a view to the ease and comfort of its guests. A commercial moving concern in Chicago tackled the staggering task. For 13 days, working in 12-hour shifts, huge vans shuttled back and forth from hotel to storehouse.

Biggest messroom is named "B-19"



They traveled only at night because of the traffic problem. Every bit of furniture that was not absolutely essential to the Army was evacuated.

Name, Number — and Date

Every piece of furniture was carefully packed and labeled with the number of the room from which it came, so that at the end of the war the Army would be able to return it to its exact place. Military police rode every van to guard each load.

But that was only the first step. In the famous Exhibition Hall in the basement of the Stevens, thousands of double-deck cots had been stored against this day. These were moved into the hotel's rooms as fast as the regular furnishings were taken out.

How many men are quartered or will eventually be quartered in Unit Number 1 is a military secret, but you can make an estimate from the fact that 20 floors of this great hotel will be packed with soldiers who are studying radio. Officers have another floor. In a room which was formerly occupied by a single guest there are now quartered four soldiers. In the larger rooms even more are living.

And while all this was happening, what has become of the 1500 bellhops, waiters, chambermaids, elevator operators, clerks and cooks of the Stevens? Did they get the axe?

No — the Army needed plenty of civilian help to run such a complex institution as the Stevens. Civilians run the elevators. Maintenance men, engineers, and kitchen help are all civilians. Girls who used to operate the telephone switchboards and do clerical jobs still do. The only requirement is that they be Civil Service appointees — and very few of the former Stevens employees who applied failed to meet Civil Service requirements.

With the exception of West Point and Randolph Field, Unit Number 1 is the only U. S. Army post which employs all civilian help in its kitchens. Students have no fear of K. P. duty — not that officers in command at this post do not believe K.P. serves a useful purpose. But the war needs these radio technicians in a hurry, and K.P., according to usual Army regulations, would require one day a month out of each man's valuable training time.

What has become of the public rooms and shops in the Stevens, so well known to oil men who attended conventions there?

The outstanding banquet halls have been converted into mess halls, and renamed after bombing planes. The largest mess, formerly the Grand Ballroom, is now known as the B-19 Mess, because the B-19 is the largest of land-based bombers; the Boulevard Room is the B-17 Mess, and the smaller converted banquet halls are named after smaller bombers. The B-19 Mess contains 68 tables and 680 chairs. With men coming in to eat in regular shifts, it can serve three meals a day to five thousand men. There are no waiters in any of the mess halls. The soldiers serve themselves from steam tables, cafeteria style.



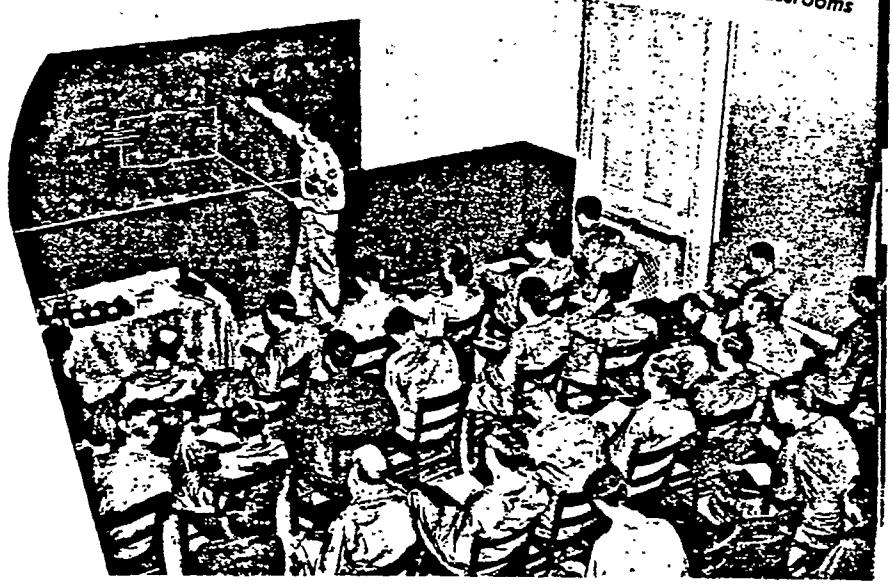
Non-com rings for all the elevators

Military Metamorphosis

The hotel's shops have also been taken over. The drug store has become the post exchange, where soldiers can buy sodas, light lunches, and other merchandise at cut rates. Girl civilian employees wait on them. The beauty parlor has been changed into a medical dispensary. The book store is the office of the

ETC 23039

Mirrored North Ballroom is now four radio classrooms





Non-coms assign quarters to all new soldiers

American Red Cross field director.

Soldiers newly arrived go to what used to be the main desk of the hotel. This has been taken over by the billeting officer, who has at his fingertips the locater file, corresponding to the room clerk's guide, showing at a glance what rooms are vacant and where every soldier in the post is quartered. It is the billeting officer who assigns all "casuals" to their quarters — casuals being the troops just arrived from basic training centers. They are met at the railroad station by an officer, brought to the post, given their secondary physical examination, and then assigned rooms.

Transient officers of the Air Forces, who are stopping over in Chicago for a short time, can obtain rooms in the officers' quarters on the 23rd floor.

At the floor clerk's desk on each floor a non-commissioned officer, known as "charge of quarters," is stationed. Here is another military innovation. The "charge of quarters" is the only man on the floor who can ring for an elevator, with "up" and "down" buttons at the desk. Every soldier leaving the floor must tell the charge of quarters where he is going, and if it is four floors or less he must walk. Elevators do not stop at mess floors, and the men must walk up or down at least a flight before and after each meal. These regulations are chiefly to avoid traffic jams on the elevators.

Army life at the famous old Stevens is no picnic. The routine is tough. Student soldiers go through it in shifts. For a better idea of the life at this post, let's take a quick look at the routine of the first section of shift number one.

The men in this group get up at 5:15 A.M., which is not exactly a witching hour. They must make up their beds, police their quarters and be all ready for breakfast by 5:45. At 6:45 they start school, which lasts until 10:05 when they have drill and exercise until 11:05. Lunch is ready at 11:20, and then at noon they are under the jurisdiction of their squadrons, which means that they are free, they study, or they work, depending on their status in the school or on the immediate requirements of their group.

Life Goes by Timetable

At 1:55 school begins again and lasts till 5:15 and supper. After supper the men are again under squadron jurisdiction. As each man must get at least eight hours of rest, "lights out" for this group comes at 9:15.

Other sections of the first shift begin their day at 5:30 and 5:45, and the three sections of the second shift tumble out at 7, 7:15, and 7:30, respectively. Each goes through its daily program just so many minutes later than the first group — so the boys who don't have to scramble out of bed until 7:30 must attend classes until quite late in the evening.

Can't Get Out — or In!

After a man's work for the day is done, can he wander out into the street and go where he pleases? He *cannot!* The Stevens is an Army post, and to get away from an Army post a soldier must have a pass. If a man's grade in his classes is above 85, he may occasionally get a pass to go off the post on a week night, though such privilege passes are exceedingly rare. Week-ends, however, are a different matter, and any man who is doing reasonably well in his studies can obtain a pass for Saturday and Sunday nights.

If you're a civilian, try to get inside this military post without a pass! Military police guard every entrance, keeping civilians outside and soldiers inside.

There was one notable exception, however, who talked his way past the stern M.P. at the door. This super-salesman was an 11-year-old boy, who had an invention he claimed would save the lives of American airmen. The kid wouldn't take No for an answer, so the M.P. brought him to the provost marshal's office. The provost marshal listened to the lad's story and then sent him to see Colonel Lindeburg, the executive officer. The Colonel listened with interest, gave the youngster some helpful suggestions on improving his invention, and sent him happily on his way, without having committed the Army to adopting it. . . .



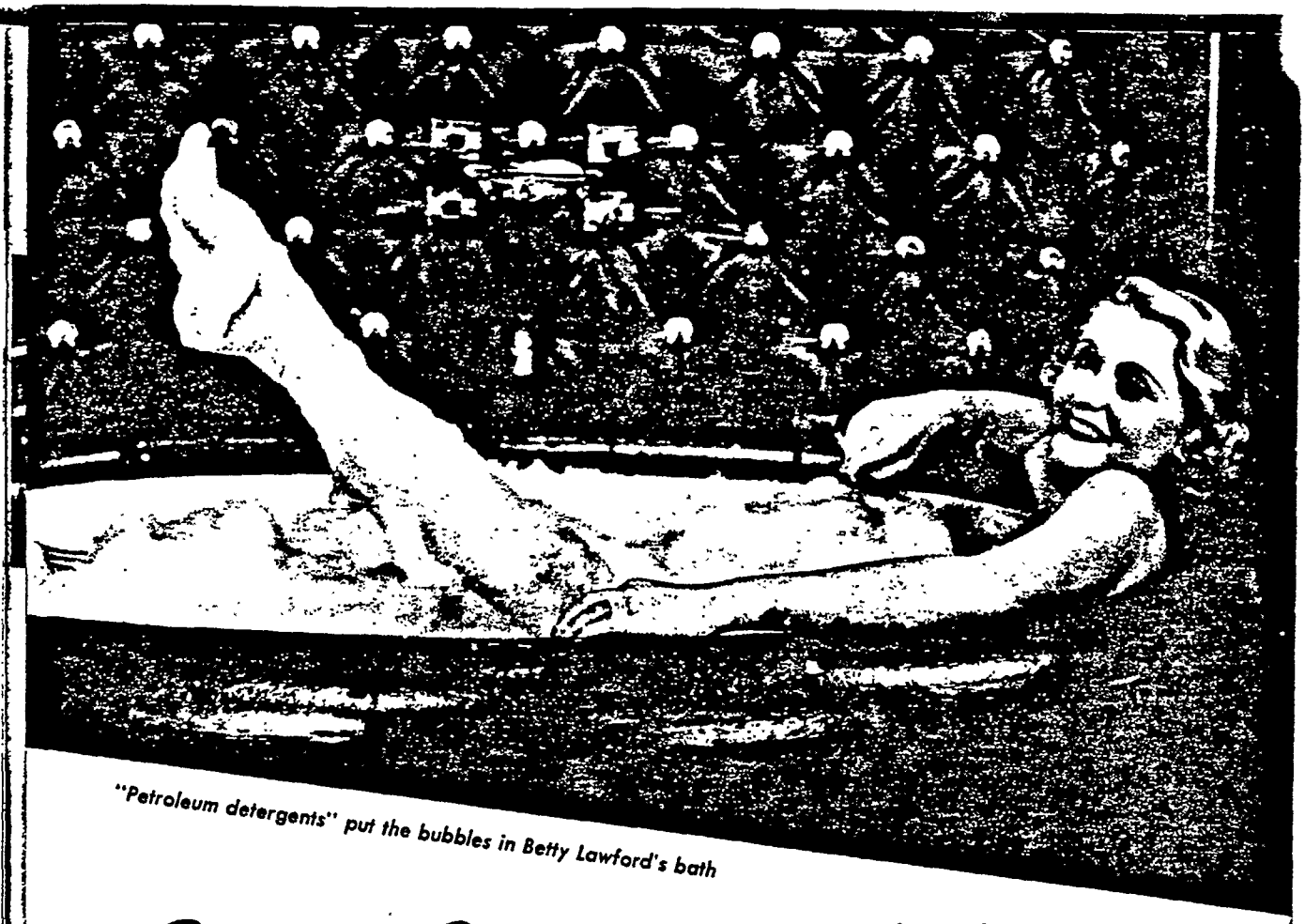
Drug store is now the post exchange

This is what you'll find inside the famous Stevens today — thousands of soldiers busily learning how to talk with each other through the ether. They will be all-important links of communication once they get to the battlefield, so they're working hard.

Four men sleep, study and relax in a former single bedroom



ETC 23041



"Petroleum detergents" put the bubbles in Betty Lawford's bath

Super-Soap from Oil

by Northrop Clarey, jr.

Bubble baths, flea and dish-pan soap—all from "Swerl," a revolutionary oil product which may replace soap

WHEN THE CURTAIN went up every man in the theatre leaned forward and swallowed suddenly. In a gleaming bathtub on the stage lolled a copper-haired damsel of lush outlines. Her complexion was peaches and cream — and all that kept it from the hungry eyes of the audience was an iridescent luxury of foam which glinted under the spotlights.

Decorum Guaranteed

The scene was the famous "bubble bath" episode in Clare Boothe's play, *The Women*. The scene went on for five minutes, ten minutes, while men began to mop their foreheads. How long would the bubbles last?

Two young men in one of the front boxes seemed intrigued with the same question. They leaned far over the rail, consulting their watches, and debated in whispers. After twelve and a half minutes the scene ended. One of the young men, a small, pale chap with glasses, slapped his knee triumphantly.

"I *knew* it would last, Harvey!" he declared. "They even guaranteed the bubbles would last *seventeen* and a half minutes. What's more, it kills fleas. And it makes woolen goods obnoxious to moths."

Harvey mopped his forehead. "You win," he said. "But what's in that bath — liquid shampoo or Flit?"

"Neither," said the little fellow brightly. "It's a detergent. Made from petroleum. Shhh — I'll tell you later."

Later, after the show, Harvey heard all about it. His friend, who

ETC 23042

had been making a study of detergents, had simply dropped in on *The Women* as a point of research. This bubble bath had touched off a fad, he said. Drugstores everywhere were featuring scented foam bath preparations along their counters.

"Basis of the whole thing is a preparation called Nacconol," said the little scientist. "Wonderful stuff. Soaks the label off a beer bottle in six minutes. The Navy has ordered over a million pounds of it."

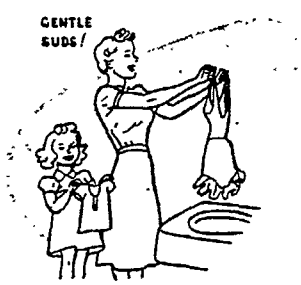
"For beer bottles?" asked Harvey.

"No – it lathers in salt water. Wonderful stuff. Alkyl aryl sodium sulfonate. Won't sting your eyes. Wash cars with it. Put it in toothpaste. Cleans dishes – like *that!*"

Blinking slightly, Harvey guided his friend into the next bar, ordered two beers, and asked for the whole story – from the beginning, one step at a time.

Soap May Disappear

The beginning, he learned, is the fact that ordinary soaps and cleaning agents are almost all made from imported vegetable and animal oils



– which are not being imported any more. First on the list of oils we no longer receive is cocoanut oil, most of which came from the Philippines and went into practically all household soaps. In 1941 we brought in six hundred million pounds of it, out of which almost *five* hundred million pounds went into the soap kettle. What domestic substitutes can we find? Already 90% of our tallow goes into soap.

Petroleum Possibility

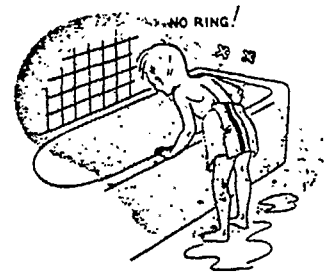
Luckily, cleaning agents (or "detergents," as they are called by scientists) can be made from petroleum. The National Aniline Division of Allied Chemical and Dye Corporation had developed successful detergents from petroleum which had become, long before Pearl Harbor, commercially important because of their powerful washing action. Petroleum distillates are put through



a series of reactions which finally produce alkyl aryl sulfonate and sodium sulfate, which are mixed to make one variety of Nacconol.

Whatever our shortages in animal and vegetable oils, this country certainly has enough petroleum. Our ability to make cleaning substitutes from it makes potentially possible the release of two billion pounds of fats and oils for food stuffs. This would increase by more than 30% the amount of oils and fats available for food, but the really bright side of the story is that such a detergent as Nacconol is not merely ersatz soap. It far surpasses in almost every way the cleansing ability of soap, and turns out to have other virtues of its own which make us wonder whether we will ever wish to go back to the traditional type of soap when the war is over and we can again get all the oils we need.

First of all, these detergents are chemically neutral – no acid, no alkali. So they will not sting your



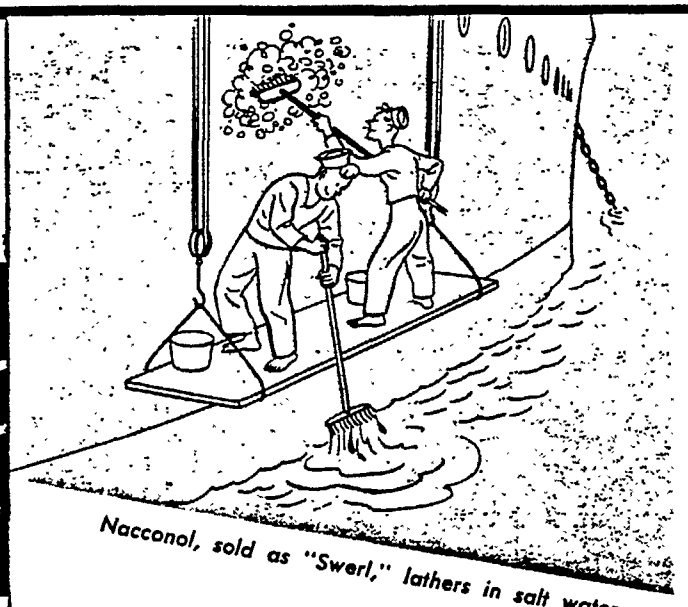
eyes when washing. More important, they will not attack the fabrics or colors of delicate garments. More important still, they may be used commercially in either acid or alkaline solutions. One of the largest uses of Nacconol is for processing all sorts of delicate textiles, leather and paper goods. It washes better in hard water than it does in rain water, and because of its dispersing action it breaks up soapy scum – no more ring in the bathtub, no more waterline in the dishpan! It leaves no "soap streak" and rinses off clean even in cold water. Dishes washed in a petroleum detergent of this type do not have to be wiped.

Washes Off Grease

Also, the new cleaner dissolves instantly, forming small-bubble suds



ETC 23043



Nacconol, sold as "Swerl," lathers in salt water

that wash more quickly than soap. It takes but a very small quantity, one tablespoon of the flakes to a gallon of water, to do the work. It is tasteless, useful not only in toothpaste but in washing bugs off of vegetables such as broccoli and spinach.

(Harvey was much impressed. He ordered two more beers, and listened attentively to the further virtues of "soapless soap.")

It is amazingly effective on grease — cleans a soiled frying pan as easily as a salad plate. A tablespoonful of the stuff washed down the kitchen drain will free the pipes of grease.



A handful of it sprinkled on a moist garage floor and scrubbed with a brush removes caked oil and grease from the cement.

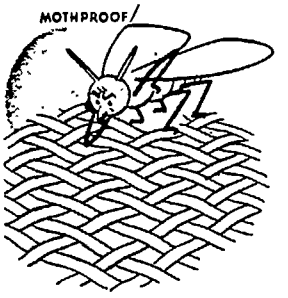
Would he believe more about Nacconol? It possesses bacteriostatic and mild bactericidal properties in its own right, and asserts a powerful boosting effect on the sterilizing properties of regular soap or alkaline cleaning solutions — a factor which makes it immensely valuable in hospitals and laundries, and in bottling establishments, dairies or breweries where glass bottles must be thoroughly cleaned by soaking. It is truly a very versatile bit of chemical magic. Because of its chemically neutral character (it has been boiled 24 hours with both caustic soda and sulfuric acid and remained unchanged by either) it can be used for washing woolens. And because of its rapid action, cold water may be used — which keeps shrinkage at a minimum. Most marvelous of all, it leaves the material mothproof and insect-repellent.

Believe It or Not

Since it lathers and washes perfectly well in salt water, our Navy has purchased one and a half million pounds of it for use on its fighting ships — freeing fresh water storage space for fuel and shells.

"— And it has a special use in cooking," concluded the little scientist. "Believe it or not."

Harvey rose and waggled his finger. "I will not!" he declared. "Bubble baths, broccoli, beer bottles and battleships — yes. But cooking — no. When I next hear of Nacconol, let me think of a bathtub of bubbles, blinking and winking under colored lights — gaily shielding the modesty of a creature luscious be-



yond all aspiration. Let me think . . ." he faltered. "Well, anyway, let me think of something better than cooking!"

"Better than angel cake?" asked his friend.

"Why angel cake?"

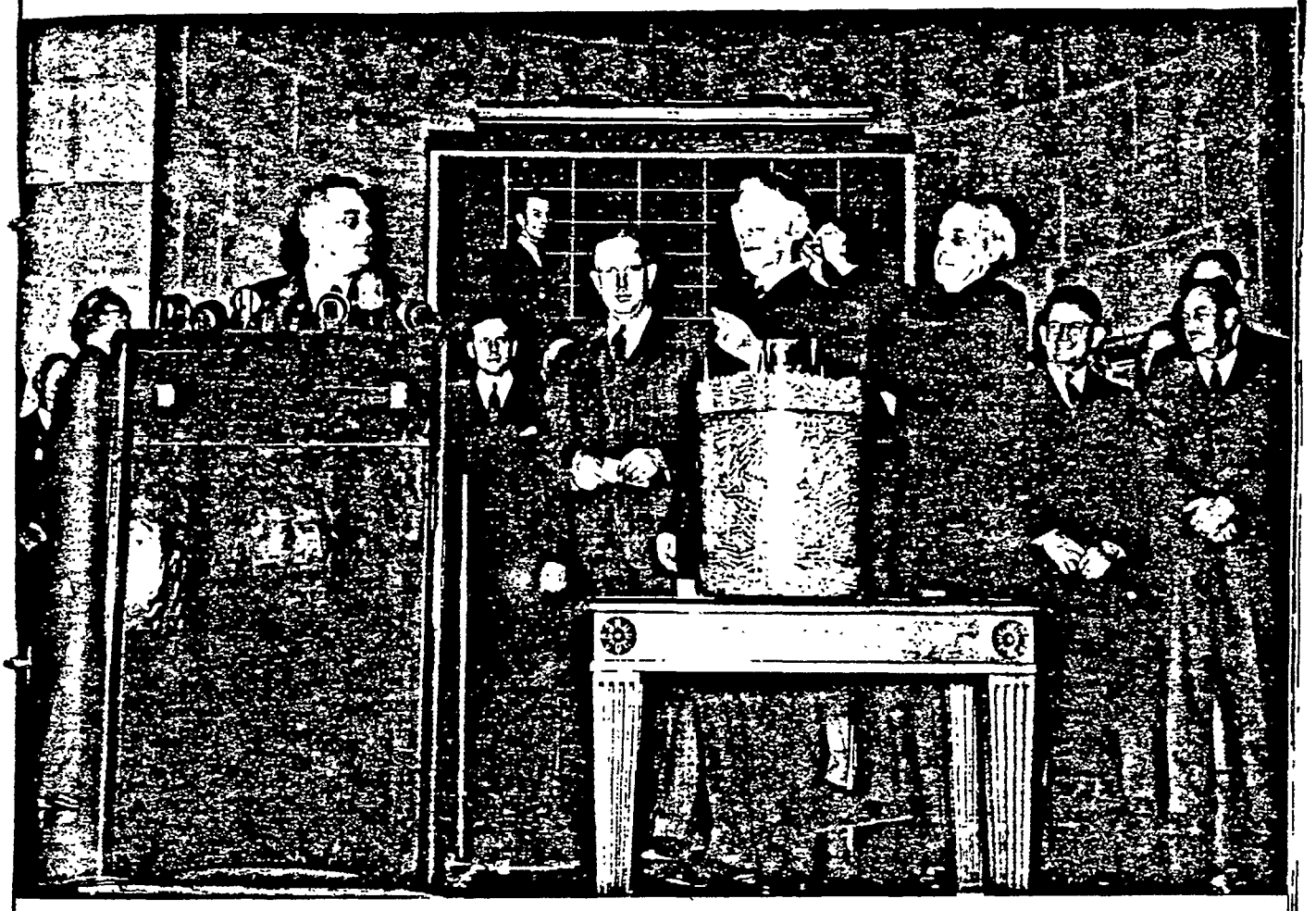
"That's what they use it in," whispered the scientist. "They use it together with a vitamin booster — makes the cake lighter and adds vitamins."

"Vitamins?" asked Harvey weakly. He sank back into the chair. "Oh, go ahead. . . ."

Our Pictures . . .

Photos of Army life at the Stevens (pages 3-7) were taken for Ethyl News by Kaufman & Fabry. Other credits: page 8, Lucas & Monroe; pages 11-14, Press Assn.; page 15, U. S. Army; pages 16-17, taken by Ethyl engineers at Fort Lewis; pages 18-20, furnished by the Osage Indian Agency.

CALL TO ARMS



War Secretary Stimson picks the first number in the greatest lottery ever run

"Selective Service" is the third conscription of free Americans. Our grandfathers – and their grandfathers – resisted it

GREETINGS, *from the President of the United States:*

Having submitted yourself to a local board composed of your neighbors for the purpose of determining your availability for training and service in the Armed Forces of the United States, you are hereby notified that you have been selected for training and service in the . . .

* * *

That's how they came to be in the dingy railroad station – Farrugia, Chan, Cody, Silverstein, O'Rourke, Mueller and a dozen others from the Melting Pot. Maybe they'd been given a rousing send-off with coffee and doughnuts and a speech by the mayor: " . . . proud day for all concerned; a day of honor for young manhood and of high resolve for the town. . . ."

Whatever the background, they had one thing in common. They were off for the great adventure – war. Off for Camp. . . .

You name it. A hundred similar destinations, from a thousand similar



Draft capsules — 1940 and 1917

towns throughout the United States.

Other trains had left the same sort of station in the same sort of town with the same sort of youths a quarter of a century ago.

Draftees? Selectees? Conscriptees?

Let the philologists play with nuances, but among free peoples the word "draft" has had a bad name ever since Napoleon's time. Then, it meant the impressment of civilians by the war lords. Conscription has been the instrument of tyranny. Not has. Still is. Look at what Hitler is doing with French labor.

But "draft" has had its face lifted in America. True, the word doesn't glow. But neither does it hiss.

Papa Farrugia and Herr Mueller, who themselves may have fled the Old World to escape enforced service, might not have been able to say it as well as President Roosevelt but they undoubtedly would agree with his sentiment:

Conscripting Free Men

"Conscription can also be used to create a country where the people shall be truly free."

Thus, what once brought rebellion now brings unity and power.

Equality of service is what took the curse off the draft. For after all, every man considers his skin as precious as the next. The selective service law passed by Congress in the autumn of 1940 made this clear: no one may pay a forfeit to escape the draft, pay a substitute to serve for him, or buy his way out once he's in service. In addition, Congress buried a tradition — the tradition that the United States in time of peace never demanded that its men take up arms.

It is the third appearance of conscription in America in 150 years. Not only was it the most far-reaching, but also the least troublesome to put through. The rookie who was drafted need have no qualms about his dower rights to the term "patriot." For he would stack up very well, indeed, alongside many patriots of yesteryear.

The fact is, our founding fathers had a terrible time getting together an army during the Revolutionary War.

The voluntary system flopped miserably. It got so bad that to lure men to the defense of their country, bounties of one thousand dollars cash and five hundred acres of land were offered. Some scoundrels would take the thousand, then disappear. The states of Massachusetts and New Hampshire were so lavish in their bids that George Washington was provoked to remark:

"There is some reason to dread that the enemies of New England's reputation may hereafter say it was not principle that saved them, but that they were bribed into the preservation of their liberties."

So poor was the response, however, that Massachusetts and Virginia resorted to conscription in 1777. And on February 6, 1778, Congress recommended that other states follow their example, for two-thirds of the Continental army still was unfilled! But conscription was avoided by the aid from the French.

The situation was little better in the War of 1812. Congress considered several ways of building up the army when not enough men volunteered. But peace forestalled definite action.

Our First Draft Law

The showdown finally came in the Civil War.

The tide was going against the North. The federal generals were hard-pressed in Pennsylvania and Maryland. Troops were needed badly, but not even a one hundred dollar bounty could bring them in after Johnny Reb near scared the life out of the Yanks at Bull Run.

The voluntary system practically collapsed in 1862 when President Lincoln called for three hundred thousand men. Only 87 thousand showed up, and even this number was cut greatly before the troops reached their rendezvous.

Thereupon, the Congress passed a draft law in 1863 — something the Confederacy did the year before. But it was weakened by the payment of bounties and the hiring of substitutes. The ability of wealthy communities to buy manpower from the

poorer localities began to foment trouble.

Riots broke out like a rash, with the worst in New York.

The police were powerless for several days before the killing, burning, looting mobs. The demonstrators even seized guns from the bewildered troops – the Invalid corps, so-named because it was made up of men physically unfit for the front – beat them over the head with their own weapons, then chased them like sheep through the streets.

The mob then marched on the draft registration headquarters. It seized the wheels containing the names, destroyed them, then set fire to the place. The word "compulsory" was anathema to the northerners.

* * *

Riffle through the years.

June 5th, 1917. October 16th, 1940.

Both are landmarks in American history – better make that world history – militarily, socially, economically, and morally.

Each gave birth to new armies.

On June 5th, 1917, over ten million Americans between the ages of 21 and 30 enrolled for the draft. "Hang the Kaiser!" was a stimulant. But Congress also had done a better job – passed an unequivocal law which avoided the errors of 1863. To a large extent, however, it had the head start of being fashioned in the crucible of war hysteria.

The other came about in what, in some respects, were more trying days.

Past mistakes and the world's current misfortunes were plaguing a people who wanted nothing more than to remain at peace.

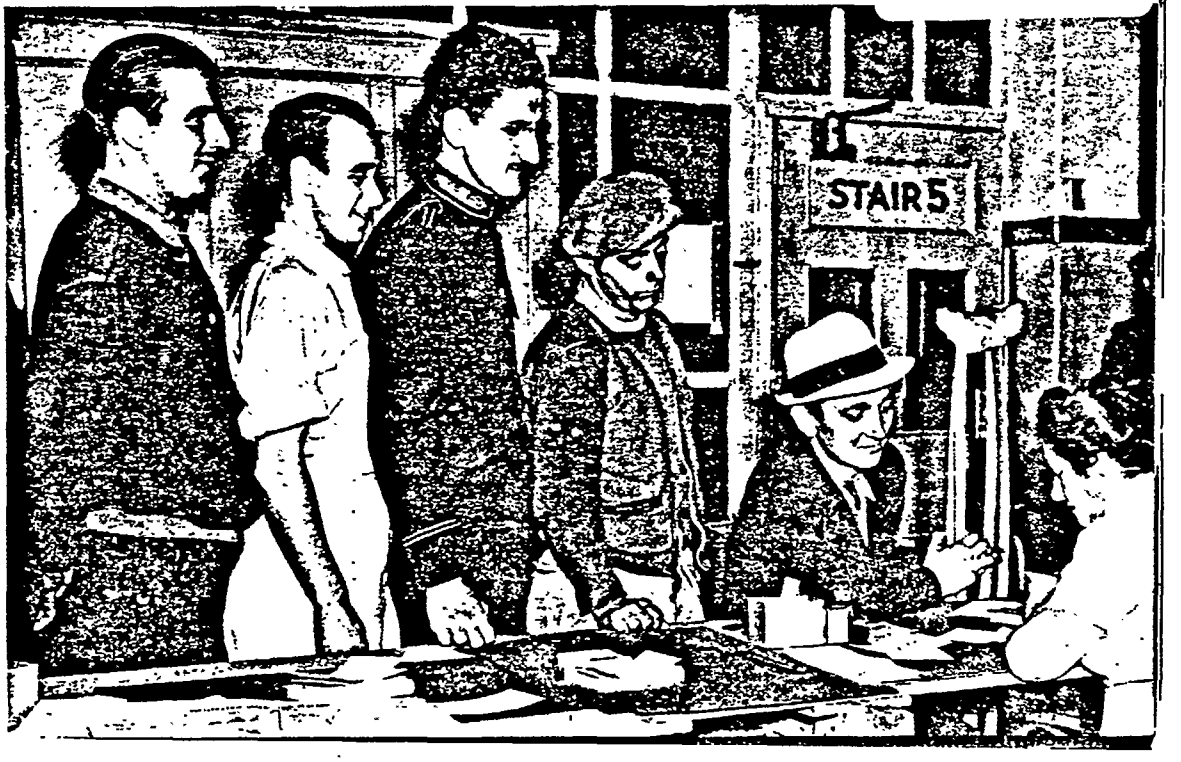
A new generation, which had been moulded by the extremes of unprecedented luxury and depression, was approaching flower. It had been raised in a period when it was fashionable to say that the United States had been rooked by a venal Europe; that it had been tricked into snatching British and French chestnuts from the fire and into enriching munitions makers. It was a time of debunking, of ridiculing the ideals that accompanied our entry into the war in 1917.

The administration's move to establish peacetime selective service brought a roar from opponents like that of the Bull of Bashan. Congress seethed with pros and cons and a minor climax was the haymaker Representative Beverly M. Vincent, of Kentucky, threw at Representative Martin L. Sweeney, of Ohio, after the latter denounced the draft as a scheme to turn the United States over to the British. The doorkeeper of the House said it was the best blow he'd seen in 50 years with Congress.

In 1917, the college boys were rarin' to go overseas and wallop the Hun. In 1940, petitions were floating around campuses opposing intervention. In truth, there was little desire to be prepared, for the popular notion has not yet died in the United States that the army is a catch-all – for the luckless. Men used to the comforts of easy living also argued:

The discipline is tough. There's reveille in the cold dawn. Men are hobbled by rules at every turn. There's setting-up drill and kitchen police and sentry-go – and lights out in the shank of the evening!

The butcher, the baker and the Salvation Army captain all registered ETC 23047



But when the time came they lined up outside a thousand school houses for registration, that October morning two years ago. Some had been waiting since 2 a.m., swathed in blankets like Indians.

Rich and poor, obscure and famous took their places. Descendants of Mayflower families and the sons of Germans, Irish, Chinese, Hungarians, and Italians who came over in steerage were there. Among them were three Rockefellers and Joe Louis and Francis Pershing, the son of Black Jack, the commander of the first A.E.F.

Men Become Manpower

At Trenton, New Jersey, John T. Cook came out of hiding, registered, then surrendered on a murder charge.

Seventeen million men between the ages of 21 and 35 answered eleven identical questions, got the same sort of card. Henceforth they were Manpower, subject to call.

• • •

In 1917 there was a lilt to the war.

The fire burned brightly. It was a great adventure. We won't stop 'till we get to Berlin. There was a heady tonic in George M. Cohan's "Over There." Hardly a barn door escaped a chalk caricature of a villainous Kaiser Wilhelm in steel-pointed helmet and ferocious mustache. They stopped teaching German in schools.

Likely looking recruits found it embarassing, sometimes dangerous, to be seen in mufti.

In 1942, the flame of public feeling is less spectacular. There are good reasons:

After 1917, millions of men and women realize that the picture of a young stalwart dashing to war with shining shield and flashing sword is somewhat out of focus. The realization that America faces a task of unprecedented size and complexity has sobered everyone. The flame of public feeling is less spectacular now, but it burns no less intensely.

• • •

Behind every draft number there is a drama, highlighted sometimes by comedy relief.

The foreign-born often vibrate with patriotic spirit before their local boards. They burst into fiery speeches in broken English.

Many husbands have decided that martial life couldn't be any worse than the marital kind. It's not unusual for draft boards to get letters that go something like this: "My man has run away to the army, send him back."

It Takes All Kinds . . .

And then there's the one about the doctor who stamped into a local draft board demanding to know why in the world they sent him a cross-eyed man with half a dozen physical ailments. The board explained that he insisted on being accepted and that was the only way it could get rid of him.

• • •

At the end of the train ride, city men and country men, dock wallopers and playboys, ice men and Ph. D.'s arrive at camp.

The air is filled with heterogeneous odors — wood smoke, linseed water-proofing from squad tents, frying bacon from kitchens, and oil from the stacks of guns.

They're inoculated, vaccinated, shod, and tested.

Farrugia, Chan, Cody, Silverstein, O'Rourke and Mueller no longer are draftees or conscriptees, or selectees. They're jeeps.

Fort Dix — from now on they make their own beds





Thousand-unit "fleets" are far from unusual in the Army

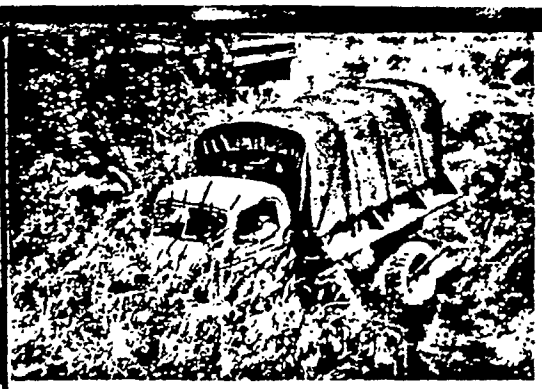
How would you go about teaching convoy and blackout driving, trouble-shooting and preventive maintenance, to the drivers of the biggest fleet in the country? Here's how Uncle Sam does it

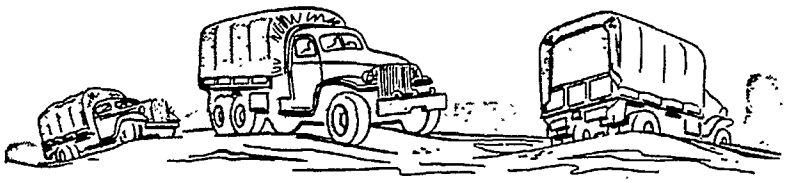
TRAINING MEN to drive and take care of all the varieties of mechanized army vehicles is a problem of huge proportions – but it's one that Army G-4 officers are taking in their stride. To see how they do it, let's look at Fort Lewis in Washington. We can tell you at first hand of the interesting training program there because Ethyl engineers in that territory have been actively cooperating with the Fort's commanding officers, drawing on their years of automotive experience to help in the vast soldier-driver training program.

Campus in the Cascades

Fort Lewis is one of the most beautiful military posts in the country. It stands in the shadow of majestic, snow-capped Mount Rainier and stretches through the tall evergreen forests of the Cascade Range all the way to Puget Sound. A few years ago life in the Fort followed a peaceful routine. Today the grounds are alive with men from every part of the country – men called to the colors from every type of trade. Turning these "Sunday drivers" into Army drivers is an accomplishment that should command the interest and the respect of every fleet operator in the country.

The basic problem is to keep the vast armada of Army vehicles in good running order. This, as G-4 officers have realized, is not so much a matter of establishing innumer-





A truck gets badly bogged down in a brook

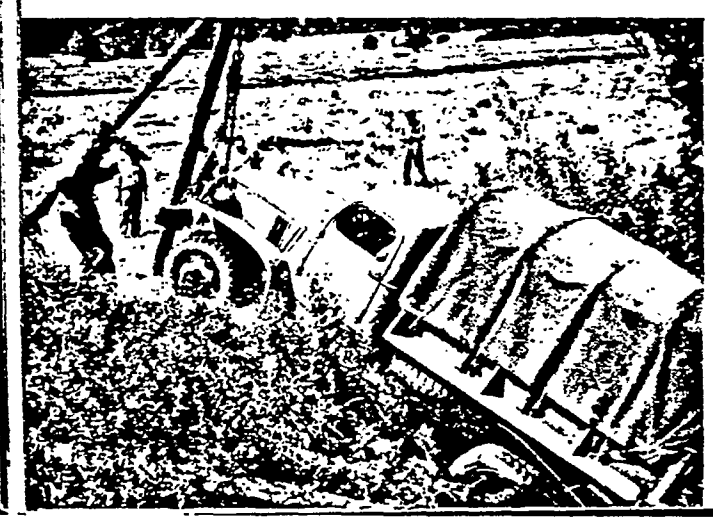
How will the soldiers get it across?





Answer — they erect an "A" frame of logs and chains, with a tow line

Another truck heaves — and lifts it clear



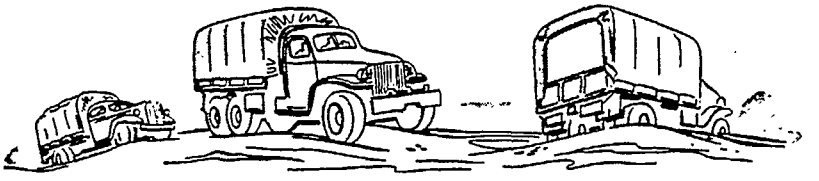
able repair shops as it is a question of teaching the men to handle and care for their vehicles in such a way as to prevent breakdowns from failure or abuse. A commercial fleet of 100 trucks is considered sizeable; in the Army fleets often run into more than 1,000 units. The problem is proportional. Since time is a factor of success in warfare, only the briefest time can be given to training the men who will handle these super-fleets.

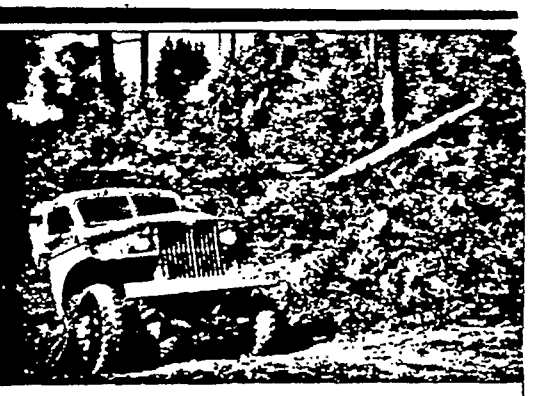
Training is based on the principle that handling all equipment in accordance with proven methods of maintenance would prevent inevitable minor mechanical troubles from developing into breakdowns which might require a major overhaul. The course was drawn up to include breakdown prevention, car lubrication and driver responsibility. It includes all the aspects of driving and servicing a vehicle which a soldier should know in order to understand the mechanism he is handling – the design and function of the motor, the transfer case, the transmission, differential, brakes, ignition, and other parts of the car's anatomy. How to drive each vehicle over all sorts of terrain, singly or in convoy, in daylight or blackout, is also included.

This business of teaching drivers the mechanical side of their cars or tanks is not to prepare them for doing major overhaul work. Rather, it is the subtle application of basic American psychology – a man will privately thumb his nose at arbitrary instruction, but if he is shown a good reason for doing a certain job in a certain way he will do that job more faithfully than anyone else on earth.

How, Where — and Why

The program has been eminently successful, largely because the information is presented to the student soldiers in easy, digestible doses, emphasizing actual monkey-wrench work on the vehicles. And the class work is presented in such an interesting manner as to arouse the pro-

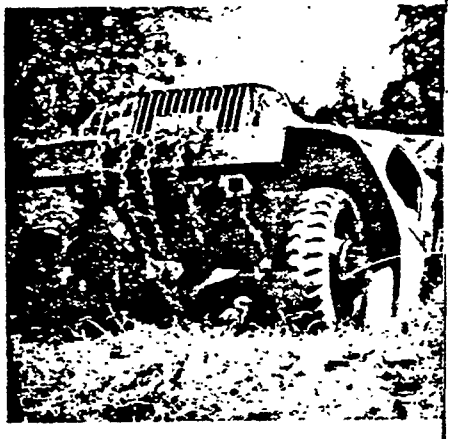




Cascade Range forests provide rugged terrain

Over the foothills of Mount Rainier





Trucks help each other up the toughest pulls with chains or hoists

Ethyl engineer and Jeep explain tune-up



nounced but often undeveloped mechanical ability of the ex-Sunday-drivers. A recent graduate of the "Preventive Maintenance and Driver Training School" has testified to the success of the program in these words: "Every driver in the Army should take this course. I can well say that any man taking the course will not treat a vehicle in the future as he did in the past."

School for Teachers

Since time is so short, only certain representatives from each Army unit can take the course. These men are picked for their high I.Q. rating. Every Monday morning 50 to 100 men report at Fort Lewis for their two weeks of training. They spend 60% of the time actually working on different vehicles under the supervision of some 20 non-commissioned officers. The other 40% of the time is taken up by classroom work, including blackboard lectures, examination of cut-away exhibits, Army moving pictures, and "sound slide" films. Each day a few pages of mimeographed notes summarizing the salient points of the lesson are handed out. These have proven to be very popular, because the average man shies away from a textbook but easily assimilates notes that are clear, short and brief. "You can lead a horse to water but you can't make him drink" is a line of common-sense reasoning which has led the officers in charge of the school to do their utmost in making the course simple and interesting. The men *want* to learn.

A test is given at the conclusion of each lesson. On completion of the course a final examination certifies each man as a qualified driver, equipped with a knowledge of preventive maintenance. Upon graduation the men rejoin their own companies — and they in turn become instructors for the other men in their own units. The whole business is short, valuable, and to the point — a course which will live up to the Army standards of today.

ETC 23051

—and Sudden Wealth!

By treaties and laws we pushed the poor Osages onto a rocky piece of Oklahoma worth 70 cents an acre. Now the Indians wouldn't give it back — for it's brought them $273,000,000

IN EVERY DEAL between red man and white the red man came out on the losing end. Except once!

For over three hundred years the white man slowly but steadily pushed the Indian westward across this continent. In battle and by treaty the Indian relinquished, step by step, parts of his vast domain to the ever advancing and acquisitive paleface. In each of these moves the Indian gave up rich productive land in exchange for smaller and less fertile tracts.

The Osage tribe was no exception. We have little authentic history of the Osages prior to their treaty with the United States in 1808, though it is known that the name "Osage" is a corruption by the early French traders of the Indian name "Wah-sha-she." By the terms of the 1808 treaty they ceded to the federal government nothern Arkansas and most of Missouri, retaining only northern Oklahoma and part of southern Kansas out of their once great domain. By later treaties they ceded still more territory, until at the time of the War between the States they possessed only a small stretch of land near St. Paul, Kansas, where they were engaged in agriculture.

Fred Lookout, Principal Chief of the Osage millionaires

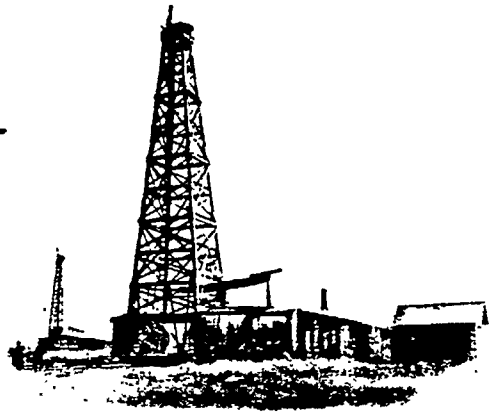


By 1870 the white settlers of Kansas had cast longing eyes on this fertile strip of the Osages, and in that year an Act of Congress forced the Tribe to sell its remaining land to the United States for $10,132,866, which sum was held in trust by the U. S. Treasury at five percent interest. As a new residence for the Osages a million and a half acres in northern Oklahoma were purchased from the Cherokee Nation at 70 cents an acre with monies from this trust fund.

The new land was rugged and uninviting to the white man, consisting of rocky and wooded hills with narrow valleys that were hardly fit for cultivation in between. The Indians lived on hunting, fishing, what agriculture the nature of the country permitted, and the interest from the trust fund, which amounted to about $191 per year per person.

Once more the white man had driven a sharp and shrewd bargain, so he thought. Once more he had got the best of the aborigine in a deal.

And then came oil — black gold gushing in torrents from the Osage hills, pouring undreamed-of wealth into the laps of the once impoverished redmen.





First Osage well — and a "Million Dollar Elm" auction

One of the most important events in the life of the Osage Nation prior to the discovery of oil occurred on June 28, 1906, when Congress passed the Allotment Bill. This provided for the division of all Tribal lands and monies among the members, to be held as individual instead of common property. Each of the 2,229 persons on the Tribal roll of July 1, 1907, received a $3,819.76 share of the trust fund and 657 acres of the community property.

Share-the-Wealth

There was, however, in this Allotment Bill a unique and far reaching provision for the welfare of the Tribe, which stipulated that all minerals covered by Tribal lands were to be reserved for the entire Tribe regardless of who owned the surface rights. Thus, instead of just a few Osage landowners attaining enormous wealth from the oil beneath their property, the wealth was spread out among the entire Tribe, making the Osages the richest nation per capita on the face of the earth.

The oil business of the Osage Nation, which is under the supervision of the Secretary of the Interior, has been shrewdly handled. Royalty interests of one sixth of the total production have been secured instead of the customary one eighth, with an increase to one fifth on all leases producing over 100 barrels a day. Only 100,000 acres a year have been offered for leasing, and that at auction to competitive bidders with provisions calling for development within a comparatively short time.

As a result of the above leasing procedure, most of the acreage has been proven good oil territory before leasing and has brought tremendous lease bonuses. Lease prices of over $5,000 an acre were not uncommon in the rich Burbank field, and one 160-acre tract brought the amazing sum of $1,990,000, or $12,437.50 per acre. The income from leases alone has equalled over 75% of that obtained from royalties.

Lease auctions are colorful spectacles and are usually held several times a year under the famous Million Dollar Elm on the agency grounds or in the Constantine Theatre, both in Pawhuska, Okla., capital of the Osage Nation. Representatives of the largest oil companies in the world are there, loaded down with the reports of their geologists, with blueprint maps of the acreage offered for lease, and with instructions from superiors or associates on how high they may go in the hot and heavy bidding for the coveted tracts. There is also the man of comparatively small means, hoping to secure an inexpensive lease in wildcat territory that may prove the basis of a fortune.

Carnival Color

Members of the Tribal Council attend with their families, together with many of the well educated Osages. Standing out sharply in the throng are the full-bloods in their gayly colored blankets, most of them not quite understanding what

the show is all about but catching the holiday spirit, nevertheless.

The lease sales held just prior to the opening of the Burbank field, when bids rose a hundred thousand dollars at a time, were probably the most thrilling of them all. Those tense moments, however, may be gone forever, as petroleum experts believe that the most productive territory in the Osage country has already been leased.

In 1917, during the first World War, the Osage Tribal Council as a patriotic move offered the Navy Department up to 5,000 acres of potential production without lease or bonus. The full acreage was selected by the Navy after a study of data furnished by geologic surveys, and to prevent drainage of the adjoining reserve, zones amounting to a total of 25,000 acres were withheld from lease by the Indians. The Navy, however, did not need to drill on this land and in 1928 returned it to the Tribe.

The Osage Nation was well repaid in the long run for its generosity to the Navy. At the time of the establishment of this Naval reserve there was no development on the 5,000 acres loaned to the Navy nor on the adjoining 25,000 acres withheld from lease, but later these lands became important fields and even included part of the rich Burbank field. Between the time of their return by the Navy and their development the areas had been tested by gas lessees, with the result that the oil leases sold for handsome bonuses, far more than they would have brought if they had been auctioned off at an earlier date.

Up to February 1942, 17,500 wells had been drilled in the Osage Nation, 8,564 of which are still producing oil and gas. Up to June 1941, a total of 540,300,000 barrels of crude oil had been produced, oil and gas royalties totaled $151,000,000, and the almost incredible sum of $114,300,000 had come from lease sales. Altogether, the grand total of $273,000,000 had been realized from the oil and gas operations of the Osage Nation.

Incomes Up 4000%

And look at what all this has done to the "poor Indian!" Previous to the oil bonanza the income from the original headright of $3,819.76, plus each individual's share of the income from Tribal lands, rarely reached $300 a year. But in 1924 the income from each headright exceeded $12,000! In exchange for his farm lands in Kansas, each Osage with a full headright has received, in addition to his trust fund, its income and 657 acres of land, the sum of approximately $120,000 in oil and gas revenues.

In his final swap with the white man, the red man had the last laugh!

(Ethyl News is greatly indebted to Mr. George H. Beaulieu, Administrative Assistant to the Supervisor of Oil and Gas Operations of the Osage Indian Agency, who supplied much of the information upon which the article is based.)

Old Osage chiefs were settled on poor land . . . with oil under it



ETC 23054

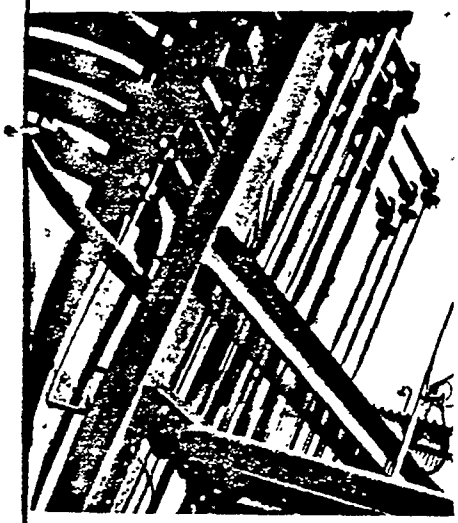


SALT FOR A JAP WARBIRD'S TAIL

THE WHITE STUFF you see pouring from the big bin above is just common table salt, but it will never season any soup. Instead, it will help some American pilot knock a Jap war bird out of the skies. Which is another way of saying that it is going to help raise the antiknock quality of a lot of fighting grade aviation gasoline. Here's how it works.

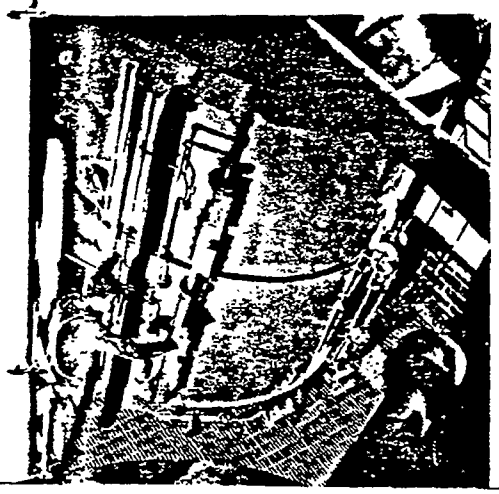
This salt is headed for the electric chair, more commonly known as an electrolytic cell. There, as the ultimate source of two of chemistry's most important elements — sodium and chlorine — it will be torn apart by an overdose of kilowatts. Around the negative electrode in this electric cell molten sodium will collect in a pool and be piped away as liquid metal to storage tanks. Around the positive electrode bubbles of chlorine gas will be captured. Both of these cantankerous but virile chemicals are used to make other intermediate chemicals that enter into the manufacture of Ethyl fluid, standard antiknock ingredient for all U. S. fighting grade aviation gasoline.

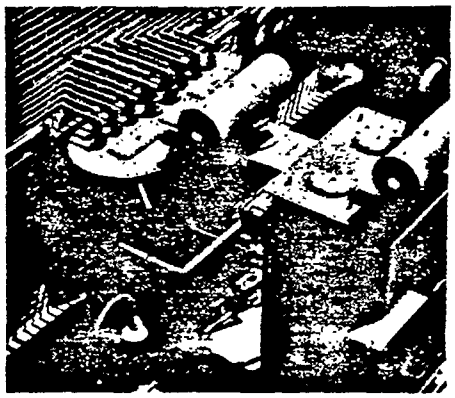
The daily tonnage of common salt required is tremendous. But since any one of Louisiana's salt deposits contains enough to supply the



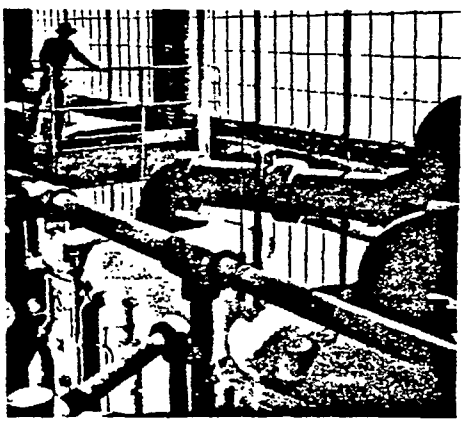
Maze of tanks and pipes handle brine

Concentrators make wet salt from brine



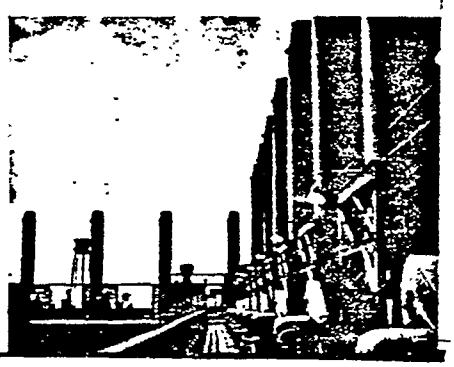


Two-story transformers step up current



Tops of some of the settling tanks

Ventilators cool electric cell room



ETC 23055



William J. Ross, in charge of the plant



A section of the main control room

Huge copper buss-bars for heavy loads



whole world indefinitely, a year's supply barely makes a dent in the reserves available.

Ethyl's electrolytic plant for divorcing the hard-to-separate atoms of sodium and chlorine is the largest in the South. It is located in the midst of other manufacturing units which contribute to the finished Ethyl fluid and supplies the two chemicals as needed through closed pipe systems. Electrochemicals division of du Pont, under the supervision of William Ross, operates the plant, utilizing the "know-how" of years of development work in this process by their Niagara Falls organization.

The chlorine is used to make anhydrous hydrochloric acid, ethyl chloride, ethylene dichloride and other chlorides needed. The sodium is used to make an alloy with lead for the metallic charge to the tetraethyl lead autoclaves.

It Isn't Easy

But before the salt can be put into cells for the electric shock which breaks the bondage between the two elements — a bondage of millions of years duration — quite a few preparatory steps are necessary. Some of them are illustrated here.

Instead of mining with a pick and shovel, salt for Ethyl's plant is mined by pumping hot water down to the deposit and pumping out the brine. The brine is then collected in storage and settling tanks, evaporated and purified — the salt you put in your soup is much too impure for this process. Then our common salt is ready and the fireworks begin. In the end you have a metal that will burst into flame if it touches water and a gas that was the original poison gas of World War I. But both are very useful if you handle them right.

ETC 23056

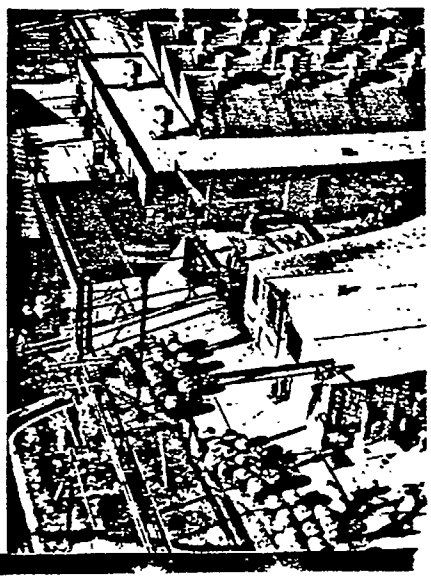


Corner of one of the rectifier rooms



Oil coils will remelt sodium in storage

Charges of lead-sodium alloy all ready



Facts and Flashes

From the
Technical Service Department
ETHYL CORPORATION

FOR THE WARTIME PETROLEUM REFINER AND MARKETER

1600 West Eight Mile Road
DETROIT, Michigan

Urging of car owners to drive LESS is now sound business for oil companies, gasoline dealers and all petroleum industry branches. Reason is that existing tires have just so much mileage remaining—equivalent of just so many gallons of gasoline and quarts of oil. By spreading mileage over long period, petroleum marketers assure themselves of more lasting source of income. Most important reason for tire conservation, however, is vital need to keep essential civilian transportation rolling for duration.

Shortage of distillate in farm areas is accelerating swing to gasoline for tractor use. Gasoline has proved best fuel on all counts—gives more power (up to 30% more when tractors are changed over to high compression), minimizes oil dilution and lengthens tractor life. Recent tests show wear on engine parts is less than half as fast with gasoline as with distillate. Marketers in rural areas should consider farm market as prime opportunity. Send for two new booklets published by Ethyl — "Wartime Tractors" and "High Compression Overhaul and Service." Remember, "Farm power is fighting power!"

Need for scrap metal is far more urgent than most Americans realize. Gasoline dealers who cooperate in present drive to "Get in the Scrap" are rendering important patriotic service—should redouble their efforts to salvage steel, copper, brass and other metals.

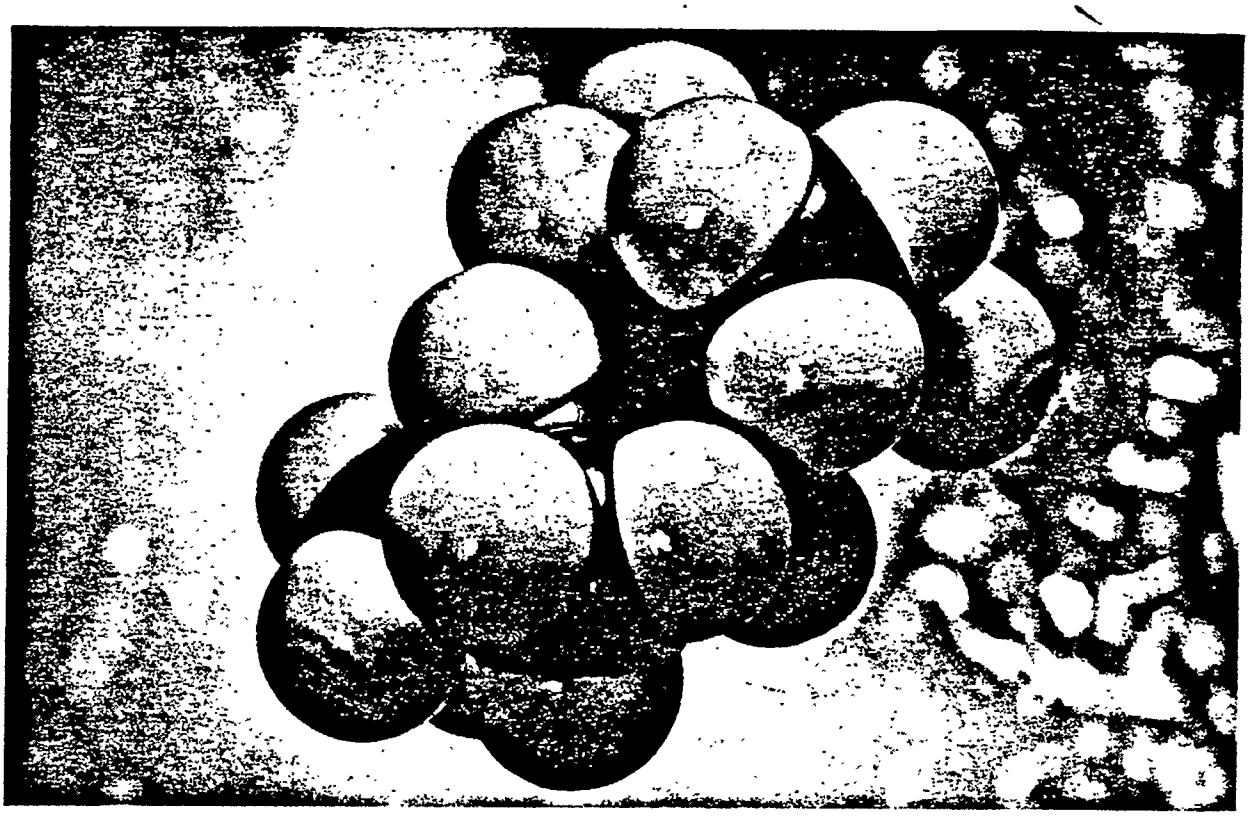
Elaborate precautions needed to protect cars in storage have influenced many owners to keep their cars in service. Occasional use of car benefits tires by flexing rubber in sidewalls, prevents oil gumming, battery deterioration and other storage ills. At same time car is always ready for use in possible emergency.

Speedometer readings are no longer reliable as service reminders. Reduced operation by many car owners means cars are in service only two or three days a week. Condition of battery, crankcase oil, etc., should be checked on time rather than mileage basis these days.

Reported effect of war is general leveling off of gasoline octane ratings over country. Antiknock quality of regular and premium is holding up well, but "peaks" of extremely high octane ratings are disappearing.

"Oil is ammunition—use it wisely!"

ETC 23057





GRAPES OF RAF

"NEVER in the field of human conflict was there so much owed by so many to so few," said Winston Churchill. For the fate of England —if not the whole world—was determined by the men of the Royal Air Force between August 8 and October 31, 1940, when they turned back the Luftwaffe in the Battle of Britain.

As the records of that epochal struggle are revealed, we learn more and more of the gallant sacrifices made, the courageous deeds performed, during those eighty-five days of furious fighting. We learn, too, of the little details that sometimes play a part in deciding the fate of nations.

One of those "little" things is pictured above.

It is a molecule of an ingredient in the gasoline that helped the RAF win the Battle of Britain. It is called iso-octane. The atoms of hydrogen and carbon which form iso-octane hang closely together like a bunch of grapes, as shown in the chemist's model above.

Maybe that peculiar bunching of the atoms is the reason why iso-octane has such a high antiknock quality that years ago it was considered "perfect" and was adopted as the scale for measuring the antiknock quality of gasoline. Possibly iso-octane's remarkably high antiknock quality is due to some other reason.

Whatever the reason, this clear-cut superiority over ordinary gasoline was enough to start the research laboratories of the American petroleum industry working, developing manufacturing processes that changed iso-octane from a forty-dollar-a-gallon curiosity to a twenty-cent-a-gallon ingredient of aviation fuel for the planes of the United Nations.

The Battle of Britain might have been won without iso-octane. We cannot say. All we know is that the British had it for their fighting fuel in quantity—the Germans did not. For *that* we are indebted to the peacetime research and developments of American oil refiners.

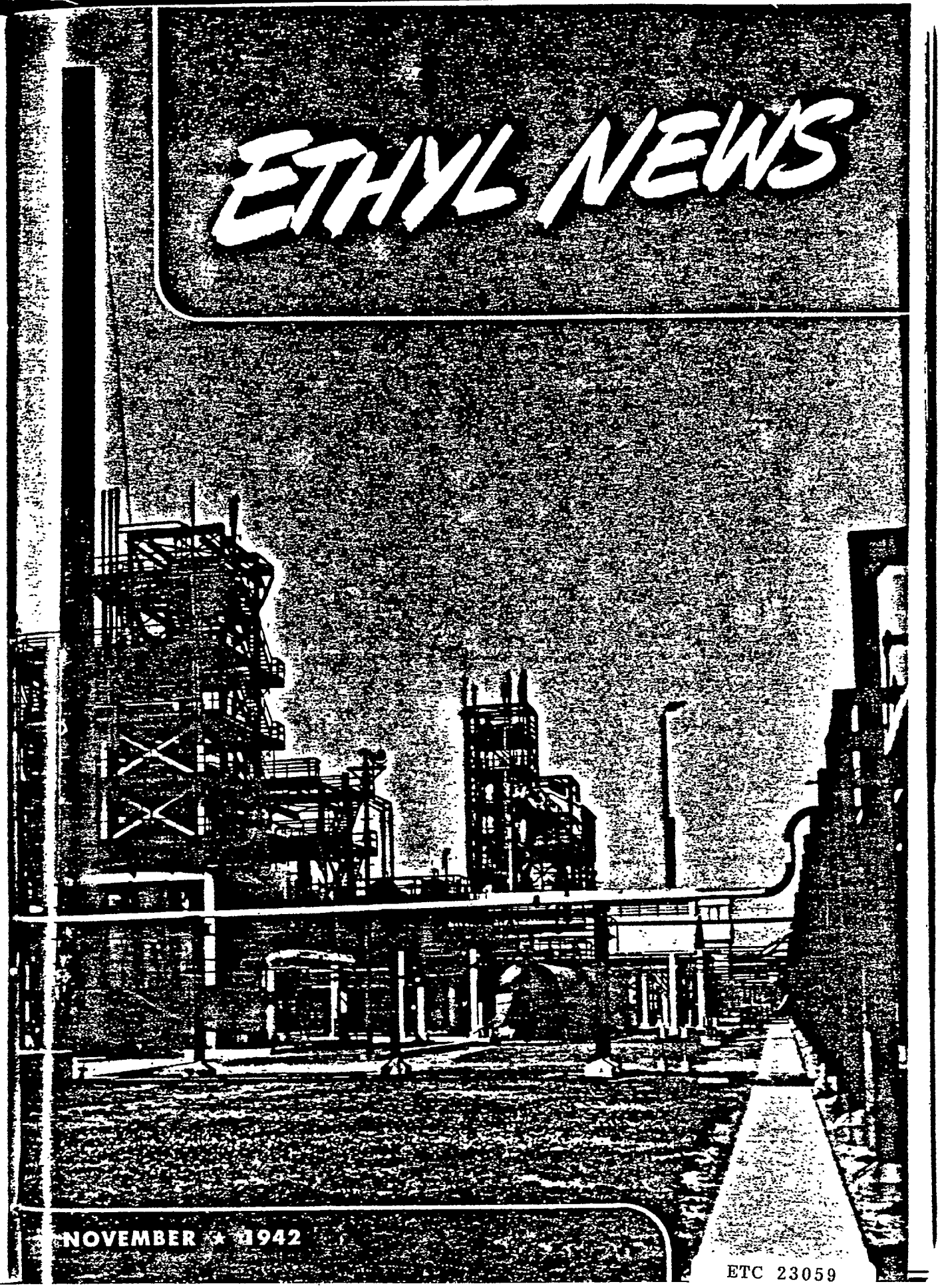
This development of iso-octane has been only one of countless chemical achievements of petroleum technology in the long search for better fuels. Ethyl fluid is another of those achievements. It, too, is a prime ingredient in the fighting fuels that power the planes and mechanized armies of the United Nations.

ETHYL CORPORATION
Chrysler Building, New York City

Manufacturers of Ethyl fluid, used by oil refiners to improve the antiknock quality of aviation and motor gasoline.

ETC 23058

ETHYL NEWS



NOVEMBER ★ 1942

ETC 23059

ON THE COVER

THE ETHYL PLANT pictured on the front cover will play an important part in keeping *necessary* civilian motor transport rolling. A quick conversion job has made it possible for this plant to turn out ethylene dichloride, one of the prime ingredients in the manufacture of "Thiokol" synthetic rubber type "N" recommended by the Baruch Committee as a suitable and quickly available material for recapping tires. The plant went on stream on October 29. Another similar Ethyl unit is available for conversion and may be changed over within the next few weeks. The two units have capacity sufficient to produce about 60,000 pounds of ethylene dichloride yearly. The "Thiokol" program set up by Rubber Reserve Corporation calls for enough of this synthetic to retread approximately 24,000,000 civilian tires yearly.

ETHYL NEWS

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Manufacturers of Ethyl Fluid, used by oil companies to improve the antiknock quality of aviation and motor gasolines

W. J. Heggen..... Editor

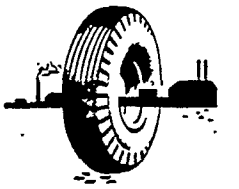
IN THE

ETHYL NEWS

NOVEMBER * 1942



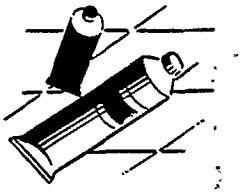
FOOD — NAZI WEAPON . . .
A great famine in Europe has been ordered by Hitler — for strictly military reasons



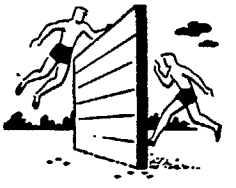
CHEMICAL RECAPS FOR CIVILIAN TIRES 8
Ethyl is now making material for Thiokol, a synthetic rubber to give you tires



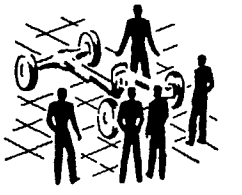
FLASH! 10
The story of radio news — unknown just a few years ago, but a major industry today



PLASTIC TUBES 14
You've wondered what we'd do for tooth-paste tubes without tin. Here's a substitute



HELLHAWKS OF THE AIR . . 16
Navy pre-flight schools "case-harden" their men into the world's toughest sky-fighters



NEW YORK KEEPS 'EM ROLLING 20
Wartime maintenance problems for New York's fleet are solved with Ethyl men's help



PRAISE THE LORD AND— . . 22
Our most popular and most controversial war song is a by-product of Pearl Harbor

ETC 23060



FOOD—NAZI WEAPON

Famine — ordered by Hitler — hangs over Europe like an approaching cloud. Read how the Nazis have made food a weapon . . . and how we may turn it against them

by Northrop Clarey, jr.

INTO MARSEILLES, principal seaport of famished France, ships bring eighty thousand tons of food a week — food to make an American's mouth water.

Down the gangplanks trot herds of the succulent lambs and milk goats of Morocco and Algeria. Wharves are piled high with crates of figs and golden-brown dates. Olive oil from Sahel, oranges and tangerines from the African coast, plums and nectarines from Tunisia, tomatoes and beans and buttery-flavored artichokes from Algerian truck farms, all pour into Marseilles, Sète, Toulon. Tons of the rich, soft wheat of Algeria and the hard wheat of Morocco are unloaded. French longshoremen sweat and stagger under sacks of Berber almonds, Atlas walnuts, Algerian peanuts — bulging bags of potatoes, barley, oats and lentils.

Gingerly they unload great hogsheads of the delicious strong wines of Algeria and roll the precious, rumbling casks across the cobblestones of the quai.

Leaning against the shady side of these barrels at noon, they will eat their lunch — part of a cold potato, a small apple, a bit of cheese with some miserable bread, and a bottle of water. One will touch the next one on the knee. "Look — in the cuffs of my *pantalons*, and in my shoes, I have let a little grain spill while one was looking somewhere else. For little Jeannine, my smallest one, with the rickets."

A muttered answer: "It will take

ETC 23061

more than a little wheat, my friend. If one could bring her a cup of this wine — *that* would put the color in her cheeks again!"

"Ah, this wine!" says the other. "Mon dieu, this magnificent wine will warm the heart of no one. *Personne!* It goes into Germany — for the alcohol of industry — for bombs."

Starving Amid Plenty

And they go back to their work again, staggering under loads of food that would make even an American's mouth water. Staggering, because they are starved. Over 70% of those 80,000 tons of food they unload each week in "Unoccupied" France go right through to the Reich.

France should not be hungry. Besides these regular impressive imports of African foodstuffs, she had a normal wheat crop last year and a better-than-normal potato crop. Yet Frenchmen get miserable rations of potatoes and bread. Fertile France is suffering from acute malnutrition. Parisians who once dined in gourmet societies now consider it a stroke of good fortune if they can find a cat carcass in the black market.

In other countries it is worse yet. A cat carcass in Belgium cost 125 francs last winter. Poland and Greece are starving. Spain has been hungry since her civil war ended, three years ago. Holland, Denmark, Norway, Sweden, even Finland and Italy, have had to take several hitches in their belts. Recently the Journal of the American Medical Association published some "optimistic" figures on the calories per person in Europe's diet. Measured against accepted standards, Germany's diet has just adequate food-energy, Norway is 10% deficient, Italy is 15% deficient, Bohemia and the Netherlands are 20% below par, France is 25% under, Belgium and Luxembourg are 35% under. No figures were available for Poland and Greece.

Famine — *man-made famine* — hangs over Europe like a dark cloud on the horizon. Not because war has ravaged all the agricultural areas or because food stores have been destroyed. Even the Russian attempts to "scorch" the golden earth of the Ukraine left most of the green crops standing and burned only the wheat from previous years already in storage. Nor is it because Europe will have to starve so Germans can eat; Germany has more grain in storage today than she did when the Wehrmacht rolled into Poland.

Hitler *wants* all of Europe — both occupied and neutral countries — to feel the anguish of starvation this winter. Not because he is a maniac. His reasons are economic and political.

Germany's biggest need today is manpower. Over and above the millions in arms, Hitler must keep a mighty army of men working in her mines and industrial plants — and another mighty army growing food. For these he must rely on the reluctant, rebellious, sabotage-minded people of his captive countries. Over a million prisoners of war and alien workers toil on German farms today, but thousands more are needed.

The loyal Frenchmen, Dane or Hollander who so far has been able to keep body and soul together may decide he's glad to gain food by

Famine is hardest to bear when you see your own children starving. Hitler counts on this also to produce "cooperation"



ETC 23062

working in Germany when he sees his family cold, undernourished, emaciated, weakening day by day. Hitler has the people of Europe stretched on the rack of hunger. As he needs more cooperation, from time to time he draws the rack another notch tighter.

"Guns — not Butter"

But foods work for Hitler and Goering in ways even more direct — as raw materials for the ingredients of warfare. From wines they make industrial alcohol, from milk they produce lubricants. Beans make plastics; soybeans make synthetic wool for clothing, as well as printing ink — another effective Nazi weapon. Potatoes and sugar beets that would warm the fingers of anemic children go into acetone for explosives. Copra, which should go into margarine, makes glycerin; so does cotton seed. Palm and olive oils are used for processing military and civilian textiles. So it is doubly important for Germany to raise abundant crops.

But Germany has only 112 acres of agricultural area for every 100 inhabitants. The United States, by contrast, has 300. Forests and parks are leveled, scraped bare, plowed and planted. Bulldozers crash through hedges and flower beds alike, making great fields of them that can be worked on a mass-production basis.

For the Germans learned their lesson well in the first World War, when 750,000 of them allegedly died from insufficient food. They had more than 600,000 tons of grain in storage before they invaded Poland. Anticipating another blockade, they had prepared for six years before the shooting started. And they prepared with such efficient thoroughness that even when food rationing was ordered they had had the ration cards worked out for four years. Germans are not eating well these days, but war will not starve them. Today their food resources are expanding.

Last year alone, Germany took 80% of Russia's sugar-beet country and 40,000,000 of her people, including the wheat-expert Ukrainians. Farms in all conquered areas near Germany have been expropriated at a fraction of their value, and the owners forbidden to buy elsewhere; their implements have been confiscated. During the first 15 months of the war, 1,500,000 Poles were evicted from their land and 442,000 German colonists settled in their places. The area is rich. It provides, for instance, one sixth of the German sugar supply.

The Ostland Corporation, state-farming arm of Germany's Food Estate, has prepared for years to run these captured farms on the same basis as the Russians operate their collective farms. Peasants and military prisoners supply the labor in Poland; French-African prisoners, all under guard, work in France.

So Germany has kept food from being an effective weapon against herself. And she has not only turned this weapon against conquered peoples — she has actually used it in a different way against England.

When England declared war on the Nazis, she had to feed 6,750,000 more people than during the last war — with 4,500,000 fewer acres under the plow. Many of her agricultural workers were in uniform. She was importing 70% of her food. Germany turned loose her packs of prowling U-boats — and you have read what American correspondents say of food prices and scarcities in London. But the main effect of the U-boats was a secondary one.

The English rallied nobly, of course. Tractors ran all day and all night. Estates and parks became gardens — the attractive British kind, not mile-wide monuments to Teutonic ruthlessness. Volunteer land clubs of city people worked during their weekends. The Women's Land Army raised 15,000 pairs of hands for permanent agricultural work. In backyards and tiny frontyards over half a million vegetable gardens were planted.

Soybeans feed the cannons as well as the men of the German army



ETC 23063



80,000 tons of food a week go into Marseilles — en route to Germany. Frenchmen stand in line for their food rations



"Victory gardens" are not a summertime lark in England. A patch of green on the roof means more strength for fighting

Jews and Poles are not regarded as "cooperative." Soldiers throw leftover food to them as if they were feeding pigs



And we Americans rallied pretty nobly ourselves, with Lease-Lend. During the 12 months before last May, for instance, we delivered for shipment more than two million tons of farm products — approximately a hundred pounds for each inhabitant of Britain. Lease-Lend is expected to take 10 to 15% of our food production in 1943.

This is a huge tonnage of food — tonnage that ties up ships which could be transporting tanks and airplane engines and torpedoes to Britain. Hitler's campaign to starve the British did not work — but it certainly was an effective weapon in postponing the Second Front, the bombing of Berlin, and the day of ultimate reckoning.

America, to make its food effective, must do two things. It must grow more than ever before, and it must see that this food reaches Europe, China and Russia in sufficient quantities.

Our Answer — 125%

As for raising more food, American farm goals are 25% higher than last year. With much farm labor called into the Army or migrating into industry, farmers are putting in twelve and fourteen hours a day. Women are raising more chickens and bigger gardens, putting up more canned foods — and driving tractors. Girls and ten-year-old boys are taking the places of their brothers. More than ever before farmers are trying to make the most of their tractors and power equipment. When the Ethyl Corporation, for example, compiled a booklet on the conservation, maintenance, and efficient use of tractors, the number of farmers who asked for copies was overwhelming. "Wartime Tractors," issued both as a builder of good will and as a practical patriotic contribution to America's battle of the soil,

has already been distributed to the amount of 1,200,000 copies.

Are the farmers winning their "great green battle"? The number of hogs has soared eighteen and a half million beyond any year in our history. In one minute Wisconsin cows make 15,000 quarts of milk; Indiana fields produce 14,000 pounds of tomatoes; Illinois farmers produce 150 bushels of soy beans, to make glycerine for explosives, oil for margarine and battleship paint, feed for pork and beef, fibre for plastics which release metal for munitions. Soybeans work for *us*, too!

As for the shipping problem, seeing that food reaches the places where it will count most heavily has called for more than convoy protection and Liberty ships to provide additional tonnage. Food scientists have developed methods of condensing foods by taking the water out of them. On the average, they weigh one tenth as much as before, and occupy only one tenth the space. What's more, they keep without refrigeration.

You have probably read of the process by which three dozen eggs can be reduced to one pound of powder, and you doubtless are familiar with the dried skim milk powder we have had for years. That was child's play. It is now possible to pack enough vegetable soup for two hundred soldiers in a two and a half gallon container. An even 2,000 pounds of fresh peas weigh 4,000 pounds in cans — but only 350 pounds when dehydrated. One quart of milk — and they have recently discovered how to dehydrate whole milk without having the cream turn rancid — makes one cupful of powder. A two-pound steak can be heated and compressed to the size of a piece of toast. As we said, dehydrating usually saves 90% of weight and bulk. To give you an idea of what this means, we could have released eighty 10,000-ton ships in the first year of Lease-Lend alone simply by dehydrating those foods which can be successfully condensed this way. And in London, where a fresh egg may cost you a dollar, you can buy a dozen powdered eggs for 34 cents.

Why is food dehydration so important? All that we have done so far on it has been part of our counter-attack on the food front which Hitler opened. But as the expanded facilities for dehydration begin to pile up reserves of food, we can use them as a most potent weapon against him. One Flying Fortress, fitted out as a cargo-carrying plane, can fly a thousand miles with enough dehydrated staple food to feed a small city for several days. If we start dropping bundles of such food by parachute, how long would starvation continue to bring Frenchmen, Poles, Danes, and Dutchmen into German arms factories or farms? If they knew they would no longer be at the mercy of their conquerors for food, how many patriots in the occupied countries would arise overnight in revolt?

Even the Second Front would be made easier with condensed foodstuffs — for the armies of freedom must bring in with them food for any peoples they liberate. Each city won back from the Germans is one more city that must eat from our kitchen.

Second Front Food

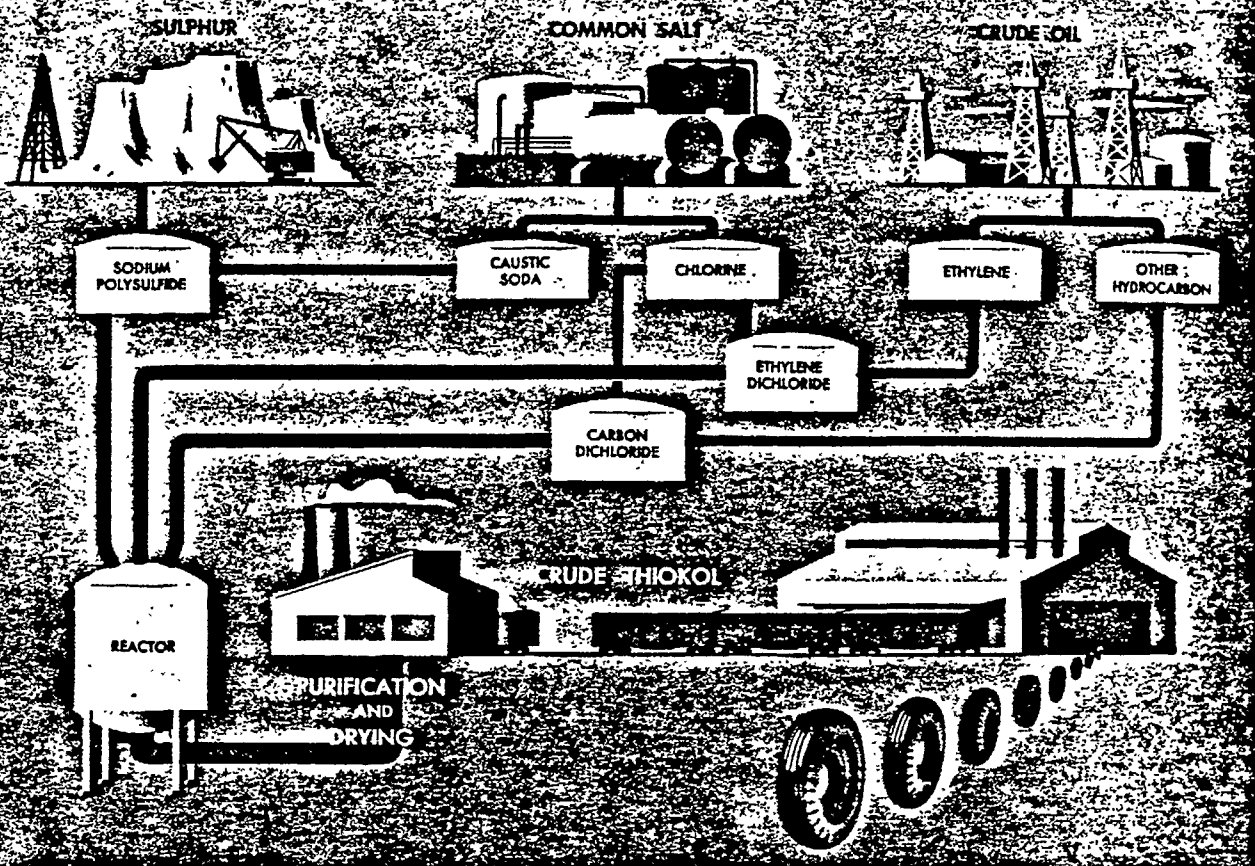
Our present overstocks of grains and cheese would be spread very thin over a liberated Europe. America alone can not hope to feed the victims of Germany while they resettle themselves, get their farms working again and their starved or butchered herds restored, without help from Canada and South America. Shipping will be the principal bottleneck — but our multi-million-dollar food processing industry, when it no longer needs to pack food for our Army, can condense enough of it to see that French children with the rickets, Belgian youngsters who have forgotten the taste of milk, and the gaunt prisoners turned loose from German camps, are fed. Not merely fed, but cheered and restored to health by good food . . . food which has been used, in the end, as a weapon *against* the Nazis.

"Cooperative" peoples are comparatively well fed, as an object lesson.



ETC 23065

CHEMICAL RECAPS FOR CIVILIAN TIRES



Ethyl Corporation plants found suitable for part in Thiokol program. First unit "on stream" October twenty-ninth

TWO MILLION camelbacks a month for retreading tires on civilian cars were called for by the Baruch Committee's recommendations that "Thiokol" production be stepped up to 60,000 tons a year. The report says in part: " . . . We find that rubber for necessitous civilian use has been insufficiently allocated. More must be allowed for tire replacement and recapping." And again: "We *must* maintain the tires on *at least* a substantial proportion of the 27,000,000 civilian automobiles. Otherwise an economy geared to rubber-borne motor transport to an extent not approached elsewhere in the world will break down."

"Thiokol" synthetic rubber type "N" offers quick possibilities for satisfactory re-cap material. Consequently, Rubber Reserve Corporation has set up a program to make 60,000 tons of this material yearly, enough to re-cap approximately 24,000,000 tires on the basis of five pounds per tire.

Fortunately two Ethyl plants, built long before Pearl Harbor, can be converted quickly to manufacture a prime raw material for "Thiokol" type "N," namely ethylene dichloride. Originally constructed for the purpose of making ethyl chloride, one of the plants is now being

ETC 23066

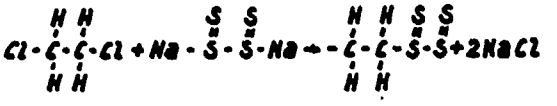
changed over to manufacture ethylene dichloride from the same raw materials and it is expected that the other will be converted in the near future. To manufacture 60,000 tons of "Thiokol," 72,000 tons of ethylene dichloride are required. The two Ethyl plants when converted would be able to furnish 60,000 tons of the needed 72,000.

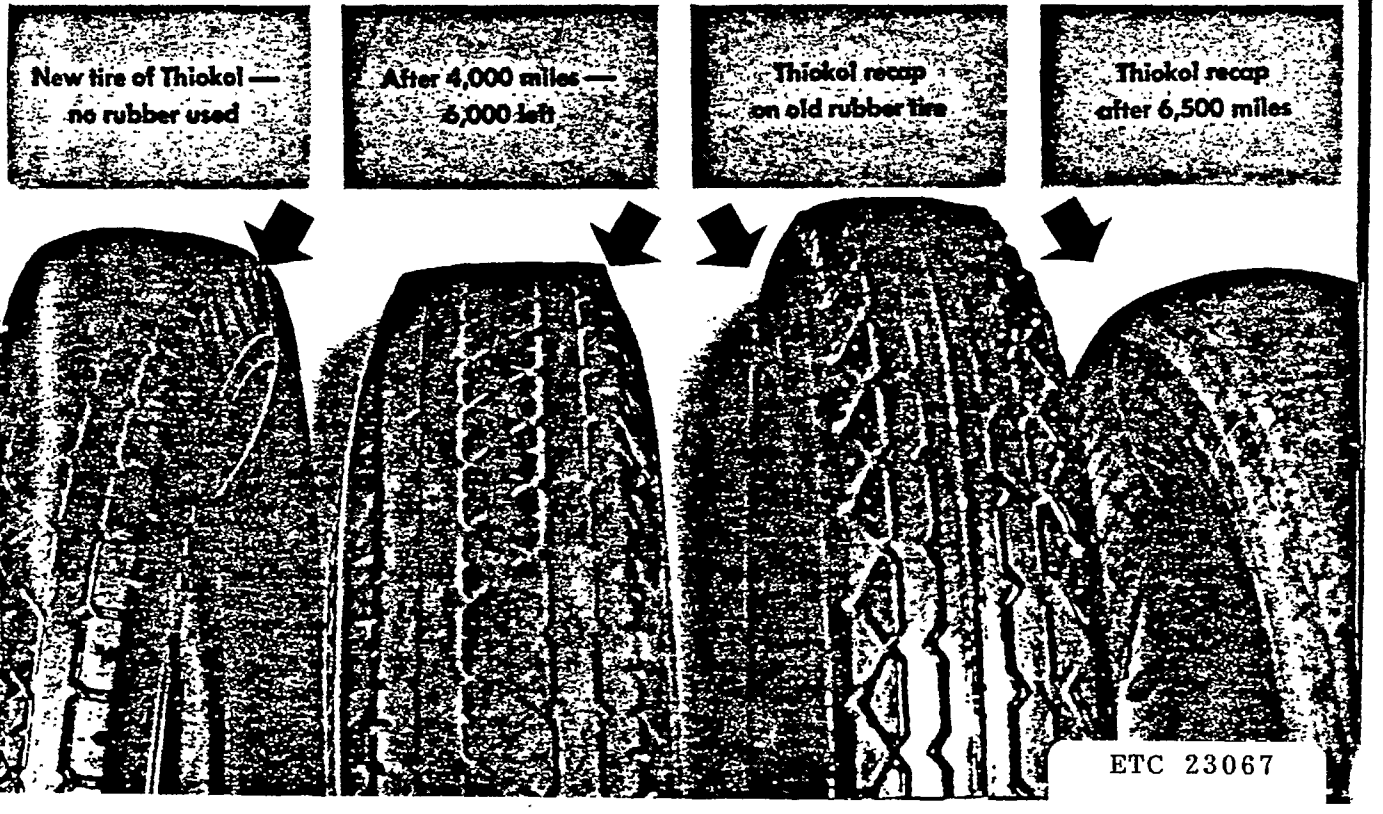
Preliminary tests indicate that a tire re-capped with "Thiokol" will give an additional 7,500 miles of service, providing reasonable care is exercised and speed does not exceed 35 miles per hour. Tires fabricated entirely from "Thiokol" also have been made. Research men believe that such tires will run for 10,000 miles – possibly more.

While "Thiokol" is not nearly the equal of natural crude rubber for uses such as tires, it has three definite advantages in a program that calls for a large amount of re-cap material quickly: (1) the essential raw materials are found in almost unlimited quantities within the United States; (2) the manufacturing operation is comparatively simple; and (3) America possesses the "know-how" for the production of all the raw materials and for the production of the material itself.

Actually, "Thiokol" is not a new product. Made from the thermoplastic reaction of ethylene dichloride and sodium polysulphide, it was discovered by Dr. J. C. Patrick, chemist-physician of Kansas City, about 1923. In 1929 the Thiokol Corporation was formed to manufacture this rubber and now has more than 12 years of production experience. The Dow Chemical Company became associated with the project in 1930 and for the next 8 years supplied the necessary chemicals to Thiokol Corporation. In 1938 Dow set up facilities to manufacture certain products at Midland to the order of the Thiokol Corporation. Dow will have an important part in the new program which is just getting under way. The du Pont company also is expected to participate.

"Thiokol" rubber looks, feels, acts, is fabricated, compounded, cured and vulcanized much the same as natural rubber. It has a high degree of resistance to air, sunlight and solvents and is unaffected by oils, greases and gasoline. But more important it will take war workers to and from their jobs and keep other essential rubber-borne motor transportation rolling in a critical period.





ETC 23067



Radio announced the Hindenburg fire before the ship hit the ground. How do radio news men bring these scoops and flashes to you?

by Joseph Edelstein

THE SILVER SHIP floated in through the mist, a cigar-shaped wraith in the dusk.

In a phone booth at the Naval Air Station in Lakehurst, New Jersey, a reporter was giving a rewrite man in New York a running description of the Dirigible Hindenburg's arrival after its first trans-atlantic voyage of the year. It was routine stuff. The reporter glanced casually at his watch. He'd mark her in at 7:23 P. M. Suddenly, the giant airship dipped wildly.

There was a boom. A flash seared the murky sky. Stunned, the reporter yelled:

"She's blowing up!"

A few seconds later, a teletype machine in the New York office of the United Press Radio division stuttered:

"Flash. Lakehurst, New Jersey — Dirigible Hindenburg explodes."

The bell on the machine rang wildly, and then:

"Flash. Lakehurst, New Jersey — Dirigible Hindenburg on fire."

Thereafter the bulletins streamed in. Newsmen worked feverishly.

The disaster occurred at 7:23 p.m.

Within three minutes, several hundred urgent-voiced radio announcers throughout the country were tugging at the consciousness of their vast audience with:

"Ladies and gentlemen, we interrupt this program to bring you a special news bulletin . . . "

And then the spectacular story.

Thus, another scoop for radio. A beat that no other method of news dissemination could hope to match.

News broadcasts have come a long way in the last ten years. The Cinderella of journalism now has become a glamour girl, a multi-million dollar baby.

Today, the big press associations provide radio stations in Canada, the United States, and Central and South

America with specially-prepared news reports; reports designed for listening.

They are built on accuracy, steeped in public responsibility, and cloaked in homeiness.

For instance, that newscast you heard at breakfast: Its simplicity is misleading.

You have no idea of the hours of preparation and the tremendous sum that went into it. While the world slept, specially-skilled writers and editors labored over it. They are people with a flair for moulding the maximum picture from a minimum of words. They have wrestled with a multitude of dispatches and communiques so that you will know quickly and clearly what has happened.

For the clock on the radio wall is an even sterner task master than type in the composing room.

Every hour on the hour, every quarter and every half hour — 24 hours a day — an unparalleled flow of news is fed into the vast maw of the microphone.

It wasn't always so. A short ten years ago you could have dialed for hours without ever coming upon a "spot" news program. There were a few "commentators" on the air but their treatment of the news was strictly interpretive and it was always yesterday's news. It wasn't that the radio stations didn't want fresh news. They were willing to pay fancy prices, but the newspaper interests wouldn't play. They saw, or thought they saw, a grave threat to newspaper circulation if news was available on the radio. Commercial sponsorship of radio news programs was another bone of contention. Important advertising revenues were at stake. The net result was a bitter battle that lasted for years. Radio finally won because the press associations were unable to withstand the lure of the important money they could make out of the sale of their news.

Something New in News

The end of the press-radio battle started a new era in news dissemination. Dozens and dozens of radio news programs popped up all over the dial—at all hours of the day and night. Local news, regional news, national news, international news. Once the public got a real taste of radio news the demand was almost insatiable.

Advertisers were quick to grasp the possibilities of the radio news program. As a matter of fact, the oil



The faces behind those famous voices — above, H. V. Kaltenborn and Robert St. John; below, William L. Shirer, John Vandercook, Alex Dreier

ETC 23069



Busy United Press radio news room in New York. Here specially skilled writers prepare news for the air

industry was about the first to recognize the pulling power of radio news. The pioneer "spot" news program on the air is that presented by Lowell Thomas for the Sun Oil Company. It goes back a dozen years and still is going strong. The Richfield Reporter on the Pacific Coast was another pioneer news program. Nearly all the major oil companies have sponsored news broadcasts of one kind or another in recent years.

Today radio stations get the same news reports that newspapers receive, but the big networks have gone a step further. They have developed their own news sources. Radio correspondents have been spotted all over the world. Their reports before the microphone have a vividness and wealth of detail unequalled by any other medium. This kind of news coverage costs fabulous sums of money, but broadcasting executives think the public is entitled to it.

Broadcasting has been described as a split-second science. It never ceases to be a nerve-wracking operation, whether it is a home studio broadcast or whether it involves a pick-up. Timing, as in almost everything else, may mean success or failure.

The war correspondent's problem of trying to make sure that a cabled story gets through is difficult enough. It is even worse for the radio war correspondent. He not only must gather and write his material and get it cleared by the censorship, he must also pray that the fates be kind in putting through his broadcast.

That's where timing, the split-second science, and all the other hundred and one problems which give special events directors migraine headaches come in. We'll drop in at the National Broadcasting Company which has a nightly round-the-world show.

Lathrop Mack, who is handling special events, is in the control room helping monitor the broadcast. The no-one-knows-how-many-million persons listening in don't realize Mack is a three-way captive on their account. They probably don't care . . . all they're interested in is the latest news from either side of the Atlantic or the Pacific. Mack's there to see that they get it—or at least a reasonable facsimile.

On the air at the moment is N-B-C's man in Wellington, New Zealand. That's why Mack is almost chipper. Until the second he came on the air, it was doubtful whether there would be a broadcast from Wellington—bad atmospherics. And that's why the teletype printer was ringing so insistently behind Mack's back.

It was the engineer for N-B-C in San Francisco reporting that if New Zealand failed, he could call in Moscow. The signal from the Soviet sender was strong.

So, there's Mack. Timing the New Zealand broadcast with one hand and sending messages to San Francisco with the other.

But that's not all.

He also is giving instructions on the switch from New Zealand to Washington to the engineer sitting at a panel in front of him. And at

Axis short wave "newscasts" are recorded on wax and then translated



the same time, Mack is talking into a microphone keeping up a conversation with Alex Dreier, the N-B-C representative in London, who broadcasts in a moment. They're making arrangements for a pick-up from Cairo the next night.

Everything goes smoothly right through the sign-off and Mack comes away blithely from 15 minutes of what would turn gray the hair of any reasonable man.

Now for a call on Paul White, news director of the Columbia Broadcasting System, on a recent Sunday afternoon. This is another round-the-world show and White is at his desk talking into a mike.

"Calling London. Calling London. Hello, London."

No response.

White glances into the adjoining studio where Announcer John Daley is reading the news report prepared in New York, then resumes:

"Hello London. Hello."

More silence. Then a British voice comes through querulously:

"Yes?"

"This is Paul White, of C-B-S, in New York. We have a pick-up from London scheduled for this time."

"I'm sorry, but the lines have been cancelled."

"Who cancelled them?"

"I did. Your signal earlier was bad and so I assumed you would be unable to hear us."

The British engineer's voice is coming in perfectly.

White persists.

"Is the New Delhi circuit up?"

"Sorry, old chap, that also is gone."

"O.K.," replies White disgustedly and snaps off the switch on a control panel alongside his desk. "That," he adds to himself, "will never happen again."

To White, however, this was a contingency which must be taken into consideration with every pick-up broadcast. And so, when London failed there was no lag. Other correspondents were standing by in Washington, Montreal, and Honolulu, and all came on the air.

Rivalries are the meat and drink of the newspaper world and so they are in the radio world.

Coronations. Abdications. Political conventions. Prize fights. Round-the-world flights. Yes, and singing mice.

But two of the most exciting scoops concerned sinking ships and N-B-C and C-B-S split the honors. As always, foresight and a liberal dash of luck helped both.

Late in the afternoon of December 17, 1939, James Bowen, a special representative for N-B-C in Montevideo, was on the death watch of the defeated, battle-scarred Nazi pocket battleship, Graf Spee. This had been his assignment for four days. At 5:55 p.m., while talking on the short wave cue channel with an N-B-C man in New York, Bowen suddenly cried:

"Give me the air! Quick! The ship has exploded!"

Captain Hans Langsdorff, her commander, had scuttled her by standing in a launch and pressing an electric button which set off the fatal charge in the Graf Spee's hull.

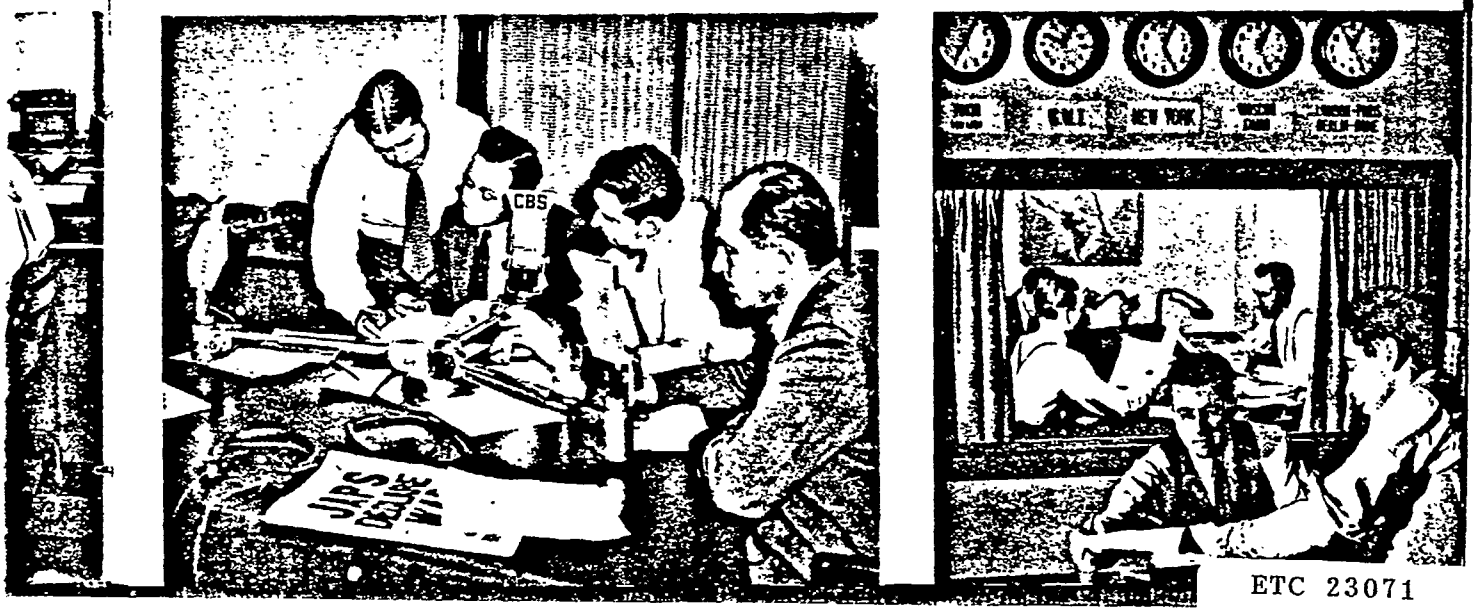
In 30 seconds, both the Red and the Blue networks were cleared and Bowen, his voice vibrating with excitement, scooped the world with a five-minute broadcast describing the sinking ship. Among his listeners was President Roosevelt. The president, like millions of others, was thrilled.

C-B-S turned the tables two years later—last winter.

Cecil Brown, Columbia's Correspondent in the Far East, was on the mighty Repulse when it was sunk by Japanese torpedo planes off Malaya. His eye-witness story after his rescue was one of the best reporting jobs of the war.

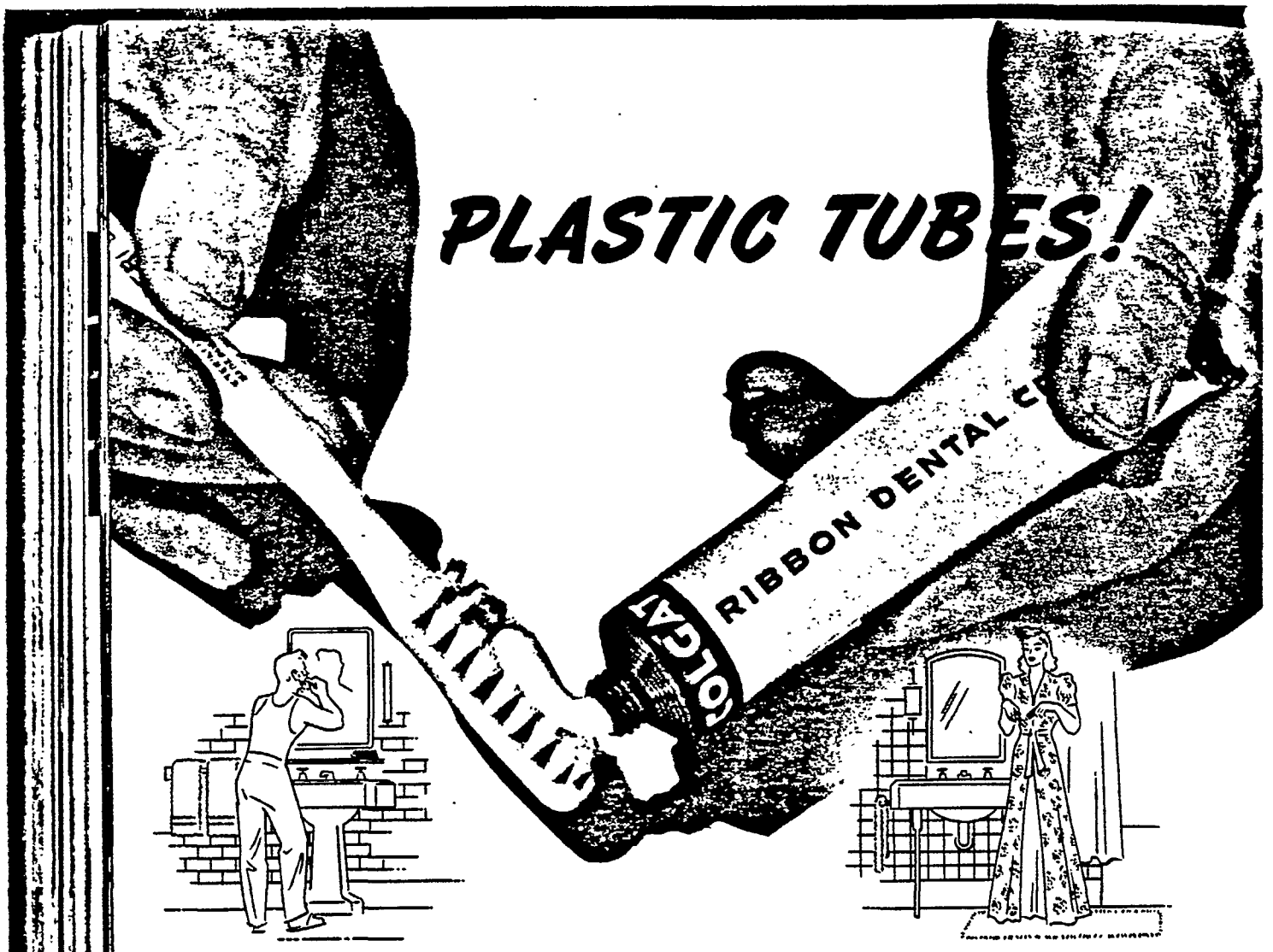
CBS News Director Paul White (extreme left) checks over an important story before it goes on the air

Radio news must be up to the minute. NBC's Lathrop Mack checks late bulletins



ETC 23071

PLASTIC TUBES!



Next time you buy shaving cream or tooth paste, examine the tube carefully. If it is made of shiny plastic, you can donate those old tin tubes you have been saving to the local scrap metal drive

IT WON'T BE LONG now before you can stop worrying about having to save those empty shaving cream and toothpaste tubes. Perhaps by the time you read this article you will be able to walk into a store and buy a tube of shaving cream or tooth paste without handing the clerk a used-up tube in return.

Does this mean that the shortage of metal is a thing of the past?

No, the shortage of metal is still with us – very much so. But ingenious laboratory research experts have perfected an all plastic tube which requires no metal at all in its manufacture. Even the caps are made of plastic, and the bottom of each tube, instead of being closed with a metal clip as formerly, is sealed by a heat and pressure process on which patents are pending.

The company which makes the plastic tube is the Celluplastic Corporation of Newark, N. J., which has been working with plastics for 25 years. Celluplastic chemists, experimenting in conjunction with chemists of the Colgate-Palmolive-Peet Company of Jersey City, the Chesebrough Manufacturing Company, Consolidated, of New York, and Ortho Products, Inc., of Linden,

ETC 23072

N. J., have been perfecting the plastic tube for over a year.

The new tube, which has the approval of the War Production Board, will save about 2,200,000 pounds of pure tin during the coming year, according to Herman B. Lermer, Celluplastic's president. Mr. Lermer said his firm had sought no publicity on the tube because they already had all the orders they could handle. The plant's entire capacity for next year, 100,000,000 tubes, has already been spoken for and many prominent concerns seeking a stock of plastic tubes have had to be turned down.

A plastic tube doesn't look any different from an ordinary tube. It is made from a plastic called lumarith derived from a special type of cellulose acetate formulated by Celluplastic chemists. This in turn can be derived from either cotton linters or wood pulp. Caps are of phenolic plastic.

The manufacturing problem was to turn out a tube with a uniformly thin wall which would also be flexible. It must maintain its roundness so that it could be run through standard production line equipment. When the research chemists had reached a solution, they had a tube which stood up under Colgate's consumer tests at temperatures ranging from below freezing to above the boiling point.

Another problem was to find an ink which would adhere readily to the tube. Six months of experimentation on various inks and pigments were necessary to overcome this difficulty, so that the new tubes will carry the same designs and coloring as those made of tin. Plastic tubes can now be manufactured either as transparent as glass or pigmented to any desired color.

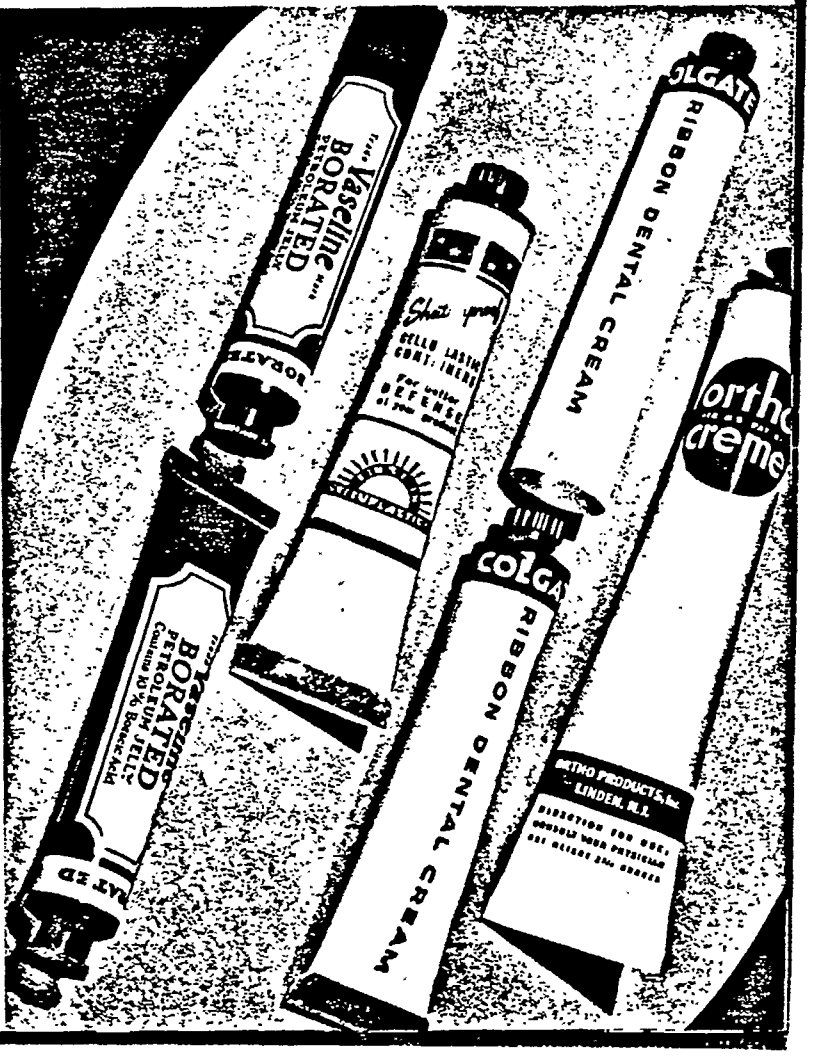
In certain cases special internal treatments are given the Celluplastic tubes, depending on the nature of the product going into them. Many products, however, do not require that the tube be treated internally.

You notice some difference in the plastic tube when you squeeze it or when you roll it. When squeezed, it doesn't stay squeezed like tin but bounces back into shape as soon as the pressure of your finger is removed. When rolled, it won't stay as tightly rolled as its tin brother. This, Mr. Lermer said, is because the plastic tube is much tougher and will take considerably more of a beating than one made of metal. With the plastic tube you don't need to worry about leaks due to rough handling.

The Celluplastic Corporation, formerly called the Hygienic Tube and Container Corporation, has made many plastic products, including plastic vials of all sorts and the plastic capsules which contained the Selective Service numbers. It is at present engaged up to 90 percent of its capacity in war work, and although Mr. Lermer didn't say so, its research staff is probably engaged right now in a careful search for other products which will relieve war shortages.

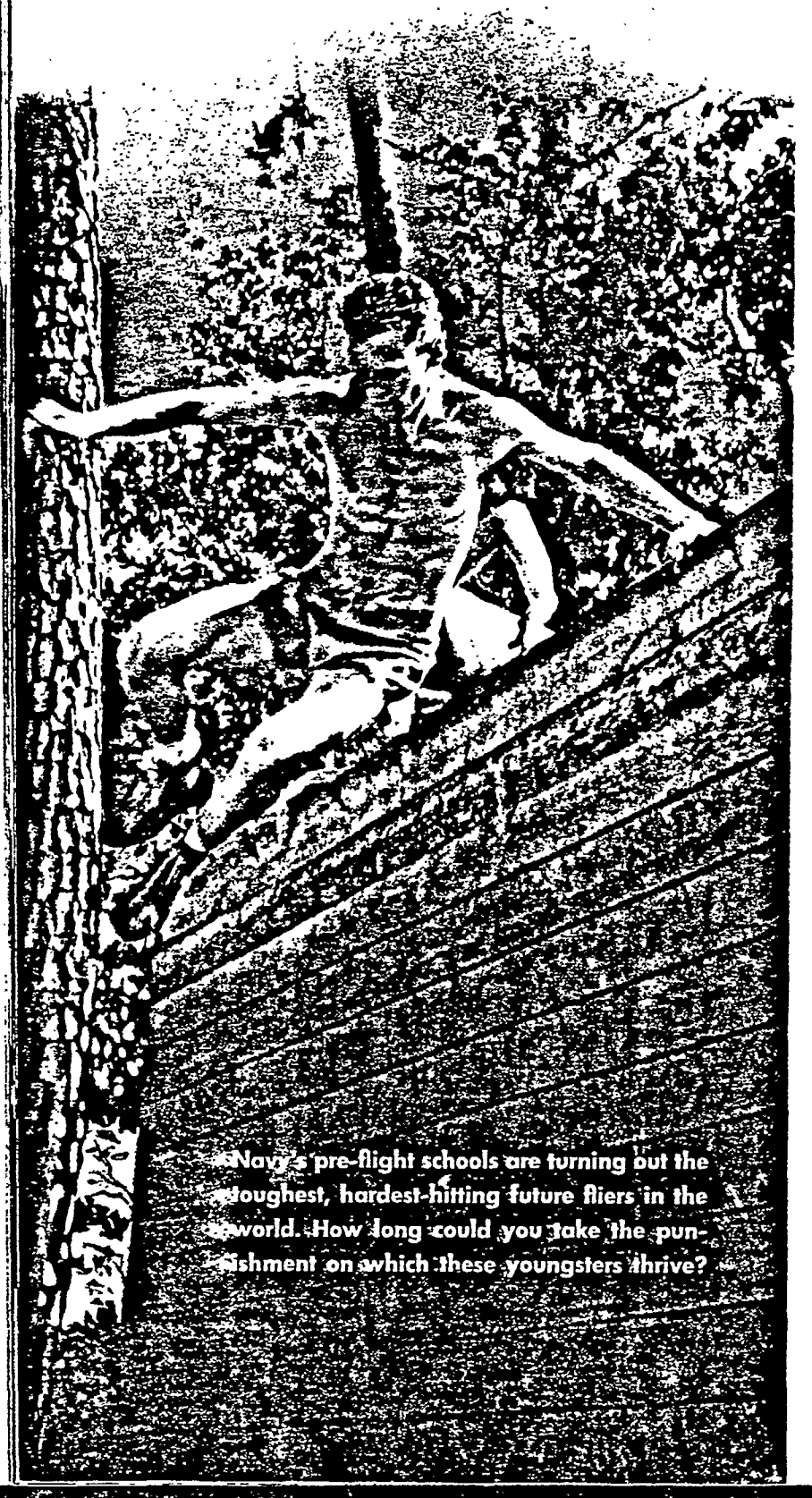
So next time you buy shaving cream or tooth paste, examine the tube carefully. If it is made of plastic, you can donate those old tin tubes you have been saving to the scrap drive.

Tooth paste, shaving cream, medicinal preparations in plastic tubes will soon appear on drug counters



ETC 23073

HELLHAWKS OF THE AIR



YOU SIT THERE and wonder how the human body can possibly stand that much punishment. Out on the athletic field there at Chapel Hill, North Carolina, a group of Naval Air Cadets are staging a soccer game for the benefit of newsreel cameramen. They are incredibly rough. They charge like wild bulls, crash into one another with bone-crushing, teeth-rattling force and bounce up like professional tumblers every time they are downed. Turning to a blond, snub-nosed boy who was on the sidelines with a sprained knee, you said: "At this rate they'll kill themselves for those newsreel guys."

This Is Just Fun

"Oh, no, sir," the cadet replied, "they're not playing nearly as hard today as they play in a regular game, because they cool off while the men are reloading the cameras."

That will give you a faint idea of the kind of toughening all the U. S. Navy's future aviators are getting today before they ever set foot inside a plane or lay a hand on the controls. The University of North Carolina is one of four universities that have been taken over largely by the Navy for the training and conditioning of 30,000 young men a year.

The fundamental need for the course lies in the fact that naval aviation is just naturally tough. It is one thing to fly a plane, but it is quite another to take off, with split-second timing from the narrow deck

ETC 23074

of an aircraft carrier, navigate over thousands of square miles of open ocean, seek out the enemy fleet, fight off savage attacks by enemy fighters, launch an attack at short range in a storm of anti-aircraft fire, navigate back to the tiny floating airport which by now is miles from where you left it, and finally land at nearly stalling speed on its pitching, rolling, plane-packed deck. It is one thing to fly a plane, but it is quite another to hurl yourself into an attack against "hopeless" odds as Lieutenant Commander "Butch" O'Hare did; or keep yourself afloat in the open ocean for 24 hours despite severe wounds as Ensign John Gay did; or keep alive for 34 days in an open boat without food, water or clothing as airmen Dixon, Pastula and Aldrich did; or survive a crash landing and fight your way for days through tropical jungle to get back to your carrier and fight again as several naval aviators have done in the islands of the South Pacific.

Naval aviators may be called upon to do one or all of these things. And even at best theirs is a gruelling, nerve-wracking duty, demanding the highest type of never-say-die fighting spirit. They've got to be tough.

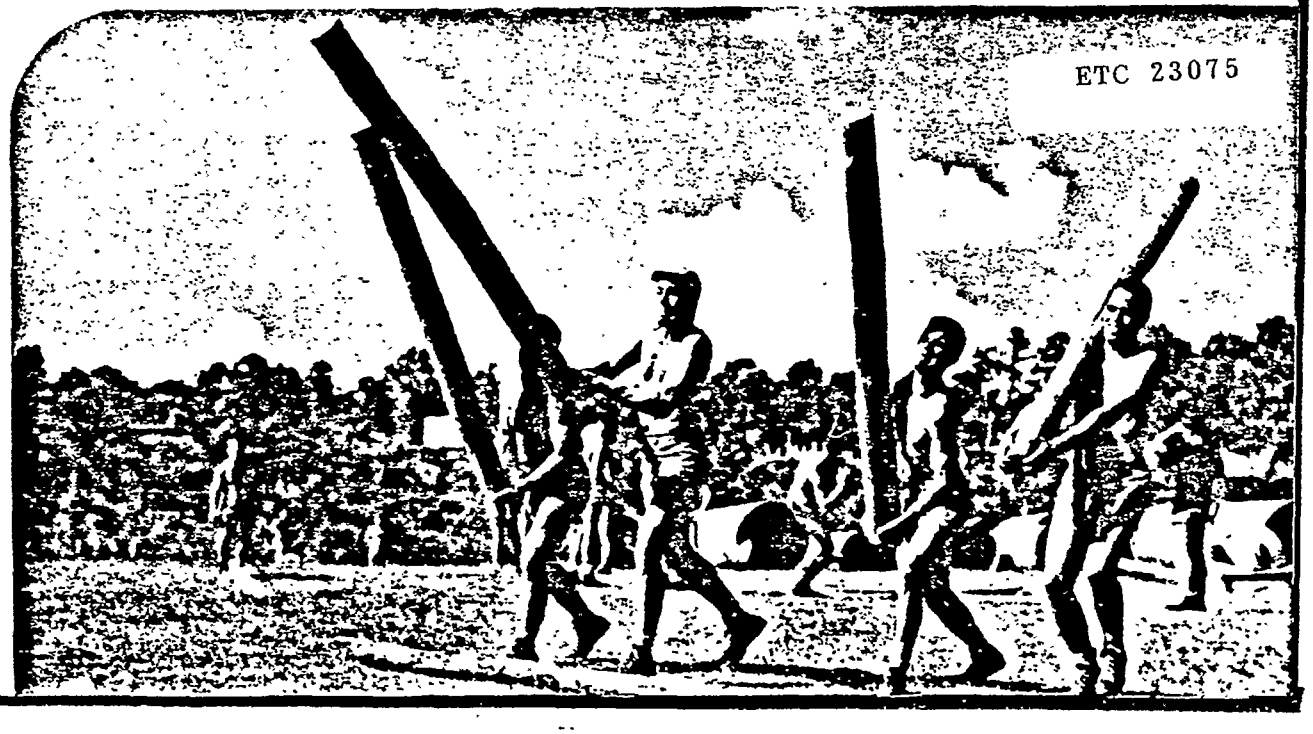
This became all too apparent to the Navy when it discovered that 40 percent of all naval aviation candidates "washed out" of flight training because of physical or psychological inability to keep up with the strenuous program. The Navy found the answer by setting up its *pre-flight* training program for all fledgling fliers – three months of iron discipline and body building and development of endurance and intensive indoctrination with the hell-bent fighting spirit. The country was searched for four college campuses with elaborate physical education and sports facilities as well as housing facilities for 1,850 cadets. Finally the Universities of Iowa, Georgia, North Carolina, and St. Mary's College in California were selected. The nation's educational institutions were combed for the best coaches and educational instructors to make up the faculties of the training centers. There, men were commissioned in the Naval Reserve and sent for a special indoctrination course of their own at the U. S. Naval Academy at Annapolis. Finally, a detailed course of instruction was set up with four broad objectives:

1. Physical conditioning and strength
2. Knowledge of general naval lore
3. Knowledge of military drill and seamanship
4. Elementary training in communication and specialties

In short, the cadets were to emerge in three short months as embryo naval officers, well grounded for their plunge into nine long months of actual flying instructions. The emphasis was to be on sports – but never on sports for sports' sake. Every form of physical exercise was to involve *bodily contact, competition, combat.*

For a first-hand glimpse of one of these pre-flight training schools, imagine yourself on the campus at the University of North Carolina. Athletic and sports facilities are probably the finest in the country for a college of this size. The campus

This exercise is not recommended for weaklings. Tossing six foot logs around takes the place of the shot put in the Navy's preflight training schools



boasts no less than three stadiums — a beautiful football stadium in a natural bowl, surrounded by pine forest; a huge field for track events, with stands for spectators; and a practice field, also with bleachers. In addition, there are two more huge athletic fields for other sports. There is a vast gymnasium as big as a field house; a regulation baseball game could easily be held in it. There is an immense, blue-and-white-tile, 150-foot swimming pool, said to be the largest indoor pool in the country with the exception of that at Annapolis.

To this superb spot every other Thursday comes a new group of recruits, ranging from 165 to 250 in number. Their new life begins with a bang. As the buses pull up at the stone wall near the drill field and the students clamber down, bags in hand, they are organized into platoons on the spot. One half is marched off immediately to register and draw uniforms, while the other half, letting suitcases fall where they may, begins drilling. Hours later they march off to go through the necessary preliminaries while the first half gets its first taste of drilling. From that moment on, the pace never slackens.

The instruction that the cadets are given is divided into three general classifications: academic, military and athletic. Each man has two hours of each type every day.

The academic instruction includes a course in "Essentials of Naval Service," covering naval history, traditions, and customs, and aimed at giving the novice the *feeling* of the U. S. Navy in the shortest possible time. Also a part of academic instruction are courses in mathematics and physics, and more specialized subjects. The cadets are taught, for example, to recognize U. S. and enemy aircraft and surface ships in the flash of an eye. They are taught something of the background of the war and something of the ideologies we fight. They are taught enemy tactics and how to combat them.

Under the heading of military instruction comes lots of regular infantry drill and gunnery, including actual practice in pistol and rifle marksmanship and the operation of machine guns and anti-aircraft guns. They are taught seamanship, and radio, and blinker code. They learn how to take care of a wound and how to get out of a jungle.

How to Kill — or Live

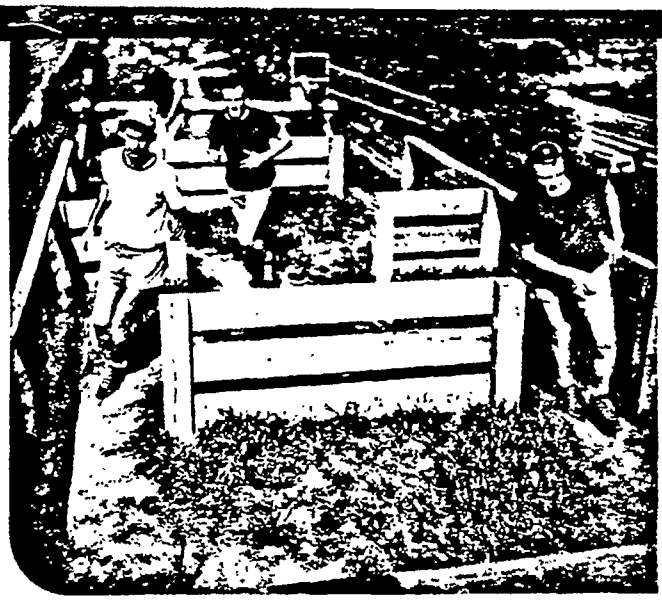
In the third classification of instruction, athletics, the boys are given expert tutoring in boxing, wrestling, rough-and-tumble, fighting hand to hand combat and swimming. Hard realism rules the courses. Marquis de Queensbury rules are forgotten as the cadets are taught how to disable an opponent in the most efficient possible manner, no blows barred. They are taught how to handle unruly prisoners, how to overcome a guard, how to kill an armed man bare-handed. They are taught not only how to swim, but how to stay afloat indefinitely, how to disrobe under water, and how to rescue unconscious shipmates.

All this in three months, mind you — and accompanied by the stiffest compulsory sports program imaginable.

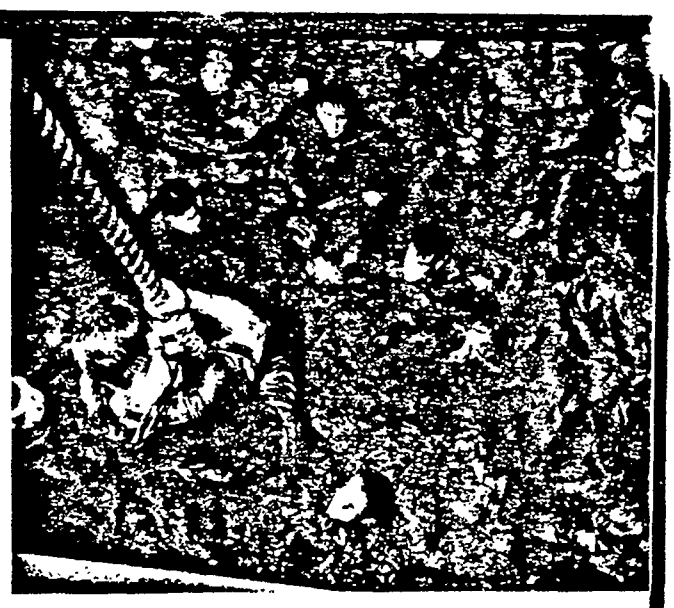
The daily routine at Chapel Hill begins at 5:30, when the cadets are routed out by reveille. During the next hour and a half they make their beds, clean their quarters, limber up with a few mass calisthenics or a little road work, and devour a hearty breakfast. Then, at 7:10, they march off to their first class. The order of classes varies with the battalion and the period concerned, but a typical

Hand to hand combat — how to disarm a man with a knife





A fiendish obstacle course helps put men in shape



Fliers must know how to handle themselves in water

day might begin with two hours of academic instruction — perhaps "Essentials of Naval Service," and aircraft recognition. Following this, two hours of military instruction — approximately one hour of hard infantry drill and one hour on the rifle range, with 15 minutes of drill with the blinker or alphabet flags thrown in. Then everyone marches off to lunch. After lunch comes two hours of athletic instruction — perhaps wrestling, followed by practice in annihilating armed sentries. Then, beginning at 3:30, the rest of the afternoon is taken up by team participation in the compulsory sports program—the hardest, most exhausting body-contact sports known. Football is the most popular, but soccer, basketball, touchball, boxing, wrestling, track and other competitive games are included in the schedule. The competition is between teams from the various platoons, and inter-team spirit runs high.

Perhaps you wonder about the place of track in such a program. What is so tough about track? You ask. Well, when the Navy talks about track, it means a new kind of track called *military* track. Yes, they have hurdle races, but just to be fiendish they alternate the high and low hurdles. Yes, they have an event corresponding to the shot-put, but instead of a round shot the cadets throw six-foot logs around. The classic feature of military track, however, is the 6,000-yard obstacle course, up and down hill, over fences, log piles, hurdles, and water holes, through sand pits, mazes, log traps, and wooden pipes. It's not exactly for weaklings. Still, after they've been in training a few weeks, some cadets try it barefooted, just to make it more interesting. . . .

After three hours of team sports, the cadets take a shower and march to dinner. This, like the other meals of the day, is both huge and wholesome. About 2,500 calories a day are considered ample for the average man engaged in hard physical labor; the cadets at Chapel Hill get 5,000 calories a day.

After dinner, the cadets loll in their quarters or in their quadrangles for a half hour of rest, after which two hours of either study or recreation are scheduled. The "recreation," however, may consist of educational Navy motion pictures, talks by Navy men just back from battle fronts, or — boxing and wrestling matches!

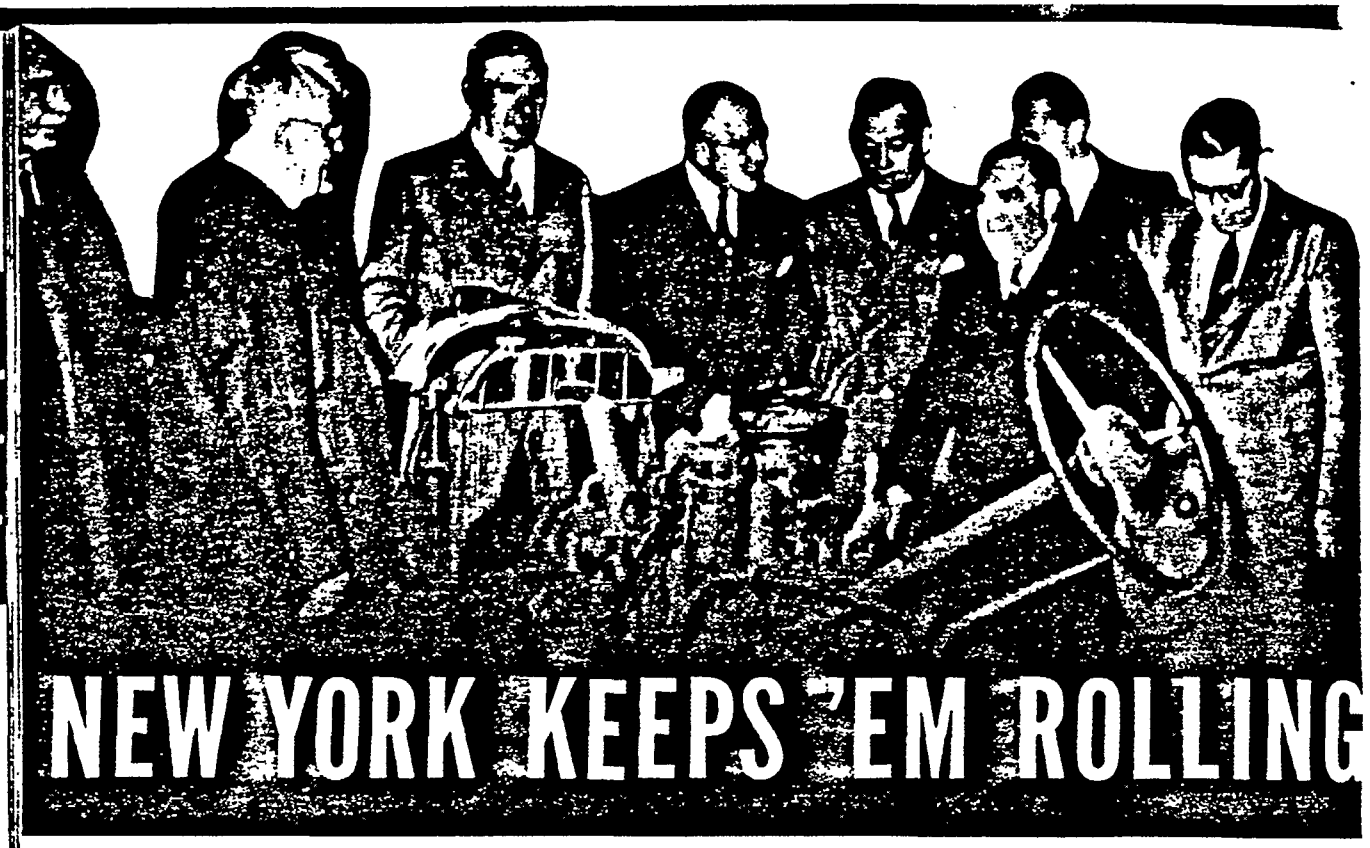
Taps are at 9:30.

World's Toughest Fliers

It is not too early to evaluate the worth of the pre-flight training schools. Within a few months, when graduates fill the flying schools, it will be seen that the number of "washouts" is drastically reduced. When they go on to advanced training stations and finally to operational bases, the real potentialities of these new supermen will begin to be revealed. "But," say the Navy men closest to the pre-flight schools, "wait another year. Then you'll see how much these courses are doing for America! Wait until these boys get out in the fleet, and the Japs themselves will learn what it's like to face the toughest gang of fighting fliers ever turned out by any country in the world."

This interesting article was written especially for Ethyl News by the Magazine Section of the Office of Public Relations, U. S. Navy Department.

ETC 23077



NEW YORK KEEPS 'EM ROLLING

Ethyl contributes some of the know-how to Mayor La Guardia's program for keeping New York's fleet "on its toes" for the duration

TO KEEP ITS huge fleet of motor vehicles operating at top efficiency for the duration of the war, the city of New York has inaugurated an "all out" preventive maintenance program. Officially designated the Wartime Automotive Conservation and Maintenance Program, it is believed to be the first and most extensive undertaken by any municipality in the nation. To insure its success, city officials have enlisted the cooperation of some of industry's top flight maintenance engineers.

Formally opening the program on October 6, Mayor LaGuardia summoned all city commissioners to a meeting at the City's Central Motor Repair Shop and told them of the absolute necessity for the conservation of automotive equipment now on hand. The Mayor stressed the fact that any vehicle which broke down during the present national emergency could not possibly be replaced.

"We have been, let me say, 'intelligently extravagant' in the use of motor vehicles," said the Mayor. "Now all that is changed, and changed suddenly, and we have to acquire an entirely new habit and employ a new system of maintenance of cars and of all motor equipment. You commissioners who have a great deal of motor equipment might as well know now that's all there is; there isn't any more. And you must use what you have and nurse it and baby it and care for it because we will not get any more during the war and at least for one year or a year and one half after the war. The task before us is not too difficult and I say that on my own personal information."

Mayor LaGuardia then pointed out that after the last war thousands of motor cars and trucks, which had been used by the A. E. F., were not brought back to this country but sold and left in France, England, Italy and Belgium.

"In 1929, when I was a delegate to the Inter-Parliamentary Conference in Berlin, and in 1930, when I was again a delegate to the Inter-Parliamentary Conference in London, I went through France, Great Britain and Germany, and I saw those same motor cars and trucks in fine condition," he continued. "Remember that these vehicles had gone through the very severe wear and tear of war service. In those countries they use their motor equipment much more carefully than we

ETC 23078

do and great care and pains are taken in their maintenance. In Europe a motor is what it really is – a delicate piece of mechanism – and men working on maintenance are still mechanics. Ten to fifteen years' service out of a truck or car is not unusual in Europe.

"If you go through the West, you see many farmers still driving their T-Model Fords and the motor is in good condition. That is why I want to stress, gentlemen, that this course is not asking you to do the impossible. It is to train your men to do what others have already, through necessity, learned to do."

Following the Mayor's talk, there was a demonstration of testing equipment furnished by the various companies taking part in the program. William G. Ball of the Ethyl Corporation opened this demonstration with a talk on the necessity of fuel conservation and the need for a thorough understanding of fuel problems in fleet maintenance work.

"The City's allotment of gasoline has been substantially reduced, and unless this fuel supply is used efficiently, motor vehicles will be unable to operate, regardless of the degree of maintenance they receive," said Mr. Ball. "The training course to be administered by the Bureau of Training of the Civil Service Commission will clearly define the problem of fuel conservation, and the various department representatives who attend the training school will be instructed that motor fuel may be conserved by (1) a rigid restriction of motor vehicles to essential uses only; (2) proper engine maintenance, the absence of which in the past may have wasted motor fuel; and (3) the instruction of drivers in proper driving habits.

"In addition to the reduction in quantity of fuel for City departments, there may be some drop in the antiknock quality of fuel. Many vehicles operated by the City are equipped with modern high compression engines, and when fuel antiknock quality is reduced, an increase in knocking complaints may be expected."

Mr. Ball then gave a demonstration of knock on a small gasoline testing engine, comparing a fuel sufficiently high in antiknock quality to operate the engine at peak economy and power with another fuel of lower antiknock quality. He advised against retarding the timing of cars unless the knock continued after all the mechanical causes of knock had been checked and eliminated.

Other companies whose representatives took part in the demonstration were the American-Brakeblok Company, Carter Carburetor Corporation, Chrysler Corporation, the Durham Company, Ford Motor Company, General Motors Corporation, Gulf Oil Company, A. Schrader's Sons Company, Sun Manufacturing Company, Testing Apparatus Company, and Thermoid Company.

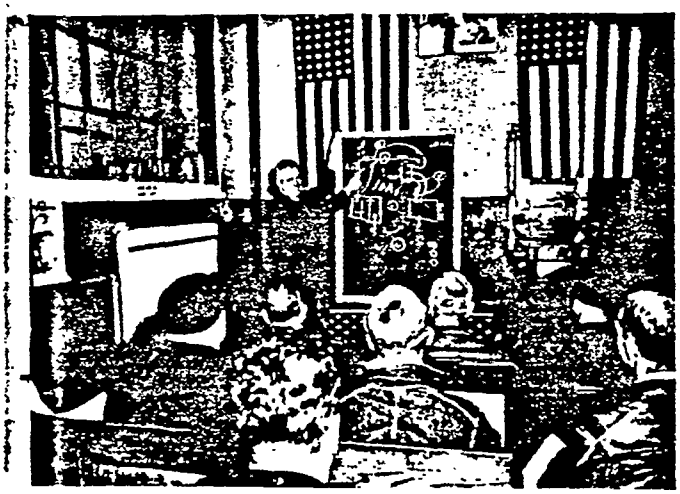
The two days following the opening of the program were given over to registration of selected City employees who were scheduled to attend classes in maintenance and conservation of vehicles. Additional demonstrations were given on these days for executives of many commercial concerns, representatives of the Army and other visitors who had been invited to inspect the program's facilities.

Classes began on October 9 and continued for the first group through October 30, after which a new group was registered. Ethyl's Mr. Ball gave three lectures on the program. Engineers from other companies lectured on the particular phases of maintenance with which their companies are concerned. One of the textbooks used is Ethyl's "Practical Pointers on Engine Maintenance."

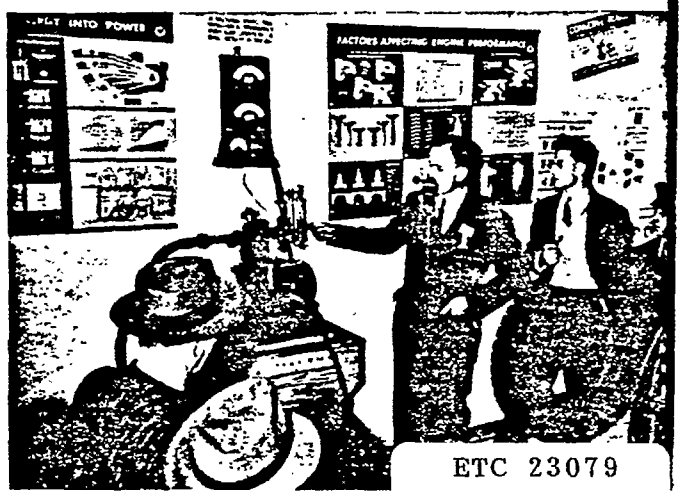
Others to Follow

The Bureau of Training of the Civil Service Commission, of which Dr. John J. Furia is director, is in charge of the course, and supervising and coordinating the training is Otis Presbrey, automotive consultant of the Bureau. Albert Pleydell, Commissioner, Department of Purchase, is chairman of the program.

Maintenance men are given blackboard drills on how to find trouble in an electrical system



Ethyl's Bill Ball uses a demonstrating engine to show importance of antiknock value of fuel



ETC 23079

Praise The Lord And Pass The Ammunition!

Words and Music by
FRANK LOESSER



BOMBS were falling like rain. Low flying planes with the Rising Sun insignia clearly visible in the early morning light were strafing the decks of American naval vessels as they lay at anchor. Sailors rushing topside to man their guns were picked off like ducks in a shooting gallery. Great clouds of thick, black smoke were pouring from the U. S. S. Arizona as she heeled over after a direct bomb hit. All was confusion, chaos.

You recognize the setting. It was Pearl Harbor about 8 A.M. on December 7, 1941. A tough, tricky veteran was dealing out a series of rabbit punches to a strong but still green opponent and there was no referee to call fouls.

In the midst of that uproar and confusion America's newest war song was born. On board one of our cruisers the power for a powder hoist failed and ammunition had to be passed from hand to hand up to the deck. The ship's chaplain, young Lieut. Howell Forgy, moved along the line of weary men slapping them on the back and shouting encouragement: "*Praise the Lord and pass the ammunition, boys!*" The first story, reaching America in garbled form, pictured another chaplain, Captain William Maguire, as giving this battle cry as he manned a gun — a story which he has vigorously denied. Navy chaplains do not take part in combat.

No matter who said it or when, the phrase has a ring which inspired a Tin Pan Alley tunesmith to fashion the words and music of a song which he titled "Praise the Lord and Pass the Ammunition." It has that fervent quality you find in spirituals, which sets people humming and which lends itself to group singing. It is typically American in its irreverent, swingy sort of way, yet it reflects the grim temper of the people.

In keeping with the spirit of his song, the composer, Frank Loesser, is donating all his royalties to the Navy Relief Society. Loesser, who has written such hits as "Jingle, Jangle, Jingle" and "I Don't Want to Walk Without You, Baby," has made a greater contribution — he's now in the Army Air Corps.

The inspirational value of a war song that catches the spirit of the times has long been recognized. George M. Cohan caught that spirit with his "Over There," one of the popular songs of World War I, and was rewarded suitably, although belatedly, by a grateful government. In May, 1940, President Roosevelt personally presented Mr. Cohan with a gold medal, authorized by an Act of Congress. Camille Robert, who composed the famous French marching song, "Madelon," was awarded the Cross of the Legion of Honor by the French government.

Whether "Praise the Lord and Pass the Ammunition" wins that kind of immortality remains to be seen. At best, sentiment is an unstable commodity and nothing is more unpredictable than the durability of a song. Better songs may come along before the war is over. But in the meantime civilians and members of the armed forces alike can echo the words of America's newest war song:

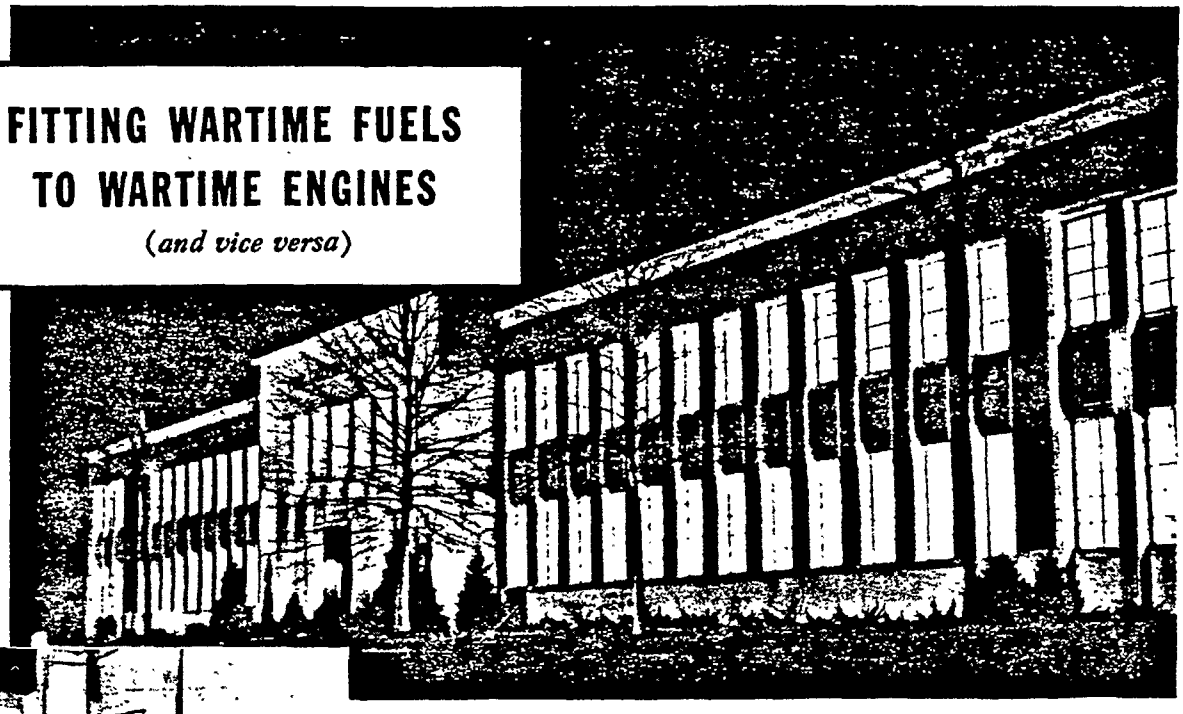
Praise the Lord, we're on a mighty mission!
All aboard, we're not a-goin' fishin'.
Praise the Lord and Pass the Ammunition
And we'll all stay free.

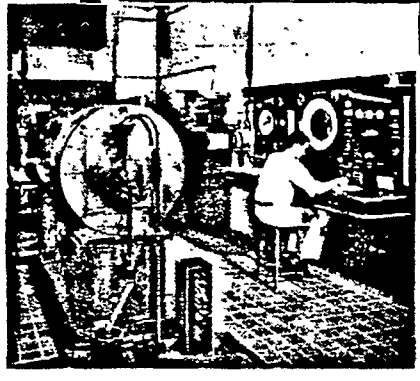
Our Pictures . . .

Pages 4-7, from "The World in Action," released through United Artists — except top foto, page 6: Press Assn. Page 10, Press Assn. Pages 11-14, NBC, CBS and U.P. Pages 16-19, U.S. Navy. Song this page, © 1942 by Famous Music Corp., 1619 Broadway, N.Y.C., publishers to Paramount Pictures.

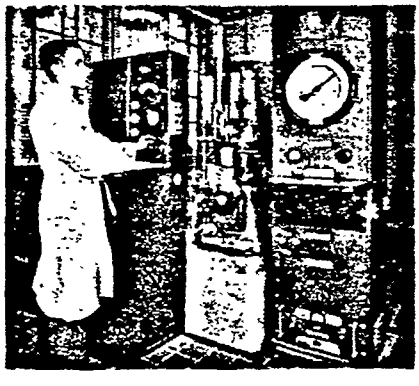
FITTING WARTIME FUELS TO WARTIME ENGINES

(and vice versa)









The impact of war has emphasized the need for correlating fuel and engine research—has brought more sharply to the attention of American engineers that the many individual and specialized problems of fuels and engines are in reality only part of a single problem.

That basic problem is the securing of more power, more work from each drop of fuel consumed and each ounce of metal used in the construction of a given engine.

For many years Ethyl engineers have cooperated with the technologists of the petroleum, automotive and aviation industries in the development of fuels and engines in terms of each other. Today, the new Ethyl Laboratories offer vastly more extensive facilities—some of which are pictured here—for the continuation of this work.

Since winning the war is the prime job of every American, this research work is now devoted largely to engines and fuels for airplanes and other motorized military equipment. It is our objective to explore, in so far as we are able, every means of increasing the power, economy and reliability of the machines which our fighting men use in battle.

ETHYL CORPORATION

Chrysler Building, New York City

Manufacturer of antiknock fluids used by oil companies to improve gasolines

ETC 23081



*He's setting his sights on an enemy
3700 MILES AWAY

THE ENEMY this American is fighting is an army few people think about. Yet this army is as real and powerful and dangerous as any Axis fighting force. It's the army of Nazi technologists that is working night and day to give Hitler's war machines greater destructive power.

Superior engine performance means an important advantage in battle. That is why the research engineers of our own country, like the man in the picture, are pitting their knowledge, experience and ingenuity against the Axis. They know that the outcome of this battle of research might well decide the course of the entire war. They know it's their responsibility to be *first* with the fuels and engines that will give our airplanes and mechanized equipment more power, more speed and greater cruising range. There's no second prize in this fight!

These scientists do not underestimate the resourcefulness and cunning of the enemy. But they believe the odds are in our favor. They know, for instance, that American petroleum engineers have led the world in developing processes for producing high-octane fuels. They know that American engine designers know how to build engines to take full advantage of improved fuels.

The war is spurring them on to new, even greater efforts. Already they have developed many devices to meet changing combat conditions—and more are coming. And these new fighting machines are being produced in the true spirit of American cooperation—through teamwork by many industries.

Since Ethyl fluid is used in the manufacture of high-octane fuels, Ethyl research workers are cooperating with the engineers of the oil and automotive industries in their research. The Ethyl laboratories also cooperate with the technical staffs of the armed forces. They have only one objective—to help in every possible way to give our men fighting machines which will surpass anything the Nazis or their Japanese henchmen can devise.

ETHYL CORPORATION
Chrysler Building, New York City
Manufacturers of Ethyl fluid, used by oil refiners to improve antiknock quality of aviation and motor gasolines.

ETC 23082


"...we here highly resolve that these dead shall not have died in vain..."
ETHYL NEWS
DECEMBER 7, 1942

ETC 23083

ON THE COVER

THE picture on the cover of this month's Ethyl News is an official U. S. Navy photograph made at the exact moment the destroyer Shaw blew up during the Japanese attack on Pearl Harbor. It has been described by many experts as one of the most remarkable combat photographs of all time. This is a photographer's dream picture. To be on the spot, with camera loaded, at a moment like this during a world-shaking event is something that happens to few men in a life time. The identity of the photographer is not known to us.

In the midst of that holocaust on Dec. 7, 1941, a direct bomb hit touched off the Shaw's magazine and the resulting explosion rocked the harbor from end to end. No one would ever believe that a ship devastated by such an explosion as this would ever put to sea again. But take a look at the third cover . . .

ETHYL NEWS

Published by

ETHYL CORPORATION

405 Lexington Avenue

New York, N. Y.

Manufacturers of Ethyl Fluid, used by oil companies to improve the antiknock quality of aviation and motor gasolines

W. J. Heggen ..... Editor

IN THE

ETHYL NEWS

DECEMBER 7, 1942

Chemical Building Blocks 4

Petroleum hydrocarbons are helping build a tremendous new industry — synthetic rubber

Higher, Farther, Faster 6

Super-aviation gasoline sparks the drive for complete Allied air mastery over the Axis

Transport — A Growing Problem 8

Getting oil to the rationed East Coast — without tankers — calls for transportation miracles now

Fake Gas Savers 12

War and rationing have revived an old racket in gasoline saving gadgets. Caveat emptor!

An Industry Marches to War 16

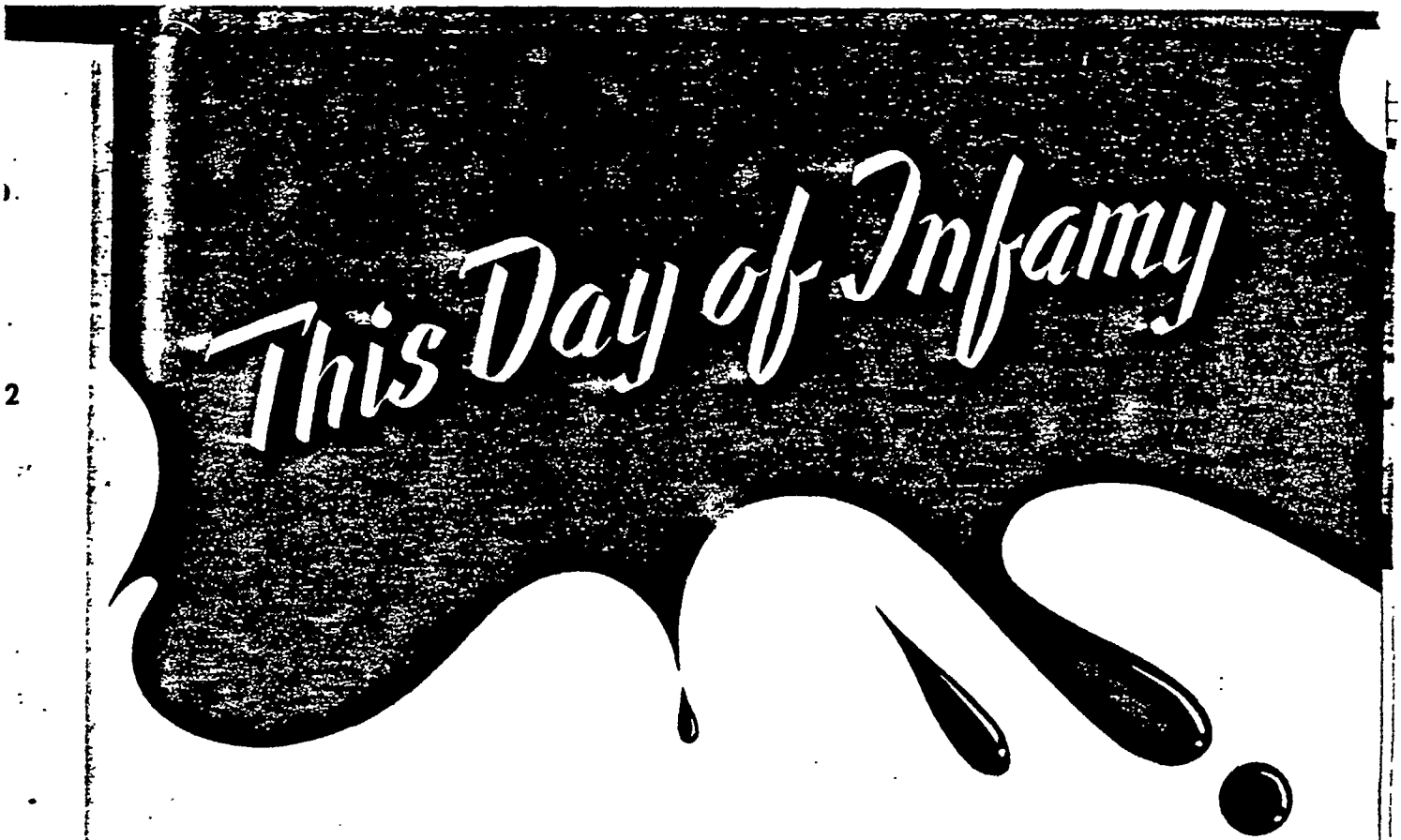
Auto manufacturers are turning out machines by the thousands but their dealers can't sell them

Safety in Wartime 20

Why are we killing more people on the home front than have been lost on the battlefields to date?

Marketing — A Memory 22

A hard-fighting crew of the oil industry teams up to "keep 'em rolling" to factories and farms



TODAY we observe the anniversary of Pearl Harbor — the anniversary of the day when the student of mechanical industrialization tried to so cripple his teacher that he could conquer him in the months which have followed.

With only a century of study, the Jap underestimated the strength of the way of life he emulated. True, he learned some of his lessons well. He gained the reputation of being the world's cleverest copiest and imitator. He learned how to build engines and how to fly them; how to build guns and how to fire them. But he didn't learn that there is more than mechanical skill and courage in the mind and heart of an American. There is also resourcefulness and ingenuity that are part of freedom's heritage. Democracy is the breeding place of individuals. And individuals are not taught how to be licked. Industries bred in this air of freedom are as individuals. Both possess reservoirs of strength that the Axis mind will never comprehend.

A year after Pearl Harbor the industries that build the engines of war for America have changed more, and faster, than anyone would have believed possible. The internal combustion engine, which is the throbbing heart of mechanized and aerial warfare, provides an example of what has happened. What were automobile companies, aircraft companies, tractor companies and oil companies are now war companies. The civilian business they do today is a sideline. And the job they have done in supplying the engines of war and the fuel to feed those engines is a job they can be proud of — as all Americans who have contributed to our accomplishments in these short twelve months can be proud.

Without boasting for them, without overlooking the work done by others in other fields, the editors of the Ethyl News feel it is appropriate on this anniversary to review briefly — and within the limits of restricted information — some of the changes that have occurred in those industries which the Ethyl Corporation strives to serve.



Inspecting a sheet of synthetic rubber as it rolls off a milling machine

CHEMICAL BUILDING BLOCKS

Petroleum chemistry is building a new industry: synthetic rubber. Crude oil will yield three-quarters of its basic raw material. Here's the story of the industry's role in this industrial revolution

"IT FELL TO an unfortunate young major named Wilde to carry the white flag toward Japanese headquarters. He reached Lieut. General Tomoyuki Yamashita at 2:30 P.M. and asked for conditions of surrender."

This was the final blow — this was the fall of Singapore. The attack on Pearl Harbor had taken place more than two months before and the Japanese were "on the loose" in the Pacific, but there was still a faint hope in the minds of some people that an occasional shipload of crude rubber might get through to America. But with the fall of Singapore even the most hardy optimists finally accepted the fact that the source of approximately 97% of America's crude rubber supply was definitely and irrevocably cut off.

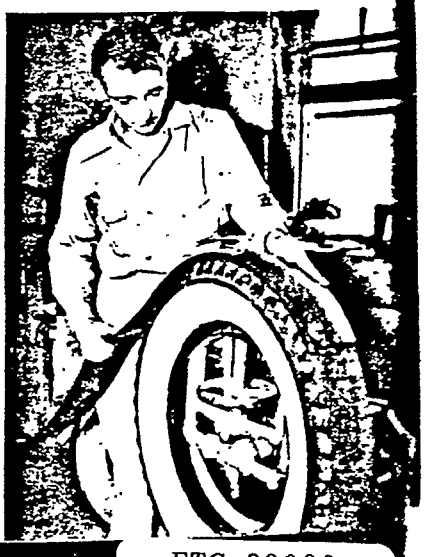
The loss of Britain's most important naval base in the Far East meant that the Japanese now controlled the sea lanes; that Malaya already was gone; that the fall of Java and Sumatra was only days away; that the American petroleum industry had been tossed, willy nilly, into the rubber business.

Scientists had been saying for years that the possibilities in a barrel of crude oil were endless — that almost anything under the sun might be created with these chemical building blocks of hydrogen and carbon. The industry's research men had done some truly wonderful things with petroleum hydrocarbons — 100 octane gasoline, toluol, new alcohols, esters, acids, solvents, pharmaceuticals. Also from the crude barrel had come derivatives suitable for synthetic rubber, but it can hardly be said that the industry was prepared for the role it was now called upon to play.

It became evident very early in the game that the petroleum industry would have an important part in the rubber program being put together in Washington. Pearl Harbor and Singapore meant that virtually an entire new industry had to be built up. Synthetic rubber was not new in this country, but total production from all sources in 1941 amounted to only 9,000 tons, mostly specialized products. Total installed capacity was only 20,000 tons. Compared with our natural rubber consumption of 800,000 tons per year this was but a drop in the bucket.

It had taken more than a hundred years to bring the world's total production of crude rubber to more than a million tons a year. Under the lash of war American industry —

Recaps for civilian tires are made from Thiokol, to keep 'em rolling



ETC 23086

the oil industry and others — was called upon to duplicate this tonnage in chemical rubbers in *two* years. In normal times the verdict would have been: impossible.

The first estimates on our synthetic rubber needs were staggering enough. The program, as fixed by the War Production Board in June, 1942, called for the production of 886,000 tons per year. A few weeks later the figures were revised upward. The now famous Baruch committee report recommended that the total figure be raised to 1,106,000 tons per year. As finally set up the rubber program called for 845,000 tons of Buna-S; 69,000 tons of neoprene; 132,000 tons of butyl; 60,000 tons of Thiokol.

Buna-S was chosen as the mainstay of the program because of the availability of necessary raw materials, probable cost and demonstrated suitability for tires. Buna-S is made from two substances — butadiene and styrene, both of which can be derived from petroleum. As a matter of fact butadiene also can be derived from grain, coal and several other sources, but under the present plan 75% of it comes from petroleum. Likewise a considerable portion of the styrene needed is petroleum derived. Butyl rubber, comprising the second largest category in the program, is wholly of petroleum hydrocarbon content. Neoprene is made from chloroprene, a chemical product derived from limestone, coke, salt and acid. Thiokol is composed of polysulphides and ethylene dichloride, a considerable amount of the latter being furnished by Ethyl Corporation.

Because of the need for war time secrecy no figures are available on the number of new plants that have had to be built to enable the petroleum industry to furnish raw materials for synthetic rubber, nor are there any figures on the number of plants converted for this purpose. Suffice it to say, however, that there have been a great many and that the industry as a whole has done, and is doing, an heroic job.

Even under ordinary conditions the task would have been a big one, but raw materials for synthetic rubber is only one of the products the industry is turning out for the war effort. While struggling to match plant capacity with military demands for aviation gasoline and lubricants the industry was called upon to supply toluol for explosives. Then came Pearl Harbor and Singapore and synthetic rubber. In addition, of course, the industry had to go on with its job of furnishing fuels and lubricants for industrial and civilian uses.

Technologically the industry has aged 20 years during the past 12 months. It is taking part in an industrial revolution without parallel in history. There seems little doubt that synthetic rubber is here to stay and that the petroleum industry will have a part in its further development. William Jeffers, head of the rubber program, has said on more than one occasion that never again will this country be dependent for its rubber supply on a thin line of communication extending over thousands of miles of ocean. A kind of technological snowball has begun to roll. How far it will travel and how much it will pick up on the way no living man can tell.

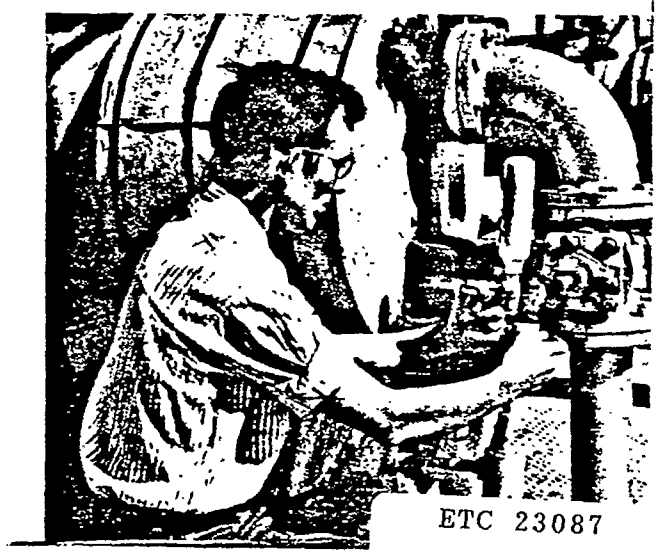


Less than 24 hours ago, this rubber was mostly petroleum refinery gas

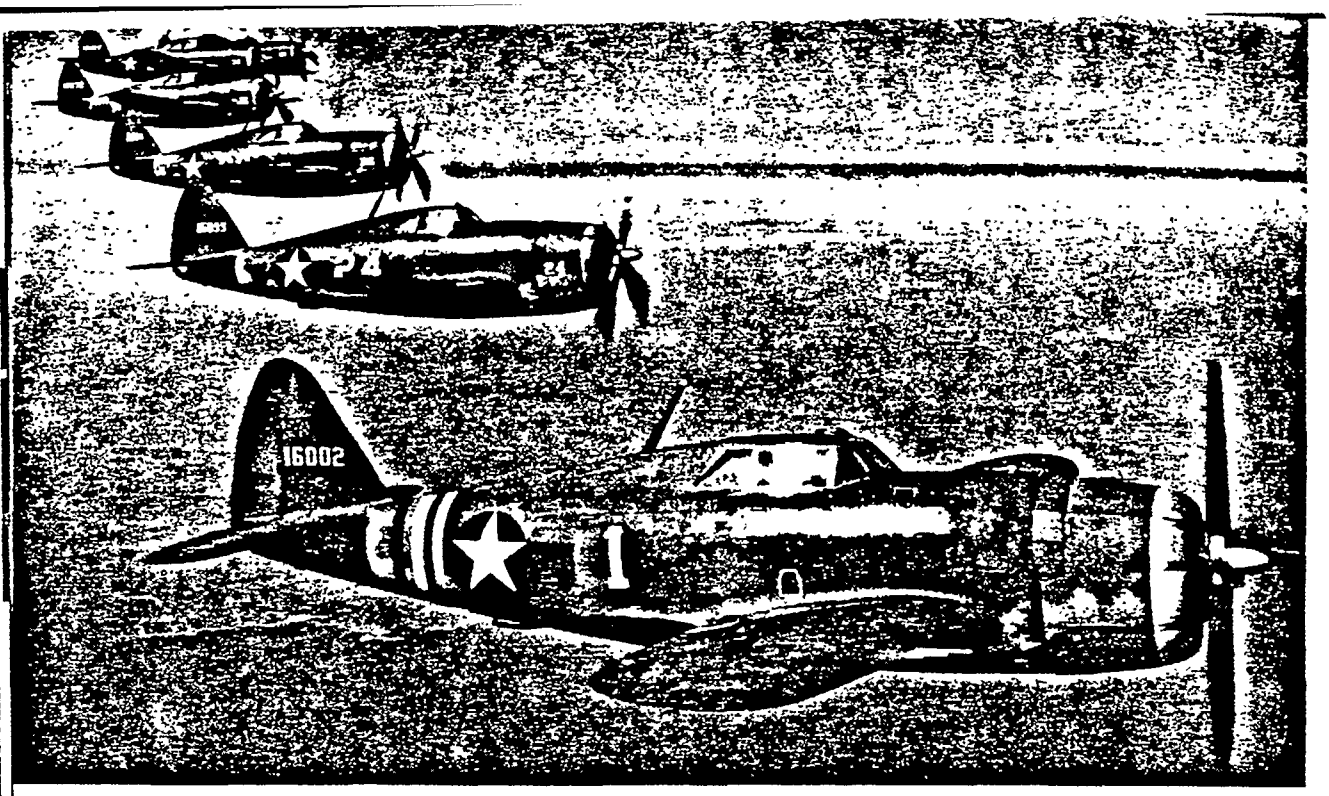
Out of the filter and into the squeeze mill — a step in the manufacture of synthetic rubber from petroleum



A sample of butadiene is drawn off for analysis, during which time it will be checked for purity



ETC 23087



A formation of one of America's deadly fighters — the Republic Thunderbolt

HIGHER, FARTHER, FASTER

THE AMERICAN invasion of North Africa last month gave the American public the news for which it had long thirsted. Overnight it learned that the Axis had been outguessed and caught with its plans down in Africa, that the vaunted Nazi Field Marshal, Erwin Rommel, could run even faster away from an enemy than toward him, that perhaps Adolf Hitler had made his fatal blunder. Here, indeed, was the tonic for an action-hungry people.

As the campaign opened, the underlying strategy became clear. But not until it was well under way did the world learn of the months of preparation that went into it. Then, Prime Minister Churchill and President Roosevelt revealed the painstaking plans that were made. Men, planes, tanks, guns, food — even gold for the services of natives — all these and other supplies had to be assembled before the campaign could be launched. The expeditionary force landed in the largest invasion fleet ever assembled; 850 ships!

This preparedness had its counterpart on the other side of the Atlantic. There, American industry day and night was turning out the weapons which kept the Allied forces carrying the fight to the Axis. It is doing that job even more vigorously today, in preparation for the decisive battles ahead. Here is the story of a vital part of that war production job — the production of super fuels which give Allied bombers and fighters superiority over those of the Axis, superiority which may well determine the outcome of the war.

Super-aviation gasoline — or 100 octane, as it is called — is as important to aerial superiority as the planes themselves. For it gives planes greater potential power, speed and range. And whether in a dogfight, a bombing raid, or on a lonely patrol across endless seas, these are the extra ingredients which count — and bring the pilot and plane safely home.

Doubled and Redoubled

This super fuel is a weapon the Axis doesn't have. The United States is the world's largest producer of it. And to meet the ever-soaring demands of aerial warfare, production here has been doubled, tripled, quadrupled! The expansion of recently developed refining processes behind this aviation program is stupendous.

ETC 23088

For instance, by the end of 1943 it has been estimated that the total capacity of catalytic cracking plants alone will be *one million barrels a day*. As recently as 1939, catalytic cracking output was only *one million barrels a month*. This is another clue to what has happened to the American petroleum industry since Pearl Harbor.

Aviation gasoline capacity has been expanded to the point where it is a prime military secret. Construction of added facilities has been accomplished in the face of severe material shortages. But it is no secret that only sufficient production could make possible such aerial attacks as those which cut Rommel's supply lines, the bombing raids which are softening up Italy's important war centers and are playing havoc in Hitler's Germany, the increasing tempo of aerial warfare all over the world.

100-octane — $25 a gallon

America's commanding role in the production of aviation gasoline results primarily from the research and development undertaken by the oil industry in recent years. In the early 1930's, 100 octane gasoline was little more than a test tube curiosity, and it cost $25 a gallon. But by 1940, when President Roosevelt first issued a call for 50,000 planes, capacity installed or under construction had grown so large that even the Government considered it ample for our needs.

Since then, as we know, demands have soared.

The original plane production goals were revised upward to published figures of 60,000 planes this year, 120,000 next. The inauguration of lend-lease added our fighting Allies' requirements to the reserves being built up for the American forces; the German invasion of Russia brought still another need for our planes and the 100 octane gasoline they are designed for. And now with Japan making this truly a global war, American aviation gas is being shipped and used in every corner of the world.

One hundred octane gasoline contains three principal ingredients: a base stock of 70 to 80 octane rating, a blending stock which raises the octane to about 85, and Ethyl fluid which brings it up to 100. Approximately one-quarter liquid ounce of Ethyl fluid is required per gallon.

What does this super-fuel do for a plane? Compare an engine designed for 100 octane with one using 91. Other things being equal, the engine fueled by 100 octane gas will develop about 25% more power at the takeoff, or maintain maximum flying speed at about 1,500 feet higher altitude. And it will require less fuel on any given trip.

The American oil industry has undertaken a mammoth job — keeping them flying to wherever the enemy is to be found.

Its super-fuel is powering the ships on patrol duty across vast reaches of our coastline.

Its super-fuel is flying planes and crews across the oceans to the far-flung fighting fronts.

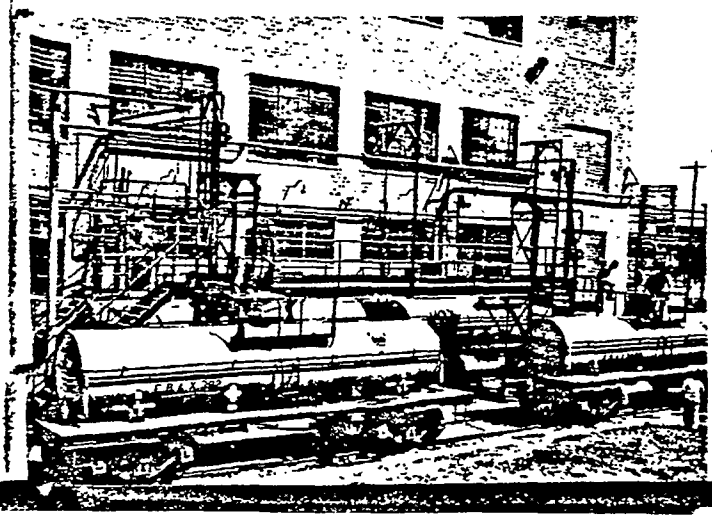
Its super-fuel is carrying the fight to the enemy in Europe, in Africa, and the Pacific.

Added Responsibilities

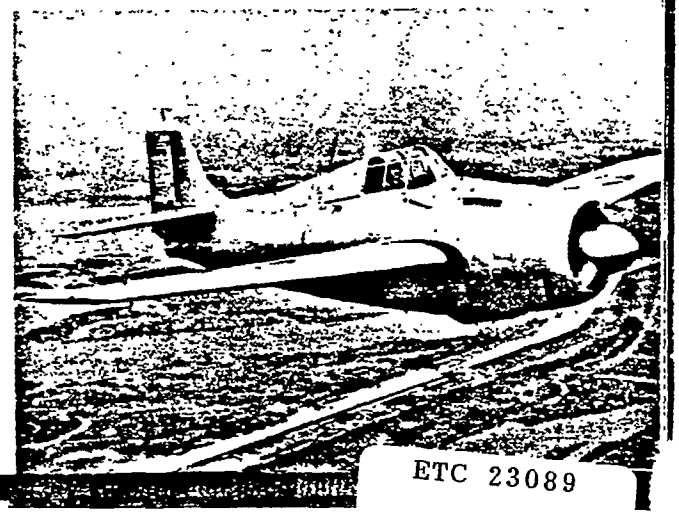
To meet the ever-increasing demand for this fuel, capacity has been increased again and again, although expansion has been exceedingly difficult in view of the unprecedented shortages in raw materials. But the industry has met the added responsibilities brought on by each extension of the war. That it will do so in the future, to the sheer limit of its ability, is plain. At the same time, it is continually seeking to improve its refining processes further, so that the flyers at the front will have the best fuel in the world.

And those flyers do. Compared with the super fuel they use to power their planes, most of the Axis planes use a grade comparable to that which the United States uses for its trainers. If, as has been said, victory will be won through air power, a prime aid to that victory will be the combination of super planes and super fuel, in whose production the United States leads the world.

Cars being loaded with Ethyl fluid. Nearly half of our entire production goes into aviation gas

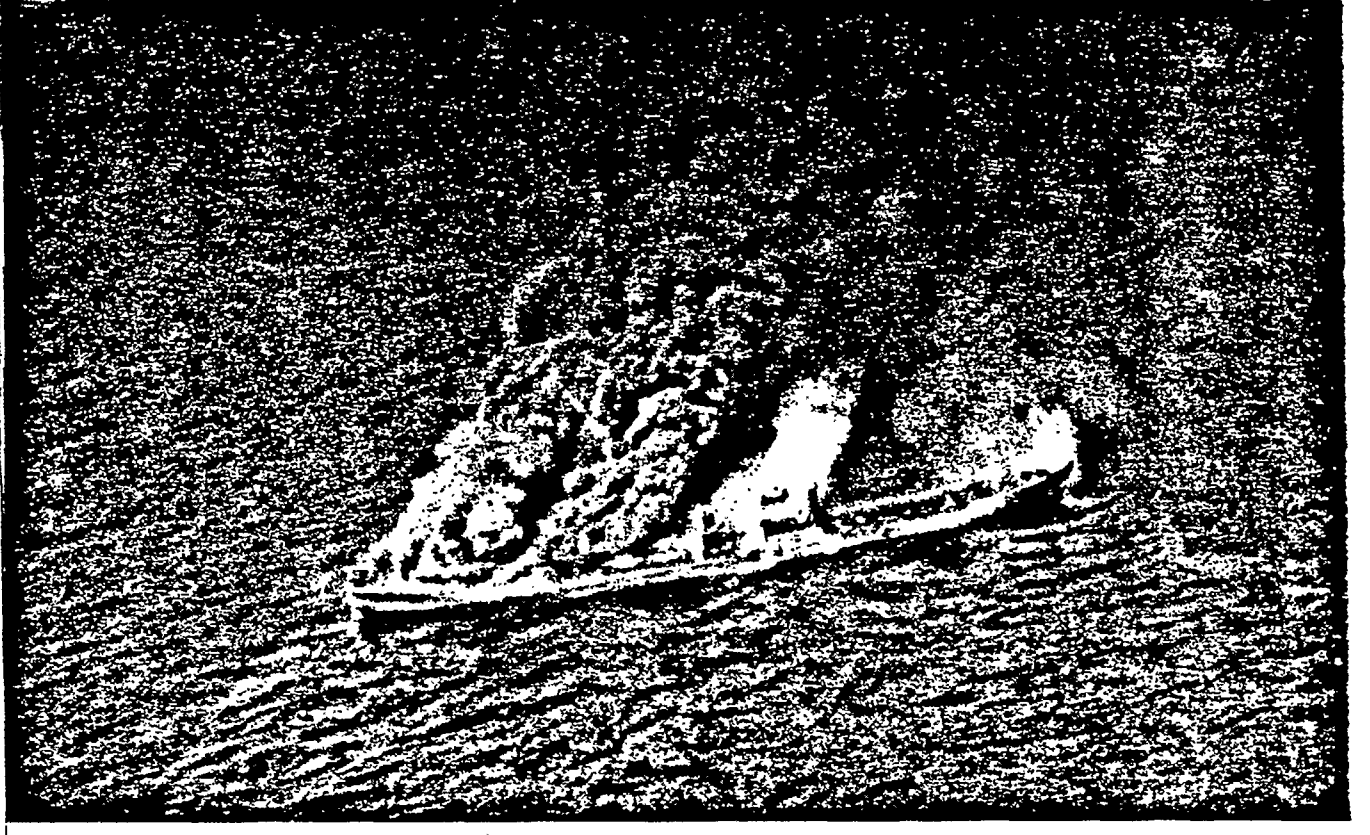


This Grumman Wildcat is powered with 100-octane gasoline — a weapon the Axis doesn't possess



ETC 23089

TRANSPORT—A GROWING PROBLEM



There's plenty of oil — but not where it's needed. Getting enough to the rationed East Coast is the industry's No. 1 headache. Yet it is performing near-miracles with inadequate transport means

by John P. Knapp

OF ALL BATTLES that the petroleum industry is helping to fight, its toughest promises to be the battle of transportation. Billions of barrels in underground oil reserves are a comforting thought but only after production, refining and transportation can those reserves release their power over fascist skies.

The major night-and-day task of supplying petroleum products to our vast military establishments while simultaneously meeting essential civilian needs is one that still eludes solution. There are various good reasons for this, not the least among them being the dynamism of the war itself, which, as in the North African campaign, can overnight become a factor in diverting petroleum supplies. Men who drafted the oil and gasoline programs for the coming year didn't figure the African offensive in their calculations, with the result that its inauguration meant less oil for the East Coast scarcity area, and a larger share for the Army and Navy. Now even further reductions in petroleum products for civilian requirements are in prospect for this winter. Although fuel oil was expected to be rationed in the 17 Eastern states on the basis of holding interior temperatures to 65 degrees this winter, transportation departments must perform a miracle to be able to fill these expectations.

Practically 95% of the petroleum consumed in these 17 states heretofore moved north in ocean tank ships. The magnitude of the problem of transporting southern oil into the Eastern scarcity area by other means is best visualized from these oft-repeated figures: the 17 Eastern states normally consumed about 565,000,000 barrels of petroleum products annually; they constituted the market for 39% of the gasoline consumed in the entire United States, 46% of the distillate fuel oil, 40% of

the residual fuel oil, and 64% of the kerosene. To add to the problem, 85% of the industrial fuel oil consumed in the area is used north of Washington, D. C. At the beginning of 1941, the number of tankers in operation in both east and west coast and in export service was 664, more than half of the world tonnage of these tank ships. These 664 carriers had a cargo capacity aggregating 34,500,000 barrels. The pre-war pipeline network comprised about 130,000 miles for both crude and refined oil products, while the number of tank cars of all types in the country was about 160,000, 83% of which are used in the transport of petroleum and its products.

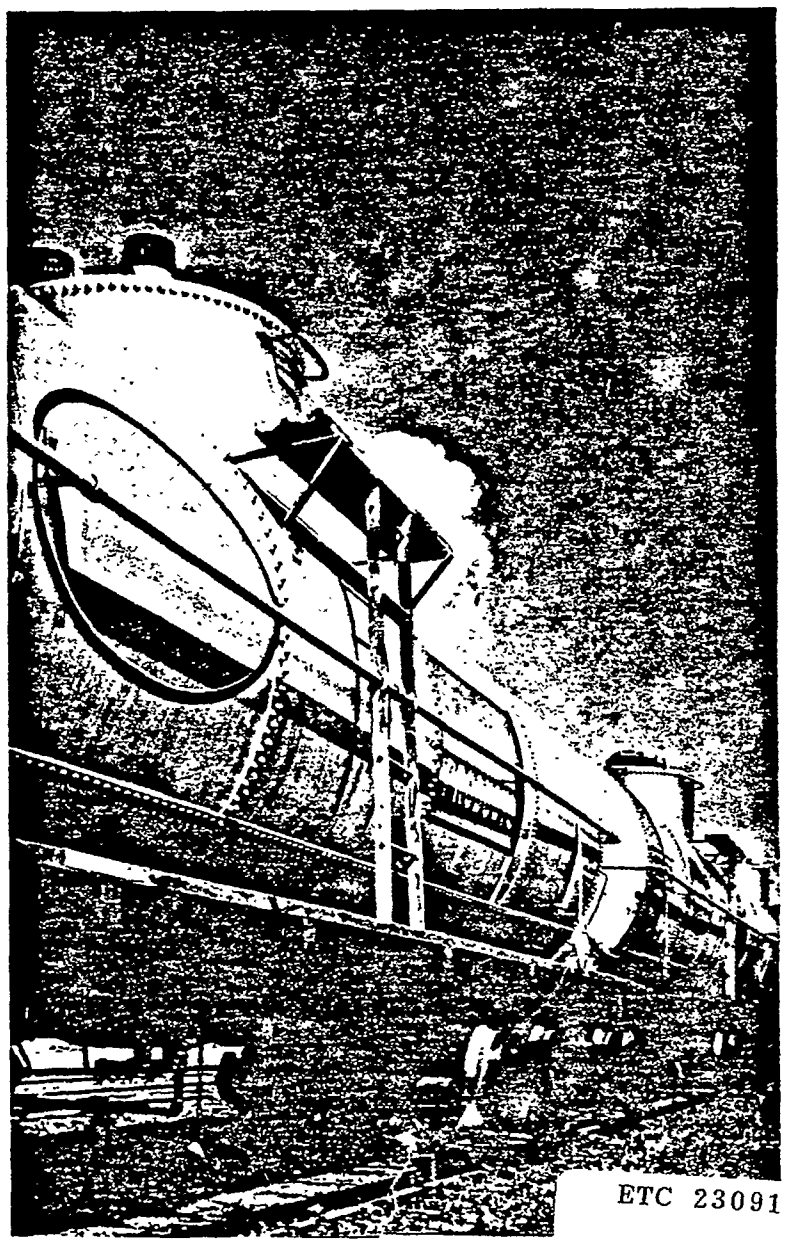
The need for the East Coast area (not counting shipments that may be made necessary by the African invasion) is placed at about 1,400,000 barrels daily. The area is now receiving 750,000-800,000 barrels of petroleum and products a day by railroad tank car, 60,000 barrels via the Mississippi and Ohio river barges, another 60,000 barrels by tanker and barge in the Great Lakes, and about 125,000 barrels daily by pipeline. This makes a total of around 1,000,000 barrels and leaves a shortage of upwards of 400,000 barrels daily — plus any increase in military requirements from the East.

The railroads, aided by the cooperation of the oil companies in providing loading and discharge facilities and stepping up turn-arounds at terminals, have performed near-miracles in filling the gap. Tank car shipments of petroleum and petroleum products into the Atlantic Seaboard states amounted to a mere 11,250 barrels daily in the Spring of 1941, but by mid-September of that year the total had climbed to more than 77,000 barrels a day. It has since risen to the present 750,000-800,000 barrels-daily figure, but other troubles are ahead. For one thing, breakdowns in tank cars have occurred because of their unrelieved use, and many are in need of repairs which can be ill-afforded at this time. In addition, some tank cars have been diverted to the movement of vital vegetable oils.

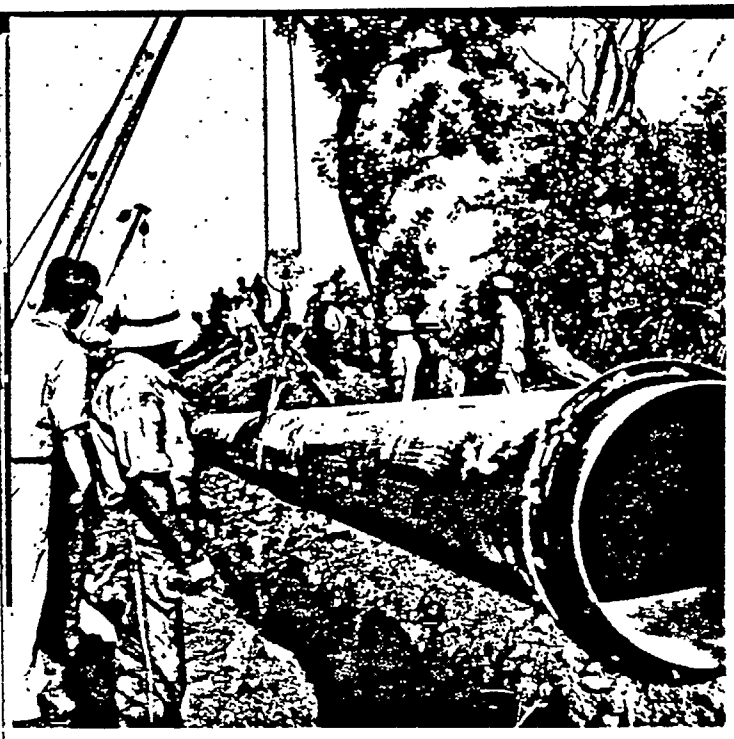
Barge and lake tanker transportation of petroleum may be stepped up somewhat, but it is not likely to be a major factor in relieving the Eastern shortage. There remains the pipeline deliveries, and these have caught the public's imagination.

Pipeline relocation projects now under way and scheduled for completion during the next few months are expected to increase the present pipeline flow of 125,000 barrels daily to something over 200,000 barrels, and in addition, when the new 24-inch line now three-quarters completed and running from Texas to southern Illinois comes into service next February, the shortened rail haul to the East will permit tank cars now in use to deliver another 100,000 barrels daily. The "Big Inch,"

Rail tank cars now shoulder the major part of the load. But no-time-out for maintenance threatens breakdowns



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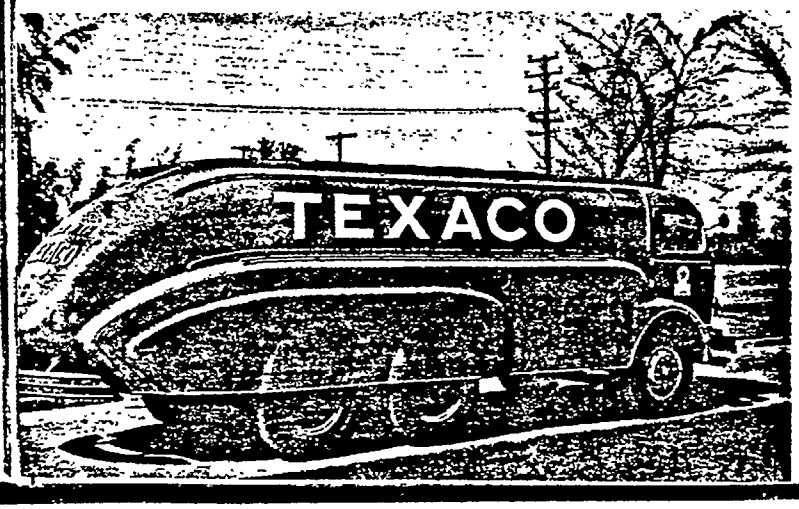


New pipelines are being rushed to bring in more oil

Inland waterway steamers have stepped up their oil deliveries



Final link in the transport chain is the gasoline truck. When seen on a road, they spell "manna" to parched motorists



as the new pipeline is called, is expected to be able to handle up to 300,000 barrels a day.

Major J. R. Parten, director of transportation of the Office of Petroleum Co-ordinator, has stated that he believes pipelines are more desirable now than other forms of transport. Deciding among pipelines, tank cars, tank ships, barges and other oil transportation means in the use of critical war materials for new construction has been made on a comparison of the efficiency in steel and power, Mr. Parten explains. In most instances so far, this comparison has favored the pipelines. Barges deliver 0.50 barrel a day per ton of steel, tank cars 0.52 barrel, and large pipelines, such as the "Big Inch," about 0.82 barrel. Tank ships are about equal to the large pipelines in steel efficiency, it is said, but convoy equipment required, and other uncertainties have eliminated them from consideration for the present. However, an enlarged program of oil tanker construction which already has been expanded to call for delivery of 300 vessels by the end of 1943, is possible.

Value of Pipelines

The value of a comprehensive system of oil pipelines to reach all important consuming areas is recognized. The reliance of the nation on inland transportation of oil at present has not only resulted in a wider application of the value of the pipeline, but has brought about a vast improvement in pipeline operation and control technique. This has made possible the widespread movement of petroleum products, as well as crude oil, by pipeline with a high degree of flexibility in the substitution of various products in the line when needed.

Tank car transportation costs are roughly nine times that of a tank

ship, while pipeline transportation costs are about triple those of a tanker. But even tanker costs in recent months became more costly – eventually three times normal rates.

The oil industry's investment in transportation in 1940 amounted to more than $800,000,000, out of a total investment in all oil property of $6,650,000,000. The industry was forced to absorb the extra transportation costs for some months after it was placed under price control in October, 1941, months before the general price fixing went into effect in April, 1942. Because of the added cost of the higher priced transportation, the oil companies shouldered a substantial financial burden in continuing the steady flow of petroleum from the wells to the consuming centers. This added cost was shared by a pooling arrangement until the government provided a method of reimbursement.

In addition, the government's transportation division fostered plans to dig up old pipelines and relay them in other sections of the country, to convert, reverse, and connect existing lines, and to form a new network capable of pumping oil from the Southwest producing areas to the Eastern consuming section, all with relatively small amounts of new equipment or critical materials. The plans call for digging up and relocating some 1,700 miles of old pipe, laying a total of more than 800 miles of new line in addition to the "Big Inch," reversing and converting more than 2,500 miles of other lines, and installing additional pumping equipment and storage facilities. The major portion of this task is being financed by the oil industry, although the Defense Plant Corporation is paying for three of the relocation projects and, of course, will own the $40,000,000 "Big Inch."

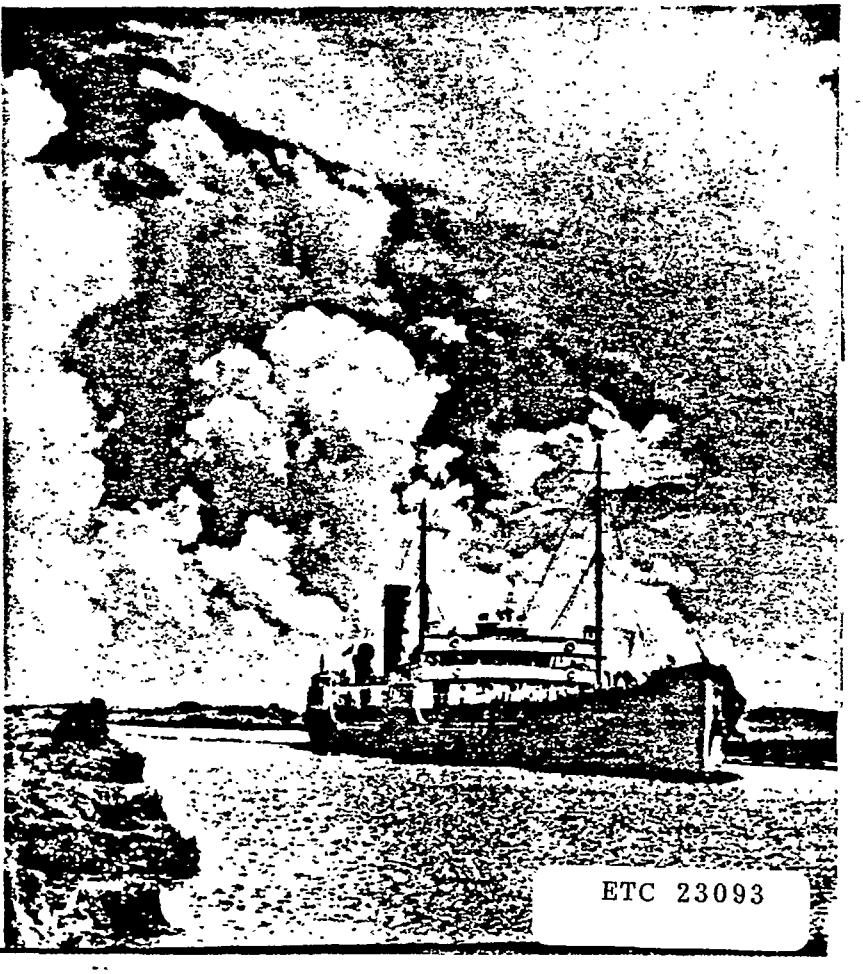
THE "BIG INCH"

INSIDE the 550-mile 24-inch pipeline now being built to relieve the Eastern states' oil shortage, men called "swabs" crawl along every inch of completed pipe on wheeled cradles, routing skunks, snakes, squirrels and other small animals. At the same time they scour corrosion and metallic inner projections. Occasionally a "swab" emerges with scorched clothing after crawling past a still hot weld.

The government is planning this line, buried eight to sixteen feet deep, to last for a century. The big pipe is welded and prepared alongside the trench, which goes in a straight line through swamps, over hills and mountains and across rivers. Sometimes the heavy boots of the swamp crews are marked by snake fangs, and some of the men smear their faces grotesquely with zinc ointment for protection against fumes of the tar enamel with which the pipe is coated.

Winter will be no barrier to construction, for the big trench digging machines cut through snow, ice and frozen soil as readily as through summer ground. When the "Big Inch" and its extension is completed, the oil starting at Longview, Texas, will require about 20 days to reach Pennsylvania, 1,408 miles distant. The pipe will hold 3,100 barrels of oil in every mile, moving at about three miles an hour.

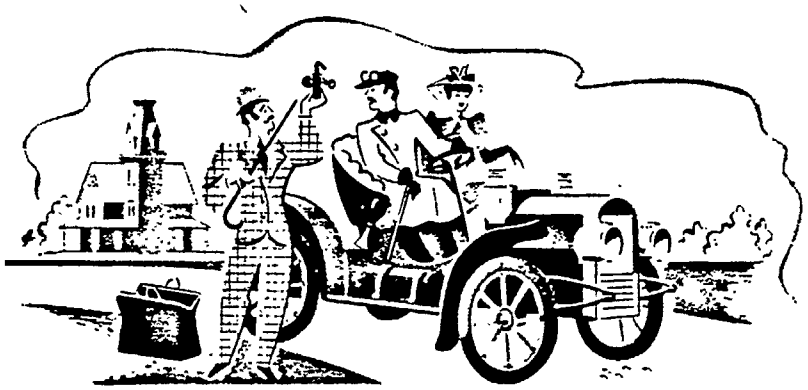
Gone to war is the tanker fleet which once served the rationed East. They formerly carried 95% of the petroleum consumed in that area



Fake Gas Savers

by Martin Sheridan

You can't stretch your gasoline ration with gadgets. "They're strictly phoney," say responsible authorities. Here are the facts on an old racket revived by the war



EVER SINCE the automobile started to replace the horse, motorists have been the target of promoters and "inventors" with schemes for increasing gas mileage per gallon, stepping up power and reducing carbon. "Drop some of our magic powder in your gas tank and get high test action from low-priced gas," was the way they advertised.

Today these parasites are flitting about again to relieve the nation's gullible motorists of from one to five dollars for gadgets, tablets or formulas "guaranteed" to stretch "A" gas rationing books into something unbelievable.

Several years ago this writer heard of a powder which was said to increase gas mileage and give better all-round engine performance. We paid one dollar for a four-ounce box of reddish powder which resembled gelatine. The directions said to add only one teaspoonful to every 10 gallons of gasoline.

Gas station attendants blinked their eyes in amazement every time we told them to wait a minute until we gave the gas buggy her medicine. We carefully measured out a level teaspoon of the crystals, dropped them in the neck of the tank and beamed as the gas splashed in.

Three boxes of the stuff for $3 soon relieved me of any notion that extra mileage could be had.

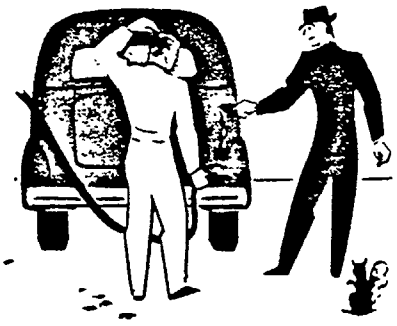
But don't take my word for it. Listen to what the Bureau of Standards in Washington has to say on the subject: "None of the hundreds of tests made at the Bureau thus far (in about 20 years) has shown that the use of these fuel dopes or gadgets produced any appreciable improvement in power or fuel consumption."

And the Boston Better Business Bureau adds that none of the new mixtures or devices has been able to fulfill its grandiose claims. These gas-saving schemes have been prosecuted by the Federal government annually as out-and-out frauds.

The so-called gas savers can be broken down into three categories. First, the tablets, liquids or powders added to the gasoline. Second, mechanical gadgets which are attached to the carburetor. Lastly, mechanical gadgets attached to the coil supposedly to intensify the engine spark.

One of the first of these gas-saving schemes was woven around a gaily-decorated box of 12 red balls which sold for one dollar. Whenever you bought five gallons of gasoline you were instructed to drop one of these balls into your gas tank. An immediate saving of 25 per cent or more was promised.

The directions added that you must immediately cut down the car-



ETC 23094



buretor about three to four notches. Fifteen years ago you'll recall that most drivers ran their car with too rich a mixture. That was before the day of automatic chokes.

Shortly afterward, a Boston firm introduced a phenomenal liquid which, when added to gasoline, did wonders for your engine, your pocketbook and your mind. Several BBB officials went along on a test with the concoctors of the liquid magic. They drove out to the Fellsway, where the inventors drained the gasoline from the tank and carburetor. They added one gallon and drove around until the automobile ran out of fuel. The mileage was carefully checked.

Then they poured another gallon of gasoline into the tank along with two teaspoonsful of magic-liquid. The party drove over the same prearranged course and ran out of gasoline after covering exactly the same distance covered without the gas-saver!

One of the mechanical devices was a transformer attached to the spark plugs. This was said to burn out carbon and fire any spark plug, regardless of its condition or setting.

Another gadget promised to increase mileage 25 to 50 per cent and save $4.50 to $9.00 on every 100 gallons of gasoline.

With these claims the schemers weren't content just to mulct the public. They also operated a territorial rights scheme in connection with distribution. Victims paid anywhere from $250 to $1,250 each for the "privilege" of selling the devices. But Uncle Sam's postal agents caught up with most of these ideamen.

Oddly enough, most of these fakers have been convicted in the past for promoting other frauds. Motorists who hold "A" books and are desirous of increasing their gas mileage to the maximum will get results only if they take their car to a reliable garage or mechanic.

Have your spark plugs cleaned and the gaps checked. If your battery terminals are dirty, have them cleaned. Take a look at your points and spark timing.

It's the Old Malarkey

So the next time you hear this spiel, just keep going.

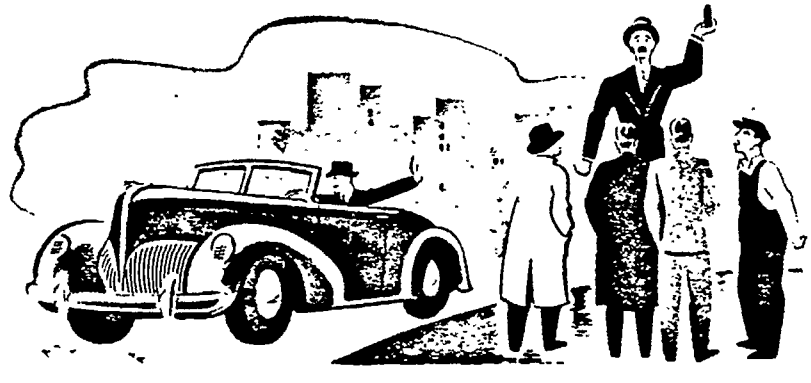
"Step up this way men. I want to show all of you the latest, safest and best gadget ever made — tried and tested to save you fellas money. I have proof you can run 559 miles over mountains on 11 gallons of gas. Quicker pick-up, instant starting, smoother running motors and disappearance of carbon. Our amazing



invention converts every drop of gas into power.

"It is a combination vaporizer and decarbonizer which will positively double the mileage of any automobile and also remove the carbon from the motor. This gadget has been tested by competent engineers — it's no school boy, box kite dream, it's a fact! It's just like buying gasoline for 10 cents a gallon, fellas. Think of getting into your car with the feeling you could ride along merrily for 57 miles on one gallon of gas — wouldn't mind taking a trip to see your mother-in-law occasionally at that rate would you? Only four dollars and I'll attach it for you. The chance of a lifetime."

This, too, is a part of what has happened in the oil industry since Pearl Harbor.





ETC 23096



The Man Who Won the War

NO, YOU'RE NOT the first to ask me about Bill Thomas. But I'm glad to talk about him. We all like Bill real well. We call him "the man who won the war."

Bill wasn't a Captain, you know. Nor even a Private. Far as I know he hardly set foot out of town during the whole war. He just stayed here with the rest of us older fellows.

We used to kid Bill a lot, I remember. For quite a while we thought he was some sort of a nut. Or maybe just a sucker. We used to say nobody had ever told him the truth about Santa Claus. He believed in everything, like a kid.

Here's what I mean. I say to you that America is the greatest country in the world. And you say, "Sure, sure . . . none greater." And you believe it, too. But not like Bill.

Tell Bill a thing like that and you'd start him going for ten minutes. He was just cracked on America — really believed in it, if you get what I mean.

Bill believed there just wasn't any decent kind of government but democracy.

And he believed that a fellow ought to do anything — everything — to keep it going.

He believed we'd sure win the war sooner or later. And he kept right on believing it, no matter how tough the going got.

He thought everybody was trying to win the war, too. Except maybe a few crooks and spies and loafers.

Sure, Bill would gripe a little now and then. Who didn't? But that didn't seem to affect his believing any. And it didn't stop him from acting on his beliefs, either.

Take back there in the first year of the war. A lot of companies didn't have much left to sell. So they started advertising War Bonds.

Well, Bill didn't just buy his share. No, sir, he socked nearly all his vacation money into them. So he had to give up his usual fishing trip. But you'd find him some Sundays trying to tease a fish out of the pond by the old mill.

Then the rubber companies started asking everybody to save scrap. Honest, Bill turned his house wrong side out. Nothing made out of rubber was safe. And half the stuff Bill turned in was still good, his wife said.

When the gasoline companies said to drive under 40, Bill cut it to 25. The only reason he didn't become a one-man traffic jam was that he only took the old bus out once or twice a week.

And that's the way it was with everything. Every time they'd ration Bill, he'd ration himself still harder. And every time they'd tax him, he'd say, "Sure, all of us have got to pay for this war."

I got to admit it seemed pretty silly for the first year or so.

Then the going began to get really tough. And some of us began to think a little different. It didn't seem so silly then, with a lot of our boys gone for keeps.

I just can't remember who said it first, but we'd all started thinking it . . .

"You know," this fellow said, "maybe Bill *isn't* crazy after all. Maybe he's just had his eye on the ball all this time. Maybe he's right to be all steamed up about America and democracy and all that. Maybe he's right to do everything the hard way."

Well, it was pretty hard to argue against it, and pretty soon even the wise guys came around to Bill's way of thinking. And not just in our town either. It seemed to happen all over the country.

And when a lot of people started thinking like Bill, things really got to rolling. Winning the war became the one big idea.

Production got to be more important than paydays. Politicians stopped worrying so much about elections. Enlistments jumped all over the country. And Bond sales busted right through their quota every month.

The only slowdown was in griping, because everybody got too busy doing his own job to make cracks about the other fellow.

Well, all this added up to just one answer . . . we knocked the Axis flatter than a slice of dried pumpernickel.

So that's why we call Bill "the man who won the war." Only we don't very often call him that to his face. Makes him a little sore.

"Hell," he says, "you know who won the war. The fellows who did the fighting and the sweating and the bleeding won the war. All I did was stay home."

* * *

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AN INDUSTRY MARCHES TO WAR

Batteries of machines mill the gunports of turrets for all-welded M-4 tanks

Each day sees armament worth $15,000,000 roll off the production lines which formerly turned out the nation's pleasure cars — but the retailers have been hit hard

WHEN THE SUN sank into the Pacific on Dec. 7 a year ago the smoke rising from Pearl Harbor signalled a new order of business in the automotive world. The manufacturers, with their assembly lines, their machine tools and their production skills, went marching off to war, figuratively speaking. To the dealers, the men who sell the automobiles to the public and help to keep them rolling, the war has meant hardship, red tape and a sharp cut in income. On the whole, however, the mortality among dealers has been less than expected and it is now possible that most of them will be able to pull through, if the war does not last too long.

The production end of the automotive business is now racing along in high gear toward a single objective — outproducing the Axis in military equipment. The industry now is turning out armament at the rate of close to $15,000,000 a day and the pace is increasing steadily. Tanks, aircraft engines, marine engines, guns, shells and military vehicles are rolling out by the thousands. Some idea of the production volume, present and potential, can be gained from the fact that 986 automotive plants in 31 states are engaged in turning out 223 war items.

With re-tooling and conversion difficulties now behind it, the industry is expected to hit peak production in the very near future, possibly before the end of this year. When that day comes the world will see an outpouring of armaments unequalled in history.

The retail end of the automotive business has been hard hit by war. Traditionally the dealer has had two strings to his bow—sales and service. Since Pearl Harbor he has had to depend more and more on service for his income. However, the dealer

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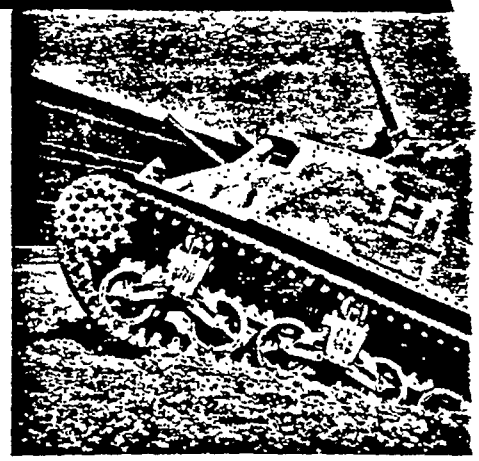
is still deriving some income from the sale of both new and used cars and will continue to do so for another six months at least. Sales volume may be way down from the lush days of 1940 and 1941, but what sales remain are made at a profit.

The New Order

The sale of new cars began dwindling eleven months ago when all vehicles held by dealers were frozen. Since then customers have to show cause and obtain the necessary approval before purchasing. And the Office of Price Administration has set retail prices by allowing dealers to charge the list price of the automobile plus 1 per cent or $15, whichever is lower, for each month the dealer has held the car since stocks were frozen.

Income from new cars is likely to stay in this state for the first half of the coming year. The Reconstruction Finance Corporation has been authorized by the Murray-Patman Act to purchase from dealers all cars not sold eighteen months after the freeze at a "fair retail price." The eighteen months will be up in July, but the act authorizes, not compels, such purchasing. Some dealers have construed the act to mean the RFC will purchase unsold cars in July at list plus 18 per cent. The net effect, no matter what the RFC does, is to calm dealers so they are selling at the full retail price allowed by the OPA, and making a profit on new car sales.

Sales also mean income from used cars. Stocks now are low. Sales are slow. There seems to be no inclination on the part of dealers to liquidate, however, and the feeling prevails that used cars eventually will move so there is no point to reducing profits just to close a deal.



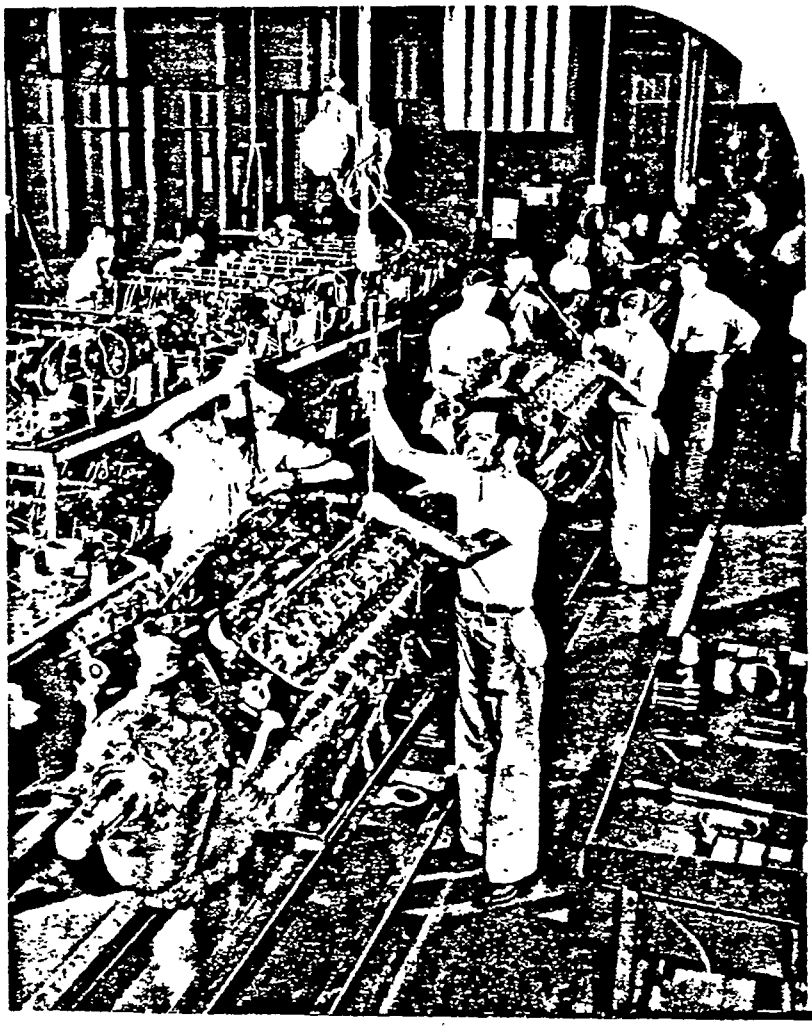
A tank is tested on the proving ground adjoining an arsenal

The second string in the car dealer's bow is service . . . repairs and the sale of parts. The service picture at the moment is complicated by the shortage of mechanics. It is not so much a problem of getting service customers as it is getting work done. The shortage has hit dealers especially hard in war production centers, and it has been estimated that in some cases the supply of mechanics is only 50% of the number needed to fully staff all dealerships.

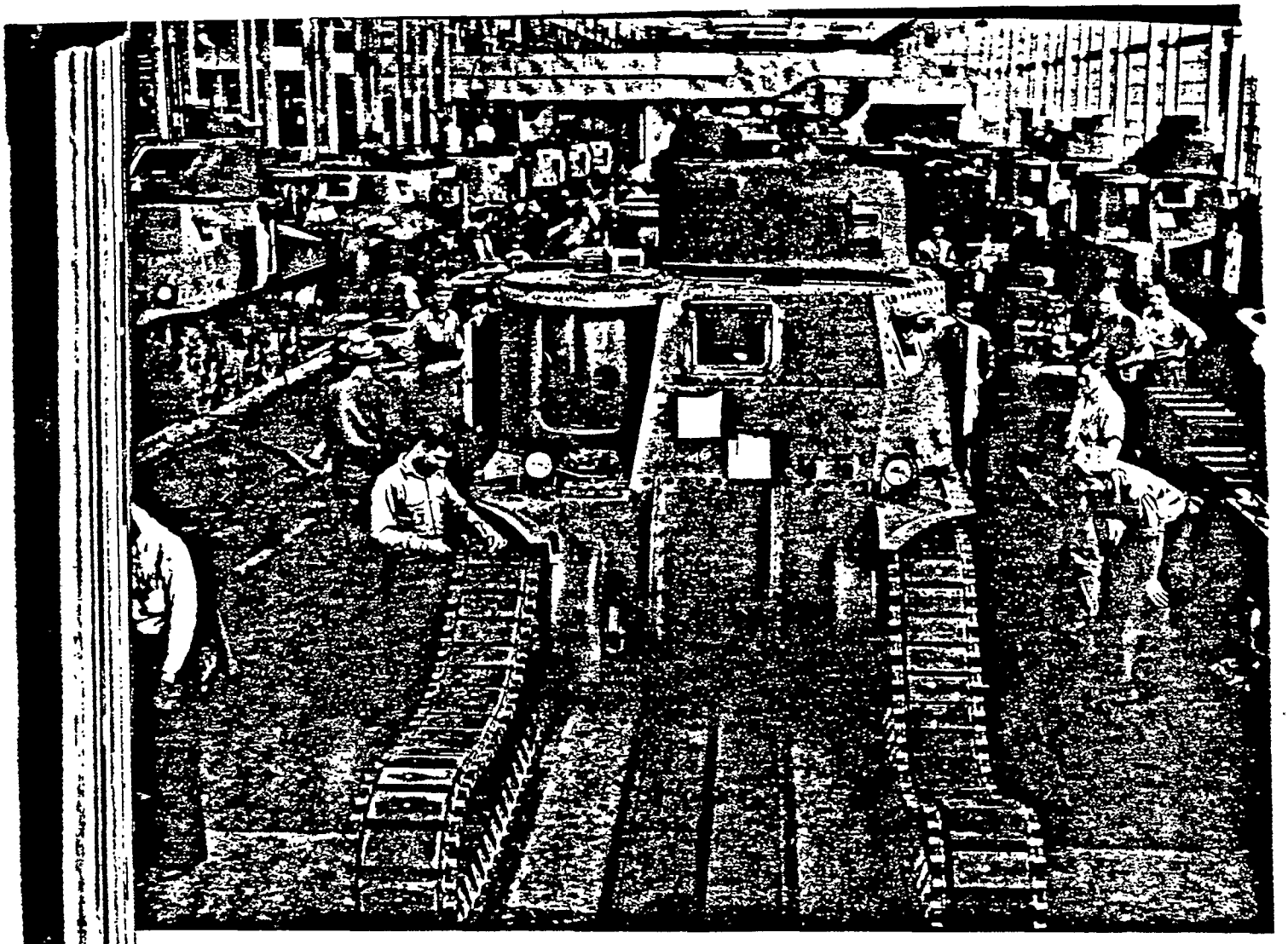
The manpower problem is most burdensome to the car dealer who has functioned as a manager and employed all labor for the service department. Independent repair shops are in a better position as census figures indicate the owners or managers of such shops represent about half the total labor.

Service includes the sale and installation of replacement parts, and this part of the dealer's service business is spotty. Most small parts are on the market, at least for the present, and there has not been any real shortage. Larger parts, crankshafts made of alloy steel for example, are

Allison liquid-cooled plane engines are assembled for future service in blasting freedom's enemies



ETC 23099



Workers in a tank arsenal put the tracks on one of the mighty rolling fortresses

practically unobtainable, but in these days not many are needed.

On the credit side of the service picture are the five million trucks now operating, with about four and a half million depending on dealerships for service. Dealers in smaller communities are beginning to broaden service possibilities to include the 2 million tractors on farms. Light servicing is usually performed by the farmer right in the field, but expert mechanical help is needed on heavy repairs to the engine and gears, and for such technical servicing as magnetoes and governors.

Automobile dealers, along with other retail and service businesses, have sustained casualties as a result of the war. Right after Pearl Harbor there were some dire predictions on dealer mortality, but so far they have not been borne out. Casualties to date have been only slightly over 10%. The factory has done everything possible to help the dealer, but at the moment there is not much that can be done except give assistance in management and help to promote service campaigns.

Dealers now face the second year of war certain that some income will be available from the sale of new cars at least until next July, and from used cars as long as there are any on the market. The paramount question in the service field is mechanics. As long as dealers can get them there will be sufficient business to keep them busy, and it is estimated that over 80% of the dealerships can survive at least a year on service income alone.

The post-war period promises to be a prosperous one for the automotive industry. The demand for new cars is expected to be tremendous. The public will have money and a great urge to "go places" after the war and the automotive industry will be in a strategic position. Trade

ETC 23100

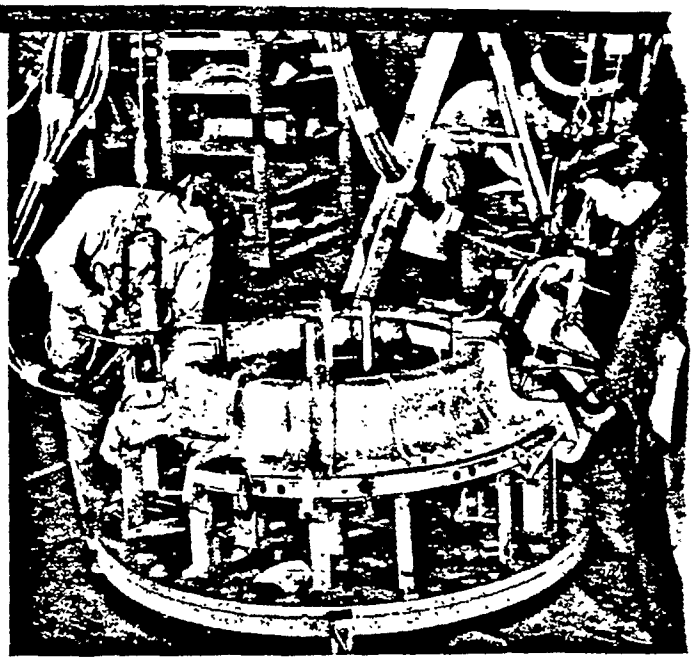
publications even now are suggesting a savings plan for post-war car buying, a kind of save-now-and-get-it-later, or installment buying in reverse.

Recently there has been a considerable amount of speculation on the "car of the future" – speculation on appearance, engine design, fuel requirements, economy, performance. Actually very little research work is being done at the present time. Design engineers are at a premium – most of them are engaged in the design and production of armaments.

No New Cars for a Year

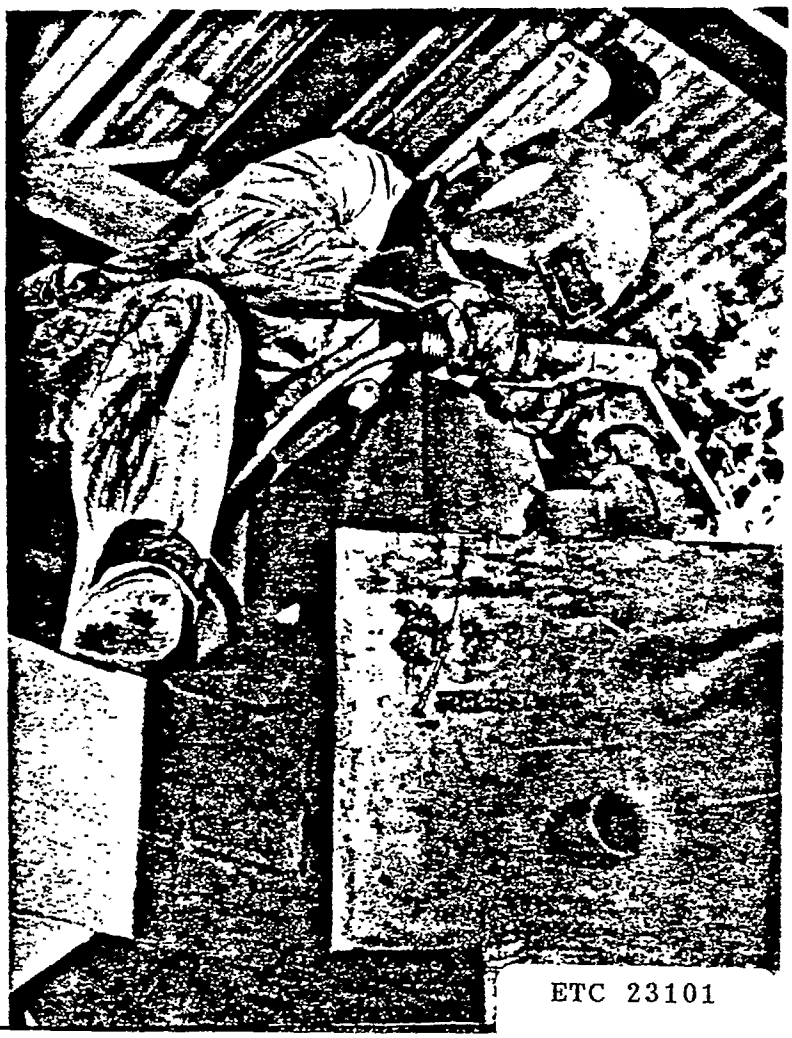
The "car of the future," therefore, is not just around the corner. It will be at least a year after the war ends before cars of any kind will come off the assembly line. Many of the tools have been scrapped and others are being used in other plants to turn out war materials. The Dormant Scrap Drive now is taking tools which have not been used for thirty days, or are not likely to be used within the next thirty days, although manufacturers are being allowed to retain their die inserts. First cars off the line after the war are likely to be 1942 models, with possibly a few superficial changes.

However, the "car of the future" will be well worth waiting for. Many of the lessons learned in the production of mechanized equipment and aircraft engines will be applied to the post-war automobile and new materials, both metals and plastics, probably will be utilized. A light, super-compression engine, perhaps located in the rear, is another possibility. The traditional concept of the automobile as a kind of refined buggy may be scrapped entirely.

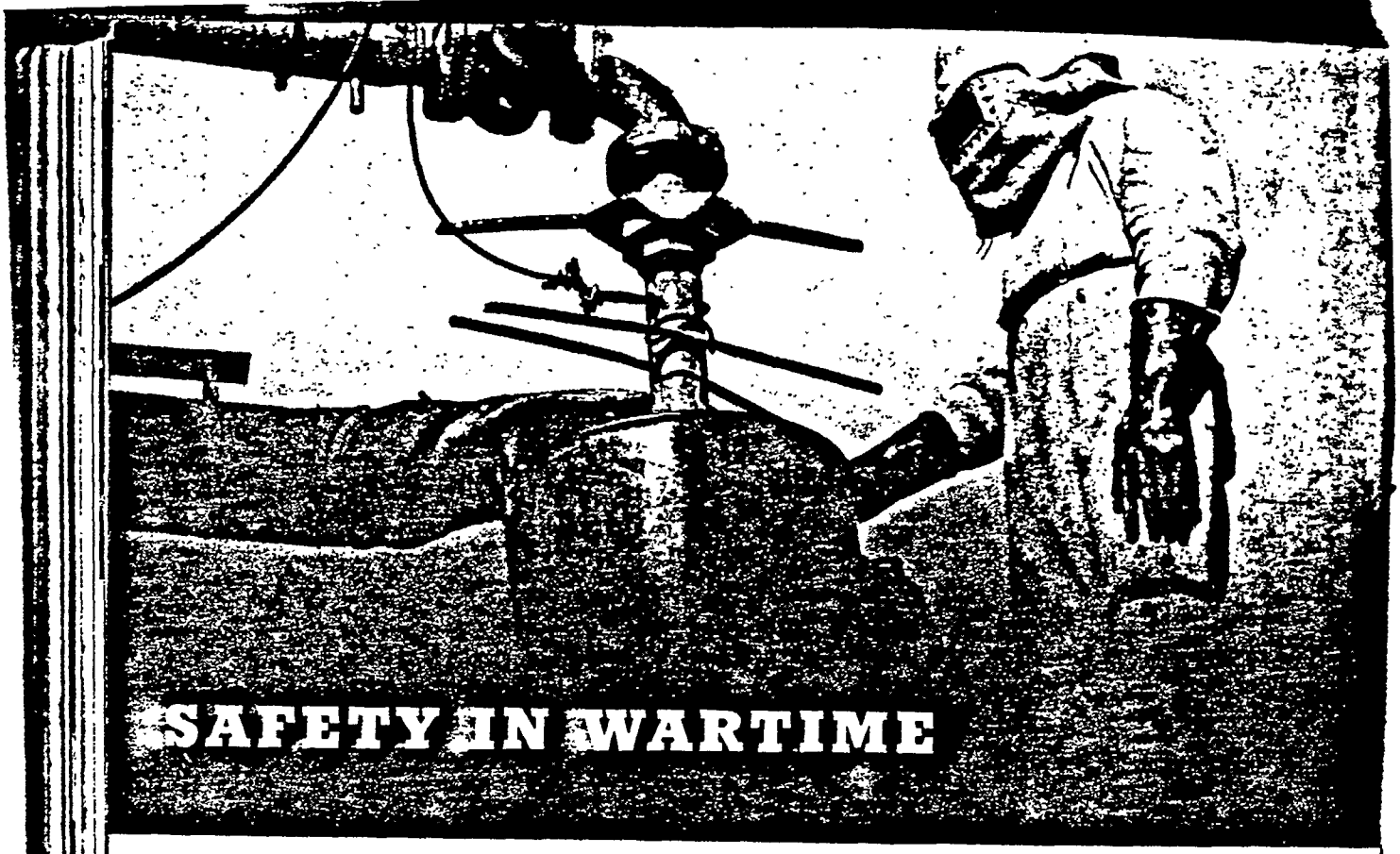


The cowling for an engine of a Flying Fortress bomber is spot welded in an automobile body plant

A welder's fiery torch seals the hull of an all-welded tank, America's answer to Axis desert fighters



ETC 23101



SAFETY IN WARTIME

Casualties on the home front outweigh those on the battlefield 7 to 1. That's why we must make safety a habit — to cut down war's cost in lives

by Oliver Jones

IN TIME OF WAR human life seems to become cheaper. This is by no means due to the fact that a human life is or should be less valuable, but more to a change in the mass psychology of nations and individuals. When the newspapers are full of accounts of air, land and sea battles, ships sunk, industrial plants sabotaged, and casualty lists, one inevitably and unconsciously becomes conditioned to these things and passes over all but the most severe catastrophes with a sort of callousness. It is well that this is so for otherwise those people particularly sensitive to human suffering would be driven into a state of frenzy closely akin to madness. In times of peace the loss of an airliner or a severe railroad wreck is talked of for days and assumes the proportions of a national tragedy. In war, on the other hand, the loss of fifteen or twenty planes is so insignificant as to rate but a paragraph or two in a communique.

But when mass thinking follows lines of this sort, what happens to the safety campaigns of industry, municipal traffic control bureaus, insurance organizations and the like? The thoughtless will ask why good time and money should be spent on expensive preventive safety efforts when young men are being dispatched to war to die by the thousands, and when those who remain at home are using all their brains and brawn to devise more varied and efficient means of wreaking destruction on the industry and manpower of the enemy. It is natural enough in these grim days to evaluate everything in terms of the war, but we must remember that the battle for safety is a kind of a war in itself — a war that never ends. As a matter of fact the common things, the automobile, industrial machines and careless disregard of small injuries from any source result each year in more loss of life, more injuries and more suffering than any ordinary war. Figures released by the National Safety Council in November (before the North African campaign began) show that accidental deaths of American workers exceeded deaths of American fighters by a ratio of 7 to 1. Thus there is no time to relax vigilance. We must redouble our efforts.

Certain groups, notably medicine, insurance, industrial management and municipal traffic control bureaus have been keenly aware of the tremendous toll in human life and health exacted each year by careless and improper handling of hazardous materials, tools and machines. Working steadily and largely without publicity, these groups have, individually and collectively, accomplished stupendous savings both in life and health and in man-hours over the last twenty or thirty years.

The continuation and amplification of this type of effort during wartime is doubly important. Industrial and personal accidents tend to become more frequent during war. Industrial miracles must be accomplished in short periods. Much of industry's experienced manpower is drained into the armed forces, leaving older and less experienced men and women to keep up production. Unfamiliar products and operations are suddenly demanded of plants not always properly equipped to handle them. All these conditions tend to increase the casualties at home — and every casualty on the home front impedes the war effort and delays victory just a little. Added together these little delays may reach staggering proportions, and certainly no American would voluntarily delay ultimate victory.

It has become evident that continuing and increasing expenditures on industrial safety are not only desirable but absolutely essential to the successful implementation of an all-out war effort. Men must be preserved to serve their turns in the armed forces, industrial production at home must proceed at peak efficiency, unimpeded by avoidable accidents, breakdowns and lost time. Because, inevitably, wartime production is carried out by inexperienced and sometimes inept operators, better safeguards must continually be developed and put into use. By the same token the armed forces themselves are made up of tremendous numbers of inexperienced personnel, living and working in strange surroundings and doing unfamiliar jobs. Thus the tried and proven methods of industrial and personal safety training should be applied no less thoroughly to camps, navy yards, proving grounds and the like. Only by this means can men and materials reach the fighting fronts in maximum quantities and in the best condition.

Must Work Together

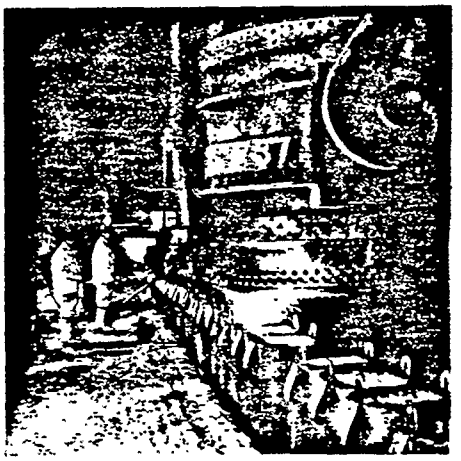
Such a safety program requires the whole hearted and thoughtful cooperation of all branches of the government, industrial management, the medical profession and the existing safety organizations, such as the National Safety Council. Each war plant, camp, navy yard, proving ground and the like should and must have a well integrated safety organization under the leadership of a trained staff officer. Much effort is being expended upon plant protection by the Provost Marshal General's staff. This effort, so far, has been largely devoted to protection against invasion from without and sabotage from within, and gives promise of being highly successful. Second only in importance to a plant or organization properly protected against invaders and saboteurs, is the smooth, efficient operation of that plant or organization without costly losses in time, men and production from avoidable accidents. It can readily be demonstrated that the return from relatively small investments in safety are almost unbelievably large.

Let us all, therefore, work and play safely. Let us not forget the safety of the other fellow. Let us "keep 'em flying, rolling and sailing" by doing efficiently and safely each act of our daily lives. Thus will victory be ours sooner and at minimum cost.

Both hand trippers of this machine must be depressed before it starts its motion



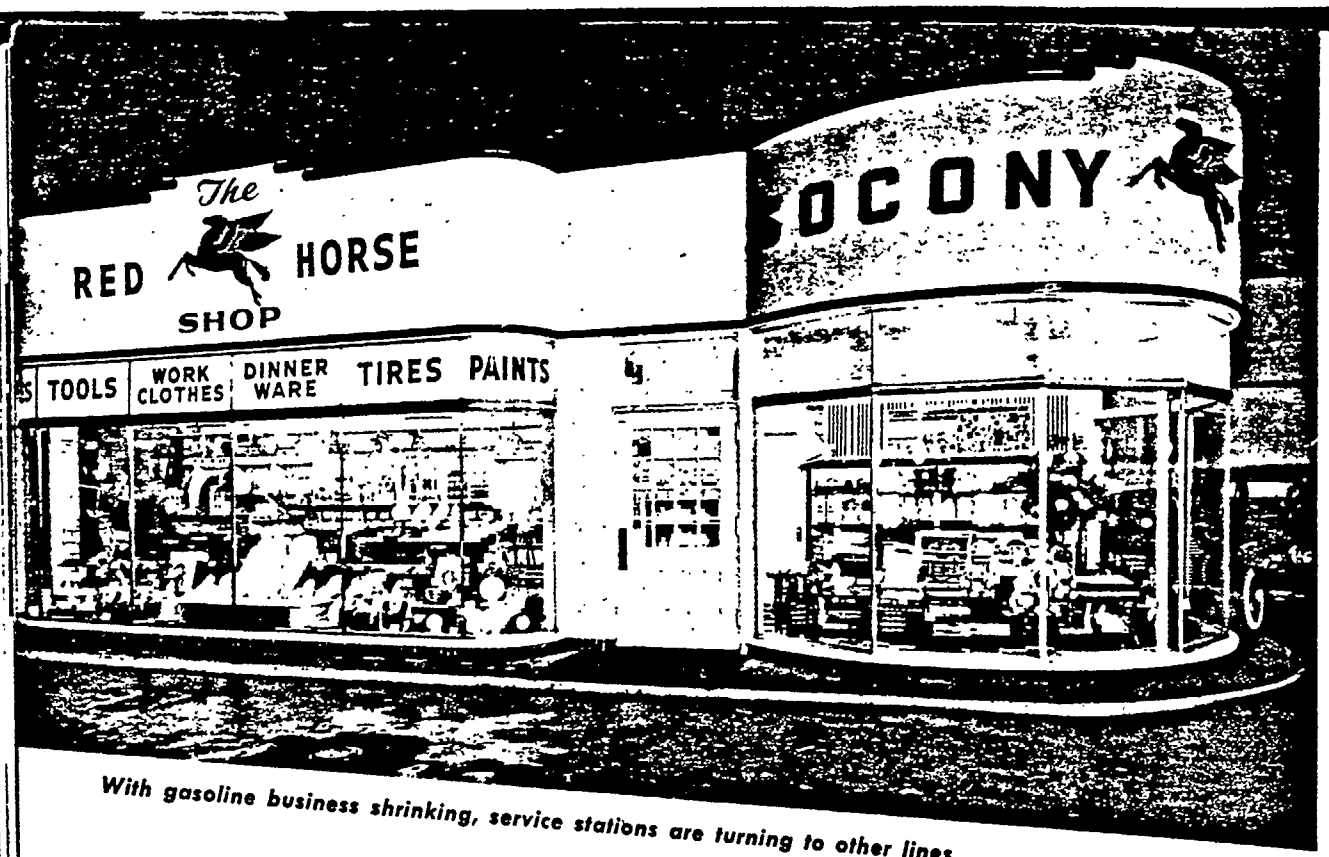
Workmen watching molten steel being poured are protected by special clothing



Man from Mars? No, a workman sensibly protected against injury on his job



ETC 23103



With gasoline business shrinking, service stations are turning to other lines

Marketing—A Memory

Hard-fighting competitors who battled one another for business have joined hands in a struggle to keep retail outlets alive

THE HARDEST-SELLING, toughest-scrapping competitors in the country prior to Pearl Harbor are sitting down around one table today trying to help each other take care of what was once called the "marketing end" of the oil business. Marketing, as the oil industry knew it, is out for the duration. The "mad scramble" for volume that often resulted in products being offered below cost, but which help build successful businesses and made possible better products year after year at constantly decreasing prices, has undergone a complete change of life for the war's duration.

A look at gasoline sales figures tell you in a moment what has happened to marketing. In August, to take a month at random, sales in rationed areas were off 35%; in unrationed areas, 13.6%. With rationing on a nation-wide basis, it is expected that total sales will be off approximately one-third in December, 1942, as compared to December, 1941.

The principal task of the marketing departments today is to keep products available. This means maintaining enough service stations so that trucks hauling war products and workers who must drive to war factories will be able to get gasoline wherever and whenever it is needed. This has been difficult because the mortality rate in service stations has been high. They started closing long before gasoline rationing was introduced due to the drain on manpower from the Army and higher paying war jobs. The rubber shortage also helped to close the stations as the marked declines in gasoline consumption in nonrationed areas prove.

Accurate data on the closing of stations are not available since only one agency, the Bureau of Census, provides information on this subject and its reports on current conditions will not be available for many

months. Oil companies, which can speak only of their own outlets in restricted marketing areas, estimate that 15%, or about 65,000 outlets, have been closed. Marketers are unanimous in the belief that more will be shut down. They think that the total number of outlets will be reduced by at least 100,000 as economical operation becomes more and more difficult.

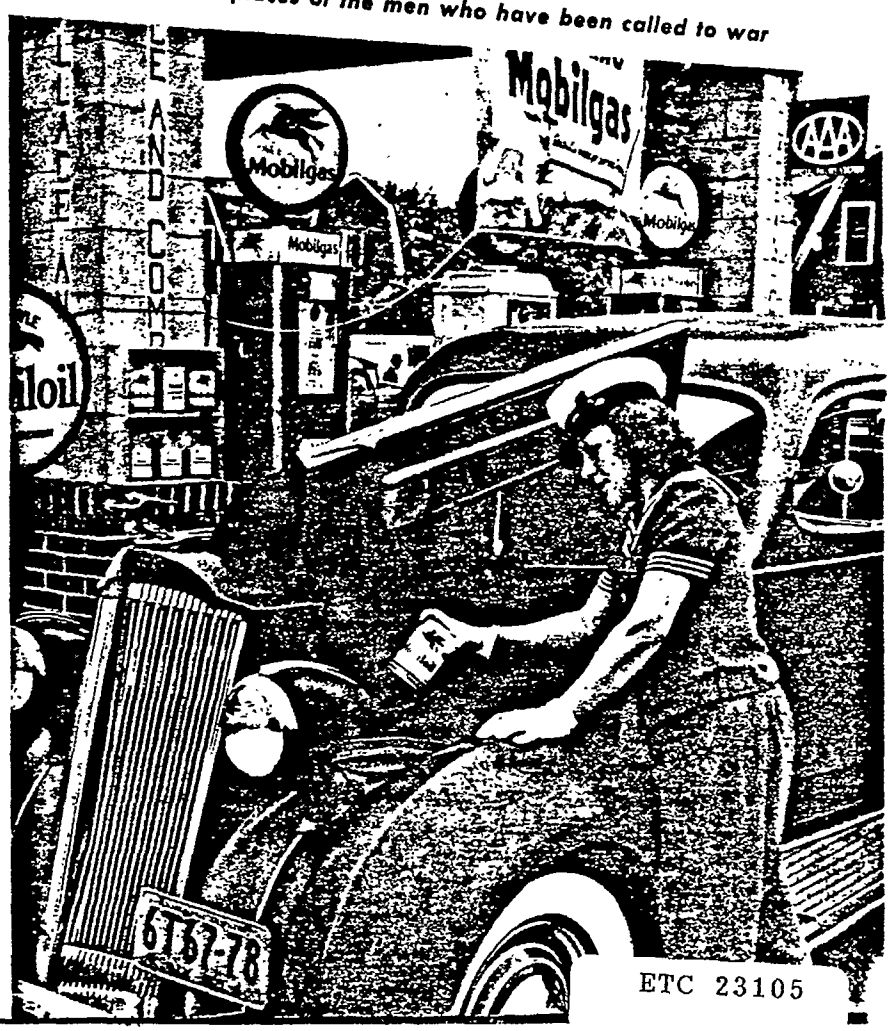
Several steps are being taken by the companies to offset this loss of outlets. In communities where they have a number of stations all but a few of the more strategically located are being shut down. Shorter hours, limited to 72 per week in the rationed areas, have offset the loss of manpower to some degree. Girls are making their appearance in service station coveralls. The verdict isn't in yet, but first reports indicate that they are performing acceptably — in some respects they have been superior to the men.

The most generally adopted alternative is the stressing of other services than the sale of gasoline. Early this year the industry adopted the slogan, "Care for your car for your country," and since has stressed vital lubrication for the maintenance of irreplaceable automobiles. As a result the average motorist is taking better care of his car. However, since there are fewer cars operating and since the operation of these cars is on a curtailed basis, the overall sales of motor oil and other lubricants has declined. This alternative also has been pursued to the extent of adopting non-allied services and a number of service stations has gone into the marketing of such alien products as radios, garden tools, groceries, etc.

The extent to which the main function of service stations, the sale of gasoline, has been affected is impossible to gauge accurately. Private motoring has declined substantially but it has been offset partially by the increased demands of the armed forces and the war industries. Since all figures on gasoline are lumped together in such reports as those of the U. S. Bureau of Mines, the effect of these factors can not be weighed. Calculations based on the Bureau's reports for September indicate that the total consumption of gasoline was 15.6 per cent less than it was in the same month of 1941. But much of September's demand was made up of army and navy purchases which were far more substantial last September than they were a year ago. It also included the demands of trucking companies and war workers which also were higher than before. Therefore the decline in normal civilian consumption was obviously much heavier than that indicated by the Bureau's statistics.

The effects in states which pretty well escaped these influences would possibly give a more accurate indication of what happened to normal service station business. Isolated Vermont, a rationed state, reported a decline of almost 52 per cent for August. Wyoming, in the unrationed area, experienced a 44 per cent decline in the same month. These figures are more in line with estimates of the Petroleum Industry War Council's Economics Committee which foresaw a decline of 48 per cent in normal consumption as a result of the rubber shortage and gasoline rationing.

Girls are taking the places of the men who have been called to war





"Faulty plugs eat up gas, mister!" Heavy stress is being laid these days on service which will result in more economical operation of your car

Gasoline sales in the rationed area dropped 35 per cent in August, according to the American Petroleum Institute's compilation of taxable sales by states. The effect has been most severe in New England which probably has been less affected than the rest of the country by war industry and army and navy training bases. Declines in New England range from Rhode Island's drop of some 36 per cent to New Hampshire's decline of almost 53 per cent.

Sales in non-rationed areas, according to the same source, have declined 13.6 per cent. Here too, there are differences according to locale. In the comparatively heavily populated Ohio, Indiana and Illinois area the drop was 18 per cent while in the less densely populated Oklahoma, Arkansas and Texas district, the decline was only slightly more than 7 per cent. This may be attributed to the fact that the concentration of war industries and camps in the South has been greater in proportion to the population than in the Northern states.

Loss of markets has resulted in an overproduction of gasoline in certain refining districts. In order to utilize the excess, new uses for it are being considered. It has been proposed that it be used as an enriching agent for natural and manufactured gas. The farm, where large quantities of fuel are consumed in tractors, is receiving more attention as a potentially important consumer.

Gasoline, of course is not the only product of the oil industry though it is its most important. Its second most important product is fuel oil and the industry faces problems here also. The Northeast is the country's most heavily consuming area for heating oil and this region, normally served by tanker, is now reached principally by tankcar. Shipments by tankcar in October and early November were running more than 100,000 per day less than expectations so that rationing here has become essential. The industry hoped at first to supply 75 per cent of normal requirements but with anticipated rail shipments unrealized, a more severe cut is in prospect.

Lubricating oils, most important product from the unit value standpoint, likewise pose a problem. In normal times they are distributed in

containers but material for containers is no longer available. Many refineries have replaced the can with glass bottles or jars while others have substituted paper-type containers. Drums are now irreplaceable so they are being handled with care and watched with a loving eye.

The net effect of these developments has been to reduce the overall value of its products to the industry. By reducing the proportion of production of higher priced gasoline and increasing the proportion of lower priced industrial and domestic fuel oil, the aggregate value of these products, which constituted 80 per cent of the output of the country's refineries in September, is thereby lowered.

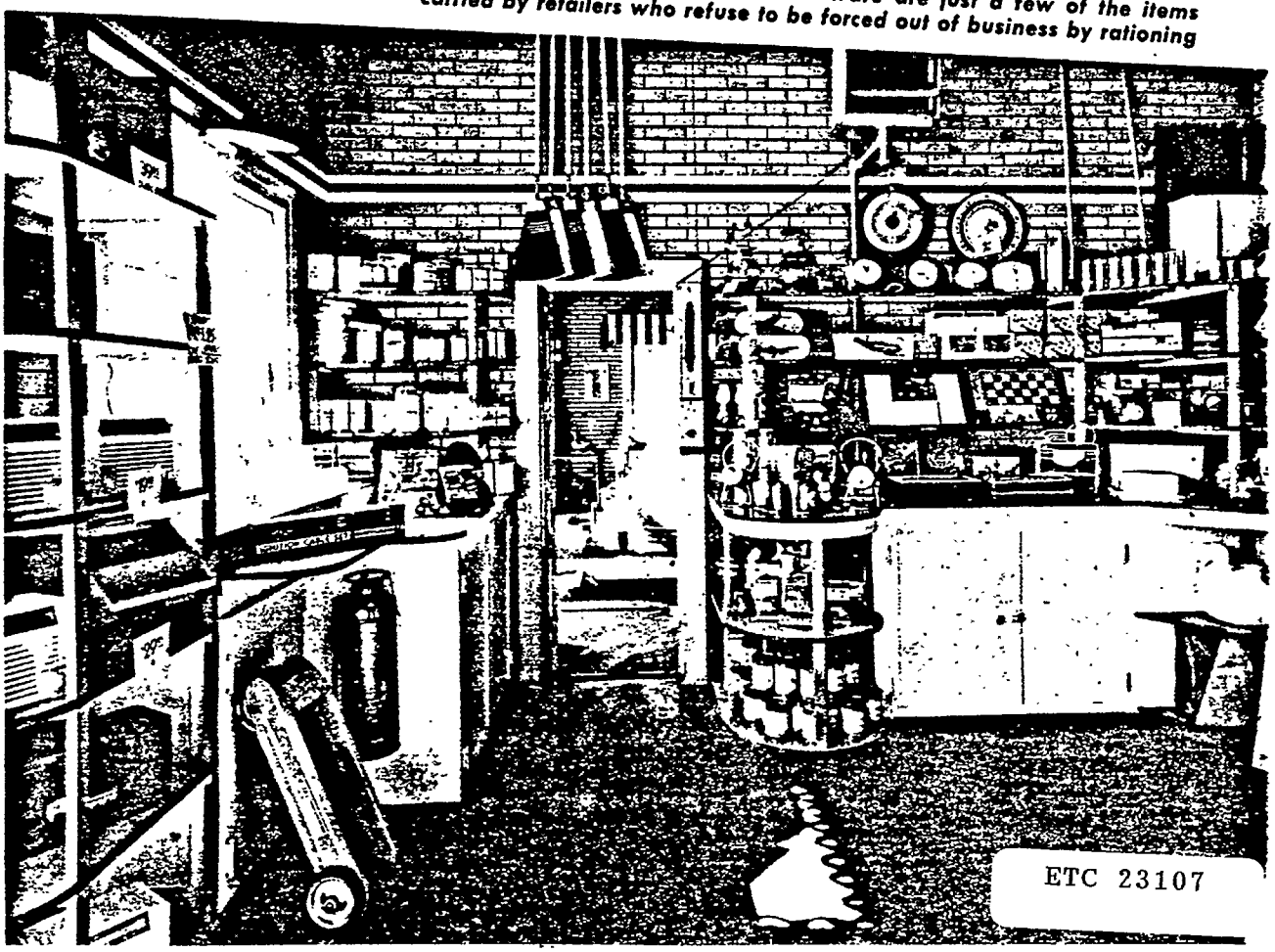
To the uninitiated, probably the most surprising thing about it all is that the industry has fostered many of the policies which are depriving it of its normal market. Oil men urged rationing in the East long before it was adopted. Their companies advertised in newspapers and on the radio to urge drivers to drive less and home owners to convert their heating units from oil to coal. It initiated the large-scale transportation of oil by rail to offset tanker losses without the assurance of since forthcoming compensation. It has proposed pooling of facilities, revision of yields and many other steps which are costly and disruptive to normal procedure but which enable it to serve the country better.

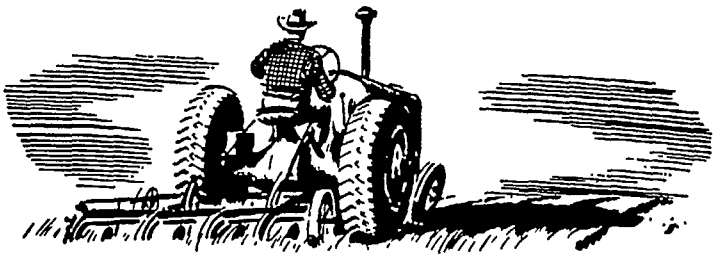
The marketing division of the industry has experienced great change since Pearl Harbor and further change, as pooling of facilities proceeds, is in prospect. However the effect of the keen competition that characterized pre-war-marketing has not been lost. Products are still being improved and the gasoline that will be sold from service stations after the war, as a result of the competition between companies to provide the ultimate in aviation fuel for Uncle Sam's flyers, will be a far superior product to that which the motorist bought before December 7, 1941.



This station still offers service — but a different kind

Radios, clocks, brooms, and kitchen ware are just a few of the items carried by retailers who refuse to be forced out of business by rationing





WORTH ITS WEIGHT IN GOLD

IF YOU HAD told a farmer a year ago that by December, 1942, it would be practically impossible to buy a new tractor, he would have laughed in your face. He would have pointed out that in a global war abundant supplies of food are almost as important as ammunition and that the farmer would be able to get anything he needed, including tractors, tractor tires, tools, gasoline and manpower.

As things have turned out he would have been wrong on a number of counts. The government very quickly recognized the need for food and fibers – grains for the raw materials of war industries, foods of all kinds for Lend-Lease shipments and for our own armed forces. The farmer was asked to step up production 25%.

Then the squeeze began. His manpower began to drift away – part of it slipped into the higher paying war industries; part of it was drafted into the army. Tractor manufacturers began making armaments thereby reducing their output of farm machines. Need of raw materials for tanks, guns and planes further cut into the production of farm machinery.

Recently the War Production Board issued Limitation Order L-170 which provides that from Nov. 1, 1942, to Oct. 31, 1943, the production of tractors and other farm machinery will be limited to approximately 20% of either the 1940 or 1941 output. Even this scanty amount will be doled out to the farmer by a county rationing board after very careful scrutiny of each applicant's case.

As a result the farm tractor is now just about worth its weight in gold. New tractors will be practically unobtainable. Tractors now in operation will have to work longer hours for more days of the week and will probably have to last for the duration.

Only expanding Market

This situation has provided the oil industry with an opportunity to be of service to the farmer and at the same time to explore an expanding market for petroleum products – the only civilian market that is expanding.

There are today some 1,800,000 farm tractors in use in the United States. Should only a small percentage of these suddenly break down it would be an agricultural calamity of no small magnitude. Anything that can be done to prevent such a happening and to keep all these tractors in use will come under the heading of "war effort."

Many oil companies have been doing yeoman service in this respect by disseminating information on preventive maintenance to farmers through dealers and tank wagon drivers. Nearly a million and a quarter copies of Ethyl Corporation's booklet "Wartime Tractors" have been distributed in this manner. A number of oil companies have distributed similar educational booklets of their own.

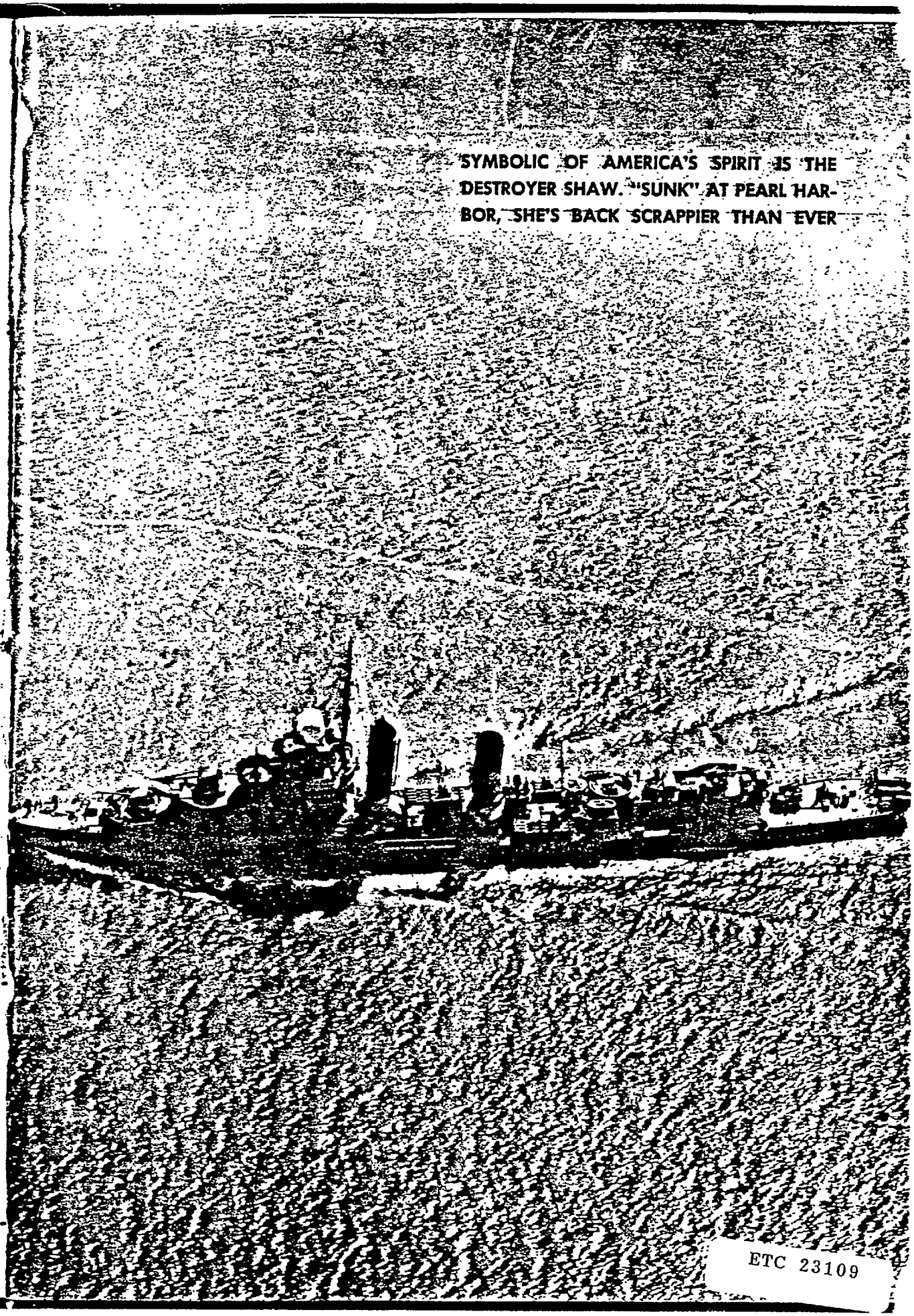
From a marketing viewpoint, the sale of petroleum products to the farmer is the only bright spot in an otherwise drab and discouraging picture. With gasoline rationing now effective on a nation-wide scale and gasoline stocks piling up at an alarming rate, the farm tractor is an outlet that deserves the careful consideration of every marketing company.

The farm market always has been an important one, although it hasn't always received the attention it deserved. Today, a year after Pearl Harbor, it is more important than ever because it is expanding while all other markets are contracting. The tractor is the key to it. It offers the industry an opportunity and a challenge.

Our Pictures . . .

Page 4 (top) and Page 5, Standard Oil Co. (N. J.); Page 4 (bottom), Thiokol Corp.; Page 6, 1st Air Force; Page 7, Aviation Magazine; Page 8, Press Association; Pages 9-11, API, except Page 10 (bottom), the Texas Co.; Pages 16, 17 (bottom), 19 and 21 (top), General Motors; Pages 17 (top) and 18, OWI; Page 20, Monsanto Chemical; Page 21 (center) Carnegie-Illinois, (bottom) Westinghouse Electric; Pages 22, 23, and 25, Socony-Vacuum; Page 24, Esso Marketers. Third cover, foto courtesy, U. S. Navy.

ETC 23108



SYMBOLIC OF AMERICA'S SPIRIT IS THE DESTROYER SHAW. "SUNK" AT PEARL HARBOR, SHE'S BACK SCRAPPIER THAN EVER

ETC 23109



WHAT COMES DOWN MUST GO UP

We read a great deal about dropping bombs on Hitler, Hirohito & Company. But *dropping* a bomb is only half the story. The real trick is to *lift* it some 30,000 feet and fly it several hundred miles.

You can't drop a bigger bomb than you can lift. And the lifting power of bombing planes depends a great deal upon the quality of the gasoline they use.

That's a break for the United Nations. Our aviation gasoline is the best in the world. For years the U. S. petroleum industry has been way out in front in the improvement of fuels and the development of new manufacturing processes.

What's more, our oil industry men aren't resting on their laurels. They're hard at work right now searching for even better fuels and refining methods. For while higher quality gasoline alone won't lift more or heavier bombs, it's a great help to engine designers in building more powerful engines.

Since Ethyl antiknock fluid is used in all our tactical, or "fighting grade," aviation fuel, and in nearly all gasoline used by our mechanized land forces, Ethyl engineers work closely with these men of the petroleum industry. At the same time they cooperate wherever possible with aviation and automotive engineers in research on *engines* that can best put this extra gasoline quality to work at the job of carrying destruction to the enemy.

ETHYL CORPORATION
Chrysler Building, New York City

Manufacturers of Ethyl fluid, used by oil refiners to improve the antiknock quality of aviation and motor gasoline.

ETC 23110