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ETCO-101

ETHYL NEWS

1941

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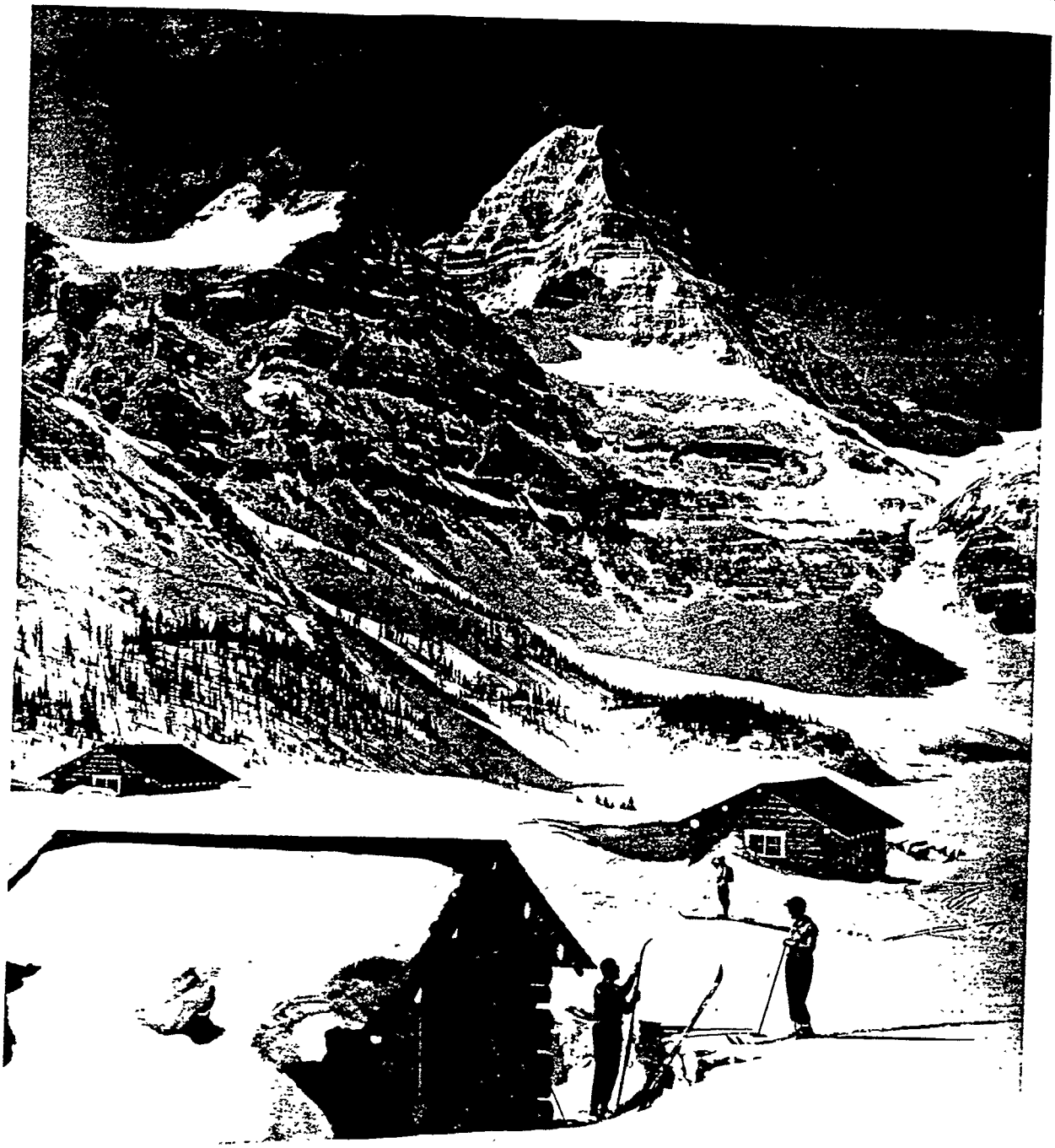
WASHINGTON and LAFAYETTE at Valley Forge

January 1941



This picturesque log cabin ski camp nestles in the shelter of stately Mount Assiniboine, the Matterhorn of the Canadian Rockies.

Photo courtesy Canadian Pacific Railway.

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VOLUME 8, NUMBER 1

It's Pilots That Count

BERT ACOSTA, most colorful of all trans-Atlantic flying pioneers, once remarked:

"Give me enough power and I'll fly an old barn door!"

Given the power, Bert probably could fly his "old barn door" better than many a hastily trained aviator can handle an up-to-the minute warplane. Without good pilots the finest fighting aircraft in the world aren't much better than the ancient crates of 1917-18.

The Nazis are said to be turning out warplanes at an unbelievably rapid rate —faster than Great Britain and the United States combined. But can the Nazis furnish the pilots to take these planes aloft?

It takes thousands of hours to make an expert pilot. When a pilot has from fifty to two hundred hours' flying experience, he is at the most dangerous stage of his career, because then he usually thinks he knows everything there is to know about flying. After he has passed the two hundred hour mark, he begins to realize how little he knows and his mind, accordingly, becomes receptive to further instruction.

The U. S. Army requires a year to give its fledgling flyers a little over two hundred hours of training. The Navy does it in nine months and some commercial schools do it in eight months, but that is the absolute minimum. Learning to fly is like eating—too much instruction or practice in one day cannot be digested, and an hour and a half to two hours should be the daily limit, according to aviation experts.

Commercial airlines in the United States won't hire a man, even for a co-pilot's job, unless he has a minimum of a thousand solo hours.

The Germans trained thousands of pilots in gliders and light sport planes in the years preceding the war. There is a world of difference, however, between such craft and the modern high speed fighters and bombers. There is as much difference as there is between driving old Dobbin, who has done his duty all these years and is about to be turned out to pasture for his remaining days, and driving a spirited three-year-old thoroughbred race horse.

The British, on the other hand, have been going in for high speed military flying for many years, and their veterans have been doing very well for themselves in this war. In the majority of aerial encounters they have proved themselves far superior to the Germans.

If British and American manufacturers can furnish these British veterans with an adequate number of up-to-date planes, it wouldn't be surprising if they soon gained complete mastery of the sky, regardless of how many planes the Nazis turn out. Good pilots cannot be manufactured on an assembly line!

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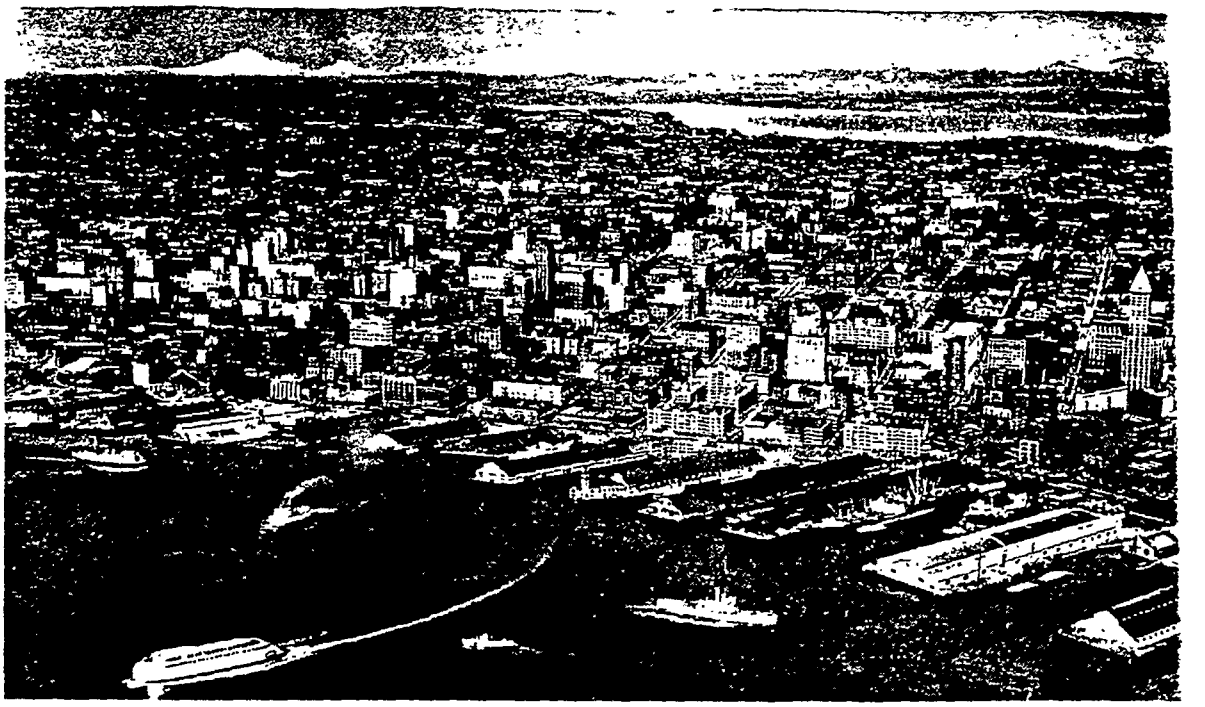


Seattle's waterfront and downtown district look like this to an airplane pilot flying over Elliott Bay.

Queen City of the NORTHWEST

In the 88 Years Since its Founding Seattle has Grown into a Bustling Metropolis of over 450,000.

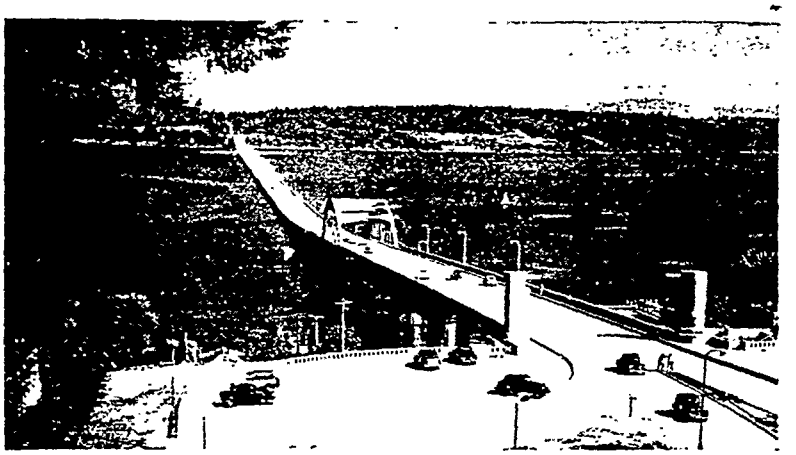
AS THE largest city in the Pacific Northwest and the financial, shipping, industrial and distributing center of the area, Seattle becomes the key to one of the nation's richest and most promising areas. In view of this Ethyl, about a year ago, established a new sales division for the territory with headquarters in that city.

In the 88 years since the first white settlers landed on the site which it now occupies, Seattle has capitalized effectively on a rare combination of industrial wealth, amazing scenic background and civic foresight to grow into a bustling metropolis of over 450,000.

Seattle has a magnificent natural harbor, Elliott Bay, the far-reaching waterfront of which feeds a score of coastal neighbors, the Orient, Alaska and Europe with products grown in abundance in Washington and the Pacific Northwest.

The extreme northwest corner of the United States, now the state of Washington, was a stretch of rugged, undeveloped territory from which the pioneers were hewing new land long after the east was settled. Seattle still reflects that frontier spirit, and many landmarks remain today as a tribute to the pioneers whose courage, skill, and foresight enabled the state of Washington to grow and to become one of the most productive areas in the United States.

Only a century after Columbus dis-



The famed floating bridge across Lake Washington is supported by 25 concrete pontoons. A floating draw-span pontoon makes it possible to open the bridge for the passage of large vessels.

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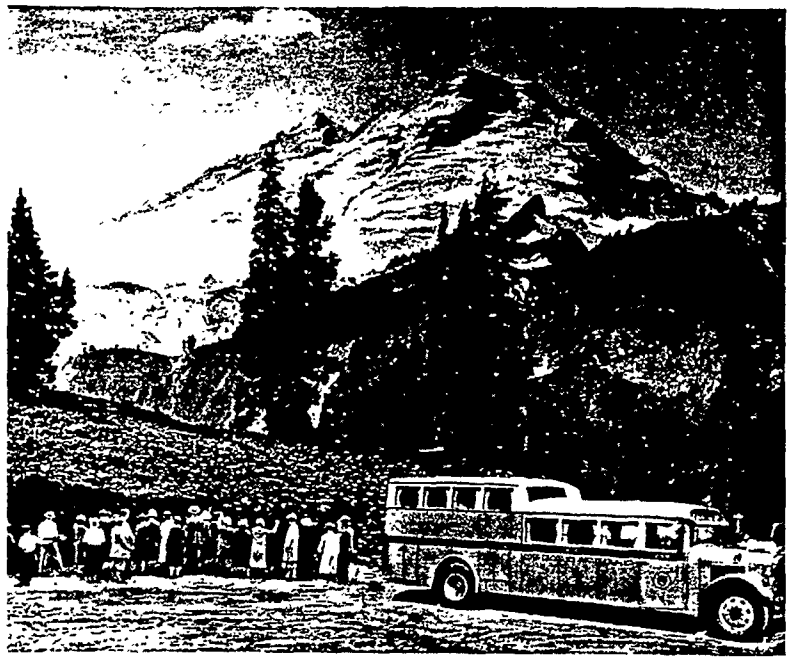


From the end of the highway, which is 5,000 feet above sea level, a group of sightseers gaze at snow covered Mount Baker, towering 10,750 feet into the blue sky.

covered this continent, an old Greek navigator, sailing in the service of the King of Spain and having for the moment the good Spanish name of Juan de Fuca, visited Puget Sound and thought it was the mythical "northwest passage" from the Pacific to the Atlantic. Two centuries later came George Vancouver, a navigator and explorer for Great Britain, and from that time on other adventurers arrived with increasing frequency, bringing with them the first glimpse of new life that was to open up this vast area.

Seattle was blessed in the beginning with its fine harbor and with an amazing abundance of timber, minerals, fish and other products. With this setup it was inevitable that the city should become a great port and industrial and transportation center.

The Port of Seattle is nearer to the Orient and Alaska than any other major United States port. Furthermore, it is 500 miles nearer Chicago than San Francisco. Four transcontinential railroads have their western termini in Seattle, sixty steamship lines operate seventy scheduled services on the principal world trade routes and in the noncontiguous territories of the United States, while several lines enter Puget Sound as cargo is offered and numerous private and contract carriers are employed in the lumber and oil trades.

The total import and export tonnage for the port in 1939 was 6,070,565, with a value of $350,438,165. Included in this great volume were lumber moving out in every possible form, apples amounting to one-fourth of the commercial apple crop of the United States and valued at $17,000,000, pears, peaches, prunes, berries, flour, fish, machinery, and many other products.

With a hinterland so rich in natural resources, with such a fine harbor and a market like the Orient and Alaska near at hand, it was natural that Seattle should become an outstanding industrial center. Leading industries, in order of importance, are foodstuffs, lumber and allied products, manufacture of iron, steel and machinery, meat packing, flour-milling, and wearing apparel.

Although an industrial and transportation center, it is also a city of homes, standing second among American cities of over 300,000 population, with 46 per cent owned by the occupants. Seattle is built on several hills, with mountains to the east and west and lakes to the north, south and east, so that even the most modest home commands a view of lake, mountain or sea.

For the traveler on vacation, Seattle presents scenic attractions seldom equalled—beautiful Lake Washington and its 52-mile drive, Puget Sound and the 605 acre University of Washington campus are but a few. And nearby are far-famed Mount Rainier to the south, Mount Baker to the north and Grand Coulee Dam across the Cascade Mountains to the east.

Not far from Seattle are Paradise Valley and majestic Mount Rainier, where city folk may take horseback trips in a virgin wilderness.

ETC 31185

Punch Bott, Montreal skier, takes to the air from the Mount Norquay jump at Banff, Alberta. Among the spectators is a member of the Royal Canadian Mounted Police, left foreground.
Photo courtesy Canadian Pacific Railway.

A Multi-Million Dollar Baby

During the Past Ten Years Skiing Has Grown from a Minor Sport to a $35,000,000 Industry. And it's Still Growing!

TEN YEARS ago if anyone had suggested that sliding down hill would soon become a $35,000,000 industry, his listeners would probably have pounced on him and dragged him off to the nearest refuge for the mentally deficient. But how wrong they would have been!

Today the business of skiing probably exceeds by several millions the above figure of conservative estimators. Between two and three million devotees worship annually at the shrine of the ski. Each weekend during the season of snow thousands of them crowd the special trains which run to scores of resorts. Other thousands, with special racks for skis fitted on the tops and sides of their cars, throng the highways. Even the crowded subway trains of New York are not exempt and innocent commuters are often in danger of being decapitated by a stout hickory blade in the hands of a not-so-expert enthusiast.

Besides being a boon to the gasoline station operators, the railroads and the manufacturers of sporting goods, ski fever has come as a gift from heaven to the resorts. Well known places, such as Lake George, N. Y., and North Conway, N. H., for instance, which formerly flourished for two brief summer months and then went into hibernation for the rest of the year, now operate on a year round basis. Other spots, which were slowly dying of old age and inertia, suddenly discovered they had ideal facilities for skiing and were rejuvenated with a bang.

Here are a few figures on the new big business. Sun Valley, Idaho, which a few years ago wasn't on any map, has had $4,000,000 spent on its development and now is known from coast to

ETC 31186

The downhill course on Whistler's Mountain, Jasper National Park, is the only one in Canada recognized by the Federation Internationale des Skieurs. Starting at 8,085 feet above sea level, it finishes at an altitude of 3,500 feet.
Photo courtesy Canadian National Railways.

coast. Lake Placid, N. Y., has invested $1,000,000 in winter sports facilities. Mont Tremblant, in Quebec's Laurentians, has a $250,000 ski tow. Old Forge in the Adirondacks has spent $100,000 and North Creek, N. Y., $50,000. At Stowe, Vermont, an ultra-modern chair lift, which was constructed up the side of Mount Mansfield at a cost of $100,000, was opened recently. During the 1939-40 season the New York Central Railroad carried 21,230 skiers and is planning to spend $10,000 on ski advertising this season. And these figures are only a drop in the bucket!

It all began less than ten years ago, when, in 1931, the Boston & Maine Railroad ran the first ski train out of Boston as an experiment. A little band of 197 skiers was aboard, and they were regarded as freaks by a scornful populace. That they weren't so freakish, however, was proved less than a year later, when a snow train pulled out one Sunday with a mob of 3,000 aboard.

Before the above events took place, skiing was generally believed to be a mysterious activity in which no one could excel who was not the possessor of a Scandinavian name. In the average person's mind, too, skiing was synonymous with ski jumping, and ski jumping, judging from pictures in the daily press and on the movie screen, was one of the easiest ways to break one's neck. The 1932 Winter Olympic Games, held at Lake Placid, changed all that and gave skiing the push it needed. Although the Scandinavian contingent mopped up in all events as usual, the slalom, downhill and cross country races opened up the eyes of Americans to the possibilities of the sport as a healthful form of recreation for all.

Although skiing is comparatively new in popularity in the United States, the Finns, Swedes and Norwegians have been at it for thousands of years. It is believed by some delvers into ancient history that skis were first introduced to America by Leif Ericson when he landed on this continent some five hundred years ahead of Columbus.

The Nansen Ski Club, formed in Berlin, N. H., in 1882, was the first organization of its kind in this country. The first recognized ski meet was held at Red Wing, Minnesota, in January 1905, and at that time Gustave Bye set an American jumping record of 106 feet. The National Ski Association, which now has a membership of over 275 chartered clubs, was founded in 1904 and was composed of only five clubs.

Dartmouth College holds a foremost rank among America's ski pioneers, the first edition of the famed Dartmouth

An enthusiastic crowd disembarks from a ski train at Thendara, N. Y., and piles into buses, autos and sleighs for the trip to Old Forge.
Photo courtesy New York Central System.

ETC 31187

A safety patrol comes to the aid of a injured skier on Gore Mountain, Nort Creek, N. Y.
Photo courtesy New York Central System.

Winter Carnival taking place in 1910. The first intercollegiate ski event was the Dartmouth-McGill relay race in 1913. The latter marked the start of the Intercollegiate Ski Union, which became the Intercollegiate Winter Sports Union in 1923 and listed less than a dozen colleges in its membership.

The I.W.S.U. went in for winter sports of all kinds, including snowshoeing, skating, and tobogganing, in addition to skiing. But in the early 1930's skiing forced all the others to take a back seat and in 1934 the Intercollegiate Ski Union was formed, to devote itself exclusively to the national sport of the Norsemen. The I.S.U. now has a membership of 21 colleges, including Dartmouth, Cornell, McGill, Yale. Harvard, Princeton, Williams and M.I.T.

Jumping is by all odds the most spectacular event in ski competition. And the most dangerous! The world's record for a single jump is 350 feet, made in Jugoslavia in 1938 by Joseph Bradl of Austria. The U. S. jump record is held by Bob Roecker, who in 1939 leaped 257 feet at Iron Mountain, Michigan. This doesn't mean that foreign jumpers are so much superior to Americans; it simply means that they have faster jumps over there. As in golf an easy course will knock strokes off your score, so in ski jumping a fast jump will add many feet to your distance. Sigmund Ruud, former world's champion jumper, estimates that a good jumper, on a hill which would enable him to reach a speed of 90 miles an hour, could leap 425 feet without injury.

Since jumping, fortunately, is indulged in by only a few experts, skiing is one of the safer sports. During the 1938-39 season there were only 700 accidents, none of them fatal, among over two million skiers, which means the odds against an individual's getting hurt were about 3,000 to one—less than that if one used care. As additional safety insurance, the National Ski Patrol System was founded in 1938. These safety patrols, which now operate at all the leading ski centers, are made up of expert skiers who have been trained in first aid and approved methods of transporting the injured.

Probably the best known winter sports center in the United States is Lake Placid, site of the 1932 Winter Olympics. There, in addition to ski facilities of all kinds, is the championship bobsled run on Mount Van Hoevenberg, down which the four famous Stevens brothers of Lake Placid still race to glory and new records.

North Creek in the southern Adirondacks is a New York center where snow can usually be found when slopes everywhere else are bare. This tiny mountain village, away up where the mighty Hudson is only a trout stream, dozes peacefully during most of the year but wakes up full of vigor when the first

Like a village in Switzerland is Sun Valley, Idaho's famous winter resort.
Photo courtesy Steve Hannagan Associates.

ETC 31188

Snow flies as a skier does a slalom in good form in a race at the eastern slope, North Conway, N. H.
Photo courtesy Eastern Slope Inn.

flakes of snow begin to sift downward.

Stowe, Vermont, tucked away at the foot of Mount Mansfield, highest of the Green Mountains, is another spot which is blessed with snow during most of the cold season. Its $100,000 ski lift moves at a speed of 500 feet a minute and can carry 200 passengers an hour in each direction in its 87 individual chairs which are spaced 147 feet apart. The lift rises 2,030 feet and has a horizontal length of 6,330 feet.

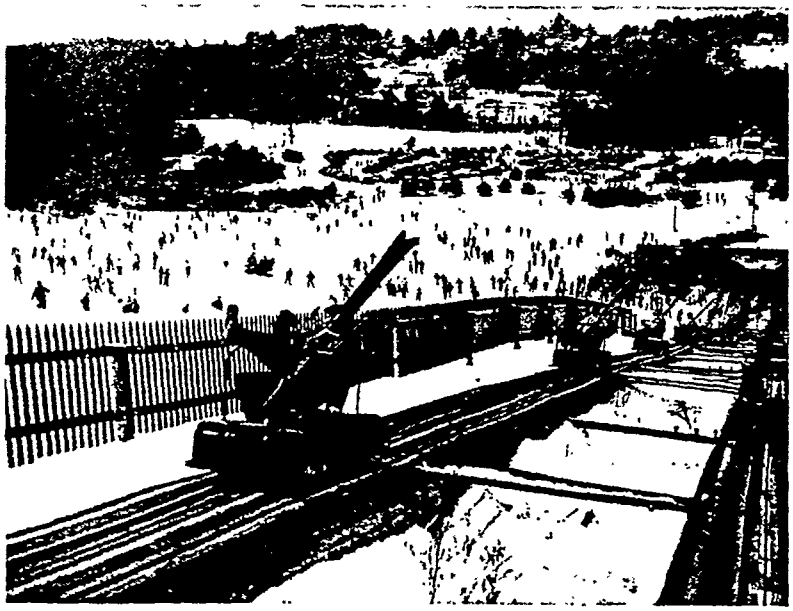
The man behind that popular development, the Eastern Slope, at North Conway, N. H., is Harvey Gibson, who was head man at the New York World's Fair and is chairman of the board of the Manufacturer's Trust Company. Not far from North Conway is Mount Washington, highest of the White Mountains, on the sides of which devotees of the ski cavort until late in June.

For those who desire a European flavor in their skiing there are the Laurentian hills in Quebec, the province in which French is the language of nine-tenths of the populace. The quaint city of Quebec, famed rampart of the St. Lawrence, is like a bit of the old world dropped from the sky into the new. Some of the finest skiing in America is to be found in the Laurentian resorts, in which millions of dollars have been invested.

Farther west are the Canadian Rockies and Jasper National Park. In the latter is the only downhill course in Canada which meets the standards of the International Ski Federation. Starting at the top of Whistlers Mountain at an elevation of 8,085 feet, the run traverses a three and a half mile winding trail down to Jasper village at an elevation of 3,500 feet.

No ski article would be complete without mention of Sun Valley, the infant prodigy of ski centers. Development of this $4,000,000 resort was begun just a few years ago by W. Averell Harriman, chairman of the board of the Union Pacific Railroad, who commissioned Steve Hannagan, ace publicity director, to put it on the map. Sun Valley offers every kind of winter activity and, in addition, has two warm water outdoor pools, which make it possible for visitors to swim in the fresh air the year round.

Other resorts, too numerous to mention here, are thickly scattered throughout the northeastern and the far western states. Even Illinois, which for the most part is flat as a pancake, has a championship jump. Chambers of commerce are backing the ski movement, because it means business, and residents of the resorts are almost one hundred per cent ski minded. They stage barn dances and similar forms of entertainment in profusion to fill in the hours of darkness, when the skiers are not on the slopes.

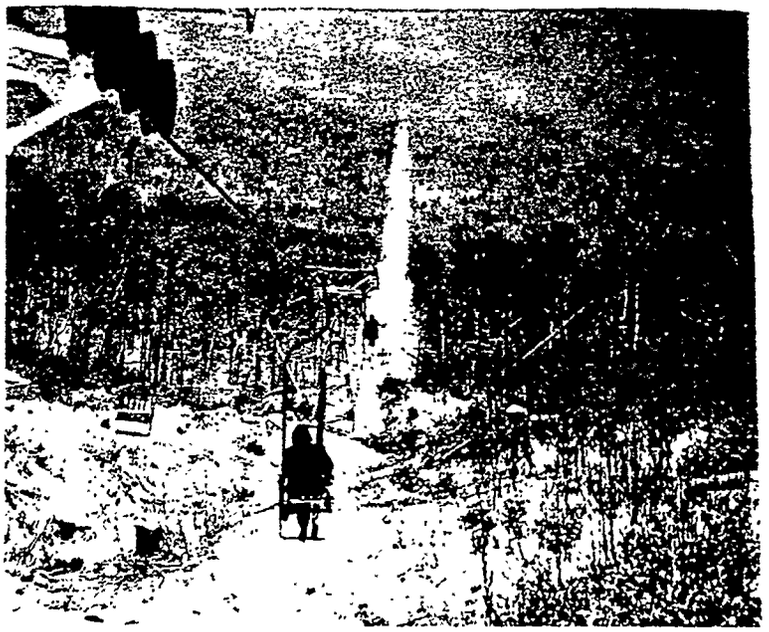


Skiers ride up the hills in comfort aboard skimobiles, which operate at the eastern slope, North Conway, N. H.
Photo courtesy Eastern Slope Inn.

ETC 31189

Two skiers start up the side of Mount Mansfield on the new $100,000 chair lift. The empty chair on the left is coming down.

Photo courtesy the New Haven R.R.



Skiing seems to be the answer to the question: What shall I do for outdoor recreation when the golf courses are snowed under? Like golf, it enables one to compete with one's self in a struggle for continuous improvement.

And it may be the answer for the tired business man who is weary of the city and would like to retire to the country for good—"if I could afford it." A small amount of capital invested in a ski tow and a little advertising, and he would have a profitable business!

"A bit of cinnamon toast, miss?" This tea table sheltered by blocks of ice in the Laurentians may be convenient for the skiers, but it looks as if the waiter might get frostbitten.

Photo courtesy Canadian Pacific Railway.

ETC 31190

A long avenue of royal palms leads into the McKee Jungle Gardens. These trees belong to one of the 300 species of palms in the 80 acre botanical paradise.

JUNGLE IN CIVILIZATION

A Visit to the McKee Gardens in Florida is Like a Trip to Darkest Africa. Wide Variety of Plant Life Thrives in Their Fertile Soil.

A BIT of Florida as it was when Ponce de Leon came seeking the miraculous Fountain of Youth still remains in the McKee Jungle Gardens, located on U. S. Highway 1, three miles south of Vero Beach. These eighty acres of lush, exotic, mysterious beauty, which are easily accessible and open to the public, contain scenery such as a traveler through the inner fastnesses of India or Africa would see.

The jungle is the hobby of two well-to-do orange growers, Waldo E. Sexton and Arthur G. McKee, who decided natural beauty was more to be desired than space for more orange groves. It has been found valuable by the plant and seed importation department of the United States Government as an Ellis Island for plant immigrants, many of which are placed there for extended observation. The fertility of its soil is remarkable, pushing up bamboo sprouts which ordinarily never grow more than 50 or 75 feet tall to the impressive height of 150 feet in from six to eight weeks.

Among the plants which are thriving in the McKee jungle are 40 varieties of rubber trees, 110 kinds of palms, many types of tea and coffee plants, the Cajeput tree which Edison prophesied would someday be used extensively for insulation, spices, vanilla vines, Australian tree ferns 15 feet high, weeping laurels, over 50 kinds of orchids of all colors, and tens of thousands of air plants which grow in the tops of trees.

A special section is devoted to the clinical growing of ramie from China, a plant which has a fiber 16 to 20 times as strong as cotton and four times as strong as linen. Ramie, the oldest known fabric source, was used by the early Egyptians for wrapping mummies, and the centuries that have elapsed since the days of King Tut have given ample proof of its durability.

To satisfy seekers after the unusual, there are the wine palm, a living vat which produces 124 gallons of palm wine a season; the traveler's palm, yielding, when gashed, sufficient water to satisfy the thirstiest desert traveler; the compass tree, with its branches growing in geometric progression and pointing to the four points of the compass; the barometer fern, which grows on tree trunks and spreads out when rain is due but folds up when a dry spell is on the way; the spider orchid, bearing a close resemblance to its namesake; the

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A mammoth Victoria Regia lily pad provides an excellent sun seat for this little fellow.

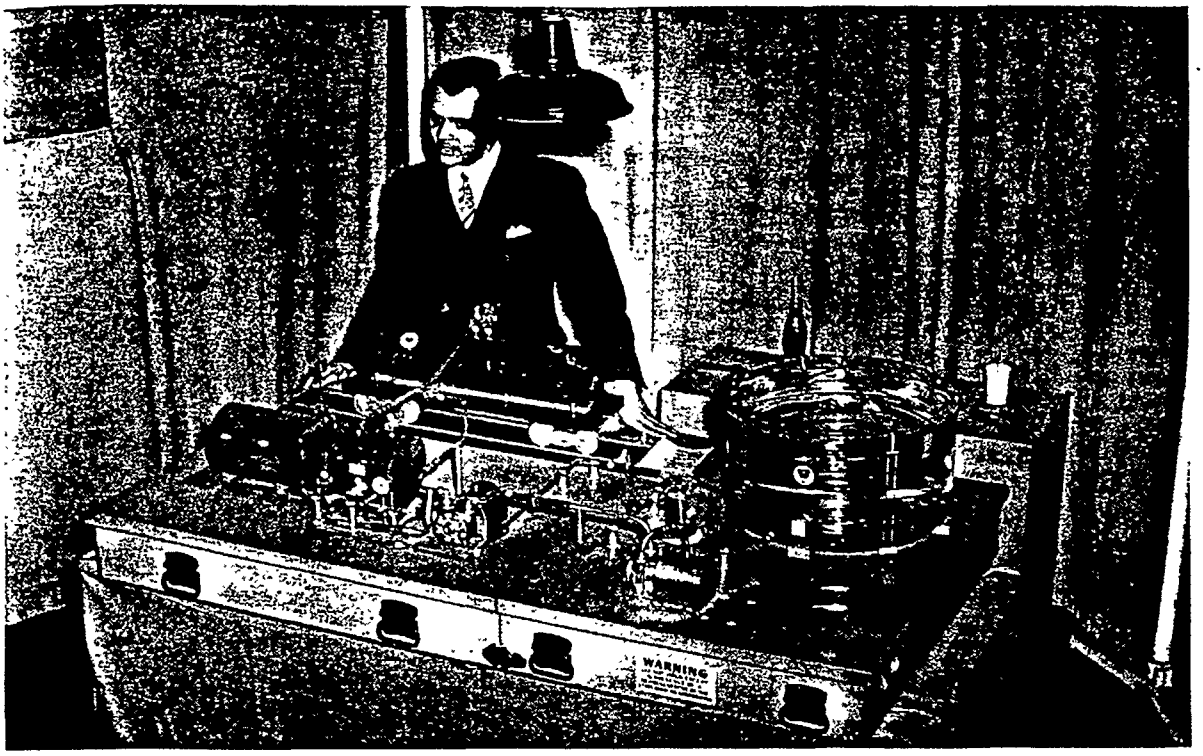
ylang-ylang perfume tree, which sweetens the atmosphere for a considerable distance; the insect eating pelican flower; the royal water-lily, with its leaf large enough and strong enough to support a 30-pound child; green roses; a plant that at intervals crackles like a string of firecrackers; the screwpine, trunk and limbs of which spiral heavenward; the strangler fig, which encircles a sturdy oak or palm and kills it within a few years.

The character of the native jungle has been carefully retained, even to the hundreds of apes and monkeys which scamper through the trees.

Many motorists are adding the McKee Jungle Gardens to their "must" list of things to see during a vacation in Florida.

A member of the McKee monkey family lazily strokes a spiked sandbox tree. The sandbox tree is also known as the "Monkey Dinner Bell," because, when its seed pods are ripe, they burst with a loud report, summoning the monkeys to feed on the scattered pods.

ETC 31192



The portable, miniature blending plant, constructed by the Chicago Division, set up for a demonstration, with Howard Hudiburg, safety man in the division, ready to show how gasoline, tetraethyl lead and dye are blended.

Model Ethyl Blending Plant

Glass Miniature, Constructed by Chicago Sales Division, to be Used for Demonstrating Various Operations.

A MODEL blending plant of glass, showing the procedure in mixing gasoline with tetraethyl lead and dye, has been constructed by the Chicago Sales Division.

The model was displayed first at the joint Chicago-Dayton division meeting this winter in French Lick, Indiana. It will be used for demonstrating the various blending operations to company engineers and other interested persons.

All of the blending operations are conducted with the model, just as in real plants. While the demonstration is in progress, photographs of valves and other equipment under discussion are projected on a small screen.

The model was constructed in two sections, each about three feet square and with separate covers so the miniature pant is portable. The two sections are set up on a table, the two pipe-lines connected with short sections of rubber tubing, the electrical connection plugged in, and the model is ready for the demonstration.

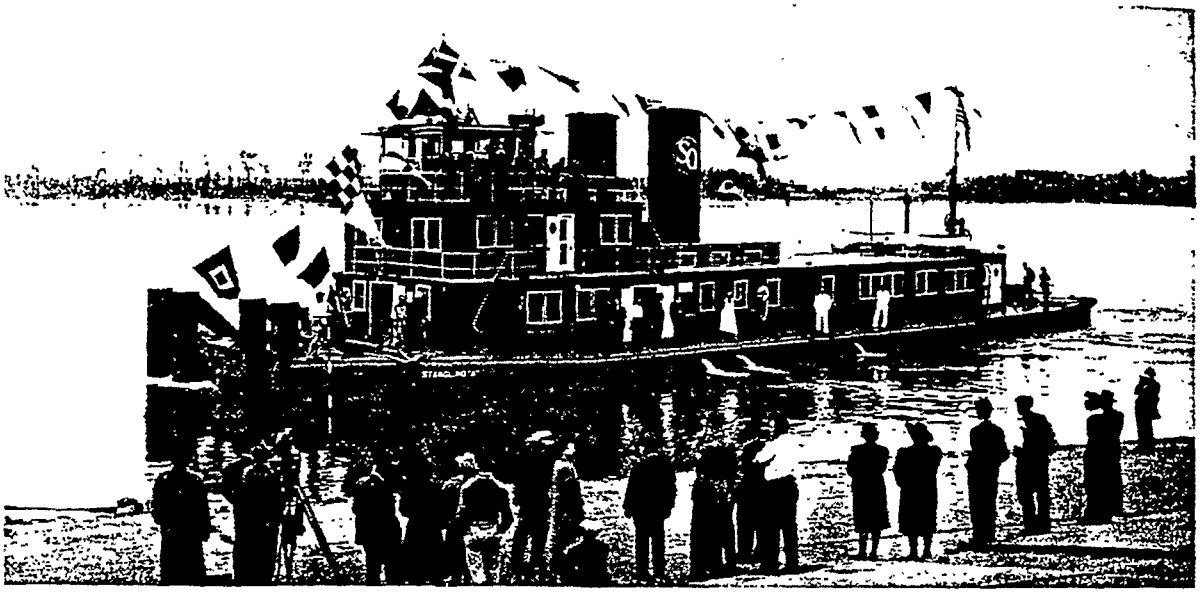
Howard Hudiburg, a safety man in the Chicago Division, thought up the idea for the model blending plant. His hobby is making models, and he foresaw the possibilities of demonstrating what occurs inside blending plant tanks, valves and lines to supplement knowledge gained by studying flow charts and valve diagrams. Mr. Hudiburg and A. B. Wyrick worked evenings and weekends for six weeks in making the model.

The tank car and weigh tank are made of cellulose acetate. The field storage tank is a glass bowl with a celluloid roof. All the pipelines, the dye pot, and check valves are of glass. The model has an eductor and recirculating pump. The miniature field tank is filled with water to simulate gasoline, and the tank car contains a vegetable dye to represent tetraethyl lead.

All refinery blending operations are conducted with the model. The tank car is unloaded into the weigh tank by pulling a vacuum on the weigh tank. The tank car then is washed by circulating "gasoline". The clear "gasoline" is circulated, with "tetraethyl lead" entering the stream in the proper concentration and the material for coloring the gasoline to the refiner's specification coming from the miniature dye pot.

A complete demonstration is given at meetings conducted for refinery personnel, showing blending procedure, with an extensive discussion on the eductor valve and the ability of vacuum to raise liquids in the lines.

ETC 31193



The Stanolind, latest word in towboat efficiency, which was built on Lake Michigan and traveled past five states to reach her home berth in Illinois.

Old Man River Gets a Streamlined Towboat

HORACE BIXBY, once the most famous pilot on the Mississippi and the man who taught Mark Twain his art, would sit up in his grave and blink if he could see the latest type of river boat nosing its way past Cairo and "taking the fork" up the old Ohio river.

It is a far cry from the floating palaces of the 1860's, such as the *Natchez* or the *Robert E. Lee*, that used to race each other proudly up and down the river with pine smoke and sparks rolling from their twin funnels. The new boat even makes obsolete the more modern stern-wheel towboats, designed to push long lines of barges lashed together. Soon they too will disappear, leaving to the rivermen only their memories of the soft, whistling puff-puff of exhausts, the muffled booming of paddle wheels below the bend, and the quiet, carefully pulled "ding-ding . . . *dang*" of the engine room bells coming across the water at night.

For the towboat of tomorrow has appeared—all metal, streamlined, sturdy, and super-powered to make long runs pushing a block of heavily loaded barges ahead of it.

This is the *Stanolind A*, built for Standard Oil Company of Indiana, designed for barge service on the Mississippi and Ohio rivers, with her home port at Evansville, Indiana. She measures 144 feet in length, from her four stubby towing knees at the bows to her twin screws aft—tunnel-type, for work in shoal river waters. She is 35 feet in the beam, draws 8½ feet of water. Deck house and pilot house are low-lying, as are the short stacks rising from her texas deck. Twelve hundred horsepower transmitted through 76-inch propellers, gives her "oomph" to move 2,400,000 gallons of Stanolind oil products in six loaded barges, even against the current.

In each efficient detail she's a 1941 model water craft. The engine room is neat as a pin; even the roar of the two 600-horsepower engines is deadened with a Maxim silencer and sound-proof material on the bulkheads, so the engineer can talk easily with the pilot through loud speaker microphones. The pilot house would have our Horace

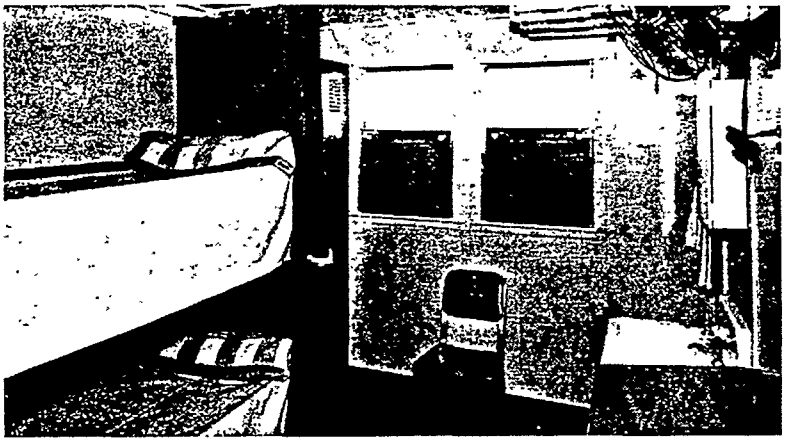
Captain Charles E. Rheinhardt at the steering levers in the pilot house. In front of him is the modern semaphore type of engine-room telegraph; overhead are controls for searchlights.

ETC 31194

Bixby blinking again. Instead of spinning a tall wheel, the pilot manipulates a pair of shining brass levers to steer the boat. Electric fans and a modern heating system guard him against hot or cold weather; a shining aluminum high swivel chair provides for his further comfort while he's on wheel watch. A battery of high powered searchlights aids him at night; no longer will he need to read each ripple of the dark water with owl's eyes to know when he's in the channel.

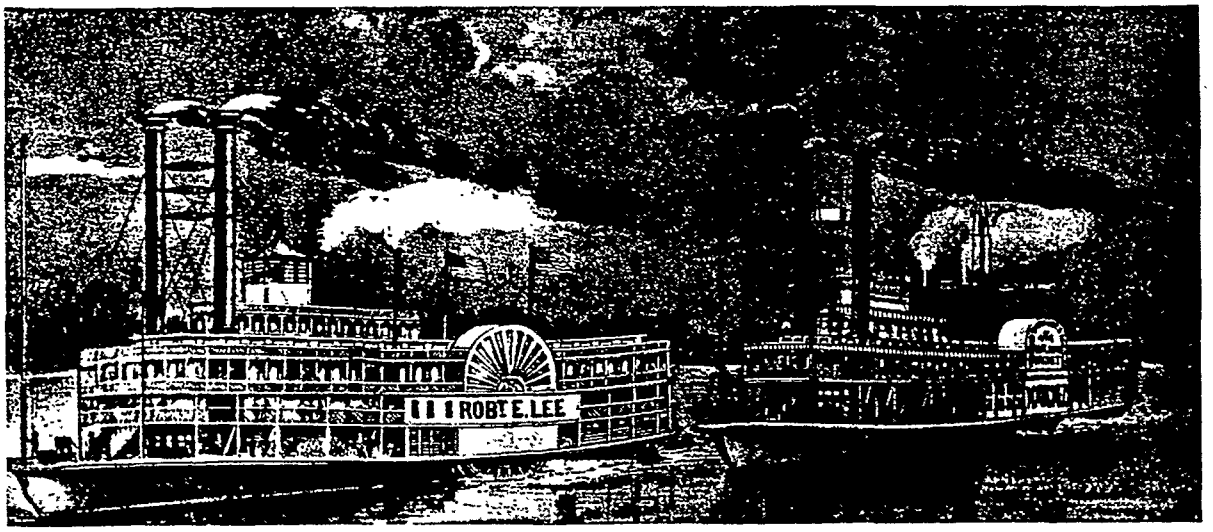
No less sumptuous are the crew's accommodations. Besides having a roomy, well-equipped mess room and galley, they are provided with quarters that would have deep-water sailors green with envy. The crew is quartered two men to a room; each room contains a pair of bunks, two lockers for clothing and personal belongings, a drop-leaf writing desk mounted on the bulkhead, a streamlined leather-cushioned chair, a 15-inch electric fan, and a wash basin with hot and cold running water, medicine cabinet with plate glass mirror, towel rack, toothbrush holder and soap dish. Each berth is fitted with curtains to shut out the light—and for those who like a mystery story before going to sleep, there is a private reading lamp at the head of each berth.

The kitchen of an up-to-date housewife is no more efficiently equipped than the Stanolind's A's galley with its oil-burning range, two electric refrigerators, sink and drain board, lockers and dish racks, electric coffee urn, electric fans and clock.



In each of the crew's seven staterooms there are two metal berths, two lockers for clothing and personal effects, a drop-leaf table, a 15-inch electric fan, wash bowl with hot and cold running water, plate glass mirror and cabinet over the wash basin.

An old print of the famous race between the Robert E. Lee and the Natchez, river queens of an earlier era, shows how they differed from the 1941 model.



ETC 31195

A general view of a few of the cattle pens at the Stock Yard. In the background is the Exchange Building and the aerial of radio station WAAF.

Stock Yard Has a Birthday

Chicago Livestock Market, Largest in the World, Marks 75 Years of Service to Agriculture. Volume of Business Exceeds 21 Billions.

CHRISTMAS DAY, 1940, marked the completion of 75 years of service to American agriculture by the Chicago Union Stock Yard which first opened its gates on that day in 1865. Since then it has won recognition as the greatest competitive livestock market in the world.

A total of 896,000,000 cattle, hogs, sheep and horses has been sold there for $21,500,000,000, and this large sum, returned to farmers and stockmen throughout the Corn Belt and the western states, has been a leading factor in developing the agriculture of those regions. No matter what type of livestock the producer desires to sell, he has always been able to find a cash buyer among the many who bid against each other on the Chicago market.

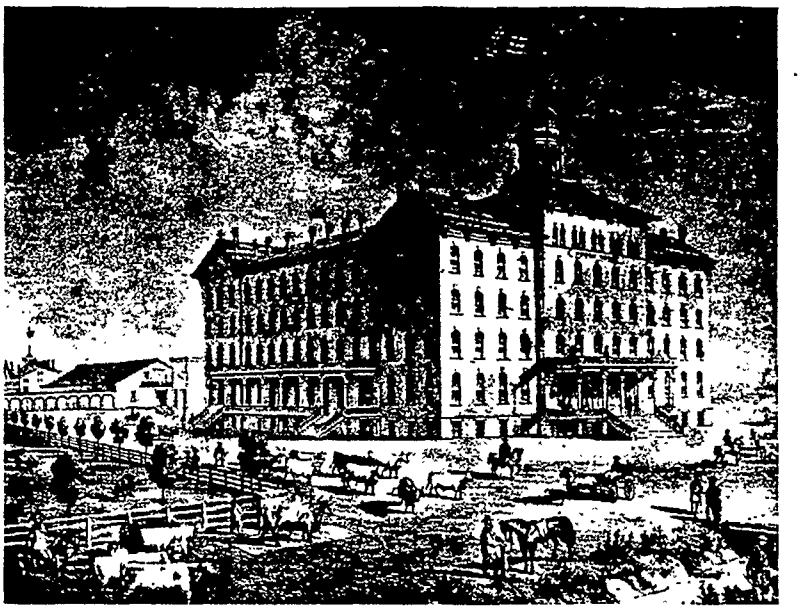
An average of 1,000,000 head has been sold each month during three-quarters of a century.

Located at the greatest of all railroad centers, between the vast producing areas of the West and the thickly populated consuming centers of the East, the Chicago livestock mart occupies a strategic position. Twenty-eight railroad systems bring in livestock or carry them away, making the city a natural meeting place for shippers from the West and buyers from the East.

Due to the tremendous volume of livestock always available, the largest packing houses in the world have been constructed just west of the market in what is called Packingtown. Over 300 buyers, representing the Chicago plants and slaughtering establishments located throughout the East, are constantly in attendance and establish true market values by balancing all factors of supply and demand. The fact that Chicago sells a larger volume of livestock than any other point makes it the price basing point for the entire industry.

The Chicago market has also been an important factor in making agriculture more profitable and attractive. As far back as 1871 a national swine show was held on its property. In 1900 the world famous International Live Stock Exposition was founded and a permanent home given it at the Chicago Stock Yard. Starting at first as purely a livestock show, this exposition has expanded

ETC 31196



This print shows the Hough House as it looked shortly after the Civil War. The site, which is at the East entrance to the Stock Yard, is now occupied by the up-to-date Stock Yard Inn.

its sphere of usefulness and has added such important departments as the International Grain and Hay Show. The 41st International, which was recently staged, set still higher standards for an educational agricultural exhibition.

How did this great commercial institution, the Chicago Union Stock Yard, happen to come into existence at the location where it is now, within the borders of a great metropolis? The earliest records disclose that livestock were driven from the rich Wabash country of western Indiana over trails to near the site of Fort Dearborn at the mouth of the Chicago River, where they were slaughtered to furnish fresh meat for the garrison and the early settlers. In the 1830's the first eastern outlets for Chicago packed meat developed, when orders were received for barreled beef and pork to be shipped by boat to Buffalo, New York and other cities. Since there was no livestock market as we use the term today, it was necessary for the men who received these eastern orders to ride down into Indiana and Illinois, purchase the required animals and drive them to Chicago.

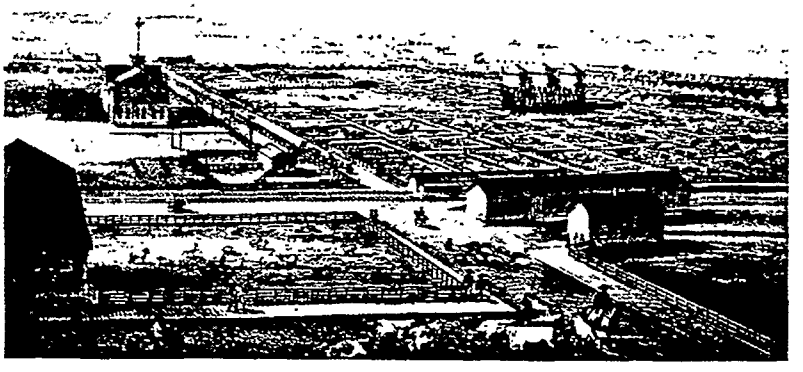
For the next twenty years the city had two packing seasons, one for beef in the late fall and one for pork during the cold weather of winter. The stockmen grazed their cattle on the lush grasses of the prairie, gradually working them toward the city to be slaughtered in the small packing houses. The meat was packed in barrels, loaded on lake vessels and started eastward before Lake Michigan was closed to navigation for the winter.

After the beef was shipped, the packing houses prepared barrels for the coming crop of pork. When the weather grew cold, farmers brought in their hogs either on sleds in carcass form or on foot over the icy roads to be packed. As soon as the ice was out of the Great Lakes in the spring, the meat was hurried forward ahead of warm weather, as in those days refrigeration was unknown.

As early as 1836, the Myrick Tavern on the lake shore was a favorite stopping place for drovers bringing their animals up from the southern country. In order to furnish facilities for its guests, this tavern provided pens for livestock as well as stables for the horses, and in due time the buyers in the city found it convenient to ride out and trade with the drovers at that point. However, much of the land near Chicago was low and swampy, so to make it easier to reach the trading center a series of planked roads radiating from Chicago into the country were built. These were toll roads and those who used them paid a certain amount per mile for each horse or beast. Soon other taverns were built on these roads near the limits of the village, each with its compliment of barns and pens and so other livestock markets sprang up.

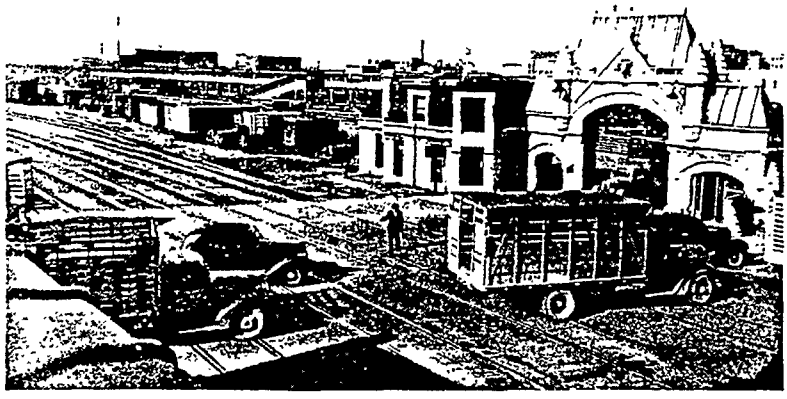
The year 1852 marks the real beginning of what we now know as a livestock market. In that year two railroads, the Michigan Central and the Michigan Southern, reached Chicago from the East after a spectacular construction race. This caused the livestock market to spring immediately into greater importance, as it now had buyers from Chicago plants and eastern slaughtering houses.

In 1856 a junction railroad joined the Chicago & Northwestern and the Chi-



The Stock Yard looked like this in its early days. In the left background is the old Exchange Building, a dwarf in comparison with the present nine-story edifice which was built on the same site.

ETC 31197



Through this historic stone gate at the entrance to the Stock Yard trucks carry a greater tonnage of livestock than is received at any other point in the world.

cago, Burlington & Quincy lines with the eastern railroads, making it possible for livestock arriving from the West to reach the growing markets of the East. For several years these railroad markets divided the livestock trade in the city and with the coming of the Civil War the volume of business which they handled increased tremendously. Packers who had previously operated at Cincinnati, known as Porkopolis because it was the largest pork slaughtering center, and other cities dealing with the South transferred their operations to the safer territory at Chicago. New packing houses sprang up and Chicago forged to the front as the leading pork packing center, just as it had a few years previously taken the lead as a beef slaughtering center.

In June 1864 the Chicago Pork Packers Association called a meeting to propose a possible plan to consolidate the numerous yards in relation to the railroads and thus eliminate an inconvenience. In July 1864 the railroads agreed to finance largely the construction of a great union stockyard south of the city and a junction railroad connecting all nine lines entering the city. They agreed to transfer all of their business to this market and to handle all incoming and outgoing livestock through this union yard.

On February 13, 1865, a group of Chicago packers and railroad men obtained a charter for the Union Stock Yards and Transit Company, and in July of that year ground was broken on a 345 acre tract lying just south of the city limits. A great nine story brick hotel, known as the Hough House in honor of Colonel R. M. Hough who was the leading spirit in charge of the actual construction of the market, was built on the present site of the world famous Stock Yard Inn. An independent post office known as Stock Yards, Cook County, Illinois, was established.

The Chicago Union Stock Yard has its own daily livestock paper, its own bank, its own branch post office, its own telegraph offices. It is, in fact, still an independent community within the larger metropolis of Chicago.

On Christmas Day, 1865, the Stock Yard, which was destined to be the outstanding livestock market of the world, opened its doors for business. Due to conflicting reports concerning its actual opening, there were no livestock received on the first day. However, on December 26 the first train of fifteen cars of hogs was sold with great enthusiasm.

The principle upon which the Chicago market was founded, that the best method of selling livestock is in free and open competition, proved sound. Throughout the intervening years a steady stream of livestock has poured into the mart and been converted into cash. With the advent of the hard roads and the availability of trucks, a large number of animals began arriving over the highways, until now a greater tonnage of livestock is received at this market by truck than at any other point in the world. Approximately fifty per cent of the livestock received at the yard is brought in by truck. Some of these shipments come from distances as great as 800 miles, but the average trucking distance is one hundred miles. In 1939 there were received at the yards 147,816 truckloads of livestock, representing about 29,500,000 miles of truck travel, which consumed close to 5,500,000 gallons of gasoline.

Yesterday meets today when a covered wagon of 1865 vintage, visiting the 1940 International Livestock Exposition at the Chicago market, halts before the modern Stock Yard Inn.

ETC 31198

One of New York's new 3,500-gallon street flushers takes the first bite into a storm which hit the island with hurricane force.

Keeping New York's Streets Clean

A Fleet of Thousands of Motor Vehicles is Maintained by the Metropolis for Use in the Year 'Round Battle Against Dirt and Snow.

WHEN a big snow storm hits New York City it can really tie things up. Seeing that it doesn't is the job of the Department of Sanitation, the battalion of "whitewings" who, under Commissioner W. F. Carey, spend their time in good weather collecting refuse, cleaning and washing the streets, and piling up filling in areas where landfills are needed.

Because traffic on the streets of New York is so dense, it is all-important to keep them open from the very first flurries of snow. Letting the storm get a head start would mean such confusion that snow-removal efforts would be seriously hampered. With only the center of the streets open, all traffic moves at the pace of the slowest vehicle. Parking becomes hazardous and cars are left almost in the middle of the road, blocking other cars and getting in the way of snowplows.

For this reason, storms are anticipated as much as possible and equipment for battling them is made ready, waiting at the 58 various departmental garages about the city. Not only is the conventional type of snowplow used, but many of the Sanitation Department's garbage trucks or sprinkler trucks are quickly fitted with broad plows and sent out to keep things open. Dump trucks and loaders scurry out to carry away the piled-up snow. Because of the need for immediately mobilizing snow-clearing facilities when a storm strikes, most of the regular equipment used by the department is designed to be of use during winter storms.

The present streamlined, covered, automatic-loader-collection truck was evolved with two thoughts in mind: to control dust and litter, as was practically impossible with the old open trucks, and to eliminate the need for lifting heavy cans six or more feet. Many employees were suffering from hernia or other internal injuries from the strain of heaving up the cans. Now they merely dump each can into a hopper in the rear and a conveyor distributes the material evenly over the entire truck.

The latest units have a hydraulic drive on the conveyor, so arranged that if the conveyor clogs, a special valve reverses the mechanism and allows it to clear itself. All these machines, like the street flushing trucks, are fitted with plows in winter time.

The street flushers, most of them designed by department engineers, will wash the dust and debris from seven-eighths of a mile of pavement, over a path 40 feet wide. They carry 3500 gallons of water.

Another summertime machine which does double duty in the winter is the patrol sweeper, a three-wheeled affair with brooms underneath and, in snow season, a plow in front. Operated in three shifts throughout the 24 hours, each machine will sweep 60 miles of curbs a day. A rotary broom of steel fibre in front throws dirt from the curb directly under the machine. Another spinning broom made of split rattan or bassine fibre tosses these sweepings into a metal hopper under the car. In winter the plow and sweeper can be operated together or independently.

But this isn't all. Hundreds of tractors are fitted each winter with crosswalk plows, to spend their time nosing into drifts in busy locations, pushing away the high ridges of snow that trucks or other snowplows leave in the pedestrians' way. Two other types of equipment complete the picture — the open trucks which haul the snow away and the automatic loading machines which throw the snow into these trucks. Each department snow-loader can load 15 tons a minute.

All these vehicles—more than 2,000

ETC 31199

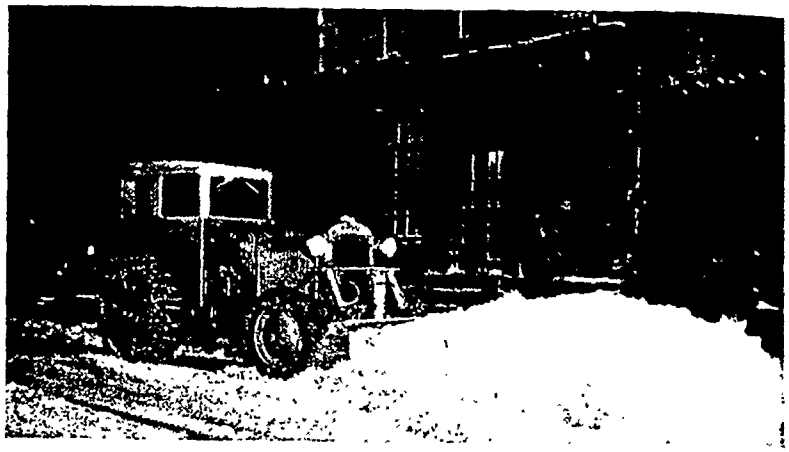
of them—make an impressive fleet of automotive equipment, but this is not by any means the whole list. There are also 143 executives' passenger cars, 29 motor tricycles, 58 light delivery trucks, three fuel tank trucks, four 700-gallon pumpers formerly used by the fire department, 22 rack platform trucks, and three tractor-trailer units for carrying heavy equipment around. Two of these carry 20 tons; the third has 10 tons capacity.

Above and beyond these, there are many pieces of equipment used in landfill or construction—four truck cranes, 24 crawler wagons of 20 tons each, seven dragline excavators, three power road-graders, 46 sand spreaders, a crawler shovel, and three complete offices—with desks, lights and telephones, mounted on 7-ton chassis. They are used as headquarters during landfill operations or on emergencies where long, arduous rescue work is necessary.

Because of the size of this fleet, a regular program of preventive maintenance was instituted in the fall of 1936. Although this type of fleet care has been used by many private operators, New York's Department of Sanitation believes it is the first municipal department to practice this mass economy. Since its inception, maintenance and repair bills have been reduced more than thirty percent.

Picture on the Cover

This month's cover shows the historic meeting of Washington and Lafayette at Valley Forge, from a painting by A. Chappel. An engraving by H. B. Hall, copyright 1858, is in the collection of the New York Historical Society, by whose permission a copy was made.



A busy little cross-walk plow, used mainly for clearing intersections, is photographed here piling up snow on one of the busy industrial streets. Later the snow will be loaded on a truck by a snow-go machine.

One reason the kids don't make snow forts in New York. To keep the streets clear for traffic, all the snow is hauled away and dumped into the river. Here a squad of hired trucks lines up at Battery Park with a load for the Hudson River.

Awkward looking but practical, these snow-go machines are able to load fifteen tons of snow per minute.

ETC 31200

NO RETURN TO DARK AGES

Interview With Scientists Reveals a General Note of Optimism, Says Bruce Bliven, Writing in the New Republic. Reasons for War Seen Becoming Obsolete.

THE SCIENTISTS are on the whole optimistic—markedly more so than any of the other groups in the community with whom he has recently come into contact, says Bruce Bliven, writing in the New Republic. They do not believe that civilization is perishing, that the Dark Ages are about to return. On the contrary, they think that through the work of science itself, mankind is on the threshold of a new and better existence than ever before.

They feel, for example, that most wars nowadays are fought (or so the statesmen say) for reasons that are already partly obsolete and will soon be almost entirely so. One important basis for international conflict is the struggle for raw materials and natural resources many of which we are already able to reproduce artificially in the laboratory. It is always stupid for men to kill each other; but it becomes doubly foolish when they do so for the possession of things that they can easily and abundantly obtain in other ways.

The scientists, with almost no exceptions, believe firmly in democracy as the only possible way of life. They consider that one of the most important things in human experience is the search for truth, and they know that this is only possible when the "winds of freedom blow." It was the liberalism that came to Europe in the eighteenth century that made possible the great advances of the last 150 years—advances far larger and deeper than in all man's previous history on earth.

They believe—and have vehemently stated — that under the totalitarians, with their rigid restrictions on men's minds, their denial that there is any such thing as universal truth (distinct from Nazi or Fascist or Communist truth) progress cannot long continue.

These research experts show little fear that mankind is destroying the irreplacable raw materials and will some day suffer drastically for this. The reason is that some of these resources have proved to be far greater than was supposed. Not long ago, for example, people were worried lest our oil resources should last only a few years longer; and it is a fact that at the present rate of consumption, oil for gasoline within the United States would be exhausted in about thirty years. But there is enough oil in shale rock (at a somewhat higher cost of extraction) to last 3,000 or 4,000 years and there is coal enough for about 2,000.

Nowadays gasoline can be made from shale rock or coal. Tomorrow its sources may be almost anything containing carbohydrate material. The other day in the laboratory of Dr. Ernst Berl of the Carnegie Institute of Technology was exhibited a test tube full of high grade motor fuel. It had been made from molasses. Dr. Berl (who, incidentally, is a great former Austrian chemist and is a Hitler refugee) can produce the same result from corn, wood, seaweed or leaves. We can also run motor cars on alcohol, and alcohol can be made from corn, molasses, beets, Jerusalem artichokes, sweet potatoes—or for that matter, from petroleum, wood or coal.

Moreover, we do not know how much greater efficiency may be achieved in the future from gasoline itself by new methods. Already we have almost tripled the amount of gasoline obtained from a gallon of crude oil, by new types of extraction. The latest "cracking" process, and the addition of tetra ethyl lead, save every year in the United States about one thousand times as much power as is produced by all the vast dams of the Tennessee Valley authority.

The Following

Service Awards

have been made as of

January 1st, 1941

15 YEARS

FRED J. DYKSTRA
Chemical Research, Detroit

THOMAS E. RONAN Sales, New York

10 YEARS

HENRY K. BALL Sales, Boston

HAROLD A. BEATTY
Chemical Research, Detroit

ALMA I. BRASURE
Manufacturing, Deepwater

CHARLES E. COLVIN, JR.
Manufacturing, New York

HOMER H. DEDO Engineering, Detroit

LOWELL A. DOLLAHAN Sales, Chicago

DONALD S. FLYNN Sales, Kansas City

EVERETT N. GARNSEY
Gasoline Testing, Yonkers

HERBERT F. GREEN
Gasoline Testing, Tulsa

DAN M. GUY Sales, Tulsa

HOWARD LAPPE Sales, Kansas City

C. FRED NAYLOR Sales, Seattle

J. B. TAYLOR, JR. Engineering, Detroit

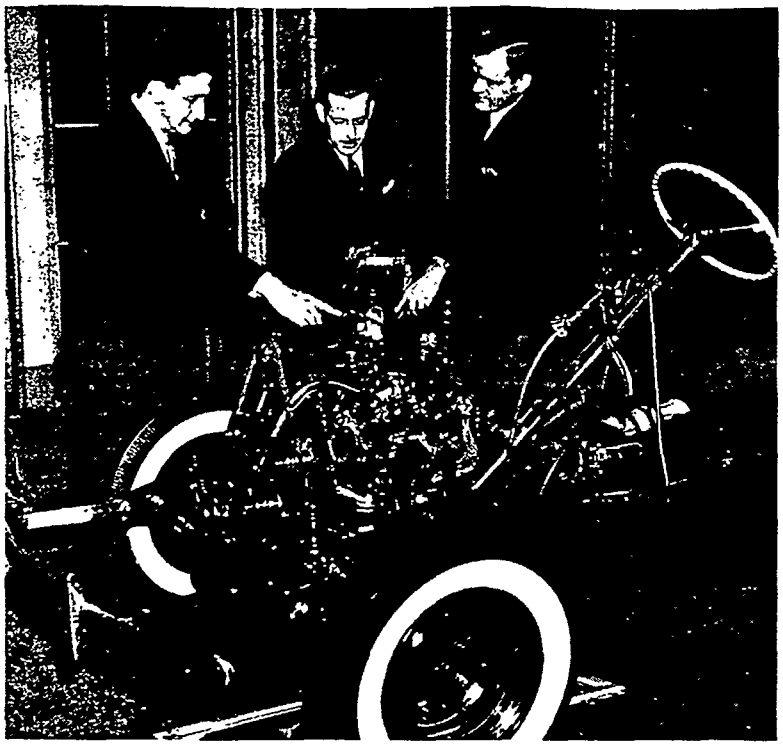
J. D. THOMPSON
Gasoline Testing, Baton Rouge

5 YEARS

ROBERT W. HOGAN Sales, Baltimore

RICHARD B. SNEED Engineering, Detroit

ETC 31201



C. P. Speaker, Ethyl Corporation, H. M. Keast, AAA Service Manager, and W. G. Ball, Ethyl Corporation, discuss the cut-away chassis used in the school.

Ethyl and AAA Complete Cooperative Tune-up School at Philadelphia

THE Automobile Club of Philadelphia, affiliated with the American Automobile Association, has recently completed a series of ten lectures on motor tune-up designed to directly improve the service offered by the AAA to its members.

An analysis recently completed by AAA road service officials, indicated that more than 40% of the emergency service calls arose from tune-up items. Thus, it might be said that 40% of AAA calls actually could have been avoided had each car involved received an adequate motor check periodically to catch trouble in the shop before it could give rise to an emergency service call. Since the AAA is not engaged in maintenance work, its only alternative is to train member garage employees in the art of emergency diagnosis.

This program, one of the first of its kind for the AAA, was inaugurated by Herbert M. Keast, manager of the Emergency Service Department for the Philadelphia Club. Mr. Keast in pioneering such an activity for the association stated "that any effort to bring to our member garages a clearer picture of engine maintenance theory and the quick diagnosis of road service troubles, will be of immeasurable value in improving our emergency service."

Accordingly, a cooperative tune-up school was launched with lectures held once a week in the club auditorium. Various companies in the automotive field contributed speakers to the schedule and their services to the planning committee. The committee in charge of organizing the courses comprised Mr. Keast, Allan Hoover of Sullivan Brothers Company, and W. G. Ball and W. F. Nixon of the Ethyl Gasoline Corporation. In organizing such a training program the committee decided on the basis of previous experiences, that the subject of emergency diagnosis is too great to cover in a few lectures without sacrifice of the required background information. Hence, the subject matter was divided into ten parts, each part to be covered in one evening by a speaker trained in this particular phase of the work.

Following is the schedule and the subjects covered by the cooperating companies:

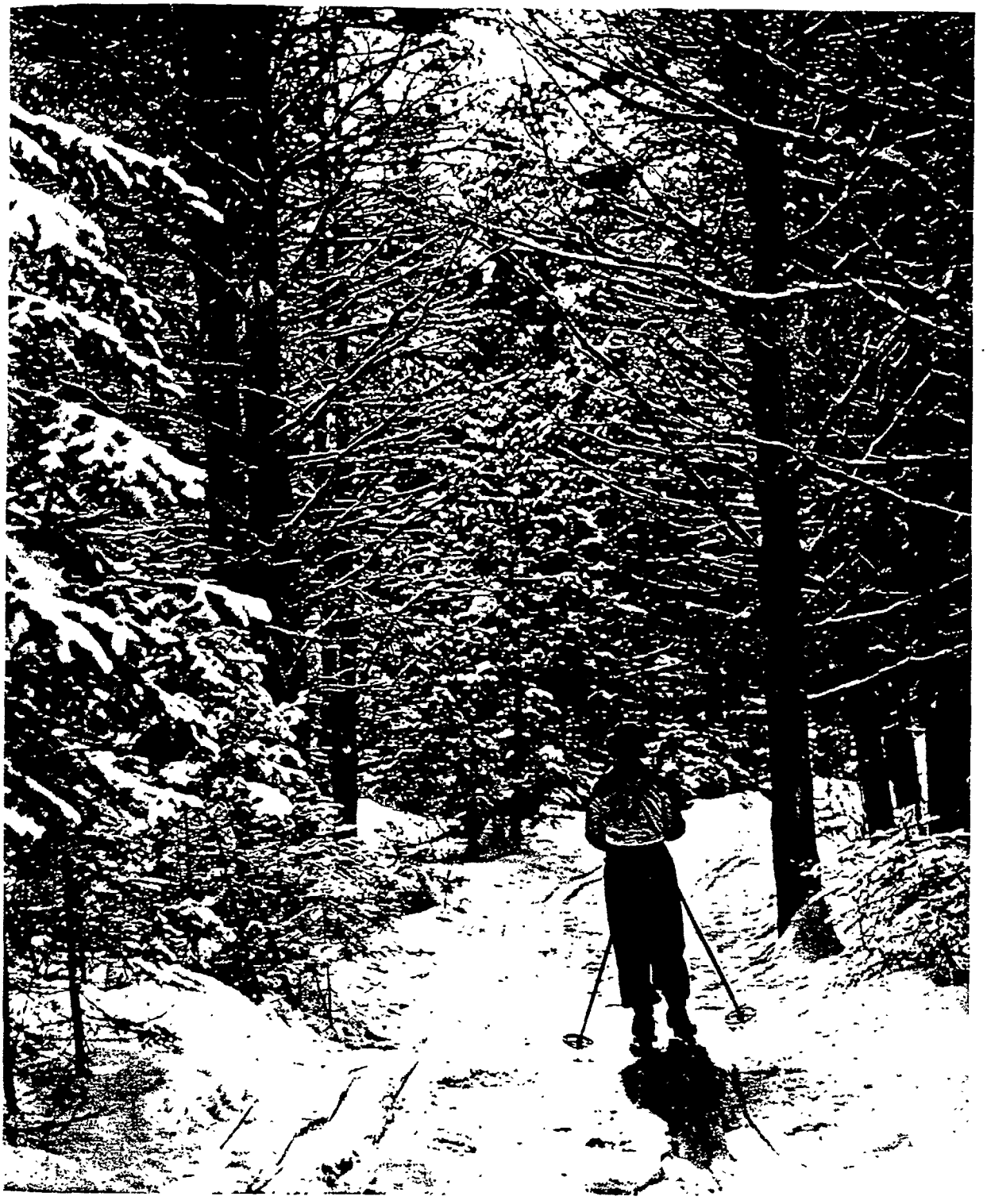
Meeting	*Subject*	*Speaker*
1	Motor Tune-up Procedure	*W. G. Ball*
2	Carburetion Theory	*Allan Hoover*
3	Motor Fuels & Combustion	*W. G. Ball*
4	Compression & Its Bearing on Tune-up	*R. G. Riley*
5	Batteries & Starting Motors	*Clarence Letts*
6	Generators & Regulators	*H. M. Artley*
7	Ignition	*Edw. Planas*
8	Spark Plugs	*Mr. Bucklin*
9	Carburetion Problems	*Chas. P. Speaker*
10	Tune-up Problems	*Chas. P. Speaker*
11	Meeting the Customer	*A. Williamson*

Each shop represented received a set of Ethyl's tune-up posters as well as valuable printed data on tune-up from the manufacturers who cooperated in the school.

One of the garage owners represented in the school has recently purchased a chassis dynamometer and in appreciation for the information he secured from the school he has offered the facilities of his shop for an additional session so that all the men who attended the school may receive an evening's training in dynamometer analysis and tune-up for maximum power.

In view of the success of the school, it is contemplated that the idea may be extended to certain other of the larger AAA clubs.

ETC 31202



Snow clings to the branches of the trees to create this winter wonderland at St. Marguerite in the Laurentian Mountains, Quebec.
Photo courtesy Canadian Pacific Railway.

ETC 31203

Helping America deliver the goods

AMERICA'S ability, not only to produce goods efficiently, but to deliver them where and when they are wanted, has become a keystone of our national strength. In our vast fleets of motor trucks—trucks of many types and sizes built to carry a thousand-and-one commodities—we have a fast transportation system that is ready to serve the Nation.

And as motor transportation takes on new importance, research to improve commercial vehicles and the engines and fuels that propel them takes on new significance. Rapid as automotive progress has been in the past ten years, engineers look forward to a decade of even greater improvements.

But the further development of motor transportation is a task not only for the makers of engines, engine parts and materials, but also for those responsible for the development of fuels and lubricants. For fuels and engines are inseparably related in their use and development.

That's why we of the Ethyl Gasoline Corporation, through our Research Laboratories in Detroit and San Bernardino, are helping to coordinate the developments of the automotive and petroleum industries. Our research workers cooperate with refiners to produce fuels best suited to the engines of tomorrow and cooperate with engine designers to make the best possible use of such fuels. In addition, our field engineers work constantly with users of engines and fuels in the practical application of laboratory findings.

Our research facilities, together with the results obtained from many tests and experiments with possible future fuels, supercharged engines and engines having super-compression ratios are always available to the technical men and organizations now planning to help America "deliver the goods."

* * *

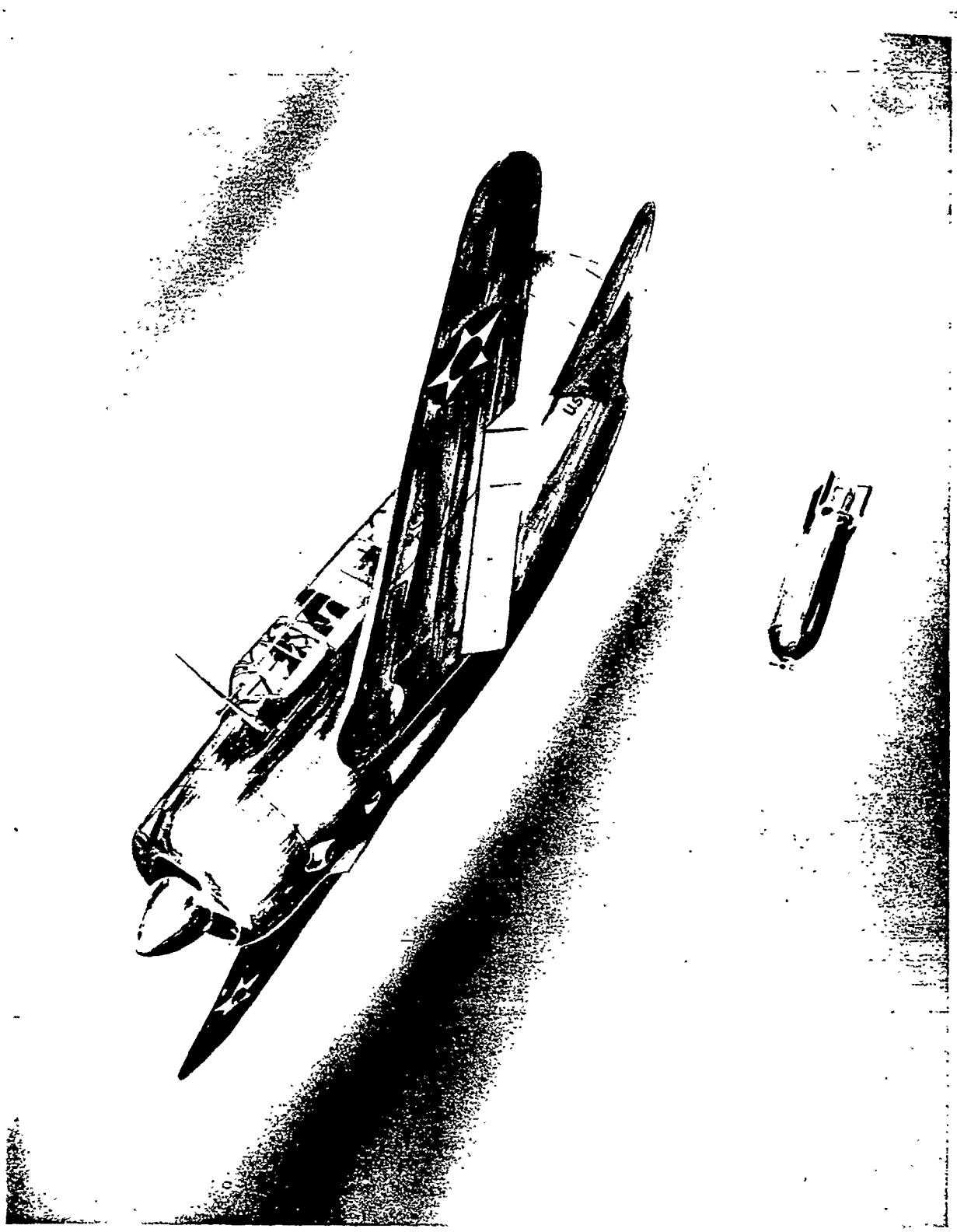
Ethyl Gasoline Corporation, Chrysler Building, New York City, manufacturers of anti-knock fluids used by oil companies to improve gasoline.

Better and more economical transportation through
ETHYL RESEARCH SERVICE

ETC 31204

ETHYL NEWS

ETC 31205



An artist's conception of the new Curtiss Dive Bomber, built for the U.S. Navy, as it releases its cargo of destruction. The plane is powered with a 1700 horsepower Wright double-row Cyclone 14-cylinder engine.

Curtiss-Wright Corp. photo

ETC 31206

ETHYL NEWS

Ethyl Gasoline Corporation
Chrysler Building, New York City

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FEBRUARY 1941
VOLUME 8, NUMBER 2

Without A Chance

A squalid village set in wintry mud.
A hub-deep oxcart slowly groans and creaks.
A horseman hails and halts. He shifts his cud
And speaks:

"Well, did you hear? Tom Lincoln's wife today.
The devil's luck for folk as poor as they!
Poor Tom! poor Nance!
Poor young 'un born without a chance!

"Another squawking, squalling, good-for-naught
Spilled on the world, heaven only knows for what.
Better if he were black,
For then he'd have a shirt upon his back,
And something in his belly, as he grows.
More than he's like to have, as I suppose.
Yet there be those
Who claim 'equality' for this new brat,
And that damned Democrat
Who squats today where Washington once sat,
He'd have it that this Lincoln cub might be
Of even value in the world with you and me!

"Yes, Jefferson, Tom Jefferson, who but he?
Who even hints that black men should be free.
That featherheaded fool would tell you maybe
A President might lie in this new baby!
In this new squawker born without a rag
To hide himself! Good God, it makes me gag!
This human spawn
Born for the world to wipe its feet upon
A few years hence, but now
More helpless than the litter of a sow,
And — Oh, well!
Send the womenfolks to see to Nance.

"Poor little devil; born without a chance!"

By EDMUND VANCE COOKE

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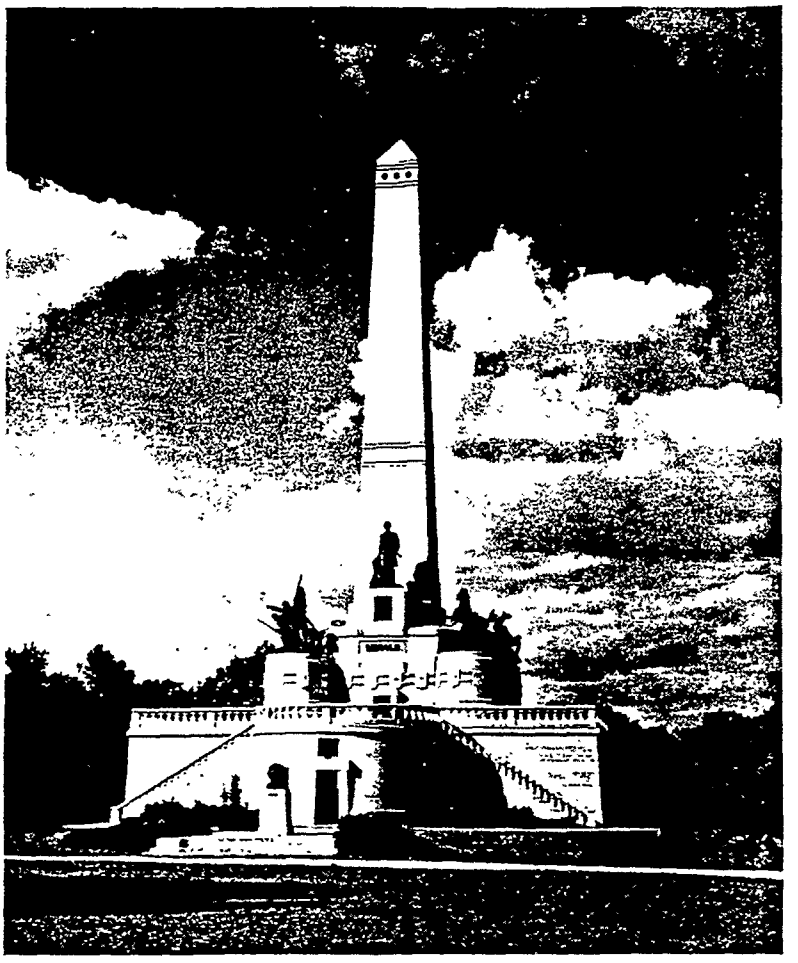
Chicago's Boulevard Fin
America as it Used to Be
Life's That Way

ETC 31207



The Abraham Lincoln Tomb is located in Oak Ridge Cemetery, Springfield.
Courtesy Herbert Georg Studio, Springfield, Ill.

The Lincoln Country

The people of Illinois, his adopted state, have set up many monuments to the memory of their most famous citizen.

KENTUCKY was Lincoln's birthplace, Indiana his boyhood home but it was in Illinois that the young backwoodsman of 21 grew to be one of the greatest statesmen of our country.

The people of Illinois are very proud of their most famous citizen and have over a period of years erected and maintained a host of memorials commemorating Abraham Lincoln.

The Lincoln Memorial Highway running from Vincennes, Indiana, to Beardstown, Illinois, takes the modern motorist over the exact route followed by the Lincolns with their covered wagon in the 1830's. Everywhere along the highway one finds reminders of the rail-splitter, surveyor, Black Hawk War soldier, circuit rider, debator and legislator who was to save a nation.

The most elaborate of the many memorials is at New Salem State Park, twenty miles northwest of Springfield, Illinois. Here the little village of New Salem which played such an important part in the development of Lincoln, the man, has been restored exactly as it was from 1831 to 1837, the years that young Lincoln lived and worked in the village. It was in New Salem that Lincoln met Ann Rutledge, worked as a storekeeper and earned the title of "Honest Abe". He served as village postmaster, was chosen by a group of New Salem volunteers as their Captain in the Black Hawk Indian War and surveyed much of the surrounding country for the county. He was elected to the State General Assembly from the New Salem District and was admitted to the bar while still residing in the village.

The restoration of this village is the only memorial of its kind and forms one of the most comprehensive collections of early Americana ever assembled.

The only original building in the village is the Onstot Cooper Shop (barrel shop). It was built in 1834, moved to Petersburg in 1840, and returned to New Salem in 1922. In this little shop Lincoln read law by the cooper's fire.

Thirteen cabins, six shops and the Rutledge Tavern have been reproduced and furnished as they were in the 1830's. A Federal Post Office is operated in the store where Lincoln served his postmastership and even the gardens in front of the cabins are planted with historical authenticity. Adjacent to the village is a museum housing an interesting collection of Lincoln relics and articles associated with the history of New Salem.

In 1837 Lincoln moved to Springfield, the capital of Illinois, where he lived for 24 years, leaving after he was elected President of the United States.

In Springfield he married Mary Todd and here their four children were born. Here also was the only house that Lincoln ever owned, and it stands today furnished exactly as it was during the time the Lincoln family lived there.

The city of Springfield abounds with places and events associated with the life of Abraham Lincoln. The old State House where he served in the state legis-

ETC 31208

The Abraham Lincoln Home, only house he ever owned, as it stands today in Springfield.
Courtesy Herbert Georg Studio, Springfield, Ill.

lature, argued before the Supreme Court, and debated with Douglas still stands in the center of the city. The offices occupied by Lincoln during his law partnerships with Stuart, Logan and Herndon, the Governor's Mansion where the Lincolns attended many large parties, and the railroad station from which Lincoln made his famous farewell address to the people of Springfield as he left to become President of the United States, are all famous landmarks.

The most outstanding memorial is the Lincoln Tomb located in Oak Ridge Cemetery on the outskirts of Springfield. Here rests the body of the Great Emancipator, around which are draped the flags of the states through which successive generations of the Lincoln family passed before halting in Illinois. Lining the corridor around the base are nine statues of Abraham Lincoln and in the base are buried Mrs. Lincoln and three of their four children.

Throughout all of central Illinois one finds many reminders that this was the Lincoln Country. South of Springfield lies the little town of Vandalia, one time capital of Illinois, and the State House in which Lincoln served his first term in the state legislature still stands in the village square.

Closely associated with Lincoln, the circuit rider, are the Mt. Pulaski Court House in Logan County and the Metamora Court House in Woodford Country, both a short distance north of Springfield. In these court houses and the twelve others in the old Eighth Judicial District Lincoln, in his associations and combats with Douglas and other brilliant attorneys of the day,

An interior view of the Lincoln-Berry Store in the reconstructed village of New Salem State Park.
Courtesy Herbert Georg Studio, Springfield, Ill.

ETC 31209

broadened his facilities and found the technical schooling he lacked as a youth. These buildings saw much of Lincoln, who for nearly a quarter of a century rode the old Eighth Circuit as a lawyer recognized for his leadership, his common sense and his endless store of wit.

Another tie that binds the memory of Lincoln to the people of Illinois is Lincoln Log Cabin State Park, in Coles County, southeast of Springfield. Here Thomas Lincoln and Sarah Bush Lincoln, Abraham Lincoln's father and stepmother, settled in 1837 and spent their last years. The Lincoln cabin was exhibited at the Columbian Exposition in Chicago in 1893 and, while dismantled, it mysteriously disappeared. When the State, after acquiring the site of the original cabin, set about reconstructing it, existing photographs and affidavits of old settlers were used to duplicate all its original details. A pole barn stands nearby, and an ash-hopper for making lye, long steel wedges for splitting rails, an ox-yoke and a grindstone have been added. Authentic interior furnishings complete the picture of the old Lincoln Home.

And so the people of Illinois hold the memory of their "Honest Abe" deep in their hearts — the memory of a gaunt man in a tall hat, an old grey shawl around his shoulders, walking slowly with head bowed in thought. A man born in a log cabin, he ascended to the White House. Attending school less than one year, he became a great orator and writer. Beset with disappointments and defeats, he rose above them and became one of the most revered and beloved of statesmen in all history.

The Following

Service Awards

have been made as of

February 1st, 1941

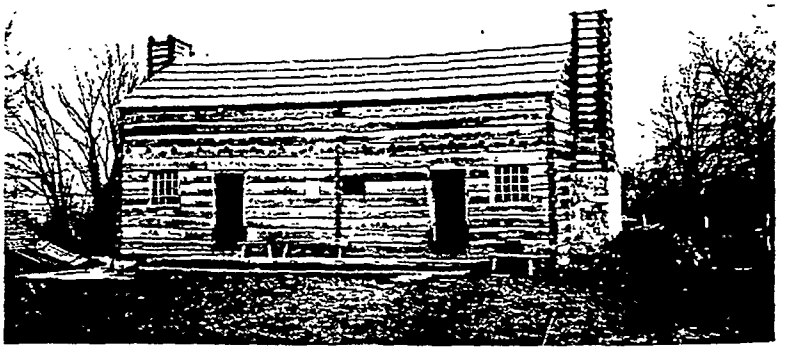
TEN YEARS

WALTER H. RESLER
New York General

ALAN C. TULLY Sales, Dayton

The Lincoln-Berry Store as it looks from the outside.

Hill-McNeil Store and U. S. Post Office in New Salem State Park. Here the young Lincoln clerked and was Postmaster.



Rutledge Tavern, New Salem State Park, the place where Abe Lincoln came to court Ann Rutledge.

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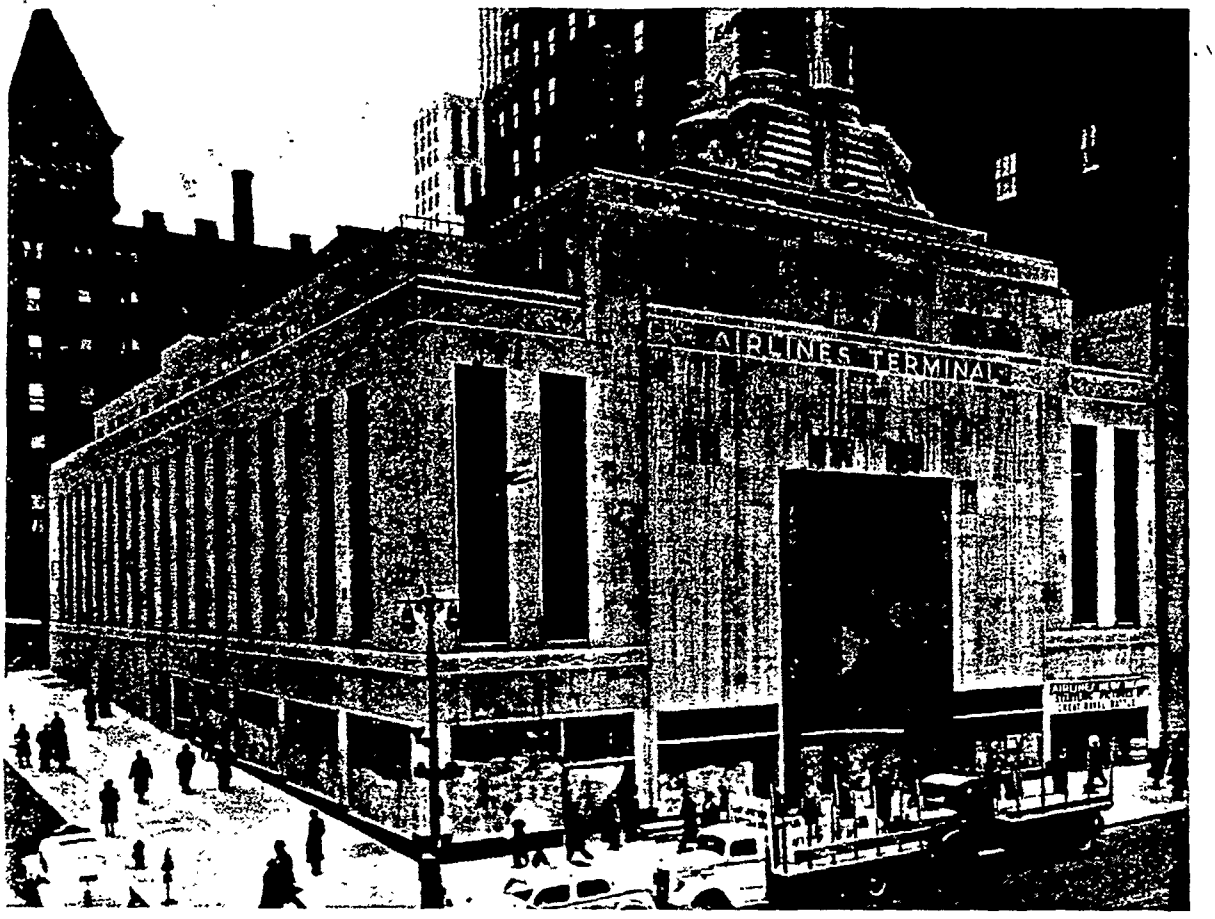


Over the entrance to the Airlines Terminal is a map of the world. Above is seen the red and green beacon light. Lower right, the newsreel theatre is open for business.

First Union Station of the Air

Airlines Terminal, Constructed at a Cost of $5,000,000, Opens in Heart of New York. Six Companies Leasing Building Offer Worldwide Service.

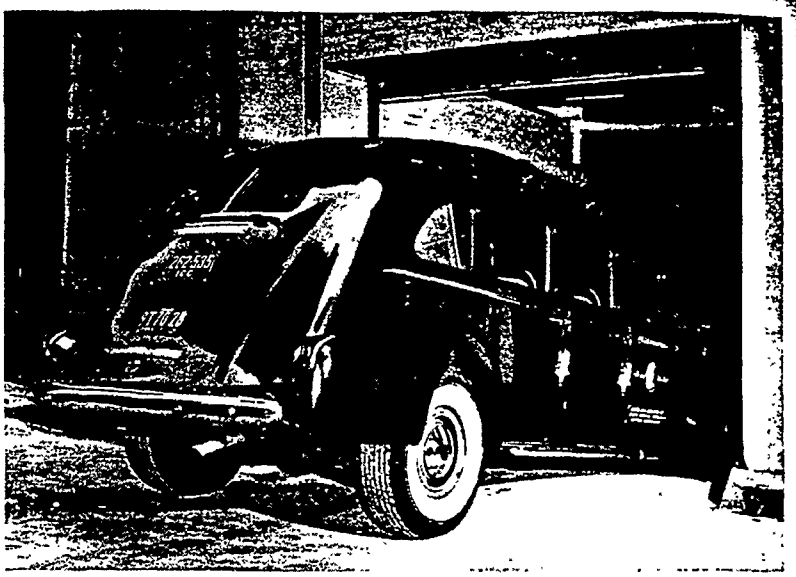
AVIATION took another forward step with the recent opening of the Airlines Terminal, the first union station of the air, located in the heart of Manhattan, directly across 42nd Street from the Grand Central Terminal. This $5,000,000 building, which was financed by the Mutual Life Insurance Company of New York, is leased by six airlines—American Airlines, Canadian Colonial Airways, Eastern Air Lines, Pan American Airways, Transcontinental and Western Air, and United Air Lines—which schedule regular flights to almost every section of the globe.

A traveler, wishing to go to Philadelphia or Chicago, to Lisbon, Buenos Aires or Hong Kong, enters the terminal and boards the escalator, which takes him to the Main Rotunda or waiting room. Surrounding him he finds the names of six airlines, embossed on glass borders above curved counters. He chooses the one he wants.

Recesses about two feet wide and two deep break the continuity of the counters, and in one of these he places his luggage. A closer look shows him the latter is on a scale and the ticket seller is reading its weight through a small glass panel on top of the counter. The baggage is then placed on a high speed conveyor belt, which carries it to a waiting motor coach.

When the traveler's destination is called through a loud speaker system, he walks through swinging doors at the far end of the Rotunda to a group of motor coaches, lined up side by side. The coaches are standing on the floors of large elevators—the terminal has six of these—which have whisked them up from the garage at the bottom of the

ETC 31211



One of the luxury motor coaches, used to ferry passengers to waiting planes, enters the Airlines Terminal.

four-story basement. One of them connects with his plane, and in about half an hour he is flying through the air far above the metropolis.

If the traveler has plenty of time before his plane leaves, he can step on one of the two escalators or one of the two passenger elevators and descend to the terminal's elaborate restaurant and cocktail lounge; or he can spend his time in the 600-seat newsreel theatre, also in the building.

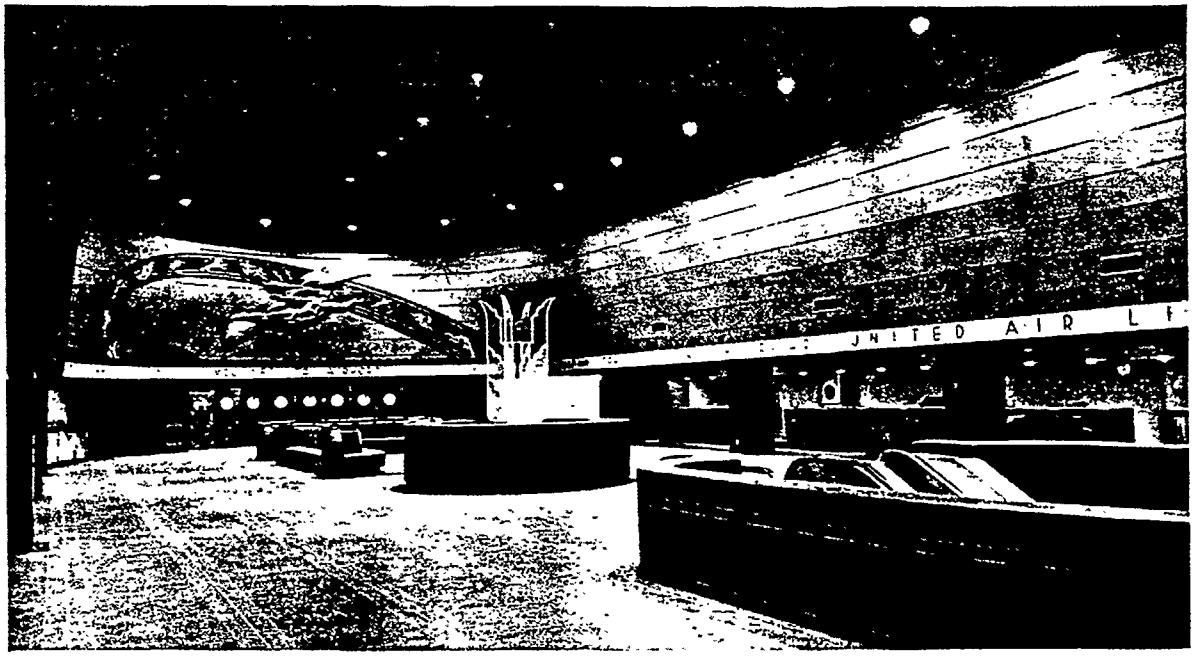
Officials of the Airlines Terminal Estimate that during 1941 a million air passengers will use the new station, half of them on their way to outgoing planes and the other half coming into the city. The terminal will be the place of origin and termination of 41 flights daily between New York and Chicago, an average of one almost every half hour right around the clock. There are forty scheduled flights daily between New York and Washington, 24 between New York and Philadelphia, and 20 to the Pacific Coast. One flight goes every week to South America, three a week to Europe and one a week to the Orient.

The building, which was designed by John B. Peterkin, architect, is six stories high, including the penthouse. It has four basements and 60 office rooms from the street surface up, in addition to the Main Rotunda. All metal construction eliminated the necessity of rivets, thus sparing the neighbors the ear splitting din that usually goes with steel work.

The exterior is of white limestone, with marble columns on the 42nd Street side. Topping the front of the building is a giant reproduction of an airport beacon, which alternately flashes red and green lights.

The terminal is one of the most important telephone and teletype centers in the city, with thousands of miles of wires converging on the reservations offices.

In the center of the main rotunda is the circular information booth and the terminal's master clock.



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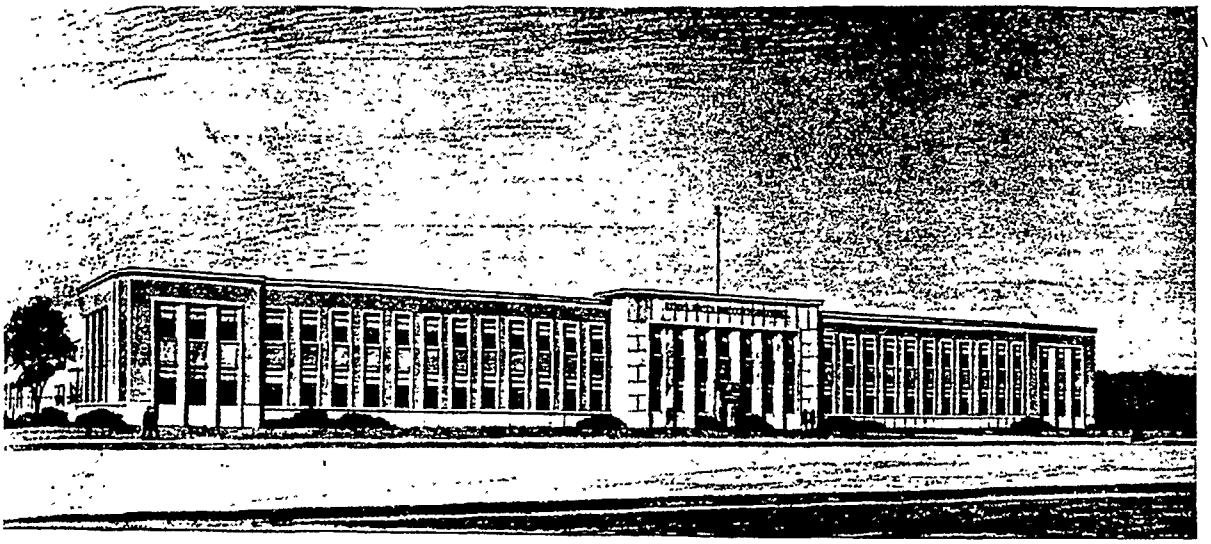


This drawing by Albert Kahn, architect, shows how Ethyl's new research building at Ferndale, Mich., eight miles from downtown Detroit, will look on its completion this coming Summer.

Ethyl to Have New Laboratory

Expanded Research Facilities in Ferndale, Mich., Outside Detroit, to be Ready for Occupancy During Summer of 1941.

CONSTRUCTION work is progressing rapidly at the site of the Ethyl Gasoline Corporation's new research laboratories in Ferndale, Mich., a short distance outside Detroit. Contracts for the job were let in December and the building will be ready for occupancy during the summer of 1941. Until that time the present Ethyl laboratories at 723 East Milwaukee Avenue, Detroit, will continue in service.

Chemical research laboratories were completed at the Ferndale location over a year ago. The new building, of which the chemical laboratories will form one wing, will also house engineering research divisions for both automotive and aeronautical engines, the fuel testing laboratory, the technical sales division, the refinery technology division, and accessories facilities such as road testing, machine shop, maintenance, etc.

"The great impetus of present day technology in the oil and automotive industries and the increasing complexity of further advances in fuels and engines call for a speed-up on our part to keep abreast of the demand of oil and automotive companies, if we are to continue, as in the past, to aid them in the most efficient use of advancing antiknock quality in fuels and expected progress in engine design," said Earl Bartholomew, Ethyl's director of engineering research.

"Equipment ordered for the new laboratories has been designed to provide a scope and detail of research not now available in our work on engines, engine parts and fuels."

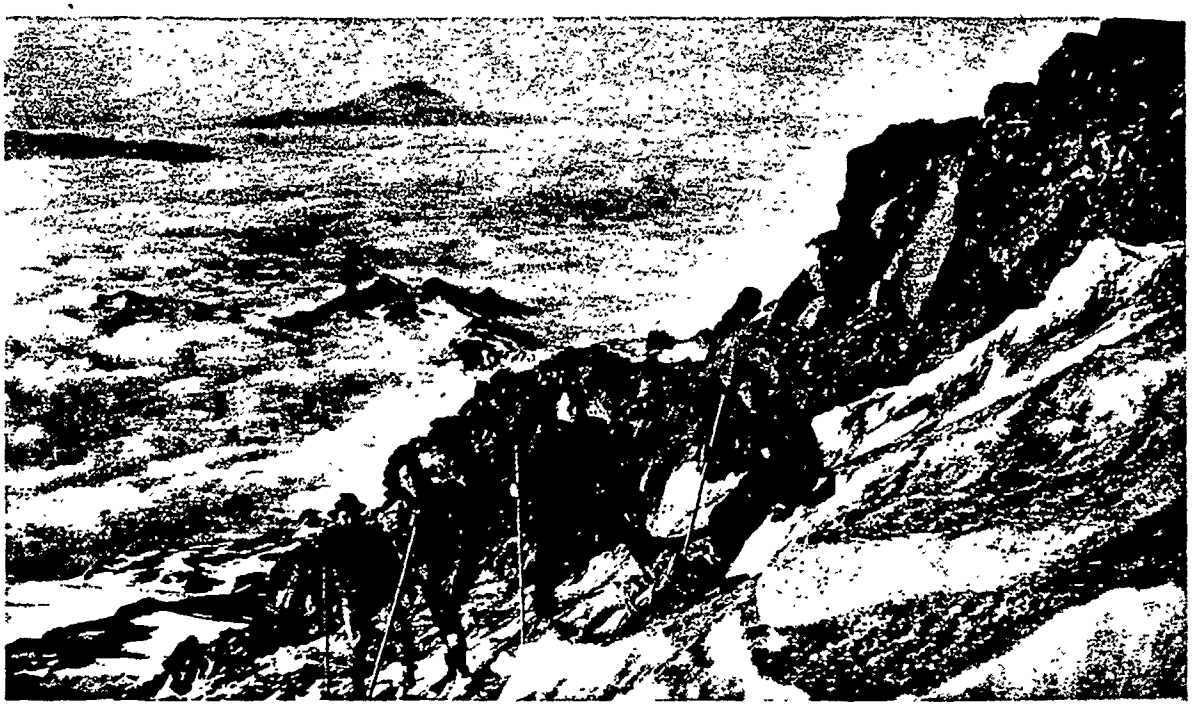
The Ethyl laboratories have for some years served as a focal point for cooperation between oil and automotive technologists and it is expected that the range of this work will be expanded with the completion of facilities at Ferndale. Predictions for even more rapid advances in the progress of fuels and engines during the next decade assure an increasing need for this research as with each step forward progress becomes more complex.

Albert Kahn is the architect for the new laboratories, and his blueprint calls for a structure which will be shaped like a huge letter "E." Construction of the building is being handled by the O. W. Burke Company of Detroit.

This Month's Cover

The picture on the cover, "Drafting the Declaration of Independence," shows the committee of five, headed by Thomas Jefferson, at work on the most important document in American history. In the group are, left to right, Benjamin Franklin, Jefferson, John Adams, Robert R. Livingston, and Roger Sherman. The picture is a copy of a painting by Alonzo Chappel and is reprinted here through the courtesy of the New York Historical Society, New York City.

ETC 31213



A halt is made at daybreak far above the clouds. The peaks rising through the sea of mist in the background are over 6,000 feet high.

The Mighty Mountain

A Climb to the 14,408-foot Summit of Mount Rainier, Third Highest Peak in the United States, Offers to the Vacationist the Hazards of Real Adventure.

IF YOU are looking for a holiday that is out of the ordinary, a holiday that will test your physical stamina, give you a taste of really hazardous adventure, and linger long in your memory, then fill the car with Ethyl, drive to Paradise Valley in the state of Washington and climb mighty Mount Rainier.

Formerly known as Mount Tahoma by the Indians, the peak was given its present name in 1792 by Captain George Vancouver, English explorer, in honor of Peter Rainier, a British admiral who figured in the American Revolution. It is 14,408 feet high and is topped by only two other mountains in the United States, Mount Whitney in California which rises 14,495 feet above sea level and Mount Elbert in Colorado with an elevation of 14,431 feet. Twenty-eight glaciers, some of them famous, and eternal snow several hundred feet deep cling to Rainier's sides. The mountain, an extinct volcano, covers an area of a hundred square miles.

There were five of us, including the professional guide, in the party that left Paradise Valley that July afternoon and started up Rainier. We were all equipped with corduroy trousers, hobnail shoes, alpenstocks, and hooded parkas to protect us from the cold high up on the mountain. Before we departed the head guide called us together and gave us a last warning.

"You'll probably find this climb is just about the toughest work you've ever done, so if any of you aren't in the best of physical condition you had better not try it," he advised.

He looked as he spoke at a man in our party named Shelby. Shelby was almost sixty years old.

Tommy Hermans, our guide, who was a graduate of the University of Washington and a school teacher during the winter months, set a snail's pace during the easy first part of the climb. When some of us grumbled, he said:

"Don't be in a rush. You'll be glad you took it easy when we get up a little higher."

Camp Muir, at 10,000 feet, is composed of two stone huts and marks the end of the easy climbing. Climbers sleep there for a few hours before crawling

ETC 31214

Uncle Sam's ski soldiers glide swiftly toward their objective. In the background is the massive form of Mount Rainier. *Pictures, Inc.*

out at 2.30 a.m. to continue their trip. The reason for such an atrocious rising hour is safety. The trail passes under a lofty shoulder of the mountain, composed of volcanic rock and known as the Rock of Gibraltar. When the sun gets around on the west side of Gibraltar, it melts the ice, which freezes every night, and drops rocks about the size of watermelons from great heights onto the trail. There have been several fatalities because of these rock showers; therefore, unless a climber wishes to take his chances in a barrage of stone, he should pass under Gibraltar on his return journey before noon.

We arrived at Camp Muir at seven that evening and ate a frugal meal—full stomachs are a cordial invitation to mountain sickness, which is akin to seasickness. Since Tommy and I had discovered that we were both brothers in the bonds of the same Greek letter fraternity, he invited me to share the guide's cabin with him while the "barbarians" bunked in the larger stone hut.

It was still dark and the temperature was below freezing—in mid-July, too—when Tommy's alarm clock jangled harshly to rouse us from fitful slumber. Our breakfast before starting up the mountain consisted of one orange apiece and even that proved too much for one of the party.

Shivering despite our heavy parkas, we started upward, but hadn't progressed very far up the rocky trail before Shelby commenced to have his

The crater rim at last! Success brings smiles to the faces of all. At the right is the snow filled crater of the dormant volcano. Tommy Hermans, the guide, is second from right in the group.

ETC 31215

troubles. The altitude was getting his wind. We had to stop every hundred yards or so to let him rest. At last he could go no farther, and we left him in a small hollow among the rocks, called Camp Misery because it marks the beginning of the rougher trail beneath Gibraltar.

"Don't stir out of here till we get back!" Tommy admonished him. "It isn't safe for you to go down the mountain alone."

At Camp Misery we lingered a while to watch the sunrise. Far below us were the clouds, a sea of purple in the pale light of early dawn. To the south, spaced almost equal distances apart, like towering sentinels, rose the purple cones of Mount St. Helen, Mount Adams, Mount Hood and Mount Jefferson. As it grew lighter, the purple faded, until the sun, a blazing ball, appeared on the rim of the horizon and changed the snow-garbed mountains to silver isles of mystery in an ocean with waves of gold.

With the coming of the sun we smeared our faces with actor's grease paint and put on dark glasses. The glare on the snow and ice of Rainier is terrific and will burn your face to a crisp, regardless of how good a tan you may already have, unless you are liberal with the grease paint. I know, because I failed to cover part of my forehead and as a result suffered from as painful a crop of water blisters as was ever wished on a man.

The climbers pose before the larger of Camp Muir's two stone cabins. Here, 10,000 feet above sea level, climbing parties spend the night before rising in the gray dawn to continue the ascent.

Crevasses hundreds of feet deep are the chief danger of the dim trail through eternal snow. Climbers must wear grease paint and dark glasses to protect faces and eyes from the glare.

After some difficult climbing along the Gibraltar trail, we arrived at last at another hollow in the rocks, known as Camp Comfort. This marked the end of the ascent under Gibraltar and the beginning of the glaciers. Tommy Hermans uncoiled the long rope he carried and tied us all together.

The 2,000-foot ascent among the glaciers is probably the most dangerous part of the entire trip. The trail changes continually, due to the shifting snows. Crevasses 300 or more feet deep are numerous and not a few climbers have plunged to their death in these narrow fissures.

Tommy halted us often in the icefields for at that altitude the oxygen content of the air is meagre. Two of the party were seized by the violent nausea of mountain sickness and a longer rest was necessary.

We arrived at the rim of the crater, over 14,000 feet up, at 9:30 a.m. The others lay down on the rocks to rest, but I decided to go on around the crater alone. I wanted to stand on Columbia Crest, the mountain's highest point, which was on the far side of the crater.

"Don't go down into the crater," Tommy warned me before I left. "There are warm springs there. Keep to the rim trail."

The warm springs are the only hangover from the days of Rainier's volcanic activity. The peak has been dormant for many years. There were slight rumblings during the Nineteenth Century but there have been no eruptions in historic times. Indian legend tells of a great eruption sometime in the past, and scientists are inclined to believe that this outbreak blew away the top of the mountain, reducing it from an original height of over 16,000 feet to its present elevation.

Still roped together, the mountaineers rest under the shadow of Gibraltar after their descent through the treacherous snow fields. Ahead of them lies one of the most dangerous stretches of the trail.

ETC 31216

The trail around the crater is over a mile long and winds in and out among jagged volcanic rocks. While picking my way along it, I saw a sight that puzzled me. A tiny striped ground squirrel, something like an eastern chipmunk, scampered away from me. He was a bright-eyed and active little fellow, but what he lived on or how he got up there through all that snow and ice is still a mystery to me.

On Columbia Crest there is a stone cairn in which reposes a brass cylinder. This contains a notebook, which I signed after the names of previous climbers of Rainier.

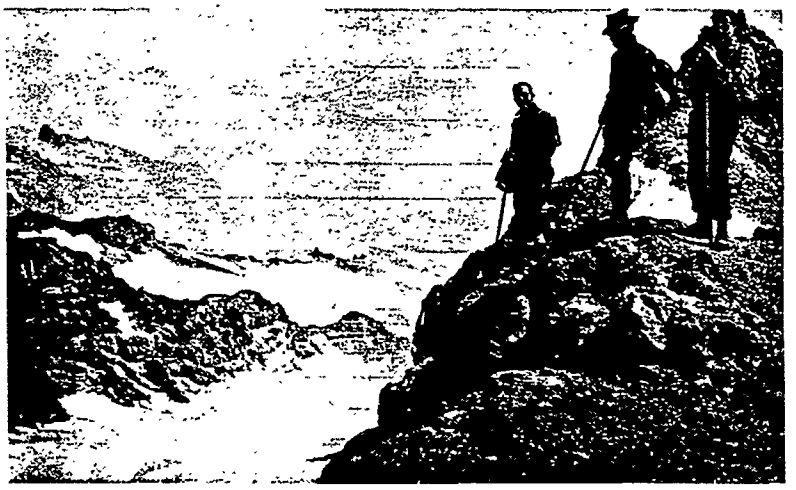
Before going on I paused for a long look at the beauty which surrounded me on every side. Down in the valley forest fires had been raging for several days and a pall of smoke cut down visibility, but from this great height the smoke blanket was transparent and everything below stood out perfectly clear. Miles and miles of evergreen forests, interrupted occasionally by wide meadows bright with alpine flowers, stretched to the horizon. From the forests and vales rose lofty mountains of rock, their sides splotched with patches of snow and ice which threw back the sun's brilliance. In that clear, rare atmosphere Mount Jefferson far down in Oregon, 180 miles distant, was as easy to see as Mount St. Helen, only 70 miles away.

The scene was one of surpassing peace and beauty, a far cry from the hustling, bustling world of civilization, the world of smoky cities, snarled traffic, discordant sounds and rushing throngs.

When I arrived back on the other side of the crater I found the group there had been increased by two Englishmen, veteran mountain climbers who had come up alone. Tommy took a few pictures and then started us down. It was almost noon when we arrived at the head of the Gibraltar trail.

At this point Tommy's manner became that of a hard-boiled football coach. He drove us downward at a rapid pace, while he cast frequent apprehensive glances at the mighty rock above us. He didn't want any casualties in a party guided by him.

Not embattled Finns are these, but members of the Ski Patrol, 41st Division, U.S.A., learning how to conceal themselves from "the enemy" on the snowy slopes of Mount Rainier. *Pictures, Inc.*



At rocky Camp Comfort, the last stopping place before venturing out on the glaciers, the party takes a look at the rugged country below.

We were soon out of danger and the tension lifted. We began to make bets that, when we arrived at Camp Misery, we would find Shelby had gone on down the mountain alone.

"He better hadn't!" Tommy exclaimed good-naturedly.

But he had!

Tommy swore and made a few uncomplimentary remarks on the mental equipment of some people.

I felt full of pep when we reached Paradise Valley again, but when I finished my supper I could hardly keep my eyes open. During the next three days and nights I couldn't get enough sleep. The Mount Rainier climb is a real test.

ETC 31217

Rugged terrain doesn't halt a Pygmy. An auxiliary transmission gives the little fellow six speeds forward and two in reverse.

Army Orders Midget Trucks

Pygmies Now Being Tested By United States Army Are Light Enough to be Carried in a Plane. Four-wheel Drive Gives Them Traction for Work in Rough Country.

PYGMY trucks are being tested by the United States Army and if they prove successful, the Army plans a fleet of 50,000 midget combat cars for the new streamlined Panzer divisions.

These trucks are small, light in weight and highly maneuverable, and the little car is expected to find many uses in the military field, similar to those performed by the motorcycle and sidecar divisions of the European armies. Fundamentally, it is a reconnaissance car but it can be used to transport troops quickly or haul light field pieces.

A contract for 1500 of these Pygmy trucks has been awarded the Ford Motor Company and manufacturing has commenced.

"Command reconnaissance 4-4's" is the formal Army name for these midget cars.

Their four-wheel drive provides them with plenty of traction for the most rugged terrain and they are capable of traveling sixty miles per hour. Their light weight will make it possible to carry two or three of them in a transport or bombing plane, providing a very mobile unit.

These Ford trucks have a wheel base of eighty-one inches and stand thirty-eight inches at the cowl. They are equipped with 5.50x16 tires specially designed for use in mud and snow. An interesting feature of the four-wheel drive is that the front axle can be used as a driving axle or an idling axle. There is an auxiliary transmission in addition to the regular gear box and the combination of the two gives the little car six speeds forward and two reverses. They are equipped with hydraulic brakes.

In addition to the regular light equipment, they are equipped with blackout lamps front and rear. A brush protects the front of the car and there is a windshield that folds flat over the hood. There is also a folding top or canopy.

During recent tests, these cars dem-

ETC 31218

A sixty mile-an-hour clip was hit by a Pygmy during a recent test at Camp Holabird, Md. Blackout lamps can be seen below the regular headlights.

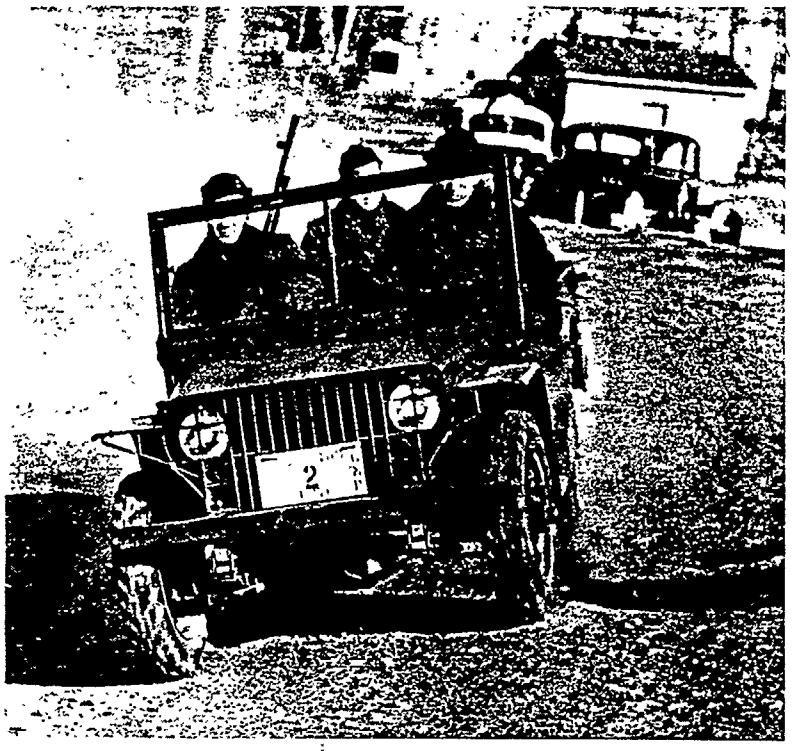
onstrated an amazing ability to carry a cargo of one-fourth ton up sharp inclines as well as across rough and soft ground.

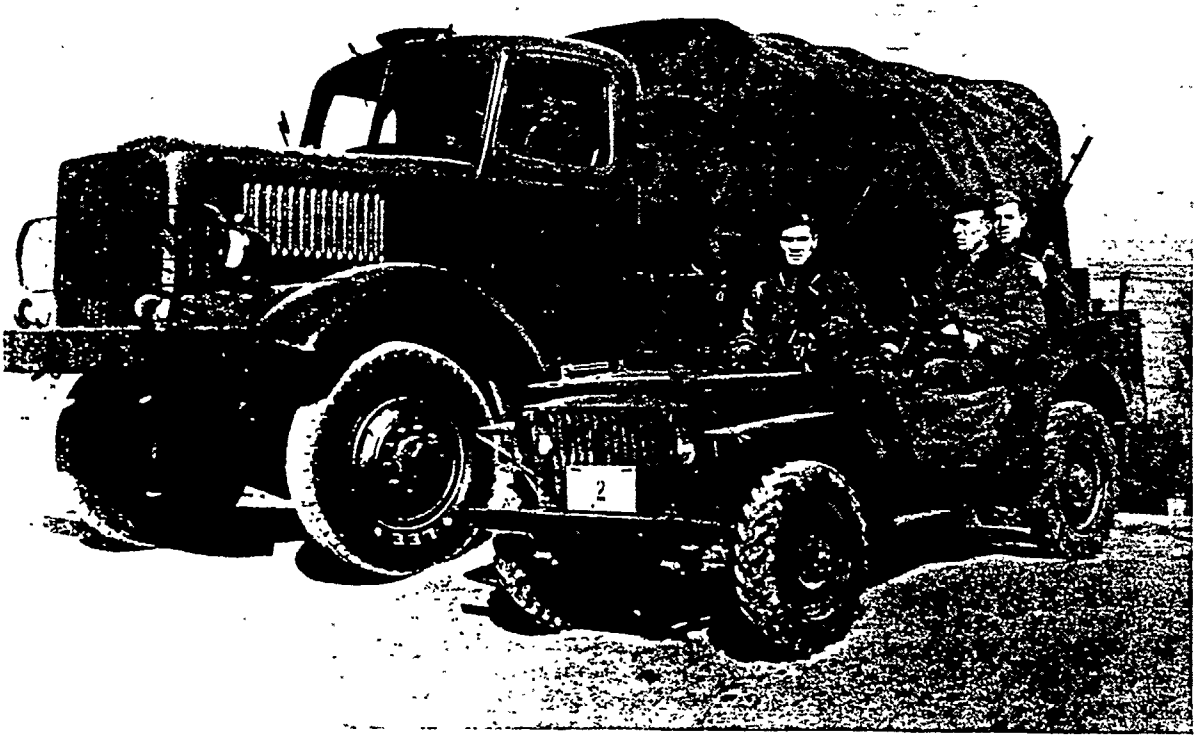
Hand grips were placed around the outside so that the crew can "manhandle" their machine should it fall into a hole too deep for it to dig itself out.

These trucks are designed to carry three men and an all-angle machine gun to be used as a protection against enemy aircraft.

The Ford Pygmy truck is powered by a forty-two horsepower four-cylinder engine, and an adaptation of the high compression Ford tractor engine.

This might be called a modern version of the tale of David and Goliath. The Pygmy's height is only 38 inches at the cowl.





ETC 31219

JOHN G. MARTIN

He will assist in the direction of the Boston, New York, Baltimore, Dayton and Atlanta Divisions.

RICHARD C. MURPHY

His territory is composed of the Chicago, Kansas City, Tulsa, Los Angeles and Seattle Divisions.

Ethyl Sales Organizes for Closer Cooperation with Industry

Martin and Murphy named Eastern and Western Regional Managers

J. COARD TAYLOR, Vice President in charge of sales, has announced the appointment of regional managers to assist Harry W. Kaley, General Sales Manager, in directing the activities of Ethyl's ten division offices and administering the enlarged program of cooperative service to be undertaken in 1941.

"It is expected," Mr. Taylor explained, "that the new administrative arrangement will expedite both our technical service and our cooperative promotional activities in serving companies in the petroleum, automotive, bus, tractor, truck and accessory fields. Our plans for increased service effort have been discussed with a number of executives of our customer companies and it is believed that the changes in our organization will be effective in supplementing our sales programs."

John G. Martin, formerly director of Ethyl Clinics, has been appointed regional manager of the five divisions in the East, comprising Boston, New York, Dayton, Baltimore and Atlanta. Richard C. Murphy, formerly New York Division manager, has been appointed regional manager for the five divisions in the West and Midwest, comprising Chicago, Kansas City, Tulsa, Seattle and Los Angeles.

Mr. Martin joined the Ethyl organization in March, 1927, and for a year and a half covered the territory of Maryland, District of Columbia, Virginia, North and South Carolina, reporting directly to New York, since at that stage of the company's history divisions had not been formed. Transferred to Dallas, Texas, he opened one of the Company's first branch offices and supervised activities in Texas, Arkansas, Louisiana and Oklahoma. Later headquarters offices for this division were moved to Tulsa, Oklahoma.

In 1932 Mr. Martin was brought to New York to spend a year in specialized sales work, after which he was assigned to the Los Angeles Division where for four years he worked on sales promotional activities. He returned to New York in June, 1937, as director of Ethyl Clinics, to expand and supervise the Clinic program which he had been instrumental in establishing on the Pacific Coast.

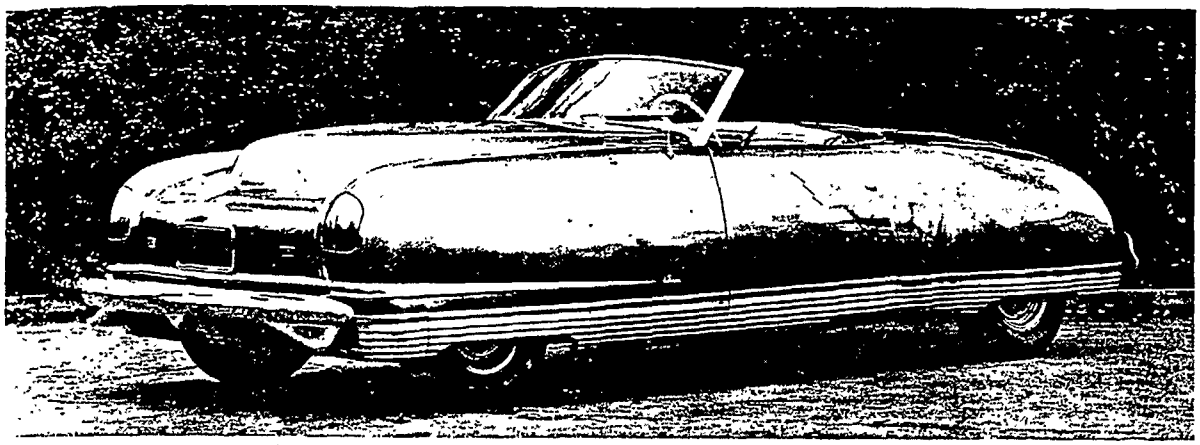
Mr. Martin was born in Norfolk, Va., on April 12, 1906, and received his early schooling in Suffolk, Va., and Florence, S. C. Later he attended Furman University at Greenville, S. C., and the University of Richmond. Before coming with the Company he was with the Engineering Department of the State of Virginia.

Mr. Murphy's first assignment with Ethyl was in Baltimore in 1929, where he conducted meetings for the Standard Oil Company of New Jersey. When the Standard Oil Company of New York began marketing Ethyl he was shifted to the New England territory to hold meetings for their sales personnel. From New England he went to the Atlanta Division to assist in the Pan American Oil Company campaign.

On completion of this work he came to the New York territory and was located in the western part of the state until he was called to the metropolitan area late in 1931. He was appointed assistant manager of the New York Division in 1935 and in June, 1936, was made manager.

Mr. Murphy was born February 18, 1907, in Olean, N. Y., and went to grammar and high school in that city. He attended Cornell University and for a year before joining the Company was with the National City Bank of New York.

ETC 31220



The specially built Thunderbolt is a preview of future motor car design. Automobiles like this will probably have for a power plant an engine with a compression ratio of almost 11 to 1.
Photo courtesy of Ivy Lee and T. J. Ross

The Fuel Factor in Engine Design

Increases in Antiknock Values of Fuels and Advances in Engine Design Will Go Hand in Hand, Says Ethyl Expert.

THAT ANTIKNOCK values of fuels will continue to go up and that engine manufacturers will design engines to take full advantage of these fuels and fuels of still higher antiknock quality, is the double-barreled prediction William H. Hubner, head of Ethyl's Refinery Technology Division, made in a series of talks before S.A.E. groups in Seattle, Los Angeles, Portland and Corvallis, Oregon.

"I believe that in 1945 the premium gasoline sold will have a road octane number of 95 and we will see 85 to 90 values of regular grade fuels," Mr. Hubner said. "These advances will be utilized to give greater fuel economy as well as improved performance."

To engine designers antiknock value is the most important characteristic of a gasoline because a fuel's knock tendency limits the engine's ability to convert heat energy into useful mechanical power, Mr. Hubner told his audiences. During the past ten years octane values of premium grade gasolines have jumped from 70 to 80, regular grade from 58 to 74, and third grade from 52 to 65. In this same period average compression ratios have been raised from 5.15 to 6.43 in passenger car engines and from 4.37 to 5.56 in truck and bus engines, while horsepower per cubic inch piston displacement has increased from 0.34 to 0.43 in passenger cars and from 0.24 to 0.30 in trucks and buses.

Future improvements in engine design to take advantage of rising antiknock values may come through supercharging, through high compression or through a combination of both, or they may come through something else, Mr. Hubner said. Laboratory tests on an eight-cylinder valve-in-head engine showed that with a 12 octane number improvement in fuel, from 78 to 90, it was possible to almost double the maximum horsepower by supercharging.

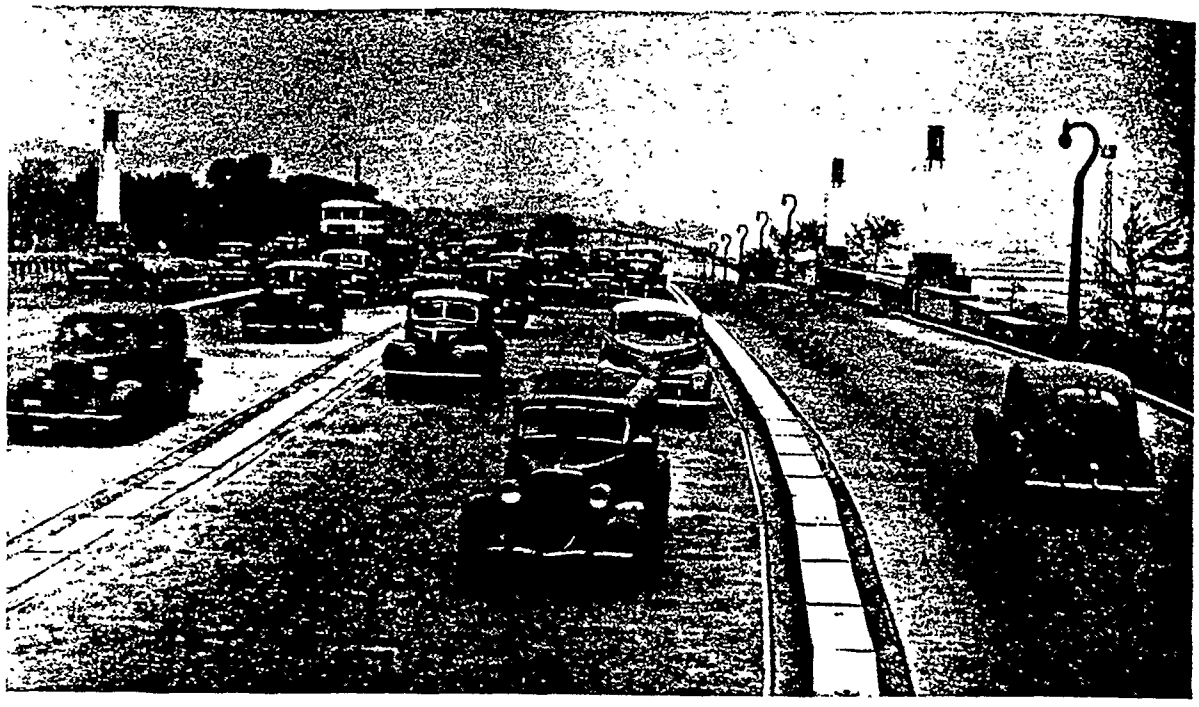
Citing figures to show gains in performance and economy brought about by high compression engines, Mr. Hubner said:

"Picture yourself at the entrance to the new superhighway in Pennsylvania. Your car has a 5.25 compression ratio, a top speed of 70 to 75 miles an hour and a top cruising speed of 66 miles an hour, with fuel consumption ten miles per gallon at this cruising speed. On your right is an identical car, except that its compression ratio has been increased to 8 to 1 and its rear axle ratio changed to give low speed acceleration equal to yours. When duplicating your fuel consumption of ten miles per gallon, the top cruising speed of this higher compression job is 78 miles per hour.

"Next to these two cars is a similar one, except that its ratio is 10.3 to 1. At the same fuel consumption, its top cruising speed is 88 miles per hour. Now if 66 miles per hour is a high enough cruising speed for all three cars, the car with the 8.0 ratio will travel 12 miles per gallon and the one with the 10.3 ratio will go 15 miles to the gallon. For the 10.3 compression ratio a fuel above 100 octane number is required, while for the lower ratios 95 and 70 respectively, are necessary."

As a desirable way to produce 95 road octane premium grade which will keep pace with increasing antiknock requirements, Mr. Hubner suggested a blend of catalytically cracked gasoline and alkylate plus 3 cc. of tetraethyl lead per gallon. He pointed out that more than three-fourths of the motor fuel sold in the United States and Canada contains tetraethyl lead in amounts varying up to a maximum of 3 cc. per gallon, due to the economy and efficiency of this method of raising the octane number.

ETC 31221



To speed up the morning flow into the business section of the city, the roadway is divided by the fin into three lanes inbound and one outbound.

Photo courtesy Chicago Park Department

Chicago's Boulevard Fin

New Device Makes It Possible to Adjust Widths of Directional Lanes, Thus Simplifying the Handling of Rush Hour Traffic Along the City's Waterfront.

THE LAST link in Chicago's shoreline playground is now being forged in Lincoln Park. The completion of the widening of the Outer Drive to 100 feet will join Lincoln and Jackson parks in the world's greatest waterfront boulevard.

One of the notable features used in this concentration of traffic on the lake front is the divisional separator, a new mechanical device better known as the disappearing fin or adjustable center line curb.

The fin, originated and developed by the Chicago Park District Engineering staff, is making its first appearance on the approaches to the North Avenue rigid frame bridge at the south end of the park. A combination of tried standard equipment, it is the first scientific approach to road construction based on traffic volume with the ultimate end of making traffic capacities more flexible. Three of these fins, each 2,000 feet in length, have already been installed on the bridge approaches. Three more are being installed in the stretch that runs farther north.

Their use will permit almost twice the previous traffic volume on the same width road; the eight Outer Drive lanes will be equivalent to twelve lanes or a 120-foot roadway.

The fin itself is a movable steel curb, nineteen inches wide and equipped with lights, so that it can be seen at night. It is raised nine inches from the road by means of hydaulic jacks identical to those used on battleships. It is flush with the road when lowered. The device is operated by the push of a button from a switch box, which is controlled by the Traffic Department of the Park District.

Traffic can thus be directed automatically into double lanes for heavy southbound traffic in the morning, normal lanes during the day, double lanes for heavy northbound traffic at night and normal lanes at night. This eliminates the present makeshift of the Park District traffic patrol detail setting out wooden horses four times a day.

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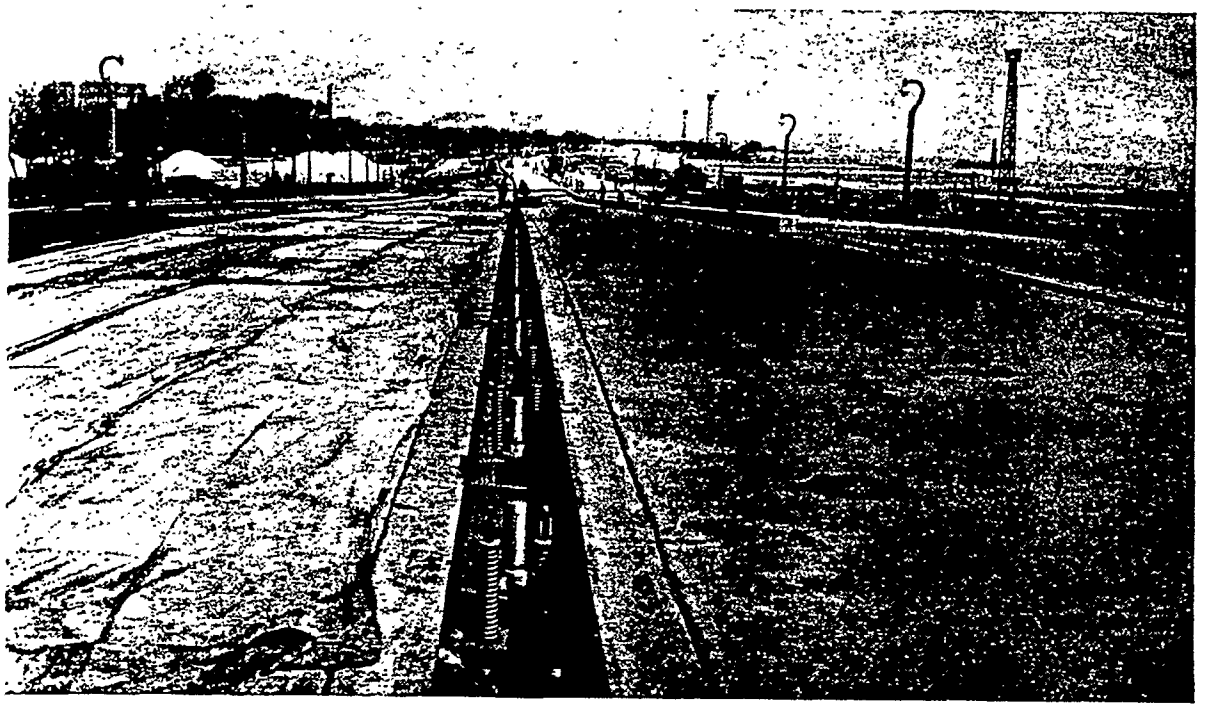
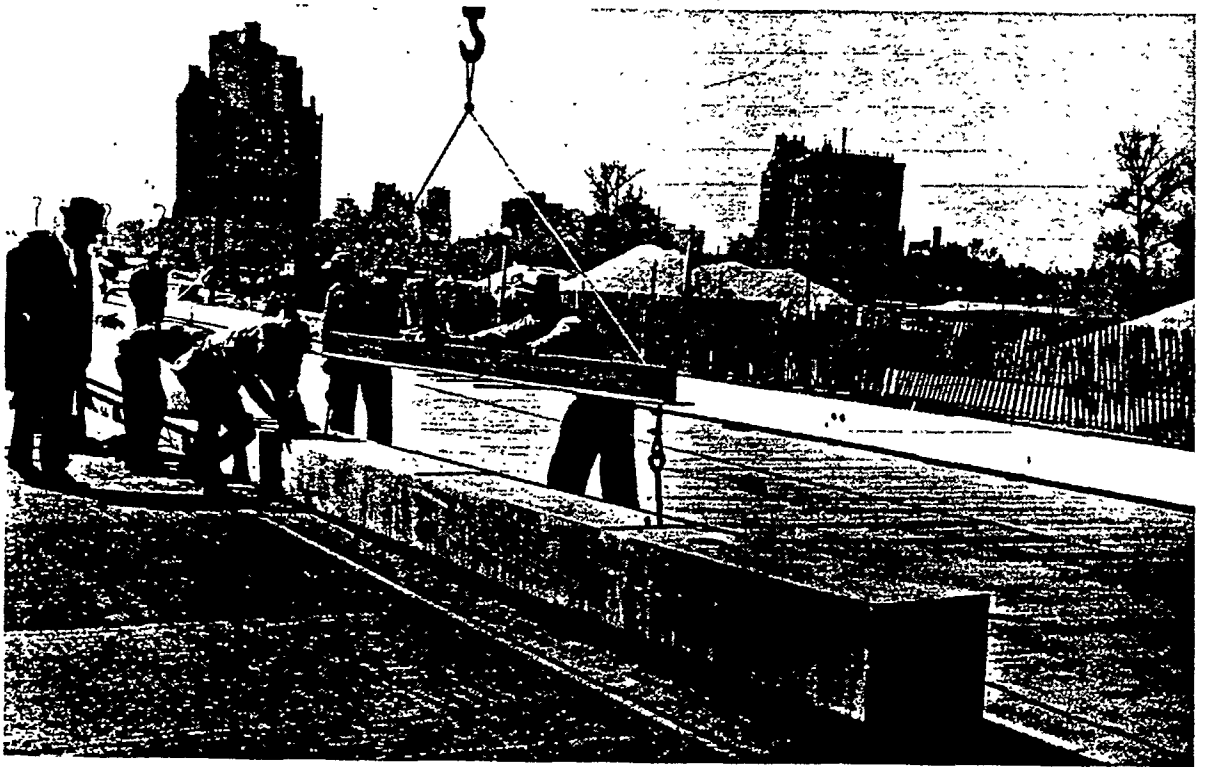


A view of the mechanism which raises and lowers the separator fin.

Photo courtesy Chicago Park Department



A section of the fin is lifted into place by a crane.

Photo courtesy Chicago Park Department

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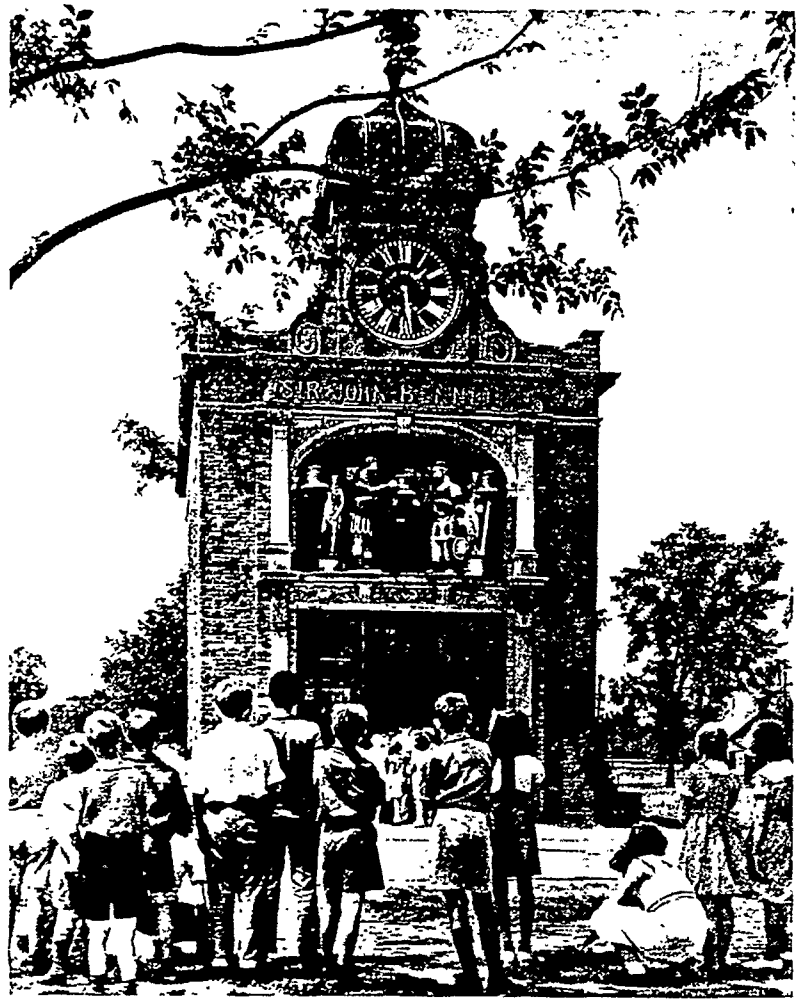


Henry Ford, who has aways been interested in watches, has had the jewelry shop of Sir John Bennett reconstructed at Greenfield Village. Gog and Magog, giant figures almost 200 years old, strike the bells of the shop every quarter hour.

America as it Used to Be

Henry Ford's Greenfield Village at Dearborn, Mich., Offers an Accurate Picture of How Our Grandfathers Lived and Prospered.

NOWHERE in the nation has the American spirit of progress and achievement been captured better than in the 200-acre collection of Americana assembled by Henry Ford in Greenfield Village, at Dearborn, Mich.

Visited the year around by millions since it was formally opened to the public in 1933, this picturesque reconstruction of a by-gone era has in a few short years become a mecca for tourists from all parts of the world. Once the visitor steps through the entrance, he or she sees first a picture of the typical American village of 1830.

Buildings center around the village green as they did in early American communities. Authentic throughout, these structures present a page of living history from the nation's past and recreate conditions under which our forefathers actually lived and worked. The buildings were brought from all corners of the country to be oriented in accord with original direction and topography.

At one end of the green the visitor sees a white chapel, beautiful in its simplicity. This is the chapel of Martha and Mary, named for the mothers of Mrs. Ford and Mr. Ford. The bricks in the building, and the doors, are from the girlhood home of Mrs. Ford. In the tower a sweet-toned bell cast by Paul Revere, Jr., announces the morning services to the children who attend the Village schools.

The old Clinton Inn, a typical hostelry of 100 years ago which stood in Clinton, Michigan, on the great Sauk Indian Trail also arouses interest. Its public rooms are furnished in keeping with the original furnishings, from the "everyday" parlor with its rag carpet and Currier and Ives prints to the "Sunday" parlor with its haircloth covered furniture, lace window curtains and ornamental fireplace. In the kitchen the great fireplace is hung about with cranes and kettles.

Just across the green, stands the Scotch Settlement School of two generations ago. Here the teacher uses the same hand-bell Miss Emily Collins used in 1874 to call Henry Ford and his classmates.

Near the schoolhouse and on the same side of the green is the village courthouse. It was built in 1840 as the Logan County Courthouse of Illinois, where for eight years young Abraham Lincoln practiced law. In Lincoln's time the lower floor was used for court, with the judge's bench at one end of the room and a fireplace at the other. Several pieces of Lincoln furniture are in the room, including the original corner cupboard fashioned by young Abe and his

ETC 31224

father, Lincoln's wardrobe, and the table from a nearby courthouse where he once practiced. In one corner stands the chair in which Lincoln was sitting on the night of his assassination in a Washington theater.

To older folks among the thousands of visitors to Greenfield Village, the General Store brings memories. This white frame structure was the principal store of Waterford, Michigan, after 1854. Its equipment includes original counters, spice and coffee grinders, cracker barrels, fancy jewelry, slates and comic valentines.

Under the direction of Henry Ford, who founded the Village, the entire Menlo Park, New Jersey, laboratories of Thomas A. Edison have been reconstructed. Travelers visiting the Menlo Park group can gaze upon the very work table and apparatus Edison used in creating the first electric light bulb, the first phonograph, and a dozen other inventions which have left their stamp on the world. There is also the laboratory pipe organ at which Edison and his associates relaxed with a song or two between experiments.

The laboratory is surrounded by other buildings. There is an Office and Library of brick; the Little Glass House, where the glass parts of the incandescent lamp were blown; the Carbon Shed, where the buttons for Edison's telephone transmitters were made; the Carpenter's Shed, housing also the machine for manufacturing gas for illuminating purposes, and the large one-story brick Machine Shop where Edison developed his early generators and electric light equipment.

The care taken to restore Menlo Park precisely to its original state extends even to the soil. Around these Edison buildings the earth has a reddish color, different from that in the rest of the Village. Mr. Ford had several carloads of this soil brought directly from the original site in New Jersey.

A shrine to the accomplishments of Wilbur and Orville Wright is found in the Wright Cycle Shop where the brothers produced the engine and parts for the first successful airplane. This building stood at 1123 Third Street,

On the quiet waters of the "Suwanee River" in Henry Ford's Greenfield Village, the stern wheeler Suwanee floats serenely. At right is the Stephen Foster home.

When the visitor arrives at Greenfield Village, his car will have to remain in a special parking lot outside. The only vehicles allowed are horse-drawn hacks.

When buildings used by Edison at Menlo Park, N. J., were brought to the village, the laboratory was rebuilt to look as it did before the turn of the century.

ETC 31225

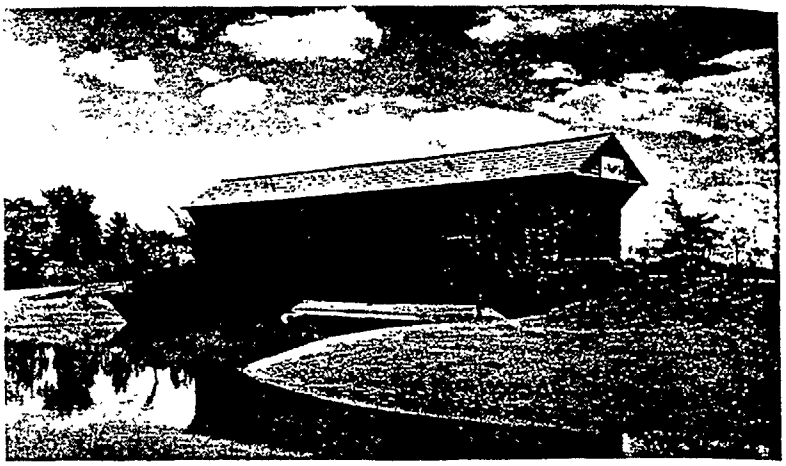
Dayton, Ohio, when it was occupied by the Wright Brothers. As the result of a long search in which Orville Wright assisted, most of the machinery used to manufacture the first airplane has been found and replaced as it was in 1903. The wind tunnel the Wrights used in making many of their discoveries in aerodynamics has been reconstructed. The home at No. 7 Hawthorne Street, Dayton, Ohio, where Orville was born in 1871 and in which the Wright brothers grew up, stands beside the bicycle shop.

Among other notable buildings are the birthplace of William Holmes McGuffey, author of the famous reader; the home of Noah Webster of dictionary fame; the home of Stephen Foster, beloved composer; the unusual working place of Charles P. Steinmetz, the electrical wizard, and the office which was the nerve center of Luther Burbank's far-reaching work.

Old shops and mills help evoke the spirit of America's past. There is ancient Cape Cod Mill, the 1827 Carding Mill, an old grist mill, the "Deluge," old-time fire-fighting apparatus; the Village Post Office, and the Apothecary Shop. Most popular among them is the Tintype Shop where many of the world's great have posed for their daguerrotypes.

A number of people have called Greenfield Village "the most inspiring sight in the Midwest," and every thoughtful visitor senses the serious purpose behind it. There is an inspiration which comes from buildings hallowed by the presence of great men who worked within them, giving one the feeling that the race of men has come a far distance from the pioneer past and has projected itself a long way toward a glorious future. The realization follows that our modern advantages and standard of living are products of our American independence, self-reliance and industry—all generated and fostered in the pioneer towns and villages of our ancestors.

The Edison Institute Museum, adjoining the Village, contains priceless exhibits illustrating the march of American science and industry during the past century or more. Covering approximately eight acres, the museum building is one of the most modern in the world. The entrance hall is a replica of Independence Hall, where the Declaration of Independence was written.



One of the unforgettable bits of Americana in the village is this covered bridge, a recent addition to the historic community.

Priceless exhibits, illustrating the march of American science and industry during the past century or more, fascinate visitors. This illustration shows part of the transportation section, where the history of American railroading comes to life.

The Museum houses one of the most complete collections of automobiles in the world. Included are both European and American makes—gasoline, electric, and steam—each selected because it exemplifies some advance in automobile development.

The same type of progression animates displays of agricultural implements, tracing every step in mankind's slow conquest of the soil from crude stick plow to modern combine harvester, and exhibits showing development of the modern steam engine from its crude beginnings.

There are also a number of structures built within the museum representative of colonial shops, including Caleb Taft's Blacksmith Shop, Pewter Shop, Tinsmith's Shop, Candle Maker's Shop and Barber Shop—each furnished with originals of the period it represents.

In the transportation section are displays of every type of locomotion—chariots, ox carts, primitive ox sledges, airplanes, railroad engines and coaches, bicycles and boats.

ETC 31226

Life's that Way

If a fellow is asked how he likes his job
It's hard telling just what he'll say,
It'll likely depend on the mood he's in
And sometimes on the time of day.

Suppose you ask a test driver
Who drives for Ethyl Gas,
And he's just come in from the graveyard shift
Through the fog that lay thick in the pass.

His eyes are red and burning
And he sure looks far from his best,
Due to irregular meal times
And the lack of proper rest.

You can tell at a glance that he's feeling mean
And the mood that he's in is bad,
When you ask him how he likes his job
You kinda wish you never had.

"How would you like," he shouts at you,
And you see your mistake right then;
"To drive all night and try to sleep all day
With the thermometer at a hundred and ten?

"I nearly wrecked a car last night,"
And his anger he plainly showed.
"I met a drunk from Mojave
And he ran me off the road.

"I've been told it must be easy
To just sit in a car and drive,
But a guy has to mind his P's and Q's
If he wants to stay alive.

"Last night I met more than a dozen cars
That wouldn't dim their lights,
They just don't give a hoot out there
For some one else's rights.

"When I'm driving on the day shift
It's just about as bad,
The heat in that doggoned desert
Nearly drives a fellow mad.

"In the summer I nearly melt out there,
In the winter I've been numb with the cold;
I intend to do something else some day,
Before I get too old.

"I've had a lame back from driving
And took about all I could stand,
Then get sent out back to a trailer
To unload those sacks of sand."

You could see he felt much better
When he'd finished his tale of woe,
And seemed to be wearing a satisfied smile
As he turned, and you watched him go.

When a fellow is sorta discouraged
And his troubles seem to have no end,
It always makes him feel better
If he'll just talk it over with a friend.

The next time you talked to him
He was in a different frame of mind.
A happier and more contented fellow
Would be pretty hard to find.

"You know," he said, "I've liked this job,"
And you could tell he meant it too,
"Especially when I look around
And see what others have to do.

"I've learned to know the desert
With its sunburned rocks and sand,
And the prickly sage and Joshua trees
That grow in that waterless land.

"And that veiling mist in the distance
Never fails to give a thrill,
As I roll around that treacherous curve
At the top of Kramer Hill.

"I know the beauty of a desert sunset
At the close of a summery day,
And feel the relief of the evening breeze
As it sweeps the heat away.

"I know the peace and solitude
Of a silent desert night,
Where a million stars from over head
Cast off their mellow light.

"Of the many things that I've seen and learned
Since I've been living here in the West,
The desert, with all its mysteries
Is the place that I like best.

"I guess it's human nature
To get dissatisfied and blue,
When it seems like only trouble
Ever comes along to you.

"But soon the dark clouds drift away
And you'll find it easier to smile
And again you'll enjoy your daily tasks,
And find them all worthwhile."

B. LORD,
San Bernardino Laboratory.

ETC 31227

"Not enough power, I guess"

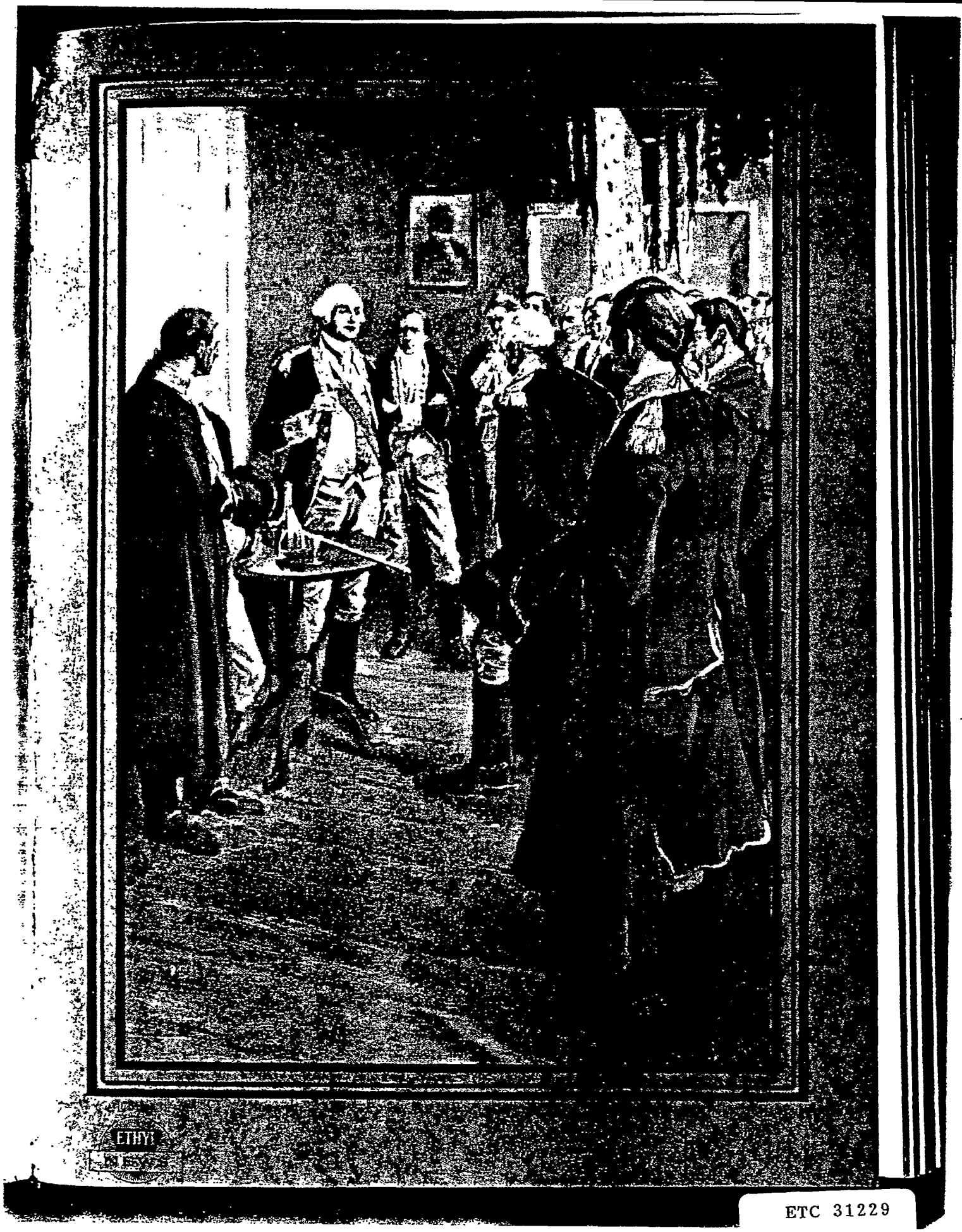
Today the youngsters play with models: tomorrow they'll be running America's airlines, flying and building America's planes.

And in those days to come they'll probably say, even as you say today, "How can we get *more* power?"

It is to help in this constant search for greater power that the Ethyl engineers are working with aviation engineers in a planned program of research—a search for better fuels and better engines. They are adding to a fund of data and information that will some day be the heritage of the youngsters who are now busy experimenting with their rubber band "motors."

ETHYL GASOLINE CORPORATION, manufacturer of anti-knock fluids used by oil companies to improve gasoline

ETC 31228



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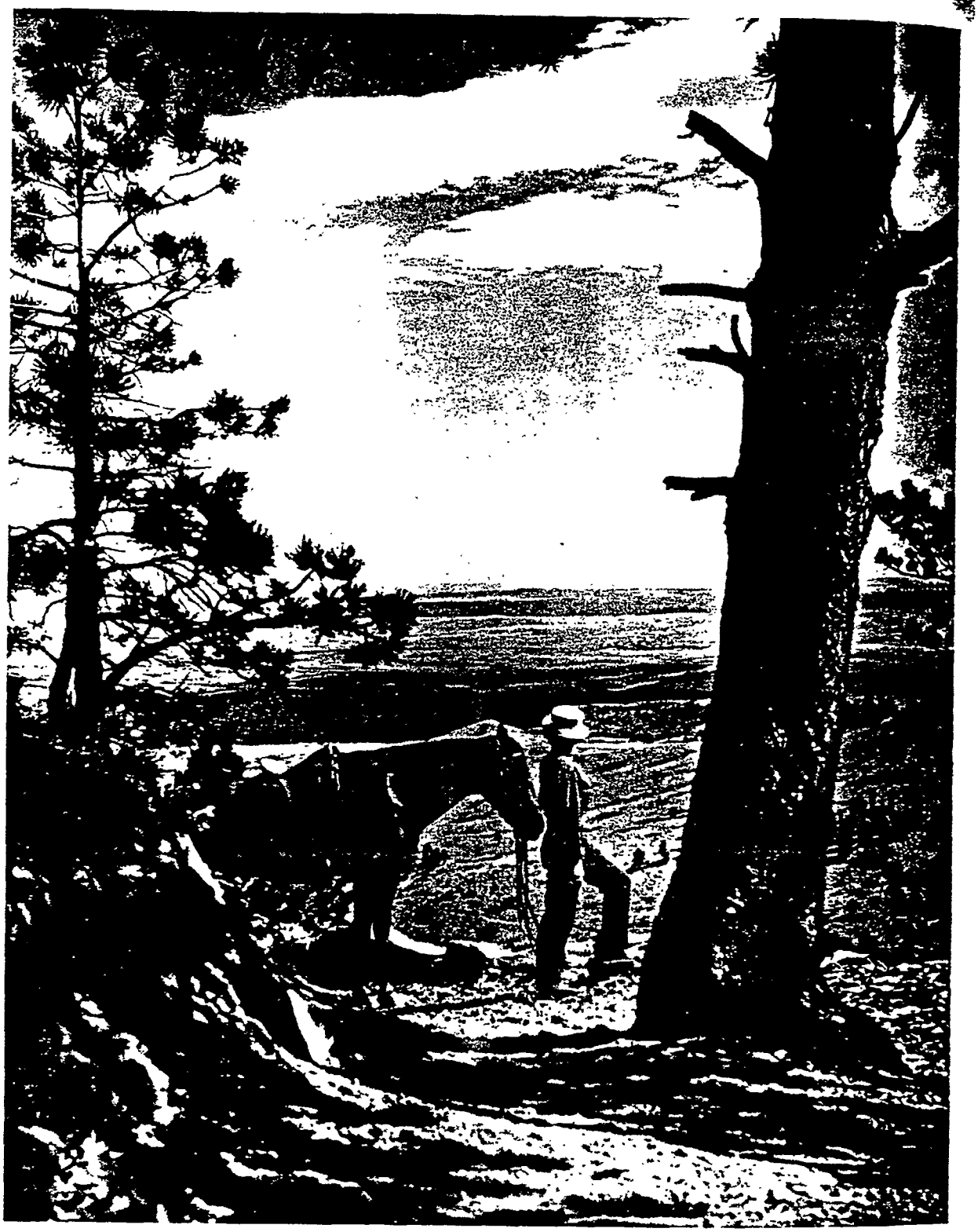

A fair rider dismounts at the top of Garden Creek Falls in Wyoming for a look down the valley toward Casper.

ETHYL NEWS

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To the Strong—

A WHITE hot sun beat down on the shirt-sleeved thousands in the big pine bowl and on the tiny white square of canvas in its center, but few in that great throng were conscious of the fierce heat. All eyes were on the two men who sat in diagonally opposite corners of that square of canvas.

One was a giant of a man, standing six and a half feet in height and weighing 250 pounds. His face had a full, well fed, self satisfied appearance, and why not? Hadn't he for several years been Heavyweight Champion of the World, enjoying the wealth and all the other good things that went with the title?

The other man was a pygmy compared to the Champion — he was five inches shorter and seventy pounds lighter — but his face and body were lean and tough as rawhide and muscles like those of a panther rippled under his bronzed skin. He had come up only recently from the hobo camps, where he had known what it was to be hungry and cold, to sleep outdoors in all kinds of weather, to endure every hardship. He wanted those good things the Champion had. That was why he had trained until he was as lean and tough as any man had ever been.

The Champion's handlers had warned him often that he had better be in tip top shape for the little fellow, who was known to pack dynamite in either mitt. But the Champion had only smiled good-naturedly and continued to be lackadaisical in his workouts.

"I'll moider da bum!" or words to that effect, had been his reply.

The bell rang and the gigantic Champion came leisurely out of his corner, a half smile on his lips. From the opposite corner sprang the scowling challenger, his face dark with two days' growth of black beard. Like a cornered jungle creature, he lashed at the Champion. TNT suddenly exploded on the startled Champion's chin.

When the darkness cleared away, the Champion found himself on the canvas, the salty taste of blood in his mouth. He dragged himself to his feet, only to be battered down. Again and again the relentless challenger's iron fists smashed him to the canvas.

For three rounds the Champion absorbed one of the worst beatings ever meted out to a heavyweight titleholder, and when, at the start of the fourth, he was unable to drag himself off his stool, he knew that poor condition as much as anything was responsible for his massacre.

The result of the battle on that sweltering July day in Toledo might have been different if Jess Willard had been as lean and hard as Jack Dempsey, for Willard had tremendous physical advantages. That battle, however, though it was fought nearly 22 years ago, should be an object lesson to all Americans.

We are undoubtedly the champion country of the world, and as such we enjoy blessings and good things enjoyed by no other nation. But a superabundance

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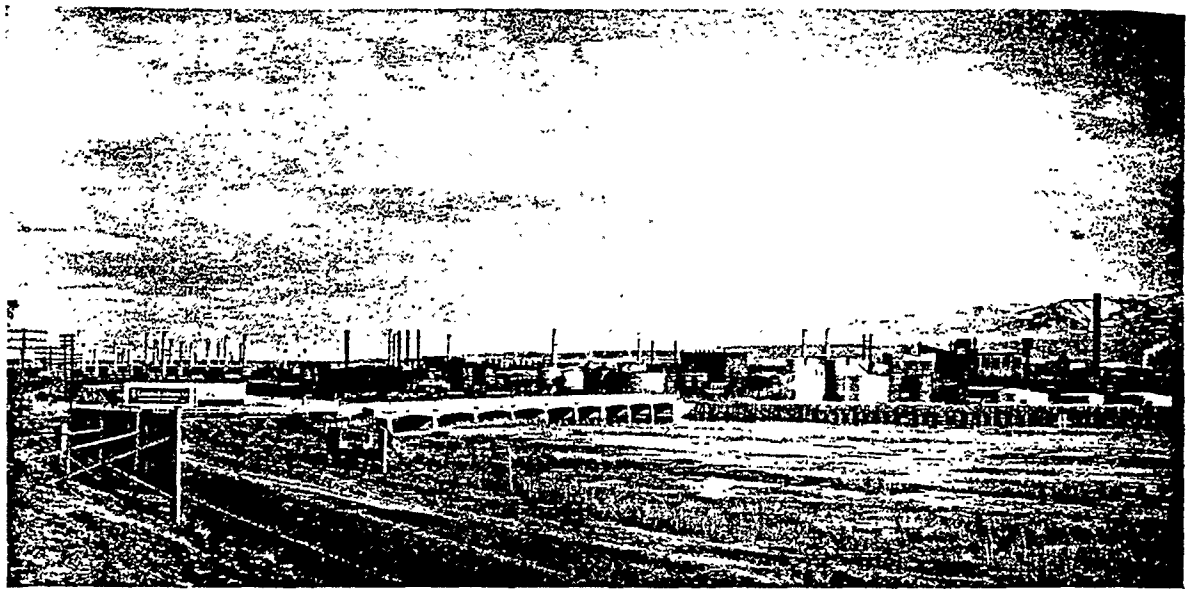

Snow covered mountains form the background for this Standard Oil Company refinery.

Wyoming's Metropolitan City

Casper Today Is a Modern Community, But Visitors Can Still See Reminders of the Period When It Was a Rip-roaring Frontier Town of the Old West.

ONE OF the gayest cities of the Rocky Mountain region is Casper, Wyoming, with luxurious hotels and night clubs as swanky as those of large metropolitan areas, but traces of the early days of the Old West still are visible. Even today cowboys and sheepmen, clad in all their old time regalia, swagger along the streets to give visitors from the East a thrill.

Only a few minutes' ride from the center of town is old Fort Casper, stronghold against Indian attack, preserved in all its glory. Landmarks of the famous Oregon Trail and carvings on Independence Rock recall the days when Casper was adding pages to the history of the winning of the West.

The first house in Casper was built of rough boards in June 1888. The population of this typical frontier town was then less than one hundred persons, most of them living in tents. Cowboys used to ride in from the range, take on a cargo of "nose paint" and then whoop up and down the streets, six-shooters blazing in true wild west style, while their lady friends cheered them on.

This exuberance irked the soberer residents of the community, and on July 20, 1889, a little over a year after its founding, Casper made a serious attempt to become a "Sunday school town." On that date the town council, meeting in its seventh session, clamped down on the ladies by passing the following ordinance:

"It shall be unlawful for any woman to frequent or remain in the barroom of any saloon in the town of Casper between the hours of 7 a.m. and 10 p.m., and any woman who shall enter, frequent or remain in the barroom of any saloon in said town between the hours of 7 a.m. and 10 p.m. shall, upon conviction thereof, be fined in any sum not less than five dollars nor more than 25 dollars.

"It shall be unlawful for any woman to use any vile, profane or indecent language, or to act in a boisterous or lewd manner, or to smoke any cigar, cigarette or pipe on any street in Casper, and if any woman shall use any vile, indecent or profane language, or shall act in a boisterous or lewd manner, or shall smoke any cigar, cigarette or pipe on

Garden Creek Falls tumbles down the side of a mountain outside Casper.

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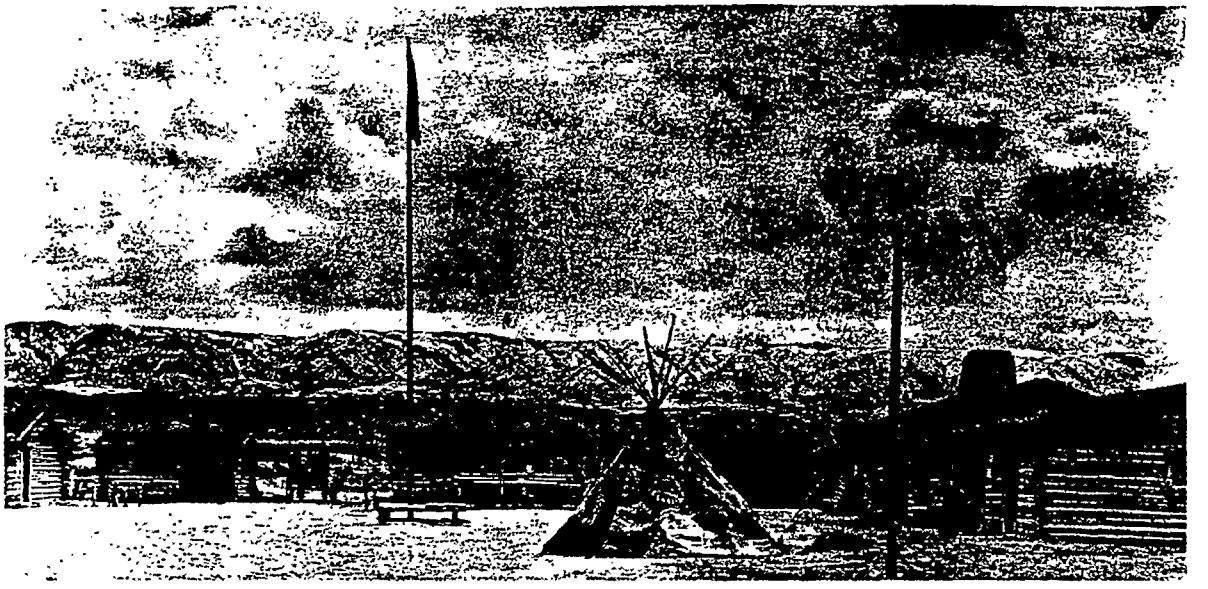

Old Fort Casper, preserved as it was during the days of Indian warfare, is one of the most interesting spots in Natrona County.

any street in Casper, she shall, upon conviction thereof, be fined in any sum not less than five dollars nor more than 25 dollars."

But the ladies of that era, even as today, had minds of their own, and it wasn't long before the town fathers discovered that their reform law was unenforceable.

Casper is fast becoming the tourist mecca of the Rocky Mountain region.

The natural rock tunnel is one of the sights along the bridle path which ascends Casper Mountain.

Surveys conducted during the last two years at the Port of Welcome have disclosed that approximately 800 cars, carrying 2,640 tourists, visit the city daily during a normal vacation season.

Casper Mountain, the summit of which may be reached in twenty minutes from the center of the city, rises to a height of 8,500 feet and is blanketed with snow the year round. Horseback and hiking trails, cottage resorts, picnic grounds, trout streams and the sough of wind through the pines all beckon to the outdoor enthusiast. Some of the most beautiful sights in Wyoming can be seen during a boat trip up Alcova Canyon, where sheer granite and limestone walls rise to a height of from 600 to a thousand feet.

Casper is located in the geographic center of a scenic area that includes the Black Hills, Yellowstone National Park, Glacier National Park, Estes Park, Denver, and Salt Lake City. U. S. Highway 20, a paved road running all the way from Boston, Mass., to the Pacific Northwest, passes through the heart of this region.

The original Hell's Half Acre is located about fifty miles from Casper. It covers in reality about 300 acres and is a freak geological formation composed of warped and twisted rocks. The land was set aside as a public park a few years ago by an act of Congress.

The production and refining of oil is Casper's leading industry, with six major companies and several smaller concerns operating in the city or its immediate vicinity. Crude oil and many of its by-products are shipped out daily to all sections of the United States and to many foreign countries. Approximately 1,422 people are employed in the oil industry in and around the city, making a total annual payroll of $2,788,000. New wells are drilled at regular intervals throughout the year. Geologists claim there is a sufficient supply of oil in this territory to last at least fifty years.

The livestock industry comes next in importance to oil, as Casper is situated in the center of one of the largest wool producing areas in the United States. About 1,300,000 head of sheep graze on the ranges surrounding the city. From these 13,000,000 pounds of wool are clipped and shipped annually.

From the ranches of Natrona County approximately 400 carloads of cattle are shipped each year. The Casper Packing Company affords a market for some of the county's livestock, processing about 400 head of cattle and 800 hogs per month.

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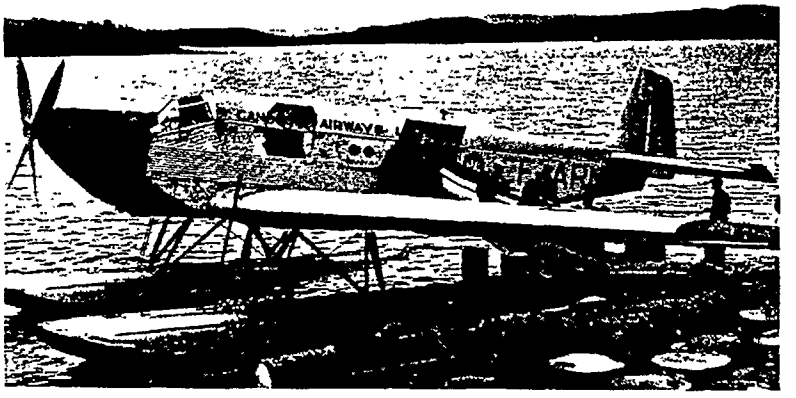


The loading crew had a hard time getting this 20-foot boat into the cabin of the Junkers.

Photo courtesy Canadian Aviation.

Freighting by Air

Shipping Livestock and Heavy Machinery to a Construction Camp Deep in the Canadian Wilderness Offers Many New Problems.

SOMEWHERE in northeastern Quebec a huge war construction project got under way last summer. Located deep in a wilderness of dense evergreen forests and muskeg swamps, where even deer trails are scarce, the construction camp had to depend entirely on the airplane for its equipment and supplies. Men, horses, cattle, tractors, and steam shovels were all transported that way.

Canadian Airways was given the contract for this big job, and from the start of operations on August 11, 1940, until the fall freeze-up November 1 the line carried 626 tons of freight and 494 passengers over the 110 miles of wild country between its base and the camp. The figures, however, give no hint of the headaches encountered by the loading crews before all these consignments reached their ultimate destination.

The spot selected for the aircraft base was on a large lake, at a point 18 miles north of the end of the only road leading to the lake. Freight coming in from outside was trans-shipped from the railroad to trucks, which brought it to the end of the road. From there it was ferried down the lake on large, flat-bottomed scows towed by motorboats. At the base the freight was sorted and everything urgently needed was flown in at once, while the remainder was stored in a large warehouse, to go later.

There were usually from five to eight planes at the base, all of them light ships except a big Junkers which had been nicknamed the "Flying Boxcar." While they were being loaded, the planes were tied to floating docks from which ramps extended to the shore. Keeping docks and planes afloat presented the first difficulty, since the level of the lake had been raised 15 feet by a dam at the outlet and this level was continually dropping. One night the water went down a foot, grounding all docks and planes; which meant that the docks had to be moved out until they floated again and ramps leading to them had to be lengthened accordingly.

One day there arrived at the base a cargo, the contents of which have often proved a source of grief to many men. Horses!

None of the loading crew had ever had any experience in getting a horse aboard a plane. The idea of putting him in a sling and hoisting him aboard by a derrick was thought of and discarded. It was decided at last to tie the horse's feet and slide him aboard on a skid.

The most docile horse of the eight which had arrived was chosen for the experiment. The loading crew, after much sweating, managed to get him down on one side, where they tied him fast; but they had no sooner finished

When diplomacy and artifice failed to get this prize bull aboard the plane, force prevailed.

Photo courtesy Canadian Aviation.

ETC 31234

A horse's hind legs fold up as the dope begins to take effect.
Photo courtesy Canadian Aviation.

this job and stepped back than the animal snapped his bonds with the greatest of ease and scrambled to his feet. This called for a repetition of the tying operation, only this time stronger straps were used.

The horse was then placed on a skid well padded with grain sacks and hay. His head was covered to guard against injury and he was slid through the door and into the cabin of the plane. More hay was packed around him and a heavy board was placed at his feet, to keep him from kicking holes through the side of the plane.

The loading job required seven hours and, so the report states, took seven years off the lives of the men who did it; yet despite their solicitude for the beast's comfort, he kicked during the entire trip. The pilot said that the impact of his hoofs shook the controls, giving the effect of flying in rough air.

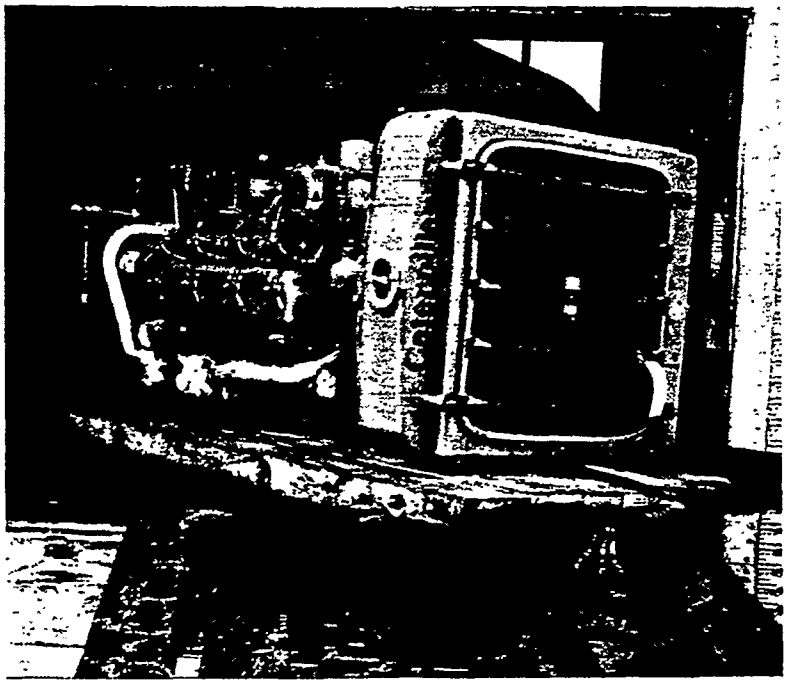
The remaining seven horses would be doped, it was decided, so to perform the operation correctly a veterinary was called in. The "doc" got out his tools and gave one of the horses two injections in the neck, the dose necessary to float him into the arms of Morpheus. As soon as the dope began to take effect, the horse began to stagger like a sailor after a rough night ashore. Three or four men took places on each side of him, to hold him up so that he wouldn't fall hard and injure himself. His ears and eyelids began to droop, then his head. At last he folded up completely and went peacefully to sleep.

Loading the animals this way took only from an hour and a half to two hours each, depending on the speed with which the shots in the neck took effect. Given a few days to rest up after their arrival at the construction camp, the horses appeared to be as good as ever.

Four bulls were the next passengers, the first of which was a prize winner. Doping was planned for these members of the bovine species, too, but doping cattle was found to be a different proposition from doping horses, so that notion was cast overboard.

An effort was made to lead the prize bull aboard the plane, where he could be packed snugly in hay. He would follow his leader until the latter would approach the plane, when he would balk. He was tempted with hay but to no avail. Next, strategy was tried. The bull was blindfolded and led in circles and then headed toward the ramp leading to the plane. Nothing doing! Mr. Bull couldn't be fooled that way. At last he had to be thrown, tied to a skid and dragged up the ramp.

The other three bulls were much more cooperative. They went aboard with



The engine of one of three tractors which were dismantled and shipped via the sky route.
Photo courtesy Canadian Aviation.

ETC 31235

scarcely any urging, and during the flight they lay on their sides and munched hay peacefully.

Other animals that went by the air route were a shipment of cats. Wood mice and other rodents had been having a field day in the camp commissary, so a hurry call was sent out for the kitties. They were an ill starred lot, however. Liberal doses of rat poison had been scattered around before their arrival, in an offensive against all rodent life. The cats proceeded to stuff themselves with the poison and soon the camp site was littered with stiff, stark feline bodies.

A 20-foot motorboat which weighed 1,600 pounds minus the engine turned out to be a loading problem. It had been built to such a size that it should have slid easily through the plane's door; but as is often the case with theoretical measurements, they didn't work. After much sweating and swearing and figuring clearances to a quarter of an inch, the surplus trimmings had to be removed. And when the boat arrived at its destination more whittling had to be done to get it out of the plane.

Three tractors, one large and two small, were brought in, the engines going in the Flying Boxcar. The remaining pieces were taken apart and shipped in the smaller planes. Despite the multitude of parts into which the tractors were broken up, not a part was lost.

A complete steam shovel, the base and bucket of which weighed 4,000 pounds each, went into the woods by air. The Junkers was moored and out to it was built a solid ramp, along which these heavy pieces were skidded on rollers. The shovel base had to stand upright, so a wooden framework was built inside the cabin of the plane and a chain block attached to it. Loading the base was a five-hour job, accomplished with the aid of rollers, pinch bars and the chain block.

Other articles to be carried in this remarkable shipment of freight by air were air compressors, electric generating plants, a wagon drill, narrow gauge dump cars and the rails for them to run on, water pumps, pneumatic hammers, etc., in addition to personnel, provisions, bedding, gasoline and oil.

A sleep-producing injection, administered by a veterinary, will insure a peaceful flight for this horse. *Photo courtesy Canadian Aviation.*

The first horse to make the trip wasn't the least bit airminded. *Photo courtesy Canadian Aviation.*

When mice began to run wild in the camp food supply, a hurry call was sent out for a troop of cats. *Photo courtesy Canadian Aviation.*

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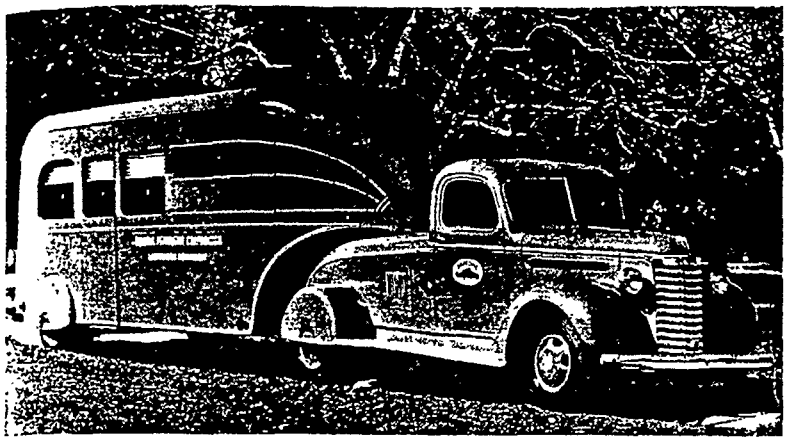


An exterior view of General Petroleum's traveling laboratory.

Technical Unit on Wheels

West Coast Oil Company Sends Traveling Laboratory to Consumers in Remote Communities.

"IF THE consumer cannot come to us, we will gladly go to him." This, in effect, is the attitude of General Petroleum Corporation in sending its traveling laboratories, known as technical units, into the most remote communities in the vast Pacific Coast area which that company serves.

C. F. Naylor, Seattle Assistant Division Manager and correspondent for the "Ethyl News," recently visited one of these units with Phil S. Adams, General Petroleum's automotive engineer operating the unit assigned to Washington, Oregon and Idaho. He found a fully equipped laboratory, housed in a specially designed trailer and transported by a short-coupled heavy duty truck equipped with dual rear wheels.

Inside the trailer, there is room enough to show motion pictures and conduct small classes. All the latest devices are provided for testing fuels and lubricants. A cleverly designed installation, employing butane and dry ice, permits the unit to manufacture its own weather for the purpose of making tests under various degrees of temperature and climatic conditions. When electric current is not available, the unit can produce its own with a Delco motor generator capable of producing 1000 watts of electricity.

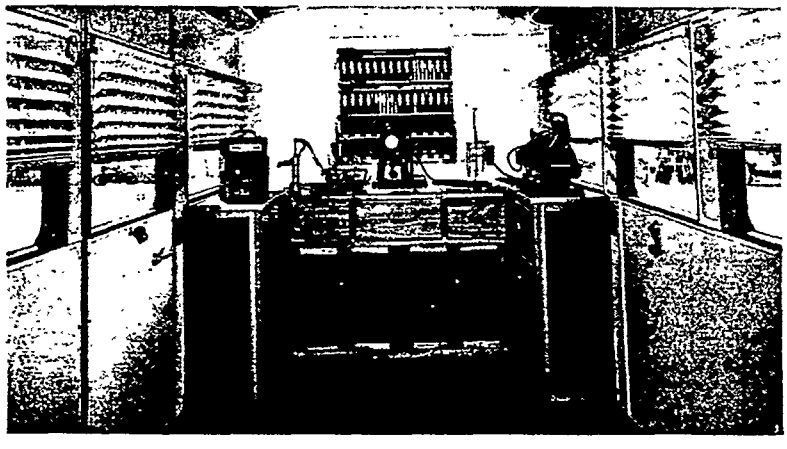
Before the introduction of these traveling laboratories, operators of plant and automotive equipment were often obliged to go to considerable trouble and inconvenience in order to secure tests of the various petroleum products in use in their machinery.

Now the technical units can go into the field to plants, fleet depots, logging operations and farming communities, where tests can be made under actual operating conditions. The company believes this a great advantage to consumers, who are anxious to secure top performance at the lowest possible cost.

The motion picture films, which are available to the engineers traveling with the laboratories, cover a wide range of subjects in a manner both instructive and entertaining, so that it is possible to supplement tests and class discussions with illustrations of practically every operating condition the camera can portray.

Although the units weigh around five and one-half tons, they are comparatively easy to handle. Because of the extremes in climatic and road conditions encountered, H. W. Taylor, Pacific Coast sales manager of the lubricants department of General Petroleum, has specified the use of their Mobilgas Special Gasoline as the motor fuel which can provide maximum operating efficiency wherever the increasing demands of consumers may require the services of the company's roving technicians. Mr. Adams commented that Northwest mountains are climbed with gear ratios from one to two steps higher, when their Ethyl treated premium gasoline is used.

The General Petroleum Corporation has three such units in operation on the West coast under the supervision of John T. Miller, Edwin E. Charles and Phil S. Adams.



Looking toward the rear of the trailer, one sees some of the facilities for conducting tests.

ETC 31237

Swindlers will allow themselves to be painfully injured, even to the extent of a broken arm or leg, in order to collect.

It's a Losing Game

Faking Accidents to Collect Money Is Almost Always Disastrous for the Fakers, the Majority of Whom Wind Up Behind Prison Bars.

IT IS hard to believe that a man, and a young man at that, would deliberately sacrifice his foot in order to collect a small insurance claim. But that is exactly what was done by an individual whom we will refer to as James Smith.

Smith placed his foot in front of the wheel of a street car and allowed the car to run over it, necessitating an amputation. As a result he received $600 from one insurance company and $250 from another company in another state. A routine check-up through the Claims Bureau of the Association of Casualty and Surety Executives revealed that Smith had filed five separate claims for insurance during that same year.

Further investigation showed that he was involved in filing 18 claims against insurance companies in the past 21 years, beginning when he was only 18 years of age. Some of the claims were for injuries allegedly sustained in the course of employment and others for injuries due to falls on buses and street cars. Evidence indicated that Smith, who collected a total of about $1,700 for his accidents, deliberately staged most of them.

It was found that in Smith's application to the insurance company he had falsified several answers to questions regarding prior medical attention. On this charge he was brought into court, convicted and sentenced to jail for two years. However, in view of the heavy price Smith paid by the loss of his foot, the judge suspended sentence and placed him on probation for five years.

The Claims Bureau of the Association of Casualty and Surety Executives was established to protect the insurance dollar against fradulent raids by criminal elements. The benefits extend not only to the member insurance companies but equally to the insuring public and even to the general public, for if an individual owns a business, a car, a home, or has an income, he is fair game for the claim fakers, regardless of whether he is insured or not.

Among the Bureau's investigators are many former aces of the Federal Bureau of Investigation. Its solicitor general is Barent Ten Eyck, who did outstanding work as an assistant prosecutor on the staff of New York's District Attorney Thomas E. Dewey.

The Claims Bureau operates the Index System, with branch offices in many large cities. An intelligence service, this system keeps a record of all claims filed against casualty and surety companies, and its files are so organized that claim repeaters are detected at once. Thus payment of fradulent claims is prevented while payment of just claims is expedited. When fraud is indicated, Claims Bureau investigators go to work. If they find evidence of fraud, they submit it to the police and district attorney of that locality.

Not long ago the Claims Bureau broke up a ring in the South which specialized in faking automobile accidents. Out of 38 persons indicted, 31 were convicted of using the mails to defraud. Prison terms totaling 30 years and eight months were handed out to 14 of the ring members and probationary sentences totaling 105 years to 22 others.

While the ring was riding high, its total take from claims filed against a large number of companies amounted to approximately $12,000. Members of the

Barent Ten Eyck, general solicitor for the Claims Bureau, was a former assistant on the staff of District Attorney Dewey.

ring who expected to profit by a fake claim would each be required to contribute a pro rata share to the premium of a liability policy on a car owned by one of them. Soon after the policy was issued an alleged accident would take place.

To simulate real injuries the claimant would usually submit to terrific physical punishment. One had his body scraped raw with a nutmeg grater, others were beaten with clubs or otherwise mutilated, while seven women victims permitted illegal operations to be performed on them. But these persons who suffered the most didn't receive money in proportion. Instead, the "big shots" at the top of the ring took the biggest cuts.

The ring staged its accidents in the presence of persons of well known integrity. The prospective witness would hear a cleverly faked blow and a heart-rending cry and would rush toward the sound to see a bruised and battered individual writhing on the ground. Usually the "victim" would be a neighbor or acquaintance of the witness, so the latter would be only too glad to assist him with his claim. And the insurance companies paid!

The long arm of the law reached in and began to write "Finis" when two strikingly similar accidents took place in different states within a short time of one another. The persons involved in the second accident claimed they had never been in the state where the first occurred, but witnesses were produced who proved that they lied. Later, the leader of the ring broke down and confessed everything. As a result, prison gates yawned wide.

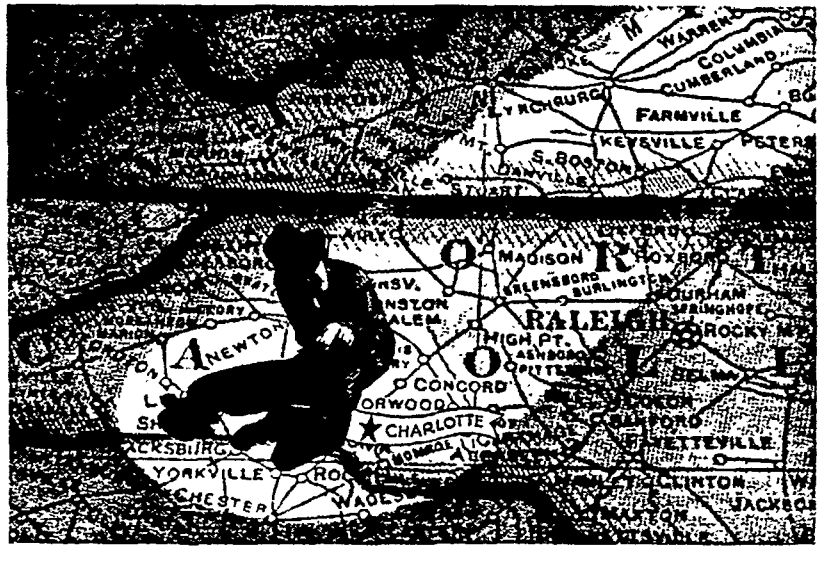
Sometimes a fake claim syndicate doesn't need to stage its accidents, for a train wreck or similar event involving many people offers a first class opportunity for shyster lawyers to turn up with droves of bruised and battered clients. A few years ago, after a Chicago elevated train was wrecked, there were more claimants than there had been passengers on the train.

Among the most troublesome and costly claim fakers are the tumblers, who make an art of falling. They can do a most realistic flop in any place of their choosing. Most of them have malformed joints or other chronic deformities, which can deceive even doctors into believing they are serious injuries.

Frank Jones was an expert tumbler. In addition, he could dislocate his jaw, neck, shoulders, hips, wrists, knuckles, knees, ankles and toes, and could simulate concussion of the brain by self-hypnosis. A few years ago he put in a claim against a rapid transit company for injuries he said he had received in a fall while ascending the stairs of a double-decker bus. Next day he telephoned from his bed in an expensive private room in a hospital to inform the bus company that three of his cervical vertebrae were fractured and his neck dislocated. He demanded $10,000.

Although the x-ray failed to reveal any fracture, it showed two positive dislocations. The hospital surgeon reduced them, harnessed the patient's head to the bedstead, and made plans to encase the neck in a plaster cast. He regarded the injury as serious and was convinced it was caused by the accident. But as soon as the defendant's adjuster had talked with Jones, settled with him for $200, and departed, Jones got up, discarded the harness and walked out of the hospital.

This ability to fake a broken neck gave the doctors such a jolt that inquiries were made of various insurance companies, which reported that this man had been operating under various aliases for some time and had collected sizeable amounts. Jones later admitted to police that he made over $30,000 a year, staging phoney accidents. He discovered his ability to dislocate his joints while still a youngster, he confessed, but used it merely for entertainment for



The claim faker in the spotlight! This picture was used by the Association in a drive against insurance frauds.

ETC 31239

Most claim fakers eventually wind up behind prison bars.

several years until he saw its money-making possibilities.

Jones was sent to the penitentiary to reflect on the disadvantages of taking money under false pretenses. His reflection didn't do him much good, however, for just 27 days after his release he flopped on another bus. A check-up by the Claims Bureau resulted in a five-year stretch in state's prison for Jones.

Another tumbler had an ingenious stunt. He would tuck a crumpled brief case in the bumper of a passing car, then he would flop on the pavement and pretend to be badly injured.

The car's driver would generally find the battered brief case on his return home, and immediately visions of arraignment as a hit-and-run driver would begin to torture his mind. In most cases he would hasten to call the nearest police station to find out if such an accident had been reported. If the driver failed to call the police, the claim faker would make sure that his license number was turned in, so the police would come after him.

When brought face to face with his "victim" in the hospital, however, the shaky motorist would find a charming fellow. The latter would quickly reassure the driver. There wouldn't be any criminal charges, he would promise, as accidents were bound to happen. If the motorist would just ask his insurance adjuster to drop around —

This gentleman also received a vacation behind the bars.

Restaurants and taverns are considered excellent hunting grounds by many claim swindlers. They were the specialty of the fellow who was known to insurance companies as "the man with the tack in his stomach." His method was to enter a restaurant and order pie.

"Fine pie," he would say to the waitress after polishing off a slice. "Let's have another cut."

Part way through the second piece he would begin to choke. His throat felt as if he had swallowed something sharp, he would complain to the manager. Next day he would be back, with a tale of woe about severe pains in his stomach. A trip to a doctor and an x-ray, at the restaurant's expense, would reveal the alarming sight of a large tack in his intestine.

The doctor would advise an immediate visit to the hospital to have the tack removed, but the faker would refuse and would suggest instead a settlement apparently so reasonable that the restaurant proprietor or the company that insured him would snap it up at once. Then the faker would be on his way with a smile to new fields of conquest.

This man really had a tack in his stomach, where it had been embedded for years in the wall of the large intestine. To have it removed would have been to destroy a gold mine. Under numerous aliases he preyed on restaurant owners in many places, until a flood of complaints to the Claims Bureau resulted in a penitentiary term.

Then there was the case of the mouse in the bottle. A man and his wife would enter a tavern and order beer. The man would audibly praise his beer, but his wife would complain that hers wasn't so good. A waiter would be called to sip

The expert sprawler, who can fall anywhere and fake an injury, is one of the most troublesome insurance swindlers.

ETC 31240

Some ambulance chasing rings bribe juries and witnesses in order to collect large amounts.

her beer, and he, too, would admit that it had a queer taste. At that point the husband would make a wry face.

"Waiter, there's a mouse in that bottle!" he would bellow.

After that there would be a scene, with the man's wife getting sick and having to be taken to the hospital, while the man insisted on preserving the bottle as evidence. Investigators at last got suspicious and had the beer analyzed. They found it wasn't beer, but wine! The original bottle had been replaced by one containing wine and the mouse.

With this little trick the swindler had fleeced a brewery of $1,500. It was discovered. He received an indeterminate sentence of one to five years. His wife's sentence was suspended on her promise to leave the state.

The lone wolf claim fakers generally believe in the low-profit quick-turnover method of doing business. They will grab eagerly at settlements of from $10 to $100. Not so the ambulance chasing rings, which are after the big money. They have on their payroll crooked lawyers, crooked doctors and crooked hospital attendants. They try to effect a settlement out of court, but if necessary to collect they will take a case to trial, and there they are not above offering bribes to jurors.

The accident victim who entrusts an ambulance chaser with the job of collecting his claim is always the loser. The shyster hears of an accident through one of his tipsters and hastens to call on one of the injured victims, to whom he explains glibly that he has made a complete check-up on the crash and would be glad to act as the victim's attorney. The victim, who may still be in a dazed condition, will consent, whereupon the shyster gets him to sign a blank release.

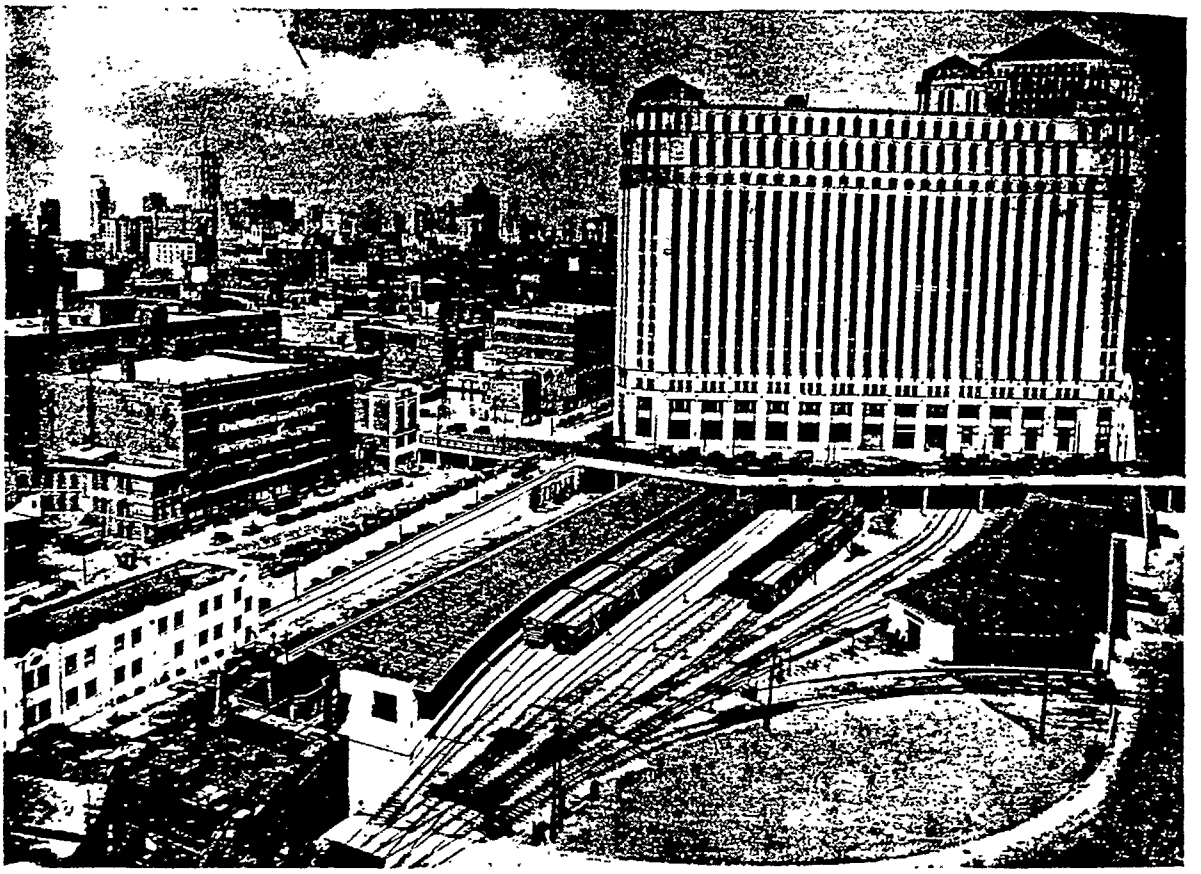
The chaser then goes to see another person who was involved in the accident, always picking the one with the most money. He offers a quick settlement, which will be for a large amount yet an amount which he knows this second party can afford to pay. If the latter comes across, the chaser fills in the amount on the blank release and surrenders it to him. The chaser's client, however, may not see a cent of the money, for the chaser may return to him and tell him he was unable to collect.

Even if the case goes to trial the poor client takes it on the chin. The shyster is probably working with him on a 50-50 split basis, with all expenses of the case to come out of the client's 50 per cent. Since expenses are up to the shyster, a large portion of the client's share of the settlement may be used to pay off crooked witnesses, crooked doctors, and other members of the ring. As a result the client winds up with only a small fraction of what he would have received if he had dealt with the insurance company direct or engaged the services of an honest lawyer.

The Claims Bureau has done much toward crushing claim swindlers, both the syndicates and the lone wolves. The Bureau has helped also to educate the public against the high pressure methods of the smooth talking, ambulance chasing shyster. The Association of Casualty and Surety Executives has united insurance companies, legal authorities and an enlightened public in a drive to stamp out what has been a major racket.

Claims Bureau investigators discuss with a doctor a claim that has the earmarks of fraud.

ETC 31241



The Northwestern Railway runs under the western end of the mart.

Chicago's Merchandise Mart

World's Largest Commercial Building, Erected on Site of Old Frontier Trading Post, Houses Vast Buying Center Which Recently Celebrated Its Tenth Anniversary.

THE CHICAGO Merchandise Mart, which occupies the world's largest commercial building, recently celebrated its tenth birthday. Its record breaking market coverage, which recently established all time highs in both registration of buyers and dollar volume of business, is a far cry from the little trading post that stood on the bank of a lonely western river at a place called Wolf's Point.

When this outpost was set up 113 years ago, Indians and trappers came in to exchange pelts for food, clothing and tobacco. After it grew to a settlement of more than 100 persons, it came to be known as Chi-ca-gou, an Indian word meaning "wild onion" or, figuratively speaking, "strength." Later the "u" was dropped and the place became Chicago.

Over a hundred years after the trading post was founded, ground was broken in 1928 for a trading center, dedicated to the concept of marketing on a vast scale. This project, which was called the Merchandise Mart, now requires 27,618 persons for the administration of its business. On the site of the frontier post's tiny log cabin a building two blocks long and a block wide, which towers 23 stories above the Chicago Loop, has been erected as a permanent home for 6,000 lines of merchandise.

The Merchandise Mart, in the center of Chicago, lies in the geographical heart of America, within a night's ride of 65 per cent of the country's population. It is within 50 miles of the center of industry, within 170 miles of the center of population, and within 270 miles of the center of agriculture.

The world's largest commercial build-

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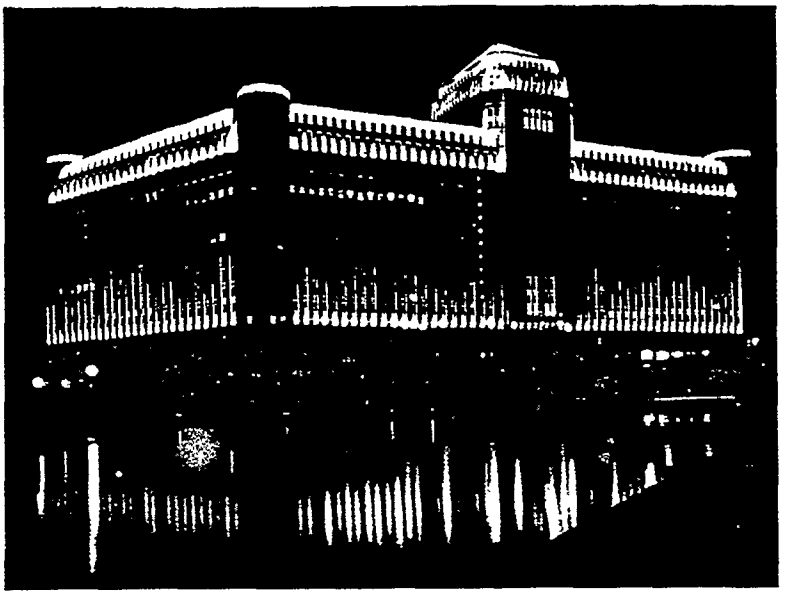
ing covers 93 acres of floor space. Twenty million bricks, 45,000 tons of steel, 40 miles of plumbing and 380 miles of wiring went into it. Total cost of construction was $30,000,000.

More important than the physical aspect of the Merchandise Mart is its presentation of a new merchandising idea. The market offers to the retailer a wide variety of goods, yet it has not supplanted the traveling salesman. Instead, it has helped to make the latter's work more effective.

The retailer has benefited from this central arrangement because it has made possible frequent inspections of new goods and the purchase of items needed to supply an unexpected trend, without the danger of overstocking. Retailers may now buy goods in smaller quantities but more often. Manufacturers have found the Mart advantageous as a closer contact with their outlets and as a means of simplifying production schedules by a more even flow of goods.

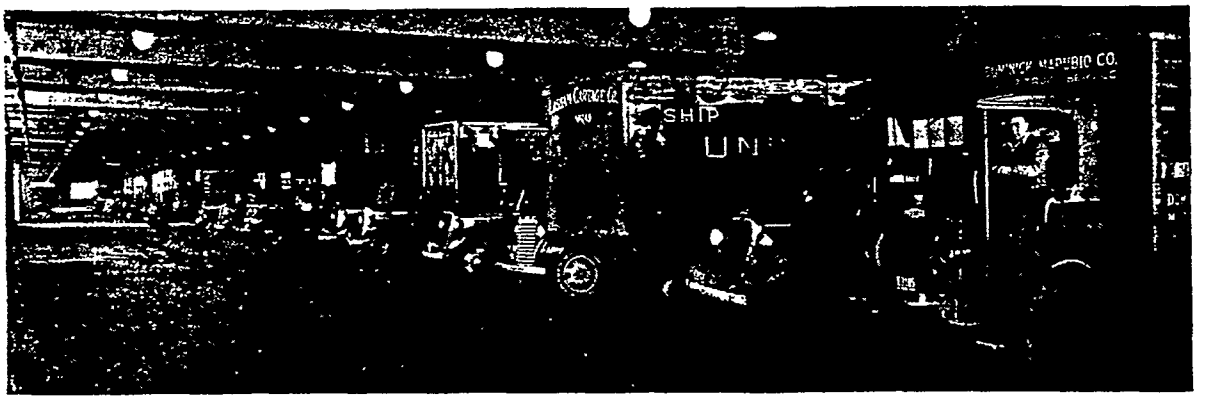
Modern methods of transportation, including the widespread use of the automobile, have simplified trips to the Mart. Buyers who used to make a buying trip once in six months are forming the habit of a quick trip every few weeks.

Buyers are using automobiles in ever increasing numbers to come to the Merchandise Mart. A total of 241,937 buyers' cars were parked there during the first eleven months of 1940, an increase of ten per cent over the figure of 218,772 during the same period in 1939.



The Merchandise Mart, world's largest commercial building, as it looks at night.

An artist's conception of Wolf's Point as it was 113 years ago.



At this platform, which is two blocks long, an average of 1,600 trucks are loaded or unloaded.

ETC 31243

Fleet owners and technical men attended a dinner meeting the first evening of their two-day forum.

National Transportation Forum

Fleet Owners, Bus Manufacturers and Petroleum Refiners Hold First Joint Conference for Presentation of Viewpoints

OVER 350 bus fleet operators and technical men from the oil and automotive industries, including fleet engineers from Ethyl's ten divisions, assembled in Detroit in mid-February to attend the first national forum on gasoline and lubrication. The meeting was sponsored by the Bus Division of the American Transit Association to discuss mutual problems of fleet owner, bus manufacturer and petroleum refiner.

Chairman of the forum was Floyd L. Wheaton, superintendent of automotive equipment for the Detroit Street Railways. Errol Gay of Ethyl Corporation was co-chairman. The conference was divided into two sessions, the first day's discussions being devoted entirely to the subject of gasoline and the second day to lubrication.

Speaking on gasoline from the city transit line operator's viewpoint, E. S. Pardoe, automotive engineer of the Capital Transit Company, said that miles per gallon is the first interest of the fleet operator. He presented data on gasoline advancements in the past ten years, showing a 50 per cent gain in miles per gallon and 47 per cent improvement in passenger ton mile costs in computing gasoline prices exclusive of taxes.

"It is my firm belief that, if advance in the desired characteristics of gasolines and gasoline engines continues as it has in the past few years, there is going to be a whale of a battle between spark ignition and compression ignition types of internal combustion engines to determine supremacy in the city transportation field," Mr. Pardoe said.

He listed other factors sought in gasoline by fleet operators, including freedom from vapor lock and gum formation, elimination of exhaust gas odors, acceleration comparable to automobile performance, power, uniformity of product, and octane rating. He expressed the opinion that fleet owners, as laymen, are not qualified to write their own fuel specifications.

Charles O. Guernsey, vice-president of the J. G. Brill Company, Philadelphia, presenting the bus manufacturer's viewpoint, said:

"We have found comparatively serious variations between different refiners, notably between those in different sections of the country, in the volatility of fuels supplied for commercial use. The variation is sufficiently broad that a hot-spot system correct for the more volatile fuels is inadequate for heavier fuels, and vice versa.

"Certain operators have had the opinion that heavier fuels gave more power and better economy, but I question whether this can be sustained, particularly in view of the added troubles of fuel distribution when using the heavier fuel and operating on part throttle."

Mr. Guernsey said that in recent years he had heard various engineers prophesy that the ultimate power plant for automotive transportation would be neither a gasoline nor a diesel engine, but that some way would be found to combine the advantages of the two types.

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"If, as seems probable, the octane rating of gasoline continues to improve and we can raise the compression ratio and improve the economy as a consequence, perhaps the gasoline engine may match or closely approach the efficiency of the diesel engine, while retaining the smoothness, flexibility, light weight, and clean exhaust of the spark ignition type," he concluded.

A paper by C. J. Wilson, W. J. Sweeney and A. J. Blackwood of the Standard Oil Development Company on the oil industry's viewpoint, with a review of the production of gasoline from crude oil, was presented by Mr. Blackwood. He described the qualities of fuel, including volatility, vapor lock, warm-up and octane number, and told the forum that since 1935 the oil industry has been over the billion barrel mark.

"At the present time consumers are being supplied with more than 150,000,000 gallons of petroleum products a day," Mr. Blackwood said. "If this rate continues, an average of about 425 gallons for every man, woman and child in the United States will have been consumed this year."

Mr. Blackwood pointed out that large volume production results in lower costs; therefore, in the interests of economy, transport equipment should be designed to operate on fuel supplied for the large volume market. He noted that, while the average truck consumes twice as much gasoline as the average passenger car and the average bus six or seven times as much, the far smaller number of bus and truck units compared to the number of passenger cars more than compensates for the greater fuel consumption. Of the total gasoline used in 1940 only 21 per cent went to trucks and only four per cent to buses.

"Since the passenger car is the largest consumer of gasoline, fuel must be produced to meet the requirements of this vehicle," Mr. Blackwood continued. "However, though the percentage of the total gasoline used in trucks and buses is small, it represents a volume of six billion gallons, and the requirements of these units must be considered in establishing the necessary quality of motor fuel.

"For example, the volatility requirements of fuels used under heavy duty conditions affect to an important degree refining operations in the preparation of fuels for passenger cars. Slight changes in the volatility requirements or other characteristics to suit consumers' individual specifications often increase the manufacturing cost substantially, because of special handling, segregation and blending operations."

Other speakers on gasoline were H. I. Sullivan of the Eastern Massachusetts Street Railway, R. H. Stier of the Philadelphia Transportation Company, Lee Daniels of the Twin Coach Company, Robert Cass of the White Motor Company, A. B. Culbertson of the Shell Oil Company, and O. M. Setrum of the Phillips Petroleum Company.

Leading off for the fleet operators at the session on lubrication, C. M. Gray, superintendent of shops and equipment of the St. Louis Public Service Company, suggested mechanical means for attacking the "hot sludge" problem.

"Crankcase sludge offers some evidence of metallic compounds, usually lead from fuel residues and iron from cylinder and ring wear," Mr. Gray said. "Lead from the fuel, however, appears to have no detrimental effect on crankcase or cylinder parts."

Other speakers on lubrication were H. C. Mougey of General Motors Corporation, C. J. Livingstone of Gulf Research and Development Company, J. C. Baine, Jr., of New Orleans Public Service, Inc., C. O. Sparhawk of United Electric Railways Company, W. F. Aug of Mack Manufacturing Company, R. R. Abbott of the White Motor Company, George Rounds of Socony-Vacuum Oil Company, G. K. Squier of Standard Oil Company of Indiana, and Dr. John Geniesse of the Atlantic Refining Company.

Many officials of the American Transit Association attended the forum, including Charles Gordon, the managing director. At a dinner meeting which was held the first evening, the speakers were William B. Stout, well known Detroit airplane and automobile designer, and William J. Cameron of the Ford Motor Company.

PERCY L. GRIFFITHS

Ethyl Elects New Vice-President

THE BOARD OF DIRECTORS of Ethyl Gasoline Corporation has elected Percy L. Griffiths, former treasurer of General Motors Overseas Operations, vice-president. Mr. Griffiths joined the Company in February to take charge of Ethyl finances.

Since 1925, when he was elected treasurer of General Motors Peninsular, Mr. Griffiths has been engaged in the financial operations of General Motors Export. After service with General Motors Peninsula, he was treasurer of General Motors Continental until 1936, when he returned to New York as treasurer of the entire Overseas field.

During the first World War Mr. Griffiths served in the British Army in France and in Mesopotamia, reaching the rank of major by the time the war ended. In the army he was also concerned with finances. In Mesopotamia he was deputy field comptroller for the Forward Area and later was assistant financial advisor to the commander-in-chief in Bagdad.

After the war Mr. Griffiths was European auditor for Armour & Company for four and a half years before joining General Motors in Madrid, Spain.

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The Hermit, left, tells Senator Edwin C. Johnson of Colorado about "Gimlett's Folly," a pair of woman's garters each set with a five dollar gold piece.
Pictures, Inc.

And You Meet The Most Interesting People

The Hermit of Arbor Villa, Who Digs Gold for a Living, Discourses at Some Length on the Economic Situation, Women, and Other Matters.

IT WAS 6:50 A.M. on a gloomy Sunday morning. We had spent two nights on the sleeper. We had sat up half the night reading a book called "How to Read a Book" — if that makes any sense to you. We had been routed out of a warm bed an hour before to change trains. Any way you figure it that means 5:50 A.M., which is no fit hour for man or beast to be astir on Sunday morning. We hadn't had our breakfast. You see what we mean — it was one of those mornings!

Groping our way into the parlor car of the Washington-New York train we saw something that brought us up short. There was only one other animate object in the car and that was something that looked like an English sheep dog wearing dark glasses. We averted our eyes quickly and made a mental note. Experts in esoteric mammalia say that pink elephants and blood red tigers are often seen abroad during the early morning hours and during certain other low pressure periods, but this sheep dog business was entirely new to us. We know better than to fool around with the supernatural so we turned tail and headed for the diner.

Breakfast, including lots of black coffee, and the Sunday papers occupied us for the next hour. In the meantime the sun had come out and ordinary objects had taken on sharper, truer outlines. So naturally we weren't prepared for what we found back in the parlor car.

Instead of disappearing, our sheep dog was still there, large as life—larger! —only now it was smoking a pipe.

They say that if you go up and try to touch these things they will disappear. So we walked resolutely toward it. As we got closer, we saw that we had been wrong about the whole thing. It was a man, a living breathing man, but obviously a man in disguise. In the first place he had a long white beard that came down to here. He had long white hair that came down over his neck and rather bushy eyebrows covered part of his forehead. This, together with his dark glasses, left very little of his physiognomy out in the open. The man wore a faded blue polka dot shirt in the breast pocket of which he carried a toothbrush and a sack of tobacco — tag out. A pair of blue denim breeches tucked into high laced boots and a sheepskin coat completed the outfit.

Now what would you think? Well, that's what we thought, too — a disguise! And not a very good one. We followers of comic strips know a disguise when we see one. Why, we remember the time that a make-up expert worked on "Winslow of the Navy" for a week and we still knew him!

We decided it might be a good idea to keep an eye on this man, and what a man he was. He must have been a giant when he was young and he was no panty-waist now, although he looked to be well over three score and ten.

In the meantime he was looking us over. In this sizing-up process our eyes met and the ice broke with a crash.

"Business pretty good here in the East, I guess, eh?" said the bearded one in a booming voice.

"Well," we said guardedly, not wanting to give anything away, "that's what the papers say." You know, polite but not revealing.

"Let the boys have their fun," the beaver said. "They only think they're making money. This money we have nowadays is no good — a lot of paper with nothing behind it. I've been in Washington for three weeks trying to find out something about this money situation. I want to know why I have

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to take this filthy, germ-ridden paper money for the gold I dig out of the ground by the sweat of my brow. Do you know that every dollar bill has 1,014 germs on it?"

All this had a vaguely familiar ring and then, all of a sudden it clicked. This guy was the real McCoy — an old time prospector who really had come to Washington to ask those questions. We remembered reading about it in the papers. Called himself the Hermit of Arbor Villa. We pricked up our ears.

"Yes, sir," the Hermit was saying, "1,014 germs. That's not true of gold and silver money. Germs are allergic to gold and silver."

We fell to wondering if a five dollar bill had 5,070 germs, etc., but we let it pass.

"The government is trying to make a mystery out of money," the old prospector boomed, "when there's no mystery to it. They've got things in such a mess now that only a wizard can solve it and, believe me, the wizards are few and far between. I haven't been able to find any in Washington."

The old man gazed out the window at the fleeting Pennsylvania countryside. "You know," he said, "I've talked to dozens of Congressmen and Senators in Washington about this money situation. I want to know why they pay me 71 cents for silver and book it at the treasury at $1.29. What kind of monkey business is that? Not one of them can give me an answer — not one! I went before the Senate Banking and Currency Committee and asked the same question. Nobody on that committee knew the answer, either.

"Prospectors dig gold out of the ground," the Hermit continued, "sell it to the Treasury, and they turn around and bury it in another hole in the ground at Fort Knox, Kentucky. They hire an army to guard it. It doesn't make sense. I've been a prospector all my life and I thought I knew something about money, but I certainly don't understand this kind of folderol.

"They took me over to the Bureau of Printing and Engraving the other day. Somebody handed me a hundred thousand dollar bill — put it right in my hand. Wanted to know if I'd ever held that much money before. 'Hell,' I said, 'that's not money. That's just a piece of paper that's worth about a dime. There's nothing behind it. Was a time when you could take this to the Treasury and exchange it for gold. Not any more'."

We clucked sympathetically and asked: "Didn't the newspapers carry a story about you?"

"Yes, they wrote me up in the papers, Washington papers, New York papers —papers all over the country. Also Time Magazine. Guess the reporters thought I was some kind of a curiosity — like a three legged duck. I told them about trying to get a room at the Willard Hotel because that's where Haw Tabor, you know, 'Silver Dollar' Tabor, put up when he was in Washington a good many years ago. But the clerk kinda looked down his nose and said they were full up."

The old prospector chuckled. "Didn't like the look of my clothes, I guess." He glanced down at his faded blue shirt and overall pants. "There was nothing I could do about that — they're all the clothes I have or need. Later on Senator Johnson of Colorado — I've known him for years — introduced me to the manager of the hotel, who apologized all over the place. 'That's all right,' I said. 'You fellows here in the East judge a man by the way he looks. Out where I come from they judge him by what he is. Besides, I had my blanket roll with me. I could have slept out in the open. I've done it many a time'."

"Did you know 'Silver Dollar' Tabor?" we asked.

"Yes, I knew him. He was a great man — one of the greatest men Colorado ever saw. Made a lot of money out of claims. Never did any prospecting. He made money, but he couldn't hold on to it. Haw Tabor filled out an unexpired term in the Senate, you know. He was in Washington just a month and it cost him $200,000. He bought whiskey and champagne for everybody — the town was floating in it. But he was a great man just the same."

We learned that the prospector's name was Frank Edward Gimlett, that he was 75 years old and still worked with pick and shovel high up on the Continental Divide about 20 miles west of Salida, Colorado.

A year or so ago Gimlett's name appeared in the news in connection with a

A $3,640 claim was filed by the Hermit with an irrigation company for the 55-year storage of snow upon this mountain, which is on Gimlett's land. Gimlett claims the snow, to which the irrigation company has title, prevents his mining the land. Acme Photo

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rather unusual law suit. He filed a claim against an irrigation company for rental on his land. It seems that the defendant legally owns the snow that falls on Gimlett's land. Since the snow never melts on one of the peaks on the land in question, Gimlett figured that he had been storing their snow for about 55 years and that it was time they either paid rent or took their old snow away. The rent, he said, amounted to $3,640.62. We don't know how it came out.

The old prospector asserted that on an average day he could dig out about $2 worth of gold.

"It's enough for me to live on," he said, "and I can do it without hurting anyone. Do you realize that prospecting is the only business in the world where that's true? The gold and silver is there, a natural resource. I dig it out and turn it over to the government for cash. Nobody gets hurt."

Gimlett, despite his somewhat quaint appearance, talked well and held strong views on a number of subjects, including women, morals and tipping. He showed us a picture of his place near Salida. The entrance was framed by two large posts topped by a cross piece on which was printed in large letters: "Hermit of Arbor Villa — Paradise."

"You know why I call it Paradise?" he asked. "No women! Never been a woman on the place."

He wasn't bitter about it — just emphatic.

"You know," he said, "when I was a young man we had three credos in my country. The first was that women — all women — were angels; second, that gold and silver made the world go round; and third, that there was a God in his heaven. I'm beginning to think we were wrong about all three.

"Until I was 30 years old I didn't even know a woman had an ankle. I knew they got around somehow, but I didn't know how. No question about ankles or anything else these days. No mystery anymore. I've been noticing these modern women — smoking cigarettes, drinking liquor and kissing everybody."

The old timer pulled at his pipe. "Listen," he said, "I've seen 15 men shot

When Gimlett put in his claim for snow storage a little over a year ago, he didn't have the luxuriant crop of whiskers which now adorns his face.

Acme Photo

over a woman's kiss." This apparently reminded him of something for he reached into his pocket and pulled out a pair of ladies' garters. They looked a little bedraggled, but each one had a fancy gold buckle in which a $5 gold piece had been set.

"I call these Gimlett's Folly. Had them made for a lady friend who married the other fellow," he explained.

Obviously this happened sometime after he found out that women were bifurcated.

"Here's a couple of gold coins that F. D. R. won't get," the old prospector said with satisfaction.

The Hermit had something else to get off his chest. "Another thing that riles me is this tipping business. Everytime you turn around you are supposed to tip somebody. Well, I just don't do it. When I go into a restaurant I tell the waiter that he's not going to get a tip. Then we both know where we stand. And I get better service than you might think."

By this time the skyline of New York was visible. The Hermit looked at it with interest. "Been 30 years since I was in New York. Never forget that trip. I had decided to stay at the Pennsylvania Hotel. I got into a cab and we drove for an hour. Finally we pulled up at the hotel and the driver said the fare was $2. The next morning I found out that the hotel was just across the street from the station. I'd been taken for a buggy ride. Well, live and learn."

Walking up the platform toward the station the old prospector was the cynosure of all eyes. He knew he was being stared at and he loved it. "They don't see my kind every day," he said with a chuckle.

As we shook hands inside the station he said, "Bet I'm the first gold digger that ever came to New York wearing blue denim pants."

You can interpret that one any way you like.

The Following

Service Awards

have been made as of

March 1st, 1941

10 YEARS

CARL ABELL	Sales, Los Angeles
EDNA HUNT	Gasoline Testing Yonkers

To the Strong—

(*Continued from page 3*)

of the good things of life often makes the possessor soft and easy going. We must guard against this as our chief danger. We must prepare and train ourselves until we are lean and hard; as lean and hard as the Jack Dempsey who whipped the giant Willard; as lean and hard as were our forefathers, who braved thousands of miles of little known ocean, a vast and trackless wilderness, and hordes of marauding Indians to build the heritage they have handed down to us.

Someday — and the day may be at hand — some lean and tough nation is going to want that heritage, perhaps going to try and grab it from us and our children. We must be so hard and tough that no nation ever can!

ETC 31248

Auto Industry Gets Defense Job

Plan Devised to Build Bombing Planes by Assembly Line Methods. Car Manufacturers Can Take Part by Making Airplane Parts.

THE NATIONAL Defense Advisory Commission has dropped in the lap of the automotive industries a huge defense assignment, namely supplying aircraft parts in quantity for a new program of building bombing planes by the assembly plant method. Industry-wide aid will be required to "deliver" on this novel and ramified job.

What is the most efficient procedure for a manufacturer who, knowing he has plant capacity available and believing he can use it efficiently for this aircraft program, wants to figure on taking on part of the work?

Two first steps are open to him, both of which have been taken already by several hundred automotive concerns and metal-working firms:

First, write to the Automotive Committee for Air Defense, 8505 West Warren Avenue, Detroit, describing the type and volume of work done by the establishment, the character of equipment installed, personnel employed, etc., and thereby list the plant as available for the aircraft parts work.

Second, send a representative to visit the exhibit of aircraft parts which the committee is establishing at its headquarters. Here with the aid of the U. S. Army Air Corps the committee is gradually accumulating not only blueprints of the plane models which have been selected for this program but actual, disassembled parts and sub-assemblies in various stages of fabrication. The committee has obtained more than 40,000 square feet of floor space for displaying the parts.

This plant is much more than a museum of airplane pieces. The committee is putting together a staff of production men, both from the aviation and automotive industries, and the army is lending experts, led by Major James H. Doolittle of the Air Corps procurement branch.

These men, collectively, are able to describe how these pieces are now being made and assembled; what equipment is used; what performance factors or specifications must be met; what "bugs" will be encountered in getting various results with the special lightweight aircraft alloys that have to be used.

If a manufacturer wishes to visit the exhibit at this time, or send a representative, he should obtain a special pass entitling the bearer to admission. While few military secrets may be exposed to view at the exhibit, the U. S. Army maintains precautions to safeguard blueprints and designs. Identification cards may be obtained with a minimum of delay on application to whichever automotive manufacturing trade association the manufacturer belongs, or by applying directly to the committee.

After writing, or visiting the exhibit, the manufacturer may embark on experimental studies of parts he would like to undertake, and await call from the committee for a more complete appraisal of his plant's facilities; or he may go out and seek immediate orders to supply aircraft manufacturers who may need assistance to expedite contracts which they already have under way.

The latter method serves a double purpose: It helps relieve the existing pressure on the heavily expanded aircraft companies, and it gives a potential supplier for the larger job ahead the benefit and experience of an "educational order."

Several automotive firms have contracts now—some small and some large—to supply pieces and sub-assemblies for current plane programs. These firms, in a highly cooperative manner, have offered to make available to other establishments the lessons taught by their pioneer experience in an unfamiliar field.

"The Better The Gas, The Better Your Car," says the Resolute Oil Corporation on their large new neon sign at their Great Falls, Montana station. Marketers of Resolute Ethyl and Resolute 74-plus in Montana and Wyoming, they employ this modern method to tell the public that they are keeping up with the trend in motor car and fuel advancements.

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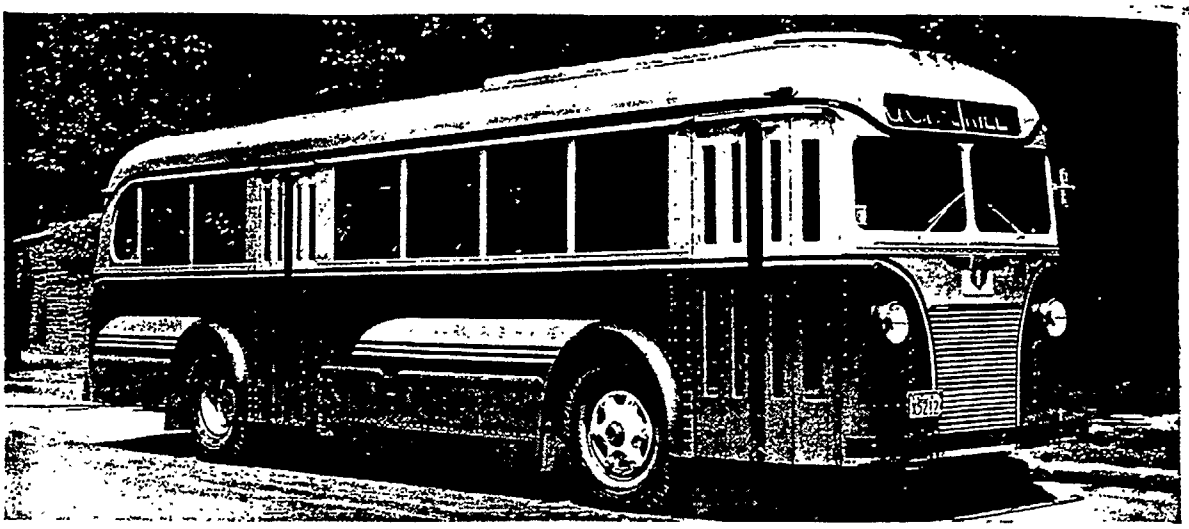

Loaded to the amount of full seating capacity, this 36-passenger A.C.F. bus was used in tests by the J. G. Brill Company.

Power plus Economy

Large Commercial Engine Develops More Horsepower and Uses Less Gasoline After Compression Ratio Has Been Raised 30 Per Cent.

A 30 PER CENT increase in compression ratio plus the use of 85 octane gasoline boosted the horsepower of a large commercial engine 23 per cent and reduced fuel consumption 14 to 15 per cent in tests reported by Charles O. Guernsey, vice president of the J. G. Brill Company, Philadelphia. The vehicle used to determine the differences in operating economy with various grades of gasoline was a 36-passenger A.C.F. underfloor powered bus.

Loaded to simulate full seating capacity, it was first tested for fuel economy and acceleration characteristics under service conditions. Then the engine was placed on a dynamometer to check horsepower and fuel economy. All conditions were uniform except for the change in fuel, and corresponding changes in compression ratio and spark setting. Acceleration of the bus from 10 to 35 miles per hour required 32.3 seconds on 70 octane fuel and only 26.3 seconds on 85 octane fuel.

Mr. Guernsey estimates that if the engine displacement had been reduced or rear axle ratio changed to maintain the same level of road performance for all grades of fuel the higher octane gasoline would have shown an increase in economy of about 18 to 20 per cent.

Most bus operators now are octane minded and recognize the advantages of high anti-knock value gasolines, Mr. Guernsey pointed out. "It seems certain that we may expect a continuation of the present trend, with the resulting improvements as outlined," he said. "In addition, there will be coincidental improvements in other directions. The weight of the engine per horsepower will be less. Because of improved thermal efficiency, the amount of heat rejected to the exhaust and water jacket will be reduced, thus decreasing the demand on the cooling system.

"The bus and engine builders are fully aware of the implications and possibilities thus opened up to them, and may be depended upon to keep engine design as nearly as possible in step with such improvements in fuels."

THIS MONTH'S COVER

THIS famous scene took place December 4, 1783, in Fraunces Tavern, located at Broad and Pearl Streets, New York, and still preserved as it was in Revolutionary times by the Sons of the Revolution.

The British had sailed away and Washington wished to return to Mount Vernon, so he summoned his officers to meet him. Colonel Tallmadge wrote of the event:

"We had assembled but a few moments when His Excellency entered the room. His emotion, too strong to be concealed, seemed to be reciprocated by every officer present. After partaking of a slight refreshment in almost breathless silence, the General said:

" 'With a heart full of love and gratitude I now take leave of you. I most devoutly wish that your latter days may be as prosperous and happy as your former ones have been glorious and honorable.' "

The picture of the event is based on a drawing by F. C. Yohn, made for Charles Scribners Sons, by whose permission it is reproduced.

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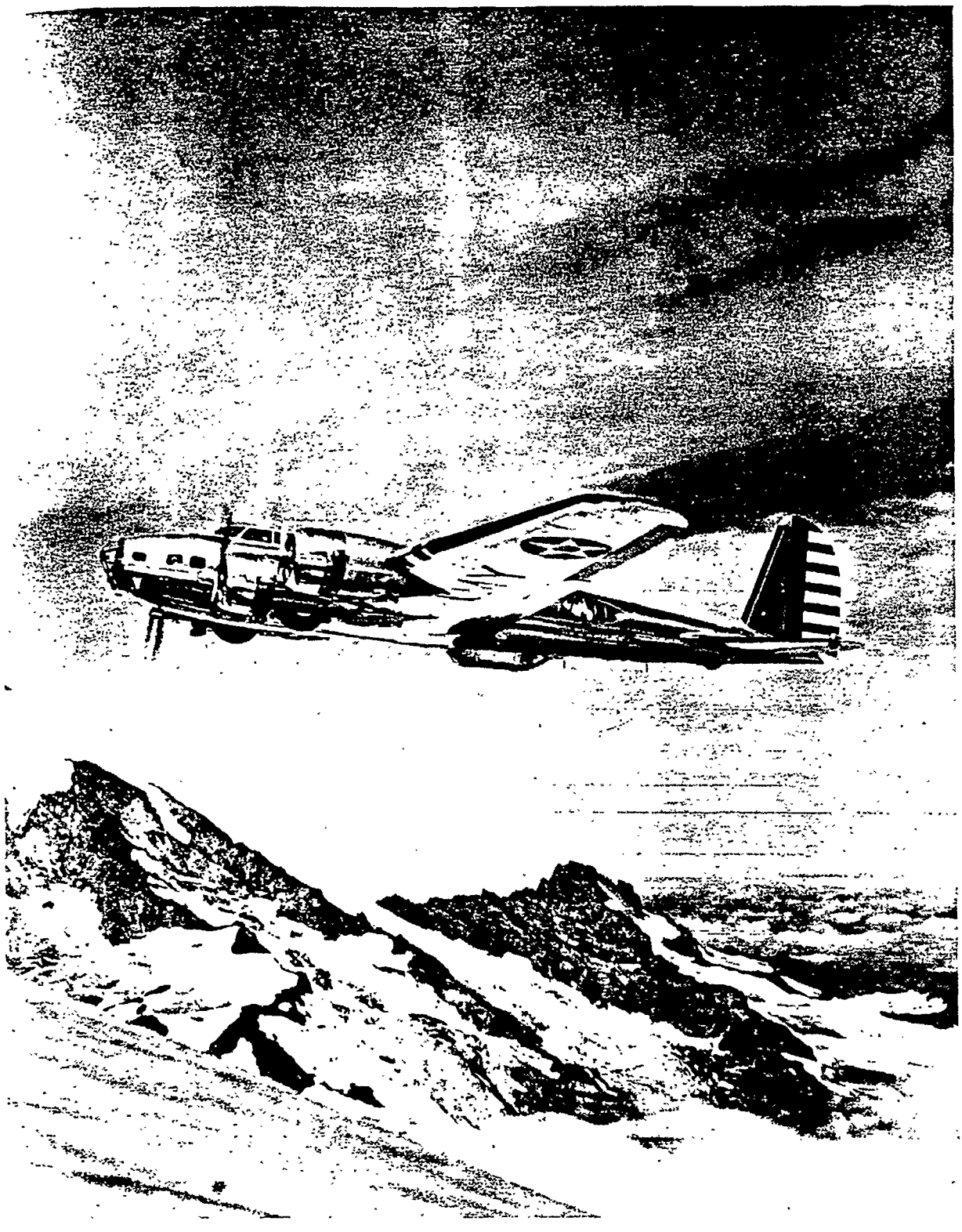

A Boeing Flying Fortress, huge Army bomber with a speed of over 300 miles an hour, flies over western mountain country on a test hop.

Photo courtesy Boeing Aircraft Company

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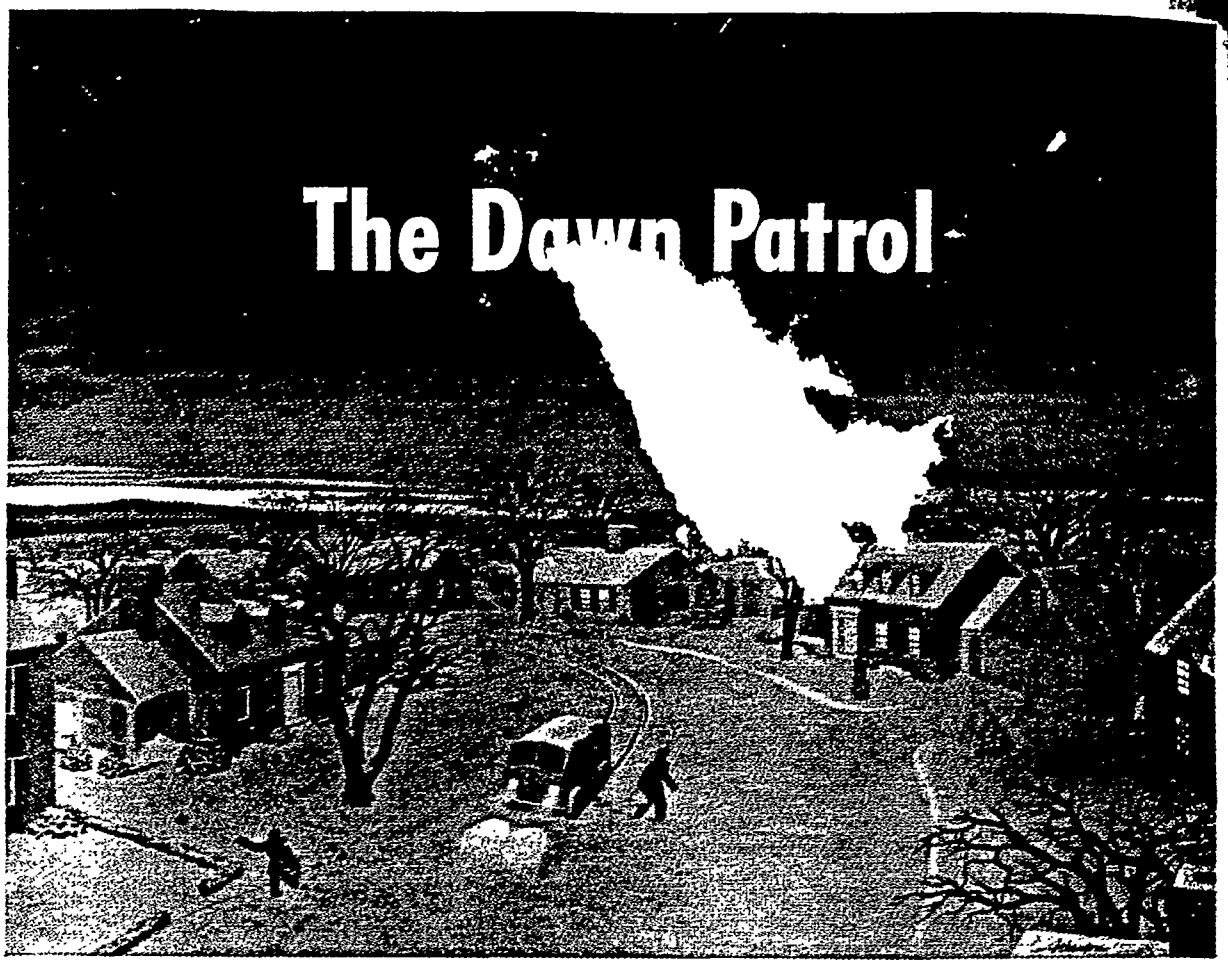

A story of day-to-day progress in automotive research

STARS still hang in the frosty sky, but men are already at work. They are busy putting bottles of milk and newspapers and bags of fresh rolls on millions of doorsteps. They are members of the "dawn patrol"— the men who early each morning step on the starting pedals of millions of engines to bring life to the towns and cities of America.

Today no city could exist if it were not nourished by the life stream that flows in its streets. And each improvement in automobiles, trucks and buses benefits the entire city. For example, when the cost of operating trucks can be shaved a fraction of a cent a mile, the savings may be reflected in the prices of canned goods or soap or oranges. Or if a bus company can improve the power output of its engines, Mr. Citizen may get home five minutes earlier. The improvement of motor transportation is, in effect, a public service—a service that eventually helps everybody, whether he has a car of his own or not.

But such improvement is not a task for the makers of engines, engine parts and materials alone. It is a task that must be shared with those responsible for the development of fuels and lubricants. For the engine and its fuel are inseparably related. Thus, while Ethyl's product, *tetraethyl lead*, is used by oil refiners to raise the anti-knock quality of gasoline, improved gasoline in turn permits the automotive manufacturer to build higher compression, therefore more efficient engines.

Ethyl research workers in Detroit and San Bernardino have joined forces with progressive automotive and petroleum engineers in their efforts to make even better automobiles, trucks, buses, tractors, and airplanes.

To technologists in every field of automotive development we extend an invitation to avail themselves of our research and service facilities. And in order that laboratory findings may be more quickly reflected in practical operation, our service engineers will continue to cooperate with commercial users of fuels and engines. Ethyl Gasoline Corporation, Chrysler Building, New York City.

ETHYL

Better and more economical transportation through
ETHYL RESEARCH *and* **SERVICE**

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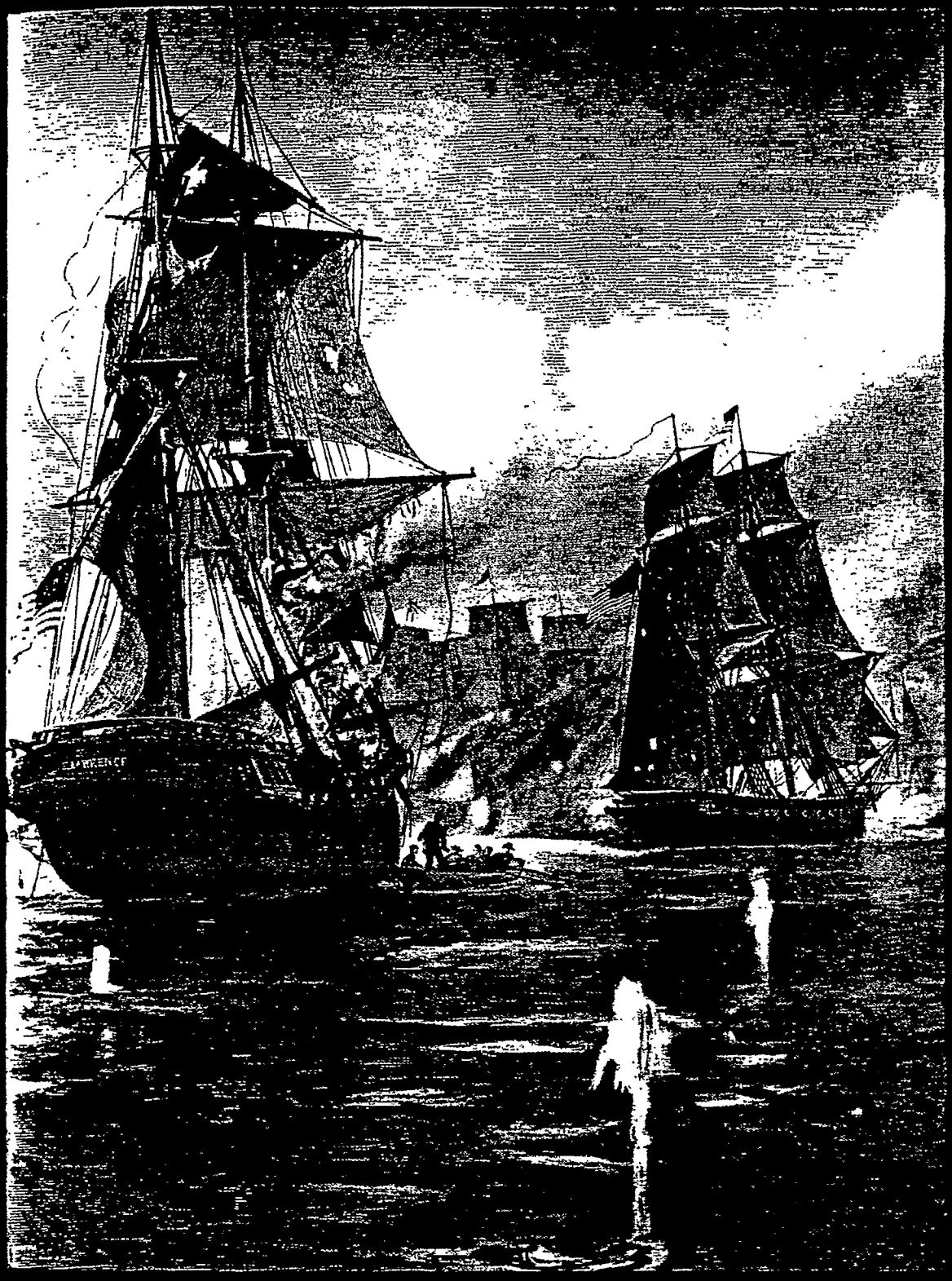

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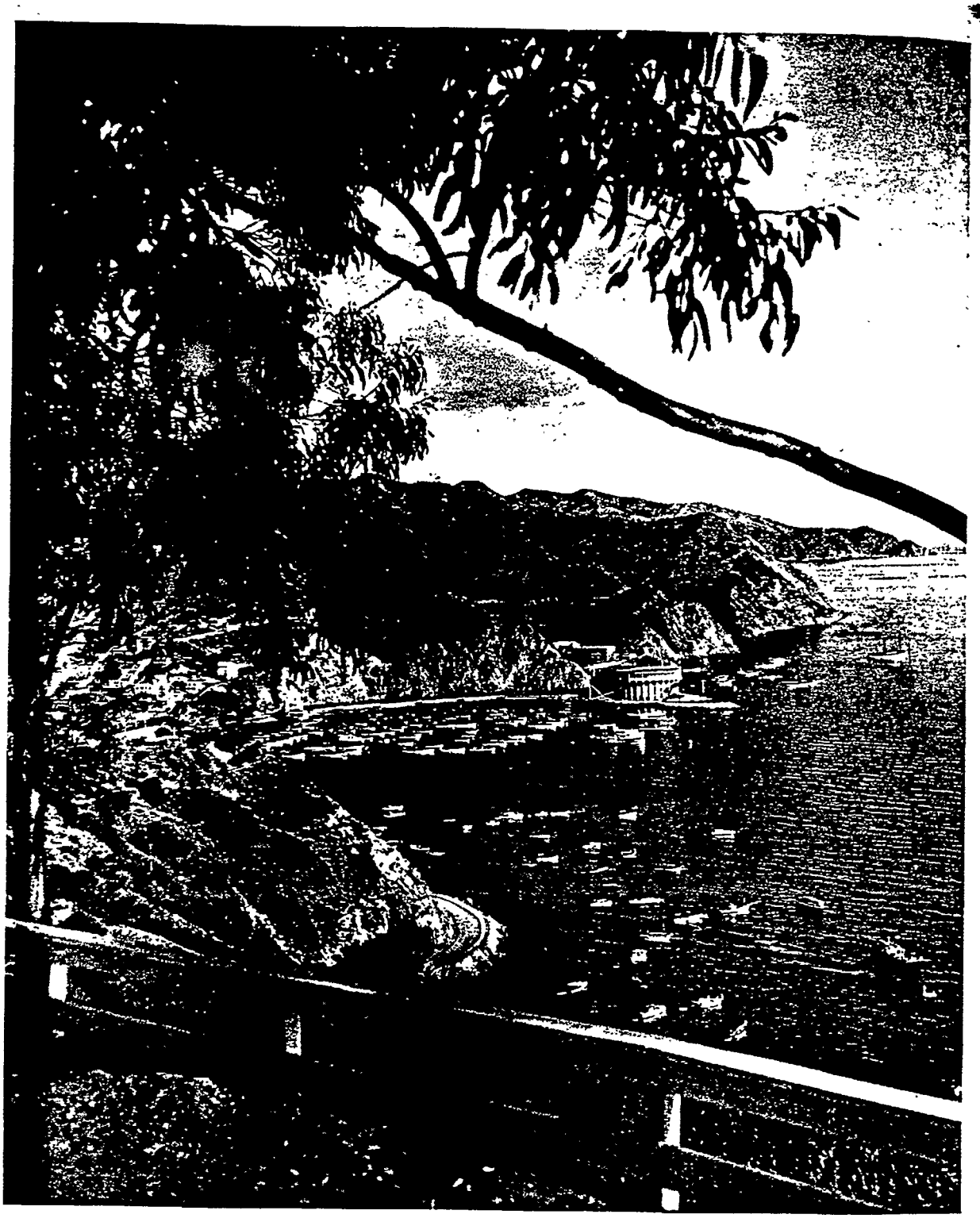

Sheltered by lofty headlands, a fleet of small boats rides at anchor in peaceful Avalon Bay, Santa Catalina Island. The round building on the point in the background is the Casino.

Santa Catalina Island photo.

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ETHYL NEWS

Ethyl Gasoline Corporation
Chrysler Building, New York City

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Trivialities?

IT WAS a beautiful spring day, with the sun shining its brightest and the birds singing gleefully in the trees. The Old Scout and I were bubbling over with enthusiasm about the imminent opening of the baseball season and about how the golf courses would soon be in shape for us to smack that little white ball three hundred yards—or less—down the fairway. We touched also on the trout fishing season and the Indianapolis speedway race and other sporting events which would soon come to pass, for both the Old Scout and I take our sports seriously. Whereupon the European gentleman at our table inserted the note of gloom.

"*How can you Americans be so interested in trivialities when there is so much* of importance going on in the world?" he asked in his broken English.

The query floored me for a moment. I began to wonder if perhaps we weren't doing wrong to give so much thought to sports at a time like this. I looked at the Old Scout, who seemed to be taking things calmly as usual. He gazed for a while into the clouds of pipe smoke which hovered over his head, as if he could find the answer in them.

"Trivialities?" he repeated. I'm not so sure, but let's see. In a few days some young pitcher will step into the box and blaze his fast ball past a batter for the third strike. The loud report you'll hear will be the ball smacking into the catcher's glove. The batter will be disgusted, of course, that he didn't pole a long one into the stands. He may even make a few caustic remarks about the umpire's eyesight. But when he gets under the shower, he will cool off and think of hitting that home run some other day. And everyone will be happy.

"In Europe, however, the same young man would be carrying a rifle instead of a bat, and the pitcher would be throwing a hand grenade instead of a baseball. And the noise you'd hear would be the explosion of the grenade or the rifle, or both, writing 'finis' to one or more young lives.

"In Europe the army of duffers who dig up the golf courses so merrily over here would probably be a tired-eyed army digging trenches. And while they were working, a shell might suddenly explode in their midst. Shells don't yell 'Fore!' either.

"The fellow who wins the Indianapolis auto race a few weeks from now will receive a sizeable cash prize and the cheers of the sports world. In Europe this same fellow would be driving a tank, with the chances good that his only reward would be a six-foot plot of earth with a wooden cross at one end in a strange land far from his home.

"As for fishing, the anglers in Europe don't fish so often in a gurgling brook, flowing peacefully through a shady wood. Most of them are too busy fishing mines out of the ocean, where one little mistake by the fisherman brings a roar and a blinding flash which sends him to Kingdom Come."

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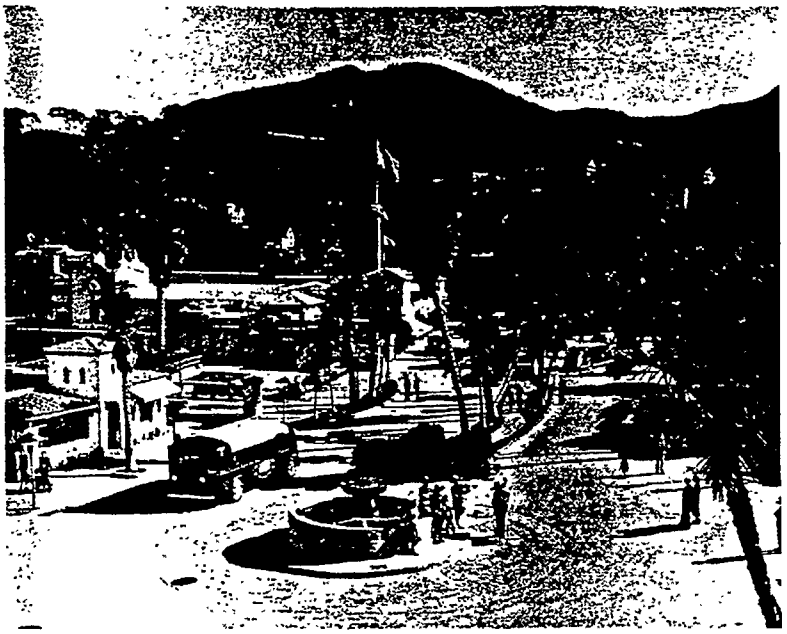

Palm shaded Avenida La Crescenta fronts on the blue waters of Avalon Bay. At the fountain in the foreground trubadours strum their instruments.
Santa Catalina Island photo.

Pacific Beauty Spot

Santa Catalina Island, 22 Miles Off the California Coast, Offers a Variety of Sights and Recreational Opportunities to Over a Million Visitors Annually.

TWENTY-TWO miles out in the Pacific but within the jurisdiction of Los Angeles County, California, lies Santa Catalina, noted as a pleasure resort and the place where the Chicago Cubs go into spring training for the National League pennant race, and famed for its submarine gardens, flying fish, wild boar and mountain goat hunting, fine game fishing, and abundance of bird and animal life.

The island is 21 miles long and varies in width from a quarter mile at its narrowest point to eight miles at the widest. The topography of its 49,958 acres is rugged, as the island is the top of a mountain range jutting out of the ocean. Due to the warm Japanese current which flows close by, Santa Catalina is from 10 to 15 degrees warmer than the mainland in winter, and during the summer the sea breezes keep it that much cooler.

The island's only municipality is Avalon, an incorporated city of the sixth class, with a mayor, city manager, harbor master, fire and police departments. The resident population of Avalon is 2,500 persons, but more than a million persons from all parts of the globe visit Santa Catalina each year. Among these are many anglers, who come there to catch the tuna, marlin and broadbill swordfish which abound in the surrounding waters.

Although known chiefly as a resort, Santa Catalina has a cattle range of 38,000 acres and ships annually 3,000 head to the mainland. Fifty thousand wild mountain goats which are descendants of animals brought in by early Portuguese and Spanish navigators, two herds of buffalo, red fox, deer, and large covies of quail roam the interior and wild boars were recently imported from Santa Cruz island for hunting. In addition to the boars, sportsmen are permitted to shoot goats and quail.

Two passenger steamers, the *Catalina* and the *Avalon*, of 2,200 and 1,800 capacity respectively, carry visitors to and from the island, making the trip between Wilmington, in Los Angeles harbor, and Avalon in two hours. Amphibian planes cover this distance in 15 minutes.

A fleet of glass bottom boats cruise over the submarine gardens, which are located close to the island's shore. It is estimated that more than five million persons have looked through these sea windows to see fish of many colors dart through forests of kelp and fern and through moss covered canyons. This sub-ocean scenery varies with the seasons, since undersea flora changes as does that on land.

Santa Catalina's flying fish, many of which have a wing spread of almost three feet, are one of the island's most fascinating sights. At night excursion boats equipped with powerful searchlights take visitors to see these fish play. The lights bring thousands of them to the surface, where their wings take on the appearance of spun silver.

More than ten acres is given over to the Santa Catalina Bird Park, the home of 5,000 birds representing over 500 species gathered from all over the world, including many rare specimens. On the island's sporty 18-hole golf course several major tournaments have been held. The Chicago Cubs' training field adjoins the course. The Island Villa and

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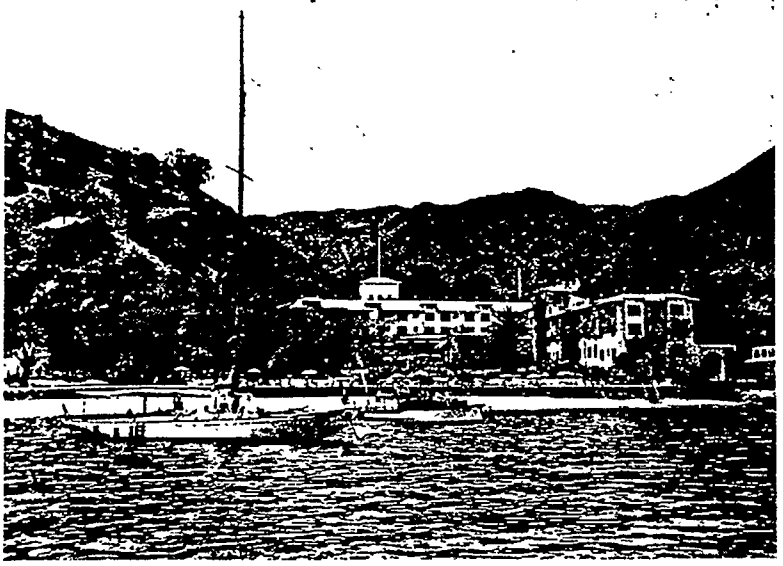


Sage covered hills rise in back of the Hotel St. Catherine.

Santa Catalina Island photo.

its annexes, comprising 1,250 individual villas, are famed as the world's largest one-floor hotel.

The Catalina Isthmus, 22 miles north of Avalon, is where a large percentage of all South Sea or sea going motion pictures are made. Among the box office hits which have been filmed there are "Old Ironsides", "Treasure Island", "Mutiny on the Bounty", "Sadie Thompson", "Captains Courageous", "Ebb Tide", "The Buccaneer", "Hurricane", and "Typhoon".

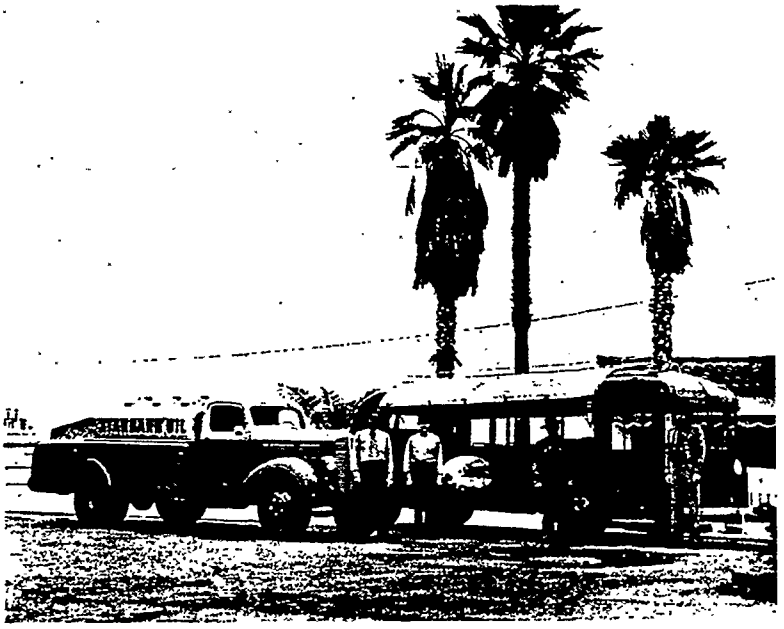
The island is reminiscent of early California when troubadours clad in Spanish costume, roam the beaches at night and strum guitars for the entertainment of visitors. Taxi and bus drivers wear similar costumes.

Santa Catalina was discovered in 1542, just fifty years after Columbus arrived in the West Indies, by Juan Cabrillo, a Portuguese navigator in the service of Spain, who named the island La Vittoria after his flagship. When he sailed away, the island was forgotten for sixty years, until on the eve of the feast of St. Catherine of Alexandria, November 24, 1602, Sebastian Viscaino anchored at the island and named it Santa Catalina in her honor.

The original inhabitants of Catalina were peaceful, sun worshipping Indians, but they were all chased to the mainland in 1811 by fierce Aleuts and Kodiaks from Alaska, who came to the island aboard Russian whaling vessels engaged in hunting sea otters. Today the native tribe has disappeared entirely.

For some years after this the island was a favorite hiding place of smugglers and buccaneers. In 1848, at the close of the Mexican War, Pio Pico, the last Mexican governor of California, deeded it to Thomas Robbins of Santa Barbara in exchange for a silver mounted saddle. There was a mining boom in the hills in 1863, which was halted when Union troops took possession for the duration of the Civil War and ordered all inhabitants to leave. The barracks of these soldiers still stand at the Isthmus.

After Robbins the ownership of the island changed hands several times until it was purchased in 1892 by the three sons of General Phineas Banning, who formed the Santa Catalina Island Company for the purpose of developing it as a pleasure resort. William Wrigley, Jr., purchased the island in 1919 for approximately $3,000,000 and made it into a world playground. Since his death, his only son, Philip K. Wrigley, has been carrying on his father's work of development.



A Standard Oil service truck parks beside a sight seeing bus. Drivers of these busses dress in the fashion of early California.

Santa Catalina Island photo.

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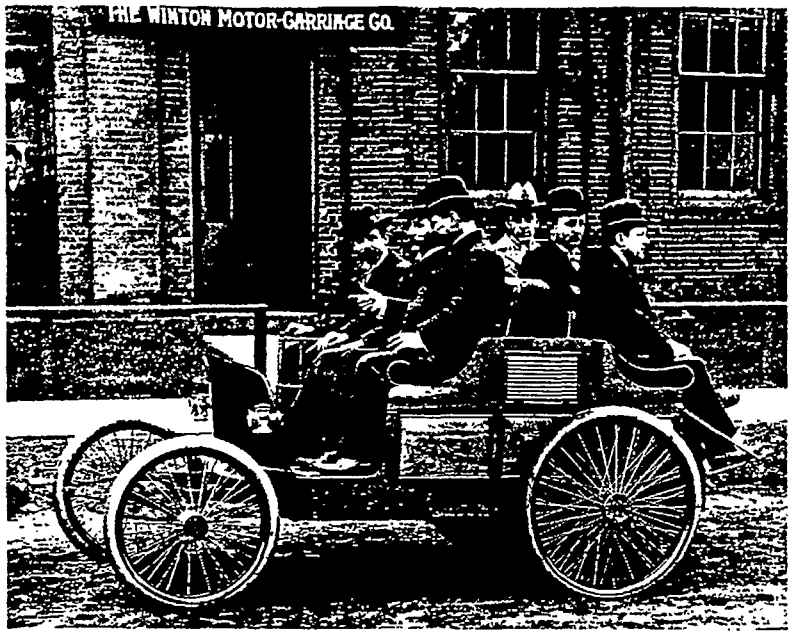

Alexander Winton, designer of the Winton car, drives his 1896 model as he takes a few friends for a spin.

Life with Father's Car

The Automobile Has Come a Long, Long Distance Since the Days when Dad Used to "Get Out and Get Under."

"A SPEED of almost thirty miles an hour! Think of it!" Dad exclaimed enthusiastically after watching Charles E. Duryea, famed auto pioneer, win the automotive event of the year, a race from the New York city line to Ardsley in Westchester County, covering a distance of about fifteen miles.

After seeing the race Dad decided to buy a car. It was a stunning piece of machinery with shining carbide lamps and two big wicker baskets for lunch or anything else you cared to put in them, one on each side. And what a soul satisfying fragrance it had—a blend of the odors of gasoline and leather cushions.

You entered the tonneau from a door in the rear. One time when Mother and two of her friends were out riding, the tonneau came loose and began to slip. It almost knocked the ladies out of the car before Dad could stop.

When you went riding in those days there were no windshields or fenders on the car, so you had to dress in cap and goggles and linen duster for protection. There was no top on the car, either, and if you got caught in a sudden shower the aforementioned articles didn't offer much protection. Darkness was another hazard to be reckoned with, as the lamps had to be lit with matches and there was no telling how long they would stay lit.

How the horses used to shy at those early cars! They would rear up and show the whites of their eyes while the driver fought and tugged at the reins to keep them from bolting. After a while Dad got so he knew everybody in the neighborhood who had skittish horses, and when he met such a person on the road he would pull over to the side, stop and wait for him to get safely by.

There was a hill near where we lived called Jones Hill, which wouldn't be considered more than a slight rise today, but in those early days Dad would go miles out of his way to avoid it. If by some chance he did have to go up it, he would hold his breath until he had chugged over the top at the breath-taking speed of three miles per hour.

One time Dad had an urgent business appointment with a friend in a town about twenty miles away. Instead of taking the train, he decided to go in the car. He had a flat tire en route, and a flat tire in those days, when you had to take it off the rim, remount the spare and pump it up by hand, was really something. Although he had made an early start, Dad was over an hour late for his appointment, which irritated his friend exceedingly.

"Hang it, George, a man of your age should know better!" snorted the friend. "The idea of trusting to a contraption like that when we have important business to settle!"

It was a big step forward when Dad bought a car with a windshield and side doors opening on the back seat. A presto-lite tank occupied a large part of the running board and was a considerable improvement over the carbide lighting system, though once in a while you might find yourself in the dark when your tank unexpectedly ran dry. In this ultra-modern conveyance hundred-mile trips became possible, although the long hours between a summer sunrise and sunset were necessary to cover such an incredible distance. I took great pleasure in gloating over my envious cousins, whose father owned only a one-cylinder Cadillac which snorted around town as if each snort would be its last.

When winter was in the offing, Dad bought a limousine body for the new

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car. It was a huge thing, resembling the cab of a locomotive, and it had seat cushions of bright red leather. Mother took one look at it and exclaimed:

"Oh, George, how could you!"

Dad used to pay from $3,500 to $4,000 for his cars, which was about the average price at that time. License plates, however, were cheap. You could buy a set of New York plates for two dollars, and if you lived over in New Jersey you could get a set for only a dollar.

The laws didn't give the speed demon much leeway in those days but, since there were no motorcycle cops around to enforce them, they didn't cramp his style to any great extent. Motorists were permitted a top speed of twenty miles an hour when going round a curve. When Barney Oldfield turned in a mile-a-minute speed during a race, Dad shook his head and remarked sagely:

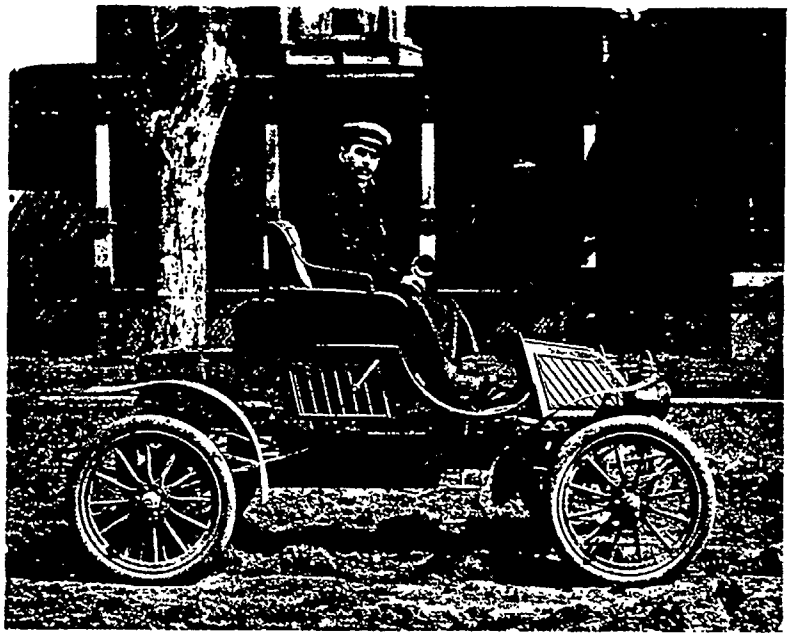
"That fellow won't live very long, driving at that rate!"

Somebody got the idea that the bigger the wheels on a car, the faster it would go, so one model came out with wheels almost three feet in diameter. Makers of the Rambler created a mild sensation by offering an extra wheel as stock equipment, claiming in the advertisements that it cut the time needed for changing a tire to only a few minutes. Their "ad" showed a picture of a man changing a wheel and timing himself by a kitchen clock hung on the side of the car.

The first self-starters came out in 1912. Dad had one put on the car. It stuck out from the bottom of the radiator, like the long nose of a face in which the headlights were the eyes.

"What won't they think of next?" was Dad's stock comment on every new development.

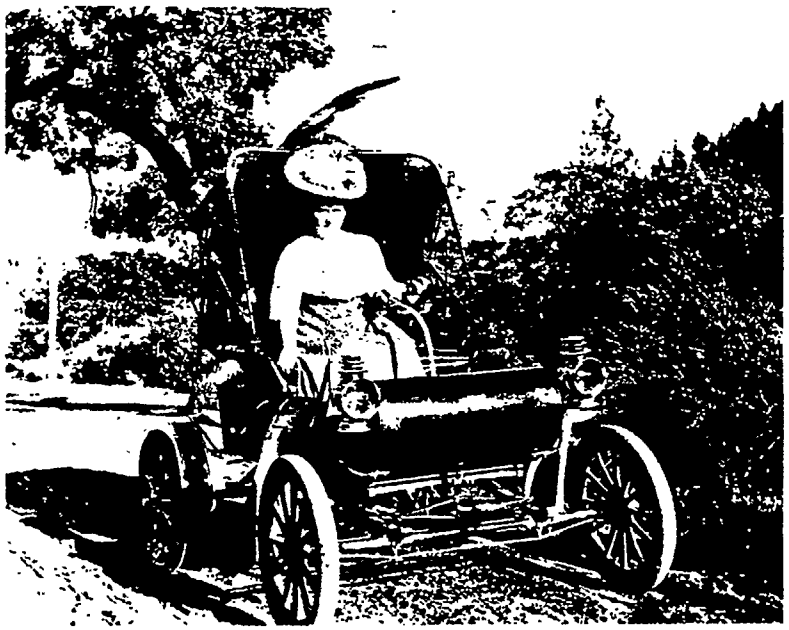
Filling the car with gasoline in those days was no simple task. There weren't any service stations and the gasoline had to be bought at garages, which weren't too numerous. Besides, the gas tank in most cars was under the seat, so that everybody had to pile out. It was a memorable sight to see a car packed with portly, middle-aged ladies, all bundled up in lap robes, veils and dusters, drive up to a garage and unload its human cargo in order to take on fuel. By the time the ladies were comfortably settled once again, probably a good half hour had elapsed.



Dr. Harry P. Engle of Newton, Iowa, who bought his first auto in 1901, was one of the first M.D.'s to use a car in his practice.

Nothing used to give Dad more pleasure than tinkering with the car. "Don't plan to use the machine today, Mary," he would say to Mother. "The engine isn't running as it should, so Fred and I are going to fix her up."

"That means it will be laid up for a week," Mother would reply resignedly.



Showing what a stylish lady looked like when she went touring in her runabout soon after the turn of the century. Note the crank on the right side of the car.

ETC 31259

My uncles were just like Dad in this respect, which caused John Van Schaick, the local Stevens-Duryea dealer, to remark a trifle caustically that "the Bradford brothers didn't buy automobiles to drive. They bought 'em to take 'em apart."

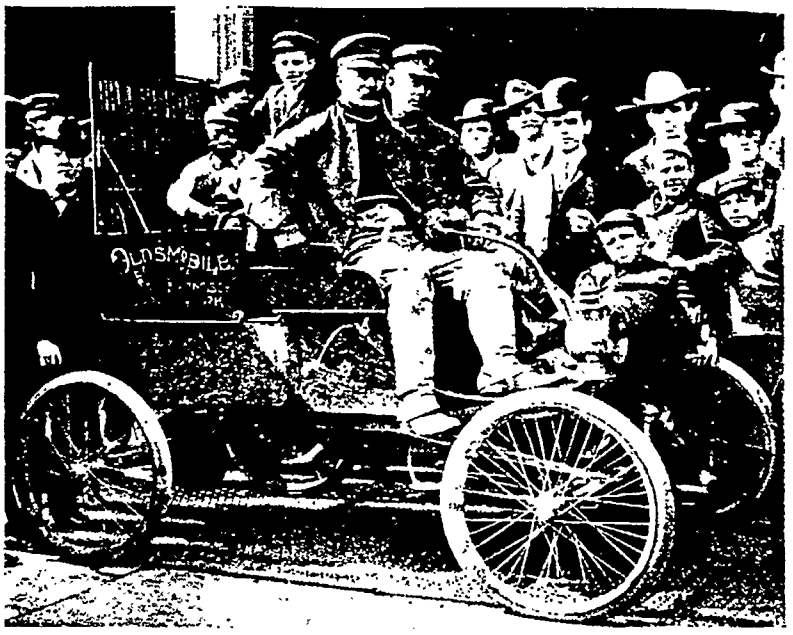
When my two older brothers went to college, Dad thought it would be nice to give them a present, so he got them a four cylinder Hudson runabout which would do close to fifty miles an hour with the cutout open. My brothers had always been considered reputable young men, but it didn't take them long to acquire a reputation as "those wild Bradford boys." One day I was standing with Dad as he watched them tear along the road, engine roaring through wide open exhaust and a huge dust cloud billowing in their wake.

"That settles it!" Dad snapped at me, as if I were the speed demon. "When you go to college, you'll walk!"

Dad bought a Model T Ford for the hired man to run errands in. One of the early Fords held the speed record for its time. At first two models were manufactured, one costing $2,000 and a cheaper model for only $850, but when Dad bought his, the Model T had come into its own and the price wasn't so high.

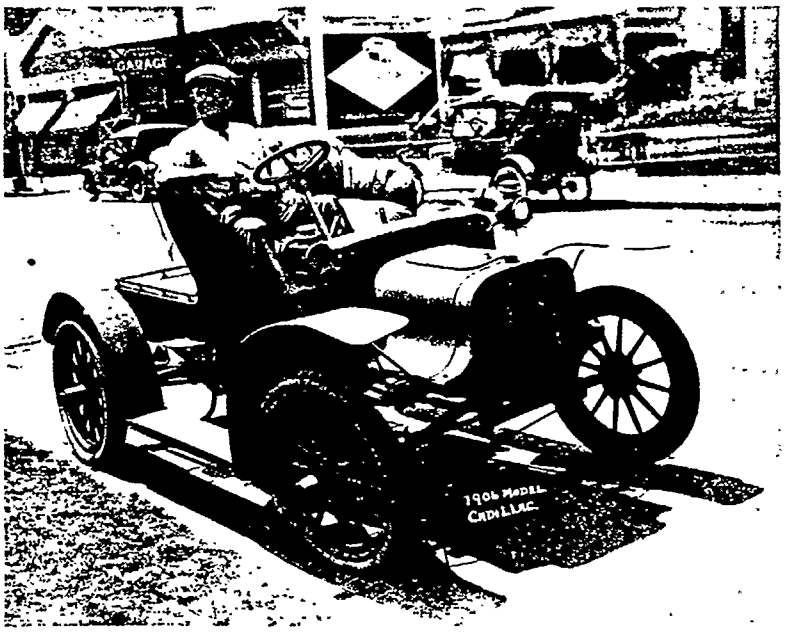
Remember the good old reliable Model T? You drove it "blind" — the dashboard was just a blank, with no speedometer, oil gauge, gasoline gauge or ammeter to baffle the driver and disturb his tranquility. If your lights weren't quite bright enough to enable you to see a certain object in the dark, you need only step on the clutch and race the motor to add considerably to their candlepower. When your brake bands were worn down, you could always rely on the reverse pedal to slow you up and bring you to a stop.

The Model T had its disadvantages, too. Dad, who had always driven cars with a hand lever for shifting gears, couldn't get used to the multiplicity of pedals under his feet. When caught in a tight spot in traffic, he had a tendency to jam down hard with both feet. That meant of course, that he shifted into low with his left foot and locked the brake with his right, which added up to a stall. Dad would mutter "Damn!" and climb out and crank.

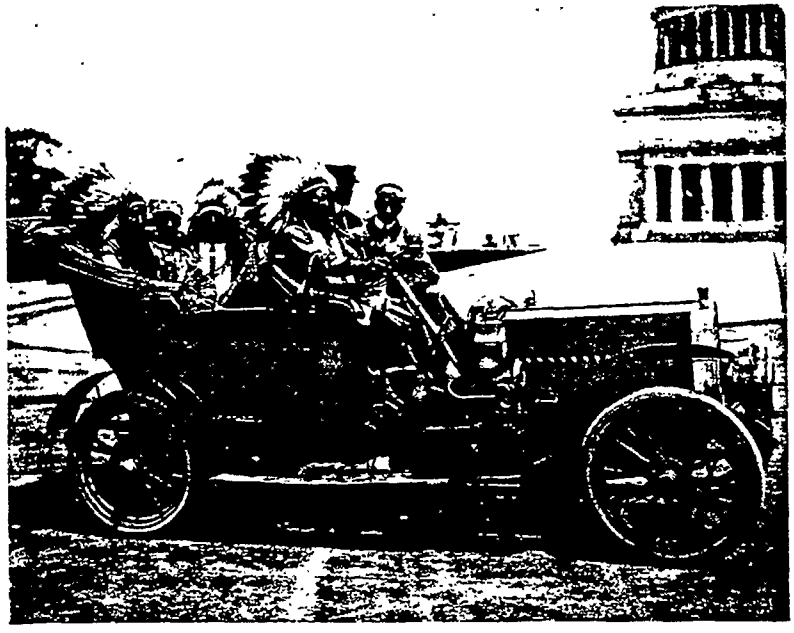


These hardy fellows are making a transcontinental run from San Francisco to New York in a 1905 Oldsmobile.

Cranking the Model T was an art in itself. You pulled the gasoline lever down and shoved the spark up—if you left the spark advanced you stood an excellent chance of breaking your arm. Then you went around to the front of the car and pulling on the choke wire with your left hand, you spun the crank with your right. As soon as the motor



This 1906 Cadillac had only one cylinder. Parked across the street is a Ford Model T touring car.

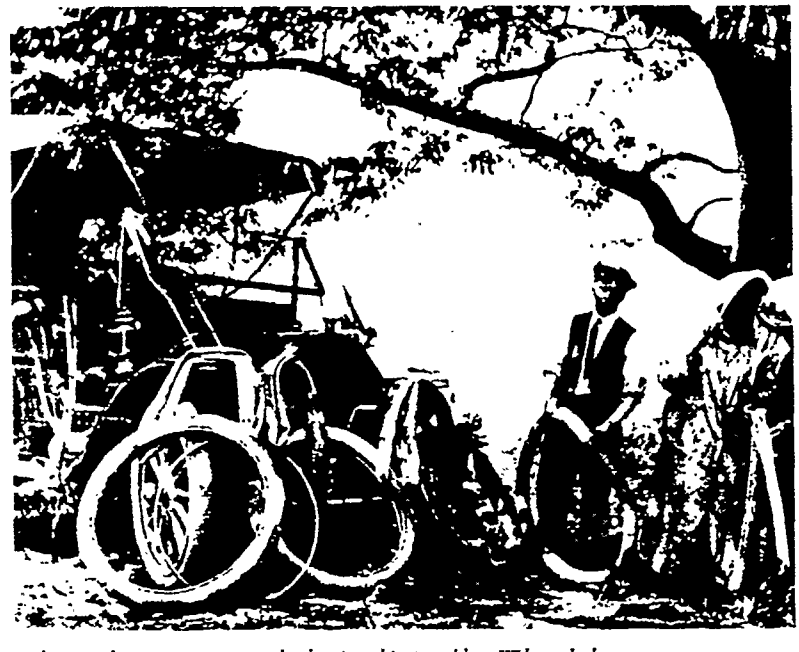


Heap big chiefs forsake their mustangs to visit Grant's Tomb in one of the pale-face's amazing gasoline wagons. *Culver Service.*

took hold, you dashed back to the steering wheel, to advance the spark and close the throttle before your car vibrated itself to pieces.

One thing you had to be particularly careful about when cranking was to see that your emergency brake was on all the way. If it wasn't, the car was in high gear and, unless you could move fast, it would start up and run you down. One time the hired man left the emergency brake off, and the Model T sprang at him and pinned him to the wall of the garage. Fortunately he wasn't hurt, but during the moments while he braced himself against the wall and shoved the car backward, he proved beyond the shadow of a doubt that he was a master of profanity.

They were good old days, those early days of the automobile. Nevertheless, if we had to make a choice between the old and the new, I think both Dad and I would take one of the new high compression jobs.



The gentleman appears to be having his troubles. When dad was younger many a joyride wound up this way. *Culver Service.*

Trivialities?

(Continued from page 3)

The European gentleman was strangely silent. The Old Scout blew a thick cloud of smoke and continued:

"Our sports are mighty important to us Americans. They help us more than anything I know to keep our sanity and sense of humor and to avoid the poison virus of the various 'isms' which have bitten so many in Europe. Maybe if the youth in certain countries over there had given more thought to sports and less to power politics there would be no war today. After all, whoever heard of a Fascist or Communist plot being hatched on an athletic field or in a locker room?"

Oil and War

ONE OF those behind-the-scenes but highly important factors of the war now raging in Europe is the question as to whether, in mechanized warfare, combatant nations can win, or even hold out, lacking adequate supplies of oil. Mechanized warfare calls for drafting the petroleum hydrocarbons, among other resources, for use as fuels, lubricants, explosives, and other wartime commodities.

So far as is known the Axis powers own or control about five per cent of the world's oil supply, including resources of captured nations. Russia controls about 10 per cent, and Great Britain can command about 15 per cent. The balance of power definitely rests with the United States which controls more than 60 per cent of the world's oil, and has the facilities for producing, refining and putting it to use.

ETC 31261

A side view of truck, showing compartments which hold everything needed for a complete demonstration.

Tune-Up Equipment Goes for Ride

Los Angeles Division's "Meeting Wagon" Features Compactness and Mobility.

ETHYL'S Los Angeles Division is making good use of a specially built truck for the transportation of demonstration and tune-up equipment. Each article which goes into the truck has been designed and arranged to be portable, and the whole unit is unusual in its compactness and mobility.

The chassis is a 1½-ton Chevrolet, with the body tailor-made to carry needed appartus. There are three doors on each side of the truck, opening into separate compartments, and doors at the rear opening into the body. This arrangement assures rapid loading and unloading with a minimum of confusion, since each compartment is especially fitted for certain pieces.

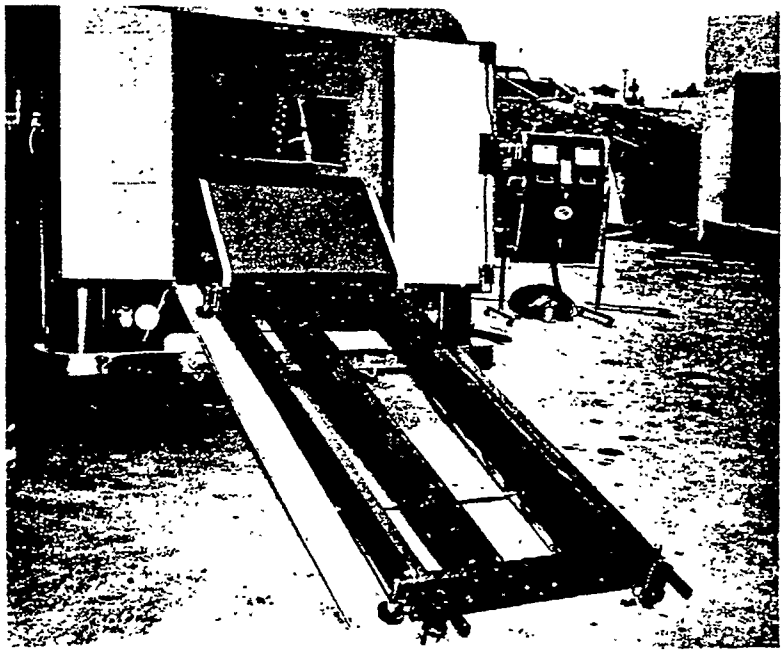
The center compartment holds a portable chassis dynamometer on the truck bed. In the racks above are carried 45 folding chairs, movie projection screens and light weight pipe for expulsion of exhaust gases. The dynamometer is loaded and unloaded by means of a hand winch on duraluminum ramps, so that no lifting is necessary. In fact everything heavy is so placed as to reduce lifting to a minimum.

Since the dynamometer weighs only 850 pounds, it is easily rolled on quickly attached casters. When placed where needed, the casters are removed and the dynamometer rests on rubber pads attached to its frame.

The dynamometer instrument panel is carried in its special compartment, the door of which becomes a ramp when fully opened. The instrument stand is rolled on tracks in this ramp, so that loading and unloading is simple.

The other compartments are arranged to carry tools, tune-up equipment, literature, a demonstration engine, movie projector and public address system, exhaust blower for use with the dynamometer, slide and meter projectors, a complete library of films, a collapsible speaker's table, and stands for other articles. In fact, everything that would be needed for any type of meeting or demonstration is conveniently ready for immediate use.

The truck is kept ready to roll at all times and two men can set up all that is necessary for a meeting in from one to one and a half hours. Many oil companies, automobile companies, and others have taken advantage of the Division's cooperation with this "meeting wagon" and all of them have commented on the ease and speed with which everything worked.



The portable chassis dynamometer comes out through the rear doors. At right is its instrument panel.

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Charles F. Kettering in 1919, when he was president of Dayton Engineering Laboratories.

Anti-Knock Gasoline—An Idea Nobody Wanted

Kettering's Speech Before the Society of Automotive Engineers in 1919 Pointed Out the Need for Research to Find the Way Around Knock; Proposed Cooperative Program.

TWENTY-ONE years ago last January, Charles F. Kettering, then president of the Dayton Engineering Laboratories Company, called on automotive engineers to help solve the problem of knock. Speaking at the annual meeting of the Society of Automotive Engineers, he described the work being done in his laboratories and outlined the problem to be overcome if automotive progress was not to be blocked by the shortcomings of ordinary gasoline.

"My idea," he said to that assembled body, "has been to present this subject to you more as a means of stirring up your interest and exciting your curiosity than supplying any fundamental engineering data."

Naturally some of the theories and parts of the discussion of the chemistry of combustion in this amazing paper have been out-dated by the facts revealed in subsequent research, but generally speaking, one wonders on reading this paper why many who listened to the talk 22 years ago did not see the need and opportunity of exploring the field so clearly outlined by Mr. Kettering. For the convenience of those who do not have copies of this issue of the SAE Journal in their library, excerpts of the paper are printed here.

Unfortunately, we have not been able to secure original copies of the pressure time indicator cards, published with the paper, which show normal combustion, pre-ignition, knock, and what was then called "delayed knock". Except for the last mentioned, the other three, presented two decades ago, are typical of more recent pressure - time indicator cards for these three types of combustion.

Beginning his paper, Mr. Kettering said:

"As far as the automotive engineer is concerned, there are two problems involved in the fuel situation, each of which is of great importance. These have to do with the application of fuel to an internal combustion engine. One is getting the fuel into the engine and the other is burning it after it gets in.

"To get the fuel into the engine, innumerable devices have been constructed and given consideration, and yet I think we all recognize that the results from these have been disappointing, because they did not solve the problem that really needed solving; namely, what happens inside the cylinder. Having recognized this condition of practically complete ignorance as regards what goes on within the cylinder of an engine during operation, we started to see what we could find out about it. Naturally it is a little difficult to sit around in a cylinder while it is in operation and tell just what happens in there, so we had to devise ways and means of staying outside and still telling what was going on inside. In doing so we had to build some new instruments, and we had to do a lot of theorizing. The result is that some of the things I am going to tell you may not be so, but then it is not my fault if they are not.

"In discussing the question of fuels I

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Vol IV April, 1919 No. 4

The SAE Journal for April, 1919, published an article that makes interesting reading for anyone in the oil business today.

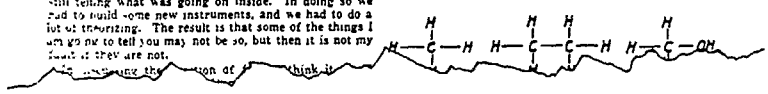
More Efficient Utilization of Fuel

By Charles F. Kettering[1] (*Member*)

Annual Meeting Paper *Illustrated with* Photographs and Diagrams

As far as the automotive engineer is concerned, there are two problems involved in the fuel situation, each of which is of great importance. These have to do with the application of fuel to an internal-combustion engine. One is getting the fuel into the engine, and the other is burning it after it gets in.

To get the fuel into the engine, innumerable devices have been constructed and given consideration, and yet I think we all recognize that the results from these have been disappointing, because they did not solve the problem that really needed solving; namely, what happens inside of the cylinder. Having recognized this condition of practically complete ignorance as regards what goes on within the cylinder of an engine during operation, we started to see what we could find out about it. Naturally it is a little difficult to sit around in a cylinder while it is in operation and tell just what happens in there, so we had to devise ways and means of staying outside and still seeing what was going on inside. In doing so we had to build some new instruments, and we had to do a lot of theorizing. The result is that some of the things I am going to tell you may not be so, but then it is not my fault if they are not.



I assume the position of [illegible] think it would be well to go back a little. Our present idea of fuel, as you know, is that a satisfactory fuel must have a certain gravity. I want to go into the fuel situation a little more deeply than merely determining its uses according to its gravity. It has been a general observation that as you lower the gravity of a fuel, such as the present commercial fuels on the market, even though you get the fuel properly distributed, you have to lower the compression of the engine because of the knock which results. This knock is the kerosene knock, pre-ignition, pinging or whatever it is called. To make my subsequent discussion somewhat more intelligible I want to first discuss briefly the construction of a fuel, its relation to gravity, etc., and then what happens when we try to burn it.

"As you know, all our fuels are hydrocarbons. I think we have all studied the subject enough to know that a hydrocarbon is a very uncertain and miscellaneous sort of an individual, consisting of varying combinations of carbon and hydrogen."

Mr. Kettering then described the molecular structure of typical hydrocarbons, stressing the point that it is molecular structure rather than gravity which determines how a fuel burns inside a cylinder.

"The gravity of fuel has absolutely nothing to do with what the fuel really is or how it performs in service," he continued. "The main point I want to get to you is that the fuel proposition is, so far as future engine design is concerned, practically a question of chemical construction and make-up, together with energy of combination that exists within the fuel itself. . . .

"I have mentioned energy of combination because to us it has proved very, very interesting, inasmuch as it apparently affects fuel action very directly. As I said before, as fuels of lower gravity came into use it became necessary to lower compressions. The general idea has been that this lowering of compressions has been necessary because of pre-ignition. To study this problem we developed an indicator which gave us a new but very satisfactory type of indicator card. This indicator is different in that it gives pressure-time indications and not pressure-volume. As a result of our work with this indicator, we discovered that the knock which comes from kerosene is an entirely different thing from actual pre-ignition. We have made hundreds of indicator diagrams or cards with this instrument and each of them is very different from the usual pressure-volume card secured with the ordinary indicator.

"A card made with our indicator is also shown illustrating the normal burn in an engine cylinder, without any evidence of knock. As you can see from this card, pressures begin to go up at the instant the compression stroke of the piston is started and increase uniformly until ignition, after which pressures go up rapidly to a maximum and then taper off gradually during the work stroke of the piston. The difference between the cards made on these two types of indicator is quite obvious and needs no explanation.

"Another card made with our indicator and illustrating a case of true pre-ignition is reproduced. The kerosene knock occurs in a region of from 10 degrees after ignition to 25 degrees past top center on the down stroke. In one card shown, the knock occurs fairly early in the combustion stroke, while in another it occurs at approximately 25 degrees after top center and on the down stroke of the piston.

"These cards proved tremendously interesting to us and we began to study the knock to see what it is and why it is. In the course of our study we have been theorizing and reached the following conclusion. If you take a complex molecule and start to burn it, it will not burn by a single step from the carbon and hydrogen in it to carbon dioxide and water, but as it starts to break down it may be decomposed into a variety of compounds. If during this burning you should happen to liberate, for an instant, as intermediate products of combustion, some compounds of an extremely explosive or detonatable nature, you would, upon explosion of these compounds, get such a sudden rise in pressure as is indicated in the cards shown. Now the compounds which you form, if these big molecules do break down in this way, will differ, depending upon the temperature and pressure conditions at the time combustion takes place. That is, the type of compounds which are formed will vary with the compression, explosion pressures and the temperatures which exist in the cylinders.

"In studying the conditions existent within the cylinder during knocking, we endeavored to get an actual view of

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conditions within the cylinder at the time the knocking took place. To do this we put a window in the cylinder and pointed a spectroscope at this window. In this way we were able to reach some rather definite ideas as to the substances or compounds actually present and causing the knock. As a result of these observations we came to the conclusion that the compound which caused the trouble is acetylene. I will admit that this is one of the things that we have only theorized about so far and that we do not know now that this is really true.

"What takes place within a cylinder when the knock occurs may readily be in accordance with my previously mentioned conception. You have all seen the grains of powder used in big guns. It comes in little sticks with perforations through them. Now you can take one of these sticks and light it with a match and hold it in your hand as it burns and it is perfectly harmless. But if you stuff that powder into an iron pipe and screw the end on it and light it, and then get away in time, you would witness quite a different reaction. The reason is that when you vary the pressure and the temperature conditions you change the entire nature of the burn. In other words, in the first case you are simply burning the stick of powder as you would any other inflammable hydrocarbon, while in the second case you are releasing its energy of combination in a very short space of time. The resulting variation in the chemical reaction which takes place causes the sudden building up of pressure that we call an explosion.

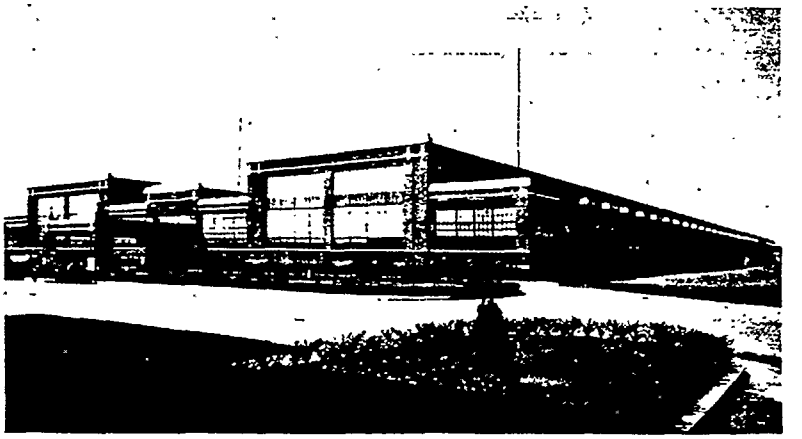
"Why then should lowering of compression prevent the development of the knock? Simply because lowering the compression results in a substantial lowering of the maximum combustion temperature within the engine cylinder.

"For testing cyclohexane we built a Liberty engine having 200 pounds compression, and this fuel burned at such high compressions without any knock whatever. With the best grades of gasoline that we could secure we could not use compressions in excess of 125 pounds; in fact, without very careful selection of gasoline the compression could not be run up to more than 100 pounds.

"There is another interesting thing leading us to believe that there is a critical temperature beyond which you may not go without causing an entirely different type of combustion to take place in the engine. If you take an engine operating at 75 to 80 pounds compression, start to run it on kerosene and let it warm up, there will be no knock during this warming-up period. As soon as the engine gets to operating temperature, however, it will start to knock, and it will immediately heat up, with loss of power and other evidences of poor performance. However, if you introduce into the fuel that is being used three to four per cent of ethyl iodide, you can run the same engine right up to full compression without knocking and accompanying troubles. In other words, the engine will run as well as it does on gasoline. The reason for this, we think, is that below 1200 degrees fahrenheit iodine exists in the form of molecular vapor, but when you get up between 1200 and 2000 degrees fahrenheit the iodine vapor breaks apart into an atomic vapor and in so doing uses up a considerable quantity of the heat energy resulting from the combustion within the cylinder. And the heat energy so used up will just ease off the temperature curve, flatten it out, in other words, and hold the maximum temperature below the critical line so that the secondary explosive compounds will not be formed.

"I might go into various interesting experimental data, but there are one or two other things that I want to bring out. We have all talked about carbon causing the knock in an engine and we know that when we clean the engine out we do not get the knock any more. And we have all had the idea that the reason we have carbon knocks is because some of the carbon heats up and preignites the incoming mixture. That is not what happens at all. One of the best heat insulators we have is carbon, and the only thing you do when you have a nice little carbon deposit in a gas engine cylinder is to cut down the rate of thermal transfer. . . .

"Remember the problem is what you think it is. . . . Anything that man creates is only a physical representation of his mental conception of it. If someone should come here from some other world he would get a very bad idea of the mental conception of our automotive engineers, if they do not get busy on the little simple problems of settling this fuel question. In this talk I have shown where I think the problem lies. No matter what kind of injection devices or other instruments you may have, there is the problem of finding out how the fuel acts after it is inside the cylinder, and we have got to work out that problem. And this problem can never be solved by any one individual. It is going to be solved by the oil and the engine people and everyone else working together."



The birthplace of the anti-knock idea was the Dayton Engineering Laboratories Company, Dayton, Ohio.

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All American Aviation plane makes a scheduled pick-up at Parkersburg, West Virginia, during a flood.

Expanding the Air Mail

The Air Pick-up System Serves Communities Not Reached by Regular Air Lines. Planes Collect and Deliver Mail Without Landing.

THE NETWORK of air lines spanning the nation makes an imposing map, but actually it covers only 210 cities and towns. These represent about five per cent of the 4,000 cities in the country with more than 2,500 inhabitants, and they contain a trifle more than one-quarter of the country's population.

An air mail letter may move hundreds of miles between air line cities within the space of a few hours and then take overnight to arrive at a town a short distance away which is served only by surface transportation. The almost magic growth that has taken place in air transportation in recent years has only accentuated this deficiency.

Since its beginning, the trend in air transport development has been toward bigger and faster planes because of the economy in high speed and high altitude operations. The result has been an increasing reluctance on the part of the airlines to schedule intermediate stops between large cities. Inadequate airports also have restricted expansion of the air line system.

In the territory that lies beyond the sphere of the airlines, there is a rich field for development. The Annual Report of the Postmaster General shows that millions of pieces of air mail move in and out of off-line points annually, and the records of the Railway Express disclose that thirty per cent of all air express shipments move to and from these places.

The Air Pick-up was designed to bridge the void between air line cities and off-line communities. This novel and flexible system by which air mail and air express are collected and delivered by an airplane in flight, requiring no airports for its operation, has brought direct air mail service within the reach of every town in the country, regardless of size or geography.

The Air Pick-up system is now in daily operation on five routes which radiate from Pittsburgh to 108 cities and towns in the six states of Pennsylvania, West Virginia, Kentucky, Delaware, New York and Ohio. These routes average 275 miles in length and each serves around 20 communities which are an average distance of 18 miles apart, although some are less than 10 miles from each other. Service to all points is provided by two flights a day, one in the morning and one in the evening, both being timed to give each community overnight connections with every other air line point in the country.

Operator of the system is All American Aviation, Inc., which maintains executive offices in Wilmington and operations offices in Pittsburgh. Head of the company is Richard C. du Pont, the former national soaring champion.

Communities along the routes range in population from 800 to 120,000. Air Pick-up stations are located on hilltops, in meadows and public parks, and can be established anywhere that the approaches are clear of obstacles for a distance of 500 to 1,000 feet in both directions. In towns that have airports, stations are usually located on the landing fields, few of which are large enough to accommodate a modern transport plane. Schedules are maintained at an average speed of 110 m.p.h.

It is obvious that routes of this type with stations so close together could not be operated by regular airlines, even if all communities had airports, for the delays incident to making landings at every point would render the service as slow as surface transportation.

The present Air Pick-up system began as an experiment. In 1938 Congress passed a special Act authorizing the Post Office Department to make a test of the efficacy of the system for the transportation of air mail. Routes selected ran through parts of Pennsylvania and West Virginia, where the terrain is extremely rugged and weather conditions are very changeable. They covered 55 cities and towns.

The experiment lasted for a year, during which Air Pick-up planes flew 438,145 scheduled miles and made over 23,000 pick-ups and deliveries without a mishap, for an operations record of 91.6 per cent. The two lines handled over 75,000 pounds of mail without damage to a single piece.

In reporting to Congress on the success of the experiment the Postmaster General said:

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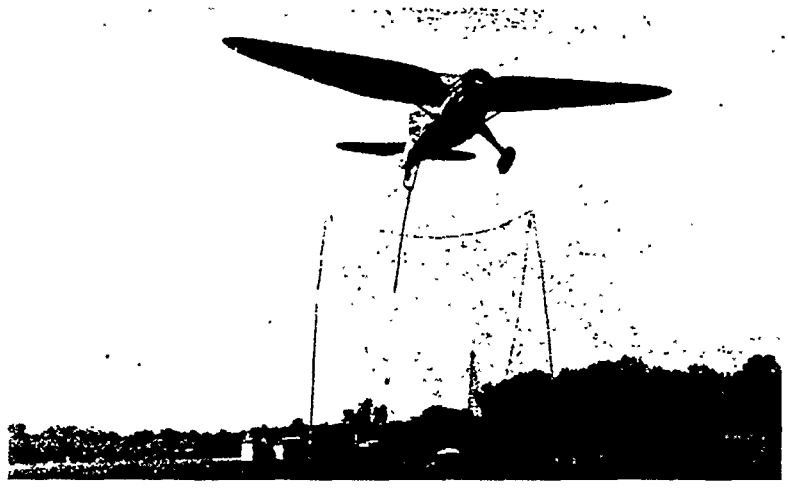

The Air Pick-up in operation. Boom with hook on end is extended to snare loop attached to mail container.

"A very high percentage of performance has been maintained even during the worst of the winter months . . . In one instance in which the regular transport planes could not operate into the Pittsburgh Airport on account of snow, the Pick-up was the only type of plane service which was operated. In a recent instance, Pick-up service was maintained in the Ohio River Valley when there was no other transportation. It was necessary to use rowboats to place the mail on the pick-up poles."

Establishment of Air Pick-up routes on a permanent basis under the supervision of the Civil Aeronautics Authority was recommended by the Postmaster General, and shortly after the experiment ended, the Civil Aeronautics Authority issued a certificate of public convenience and necessity for the transportation of mail and property for five routes.

While the Air Pick-up is a spectacular sight, it is in reality a simple operation. Single-motored planes are used. Each ship carries a crew of two, a pilot and a sky clerk who operates the pick-up apparatus. The latter consists of a winch with an automatic drive, a 40-foot length of rope and a 15-foot arm or boom which retracts into the bottom of the plane.

Two sectional poles, which are set in the ground 20 feet apart and dismantled after each pick-up, comprise the ground station. The transfer rope, a 60-foot loop to which the air mail container is attached, is suspended between the poles, with the container resting on the ground.

In approaching the station for a pick-up and delivery, the pilot levels off as he would in making a landing, except that his speed is much greater. The pick-up boom is let down and the delivery container trails behind it on its own transfer loop. Just before making the pick-up, the pilot trips a release and the delivery container falls to the ground. At almost the same instant, the boom with the pick-up hook at its lower end strikes the transfer rope suspended between the two station poles.

The plane is about 30 feet above the ground when making contact at the station. After the pick-up, the container is brought into the plane through a hatch in the bottom, where it is opened by the sky clerk, the mail sorted and the container prepared for delivery at the next station.

This container has been built for hard usage, with a reinforced fibre nose and a heavy rubber skirt to sheathe the canvas bag which holds the mail. It has a capacity of about 50 pounds, delivery of heavier loads being made by parachute. The Post Office Department has designed a special pouch to fit inside it.

Air Pick-up lines are "feeder" systems designed primarily to operate where airlines cannot be operated profitably. The Air Pick-up extends the scope of the airlines' service and feeds them additional traffic from new and potentially rich territory.

The operations conducted by All American have attracted attention throughout the world. Other companies are now planning the establishment of similar service in different parts of the United States, and inquiries have been received from several foreign countries. All American recently announced its own plans for seven new routes in New England and adjacent areas in New York, New Jersey and Pennsylvania.

Richard C. duPont, president of All American Aviation and former national soaring champion.

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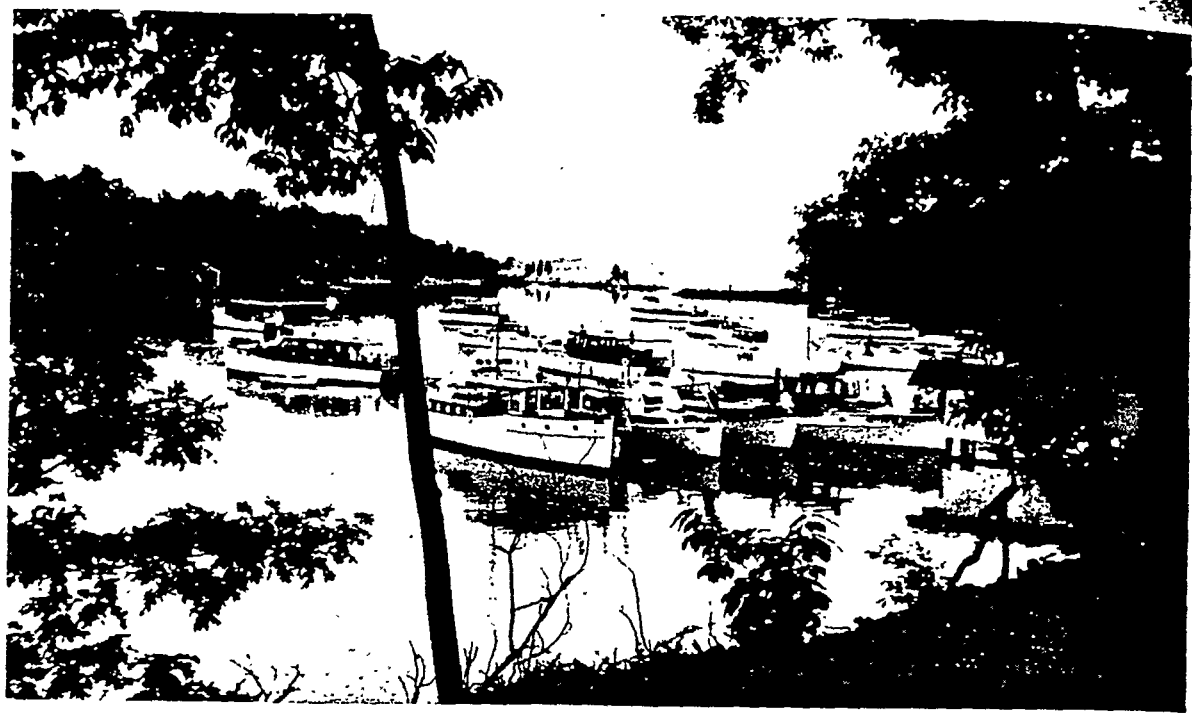

Members of several Squadrons assemble for a two-day rendezvous in Commander Bert Perry's private harbor at Crab Creek, Md., off Chesapeake Bay.

An Aid to the Navy

U.S. Power Squadrons, Composed of Business and Professional Men, Take Winter Courses to Improve Their Technique in Handling Small Craft.

GROUPS OF men are meeting this winter along the Atlantic Coast, the Great Lakes, the Gulf Coast or at inland river points to study the science of navigation and the piloting of small craft. They are members of the United States Power Squadrons, carrying on the traditions of this 27-year-old organization.

Yachtsmen and others interested in boating comprise the membership, seeking to improve their technique in handling small craft for greater safety in pleasure cruising and for any naval service desired by the government. Members enroll for courses of study during the winter and apply this knowledge during summer sailing months. The highest rating, that of navigator, is attained after four years of class work.

Service to the United States in times of emergency was one of the earliest purposes of the Squadrons and again is assuming great importance. The Squadron movement originated in Boston out of a desire to create a Naval auxiliary during war emergencies. Yacht clubs in other cities took up the movement which was endorsed by the Navy Department, and the national organization was established February 2, 1914.

During the World War, Squadron men entered the Navy, and as a result of their earlier training many received commissions. Other Squadron members at home served by establishing free nautical schools teaching the essentials of navigation to about 3,000 students, many of whom entered the Navy. Boats owned by some members were enlisted and became part of the police force of New Rochelle, N. Y., and New York City, patrolling the western end of Long Island Sound.

The niche in national Naval defense that may be filled by Squadron members was outlined at the organization's annual meeting this winter in an address by Chief Commander William K. Anderson. He pointed with pride to the background of the average member, a man about 40 years old, with around 12 and a half years' boat experience, just short of being a college graduate (most members have earned degrees), and engaged in business or a profession. Such a background of stability and experience, plus the training in making independent, accurate judgments in their work, fits men to supplement or take part in Naval service, the commander commented.

Although the original purpose was to create a Naval auxiliary, the World War established the Squadrons' activity in teaching. Many thousands have re-

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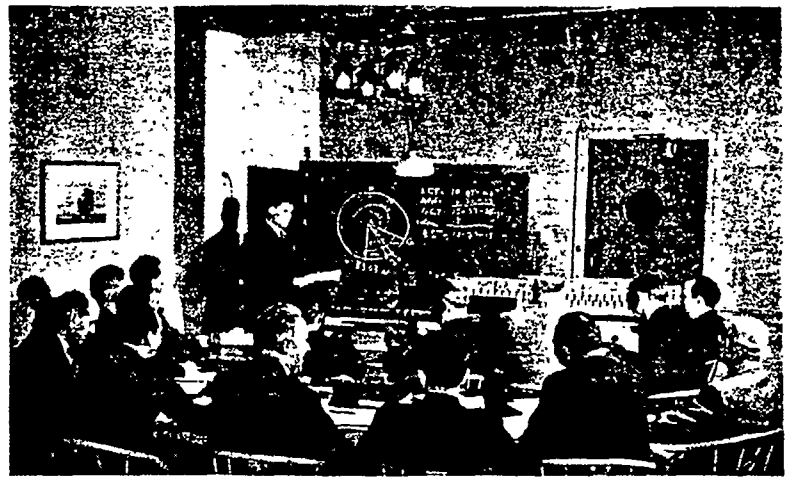
These men, who belong to the Detroit Squadron, are taking the final course to qualify as navigators.



ceived training, free of charge, in elementary piloting, and there are now about 7,000 members of the various Squadrons.

Membership is open to any man able to pass the prescribed entrance examination and approved by the local membership board. Ownership of a boat is not essential. To aid men in preparing for the entrance examination, local Squadrons each winter conduct classes for twelve weeks in elementary piloting and small boat handling. Attendance at this course does not obligate anyone to take the entrance examination.

Ladies may enroll in the elementary piloting class and after passing an examination are presented with a certificate of qualification in piloting. Ladies, however, are not eligible to membership, which includes the privilege of flying the Squadron flag, receiving a membership certificate with spaces for endorsement to higher ranks, and enrolling in the advanced classes.

The first course for members only is the advanced piloting class, concentrating on charts, chart reading, the compass, its error, and the use of government publications pertaining to navigation. On satisfactory completion, a member is rated as an advanced pilot and is entitled to display a bronze star on the bow of his boat.

Next is the junior navigator class which takes up dead reckoning. Members passing become junior navigators and may display two stars on their boat.

The four-year course winds up with the navigator class, dealing with celestial navigation and nautical astronomy. Successful students attain the highest ranking, that of navigator, and may display three stars on the bow of their boat.

The United States Power Squadrons is the parent body which directs activities through the local Squadrons. Mr. Anderson, of Detroit, who was elected chief commander this winter previously had been vice-commander. Other national officers are William L. Sayers, New York City, vice-commander; Lt. Com. F. K. Gundlach, New York City, secretary; and Edwin A. Jimenis, New York City, treasurer.

Chief Commander William K. Anderson, shown with Mrs. Anderson, was elected to national leadership of the Squadrons at the annual meeting this winter.

This Month's Cover

THE Battle of Lake Erie, fought September 10, 1813, was a decisive action in the War of 1812. Commodore Oliver Hazard Perry, in command of the American squadron of nine vessels, including the 20-gun flagship *Lawrence*, the 20-gun *Niagara* commanded by Captain J. D. Elliott, five schooners, a brig and a sloop, defeated six ships commanded by Captain Robert Barclay, a sea veteran who had fought under Lord Nelson.

After the victory, which was won at the conclusion of a fierce battle in which the *Lawrence* was put out of action, Perry sent his historic message to General William Henry "Tippecanoe" Harrison:

"We have met the enemy and they are ours."

The result of the encounter gave the Americans control of Lake Erie, enabling Perry to cooperate with Harrison's troops and force the evacuation of Detroit.

ETC 31269

That the new Y.M.C.A. tea cars are popular with the soldiers can be seen from this photo.

Canteens on Wheels

A Fleet of Specially Designed Y.M.C.A. Tea Cars Goes on 24-Hour Duty to Furnish Hot Foods and Drinks to Canadian Soldiers.

A FLEET of five Y.M.C.A. tea cars, specially designed to accompany troops on maneuvers and to visit remote outposts in Canada, has been completed recently by Wilson Motor Bodies, Ltd., of Toronto and is now on 24-hour duty in several army camps. Included in the construction of the cars are several features which have made them valuable in England, where over 500 are now being used.

The right side of each body consists of two panels, one of which can be raised to form a canopy while the other drops to become a counter seven and a half feet by one foot in size, from which hot tea, biscuits, etc., are served. A single all steel door at the rear slides along the roof of the car, and a speaker's platform can be drawn out from under the body for use in showing motion pictures. Two compartments for tools and baggage are on the left side of the body.

Beneath the counter on the right side is a serving table 30 inches by 18 inches with a well at each end in which attendants can stand. A 14-gallon copper tank heated by two gasoline burners supplies hot water, and the car also carries six two-gallon thermos jugs. With this capacity over 300 men can be served hot tea. Two dome lights and a gasoline lamp supply illumination, and in winter a gasoline stove gives out heat.

Two stretchers, blankets, and a shovel are part of each car's equipment, and every one has a letter box located in the rear. For service in bad weather the cars carry shelters of 10-ounce khaki duck.

A view of the interior of a tea car.

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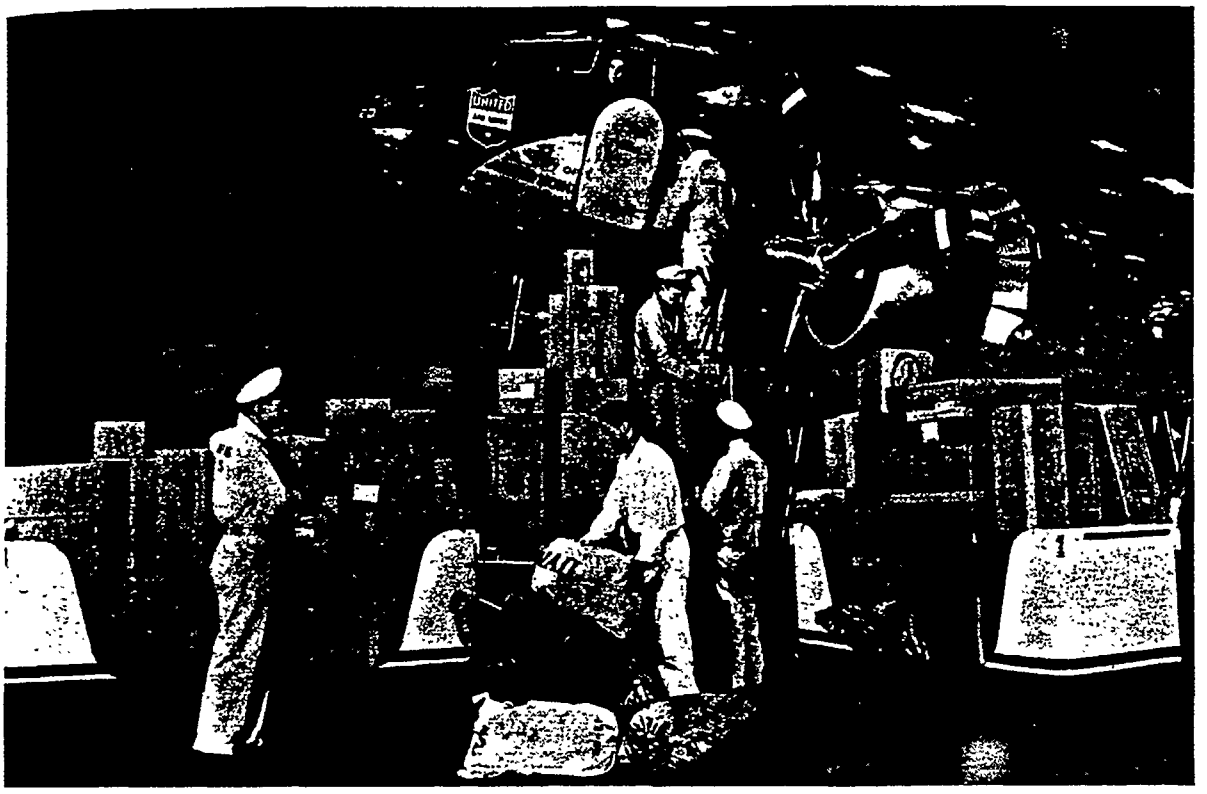

An average of 3,000 pounds of air mail and express is carried nightly from New York to Chicago on one of the recently inaugurated all-cargo freight planes.
United Air Lines photo.

Commercial Wings for Defense

The Air Transportation Industry is a Valuable Cog in the National Rearmament Machinery.

A NAVAL construction project on lonely Wake Island, mid-Pacific outpost of U.S. defense, was stalled.

The huge engine used to operate a power shovel had broken down; the necessary replacement part, a 750-pound crankshaft, could only be secured from the manufacturer, the Buda Company of Harvey, Illinois, nearly 7,000 miles away.

A cablegram marked "urgent" crackled over the wires and from Harvey a few minutes later came the answer. The crankshaft was immediately available but it would take several weeks for it to reach Wake Island by rail and boat. How about shipping it via air express?

Naval officials, harried by approaching deadlines, okayed the suggestion and the Buda Company made arrangements with United Air Lines to carry the shipment to San Francisco where it was to be transferred to a Pan American Airways clipper for Wake Island. It would cost $4300 to ship the $500 crankshaft by air.

Later on the same afternoon the heavy crate was loaded aboard a United Mainliner at Chicago's municipal airport and whisked across the continent at three miles a minute to San Francisco. Countless precious hours had been saved.

Thus the air transportation industry had proved its value to the national defense program in a spectacular manner. And men and women who read of the incident began to realize, too, that the industry was serving the defense program in similar, though less striking, ways every day.

During the years since 1918, when the Post Office Department inaugurated the nation's first air mail service between New York and Washington, a vast network of airways covering 45,000 miles and reaching 255 cities has been created in the United States. Over this carefully integrated system the nation's 17 domestic airlines are today flying more than 300 ultra-modern airliners, each capable of carrying from 500 to 5,000 pounds of cargo and from 10 to 33 passengers. No two cities in the country are more than 24 hours apart by air.

These facilities were geared and ready when the defense program got under way last fall. Today they have become

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a vital cog in the machinery of high speed, all-out production. Industrialists with urgent business in Washington or distant branch plants and offices are flocking to the airways. Bidders on government contracts have discovered the time-saving features of flying. Government heads, carrying bulging briefcases and with "no comment" answers to newspapermen, have become regular air travelers. And air express and air mail revenues have boomed in the same proportion.

Contrary to the general belief that only light articles of an emergency nature find their way into the air, machinery has become the greatest revenue producer of any class regularly using air express as an integral part of business routine. Machinery, including airplane, automobile, rubber and electrical parts, constituted, in one month studied, 53 tons of shipments carried by one air line alone. And besides this, air express shipments of everything from lingerie to radios and from canaries to medical supplies are common.

To meet the increased demands of the defense program the airlines soon developed special services. Among these was an all-cargo schedule inaugurated between New York and Chicago by United Air Lines on January 1. As the first "freight plane" schedule in air transport history, one of the company's numerous daily flights between the two cities was set apart for express and mail exclusively. Since that date the flight, operated in a regular 21-passenger Mainliner with its passenger space given over to cargo, has been leaving New York nightly at 11:30 p.m. (E.S.T.) and arriving in Chicago at 3:40 a.m. (C.S.T.)

The air express division of the Railway Express Agency, which has 22,000 offices in the United States, acts as the pick-up and delivery system for the airlines. The importance of this connection is illustrated by the fact that an estimated 30 per cent of all air express either starts or finishes by rail.

Although air express traffic is increasing rapidly, there is seldom a case where a shipment is held up for lack of space. In 1927 there were only two flights daily between Chicago and New York. Today there are 82. Thus, in an emergency, if there is no space immediately available for an air express shipment, there will always be space on a plane leaving a few minutes later.

The air lines have been steadily reducing air express rates and in the last decade have cut tariffs 66 per cent. Where a five-pound package once required 33 hours and cost $15 to be expressed from New York to the Pacific Coast, the same package today is carried for $5.80 in 17 hours.

Last year a leading air line carried 7,150,000 pounds of air mail and 2,900,000 pounds of air express. During the same period this company's 67 twin-engined transports flew 23,300,000 revenue plane miles and 226,000,000 revenue passenger miles. To keep pace with soaring demands upon its services the line last year boosted its personnel from 2,000 to more than 3,000 and placed orders for approximately $2,700,000 worth of new airplanes, engines and propellers.

In addition to the scheduled services offered by the nation's airlines, manufacturers and other groups have had occasion to charter planes for special missions in recent months. Not long ago the Lockheed Aircraft Corporation of Los Angeles, now heavily engaged in military aircraft construction, needed some special material for experimental purposes.

A 750-pound crankshaft goes aboard a plane at Chicago for the first leg of its flight to Wake Island, 7,000 miles distant. *United Air Lines photo.*

ETC 31272

Mechanics refuel a passenger plane which has a capacity of 820 gallons of gasoline and 66 gallons of oil. United Air Lines last year purchased 11,000,000 gallons of 90-octane Ethyl gasoline.
United Air Lines photo.

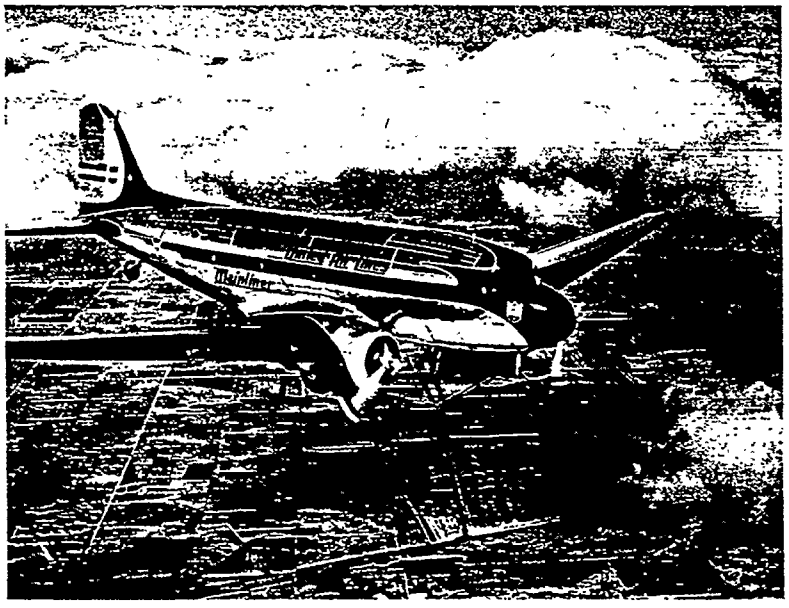
While plenty of regular supplies were on hand at the Lockheed factory, the particular material needed — and in a hurry—was no nearer than Pittsburgh, Pa., location of the Aluminum Company of America's plant. United Air Lines' air express department was asked if it could assign one of the company's regular Mainliners for a Pittsburgh-Los Angeles flight under a charter basis.

The company's answer was an immediate order for mechanics at Chicago to strip a luxurious plane of its passenger accommodations and prepare it for a rush flight to Pittsburgh. There the material, weighing more than 1,200 pounds, was picked up, stored in the passenger cabin and started for Los Angeles at 11:30 p.m. Shortly after noon the next day, the shipment was delivered in Los Angeles after only two stops en route for refueling. Whole days were cut from the time which would have been required by surface transportation facilities.

In the same manner planes are always available for charter flights to conventions, conferences, athletic events and innumerable other gatherings. Last fall, for instance, members of the joint Canadian-American defense commission headed by Mayor LaGuardia of New York chartered air liners for special New York-Ottawa trips.

Thus the air transportation industry of today, in overcoming the barriers of time and space, has pledged its vast resources to the interests of a national emergency. But never far from the thoughts of air line people is the guiding confidence that tomorrow those resources will once again be pledged wholly to the peaceful interests of a great nation.

An air liner climbs among the clouds to take advantage of a tail wind. These ships cruise at 200 miles an hour and carry 21 passengers and 1,000 pounds of mail. *United Air Lines photo.*



The Following

Service Awards

have been made as of
April 1st, 1941

5 YEARS

Jewel Ahonen	Sales, Detroit
Dwight F. Andrews	Sales, Baltimore
Marie Brand	Sales, Chicago
Dorothy Fowser	Manufacturing, Deepwater
Dr. O. Edward Kurt	Chemical Research
Emalee Pipal	Engineering, Detroit
William Trelease, Jr.	Sales, Dayton

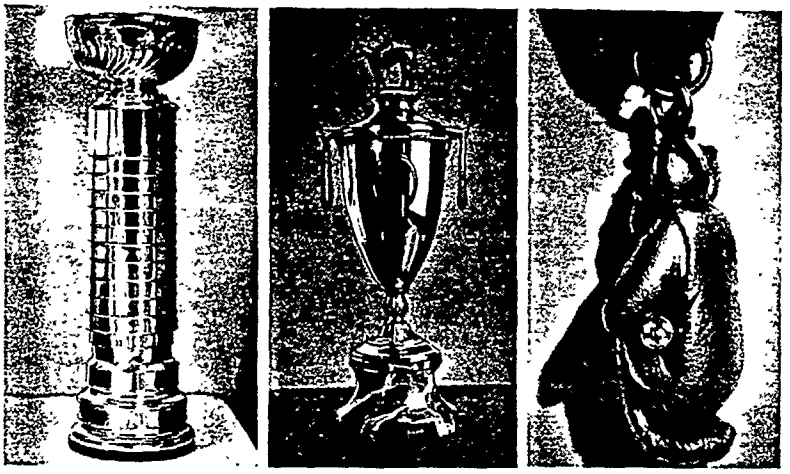
10 YEARS

H. Claire Dees	Sales, Baltimore

15 YEARS

Elizabeth Carr	Administration
John R. Murphy	Gasoline Testing, Yonkers Control

ETC 31273



Hockey's Stanley Cup, the Kentucky Derby Trophy and the Golden Gloves are "Emblems of Excellence."

The Story of Better Gasoline

Ethyl Advertising for 1941 Does an Important Educational Job, Approaching Specific Groups in Terms of Their Own Needs and Interests.

AMERICA never had such good gasolines before. Octane numbers of both regular and premium fuels have attained new heights. But the benefits of today's improved fuels will not be completely realized by the public unless the users of gasoline take full advantage of the extra power the petroleum industry has made available. This requires that the story of better gasolines be told to everybody who has anything to do with the use, distribution or refining of fuels.

Since the primary objective of individual oil companies is to market their own products, they cannot be expected to carry the burden of a program designed to sell better gasolines in general. Therefore the Ethyl Gasoline Corporation, through this year's advertising, continues to do this important educational job, approaching specific groups in terms of their own needs and interests.

The "Emblems of Excellence" campaign is designed to tell the story of better gasoline to the general public and to fix in the reader's memory the significance of the Ethyl emblem as a mark of the highest quality in gasoline. By aiding dealers to sell their top-quality fuels, this advertising helps to maintain the nationwide distribution of gasoline of extra-high antiknock quality, thus providing automobile manufacturers with a cushion for further increases in compression ratio, power and efficiency of engines. Advertisements in the "Emblems of Excellence" campaign will appear in national weeklies and monthlies of largest circulation.

Designed to reach the key men in industry is a series of informative advertisements running in several of the leading business publications. This series deals with problems involved in automotive progress and shows how Ethyl research is at the service of executives and technologists of the oil and automotive industries.

Advertisements appearing in the various automotive trade and dealer magazines explain to the service man the importance of correct ignition timing if the public is to receive the full benefit of improved gasoline.

Technical articles in advertisement form appear regularly in automotive and petroleum technical journals, informing technologists in those industries of the inseparable relation between engines and fuels and offering research engineers the full cooperation of the Ethyl Research Laboratories in Detroit and San Bernardino.

In magazines read by the oil trade are advertisements which tell men in the industry why better gasolines mean better business for everybody. They also aid the man at the pump, the point of contact between the industry and the general public, to explain the value of good gasoline to his customers.

Aimed at the farmer and at the tractor dealer are advertisements which point out the advantages of high compression tractors over other forms of power. These appear in trade papers read by tractor dealers and in farm publications. By helping to increase the number of tractors on American farms, this campaign also helps the sale of petroleum products.

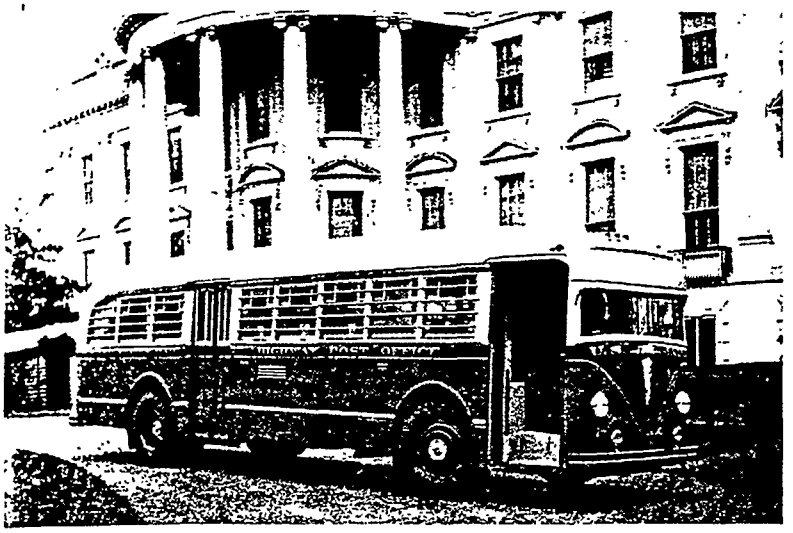
Fuel cost is the largest single item of expense in operating commercial vehicles, and Ethyl advertising in publications read by fleet operators is designed to help the operators to get the most out of fuel dollars. These advertisements also offer the services of Ethyl field engineers.

Airplane progress depends largely on engine improvement, which is related to fuel improvements. To remind men in aviation of research now being conducted by Ethyl engineers in cooperation with aviation technologists, a series of advertisements is appearing in aviation papers.

Motion pictures and strip films for presentation to interested groups, as well as booklets telling the story of better gasoline, are also available on request.

The illustrations in this article are basic pictures of the "Emblems of Excellence" campaign. The back cover of each issue of the "Ethyl News" shows a typical institutional advertisement of the type designed to reach the key men in industry.

ETC 31274



The first highway post office stops in front of the White House.

Highway Post Office

Motor Bus Provides Communities Lacking Railroad Service With New, Efficient Mail Delivery.

UP ANOTHER notch in speed and efficiency goes Uncle Sam's mail delivery this month, through inauguration of highway postal car service on three pilot routes.

Companion of the famed railway mail service, the highway operation ultimately will permit pick-up, sorting and delivery of mail between the tens of thousands of communities and towns which depend on paved roads exclusively for their transport communication with the rest of the nation.

The first "highway post office" consists of a specially equipped motor bus, duplicating facilities in railroad mail cars in which letters are sorted enroute. The bus will make regular, daily round trips for the benefit of towns along the 141-mile route between Washington, D.C., and Harrisonburg, Va.

This is the first of three experimental services, designed to test out different types of vehicles and special accessories as to adaptability to the work.

From its experience with these initial services, the Post Office Department will establish standards for all vehicles serving as "traveling Post Offices." The plan is then to contract for mail service with private operators of such vehicles at the points over the country where modern, speedy mail service has heretofore been hampered through lack of transport facilities. Post Office authorities already are receiving requests from transport companies as to what types of vehicles they should obtain in order to be assigned routes under the new system.

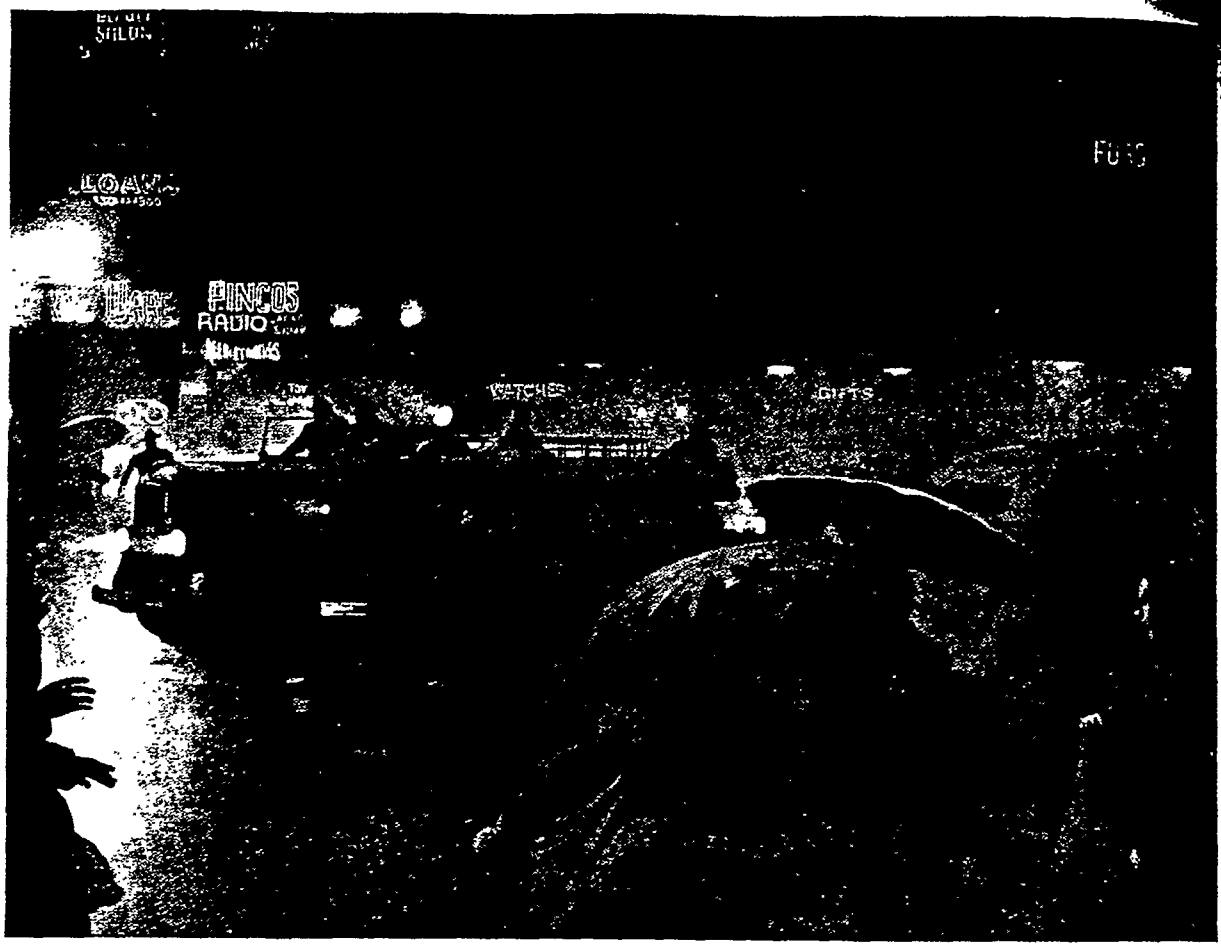
There are some 48,000 communities that completely lack railroad service. Previously numerous of these have had postal service through "Star Routes." These consist of contract motor truck services under which mail is sorted in a city post office, sealed into various bags for each town and then dropped off along the route. Mail for the city is picked up from each town on the return trip.

Pick-up, sorting and delivery of mail en route, through the specially equipped vehicles such as now going into service, will speed efficiency and cut down elapsed time so that the small community receives the same first class service enjoyed by larger centers.

The special vehicles whch the motor industry is providing the Post Office contain sorting equipment—pigeon hole compartments, etc.—racks to hold mail sacks, specially locked doors and barred windows to confound possible thieves, and mail slots in the sides for the convenience of customers.

The interior of the bus is similar to that of a railway mail car.

ETC 31275



Men against fire

(A story of day-to-day progress in automotive research)

ANY FIRE CHIEF will tell you that the speed with which he can get to a fire is as important as the skill and courage of his men in actually fighting a blaze. Today the greatest help in saving vital minutes is modern gasoline-driven fire equipment. Picturesque as was the old horse-drawn fire engine with its smoking boiler, it could not attain the speed of modern equipment nor could it pump the torrents of water required in modern fire-fighting.

Each successive improvement in automotive engines and their fuels has aided not only the fire-fighters of America but also the users of all other kinds of automotive vehicles.

Since the tendency of fuel to knock has been a limiting factor in the design of more efficient engines, the steady rise in the anti-knock (octane) value of gasoline has played and will continue to play a vital part in this progress. Each advance in gasoline anti-knock quality can be utilized by the automotive industry to produce engines of still greater power, performance and economy. Thus the use by oil refiners of Ethyl's product, *tetraethyl lead,* as an anti-knock ingredient in gasoline, contributes to the day-to-day improvement of automotive equipment of all types.

Because engines and fuels are inseparably related in their further development, Ethyl research workers are cooperating with technical men in both the automotive and petroleum industries. The Ethyl laboratories at Detroit and San Bernardino are helping to coordinate the developments of both industries and are contributing the results of many tests and experiments with possible future fuels and engines. At the same time our service engineers in the field are working with many commercial users of engines and fuels in the practical application of laboratory findings.

To engineers in every phase of automotive development we extend an invitation to avail themselves of our research and service facilities. Ethyl Gasoline Corporation, Chrysler Building, New York City.

ETHYL

Better and more economical transportation through

ETHYL RESEARCH *and* **SERVICE**

Printed in U. S. A.

ETHYL NEWS

May 1941

ETC 31277

The "Fort Garry," one of the Hudson's Bay Company auxiliary schooners, carries supplies to and takes furs from posts in the far north.

Hudson's Bay Company photo

[Story on page 4]

ETC 31278

ETHYL NEWS

Ethyl Gasoline Corporation
Chrysler Building, New York City

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MFG. DEPT.

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MAY 1941
VOLUME 8, NUMBER 5

Democracy's Grand Coulee Dams

WE AMERICANS have a habit of taking even our biggest achievements in our stride. Maybe that's a mistake. For instance:

Two years ahead of schedule, Grand Coulee Dam has begun operations on the Columbia River in Washington. If the dictators had completed so mighty a project in so short a time, their fanfare and flourishes would have reverberated throughout the world. At a time when high pressure publicity men like Goebbels and Gayda play an important part in world affairs, we Americans can well afford to blow the trumpets for ourselves.

Here is the largest man-made structure in the world. Its power plant will bring light and power to a large section of the Pacific Northwest. Its irrigation system will bring water to 1,200,000 acres of productive land — land that will support some 300,000 persons.

What better example of the way democracy works? Out of this engineering achievement will grow the development of a vast area of America. This 20th Century pioneering is what democracy means. It is the process by which free men build the future.

American imagination, American engineering, American labor — all set free by democracy — have combined to produce a great symbol of democratic efficiency.

There is no reason why we should take the physical successes of democracy for granted. Without enslaving labor, without destroying freedom, without unleashing hatreds, our American democracy is proving that it outdoes the achievements of the dictators every day in the year.

Why shouldn't we make a special point of boosting Grand Coulee, the Golden Gate Bridge, the Henry Hudson Parkway, the Skyline Drive, Radio City, and, right now, the overnight industrial expansion for defense?

These are things worth bragging about. They prove that democracy can be efficient for constructive ends. They prove that democracy is modern, streamlined, businesslike, and progressive. They prove that the democratic system is far superior to any of the phoney social orders touted by the would-be masters of the world.

It's high time for each of us to do some skywriting for the Grand Coulee Dams of democracy.

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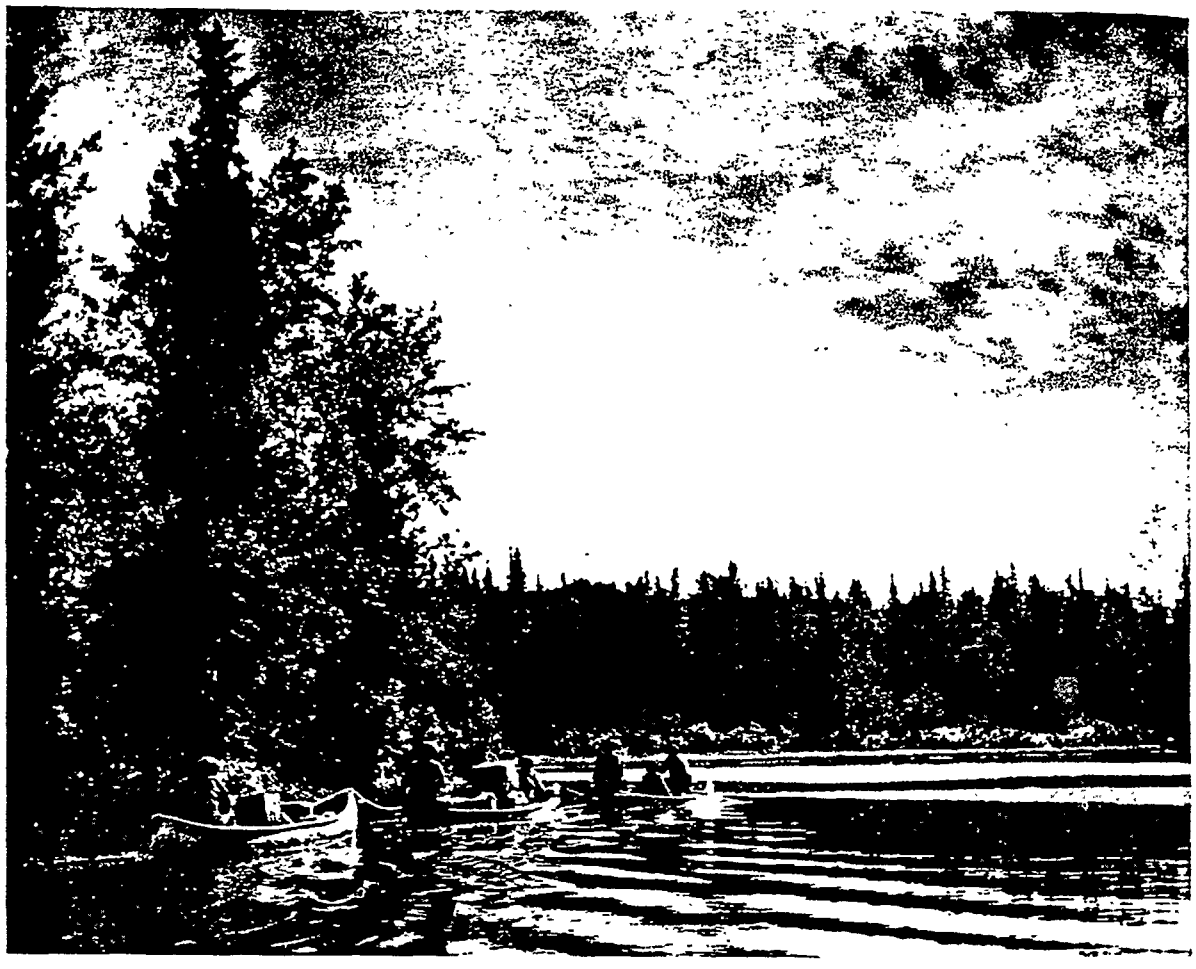
Highway to the Sky
Trucks Boom War Savings
Faster Than a Bullet
High-Flying Photography
Growth of Automotive Service Industry Pictured in Mural
This Month's Cover

ETC 31279



Part of a canoe brigade cruises through a forest in northern Manitoba. The canoe with the outboard engine is towing the other two.

Hudson's Bay Company photo

Empire Builder of the North

The Hudson's Bay Company, Which Established Its First Fur Trading Post in Canada in 1668, Is the Oldest Merchant Trading Company in the World.

IN 1668, the French adventurer Groseilliers, in the service of King Charles II of England, established on the shores of James Bay the fur trading post of Fort Charles. This frontier outpost, which is located near the mouth of the Rupert River and the spot where Hendrik Hudson is believed to have wintered in 1611, soon became known as Rupert's House and was the beginning of the far flung empire of the Hudson's Bay Company.

From this small start the Company of Adventurers, as it was known, expanded rapidly, until it ruled the whole of Canada west of the St. Lawrence watershed and held it for the British Empire. Officers of the company founded most of the cities of Western Canada, including Winnipeg, Edmonton and Victoria. They explored and mapped the northern interior of British Columbia and the Canadian Arctic, and they built Fort Yukon and traded in Alaska when that country belonged to Russia. Harry Kelsey, sent west from Hudson Bay, was the first white man to see the Canadian prairies.

The Hudson's Bay Company is the oldest business institution on the American continent and the oldest merchant trading company in the world. It was the first company to run a chain store system. The company owns and operates today six large department stores, in Winnipeg, Saskatoon, Calgary, Edmonton, Vancouver and Victoria; a chain

ETC 31280

of small department stores across Canada; tea and coffee manufacturing plants at Winnipeg and Vancouver; a salmon fishing fleet, including cold storage ships, off the coasts of Newfoundland and Labrador and 218 fur trading posts throughout Canada.

Other assets of the company include 1,800,000 acres of farm and pasture lands in Manitoba, Saskatchewan and Alberta; eight raw fur departments; a model experimental fur ranch; 81 private commercial radio stations; nine government meteorological observation stations; 7,000 square miles of beaver sanctuary leased from the Province of Quebec; 308,000 acres of muskrat preserve leased from Saskatchewan and Manitoba and several subsidiary companies, such as oil and gasoline, exploration, transportation, fishing, etc.

In covering such a vast field of operations transportation has always played a leading part. Until recently all furs were shipped to England, so that, for example, furs traveling upstream from the mouth of the Mackenzie River to what is now the Province of Saskatchewan and then via a series of lakes and rivers to Hudson Bay and the British Isles were carried thousands of miles before reaching their destination. Under old systems of transportation—by canoe and York boat propelled by the strong arms of voyageurs, and by sailing ship—years elapsed after trade goods were sent out from London before returns in furs came in.

The first speed-up in transportation occurred when steamers made their appearance both on the sea and on the inland waterways, but it wasn't until recent years that great strides were made through the use of airplanes and gasoline-powered boats. Today the company operates two Beechcraft airplanes, 275 schooners and 1,000 canoes. In some places, such as northern Quebec, canoe brigades powered by paddlers still ply rapid and rocky streams, but in most cases when canoes are used the outboard motor has increased their speed.

The modern canoe brigade consists of a few gasoline-powered canoes towing two or more ordinary canoes, all of them laden with furs. Auxiliary schooners are also used to a great extent in Arctic waters. The newest of these, built last year at Shelburne, Nova Scotia, and named the *Fort Charles* after Groseilliers' first post, arrived in James Bay last summer.

The fur trade has brought sufficient wealth to many of the Eskimos of the Arctic so that they can buy their own motor boats. Gasoline for these craft and for the company's Arctic boats is brought in drums to the eastern Arctic each summer by the annual supply ship, the R.M.S. Nascopie. When empty, the gasoline drums prove useful for shipping considerable quantities of whale oil refined from the blubber of white whales, most of which are caught at Pangnirtung, Baffin Island.

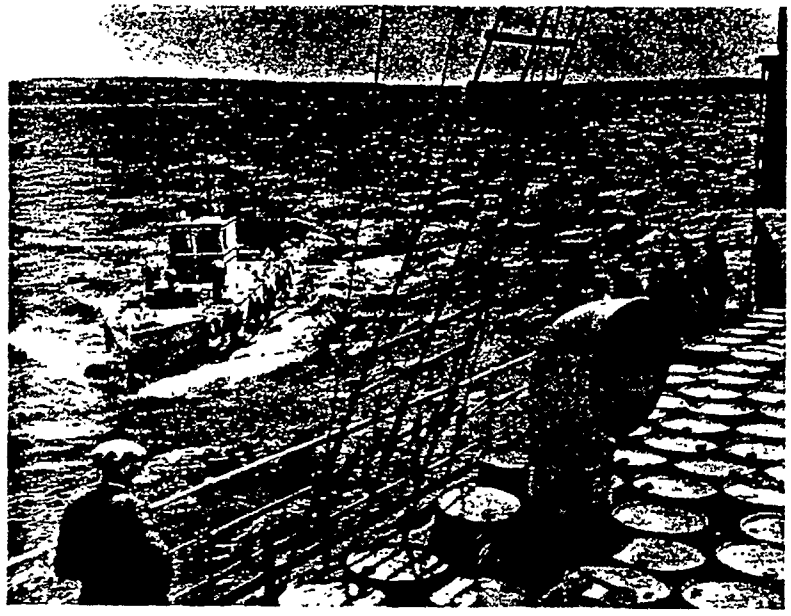
The two company airplanes are used for inspection trips and carrying passengers, mail and freight. The larger of the two, which seats ten persons, covers the entire Dominion from coast to coast and from Winnipeg to the Arctic. A year ago she made the first Arctic winter inspection trip on record and spanned thousands of miles of wilderness without a mishap.

Operation of these planes through wide stretches of barren and uninhabited country is far different from air line flying. Navigation is entirely by ground contact and dead reckoning, since there are no radio beam signals. The only help the pilot gets from radio

For the outboard motor of today's canoe brigade the drum of gasoline is as necessary as the rolls of birch bark and can of pitch were in the old days.

Hudson's Bay Company photo

ETC 31281



Drums of gasoline are carried north on the company's annual supply ship, R.M.S. "Nascopie."

Hudson's Bay Company photo

is information on weather conditions at various points.

Winter flying in the far North is difficult, too, because of the short days and the lack of variety in the white terrain, which makes it hard for the pilot to see rough places in the surface of the snow. In addition, the planes must remain out all night in temperatures that sometimes drop to 60 degrees below zero, so that starting an engine in the morning is a job that often takes several hours.

The company's 218 posts, scattered through frontier Canada from Labrador to the Pacific, are supplied from three depots, situated in Winnipeg, Edmonton and Montreal. From the depots go out the modern trade goods — historic articles such as beads and snow knives for building igloos, as well as up-to-date merchandise like cosmetics and lingerie. These are exchanged for furs at the various posts.

The Hudson's Bay Company began trading as an incorporated company in 1670, and each year's shipment of trade goods is known as an outfit. Outfit Number 1 went out in 1670, while Outfit Number 272 will be sent out this summer.

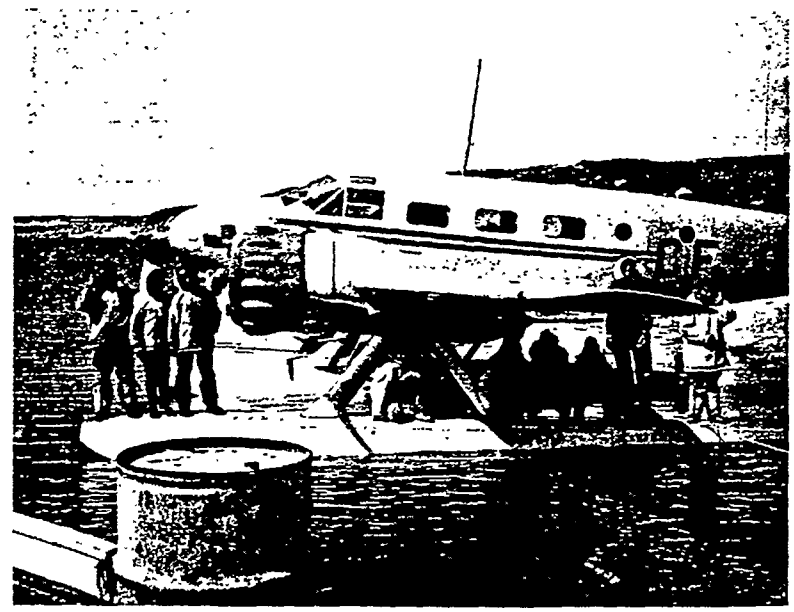
Some fur trading posts are on railway lines, and there goods are sold for cash as well as bartered for furs, but on the frontier, cash is rarely seen. In the Arctic, trade is carried on almost entirely in white or Arctic foxes, so that the fox has become the unit of currency just as the beaver was in former years.

Some posts use the token system. When a trapper comes in with furs, the post manager values them as worth so many units and gives a number of tokens in exchange. If, for instance, the trapper then wants a sack of flour worth two tokens, he passes back the two tokens to the manager. In like manner he may return one token for a pound of tea, another for a bag of sugar, and so on. This is the old method used in the days of beaver currency, when everything was reckoned in terms of beaver skins. It is the simplest way of showing the trapper that he is getting a square deal.

To train men for the specialized business of fur trading and dealing with natives, an apprentice training school has been set up in the head office of the company in Winnipeg and turns out two classes a year. The young men who graduate are sent to various posts throughout Canada, where they serve for a number of years before becoming post managers. Many famous traders began their service as apprentices, among them R. M. Ballantyne, the Scottish author, and Lord Strathcona, who governed the company for 25 years. Apprentices are taught such subjects as grading furs, cooking, carpentry and radio operation and equipment.

The company Beechcraft, CF-BMI, is welcomed by Eskimos at Bathurst Inlet in the central Arctic.

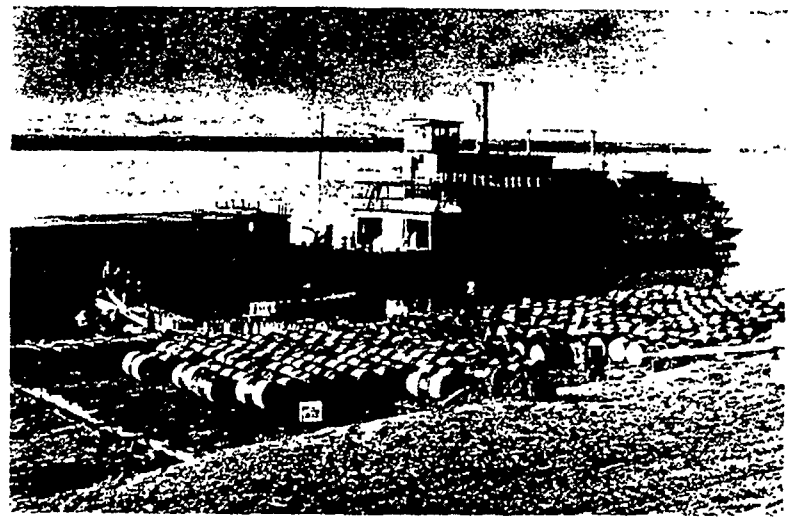
Hudson's Bay Company photo



ETC 31282

The extensive use of radio by the company is of great value to the Empire in the present war, as from eleven trading posts meteorological reports are sent daily to Toronto. Since much of the weather of the Northern Hemisphere originates in the Canadian Arctic and moves eastward to Europe, these reports, which are closely guarded secrets, are of considerable assistance to Royal Air Force pilots in England.

The company's radio system of 81 stations also serves as a safeguard against invasion of Canada by way of some isolated section of coast. All dwellers and travelers in the Northland are instructed to watch for strange boats or planes and to report any they see to the nearest radio station so that an alarm may be sent out. Many instances have occurred to prove the efficiency of this method of protection.



Barrels of oil from the Imperial Oil Company's wells at Fort Norman go aboard the Hudson's Bay Company sternwheeler "Distributor" on the Mackenzie River.

Hudson's Bay Company photo

For example, last summer a Hudson's Bay Company transport vessel was cruising toward James Bay via Hudson Strait. Early one evening it had to tie up in a wild, apparently uninhabited cove on the rugged shore of the strait. Next day, when the weather moderated, the ship proceeded to a trading post fifty miles farther on, where to the captain's surprise he learned that his vessel's movements had been known since the evening before. The answer was that Eskimos, seal fishing along the shore, had reported the strange ship to the post.

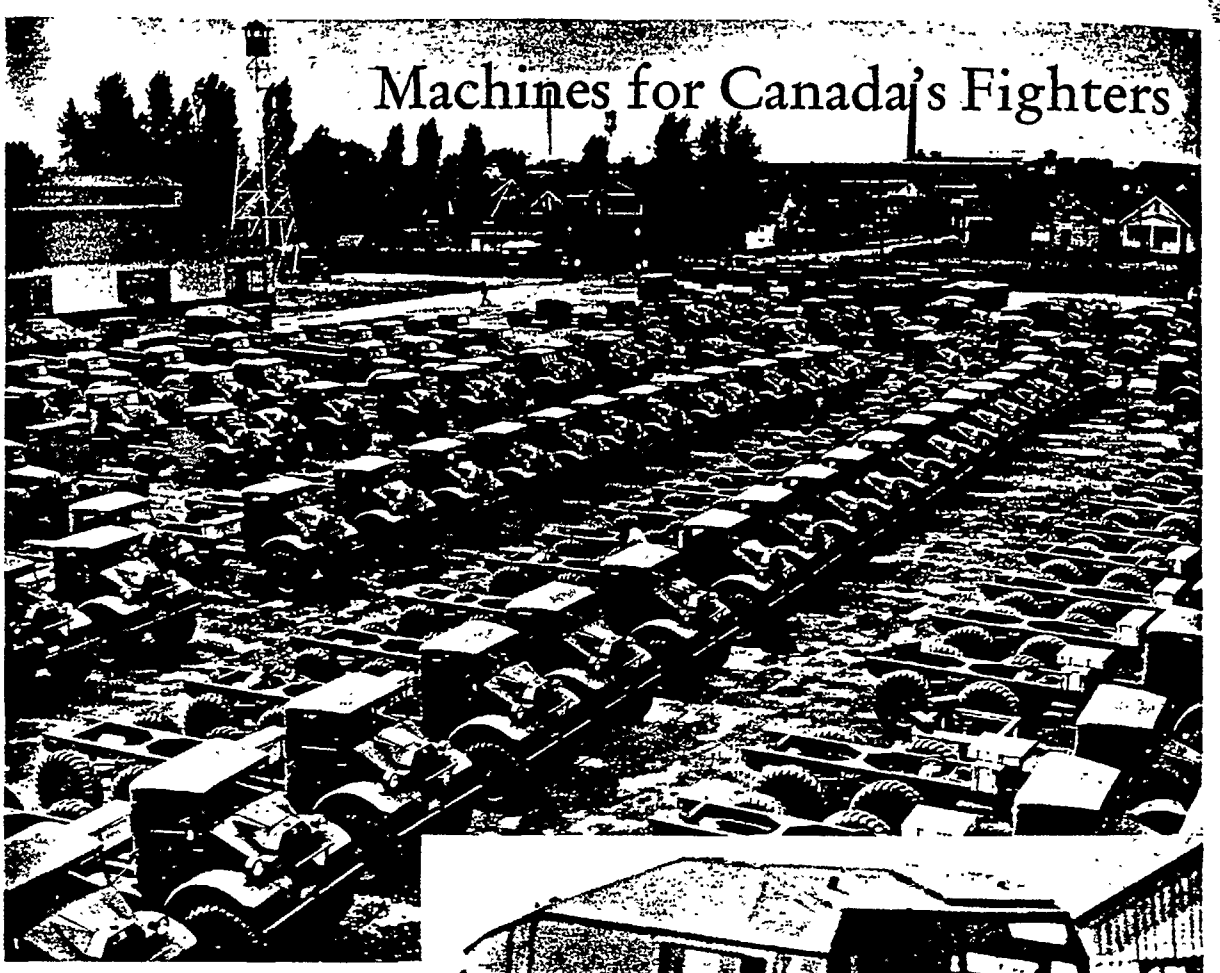
Another instance was that of a trading schooner, carrying trade goods to posts on Hudson Strait and Bay during July and August. The movements of this ship, which was painted a battleship gray, were completely reported to various radio equipped centers by watchful natives.

An outboard engine is filled with gasoline at the end of a portage.

Hudson's Bay Company photo

ETC 31283

Machines for Canada's Fighters



ABOVE: *Army vehicles outside the Ford plant at Windsor, Ontario.*
RIGHT: *Artillery tractors must pass punishing tests before they are accepted.*

The Dominion's Automotive Industry Is Geared to High Speed Production for the Purpose of Putting Hitler Out of Business.

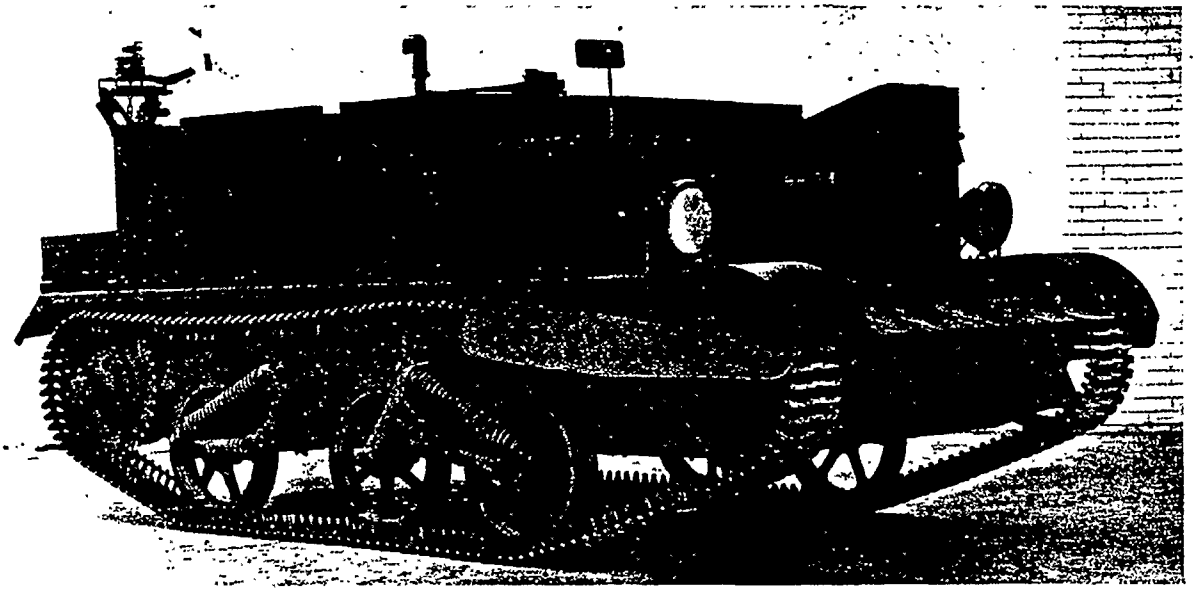
FAR from the danger of destruction by enemy bombers, Canada's automotive industry is running night and day, pouring out an uninterrupted stream of tens of thousands of mechanized units for the armies of the British Empire.

The Ford Motor Company of Canada, Limited, can turn out 125,000 units a year and has supplied more than 50,000 vehicles to the governments of Canada, Great Britain, South Africa, Australia, India, Malaya, and other British countries. Ten thousand Canadians work in the Ford plant at Windsor, Ontario, where production schedules are geared as high as 450 units daily.

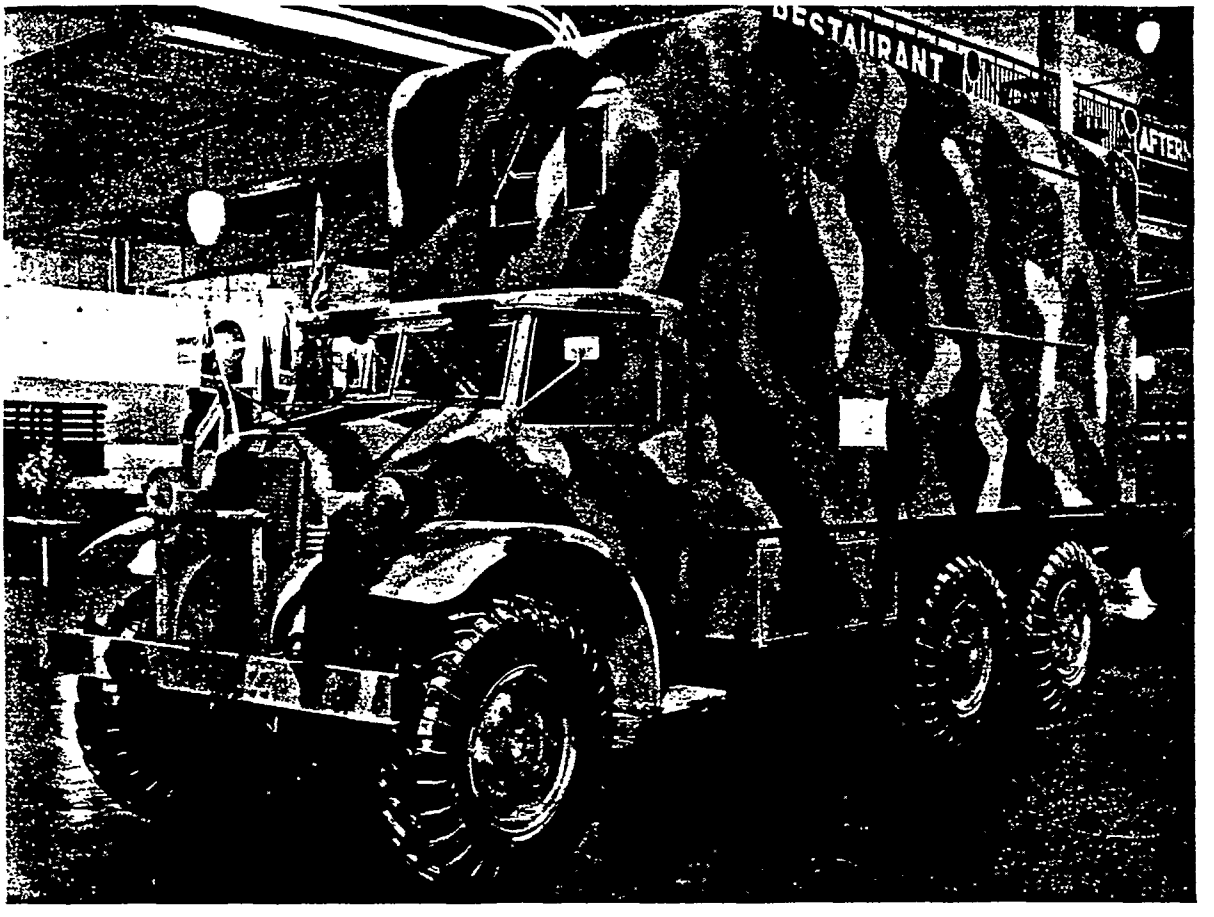
General Motors of Canada initiated and carried through a program of production in which the company produced a greater number of military units in the month of November alone than they would produce commercial vehicles for domestic consumption in a normal year of 12 months.

General Motors also originated the Volunteer Auxiliary Drivers' Corps, the civilian activity which to date has trained and graduated more than 3,000 young women in the elementary mechanics of motor cars and trucks.

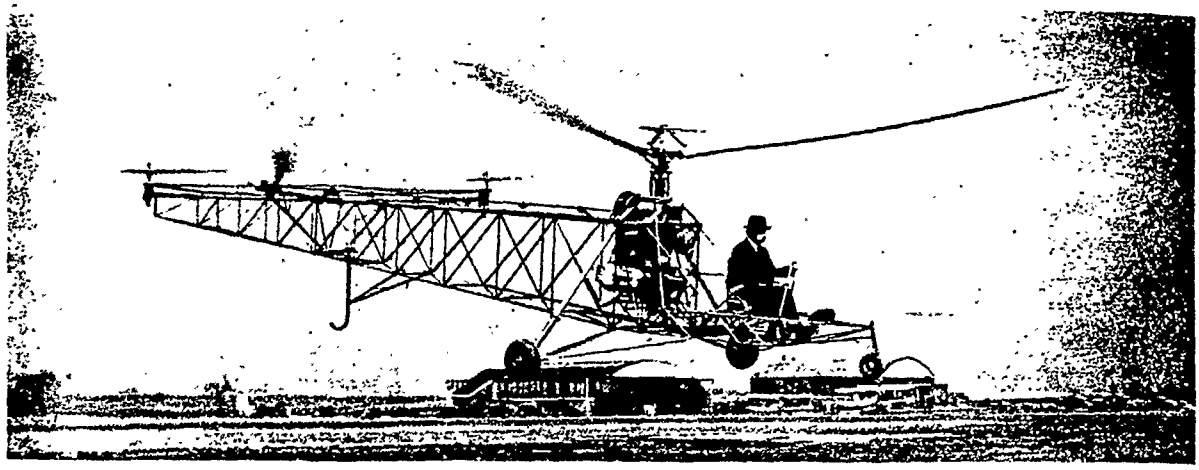
ETC 31284



Universal gun carriers have a tank-like tread and are armored against small arms fire.



Size and power are the outstanding characteristics of this six-wheeled, four-wheel drive lorry.



With Sikorsky at the controls, the helicopter goes aloft on a test hop at the Stratford, Conn. airport.

Flying Machine Ascends Vertically

Vought-Sikorsky Helicopter May Fulfill Dream of Controlled Flight at Zero Miles an Hour.

IGOR I. SIKORSKY, famed airplane builder who is engineering manager of United Aircraft's Vought-Sikorsky Division has designed an experimental helicopter which has demonstrated in several hundred test flights during recent months its ability to rise vertically and obliquely, to fly forward, backward and sideways, and to hover over one spot under wind conditions ranging from a dead calm to fresh gusts of some 25 miles an hour. In its ability to hover, the machine represents fulfillment of the long-awaited dream of controlled flight at zero miles per hour.

This helicopter has been flown at forward speeds ranging from 0 to 45 miles an hour. Although the fastest speeds have been attained in forward flight, speeds up to 20 miles an hour have been reached in backward and sideways flight. During these and several hundred other flights the helicopter reached altitudes of between 80 and 100 feet.

On numerous occasions the craft was flown to a landing place hemmed in on all sides by obstacles. Hovering over a small cleared area, it then descended vertically under complete control by the pilot. The helicopter rose into the air with similar ease, clearly demonstrating its ability to operate successfully from areas congested except for a space not much bigger than the diameter of the main rotor—a matter of some 28 feet.

The most spectacular performance of which the machine is capable is hovering. On one test flight the helicopter flew directly up to a man, hovered before him, and finally backed off without touching the ground.

In earlier single-rotor helicopter types one of the main difficulties was control. This problem of control has been solved in the Vought-Sikorsky VS-300 by a system of three small auxiliary rotors located at the rear of the fuselage — one being in line with the centerline of the fuselage and revolving in a vertical plane, while the other two are at right angles to the centerline and revolve in a horizontal plane. These elements take the place of the ailerons, elevators, and rudder of the conventional airplane, and the effects of the latter controls are duplicated by merely changing the pitch of the auxiliary rotors.

The main lifting force of the VS-300 helicopter is derived from the main rotor, composed of three blades of 14-foot radius. The magnitude of the lifting force is varied by changing the pitch of the blades of the main rotor.

Thus the main rotor provides the forces necessary for ascent, descent, hovering, or level flight, and the direction of flight is governed by the auxiliary rotors. By using the latter to slightly tilt the helicopter in a certain direction, flight in that direction is achieved.

A 90-horsepower aircooled engine, located near the center of gravity of the helicopter, supplies the power to drive the rotors.

The Vought-Sikorsky helicopter has three necessary flight controls; the control column or stick, the foot pedals, and the main pitch control lever. This arrangement calls for none other than normal airplane flight reactions on the part of the pilot.

A great advantage of the control system employed in the VS-300 helicopter — compared with that of the conventional fixed-wing airplane — is that the feel and effectiveness of the controls never vary, regardless of the attitude of the machine, since the control surfaces are always rotating at rates far in excess of their stalling speeds.

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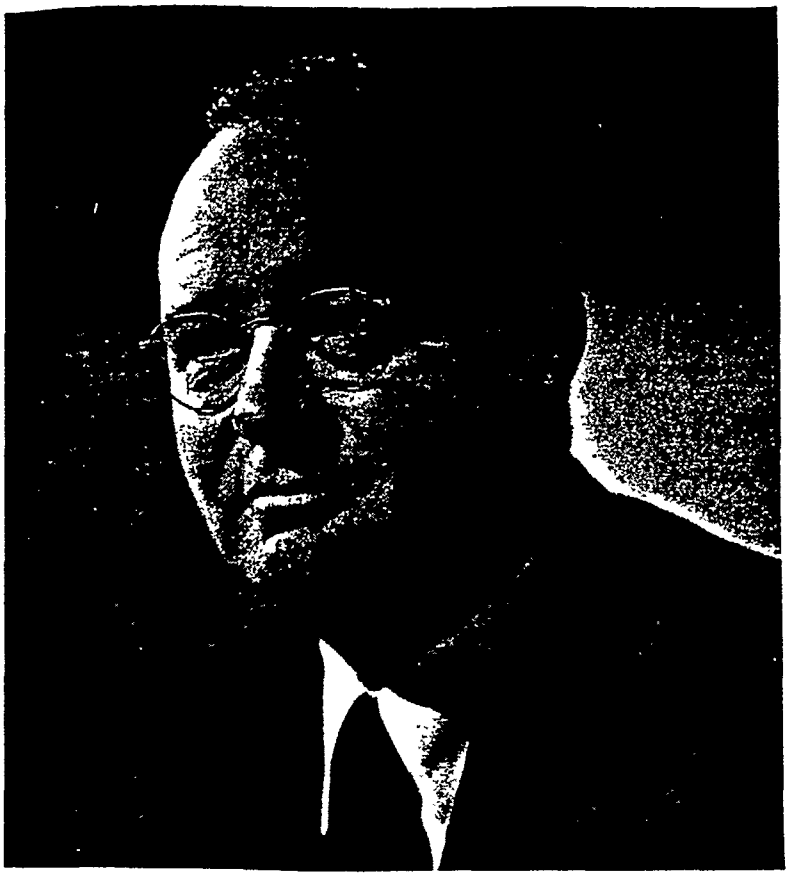

At 51 Mr. Midgley was awarded the Priestly Medal for outstanding achievement in chemical science.

Pre-Ethyl Theories of Knock

Priestly Medal Winner Sought the Answer to Knockless High Compressions in Many Places Before the Discovery of Tetraethyl Lead.

THE recent award of the Priestly Medal, highest award bestowed by the American Chemical Society, to Thomas Midgley, Jr., Ethyl's vice-president, for outstanding achievement in chemical science, recalled to automotive veterans the long struggle of GM researchers to find some way to raise compressions and at the same time avoid engine knock.

For several years previous to the discovery of tetraethyl lead Mr. Midgley and his associates in that research felt that higher compressions were the most practical way to increase the fuel economy of automotive engines and still build a car the American public would buy. Before they found the antiknock qualities of tetraethyl lead, however, dozens of blind alleys of engineering and chemical theory were explored and abandoned.

In a speech before the Mid-West Section of the Society of Automotive Engineers in 1920 Mr. Midgley, 31-year-old mechanical engineer, described past efforts to solve the problem of what went on within an engine cylinder during combustion. The speech, excerpts from which are given below, was published in the December, 1920, issue of the SAE Journal. Some of the figures given at that time provide a quick index of the progress motor transportation has made in two short decades.

"For several years past our laboratory has been conducting a research into the behavior of various fuels during combustion," young Midgley began. "This is merely one phase of the fuel problem. We consider it a fairly important phase and have spent some time in trying to find out what happens inside the cylinder of an engine during and following the combustion period. I will review briefly some of the salient points in the fuel problem proper, which has more of an economic than an engineering nature, although engineering must be applied in its solution.

"Power from the internal combustion engine depends on a supply of liquid fuel. The situation is that there are some 7,000,000 or 8,000,000 automobiles in use in the United States, and each requires about 600 gallons of gasoline annually. The total is something like 5,000,000,000 gallons. The oil industry must exert every possible effort to supply 4,500,000,000 gallons this year. This is why there is a fuel problem. Oil men tell us that, as automotive engineers, we ought to design efficient engines which will deliver twice as many miles per gallon. They say that this would be equivalent to doubling the supply of fuel. They go further and tell us how we ought to build these cars. They say we ought to adopt European practice, gear accordingly and change gears every time we come to a five per cent grade. This is a good theory, but will the oil men sell such cars if we build them? I do not believe the American public would buy such a car. The true solution of this problem is to deliver to customers not only what they must have but also what they want.

"This result could be accomplished if we could raise compressions, but we cannot raise compressions successfully merely by reducing the clearance volume because at about 100 to 110 pounds per square inch, which is really low compared to what we ought to have, the engines pound every time they are accelerated and are unpleasant to drive. The incipient knocks such as the general

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public complains of today are not really harmful, but the heavier knocks caused by running at compressions of 125 to 130 pounds per square inch on automobile gasoline are harmful. We have data showing that, during an hour's run on an engine under such conditions, several of the piston heads were cracked and every spark plug practically ruined. Therefore, the problem confronting the research engineer is not only to determine what knock is, but also how to overcome it. I will tell of the work we have done toward overcoming the knock, explaining the latest theories concerning what it is and prefacing this with a review of some of the simpler relations of organic chemistry.

"The engineer expresses physical relationships, such as the power output of an engine, by curves. Such curves, however, serve only as a graphical representation of relationships. The chemist uses structural formulas to represent graphically certain relationships which exist within the molecule of a substance. By these structural formulas it is possible to foretell to a certain extent the properties that a given material has; so, by examining the structural formula of a fuel that may never have been run in an internal combustion engine, we can predict, without actually trying the substance, what compression pressures it will withstand and how it will behave during combustion."

Mr. Midgley next described the structures of hydrocarbons of the paraffin, benzol, alcohol and ether series and their reaction inside a cylinder. He detailed the workings of the indicator he used, which gave an optical record of what went on when each of these paraffins was burned inside a cylinder.

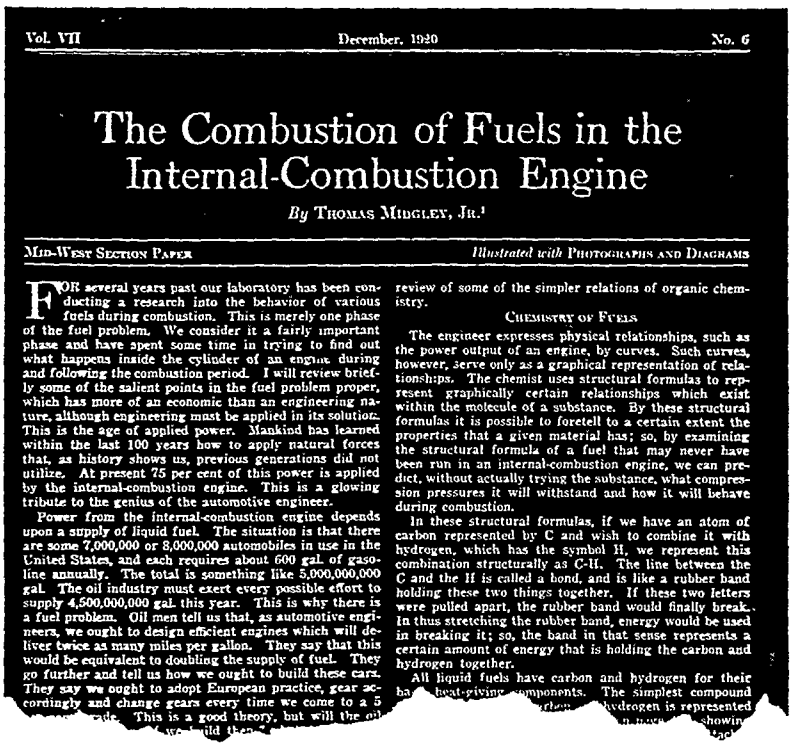
"Can knocking be associated with volatility?" he asked. "It cannot. It functions only within an homologous series. The ultimate composition, or the total number of carbon, hydrogen and oxygen atoms involved, was exactly the same with both ether and butyl alcohol; so, we cannot depend on ultimate composition to tell us what causes the knock. We have the same proportion in both fuels, yet one knocked and the other did not. . . . .

"When we had completed these experiments, there was little cause for accepting any of the old theories as to what knock is. We knew it was not caused by auto-ignition; or by the ultimate composition of the fuel; or by burning ahead of the point at which ignition should occur by means of the spark plug, because it came after the spark plug fired the mixture. We knew many things that the knock was not but nothing that it is."

Mr. Midgley told of an early theory, which he later found to be incorrect, that if the small transparent particles of a fuel were dyed some color to speed up heating, knock would be eliminated. Iodine had this effect but no other dyes did. In attempting to interpret the meaning of the sudden rise and fall of pressure in a knocking cylinder, Mr. Midgley said he used to think a detonation of some sort within the charge was the cause. This he believed to be due to the formation of acetylene, an unsaturated substance, though he never was able to isolate any such substance.

"When Mr. Horning and Dr. Dickinson went oversea they met Dr. Dixon, an English physicist, who had done some remarkable research work on the explosion of gases in mines," he continued. "Mr. Horning and Dr. Dickinson obtained from Dr. Dixon considerable information about the explosion of these gases and they connected the results of Dr. Dixon's work with our detonation theory. Dr. Dixon had proved that these fuels themselves could be detonated without any intermediate compound. We put the acid test to this theory, and in so doing we have absolutely convinced ourselves that it is correct.

"Dr. Dixon showed several years ago that in a long tube filled with an explosive mixture of gas which was fired at the near end, the velocity of the flame propagation was not a constant but accelerated to a very high velocity. Translated from meters, this velocity is about one mile per second. Dr. Dixon's calculations would indicate that the pressures on the wave front are about 100,000 pounds per square inch.



Vol. VII December, 1920 No. 6

The Combustion of Fuels in the Internal-Combustion Engine

By Thomas Midgley, Jr.[1]

Mid-West Section Paper *Illustrated with* Photographs and Diagrams

FOR several years past our laboratory has been conducting a research into the behavior of various fuels during combustion. This is merely one phase of the fuel problem. We consider it a fairly important phase and have spent some time in trying to find out what happens inside the cylinder of an engine during and following the combustion period. I will review briefly some of the salient points in the fuel problem proper, which has more of an economic than an engineering nature, although engineering must be applied in its solution. This is the age of applied power. Mankind has learned within the last 100 years how to apply natural forces that, as history shows us, previous generations did not utilize. At present 75 per cent of this power is applied by the internal-combustion engine. This is a glowing tribute to the genius of the automotive engineer.

Power from the internal-combustion engine depends upon a supply of liquid fuel. The situation is that there are some 7,000,000 or 8,000,000 automobiles in use in the United States, and each requires about 600 gal. of gasoline annually. The total is something like 5,000,000,000 gal. The oil industry must exert every possible effort to supply 4,500,000,000 gal. this year. This is why there is a fuel problem. Oil men tell us that, as automotive engineers, we ought to design efficient engines which will deliver twice as many miles per gallon. They say that this would be equivalent to doubling the supply of fuel. They go further and tell us how we ought to build these cars. They say we ought to adopt European practice, gear accordingly and change gears every time we come to a 5 [illegible]. This is a good theory, but will the oil [illegible] hold them [illegible]

review of some of the simpler relations of organic chemistry.

Chemistry of Fuels

The engineer expresses physical relationships, such as the power output of an engine, by curves. Such curves, however, serve only as a graphical representation of relationships. The chemist uses structural formulas to represent graphically certain relationships which exist within the molecule of a substance. By these structural formulas it is possible to foretell to a certain extent the properties that a given material has; so, by examining the structural formula of a fuel that may never have been run in an internal-combustion engine, we can predict, without actually trying the substance, what compression pressures it will withstand and how it will behave during combustion.

In these structural formulas, if we have an atom of carbon represented by C and wish to combine it with hydrogen, which has the symbol H, we represent this combination structurally as C-H. The line between the C and the H is called a bond, and is like a rubber band holding these two things together. If these two letters were pulled apart, the rubber band would finally break. In thus stretching the rubber band, energy would be used in breaking it; so, the band in that sense represents a certain amount of energy that is holding the carbon and hydrogen together.

All liquid fuels have carbon and hydrogen for their ba[illegible] heat-giving components. The simplest compound [illegible] hydrogen is represented [illegible] showing

In the December, 1920, issue of the SAE Journal was printed a talk by Mr. Midgley, in which he described some of the results of his early research.

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"Detonation is a pressure wave traveling through a gas. True detonation means that the wave travels so fast that the energy liberated by burning the fuel in the wave front cannot be dissipated. Instead, it builds up pressure and adds energy to the wave front, which later hits the side of the cylinder head with a tack hammer blow. This is the knock. It does not injure the rods, because it is completed too quickly."

Experimenting along this line, Mr. Midgley said he filled a glass tube with an explosive mixture and lighted it. He found that, as the mixture started to burn, the flame was blue, became yellow about the middle and white as it approached the end of the tube. As long as the flame was blue there was no detonation. Putting the same mixture in an engine and watching it through a window in the cylinder wall, he found that when the engine was cool the flame was blue and there was no knock. When the cylinder was warmer, it knocked and the flame was white.

Mr. Midgley exhibited the following tables, which were made for a report during the first World War:

TABLE 1—FUEL STUDIES

Fuels	*Disadvantages*
Ethers	Pre-ignition
Paraffins	None, if volatile
Olefins	Polymerize and stick intake valves
Naphthenes	None, if volatile
Aromatics	Form fluffy carbon
Alcohols	Low heating value

TABLE 2—ENERGY LIBERATED DURING DETONATION

Fuels	*Excess Energy Liberated During Detonation*
Ethers	1000
Paraffins	860
Olefins	805
Naphthenes	780
Aromatics	545
Alcohols	620

"We found that the ethers were the worst knockers," he said. "The paraffins, which are the ones we must use, come next. The olefins are considerably better than the paraffins, and the naphthenes are still better than the olefins. Then, in order come the aromatics and the alcohols.

"The question always arises as to why anilin and iodine stop the knock. If the detonation theory as stated thus far is accepted, I think I can tell why anilin stops the knock. We can calculate the antiknock value of anilin just as we calculate the knocking value of fuels; but I cannot tell why iodin stops the knock. This can be illustrated by putting anilin on one wick and ethyl iodid on another wick and trying to light them. The anilin burns easily in this way. It has about the same volatility as kerosene. We see a great amount of carbon because anilin is rich in carbon, since it is made from benzol. We observe something different in the case of ethyl iodid, though it is even more volatile than ordinary gasoline. We see that the ethyl iodid puts out the match flame.

Young Mr. Midgley as he looked in 1920, when he was trying to find a compound which would stop knock.

"We found that all compounds of iodin stop the knock. Even potassium iodid will do it, if dropped into the intake valve. Although ethyl iodid extinguishes the flame of the match, it has a perfectly definite, positive heating value. If ethyl alcohol burns, ethyl iodid should also burn; but there is something that iodin does in a catalytic way that tends to stop the hydrogen from combining with the oxygen. What happens when we put the iodin in, or why it happens, we do not know. It prevents this detonation from occurring; it must do so because it does stop the knock."

Mr. Midgley cited the case of carbon tetrachloride, which, though it has no appreciable heating value, will not prevent knock. The reason anilin stops knock, he explained, is because of the high ratio of bonds to hydrogen atoms in the benzol molecule — 15 to six as compared with a 10 to eight ratio in the paraffin molecule.

During the discussion following Mr. Midgley's talk, D. J. Arnold asked why carbon tetrachloride increases knock.

"I do not know," replied Mr. Midgley.

"Is it because too much carbon was added to the flame?"

"No, only a breath of carbon tetrachloride was used. It could not have been more than one per cent."

Replying to a query by F. C. Mock, Mr. Midgley said:

"When we put in sufficient hot spots to actually vaporize and send in the gasoline as a vapor, the knock very appreciably increased. The experience I have particularly in mind was with a Delco light plant, in which there is no distribution to fight, and which keeps down the temperatures and thus helps prevent detonation. In this connection let me refer to one point which I failed to treat properly, the effect of temperature on detonation; that is, temperature as compared with pressure. I am firmly of the opinion that temperature is the prime factor in speeding up these detonations, and not compression."

Explaining why gasoline knocks less than kerosene, Mr. Midgley said that gasoline, being a more volatile liquid, absorbs heat and cools itself when it evaporates. Knock, he said, could be eliminated either by a very rich or very lean mixture, although neither of these extremes would be practical for operation.

Following this talk, Tom Midgley went back to the laboratory, the test engines and the collection of knocking fuels and knocking engines that were his tools. The months ahead were arduous. But every theory proved wrong was one less mile to be traveled, every chemical tested was one step advanced. When the long road reached tetraethyl lead, many of the ideas and questions in this 1920 paper became obsolete, some others are still not answered.

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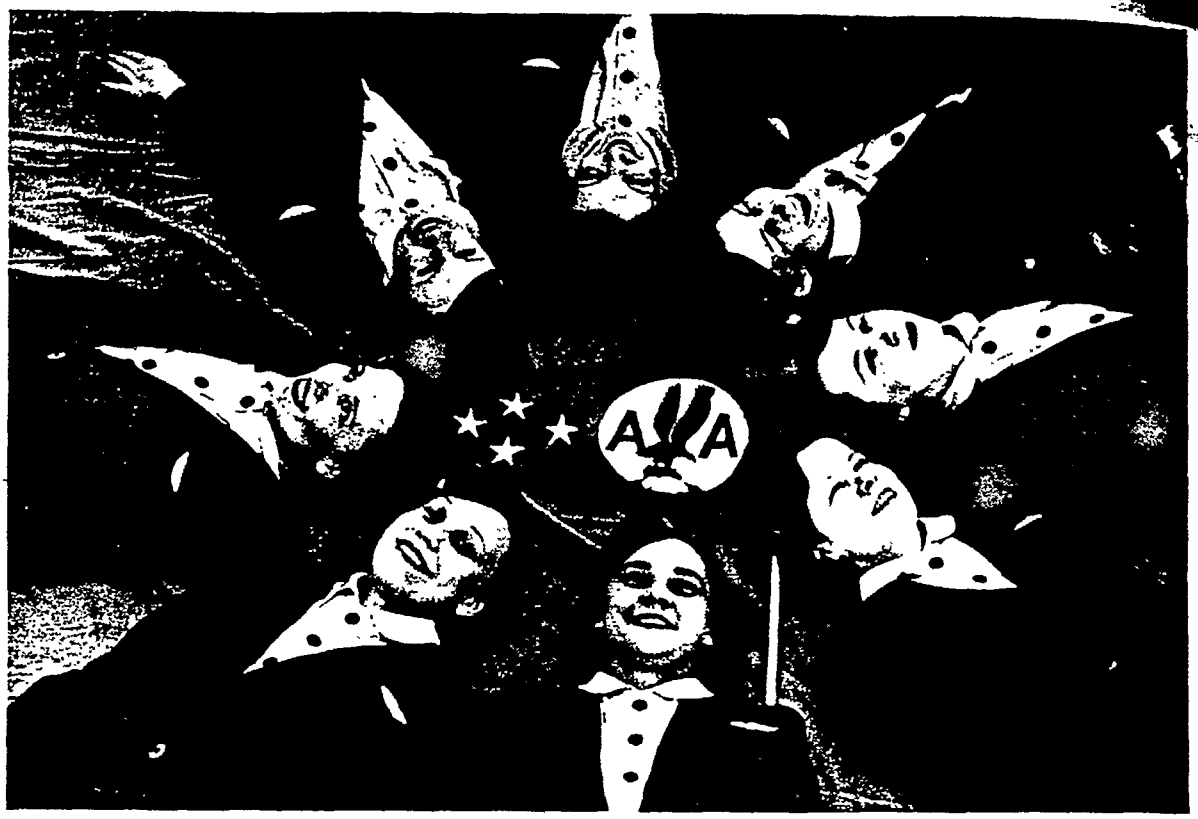

Eight nationalities are represented in this group. Starting with the girl directly under the flag and moving counterclockwise, they are: Agnes Spence, Irish; Joan Waltermeier, German; Ruth Delmore, American; Martha Bonnell, French; Marie Wanda, Polish; Wilfreda MacAssey, Scotch; Bernice Hoiness, Norwegian; Agnes Mallory, English.

Photo: American Airlines, Inc.

Glamour Girls Not Wanted

To Land a Job as an Airline Stewardess a Young Woman Must Possess the Unusual Combination of Brains, Beauty and Personality.

THE job of air stewardess is generally regarded as one of the most glamorous occupations open to young women today, but, young lady, if you are a glamour girl of the type glorified in the Broadway columns, don't try to land a job with the airlines. They don't want glamour girls!

The stewardess, aviation officials believe, through her close contact with passengers has an outstanding opportunity to build good will for the line that employs her. Therefore she must be a serious minded young lady, with years of specialized training behind her, who realizes the importance of her work. She must have poise, tact and good looks. To quote Miss Hazel Brooks, chief instructress of American Airlines' stewardess school:

"The stewardess is represented as a clean cut, clear thinking young woman, adept in dealing with people, not too retiring nor too forward. She must possess charm, personality, evident intelligence, clearly indicated refinement, good moral character, and the ability to wear clothes well, to speak distinctly and to use good English."

A stewardess must be a graduate and registered nurse in good standing, and she must remain in good standing throughout the period of her employment. Again quoting Miss Brooks:

"Registered nurses are employed because of their medical training and experience, education, self discipline, personal attributes, devotion to duty, and experience in meeting and dealing with people."

Physical specifications are as stiff as those for entrance to the United States Military Academy, and if a girl is too short or too tall for her weight, her chances of getting a job are practically zero. Five feet six inches is the height limit, with the ideal set between five feet three and five feet five inches. Weight limits are 105 and 120 pounds. Applicants must be between the ages of

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Everett Alexander, Westmore specialist in make-up analysis, advises on the use of cosmetics.

Photo: American Airlines, Inc.

21 and 26, with preference given to girls of 24, 25 and 26, because of the added experience and poise they have attained.

Girls with husbands are taboo, which explains the large turnover in stewardesses—they are continually resigning to make that trip to the altar.

The working hours of a stewardess though not always regular, would make the average WPA worker turn green with envy. The maximum is 110 hours a month, of which not more than forty are scheduled in any one week nor more than ten in one day. At least once in every seven days there is a 24-hour rest period.

An American Airlines stewardess starts at a salary of $110 a month, which is boosted to $125 if she gets through the six months' probationary period. After a year the pay jumps to $130 and is increased by a $5 a month raise each year thereafter, until the maximum of $145 is reached. In addition, living expenses are allowed when the girls are away from their base station.

An applicant, when accepted, enters the stewardess school for a course which includes intensive classroom study and several observation flights. Required reading during this time is "How to Win Friends and Influence People" by Dale Carnegie, "to further insure the proper development of personality." She must also peruse the Reader's Digest each month, as well as newspapers and general magazines, so that she will have a good knowledge of what is going on in the world.

Following her training, the new stewardess receives her uniform and begins a course of "beauty" training. An expert shows her how to apply cosmetics which will best harmonize with her complexion and uniform, how to fix her hair in the way most suited to her personality. She is told to take good care of her hands, because they are constantly in view, and if she uses nail polish, not to use a shade darker than medium red.

She may display jewelry, but sparingly, and it must not clash with her uniform. She may not, however, wear lapel buttons, pins, colored handkerchiefs or flowers, nor may she carry in her pockets articles which bulge or protrude, such as handkerchiefs, fountain pens, pencils and notebooks. She may use perfume, if she is conservative about it. And she may not chew gum on duty!

Going on duty, a stewardess reports to the Operations office an hour before her plane is scheduled to take off. She has lots to do during that hour, but one of her most important jobs is to study advance information on the passengers and the plan of flight. This helps her in her contacts with passengers and enables her to give out correct information on routes, weather, and so forth.

A stewardess studies the passenger list and the plan of flight before going aboard her plane.

Photo: American Airlines, Inc.

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Three steps in the career of a typical stewardess. At left, she is a mid-western farm girl; center, she is trained nurse, and at the right, she attends class in stewardess training school.

Photo: American Airlines, Inc.

She goes aboard the plane before it taxies over to the terminal landing ramp, where she receives her food supply from the commissary. Food taken on a plane is carefully selected to give the most nourishment with the least bulk, since it is important to limit size and weight, so a stewardess must be adept at counting calories and vitamins.

When the passengers come aboard, she checks off each one, escorts him to a seat and makes sure that he fastens his safety belt. Before the take-off she, too, must sit in a seat and fasten the safety belt until the signal warning light in the front of the cabin flashes off, when she goes about her work.

After checking equipment for her flight, Stewardess June Marwede signals that everything is in order.

Photo: American Airlines, Inc.

Seeing that passengers have a comfortable and enjoyable trip is the chief job of the stewardess. From the moment they board the plane until they leave it, she is charged with complete responsibility for them. She must make periodic trips through the cabin, offering her services. The latter include taking care of hats, coats and bundles, distributing newspapers and magazines, handing out blankets and pillows to those who wish them, adjusting seats to the most comfortable position, serving meals and snacks between meals, promoting card games, pointing out places of interest along the route, furnishing cigarettes, stationery, and so forth—in short, treating each and every passenger as if he were a guest in her own home.

Regarding conversation with passengers, the stewardess is given the following advice:

Be a sincere listener. Avoid talking about yourself. Avoid argumentation. Avoid flippant or smart answers regardless of how foolish or irrelevant questions may be. Avoid any type of conversation which is unladylike. Avoid lengthy conversation. Present information in as clear and interesting a manner as possible. Allow passengers to ask questions as an indication of their interest.

Since many requests are received for stewardesses to attend public meetings and address gatherings, the girls are urged to develop their ability along this line. The most frequent special assignments are talks before women's groups; accompaniments of special flights, such as the movie "Gold Diggers" tour with which Miss Brooks traveled all over the country; radio talks, pictures and special interviews.

"To put it briefly," said Miss Brooks, "the air stewardess of today exemplifies the typical All American Girl."

The Following

Service Awards

have been made as of

May 1st, 1941

15 YEARS

SANFORD M. WAGNER · Sales, Los Angeles

10 YEARS

F. L. COLEMAN Gasoline Testing, Kansas City

NELSON GAGE, Engineering, Detroit

5 YEARS

MARGUERITE A. WARE Manufacturing, Deepwater

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In the foreground is Whiteface Castle with the footpath leading from it to the shelter house on the summit. The entrance to the elevator tunnel may be seen at the left.

Highway to the Sky

Whiteface Mountain, Rising Almost a Mile Above Lake Placid, Is the Only Peak in the Adirondacks Accessible to the Motorist.

TOWERING above the lesser green-clad hills which surround it, Whiteface Mountain's cone-shaped dome rises majestically to a height of 4,872 feet above sea level. Other Adirondack peaks are higher than Whiteface, notably MacIntyre and Marcy—the latter, with an elevation of 5,344 feet, is the highest in New York—but the others, surrounded as they are by mountains almost as lofty, do not stand out as Whiteface does.

The Whiteface Memorial Highway, which is open from about May 15 to about November 1 each year, depending on the weather, makes the mountain the only one in the Adirondacks which is accessible to the motorist. Almost four years were required to blast these eight miles of road out of the gray granite of which the mountain is composed. The cost was a million and a quarter dollars.

Franklin D. Roosevelt, then Governor of New York, turned the first shovelful of earth September 11, 1929, but actual construction didn't start until Christmas Day, 1931. President Roosevelt dedicated the completed highway September 14, 1935, as a memorial to New York's World War dead. It was opened to traffic July 20, 1935, with the toll set at one dollar per person.

The road begins at Wilmington, N. Y., and winds upward for eight miles through scenic grandeur unsurpassed in America. The pavement is 20 feet wide with a four-foot shoulder on each side. The grade is easy all the way to the summit, averaging eight per cent and never exceeding ten per cent. Curves are wide and edges of the road are well protected throughout its length. Signs along the highway indicate the various thousand-foot levels.

At the terminus of the road, 273 feet vertically from the summit, is Whiteface Castle, a Norman-type building of gray stone, in which are lounging rooms and a spacious restaurant. From there sightseers may reach the summit either by a footpath along a shoulder of the peak or by a modern electric elevator which rises in a shaft cut through the solid rock. Four hundred feet from the end of the highway a tunnel 424 feet long has been drilled into the heart of the mountain to reach this perpendicular shaft. The elevator finishes its ascent in the stone shelter house, built oval shaped to blend with the very tip of the mountain on which it perches.

The view from this high point is breath taking. In the east the jagged chain of Vermont's Green Mountains towers over the gleeaming surface of Lake Champlain. Beyond them the White Mountains of New Hampshire, topped by 6,288-foot Mount Washington, are visible on clear days. Eighty miles to the north sparkles a wide ribbon of silver, the St. Lawrence, on the far bank of which are Mount Royal and the spires of Montreal. Beautiful Lake Placid lies at the foot of Whiteface, and stretching away to east and west to the

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lofty distant peaks which form its boundaries is the rolling green carpet of the Adirondack wilderness, its surface brightened by numerous shining rivers and lakes and darkened by the shadows of fleecy clouds floating in the blue sky overhead.

In addition to its lavish natural endowments, the summit of Whiteface renders valuable aid to the science of meteorology. Rensselaer Polytechnic Institute of Troy, N. Y., and New York University operate a weather observatory and a radio research laboratory in the shelter house. Whiteface is the only mountain in the United States from which important research into ozone is being conducted. Observers are on duty the year 'round, even during the ice-bound winter months when they are completely isolated for long periods, except for radio communication.

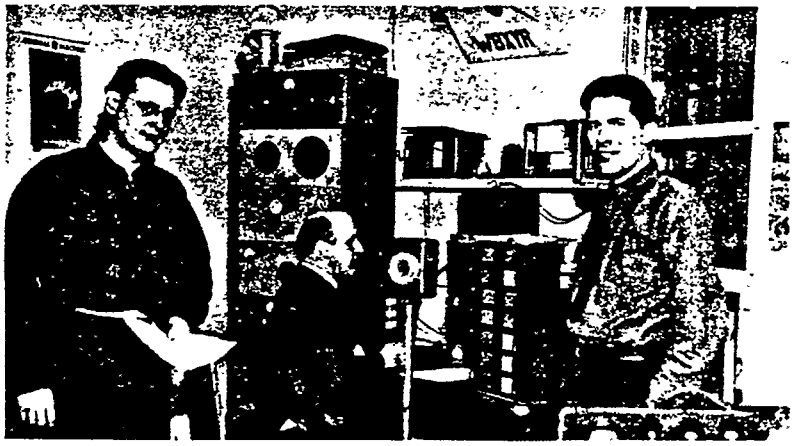
Whiteface and Mount Washington, the two important mountain weather observatories in the East, report to the Weather Bureau eight times every 24 hours. Observations are made regardless of conditions. Wind velocities of over 140 miles an hour have been recorded, and it is not uncommon during the winter for a 100-mile-an-hour wind to be accompanied by a temperature under 30 degrees below zero. In summer the peak seems to be a magnet for fierce thunderstorms, the lightning striking with such violence that it sometimes blows observation equipment to bits, despite the protection of heavy lightning switches.

Much laboratory work has also been done in short wave radio, including television, facsimile printing, and so forth. Reception in the rarefied air of the summit is excellent, foreign countries coming in like local stations.

Whiteface got its name because one of its sides is scarred by an ancient landslide, started perhaps by some prehistoric thunderbolt. The exposed granite is visible for many miles. The originial Indian names were "Theanoguen," the Iroquois name for the great war chief, King Hendrik, who had a white scalp lock in which the aborigines saw a resemblance to the white slide on the mountain, and "Wahopartenie," the Algonquin word meaning, "It is white."

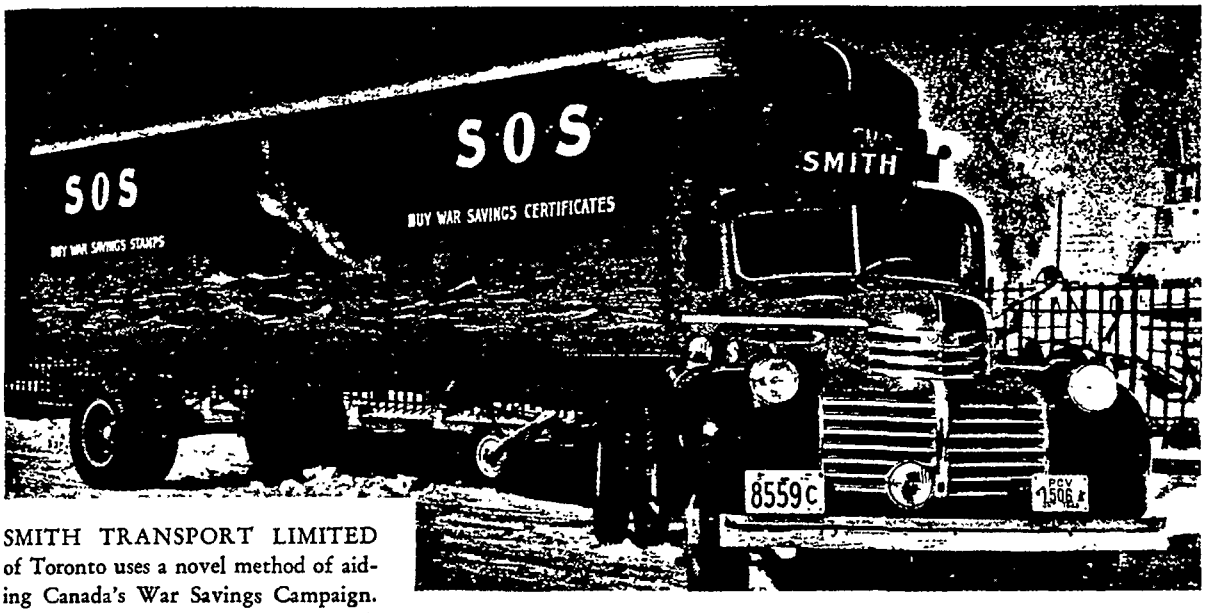
From the end of the highway there is a fine view of Lake Placid

The shelter house perches on the highest tip of the mountain.



Weather observers and some of the radio equipment they use.

ETC 31294



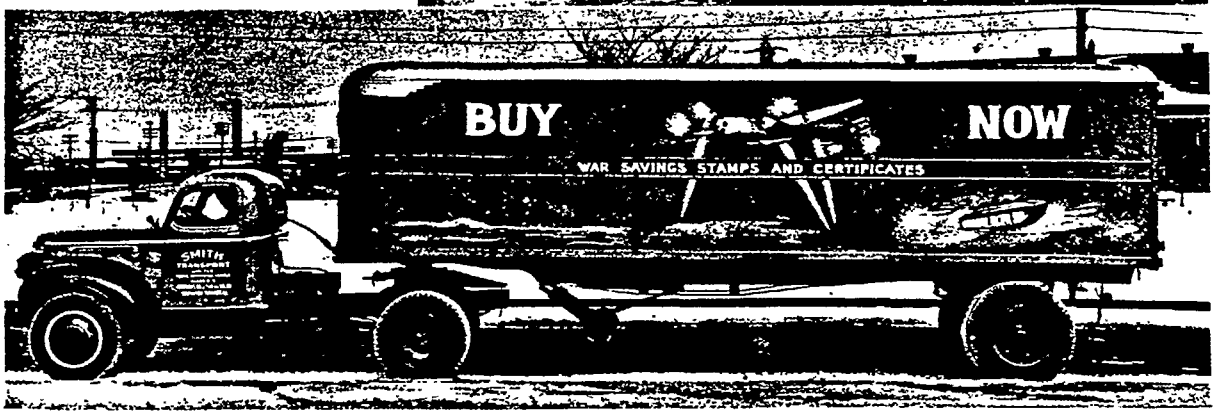
Trucks Boom War Savings

Billboards Painted on Sides of Trailers Urge Canadians to Buy Certificates.

SMITH TRANSPORT LIMITED of Toronto uses a novel method of aiding Canada's War Savings Campaign. On the sides of all the company's truck trailers have been painted traveling billboards, composed of appropriate pictures and words which urge the public to buy War Savings Certificates.

A picture of a soldier in battle and a farmer in the field, appears on the side of one of the trailers shown here. Another picture shows a merchant ship sinking, while in the third a warship, a bombing plane and tanks going into action are seen. All carry messages which give the War Savings drive a strong boost.

The Smith company believes that these trailer trucks, which circulate through a territory stretching from Kitchener, Ontario, in the west to Three Rivers and Sherbrooke, Quebec, in the east, will serve as a constant reminder of Canada's war effort.



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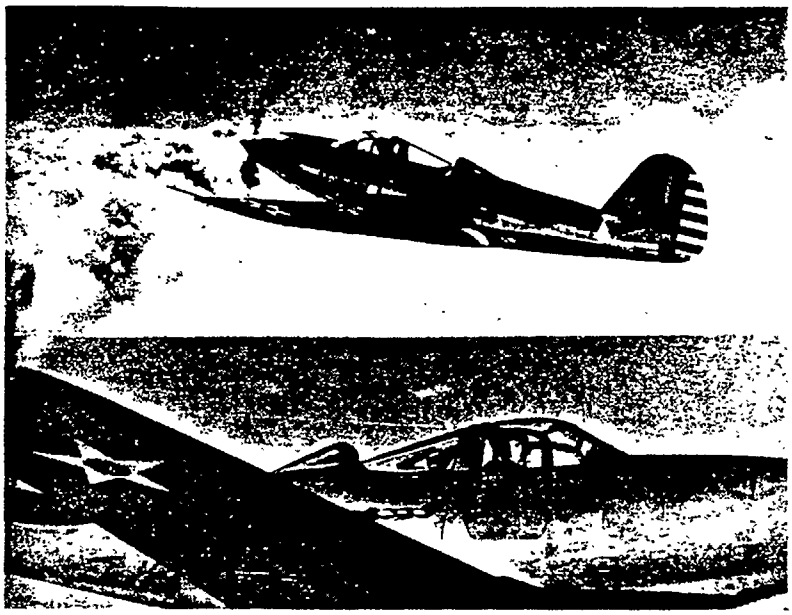


TOP: *The Airacobra, McDonough at the controls, cruises above the clouds.*
BELOW: *McDonough smiles from the cockpit after a dive test.*

Faster Than a Bullet!

But Diving an Airacobra Interceptor-Pursuit Plane at the Record Speed of 620 Miles Per Hour Isn't Very Exciting, Pilot Claims.

WHEN 30-year-old Andrew Charles McDonough, lieutenant in the Navy Air Corps Reserve and Eastern Air Lines pilot, climbed out of the cockpit of the Allison-powered Bell Airacobra interceptor-pursuit plane he tested for the Army Air Corps at Buffalo, N. Y., he didnt know he had flown 620 miles per hour, 45 miles an hour faster than any human had ever traveled before.

Even when informed that his "free" dive, made with the propeller turning just rapidly enough to keep the engine warm, had exceeded by 97 miles an hour the indicated air speed required of such planes accepted by the Army, McDonough was still given to understatement. Debunking the glamour of dive tests, he said:

"As you ride along at such a speed, you don't feel any different than you did on level keel. It's a better ride than you can get in a jalopy on the ground at 50 miles per hour. You don't realize you're going so fast until you pull out of the dive. Even then it's not so bad. When you pull out, you sit down a little hard on the seat. It's as though you suddenly sat down on the floor. Or maybe it's like being kicked by a mule, but not so sudden."

McDonough doesn't see anything miraculous about his feat, although he hurtled through space faster than a bullet. His exact speed was 909 feet a second, as compared with the muzzle velocity of 802 feet per second of a .45 calibre pistol slug.

"When you fly an Airacobra," he said, "you simply sit in the seat and become part of the airplane. From there on you fly it with merely a wrist movement on the stick. It's one airplane you can't 'herd' when you fly."

His experience in testing high speed planes for the Navy, augmented by his tests for the Army on the Airacobra, has convinced him that the ideal weight of an interceptor-pursuit pilot is from 140 to 160 pounds.

"Fifty pounds makes a big difference in the performance of a high speed plane," he said. "With a lighter load a plane will turn on a sharper radius before it falls off into a spin. I have observed this often in the Navy. I found I could turn inside the radius of the flight path of planes flown by heavier men. This, of course, is a decided advantage."

McDonough weighs only 139 pounds stripped and is about five feet nine inches tall.

Before going up for his record-breaking dive, he spent four days getting acquainted with his ship and feeling it out in test flights. Then, on January 8, bundled in his leather flying suit, he climbed into the cockpit, checked his instruments and roared across the field into the air.

The day was clear with an unlimited ceiling of blue sky. At 14,000 feet he put on his oxygen mask and began circling toward the northeast. When he

Lieutenant Andrew C. McDonough, the man who flew a Bell Airacobra 620 miles per hour.

ETC 31296

reached 27,000 feet he was 15 miles from the field, but the air was so free of water vapor that he easily spotted Niagara Falls 25 miles to the northwest. The thermometer at this height registered 33 degrees below zero. McDonough phoned the ground crew and told them he would dive from west to east. Then he reached behind his head and turned a switch in a box which contained a movie camera focused on the faces of the altimeter, air speed indicator, clock and thermometer. He adjusted the controls, set for a level flight, to dive.

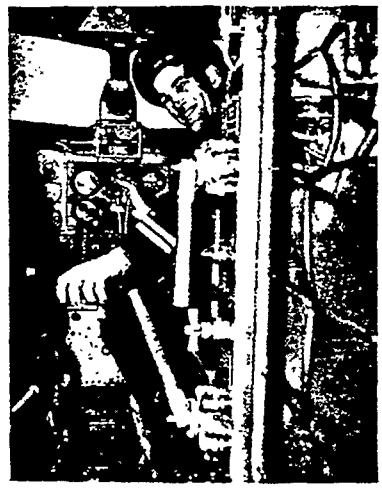
His eyes on the air speed indicator, he watched the hand move along, until it passed the 450 mark. At that speed he could no longer bale out if anything went wrong. At 450 miles an hour air has the same consistency as water, and if a pilot stuck his head out of the cockpit of a plane moving that fast, the effect would be as devastating as if he hit water at the same speed. The fastest clip at which a pilot has ever gone over the side and lived is 225 miles an hour, and that pilot went to the hospital for a long stretch.

At 8,500 feet McDonough began to pull out of the dive. Leveled off at 5,000, he called the field and told them the dive was completed and he was coming in to land. He didn't realize he had set a record.

"It was merely a routine flight and we weren't trying for any record," he explained. "When I landed a doctor checked me over thoroughly but found nothing wrong, except that I was dead tired from the strain and pressure. Some pilots after such dives develop a condition similar to the bends that affect divers working under water.

"Then mechanics checked over the Airacobra for skin wrinkles or evidences of strain, while technicians checked the film for airspeed, temperature and pressure recordings. So, you see, it was some time before I learned a record had been set."

The dive was performed with a production ship carrying full military load, which includes a 37-millimeter cannon, two .30 and two .50 calibre machine guns. The ship was steady as a rock all the way down, McDonough reported.



The record smashing pilot seems happy to be back on his regular job at the controls of an Eastern Air Lines transport plane. *Acme Photo*

The previous speed mark was 575 miles an hour, set by H. Lloyd Child, Curtiss-Wright chief test pilot, diving with a now obsolete Curtiss Hawk 75 scheduled for delivery to the French Army.

McDonough wouldn't commit himself on the maximum possible speed for a plane in a test dive. "There is a theory that as the plane approaches the speed of sound, which is around 750 miles an hour, the center of lift and the center of gravity automatically shift forward, which gives the plane a sudden rotary movement capable of shearing off the wings immediately," he said. "That's the theory at the present time, but in aviation we have to discard so many old theories that I wouldn't bet too much on it."

The record holder is a comparative newcomer to the flying game, graduating from the Navy's school at Pensacola, Fla., December 23, 1936. His first assignment to fleet duty was with the aircraft carrier Lexington, and after a year he was transferred to the aircraft carrier Ranger. During this period of service he made two cruises to the Hawaiian Islands and out past Midway Island, and participated in the goodwill tour to Lima, Peru. He took part in the dedication of the new San Francisco Bay bridge and flew in the President's Parade the following summer.

His reputation for dive bombing and precision flying earned him a transfer to Pensacola as an instructor in August 1938. Receiving his rank of lieutenant, junior grade, July 1, 1939, he obtained his discharge from active duty September 21, 1939, and joined Eastern Air Lines October 9 of the same year.

Through one of McDonough's Pensacola classmates, Robert Stanley, a Bell Aircraft Corporation engineer who has done much work on the Airacobra, the Bell company learned of McDonough's skill as a test pilot. Stanley suggested that McDonough would be an ideal man to test the Airacobra for the Army.

McDonough prefers commercial to military flying, finding it less fatiguing even though the flying hours are longer.

"Air line flying is a thousand percent more accurate than military flying," he said. "When I came with Eastern I saw, for the first time, flying done exactly as it should be done, in all kinds of weather over a 300-foot ceiling."

High-Flying Photography

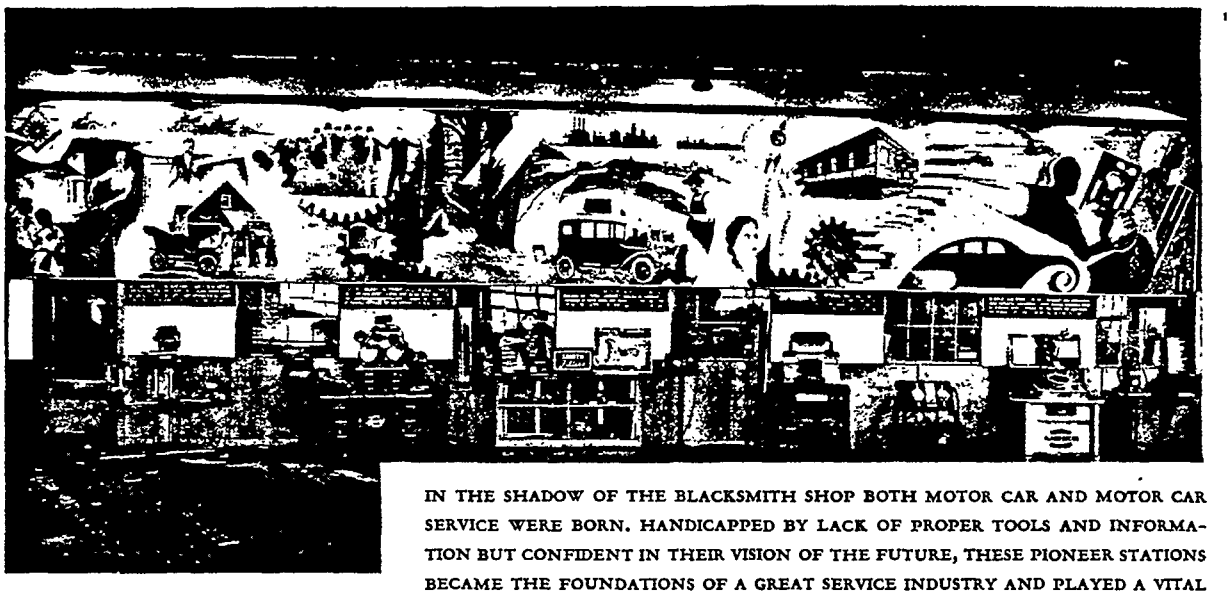
About 3600 square miles may be photographed on a single airplane flight with a new wide-angle mapping camera used in a new photographic air corps plane flying at four miles altitude. Army photographers snap 36 square miles of terrain with a single exposure. The camera magazine carries sufficient film for 249 such pictures.

Pilot, navigator and camera man communicate by throat mikes which pick up the vibrations of the larynx and do not interfere with breathing the extra supply of oxygen required at high altitude.

Oxygen cylinders are racked to the walls, complete with rubber tubes, and the cabin is electrically heated so that the crew may operate at 25,000 feet in ordinary clothing, although the outside temperature is sub-zero. Resulting photographs on plain and color film, viewed through a stereoscope, produce relief maps of the terrain. Even the tracks of motor vehicles crossing a field are revealed.

ETC 31297

Growth of Automotive Service Industry Pictured In 48-foot Mural



IN THE SHADOW OF THE BLACKSMITH SHOP BOTH MOTOR CAR AND MOTOR CAR SERVICE WERE BORN. HANDICAPPED BY LACK OF PROPER TOOLS AND INFORMATION BUT CONFIDENT IN THEIR VISION OF THE FUTURE, THESE PIONEER STATIONS BECAME THE FOUNDATIONS OF A GREAT SERVICE INDUSTRY AND PLAYED A VITAL PART IN THE DEVELOPMENT OF AUTOMOTIVE TRANSPORTATION . . . FROM THESE HUMBLE BEGINNINGS, IMPELLED BY THE STEADILY GROWING DEMAND FOR SERVICE, GREW A NETWORK OF STATIONS REACHING INTO EVERY COMMUNITY. ENRICHED BY EXPERIENCE GATHERED AT FIRST HAND AND UNDER ALL OPERATING CONDITIONS, THEY ACTED AS A GIANT LABORATORY, PIONEERING MANY REFINEMENTS IN MOTORING SAFETY AND COMFORT NOW STANDARD EQUIPMENT . . . UP THE LONG ROAD FROM ITS ADVENTUROUS BEGINNING TO THE MODERN STATION, SPECIALIZED AUTOMOTIVE SERVICE HAS COME. SCIENCE HAS POINTED THE WAY. ACCURACY AND KNOWLEDGE HAVE REPLACED GUESSWORK. TODAY, TRAINED MECHANICS AIDED BY SCIENTIFIC DEVICES ASSURE THE CAR OWNER THE MAXIMUM PERFORMANCE, SPEED AND ECONOMY HIS MOTOR ALLOWS.

A STRIKING feature of the service department of the Illinois Auto Electric Company of Chicago is a 48-foot mural which depicts the development of the automotive service industry from the blacksmith shop to the modern specialized and scientifically equipped station. The mural is the work of a Chicago artist and has received widespread publicity. The inscription, in five panels, reads as follows:

This Month's Cover

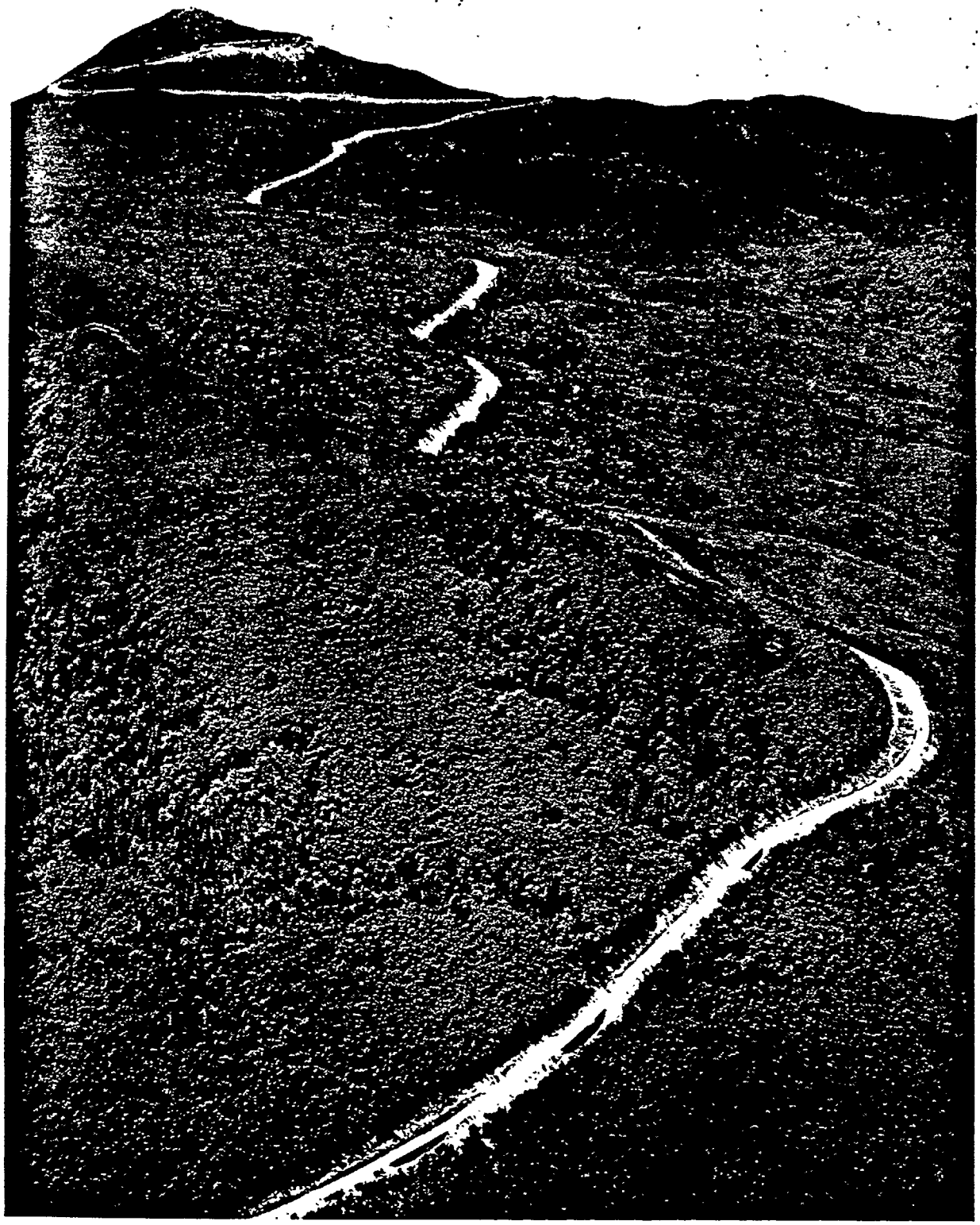
THE Battle of New Orleans, final encounter of the War of 1812, was fought January 8, 1815, when American forces under Major-General Andrew Jackson defeated a much larger army of invaders under Major-General Sir Edward Pakenham.

The abdication of Napoleon in April, 1814, freed thousands of British troops for service in America. Accordingly, an army of 10,000 veterans was sent over in 50 ships, the advance guard arriving December 23, 1814. Jackson was taken completely by surprise, but he attacked with such vigor on December 24 that the enemy decided to wait for the arrival of the main army and the artillery before launching an offensive. That gave Jackson time to erect fortifications and bring up reenforcements.

The enemy made a direct attack January 8 on the strong American position at Chalmette, near the Mississippi River. It failed disastrously, the enemy losing 2,000 men, including Pakenham and Major-General Sir Samuel Gibbs who led their troops into action, out of an attacking force of about 9,000. American losses numbered only 71 out of an army of 4,000.

An attack by the invaders on the west bank of the river was successful, but Major-General John Lambert, Pakenham's successor, was unwilling to take the responsibility for further fighting and called off his troops. The expedition was abandoned and the defeated army embarked for home.

The Battle of New Orleans had no bearing on the outcome of the War of 1812, as a peace treaty had been signed at Ghent in Belgium 15 days before it was fought. News of the treaty and of the battle arrived in Washington almost at the same time.



Through a dense forest Whiteface Memorial Highway winds up the northwest slope of the peak.

[Story on page 17]

ETC 31299

Mrs. Taxi-Driver

(A story of day-to-day progress in automotive research)

THERE'S no meter on her "cab," but she has plenty of regular customers. She is on call for trips to school, store, station and a dozen other places. Her children and her neighbors and their children are her "fares." She drives more miles than her husband—for the "taxi service" of the American housewife is a large part of her life.

Since women spend so much of their time behind the wheels of automobiles, they exert a strong influence upon trends in automotive design. Engineers strive not only to make cars more powerful and reliable, but to make them more beautiful, more comfortable, easier to drive. One has only to compare the present-day automobile with the car of ten years ago to realize the amazing progress that has been made

But what of the next ten years? The engineers of the automotive and petroleum industries look forward to even greater progress than we have seen in the past decade. Progress will be accelerated because the technical men of both industries realize that the problems of engine, engine parts and fuel improvements are inseparable and that they must be solved by cooperative research effort.

To the solution of these problems Ethyl is providing both product and service. Our product, anti-knock fluid containing tetraethyl lead, is used by oil refiners to raise the anti-knock quality (octane number) of gasoline. Ethyl's research workers are cooperating with automotive engineers in steps to take advantage of better fuel. Our research laboratories in Detroit and San Bernardino are helping to coordinate lines of research engaged in by the technical men of both industries. And our field engineers are offering to commercial users of fuels and engines the practical application of the data we have developed.

The public benefits by every improvement in automobiles, trucks, buses, tractors and airplanes. Thus we believe that by making our service available to the executives and technologists of the automotive and petroleum industries we are serving "everybody."

ETHYL

ETHYL GASOLINE CORPORATION

Chrysler Bldg., New York, N. Y.

ETC 31300

ETHYL NEWS

June 1941

ETC 31301

A unit of the Armored Force rumbles along a southern highway in training maneuvers.
Photo by U. S. Army Signal Corps

[See page 4]

ETHYL NEWS

Ethyl Gasoline Corporation
Chrysler Building, New York City

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JUNE 1941
VOLUME 8, NUMBER 6

Counselors of Despair

WHEN a famous aviator recently acknowledged himself to be an advocate of the "it can't be done" philosophy, it made us wonder how it was that the years had seemingly so changed his character. Fourteen years ago, when this same aviator believed he could fly over thousands of miles of wild ocean in a tiny plane powered with what would now be considered a puny engine, he was bombarded with advice by disciples of the "it can't be done" school. It was an impossible feat to fly non-stop from New York to Paris. It had never been done before. He was committing suicide. But the young man refused to listen to the counselors of despair. He believed he could fly the Atlantic. And he did.

Abraham Lincoln went to the White House with swarms of "it can't be done" advisers yapping at his heels. Why should he take on his shoulders the responsibility of trying to prevent secession? Hadn't his predecessor, James Buchanan, admitted the right of states to secede? Weren't a large number of people in the North strongly in favor of secession rather than war? And even if he, an uncouth backwoodsman from Illinois, went against the advice of more polished and supposedly wiser men, how could he hope, with a divided North, to defeat the united South, in whose armies were the finest fighting men in America? Lincoln, however, went through those dark years, never once wavering in his belief that the Union must and would be preserved.

Was any outlook ever blacker than that of George Washington during that long, cold winter at Valley Forge? How could he hope to win a war against a mighty empire with his ragged, miserable, poorly equipped little army, the ranks of which were constantly being thinned by wholesale desertions? If he negotiated with the enemy and offered to surrender, he could probably arrange a peace that would allow him to return to his rolling acres in Virginia without loss of his personal fortune. Wouldn't that be the better way in view of the overwhelming odds against him? George Washington didn't think so. The word "can't" wasn't in his vocabulary.

Almost two thousand years ago, in a place called Gethsemane, a carpenter of Nazareth made a decision that was to change the lives of countless millions. In his ears rang the voice of temptation, crying, "All is lost! Even your chosen disciples are deserting you. There's an easy path to safety on the other side of the hill. Flee along it and save yourself from a horrible death."

Instead, the Nazarene chose Golgotha and Calvary, and the cause that was lost became a religion that reached to every corner of the earth.

The counselors of despair are numerous. Almost every day of our lives they tell us we can't do this or we can't do that. But the founders of the Christian religion and of the United States of America never listened to them. Neither did anyone else who has ever accomplished anything worth while.

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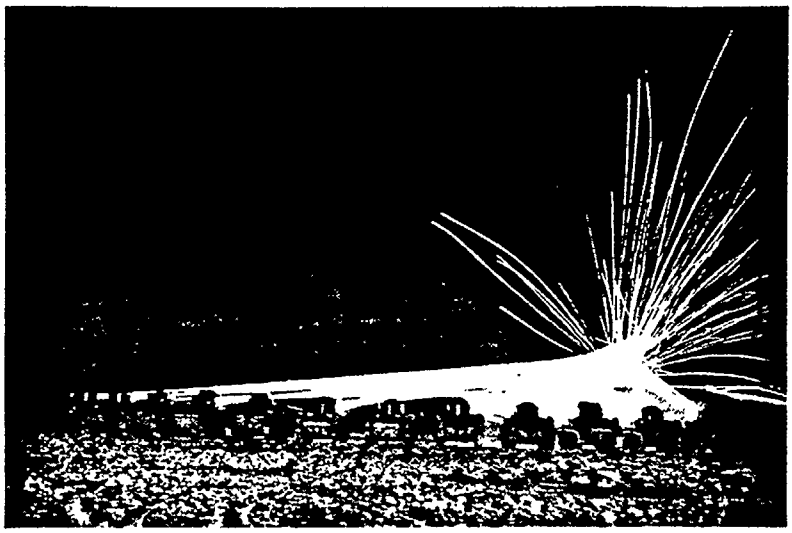


Tanks concentrate tracer fire on a target at night. *Photo by U. S. Army Signal Corps*

Our Army Learns Mechanized Warfare

Uncle Sam's Soldiers Receive Specialized Training in the Armored Force School at Fort Knox, Ky.

DEFENSE! All America has bristled at the word, but few of us realize the size of the job which has been placed upon our army. This word defense covers a myriad things to be done and places on the army's shoulders a man sized job. But as usual the army has tackled the problem in an aggressive and capable manner. It has planned its job, organized its methods of attack on all problems, and pitched into the work in business-like fashion.

Let us consider just one integral part of specialized soldier training, the Armored Force School at Fort Knox, Ky.

Mechanized warfare has changed many things about military organization. Just as high compressioning has dictated motor design, so mechanization has been the watchword of recent military development. The size, the power, the speed, and the organization of a modern army is quite a different thing than we knew or thought of 25 years ago. Consider the organization of the Armored Force. Imagine 60 freight trains of 22 cars each, filled to capacity with tanks, scout cars, armored trucks, motorcycles, airplanes, half tracks, pistols, rifles, cannon, machine guns, artillery, assault boats, power shovels, radio, telegraph and telephone equipment, medical supplies and bridge building equipment. Picture this and you have a good idea of a single division. Today our Armored Force, under the command of General Adna R. Chaffee at Fort Knox, Ky., has two of these divisions in its First Armored Corps, one located at Fort Knox and the other at Fort Benning, Ga.

This great galaxy of power operates on 80 octane gasoline. During the coming fiscal year the division at Fort Knox will use close to 4,000,000 gallons of gasoline, burning 112,000 gallons on a normal day's march. The entire Armored Force will use approximately 25,000,000 gallons during the coming year. Knowing the power content of each gallon, try to visualize the developed power of this fighting army, and then mentally assume the job of training the man-power needed to operate such an outfit.

The Armored Division at Fort Knox has 9,500 men who operate this highly geared power monster. They must force it across any terrain at terrific speed and keep it moving against all obstacles.

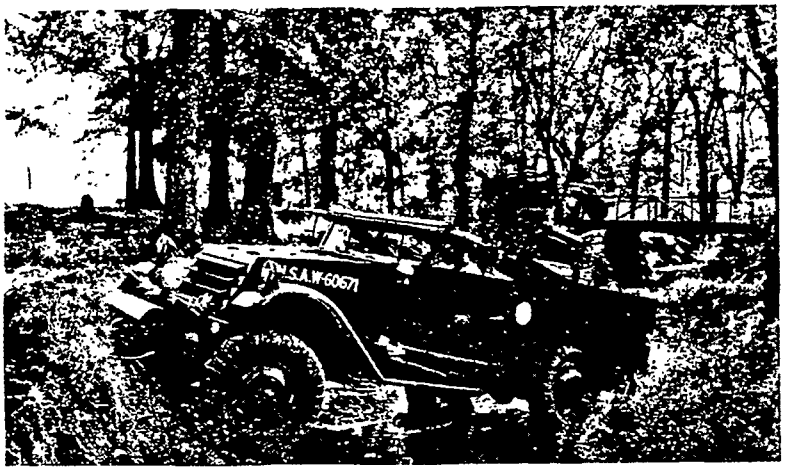
In a few short months Colonel S. G. Henry and his staff have built up a training school for the men who have undertaken to handle this job. On wooded, undeveloped land in Kentucky they have created a military training organization which went into gear in November with an enrollment of 1695 enlisted men and 216 officers. A physical plant had first to be erected. They have put up 26 school buildings, an administration building, a power plant, 30 barracks, and five mess halls. All buildings had to be equipped not only for the needs of ordinary life, but also for complete and effective training in all phases of Armored Force military operations. Much equipment had to be obtained, all types of building construction work done and the entire project completed within a matter of weeks.

In the course of instruction so many subjects must be dealt with and so many different specialists trained that the entire school has been divided into eight departments, each department handling the complete teaching of its related subjects. Various courses, designed for training men in the specialized work of the army, have been set up, and in completing them the time spent in any one department will vary.

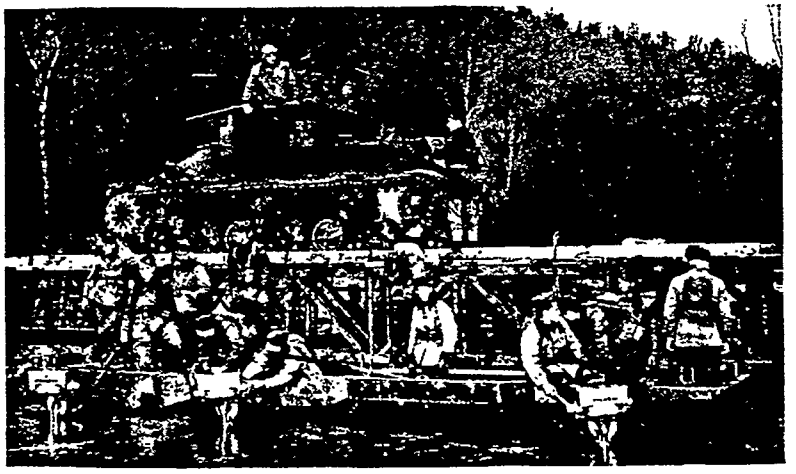
No man is placed in the Armored Force School who is not already a good soldier and has not received full general basic military training. At the completion of his course he is then a trained specialist in some one department of the Armored Force. Generally the school courses require three months for completion, though some courses are shorter. The school was originally designed for a total capacity of 2,000 enlisted men and 225 officer students, but later it was decided to double this capacity by

ETC 31304

Swiftly flowing streams and wooded terrain do not halt Armored Force tanks.
Photo by U. S. Army Signal Corps



The ordinary auto would need one or more wrecking trucks to rescue it from such a spot. But this armored car will get out under its own power.
Photo by U. S. Army Signal Corps



When streams are deep, Armored Force Engineers build ferries to take the tanks across.
Photo by U. S. Army Signal Corps

operating with two groups of instructors and running two complete school sessions per day.

As in the past, Ethyl is taking its part in assisting the Armored Force School, and the company's Kentucky representative has held a number of meetings with the wheeled vehicle department. Ethyl films such as "What Is Good Gasoline?" and "What Is Good Tune Up?" are shown at various stages of the carburetion, ignition, and tune up work and two clinic dynamometers have been installed in the school buildings. All courses are complete in practical and shop training as well as in the lecture work necessary for equipping each man with a thorough knowledge of his own specialized work.

The Following

Service Awards

have been made as of

June 1st, 1941

15 YEARS

ELMER R. CHELLBORG — Administration

FRANK R. ELLIOTT — Sales, Los Angeles

JOHN H. SCHAEFER — Manufacturing, New York

10 YEARS

ROBERT F. CLEVELAND — Sales, New York General

ALLIE C. GRADY — Administration

MADGE LOFTHOUSE — Gasoline Testing, Yonkers

HERBERT R. NEAL — Chemical Research, Detroit

5 YEARS

ROBERT C. BURNS — Administration

THOMAS H. TENNENT — Sales, Atlanta

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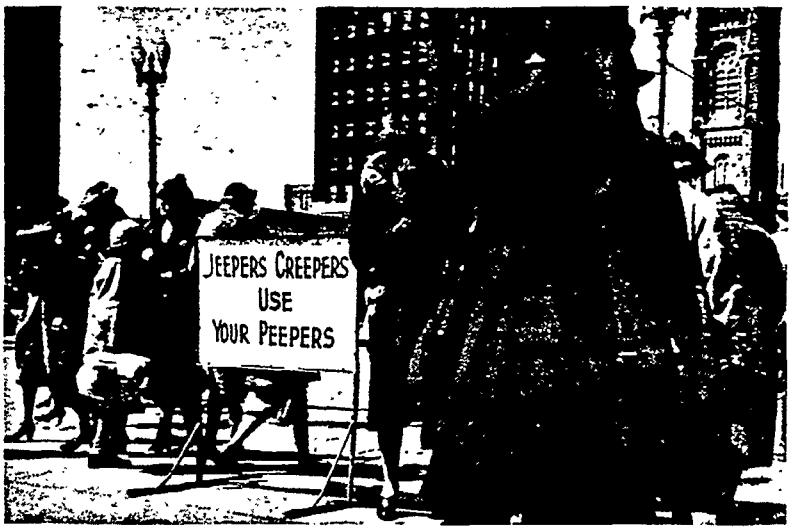

A humorous sign in Cleveland's Public Square was especially effective in encouraging pedestrians to be alert.
Courtesy Police Dept., Cleveland, O., and AAA

Save the Pedestrian!

Motorists and Persons on Foot Must Join in a Plan for Cooperative Street Use if High Death Toll is to be Reduced.

by BURTON W. MARSH

Director, Safety and Traffic Engineering Dept., American Automobile Association.

WALKING slowly along the sidewalk, an elderly lady reached a midblock alley. Vision obscured by a building, she did not see a car being driven out of the alley until it was almost on top of her. A passerby held out his arm to prevent an accident. The motorist, not stopping to give her the right-of-way which was her due, drove across the sidewalk.

A neighbor who doesn't drive frequently rides downtown with me. He leaned out of the car window one morning to cuss out a pedestrian who had suddenly stepped from behind a truck, causing me to jam on my brakes and swerve the car to the middle of the street. But after I dropped my neighbor across from his office, I saw him run into the street against a red traffic light and just miss being hit by a car.

Backing her car into a curb parking space, a woman driver had to stop suddenly. A woman pedestrian, who had crossed the street in the middle of the block, had stepped in back of the car. The driver's ire arose and she spoke sharply to the woman afoot about the near-accident. In defense the pedestrian said to me:

"That driver had a lot of nerve talking like that."

I said, "But lots of pedestrians are hurt or killed because they cross in the middle of the block."

If we are to see marked reduction in the unnecessarily high death toll involving pedestrians — some 12,600 killed and 270,000 injured last year — motorists and pedestrians must join in a sensible plan for cooperative street use.

In the average city two-thirds of all persons killed were pedestrians while in some cities all traffic fatalities involved pedestrians. Nearly one-half of those injured in cities were pedestrians, and for the country as a whole two out of five persons killed were afoot. Worse yet, the high ratios in many cities and states have been increasing.

For centuries the man-on-foot has been master of the highway. Even today, except where specific statutes have been enacted to protect and restrict his movements, the pedestrian uses the roadway by right; the motor vehicle uses it by privilege. But right or privilege, it's a pattern for cooperative street use that's the big need.

To determine what this cooperative plan should be, and to learn how, when, where, and why pedestrians were so frequently involved in traffic accidents, the American Automobile Association conducted a three-year nationwide study. Key facts of interest to every motorist and pedestrian revealed are:

1–Grandpa, aged 50 or over, is the victim in the majority of pedestrian fatalities. Though he so frequently cautions little Johnnie about crossing the street, he is five times as likely to be killed in a traffic accident.

2–Seven out of 10 pedestrians killed are male.

3–It is mainly a case of "death after dark," with several studies showing three-quarters of the pedestrian fatalities in hours of darkness.

4–Ignorant of the problems and limitations of the man at the wheel are nondrivers, to which class belong nine out of ten persons killed.

5–Spotting fatalities by locations of residence of pedestrians involved has indicated that certain groups have unusually high numbers of pedestrian fatalities. These are generally groups like the foreign-born, non-English speaking, low-income, and those poorly endowed mentally.

6–Crossing away from intersections accounts for a majority of adult fatalities.

7–Two out of five pedestrians killed had been drinking substantial amounts of alcoholic beverages, according to studies by the Chief Medical Examiner of New York City, and the Coroner of Cuyahoga County, Ohio (Cleveland area).

8–In comparison with that of the elderly, the pedestrian fatality rate for children of school age is not high. However, their injury rate in traffic

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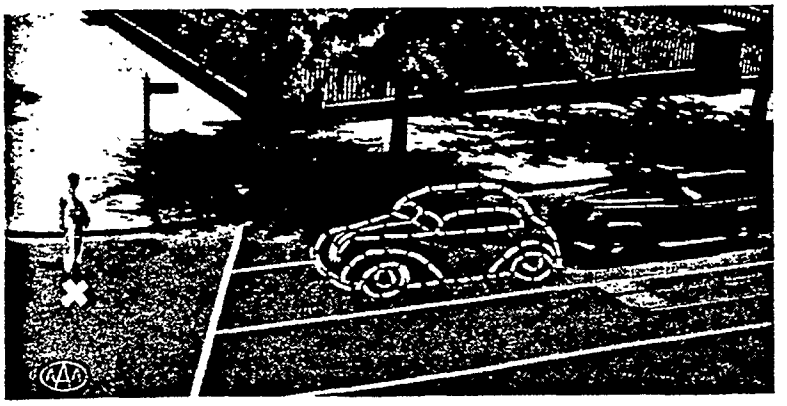


One more step will bring this pedestrian into a position of serious danger.
Courtesy American Automobile Association

is the highest of all age-groups in the data studied. Moreover, traffic crashes in 1938 caused one-third more deaths to youngsters aged five to fourteen in the United States than did diphtheria, infantile paralysis, scarlet fever, whooping cough and measles combined.

9–While roughly one out of four non-pedestrian accidents involves injury, almost every pedestrian crash involves injury.

Why do pedestrians have these troubles? What is wrong with those groups which stand out with undue prominence in the toll? To what extent has society failed to provide proper environmental conditions? An attempt to answer such questions leads to the following statements:

1–Middle-aged and older persons formed their walking habits and their traffic attitudes before there was any considerable automobile traffic problem. They are often unwilling to face the need for readjustments.

2–Ignorance by a great majority of pedestrians as to their relative invisibility on the highway at night is probably the greatest single cause of night-time pedestrian fatalities. Over and over again in a special case history study of 1,715 fatal accidents the driver asserted that he didn't see the pedestrian at all, or didn't see him soon enough.

3–Believed to be of considerable importance are the less keen vision (especially night vision) and hearing, less agile pace, and lowered alertness and resistance of persons of advanced years.

4–Studies indicate clearly the frequency of unsound walking practices on the part of pedestrians.

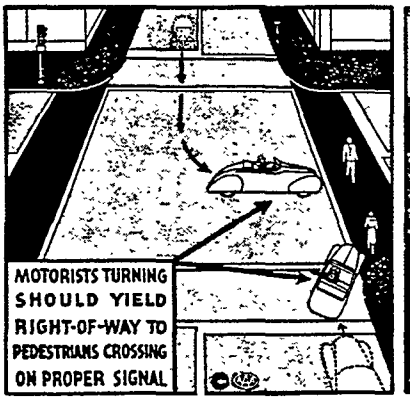
5–One major reason why pedestrians have trouble today is that street and traffic facilities have not been properly designed for them. For example, in Bethesda, Maryland, there is a roadway in an active little business district which has a width of 90 feet from curb to curb, with no raised isle of refuge for pedestrians. It takes some elderly folks, and some mothers with baby carriages or small children, one-half minute to walk across that roadway. Even at 25 miles an hour, a vehicle goes 1,100 feet in that time.

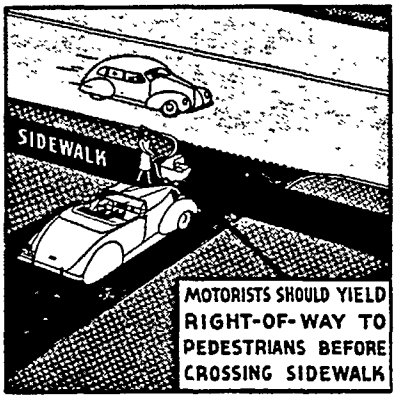
6–Behind it all, major reasons for existing pedestrian ills are the lack of essential local facts and lack of proper analysis and use of such data. It isn't going too far to say that most communities haven't known what their pedestrian problems were and so haven't done much about them.

However, during recent months, the pedestrian, who was "the forgotten man" in traffic for many years, has begun to receive more of the attention that his numbers and importance warrant. Many cities and states have instituted programs of traffic engineering, enforcement and education to stay the hand of the Grim Reaper on their streets and highways. Last year, all 48 states and 435 cities entered the second National Pedestrian Protection Contest sponsored by the American Automobile Association. Again in 1941, hundreds of cities are competing for annual AAA awards given for the best improvements in record, for most effective educational and engineering activities, and for the development of new and unusual ways of dealing with the pedestrian problem.

In its 96-page manual, "Pedestrian Protection," the American Automobile Association has proposed the general adoption by motorists and pedestrians of a cooperative plan of street use to adjust existing conflicts between vehicles and pedestrians. This plan recognizes that: (1) at certain places on the street or highway, and under certain conditions, it is in the public interest to grant a preferred status to pedestrians; and (2) at other places, and under other conditions, it is equally in the public interest to grant a preferred status to vehicle drivers.

An individual's personal adoption of the fair, sensible rules implementing this plan, both as a motorist and pedestrian, will not only safeguard him, but will enable him to make a definite contribution toward better traffic conditions.





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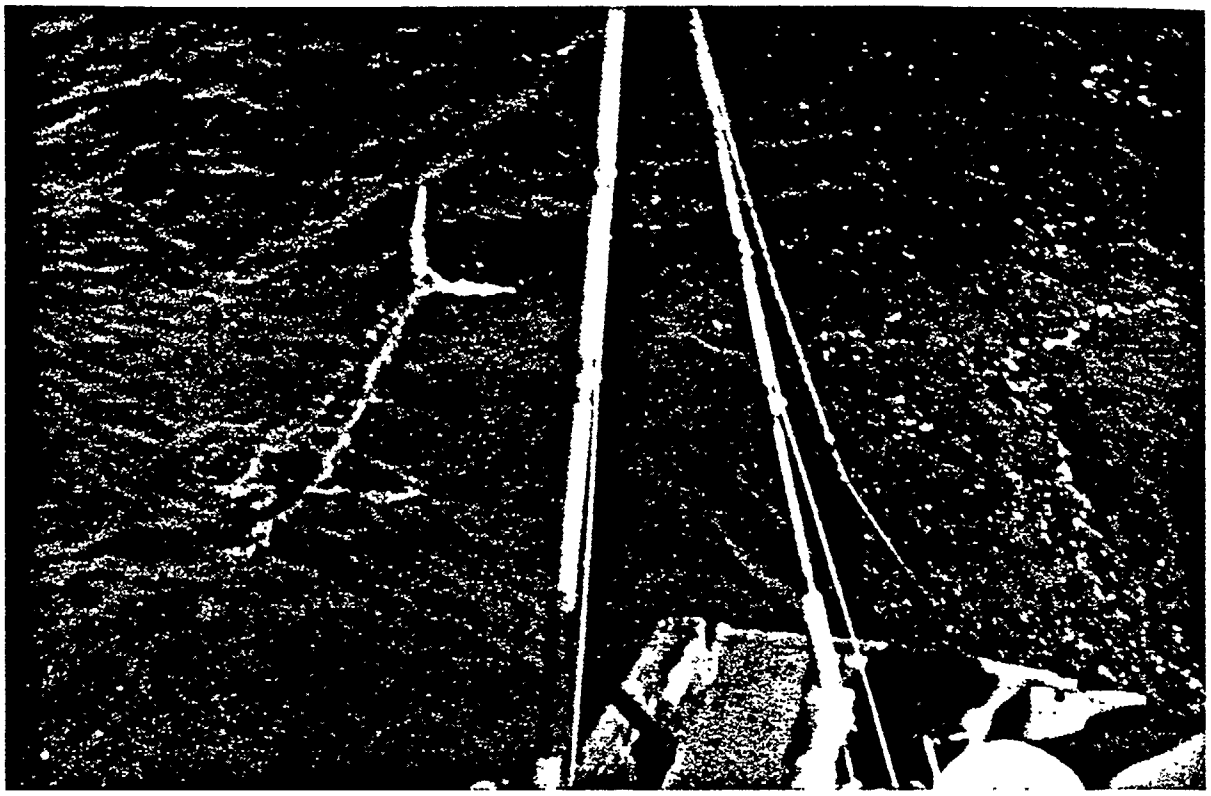

A white marlin is brought alongside the boat.

Courtesy of Field and Stream magazine

Prizes for the Big Ones

George Ruppert Sponsors Another Contest for 12 Classes of Atlantic Salt Water Fish, with 49 Cash Awards Totalling $6100.

George Ruppert exhibits a 150-pound tarpon he caught.

THERE is good news for all Eastern fishermen in the announcement from George Ruppert, the New York sportsman, that he is sponsoring a 1941 contest for 12 classes of Atlantic coast salt water fish, with 49 cash prizes totalling $6100.

This is the second such contest Mr. Ruppert has conducted. The first, held last year, was highly successful and attracted a deluge of entries of magnificent fish caught all the way from Maine to Florida. The contest is open to everybody, with no entry fees and no other expenses of any kind.

The classes of fish eligible for the three cash prizes in each class are blackfish, bluefish, channel bass, codfish, fluke, sailfish, sea bass, striped bass, tarpon, tuna, weakfish and white marlin. In eight of the classes the three prizes are $250, $100 and $50. In the other

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four they are $100, $50, and $25. In each class, if the first prize fish is caught from a charter or open party boat, the captain or guide will be awarded $100. And as a grand prize, the angler performing the outstanding fishing achievement of the year will be given his choice of an automobile or a motorboat. Last year the grand prize was won by Dr. John B. Vernaglia, of Medford, Mass., for bringing the tuna record to the United States for the first time with a monstrous tuna of 927 pounds caught in Ipswich Bay, Mass.

Last year's George Ruppert Fishing Contest was replete with drama and thrills. One man jumped overboard and captured a sailfish which had shaken loose from the hook of a woman angler. Two boys caught a large swordfish by lassoing it in the surf. Two others brought in from the surf a 201-pound louvar, a species of fish never before seen in the Western Hemisphere.

The rules for the 1941 Ruppert Contest are practically the same as those for last year, except that the territory has been extended a little and now runs from the northern boundary of Maine to Key West and up the West Florida coast to Pensacola. All fish must be caught on rod and reel without assistance except that the captain or member of the crew may hold the leader (which shall not be more than 15 feet) while the fish is being gaffed or boated. A broken rod or line disqualifies the angler. Fish must be weighed on tested scales in the presence of two witnesses other than the boat captain or crew, before a notary public, or at a regularly designated weighing station.

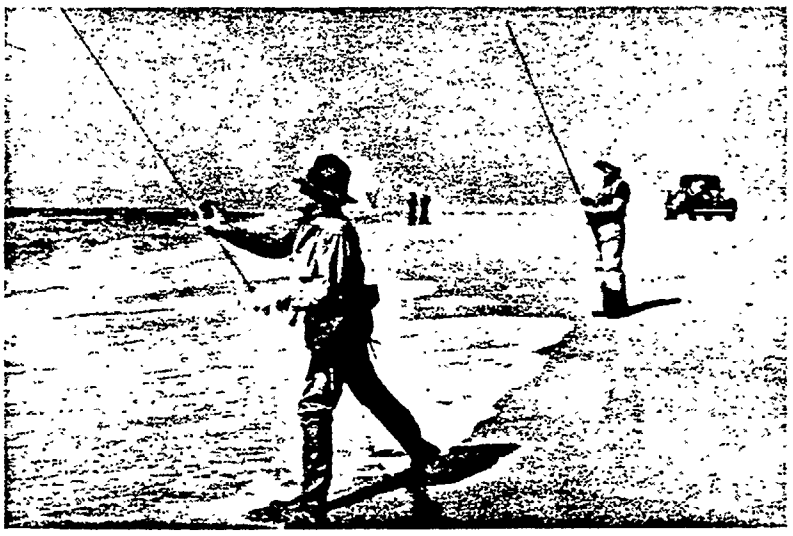
All entries must be mailed within 15 days of the capture of a fish and should be accompanied by a letter giving details of the capture and, if possible, a photograph of the fish and angler. For a boat captain or guide to be eligible for the "Boat Captain — Guide Prize" the prize-winning fish must have been caught from aboard his boat in his presence. In case of tie, duplicate prizes will be given.

A distinguished board of judges, whose decisions are final, has been appointed for the 1941 contest, which extends from January 1 to December 31. They are: Chairman, Fred Fletcher, outdoor editor, New York Daily News; Capt. E. V. Rickenbacker, president, Eastern Air Lines, Inc., well-known aviator and sportsman; Lou Gehrig, well-known athlete and sportsman; Jack Brawley, Angler and Hunter editor, New York Journal-American; Erl Roman, fishing editor, the Miami Herald; Thomas Aitken, prominent Miami angling authority; Jim Hurley, fishing editor, New York Daily Mirror, and J. Hammond Brown, president, Outdoor Writers of America, and outdoor editor, Baltimore News-Post.

Entry blanks may be secured by writing to George Ruppert, 219 East 92nd Street, New York, N. Y., or through the editors of Ethyl News.

A big one comes aboard off the southern Florida shore.

Courtesy of Field and Stream magazine



Fishermen cast their lines far out into the surf.

Courtesy of Field and Stream magazine

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The board of directors goes for a ride in The Presidential Special. President Rawlings is sitting beside the hand brake. *Martin Sheridan Feature-Fotos*

He Bought a Railroad for $301 Cash!

On Roy Rawlings' Road the Engineer Often Stops the Train to Chase Cows Off the Track or to Pick Blueberries.

by MARTIN SHERIDAN
Boston Herald Feature Writer

THIS is the story of a man and one of the most unusual railroads in the United States. Roy Rawlings, former Speaker of the Rhode Island House of Representatives, is the man and the Wood River Branch Railroad Company is the unique "Toonerville" line, which guarantees every passenger a seat on the observation platform.

Ever since its founding in 1872, the road has had a shaky existence. It was even scheduled to fold several times, but something always turned up. Flood waters washed out most of the track on two occasions. Last year, the New York, New Haven and Hartford Railroad was ready to fold it up after operating the branch line at a deficit for some 60-odd years. Roy Rawlings' grain business, the line's principal patron, would be ruined, so he asked the New Haven people how much they wanted for the road.

"$301," was the reply.

The Federal Court approved the deal, so Mr. Rawlings dug down deep in his pockets and paid $300 cash for 336 out of 600 outstanding shares. (Seventy-five of them have been missing for years.) Then he paid an additional $1 for the title to a pile of greenish bonds with a face value of $56,500, on which no interest had been paid for 17 years.

"That payment made me the owner and president of a railroad 5.624 miles long with .712 miles of siding," Iowa-born Mr. Rawlings enumerated. "Our only rolling stock consists of a gasoline engine leased from the New Haven road and an old caboose, which is all our own."

The caboose, a sight to see, is a faded red job. It was a recent victim in a slight accident at a grade crossing and a carpenter was hired to build a new set of steps for $6.

"The Wood River Branch Railroad used to have passenger, mail, freight and express service," the president of the line pointed out. "It used to run so deep into the red that I had all the present equipment painted that color just as a reminder."

This tiny railroad operates four round trips a week (more or less) between its home base, Hope Valley, and Wood River Junction, leaving about 11 a.m. on Monday, Wednesday, Thursday and Friday. The single train is number "1872" after the date of its founding. Before leaving, engineer Reat Schofield telephones the station-master at the other end of the line to make certain that there is something to cart back. There can be no wasted runs, according to this road's policy.

The writer was presented with a pass marked "educational" by the president one morning. Before leaving the "station," the engineer explained that the 20-ton gasoline engine had six cylinders producing 150 horsepower. There are four speeds, forward or reverse. We pulled out at exactly 10:45 and rolled noisily along the wavy track at 12 miles an hour for three minutes when Schofield stopped the train.

"I'll be back in a minute," he said. "Jimmy Allen's danged cow is on the tracks again."

That was nothing. The engineer said that on busy mornings he had to shoo horses from the rails, besides chickens and sheep and an occasional lazy dog. Once more we started up. This time we covered three miles, when young Mr. Schofield again pressed the brake lever.

"Come on down by the brook," he

Engineer Schofield acts as baggage master and freight handler.
Martin Sheridan Feature-Fotos

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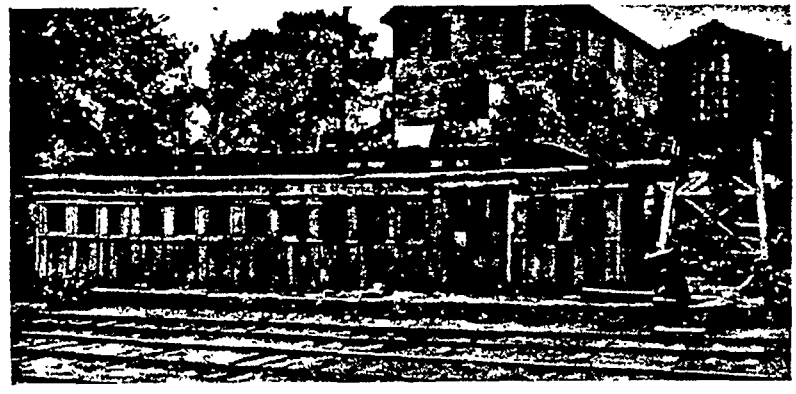
called out, "and I'll show you some of the longest fat-trout in the state."

We watched the fish for a few minutes, picked some blueberries growing between the tracks and swung aboard the engine once more. Upon arriving in Wood River Junction, the engineer backed the train onto a siding, ran into the railroad office and came out with a handful of bills of lading.

Then he uncoupled three freight cars from a steam train, coupled them onto his engine and off we went on the return journey, making a non-stop trip back in 23 minutes. Eighteen miles an hour is top speed, mind you.

En route, the engineer pointed out the four culverts, four unprotected grade crossings and the single bridge "belonging" to the road. The informal spirit of the Wood River Branch Railroad is quite different from the restrained and quiet atmosphere of a "grown-up" passenger train. You can sing, whistle, or yodel to your heart's content, or you can merely drink in the beauties of nature as you bounce along at an easy pace.

The line, which operates for the convenience of farmers scattered about South County, carries some 10,000 tons of freight annually for its 40 customers. The first directors' meeting under the new ownership was held not long ago. True, there was a deficit of $250 on the books for the fiscal year, but President Rawlings told the gathering that this was a reduction of $1,000. from the previous year's losses.



This ancient smoking car serves as office and crew headquarters. Water tower at right also belongs to the railroad.
Martin Sheridan Feature-Fotos

This year's meeting was featured by the addition of a new piece of rolling stock—"The Presidential Special." The tiny car built by engineer Schofield and Mr. Rawlings' son, Rob Roy, is an open air affair of three seats painted bright red. It is not unlike a roller coaster car and has no springs. The floor is only six inches above the tracks and a long hand brake is set in the middle. The engineer invariably places it in front of the locomotive to protect more valuable rolling stock in case of an accident and to keep the smoke from the passengers' eyes. The directors took their places on the observation platform and were pushed on an inspection tour of the road's properties. After the ride, they had a picnic lunch by the brook.

President Rawlings confided that on some days he quits the office early, has the presidential coach hitched to the locomotive, and goes fishing. He added that an open air ride on a hot day comes in pretty handy.

Mr. Rawlings' son, Rob Roy, a student at Rhode Island State College, is now receiving instruction in operating the gasoline locomotive. With the aid of his father, he built a miniature model of the entire line. There are very few young men in this country who can look over a model railroad, then go out and actually ride over the real thing.

Reat Schofield, an employe in the grain business, also acts as chief engineer, track walker, brakeman, baggage man, conductor and general agent for the Wood River Branch Railroad. The writer unearthed a payroll dating back to July 7, 1899, and listing eight employees receiving weekly salaries totalling $76.38. The superintendent of the line then received $14.68 a week, while the station agent—his brother—was paid $4.51. Conductor Frank A. Thompson was paid a daily rate of $2, while the hard working brakeman received $1.40. The engineer's salary was $2.18 and the fireman got $1.41 each day. One man, who doubled as section hand and assistant engineer, received $1.40 a day.

"Forty years ago, when the railroad was in particularly dire straits," Mr. Rawlings told us, "the owners threatened to shut down. Ralph C. Watrous upped and leased the road for a number of years because his mother lived in the vicinity served by the line. She would

Scenes like this are common on the Wood River Branch Railroad.
Martin Sheridan Feature-Fotos

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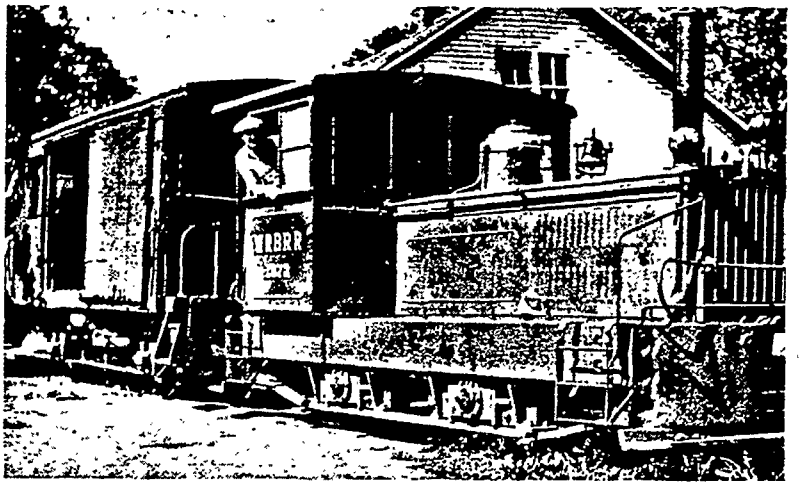


Engineer Schofield at the throttle of "1872," the line's gasoline burning locomotive.
Martin Sheridan Feature-Fotos

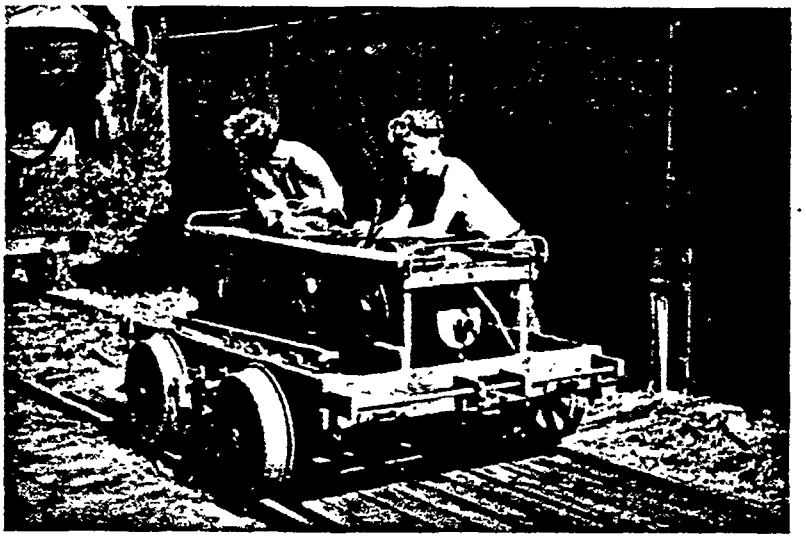
have been virtually isolated if service were suspended. Upon the death of his mother a few years ago, Mr. Watrous gave the line back to the New York, New Haven and Hartford operators."

The railroad's records reveal that only one real accident occurred during its entire history. Back in 1904, a locomotive and three coaches left the rails. Nobody was injured but one passenger's derby was ruined and had to be replaced at a cost of $4.

"Since I have begun to issue passes," President Rawlings declared, "many railroad men have written for complimentaries to allow them to see our road. Several of them have made special trips down here for the run. If they happen to arrive on a day when a trip isn't scheduled, we usually make the run anyway to accommodate them."

The several towns served by the little railroad have cooperated to the extent of exempting the line from taxes. This may result in the showing of a profit at the 69th annual directors' meeting this spring. Future plans call for the retimbering of the single bridge on the line plus the usual costly replacements of ties and track.

"If I do say one thing," concluded Mr. Rawlings, "it's much easier to run this railroad than it was to run the legislature."



Two section hands relax during lunch hour on the road's work car.
Martin Sheridan Feature-Fotos

This Month's Cover

THE ALAMO, in San Antonio, Texas, where in 1836 a small company of Texans was massacred to the last man after holding out for eleven days against four thousand Mexicans, has been called "the Thermopylae of America."

In the war for the independence of Texas from Mexico, 180 Texans under Colonels W. B. Travis, Davey Crockett and James Bowie were attacked on February 23, 1836, by the Mexican army commanded by General Santa Anna, who bombarded the Alamo almost continuously until March 6. Early in the morning of that day the attackers made a small breach in the walls and assaulted the fortress in force.

Twice they were driven back with heavy losses, but the third time they scaled the wall and swarmed inside. Though weak from privation and fatigue, the Texans fought valiantly in the ensuing hand-to-hand encounter, until only five were left alive. These were captured and shot by order of Santa Anna. Mexican losses in the battle were around 500 killed.

"Remember the Alamo!" became the war cry of the Texans, who finally caught up with Santa Anna at San Jacinto on April 21, 1836. There, led by Sam Houston, they defeated and captured the Mexican general, but spared his life on condition he would immediately withdraw all his forces and acknowledge the independence of Texas.

The cover picture is from a drawing by Victor Perari, made for Charles Scribner's Sons, by whose permission it is reproduced.

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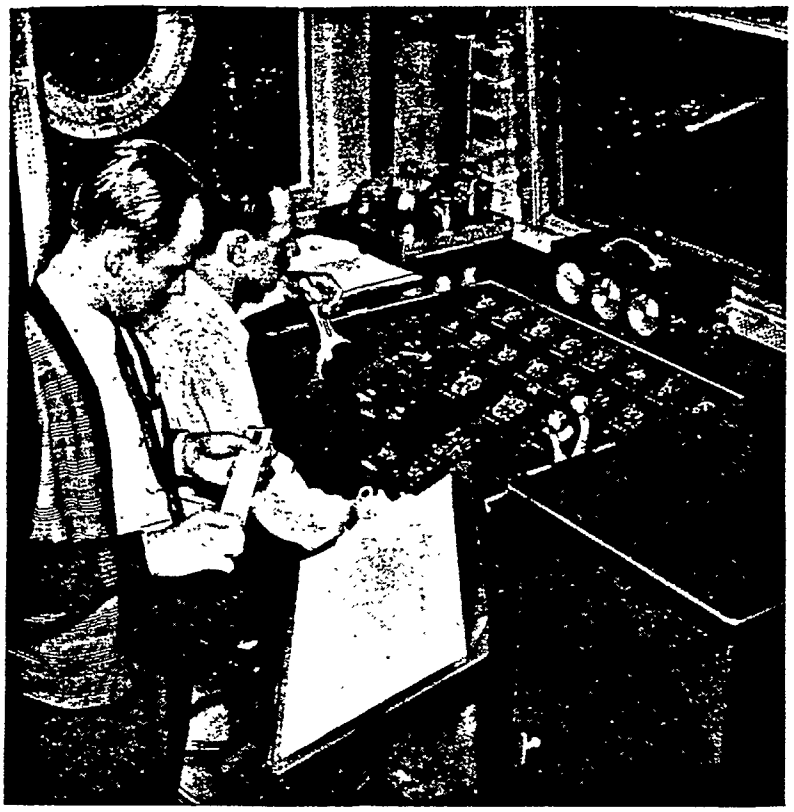


In a sound proof room each Allison engine is observed and checked during an eight-hour test run. The instrument board is an exact duplicate of those used in planes.

Boom at Allison Plant

Large Numbers of Liquid Cooled Engines Are Being Manufactured for the Fighting Aircraft of Uncle Sam and John Bull.

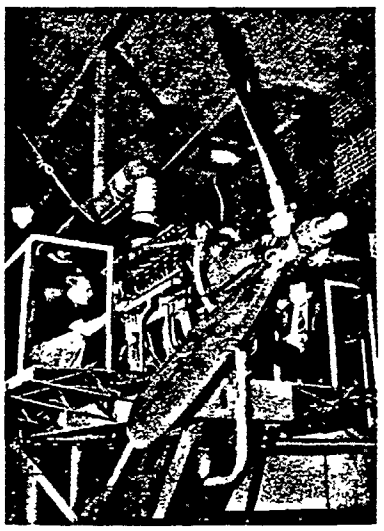
IN its huge, air conditioned plant at Indianapolis the Allison Division of General Motors is manufacturing liquid cooled engines for Uncle Sam's fighting planes and for John Bull's Royal Air Force. Although the current rate of production is around 350 per month, it is expected that by the end of this year, when additions to the plant are completed, the monthly output will reach 1,000 and a force of 10,000 men will be employed.

Until a short time ago Allison was little more than an experimental plant with no buildings or equipment designed for mass production. Since necessary additions are still under construction, the manufacture of engines has been going ahead under difficulties.

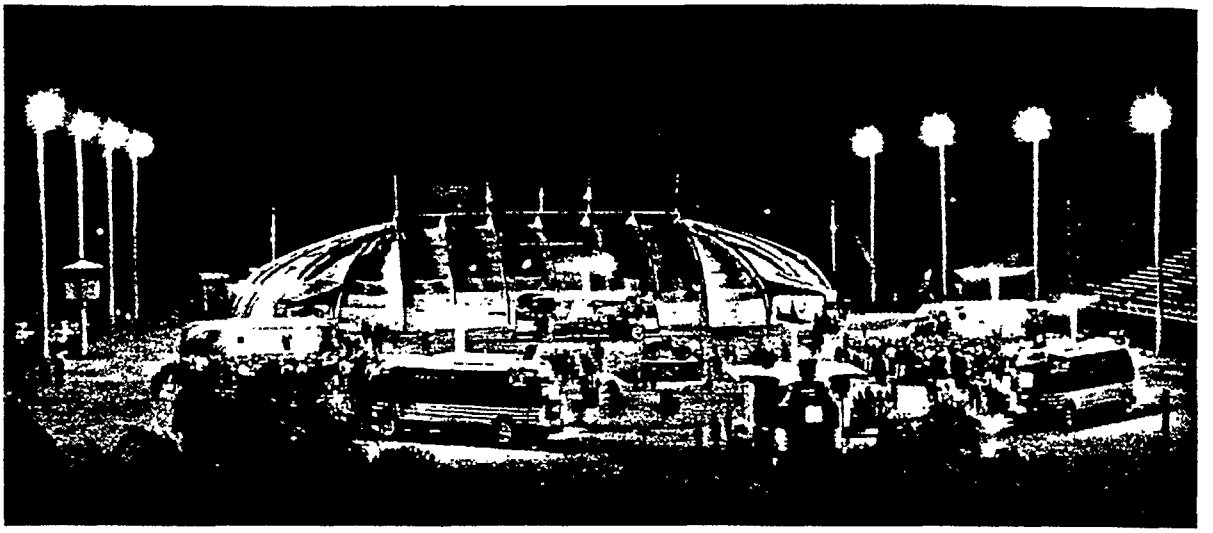
For a number of years the Allison Division conducted an engineering program on liquid cooled engines, but it was not until August, 1937, that the first one passed the necessary tests and was approved by the War Department. The Allison is the only liquid cooled engine of its type in the United States, although liquid cooled engines are in general use in European fighting planes.

Construction of the first production unit of the Allison plant was begun in June, 1939, following receipt of an order for 969 engines from the War Department, and the building was ready for occupancy in November of that year. Before the original order could be delivered, however, a flood of new orders from both the United States and British Governments began to pour in, requiring considerable expansion in plant and equipment.

A foundry to make aluminum castings for Allison engines was recently completed in record time by the Delco-Remy Division at Anderson, Ind., and is now in operation. In addition, a large number of important parts are made at the Cadillac plant in Detroit. The Indianapolis plant, which a little more than a year ago had only 9,000 square feet of floor space, now covers more than 1,200,000 square feet, while about 150,000 square feet are in use at the Cadillac plant and over 200,000 at Delco-Remy.



Every engine is run on a test stand until it develops full power. Then it is torn down, inspected, reassembled and given final acceptance test.



Powerful floodlights illuminate the Aer-o-Drome and the Futurliners parked around it.

Ethyl on Parade

The Story of Gasoline and The Story of Power Are Unfolded on the Stages of Futurliner Number 7 in the General Motors Caravan.

EXHIBITS which tell The Story of Gasoline and The Story of Power are carried aboard Ethyl's Futurliner in the General Motors Parade of Progress, which last February began a four-year tour of important United States cities.

Although the Ethyl Futurliner is Number 7 in the caravan of twelve Futurliners and ten tractor-transports, it was the first completed and began public exhibitions in Clearwater, Fla., early in February, ahead of the official opening of the Parade of Progress on February 26 in Miami. From Florida the caravan moved through the South toward the North Central States, where it will travel this summer.

Each Futurliner is 33 feet long and has dual wheels in front. The driver sits in the center of the front, at the lofty height of eleven feet above the ground. Above his head is a curved top of unbreakable plexi-glass. Retractable lights can be raised from the top of the body behind him and are used as floodlights for the exhibit.

Ethyl's Futurliner is powered with a 451-cubic inch engine, which has a compression ratio of 7.25 to 1. It has ten speeds forward and two in reverse. It also has a power take-off for driving a 220-volt generator located in the rear

The kids in Birmingham, Ala., seem to like the Ethyl Futurliner and Bill Ryan, the driver.

ETC 31314

of the truck. This generator has enough power to light simultaneously every exhibit in the Parade of Progress.

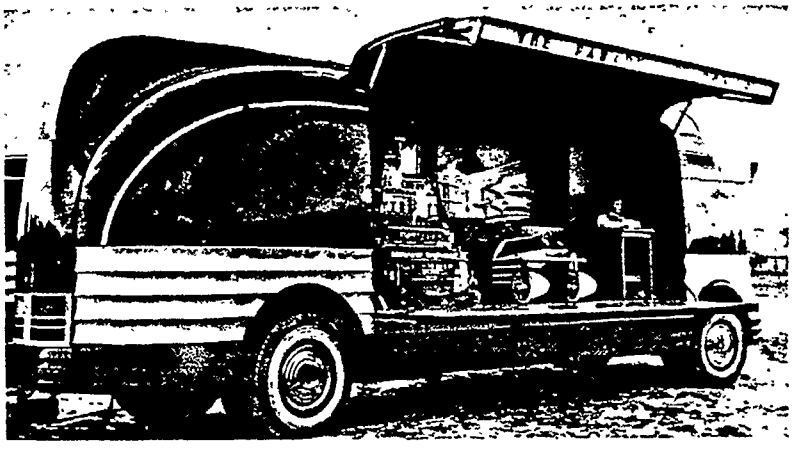
When the sides of the Futurliner are opened up a stage appears on each one. On the left stage is shown The Story of Gasoline, which is based on the use of tetraethyl lead in gasoline and consists mainly of a talk by a lecturer. The latter illustrates his words by means of an engine and four glass covered panels in the wall of the stage. The panels, through a flash mechanism, show the colors of gasoline mixtures in a cylinder during the combustion process. Normal and knocking combustion, the burning of gasoline with and without tetraethyl lead, and the burning of several different grades of gasoline are demonstrated.

On the other stage The Story of Power is told entirely by automatic methods. An attendant merely pushes a button which starts a synchronizing unit, and this controls all animations in the exhibit through a system of relays.

The exhibit begins when a puppet boy awakes, talks of dreams of power, and then falls asleep to dream again. His dreams of the progress of power are shown on a moving belt. When the belt stops, several motors, built one on top of another like a pyramid, are lighted up in succession, starting at the bottom with the oldest, which is also the largest and heaviest and knocks the most, and progressing to the latest, which is smallest and yet the most powerful. In conclusion, a conception of a transportation center of the future rises into view. The monologue and sound effects which accompany the exhibit throughout are from a recording.

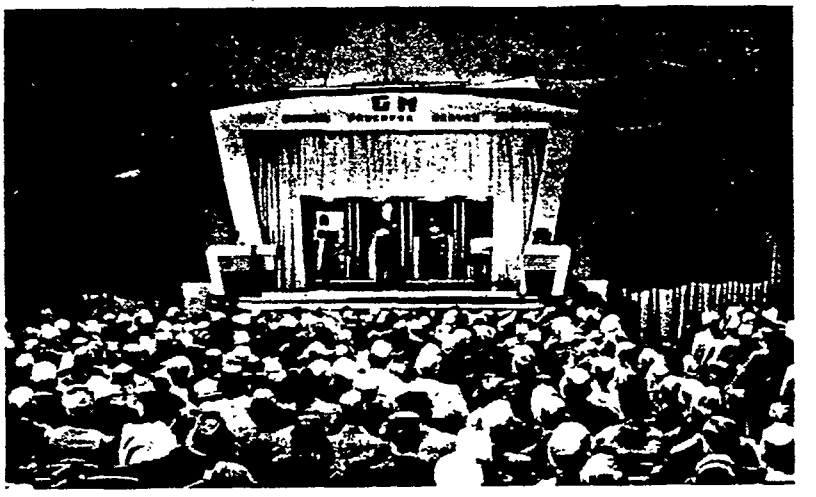
In addition to the different exhibits on the twelve Futurliners, there is a huge tent called an Aer-o-Drome, which is erected without poles and which will accommodate 1500 persons. On its stage are given demonstrations similar to those which appeared in the General Motors Building at the recent New York World's Fair.

An earlier Parade of Progress toured the country for nearly five years, appearing in 208 cities before audiences totalling more than 9,500,000 persons.



On the right side of the Ethyl Futurliner The Story of Power is told.

A large crowd gathers to hear The Story of Gasoline.



A lecturer talks to an audience of almost 1,500 inside the Aer-o-Drome.

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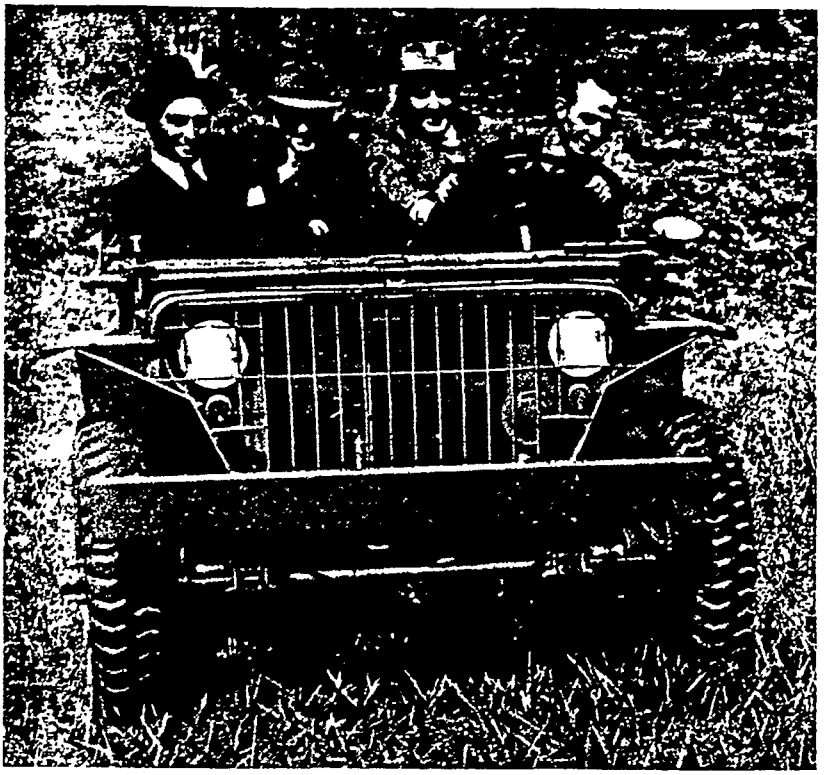

The three passengers in the blitz buggy are, left to right, Ethyl's C. G. Krieger, J. D. Harper, editor of the National Livestock Producer, and Ray Kelsey, managing editor of the Ohio Farmer and president of the American Agricultural Editors' Association.

Farm Editors View Defense Projects

Association Visits Ford, GM, and Chrysler Plants During Three-Day Program Arranged by Ethyl's Krieger.

IT SCUTTLED around like an agitated water bug. It darted through bushes and around trees, up and down steep slopes; it dug in its toes and raced along precipitous side hills on an angle of 45 degrees. It could turn on the proverbial thin dime and stop on half a dollar. Racing across an open field, it hit a ridge, leaped into the air with wheels spinning madly, landed with a crunch and sped on. It was tough, agile and speedy.

The onlookers, 35 members of the American Agricultural Editors' Association, grinned and nodded approval. Ford's famous little blitz buggy could take it! The editors, representing America's important farm publications with a combined circulation of more than 13,000,000, were in Detroit for a first hand impression of the automotive industry's part in National Defense. The association's three-day program, arranged by C. G. Krieger of the Agricultural Division of the Ethyl Corporation, included inspection trips of defense projects being carried out by motordom's big three—Ford, GM and Chrysler.

The blitz buggy is a low slung, blunt-prowed, four-wheel drive affair with seats for the driver and three passengers, but in an emergency where rapid transport of troops was required, the sturdy little car could probably carry seven or eight men with full equipment. On a good road it can travel at a speed of 55 miles an hour and when necessary can traverse almost any kind of terrain. Hundreds have already rolled off the Ford assembly line and other hundreds are to come.

On the way to the Dearborn Inn for lunch the agricultural editors saw another Ford defense project, a new plant, just completed, for the manufacture of Pratt and Whitney airplane engines. At the Inn the editors were welcomed by Edsel Ford, president of the Company, and Charles E. Sorensen, famed production chief for Ford, and other Ford executives.

Later the editors saw a two-cylinder unit of a new airplane engine Ford is developing. Two features make the engine a stand-out: (1) solid fuel injection (no carburetors). Fuel is pumped directly into the cylinders at high pressures. It atomizes instantly and mixes with air on the compression stroke. (2) A supercharger driven by exhaust gases.

The motor uses 100 octane gasoline and has cast steel crankshafts and cast steel cylinder liners. A full scale, 12-cylinder, engine is expected to be ready by July 1. Production by January 1, 1942, is a possibility, if the engine meets the approval of government experts.

Mr. Sorensen said the two-cylinder units have developed as much as 340 horsepower, which means that theoretically, at sea level, the full scale engine could turn up more than 2,000 horsepower. At 32,000 feet, Mr. Sorensen said, the motor would develop 1500 horsepower, an unheard of figure. Ordinarily power output falls off rapidly above 15,000 feet.

Other points of interest visited by the editors on Ford day were the River Rouge plant and famous Greenfield village.

On the second day of the meeting the editors were guests of General Motors and research was the keynote. The morning was spent at GM's 1268-acre proving ground near Milford, Mich. Here were miles of every known type of road and grades of every degree of steepness where cars, trucks and buses

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constantly undergo gruelling tests to detect and eliminate any "bugs" which may develop after a motor vehicle is built.

After luncheon at which General Motors executives were hosts, the editors saw a film depicting GM's participation in the National Defense Program. These projects included manufacture of airplane engines (their own Allison as well as the Pratt & Whitney engine), airplane equipment, machine guns, shells, trucks, Diesel engines for the navy, tank gun mounts and many small but essential items. Later there was a tour through part of GM's research laboratory in Detroit.

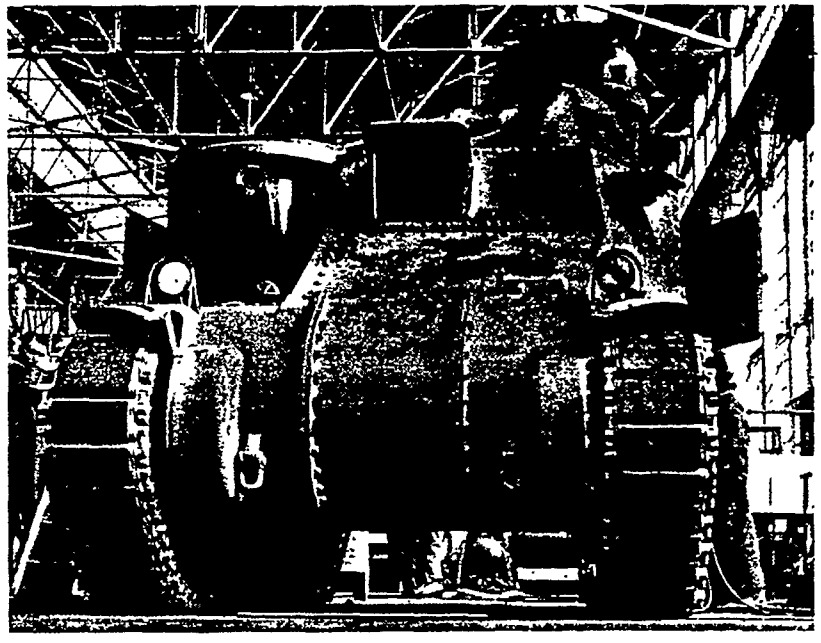
In the evening General Motors was host at a reception and a dinner attended by a number of GM executives including Paul Garrett, vice-president in charge of public relations, and Charles F. Kettering, vice-president in charge of all GM research activities.

Others attending the dinner included Ethyl's J. Coard Taylor, vice-president in charge of sales, Earl Bartholomew, director of engineering research laboratories, and Julian J. Frey, head of the technical sales division.

On the final day of the meeting the editors visited important defense projects conducted by the Chrysler Corporation. The most interesting was the tank arsenal located four miles north of the Detroit city line on a site covering 113 acres. The plant itself is about a quarter of a mile in length and 500 feet wide. The structure is filled with literally hundreds of machine tools required in the manufacture of the so-called medium, or 28-ton, tanks which the Chrysler Corporation has undertaken to build for the army.

Full scale production will not start until July, but two of the steel monsters already have been built and were on display. The tank is powered by a 400 horsepower Wright airplane engine of the radial, aircooled type and has a rated speed of 25 miles per hour, although it is said there is enough power in reserve to drive the giant 50 miles per hour.

At the Dodge truck plant the editors saw dozens of army reconnaisance cars rolling off the assembly line, another project designed to put the army on wheels. After a tour of the Plymouth assembly line the editors were entertained at luncheon in the executive dining room of the Dodge plant. Among Chrysler officials attending were K. T. Keller, president of the corporation, A. vanDerzee, a vice-president, and W. J. O'Neil, president of the Dodge division.

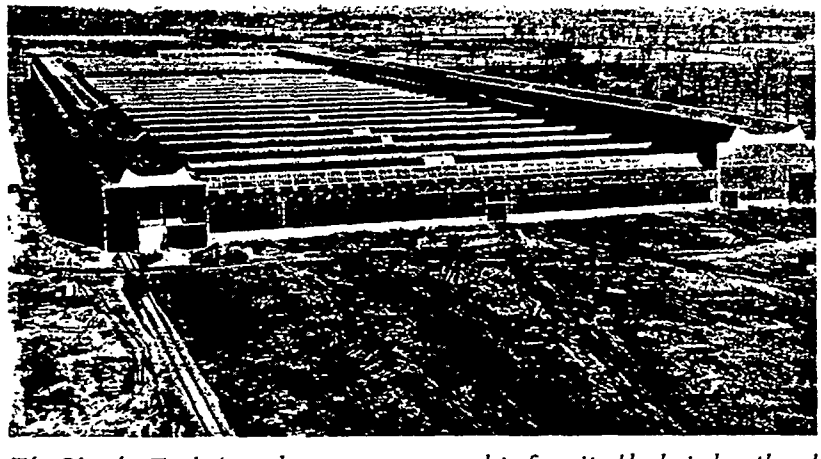


The first Chrysler M-3 medium tank receives its final inspection before delivery to the U. S. Army.

In the course of a 30 minute talk Mr. Keller made one remark that struck a responsive chord with every listener. "The cost of this defense program is simply astronomical," he said. "But it's a job that must be done and we of the automotive industry are doing our part."

Mr. Keller predicted that the normal production of cars and trucks would be off 30 percent by August and perhaps 50 percent by the end of the year.

As the last official act of the editor's association the members declared the meeting the most successful they had ever held and voted unanimously to make Ethyl's C. G. Krieger, who arranged the program, an honorary member of the association for life.



The Chrysler Tank Arsenal covers an area equal to five city blocks in length and two blocks in width—690,000 square feet.

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"He bowed his ol' neck and he shore left the ground."

Ride Him, Cowboy!

The World's Leading Bronco Busters Will Be in Cheyenne in July to Compete in Wyoming City's 45th Annual Frontier Days Rodeo.

"Let 'er buck! Yipppeeeeeeee!"

That yell in all its blood curdling shillness will ring out often from July 22 to 26, inclusive, when cowboys, Indians and crowds of spectators gather in Cheyenne, Wyoming, for the 45th successive Frontier Days rodeo and celebration, one of the largest events of its kind in the world.

From a one-day celebration first held September 23, 1897, the show has grown into a five-day spectacle of range and ranch sports, Indian dances, military maneuvers by soldiers of the United States Army, and races requiring the utmost skill in horsemanship.

Of the nine events on the first Frontier Days program, four are still features of the present celebration —bronc riding, steer roping, the wild horse race and cowpony races. To the original program have been added calf roping, bulldogging, Brahma steer riding, bareback riding, relay races, and other events, until today 22 hair raising contests constitute the daily schedule. In these, the premier horsemen of the world, a "Who's Who" of the rodeo world, compete for prizes.

One of the outstanding events of the week is the Cheyenne Frontier Days Parade and Festival held on the streets of the city Wednesday and Friday mornings, July 23 and 25. This colorful spectacle, which is witnessed each year by thousands, is in reality a history of transportation.

The pageant is complete from the buffalo, designated as one of Wyoming's oldest inhabitants, through the construction of the Union Pacific Railroad and the era of the vigilantes, wagon trains and stage coaches to the modernness of the Burlington model passenger

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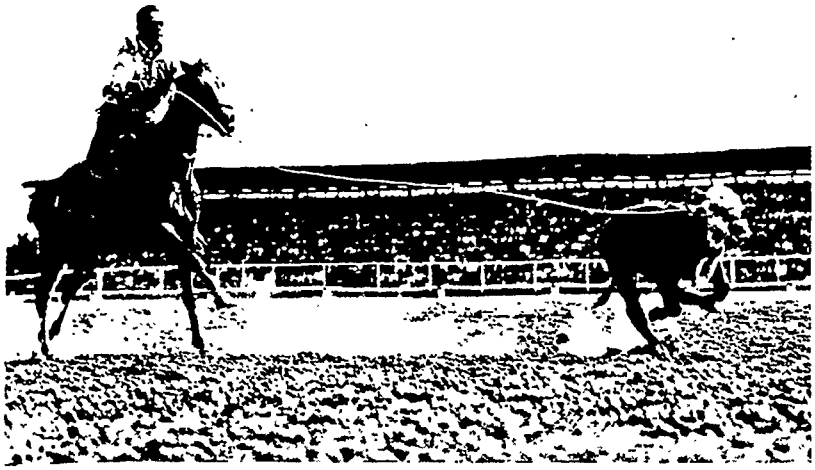

A roper misses, as the loop slips off the calf's head.

train and the Union Pacific model freight train.

Horse drawn conveyances such as the covered wagon, hack, army dogherty, stage coach, victoria, ranch wagon, surrey, hansom cab, landau, shopping coupe, shay, phaeton, tea wagon and others take part in the parade, carrying passengers wearing clothes typical of the era when the vehicle was actually used. Ladies are dressed in costumes of velvet and of broadcloth, with the full skirts, tight bodices, and tiny hats which marked the styles of the eighties.

Among the floats is an old fashioned parlor, with spinning wheel, harpsichord and period furniture. Other floats include a dance hall typical of the early days; an episode of early history, showing the vigilantes dealing out justice by a hanging; a typical ranch scene, with a calf being branded; an Indian village of tepees, with bucks, squaws and papooses around a campfire, and an old-time barroom.

Foremost on the rodeo program is the bronc riding, which is much the same as in 1897. Unusual skill is required in this event, which is open to the cowboys of the entire world. Horses used are real outlaws, the cream of thousands of buckers, selected because of their unusually fierce resentment at saddle and rider, together with an expert ability to pitch riders into the dust.

To give the horse a fair break in this bone-breaking sport, the rider must use only a plain halter or hackamore and only one rein, which is of braided rope and must not be knotted or taped. As the horse leaves the chute, the rider must have both feet in the stirrups and both spurs against the horse's shoulders. He must scratch the bronc high on the shoulders during the first five jumps and then behind the cinch. The winner is the cowboy with the highest rating for three rides.

Bulldogging is one of the most spectacular events and is an evolution of a difficult feat performed first many years ago by one Will Pickett of Taylor, Texas. Pickett startled the rodeo world

Sioux Indians adorn themselves in war bonnets and tribal regalia for the Cheyenne Frontier Days.

Courtesy of Union Pacific Railroad

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by leaping from his horse to the horns of a running steer and throwing the steer without using his hands. A local paper, dated August 30, 1904, described the accomplishment as follows:

"He sank his strong ivory teeth into the upper lip of the animal and, throwing his shoulder against the neck of the steer, strained and twisted until the brute, under the strain of the slowly bending neck, sank to the ground."

Today bulldogging is an entirely different, though equally difficult and dangerous feat. The steer is given a 30-foot start on the contestant, who, together with an assistant called a hazer, attempts to keep the animal running straight ahead. Leaping from his horse, the bulldogger grabs the steer by the horns and, after bringing him to a stop, twists him down.

Steer roping is considered by cowboys to be one of the most risky events of the show. Each roper pays $100 to enter this contest, and these entry fees are added to a substantial cash prize given by the committee to make up a purse that is well worth competing for. A carefully trained horse is necessary, and each cowboy rides his own mount, which is taught to brace itself against the weight of the steer that is being busted. After the steer is down, the horse must keep the rope taut enough to keep him down until the cowboy has finished tying his legs.

Another feature is calf roping. The Hereford calves used in this event are wiry and fast, necessitating the use of a small loop, accurately thrown to prevent the animal from running through it before the loop can be drawn tight.

Many other events are held daily. There is an artillery drill in which artillerymen of the United States Army defy all laws of safety and gravity to send charging horses and careening caissons through death defying orgies of action. Indian races and Sioux Indian war dances enliven the program.

Skill and thrills add zest to each day at the Cheyenne Frontier Days, when the Old West comes back to life with a bang.

The bulldoger will soon make this steer bite the dust.

Brahma steers are plenty tough. Maybe this one just wanted to be alone.

There are less strenuous pastimes than a bareback ride atop a bronc.

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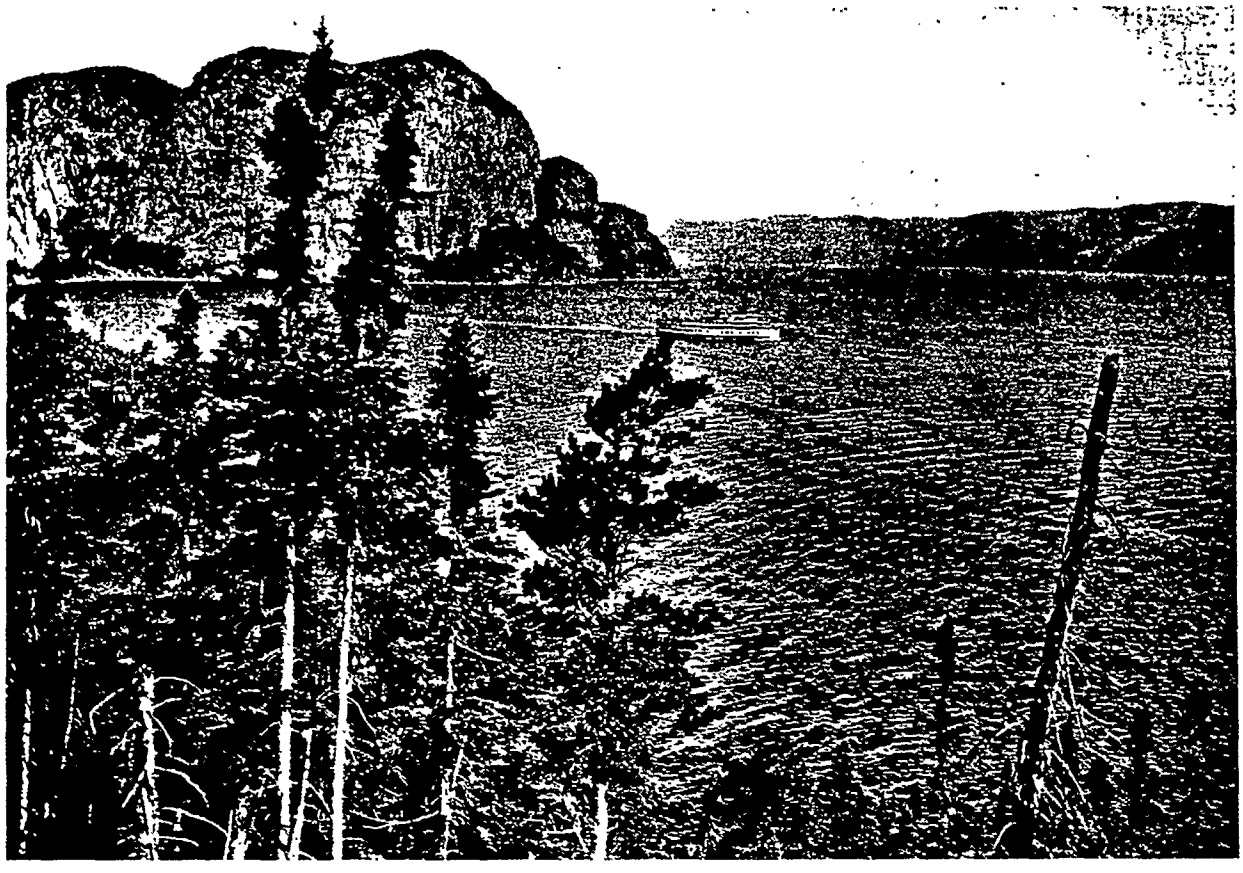

Cape Trinity, towering above the Saguenay River in Quebec, as seen from its sister, Cape Eternity.

Our American Visitors

A Famous Canadian Author and Humorist Sends a Personal Invitation to His Neighbors in the United States to Come North and Sample the Dominion's Hospitality.

By STEPHEN LEACOCK

NO, it's not just a matter of money, although of course we're always glad to get it, and the more you bring of it the better. But that's not the real point. Let me explain it. Did you ever meet an innkeeper, one of the real old fashioned type, dating down from the days of the stage coach? You have, eh? Well, what is his animating motive? Money? No — hospitality—genuine, open-hearted hospitality. He really thinks that all these people are staying with him, as his guests — that's how the word got into the trade — they're his guests, see, staying in his house and he's trying to make them comfortable. No trouble is too great.

In fact, a real hotel man can get into a sort of permanent mental delusion on this point. Such a one I recall in particular as exceeding even his own class. His fixed impression, irremovable after years of habit, was that his "guests" had come into town to pay him a personal visit; they might of course have a little business on the side, but the main idea was that of a friendly renewal of acquaintance. He would say to me, "We had your brother and his wife with us for a few days last week. We're always so delighted when they come. I wanted them to stay for the week-end but they couldn't." His hotel, and no wonder, was always full; indeed, he loved to have to give up his own sitting room, then his bedroom — sleep in a cupboard, anything — at the call of hospitality.

Well, that's how we feel about the coming of our American visitors in Canada. They're our "guests". We have the delusion that we've invited them up and that nothing is too good for them. I admit to the feeling myself; my im-

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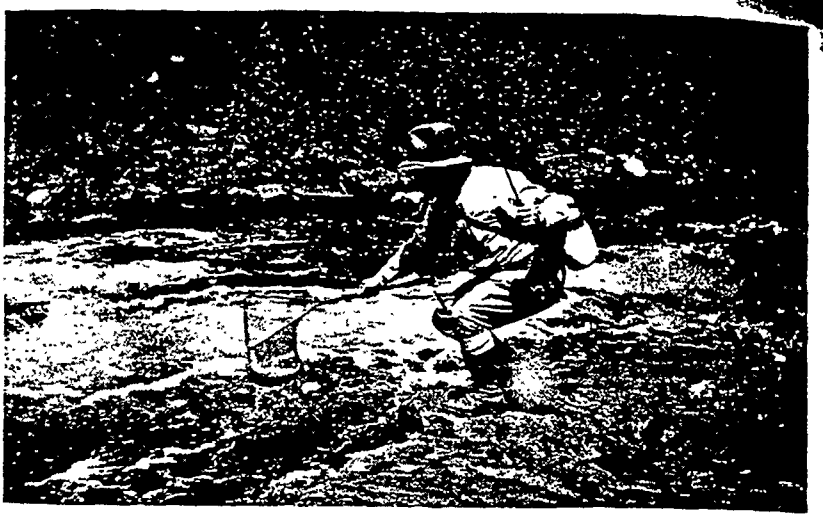
pression is that I am entertaining, personally, about 50,000 a week. I insist that they must see the Laurentians. I can't let them go without having them go down the St. Lawrence and see the old fashioned French country of the Island of Orleans, and, of course, up the St. Lawrence to Lake Huron, and sideways from the St. Lawrence and then edgeways from it. I insist on their seeing a lot of things that I have never seen myself. I wave my arm round a thousand miles of scenery and give it to them.

And of course the Americans reciprocate. If I tell them they simply must see the Georgian Bay, they say they certainly will. I tell them that it has 33,000 islands, and they say "Think of that!" "Mother," says the man at the driving wheel, "I guess we won't miss that," and they're off for it. Last year I sent some to the Great Bear Lake. I forgot the distance. I don't think they're back yet.

Now I'll tell you what I think is the main idea at the back of all this — the coming and going, this pleasure in giving away and receiving scenery, this pleasant make-believe of host and guest. It's that old fashioned urge called peace on earth, goodwill toward men. The more it is darkened over in Europe, the more brightly does it shine with us. This solid unity of North America, put behind the heroic cause of Britain, is what is saving the world, visibly already saving it. But you could never get it by mere treaties and agreements and such; not even common interest would bring it, or not in its most real shape. It has to depend on personal feeling, on mutual acquaintance, on seeing and knowing one another.

Come on up. I'll show you the Island of Orleans — I'll show you Niagara Falls, or no, I forget, half of it is yours; I won't show it; it's not so much anyway; we just keep it for English visitors. But I'll show the new mining district round Noranda, and I'll take you to the wild country along the Algoma Central — that is, if you fish. You do? You're crazy over it? Well, say, get right into your car and come on up. I'll have the bait ready.



A fisherman lands a nice trout from a swirling stream in the Laurentians.

Canoe travelers shoot through white water on the Nipigon River, Ontario.

Campers pitch tents on the Peribonka River in Quebec's Lake St. John district.

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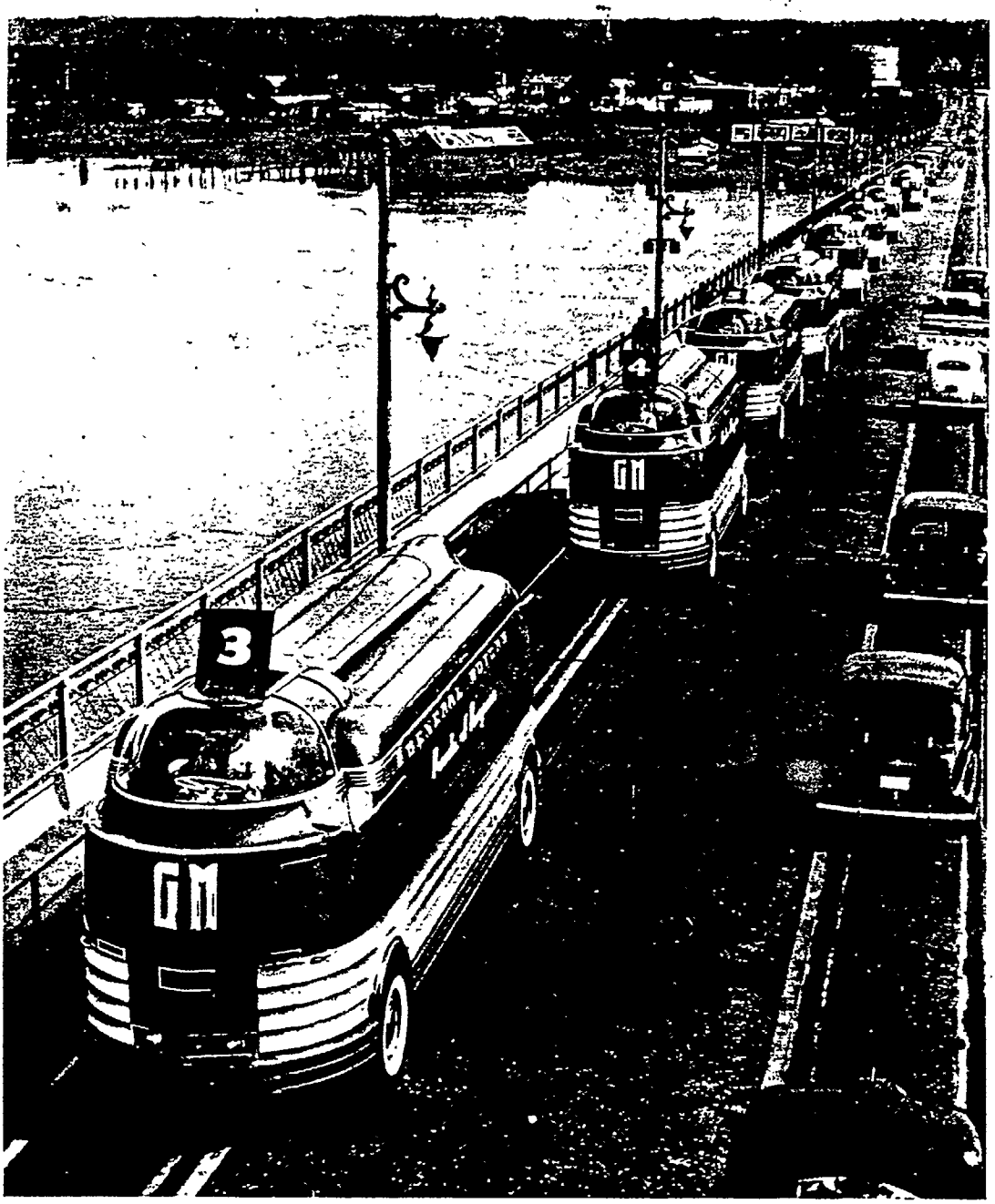

The Parade of Progress Futurliners roll across a bridge into Jacksonville, Fla.

[See page 14]

(A story of day-to-day progress in automotive research)

HE CARRIES important mail each trip. Today he has the Jones boy's first letter from camp; a new pump valve for Joe Sneed; lesson No. 6 in poultry raising for the Livingstons' hired man.

All important mail. Not in dollars so much as in human values—and so it is regarded by the Rural Free Delivery carriers—"the neighbors who carry the mail" in all seasons and all weathers.

In America's R. F. D. service the automobile gives high proof of its sturdiness and dependability. Rural mail carriers drive thousands of miles a year. Their cars, often battered in body but sound in engine, testify to the progress made in the development of automotive transportation.

Is there an end to this progress? No, say the forward-looking engineers of the automotive and petroleum industries. The next ten years, they say, will see more improvement than we have seen in the past decade because *both* these great industries are working closely together in research on mutual problems.

To the solution of these problems Ethyl is providing both product and service. Our product, anti-knock fluid containing tetraethyl lead, is used by oil refiners to raise the anti-knock (octane number) of gasoline. Ethyl's research workers are cooperating with automotive engineers in steps to take advantage of better fuel. Our research laboratories in Detroit and San Bernardino are helping to coordinate the many individual lines of research engaged in by the technical men of both industries. And our field engineers are offering to commercial users of fuels and engines the practical application of data developed in the laboratory and in the proving ground.

The public benefits by every improvement in automobiles, trucks, buses, tractors and airplanes. Thus we believe that by making our service available to the technical people of the automotive and petroleum industries we are serving "everybody."

ETHYL GASOLINE CORPORATION

Chrysler Bldg., New York, N. Y.

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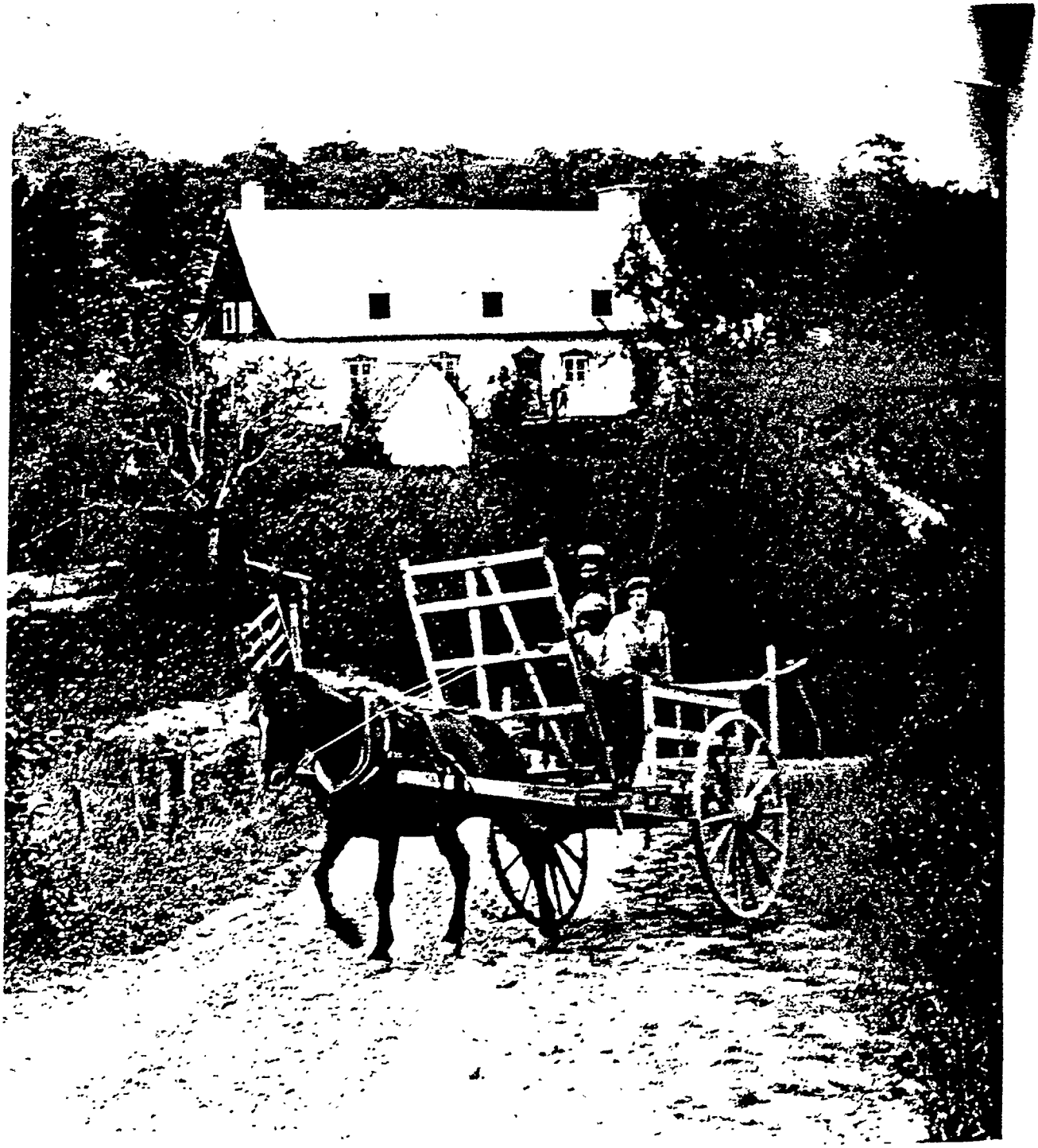
ETHYL NEWS

July 1941



On the quaint Isle d' Orleans in Quebec the horse is still the favorite source of motive power.

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ETHYL NEWS

Ethyl Gasoline Corporation
Chrysler Building, New York City

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JULY 1941
VOLUME 8, NUMBER 7

A Green Light for Production

By WILLIAM S. KNUDSEN

OVER across the ocean a battle of life and death is being fought — in the field, in the air and in the shop. Over here, thank God, we have only the battle of the shop, but it is just as serious, just as important, just as indispensable, that we may not be in the same position here.

Before it all started, we, on this side of the ocean, felt we had no particular quarrel with anybody. However, as the horror of this new-fangled warfare of killing women and children progressed to its present stage, the feelings of our American people were aroused. Under the leadership of our President and Congress they decided that we would help with material the people who were willing to fight for their liberty.

War is today a question of material. The technical progress of making war has advanced to such a stage that one man in the field requires the backing of ten men at home — not only men but machines and raw material as well. Therefore, we are particularly fortunate in having an abundance of men, machines and materials to put to work to back up our forces for home protection. But we also have a surplus potential with which to help others.

Time is the great factor. Trains run on time against schedule. Sometimes they get away late and catch up, but they only catch up if all the factors which made them late in the first place are eliminated. A clear track and lots of steam is the only remedy. We are today in the position of having gotten off to a late start. We didn't have enough time when we started and the track had to be cleared first. Now that the President has told all of us to get going full speed ahead, I feel we will all get up more steam to help us get to our last stop, which is "the arsenal of the world," and on time.

A production job like ours, I say *ours* advisedly, will call for sacrifices from everybody. "Work and Save" must be our slogan. The impact economically of an undertaking of this sort can only be softened by work and by savings. To conserve, to plan, to think is the best antidote for worrying about what is going to happen now or after the emergency is over.

We can do it, I know we can do it if we all put our hearts and efforts into the job, engineer, manufacturer, mechanic and clerk. This is our land — the land where democracy was born and will live forever — so let's go full speed ahead, a green light on the track. This is "America's special" and we must all help to get it in on time.

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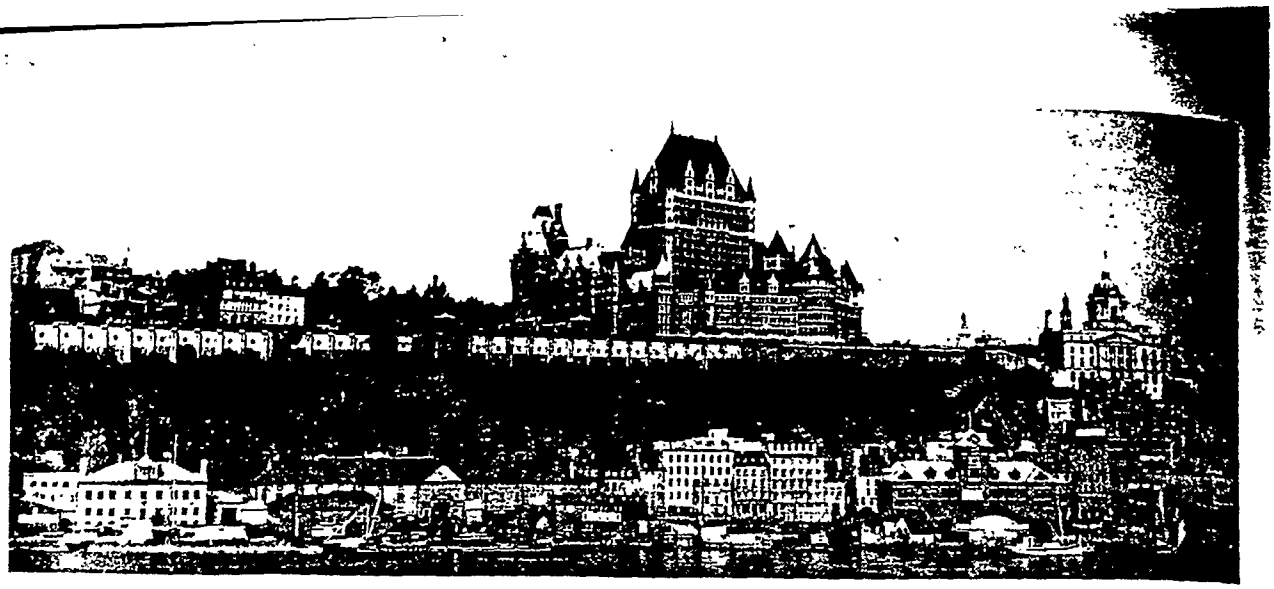


Like a Norman castle, the Chateau Frontenac towers above the city.

Courtesy of Canadian Pacific Railway

Old World in the New

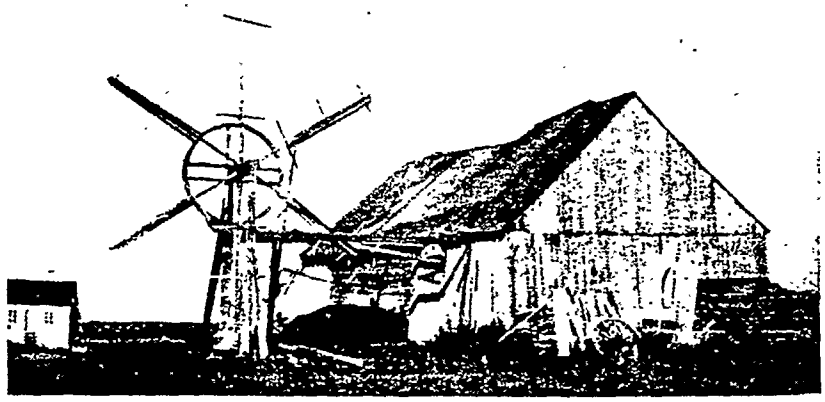
Parts of Quebec City Still Remain as They Were When Englishmen and Frenchmen Fought for a Continent.

THE tourist who previously found the time mellowed cities of Europe the solution to his vacation problems will have to revise his plans for 1941. Fortunately, however, he can still have his taste of Old World atmosphere in the heart of a modern city without departing from North America, for Quebec City in old French Canada is as rich in tradition as many tourist frequented corners of Europe.

Although most cities in America measure their history in terms of decades, the story of Quebec is written in centuries, its history dating back well over three hundred years. Today it is as modern as any city in Canada without having forsaken its old-world charm. On all sides are found reminders of yesterday — churches, monuments and other landmarks that punctuate the centuries of its growth.

Majestically situated on a great rock high above the St. Lawrence River, Quebec City is frequently referred to as "Canada's Gibraltar" and, by virtue of its strategic setting, served well as a garrison when Canada was New France. Its frowning citadel and grim ramparts still remind one of the days when Britain and France were fighting for supremacy in the New World. The Plains of Abraham, where the deciding encounter took place, have been converted into the now peaceful Battlefields National Park, where a memorial — the Wolfe and Montcalm Monument — rises in tribute to both leaders of the conflict.

It is impossible to escape the past in Quebec City, for here the past is the present and the ancient blends easily with the modern. It is reflected even in the imposing Norman architecture of the Chateau Frontenac, for years the center of the city's social activities. Reproducing the charm of a medieval castle, this famous Canadian Pacific hostelry dominates the lofty skyline of the city it serves. Its historical charm is further enhanced because it occupies the very site of the Chateau St. Louis, one time residence of the early French governors.



Many of these old wooden windmills may be seen along the St. Lawrence.

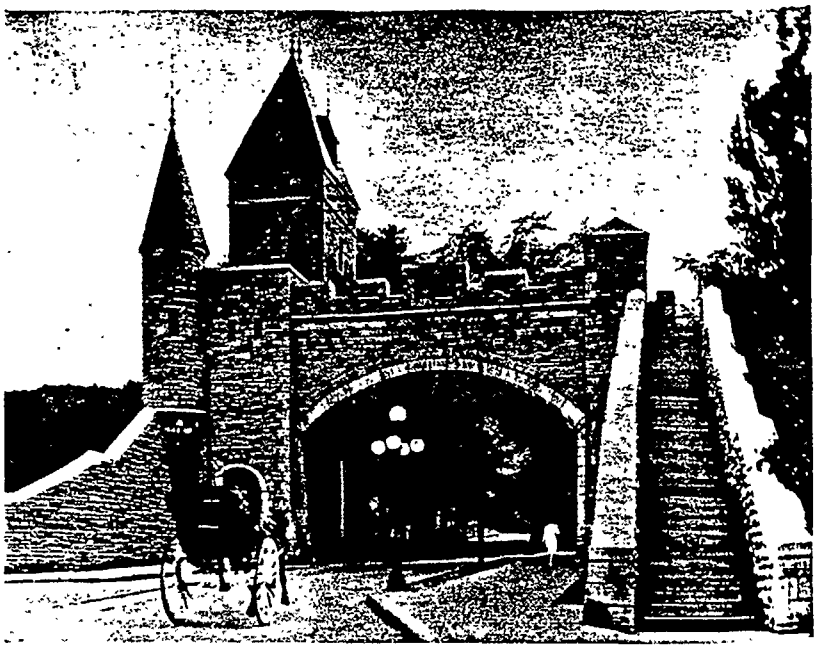
Courtesy of Canadian Pacific Railway

The visitor who views the "Lower Town" from Dufferin Terrace—a quarter mile boardwalk skirting the Chateau—cannot resist the urge to explore this picturesque section of the city at closer range. A ramble through its cobblestone streets, a few of them the narrowest this side of Europe, is a history lesson in itself. Little Champlain Street, Sous-le-Cap and Sault au Matelot, whose very names are suggestive of the past, are foremost in tourist appeal. Lined with dormered houses, quaint little shops and in some cases paved with venerable planking, Quebec's early thoroughfares were laid without the benefit of a town planning committee. It would appear that the roads were constructed to serve the buildings that got there first. A few of these souvenirs of a bygone day remain in the heart of the industrial district.

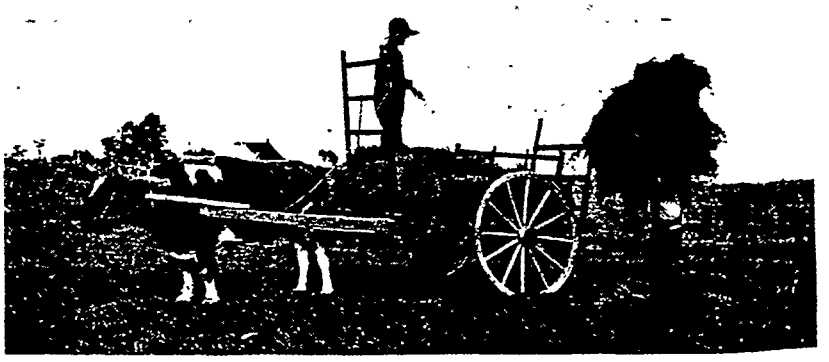
Quebec's religious life is reflected in its many fine churches, convents and hospitals. Most interesting from the tourists standpoint is the Basilica of Notre Dame, originally constructed in 1647. The ancient church of Notre Dame de Vistoires is another example of historic appeal rarely found this side of the Atlantic. In proportion to its size, Quebec City is believed to contain a greater number of churches than any other city on the continent.

Many visitors to Quebec find it an easy matter to absorb a few rudiments of the French language. All public notices are displayed in English and French, both languages being official throughout the province. Quebec is also the seat of the Provincial Government and a visit to the Parliament Buildings is definitely worth while. Their gray stone walls house the only British legislature in the world where parliamentary proceedings are carried on in French.

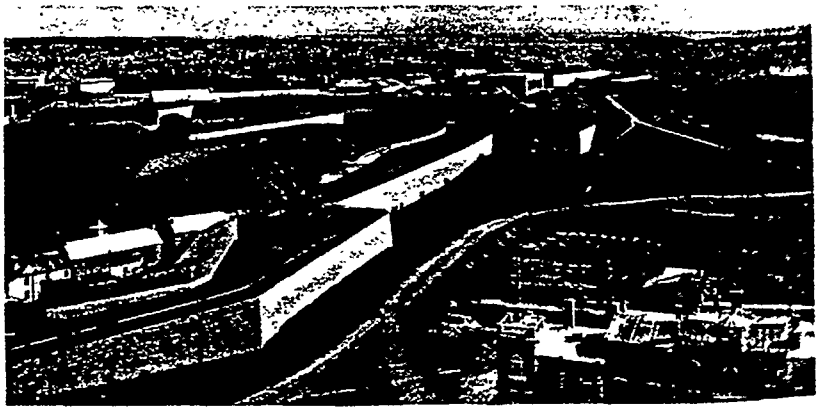
Within easy walking distance of the Chateau Frontenac are numerous other points of interest to the visitor. The new provincial Museum on Battlefields Park and the great gates of the ancient city wall should not be omitted in a tour of this quaint old city of Champlain. The automobile is recommended for visiting Quebec's surrounding districts, but for a leisurely tour of the city, there is one method of transportation that can't be



A caleche, popular sight seeing vehicle of Quebec, approaches the old St. Louis Gate.
Courtesy of Canadian Pacific Railway



Farmers on the Isle d'Orleans still stick to the methods of their great grandfathers.
Courtesy of Canadian Pacific Railway



The old citadel once guarded the gateway to a continent.
Courtesy of Canadian Pacific Railway

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surpassed — the caleche. These lofty horse drawn "two-wheelers" give the visitor a new experience in transportation, and their drivers are veritable encyclopedias on Quebec's history and landmarks.

Quebec City boasts of the second oldest golf course on the American continent, the game having been played there since 1874.

Quebec's charms are not all confined within its city limits. The Isle of Orleans, conveniently reached by ferryboat, ushers the visitor into a world of yesterday. Here the menfolk still do their sowing by hand, reap with the scythe and thresh with the flail, while the women ply their spinning wheels and hand looms. Picturesque roads wind through a drowsy countryside dotted with little fishing villages, whitewashed farmhouses and many a wayside shrine. French Canadians love their land with deep rooted affection, and many families still inhabit the land that their ancestors tilled centuries before.

Within easy motoring distance of the city is the Lorette Indian Reservation, where descendents of the warlike Huron tribe now devote their energies to peacetime pursuits. Their artistic handicraft products — snowshoes, leather goods and classic Indian beadwork — are a never-failing source of interest to the visitor. Montmorency Falls and Kent House, Ste. Anne de Beaupre and its famous shrine are other tourist magnets.

Quaint and historical as it is, the Province of Quebec does not lack scenic splendor, and the glorious Laurentian Hills, studded with gleaming lakes, have an irresistible appeal to the angler, hunter and all lovers of the great outdoors. Only a few colorful miles from the city lies lovely Lake St. Joseph, a shimmering sheet of water surrounded by verdant forest. Here are found fine facilities for canoeing, sailing, swimming, fishing, riding, and hunting.

The Laurentide National Park with an area of approximately 4,000 square miles is a veritable symphony of lakes, streams and woodlands. In an effort to preserve the abundance of wild life in the park's environs, hunting and trapping are not permitted. The average visitor, however, is content to swap his rifle for a camera when he comes to Laurentide Park — and his shots are equally gratifying.

A family of French-Canadians—les habitants—lines up in front of their 250-year old home.

Courtesy of Canadian Pacific Railway

The gray stone Parliament Buildings house the only British legislature which carries on proceedings in French.

Courtesy of Canadian Pacific Railway

Regardless of the season, there is always something interesting to do, something beautiful to see in the capital of Old French Canada. In the springtime when mild breezes stir blossoming trees in convent gardens; in the summertime when the old city is gay with throngs of vacationists; or in the autumn when the leaves turn to crimson and gold, Quebec never loses its magic spell.

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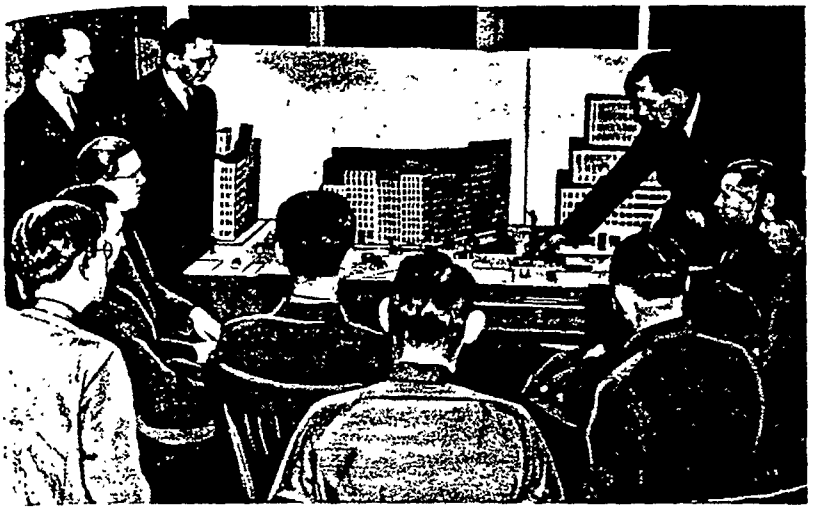


Accident prevention is demonstrated with model vehicles on table top layout.
Courtesy of New York Telephone Company

Courtesy at the Wheel

New York Telephone Company Drivers Are Given a Course in Safe, Cooperative Driving and Good Motoring Manners.

THE "Good Neighbor Policy" of which one hears so much nowadays is being put into effect daily by the men who operate the New York Telephone Company's motor vehicles. In line with increasing emphasis on friendly, individual service throughout relationships with customers and the public in general, the company has inaugurated a safe driving course for its drivers.

From the successful observance of the principles taught in this course, which is known as the Courteous and Cooperative Driving Course, it is believed that two important benefits will result. First, greater safety will be attained through the avoidance of accidents, and second, good relations with the driving and walking public will be fostered.

A portable reactometer or reaction time testing machine, similar to one demonstrated at the World's Fair, has been obtained from the Aetna Casualty and Surety Company and is used to test the reaction time of each driver. Reaction time is the time required by the driver to take his foot off the gas pedal and step on the foot brake after he has observed a situation which requires him to stop his vehicle. The relation between the distance traveled during this reaction time and the distance the car travels before the brakes take effect at different speeds is discussed in class, and each man has the opportunity to figure out for himself in how short a distance he can stop in an emergency, total stopping distance being the sum of reaction and braking distances.

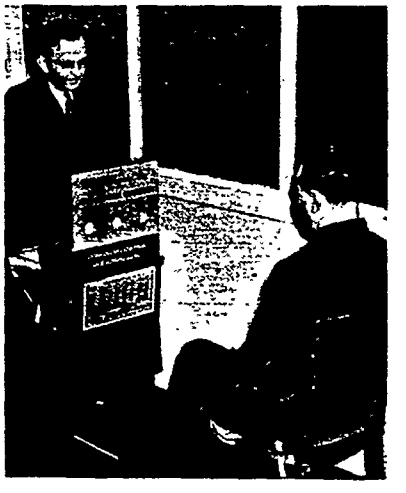
As the result of many thousands of tests, the average reaction time has been determined by the Aetna Company to be half a second. Although it is emphasized that this test is not to determine "good" or "poor" drivers, since such a classification is hard to make on the basis of a test, it is explained that reaction time is of vital concern, as a split second can mean the difference between safety and a serious accident.

During round-table discussions actual accident situations are represented by model cars on a table-top street layout. Cases are reenacted to illustrate how thoughtfulness, courtesy and cooperation on the part of drivers can prevent accidents. Individual experiences are set up and discussed by the group, so that drivers can see themselves as fellow drivers see them.

It is pointed out to classes that driving is likely to become mechanical for drivers who operate motor vehicles every day; therefore, care should be taken to avoid falling into such routine procedures as may result in accidents. Pulling out of parking spaces without looking, backing without checking clearance, pulling into tight parking places, following too closely, trying to beat lights, and failing to give proper signals are acts of carelessness to be guarded against at all times.

Precautions outlined in the New York State Drivers' Manual are reviewed, with emphasis placed on turning, backing, driving in traffic, lights, road signs and markers, right of way and signaling.

Company drivers are urged to demonstrate good motoring manners and to let their actions mark them as courteous and cooperative at all times. The safety creed, "No job is so important and no service is so urgent that we cannot take time to perform our work safely," is the keynote of the course.



The reactometer reveals how quickly each driver will react to a situation requiring a sudden stop.
Courtesy of New York Telephone Company

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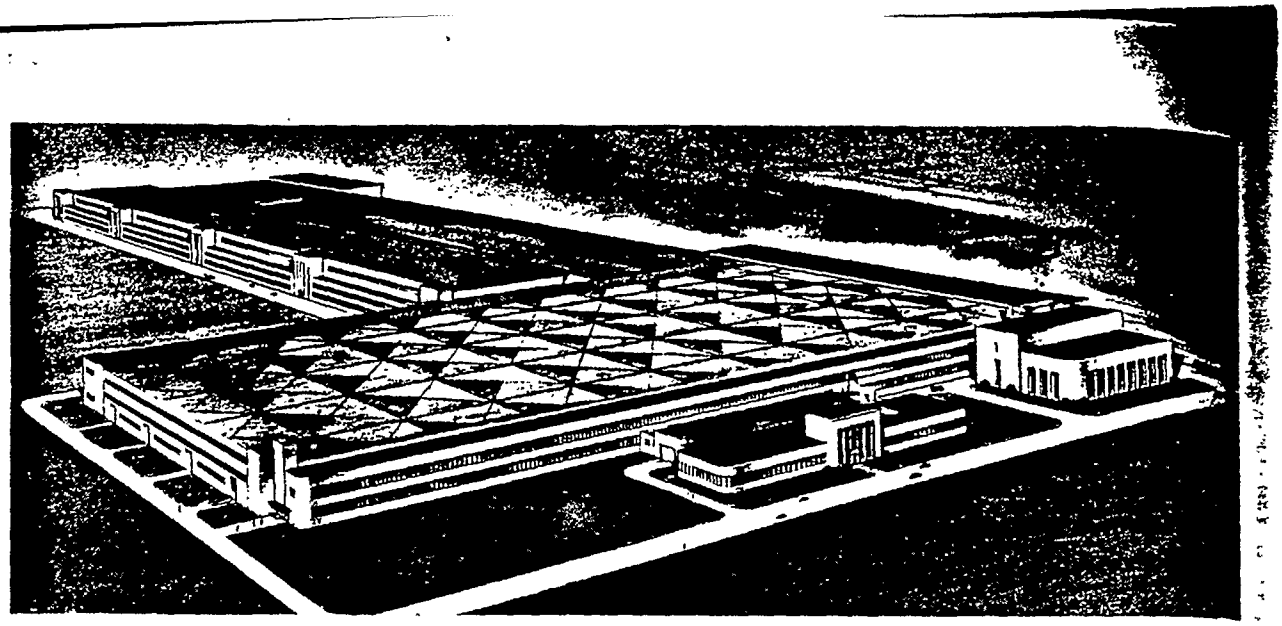


An architect's drawing of Ford's $18,000,000 plane factory.

Bomber Factory for Ford

Plant Under Construction Near Dearborn, Mich., to Build Giant Four-Engine Consolidated B-24D.

CONSTRUCTION of an $18,000,000 bombing plane factory for the Ford Motor Company is under way on a tract two miles square at Willow Run, a rural community 25 miles from Dearborn, Mich.

From this huge plant, said to be the largest of its kind in the world, will come complete sub-assemblies and parts —with exception of the four engines— for the giant Consolidated B-24D bomber.

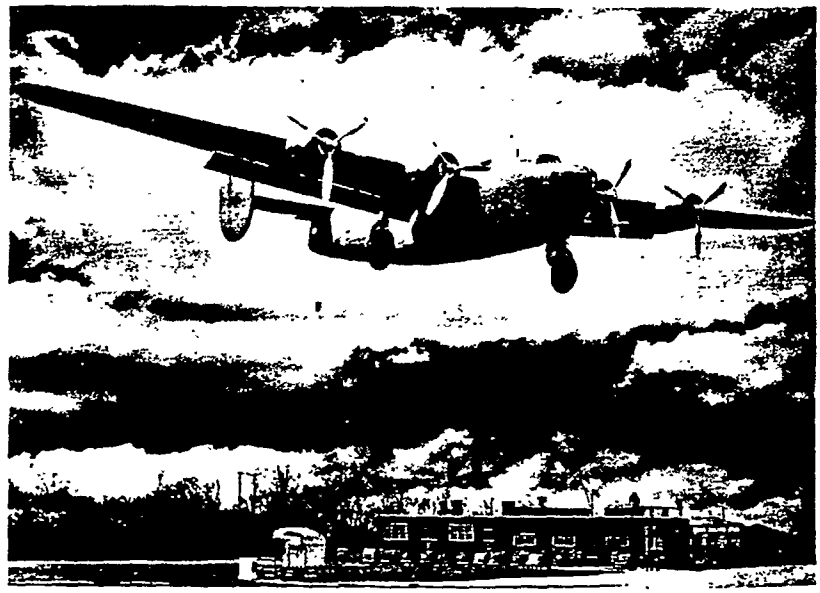
Plans now worked out between Ford and the government call for production of parts for five complete bombing planes a day, with these parts to be shipped to government final assembly plants at Tulsa, Okla., and Fort Worth, Texas.

However, provisions have been made by Ford engineers for final assembly of the bombers at Willow Run, should the government step up its demand for the long-range, heavy-duty B-24D planes. The site was selected because it permits easy and rapid plant expansion to meet any future production needs.

The B-24D is one of the world's most formidable bombers. It weighs 28 tons when loaded and is capable of carrying four tons of bombs at a speed of 300 miles an hour. The giant four-engine ship has a cruising range of more than 3,000 miles.

While construction crews toiled on the Willow Run plant, nearly 100 Ford engineers and production experts went to the Consolidated Aircraft plant at San Diego, Cal., to work out production methods for the new factory. More than 20,000 skilled workers will be employed at the Ford bomber factory when it starts full production.

In the front section of the building, shown behind the offices in the architect's drawing, is the machine shop— 900 feet wide and 320 feet deep. Beyond this is another section, 1,400 feet long and 400 feet wide for assembly of the various bomber parts. If Ford is requested to produce the complete bomber, company officials said, this structure will be extended to house an assembly line a mile and a quarter long.



A Consolidated B-24D bomber comes in for a landing at the Ford Airport at Dearborn, Mich.

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Floyd Smith, at left, shows one of his new parachutes to Lieutenant E. E. Fahy of the United States Coast Guard.

He Floats Through the Air—

Floyd Smith, Who Once Was a Daring Young Man on the Flying Trapeze, Is the Inventor of the Ripcord Type Parachute.

JAMES FLOYD SMITH, vice-president of the Pioneer Parachute Co., Inc. of Manchester, Conn., is one of the few oldtime barnstormers who is still alive, and whole. He'll tell you he has had good luck, but his luck has nearly always been buttressed by careful planning and the ability to think not only on his feet but in the air.

Smith was already a veteran flyer in 1914, having built his first plane and taught himself to fly it two years before. The ability to think fast saved his life in 1914, when the right wing of a plane he was testing folded back 1,500 feet up. The plane, which he was testing for Glenn Martin, went into a spin and it occurred to him that he might be able to control the plane to a certain extent with his elevators, one good aileron and power.

He maneuvered the plane out of the spin and into a power dive until he was within a few feet of the ground, when he pulled the nose up and landed as the ship was falling off to the right again. The undercarriage besides the wing was damaged, but Smith walked away without a scratch. The plane was repaired and flown again later.

This led directly to his invention of the ripcord type manually operated parachute, which has since saved the lives of more than 10,000 persons. For as Smith walked away from the wrecked plane he kept thinking. He knew that some day he would be up in the air in a plane so unmanageable that no amount of skill in maneuvering could save him. He confided to Charles F. Willard, chief engineer at the Martin plant, at Los Angeles, that he was going to try to invent a parachute which a flyer could open in the air.

The parachute was nothing new. Leonardo da Vinci had thought of it, even as he had of the airplane, and Don Glassman writes in his book, "Jump", that an acrobat jumped from a tower with a parachute in Siam in 1687.

There had been a number of descents via parachute from balloons since Andre Garnerin made the first one in France on October 22, 1797. Grant Morton had made the first jump from a plane in 1911, over Venice Beach, California, and shortly afterward Albert Berry jumped from a plane before a group of U. S. Army officers at Jefferson Barracks, St. Louis, Missouri. The officers, however, had not been impressed.

It is quite a different thing to jump from a plane in normal flight and from one which is in trouble. The parachute Garnerin and Berry used, like those being used by the German parachute troops, was what is now called a static-line 'chute. That is, it was always fastened to the plane or balloon by means of a light cord which broke under the weight of the jumper. The jumper didn't have to do anything but jump. This permits a jump at a low altitude, which is the reason this kind of 'chute is used by parachute troops, but Smith felt that, if the plane was falling, there was no certainty the parachutist would fall clear. Even if the cord broke, he reasoned, the 'chute was liable to get tangled up with the falling plane.

He decided the flyer must wear his parachute, jump clear of his plane and open his 'chute in the air. People told him he was crazy. They told him that all the scientists agreed that a man lost consciousness as he fell free through the air.

Smith laughed at this, for he had been a circus aerialist, and he knew that he had fallen free through the air without losing consciousness. He was also told

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that the muslin parachute weighed too much. So he turned to silk, and devised a means of packing the 'chute so a flyer could sit on it, or lean against it comfortably.

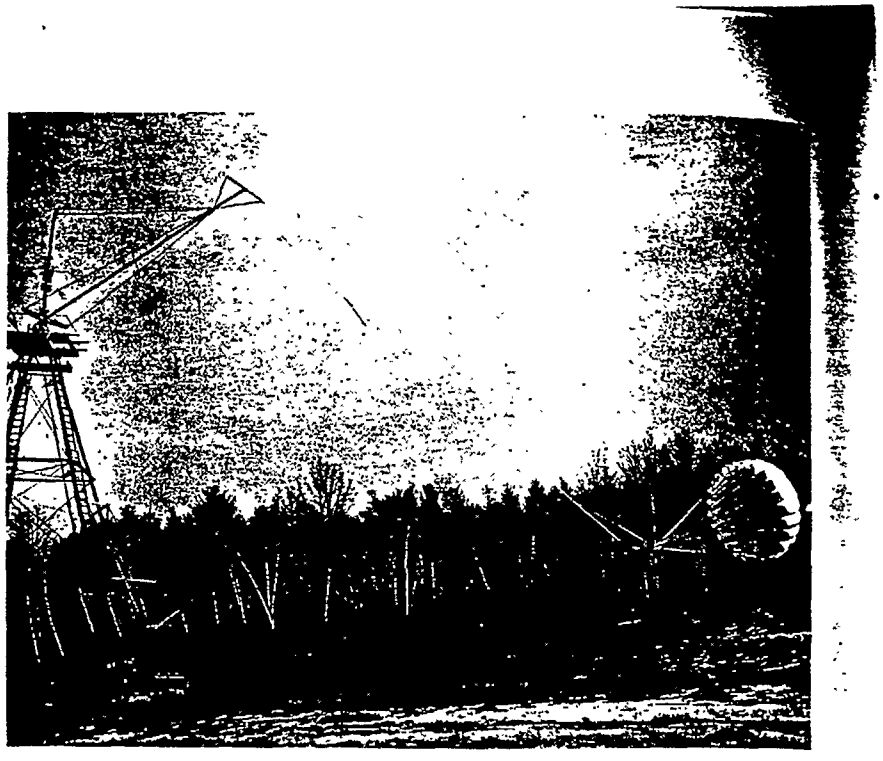
He applied for patents, but nothing came of his invention until the terrific mortality among expensively trained pilots during the World War set the brass hats to thinking, too. During this first World War pilots in observation balloons all wore parachutes, and often saved their lives with them, but it was only during the last year of the war that German pilots began wearing parachutes.

General William Mitchell, who commanded the American air force in France, inquired who in America knew about parachutes. Charles F. Willard, who had been chief engineer for the Martin plant in 1914, was now a colonel and closely associated with General Mitchell, and Willard remembered Smith and his ideas. He told General Mitchell and the general cabled home to have Smith put on parachute experimental work.

This call, in July, 1918, found Smith the final inspector of all aircraft production in the First District, with headquarters in Dayton, Ohio. He was glad to turn back to parachutes, however, and started to work in a cold hangar at McCook Field about the time the Armistice was signed. He was either overlooked, or the Army thought enough of the idea to let him continue his experiments unmolested.

He was given a free hand, for neither the captured German parachutes nor an English one, called the Guardian Angel, which came into use at the end of the war, were considered particularly successful. For months Smith and an assistant named Guy Ball sewed parachutes and dropped them from a plane, with lead dummies attached. Smith was about ready to make his first jump himself when a youth of twenty-two years, named Leslie L. Irvin, arrived at the field on the morning of April 28, 1919, and told him that he had orders to make the first "live" jump with Smith's new 'chute.

Smith was taken aback, but orders were orders and he had to content himself with piloting the plane from which Irvin jumped. The crowd which gathered to watch the test was sure Irvin was committing suicide, but he was as confident as Smith, though in his excitement Irvin didn't watch himself in landing and broke his ankle.



The testing tower, invented by Prevost Smith, makes sure a 'chute will open perfectly.

Floyd Smith was not content with his success, even when parachutes became standard equipment for all Army, Navy and Marine flyers in 26 countries. Two years ago he joined forces with the century-old silk manufacturing house of Cheney Brothers of Manchester, Connecticut, in a new company set up to manufacture parachutes, the Pioneer Parachute Company. Lyman H. Ford, long authoritatively identified with the parachute industry, joined Smith in the formation of the new company.

Cheney Brothers had long been leaders in the silk manufacturing field. A decade ago this firm began making silk cloth for parachutes and in subsequent years sold hundreds of thousands of yards of parachute fabric to parachute manufacturers and to the Federal Government. With this important silk house back of him, Smith was able to experiment extensively. His most recent invention is a new type of pilot 'chute which cannot foul either itself or the main capopy. He also developed a new method of packing the 'chute which eliminates such hazards as lines fouling, the parachute opening inside out, etc. This packing also makes the 'chute more comfortable to wear.

Smith's son, Prevost Smith, has been working with his father in parachute research, and has invented a tower for testing 'chutes, which father and son feel will lead to even greater refinements in making a 'chute that will open perfectly every time. This tower assembles data on the performance of parachutes, similar to wind tunnel tests for airplanes. It is built so as to whirl a dummy in a circle 200 feet in diameter. To the dummy are fastened a parachute harness and pack by means of flexible rods attached to the end of a boom revolving horizontally. A gear train and driveshaft from a 320-horsepower engine at the base of the tower revolves the boom at various desired speeds up to 300 miles an hour.

For many years parachute makers have known that the time required for 'chutes to open varied greatly under apparently identical conditions. By means of the new testing tower and a slow motion picture camera Floyd Smith can

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study the opening of parachutes on a basis which will allow the designing of future models on carefully tested scientific principles instead of by old rule-of-thumb methods.

The camera has been mounted on a "spreader" about one-third of the distance to the dummy from the boom end of the flexible rods which whirl at high speeds during the tests. This makes it possible to obtain close-ups of parachutes in the process of opening.

All details can be seen when the films are shown in slow motion. Recently a group of government aeronautical experts from Washington visited Manchester to witness the motion picture record and commented enthusiastically on the project.

In addition to advancing the study of parachutes, it is believed that the tower may be useful in testing high-velocity destruction of airplane parts and the reactions of humans to "high G" conditions, which occur, for example, during the quick pull-out of a dive bomber at the climax of a power dive.

Floyd Smith was born in Geneseo, Illinois, October 17, 1884, grew up with cowpunchers on the cattle range of Oregon, did a man's job from the age of ten on the ranch and on the range, chewed tobacco and carried a gun. It was a life of hardships instead of song and plenty as depicted nowadays. He was thrown, kicked and stamped by cayuses but the work had to go on as long as he could walk and ride.

As he grew up, Smith developed itching feet; and became in turn a machinist, an orange grower and a worker in a sugar factory before settling down as a circus aerialist. He toured the country for years as a member of the Flying Sylvesters, playing in both circuses and vaudeville. In 1907 he married Miss Hilder F. Youngberg, and for five years tossed her through the air in circuses.

By the time 1912 rolled around they had grown tired of flying so close to the ground, and on January 15, 1912, at Santa Ana, California, they started to build a tractor biplane. Mrs. Smith built the ribs, and sized and shellacked the canvas. Smith made his first flight on June 1, 1912, and after six days more of teaching himself to fly, he took Mrs. Smith up as his first passenger.

They lived, and on July 20 he flew her from Santa Ana to Griffith Park, 47 miles away, in an hour and seven minutes, which set a speed record. A finished flyer by the standards of those days, he began barnstorming the very next month, flying at Overland Park, Kansas City, with Art Smith, Bud Morris and Bob Fowler, all oldtime stars.

It took a year for him to go broke barnstorming. Next he became a mechanic in Glenn L. Martin's factory at Los Angeles, then chief pilot. Soon after his crack-up he made his first parachute jump, using an attached 'chute of course. A couple of days later Mrs. Smith decided to try it. The suspension lines of her 'chute became tangled, and she fell 400 feet before her 'chute opened completely. That also probably helped turn Smith to the idea of the rip-cord and free 'chute.

Meanwhile, Smith yearned to be the third pilot in the United States to loop-the-loop in a plane. He invited Mrs. Smith to go along, but she decided against it. A wing and an aileron crumpled as Smith made the loop, but again he managed to land and live.

Great care is taken with pilot 'chutes, which spring out of the pack and pull the main canopy into the air.

Smith was a test pilot for Martin until 1917, and once delivered a plane to Pancho Villa in Mexico. Villa had been stung by other Americans, who had sold him planes which could not get off the ground in the high altitudes common south of the border, but he was overjoyed when Smith proved that the Martin plane, crate though it was, could get into the air from a high plateau. He demanded that Smith fly it to Mexico City with a message for his associates there, offering base pay of $500 a week and a big bonus for flying, all to be deposited in any United States bank Smith might name.

"He swelled up like a toad when I told him I had a contract with Martin and had to return to the United States at once," Smith recalls. "I was afraid I was going to be shot, but I knew the plane couldn't make it to Mexico City; moreover, I knew that I'd almost certainly be shot by Carranza, if I fell into his hands, or by Villa's own friends before I could deliver his message, if I managed to get through to Mexico City.

"Finally he commanded that I wire Martin to send another pilot down, and insisted on my staying until this pilot relieved me. The wire was changed in transmission, however. Martin decided I'd been shot and wouldn't send anybody else."

The situation was solved when Smith cracked up the plane — by accident too, since one of Villa's officers was riding with him with a bomb on his lap! With the extra load, he was unable to clear a wall on the take-off, and pancaked. The bomb did not explode, both lived and Villa sent him back home!

Smith established three altitude records for seaplanes in 1917, and won the Aero Club of America Medal of Merit. In February, 1917, he went to England for the Marlin Arms Corporation, but returned when the United States entered the war to become test pilot for the Army at Dayton.

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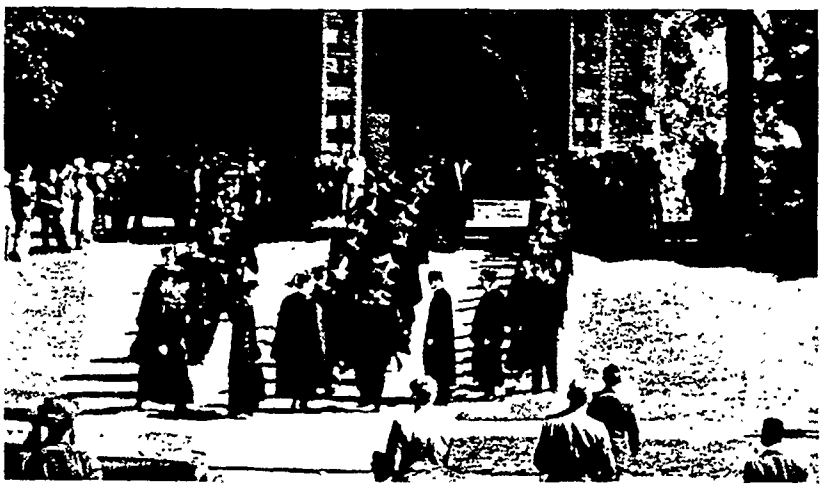

It's a long jump from the college campus into a highly competitive world.

Placing the College Graduate

Industry and the Individual Both Profit When the Latter Steps Direct from the Campus Into a Career Job.

IN THIS era of all out defense production, specialists are needed. Every important industry is looking for men with special aptitudes for their jobs.

But aptitude isn't enough, say many personnel experts. They insist that if industry and the individual are both to get the maximum benefit out of a business relationship, the individual must be in love with his job.

It is the belief of these experts—and this belief is backed up by years of observation and experience—that if a man lacks enthusiasm for his work, he soon comes to detest it, even though he showed promise at the start. As a result, he ceases to advance early in his career and a potentially valuable man is wasted.

As an example of this theory, consider a man who enjoys contact with other men and matching his wits against theirs, as in sales work. Put such a man in production work in a factory and the chances are he will be miserable, even though at first he may show remarkable aptitude for the production job. Keep that man in this job which he detests for a long time and he may even turn an attentive ear to doctrines which oppose the American system.

The same would hold true for a production man miscast in sales work.

In the dear, dead days of the late Twenties, the majority of graduates of liberal arts colleges did one of two things. They either went to law school or they became bond salesmen. A few, of course, went into medicine, the ministry, teaching, manufacturing, and so forth, but they were in the minority. And if a liberal arts college graduate took a job in which he had to work with his hands, his action would be the signal for much eyebrow lifting and other facial expressions of amazement on the part of his fellows.

How the times have changed!

Realizing an urgent need for vocational guidance, as well as for a non-profit exchange through which prospective employers and college students may contact one another, officials of many liberal arts colleges have instituted placement bureaus to help undergraduates step direct from the campus into the right occupation, instead of floundering around aimlessly for several years, trying to "find" themselves. Typical of these bureaus in the smaller colleges is the Williams College Placement Bureau, which operates under the direction of Edwin Holmes, a member of the class of 1923.

Williams, located in Williamstown, Mass., has a student body of about 800 young men and gives on graduation the degree of Bachelor of Arts. Founded in 1793 under the terms of the will of Colonel Ephraim Williams, who was killed in 1755 in the Battle of Lake George, it is one of the oldest institutions in the United States and its problems are typical of those of the average small college.

The Williams College Placement Bureau has been in operation under its present set-up for two years. In 1940, the first year of its existence, Mr. Holmes placed before graduation 90 percent of the seniors who applied to him for jobs. Shortly afterward he placed the remaining 10 percent, for a perfect record.

A large percentage of these men were placed in defense industries, where they are doing manual labor.

In addition to its work with undergraduates, the bureau has placed over sixty alumni through its auxiliary office in the Williams Club in New York City, where Mr. Holmes spends two days each week.

The main purposes of the Williams bureau are to provide vocational advice and to furnish employment contacts. Seventy-five percent of the undergraduates at the time of their first interview are in the dark about what they wish to do when they finish college. To correct this situation Mr. Holmes conducts a course of several interviews which lasts from the beginning of sophomore through senior year.

Sophomores are rated in three groups —the A group, composed of the 25 percent who know what they want to do; the B group, which is undecided between two or three occupations, and the C group, consisting of students who are more or less baffled at the prospect of

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jumping off the dock into a highly specialized and highly competitive world. Mr. Holmes doesn't have to worry about the A group until it is time to line up jobs for them in senior year, but the B and C groups are given a test known as Dr. Kúder's Preference Record, which was formulated by a professor of psychology at the University of Chicago.

Dr. Kuder's test is based solely on interest and is designed to show whether a man has a preference for scientific, computational, artistic, musical, literary, social service, or persuasive work. According to Dr. Kuder, every individual is above average in certain fields of interest and in one or more of those fields lies his best chance for success. For example, if a young man stands high in social service and persuasiveness, he would do well in sales work.

The Kuder test is not an aptitude test. Aptitude tests are not reliable, Mr. Holmes believes, because many persons possess aptitudes for jobs they don't like.

With the result of the Kuder test before him, Mr. Holmes suggests outside reading to each man in lines in which his interests lie. The combination of reading and interviews seldom fails to result in a definite decision before senior year.

As outstanding examples, Mr. Holmes cited the records of two members of the class of 1940, neither of whom knew what he wanted to do when he first came to the bureau. After several talks with Mr. Holmes, one decided to go into banking and the other into industrial personnel work. Latest reports from the New York bank where the former works state that he is one of the most promising young men they have ever employed there. The manufacturing concern which hired the latter has raised his salary three times in less than a year.

To aid him in giving vocational advice Mr. Holmes has made a careful study of the chances for jobs in various occupations at the present time. His findings indicate that a man with production talent can practically write his own ticket, as can an engineer, be he chemical, electrical or mechanical. There are a multitude of jobs in defense industries and in corporations which have been decimated by the draft. Insurance companies are looking for young men to fill salaried jobs. Banks want men under 35. Preparatory school teachers are at a premium, one school in Massachusetts sending a cry for help to the Williams bureau because of six vacancies on a normal staff of seventeen.

On the other hand, the fields of journalism and of law are still very much overcrowded. So is the advertising business, unless a man possesses considerable creative ability. Sales work is limited at present because advance orders have piled up far ahead of production schedules.

The Williams bureau has contact with over 300 business firms, as well as with officials of many preparatory, business and professional schools. About 75 percent of all business contacts come from alumni, who hold frequent meetings in cities throughout the country to spur interest. The bureau's entire financial support comes from the alumni organization.

Although many representatives of the business and professional worlds come to Williamstown to interview undergraduates, in most cases Mr. Holmes sends the job applicant to call on the executive during one of the former's vacation periods. Before a man goes on an interview, however, he is given careful instruction in how to conduct himself and how to answer questions so that he will make a good impression.

Another important function of the placement bureau is to line up summer jobs for members of the three lower classes. For freshmen and sophomores working their way through college Mr. Holmes seeks highly paid occupations, such as skilled laborer in a defense industry, tutor-companion, or camp counselor. For the junior he tries to line up a job in the industry in which the individual is interested, in order to give him preliminary training for his future career.

Not long ago an 18-year old freshman came into the bureau and asked for a summer job. "I hope you can get me something better than I had last summer," he added.

"What were you doing last summer?" Mr. Holmes asked.

"I was working in a foundry," the freshman replied, "but I couldn't make over sixty dollars a week."

Shades of the much maligned Depression and the WPA!

Up until a few years ago placement bureaus were found only in large universities and confined themselves mainly to getting part time jobs for undergraduates working their way through college. Lately, however, smaller schools are coming to realize the value of the placement bureau, with its emphasis on vocational guidance, as a necessary part of education. Non-profit organizations, they are proving their worth, not only to the individual but also to the executive, who must continue to find suitable replacements to fill vacancies in his organization.

A series of interviews aids each man to choose a career job.

Photo by Harry Port

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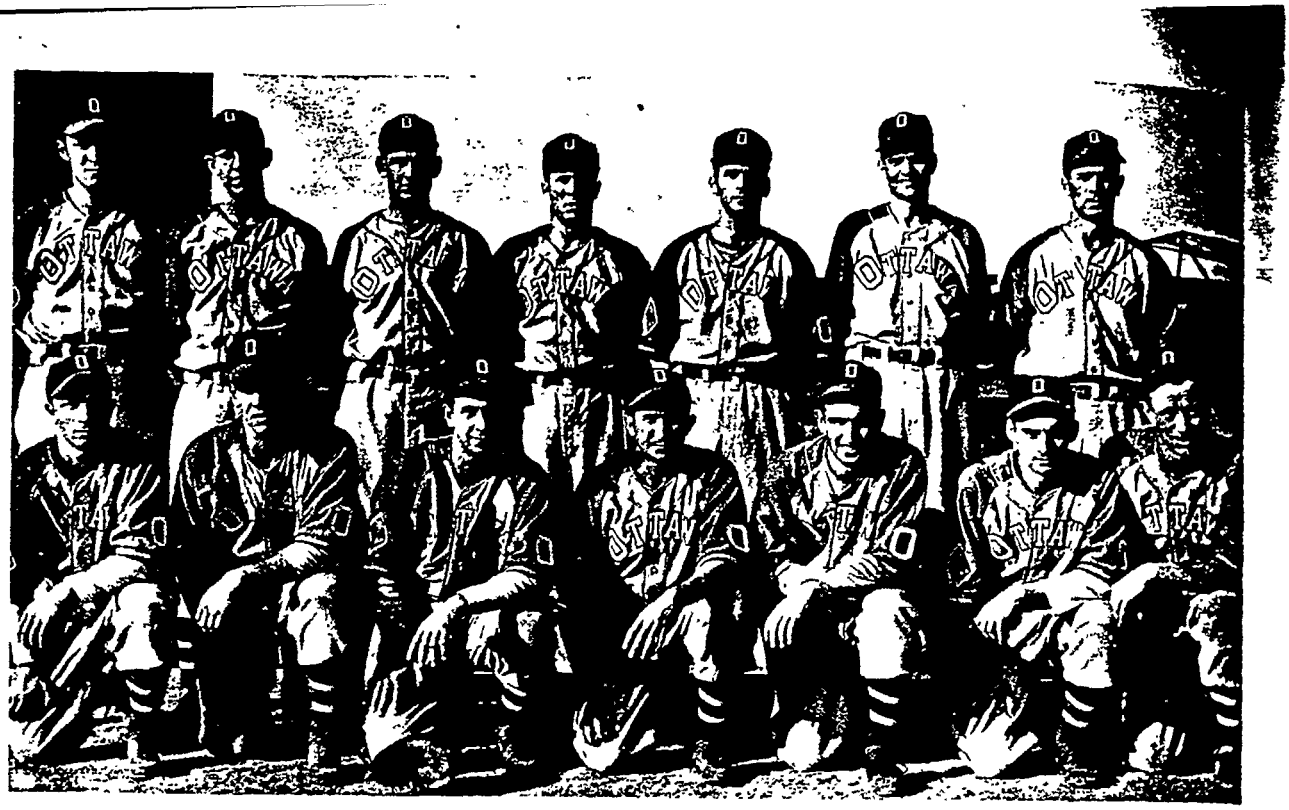

The Ottawa Senators, 1940 Can-Am pennant winners. Podgajny, second from left, Marnie, third from left, Jumonville, fifth from left, rear row, and Masterson, second from right, front row, went up to the Phillies this year.

Courtesy of Rome (N.Y.) Sentinel

Bush League Ball Players

These Young Men Don't Get Big Pay Checks, But They All Dream of Becoming Major League Stars. And Quite a Few of Them Make the Grade!

SAID JOE, the office boy, in a voice tinged with envy:

"Oh, for the life of a professional ball player, riding around the country in air-conditioned pullmans, staying at the best hotels, going to the Sunny Southland for several weeks each winter, working only seven months a year, and getting paid heavy sugar for living such a life of luxury."

Joe, of course, was referring to the big league stars, whose existence does rival that of the proverbial Mr. Reilly. But big league stars, Joe, are few and far between. The great majority of professional ball players are in the minor loops, the Class C and D circuits, drawing down an average salary of $100 a month during a season that is only four months long. Your bush leaguer can't loaf during the off season on such a small annual stipend, but must get out and hustle if he wants to bring home the pork chops.

Class C ball players don't ride the pullman cushions, either. They travel in buses, which isn't a bad way to travel, except that sometimes the jumps between league towns are long. The schedule makers have tried to rectify the latter situation, but sometimes they slip up. There have been occasions when a team played a doubleheader, including one night game, and then jumped into a bus for a 200-mile hop to another town for a second twin bill next day. Arriving at their destination about 4 A.M., the boys had to be out at the ball yard, all full of vim and vigor, by noon. You've got to be rugged to stand much of that.

Although the club lodges its players at good hotels and pays all their expenses while they are on the road, each man must shell out for his own bed and board during a home stand.

There are no long spring training sessions in the South for Class C and D teams. Two weeks on the home lot before the season opens is all the time given over to the business of ironing the winter's kinks from legs, throwing arms, and batting eyes. During this

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time the boys do not receive a cent of pay, since salaries are based on the regular playing season only.

Typical of Class C circuits is the Canadian-American — popularly called the Can-Am—League, which was organized in 1936 with six clubs, three in northern New York and three in Canada. In 1937 there were eight clubs in the loop, and it has continued with that number up to this year, although there has been some shifting of franchises. During the 1940 season Amsterdam, Gloversville, Oneonta, Utica, Auburn, Oswego and Rome, N. Y., and Ottawa, Ont., made up the league roster.

The Can-Am president since 1937 has been the Rev. Harold J. Martin of Heuvelton, N. Y., on the Canadian border. A Catholic priest, Father Martin is the only clergyman league president in organized baseball.

The territory of the Can-Am League is compact, the longest distance between towns in 1940 being the 240 miles from Amsterdam to Ottawa and the shortest the twelve miles between Amsterdam and Gloversville.

Can-Am clubs play a schedule of 126 games, 63 at home and the same number on the road, during a season which lasts from the middle of May through Labor Day. So that fans won't get tired of watching the home town nine in action, the average home stand is limited to three days. Many games are played at night, as most parks are equipped with lights.

When the regular schedule is finished, the club at the top of the won-and-lost standing is declared league champion, but the first four clubs qualify for the post season playoffs. In these the championship team meets the third place nine in a four-out-of-seven series, while the second and fourth place clubs clash in a similar series. The two victors then face each other in a three-out-of-five final. The boys get a sizeable cut of the playoff receipts in addition to receiving their regular monthly salary for the extra time, so there is plenty of financial incentive to play good ball.

Naturally Class C teams don't perform before the pop-eyed thousands that jam their way into the big league parks, but still they don't do badly. Utica, a city of 110,000, holds the season's attendance record for the Can-Am loop with a total patronage of 105,000 in 1939—this despite the fact that the Utica Braves finished in the gloomy depths of the league cellar. The average attendance at week-day games in most parks is around 800, with larger crowds turning out for weekend contests. The record crowd was 4,247 paid admissions at the final playoff game between Gloversville and Amsterdam last year in Gloversville.

The average player doesn't stick around in a Class C loop for long, although a few veterans, clinging stubbornly to the forlorn hope that they may yet show big league stuff, hang on for years. A player usually either advances to a higher classification or drops back to the sandlots. The average stay is two years, and no team in the Can-Am circuit can have on its roster more than six men who have played Class C ball longer than that. This regulation is to keep a club from getting too good and growing out of its class.

Class C baseballers range in age from about 18 to 30. The player limit for each club is 15 men, and no club may pay out more than $1,600 a month in

Joe Krakauskas, southpaw speed merchant, came to the Washington Senators from the Brockville, Ont., club, via Trenton in the Eastern League. This year he is pitching for Cleveland.

Courtesy of American League Service Bureau

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total salaries. The minimum wage for an individual is $80 per month and $150 is tops.

Class C ball is a lot faster than the college game, and college stars are often signed up by big league clubs and farmed out to Class C teams for further seasoning. Most major league clubs have working agreements with Class C circuits, which enable them to sign up promising youngsters and give the boys the opportunity to play daily under competent managers, an advantage they wouldn't get in semi-pro ball. Several former major league stars are minor league managers, among them Wally Schang, once one of the best catchers in the American League, who piloted the Ottawa Senators two years ago.

Baseball men look on Class C and D ball as apprenticeship in the professional game. As apprentices in every trade draw comparatively low wages, so do those in baseball. The difference is that a baseball apprentice, if he has what it takes, can go up much more rapidly than the beginner in almost any other trade.

Between the Class C and D leagues and the majors come the B, A, A-1 and AA circuits, but several Can-Am graduates have jumped speedily from that loop into the big time. Probably the best known of these is Joe Krakauskas, formerly of the Washington Senators but now with the Cleveland Indians. Joe has lots of smoke on his fast one, though at times he has had difficulty in finding the plate. As late as 1936 Joe was tossing his high hard one for the Brockville, Ont., club of the Can-Am League.

Mike Naymick, Cleveland Indian right-hander, twirled for Oswego in 1938.

Courtesy of American League Service Bureau

The bus in which the Amsterdam club travels picks up the team at the ball park.

Courtesy Amsterdam (N.Y.) Baseball Club

Other Can-Am alumni now in fast company are Mike Naymick, with Oswego in 1938, pitching for Cleveland; Harold White, with Rome in 1938, pitching for Detroit's Tigers; Maurice VanRobays, with Ogdensburg in 1937, patrolling the left field pasture for the Pittsburgh Pirates; and four members of Ottawa's championship outfit of 1940, Hal Marnie, George Jumonville, John Podgajny and Paul Masterson, with Philadelphia's lowly Phillies.

Forty-five minor leagues were in operation last year, all of them under the supervision and control of the National Association of Professional Baseball Leagues. President of this organization is Judge William G. Bramham of Durham, N. C., who exercises powers similar to those of baseball's high commissioner, Judge Kenesaw Mountain Landis. Class C leagues, in addition to the Can-Am, are the Arizona-Texas, Cotton States, East Texas, Michigan State, Middle Atlantic, and the Pioneer and Western Association.

The "boys", specifically the fans and sports writers, have made the bush leagues the subject of much good-natured razzing, but baseball men agree that they are vital to the life of the American and National Leagues. A scarcity of minor leagues, with the resultant cutting off of this constant source of new talent, would ultimately sound the death knell of the major circuits. That is why big league clubs continue to give financial aid to bush league farms which year after year operate at a loss.

Maurice Van Robays, who starred with Ogdensburg in 1937, is playing left field for Frankie Frisch's Pittsburgh Pirates.

Courtesy of Pittsburgh Pirates Baseball Club

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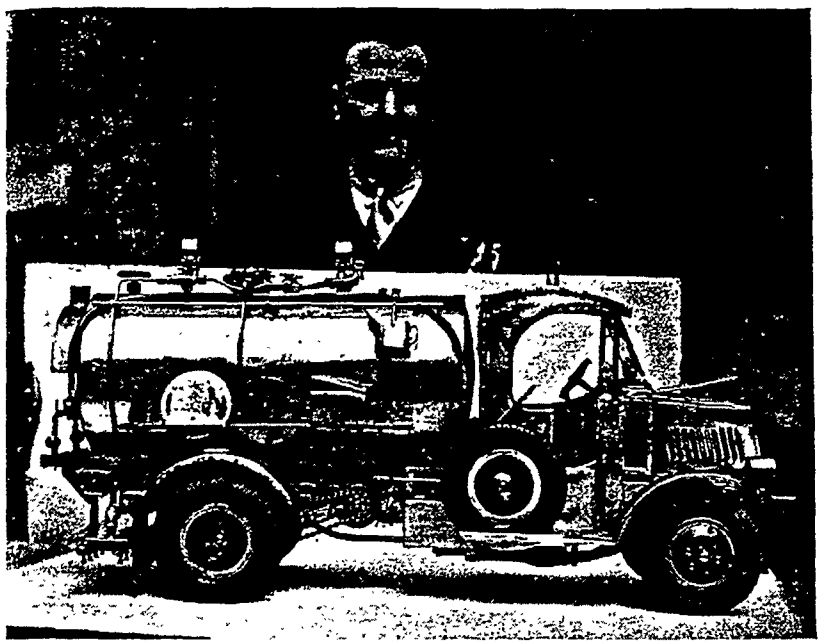


Tank Cleaner Builds Model Truck

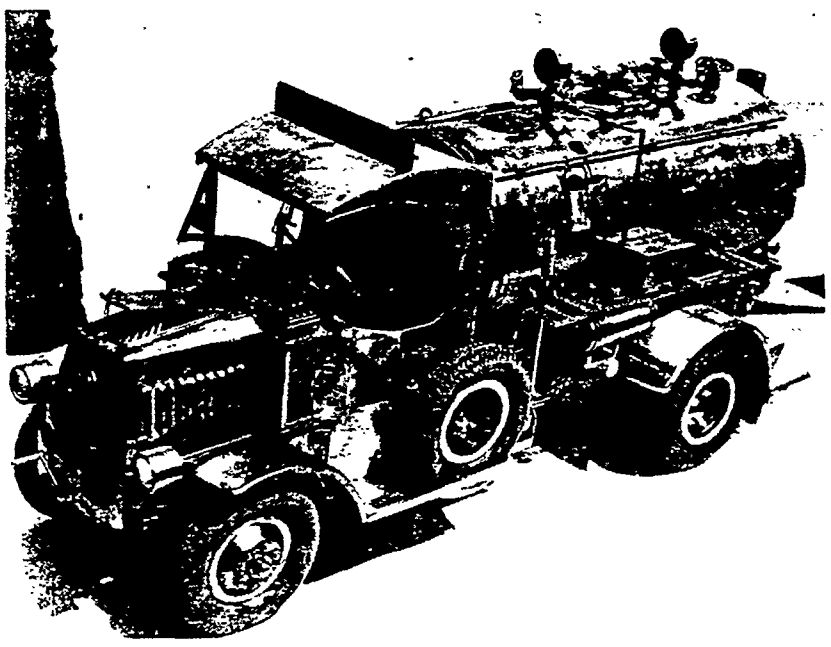
FRANK MOSCOLONI, of Everett, Mass., has developed a truck model which in every detail is like a full-size asphalt spreader truck.

Spending considerable time for six months on it, Mr. Moscoloni turned out the tiny parts with hammer, chisel and pliers. The only parts purchased for the truck were the tires.

The truck is not a toy, but an accurate model of the big trucks which states and cities use to oil and tar roads. It is 38½ inches long, 14 wide and 20 high. There are double wheels on the rear, two spares with tiny locks on the extra tires, and detachable disks for the rear wheels to prevent oil from getting in the sprockets while the truck is laying asphalt. It has three chests with all the necessary equipment for permanent and patch work on road beds. A shift lever regulates the air compressor, the air from which forces the asphalt from the rear spreader.

Mr. Moscoloni has developed some interesting ideas in connection with tank cleaning, which is his job. At the present time he is employed by the Socony-Vacuum Oil Company.

One of the pictures on this page shows Mr. Moscoloni with his model. The other gives a three-quarter view of the tiny truck.



This Month's Cover

THE Battle of Chapultepec, fought September 12 and 13, 1847, was the last large scale engagement of the Mexican war.

Chapultepec, which means Grasshopper Hill, was an isolated rocky mound 150 feet high, located two miles southwest of Mexico City and commanding a main road into the city. It was precipitous on all sides except the west and southwest, which sloped gradually to swampy ground intersected by irrigation ditches. Formerly the country seat of the Aztec emperor Montezuma, its summit was occupied by a military academy in 1847.

During the engagement Lieutenant James Longstreet of the Eighth Infantry was seriously wounded, whereupon Lieutenant George E. Pickett snatched the regimental colors from his hand as he fell and carried them over the wall.

Sixteen years later the destinies of these two men were again closely linked when, on a sweltering July day in the little Pennsylvania town of Gettysburg, General Longstreet, his head bowed on his chest, reluctantly gave the order for the gallant but suicidal charge of General Pickett's brigade, in which the flower of the Confederate Army was mowed down by Union guns.

Other young officers headed for fame who took part in the action at Chapultepec were Robert E. Lee, Stonewall Jackson, Joseph E. Johnston, D. H. Hill, J. B. Magruder, P. G. T. Beauregard, and George B. McClellan. Franklin Pierce, who in a few years was to become President of the United States, would have fought if he hadn't been wounded five days before at El Molino del Rey.

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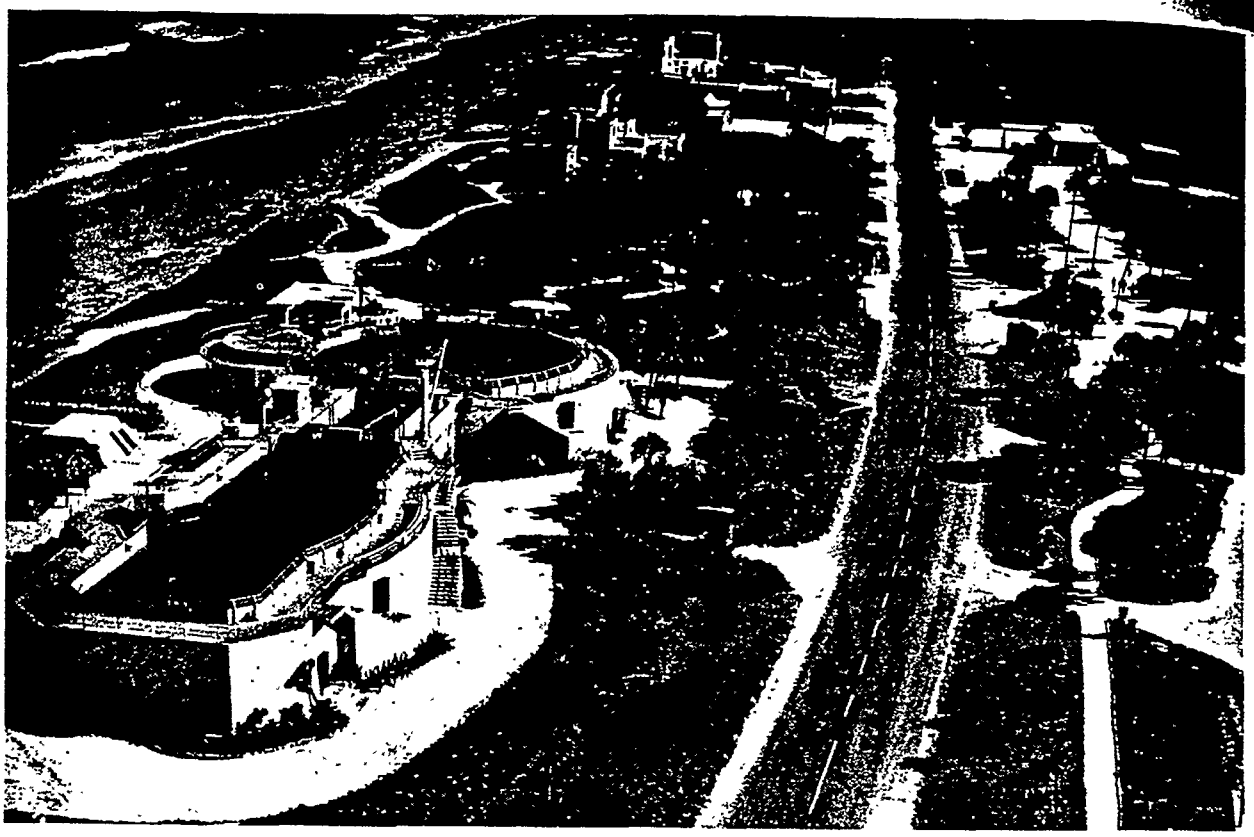

Marine Studios' two huge tanks contain 850,000 gallons of sea water.

A Trip to the Ocean Floor

At Marine Studios in Florida Science Discards the Diving Suit for a Comfortable Chair and a Camera.

BEFORE us lie the broken remains of a sunken vessel resting forlornly on the ocean bottom. A 400 pound jewfish stands silent guard before the entrance to his barnacle-encrusted home. Suddenly from the haze around the stern of the wreck appears the Martian figure of a diver, a billowy cloud of bubbles rising from his helmet airvent and cascading to the surface. The giant jewfish backs away a few inches at this intrusion into his domain.

As if this might be the cue for action the scene is rapidly filled with moving objects. Two huge mantarays, or devilfish, flap slowly through the background. A school of silvery bumper fish glide gracefully past the diver who is now cautiously maneuvering around the wreck. Then from nowhere looms the great shadow of man's most dreaded enemy of the deep—the shark! Twelve feet of sinewy, living dynamite hangs motionless, surveying the scene.

The diver freezes, hands at sides, and for a moment even his air bubbles appear to cease. But the huge monster is ignoring the diver completely. Before our wondering gaze, Mr. Shark comes to rest a few inches from our face, his beady eyes surveying us intently. For a thrill-packed moment man and monster stare at each other, until with a sulky swish of his tail the gray brute swims away. The diver moves on, small fish peer timidly from their rocky hiding places and the pastel-shaded sea fans sway with the motion of the current.

No, this isn't the preface to a fictional yarn of the deep. We have simply witnessed a normal, daily occurence at science's newest outpost for the study of marine life as it exists in the open sea.

Marine Studios at Marineland, Florida, is the place. Located 18 miles south of St. Augustine, this great mass of concrete and steel is an imposing monument to that field of science which seeks out the mysteries of the undersea world.

Marine Studios is the world's only

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oceanarium and only specially designed professional underwater motion picture studio. The difference between Marine Studios and other aquariums lies in the fact that here marine life is not segregated in small tanks by species, but placed together as it exists in the sea.

Two huge tanks, one circular and 75 feet in diameter, the other a rectangular tank 100 feet in length, comprise this unique institution. Enclosed galleries run the perimeter of the buildings, and in the sides and bottom more than 200 large, glass portholes have been placed for the observation of deep-sea denizens in a normal existence.

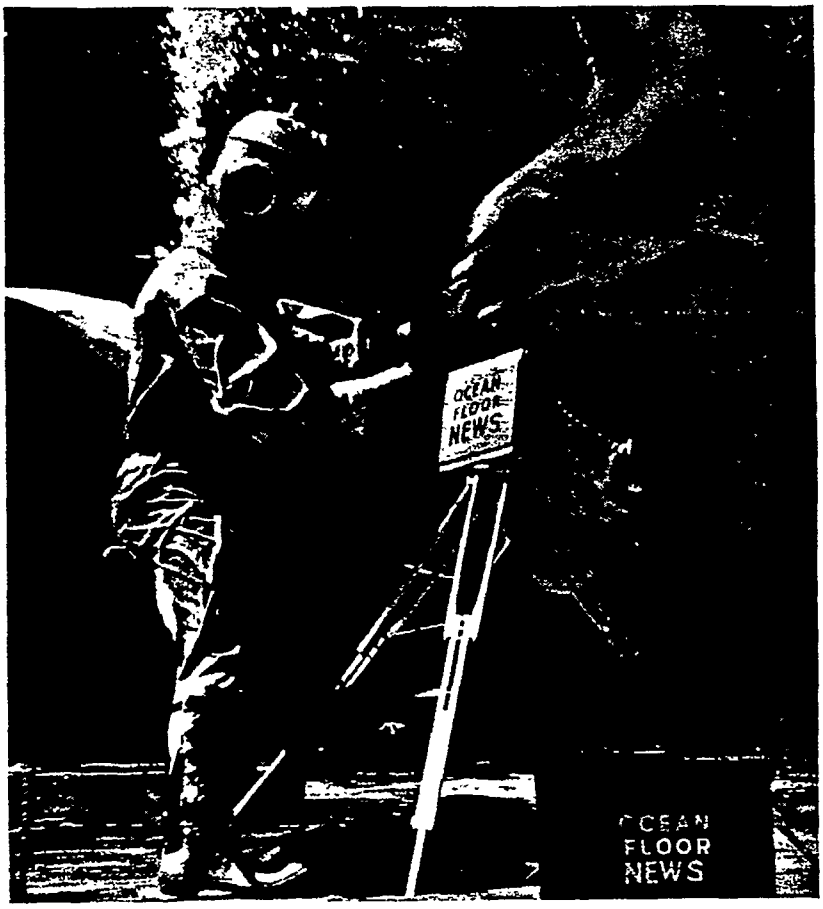
In these gigantic reservoirs have been placed a seven ton coral reef, a five ton rock garden and countless sea fans, shells and plumes. Here in these cavernous grottos, gayly colored tropical fish seek safety from their predatory enemies. Playful porpoises rise to the surface to breathe air from the curious blow-hole in the top of their heads. Clumsy turtles, some weighing 300 pounds, lumber lazily through the iridescent waters. A 1000-pound sea cow patiently nurses her 300-pound youngster. A school of mullet stupidly stumble over themselves as they flee from a mammoth shark.

Nature's mysterious, salt-water fairyland has been duplicated on land. Youthful W. Douglas Burden, trustee of the American Museum of Natural History, is the author of the dream that has materialized and is now attracting scientists, motion picture technicians, and laymen from all over the globe.

Conceived as a scientific institution, the secondary aim is to provide the setting and atmosphere required for the making of underwater motion pictures. Heretofore it had been necessary either to build small miniature tanks for underwater photography—thus losing the perspective, and the opportunity to work with giant specimens—or to go below the surface of the ocean in diving suits and bells. This latter method was almost totally unsatisfactory, inasmuch as it was necessary for the cameraman to wait for fair weather, and after that came weeks of patient waiting for the fish to swim by.

In the oceanarium an ever-changing

Still under the influence of an anesthetic, this tiger shark must be kept moving to force water through his gills or he will drown. A jewfish watches the proceedings.



The porpoise is more interested in snatching a mullet from the diver's hand than in posing for the camera.

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panorama of marine life moves before the observation ports. Fair weather or foul, the colorful inhabitants of the deep parade in review.

Science has sharpened its pencil of knowledge and is jotting down notes on ocean technicalities heretofore unknown. Equipped with its own modern laboratory, Marine Studios has a competent staff of biologists who are constantly cataloging the newly deciphered knowledge garnered from the lives of the inmates.

A fishing fleet owned by the oceanarium is in constant search for new specimens for observation and for the replacement of species that have become extinct in the great tanks, whether through death from natural causes or violent death from predatory enemies.

This fishing equipment is said by experts to be the most complete of its kind in the entire world. In addition to a full stock of nets ranging from small four-foot hand nets to thousand-yard shark nets, the specimen department maintains live cars, cranes, canvas hammocks, and harpoons. A specially designed hypodermic harpoon is capable of injecting a drug into a huge shark which in sixty seconds stuns and incapacitates the monster for two hours or longer, with no "hangover" or after effects.

What are the future plans for this mammoth project that has already cost its backers a million dollars? Of what benefit will these great tanks be to the world in the years to come?

First, the world of science in the fields of experimental biology and ichthyology can probe into the inner secrets of Father Neptune's vast domain. Intimate knowledge of marine life that has before been buried beneath tons of blue green waters and inaccessible to man is now spread before his gaze, for here marine life seeks out its own existence as it does in the seven seas.

Secondly, the motion picture industry has at hand the props necessary for successful underwater work, whether the story and continuity be of two divers fighting on the ocean floor, a diver raking forth golden guineas from the hulk of a Spanish galleon, or natives pearl fishing in the South Seas.

Slow moving turtles and speedy porpoises crowd around the diver at feeding time.

Almost completely out of the water comes the porpoise for his dinner.

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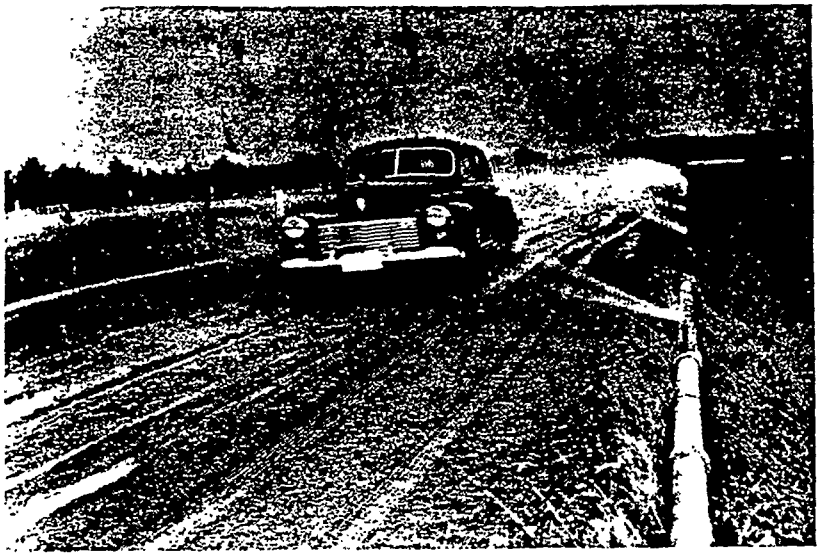

A trip along this dirt road, transformed by artificial rain into a sea of mud, reveals whether or not a car is weatherproof.

They Find Out the Answers

Engineers Put New Cars Through All Kinds of Grueling Tests, Both in the Laboratory and on the Road, at the General Motors Proving Ground.

OVER winding roads and straightaways and in shops and laboratories, a group of test drivers and engineers are working night and day to determine why today's cars are better than yesterday's and how to improve still further the car of tomorrow. Economy, speed, pick-up, hill climbing ability, brakes and durability are a few of the qualities tested on the road and double checked by laboratory analysis.

The place is the General Motors Proving Ground, located near Milford, Mich., 45 miles northwest of Detroit, where a community of 175 men devote all their working time to the sole purpose of measuring motor cars.

Every year the Proving Ground buys more than 100 cars, selected from the largest volume models of nearly every make in the world and purchased from independent dealers to insure that they are truly representative products. Each new car is taken first to the Engineering Tests shop, where all its measurements, inside and out, including compression ratio, are taken by the most accurate devices. A giant vacuum cleaner pumps the air out of each closed car in a test to determine tightness of body construction. A huge pendulum, electrically timed to a fraction of a second, swings the car back and forth and locates its exact center of gravity — which is important, as center of gravity affects an automobile's ease of handling. The amount of weight on each wheel, wheel alignment, rigidity of the chassis, and the headlights are also carefully checked.

The machine then goes out on the road and is broken in for 2,000 miles, during which it is driven slowly at the start and gradually stepped up until top speed is reached. There follows a 26-mile test for performance, economy and handling when the car is taken over every known type of road. This includes a stretch of Belgian block made especially bumpy so the car will pitch from side to side; a series of hairpin turns so sharp the tires scream for mercy; a dirt road which has been flooded to make it a sea of mud.

To determine skid characteristics, steering effort required by the driver, and stress on the wheels, a car is driven fast, with the wheels cramped as far as they will go, around a huge circular area of concrete. Sometimes so much strain is put on the tires that they blow out and are ripped off the rims during this performance.

Brakes are tried at high speeds. Hill climbing ability from both standing and moving starts is ascertained on a slope so steep that the automobile seems almost to be hanging in the air from its radiator. During the winter cars are allowed to stand outside all night in subzero weather, to see how they start in the morning.

Gasoline and oil consumption are tested with the help of special instruments designed by the Proving Ground's mechanical engineering department. During this test the car is driven at varying speeds over a measured mile on the straightaway. It is also taken on a 306-mile highway run at an average speed of 45 miles an hour.

After its strenuous ordeal on the road the car goes back to the shop for inspection and overhaul, including a horsepower check on a chassis dynamometer. At this point "Elmer" steps into the picture, "Elmer" being the electric listening post installed in the front seat to catch the noise and vibration which must be eliminated to bring the maximum amount of driving comfort. "Elmer" tests the car at cruising speed, at full throttle, and on a chassis dynamometer, to make sure that no squeak or slight vibration escapes him.

When all this data is finally assembled by engineers and test men, it is turned to the technical data department for translation into statistics.

One group of cars is tested for dur-

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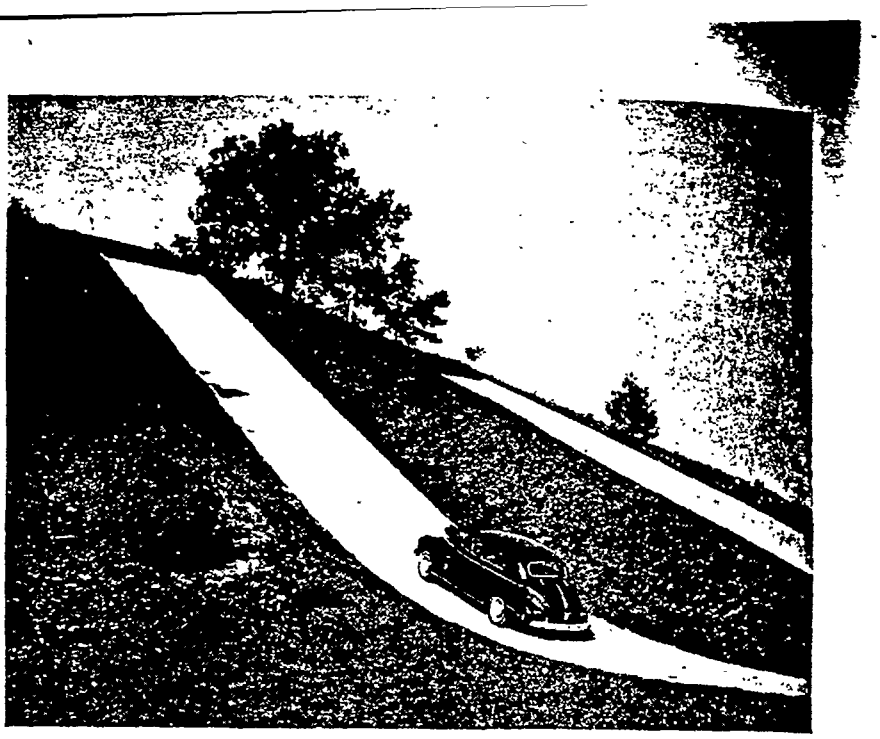

An automobile that makes this grade can climb any hill it encounters on the highway.

ability and each one in this group is driven 24 hours a day over roads of all kinds. Three shifts of drivers keep the cars rolling, and they turn in reports which include mileage covered, gasoline consumption, weather and prevailing winds.

Parts which fail during this grueling test are removed, tagged to show at what mileage they became defective, and replaced by new parts. At 25,000 miles, which is the distance of the durability run, the car is taken down completely and each part weighed and photographed for further study — quite a job when it is remembered that the average car is made up of 17,000 parts. In this way every new mechanical development is checked thoroughly before it is released as stock equipment.

The Proving Ground covers 1,300 acres of land within which are over 25 miles of roads. It has a weather bureau, living quarters for the personnel, and a dozen shops, garages and laboratories for testing. Since 1925 more than eighty million miles have been traveled along testing routes and over seven million gallons of gasoline have been burned in the quest for facts about motor cars. In 1940 Chevrolets covered 824,000 miles, Pontiacs 778,000 miles, Oldsmobiles and Buicks 600,000 miles each.

Since the first car was driven down the one-mile straightaway in 1924, the facts learned have been worth many millions of dollars. For example, as a result of the findings, one low priced car during the past ten years has increased its speed 26 percent, its acceleration from 10 to 25 miles per hour by 28 percent, its hill climbing ability by 69 percent and its fuel economy by 15 percent, while its price has gone up only nine percent per pound.

Out in Phoenix, Ariz., the Proving Ground maintains another laboratory so that Michigan tests can be duplicated and double-checked on desert and mountain roads in a warm, dry atmosphere.

Cars left out all night in sub-zero weather to find out if they start easily.

The Following

Service Awards

have been made as of
July 1st, 1941

15 YEARS

DR. KARL KITZMILLER — Medical, Cincinnati

DR. WILLARD F. MACHLE — Medical, Cincinnati

JOHN C. POPE — Laboratory, Yonkers Control

J. COARD TAYLOR — Sales, New York General

10 YEARS

IDA S. MILSTIN — Gasoline Testing, Detroit

JANET W. CANCRO — Sales, New York General

5 YEARS

FRANK DEEMER — Chemical Research

JOHN L. EBELL — Manufacturing, Deepwater

DONALD H. PULLEYBLANK — Gasoline Testing, Detroit

CHARLES C. SHEPHERD — Gasoline Testing, Detroit

MILDRED R. SPENCER — Sales, New York General

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Cars raise clouds of dust at the General Motors Proving Ground, as dirt roads test them for durability and economy.

The Men who Race with Death

HOW MANY LIVES the ambulance drivers of America have saved through their skill and courage cannot be estimated. It is reported that in a single large city there are over thirteen hundred emergency ambulance calls a day. The driver and the doctor who rides with him must consider *every* such call urgent; and the ambulance, itself, must not fail them in their race to save precious minutes and lives.

It is a tribute to the engineering genius of the automotive and petroleum industries that gasoline engines were soon made so reliable, so fast, so easy and sure to start, that they could be used in emergency vehicles—ambulances, police patrols, utility repair trucks. But the men of these industries are not resting content with what they have produced. Each day they are striving further to improve engines and fuels so that all of us may enjoy the benefits of still better automobiles, trucks, buses, tractors and airplanes.

In this further development, Ethyl research workers offer both product and service to the automotive and petroleum industries. For while we are in business to help refiners improve gasoline through the use of our product—anti-knock fluid containing tetraethyl lead, we realize that better fuels are of value only in so far as engines are improved to utilize them—and vice versa. The two must progress together.

Today our research laboratories in Detroit and San Bernardino are serving the engineers of both the automotive and petroleum industries as a "clearing house" for automotive progress—cooperating in and directing individual research efforts toward common goals. And Ethyl service engineers are assisting many commercial users of fuels and engines to take advantage of day-to-day improvements. By serving technical men in every phase of automotive development we serve "everybody." For even those advances which for the moment are of interest only to engineers will ultimately result in giving the public better and more economical transportation.

ETHYL GASOLINE CORPORATION

Chrysler Bldg., New York, N. Y.

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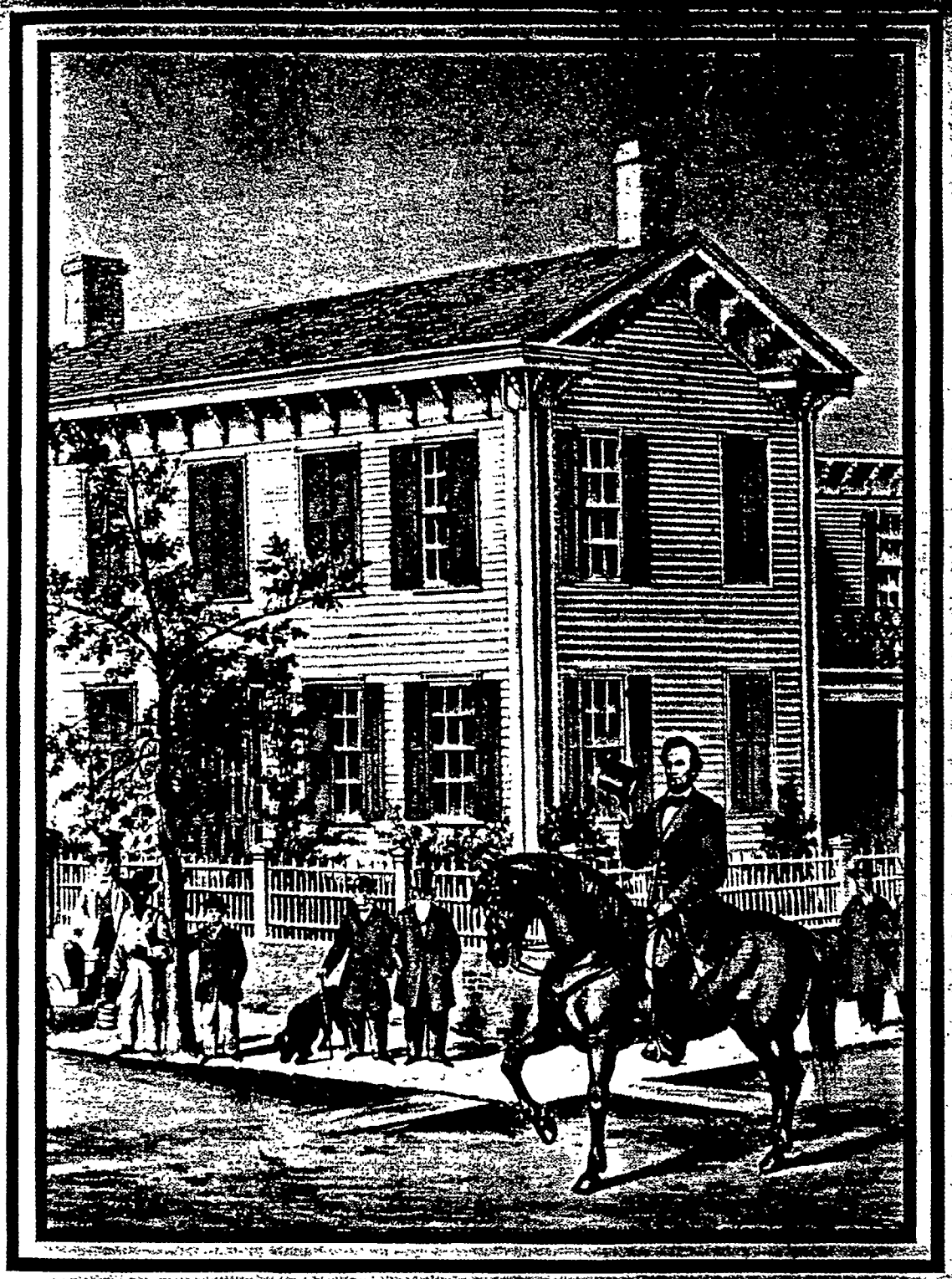

ETHYL NEWS

August 1941

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IN THE ETHYL NEWS

AUGUST 1941

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The proud race of men who hang up steel even have a language of their own

Roll Your Own Home! 6
Thousands—but not millions—find that life in a trailer has its advantages

No Handicaps Recognized 9
The famous beg no favors

Suicide Or Glory 10
Early trans-Atlantic flyers gambled for fame against the Grim Reaper

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Poison For Bugs In Knock Test Engines 14
Technicians discuss problems at Tulsa forum

Money Grows On Trees 16
They made citrus business big business

Lamps For Drying Auto Bodies 19
Precious minutes saved in turning out equipment for armed forces

Plastic Car Bodies On Their Way 20
Soon dented fenders may be a thing of the past

THIS MONTH'S COVER

Abraham Lincoln bade farewell to Springfield, Ill., February 11, 1861, and left for Washington.

The horizon was black with the threatening storm clouds of civil war. As early as December 20, 1860, South Carolina had voted in convention to secede from the Union and had declared herself an independent state. She had been followed in rapid succession by Mississippi on January 9, 1861, Florida on January 10, Alabama on January 11, Georgia on January 18, Louisiana on January 26, and Texas on February 1.

At a meeting of delegates from six states in Montgomery, Ala., Jefferson Davis of Mississippi and Alexander H. Stephens of Georgia had been elected on February 9 president and vice-president, respectively, of the new Confederacy.

And in the North many influential men were for peace at any price, even if it meant letting the southern states go their own way.

Feeling was very strong against Lincoln. Rumors of an assassination plot caused him to change his itinerary in the middle of his journey to Washington and to enter the city secretly.

But in his inaugural speech he left no doubt about the course he would follow. "The Union of these States is perpetual . . . I shall take care, as the Constitution itself expressly enjoins upon me, that the laws of the Union be faithfully executed in all the States."

And his closing words gave an insight into the greatness of character of the man who was to save the nation from disaster. "We are not enemies, but friends. We must not be enemies. Though passion may have strained, it must not break our bonds of affection."

"Roughnecks" Finish Skeleton of New Baton Rouge ELA Plant: Unit Should Be in Operation This Fall.

TEXAS JOE held up his catch-can and banged on it with the tongs. Into the echoing clatter of a half-dozen rivet guns he sang out, "*Ho-o- — rivet!*"

Forty feet away, at the rivet forge, Whitey looked up and gave the blower crank another whirl. The blower growled and whined; white fingers of flame reached up through the lumps of coke. Whitey dipped his tongs in the water-bucket, dug a glowing pink rivet out of the coals and swung his arm. The rivet arced through the air and landed in Tex's catch-bucket with a clunk.

With his little pick-up tongs Tex fished out the rivet, banged it against the can to knock the hot scale loose, and pushed it into the next hole of the connection where his crew was working. Dixon, the big fellow, laid his dolly bar over the rivet head and leaned his weight against it. Slim rammed the nose of his compressed-air gun against the tail of the glowing rivet and leaned into it as he squeezed the trigger. For a quarter of a minute the two men held on while the

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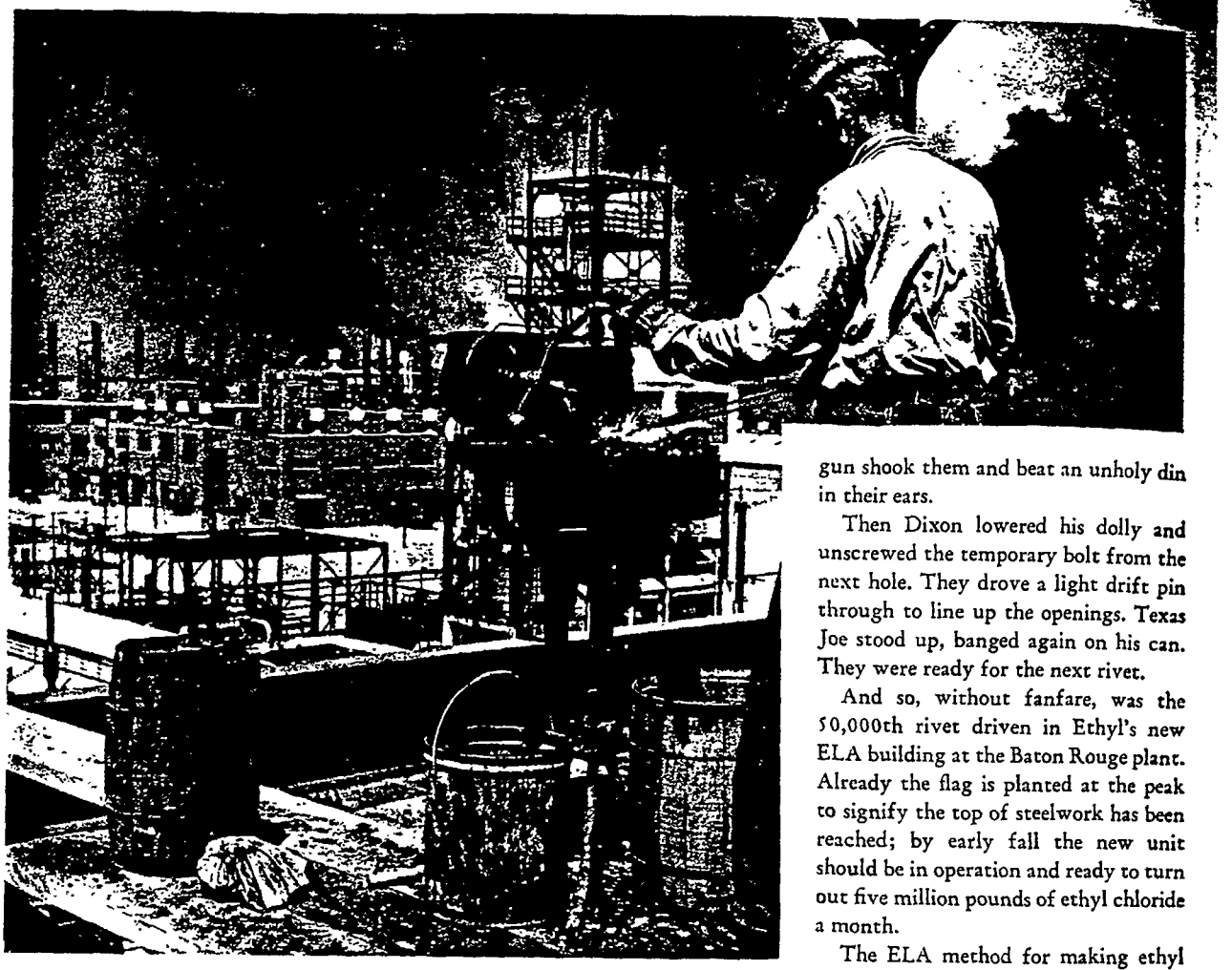
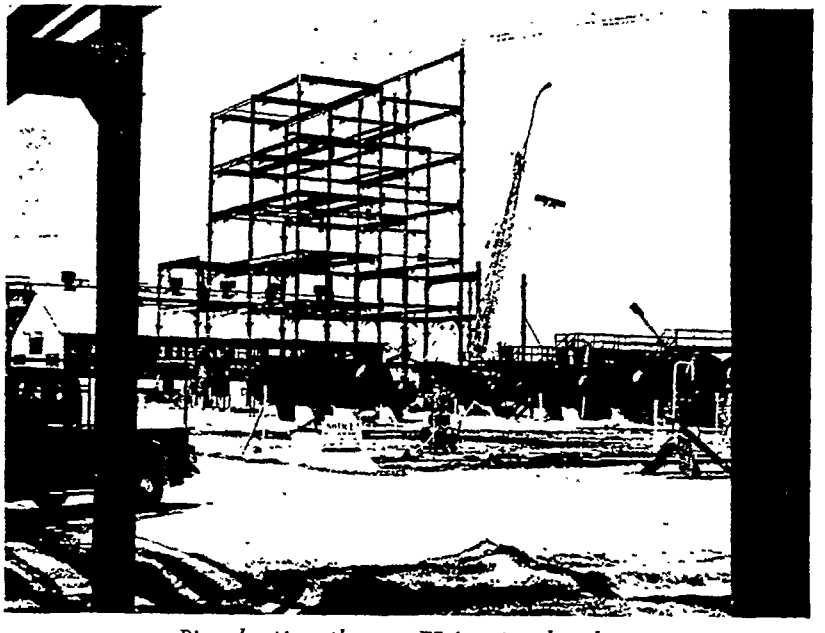


The "heater" at his coke forge cooks up the rivets.



Piece by piece the new ELA unit takes shape.

gun shook them and beat an unholy din in their ears.

Then Dixon lowered his dolly and unscrewed the temporary bolt from the next hole. They drove a light drift pin through to line up the openings. Texas Joe stood up, banged again on his can. They were ready for the next rivet.

And so, without fanfare, was the 50,000th rivet driven in Ethyl's new ELA building at the Baton Rouge plant. Already the flag is planted at the peak to signify the top of steelwork has been reached; by early fall the new unit should be in operation and ready to turn out five million pounds of ethyl chloride a month.

The ELA method for making ethyl chloride, one of the intermediate chemicals needed for producing the ingredients of Ethyl fluid, is a process that catches the interest of petroleum engineers because it uses, as its chief raw material, petroleum gases from a nearby oil refinery. Stabilizer gases, formerly burned as fuel, are now piped a half mile or so, over to the Ethyl plant, where they go into a cracking furnace. There, in much the same way that certain gasoline stocks are thermally cracked, the three- and four-carbon molecules are broken. By means of fractional distillation a pure stream of ethylene gas is obtained — which is treated with acid to form ethyl chloride. Temperatures in the cracking furnace run above 1400° Fahrenheit; a few yards away the gases are distilled at 140° below zero.

This ELA method of making ethyl chloride was developed especially for

(Continued on page 22)

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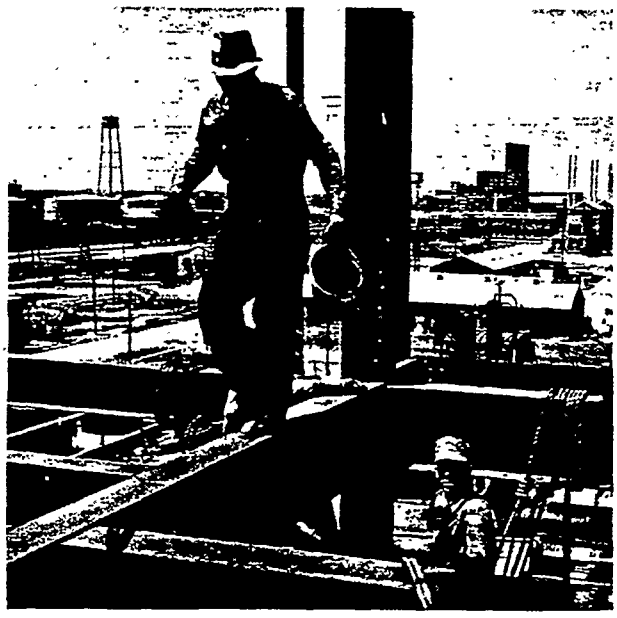
High above Ethyl's Baton Rouge plant, a rivet crew takes time out for a drink.

For this connection they have to "burn" a special hole.



Sure-footed, the catcher steps over to snare another rivet.

Roll your own home!

Conveniences of Modern Trailers Emphasized as Government Adopts Them for Defense Project Housing.

By KARL HALE DIXON,
Editor, Automobile and Trailer Travel

THE way that coach trailers plopped into public consciousness in the early 30's was so spectacular that they created quite a splash.

The real estate men felt that their interests were being trampled on by the potential Nomad hordes. They swallowed, hook, line and sinker, the predictions of economic sooth-sayers who prophesied that in twenty to thirty years half the population of the country would be living in trailers and the sanctity of accustomed living conventions would become, like ancient mythology, consigned to the limbo of the forgotten past. Even cartoons in national magazines depicted the old homestead being deserted and left in tears while the family moved into a sleek looking trailer to follow the southward flight of the birds.

Now, in that initial era of trailering in America, nobody could make an accurate or even plausible guess as to the number of trailers in existence, so all kinds of figures were tendered. No association of the manufacturers had been formed. The federal government had made no count. Even the state vehicle departments didn't know their registration figures; they lumped all sorts of trailers in one classification—house or coach, utility, display or commercial, freight or transport, etc., etc.

About that time, the pioneer magazine of the field, Trailer Travel, came into existence, and like many industry or trade publications, it became the information bureau for the trailer field as well as for the public that had be-

come curious about trailers. Even the government, admitting its lack of knowledge on the subject of trailers, turned to the magazine for facts and figures about them.

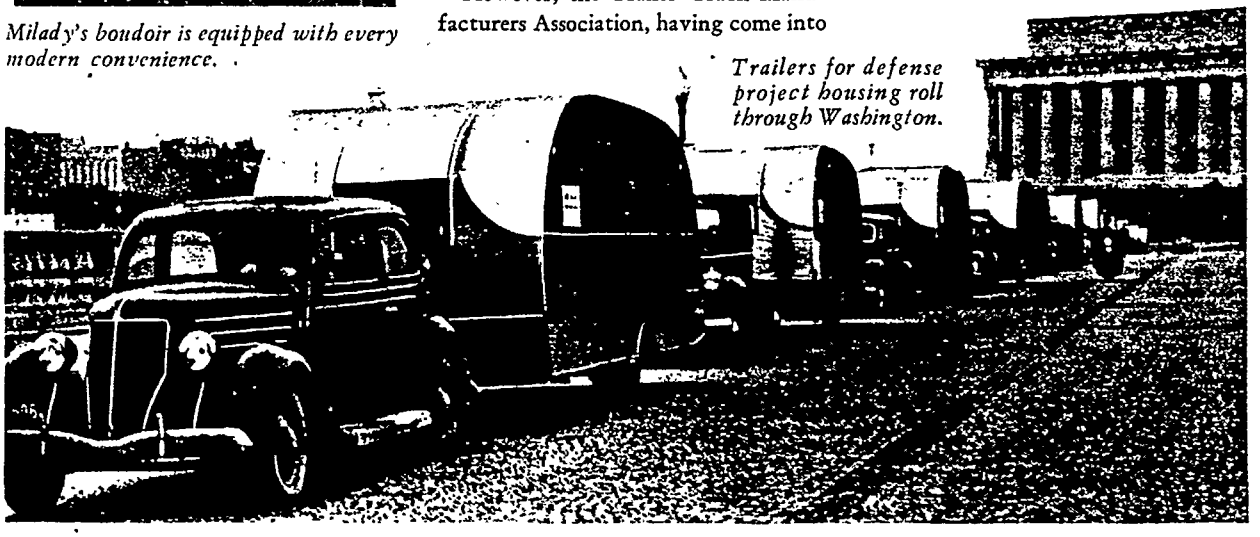
A comprehensive survey was more a matter of computation than of compilation because of unknown quantities such as home builders, of which there were literally myriads, but the result had to be one that could guide the industry as well as impress the general public. It was a large order with divergent aims. However, the magazine set about devising a pseudo-scientific basis for making a census and reached a result. The American Automobile Association had predicted a half million trailerites by the end of 1937, and that became quoted as the number of trailers in existence. The total was set by Trailer Travel at approximately 300,000 or twice what it actually is today—about 150,000.

Twice, in checks that were made, well over six hundred builders proclaimed themselves on their printed letterheads to be trailer manufacturers. That is twelve times the actual number —or about fifty—that are substantially in the picture at this moment. These figures caused something of a scare in hotel, real estate and building trade circles, and anti-trailer ordinances were agitated and passed in some places.

However, the Trailer Coach Manufacturers Association, having come into existence in the meantime, through the effort of its legal department eliminated much of the antagonism and unfairness in those proposed measures, and the association itself got behind legislation which it considered desirable for the general public and the trailer owner as well — such as the ordinances that have been passed by New York City; Toledo, Ohio; Milwaukee, Wis., and elsewhere.

A folding double bed offers beauty rest comfort for two.

Milady's boudoir is equipped with every modern convenience.



Trailers for defense project housing roll through Washington.

ETC 31355

Meanwhile, the primary uses of trailers and the trailers themselves have changed. Formerly the popular price range was from $400 to $700, but today it has moved to the $700 to $900 bracket, and while the number of coaches produced in 1940 was considerably less than in the preceding years, the total dollar volume was almost 50 per cent more than in any previous year.

Today, more than 90 per cent of all trailers being built are for living purposes primarily, rather than for touring exclusively, which means, in its effect on the manufacturers, that recently the trend of trailer building has been toward larger coaches because of the added living conveniences which the increased space affords. This, in turn, has been emphasized and enhanced by the government's current adoption of trailers for defense project housing. Such coaches have become the pinnacle of housing for both army officers and defense workers.

At the same time, the private citizen continues to see in trailers — more than ever now — a freedom and an economy that he could not enjoy so easily before their advent, and naturally he prefers to convert and divert his former rent check into an installment on a home that he can own himself — a rolling home which will remain his own and his family's wherever his work may call him.

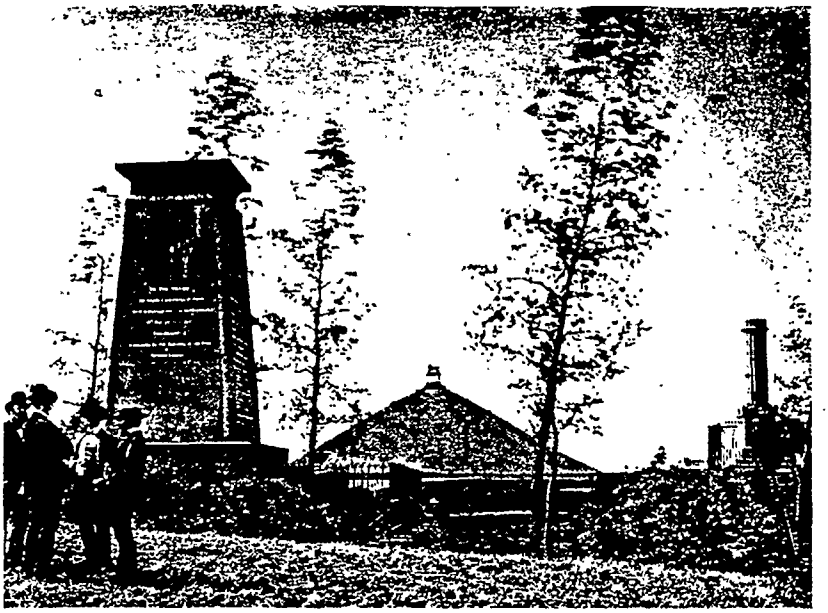
Trailers, instead of lowering the living standards of their owner-occupants, actually are raising them, a recent survey by Automobile and Trailer Travel magazine has revealed. One only has to compare $25 to $50 a month apartments and houses with the modern deluxe coach trailers now being sold for dwelling purposes to realize this. The latter represent collective engineering and mass production by fully equipped factories which use modern methods and follow the precepts of an older brother, the automobile industry.

Trailer construction has created a new field of dynamics, taking a clue, as a starter, from the boat builders. The formula is to build the maximum of convenience and comfort into the minimum of both square and cubic dimensions at the least possible weight to produce a luxury result.

ABOVE: *A social session on wheels is held in a trailer park.*
BELOW: *The cozy dinette is a good place for a card game.*

Bath tubs are built under divans in some coaches.

ETC 31356



The field of Waterloo 40 years after the battle.

No Handicaps Recognized

ONE autumn afternoon, several years before our own Civil War, a guide at Waterloo was approached by an old man and his servant, who asked to be shown over the famous battlefield.

The guide made his usual rounds, telling the stereotyped story, and commenting severely on the conduct of Grouchy, whose tardiness on that epochal day precipitated Napoleon's downfall.

The stranger examined the ground attentively, and only occasionally replied saying, "Grouchy received no orders."

At last the servant fell back, detaining the guide, and in a low voice said, "Speak no more about Marshal Grouchy, for that is he."

The guide abstained from saying anything further that might offend, but he never forgot the old soldier's agitation as he saw how little would have changed the current of the fight, and knew that the means of doing it had been in his own hands.

"Grouchy received no orders" — a pathetic alibi rendered by an old man who had done great things, but who failed at the hour of fate.

Homer could have squatted in the dust at the gates of Athens. The rich would have pitied him, and tossed gold into his cap. He, like Milton, and Prescott, the historian, had the best of alibis. He was blind.

Demosthenes, greatest of all great orators — who could have blamed him for waiving his ambition and settling comfortably in Attica, on the remains of his father's fortune? For failing in statesmanship and oratory he had a triple alibi. His lungs were weak, he had a harsh, unmusical voice, and he stuttered.

Julius Caesar, first general, statesman and historian of his age, and — excepting Cicero — its greatest orator, had his alibi for leisure and indifferent effort. He was an epileptic.

Beethoven, the ultimate genius of the classical school of music, became stone-deaf before middle life, and never heard his own great symphonies. Here was an alibi surely.

Charles Lamb, prince of essayists, spent his twenty-first year in an insane asylum, and the rest of his life as a clerk in the accounting rooms of the East India house, supporting his periodically demented sister. Here would have been an alibi.

Pope was a hunchback. Carlyle had chronic indigestion and melancholia. Robert Louis Stevenson was a consumptive and wrote most of his books in bed. Daniel Webster was too timid to recite in school. Booker T. Washington was a negro and a pauper. E. H. Harriman, at the time of his greatest battles and achievements, was a physical invalid. Robert Drake, forced by asthma to spend his nights alternately standing at the drafting board and sleeping propped up in a chair, became America's greatest bridge builder.

Alibis! Alibis! But never used. Never thought!

The rough spots on the roads to greatness are peopled with cringing alibis, whining, winking, enticing, whispering of easier bypaths, tempting by their insidious allurements to divert the traveler from his objective, and promising to excuse his failure.

"It's too early in the morning — too late in the afternoon. The day is too hot — too cold. Your customer is too busy today — it's Monday. He's on the links or in the country — it's Friday. He's all upset by the war — wait for a better mood. You didn't get to see him last time — why waste time today? He is only interested in price — you can't interest him in quality. You're not in fighting trim today — wait!" So whisper the alibis.

But the iron-willed go on — and win the battle, write the book, compose the symphony, build the railroad, clinch the sale. At least they go on, scornful of these tawdry derelicts who would plead their failure in abject and fallacious eloquence.

Alibis are counterfeit money offered in lieu of specie. They are reasons given for not doing a thing that could be done.

"Excuses," says Israel Zangwill, "are a confession of failure."

Reprinted by courtesy of "The Better Way" published by Cosmopolitan Magazine

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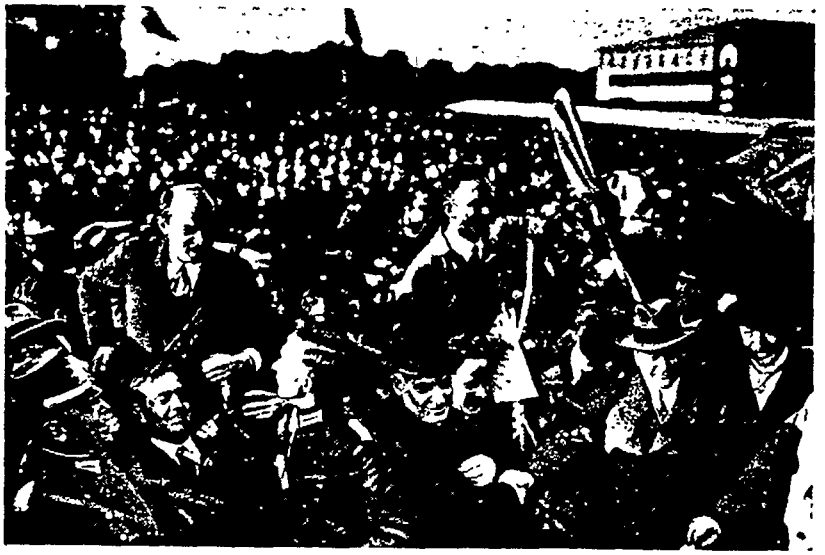

Chamberlin and Levine receive an enthusiastic welcome in Germany.

Suicide or Glory

Trans-Atlantic Flights Are Everyday Events Now, But Only 14 Years Ago Daring Pioneers in Tiny Planes Blazed the First Trails.

By FRANK ADRIANCE

FLYING the Atlantic is small potatoes nowadays, as huge bombers roar across on their way to England and giant clipper planes make routine flights to Europe. Powerful engines with high compression ratios, driven by high octane gasoline, make the trip an easy one. But only 14 years ago daring airmen in tiny planes with puny motors were defying death to be first to fly from New York to Europe. Where they led others have followed.

To get a better idea of how far aviation has advanced since those pioneering days, I recently talked with Colonel Clarence D. Chamberlin, who, with Charles A. Levine as a passenger, was the first man to fly from New York to Germany. Colonel Chamberlin is at present head of a chain of aviation engineering schools. Seated in the living room of his home in Hasbrouck Heights, N. J., I heard from him the story of the *Columbia's* epic flight on June 4, 5 and 6, 1927.

Prospective trans-ocean flyers were looked on as heroes and demi-gods in those days and had their pictures and life stories splashed over the front pages of every newspaper in the country. Any man or group of men who made the flight successfully would uncover a gold mine. Raymond Orteig was offering a $25,000 prize for the first pilot or pilots who flew from New York to Paris, and that sum would be only a fraction of the cash that would flow in.

As a result of the rich rewards, enough intrigue and conflict to fill a good-sized novel centered around some of these flights. It was so in the *Columbia's* case. Charles A. Levine, head of the Columbia Aircraft Corporation, wishing to squeeze every source of revenue to its limit, did not want Clarence Chamberlin to pilot the *Columbia,* because Chamberlin was not the "movie type." If it hadn't been for the insistence of Giuseppe M. Bellanca, designer of the *Columbia,* who believed that Chamberlin knew more about the plane than any other pilot, Chamberlin would never have been the first man to fly to Germany.

For publicity reasons Levine wanted as pilot Leigh Wade, an Army round-the-world flyer in 1924. Wade agreed but soon withdrew after several disagreements with Levine. The latter then signed up Bert Acosta, who had given him flying lessons in an old Curtiss Jenny.

Soon afterward Acosta and Chamberlin took the *Columbia* aloft on an endurance flight to test its ability to stay in the air long enough to cross the Atlantic. Before this test aviation experts scoffed, insisting that the *Columbia* would never get into the air with its load of 375 gallons of fuel, powered as it was with a Wright Whirlwind engine of only 200 horsepower — an engine which had a compression ratio of less than 5.5 to 1 and burned 73 octane gasoline. Engineers estimated that the *Columbia's* ceiling with such a load would be 600 feet below sea level!

But in spite of the dire prophecies of the experts, the *Columbia* got off the runaway at Roosevelt Field in less than 1,200 feet, with the goal set at 50 hours aloft. It cruised over Long Island for just 51 hours, 11 minutes and 25 seconds before the gasoline tanks ran dry.

This record flight, however, did not sew up a trans-Atlantic flight for Chamberlin, for Levine announced not long afterward that he had signed as navigator Lloyd Bertaud, veteran mail flyer who was to perish later on the ill-fated attempt of the *Old Glory* to fly from Old Orchard Beach, Maine, to Rome, and that Bertaud would replace either Acosta or Chamberlin. If it hadn't been for Bellanca again, Levine would have eased Chamberlin out, because both Bertaud and Acosta were big, husky fellows—ideal types for the movies which

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would follow a successful flight. Bellanca delivered an ultimatum, stating that he was through with the Columbia Aircraft Corporation unless Chamberlin was retained.

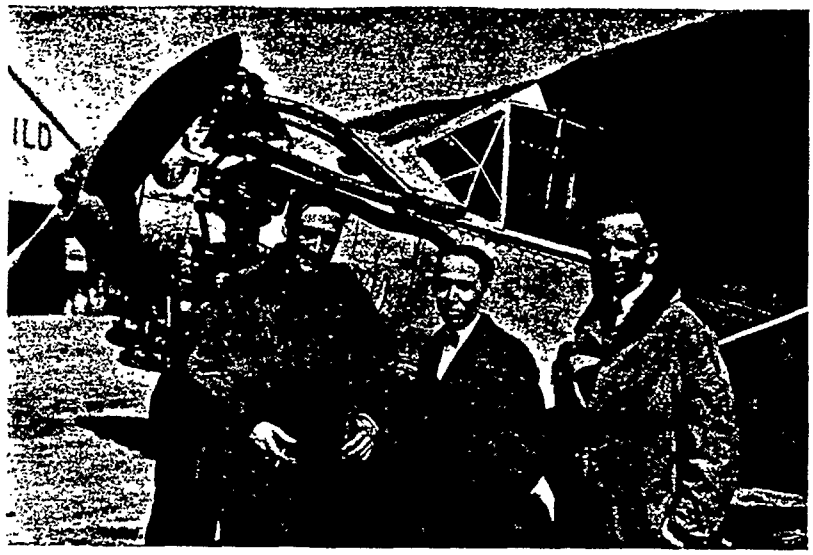
To simplify matters, Acosta withdrew, leaving Chamberlin as pilot and Bertaud as navigator. The latter pair, however, couldn't get together. They disagreed on the route of the flight, on whether or not to take along a radio, and on numerous other details.

Bertaud had his troubles with Levine, too. Dissatisfied with the contract he had signed, which called for only $150 weekly—less than he would earn as a mail pilot — and no insurance for his wife in the event of his death, he demanded a new contract. When this was not forthcoming, he got an injunction to prevent the *Columbia's* leaving without him.

Levine then made a private agreement with Chamberlin, that if Chamberlin would take him along as a passenger on the trans-Atlantic flight, Levine would give him $25,000 and would put up $50,000 life insurance for Mrs. Chamberlin. In addition, Chamberlin was to get a salary of $150 a week for a year, plus a fifty-fifty split of all money received that year by Levine as a result of the flight.

While all this controversy and bickering were delaying the *Columbia's* take-off, other aviators with trans-Atlantic aspirations were going ahead with their preparations, many of them disastrously. Lieutenant-Commander Noel Davis and Lieutenant Stanton H. Wooster were killed at Langley Field, Va., in the crash of their tri-motored *American Legion*. Commander Richard E. Byrd was injured when the *America* crashed. On May 8 Captain Charles Nungesser, famous French World War ace, and Captain Francois Coli took off from Paris in the *White Bird* and were never heard from again.

Colonel Clarence D. Chamberlin as he appeared in a recent photograph.



Standing beside the Bellanca-designed Columbia that flew to Germany are, left to right, Bert Acosta, Giuseppe M. Bellanca and Clarence Chamberlin.

But early in the morning of May 20, the very day on which Bertaud's injunction was answerable in court, a young man from the West, Captain Charles A. Lindbergh, roared down the Roosevelt Field runway in his tiny Ryan monoplane, *Spirit of St. Louis*, Paris bound.

The success of Lindbergh's flight changed the plans of Chamberlin and Levine. Instead of flying to Paris, they decided to head for Germany and keep going as long as they could, in an effort to beat Lindbergh's distance record.

Right up until the last moment nobody but Chamberlin knew that Levine was going along, not even his wife. For the newsmen's benefit Levine had made a great mystery of the identity of Chamberlin's navigator. He hadn't dared tell his wife what he planned, because once, when he had suggested the possibility of his taking such a trip, she had threatened to burn the *Columbia*. Even when the plane, heavily laden with 450 gallons of gasoline, bumped and bucked on its take-off run down the long lane between great throngs of people, Mrs. Levine thought her husband was just going aloft for a short test flight previous to Chamberlin's departure.

The *Columbia*, which weighed only 1,850 pounds empty, tipped the scales at 5,418 pounds when loaded for the long flight; nevertheless, Chamberlin lifted Bellanca's well designed ship off the runway in less than 2,000 feet. His main difficulty was to keep the heavily burdened ship from lunging out of control and into the crowd, which was large even though the hour was shortly after daybreak. Once in the air, however, the *Columbia* flew so smoothly that the pilot was able to throttle down from 1750 revolutions per minute to 1700 and then to 1650 in order to save precious fuel.

The first trouble occurred over Cape Cod, when the expensive earth inductor compass, on which Levine had spent $1,125, went entirely out of commission, leaving Chamberlin with a none too accurate magnetic compass which had cost only about $50. In addition, the chart of Cape Cod was not in complete agreement with the lay of the land below, causing Chamberlin to wonder if he were really over Cape Cod. He dis-

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Meanwhile, the primary uses of trailers and the trailers themselves have changed. Formerly the popular price range was from $400 to $700, but today it has moved to the $700 to $900 bracket, and while the number of coaches produced in 1940 was considerably less than in the preceding years, the total dollar volume was almost 50 per cent more than in any previous year.

Today, more than 90 per cent of all trailers being built are for living purposes primarily, rather than for touring exclusively, which means, in its effect on the manufacturers, that recently the trend of trailer building has been toward larger coaches because of the added living conveniences which the increased space affords. This, in turn, has been emphasized and enhanced by the government's current adoption of trailers for defense project housing. Such coaches have become the pinnacle of housing for both army officers and defense workers.

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ABOVE: *A social session on wheels is held in a trailer park.*

BELOW: *The cozy dinette is a good place for a card game.*

Bath tubs are built under divans in some coaches.

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Curious Germans crowd around the Columbia for a peek into the cabin.

cussed with Levine whether they should keep on going or turn back and have the earth inductor compass readjusted.

Levine wanted to keep going. He knew that if he went back there wouldn't be a chance of his getting away from his wife a second time. Mrs. Levine would make good her threat and burn the *Columbia,* if that drastic act were necessary to keep her husband on the ground. Besides, he insisted he would rather brave the wide Atlantic than face another session with the newspaper men, who had been pestering him mercilessly for the past few days in an effort to learn who Chamberlin's navigator was going to be. So they swung out to sea on the 250-mile water jump to Yarmouth, Nova Scotia, Levine getting some satisfaction from cursing the earth inductor compass, its manufacturers, and all their relations.

The time when they should have reached Yarmouth arrived and still no land was in sight. Chamberlin began to wonder if their magnetic compass had gone wrong, too, and was causing them to fly in aimless circles above the ocean. But the sun was where it should be, so he kept going, worrying more and more as each minute passed. At last, one hour late, land loomed ahead. Although strong head winds had delayed the plane, the magnetic compass had hit the Canadian town right on the nose.

Chamberlin continued on over Nova Scotia, bumping around in the rough air at a low altitude, where the head winds had the least force. Because of the wind direction they were two hours behind schedule when they passed over Halifax.

At Cape Breton Island the wind first began to favor the *Columbia.* Climbing higher to take advantage of it, Chamberlin hit Newfoundland at Trepassey Bay, between Cape Race and St. John's, and headed overland for the Atlantic. He intended to follow a course south of the Great Circle route, because he had been warned by Dr. James H. Kimball of the New York Weather Bureau of a storm area in the North Atlantic. In addition, ships followed the more southerly route, so that in the event of a forced landing at sea there was a chance of being picked up.

As they left the last bit of land behind them and started out over the vast ocean, Levine remarked with a grin:

"Europe next stop! Well, here goes nothing!"

"What are two men, more or less?" his pilot replied.

The sky was clear and the visibility was good for fifty miles in every direction. In the ocean below icebergs began to drift by, throwing back a reddish glow in the rays of the setting sun. Before long it was dark and they were flying under the stars. They passed two small ships, to each of which they signaled with a flashlight. One gave an answering signal, a comforting touch in a broad ocean otherwise empty of humanity.

Little cottony tufts appeared below, outlined clearly against the surface of the sea. Those were tiny clouds, Chamberlin realized — the beginning of the storm area of which Dr. Kimball had told him. They grew larger and closer together, until there were long periods when the flyers were unable to see the dark water. They were at higher levels, too, and Chamberlin had to climb continually to get above them. In those days the only blind flying instruments were a bank and turn indicator and an inclinometer, which made flying in clouds in the dark an extremely hazardous, almost suicidal undertaking.

Chamberlin climbed the *Columbia* to 15,000 feet and then, due to its heavy load of fuel, it would go no higher. Still the cloud banks loomed ominously in front of the plane's nose.

"At that point I would have given plenty for a high compression engine and the power that goes with it," Colonel Chamberlin told me. "I could then have gone above that soup without any trouble."

As day was breaking, Chamberlin tackled the clouds. It was cold, the thermometer they carried in the *Columbia* registering 31 degrees fahrenheit, and ice started to form on the wings. The only thing to do was to glide down through the mist and fly beneath the clouds—risky business, because if the cloud layer extended down to the surface of the sea the *Columbia* would wind up her career by a plunge into the waves.

After several nerve racking minutes during which the altimeter needle crept from the 1,000-foot mark toward zero, the plane nosed out of the fog over five hundred feet up. Following Dr. Kimball's counsel, Chamberlin at once turned south and soon came out of the storm area into a belt of fair weather with an unlimited ceiling.

A ship came into view over the horizon. It was only a small tramp steamer of Scandinavian registry, but the sight

of other human beings buoyed up the spirits of the weary air pioneers.

They spied another small ship, and then a huge trans-Atlantic liner, smoke pouring from her funnels, crossed the horizon. Flying close to her and waving to the cheering passengers who lined her rails, Chamberlin identified her as the *Mauretania*, one day out of Cherbourg. He knew then that he was on his course and only about 350 miles from the coast of France.

Farther on they passed the cruiser *Memphis*, bringing Lindbergh and his plane back to the United States, and the liner *Transylvania* before sighting Land's End, England, near sunset. The Cornish fields along the white chalk cliffs beckoned invitingly to the tired men, but Chamberlin had set himself a goal and he kept on.

The European continent lay ahead—and trouble! A huge cloud mass hovered over the land between them and the east. Chamberlin climbed the *Columbia*, much lighter now because of the fuel consumed, up to 21,000 feet, yet he couldn't get above the clouds. He didn't dare go into them in the dark and he couldn't go around them, so great was their extent, so that second night was spent in flying back and forth along the cloud front.

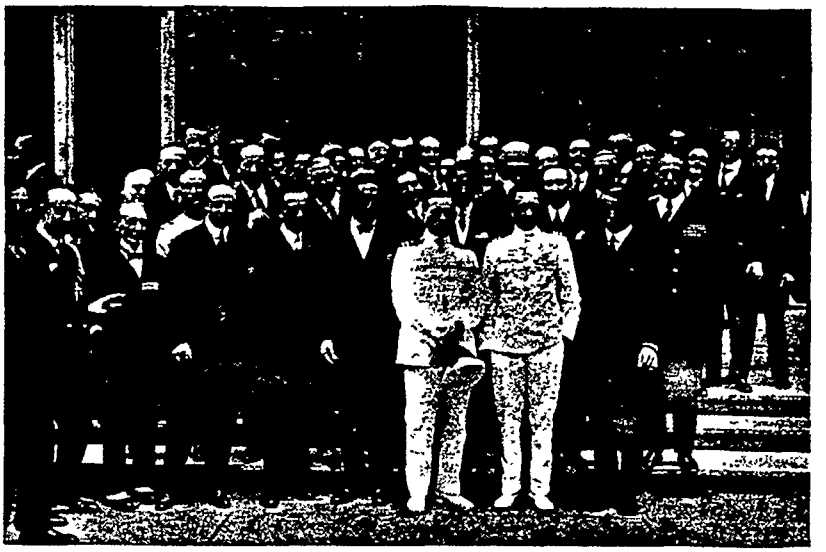
Dawn found Chamberlin almost exhausted. He felt that he couldn't go on unless he had some rest. Levine had been at the controls during part of the over water flight and Chamberlin believed his passenger could handle the plane safely for a little while, now that daylight had come. Therefore, he told Levine to take charge and crawled back on top of the gas tank for a short rest.

He had napped for only a few minutes when he was aroused by a terrific vibration. The *Columbia* was plunging earthward in a tight spiral, which is the next thing to a tailspin. In the rarefied air at 21,000 feet Levine had found the controls wobbly and had been unable to keep the ship in level flight.

Crawling back into his seat, Chamberelin fought for control. So great was the vibration of the tail surfaces that he didn't dare bring the plane out of the plunge too abruptly for fear of ripping off the entire tail assembly. Down to 4,000 feet he battled before he had the *Columbia* out of trouble.

After that narrow squeak the *Columbia* continued downward in a gentle glide until it came out of the soup between 500 and 1,000 feet above a river. The river flowed through a valley between two mountain ranges, and if the plane had gone a short distance to right or left of where it did go, it would have crashed into the side of a mountain in the clouds!

Chamberlin flew on until his gasoline ran out. Then he landed in a wheat field near the tiny village of Mansfeldt, Germany. The *Columbia* had covered a distance of 3,905 airline miles, 295 miles more than Lindbergh, in 43 hours and 31 minutes.



A group of aviation pioneers meet in Paris in 1927. Front row, right to left, are Bernt Balchen, Commander Richard E. Byrd, Lieutenant George O. Noville and Bert Acosta, who comprised crew of Byrd's America; Clarence Chamberlin, and Louis Bleriot, who was the first man to fly across the English channel.

Aviation has gone far since that June morning in 1927. A modern streamlined transport plane or bomber, with two or more engines of over 1,000 horsepower each, can cover that distance easily in a great deal less than half the time Clarence Chamberlin needed. But aviation cannot forget its debt to Chamberlin and the other daring air pioneers who, though short on equipment, were long on skill and courage.

The Following

Service Awards

have been made as of August 1st, 1941

15 YEARS

EARL BARTHOLOMEW Engineering, Detroit

DR. GEORGE CALINGAERT Chemical Research, Detroit

C. H. JOHNSON Manufacturing, Deepwater

10 YEARS

RAYMOND R. FALLER Sales, Detroit

5 YEARS

MARGARET B. ROSTAING Manufacturing, Deepwater

ELEANOR M. DOUGHERTY Manufacturing, Deepwater

MERRITT P. MARTIN Manufacturing, Deepwater

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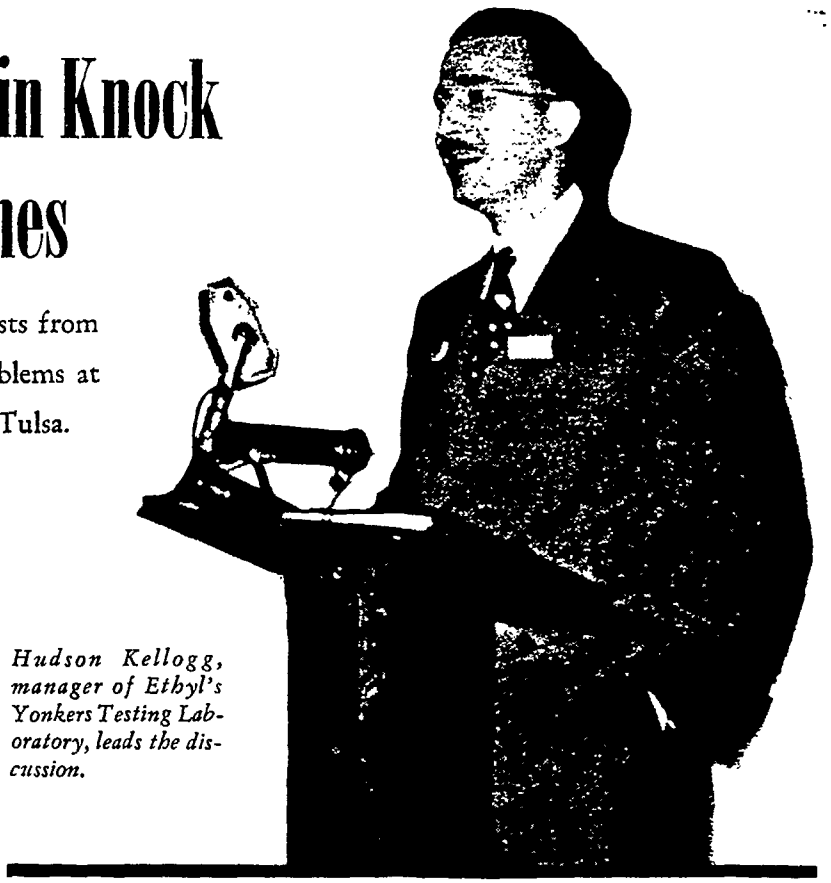
Poison for Bugs in Knock Test Engines

Technicians and Chemists from Four States Discuss Problems at Two-Day Forum in Tulsa.



Hudson Kellogg, manager of Ethyl's Yonkers Testing Laboratory, leads the discussion.

"WHAT can I do about fuse busters?"

"What do you consider the critical oil temperature?"

"Where can I buy a reference fuel burette?"

Seventy C.F.R. knock-test engine men and petroleum chemists from four states gathered in Tulsa on June 13 and 14 to thrash out these and other questions at a two-day laboratory knock testing forum.

Although broad theoretical problems in the field of octane rating and knock testing frequently have been examined by petroleum engineers, this was the first forum held by the technicians who operate the test engines, the men who bear the responsibility of maintaining the industry's standards of quality with these delicate machines.

"Each knock test engine has a personality all its own — some are fuse blowers, some are loud knockers, and some are just plain ornery," declared Hudson Kellogg, manager of Ethyl's fuel-testing laboratory at Yonkers, N. Y., and chairman of the meeting. "We're trying to depersonalize them."

The 70 participants in the forum came from widely scattered points in Texas, Missouri, Kansas, and Oklahoma for the session. Carl Bartholomew, manager of the Ethyl Tulsa Testing Laboratory, and Louis W. Shank, manager of Ethyl's Tulsa Division, were hosts. At the suggestion of several oil companies the Ethyl Corporation, whose pioneer development work established the basis for present-day apparatus and techniques in knock testing, sponsored the two-day conference to give the actual operators, the "men on the line" who run the all-important tests, an opportunity for discussing their own problems and offering suggestions in forum style. They met at the Tulsa Hotel on the first day, and on the next day adjourned to the Ethyl laboratory for the second session.

Hudson Kellogg sounded the keynote of the meeting in his opening talk to the men. "Knock rating is an art, which we hope to make more of a science. We want to level off the differences in C.F.R. engines, so one will act precisely like another — in Tulsa, in Dallas, Kansas City, or wherever they may be.

"But what to do about it? That's the question. That's what we're all trying to find out. So we thought that if you men who work with engines day after day, week after week, and month after month got together, all of us might be able to straighten out some of the kinks."

Mr. Kellogg shed light on many of those kinks during his talk. Illustrating his points with more than 70 slides, he drew on the Ethyl Corporation's years of experience in a half-dozen fuel-testing laboratories, and also described some of the latest findings in the search for newer and better ways of insuring reliable octane ratings for gasoline. He discussed various types of equipment available and operating methods used, recommending parts and techniques that have proved themselves most satisfactory — not only as tested in Ethyl laboratories, but also as reported by laboratories of customer companies and others who are faced with the same problems.

No. 1 recommendation was preventive maintenance. "It pays to fix the machines before they break down," Mr. Kellogg advised. "Use the standard equipment specified by A.S.T.M. and keep it in good shape. You get better engine behavior, better reproducibility, more accurate knock ratings. That

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No. 3 at the Tulsa laboratory is one of the "just plain ornery" C.F.R. engines. J. V. Barton, Great Lakes Pipe Line, Ponca City; Paul Sargent, Continental Oil, Ponca City; Ethyl's Herbert Green; Willis Barr, Cities Service, Ponca City and A. W. Magers, Great Lakes, Tulsa listen to her heartbeat.

Swapping theories on fuse busters, Ethyl's Webster Downer; Fred Edwards, Bureau of Mines, Bartlesville; George Engelland, National Refining, Coffeyville; Carl Bartholomew, who runs Ethyl's Tulsa laboratory, and Technician Albert Ramsey (extreme right) examine a "smoothie" to see what makes her tick that way.

means the refiner is money ahead — he is not spending more than he needs to for desired fuel quality, yet receives fewer knocking complaints.

He advocated the use of such newly designed parts as the adjustable bouncing pin, grounded knockmeter circuit, multiple speed induction motor, insulated spark advance indicator, and the Mallory distributor.

The discussion which followed Mr. Kellogg's lecture brought nearly every man in the group to his feet at one time or another to ask a question or offer a suggestion. Piston rings, the handling of which has been a major bone of contention among knock test engine operators as well as automotive engineers, were discussed at length. Each operator seemed to have a method all his own for coping with the eccentricities of the "bedeviling" bouncing pin. "It's like a game of golf," Mr. Kellogg remarked. "The other fellow's tricks never work."

The knock test engine operator can look toward fewer headaches in the future, Mr. Kellogg predicted. With continued research, many of the engine difficulties they now encounter will be overcome. Improvements such as a bouncing pin balance, automatic mixture temperature control, automatic knockmeter overload protection, air filter, and perhaps in the more distant future, a more sensitive and yet more stable knock measuring instrument may be developed.

Everyone in the group seemed to feel that they had gained many new ideas and helpful tips on operating and maintenance methods. One late comer who only arrived for the second day's laboratory session went so far as to say that he had learned more in 45 minutes than he had at some two and three day conventions. Similar forums are now being planned in other cities for the "men on the firing line" who run the C.F.R. engines in oil company laboratories in other territories.

Three Oklahomans enjoy the Oklahoma sunshine and the buffet luncheon on the back steps of Ethyl's laboratory in Tulsa. They are A. W. Magers, Great Lakes Pipe Line, Tulsa; M. G. Colby, Sinclair Refining, Sand Springs, and J. V. Barton, Great Lakes, Ponca City.

ETC 31364

After they are washed, lemons are carried on a canvas belt past experts who sort them according to color.

wear gloves to protect the fruit from accidental finger nail cuts that would permit the entrance of mold spores or other decay organisms. The fruit is clipped, never pulled, from the tree. Pickers wear sacks in which they place the fruit and from which they release it into a field box by opening a flap in the bottom of the sack.

Oranges and grapefruit are always picked ripe from the trees. The best lemons, however, are picked green and cured in packing house store rooms. This curing process brings out the full juice content and turns the skins to the waxy yellow prized in the market.

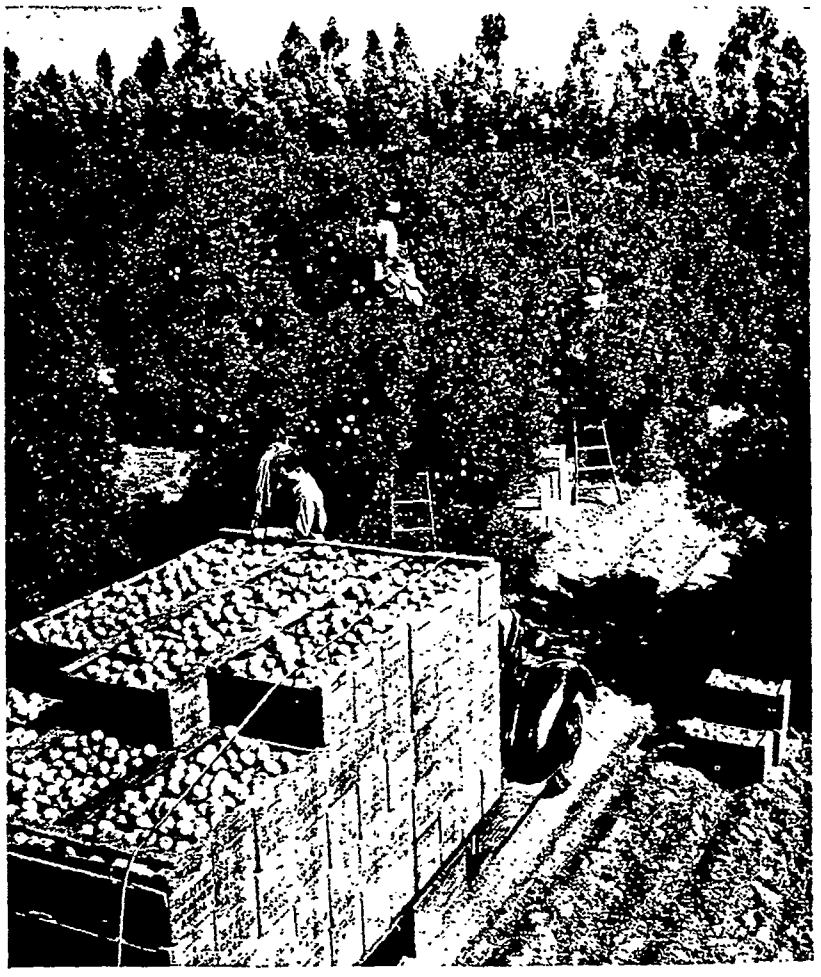
Trucks carry the field boxes of picked fruit to the packing house, where oranges, lemons or grapefruit are washed in a soapy solution, scrubbed with brushes to remove every bit of extraneous matter, and showered with clear, cool water. Next, they pass over rollers and are dried by blasts of air.

An endless belt carries the fruit past the graders, who examine it carefully and separate it into different grades. In case of doubt about the internal condition of a fruit, it is put through an x-ray machine or fluoroscope, which quickly reveals any defect due to frost or other causes. When a defective fruit appears, it is kicked off the belt into a discard bin by a lever.

Trucks carry boxes of freshly picked oranges from grove to packing house.

Oranges and grapefruit go through a sizing machine before packing, but lemons, due to their shape, are sized by the trained eye of the packer. From 60 to 75 boxes a day are packed by the average operator. These boxes then pass on a conveyor through an automatic machine which nails on a lid and straps each box in a single swift motion. A floorman picks up the stacks of boxes with a clamp truck and runs the fruit directly into refrigerator cars for shipment to the markets.

Although located 2,600 miles from the principal domestic markets for its highly perishable products, the California citrus industry today produces nearly 67 per cent of all the oranges sold in the United States and almost all the lemons.



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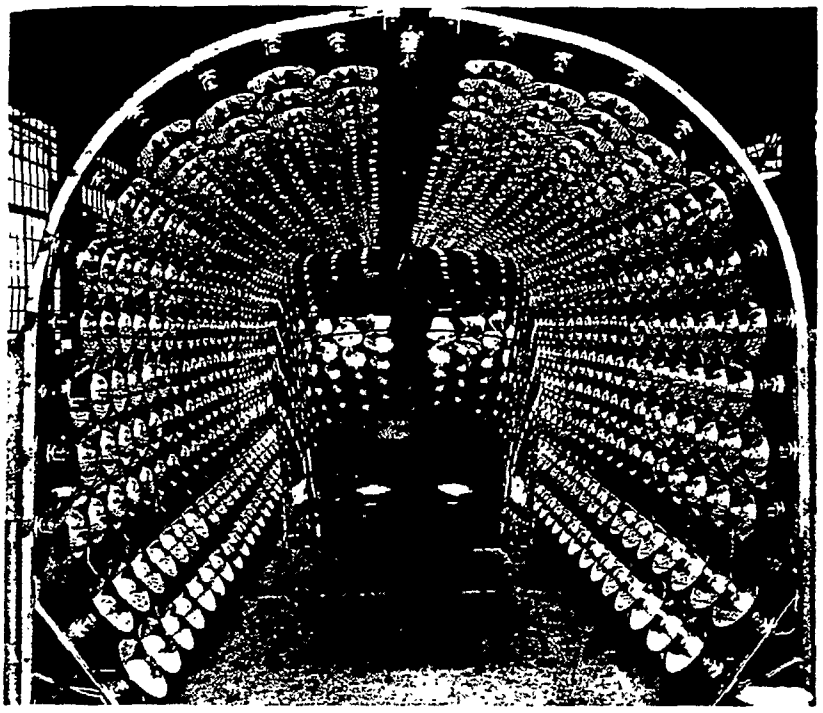

Lamps for Drying Auto Bodies

Use of "Lightless" Light and "Heatless" Heat Cuts Down the Time Needed for Finishing Car and Truck Parts.

IN the automobile industry's effort to rearm the United States as speedily as possible, valuable time is being saved through the use of "lightless" light and "heatless" heat. Both, used for some time to build better motor cars, are now cutting down the time required to finish cars, trucks and ordnance parts for the armed forces.

In ever-increasing applications, new and unusual advantages are being taken of the fact that, when electrical energy is converted into incandescent light, much infra-red radiation ("lightless" light) is lost as waste heat.

Such heat is now being employed in hundreds of places along automobile assembly lines. It dries metal parts after they have been bathed in cleaning compounds and rust-inhibiting chemicals. It bakes primer coats on bodies, paints on castings, enamels on die-castings, and finishing coats on wheels, steering columns, fenders, etc.

In simplest terms, the infra-red radiation of an incandescent electric lamp is merely that part of the energy which, forced into its filament, is useless as light because its wave-length is too long to be serviceably visible. It is wasted energy because it emerges as heat at an outlet where light is desired.

The automobile industry's first use of this wasted energy was born of necessity about a decade ago. In their constant striving to improve finishes of automobile bodies, the industry's engineers progressed from hand-brushed, slow-drying paints and varnishes to air-sprayed, quick-setting nitrocellulose lacquers and synthetic resin enamels.

Though use of the new coatings cut consumer costs by telescoping time required to apply and dry them, such use also multiplied problems. Finished bodies were sometimes marred by contact with buttons on workmen's clothes and had to be re-touched. Since such refinished bodies could not be rerouted through baking ovens without danger of overbaking, many experiments were tried. Finally the heat of ordinary electric lamps was found to be effective.

From that small beginning the practice spread until it has now become common for assembly lines to carry automobile, truck and tractor parts in an uninterrupted flow through "tunnels of light" in which hundreds of lamps converge infra-red radiation upon moving parts. In some cases drying time has been cut from an hour at 250 degrees to eight minutes at 375 degrees.

Time is not the only saving. Since the radiation's direction and focus are controlled by reflectors, the "ovens" require no costly or bulky insulation to curtail thermal loss. So little heat leaks from the lattice-like tunnels that men can work beside them in summer without discomfort.

The extreme sensitivity of control depends upon the use of gold reflectors. Gold is used because it is the best reflective medium for long-wave radiation, and because it does not discolor.

In the application of what automobile workers call "heatless" heat, cold metal parts enter coils of wire from which they emerge hot. In these tunnels of wire loops, metals become feverish, though men feel no heat. The reason is that the tunnels are transformers without secondary windings. Inside them metals become hot by induction. Since the introduced metals constitute interruptions of electromagnetic flow set up by three-phase current fed into the coils by high frequency generators, they are "rubbed" by magnetism until they "sweat" heat. Men can stand in the tunnels and feel no heat unless they carry metal.

This principle, used by at least one company to dry automobile bodies, is widely employed in heat-treating, for it is most efficient where close control of high temperature is called for.

Money Grows on Trees

California's Citrus Fruit Industry Supports 200,000 Persons and is the State's Second Largest Source of Wealth.

THE California citrus fruit industry represents an investment estimated at close to a half billion dollars. It supports about 200,000 persons and is second only to the petroleum industry as a source of the state's wealth. In addition, it is an important customer of many other industries, spending millions annually for water, fertilizer, oil, pest control, packing boxes and other necessary supplies.

Citrus growing in California had its beginnings in the latter part of the 18th Century when the Spanish padres brought orange and lemon trees into the territory and planted them in their mission gardens. The ancestors of these early trees traveled from China to lower California via Portugal and Spain. The first orchard of any size was planted at the San Gabriel Mission near Los Angeles about 1804.

Nearly a century went by before the industry began to assume commercial proportions. With the coming of American settlers the first commercial planting was undertaken at Los Angeles in 1841 by William Wolfskill, who is generally credited with shipping the first carload of oranges to the East. On completion of the first railroad line to eastern markets, a car shipped to St. Louis in 1877 from Mr. Wolfskill's orchard is reported to have arrived in good condi-

ABOVE: *Without irrigation citrus fruit trees would not grow during California's rainless summer months.*

LEFT: *The ladies recognize the value of lemons as an aid to beauty.*

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In winter, orchard heaters protect orange and lemon groves from frost.

tion, despite a period of 30 days in transit.

This transportation feat opened the eyes of American settlers to the commercial possibilities of citrus fruits, then considered luxuries. They started groves, choosing for this purpose the Washington Navel, a new seedless orange of fine eating quality that had been sent in 1873 to the Tibbets family of Riverside, Calif., by William Saunders of the Department of Agriculture in Washington, D. C. This orange, which had been imported from Bahia, Brazil, grew well in its new home. One of the two original trees sent to the Tibbets family is still alive and bearing fruit in a park in Riverside.

About the same time another variety of orange, the Valencia, was introduced to California. The Valencia, which ripens during the summer, supplemented the winter ripening Navel orange and made possible a year round crop. The success of orange growing led to the planting of lemons, which also flourished in the California climate and soil.

Growers banded together in a cooperative association, today known as the California Fruit Growers Exchange, to meet the difficulties and problems which once threatened the life of the young industry. This group's most important act was the development of an irrigation system.

Without irrigation, citrus fruit trees would not grow in California, for the summer months are rainless. Water must be brought from wells or from distant mountain and river sources by canals and aqueducts. It is then piped or carried by open flumes into cement heads or standpipes, from where it goes into furrows between the rows of trees. Most groves are irrigated regularly at intervals of from three to five weeks, beginning in May and ending in October when the rains begin.

United States Weather Bureau forecasts are essential in the fight against frost. On cold winter nights damage to fruit and trees is prevented by oil burning orchard heaters, which are placed between rows of trees and lighted when the thermometer reaches the danger point. Warnings are broadcast by the weather bureau to every district during cold weather.

Every precaution is taken to insure protection of the fruit from the time it is picked from the tree until it reaches the consumer. All pickers and packers

Power sprays are used to rid the trees of harmful insects.

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Henry Ford swings an axe with all his strength against a plastic panel. Result: not even a dent.

Plastic Body is on Its Way

Substitute for Sheet Steel, Made in Ford Laboratory, Will Absorb a Hard Blow from an Axe Without Denting.

MORE than an ordinary amount of interest is attached these days to news from Dearborn that Henry Ford is ready to pull another industrial rabbit from the hat in the form of a plastic automobile body.

Aside from the intriguing prospects it offers the motorist, the plastic body and the research behind it promise a solution to a headache now facing industry —a possible steel famine arising from demands of national defense. If steel production in this country is to keep astride the increased needs of defense work, tons of the metal now used in other ways may have to be diverted. This would affect many industries, but none more than the motor car manufacturer.

Anticipating such an emergency, Mr. Ford, as part of his research to find more industrial uses for farm products, began working years ago on a substitute for sheet steel. As evidence of his success, the Ford Motor Company probably will build a complete plastic automobile body late this year or early in 1942.

It will be a test car, but if it meets with the success the pioneer automobile manufacturer is confident it will, the company can sharply reduce the quantity of steel required in normal operation. The entire superstructure of the body, except for a tubular welded steel frame, will be made of plastic fiber.

A complete set of dies for the first road model of the plastic car is now being built at the Ford Rouge plant. The project is under the supervision of Robert A. Boyer, a young research chemist who has directed many of Mr. Ford's experiments to bring industry and the soil closer together. According to Boyer, the plastic developed for car bodies in the Ford laboratory is a material composed of 70 per cent cellulose fiber and 30 per cent resin binder.

"The fibers have very little strength by themselves," Mr. Ford relates, "but molded together under heat and pressure they produce a material that is superior to steel in everything but tensile strength. Even in that respect our plastic has one notable advantage. It will absorb a blow 10 times as great as steel can without denting."

Motorists obliged to travel on icy streets will be particularly pleased with fenders made of this plastic material. Fenders can be broken, but minor collisions which would put a bad dent in a steel fender leave plastic fenders undamaged. They simply spring back into shape after the impact because the plastic, unlike steel, does not "take a set."

From the car owner's standpoint, another advantage of plastic panels is that they can be impregnated with the proper color at the time they are formed.

A Ford laboratory worker mixes synthetic resin and farm crop fibers in a preliminary step of plastic manufacture.

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If this can be done at low cost, it will save painting panels later and will provide a finish as enduring as the panel itself. The cost of impregnating the plastic with paint still is too high, but the chemists are making headway on that problem, too.

"The plastic sheets weigh only half as much as steel panels of the same size," Boyer said. He added that the company has a number of formulae under consideration for body panel plastics.

The cellulose portion of a typical Ford experimental plastic consists of 50 per cent southern slash pine fiber, 30 per cent straw, 10 per cent hemp and 10 per cent ramie. Ramie is an Egyptian fiber which thrives in many parts of America.

Discussing the effect on American agriculture of the possible widespread adoption of plastic bodies by the motor car industry, Boyer said:

"If we made a million cars a year with plastic bodies, we would consume at least 170,000 tons of farm products and 50,000 tons of synthetic chemicals. Needed materials would include 100,000 bales of cotton, 500,000 bushels of wheat, 700,000 bushels of soybeans, and 500,000 bushels of corn. The wheat, corn and soybeans are interchangeable. We can use one of them or any combination."

Henry Ford, left, and Robert A. Boyer, chemist in charge of the Ford laboratories, compare the impact strength of steel and plastic panels. The steel panel was badly dented by an axe blow.

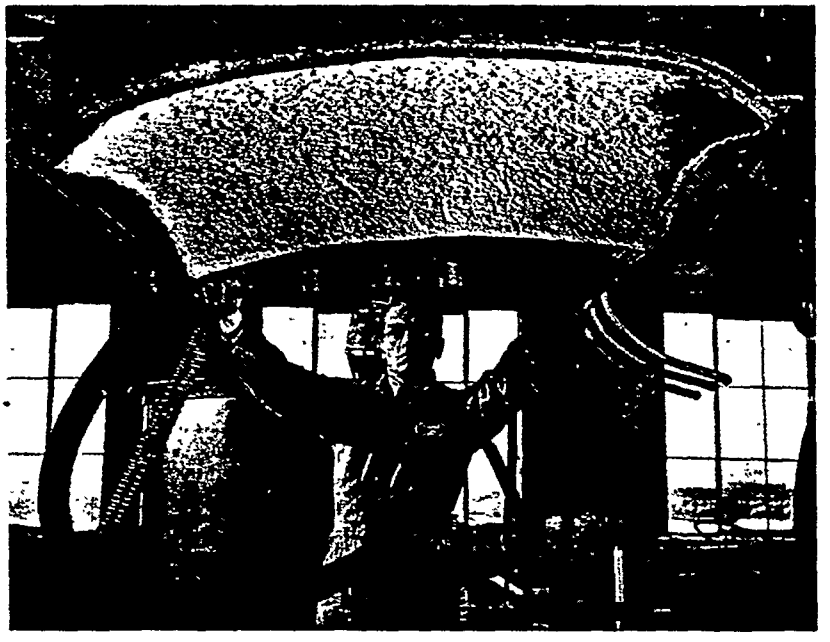
Other domestic materials needed in lesser amounts would include flax, pine pitch, sugar cane, glue, lard, hides and alcohol. The import needs would embrace cork, rubber and tung oil.

Boyer pointed out that many plastic materials already have found practical use in parts of the modern motor car. Among the latter he cited steering wheels, horn buttons, control knobs, glove compartment doors, instrument panel assemblies, accelerator pedals, radio cases and grilles, tail lamps and lenses, small gears, and numerous parts of the electrical system. Safety glass has a plastic layer in the center.

"In its earlier stages the plastic material we used in experiments had to have a high percentage of expensive resin to permit drawing and forming panels between dies in a press," Boyer explained.

"This material was expensive compared to steel. Now, however, a new pre-forming process has eliminated the need for high resin content. Under this method the fibers are suspended in liquid and deposited out on a screen of the approximate shape of the part to be reproduced.

"The plastic then is impregnated with the low-cost soybean resin binder, and a semi-formed part is put under heat and pressure in finishing dies. We have some tough problems to solve, but I think we will lick them."



The mixture of synthetic resin and crop fibers looks like this before it is put under heat and pressure by the finishing dies.

ETC 31370

Steel's Up!

(Continued from page 4)

this particular manufacturing plant. It is entirely different from the older process, which depends on alcohol. And in the newest Ethyl plant at Baton Rouge — the one that Whitey and Dixon and Texas Joe and Slim are helping to erect — the ELA process will have still further improvements.

They're a colorful crew, these steel men. Of the 32 trades that may be involved in erecting a building, theirs is the most hazardous and the most interesting. Bricklayers, stone masons, painters work on scaffolds with a guard rail behind them and a planked roof overhead. Ten stories above, the "roughnecks" move along three-inch needle beams with the casual sureness of a cat on the back fence. At heights that would make a circus acrobat think twice, they cross from one I-beam to another on a ten-inch plank with nothing under them but sudden death, carrying armloads of tools or more planks.

Their work is heavy but it's highly skilled. A gang of men, following the signals of their "pusher" like members of an orchestra, will hoist into the air a bright orange section of steel that outweighs a Pullman car, swing their clumsy load into position, lower it a half inch, another half inch, until the rivet holes meet exactly. Then the "erectors" will run a couple of bolts through, enough to hold it in position, and move on to the next piece while the "fitters-up" true up the great and small beams alike with a plumb line and bolt them securely in place.

The rivet crew follows. One by one they remove the bolts, true up the holes with their drift pins, and batter another red-hot mushroom into place. Four men are in this crew — the "heater," at the forge, the "holder-on" or "bucker-up," and two "drivers," who spell each other with the gun and take turns snaring the hot ones out of the air in the V-bottomed catch-can. No man could run the gun for long stretches without rest; it weighs 35 pounds and delivers 1,000 blows a minute with 110 pounds of air pressure behind them—which is enough to be felt all the way down the column to the footing.

The inspector, or "trouble man," comes after the riveters, testing each rivet by tapping it with a hammer. If it doesn't ring solid and true he'll mark it for replacement; the crew will have to chip off the head with a "buster" bar and drive a fresh rivet. Any one of the crew can spoil a rivet—if the heater leaves it too long in his forge, it will flake off when driven and be undersize and loose in the hole; if the catcher takes too long getting it into the hole it will be too cool for the hammer to work properly; if the bucker-up doesn't hold it tight, or the driver doesn't hammer it solidly, it will be weak. Everybody works together as a team.

They *have* to work as a team. One crew, easy-going and smooth-working, will drive 600 rivets while the next one is fussing along with 300. On a single scaffold half the size of your desk top you may have three men clinging to the same column and working on the same joint—but they have to work smoothly even though the three may have come from three different countries. You'll find "roughnecks" hailing from a dozen countries, but rarely ever an Italian, a Pole, or a Negro. Among Europeans, the best steel men are the "Squareheads"—the blue-eyed and tow-headed Swedes, Norwegians, Danes and Finns whose fathers and grandfathers earned their living high in the flapping shrouds of ships under sail.

Among the Americans, a superintendent of steel likes to find a southerner. Your Virginian, your Tarheel, or your Texas longhorn may disown any ambition higher than settin' in the sun at a ball park with a bottle of Coke in his hand—but put him up where the clouds begin, up where the wind rattles the loose planks under his feet, and you've got a first-rate roughneck. He sets his old hat at a jaunty tilt; there's a cocksure, proud indifference in him as he walks along the swaying beams from one precarious perch to another. And there's a light-hearted, devil-may-care note in his voice as he bangs on the old catch-can and sings out —

"*Ho-o-o — rivet!*"

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AUGUST 1941

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California's oranges ripen in the shadow of snow capped mountains

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Rough Riders of '41

YOU'VE got to be tough to take the rough-and-tumble jolting of a modern tank or scout car. Tanks no longer waddle slowly over obstructions, but leap and bounce over rough terrain at speeds up to twenty-five and thirty miles an hour. Scout cars, like the one in the picture, can leave the highway and roll right across country. Their crews—the "rough riders of '41"—must take the bumps. So must the machines themselves and the powerful engines that drive them.

American engineers not only produce the best automobiles, but today they are turning their skill and ingenuity to the problems of gasoline-powered defense equipment—tanks, armored cars, trucks, airplanes and motor torpedo boats. They are giving America the best equipment, the best engines and the best fuels in the world.

We of Ethyl are privileged to help this vital work through both product and service. Ethyl's product, anti-knock fluid containing tetraethyl lead, is used by petroleum refiners to improve gasoline. Without high anti-knock fuels we might not have had many of today's most efficient types of engines—the compact gasoline power-plants that save weight and space where every pound and every inch count.

Because Ethyl's anti-knock fluids are an important factor in the development of both fuels and engines, our research laboratories in Detroit and San Bernardino cooperate with both automotive and petroleum technologists. We function as a "clearing house" for technical information, help to coordinate many individual research efforts and contribute the results of many of our own tests and experiments with fuels and engines.

Thus, by supplying an essential product and by offering the services of our research laboratories to technical men and executives in every phase of automotive development, we are, we believe, serving the nation.

ETHYL GASOLINE CORPORATION

Chrysler Bldg., New York, N. Y.

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ETHYL NEWS

September 1941

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IN THE

ETHYL NEWS

SEPTEMBER 1941

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The Dayton Power & Light Company were pioneer users of a new fuel

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It's a sport that may pay off in national defense dividends

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"Dauberman Day" is celebrated at birthplace of high compression tractor

A Hundred Years Of Progress 20
Many inventions beneficial to mankind came from this Ohio city

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THE shattering of Pickett's gallant charge was the decisive action of the Battle of Gettysburg, turning point of the Civil War. For two days, July 1 and 2, 1863, Lee's army had been hammering the Union wings unsuccessfully. On July 3 Lee resolved on a mass assault against the center, to be led by Pickett's division, supported by Pettigrew on the left and Wilcox on the right.

Pickett's troops had to advance over 1,400 yards across open ground to reach

THIS MONTH'S COVER

the enemy. Facing a withering fire which tore great gaps in the gray ranks, they closed those yawning holes again and again and came on fearlessly. Armistead, one of Pickett's brigade commanders, with less than 100 men actually broke through Meade's front line and captured a gun, as shown in the picture on the cover; but he was mortally wounded and all his men either captured or killed soon afterward.

Over three-quarters of Pickett's division, 3,393 out of 4,500, were left on that bloody field. Two out of three brigade commanders were killed and the third wounded, ten out of 15 regimental commanders were slain and the surviving five wounded, and one regiment lost 90 percent of its members.

After this disastrous engagement Lee retired into Virginia, never again to invade Union territory.

They Cut Cost per-mile by Two Thirds

The Story of the Original "Test Fleet" of the Dayton Power and Light Company.

Fred Lewis, garage superintendent of the Dayton Power and Light Company.

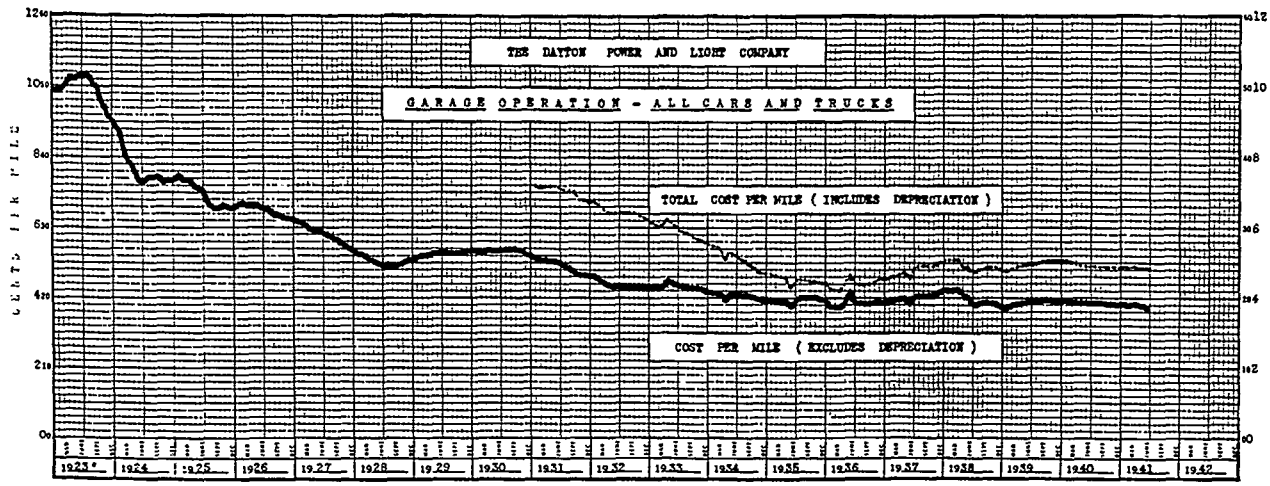
IT was the year a Chinese game called Mah Jong swept the country like a plague—the year many of us were singing a rather silly song called "Yes, We Have No Bananas". John Barrymore was having a tremendous success on Broadway in a play called "Hamlet" and a dried-up little Frenchman named Emile Coué was having almost equal success with a slogan designed to bolster everybody's ego — "Every Day, in Every Way, I'm Getting Better and Better." Remember? It was 1923. President Harding died suddenly on August 2 of that year and a man little known outside his native New England, Calvin Coolidge, took the Presidential oath of office by the light of a kerosene lamp in a rustic farm house in Vermont.

You will find all this duly recorded in history books dealing with the period, but nowhere will you find any reference to an occurrence which perhaps had more significance for the public in general than anything else that took place that year.

This event in itself was simple enough. A man driving down Main Street in Dayton, Ohio, in a Model T Ford, which was knocking like the seven furies, drove into a gasoline filling station at Sixth and Main and ordered a tankful of gas. When he drove out of the station the motor was no longer knocking. It's hardly a story you'd expect to find in a history book or even a newspaper. Yet commonplace as this incident might seem it marked the beginning of a trend that vitally affected two great industries and brought important benefits to the general public.

The circumstances surrounding this untold tale were a little out of the ordinary. In the first place, the man driving the Model T happened to be Fred Lewis, garage superintendent of the Dayton Power and Light Company. In the second place, the service station, owned by the Refiners Oil Company, was the only one in Dayton or anywhere else selling a new fangled kind of motor fuel called Ethyl anti-knock gasoline. A sign reading "Anti-Knock" had caught Fred Lewis' eye as he drove along the street. As garage superintendent for a big utility company operating a fleet of 65 units, Fred Lewis had had plenty of headaches with knock and was on the lookout for something to stop it.

The next morning Lewis called up his boss, O. B. Reemelin, general super-



This chart shows how the Dayton Power and Light Company reduced operating costs.

This service station in Dayton, owned by the Refinery Oil Company, was first in the world to sell Ethyl gasoline.

intendent of Dayton Power and Light Company.

"Mr. Reemelin," Lewis said, "I want you to take a ride with me."

"Did you say take a ride?" asked Reemelin. "Listen, Fred, you know I've got too much to do to be gallivanting around the country during business hours."

"Well, this is a little more than a ride Mr. Reemelin — it's a kind of demonstration. I think we can save the company some money."

They spent several hours cruising uphill and down dale on the roads around Dayton. The car had more power on hills than it had ever had before; there was no knock; the motor ran cooler. Reemelin was much impressed.

"Who makes this stuff, Fred?" he asked.

"Tom Midgley and Charley Kettering are behind it — it's sold by the General Motors Chemical Company," Lewis replied.

Must be all right then," Reemelin said. "I know Midgley — I'll call him up."

The two men met at lunch the next day. The first thing Reemelin wanted to know was whether he could get sufficient quantities of Ethyl gasoline to operate a fleet of 65 units day in and day out. It was a pertinent question because the anti-knock motor fuel was on sale at only one service station then and the D.P.&L. fleet used a lot of gasoline in a month. Assured by Midgley that an ample supply would be made available, Reemelin agreed to the use of the D.P.&L. fleet as a sort of proving ground. New Ethyl fluid mixes would be thoroughly tested in the Dayton fleet; the effect of different mixes on motors and parts would be carefully checked.

This proved to be a happy arrangement for both parties. The sponsors of Ethyl gasoline got a practical research testing ground and Dayton Power and Light's fleet had the services of Ethyl engineers as well as the improved fuel. Another happy result was that when word got around that the Light Company fleet was using Ethyl gasoline it became "respectable". Oil companies pricked up their ears. The sales curve began to rise. On the other side of the picture the D.P.&L. fleet began to operate more smoothly — motor knock disappeared and the cost-per-mile curve began to descend almost perpendicularly. (See chart.)

The real significance of Fred Lewis' stop at a service station goes much deeper, however. Without doubt the decision of a large fleet operator to use Ethyl gasoline helped to focus attention on an important attribute of gasoline—anti-knock quality. Since that spring day in 1923 the benefits of better anti-knock fuels have touched everyone using motor transportation. Much of the efficiency of the present-day automobile is due to them. Trucks haul bigger payloads and buses carry more passengers because of them. Airplanes fly higher, faster and farther because of them.

In 1927 the Dayton Power and Light Company made a comprehensive report on their experience with Ethyl gasoline. Parts of it will be interesting to both oil and automotive men. It showed a very satisfactory reduction in cost per mile. This came about not from any appreciable gain in miles per gallon, but from greatly decreased maintenance and repair costs, increased availability of equipment and longer car and truck life.

The gain showed up in another way. Equipment that a mechanic thought might require an hour's work often stood in the shop 12 hours or more before anyone got around to it. Thus the cost of actual repairs was negligible compared with the loss of equipment for many hours. Fred Lewis adopted a policy then of not permitting the removal of a head unless he is convinced it is absolutely necessary. The policy is still in force today. As a result D.P.&L. has no spare equipment. Every unit is expected to be and *is* on the road every day.

Other gains shown in the report were (1) depreciation figures on equipment showed an improvement of almost 25%; (2) fouling of spark plugs ceased; (3) overheating declined to the vanishing point; (4) bearing wear decreased. One group of 52 units piled up a total of over a million miles without having a pan off.

One of the intangible benefits, according to Fred Lewis, was the effect of smoother engines on the drivers. The attitude of many of the men toward their jobs underwent a marked change. They became more polite and friendly to customers and the public generally—they even told them about a wonderful new gasoline that stopped knock and made motors run better.

Meanwhile important technical data was piling up for the guidance of Ethyl

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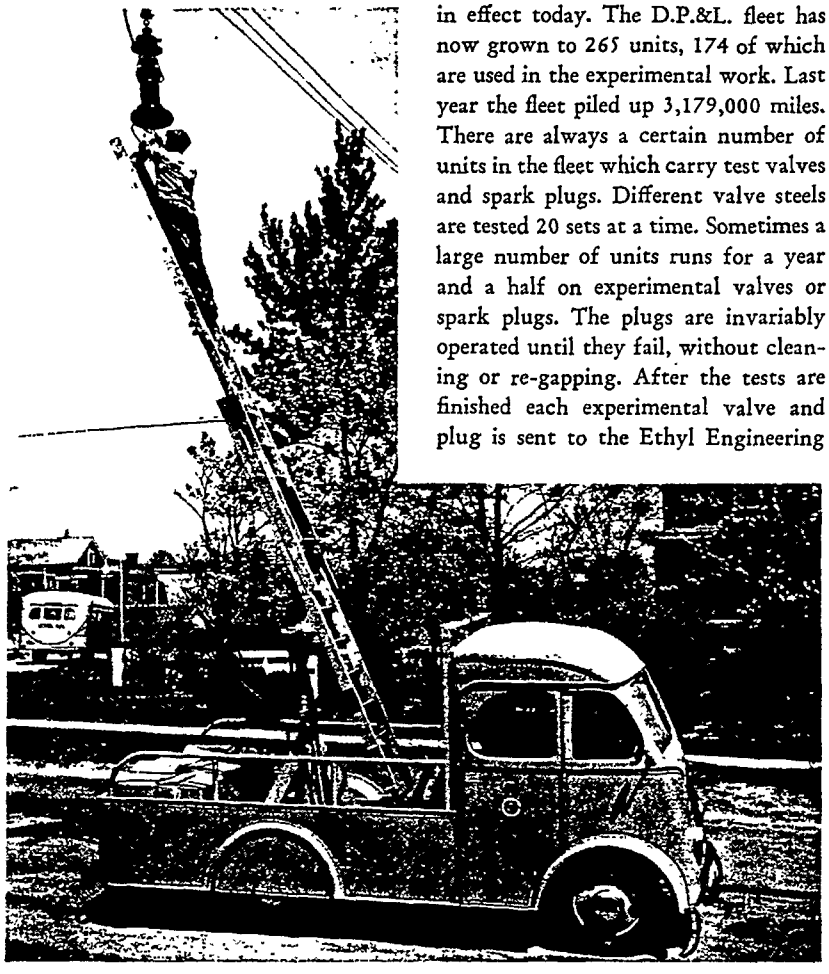
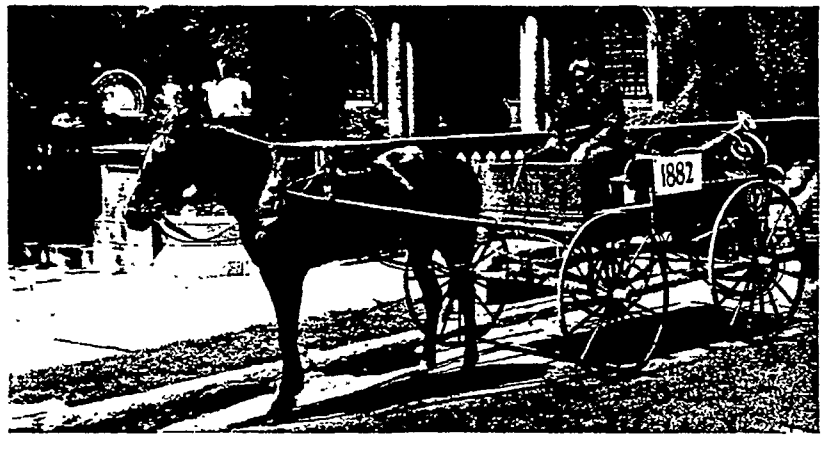


Ladder carrying trucks like this were designed for repairing arc lights.

●

Back in 1882, long before the days of the automobile, electric service man traveled via horse and wagon.



(General Motors Chemical Company became the Ethyl Gasoline Corporation in 1924) engineers and chemists. By 1927 the D.P.&L. fleet had grown to 128 units ranging in size from small passenger cars to heavy duty trucks. It reflected accurately service conditions in many different types of motor vehicles.

Fred Lewis acted as watchdog of the records and he had an uphill battle for a while. No matter how often they were told, drivers and mechanics would occasionally yank an experimental spark plug and stick in another. The business of keeping careful records of the type of vehicle, the engine number, odometer reading and other data seemed like a lot of nonsense to them. But they gradually learned and now take almost as much interest as Fred Lewis does.

The arrangement was so satisfactory that it was renewed in 1927 and is still in effect today. The D.P.&L. fleet has now grown to 265 units, 174 of which are used in the experimental work. Last year the fleet piled up 3,179,000 miles. There are always a certain number of units in the fleet which carry test valves and spark plugs. Different valve steels are tested 20 sets at a time. Sometimes a large number of units runs for a year and a half on experimental valves or spark plugs. The plugs are invariably operated until they fail, without cleaning or re-gapping. After the tests are finished each experimental valve and plug is sent to the Ethyl Engineering Laboratories in Detroit, together with a complete record.

This program of continuous experimental work may be classified under the heading of public service. There is hardly a car or truck or bus on the road today that has not benefited from some of the data compiled in Dayton. Deficiencies in materials discovered in these tests have inspired engineers to find better materials. Some of the first steelite valves were tried out in the D.P.&L. fleet and several new types of electrodes and ceramic materials received their baptism of fire there. Each of the changes in mixtures for Ethyl and Q anti-knock fluids have received thorough tests at Dayton as well as elsewhere, before being put into general use. The work at Dayton is only a small part of the total effort expended on finding better and better materials for spark plugs and valves, but D.P.&L. deserves special commendation as perhaps the first major fleet operator to permit regular service equipment to be used for test purposes.

Today the Dayton Power and Light Company is probably the oldest regular user of high octane gasoline in the world. The company began on June 1, 1923, and has never used anything but Ethyl gasoline since. Never in all that time has the fuel used contained less than 3ccs of tetraethyl lead. Today 3ccs of lead added to a good base stock gives them a fuel of approximately 84.2 octane number which is used in all of the 265 units. During the past 18 years D.P.&L.'s cost per mile, exclusive of de-

(Continued on page 22)

ETC 31378

PISTOLS FOR FUN

Ever-Increasing Thousands Are Developing Skill With Pistols Surpassing Any Ever Dreamed of by the Old Duellists With Their Clubbed Hair and Tight Breeches.

SKILL with pistols surpassing the most ambitious dreams of the old duellists with their clubbed hair and tight breeches is being developd by ever-increasing thousands. It's a sport—possibly the fastest growing sport in America today — and one with as much thrill in it, as much fun, as much man-to-man competition as golf or tennis or bowling or what-have-you.

What's more, in these days of blitzkriegs and parachute troopers, it's a sport that might pay off, in National Defense and home — and self-protection. Lots of men think so, at any rate, as is proved by the talk along the firing lines and by the marked upswing in target club memberships these past two or three years throughout the nation. Over 3,400 clubs are now affiliated with the National Rifle Association and they estimate there will be 4,000 N.R.A. clubs by the end of the year. Thirty thousand shooters have registered for 1941 tournaments—and usually only the top few from any club go in for these scheduled matches. Four or five "unregistered" matches are held by most clubs for every one that is registered with N.R.A.

Substitute a perfectly balanced modern firearm for those old smoothbores; substitute a friend beside you for an enemy in front of you; substitute a black bulls-eye for a man's shoulder as a target; make the distance twenty-five yards, or fifteen, or fifty — and the game is no longer duelling, but it is sporting. It's not a game necessarily "for men only" either. The little woman, if she has eyes for other than decorative purposes and steady hands and patience, is as apt as not to shoot as well as her lord and master.

Hitting the chalkline with a fast forehand or sinking a fifteen foot putt for a birdie is no greater thrill than seeing the "tens" add up on your score-card as you hold and squeeze 'em in there with a pistol. And, gentlemen, unless you have bowled 300 or won the championship at your golf clubs, you ain't seen nothin' in the way of sport thrills to compare with your first "possible" in match competition! That's something!

(A "possible", in case you wondered, is a score of a hundred out of a possible hundred. Ten "tens". Ever try to tie together ten perfect shots on a golf course? Or ten strikes? Or ten service aces? You get the idea, don't you? It's nice work — if you can get it!)

Pistol shooting is a game of infinite variety, simple enough for the once-a-month shooter plinking at tin-can targets, complex enough to provide ever-changing problems for the addict. It's a game you can play from a wheel-chair, and a game that can give an iron-nerved athlete the jitters. It's so-o simple! Just hold — and squeeze. But the champs, the William Tells of the six-guns, are out there day after day on the firing line, pouring string after string into the targets, trying to do it. And how they love it! You'll love it too, if you try it.

ETC 31379

1. *Target shooter's kit with spotting scope.*
2. *Colt officer's model target .38 calibre.*
3. *Colt match target woodsman .22 calibre.*
4. *Colt national match .45, U. S. Army target grade.*

It's a game that is fun alike for the novice and for the expert.

Competition makes any game better, but pistol shooting is one game you can play alone and like it. Your real opponents, whether you're shooting alone or in a match against an entry of hundreds, are yourself and your weapon. (Yourself, mostly. The gun has no nerves!) And those opponents will be present wherever you set up your target, whether you're a plinker or an all-calibres medal winner.

It's an odds-on bet, however, that there's a target club within a few miles of your doorstep. You may not know about it (target clubs seldom advertise), but it's more than apt to be there — and the love of a gun is the one requirement for a welcome.

Another nice thing about this game is that you can make it as inexpensive as bridge at a tenth of a cent or as elaborate as your circumstances and inclinations dictate. Club memberships are inexpensive — ten dollars a year or less, on an average; and for equipment you can write your own ticket.

A good .22 pistol is the smart buy for the beginner. If there's any chance that you'll ever enter match shooting (and there is!), you'd probably better make it an automatic. (Technically, it will be a semi-automatic. A true automatic keeps firing as long as the trigger is held back. The gun you'll buy will fire once each time the trigger is pulled.) That choice will save you the necessity of cocking, which isn't much of a problem at slow fire but requires fine skill and infinite practice for timed and rapid.

Your .22 should cost around twenty dollars or upward. Not much less, because a good gun is worth that; and the better the weapon you buy in the beginning the less the likelihood that you'll outgrow it and have to buy another. A Colt match target woodsman will cost a bit more than forty dollars (plus such extras as the special grips pictured) and is far more accurate than any shooter and good enough for the champions. Ammunition will cost you about seventy cents a hundred shots.

And in that purchase you will have a toy that will keep you amused a lifetime. Amused — and baffled! Just as Old Man Par baffles the golfers. There's no such thing as a perfect golfer — or a perfect marksman. But it's fun trying!

Of course, once you have tasted the bittersweet thrills of match shooting you will probably want to try its other angles. Your .22 will be your mainstay; you'll probably shoot it in two out of every three matches you enter. But the center-fires (the .32s and .38s) and the big square-jawed .45s will taunt you with their untried challenges and fill you with a yearning and from then on— you're a gun-fan, and heaven help you!

By that time you'll be complaining because you can't get enough practice and you'll wonder if there isn't some way to practice at home without arous-

(Continued on page 22)

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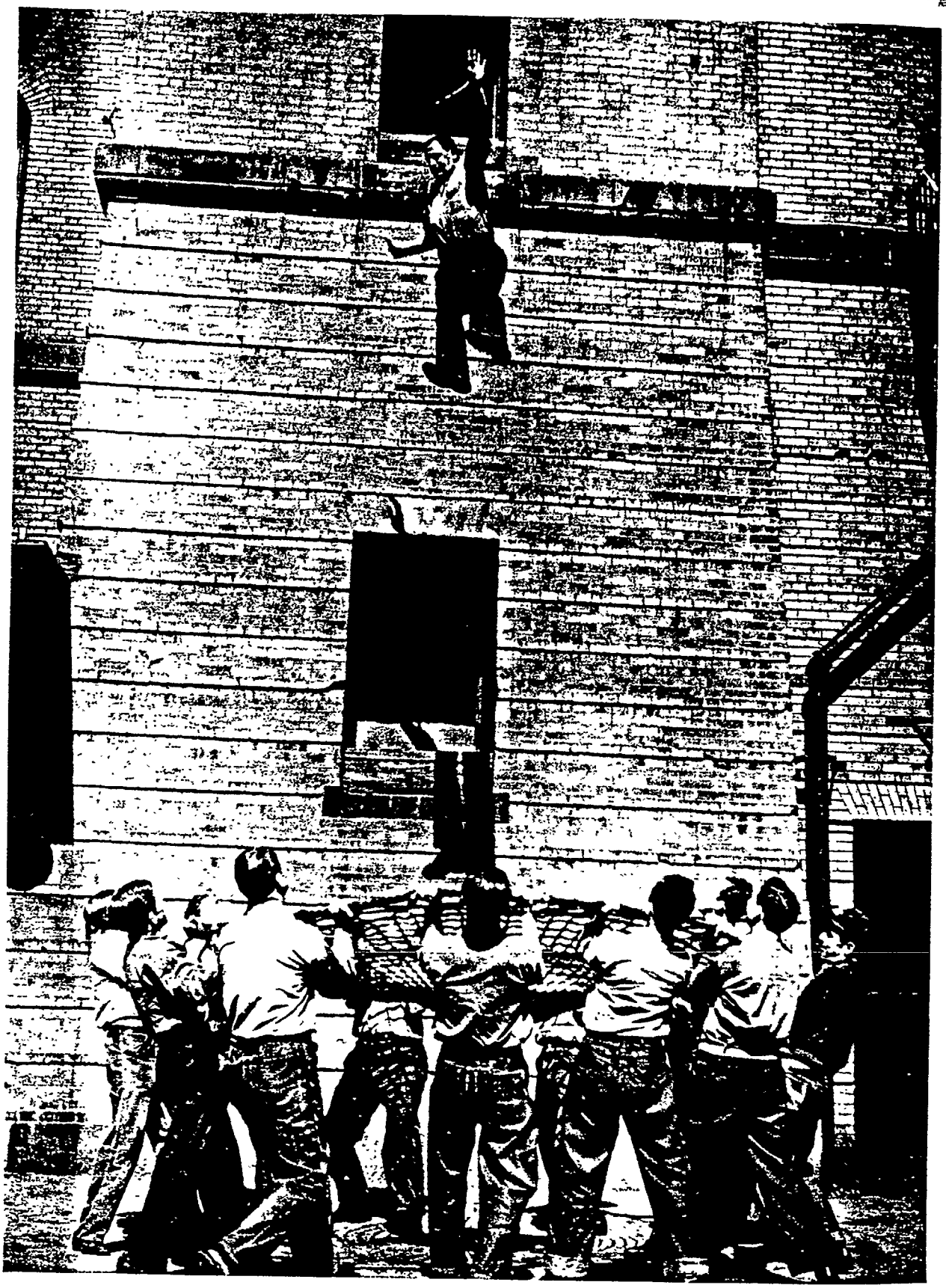


Citizen firemen get a real thrill from this sort of training.

ETC 31381

Hub City Training 3000 Civilians For Bombing Attacks

Large Force of Volunteer Fire Fighters to be Ready for Duty if Air Blitz is Unleashed.

By MARTIN SHERIDAN

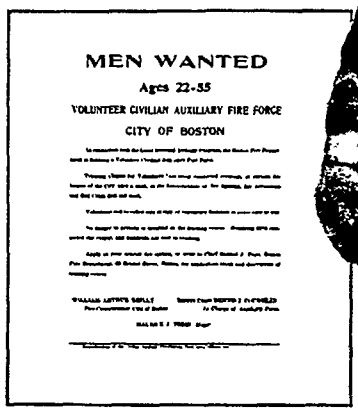
(Martin Sheridan Feature-Fotos)

REPEATED bombings of London have made it clear that next to the RAF and its fighter planes no defense group has shouldered a heavier burden than the city's fire fighters. Stories of the valorous deeds performed by both professional and volunteer units will be told and retold in the years to come. This will be especially true of the volunteer citizenry without whose aid London today might be a blackened and smouldering shambles, utterly devastated by incendiary bombs. It is said that already nine per cent of England's fire fighters have been killed in action.

In view of the possibility of a hostile power bombing American shores, Boston, almost a day nearer Europe than any other eastern metropolis, has taken nothing for granted and is going ahead with the organization of a volunteer fire fighting force adapted to conditions peculiar to that city. If an invasion of these shores should be attempted, Boston does not propose to be caught napping.

Many of the buildings in metropolitan Boston are third class wooden structures, and in case of bombing the Hub City would suffer heavily. Regular fire fighters would have a difficult time getting through debris-filled streets which are narrow and winding. Fire Commissioner William Reilly realized this when he first undertook a study of the problem in terms of national defense.

With the organization of the first school for civilian volunteer firemen, the entire list of eligibles for appointment to the fire department was obtained from the civil service commission


MEN WANTED

Ages 22-55

VOLUNTEER CIVILIAN AUXILIARY FIRE FORCE

CITY OF BOSTON

and invitations were sent to all to enroll in the civilian fire fighting force of Boston. It was made clear that there was to be no pay.

More than 450 "sparks" were signed up for the same training that is given to regular firemen upon entrance into the paid fire department. Sixty hours of drill time were completed at 12 fire stations and special certificates were awarded to the graduates. Each man was presented with a special fire line pass, acknowledging his membership in the Boston Fire Department Civilian Auxiliary Force and carrying a small photograph of the bearer.

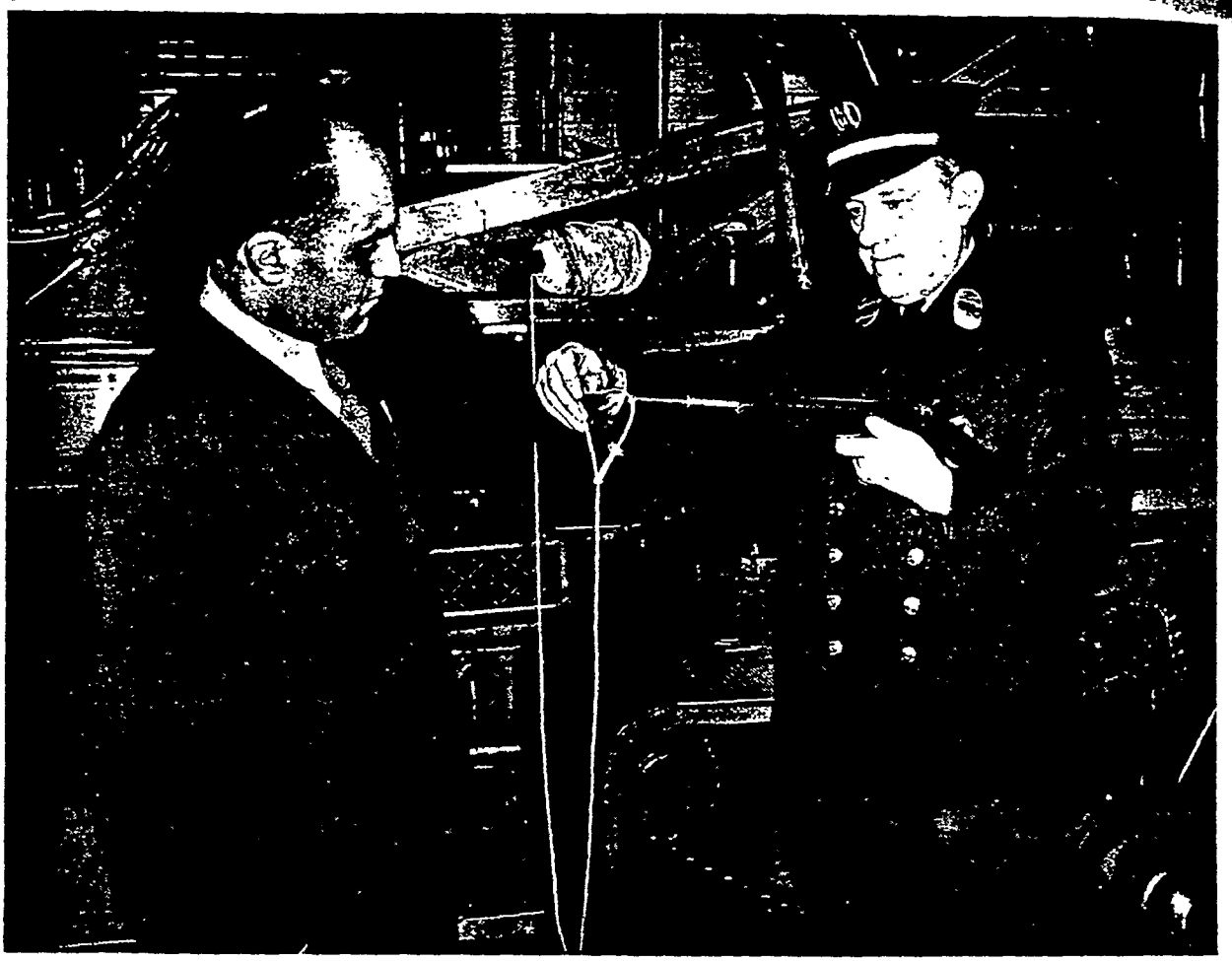
So once again Boston has volunteer firemen. The old call men — paid $3.84 a week — went off duty for the last time in 1907. The regular fire fighting force consists of 1,700 men. Present plans call for an eventual total of 5,000 firemen and volunteers to man the city's 50 fire stations. Whether war comes or not, this system will be continued until such time as it is found to be of no value.

After the first group of men was

ABOVE, LEFT: *Handbills urge civilians to enroll in the auxiliary fire force.*

ABOVE: *The job of carrying a heavy man down a 30-foot ladder is too difficult and dangerous for a novice.*

ETC 31382



Captain William J. Shepard instructs a civilian fire fighter in the use of a life line gun.

trained, posters were printed and displayed in fire house windows. They read, in part, as follows:

"Volunteers will be called only in case of emergency disaster in peace or war."

Hundreds of men enlisted in the new campaign. Officials checked applications, telephoned employers for each person's qualifications and background. Two age groups were formed to include young men from 22 to 35 and older men from 36 to 55. The latter perform less strenuous duties.

Forty pieces of spare apparatus, including engines, hose wagons and pumpers, have been stationed in strategic parts of the city for aid in practical instruction. Even after completing the instructions, members of the auxiliary force continue to report once every two weeks for a drill in the stations to which they have been assigned.

Many valuable lessons learned by English fire fighters have been included in the training course. For instance, incendiary bombs dropped by the thousands on British cities have contained aluminum or magnesium powder, which ignite easily with the oxygen in water, setting free the hydrogen to form a highly explosive gas. If a hose is turned on such a bomb, unless it is done skillfully, it will only spread the flames. This fact was proved by United States Department of Agriculture chemists during their investigation of fires in aluminum plants a few years ago.

It was found that if a very gentle spray is turned on the flames the hydrogen is released slowly and its rate of burning can be controlled.

"The difference," said one chemist, "is comparable to lighting a jet on a gas stove and lighting a match in a room full of gas."

"A fog nozzle is being used throughout England," explained Deputy Chief Dennis J. Coughlin, in charge of Boston's Auxiliary Force, "to combat the destructive thermite bombs which burn at 7,000 degrees Fahrenheit. This temperature will affect even steel girders, so you can imagine the damage a number of these bombs would do to Boston's West and South Ends. Use of the fog nozzle produces a heavy foam which

ETC 31383

doesn't put out the fire but prevents it from spreading to adjoining buildings."

Fire protection in wartime is almost entirely a civilian responsibility. For this reason the National Defense Advisory Committee named a group of engineers, Army and Navy officers and fire chiefs, headed by Mayor Maurice J. Tobin of Boston, to organize this branch of the nation's defense.

The committee reported that American professional firemen are well trained in the latest methods, yet they probably would be inadequate in the face of a concentrated shower of incendiary bombs. Many small cities and some large ones, it was revealed, are protected only by volunteer departments with little training. So vital is the need that courses in fire fighting have been organized in several colleges.

Boston is much further along in defense preparations than any other city in the country. Transportation committees have been organized to function in case of evacuation of crippled children, aged and infirm persons. Special communications systems have been developed with the assistance of amateur stations.

If the fire alarm system should break down, and communications are cut off in Boston, "ham" radio operators in surrounding cities and towns will gather together under a prearranged system to re-establish service.

The older civilians in Boston's volunteer auxiliary force have a modified drill program, planned to release them from strenuous work. They have been trained to lay hose, use fire extinguishers, and set up portable lighting equipment.

Another ramification in the auxiliary fire system is the formation of special brigades in commercial and industrial plants. Every manufacturing plant which has received a government defense order has been inspected by F.B.I. agents. Although some industries have their own fire-fighting groups, many of them can stand special training and instruction.

Boston Fire Department officers have inspected many of the plants with defense orders to suggest regulations that will help to prevent fires. In addition, they have pointed out the proper places for the location of extinguishers, conducted fire drills, and in larger plants trained employees in the fundamentals of fire fighting. Some employees have been taking the regular civilian auxiliary course. Volunteers from as distant as Springfield, Pittsfield and Worcester have also enrolled.

"By the time such a need as may be foreseen arises," said Commissioner Reilly, "no one knows how many informed 'sparks' there will be among the civilian ranks. Properly organized, properly contacted, if only fifty per cent of the volunteers respond in an emergency, Boston will be a great deal better off than it would be if this training had not taken place."

LEFT: *All gas masks are tested in a smoke chamber.* RIGHT: *A volunteer practices the "fireman's carry."*

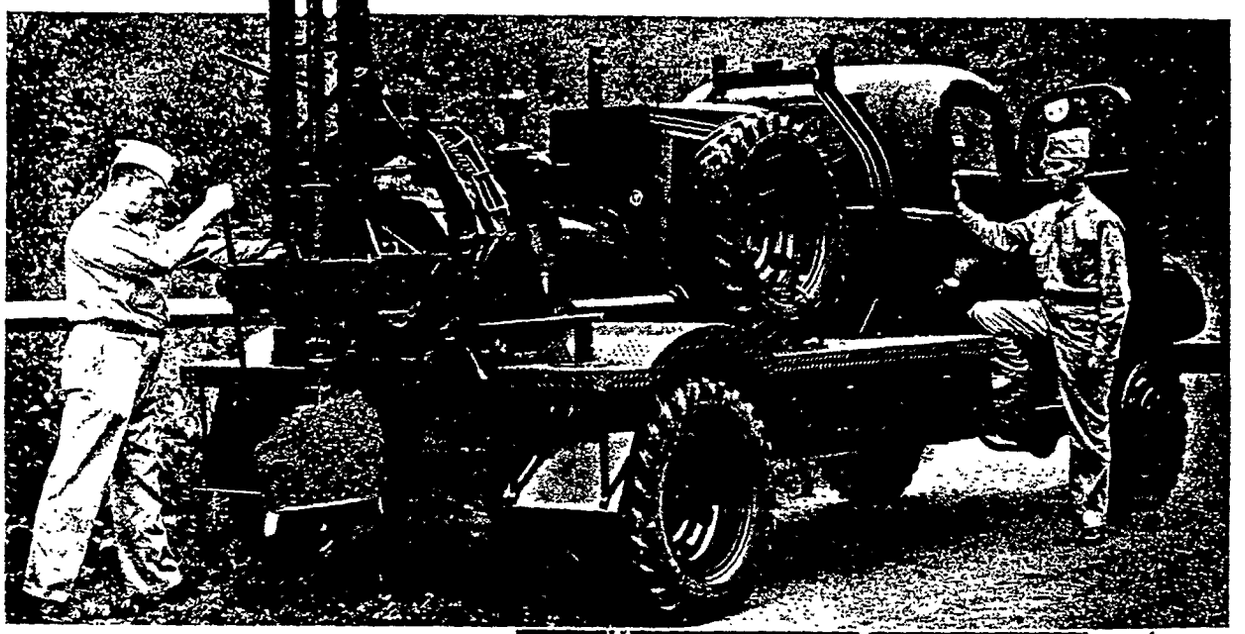
ETC 31384

In Place of Pick and Shovel

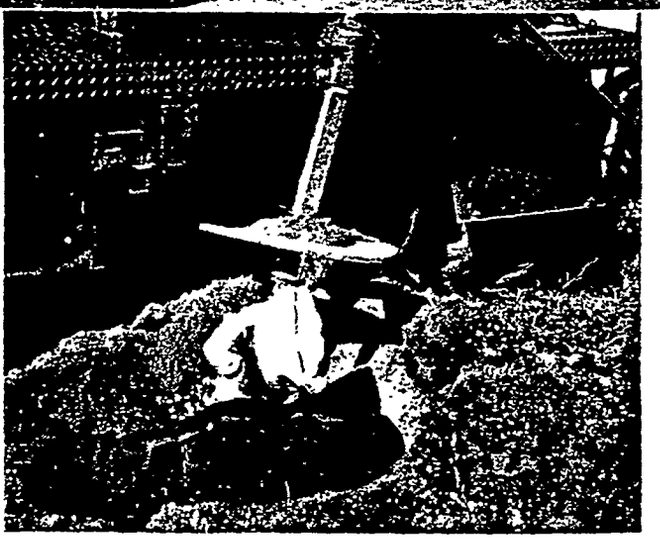
Army Adopts Peaceful Earth Drill for Doublequick Hole Digging

SOME romantic souls may sigh for the pomp of cavalry when motorized divisions go rolling by; but none will mourn the manpower — sweat power — that is replaced by the army's newest "pick and shovel brigade."

Mechanized power made Germany's "blitzkrieg" possible. Now America, home of automotive progress, is adapting the fast tireless power of flaming gasoline vapors in steel cylinders to every type of use from pursuit planes to ditch digging — to make anyone else's blitzkrieg *impossible.*



Land mines in holes like these can be set in minutes instead of hours. Deep enough to be safe for any "friendly" traffic, they are powerful enough to blow that section of the road to shambles when enemy traffic comes.

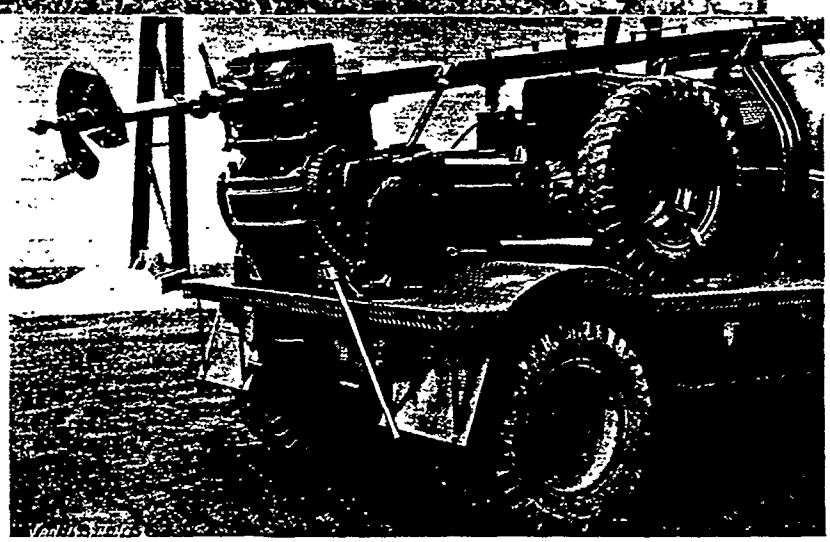


A minute and a half is all it took to dig this hole five feet deep and eighteen inches in diameter. In ordinary soft soil the Buda drill will make it twenty feet deep and twenty inches wide in less than twenty minutes. Time for other sizes and depths ranges between these two. A special drill will go fifty feet deep.

ETC 31385

The dirt flies as the power drill goes into action. An upright support for the rifle range at Fort Custer, near Detroit, will go into the hole. Later such drills may prove indispensable for digging holes in which to lay land mines under bridges, roads, railroad embankments, for building tank traps, or for the construction of emergency roads, bridges, foundations, and artillery emplacements. Where piles are needed and the soil is too tough for them to be driven, the Buda drill will rapidly dig holes of the right size and depth. The Corps of Engineers is supplying its regiments with these earth borers, for use in any operation requiring the digging of many holes in a short period of time.

Steel rails set in holes provide a quickly-laid defense against tanks. Bore and depth of holes is readily changeable to meet various needs of Army engines in action. Holes may be drilled at angles up to 45 degrees.



Ready to roll. The business end of the Buda-Hubron Earth Drill as manufactured for the Engineers Corps. Originally developed for putting in telephone poles, sinking piling in construction work and for other normal industry uses, earth drills are being made in large quantities for our mechanized army. A 4-cylinder gasoline engine powers the drill. The truck is heavy duty 4-wheel drive.

ETC 31386

Motorcycle Mechanics Wanted— QUICK

Harley-Davidson School at Milwaukee Trains Fifty a Month for Emergency.

MECHANIZED army plans call for motorcycles by the thousands. In the new armored divisions they are a key cog — besides the thousands needed for courier and scout duties with regular divisions. And mechanics to keep them running must be added as fast as the army increases its motorcycle complement. So Harley-Davidson today is making motorcycle mechanics as well as motorcycles on rush orders.

One of the two of the Army's training schools for this purpose, the Milwaukee school, has already turned out nearly a thousand graduates and welcomes fifty new candidates a month. The course is an intensive four weeks of classroom and workshop instruction, eight hours a day, five days a week. A number of changes have been necessary since the school started in July 1940 but there are few disappointments among the picked students today; four weeks after entering they are expert.

Students are selected from Army posts all over the nation on the basis of previous knowledge and aptitude for mechanical work. Both draftees and

ETC 31387

regular Army men, from the new armored divisions and from other outfits which use motorcycles, are chosen. During the course about three-quarters of their time is devoted to manual training and actual workshop practice, while the other quarter is spent at lectures and in the study of engine theory.

Instructors are veteran Harley-Davidson experts who have had many years of experience in training mechanics for service in civilian, police and military fields. Several of them have spent time in Army camps as technical advisers, thereby gaining a first hand knowledge of the Army's problems.

In addition, experts from allied industries are frequently called in to lecture on their specialties. Among these men is L. A. Dollahan of the Ethyl Corporation, who gives talks on fuels and motors to each monthly class.

During the first months of the school the men kept whatever hours they desired, except for regular class attendance at fixed times. They lived at various boarding houses near the Harley-Davidson plant. Last April, however, Lieutenant J. J. Roth was sent by the Army to take charge of the school and look after the students' welfare. He moved them all to one hotel in downtown Milwaukee, where they eat together and ride to classes in a body.

Each group is now under Army discipline and must be in bed by 10:30 p.m. on nights before classes. Rising hour is at 6:30 a.m. Instructors say that the inauguration of this system has resulted in better work.

At the beginning of the course the functions of the various parts of a machine and its motor are explained in lectures. The student mechanics then tear down motorcycles and put them together again in the workshop. After these steps are learned thoroughly, the instructors take parts from machines when students are absent. The students must then decide what parts are missing, select the proper spares from a large assortment in the workshop and install them correctly.

Toward the end of the course each student takes out an ailing motorcycle on a test run, diagnoses its trouble and repairs that trouble. Stress is laid on the problems and ailments which result from the rough treatment Army motorcycles receive during maneuvers. All tools used in the school are those which a mechanic would be likely to have available under actual field conditions, and no time is wasted in familiarizing men with the intricacies of complicated gadgets which they may never see in military service.

"We teach them to do things well and fast the hard way," explained Orrin Lamb, chief instructor.

Students are graded weekly on their working efficiency, attitude, initiative, and co-operation. On completion of the course they receive a final grade and are recommended for jobs when they return to camp. The best men are named for instructorships, posts which usually bring to each appointee an advance in rank accompanied by a boost in pay. Those who have shown outstanding ability to absorb knowledge but little aptitude for teaching others are recommended for jobs as shop foremen. The others go back to serve as mechanics, but they are better mechanics for having taken the course.

(For other pictures see page 23)

A class of officers learns what makes a motorcycle engine tick.

ETC 31388

Portable Substation for Emergency Use

Mobile Unit Can Restore Power Quickly If Regular Service Breaks Down.

OUT of the Westinghouse Transformer Division there recently rolled a "power guardsman" on wheels, ready to keep electric power flowing to national defense industries, hospitals and homes.

Built for the Cincinnati Gas & Electric Company, this mobile substation is essentially a transformer that can restore power quickly if a regular substation should break down. Transformers are the necessary distribution links between high voltage lines and factories or homes, reducing voltage to usable stages.

If the lights in a city go out because of trouble developing in a regular substation, a power company can speed a trailer unit to the scene and "plug in" to the power line, restoring power in a short time. The four-wheel trailer carrying the mobile substation can be towed on a highway at speeds up to 40 miles an hour.

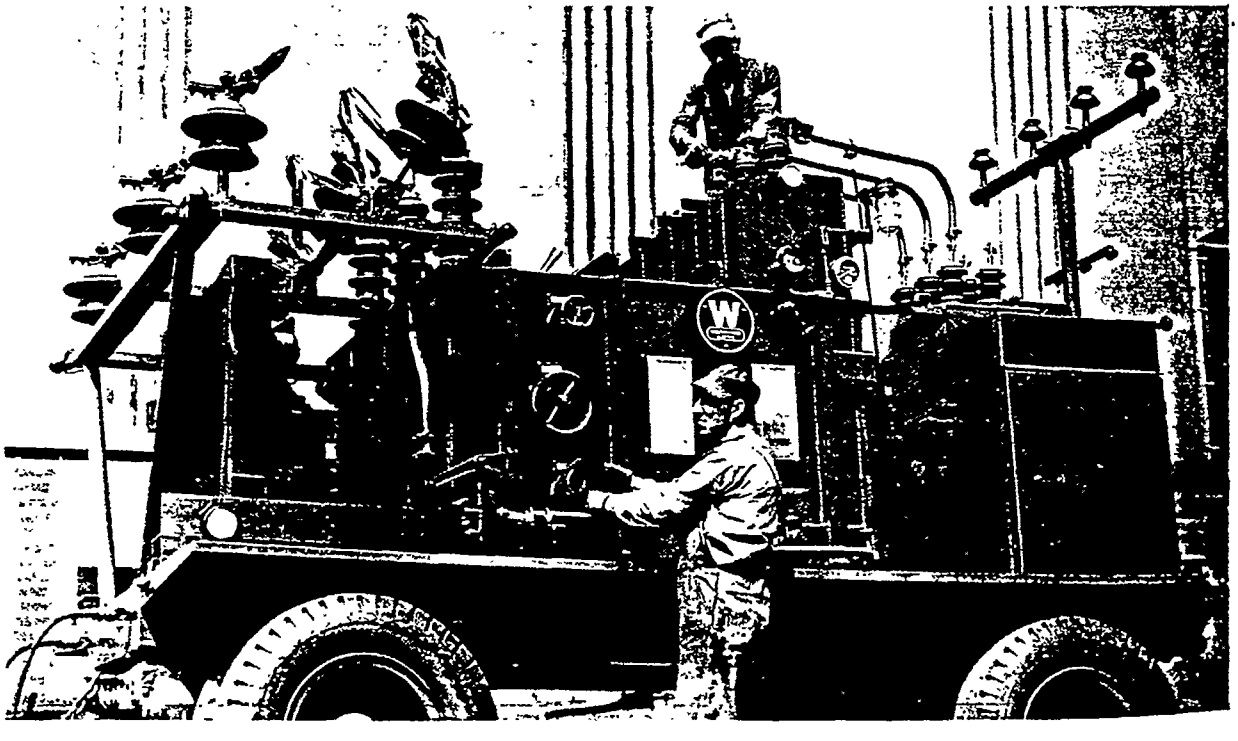
Portable units can also be substituted for permanent substations shut down for inspection or maintenance work. Another use is supplying power for construction work. One of these flexible substations, Westinghouse engineers explained, can take power from a 33,000 volt line and step it down to 4,500 volts, or the same unit can transform 13,200 volt power to 4,500 volts.

Heart of the portable substation is a compact transformer in which the core and coils are laid on their side and cooled by forced oil circulation. This transformer is an outgrowth of a transformer which was developed several years ago to fit into the small space of an electric locomotive. The new portable transformer is about one-fifth as large and weighs three-fifths as much as a permanent substation of the same rating.

This 2,500-kilovolt-ampere unit ordered by the Cincinnati Gas & Electric Company is only 10½ feet high, permitting it to go through underpasses on highways. It is eight feet wide and 14 feet long. The combined weight of transformer and trailer is 12 tons.

Last December Westinghouse shipped to the Public Service Company of Northern Illinois the first completely factory-assembled portable substation in the United States.

The Sharon Division is now at work on four additional units. One will have a 4,500 kilovolt-ampere rating and will be used on 44,000 volt systems serving several companies making machine tools for national defense production. This substation will be capable of supplying power for a community of 15,000 people.



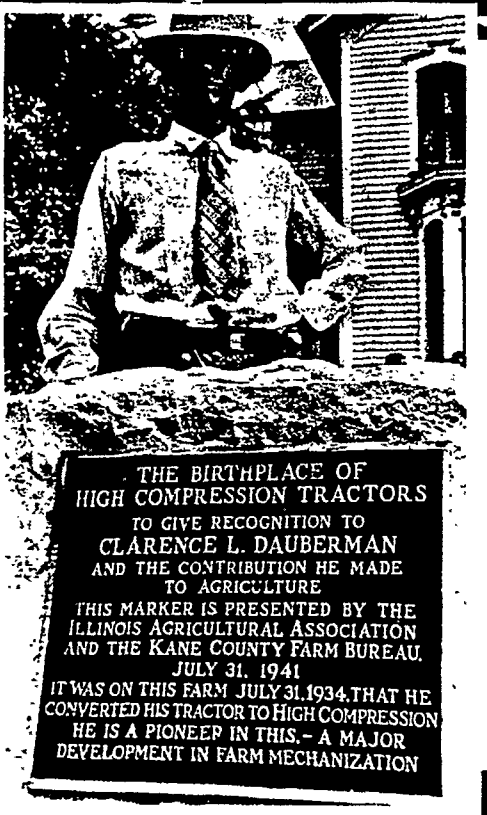
ETC 31389

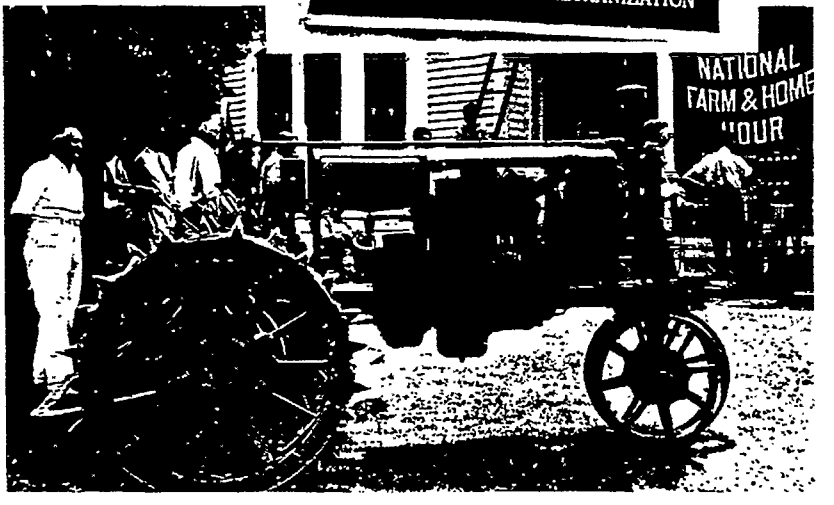
Crowds of Illinois farmers *(in photo at top of page)* left their threshing for a day to honor Clarence Dauberman *(center)* with a plaque and testimonials for his pioneer work in developing the high-compression, gasoline-powered tractor. The 16-year-old machine he experimented on *(right)* is now in museum.

•

Farmers Honor Tractor Pioneer

"Dauberman Day" Celebration Fetes Farmer Who Pioneered Automotive-Type Tractor, Opening New Market for Fuels and Lubricants.





"It's a bee-yu-tiful day in Kaneville and more beautiful on the farm of Clarence Dauberman, located approximately one mile west of Kaneville, Illinois. Today we are present at the dedication of a plaque commemorating a revolution in farm power—the birthplace of the high compression tractor . . . ."

THUS famed Everett Mitchell, whose voice is known to millions as the regular announcer on the National Farm and Home Hour, radio's premier coast-to-coast farm program, proclaimed "Clarence Dauberman Day" before a dozen leaders in agriculture and industry, a

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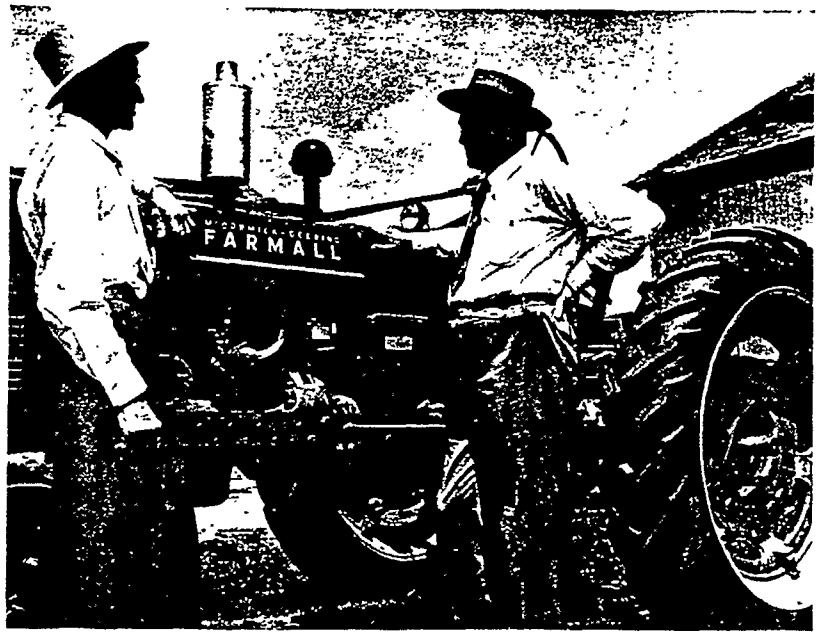

crowd of hundreds of Illinois farmers and a radio audience estimated at 7,500,000. Although this was essentially a farmers' party honoring a pioneer farmer for an outstanding contribution to agriculture, the marketers of petroleum products of the nation might have put up a companion plaque reading "In commemoration of the birthplace of the high compression tractor and an important market for fuels, lubricants and greases."

For here, on a typical Illinois farm, Clarence L. Dauberman started a revolution which not only brought better farm power to hundreds of thousands of farmers, but which developed one of the greatest potential markets for petroleum products. Here an experiment by a dissatisfied farmer turned into the chief reason for an increase in tractors in use on farms from 1,200,000 in 1934 to approximately 2,000,000 in 1941. Since the average farm tractor consumes yearly 1,000 gallons of fuel, 30 gallons of crankcase oil and 30 pounds of greases, it requires only a little multiplication to determine what this farmer's experiment has meant to marketers of petroleum products.

It is also a market that holds much promise for the future.

Robert M. Gaylord, president of the Illinois Manufacturers' Association and one of the principal speakers at the "Clarence Dauberman Day" ceremonies, declared that the production of new tractors this year will reach 300,000, a new record. This rate of production caused one speaker to predict that the

America's first high-compression farmer, Clarence Dauberman (at top), receives a brand new Farmall from International Harvester's chairman, Sidney C. McAllister. Farm neighbors (in center photo) came from all over Illinois to hear the ceremonies, share 500 home-baked pies. Speakers of the day (at left, reading left to right) included farmer Dauberman, S. G. McAllister, Prof. R. I. Shawl, head of agricultural engineering at Illinois U.; Earl C. Smith, state and national farm leader; Robert M. Gaylord, president of Illinois Manufacturers' Association; and Ethyl's high-compression prophet, George Krieger. It was Krieger who suggested and supervised the experiment on Dauberman's tractor seven years ago. Honored as a joint pioneer, he was introduced on the program as "a man who has been preaching the gospel of the high-compression tractor for 11 years . . . Agriculture owes him a great debt."

ETC 31391

number of tractors in operation will double in the next six years. Already the farm market consumes one fourth of the total U. S. production of petroleum products.

"Clarence Dauberman Day" was a gala event in Kane County and one that attracted nation-wide attention. It was covered by two separate radio broadcasts and a number of representatives of the press. Busy industrial and agricultural leaders traveled considerable distances to attend. Farmers dropped work during their busiest season to be on hand. Farm women in the neighborhood worked like beavers for days before the celebration making arrangements to feed the hungry throngs. The famous boys' band from Mooseheart, Illinois, and two radio acts furnished by Station WLS entertained the crowds. An eighty-acre parking field was set aside.

The principal speakers at the ceremonies, in addition to Mr. Gaylord, were Earl C. Smith, president of the Illinois Agricultural Association and vice-president of the American Farm Bureau Federation, who presented the plaque commemorating the event; Professor R. I. Shawl, head of the agricultural engineering department at the University of Illinois, who accepted the original tractor, "the daddy of all high compression tractors" for the museum at the university; Sidney G. McAllister, chairman of the executive committee of the International Harvester Company; and George Krieger, agricultural engineer, of the Ethyl Gasoline Corporation.

●

In top photo, announcer Everett Mitchell (with striped tie) who is familiarly known in millions of rural homes as the voice of NBC's famous National Farm and Home Hour, runs over the script with S. G. McAllister, chairman of the executive committee of International Harvester. Looking on is Earl C. Smith, head of Illinois Agricultural Association and vice-president of the powerful American Farm Bureau Federation. Below, in center picture, one of the guests purses her lips over a piece of the home-made pie — "That's a good crust, Poppa, but I always like a teeny mite more cinnamon on top and not so much raisins inside." Five hundred pies were baked by local wives, for the guests, who came from all over Illinois to the "Dauberman Day" celebration. Part of the crowd (in bottom photo) milled around the radio truck, watching the technical aspects of broadcasting the goings-on over 105 stations to a coast-to-coast audience of 7½ million people.

ETC 31392

A Hundred Years of Progress

Inventions That Came from Dayton, Birthplace of Ethyl, Are Spotlighted as Ohio City Celebrates its Centennial.

THE citizens of Dayton, Ohio, recently marked the completion of 100 years since the town of 7,000 on the banks of the Miami River was granted a city's charter, and during the week long centennial celebration they turned the spotlight with justifiable pride on the city's accomplishments.

Chief recipient of honors was Charles F. "Boss" Kettering, Dayton's "first citizen," who has probably done as much as any living man to contribute to the welfare and comfort of the average individual.

Dayton has a remarkable record in the field of invention. The late Vincent G. Apple held 350 patents in 1931 and at the time of his death had many additional applications on file in Washington. Today several Dayton corporations hold several hundred patents each, and the total number credited to Daytonians runs into the thousands.

It was in Dayton, at the Moraine General Motors Research Plant, that Thomas Midgley, an engineering associate of "Boss" Kettering, tested and rejected over 30,000 chemical compounds in an effort to find a substance that would stop engine knock. He finally discovered tetraethyl lead, the basic ingredient of Ethyl gasoline, which revolutionized the construction of automotive engines.

At the beginning of the 20th Century two brothers who ran a bicycle shop in Dayton gave birth to a brain child which has done much to change the world's entire mode of life. This was the first successful heavier-than-air flying machine, which made its initial flight in 1903 at Kitty Hawk, N. C. Years passed before the Wright brothers gained recognition for their invention, because few people would believe they had actually flown and skeptical newspaper editors refused to give the "stunt" any publicity.

To continue experiments on their flying machine, the Wright brothers rented a cow pasture outside Dayton. This tract of land, from which the cows have been gone for a long time, is now part of Wright Field, one of the Army Air Corps' most important experimental and flight testing centers.

Mr. Kettering spent many hours in his Dayton laboratories before he came out with the Delco automobile starter. This device, which did away with the crank that formerly dangled on the front of every motor car and thereby eliminated the source of a multitude of lame backs and broken arms, was a combination of an electric motor, a generator and a storage battery.

Mr. Kettering was chiefly responsible, too, for the development of the Delco-Light farm electric plant. When he introduced the latter, there were more than 150 contrivances of various kinds designed to supply electric light and power to farms, country homes and other isolated places. The trouble was that most of them wouldn't work. "Boss" Kettering, however, produced one that did work.

To Dayton goes credit for the invention of the first low air pressure tire,

A replica of the birthplace of several Kettering inventions.

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developed by engineers of the Dayton Rubber Manufacturing Company under the direction of A. L. Friedlander. Previous to that achievement, automobile tires required high inflation with consequent vibration damage to the car.

Electric refrigeration was developed to the point of widespread usefulness in Dayton, and here again Mr. Midgley played a stellar role. It was his research that resulted in a non-poisonous, non-explosive refrigerant which could be used with absolute safety by anyone.

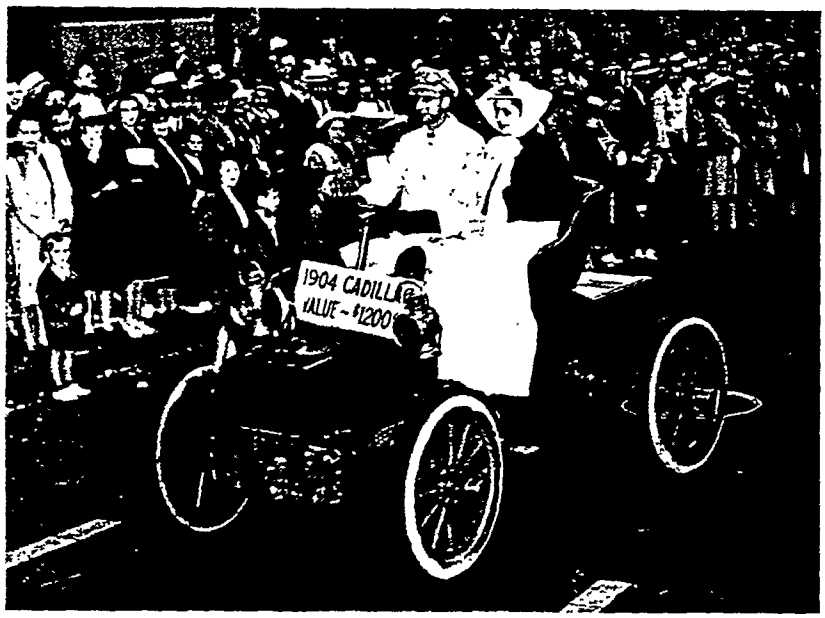
Back in the 1870's James Ritty, Dayton inventor, conceived a device for registering the amounts of money involved in retail sales transactions. From this basic idea grew the world wide business of the National Cash Register Company.

Some of the men who worked with Mr. Kettering 25 years ago are, left to right, Frank Irelan, Edward Graff, Harry Mack, Mr. Kettering, Oscar Kressler, William G. Chryst, Ward Cromer, and Frank Redelle.

●

The first settlers arrived in Dayton in 1796, after a large tract of Miami land had been purchased for settlement by Generals Jonathan Dayton, Arthur St. Clair and James Wilkinson, and Colonel Isaac Ludlow. The little outpost in the wilderness had grown to a bustling community of about 7,000 at the time it was granted a city's charter in 1841. Today it is a thriving city of 212,000.

General Dayton, after whom the city is named, was born in Elizabethtown, N. J., in 1760. Entering the Continental Army at 16, he fought through the Revolutionary War and was one of the youngest brigade leaders in the siege of Yorktown. He was the youngest member of the Constitutional Convention and the youngest man ever to be Speaker of the House of Representatives. Although he showed great interest in the development of the West throughout his life, he died in 1824 without ever having seen Dayton on the Miami.



An oldtimer wheezes along in the parade.

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The Following

Service Awards

have been made as of

September 1st, 1941

15 YEARS

HARRY M. GRIERSON
Administration

JOHN HALLAY Yonkers Laboratory

10 YEARS

J. GEORGE RICK
Sales, New York General

5 YEARS

ALEXANDER HAMILTON
Sales, Kansas City

DOROTHEA HELD Sales, New York

KARIN E. HOLM Administration

MELVIN L. OLSON Sales, Chicago

CLIFFORD C. WRIGLEY
Engineering, Detroit

They Cut Cost per-mile by Two Thirds

(Continued from page 5)

preciation, has dropped from slightly over 10 cents to approximately 3.75 cents — and is still dropping. Figures during the next three months are expected to show a further reduction. Ethyl gasoline, of course, is not solely responsible for this remarkable record. There have been many factors — better lubricants, better engine and body design, better roads, better tires.

These cost figures represent a great deal more than a bookkeeping item or a descending line on a graph. They represent the progress in motor transportation over a period of 15 years. They represent the work of thousands of men in many companies and many industries who spend their lives in a never-ending search for ways and means of making motor transportation better. They represent the strides of free men in a system of free enterprise.

Pistols For Fun

(Continued from page 7)

ing the neighbors. There is. For about eight dollars, or as much more as you care to pay, you can buy an air pistol and shoot to your heart's content in your hall bedroom or parlor. That's the answer, too, for the man who, for any reason, can't shoot elsewhere. And don't let your childhood memories of air-guns fool you. These pistols, in .177 and .22 calibres, have rifled barrels that give tack-driving accuracy at indoor ranges, they hold and pull very much like regular firearms so that practice with them is of real value for other shooting, and you can give the little pellets a very respectable velocity and penetration depending on the number of strokes you care to pump into the compression cylinder. (Air pistols come under the ban of the New York Sullivan Law and require permits.)

Indoors or outdoors or both, one gun or a dozen, alone or with somebody, it's fun to shoot a pistol. And even if you go pretty far in the way of equipment, even if you buy guns and accessories such as are here pictured — hand-carved-to-measure grips, special sights, skeletonized hammers, hand-honed actions, spotting 'scopes and all the gadgets—you still need not have an income in the six-figure brackets. Such a kit shouldn't total much over three hundred dollars, or about the initiation fees in many golf clubs.

(All bets are off, you understand, if you go a step further and go in for "free pistols". Free, in that sense, means only that these guns for the super-experts are free from rule restrictions as to sights, overall length, etc. They are not "free" over the counter; far from it!)

This is a tip: Try pistol shooting! It is also a warning: The game is a virus and once it is in your blood you will never recover. But the disease is pleasant. You might like it.

(Sure, I'll meet you on the firing line tomorrow. I've been holding off lately on my rapid. Something wrong with my grip, I think. Maybe you can show me how to cure it.)

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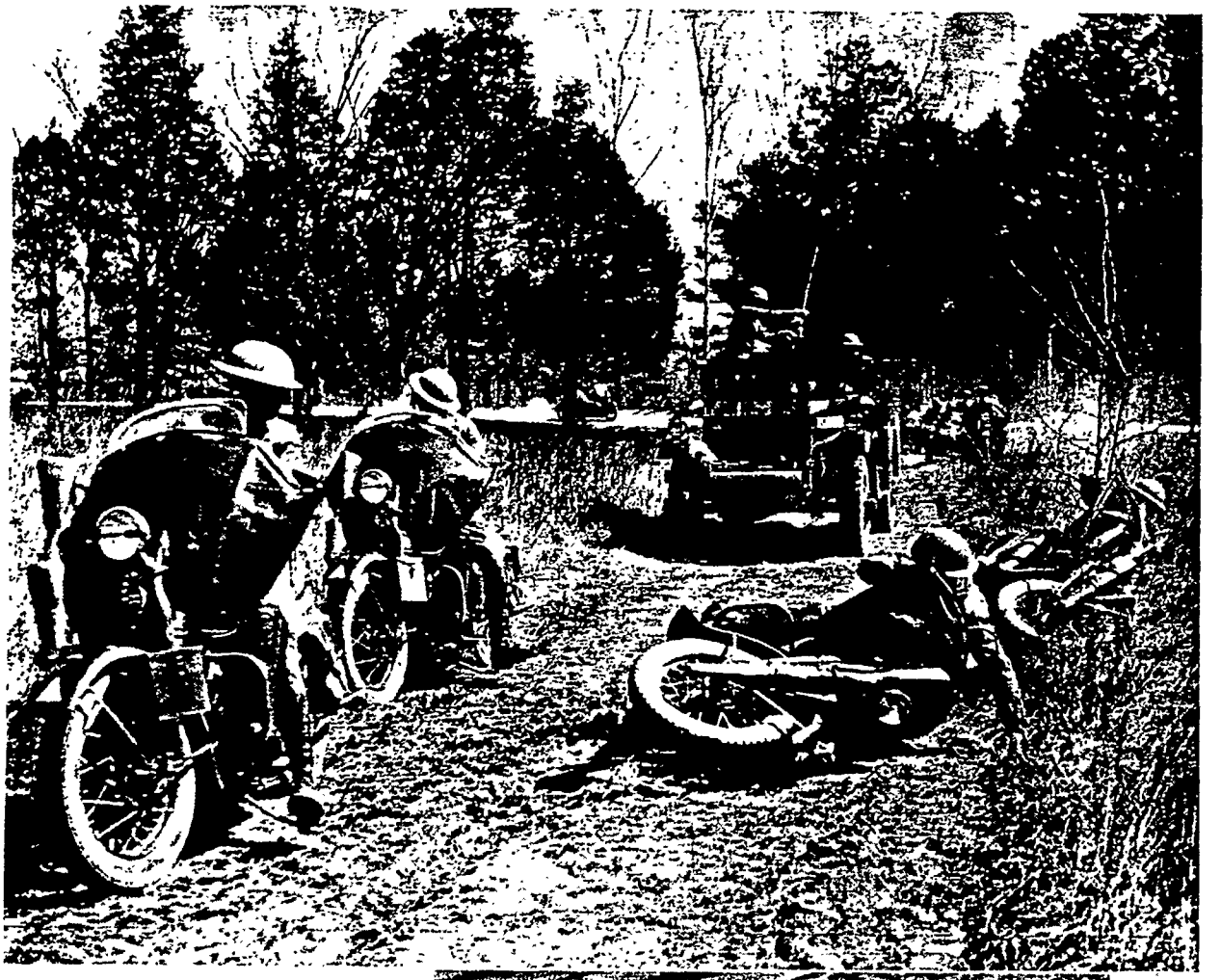
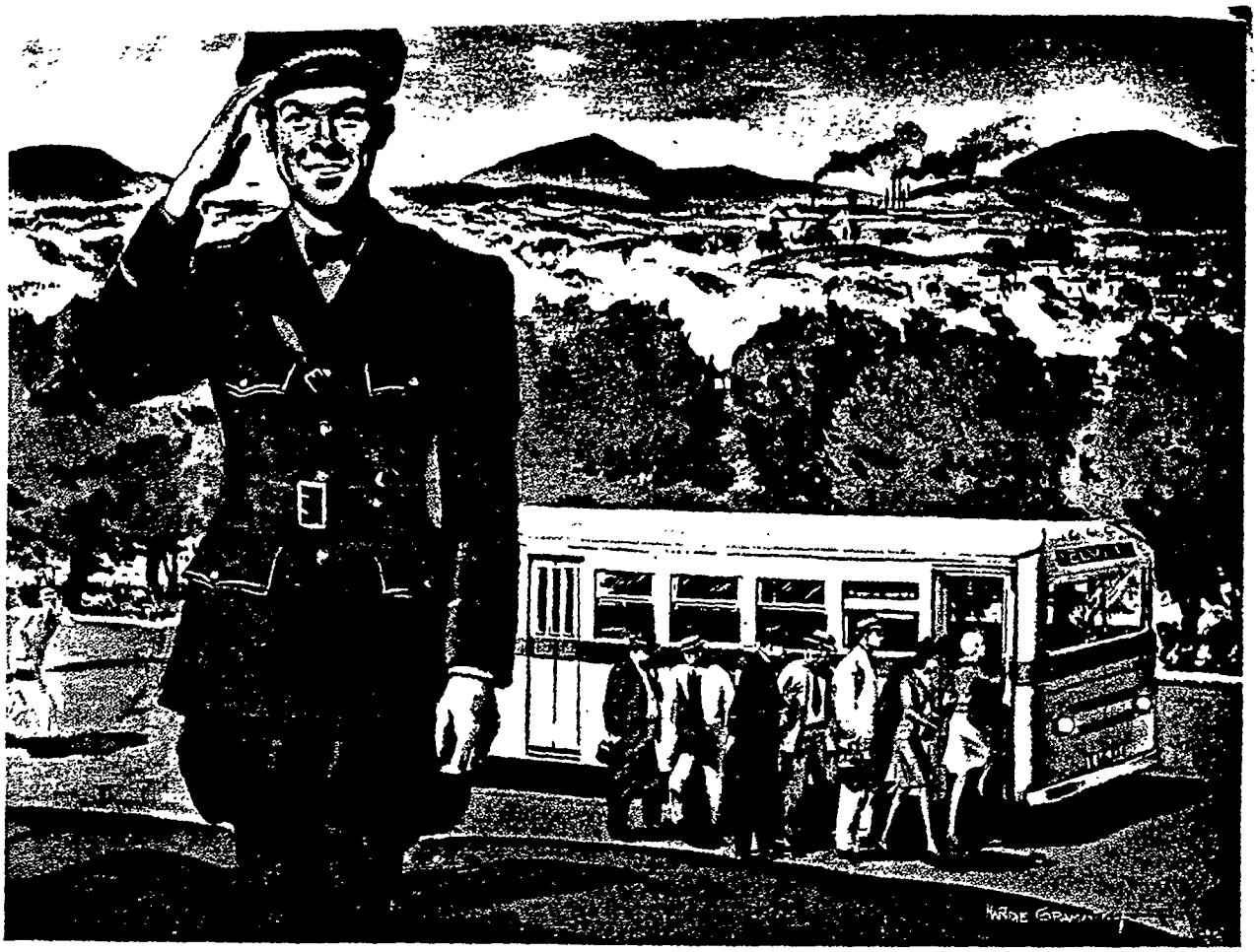


ABOVE: *A mechanized unit runs into an "enemy" ambush. The two motorcycle riders on the right have learned to fall to the ground without injury, thus enabling the armored car in the background to cut loose a machine gun blast over their heads.*

RIGHT: *A pair of cycle scouts desert the smooth concrete highway for a rough trail leading into the back country.*

(See page 14)



Service Uniform

FOR MANY YEARS this man in uniform has served American families. He's taken men to business, children to school, women into town for their shopping. Today the bus driver and the bus industry are rendering the nation another great service.

Thousands of workers in defense industries must be taken to and from their jobs—quickly, safely and without loss of their energy. As new demands have been placed upon transit facilities, the motor bus has provided a ready, flexible means of carrying the additional burden—has made possible the building of new plants in strategic locations not served by existing transit lines.

The motor bus and its co-worker, the motor truck, have a great job to do, and the more efficiently they can be operated, the better they can do that job. That is why engineers of both the automotive and petroleum industries are constantly striving to improve commercial engines and fuels, just as they are working to make still better automobiles, airplanes and tractors.

We of Ethyl are able to help in this important progress through both product and service. Ethyl's product, anti-knock fluid containing tetraethyl lead, is used by petroleum refiners to improve gasolines. Higher anti-knock fuels have in turn helped bring about many of the improvements in power and efficiency, the savings in weight per horsepower and the increases in performance that we have enjoyed in all types of gasoline-powered equipment.

Not only does Ethyl's product itself contribute to automotive progress, but our research workers in Detroit and San Bernardino assist automotive development by cooperating with the technical men of the automotive and petroleum industries. Our research laboratories function as a "clearing house" for technical information and help to coordinate many individual research efforts. At the same time we contribute the results of our own tests and experiments with fuels and engines, and Ethyl service engineers help many commercial operators to take advantage of day-to-day developments. For we believe that by serving men in every phase of automotive transport we are serving the nation.

ETHYL

ETHYL GASOLINE CORPORATION

Chrysler Bldg., New York, N. Y.

ETC 31397

ETHYL NEWS

October 1941

ETC 31398

IN THE

ETHYL NEWS

OCTOBER 1941

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THIS MONTH'S COVER

CONDITIONS in Cuba had long been a sore spot in relations between the United States and Spain, and the blowing up of the battleship Maine in Havana harbor on February 15, 1898, with the loss of 266 lives, brought matters to a head. President McKinley set April 23 as the deadline for the withdrawal of the Spanish authorities and on April 22 instituted a blockade of Cuban ports. Spain declared war April 24, but Congress announced a state of war had existed since April 21.

The President called on each state for volunteers in proportion to its population to augment the regular Army of 27,822 and militia of 114,602. His first call, for 125,000 men, brought an immediate response, and by May 124,776 volunteer soldiers had enrolled. The picture on the cover shows a typical scene of that time in a small New England village — a Union veteran of the Civil War bringing his son to a recruiting station set up in the general store.

The war was of short duration. Victories by General Shafter's troops at El Caney and San Juan Hill and destruction of the Spanish fleet at Santiago by the Navy broke resistance in Cuba by mid-July. In August Commodore Dewey and General Merritt took Manila in the Philippines and General Miles routed the Spaniards in Porto Rico.

By the Treaty of Paris, signed December 10, 1898, Spain yielded Cuba, Porto Rico, Guam and the Philippines and thereby relinquished her last claim to territory in the Western Hemisphere.

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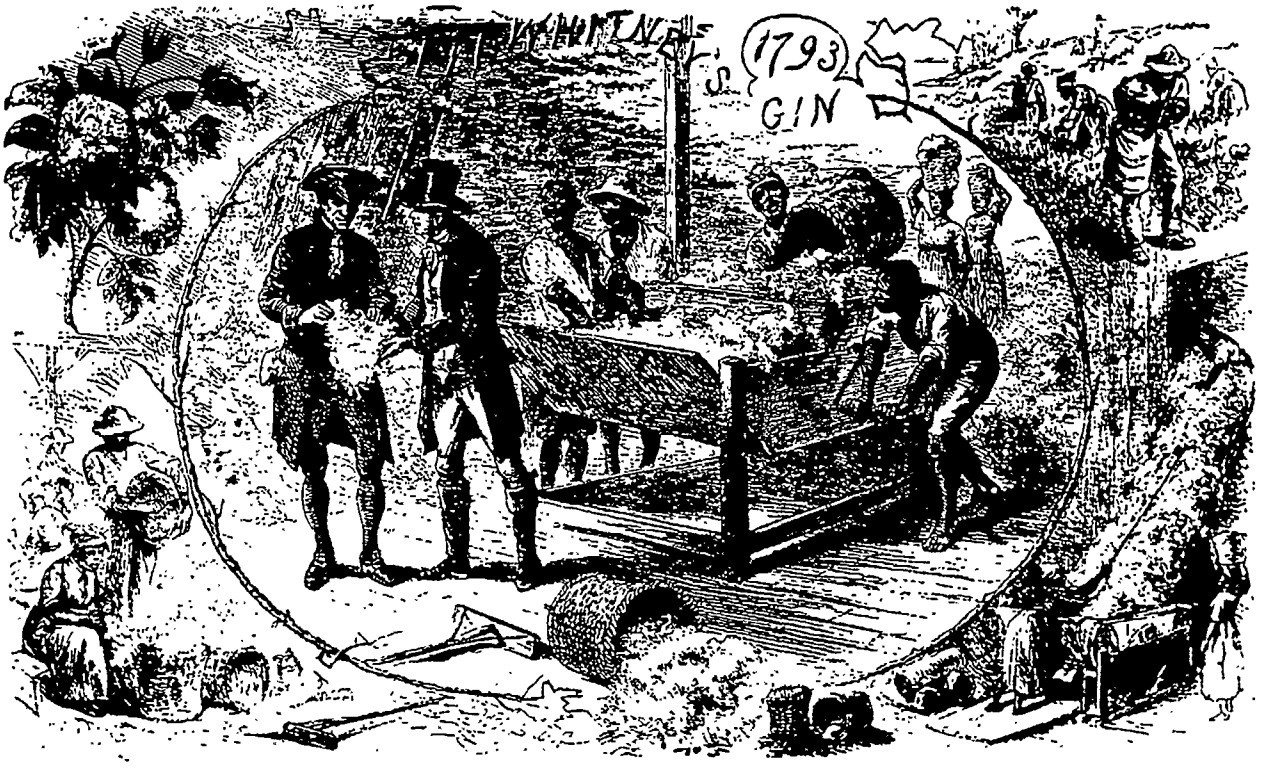

Pioneer of Mass Production

The Cotton Gin Wasn't the Only Accomplishment of Eli Whitney, Who Originated a Revolutionary System of Manufacturing.

THE industrial wealth of the United States is the result of mass production. Is the latter something that came in with the 20th Century? Who was its originator? For the answer to these questions we must turn back to late in the year 1797, when John Adams, second President of the United States, was in the White House.

In that year Eli Whitney, inventor of the cotton gin, returned to his home in New Haven, Conn., bankrupt and disappointed but not discouraged. He had had nothing but bad luck with his cotton gin. Although it had revolutionized the cotton industry in the South and brought undreamed of wealth to the plantation owners, Whitney had had to fight so many court battles due to patent infringements that all his profits had vanished.

One evening an old friend of his, Captain Carey of the U. S. Army, dropped in on him unexpectedly.

"Well, well, Carey!" said Whitney. "What brings you to Connecticut?"

"Guns," Carey replied. "The guns the Army has now are so antiquated that most of them are more dangerous to the men shooting them than to the enemy. I'll wager more men were killed by defective weapons during the Revolution than were shot by the redcoats."

"I've heard that," said Whitney. "It sounds preposterous."

"But it's true," Carey insisted. "That's why I'm looking for someone who can make rifles—really good rifles."

"You ought to have no trouble along that line," Whitney assured him. "There are many fine gunsmiths hereabouts."

Carey shook his head. "Not fine enough to fill the order I want. I need 10,000 guns."

"Ten thousand! That's a huge order for one gunsmith."

"Yes, but as things are now, with many gunsmiths turning out arms, the Army has another difficulty. Only about sixty out of every hundred guns we receive can be used."

"Only about sixty?" echoed the astonished Whitney. "Why such a tremendous waste?"

"Because every gunsmith works his own way. That means every gun is an individual, too, with its own individual parts, and if a spring is broken, a barrel dented or a stock cracked, the entire weapon must be thrown aside."

"What a shocking waste of time and material! Isn't there any way to make repairs?"

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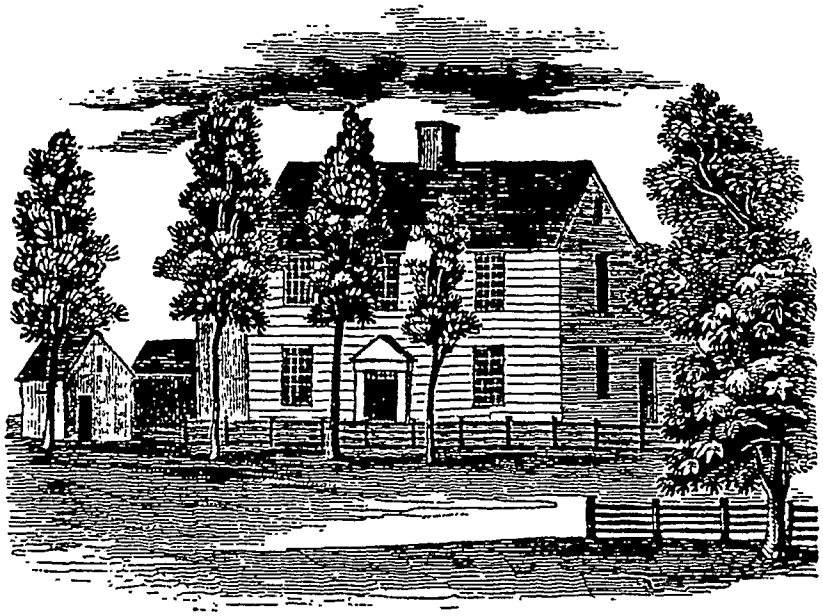


A drawing of the farmhouse at Westmoreland, Massachusetts, where Eli Whitney was born on December 8, 1765.

Carey shook his head. "We lack both equipment and skill. That's the main reason I came to you, Whitney. Why don't you make these guns?"

"Me? Why, I never made a gun in my life!"

"You never made a cotton gin either before 1793," Carey reminded him.

Whitney hesitated, his fingers drumming the arm of his chair. "Carey, I have an idea—a big idea!"

"Then you'll make the guns?" Carey asked eagerly.

"I can't promise that, Captain, because I don't know if I can do it," Whitney replied. "But I'm surely going to try!"

On January 14, 1798, Whitney signed the contract to manufacture 10,000 stand of arms, the guns to be delivered on or before September 30, 1799. Whitney had less than two years in which to build a factory, collect materials and train workmen for the intricate job.

He obtained financial backing from influential citizens of New Haven, to whom he didn't need to give security because they had great faith in the mechanical genius of Eli Whitney. After his factory was erected he startled the industrial world of that day by the radical innovation of putting up homes for his workers in the neighborhood of the plant, an idea which spread rapidly and resulted in company towns springing up throughout New England.

One day 18 months after Carey's visit Whitney was sitting at his desk in the office of his plant, talking over a new machine with his foreman, a man named Schultze. The latter was very much provoked at his employer.

"All you do, Mr. Whitney, is plan machines — more machines!" he protested in his heavy German voice. "Your time is almost up, yet you haven't made a single gun. Why don't you stop worrying about machines and get me men? I'll make the guns!"

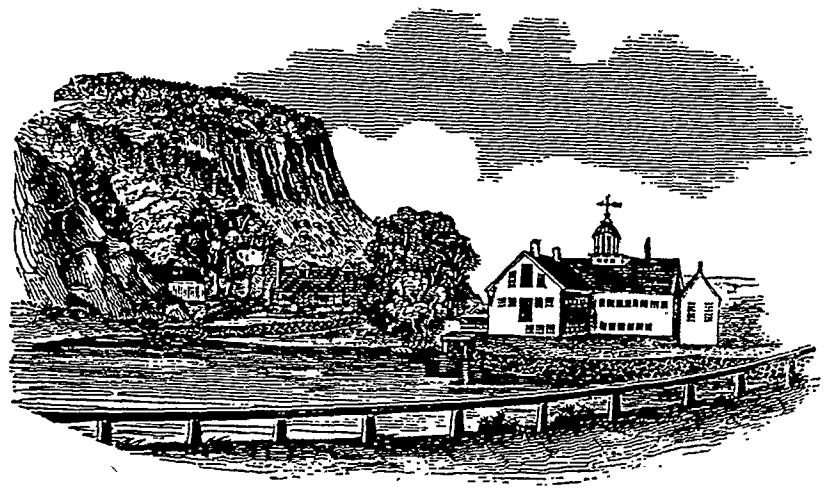
"Where do you think I'm going to find skilled men, Schultze?" Whitney asked patiently. "There aren't enough of them in the country. That's what's holding up our manufacturing progress —lack of skilled labor. We've got to discover a new method—one that will make use of unskilled labor."

"But it's crazy to think of using unskilled labor for a job like making guns," Schultze burst out. "Pardon me for saying so, Mr. Whitney, but you're wasting valuable time, sitting here day after day, just staring out the window and dreaming. What we need is action! Lots of action if we're going to get the job done on time."

Whitney just smiled. His thoughtful gaze alighted on a penny which lay on a piece of paper on his desk. He picked up a pencil and carelessly began to draw circles around the penny.

"What are you drawing there?" Schultze asked impatiently. "Plans for more machines?"

"Just a habit of mine," Whitney ex-



In this factory which was located near New Haven, Connecticut, Whitney first used mass production methods in the manufacture of muskets for the U. S. Army.

plained good-naturedly. "Whenever I'm concentrating on something, I draw circles."

Schultze threw up his hands. "Ach!" he exploded. "With 10,000 guns to be made, you sit here and draw circles. Circles all the same size like—like—"

"Like gun barrels!" Whitney almost shouted. He jumped up and banged the desk with his fist. "Schultze, we have it!"

"Wha-what?" stammered the astonished Schultze.

"The stencil or 'jig' for the machines which will build our guns! Those circles are all the same size because that penny guided my pencil. The machines we've built so far have all been guided by the human eye, which is fallible. But a machine guided by a jig can be made absolutely accurate. With such a machine all our gun barrels will be exactly alike!"

"I never saw a machine like that," said Schultze, still skeptical.

"Neither did anyone else, Schultze. But you and I are going to make one!"

Early in 1800 Whitney, who had failed to fulfil his contract within the stipulated period, appeared in Washington before the War Department to ask for more funds and a little more time to complete his 10,000 guns. He faced a hostile group.

"It takes only simple arithmetic to arrive at the conclusion that if it took Mr. Whitney two years to make a hundred muskets, it will take him 200 years to make 10,000," remarked a colonel of artillery. "Personally, I do not feel disposed to wait that long, even for Mr. Whitney."

"Gentlemen, I ask your indulgence," Whitney broke in on the wave of laughter which followed the colonel's words. "I admit I am behind on my contract, but during the past two years I have spent most of my time in thinking and planning—planning not just how to build guns, but something that will bring prosperity and happiness to many. It is up to you gentlemen whether my plan succeeds or fails. I admit I have used your money for this experiment, but if you will bear with me a few moments, I will show you what I have accomplished."

Eli Whitney, who invented the cotton gin at the age of 27, was only 34 when he originated the idea of mass production.

"Mr. Secretary, this is outrageous!" the colonel expostulated. An angry murmur went around the room.

"Mr. Secretary, may I ask your permission to give a brief demonstration?" Whitney persisted.

"Proceed, Mr. Whitney."

Whitney summoned Schultze, who was waiting in the hall with two assistants. They brought in armfuls of wood and metal, which they placed on a table and then divided into several piles.

"I have here the parts of ten complete guns," Whitney explained, "and I invite anyone of you gentlemen to step up and put together a gun. Pick a part from each of these piles. Any part will do, as they are all interchangeable."

A skeptical officer came forward and selected several pieces. As they fitted neatly into place despite the fact he had never made a gun before, his look of doubt changed to one of amazement and admiration.

"Now raise it to your shoulder, cock it and pull the trigger," Whitney suggested.

The officer obeyed. "The balance is perfect!" he admitted.

"And that, gentlemen, is what I've been doing with my time," Whitney announced. "I've given you, not just guns but a whole new theory of manu-

facturing. I've given you a way to use the wealth of unskilled labor."

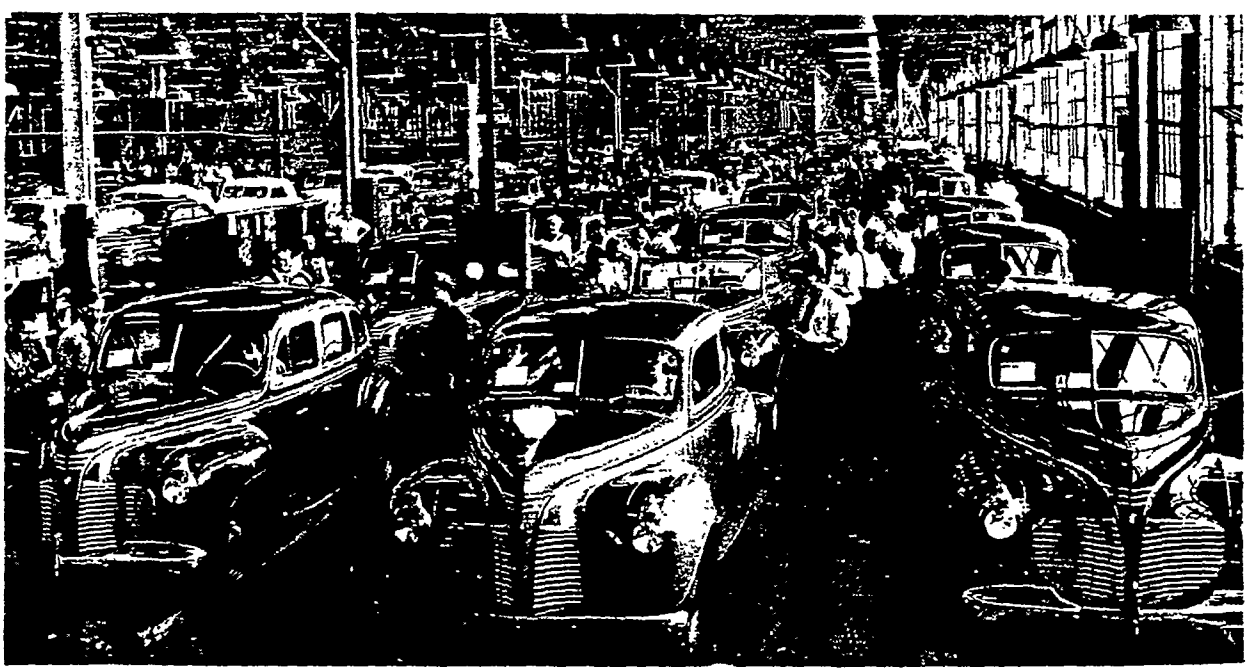
Thus Eli Whitney, who was born on a farm in Massachusetts on December 8, 1765, and who invented the cotton gin in 1793 at the age of 27, originated mass production when still a young man of only 34. Without his momentous brain child the United States might never have reached its present peak of prosperity and power.

Examples of Modern Mass Production

ABOVE: *Modern machine guns are manufactured by mass production methods, each of these machines boring several barrels at the same time.*

●

BELOW: *The finish of the Plymouth assembly line. Mass production reaches its peak in the automobile industry and the Plymouth auto assembly plant is the largest in the world.*



Ready for the Stratosphere

Boeing Trains Flight Crews for High Altitudes in Sealed Tank Which Reproduces Conditions at 35,000 Feet.

Outside the Boeing Strato-Chamber reactions of the trainees are carefully followed. Dry ice is poured into special compartment, upper right, to drop temperature well below zero.

A UNIQUE program of stratosphere conditioning, with a sealed tank that reproduces flying conditions at 35,000 feet, is being used for group training of flight crews for extreme altitude test work by the Boeing Aiarcraft Company of Seattle — tests that will yield important new data on the operation of Boeing's 4-engine Flying Fortress bomber.

Almost daily, dispatches from Europe indicate that zones of air action are on the move — up. Combat at 25,000 feet and above is frequently reported and greater heights undoubtedly will become common as specially equipped types of aircraft such as the Flying Fortress come into wider service.

But at 35,000 feet pilots are on the threshold of the stratosphere, and the air is so thin that a man will become unconscious in less time than a minute without an artificial air supply. Conditions like these require careful training of flight crews — for test hops or military missions.

In Seattle, Boeing is using its Strato-Chamber for this purpose. Not only are these the first extensive stratosphere-conditioning tests (in this country at least) to be carried out on a large group, but in the flights to follow it will be the first time that a whole crew of trained engineers has ever gone into the stratosphere to gather test data on the operation of turbo-superchargers under "flying laboratory" conditions.

Of the few planes in which turbo-supercharger installations have already been perfected, the Boeing B-17-type Flying Fortress is the only one large enough to take a passenger load of aeronautical engineers to make detailed performance observations at high altitudes. The Boeing B-17A, delivered to the U. S. Army Air Corps on January 31, 1939, was the first Flying Fortress to incorporate the important turbo-superchargers to assure maximum engine power at extreme altitudes. With these installed in all subsequent models, the four-engine planes have been flown regularly at high altitudes, including trips above 35,000 feet, but have never yet been taken to their full ceiling.

The stratosphere-conditioning program, and the flights that will follow, are being conducted by the Boeing Flight and Aerodynamics department under the supervision of Edmund T. Allen, director, and Al Reed, chief test pilot. They are working closely with the Mayo Laboratory of Aviation Medicine in assembling special equipment and in mapping out procedures, and also with the General Electric Company, developers of the turbo-supercharger equipment.

The problem in training flight test crews for high altitude work is twofold. Proper equipment must be assembled from many sources. Procedures must also be developed to guide crews in preparing for a flight, in handling their equipment during a hop, and in meeting any emergency. This type of flying is still so new that techniques or equipment details may change almost overnight.

ETC 31404

Before going into stratosphere conditions, crews must exercise for 30 minutes while breathing pure oxygen. This washes nitrogen out of their blood and avoids "aeroembolism."

Today, the well-dressed, high altitude test pilot must wear—in addition to his flying suit parachute, helmet, goggles and radio equipment—complete oxygen equipment, including an emergency mask and separate oxygen supply.

While oxygen is often used as low as 12,000 feet as an aid against tiring, the average man can maintain consciousness indefinitely up to about 18,000 feet, where the atmospheric pressure is approximately one-half what it is at sea level. A man's efficiency, however, is much reduced under these conditions.

Beyond 18,000 feet, complications arise. It has been discovered that if a man's oxygen supply is cut off at 20,000 feet, he will pass out in ten minutes. At 25,000 feet, unconsciousness comes in three minutes, at 29,000 feet the flyer passes a critical point. From there on up a loss of oxygen means a loss of consciousness in less than one minute with complete coma soon after.

Above 35,000 feet an oxygen mask may furnish enough pure oxygen, but the rarefied atmosphere doesn't supply enough lung pressure. At the 40,000-foot level, a man as active as a flight test crew member is breathing with the same difficulty again, in spite of his mask, that he would experience at 18,000 feet without a mask. He's getting only about half enough oxygen at the pressure required.

Thus, with the present-day oxygen masks, 40,000 feet seems to be the ceiling of human endurance, dangerous even for sustained flights, and when the stratosphere's frontiers are pushed any higher, it undoubtedly will be done by pressure cabin-equipped planes or by suits and helmets that will maintain an inside pressure.

Most important consideration in preparation for high-altitude flights, of course, is physical condition, especially digestion. Foods that cause gas will bring extreme discomfort at high altitudes. Yet the person who chooses not to eat will require more oxygen on the flight. Carbohydrates such as sugar and plain chocolate bars require the least oxygen in digestion.

In the past, aeroembolism has been the dread of high-altitude flyers, an effect similar to diver's "bends." To guard against this condition, high-altitude flyers today "denitrogenize" themselves. Breathing pure oxygen, they exercise mildly for half an hour before a flight, to wash all atmospheric nitrogen out of their blood. Otherwise this gas expands into tiny bubbles in the blood ves-

Once denitrogenized, trainees must continue to wear their masks, even under sea level conditions, to avoid breathing more nitrogen. Flying equipment is worn in the Strato-Chamber to accustom the men to encumbrances.

Through thick windows observers watch the men inside the Strato-Chamber and communicate with them by telephone.

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sels at high altitudes, bringing on the discomfort of aeroembolism.

Boeing's Strato-Chamber has been an invaluable aid in training flight test crews for high-altitude hops. First used several years ago in developing equipment for the Boeing 307 Stratoliner, the Strato-Chamber can reproduce flight conditions at altitudes up to 40,000 feet and can accommodate three trainees and their equipment at one time. Vacuum pumps reduce the inside pressure to the equivalent of the atmospheric pressure at any altitude. Observers outside the tank can watch the progress of the flight through thick windows and communicate with those inside by telephone.

Once denitrogenized, and wearing complete flying equipment to become used to the encumbrances, trainees enter the tank, which has complete oxygen equipment installed. The tank door is sealed tight, pumps start, and the flyers begin their journey to 35,000 feet. At various altitudes they practice handling their equipment, under simulated emergency conditions. There's little margin for error in an atmosphere that won't support life, and a practice "flight" in the Strato-Chamber develops confidence in the man who later on will make an actual journey into the stratosphere.

As a result of the Strato-Chamber tests the Mayo Laboratory of Aviation Medicine has adopted completely the Boeing check-off list for stratosphere flight crews. This list is a step-by-step procedure for crews to follow in preparing for and during any flight above 25,000 feet.

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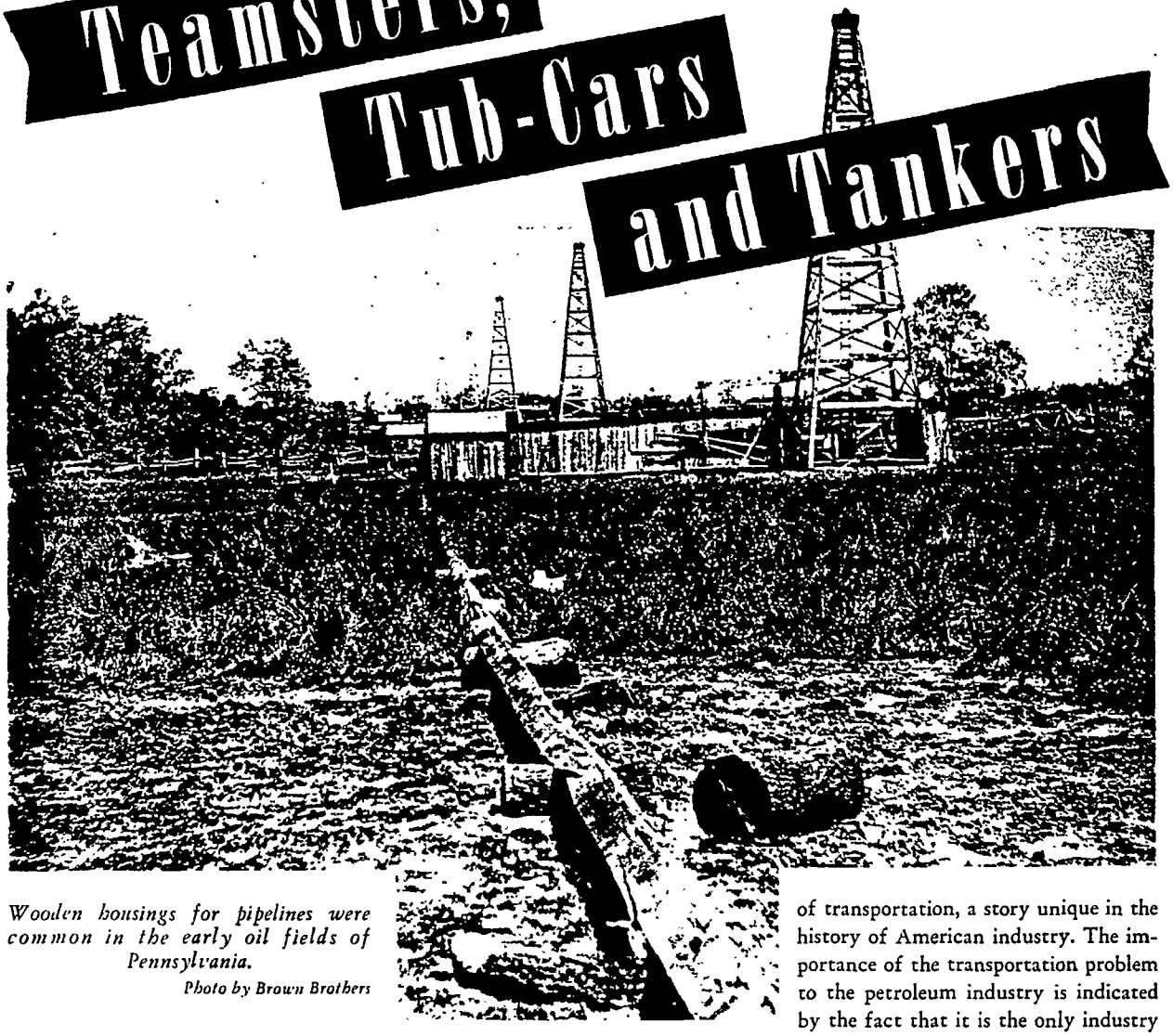
Trainees spend about an hour in the Strato-Chamber on their "round trip" to 35,000 feet. That's much less time than is required for the journey by airplane.

ETC 31406

Teamsters, Tub-Cars and Tankers



Wooden housings for pipelines were common in the early oil fields of Pennsylvania.
Photo by Brown Brothers

In the Face of a Thousand Hardships, the Petroleum Industry Battled to Develop Its Own Methods of Transportation.

By PAUL BEACH

ONE dark October night in 1865, a crowd of men stood in the middle of a Pennsylvania road, brandishing pick-axes and clubs. They were teamsters — a tough, brawling crew — who had waxed rich by charging early oil drillers exorbitant prices for hauling crude to the nearest railroad. Threatening their profitable game was a nearly-completed pipeline owned by one Samuel Van Syckel, an oil man, and tonight they were out to tear it up as they had done several times before.

But Van Syckel was ready for them. Squarely astride the newly-filled ditch, a determined little band of men stood grimly waiting, rifles in hand. The teamsters swore and threatened, but finally withdrew.

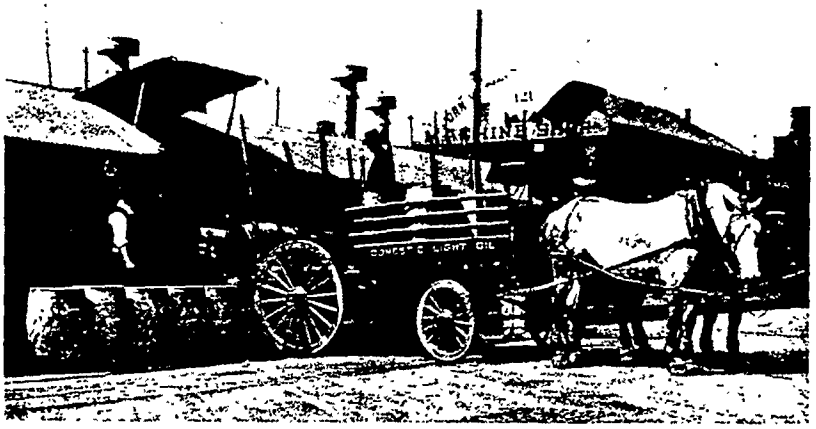
This incident marked the beginning of the petroleum industry's development of its own methods and systems of transportation, a story unique in the history of American industry. The importance of the transportation problem to the petroleum industry is indicated by the fact that it is the only industry today which uses in large volume all the various means of transportation — railroads, ships, pipelines and trucks. Furthermore, it is the only industry which has always provided its own transportation instead of waiting for professional transporters to solve the carrying problems. It is due largely to this initiative, this willingness to improve constantly on existing facilities, that the public has been able to buy gasoline at progressively lower prices through the years.

Hardly had the first well been drilled by Colonel Edwin Drake near Titusville, Pennsylvania, in 1859, before transportation became a pressing prob-

ETC 31407

Barrels of oil were transported in covered barges and distributed locally in horse drawn vehicles.

Photo by Brown Brothers



lem. The nearest railroad was twenty miles to the north, and the only containers available were barrels. So Colonel Drake and the horde of oil pioneers who followed him had to choose between only two methods of getting their oil to market.

Since most of the wells were located along a small stream called Oil Creek, the oil men first tried the water route. They hired teamsters to haul the barrels of oil to the edge of the creek, where they were either piled on rough rafts and flatboats or emptied into long, narrow barges. But this was only the beginning of the problem, for the stream was so shallow that it was unnavigable most of the year. However, the lumbermen of the region had devised a system of "pond freshets" to enable logs to float down the stream. Across the principal branches of Oil Creek above Titusville they had built dams. Then, when sufficient water was backed up, they opened the dams, releasing a stage of water deep enough to float the logs down the creek.

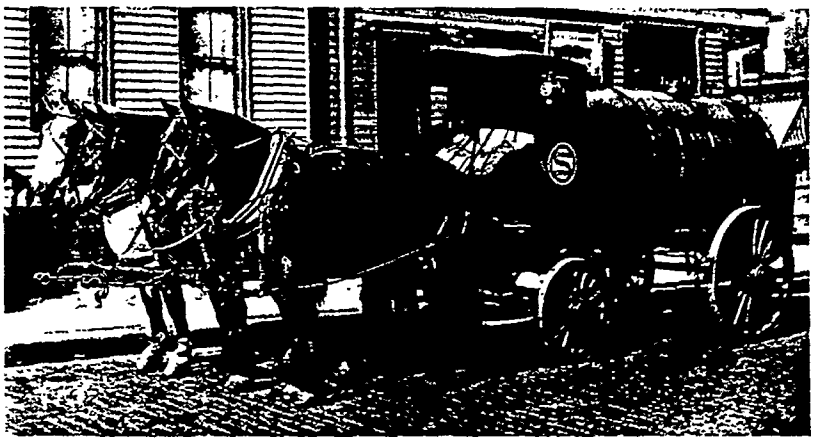
The oil men experimented with the idea of the pond freshet, paying the lumberman a per-barrel fee for the use of the dams. But the result was complete chaos. Hundreds of barges and flatboats piled high with oil were jammed together the entire length of the creek. When the rush of water came, they rammed and splintered one another. Barrels broke or overturned. Men were crushed and drowned.

The only other way of getting oil to market was to pay the teamsters to haul it to the railroad, and the teamsters charged as high as five dollars a barrel for the twenty-mile haul. Even so, delivery was slow and uncertain. During one period, no less than 6,000 teams and wagons jammed the country roads, their wheels churning the surface into a sea of mud.

Since the oil men couldn't long endure such slow, costly and hazardous transportation methods, they began experimenting with pipelines. The Van Syckel line, although but two inches in diameter and kept in operation only by holding off the teamsters at the point of a gun, eventually carried 800 barrels of oil a day for a distance of five miles. A similar line started immediately afterward by Henry Harley was opposed even more violently by the teamsters. They broke the pipeline joints several times, set fire to the oil storage plants on Harley's property, and finally threatened to murder him if he persisted. But the pipeline finally went through, blazing the trail for others that were to follow, spelling the end of wagon jams on the roads and barge jams on Oil Creek. Such was the origin of petroleum transportation in the country's first oil boom.

Seizing the initiative, from then on, the oil industry has proceeded to develop its own means of transportation. One of its first moves was to provide more efficient vehicles for carrying oil by rail.

Although the railroads wanted the new business of hauling crude oil, they regarded their standard box-cars sufficient for the purpose. If box-cars were all right for farm and factory products, they reasoned, they were all right for oil. Let the oil men stack their barrels in the box-cars. But the oil men considered barrels too expensive, too clumsy to handle, and too small as a unit of shipment. So, in 1865, an unnamed genius hit upon mounting two squat, 45-barrel wooden tubs side-by-side on a flatcar. Gradually this type of car came into general use. A few years later, oil shippers replaced the two tubs with a horizontal, cylindrical iron tank



Garages used to get their gasoline supply from "three horsepower" tank wagons such as this.

ETC 31408

mounted on the flatcar, thus presaging the modern tank car.

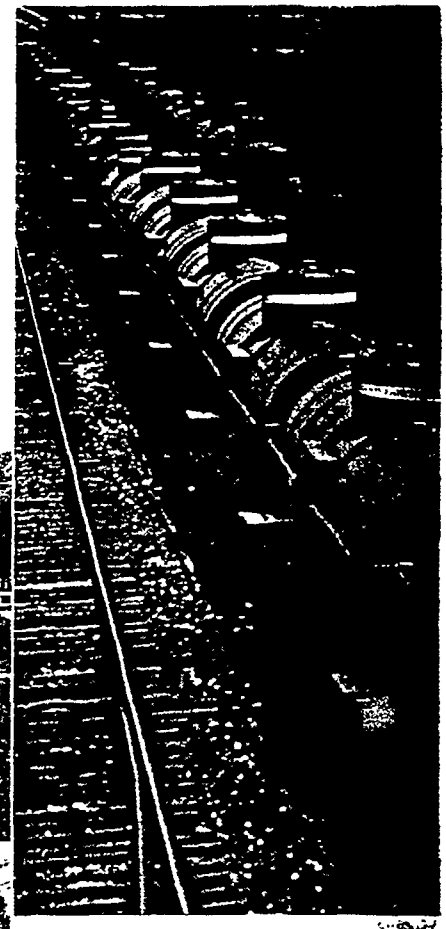
Even then, however, the railroad continued to furnish only the flatcars while the shippers furnished the tanks. In spite of the growing importance of petroleum traffic, the railroads still talked in terms of box-cars, insisting tank cars were "special equipment," which, as common carriers, they were not obligated to provide. Although they were legally within their rights, the fact remained that oil transported in barrels cost the purchaser at least 3½ cents per gallon more than that transported in tank cars. So the oil men determined to use tank cars even if they had to build them themselves.

Today the oil industry owns and operates 130,985 specially designed tank cars, which represent an original investment of more than $200,000,000. It has boosted the capacity of these cars from about 5,000 gallons to 8,000 gallons, and has added domes to allow for expansion as well as other precautions to guard against fire. All the while the oil industry has remained one of the largest customers of American railroads.

As long as the oil men laid pipelines to gather crude from wells and carry it to the nearest railhead, the railroads naturally had no objections. But when one oil company laid an eight-inch line from Millerstown, Pennsylvania, to a refinery near Pittsburgh, it met with immediate opposition from railroads, even at times reminiscent of the old teamster days. But the railroads' passive opposition to pipelines continued for a long time.

In the winter of 1878, working in five-foot snows and sub-zero weather, petroleum engineers succeeded in laying a pipeline across the Allegheny Mountains, opening a new era in the transportation of crude oil. In 1891, the first refined-product line began pumping kerosene. Since that day, pipelines have shown a steady, uninterrupted growth until today a labyrinth of more than 116,000 miles of line carries oil underneath the fields and mountains and rivers of most of the United States. Virtually all of this network, of course, is owned and operated by the petroleum companies, and represents an investment of over $900,000,000.

The improvements in pipelines have been almost too numerous to mention. Heavy, clumsy cast-iron pipe has given way to light, high-tensile-strength steel. Joints which had to be laboriously screwed together have been outmoded by joints which are electro-welded in a trice and are even stronger than the pipe itself. Once a crew of diggers and pipe men was delighted to lay a few hundred



RIGHT: *Horses retired to green pastures when fuel trucks came into common use.*

BELOW: *Speedy, streamlined trucks roll over the highways to deliver gasoline to modern service stations.*

Oil and gasoline are transported by rail in specially designed tank cars.
Photo by Ewing Galloway

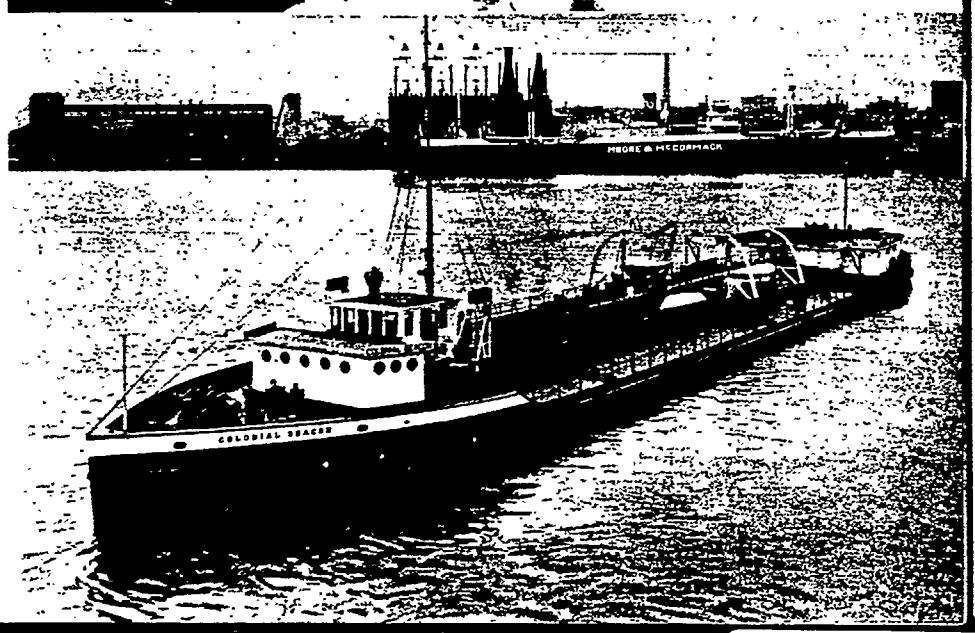
feet a day. Now ditching machines gnaw an ever-progressing trench, boomcats lower lengths of pipe into place, welders hop astraddle and apply their torches, and bulldozers back-fill the ditch in one continuous, rythmic, efficient operation. Three miles a day is not unusual.

Like the tank car and pipelines, the tank ship is a form of transportation peculiarly adapted to the petroleum industry and therefore developed and owned by it. The first oil vessels were only barges about 100 feet long by 30 feet wide by eight feet deep, which carried crude oil in their hulls. Then came sailing vessels with iron tanks installed inside the hulls. And in 1888 the first American all steel tanker was built — a steamer 175 feet long, carrying 300,000 gallons of oil in her four separate tanks. Since then, the course of tanker evolution has been even larger, ever faster. By 1930, tankers carrying 87,000 barrels of crude oil or refined products plowed through the water at about ten knots. In 1939, the oil industry, working closely with United States Navy officials, designed and built tank ships which would carry 150,000 barrels of oil and cleave the waves at 20 knots — faster than many a passenger boat! Through the years the oil industry built up a magnificent fleet of over 300 oil tankers — 25 percent of all ships of more than 2000 tons in the American merchant marine.

Lastly, the oil companies developed the tank truck to facilitate retail deliveries. Much as in the case of the tank car, the origins of the tank truck were in barrels piled on wagons. These were soon replaced by single tanks mounted on wagons, this method of hauling sufficing until the invention of the motor truck. Quick to employ the new vehicle, oil companies were making deliveries in crude tank trucks when the first World War broke out. Today, ultra-modern vehicles, equipped with automatic registering pumps and every conceivable safety device, carry loads up to 5,000 gallons at 40 miles per hour.

Thus has the petroleum industry undertaken to solve its carrying problems by developing its own means of transportation, giving the public constantly better service at less cost. But spectacular as the individual improvements have been, the way that they have been integrated into a vast, interdependent system of transportation is the most epic feat of all. It is an industrial achievement of which every American may well be proud.

LEFT: *Pipelines of today have electro-welded joints which are stronger than the pipe itself.*



BELOW: *Up-to-date tankers are fast and have an average capacity of 150,000 barrels.*

ETC 31410

COOK YOUR OWN MEAL

By MARTIN SHERIDAN

"Mmm---the sauce tastes pretty good to me," Jane Pickens decides.

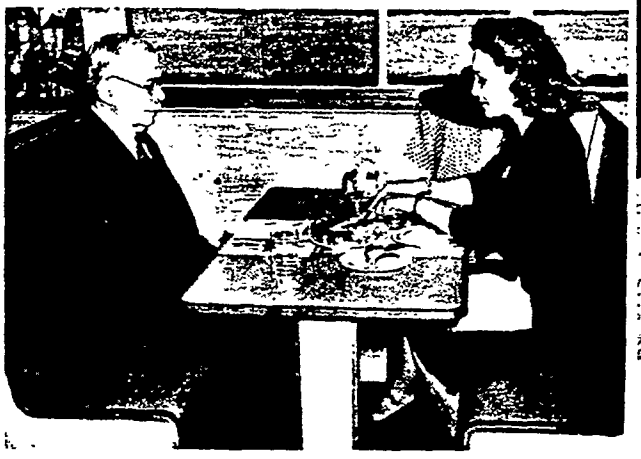
Celebrities Like to Visit Smith House, in Cambridge, Mass., Where They Can Go Into the Kitchen and Prepare Their Favorite Dishes.

NEARLY every celebrity who visits New England makes it a point to visit Cambridge and don a white coat or apron. The reason is 82-year old William E. Smith's restaurant with experimental kitchen where gourmets can prepare their favorite dishes just the way they like them.

Wendell Willkie visited Smith House and made spaghetti with mushroom sauce. Edward Everett Horton, Bob Hope and President Ernest M. Hopkins of Dartmouth have also "done their stuff."

Jane Pickens, singing star of the Ed Wynn show, "Boys and Girls Together," visited this unique restaurant while the show premiered in Boston. Although she is a Georgia Peach, Miss Pickens ranks a large broiled steak as her favorite dish, with Southern fried chicken in second place. She says plenty of red meat is a necessity for a singing voice.

Jane put on a white apron, sharpened a long knife and proceeded to carve a slice of meat from a loin of beef. She sprinkled a little salt and pepper on it, placed it in the broiler.



Mr. Smith looks on as Miss Pickens begins her meals.

Miss Pickens examines Mr. Smith's autograph collection in his hotel register. Note Will Rogers' signature.

ETC 31411

Then she consulted a recipe book, which she brought along, to find the formula for a port wine sauce. After this was prepared, Jane donned rubber gloves and stuffed a piece of bread in her mouth to keep her from crying while cutting onions. She refused to keep the bread in her mouth while the pictures were taken.

When the onions were browned, the songstress prepared a green salad, including cucumbers, lettuce, peppers, celery and cabbage, topped with an oil and lemon dressing.

After garnishing the platter, Jane removed the apron, strode into the dining room and had the meal served to her. Aged Mr. Smith, who doesn't look over 60, brought down his large collection of autographs for Miss Pickens' delectation after the meal.

He used to operate the Georgian Hotel in Boston which was frequented by notables from political, theatrical and educational fields. He got the idea for a restaurant for gourmets when Vernon Castle visited the hotel more than 20 years ago.

"I have a problem, Mr. Smith," explained Vernon Castle. "Here's my favorite recipe and I'd like to go into your kitchen and prepare the dish just the way I want it. I know what you're trying to say — let your chef prepare it. Well, a dozen chefs have tried to make it and failed. I've got to make it myself — or else."

"You're the guest, Mr. Castle," the hotel manager bowed and led the way into the kitchen. He instructed the chef Pietro to give Mr. Castle whatever he wanted in the way of ingredients, pots and pans. Vernon Castle, then at his height as America's male dancing star, removed his coat and swung into a white chef's coat. He placed a white hat on his head at a rakish angle, called for a two-and-one-quarter pound chicken, cut it into six pieces and proceeded according to the following recipe:

Remove the skin, salt and pepper, then dip in flour. Place in a saute pan in which two tablespoons of either sweet butter or olive oil has been placed. Add a shallot, finely chopped, a dozen sliced mushroom buttons which have been cooked, then cook the chicken over a small flame until it is a rich golden brown.

Add a cup of chicken stock and a piece of pate de fois gras the size of an egg, a jigger of port wine, a dash of nutmeg and paprika and cook for about 25 minutes. Just before serving this sauce add three tablespoons of sour cream. Serve the chicken with steamed rice.

Twenty-five minutes later, the dancer removed his white duck outfit, slicked down his hair and strode back into the dining room to rejoin his wife. A waiter served the couple chicken saute as prepared by Vernon Castle. After dinner, Mr. Castle took his place on the orchestra platform and drummed away to his heart's content for a full hour — his favorite hobby aside from cooking.

As the dancing stars paid their check, Vernon called out to Mr. Smith, "Thanks for letting me use your kitchen. I'd like to see more places that permitted guests to prepare their favorite dishes."

Edward F. Sullivan, author of the "Radio Patrol" comic strip, visited Smith House recently with a two-and-one-half pound trout which he had caught near his Westford, Mass. home.

He put on a white coat and hat and proceeded to clean the fish. He washed it thoroughly, salted it, then placed it on a charcoal broiler. Sullivan then prepared a delectable port wine sauce. He roasted slices of apples, sliced some cucumbers. When the trout was ready, he placed the fish on a huge silver platter, garnished it with cucumbers, apples and shrimp, while the regular chef looked on and nodded his head in approval.

Mr. Smith was the first person to give New Englanders music with their meals. The bad luck of a Hungarian band happened to be his good luck for the feature caught on and practically every restaurant copied the idea.

Back in 1892 this Hungarian band, which had been stranded, went around

(Continued on page 22)

Chef Guy Dellamano watches with approval as Mr. Sullivan puts the finishing touches on the fish.

Mr. Sullivan rubs his hands in anticipation when a waitress brings in his self-prepared meal.

ETC 31412

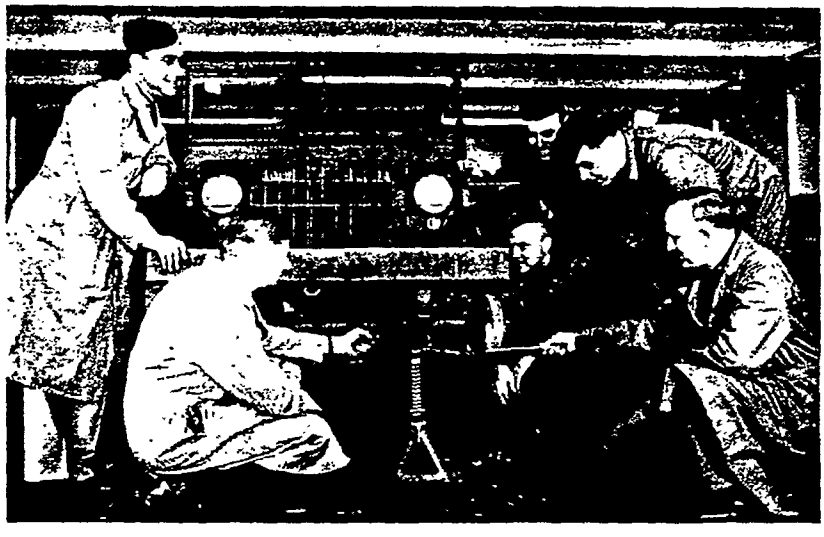
These officers will become instructors at various camps on completion of the course.

Ford Training Army Mechanics

Instructions in Servicing Motorized Equipment Given at Rouge Plant and in Traveling Classrooms.

TO help keep Uncle Sam's military machinery in top condition, the Ford Motor Company has joined hands with the army in a project to train officers and master mechanics from all parts of the nation in the maintenance of military vehicles.

In both mobile and stationary classrooms, instructions are given by Ford service experts on all phases of "blitz buggy", truck and passenger car operation. Officers representing camps scattered all over the nation receive the training and then, in turn, become instructors at their home bases.



A group of Army officers learn about a "blitz buggy" at the Ford Rouge plant.

One portion of the program is unique in its operation. Two big trucks, equipped as mobile classrooms, are rolling along a 5,000-mile route across half the continent. They are covering sixteen army posts scattered from Fort Devens in Massachusetts to San Antonio, Tex.

The other division of the program calls for 1,000 officers from army camps all over the nation to attend classes in the Army Service School at the Ford Rouge plant in Dearborn.

A new class of approximately 30 students will be trained each week at the Rouge plant. The service school is scheduled to instruct approximately 120 officers a month, or a total of 960.

Purpose of the service school is to teach the "ins" and "outs" of operating and maintaining military equipment Ford is building for the Army. This includes the "blitz buggy" or reconnaissance car, bomber service truck, and officers' staff car.

The officers attend classes in the Rouge plant's "B" Building in quarters prepared specially for instructional purposes. Classes are held from 8 A.M. to 4:30 P.M. each day, with five instructors lecturing and demonstrating on all aspects of the military vehicles.

The rolling classrooms are covering separate routes. One started from Fort Devens and the other from Fort Knox in Kentucky. School No. 1 closes its route at San Antonio after covering 2,940 miles. The second school concludes its designated route at Fort Sill, Okla., with a total of 2,075 miles. Both Ford trucks will travel an aggregate of 5,015 miles.

Each truck has two instructors and a driver as a staff. The rear of the truck contains various types of engines, transmissions, rear axle assemblies, steering units, carburetors and other vital parts

(Continued on page 22)

ASK THEM ANOTHER!

If Its Information You Need, Go to the New York Information Center. They've Answered Nearly a Million Questions!

By FRANK ADRIANCE

A YOUNG man came to the big city to get married. He arrived in New York the day before the great event and registered at a hotel, then spent the afternoon and evening with his dream girl. Later he left her at her home and in a rosy glow started to walk back to his hotel.

It was then the awful truth suddenly dawned on him. He had forgotten the name of his hotel and its address and he had left his key at the desk! His luggage, including the suit which he was to wear at his wedding, and most of his money were in that hotel room.

More than a little abashed, he revealed his sad plight at the New York Information Center. To get him straightened out looked like a stumper, but it didn't baffle the young lady attendant. Using as her only clue the length of time it had taken him to walk from his hotel to his fiancee's house, she checked every hotel within that radius and before long she had reunited the prospective bridegroom with his belongings.

The unorthodox question is the rule at the Information Center, which was opened December 16, 1939, for the purpose of performing a much needed service. Ask them any question, no matter how unusual, and they will try to answer it. No other city has anything like this fountain of knowledge, which is invaluable to strangers who want to know what to do and where to go in the metropolis and to resident New Yorkers who are eager to learn more about their city. How many New Yorkers realize, for instance, that there are 54 public golf courses and 70 public bathing beaches in the metropolitan area, or that the New York City Park Department maintains some 500 tennis courts, 15 swimming pools and many miles of bridle and cycle paths?

Interesting displays in the front window of the Information Center attract many passers-by to this busy spot.

Mrs. Grace Roberts, assistant director of the Center, estimates that more than three quarters of a million different questions have been asked since the doors opened less than two years ago. Queries pour in at the rate of from 1200 to 1400 daily, by letter, by telephone and by personal visit. During 1940 when the World's Fair was packing 'em in, the usual day's quota was from 1600 to 1800.

Problems of transportation account for about a third of all questions. The Statue of Liberty ranks as the number one goal of sightseers, according to Mrs. Roberts, and the Center has answered many queries about how to get there. Other places people want to see are Central Park, the Aquarium, LaGuardia Airport, the Empire State Building, and Rockefeller Center, to name a few.

Where do I get an auto license? Why don't they clean the snow off our street? How many taxicabs are there in the city? These are some of the typical inquiries.

The Center is a mirror of current events. Whenever a controversial matter is before Congress, the telephone rings incessantly and aroused citizens ask, "What is the name of the Congressman for my district?" During the pe-

ETC 31414

riod of registration for selective service, thousands of inquiries poured in from young men of draft age. When all aliens were required to register, questions were answered in several different languages through interpreters. The arrival of soldiers and sailors in town for a holiday means romance and a flood of inquiries on the laws governing entrance into the state of holy matrimony. If a battleship comes into the Hudson and plays its searchlights against the sky, curious persons want to know all the whys and wherefores.

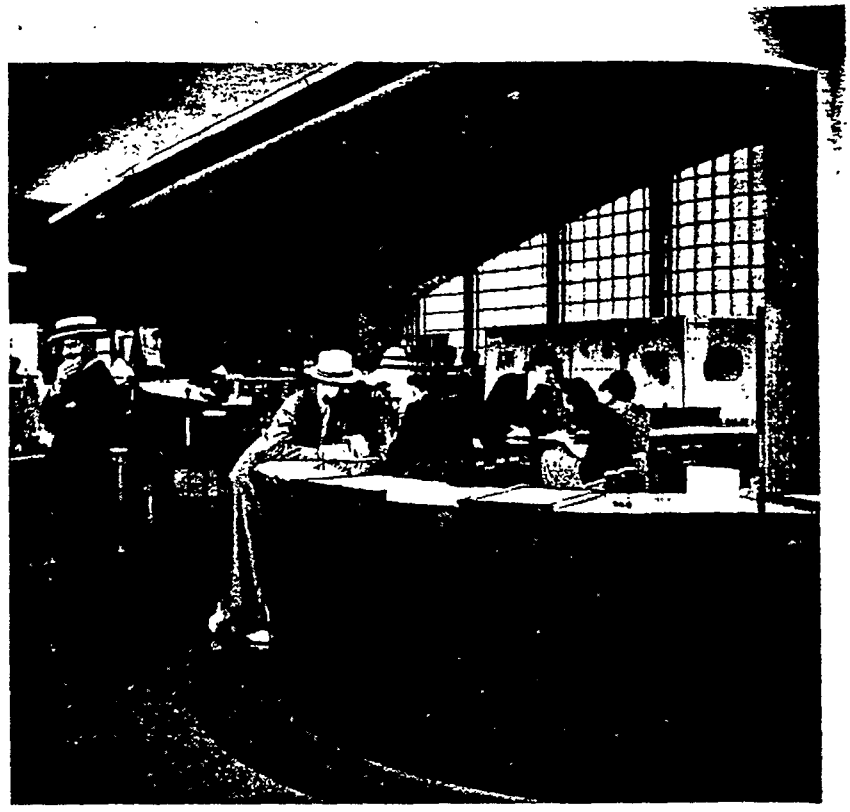
One young soldier appeared at the Center and told how the night before he had been doing the town not wisely but too well. He had awakened that morning to find himself broke and apparently stranded in the big city. He had to be back at a distant camp for first call the following morning. What was he going to do?

The attendant sent him to Governor's Island, where his problem was straightened out. A card received at the Center told of his safe arrival in camp — on time.

Who are the patient individuals who give out the answers to such a wide variety of requests for information? Most of them are civil service employees of various city departments whose previous training and knowledge fits them for the job. Included on the staff are two former school teachers, who are experts at research.

The principal source of information is a cross reference card index system which consists of over 20,000 cards. Whenever a new and difficult question is asked and the answer given, an entry is made under several heads. The Center also maintains a small but intensive reference library and a large folder file containing an assortment of maps, guide books, circulars and miscellaneous literature on a wide variety of subjects.

Despite all this source material, however, the information clerk's job is about 80 percent intelligence and only about 20 percent page turning. The job requires the ability to think not only for oneself but for the other fellow as well, as inquirers frequently are not too adept at phrasing their questions.



An attendant at the central information desk tells an out-of-towner how to find an address in the city. During the day he will answer hundreds of similar queries.

The queries asked attendants at the Center often run the gamut of human emotions. One day a frail little woman, her eyes red from weeping, stepped up to the desk. She was there to claim her husband's body, she said. Only yesterday she received word at her home in Pennsylvania that he had been killed by a truck.

"The telegram says the funeral parlor is in Brooklyn, but it doesn't give the name or address," she explained. "I've been walking the streets since I got here early this morning and I don't know what to do."

The attendant questioned the woman to find a starting point. Her husband, she said, had come to the city two weeks previously on a new job. She knew the name of the woman who ran the boarding house where he had stayed but she didn't know the woman's address or telephone number. She did know that her husband's landlady was the organist or choir leader in a church on 84th or 85th Street near Central Park.

With these slender clues to work on, the attendant called all churches in this area. The fourth church called was the right one and put the Center in contact with the landlady, who came at once and looked after the widow until she was safely aboard the train for home.

On one occasion the 'phone rang and a man's anxious voice said:

"My wife is at a dinner of a newspaper women's club which is being held at some small restaurant. It is urgent that I reach her, because my mother is dying in California and I must take a plane for there in half an hour. Can you find out where this club is meeting?"

The club was one of many such organizations, but by a process of elimination the name and phone number of one of its officers was found. Through the latter the meeting place was located and the husband was able to inform his wife of his imminent departure.

There was the family of seven, consisting of mother, father and five small children, who came from Scranton on an excursion train to spend a day seeing the sights of New York. They crossed

ETC 31415

Staff Sergeant John H. Weston, who signs up recruits for the Army at the Center, poses for his picture with Mrs. Grace Roberts, assistant director, left, and Mrs. Jane Bickley, United Air Lines Women's Defense Aid Corps, right.

the river on a ferry and took a subway uptown to Times Square, where they were to get off. Pop and three of the children got off all right, but Mom and the other two were delayed. The doors slid shut, dividing the family as effectively as if they were on opposite sides of an ocean.

The rest of that day was spent in a more or less frantic sight seeing trip — underground. Mom would ride for a while and then sit on a station platform, anxiously scrutinizing all the trains that roared in and out. Pop did the same. Miles and miles were traveled by both through the city's subterranean passages.

At last some kindly person persuaded Pop to seek help at the Information Center. He felt the same reluctance about leaving the subway as one sometimes feels about leaving the grave of a dear one, but at last he was persuaded.

The information clerk called the transit lines and an order went out to all trainmen and ticket agents to be on the lookout for Mom and her section of the family. They were found at last and the family reunited just in time to catch the excursion train back to Scranton.

"What burned me up about the whole business," said Pop, "was that Mom had the lunch."

The Center is located at 42nd Street and Park Avenue, directly across the street from the Grand Central Terminal, which makes it easy to get to for travelers who have just arrived in New York. Traffic checkers have estimated that more persons pass this location daily than any other place in the city, except Times Square.

Sponsorship of the Center was taken over from the city on July 1, 1941, by the 42nd Street Property Owners and Merchants Association, which group plans to spend $25,000 on it and expand it from a New York information bureau to a world center. Such expansion is natural, as in the past many requests for information about places far from New York have come in.

The Information Center is doing a splendid job of building good will for the city and of helping to dispel the belief of outsiders that New York is a terribly hard-boiled town. Its sincere efforts to help those in trouble does a lot to strengthen one's belief that perhaps there is some good in the human race after all, despite the depressing evidence to the contrary which appears daily on the front pages of our newspapers.

About a third of all questions asked at the Center are on problems of transportation.

ETC 31416

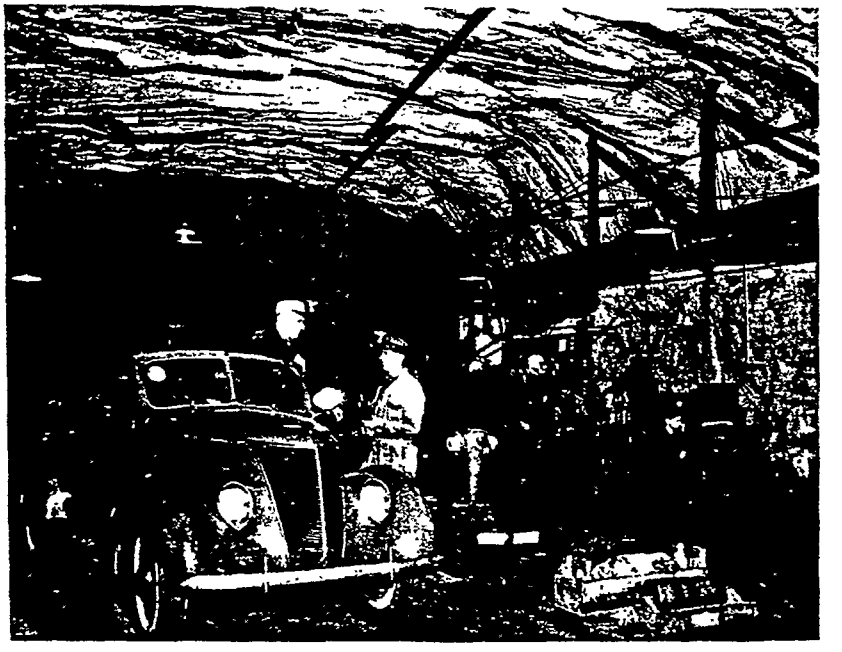
In the towering caverns of the International Salt Company's mine far below the surface of the earth this steam shovel digs deeper.

Motoring Beneath Detroit

Weather No Problem for Two Fords, Which Travel 12,000 Miles a Year a Quarter Mile Below the City's Streets.

OF the millions of automobiles that have come from Detroit, two convertible coupes have gone into regular service in one of the strangest ways imaginable—a quarter of a mile beneath the busy streets of Detroit's west side.

Running in eternal darkness with their headlights burning constantly, the two cars operate in one of the great salt mines of the International Salt Company which lies 1,134 feet below the Michigan metropolis. And to give some idea of the size of the mine, the two cars in the course of a year pile up a total of close to 12,000 miles of driving.



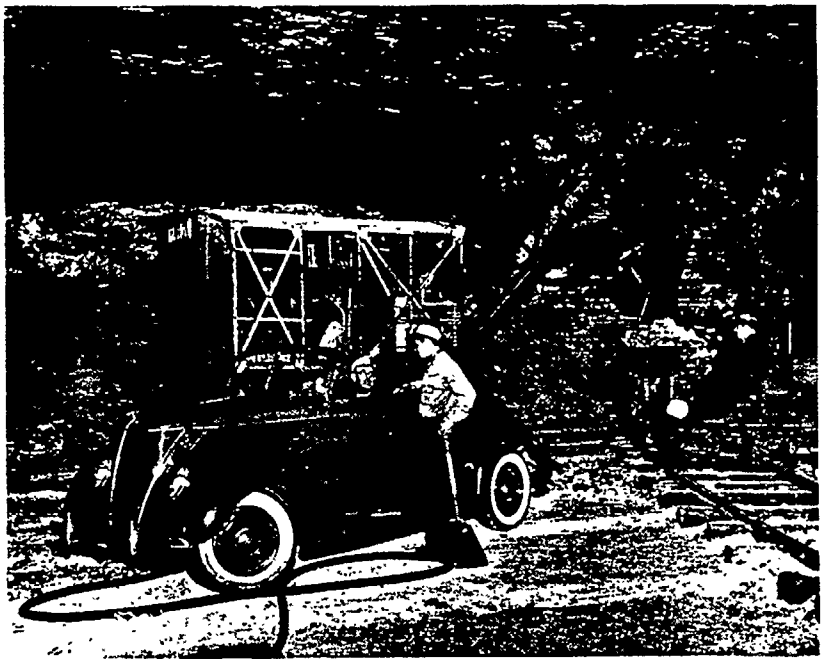
A completely equipped machine shop, located 1100 feet under the busy city of Detroit, keeps the mine's mechanical equipment in good condition.

The 160 acres covered by the International Salt Company's mine at Detroit offer the drivers of the cars both broad highways and narrower bypaths. Altogether there are 25 miles of them, driven through solid salt. For the most part the chambers are fifty feet wide and half as high. As the cars roll along the remarkably smooth roads, the headlights flash on crystal pillars and arches that support the solid salt ceiling overhead. The temperature is 58 degrees the year round, and tops of the Ford convertibles have been removed, since there is never any rain to bother the occupants of the cars.

The development of this mine, one of three operated in the United States by the International Salt Company, was begun more than thirty years ago. The first shaft was sunk in 1910, and since that time vast quantities of salt have been removed. At the present rate of production it is estimated that the mine

ETC 31417

Edward Yipe, mine foreman who has worked there since 1910, stops his car to give instructions to one of his workmen. At right is one of the rail cars which carries rock salt to the mine shaft.



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can be worked for another fifty years.

Electric trains provide the main form of underground transportation, but about a year ago it was decided to supplement them with automobiles to facilitate the work of the supervisory organization. Accordingly, one of the cars is used by Edward Yipe, mine foreman, who has worked in the mine since it was first opened in 1910. The other is used chiefly by mechanics to keep the mine's extensive machinery in perfect working order.

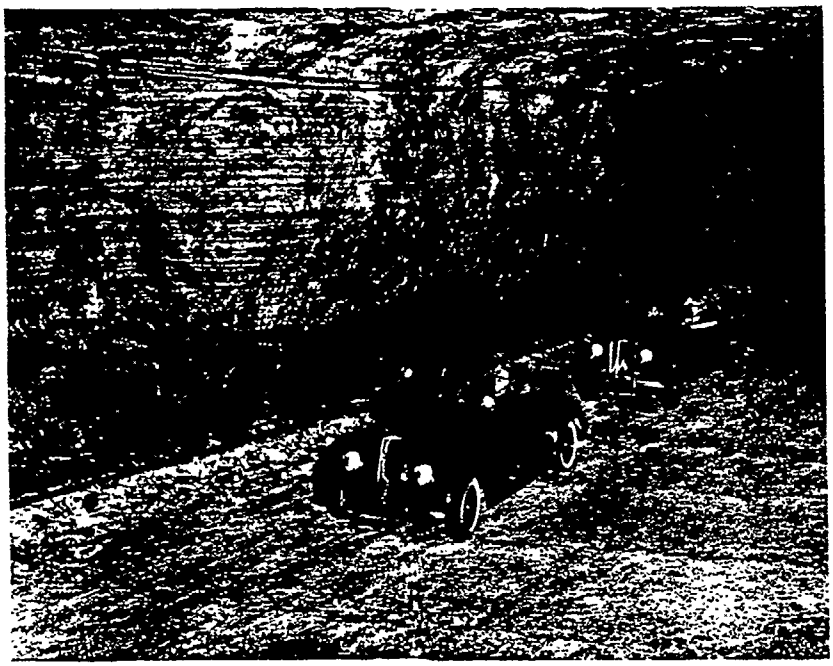
To get the cars into the mine the collapsible tops were removed as well as the fenders and wheels. They were then slung vertically beneath the "skip" (elevator to you) and lowered down the shaft to the mine level. They have not been to the surface since.

Since the mine is fully equipped with extensive machine facilities to service the tools and heavy equipment used beneath the surface, the cars are given all the mechanical attention they need underground. However, very little repair work has been necessary. Expert mechanics regularly check over the cars so the servicing is preventive in nature. Ethyl gasoline is used exclusively and it is felt that this has contributed to the fine service record that has been set by cars on this underground assignment.

It is interesting to note that these two cars are contributing in a definite way to improved driving conditions for millions of motorists traveling on the surface. Much of the mine's output is being used for road stabilization, to give highways a better all-weather surface, and for ice control, which in winter promotes safety by giving motorists a dry, bare pavement. This latter use for salt is rapidly growing as highway engineers are becoming increasingly aware of its efficiency and economy.

In addition, the rock salt which comes from the mine is extensively used in industry through the Lixate process developed by International Salt Company. This process produces a brine as pure as that obtainable from evaporated salt such as you use on your table. Agriculture, too, uses great quantities of salt, for live stock feeding, and for refrigeration, meat packing and curing.

(Additional picture on page 23)



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Tops have been removed from these cars, since weather is no problem underground. The two Fords are run a total of about 12,000 miles yearly.

ETC 31418

Cook Your Own Meal

(Continued from page 15)

to the old Boylston Cafe to see if an arrangement could be worked out whereby the musicians would play for several hours, then be served their dinner. Mr. Smith decided that good food and drinks could be improved by sweet harmonies and told the orchestra to go ahead. His boss threatened him with dismissal unless he chased the circus from the cafe but quickly changed his tone when the diners yelled at him to "quit disturbing the musicians."

Mr. Smith added another "first" to his collection when he staged the first formal New Year's Eve celebration in 1898 at the old Hotel Hayward in Boston. He has traveled all over the world, seeking new cooking methods and ways of improving the old. He believes that people with appreciative palates are nearly always good cooks.

"People do not dine any more," he says today, "they just eat. Of course, a few gourmets exist, but, for the most part, women have been responsible for the lack of interest in preparing meals. They expect to work and keep house. When they rush home from the office, they open a can, toss the contents into a pot and light a huge flame under it, not realizing that food should always be cooked slowly to preserve the flavor."

Ford Training Army Mechanics

(Continued from page 16)

of Ford-built military equipment. All of it is mounted for instructional purposes.

According to War Department plans, 30 army officers will receive instruction at each of the posts. The mobile units will remain at the posts from three to five days. A feature of the instruction will be actual performance of operations, as far as possible, by students in the classes.

The War Department itineraries for the traveling service schools cover the following camps:

Fort Devens, Worcester, Mass.; Miller Field, Staten Island, N. Y.; Camp Holabird, Baltimore, Md.; Camp Lee, Petersburg, Va.; Fort Monroe, Newport News, Va.; Fort Bragg, Fayetteville, N. C.; Fort McPherson, Atlanta, Ga.; Fort Benning, Columbus, Ga.; Camp Shelby, Hattiesburg, Miss.; Camp Livingston, Alexandria, La.; Normoyle Motor Transport School, San Antonio, Texas; Fort Knox, Louisville, Ky.; Fort Riley, Junction City, Kans.; Fort Crook, Neb.; Fort Warren, Cheyenne, Wyo.; and Fort Sill, Lawton, Okla.

★ Service Awards ★

The Following Service Awards Were Made as of October 1st, 1941

15 YEARS

ROBERT O. BROWN Administration

10 YEARS

ROSLYN B. ARBOUR
Gas Testing, Baton Rouge

5 YEARS

MARTIN ALSPAUGH
Engineering, Detroit

JESS J. CARMICHAEL
Gas Testing, Kansas City

ELMER F. MAHLKE
Gas Testing, San Bernardino

ALBERT MERZ* Administration

W. F. NIXON Sales, New York

L. D. REIS Sales, Tulsa

JOHN C. RENFROE
Gas Testing, San Bernardino

JOSEPH SESSIONS
Gas Testing, Baton Rouge

VINITA STRUTT Sales, Los Angeles

**Award made August 1st*

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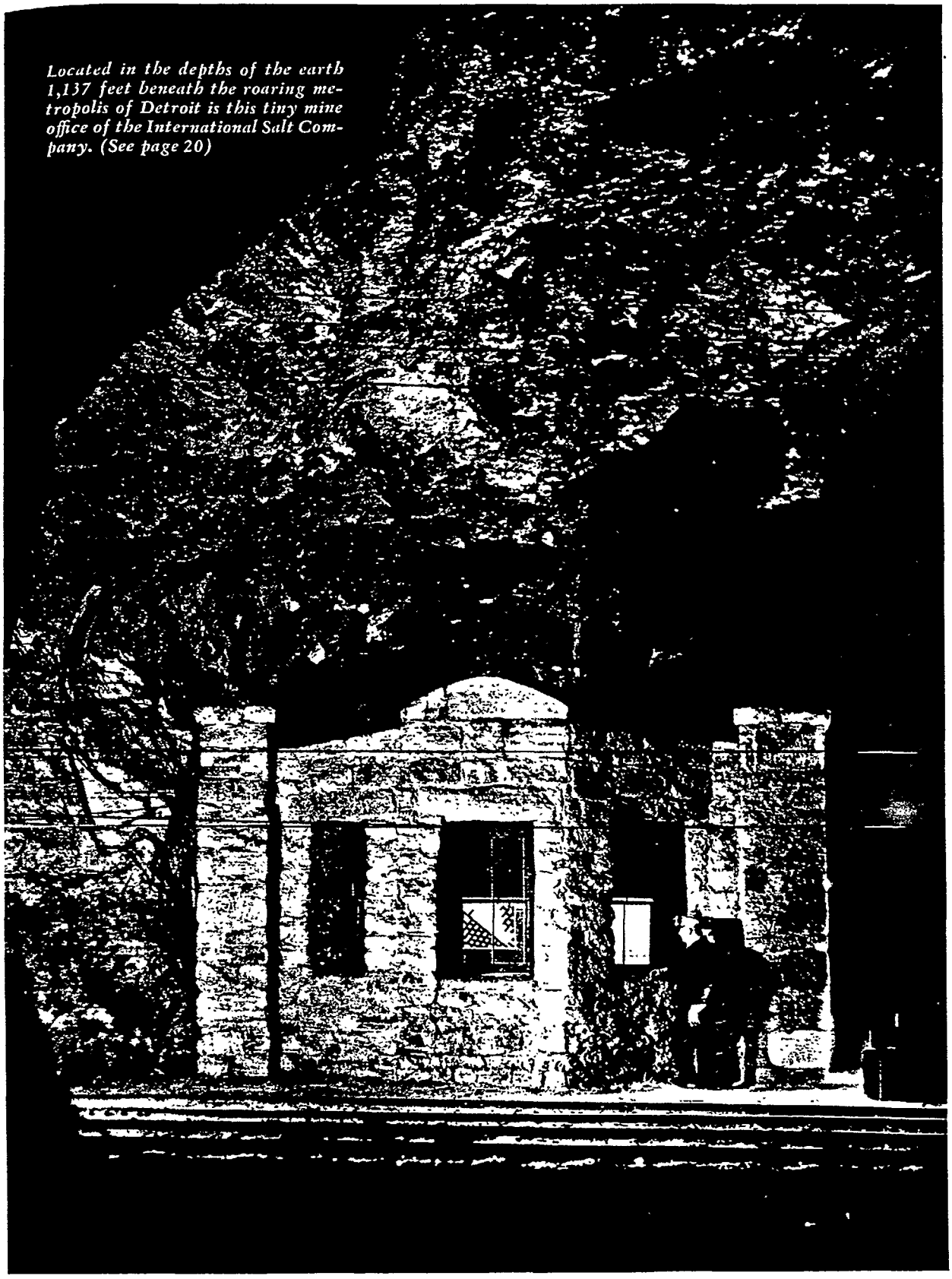
ETC 31419



Located in the depths of the earth 1,137 feet beneath the roaring metropolis of Detroit is this tiny mine office of the International Salt Company. *(See page 20)*

ETC 31420

There's a new kind of farmer in America

He works fewer hours — but gets more done. He's not a laborer scraping a bare existence from the soil, but an executive operating a well-organized, profitable business. He's the new kind of farmer—the business man in overalls who today can produce the nation's farm products at low cost and still make a good living for himself.

For farming has kept pace with the technical progress that is characteristic of other American industries. While only a few years ago the advantages of power-farming were limited to large-scale operations, today compact, modern tractors are within the reach of millions of small farm owners.

Important in the development of these smaller, less costly tractors has been the improvement of gasoline by oil refiners through the use of Ethyl's product, anti-knock fluid containing tetraethyl lead. Because higher anti-knock gasoline permits the use of higher compression engines, great increases in power and flexibility have resulted. Big, costly engines are no longer necessary and the modern, high-compression tractor with its smaller but far more efficient engine has become the backbone of modern farm power.

Today Ethyl research workers are continuing to cooperate with tractor and petroleum engineers in their search for even more efficient engines and fuels. For tractor engines—in common with automobile, bus, truck and airplane engines—are inseparably related to fuels in their development.

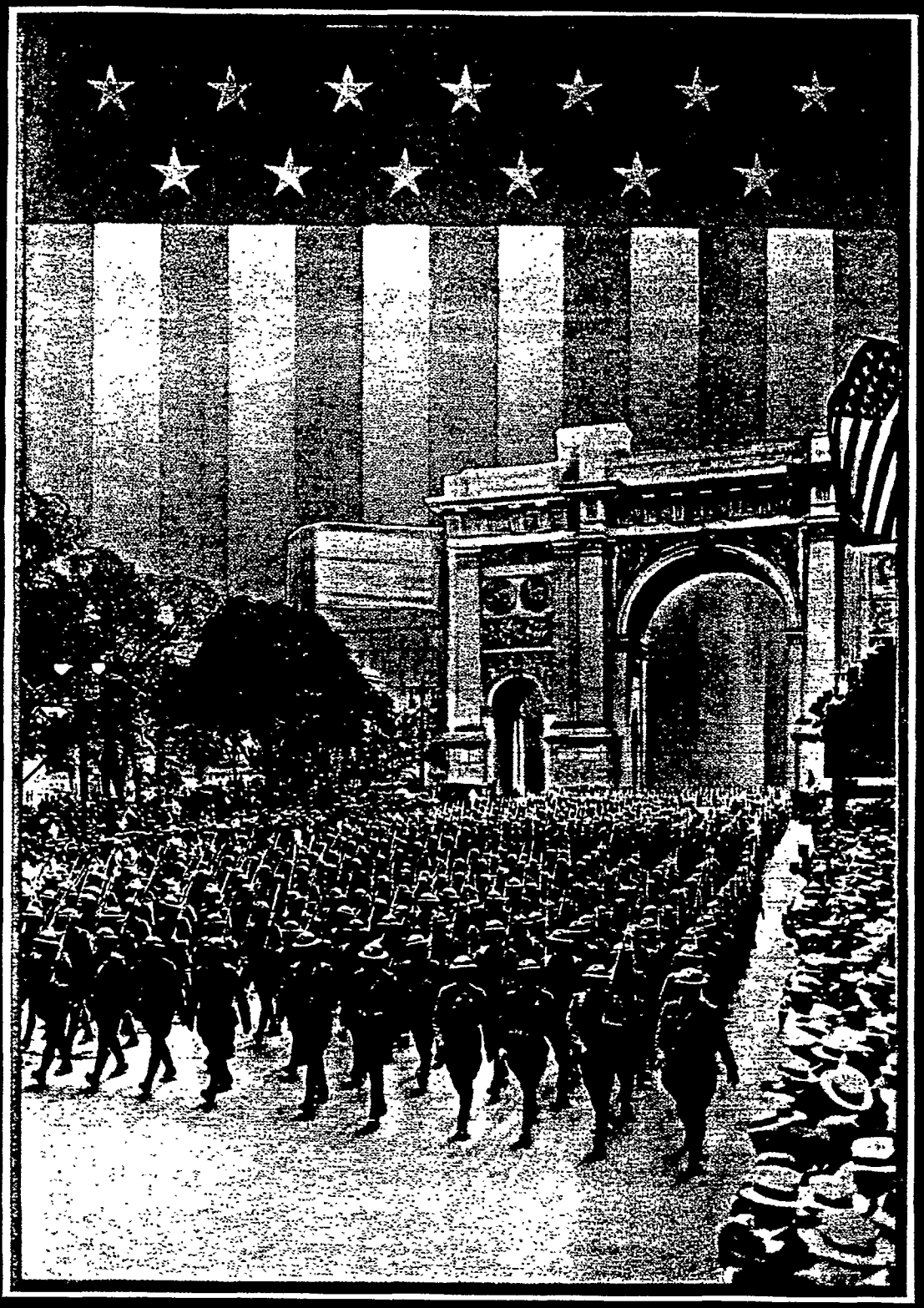
We invite engineers in every phase of automotive technology and operation to avail themselves of our research and service facilities at Detroit and San Bernardino. We believe that by working with technical men and executives of both the automotive and petroleum industries we are hastening progress that benefits the entire nation.

ETHYL

ETHYL GASOLINE CORPORATION

Chrysler Bldg., New York, N. Y.

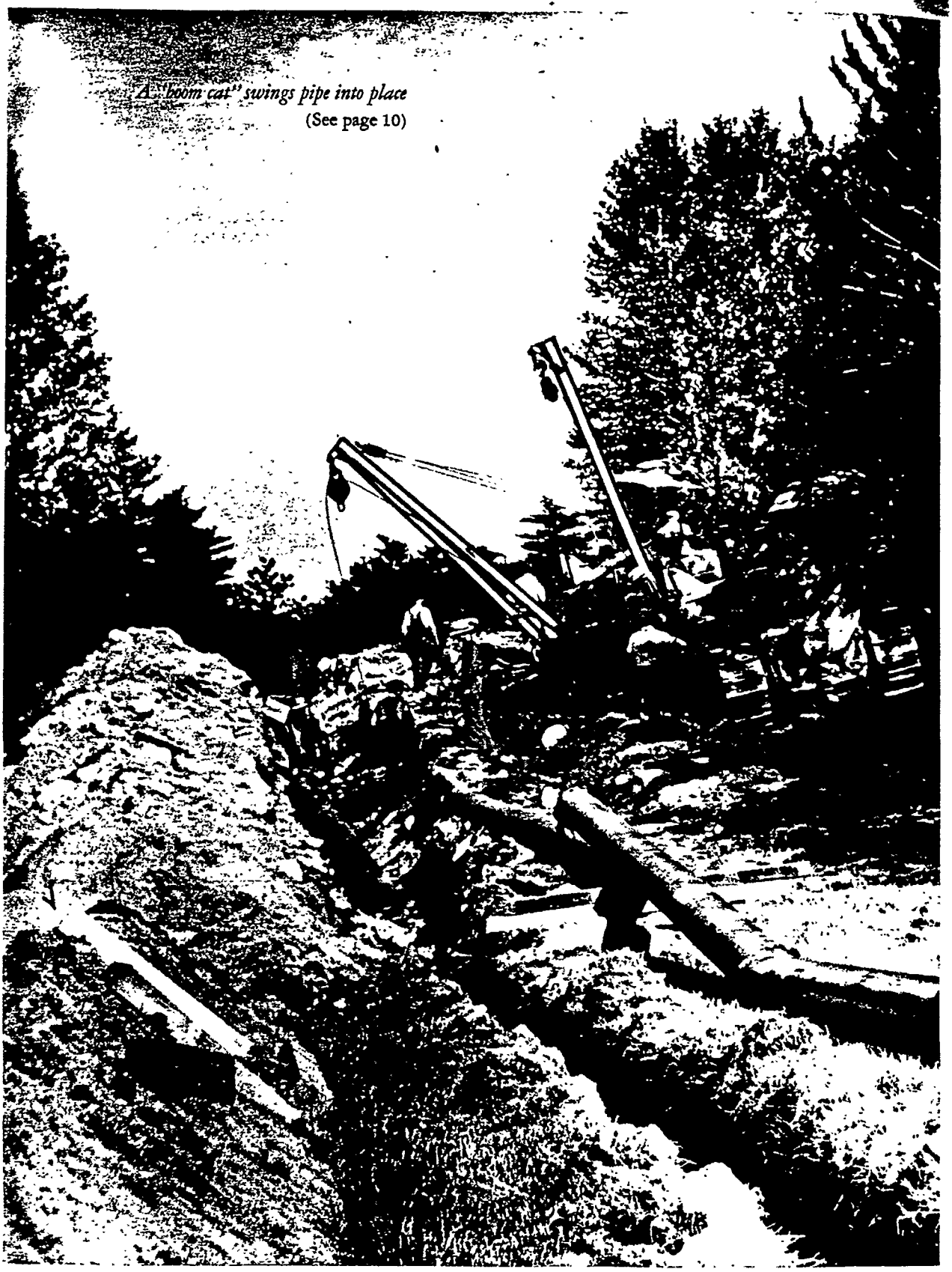
ETC 31421



NEWS

November 1941

ETC 31422



A "boom cat" swings pipe into place

(See page 10)

SONS of the VIKINGS

Young Norwegian Eagles Prepare in Canada to Fight Invaders of Their Homeland.

By ADAM ROSS

THIS is the story of the Vikings of 1941, blue-eyed, fair-haired youngsters from the villages of Norway and the towns of the U. S. A. On the broad runways of the Island Airport at Toronto, Canada, the Viking spirit lives again as members of the Royal Norwegian Air Force carry on the traditions of their ancestors, the men who discovered America 1,000 years ago.

A year and a half ago Germany invaded Norway. For 62 days one of the weakest air forces on earth fought one of the strongest. The members of that "weakest force" left Norway still fighting. Today, joined by hundreds of fellow Norwegians from the United States and far corners of the world, they are getting ready to renew that fight, to hurl it back at their homeland's invaders.

It is less than a year since a fleet of speedy American bombers and fighting planes began to arrive at Camp Little Norway in Toronto, yet already two squadrons are in action overseas. Already the first German planes have been shot down by pilots trained in Canada.

These Norwegians and the odd American who here and there manages to find a place among them are a colorful bunch. Ever since their arrival, Toronto and the rest of Canada have been on tip-toe watching their hard-hitting action.

How did they get there?

Scores left Norway with what was left of the valiant little navy that helped to sink a third of Germany's battle fleet. Scores more went on fishing boats or British destroyers. A dozen escaped in German bombers, stolen from under the noses of Nazi pilots. These were flown to the Shetland Islands.

Still more, in two's and three's, have risked death running the German coastal blockade in row boats and sail boats. One trio in an 18-footer, a trio who had never been to sea in their lives before, reached England after fooling a German submarine with fishing nets. Today each of the three is juggling the controls of a Fairchild trainer similar to those used by the U. S. Army Air Corps.

Two others, nameless for fear of Nazi revenge on relatives in Norway, made an incredible voyage across the North Sea from Bergen to the Shetland Islands in six days with a row boat. Scores more have come by other routes and from every corner of the earth.

An example to his men is the story of Major Ole Reistad, the man in charge at Little Norway. An athlete with Olympic medals and trophies by the dozen, he had 4,500 hours in the air behind him and was one of Norway's most famous test and military pilots before the blitz began.

Major Reistad was at a large military airdrome near Oslo when the Nazis descended, taking the country completely by surprise. The Major slipped away to his squadron of old, 1924-model Fokkers and was promptly blasted out of two airports by 1940-model Messerschmitts and Heinkels. But first five Norwegian planes—the only half-way modern fighters they had—went up together and took on a formation of 70 German bombers in waves. They shot down five. Three of the Norwegians were rather badly shot up before they landed and three of the pilots had flesh wounds from Nazi machine-gun bullets. At this stage the Germans really turned the heat on. So, wobbling along with almost no ammunition left, little gas and no airport, the Norwegians headed for secluded ice- and snow-cov-

● *"Watch that kid from Wisconsin!" says one ace Norwegian flying instructor to another as a recent recruit takes his first solo flight.*

Wings of the Norsemen—a long line of Royal Norwegian Air Force planes.

ered lakes. For the rest of Norway's stubborn 62-day resistance these lakes were their airports. For miles around Norwegian farmers would siphon gasoline out of their automobiles and take it in tins to the lakes.

First they tried dive-bombing by stalling the machines over the targets. Then because they had no bomb sights, they would aim the planes at their targets. Later when ammunition ran low they even tried rigging up the empty gasoline tins with dynamite to use as bombs, but Major Reistad claims they weren't much of a success. Often the snow on these makeshift airports was deep and on one occasion 3,000 reindeer were rounded up and herded onto a lake so they would tramp it down sufficiently to permit take-offs.

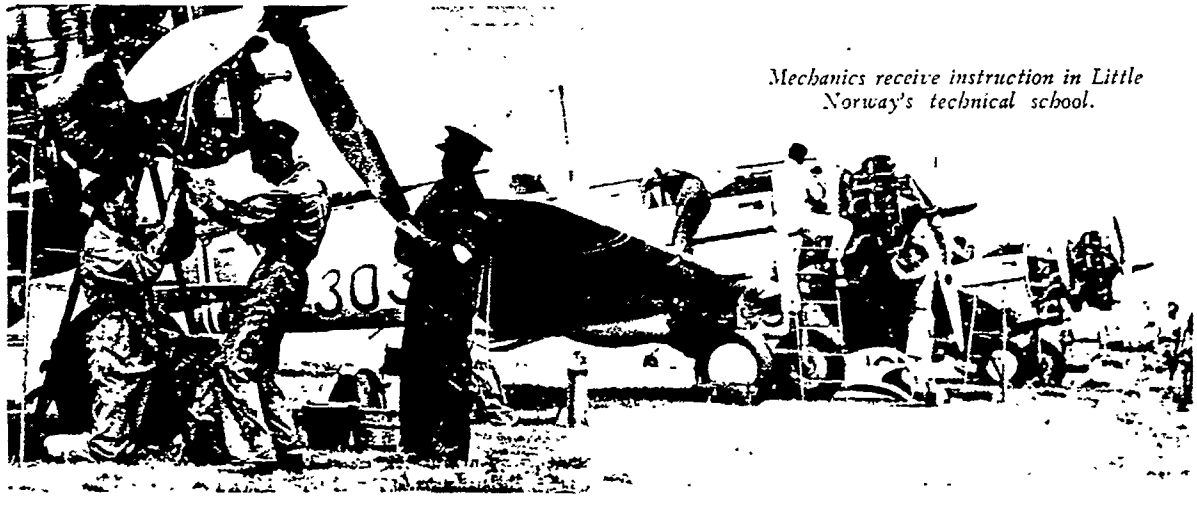
Flying a swift American-built Curtiss fighter in Toronto today and showing a youngster from Boston, Mass., how to do the same thing is one of Major Reistad's men who was cruising along at 3,000 feet after a brush with some German anti-aircraft shrapnel one night. A snow storm developed and his motor quit cold.

He and his observer bailed out. The observer landed on the edge of a mountain-top cliff in a drift, but the drift gave way, tumbling him over the side of the mountain. By some miracle his parachute re-opened and he landed safely in another drift, 300 feet below, beside the pilot. That observer also is in Toronto today, instructing in the latest of California-built Douglas attack bombers.

When Norwegian rifles and their few machine guns finally gave way before German tanks and artillery, Reistad and the 25 planes he had left flew to Finland, and there the pilots disbanded, swearing to meet again in Canada. All but five reached Toronto.

Since they came hundreds of other Norwegians have arrived to learn to fly and join in their country's fight for freedom. There were 20 from Norwegian whalers in the Antarctic. Whole ships' crews have volunteered and been turned down, for it is Norway's merchant marine, the world's fourth largest, which is earning the money that keeps her planes aloft and now makes her airmen among the world's best equipped.

But when a torpedo hits its mark on



Mechanics receive instruction in Little Norway's technical school.

ETC 31425

a Norwegian freighter the survivors usually head for Little Norway and Little Norway today is full of torpedoed sailors. Heaven help the first Nazi submarines they spot from their bombing planes.

Hundreds of Canadians have tried to join the Norwegian Air Force, but by agreement with the Canadian government the Norwegians won't take them and similarly the Royal Canadian Air Force doesn't take Norwegian citizens.

Right now with more squadrons ready for overseas the Norwegians are looking for recruits and many an American of Norwegian descent has found his way into the brotherhood of Little Norway. Pay and allowances compare favorably with those of Uncle Sam's armed forces and the fun-loving Norwegians are popular with Toronto hosts and hostesses. There's never a dull moment when the Norwegians are around.

Ask Wendell Willkie. When Willkie was in Toronto half a dozen young Norwegian daredevils roared up Toronto's busy University Avenue in the middle of the parade, wide open at 200 feet, doing barrel rolls. Traffic came to a standstill and where it didn't there were locked fenders and smashed radiator grills by the score as drivers stuck their heads out of their windows, paying more attention to what was happening above than in front of them.

Camp Little Norway consists of a settlement of special wartime buildings thrown up opposite the Island Airport. These buildings are models of what well-lit, well-ventilated living quarters should be. They have their own hospital and a model kitchen which turns out Norwegian food planned with diets supplied by a former professor of the University of Oslo whose name is known to doctors all over the world.

There's a women's auxiliary composed of the half dozen wives who managed to get out of Norway with their husbands and wives who have come from other parts of the world and from the United States, so Camp Little Norway is probably the only military barracks in the world with tastefully designed curtains on its windows and big, comfortable canteens or lounges turned out with a strictly feminine touch.

Preference is given to those who speak Norwegian when volunteers are accepted, but here and there is the odd flyer who doesn't. Number 1 of these is Captain Alex McLeod, a veteran American test pilot and a veteran of air fighting against the Japs in China. He's been in five armies and seven wars. His wife is Norwegian.

Older men with special skills get a chance too, for the Norwegian Air Force needs hundreds of radio operators, mechanics and other technicians. Younger fellows unskilled in these lines get training from the ground up with some of the most elaborate equipment in use anywhere today. Armored, mobile repair shops on wheels which move along at 50 miles an hour are part of this equipment along with mobile radio stations and parts trucks.

One of the newest American recruits is a young chap from Norfolk, Va., who had a few hours in the air to his credit. The Norwegians got quite a chuckle out of his application form and were pleased expressions when they read his answer to the stock question: "Can you speak Norwegian?" "No," was the Virginian's reply, "but I can learn."

A group of students consults a map before taking off on a long flight.

As in any army, music is a great morale builder for the youngsters of the Royal Norwegian Air Force.

ETC 31426

Mufflers must be able to withstand severe and repeated backfiring, as a faulty muffler may set a car afire or permit dangerous fumes to seep into the passenger compartment.

Testing for Safety

Thousands of Manufacturers Voluntarily Send Their Products to Underwriters' Laboratories for Investigation.

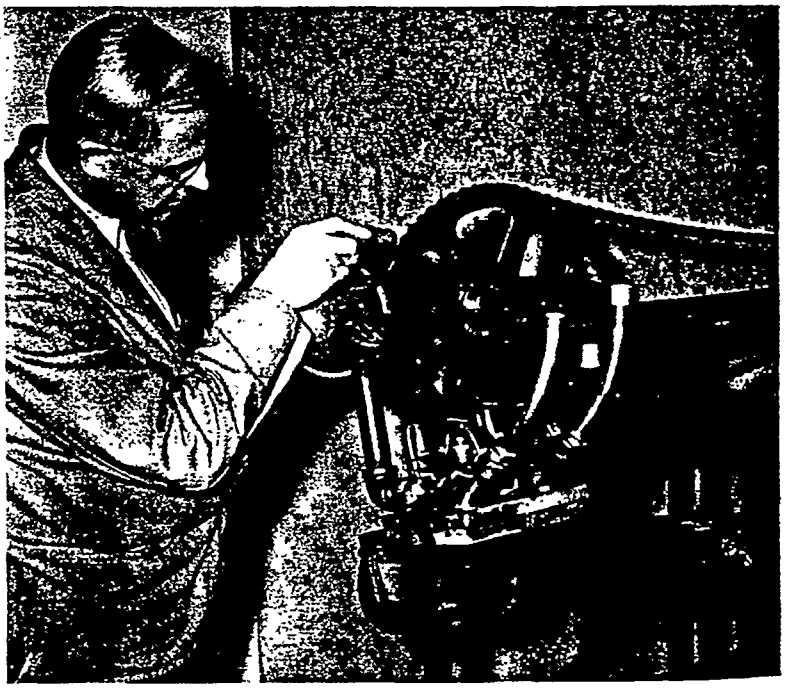
By RAY WYRICK

WHEN in doubt about the safety of a product, look for the Underwriters' Laboratories label. Anything bearing that label has been put through the most rigid safety tests.

Underwriters' Laboratories are a non-profit organization to which manufacturers voluntarily send their products for investigation, paying a fee which just covers the cost of the tests. About 3500 manufacturers, operating more than 4000 factories in all parts of the country, subscribe to this service. They represent more than 100 industries and have submitted more than 200,000 articles to the Laboratory.

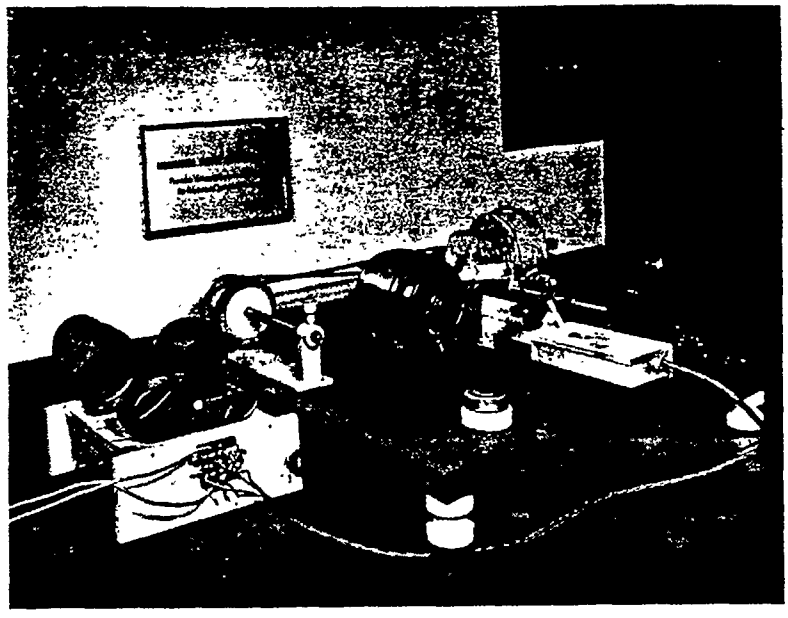
Over five million labels were used on inspected products in 1939. Tests on fire retarding materials, fire fighting equipment, accident and burglary prevention devices have dropped insurance rates in those fields. The label stands for greater safety for life and property from loss or damage by fire or crime and from danger of accident.

One of Underwriters' Laboratories' most important jobs is to test automobiles and automotive equipment. Take



Nozzle valves for filling station pumps are mechanically operated in a test for leaks. Each pump and all its fuel handling parts are required to stand a pressure of 300 pounds per square inch as insurance against the escape of gasoline and consequent fire hazard.

ETC 31427



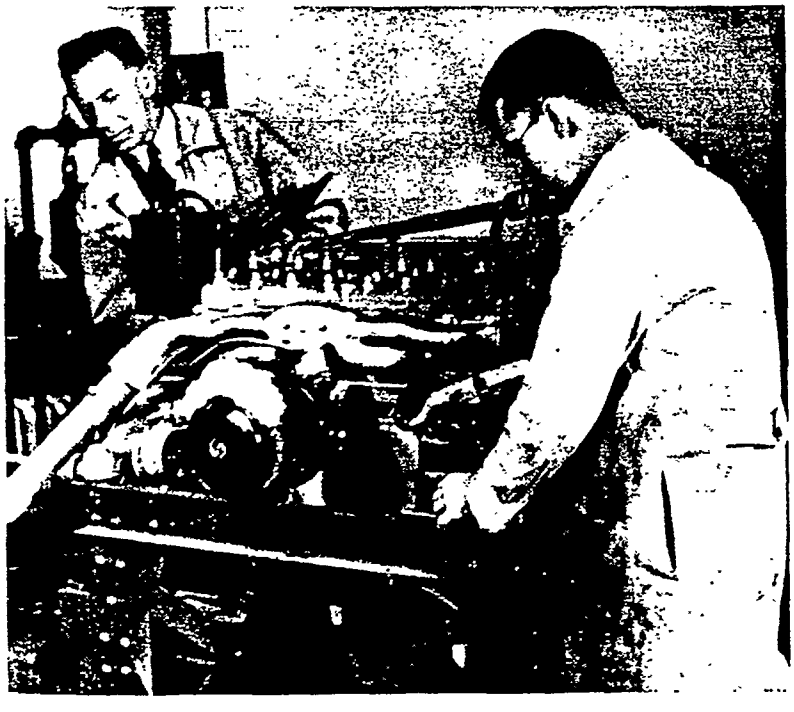
Automobile directional signals are given an endurance test of 100,000 operations to determine their reliability. Mechanical operation of the switch and other parts of the mechanism reveals any weaknesses of construction or design which may cause the device to fail to function when needed to indicate a turn of an automobile, truck or bus.

the windshield of a recent model car, for example. Windshield safety glass has been tested in actual collision of cars traveling at different rates of speed, with dummies at the wheel instead of human drivers. As a result an entirely new kind of glass has been developed to take the place of the old style safety glass, which was found to be dangerous.

The new glass consists of a plastic which is used between layers of laminated glass. If the glass is shattered the plastic holds it together, but the most important thing about the material is that it is flexible. It bulges and gives way under impact, so that the shock of striking one's head is not so great, yet it does not break so as to let the head go through and be caught in a "guillotine." A stone will not go through or shatter this type of safety glass.

The automotive industry has the Laboratories check the design of each new model for fire hazard before production is begun. Underwriters' Laboratories engineers go to the factories when the new models are being designed and put fuel, ignition and exhaust systems through rigid tests. Gasoline tanks must be able to resist damage in a collision. Fuel lines must not leak after being subjected to severe vibration. The air cleaner with which every carburetor must be equipped is tested to make sure it will snuff out the flame of a backfire through the carburetor intake.

The work done by Underwriters' Laboratories to lessen the risks involved



Air cleaners act as flame deflectors and help prevent fires under the hood. The air cleaner at left is being tested to see if it will prevent ignition of dripping gasoline. To prove its effectiveness the engine is caused to backfire through the carburetor.

ETC 31428

in handling gasoline has been responsible for a decided decrease in the number of accidents in the petroleum industry in recent years. Gasoline vapor is highly explosive and one pint of gasoline exposed to the air will soon expand into 200 cubic feet of vapor, so explosion proof lamps, floating roof tanks which practically eliminate the escape of gas, flame arresters and vent valves are among the safety devices approved.

Objects of special attention are the pumps which dispense annually billions of gallons of gasoline to millions of motor vehicles in the United States. Motors, electric switches and lighting fixtures on these pumps and the piping through which the electric wiring is run must be so constructed as to confine an explosion, in the event that any failure of the electric system causes a spark and ignites gasoline vapor. Underwriters' Laboratories determine whether the parts are able to meet this requirement by actual explosion tests in them with gasoline vapor and air mixtures.

In another test the pump unit is operated under various conditions for many hours to find out if it is reliable. Then the entire system — pump and all fuel handling parts — is required to stand a pressure of 300 pounds per square inch to see if it will leak. If it passes this test, the pump has an ample safety factor, as 300 pounds is considerably more than it will have to stand in actual service.

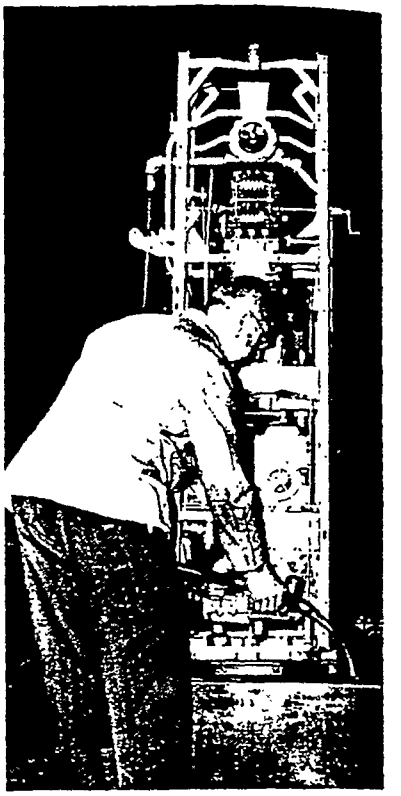
Building materials are subjected to many tests to make sure that they are fireproof. One of the most spectacular of these is the ordeal through which window glass must pass in order to win an Underwriters' Laboratories label.

A window is built in the wall of a furnace, just as it would be installed in the wall of a building. There roaring flames lick it for a period of 45 minutes and the temperature hits 1640 degrees, which is eight times as hot as boiling water and a more severe heat than any window could be subjected to in a burning building.

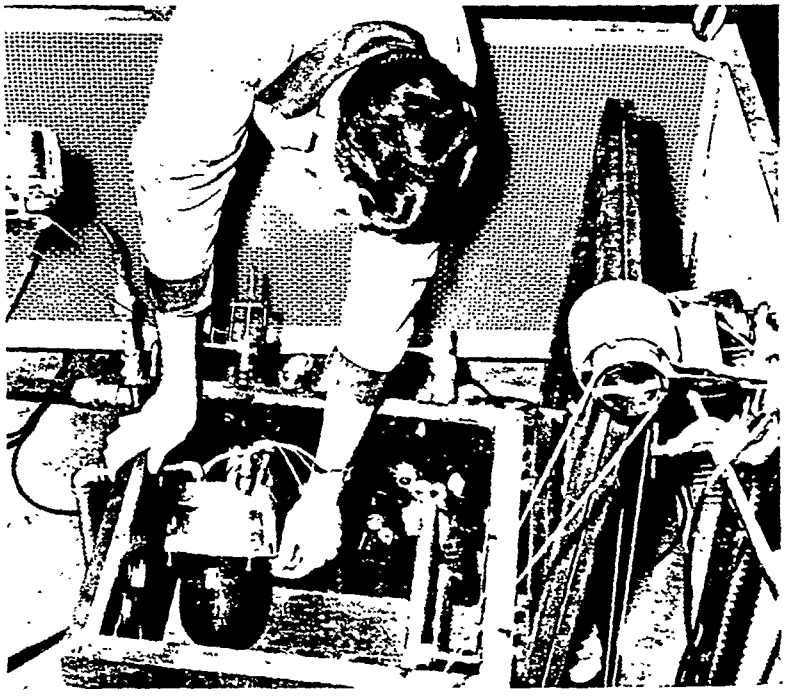
But that isn't all! If the heat has failed to crack the glass, it next must undergo the water stream test. The wall containing the window is rolled from the furnace and a fire hose stream is played on the red hot surface of the glass. Unless the glass stays in place and continues to prevent the passage of flame, it fails to pass the test and is not considered fireproof.

About half of all products submitted to the Laboratories are unsuccessful in the required tests, but in some cases only a minor change in design is necessary to bring them into compliance with the standard. When this improvement is made and the device sent in again for investigation, it may be approved. In every case of failure a detailed report goes to the manufacturer, explaining exactly what safety specifications the product did not meet.

The motoring public is protected by the pressure tests and explosion proof electrical parts which safeguard gasoline pumps. The pumps are operated under various conditions for many hours in order to check their reliability.



To test the strength of explosion-proof lighting fixtures, an actual explosion is caused inside the light container.



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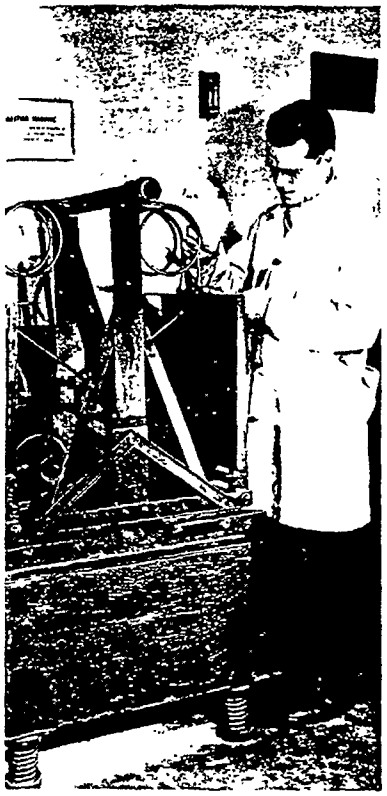


Assurance that the high degree of safety required will be maintained in production is given by frequent checks on the manufacture of approved products. Technical experts from the Laboratories' 200 inspection offices annually make over 60,000 visits to factories.

The work of Underwriters' Laboratories dates back to the Columbian Exposition — the first Chicago World's Fair — in 1893. Incandescent bulb electric lighting was to be one of the features of the Exposition, but fires broke out in some of the installations and damaged the buildings. The capital stock fire insurance companies, now the National Board of Fire Underwriters, sent an engineer to find out what could be done to stop the fires. And so Underwriters' Laboratories were born.

Today the Laboratories have a main office and testing station in Chicago, test stations in New York, San Francisco, and Lemont, Ill., and 200 inspection offices throughout the United States and Canada, as well as one in London and two in Hawaii. At the Lemont station, which is located outside the town, hazardous work is done with poisonous gases and nitroglycerine.

The Laboratories' high standards are based on the experience and engineering knowledge of some of the best minds in the country. Representatives from each industry concerned, building inspection authorities, and insurance men all collaborate with Laboratories engineers in drafting standards.

Since leaking fuel lines in automobiles are dangerous, Underwriters' Laboratories engineers subject fuel lines and fittings to 30 hours high frequency vibration on the machine at left while the lines are carrying 60 pounds of air pressure. Fittings and tubing should be tight and intact at the end of this test. No crystallization, breakage, or loosening of the joints should result.

•

Many automobile fires are caused by ignition of leaking gasoline or flammable anti-freeze solutions.

The Following

★ Service Awards ★

have been made as of

November 1st, 1941

15 YEARS

A. H. CHENAULT, Sales, Los Angeles

10 YEARS

FREDERICK HUGHES Engineering, Detroit

5 YEARS

ALVIN J. BALDWIN, Sales, New York

W. R. BARNES Sales, Tulsa

EDWARD J. DARRAGH Manufacturing, Deepwater

ARTHUR F. JOHNSON Sales, Kansas City

MILES A. KINLEY Sales, Chicago

ELLIS K. LOCHER Sales, New York

JOHN S. MAYNARD, Sales, Baltimore

ROBERT R. MEAD Sales, Seattle

HYMIN SHAPIRO Chemical Research, Detroit

ETC 31430

Manpower aids the "boom cats" to maneuver a section of pipe into place.

Pipeline Under Construction Between Portland and Montreal Will Eliminate 12-Day Tanker Trip.

•

THE 236-mile pipeline between Portland, Maine, and Montreal, scheduled for completion December 1, will free at least four tankers for other duties by eliminating the 12-day, 2000-mile trip around Cape Breton Island and up the St. Lawrence River. Eight pumping stations along the line will move a maximum of 60,000 barrels of crude daily at a rate of from three to four miles per hour.

Work was started early in the summer at Gorham, N. H., by two crews of approximately 250 men each, one crew working east and the other west. The men who comprise these crews are mostly natives of Texas and Oklahoma, veteran "pipeliners," many of whom have seen service in Romania, Iraq and South America. At the peak of construction as many as 1700 men, including many New Englanders, were employed.

The route for the line was surveyed beforehand from a plane flying at 17,000 feet. Photographs of the country were arranged in mosaics and from them engineers decided on the path of least resistance through the rugged mountain country of northern New Hampshire and Vermont. The irregular topography presented difficulties, forcing the line to a high point of 1,950 feet in the White Mountains and to a depth of 15 feet below the river bed of the St. Lawrence.

New England axemen cleared a path 35 feet wide through the forest and construction crews followed with bulldozers, steam shovels and ditching machines. The huge ditching machines cut channels four feet deep and three feet wide at the rate of 15 feet a minute in soft earth. Caterpillar tractors with derricks, known as "boom cats," lay the 12-inch pipe. So powerful are these boom cats that they can cold bend the pipe when a curving contour of the

ETC 31431

landscape, such as a hilltop or a stream bed, demands it.

The pipes are welded together by expert welders. Then, to guard against leaks, the welds are covered with soap suds and compressed air is blown into the pipe until the pressure reaches 120 pounds. If no soap bubbles which indicate leaks appear, water is pumped into the pipes under 900 pounds pressure as an additional test.

Dirt, stones and other debris are cleaned out of the pipeline by a small machine known as a "go-devil," which is equipped with rotating knife blades driven by compressed air. Frequently the go-devil evicts birds and animals, including skunks, which seem to take delight in making their homes in the weatherproof pipe.

When a section of the line has been completed, a small tractor scraper, or a back filler, pushes dirt over it to a depth of three feet.

The pipeline makes several river crossings during its 236-mile journey, going under the Androscoggin twice and under the Connecticut, the Richelieu and the St. Lawrence. Since the lat-

Governor William H. Wills of Vermont and the Honorable C. D. Howe, Minister of Munitions and Supply for Canada, weld the line where it crosses the international border.

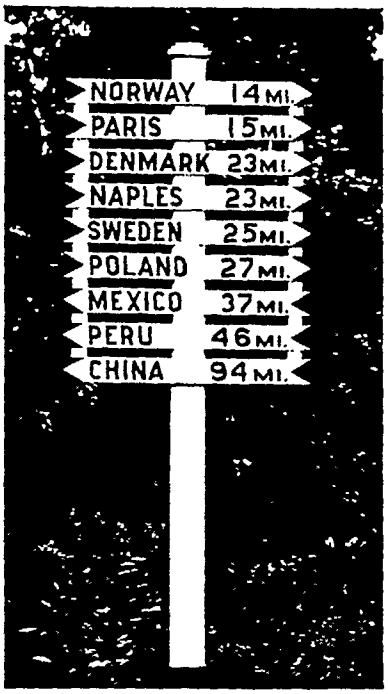
A path for the pipeline had to be cut through dense forests.

The pipe is cold bent to fit the contour of the country.

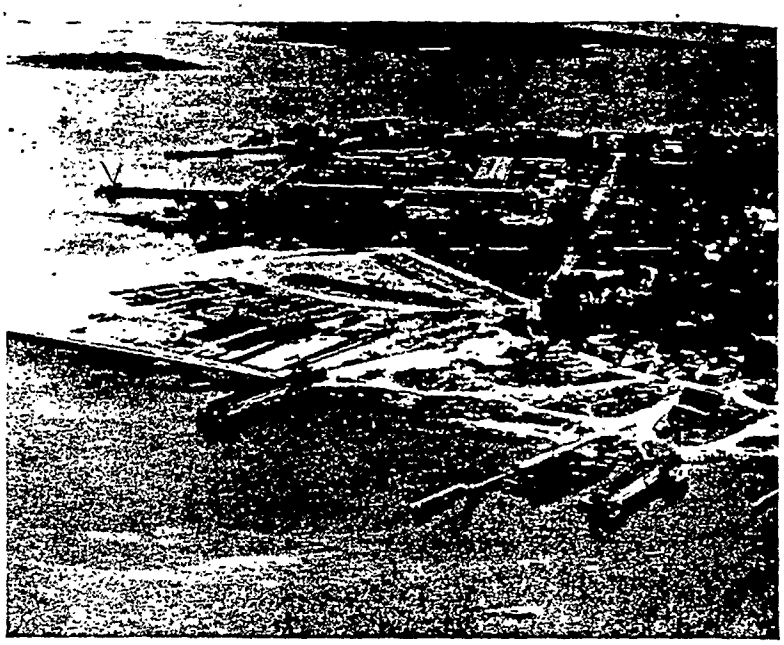
ETC 31432

ter two rivers are used extensively by cargo-bearing craft, ditches had to be blasted in their rock bottoms in order to carry the pipeline well below the depth of the channel.

The new line is being built at a cost of $8,500,000 and 32,700 tons of pipe are being used. Its eastern terminal is at South Portland, where ocean going tankers will unload their cargoes. Facilities of the tanker terminal will be such that a tanker can unload its average load of 150,000 barrels into storage tanks and be at sea again in from ten to twenty hours.



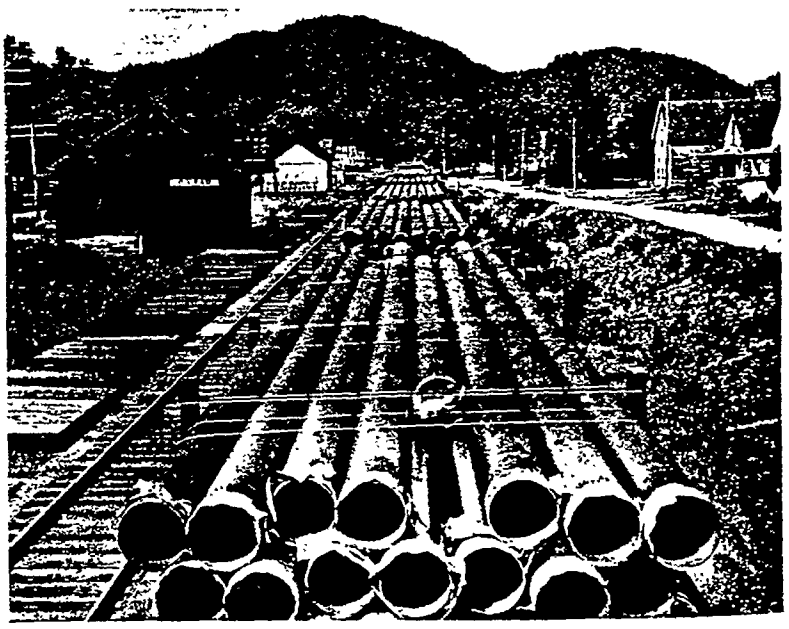
On August 1 a ceremony was held on the Canadian border near Highwater, Quebec, and North Troy, Vermont, to celebrate the welding on of the first section of the Canadian part of the line. Among those at the dedication were Adelard Godbout, prime minister of Quebec; Governor William H. Wills of Vermont, C. D. Howe, Canadian minister of munitions and supply, and J. P. Moffat, U. S. minister to Canada. More than 2,000 French Canadian villagers and Vermont dairy farmers attended the event.



- *An air view of the tanker terminal in South Portland.*

- *Not foreign countries and cities but towns in Maine near the route of the pipeline.*

- *A trainload of pipe arrives in Gilead, Maine.*



ETC 31433

Latest Football Dope from a Dummy

Coach Ducky Pond of Bates, second from right, who last year was boss of Yale's footballers, admires Bosko, the latest addition to his squad.

Marty Gilman Has Sent Over a Thousand of Them to College, but Not a Single One Has Flunked Out.

By MARTIN SHERIDAN

BELIEVING that there is little difference between himself and Lilly Daché or Hattie Carnegie, Marty Gilman, designer of football dummies for hard-hitting players, recently mailed out engraved invitations to his first fashion show forecasting what the well-dressed football player will wear and practice with.

Marty does things like that! He's a 33-year-old bachelor with plenty of nerve and brains. He describes himself as the "father of football dummies that pick themselves up" and do almost everything an opposing player does on the field except talk. And Gilman says they may be able to do that soon.

The major problem of all football coaches — aside from producing a good team — is to reduce injuries. Coaches are gradually realizing that it is a fallacy to believe that you can harden players into condition by beating them up. The chances are greater that you will break them down.

Body contact is the cause of injuries — and games being lost. While there are some coaches who do not believe in extensive use of dummies, it is noteworthy to find that the coaches who are leaders in the sport are in favor of more and better protective equipment.

The credit for Martin John Gilman's latest "fashion creation" — blocking armor — goes to Dick Harlow, Harvard's head football coach, who told Marty that something should be done to afford players with moving targets and at the same time protect both the blocker and defensive man from injury.

"After thinking over Harlow's ideas," Marty tells you, "I went back to my

ETC 31434

workshop to express them in terms of action. When I completed my interpretation of them, I took 'Fightback' to Cambridge."

These protective pads resemble a baseball umpire's chest protector in combination with hip and leg pads. Harvard's gridsters now have complete outfits which they say allow the men to drill more vigorously with less risk of injuries. They can practice full speed blocking and come out of the fray without any bruises or charley horses.

Have you heard of "Go-back," the human looking, human acting dummy? This life-like gridster is six feet tall, weighs 400 pounds, can take it all day — but he's got lead in his feet and can't dish it out. The University of South Carolina and Temple were the first schools to adopt Gilman's brain child. Unlike live players, he cannot be penalized for roughing it, for interference or for offside plays.

So Marty Gilman has become the only unmarried man — or married man, for that matter — who has sent 1,000 dummies to college. His "offspring" cannot break training by staying out late at night nor can they flunk subjects to become ineligible. Furthermore, they never try to sneak in a cocktail or a glass of beer. They lead a tough life at college, getting pushed around and smashed into all the time, but the beautiful part of their life is the fact that they don't even have to know anything — not even remember signals! In fact the dummy at the University of Mexico cannot speak Spanish!

Coach Jim Moore from Kentucky, left, and Gilman give a "Comeback" dummy the works.

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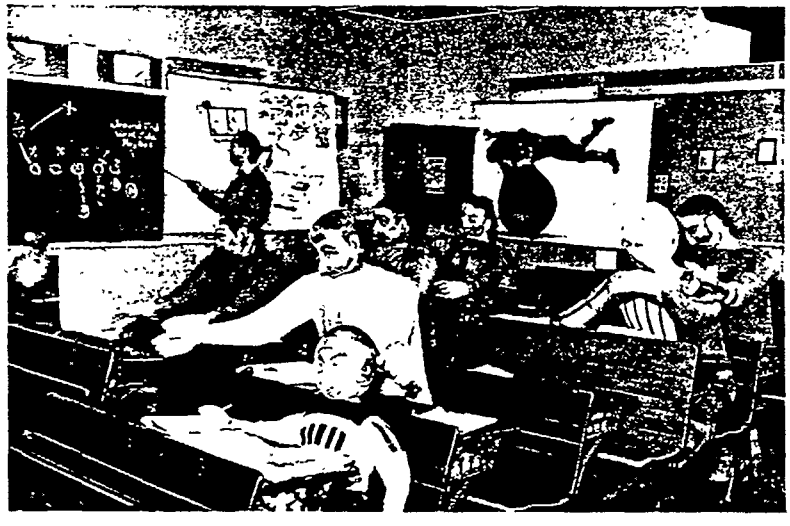
A class of dummies receives last minute instructions from Gilman before going to college.



You may say that football teams have always worked out with dummies. Oh yeah! Did you ever try hitting one of those sawdust or sandfilled bags? It's just like trying to run your shoulder through a solid oak door. You end up with bruises and sore muscles.

The latest thing in football dummies is the portable inflated dummy that weighs only a few pounds and is ideal for teams to use when practicing on distant fields. It either has the shape of a human being or is pear shaped with a heavy base which enables it to pick itself up after being knocked down.

For youngsters interested in football, there is a 42-inch dummy. High school and prep gridsters work out on a five-foot seven-inch dummy, while college and professional teams utilize the six-footer.

Bozrahville, Connecticut, might have become famous as the birthplace of Marty Gilman if he had known how to spell Bozrahville. But he didn't, and so residents changed the name of the little town of 300 people to Gilman, after Marty.

Marty is one of seven children, all of whom are college graduates. When he was 13 years old he went to Norwich Free Academy to see about enrolling.

"Sorry," said the headmaster, "but we accept only those who have stood in the upper third of their class."

"Why, I finished at the head of my class," boasted Marty.

ETC 31435

The hardest blocks don't hurt when a player wears "Fightback" pads.

"How many were there in your class?" the educator asked.

"I was the only one," Marty retorted, having attended a little red schoolhouse.

Marty later attended Connecticut State College where he played guard, although his weight was only 142 pounds. His father owned the Gilman Cotton Mills where he became general manager after graduation. The young man noticed that much cotton waste was piled up around the plant at a loss to the owner. One day he stuffed a heavy canvas bag with the waste material, had it sewed up and practiced blocking it.

His former football coach at Norwich Academy stopped by and noticed the dummy. He punched it and kicked it, then scratched his head.

"Say, Marty, that's pretty good. How about building one for us?" he asked enthusiastically.

Gilman made the dummy and, what's more important, was paid for it. Here was the solution to his cotton waste problem. He began to make simple dummies and sold them to Navy, California, Brown, Dartmouth, Army and other institutions. He was feeling satisfied until a friend told him: "I enjoy practicing with your dummies, only they fall over when hit."

That gave Marty another idea. Utilizing a simple physics formula as the entire mechanics of a new dummy, he had a heavy cast-iron base molded. He covered it with sponge rubber and placed it at the bottom of a heavy canvas covering. This Marty stuffed with the cotton batting and woolen hair. The pear-shaped creation was named "Comeback" after it proved it could pick itself up after a player knocked it down.

Visiting Gilman, Conn., is an experience. You take the road from Norwich to Hartford. When you've covered about eight miles, you come upon a little sign pointing to the right and spelling out GILMAN. Down that road you go for a quarter of a mile to the Maple Wood Hotel, a former summer hostelry, Gilman's headquarters.

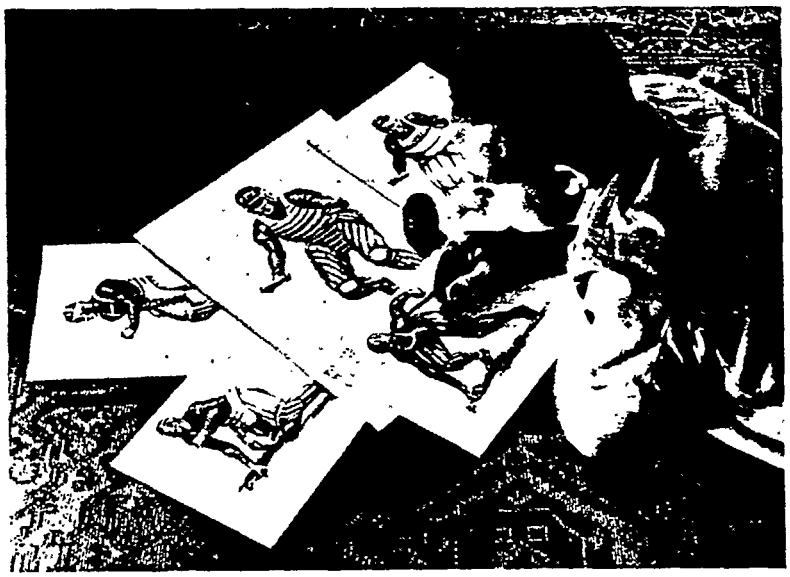
Marty works and lives here alone. During the summer dozens of coaches and players visit the "Rag Doll House" to practice blocking and tackling the dummies in Marty's field. Last summer, Jim Moore, head football coach at Murray State College in Kentucky, worked with Marty for eight weeks.

Marty Gilman is an excellent example of rugged individualism. He purchases all materials for use in construction, designs new patterns, assembles some of the equipment, tests all of it and drives more than 40,000 miles a year to show his wares to football coaches from coast to coast. In breaking down sales resistance, he reaches his climax by going to work personally on his dummies in the presence of coaches and squads. And he writes all his advertisements. Up to last year, Gilman played professional football as a diversion. In addition, this human dynamo serves as constable and police force of Gilman and has both telephones in the town.

Right now he has reached the cross roads. In other words, he is stumped — stumped in the sense of trying to figure out some new kind of dummy to create. You see, he has turned out dummies for practically every purpose. The only new one he could possibly make would be a mechanical man to go through the motions of playing and keep the live players on the bench for substitutes.

A true bachelor, Marty Gilman is not interested in marriage. Besides, he points out, his dummies are family enough for him at the present time.

Lying on the floor of his home, Gilman designs his protective equipment.



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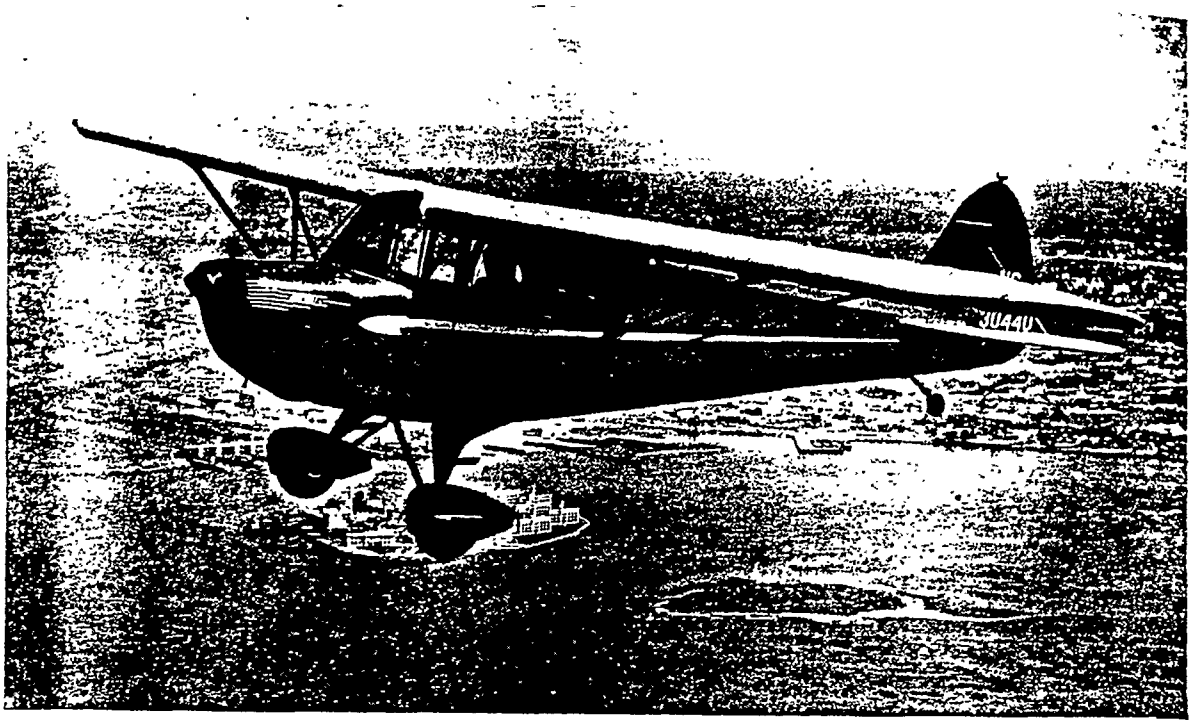

CIVILIAN WINGS

The Light Plane Industry is Stepping up Production to Keep Pace With the Government's Pilot Training Program.

By FRANCIS V. V. ADRIANCE

NOT so many years ago some gentlemen with "vision" were forecasting the day when planes would take the place of automobiles just as the automobile replaced the horse and buggy. The day when this was supposed to happen is long past, but the motor car is still with us in ever increasing numbers. Why? Because for certain purposes the airplane simply isn't practical and probably never will be.

You can't say, "The plane, James! I would fly downtown and purchase the week's groceries." You need quite a sizeable piece of ground in which to lift a light plane into the air and set it down again — a tract 300 to 400 yards square is about the minimum. Unless you wish to knock on the Pearly Gates ahead of schedule, you must warm up your engine for several minutes before taking off, so that the engine won't sputter and die when you need it most. What's more, you cannot take the family touring in your light plane, as it will accommodate only two passengers in addition to the pilot, or a maximum load of 600 pounds.

These are only a few of the reasons why most light plane owners possess automobiles, too. Nevertheless, the light plane industry is booming and shows every sign of continuing its boom, provided it is not crippled by defense priorities. Six thousand light planes were constructed in 1940 and 12,000 more are scheduled for 1941. And eight years ago, in 1933, only 73 were built!

This phenomenal growth is undoubtedly due to the tremendous jump in the number of licensed pilots, most of whom learned to fly in light planes. In 1939 there were only 23,000 private flyers, while by the end of 1941 there will be about 100,000. The CAA Civilian Training Program will have turned out 55,000 pilots by then. The Army

ETC 31437

has boosted its student training program from 12,000 men a year to 30,000 and the Navy will train 5,000 this year. A CAA official estimates that we will come out of the present emergency with over 200,000 pilots. As many of these men will wish to continue flying in their own planes, prospects for the industry appear bright.

At this point one well may ask: Just what is a light plane?

The average light plane has an engine of 75 horsepower or less, a length of 20 feet from nose to tail, and a span of 35 feet from wingtip to wingtip. It will take off in 100 yards, land within 200 feet at a speed of 40 miles an hour or less, and fly from 90 to 115 miles an hour. On a full tank of gasoline it will cruise 400 miles without refueling and it has a ceiling of 14,000 feet. Its ten to one glide ratio—which means that for every foot of altitude it loses in a glide it will travel ten feet horizontally—equals the performance of some motorless gliders and is an important safety factor.

The light plane men haven't been standing still, waiting for business to come rushing in the door. They have been making many improvements in their products, notably in engines. Makers of the three outstanding motors, the Continental, the Lycoming and the Franklin, the latter an adaption of the air-cooled engine used years ago in automobiles, have stepped up their power plants by 60 percent.

Up until 1939 about 80 percent of light plane engines were rated at from 40 to 50 horsepower, which made the planes they powered little more than gliders, good for only short flights close to the airport. In 1940 the average was stepped up to 75 horsepower with only small increases in price and weight. Engines are basically of the four-cylinder, air cooled, opposed piston type, foolproof in design and most of them having a dual ignition system. It isn't unusual for them to run 700 hours without an overhaul, and not long ago two hardy young pilots set a flight endurance record for light planes of 736 hours aloft. There have been several coast-to-coast non-stop flights which required from 23 to 30 hours.

With increased volume of production, costs of light planes have gone down. Prices range at present from $995 to almost $3,000, with most manufacturers trying to stay below the $2,000 mark. Parts which are cheaper but just as efficient are used whenever practical. For instance, plywood floats for seaplanes are now being studied and may replace the aluminum floats which add 30 percent to the cost of the plane.

Most important of all, light plane builders are going all out for safety. The modern product is practically spin proof, with wings of high camber—or curvature—equipped with flaps and wing slots that cut stalling speeds down to 40 miles an hour. In 1940 light planes set an all time record of 991,842 miles flown per fatal accident, which is a 69 percent improvement over the preceding five years. As a result, the compulsory life insurance policy which each CAA student must take out has dropped in cost during the past year from $30 a thousand to $9 for a $3,000 policy with a $1,000 hospitalization benefit in the event of injury.

In addition to the improvements described above, light plane interiors are being dressed up to rival those of the more luxurious automobiles. You will find such features as two-tone upholstery, foam-tex seat cushions, plastic control wheels, glove compartments, self starters, mufflers, and two-tone in-

● *Light plane wings have plenty of strength, as indicated by this photo.*

ETC 31438

strument panels and paint jobs in the most recent models. Some de luxe models are chrome plated from the control stick to the cowling in front.

Four producers manufacture 90 percent of all light planes. Largest of these is the Piper Aircraft Corporation of Lock Haven, Pa., which made 3,064 planes in 1940 and expects to top 5,000 in 1941. Its 1,200 employes are turning out 85 planes a week. Piper Cubs range in price from $995 to $2,395, with the standard trainer at $1,400 the most popular model.

Second largest is the Taylorcraft Aviation Corporation of Alliance, Ohio, which built 924 Taylorcrafts in 1940. With 398 workers and an addition to its plant, the company has set its goal at 2,500 in 1941. Taylorcrafts come in three models—two trainers at $1,650 and $1,885 respectively, and a de luxe model with special equipment for $2,000.

The Aeronca Aircraft Corporation of Middletown, Ohio, turned out 800 planes in 1940 and has set its 1941 quota at 2,000. Its 400 workers are producing planes at the rate of 40 a week. The Aeronca trainer sells at from $1,445 to $1,585 and more elaborate models range in price from $1,770 to $1,905.

Fourth in size is the Luscombe Airplane Corporation of West Trenton, N. J., manufacturer of 600 light planes in 1940 and working toward 1,200 this year. Luscombe planes, which are made of an all-aluminum alloy, are built in three models — the trainer priced at $2,095, the standard job at $2,195 and the de luxe at $2,795

Although this entire output is not yet large enough for manufacturers to use mass production methods throughout, the manufacturers are working toward mass production step by step.

Much has been done to bring upkeep and operating costs of light planes within the reach of the average man's pocketbook. If a plane owner does a great deal of traveling, he will find his operating costs are less than the cost of running an automobile, since a plane is less complicated than an auto and, except for the engine, has no moving parts to wear out. With a 65 horsepower engine, a light plane will cruise at about 100 miles an hour, burning 4.5 gallons an hour or a gallon every 22 miles. Flying 2,500 miles a month, an owner will pay an average of $80 monthly for everything, including hangar rent, gasoline, oil, depreciation and maintenance, or 3.2 cents per mile of which only one cent goes for gasoline and oil.

But here is the rub! If an owner flies less than 2,500 miles per month, his operating and upkeep costs per mile rise sharply.

As an inducement to prospective purchasers of light planes, manufacturers are offering a free flight training course with each plane bought. In recognized flying schools it costs from $50 to $60 to learn to solo and a minimum of $300 for a course leading to a private pilot's license.

Going back to the plane versus automobile argument, it is a fallacy to compare the light plane of today with the automobile of 35 years ago. Although today's plane is far more advanced mechanically than the 1906 car, the early automobile came on the scene with roads already built on which it could travel. For the plane, however, airports and landing fields must be constructed. In the entire United States, with its 3,300 towns and cities of more than 2,500 population, there were less than 2,300 airports, including Army, Navy, municipal and private, and about 30,500 miles of lighted airways as late as last April. Besides, autos travel on the ground where man has always traveled, but planes fly through the air, a comparatively new medium of travel.

Before light planes can furnish serious competition to the motor car, the public mind and mode of life must become adapted to the ease of long distance travel offered by the airplane, and thousands of airports must be built at a cost of from $5,000 to $20,000 each. At present only 30 percent of all light

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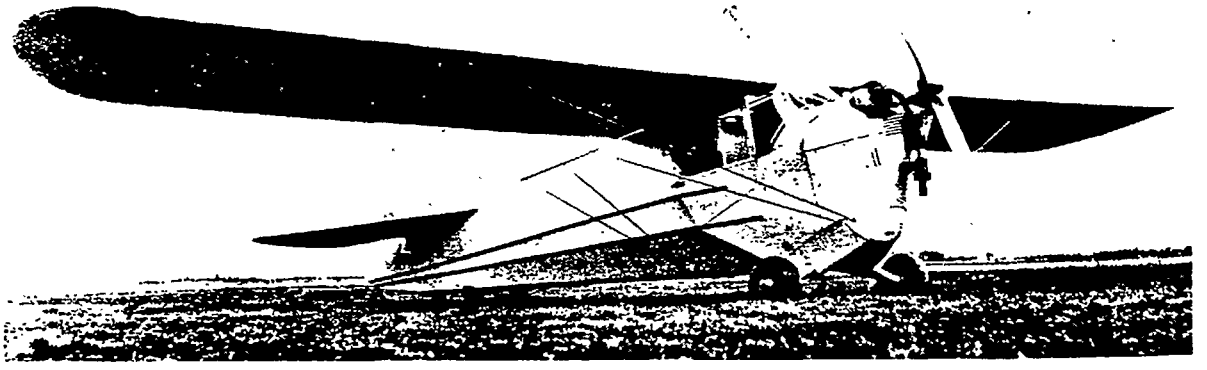
Powered with a 40-horsepower, two-cylinder engine, this Aeronca of a few years ago was little more than a glider. Now look at the photo at right.



ETC 31439

planes are used for business or pleasure; the remaining 70 percent are used for flight training purposes.

The defense program will not halt light plane production, those in the industry believe. Less than one percent of all material going into aviation products is used for light planes, and the industry requires only general utility tools and machines which can be adjusted for production changes. It does not use any new machine tools such as are used in the production of military planes. In addition, both Army and Navy are sold on light planes as economical trainers.

After the present crisis is past, the light plane industry, which at present is capitalized at only about $3,000,000, should really go places. Among other things, it may absorb the productive capacity built up for defense and so help offset the slump which inevitably follows every war.

A step toward mass production is this method of spraying paint on Piper Cub wings while they ride a ferris wheel.

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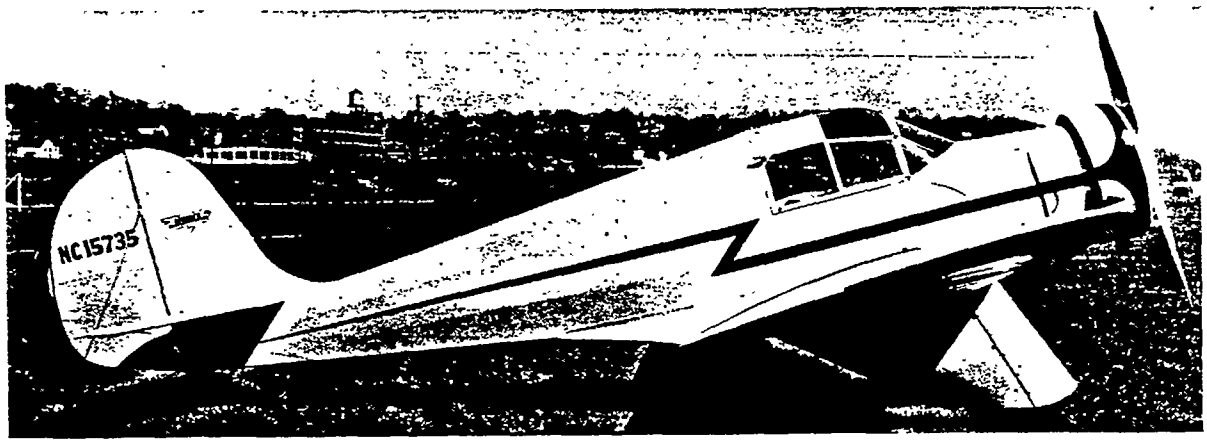
This sleek, streamlined Aeronca of today bears little resemblance to its awkward older brother, shown on the preceding page.



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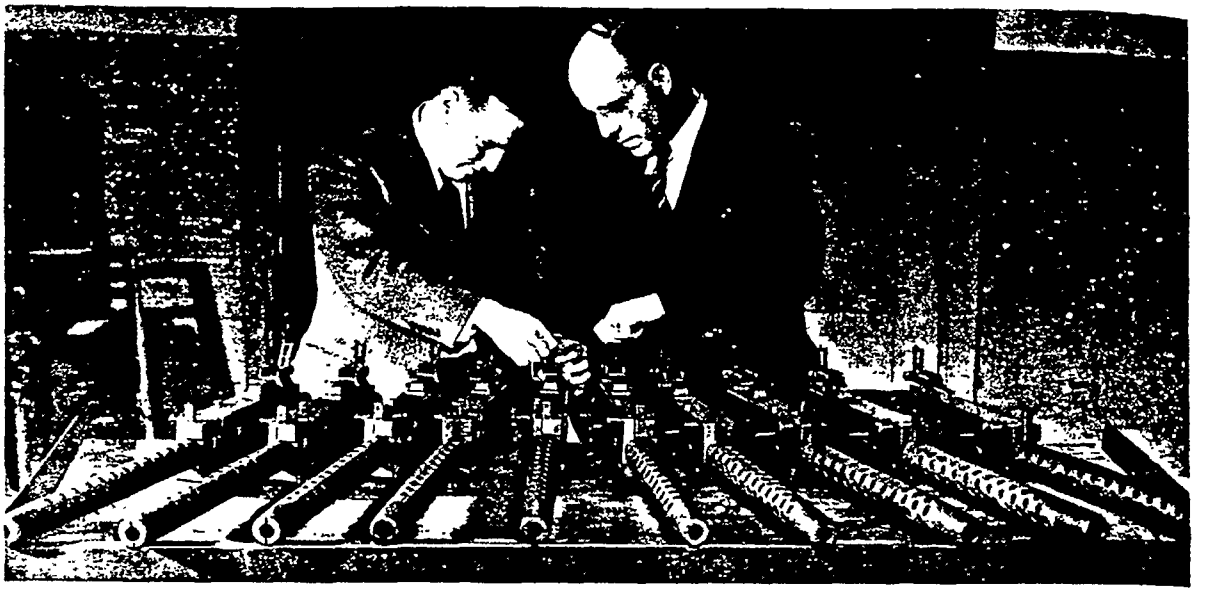

Engineers inspect the first machine guns turned out by an auto accessory plant.
Automobile Manufacturers Association photo

They Were Equal to the Problem

Automobile Accessory Production Experts Have Introduced Many New Ideas in the Manufacture of Machine Guns in Quantity.

ONE day in September 1940, United States Army Ordnance Officers asked representatives of four automobile accessory plants if they could undertake mass production of machine guns for delivery by January 1942. The manufacturers offered to try.

One day in April 1941, the first consignment of machine guns to be manufactured in automotive factories was placed aboard an army airplane for delivery to an arsenal — eight months ahead of schedule.

The accomplishment was the first fruit of a remarkable example of cooperation by government officials and automotive engineers. To achieve the result, jungles of red tape had to be slashed, hundreds of antiquated machines had to be moved from arsenal storerooms and reconditioned, scores of automotive machine tools had to be adapted to new tasks, dozens of new machines invented, and thousands of workers taught new crafts.

Though the men responsible for it would be the last to admit that the achievement is miraculous, they do maintain that it shows how the determination and ingenuity of free people in a democratic society are capable of matching the concerted effort which an autocratic state imposes on a regimented people.

Here is a measure of the accomplishment:

When the question was first asked of them, most of the manufacturers had never previously seen a machine gun of any of the types needed. After studying the ordnance exhibit, they asked:

"Do you want guns as beautifully finished as those hand-made products?"

"No," was the reply. "We want efficient guns and a lot of them—a hundred a day if possible."

The next question concerned machines for making the guns. Did the arsenals possess such machines?

They did.

But when the machines were moved out of the storerooms and divested of their protective coatings there was general consternation among the motor technicians. The machines, whose ages ranged from 21 to 73 years, were mainly belt-driven antiquated devices.

"They're the best we have," said the officers.

"We'll try to recondition them," said the manufacturers.

Moved into the automotive plants, the machines were cleaned, painted, reconditioned, re-tooled and motorized. Their ranks were bolstered by the addition of machines borrowed from automobile production lines.

While this work was in progress, some of the arsenals' machines were loaned to schools for the training of operators and supervisory personnel, of which more than 10,000 will be required in the four plants for peak production. Hence, by the time operations were ready to begin, the nucleus of the personnel was ready. Machines were set

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up in accordance with accepted assembly-line practice, so that individual gun parts would move in steady streams via overhead conveyors through successive operations toward the final assembly point, the firing test range and the shipping room.

Working together, army officers and production engineers vied with each other in instituting daring innovations in ordnance manufacturing techniques —and had a good time upsetting traditions.

Tumbling machines were designed and installed to eliminate almost 90 per cent of the time-wasting hand-filing formerly deemed necesesary to put the final finish on the 285 parts of the average gun. For the drilling of bores — formerly a slow and laborious operation with a horizontal drill—a special machine was built which drills six barrels at once, with the force of gravity and oil under pressure assisting the vertical drills.

For the cutting of some parts of the guns' mechanisms, gunsmiths traditionally used high speed steel cutting tools, which had to be sharpened between each operation.

"How about using cemented carbide tools?" the auto engineers asked.

"Let's try," the army officers replied.

Result: Tremendous savings of time.

For the finishing of some very small parts the innovators borrowed machinery formerly used in the manufacture of sewing machine parts.

Techniques developed in the manufacture of valve stems were brought to bear on the job of turning out firing pins. Trunnion blocks and side holding plates, formerly drilled separately and subsequently fitted together in assembly, were drilled together so that no laborious fitting operations would be necessary. Rivets, formerly turned out one at a time by turning down bar stock with screw machines, are now being knocked out at the rate of 180 a minute by a header machine handling rod stock. Side plates, formerly milled singly, are now ground out six at a time. Air holes in the barrel jacket were traditionally elliptical, requiring three operations for each hole.

"Why not round holes?" the auto engineers asked.

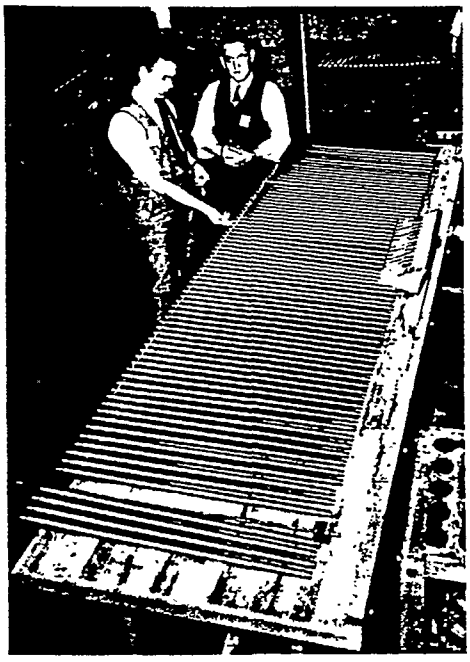
"Why not, indeed?" the army officers replied.

So, round they became and three operations per hole became one per ten holes. Then, to give the trick an additional fillip, they tried punching instead of drilling. It was faster and better. At the moment of this writing the tradition-busters are playing with the idea of punching all the holes at once in a flat steel sheet and then rolling it into a tube.

The delicate task of rifling the barrels baffled the experimenters for a time. It called for fifteen trips of the chiseling tool through each of the four spiral channels in a barrel. When the army officers said there was to be no check-reining of imagination on this job, the production engineers invented a machine which reduced the operations to two. Rifling is now done in one-thirtieth the former time.

As done by gunsmiths, production of shell chambers was a precision job from start to finish. As revised by these novice ordnance engineers, the emphasis on precision is placed where it belongs —toward the end of a series of simplified operations, where a few highly skilled men can refine the rough cuts that unskilled operators make in early stages of manufacture.

In cleaning gun barrels after test firing, the saving of time is phenomenal. "Miracle" is the only fitting word for the trick which, employed here, telescoped 48 hours into less than a minute.



Mass production of gun barrels is under way.
Automobile Manufacturers Association photo

Each of these machines drills six barrels at once.
Automobile Manufacturers Association photo

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This Month's Cover

THE Fifth Marines, a unit of the Second or Indian Division, A.E.F., are shown passing beneath the Victory Arch at Madison Square, Fifth Avenue, New York, on August 8, 1919, soon after their arrival from France.

Nine thousand officers and men comprised the first contingent of the Second which arrived in New York August 3 aboard the transports *George Washington* and *Santa Clara*. Other units came back during the next few days on the *Finland, Ryndam, Wilhelmina, Leviathan, Julia Luckenbach, Santa Paula,* and *Virginian*, swelling the total number of men who marched in the parade of the Indian Division to 27,000.

Ordered to parade by Secretary of War Newton D. Baker, the battle scarred veterans formed ranks at Washington Square and proceeded up the avenue amid throngs which cheered and wept tears of joy. They passed the reviewing stand on the steps of the New York Public Library and continued as far as 110th Street.

Major General John A. LaJeune of the Marine Corps, the Second's commander, led his men on horseback.

The Indian Division was one of the "fightingest" units in the A.E.F. Almost the first to go overseas and one of the last to return, it saw action at Verdun, Chateau Thierry, Soissons, St. Mihiel, Champagne, and in the Meuse-Argonne offensive.

While engaging 39 Hun divisions from Verdun through the Meuse-Argonne drive, the Second took 12,000 prisoners. It suffered higher casualties than any other A.E.F. division.

Citations for gallantry in action were received by 3,500 officers and men. Of this number 646 were awarded the Distinguished Service Cross.

Four days after the Armistice was signed, the Second began the historic march to the Rhine as part of the army of occupation.

Army, Navy and Marine Corps were represented in the Indian Division, the Marine Corps by the Fifth and Sixth Regiments and the Navy by medical units and Marine chaplains.

ETHYL NEWS

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An automobile looks like a toy beneath the ancient forest monarchs which border the Redwood Highway in northern California.
Redwood Empire Association photo.

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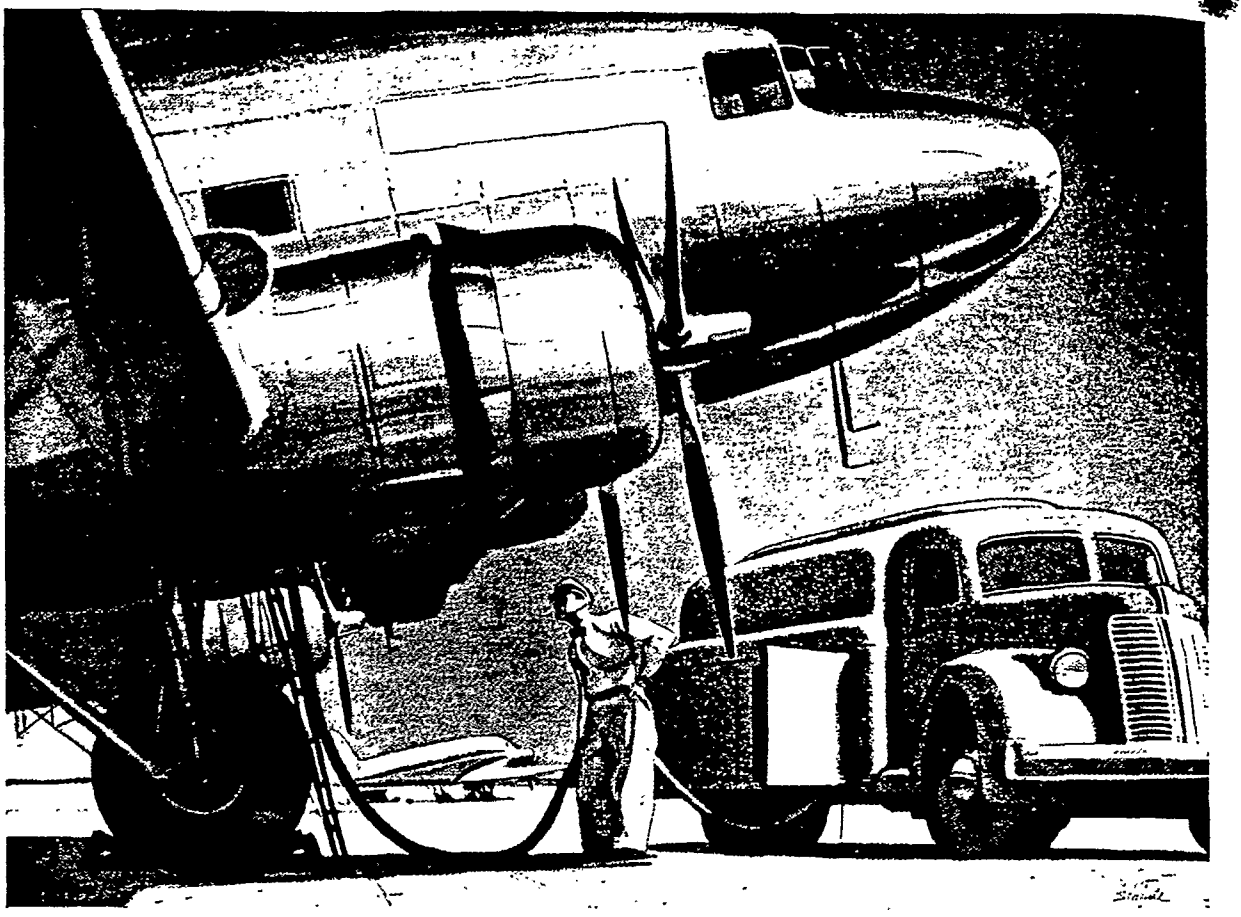

How far can a gallon of gasoline fly?

HARDLY A DAY passes that we don't read of some new airplane that shatters all previous records for speed, size, cruising range or carrying capacity. Airlines, many of them stretching across oceans and impenetrable jungles, are constantly being expanded as ways are found to make a gallon of gasoline fly farther and faster.

Spurred on by the requirements of national defense, American engineers have redoubled their efforts to produce more power from each gallon of fuel and for each ounce of engine weight. Today, years of progress are being crowded into months and weeks . . . and few would venture to predict what tomorrow will bring.

For even today's most efficient engines can convert only a small portion of gasoline's potential power into useful work. There remains a vast reservoir of unused energy that stands as a constant challenge to the engineers of both the aviation and petroleum industries. Only when we know how far they can go in the practical development of fuels and engines can we tell how far or fast tomorrow's gallon of gasoline will fly.

Ethyl is privileged to help in this important progress through both product and service. Ethyl's products, anti-knock fluids containing tetraethyl lead, are used by oil refiners to improve gasoline. This, in turn, permits engine designers to increase the efficiency of engines—not only for airplanes but for all types of gasoline-powered equipment: automobiles, trucks, buses, tractors and military vehicles.

Since both engines and their fuels are inseparably related in their development, Ethyl research workers cooperate with both engine builders and fuel refiners in solving mutual problems. Our research laboratories at Detroit and San Bernardino function as a "clearing house" for technical information and help coordinate many individual research efforts. We also contribute the results of many of our own experiments with fuels and engines.

Thus, by supplying an essential product and by assisting technical men in various phases of gasoline power development we are, we believe, contributing to progress that will be of lasting benefit to the nation.

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REG. TRADE MARK

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Chrysler Bldg., New York, N. Y.

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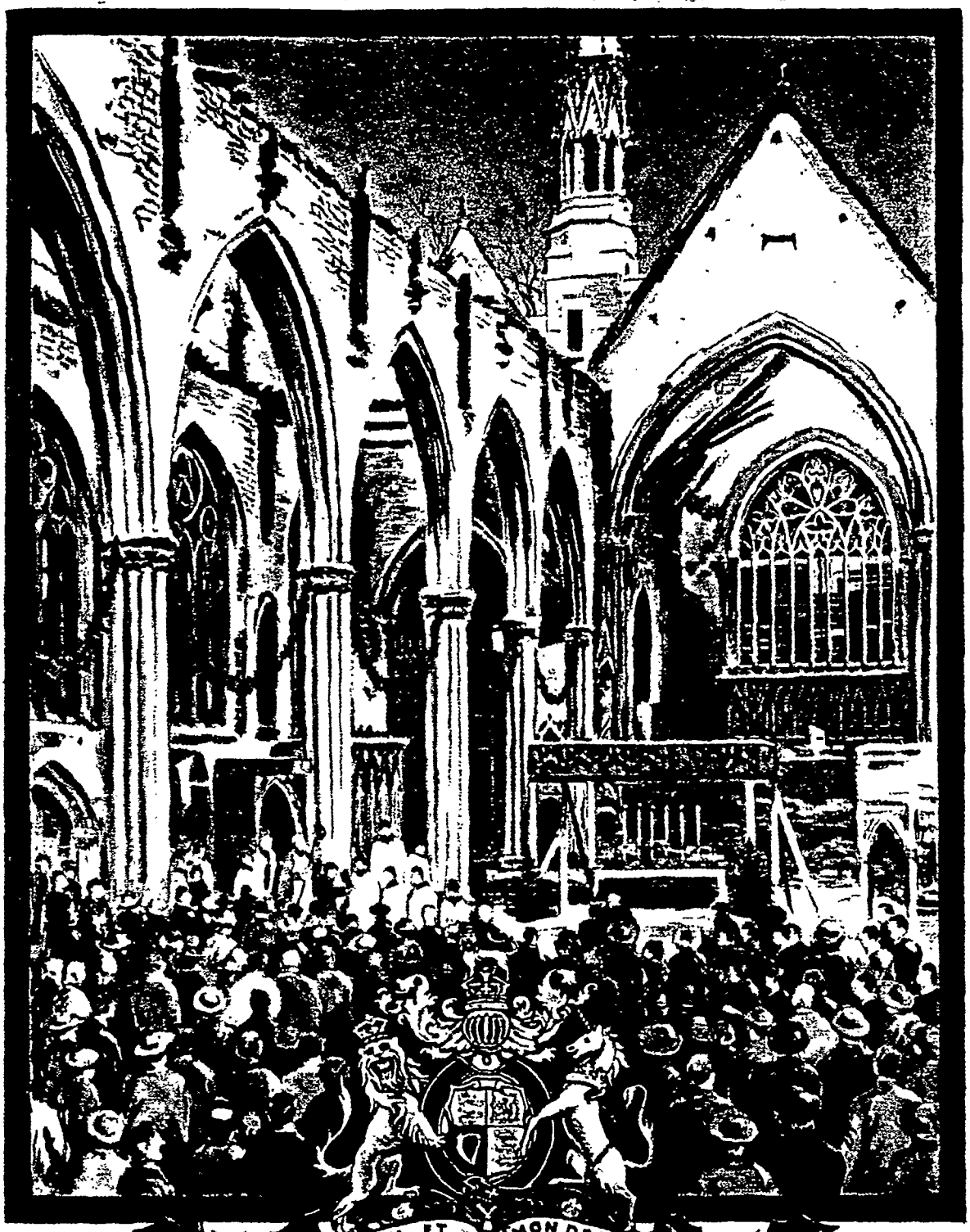

Christmas

ETHYL NEWS

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Over Midnight Highways

Test Drivers Run Cars Long Distances During the Hours of Darkness to Help Determine What Tomorrow's Automobiles Will Be Like.

By E. L. Barringer

I KNEW I wouldn't get any sleep that night, but nevertheless I couldn't sleep late in the morning. Sam was used to the night shift. It was morning to him as we nosed the test car out of the garage into the late afternoon traffic. Already the streets were filling with workers going home and others on their way to the night shift in Detroit's busy factories.

Sam stepped along briskly through boulevard traffic. He wasn't trying to keep up with the wild drivers nor was he pampering the car. His job was to put on miles in the way a normal driver would, and we could have passed for a couple of office employees in the customary hurry to get home during the 5 o'clock rush. I noticed that the speedometer had registered only 13,617 miles.

"How long have you been driving this car?" I asked.

"About four months," he said, and then as he saw me staring at the mileage he laughed. "This is the second hundred thousand."

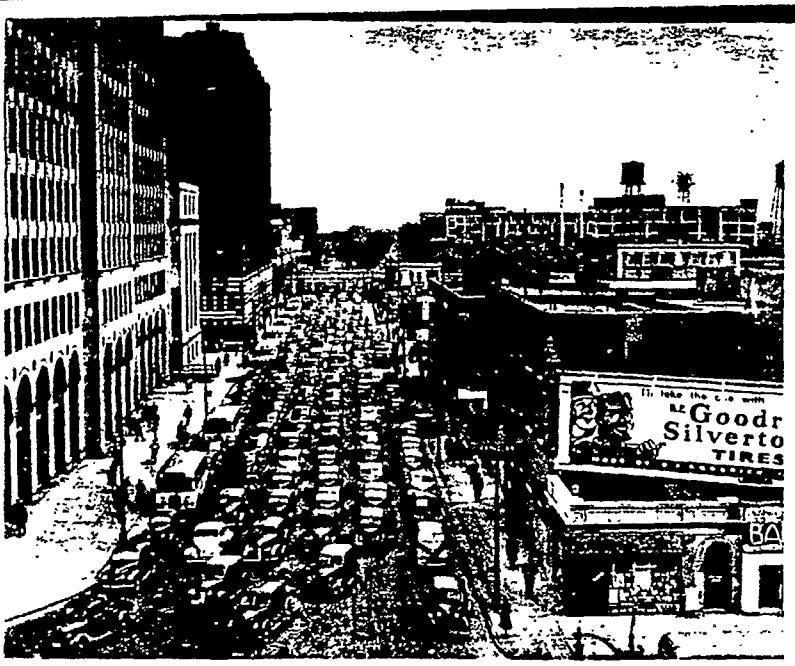
You never would have thought so to look at the car. It was a new model in the middle price range and a nice job. The only unusual thing was a pair of brass dials on the instrument panel, which showed pressure in the two fuel tanks.

Sam said that half the cylinders operated on one fuel and half on another. Two types of gasoline were being tested in the same engine to insure identical driving conditions. In the trunk compartment there was a special tank for the second type of gasoline.

Also the car had unusual zip and pickup. When I asked Sam about that he told me that the engine had been "souped up with an extra high compression ratio" to give it power far ahead of today's models. So we looked like we were driving home, but we were really driving to the conclusion of some engineer's idea on how motoring could be improved. The special engine and the special fuels required were two more steps in the long search towards better cars and better fuels.

"Maybe they are right this time — maybe they are wrong," said Sam, "but

Deep snow doesn't halt Ethyl test drivers, who pile up the miles under every type of road condition.



At the start of a test run a driver has to buck Detroit's rush hour t

Oscar and I will run this car until it falls apart, and then they can check up and find out whether it was a bad steer or a good steer. Then they will give us another car with some other trick hook up and we'll run the pants off of it. You can't find out until you run 'em."

Before an idea gets to the point of a road test, it is checked and double checked and put through its paces in laboratory engines where all operating conditions are controlled closely. The idea we were testing must have passed those stages and now was going through a road test under conditions such as you and I give the cars we drive — hitting bumps, splashing through puddles, stepping on it to get away from traffic lights and occasionally gunning the engine on the open road.

Michigan has no speed law. I remembered that a couple of times later during the night; but Sam is not a speeder. He is a professional driver, and anyone who rides with him will gain a lot of respect for that art.

Sam decided to travel a circular route in The Thumb. Michigan folks understand this. The lower peninsula of Michigan, from Indiana to the Soo, resembles the left hand spread palm down. Detroit is on the fleshy part of the hand beneath the thumb, with the thumb jutting between Lake Huron and Saginaw Bay.

Like the guide on the rubberneck bus, Sam announced the points of local interest. After full darkness he switched on his spot light, aiming it far down the country road.

The speedometer needle was on 65. Sam explained that company rules for test driving are few and simple. All speed laws and highway regulations are to be observed, but where conditions permit, a top speed of 65 miles an hour is needed on this particular test. In every other respect, driving was to resemble the operation of the car in the hands of the typical car owner. By the time engines like this one were built people would be driving faster.

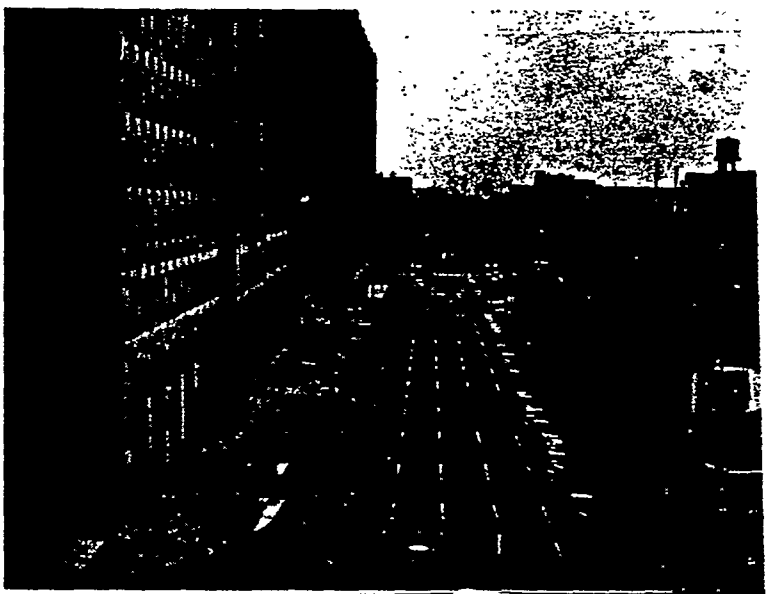
When he said that I felt a little important — this was the futur were peeking into.

This test had been going on months; other cars like this one we other roads around Detroit, in Ar and in the Mojave desert section of fornia, piling up mile upon mile of ing to give the answer beforehan what tomorrow's fuels and engines do in the hands of Mr. and America.

At thousand-mile intervals the are greased. Every 6,000 miles they put on a chassis dynamometer in laboratory for a check on fuel sumption and at the same interval run on the measured courses at C proving ground for a check on per mance. Since these two thorough vestigations are staggered, each test receives special observation every 3. miles. Any mechanical defects obser by the drivers are reported at once.

At Bad Axe, 110 miles north of troit, we made our first stop. It shortly after 8 o'clock when we

On the return to the Ethyl Laborat in the early morning hours, there is worry about crowded streets.



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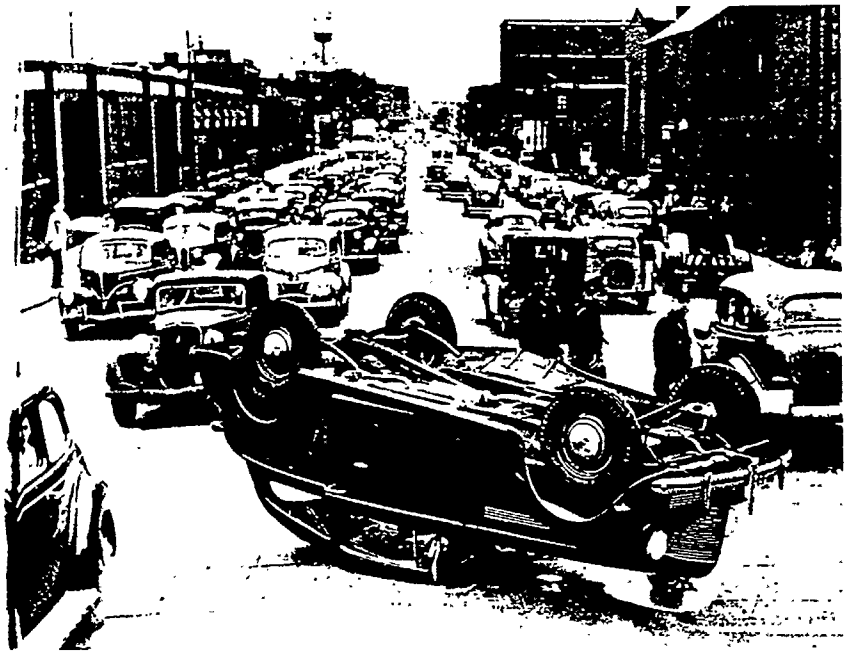
"breakfast." After scrambled eggs and coffee Sam pointed the car north, and in 20 miles we were on the uppermost part of The Thumb, at Port Austin. "That's Lake Huron," Sam said, with a sweep of his hand indicating an expanse of water in the inky night. At that point we turned east and followed the shore road back in the direction of Detroit.

Food relaxed Sam's natural quietness and he responded with some conversation on a test driver's adventures on the highways.

"Accidents? Oh, you see a lot of them. Just the other night a car right ahead of me caught fire. I was going around 65 and this fellow passed me; he must have been doing 75. He kept pulling away and then I saw him stop and jump out of the car. By the time I got there the whole front of the car was on fire.

"The worst accident, though, was at a railroad crossing when a car and an engine met. There was just nothing left." Sam evidently wanted to forget that scene, but he soon was recalling another tale.

"One of the oddest accidents I ever saw happened right on the streets of Detroit. A man got an old junker caught between two street cars. It smashed the car into splinters and we all thought the fellow was gone, but he walked out of there without a scratch, and they had to get the wrecker to pull the street cars apart."



Automobile accidents are not uncommon sights for the men who drive test cars for a living.

●

Farm houses and cottages are few in The Thumb region, up north. With traffic thin and the night dark the automobile was the one tangible thing in our world of the moment, yet it was the least important as we discussed the purposes of test driving. As a machine it represented a sizeable investment in test equipment, and as a test driver Sam was responsible for getting it back to the garage with no more than normal wear and tear. But the experience inside the engine was the thing. The auto could be replaced quickly enough, but if anything happened to the engine, or if driving instructions were disobeyed, hours of work would be wasted and the test would have to start all over again.

That made the job sparkle for Sam. He talked about it as a link in that long chain supporting the idea from the time a man, or men, held it in their minds until it was developed and became part of better motoring. It was not the manipulation of levers, gears, and steering wheel that counted; it was a man's contribution to a company, to an industry that was important.

It was getting close to midnight, and the small towns along the route were closed for the night, but life suddenly returned as we approached Port Huron. Across the river was Sarnia, Ontario, another country and other workers on a war-time basis. The whole waterfront was ablaze with lights from factory windows.

Traffic perked up considerably as we swung out of Port Huron for Mount Clemens and Detroit. The four-lane divided highway was in sharp contrast to the lonely roads farther north. Cars sped past both ways and it was natural to turn the conversation towards driving habits and Sam's experience with fellow travelers.

"My idea of the worst driving habit may surprise you," Sam began, "In my experience the worst offense and one of the greatest hazards of the road is lack of speed. I know that is contrary to a lot of the general thinking about speed as a cause of accidents, but I'm referring to safe driving speed.

"The fellow crawling along on the highway is a menace. There are others traveling the same road. Some of the drivers may have appointments to keep or some good reason for getting to their destination promptly. If every one kept moving at a reasonable speed, in keeping with traffic and road conditions, there would be little of this passing business. But when a fellow pokes along those who want to maintain speed get anxious, attempt to pass, become irritated, and then there may be trouble.

"A beginning has been made in this direction with our bigger highways. These two-lane jobs leave a lane on the outside for slow vehicles, and the faster drivers use the inner lane. You are sup-

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Instrument readings are checked when a driver takes a car out on a run and when he returns.

posed to use the inner lane only for passing, but notice how frequently traffic gets lined up so cars remain in one of the lanes in keeping with speed. I'm not against a man going slow, but I think he should keep moving in line with general traffic speed and not block traffic.

"The second worst fault is failure to dim headlights when passing a car. I don't think this is deliberate as much as it is just plain carelessness. A driver gets talking with others in the car and forgets to dim. If you blink your bright lights that usually brings him around, but there are a few stubborn fellows who just won't dim."

Near Detroit Sam began watching the gasoline tank gauge. He wanted to get as many miles on the car as he could during his time on duty, and that called for a nice piece of judgment to wind up at the garage when the tank was just about dry.

There were service stations open all along the highway, and no curfew on gasoline here, but Sam was driving with a special fuel, and his only source of supply was back at the laboratory. Even one gallon of ordinary gasoline would knock the test galley west.

Sam made some computations. He estimated the quantity remaining in the tank by the average miles per gallon he had made during the night. It seemed there was sufficient fuel left for another cruise so Sam headed the car west around Detroit towards Ann Arbor.

Finally he announced the fuel supply had reached the turning point and we had just enough left to reach the lab. The first streaks of early morning light were glowing in the eastern sky as we headed back.

The hum of dynamometers and the sharp clatter of single cylinder engines associated with Ethyl's Engineering Laboratories were stilled. Here and there a light glowed in the hulk of buildings, guiding the watchmen on their rounds. The parking lot back of the Laboratory that was packed full of automobiles when we left the previous evening was empty now. A few toots shattered the night and Charlie opened the doors.

"Morning, Charlie, Al in yet?"

"Half an hour ago. He's waiting for you."

Our test car, some 400 miles nearer a decision on someone's ideas about engines and fuels for better and more efficient motoring, was piloted to its berth and the ignition cut. Charlie started filling out the sheet: weather conditions, temperature, humidity, barometer, miles, fuel consumed, water temperature, oil reading, and on down the list. It was a rite performed on many a morning, and one to be performed on many a morning in the future, until the test cars proved or disproved one more idea of a way to make engines and fuels serve better the needs of Mr. John Average Driver.

The Following

★ Service Awards ★

have been made as of December 1, 1941

15 YEARS

FREDERICK R. BROWN — Manufacturing, Deepwater

GENEVIEVE CORCORAN — Administration

10 YEARS

HENRY T. MUELLER — Sales, Detroit

5 YEARS

ROBERT A. GOURLAY — Chemical Research, Detroit

JEAN HARMON — Sales, New York General

B. D. HARRISON* — Manufacturing, New York

**Award made August 1st, 1941*

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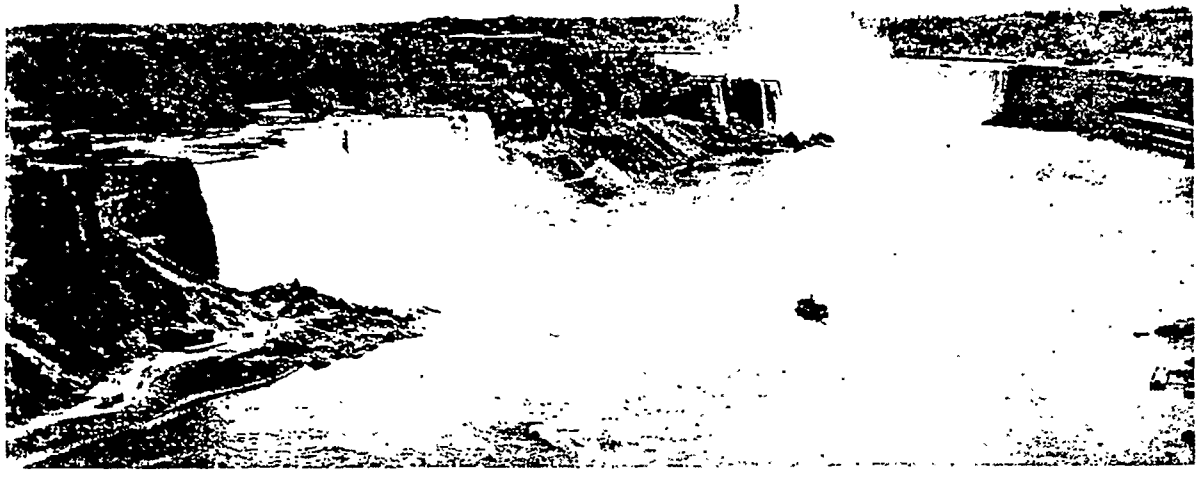
Thunderer of Waters



New Rainbow Bridge Across Niagara Gorge Summons Memories of the Falls' Eventful Past.

The MAID OF THE MIST *looks like a toy boat as it cruises upstream between the American and the Horseshoe Falls.*

NIAGARA FALLS, mecca of newly married couples for more than a hundred years, has a new bridge across its famous gorge. Rainbow Bridge, built without any superstructure except protective hand railings, was dedicated October 20 and offers pedestrians and motorists an unobstructed view of the great cataract.

The deck of the bridge, which is 1450 feet long, contains four 22-foot roadways, a four-foot central mall and a large promenade on the south side facing the Falls. Twelve approaches on the American side and 14 in Canada speed up customs inspection of motor vehicles.

The turbulent Niagara, flowing at the rate of 25 to 30 miles an hour, and danger from ice jams, one of which destroyed the famed Falls View or "Honeymoon" Bridge in 1938, forced engineers to adopt a seldom used style of procedure. Superstructures 130 feet high were erected on top of the American and Canadian abutments, and around them cables were bent to support the sections of the arch under construction. When the sections met, an 11-inch keystone was set in place, making the arch self-supporting. All cables and superstructure were then removed.

Supporting piers are located on the solid rock of the gorge about 50 feet from the water's edge, so that they are out of reach of ice and the swift current.

From the bridge tourists can see the many industries which line the banks of the mighty river and utilize its abundance of water power. If they could roll back the mists of time, they would behold, too, a vivid panorama of history and legend.

Jacques Cartier, famous explorer in the service of Francis I of France, is believed to be the first white man to gaze on the beauty of Niagara Falls away back in 1535. Samuel de Champlain described the Falls in the report of his voyage up the St. Lawrence in 1604, but since his report contained some inaccuracies, most students of history agree that it was based on what he had heard from the Indians rather than on what he had seen.

At any rate the cataract was well known before Jamestown and Plymouth were settled, and long before the white man discovered this wonder of nature it was a favorite meeting place of the Indian.

According to Indian legend, the tribe which dwelt near the Thunderer of Waters sacrificed each year to the Great Spirit its fairest maiden, sending her over the Falls in a white canoe decked with fruits and flowers. In return for this offering the Great Spirit gave the tribe protection from its enemies. At the time of the sacrifice tribes assembled from far and near for worship and re-

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ligious ceremonies.

Tradition of the Niagara Indians had it that the Thunderer of Waters demanded four lives a year, and, strangely enough, even now a year seldom passes in which at least four persons do not perish in the swirling current.

The Indian Legend of Healing presented a brighter story. It promised that any sick person would be made well, if he could climb down the side of the gorge to the base of the Falls, go behind the sheet of falling water into the cave which was the abode of the Great Spirit and, on emerging, see a complete circular rainbow, which was the deity's promise of restoration to perfect health.

Visited by thousands of tourists each year, Niagara Falls was naturally a magnet for daredevil adventurers who were willing to risk their lives for fame and the cash that went with it. Back in 1829 Sam Patch built a tower 90 feet high at the water's edge and entertained the crowds by leaping from it into the Niagara River. He jumped dozens of times successfully there, but later lost his life in an exhibition leap in Buffalo.

In 1859 Monsieur Charles Blondin, daring Frenchman, walked a tight rope across the gorge. He repeated the performance many times and became so proficient that he danced, leaped into the air, somersaulted, sat down and read a newspaper, and did other hair raising stunts. In a special exhibition for the Prince of Wales on July 4, 1859, he walked across on stilts.

But the piece de resistance of Blondin's performance was when he carried Harry Colcord, his manager, across the slender wire cable on his shoulders. Several times during this feat Blondin lost his balance and regained it just in time to escape a plunge into the wild river far below, according to Colcord's personal account of his uneasy pickaback ride.

Other tight rope walkers followed Blondin and imitated all his tricks, but they were unable to lift fame's laurel wreath from the brow of this pioneer tempter of Fate.

In 1861 Captain Robinson, skipper of an early edition of the *Maid of The Mist*, shot the boiling rapids in that little steamboat just to show it could be done. A big wave hit the smokestack and carried it away, but beyond this slight mishap no damage was suffered, and the *Maid Of The Mist* traveled under her own power through the perilous Whirlpool and down the river to Lewiston seven miles below the Falls.

Several years later, in 1883, Captain Matthew Webb, famous English swimmer, attempted to swim the rapids. He hadn't gone far before he was sucked under. Four days later his body was recovered from the river below the Whirlpool.

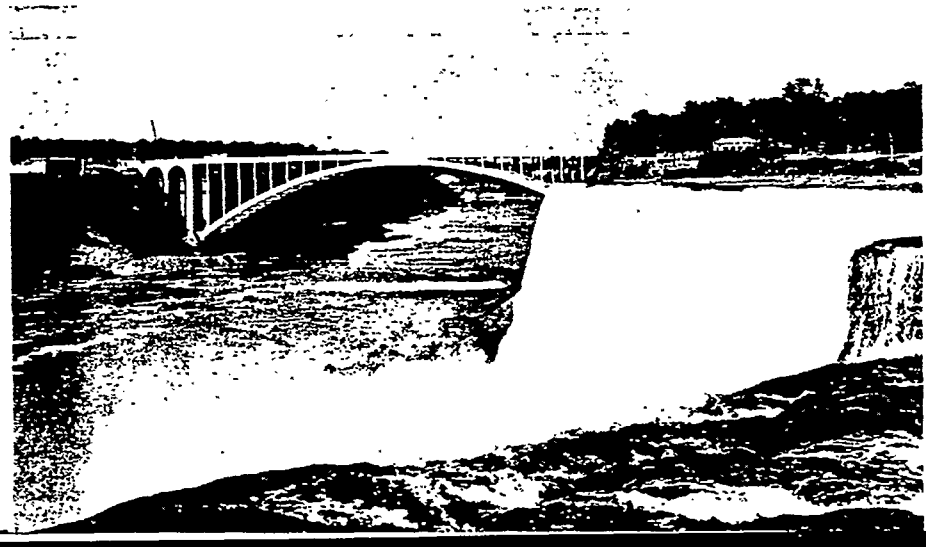
Carlisle Graham, Philadelphia cooper, was the first man to go through the rapids in a barrel, performing that feat in 1886. He tried it a second time, this time with his head sticking out through a specially constructed hole in the barrel. On this trip a big wave smacked him on the side of the head and left him almost totally deaf. Undaunted, he made three more trips through the rapids, but his last one, in 1902, almost ended fatally when his barrel was caught for a long time in an eddy in the Whirlpool and he almost suffocated.

George Hazlett and William Potts of Buffalo, who probably didn't want to be alone in the dangerous white water, made the first double descent of the rapids in a barrel in 1886. That same year W. J. Kendall, a Boston policeman, got through safely, buoyed up by only a life preserver.

Miss Sadie Allen accompanied Hazlett in a barrel to become the first member of her sex to shoot the rapids, and Martha E. Wagenfuhrer, the wife of a professional wrestler, was the first woman to make the dangerous journey alone, accomplishing this feat in 1901.

Another woman, Maud Willard, used the barrel method in 1901, taking

These helmeted gunmen at the Canadian border are men of peace. Many of the steel workers on the Rainbow Bridge are Indians.



The arch of the new Rainbow Bridge as seen from the edge of the American Falls.

ETC 31453

Niagara Falls, N. Y., forms the background for this view from the Canadian shore of the nearly completed Rainbow Bridge.

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Safety nets are insurance for bridge workers against an abrupt descent into the swift waters of the Niagara River.

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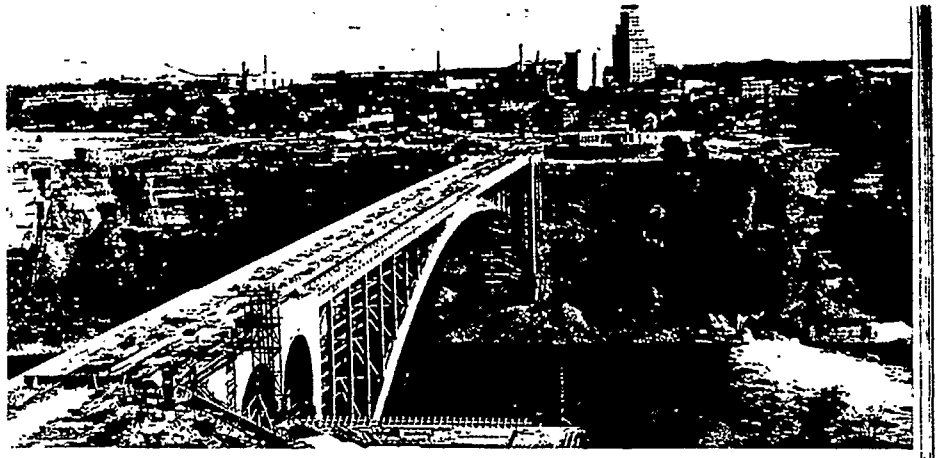

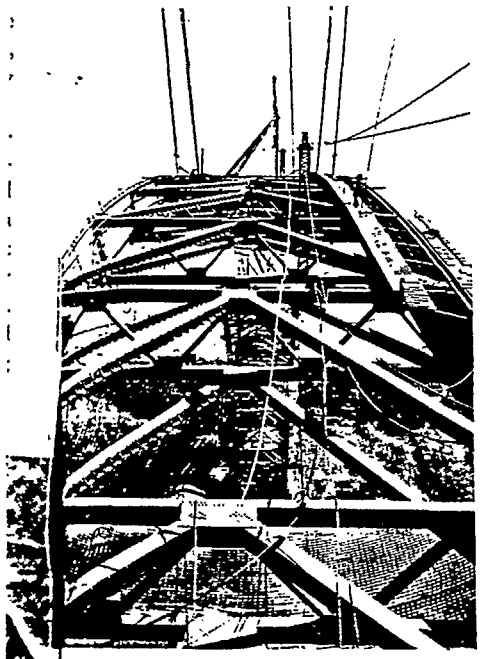

along a dog for company. Her barrel got caught in one of the swirling eddies of the Whirlpool and drifted around for several hours out of reach of rescuers. When it was hauled out at last and opened, the dog leaped out, apparently none the worse for his experience, but Miss Willard was dead. Her dog's breathing had exhausted the air supply below her needs and she had suffocated. If she hadn't had the dog with her she probably would have survived.

Other adventurers challenged the rapids in barrels and in lifeboats, most of them successfully although a few perished, but their deeds are insignificant compared with that of Mrs. Annie Edson Taylor. This 43-year old woman performed a feat which had hitherto been considered impossible. On October 24, 1901, she went over the Horseshoe Falls in a barrel and lived to tell the world about her joust with Death.

Mrs. Taylor's barrel was of Kentucky oak. It was four feet six inches in height, 12 inches in diameter at the top and 28 inches at the bilge and bottom. A 200-pound anvil was attached to its bottom to keep it upright in the water. When this daring woman emerged from it with only slight bruises, she confessed that she had taken such a chance because she was sorely in need of money.

Almost ten years went by before anyone else attempted the stunt. Then, on July 11, 1911, Bobby Leach, a former resident of Bristol, England, who had come to Niagara from Waterbury, Conn., went over the Horseshoe Falls in a steel barrel. He was pulled out in a state of complete collapse, his jaw broken and both his knee caps smashed —injuries that put him in a hospital for 23 weeks. Later, an ironic Fate caused him to slip on an orange peel in Christchurch, New Zealand, and injure his leg so badly that it had to be amputated.

From Bristol, England, came Charles G. Stephens, 58-year old barber, who saw a greater future in going over the world's most famous cataract in a Russian oak barrel than in cutting hair. He would have done better, however, to have stuck to his razor and shears, for his black and white zebra striped barrel smashed as it went over the brink. His body was never found, though several days later an arm was pulled out of the water and identified as his by tattoo marks.

Jean Albert Lussier went over the Horseshoe Falls in 1912 in a huge ball made of rubber and fabric reinforced by steel strips. This bright red sphere, weighing 758 pounds and measuring six feet in diameter, had an outer and inner steel frame, the latter surrounding the compartment in which Lussier rode. Outside the frames were thick layers of canvas, and between the inner and outer frames were 32 air pockets to absorb the shock of bumps.

His head, body and legs strapped tightly, Lussier rode in a small inner compartment with dozens of cushions packed around him as shock absorbers. When he was taken out of the ball, he was in good condition, although a little faint from lack of air and bleeding from a cut on his left temple. The ball, in which the daredevil had remained from 3:20 p.m. to 3:50 p.m., had great dents in its surface and was completely beaten out of shape.

The first suspension bridge was built across the Niagara gorge in 1848 and that same year the first steamboat was launched below the Falls.

The Niagara cataract, which occurs at a right angle bend in the river, is composed of two different falls — the American Falls, which are 167 feet high and measure 1,060 feet along the crest, and the larger Canadian or Horseshoe Falls, 158 feet high and 2,500 feet along the crest.

According to the opinion of numerous geologists, the Falls were formerly at Lewiston, seven miles below their present location, and have been about 35,000 years wearing their way back to where they are now.

ETC 31454

King of the Gate Crashers

Like Most Men Who Have Reached the Top, One-Eye Connelly Showed an Aptitude for His Profession at an Early Age.

By MARTIN SHERIDAN

IF you ever attended a national political convention, championship boxing match or intersectional football game and noticed a short, paunchy, gray-haired individual wearing a disreputable brown cloth cap on the side of his head at a rakish angle, you can rest assured that the gentleman was One-Eye Connelly, world's champion gate crasher.

Connelly, that thorn in the side of ticket-takers the country over, was in Boston recently for a business visit. He planned on making it strictly business, but ended up by going on two free rides on a fishing boat out of Boston, attending the horse races, and attempting to crash a plane from Boston to Chicago.

Connelly was born in Lowell, Mass., April 12, 1875. He has always refused to reveal his given name and claims it would spoil his character if people started to call him by it. He prefers the "One-Eye" tag.

The real story of Connelly's gate-crashing ability goes back to the time when he was a lad of 12 years in Lowell. A fair was playing his home town. The boy wanted to visit the grounds but didn't have the necessary cash. While walking by a house on the way to the fair, he spotted a beautiful bunch of flowers in a vase on the porch.

Instantly, the boy's mind clicked. He took the flowers in his arms, walked up to the ticket-taker and explained, "My mother sent me over with these flowers for the exhibition."

The man placed his hand on the youth's head (Connelly says he can still feel the fellow's touch) and told him, "Okay, sonny, go right in and leave them at the agricultural hall. And here is a four-day exhibitor's pass good for the rest of the fair!"

The climax of this incident occurred when the Connelly entry of flowers was awarded first price and a blue ribbon.

The Lowell boy then became a traveling newsboy and traveled all over the country.

"I took up boxing a short while later and fought a number of matches at 118 pounds," he revealed. "I lost the sight of my left optic in 1895 when the lacing from another fighter's glove caught me in the eye."

In 1897 Connelly crashed his first heavyweight championship fight. That was the Corbett-Fitzsimmons brawl at Carson City, Nevada. Connelly went up to the ticket-taker and told him that he wanted to see Dan Tracy, the promoter of the match.

"Tell him I just overheard some men downtown in a bar talking about holding up the place," One-Eye called out.

Tracy rushed to the gate and Connelly told him the story.

"Can you identify these men?" he asked.

"Sure," said Connelly.

"Okay, then you stand right inside the gate here and when you see the thugs, notify me at once!" the promoter advised him.

Connelly went on and told how he waited at the gate for a few minutes, then walked into the arena, took a ringside seat and watched the fight. That was his first real gate-crashing achievement.

Out in Milwaukee, he crashed grand opera—not that he likes classical music—by borrowing a broken-down camera

One-Eye Connelly is a guest speaker on a nationwide radio program.

ETC 31455

Connelly looks sad in this photo and no wonder. He bought a ticket to ride the train!

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and flashbulb from a newspaperman. He waited in front of the theatre until a dignified looking gentleman alighted from a car, then proceeded to back away in front of him, calling out, "Make way for the mayor!" When he passed inside the door, Connelly fired the flash gun, temporarily blinding the ticket-taker and in he went, sitting through the performance in a box.

At the Jack Dempsey-Georges Carpentier bout at Boyle's Thirty Acres in Jersey City, the Lowell gate-crasher par excellence was tossed out of 13 of the 15 entrances before he finally entered and remained inside. He walked into a Western Union emergency office and said that the newspapermen inside wanted something to eat. The man in charge pointed to a gallon can of coffee and a basket of sandwiches. Connelly grabbed a white coat, took the victuals and walked right through gate 14 shouting, "Food for the press!" Once inside, he gave away the sandwiches and watched the fight.

One-Eye Connelly uses no particular method for getting into these events. He usually looks over the layout, then plans his attack. Once he spent more money to get into a fight than he would have if he had purchased a ticket. But there's no fun in using a ticket, says Connelly.

The event was the Jack Dempsey-Luis Firpo bout. Connelly had been working for Dempsey, keeping sightseers and pests away from his cottage. The day before the bout, Dempsey's manager, Jack Kearns, presented him with $50 and a $22.50 ticket to the stadium.

"I gave the ticket to a fellow in a restaurant," said One-Eye. "Kearns was pretty angry about this and roared at me, 'Isn't a $22.50 ticket good enough for you?' I told him I didn't want to soften myself and spoil my reputation."

Connelly then spent $22 for a huge trunk and called up a trucking company to carry him and his luggage to the Polo Grounds in New York. The driver recognized him and asked if he could watch him "work."

"Sure," said Connelly, "but don't give me away."

He loaded the trunk on his back and walked right up to the gate, asking, "Where do you want these tickets placed?"

"I don't know," replied the attendant. "Where did they tell you to leave them?"

"At the inner office," One-Eye said, without blinking an eye.

"All right, take them in and quit blocking the entrance!"

So he walked in, planked down the trunk and told an usher to keep an eye on it.

"For all I know, he may be there still!" laughed Connelly.

He has been a visitor at the last nine Kentucky Derbies, just pushing his way through the crowd at the gate. This is pretty easy to do, he says.

It has been a long time since One-Eye Connelly was thrown out of a stadium. However, in his early days of gate-crashing he used to have disappointments. He has crashed every Democratic National Convention since Grover Cleveland was a candidate. When William Jennings Bryan was a candidate, he took 13 other men in with him, that's how simple it was.

Some time ago he went to the San Francisco Exposition on Treasure Island. Ticket-takers had been warned previously that anyone who failed to stop this super-crasher would be fired.

"I crashed five times," said Connelly. "Five fellows were fired and I was finally presented with a season pass."

He has no family and no home, but spends his winters fishing in Florida, part of each year in Warren, Ohio, and the rest of the time traveling around the country. Practically every sports writer in the land knows him and he can spin more yarns than an old sea cap-

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One of Connelly's rare failures — a pretty hostess shows him the door when he attempts to crash a Boston to Chicago plane.

ETC 31456

This picture is obviously posed, although Connelly, on his way to the top, did get tossed out of stadiums now and then.

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tain. One of his easiest stunts took place at the second Dempsey-Tunney bout, when Connelly had two supposed drunks stage a brawl right near the gate. When the gatemen rushed out to stop the fight, he walked in.

He admits that he has run dry on ideas and sticks to the time-worn methods of gate-crashing, instead of trying to think up new stunts. In 1940 he visited the New York World's Fair, Democratic National Convention, World Series and a Joe Louis bout.

He has even crashed an airplane, flying from Los Angeles to Kansas City via a giant transport ship. When the pilot asked him why he didn't hop a train, One-Eye replied, "They are too darn slow." Officials locked him in an office to wait for the sheriff to arrive, but Connelly left via a window.

When he meets you he usually recalls having met you before. He has a vivid imagination and has enough doo-dads about his person to prompt many a question. One of the first things that catches the eye is a nickel that hangs from his watch chain.

"I've never had to pawn my watch," he claims, "and I've never given up this nickel. John D. Rockefeller gave it to me when I was selling newspapers at Ninth and Superior in Cleveland 34 years ago. And he waited around for his change, too. The nickel was brand new and I've kept it as a souvenir."

He wears a ring from Red Grange that he claims he received when the Wheaton iceman was in his prime . . . "I was in Champaign and met Grange on the street," relates the old boy. "I told him I'd be around to see him play against Michigan on Saturday. He said: 'If you can crash a gate on Bob Zuppke, I'll give you a memento.' "

The morning of the game, Connelly bought a red ribbon marked "Official." He walked around to the main gate and criticized the work of the ticket-sellers. Then he noticed a ticket-taker who was tearing tickets and holding them in his hand. One-Eye strode up to him and said, "You've got a box for those stubs. Use it!" And he breezed through the gate, walked onto the field and greeted Grange who later gave him a ring engraved, "From Harold 'Red' Grange to One-Eye Connelly."

Now that he is 66 years old, Connelly speaks seriously from time to time. He admits a bit wistfully that sometimes he wishes he didn't have the reputation of being a gate-crasher.

"I thought I might be able to cash in on the publicity," he said, "but it's only once in a while that I pick up a little spare change because of my reputation. I played a couple of scenes with Milton Sills in 'The Barker,' and the movie company paid off well for it, but outside of that the pickings are sparse."

He has been getting along pretty well lately, betting on the horses. He has a system and he insists it works, but he won't explain it. On top of that One-Eye has organized the "One-Eye Connelly Chapter of the Behind the Eight Ball Club." He has had cards printed certifying memberships and he gives away a card and a small eight-ball to be worn in the coat lapel, so that a member is definitely behind it.

The number one gate crasher shakes hands with W. Ray Johnston, president of Monogram Pictures of Hollywood, after crashing a luncheon at Boston's Hotel Statler.

ETC 31457

Vehicle Vaqueros

Nation's Best Drivers Demonstrate Their Skill in Handling Trucks at ATA Roadeo in Madison Square Garden.

FIFTEEN thousand automotive fans packed New York's Madison Square Garden, leading sport palace of the U.S.A., to see the nation's best truck drivers strive for championship honors in the American Trucking Association Roadeo. The event, which took place the evening of October 29, was the finale of the annual ATA convention, held this year at the Hotel Pennsylvania in New York.

Awards to the victors were handed out by Mayor Fiorello H. LaGuardia, whose entrance into the arena was the signal for a political demonstration by the gallery gods. Ted Husing, well known radio announcer, presided at the microphone as master of ceremonies and explained the various contests to the crowd.

Only three finalists competed in each of the truck events, the field having been narrowed down to that number by elimination contests among state champions, which were conducted at Belmont Park, Long Island, on October 27 and 28. Two finalists competed in the Army Driver Class, the winners from an original field of 10,000.

Ability to maneuver one of the big vehicles is not the only requirement for getting into the finals. Before a driver can even compete in a sectional preliminary, he must be able to show a perfect safety record for a year previous to the event — even a tiny dent in a fender is enough to disqualify him. Then he must pass a stiff written examination on ICC safety regulations, safe driving practices, first aid, and knowledge of the trucking industry—with the accent on safety!

Mayor LaGuardia presents awards to, left to right, Bud Vandiver, Clarence Maas, and Charles Goins.

First Class Private Telesphore Wolanski of Camp Upton, Southern District, U.S.A., drove away with top money of $50 in the Army Driver event. He wheeled a jeep or blitz buggy in and out among barrels, over artificial bumps and up and down the sides of a ramp slanted at an angle of 60 degrees. His spectacular performance left no doubt of his superiority over First Class Private James V. Dugo of Pine Camp, Northern District, who seemed a bit flustered by the crowd in the Garden.

Backing into small spaces without delay, parking in a single backward movement, and skillful maneuvering counted in the civilian trucking events which followed the Army competition.

Charles Goins of Trucking, Inc., Indianapolis, driving an International one and a half ton truck, carried off the $625 first money, the Bendix-Westinghouse Automotive Air Brake Trophy and the ATA Trophy in the Straight Truck Class. Paul C. Hoover of Riley Truck Lines, Pratt, Kansas, who has driven over a million miles without an accident in his eleven years of piloting trucks, captured the $360 second award, while Pat Weekly of Kirk Transportation Company, Detroit, had to be satisfied with the $240 third prize.

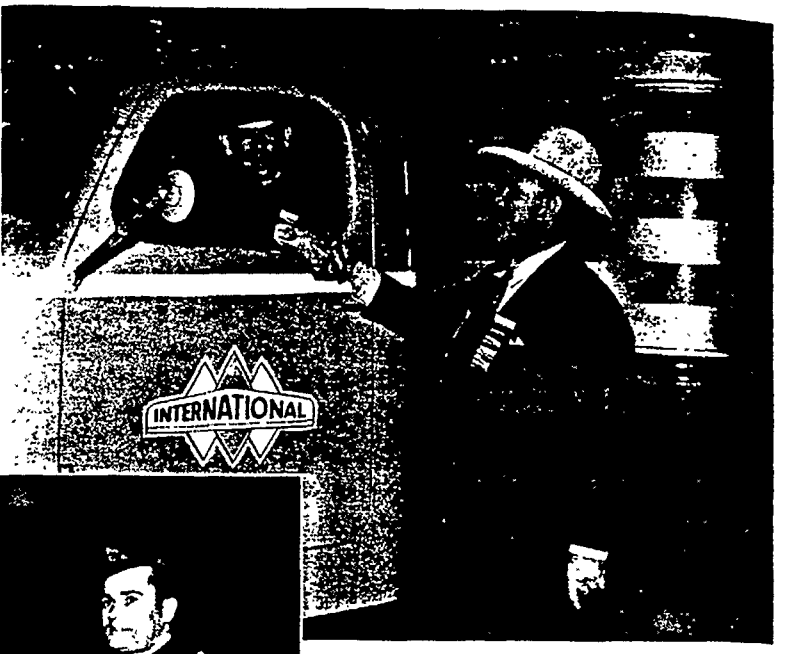
Lanky Bud Vandiver, gasoline gaucho from Wyoming who drives for the

ETC 31458

Colorado-Wyoming Express, beat out Edson Smith of Kirk Transportation Company, Detroit, 1938-39 champion, and Thomas Doyle of Atlantic States Motor Freight Lines, Atlanta, in the Tractor Semi-Trailer Class. In addition to the $625 first prize, he received the Evans Products Trophy, a wrist watch donated by the White Motor Company, and the ATA Trophy. Vandiver drove a two and a half ton International tractor truck pulling a Fruehauf trailer.

As the vehicles in the Truck and Trailer Class were too big to be maneuvered in the Garden arena, finals in that event were completed October 5 in Fresno, Calif. Clarence Maas of McCracken Brothers Motor Freight, Eugene, Oregon, the winner, was on hand to receive the Cummins-Diesel Trophy, the ATA Trophy and $625 from Mayor LaGuardia.

In the Automobile Trailer Class each of the three contestants had to load four new cars on an automobile trailer, two on the upper deck and two on the lower, so that they would ride cross country safely. This done, they had to unload



James C. Calvert, ATA Roadeo master, wearing ten gallon hat, congratulates Bud Vandiver of Wyoming on winning the Tractor Semi-Trailer event.

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First Class Privates Telesphore Wolanski, left, and James Dugo, right, Army Driver Class finalists, line up with "Mike" Cashall, first vice-president of the International Brotherhood of Teamsters and Chauffeurs.

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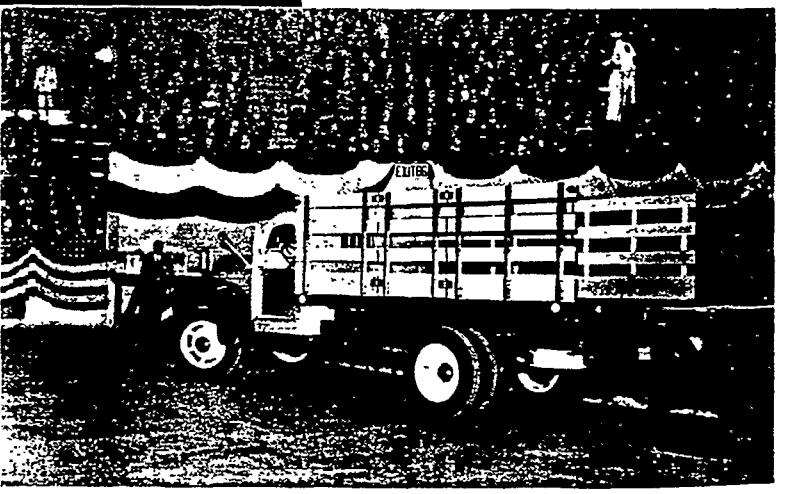
Charles Goins, winner in the Straight Truck Class, backs into a small parking space without waste motion.



ETC 31459

Army vehicles of various types line up in formation after a parade around the Garden arena.

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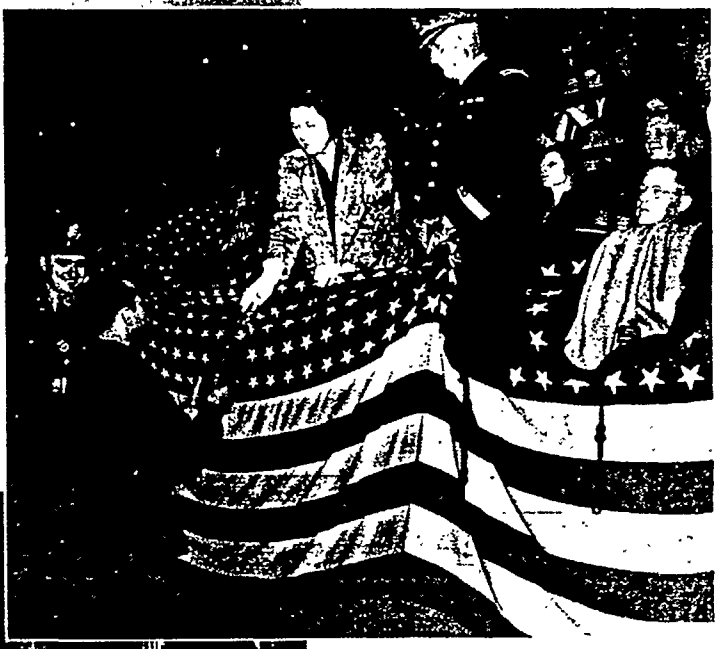
Private Wolanski, winning Army driver receives his ATA Trophy from Mrs. Junius S. Morgan, Jr.



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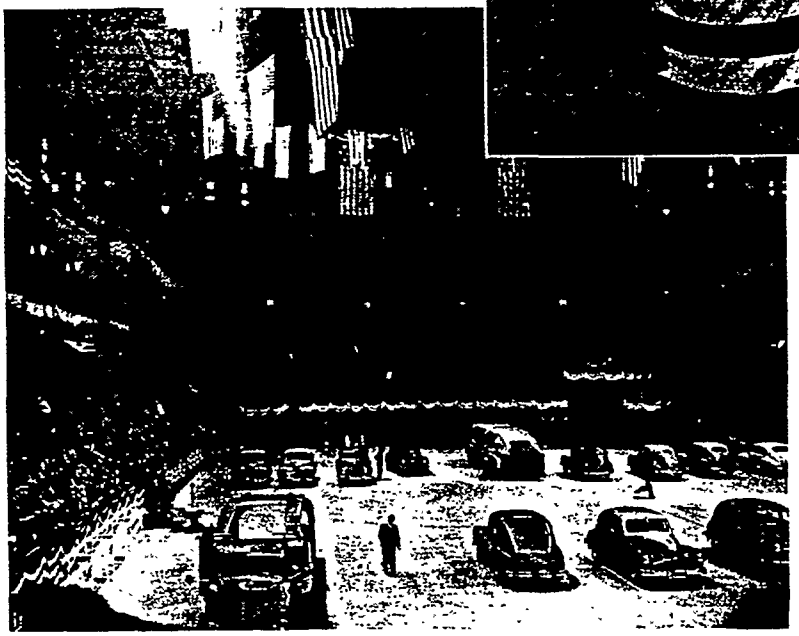
Passenger cars are lined up for loading on trailers in Automobile Transport competition.



the cars again. Driving the cars to the top deck is quite a feat, as the wheels on each side ride in a narrow runway set at a steep angle.

James Thayer of Motor Car Transport Company, Flint, Mich., romped away with this event in fast time, beating out Lewis Skaggs, United Transports, Inc., Joplin, Mo., and Harris H. Fuhr, Automobile Shippers, Inc., Detroit, for the $425 winning money. Skaggs received the $250 second award and Fuhr won $75.

The first truck roadeo was held in 1937 in a parking lot in Louisville, Ky., when a dozen or so drivers got together to try out their skill, and in five years the annual event has grown to the point where it is big enough to crash the lofty portals of Madison Square Garden.

The Roadeo may not pack all the thrills and spills of its namesake, the Rodeo, the horse and cow spectacle which occupied the Garden during the preceding weeks, but it gave those who attended a good idea of the efforts truck fleet operators are making toward greater highway safety.

ETC 31460

MEN IN GRAY

The New York State Troopers Are Succeeding at a Job That Was Too Tough for the Old-Fashioned Country Constable.

By FRANCIS V. V. ADRIANCE

THREE desperate prisoners, armed through the connivance of confederates outside the walls, shot and killed a guard and broke out of Sing Sing prison at Ossining, N. Y., in the dead of night a few months ago. They fled along the New York Central Railroad tracks to the Ossining station, where their shadowy forms were sighted by two patrolmen in a prowl car.

There was a challenge by the police and then guns roared in the darkness. Two men fell, mortally wounded, one an escaping felon and the other an Ossining policeman.

The two surviving desperadoes fled to the east shore of the Hudson River, a short distance away. There they jabbed a gun into the ribs of an early rising shad fisherman and ordered him to row them across the river. Or else!

On the long trip across the river, which is wide at that point, the terrified fisherman had to listen to his captors argue whether or not they should kill him as soon as they were safely on the other side. When at last they scrambled ashore and vanished into the woods, he made the foam fly on his way back to Ossining to spread the alarm. A hurry call was sent to the headquarters of Troop K, New York State Police, at Hawthorne, near White Plains.

Troopers soon arrived with bloodhounds, those great, sad-faced dogs with probably the most sensitive noses in the entire animal world. Monk and Sappho were the two dogs taken across the river and put on the trail by their trainer, Trooper W. W. Horton. They quickly led Trooper Horton and Lieutenant Carlson of the Ossining Police Department to the fleeing killers, who meekly raised their hands and were disarmed. The convicts had an armament of three Detective Special revolvers.

A job such as this is typical of the work of the New York State Troopers, the wide awake constabulary which does almost all the rural police work of the Empire State. A trooper's duties range from the apprehension of murderers and armed robbers to the recovery of lost dogs and cats; from patroling the highways in the interests of safety to rounding up stray cows for a farmer.

I wanted to learn first hand some facts about the State Troopers and their activities, so I visited the Hawthorne Barracks of Troop K, which is commanded by Captain John A. Gaffney and patrols Westchester, Putnam, Dutchess, Rockland, Orange and Ulster counties, and a part of Nassau County on Long Island.

There I was introduced to those famous dogs, Monk and Sappho, and to four other bloodhounds, which, unlike

MEN IN GRAY

One of Troop K's sharpshooters, Trooper Horton, sights along the barrel of a tommy gun. Shortly before this picture was taken he had looked over the sights of a .45 calibre revolver at two gun toting convicts who had escaped from Sing Sing prison.

New York State Troopers know how to use pistols, rifles and submachine guns effectively, and before a rookie trooper is sent out on duty he is thoroughly trained in the handling of these weapons. Teaching new troopers how to shoot is one of Trooper Horton's duties.

ETC 31461

the bloodthirsty beasts that chased poor Eliza across the ice in "Uncle Tom's Cabin," are very affectionate and friendly. I put my hand through the wire mesh of their cage and they licked it as if I had been a pal for years and years.

I was shown the office of the Highway Safety Patrol, which is filled with maps of Troop K's counties. These maps are speckled with black headed pins, each pin representing a motor vehicle accident of some sort. In some spots the pins are in dense clusters.

"A glance at these maps shows us the most dangerous intersections," the trooper who was acting as my guide explained. "We then take steps to remedy the situation, but sometimes it's not so easy to sell safety to the motoring public. Look at all the pins at this intersection in Monroe, on the other side of the Hudson."

It certainly looked as if almost everybody in the state had had a crash at one time or another at the point he indicated.

In the office of the Bureau of Criminal Investigation, the plain-clothes division of the State Police, I saw the intricate filing system, which records the name and complete pedigree of every person ever arrested by the State Police, together with pictures and fingerprints of persons charged with or convicted of felonies. Then I was permitted to thumb through the photograph album of gruesome pictures of homicides, suicides, fatal fires and fatal accidents which have occurred in Troop K's bailiwick. After I had reveled in this for several minutes, my guide opened the door of a small adjoining room.

"Here's where we keep any evidence that might be useful in court," he said.

Automobile tires allegedly stolen, a shotgun and other articles were there, but the object which caught—and held—my eye was something that looked like a man's head floating in a jar of liquid.

"It's a real head all right," the trooper confirmed my suspicions. "We found it, along with other parts of a body, in a pond several years ago. We've never been able to identify the man, but he is undoubtedly the victim of a gang murder."

"He obviously didn't associate with the right people," I agreed.

I was invited to stay to dinner, and despite what I had seen, I enjoyed the excellent meal. Filipino cooks and waiters have charge of the culinary department. The troopers themselves do all the rest of the work at the barracks. The wide lawns and attractive flower gardens are kept in first class condition by Trooper Peter Burke. He and Sergeant A. L. Voris are the only two members of Troop K who have been with the State Police since their organization in 1917.

The barracks resemble a mediaeval castle on the outside and a college fraternity inside. About 25 troopers are quartered there, the rest of the troops living in sub-stations and outposts throughout the territory. The large living room on the first floor is filled with trophies won by the troop, many of them for horsemanship, which reminded me that the State Police used to have a wide reputation as expert horsemen.

"What has happened to all your horses?" I asked a trooper.

"When they grew old and were retired, they weren't replaced. Troop K used to have about 35, but we've used only automobiles and motorcycles for patroling for over five years."

"How about the other troops?"

"Some still use horses where the back country is wild. Troop B, which covers the Adirondacks, even sends out ski and snowshoe patrols in the winter."

I went upstairs to the teletype room where a battery of teletype machines sends out Troop K's reports and receives police messages from all over New York and from neighboring states.

"We're planning to install a radio transmitting set so we can send messages direct to troopers in cars and on motorcycles," my guide informed me.

"Suppose you got word of a robbery

Trooper Horton points to a dense cluster of pins on a map of Orange County. Each pin represents an auto accident.

ETC 31462

and wanted to warn your men to be on their guard," I suggested. "How would you contact them now?"

"We would shoot a warning by teletype to central headquarters in Albany and they would broadcast it from there. That only takes a couple of minutes, but sometimes radio reception from Albany isn't so good down here."

Sergeant E. W. Holloway, who has been a trooper since 1918, placed at my disposal a huge book of newspaper clippings, from which I was able to glean an outline of the history of the State Police.

It was the ladies who awakened the legislature to the need for a well trained state constabulary. Miss Katherine Mayo, novelist, who later wrote the widely read book "Mother India," was visiting her friend, Miss Moyca Newell, when the latter was having a house built in Bedford Hills in 1913. One day Miss Newell's paymaster was robbed and murdered. The sheriff's office and local constables were completely baffled by the crime and didn't know how to go about rounding up the killers.

Stirred by the amateurish efforts of the rural sleuths, the two women went to Pennsylvania and made a study of the Pennsylvania State Police, who had been organized in 1905. Then Miss Mayo wrote a book, "Justice For All," with a foreword by Theodore Roosevelt, which caused considerable comment and eventually set sluggish legislative wheels in motion.

The New York State Police were created by law on April 11, 1917. Many sought posts in the new organization. There were 3,567 applications and 1,322 men appeared for the examination, which was held June 11, 1917. Only 316 were finally accepted and began training at Camp Newayo, near Manlius, which was named in honor of Misses Newell and Mayo.

Troops A, D, G and K were the original units, Troops B, C and L being added later. Headquarters of the seven troops are now located at Batavia, Oneida, Troy, Hawthorne, Malone, Sidney, and Babylon, respectively.

Major George F. Chandler, a prominent physician and surgeon of Kingston who had served in the Army on the Mexican border, was named the first superintendent by Governor Charles S. Whitman. Eager for active duty in the first World War, Major Chandler hesitated about accepting the appointment but yielded finally to persuasion by Theodore Roosevelt.

Chandler insisted on being permitted to pick his own men without assistance from the Civil Service Commission. He turned a cold shoulder on suggestions from politicians.

Trooper W. W. Horton, second from left, and Trooper Gerald Dershimer, right, with Ossining policemen guard handcuffed killers. Trooper Horton and Lieutenant Frank D. Carlson of the Ossining police, second from right, captured the convicts.

●

ETC 31463

Sergeant E. W. Holloway, a veteran trooper who joined the State Police in 1918.

●

During the new organization's first tour of duty, at the State Fair in Syracuse, September 1917, a young trooper was guarding a gate barred to automobiles when Thaddeus Sweet, Speaker of the Assembly, drove up and tried to get through — without success.

"Young man, do you know who I am?" Sweet asked sternly.

"I don't know who you are, sir," the trooper replied, "but if you were the Almighty Himself I couldn't let you in. Those are my orders."

Whereupon Speaker Sweet went to Major Chandler and congratulated him on having an organization which was untouched by politics.

In spite of this, when it became known that Chandler intended to retire and return to his medical practice, the politicians swarmed around Governor Alfred E. Smith, each with his own man for the job. The Governor's response was to summon Chandler.

"Major, if you were told to name the man you think is best qualified to succeed you, whom would you choose?" Smith asked.

"Captain John A. Warner," Chandler replied promptly.

Captain Warner became Major Warner and took over the superintendent's duties on December 1, 1923. He still holds that post.

It was Major Chandler who first called his men "State Troopers." The new force would be regarded with suspicion at first, he knew, and would undoubtedly be given some abusive nicknames. The Pennsylvania State Police were called "Cossacks" by the farmers, a name which wasn't meant to be complimentary and which stuck. So Chandler decided to beat the public to the punch.

Chandler designed the gray uniform, the color being symbolic of the eternal struggle between the black of evil and the white of good. He believed in uniformed police as a crime determent, with a plain clothes unit serving as an auxiliary to solve crimes after their commission. He ordered all railroads operating in New York to put uniforms on their special police forces under penalty of loss of charter.

Major Chandler was the first police official to have his men wear their guns in full view outside their uniforms, where weapons would be handy in an emergency. Although this is the general rule among police units today and was a long step forward in the direction of more efficient law enforcement, the Major was sharply criticized at first for issuing such an order.

"What requirements does a fellow have to meet to become a state trooper?" I asked Sergeant Holloway.

●

Captain John A. Gaffney, commanding Troop K, talks things over with Tuffy.

ETC 31464

State Police investigate a fatal accident on the Eastern State Parkway.

●

"An applicant has to be between 21 and 35 and should be at least a high school graduate. The minimum weight is 160 pounds and the minimum height five feet ten inches. When I enrolled I only weighed 142 pounds, but in those days when we used to ride a lot, smaller men were wanted because it was easier on the horses. Now that the horse is gone, men over six feet and built in proportion get the preference. In addition to being a big fellow, each candidate has to pass severe mental, physical and psychological tests."

"What are a trooper's hours?"

"Each man is on duty 24 hours a day and is allowed only one night off a week. During nine months of the year he gets one three-day leave a month, but during the busy season of June, July and August none of these extended leaves are permitted. Besides the short leaves, he gets 30 days vacation, which cannot be taken during the summer months."

"And what kind of pay does a trooper receive?"

"He starts in at $900 a year, which is raised by $200 annually until the top figure of $1900 is reached. Added to this is the $600 maintenance allowed yearly if he lives away from barracks. All clothes and equipment, except underwear and toilet articles, are furnished free. A corporal receives $2150 yearly, a sergeant $2300, a lieutenant $3000 and a captain $4600."

"The troopers work pretty hard for their money," I suggested.

"They do all right," said the Sergeant. "Remember Lester Brockelhurst, the bible reading, hitch hiking murderer from the Ozarks who was hanged by the State of Arkansas? Well, a young member of Troop K, Trooper Joe Hunt, took his guns away and brought him in while on a routine patrol in eastern Dutchess County. One of our men administered artificial respiration and saved the life of a boy who had just escaped drowning. Captain Gaffney and a detail of troopers escorted King George and Queen Elizabeth from New York to Hyde Park when they visited the President in 1939. That's how a trooper's life varies."

I went away, thinking that the New York State Police deserve to rank alongside such famous bodies of men as the Royal Northwest Mounted Police and the early Texas Rangers. The people of the state owe much to the men in gray.

Other pictures on page 23

●

The main building of Hawthorne Barracks resembles a castle.

ETC 31465

Railroad in Miniature

Operation of Santa Fe System Depicted in Scale Model, Designed and Constructed After Months of Research.

THE operation of a great railway system and the vital part the railway plays in the life of the nation are depicted in authentic miniature in the model railway exhibit at the Museum of Science and Industry in Chicago. Santa Fe equipment and operating methods illustrate the story which portrays the relationship of America's railways to national commerce and industry.

The design and construction of a complete miniature railroad required months of research, followed by many weeks of shop construction and field erection, all by expert technicians.

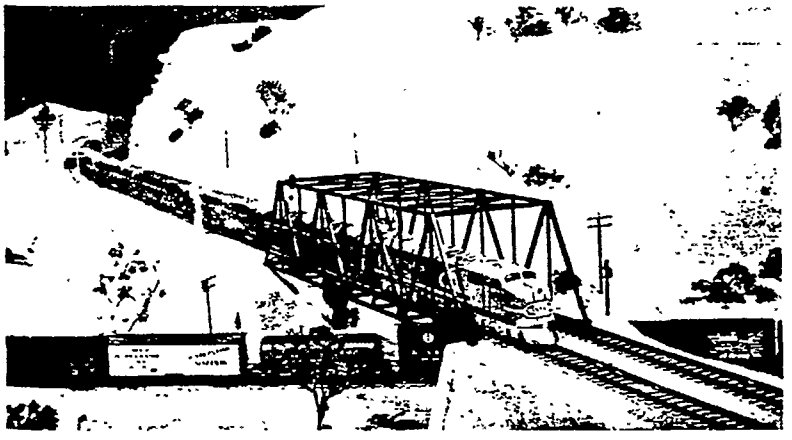
The exhibit has been laid out on a table thirty inches in height, composed of expanded steel frame. The outside dimensions are fifty by sixty feet, with framing of stainless steel, matching in shape and material the side of a Santa Fe stainless steel passenger car. Plate glass panels, with stainless steel supports, extend above the frame to a height of six feet, permitting a good view of the exhibit.

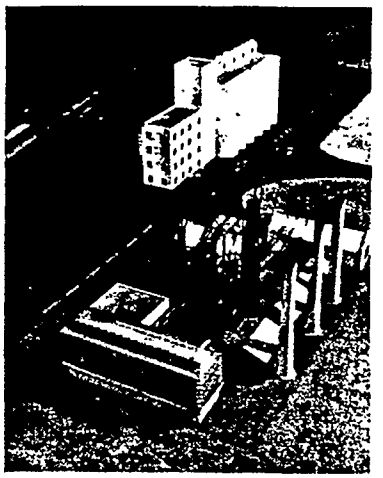
The contours and variations of the model have been shaped with wood framing over which has been placed metal lath and plaster. The plaster has been painted and textured to resemble various soils and farming operations with rocks and cliffs molded and painted to represent geologic outcroppings. All wiring for power operations of trains, signals and switches is concealed beneath the table.

Scale of trains, track, equipment and buildings is one-fourth inch to the foot, or one forty-eighth actual size. Thus, the gauge of the track is an inch and five-sixteenths. The track is, in effect, a double track main line in the form of a figure eight with the upper loop dropped inside the larger circle.

The approximate length of the main line is 350 feet. With double track and sidings, a total of 1,000 feet of railroad track is included in the exhibit. Power is supplied to the locomotives through the two running steel rails which are bonded into insulated sections or blocks. Small motor generators supply 12 volt direct current to the relays, trains and signals.

The entire system is divided into the familiar railway sections for signal control. The signal system is automatic in accordance with present day Santa Fe practice and is generally known as the Three-Block Four Indication system.





An oil refinery and a grain elevator are two of the industrial plants located beside the tracks of the model system.

●

Signals are automatically controlled by relays in the control cabinet and the relays in turn are automatically operated by the trains themselves as in actual railway practice. The circuits are standard railway circuits.

Four miniature trains are in operation, including a scale model of the Super Chief, the Grand Canyon Limited, and two freight trains. In addition, there is the Santa Fe's new 5,400 horsepower diesel-electric freight locomotive, first of its type in the world and exerting the most powerful draw-bar pull of any locomotive regardless of type. Each freight train is composed of various types of freight cars, such as refrigerator, tank, gondola and others, and cars of different kinds, loaded and empty, are "spotted" at industries located along the line.

Passenger cars are 20 inches long and two and seven-sixteenths inches wide, while freight cars are ten inches long. The length of freight trains, limited to 15 cars not including the caboose, is determined by the length of available sidings. Passenger trains are limited to seven cars.

●

The miniature Super Chief rolls across a trestle as a freight train passes underneath.

Santa Fe Railway photos

ETC 31466

This Month's Cover

IN spite of air raids with their rain of death from the skies, the gallant citizens of Great Britain are not abandoning the everyday life of a free people. In roofless St. George's Cathedral, Southwark, London, a typical congregation is shown, gathered to hear pontifical mass sung by the Bishop of Southwark. There will be similar scenes in many British churches this Christmas.

St. George's is only one of nearly 3,000 English and Scottish churches of all denominations which have been damaged by the hail of high explosives from the air. About a thousand of these houses of worship, or one in every ten churches in Great Britain, have been destroyed entirely or damaged beyond repair.

After one devastating sky attack by the Hun, Robert P. Post, correspondent for the New York *Times*, wrote the following tribute to the dauntless spirit of the islanders:

"The average Briton might even see some point if it advanced the German war effort. But it does not even do that. It merely destroys little people, ancient things. A conscientious correspondent is entitled to report that the raid was utterly and completely futile as far as advancing the war is concerned."

The original St. George's was mentioned in history back in the 12th Century. It was rebuilt in 1774-76 by John Price. General Monk, Duke of Albemarle, was married in the old church in 1653 to Anne Clarges. There Dickens' "Little Dorrit" was christened, slept in the vestry with the burials register for a pillow, and was married.

The borough of Southwark where St. George's is located is a crowded industrial sector on the south bank of the Thames. The oldest of South London towns, it is on the high road from London to the Continent.

Raids are nothing new to this ancient borough, as before the Norman conquest in 1066 it was often burned. The Romans, Norsemen, and Danes sacked it during their invasions, and during the era of Roman conquest it was the site of a Roman settlement. It has been included in the city of London since 1531.

ETHYL NEWS

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ETC 31467

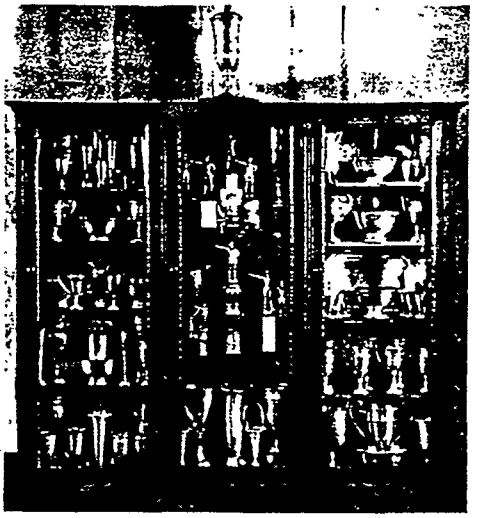
Troopers relax in the dormitory.

The luxurious living room at Hawthorne Barracks.

LEFT: *Meals are served by Filipino waiters.*

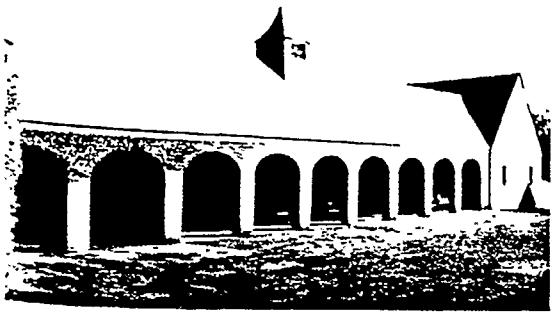
ABOVE: *Teletype machines fill one room.*

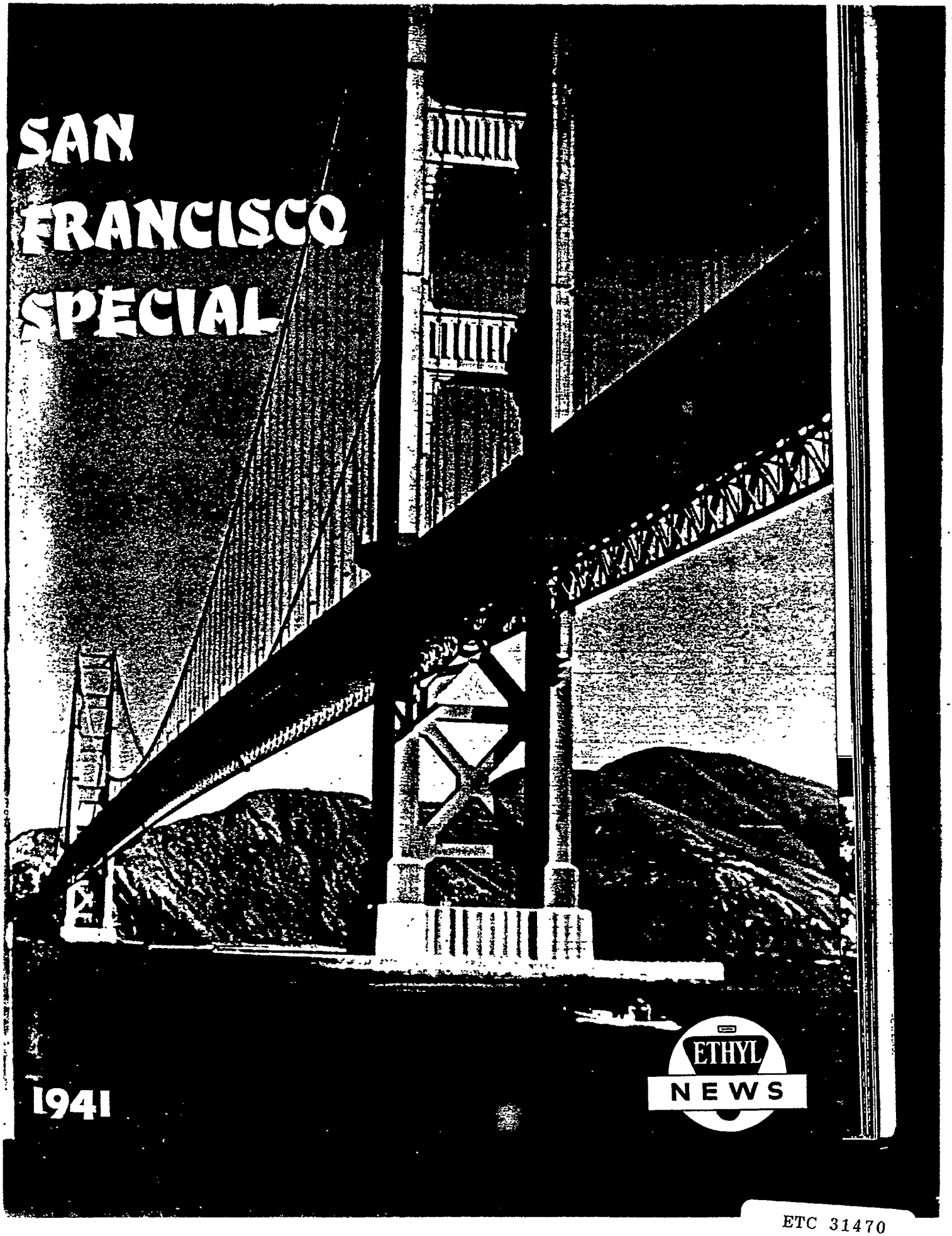
BELOW: *Where Troop K keeps a few of its cars.*



ABOVE: *Some trophies won by Troop K.*

BELOW: *Flower gardens beautify the central court.*





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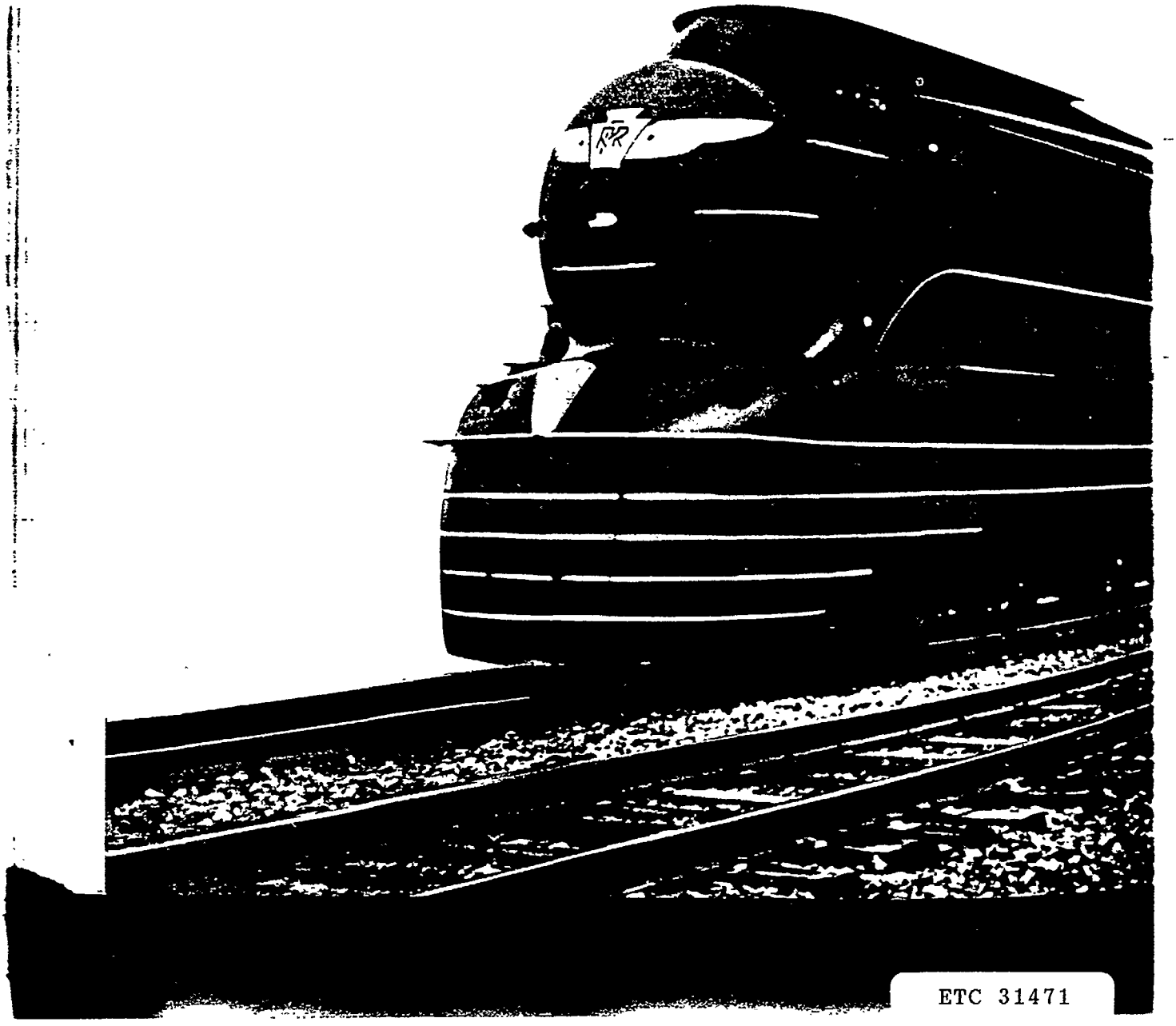
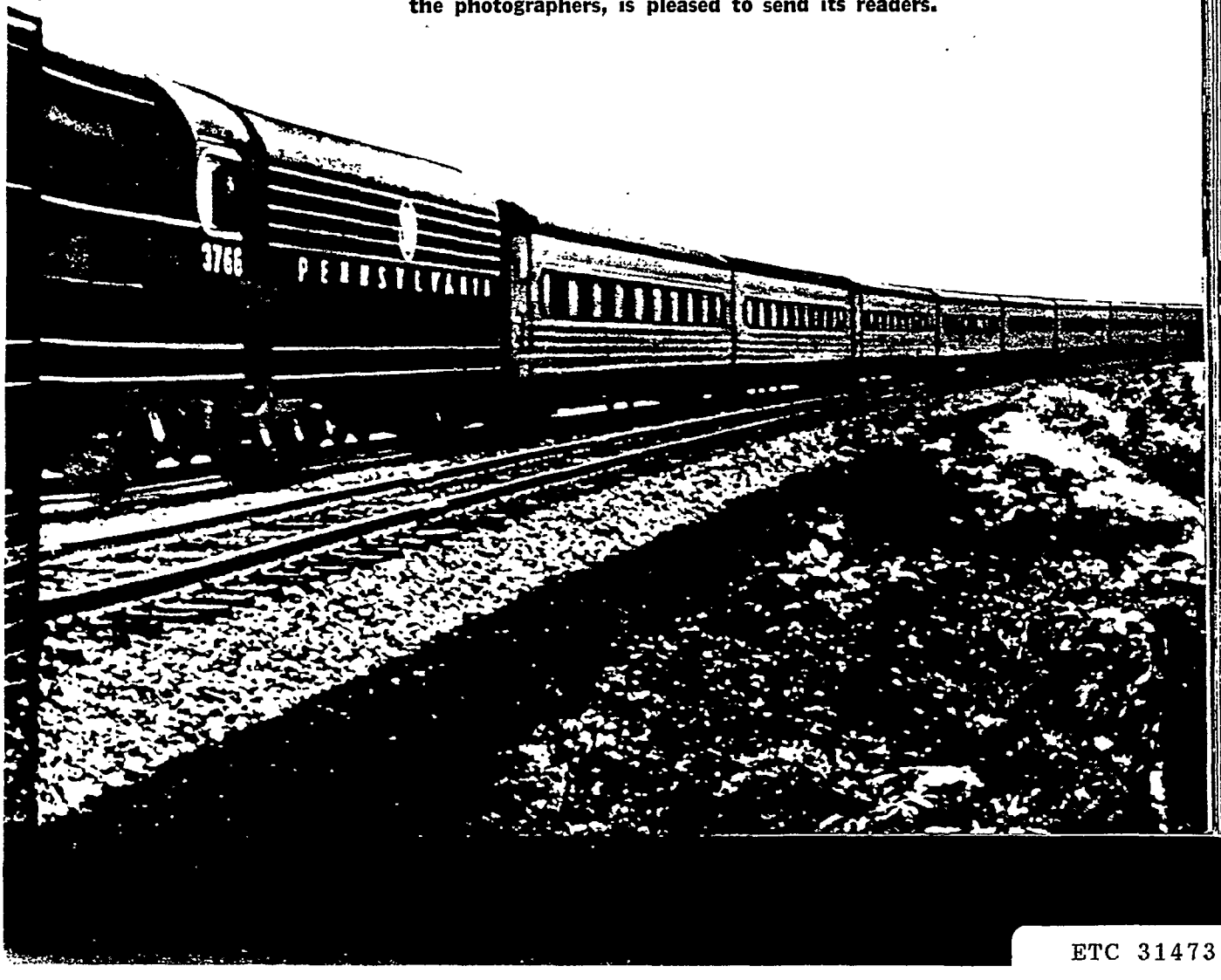


ETC 31471

Farthest from the convention, the eastern group left November 27 on the Oil Men's Caravan

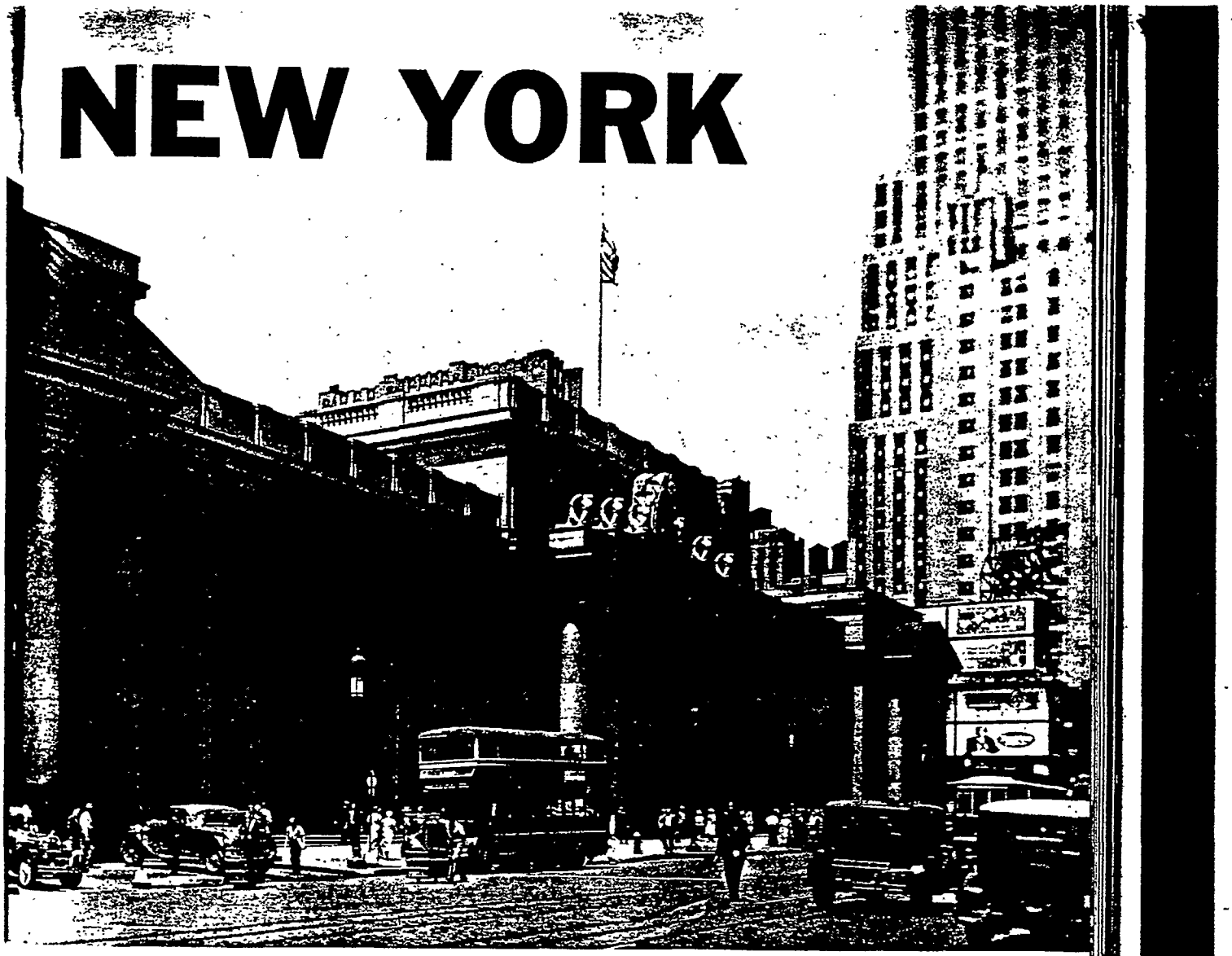
Hustle and bustle in a busy station... taxis, porters, grips! Oil men entrain for the west coast

TO SAN FRANCISCO, for the 22nd annual meeting of the American Petroleum Institute, oil men from the East, the South, the Mid-Continent, boarded trains and planes in dozens of cities. From the far West and the Coast, automobiles and buses joined the parade until Frisco's hotels were jammed. The Oil & Gas Journal arranged special trains from Chicago and Tulsa. Dick Wotowitch, who captained the well-remembered special six years ago, organized groups from New York, Philadelphia, Cleveland and St. Louis for a 1941 "Oil Men's Caravan." All the way out, and in and around San Francisco, amateur and professional photographers were busy. Even the few of those pictures which could be collected quickly tell a story which the Ethyl News, with a deep bow to the photographers, is pleased to send its readers.



ETC 31473

NEW YORK



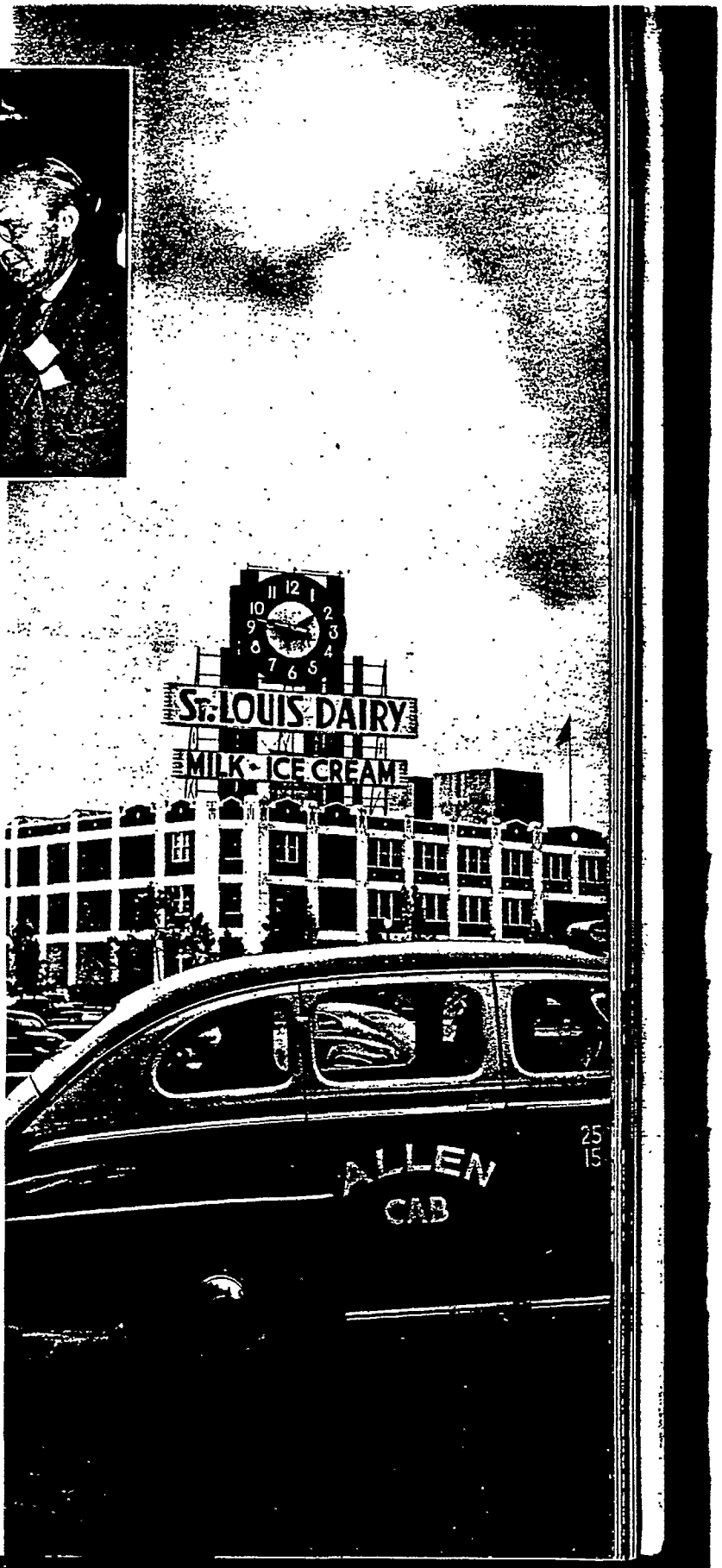
Mrs. E. A. Holbein, Mrs. J. H. Peper, J. H. Peper, and E. A. Holbein, in the club car

C. J. Skidmore plays a tune for W. C. Lane, A. W. Watt, A. H. Irelan and G. D. Snyder

Mrs. George Christie, W. M. Watson, Dick Wotowitch and Cliff Graves have fun in the diner

Knit one, purl one. Mrs. George Christie does her bit for the Red Cross in the lounge car

Over and over they go. Galloping dominoes hold the attention of Mr. and Mrs. C. E. Malley



ETC 31475

C. J. Dexter, William Simpson, Vic Crawford, and Sam A. Souder, Jr. concentrate on backgammon

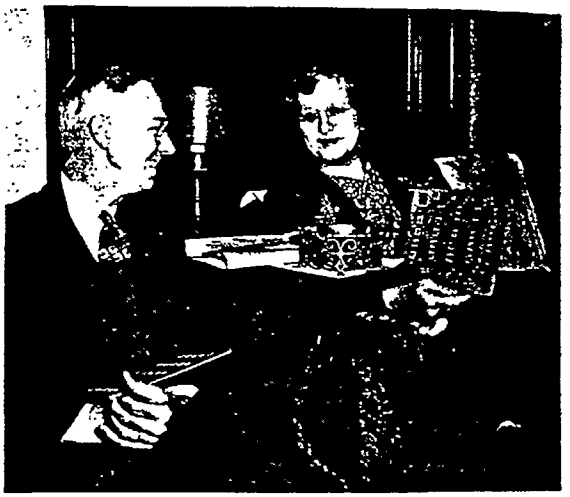
See, it comes right off... if you know how. J. A. Connelly does the Chinese ring trick

It's fun to eat on the train... Little Connie Bergfors prepares to enjoy a meal on the diner

ETC 31476

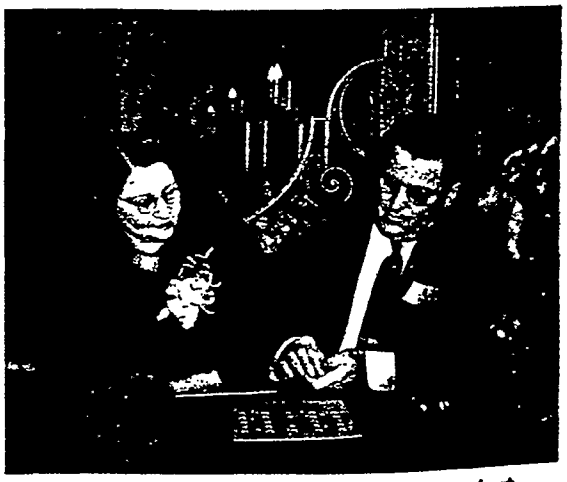
Goodbye! Had a wonderful time! Connie Bergfors and her parents wave farewell to St. Louis

An exchange in preparation for the bingo game. Mrs. G. E. Baldwin and Mrs. Milton R. Bower



Bingo! Mrs. A. W. Watt holds up the winning chart. Mr. Watt acts as the cheering section

Cliff Graves chats with Northrop Clarey in the club car as the Caravan rolls swiftly westward



Mrs. F. J. Olson checks her husband's bingo chart while he ponders the possibilities

ETC 31477

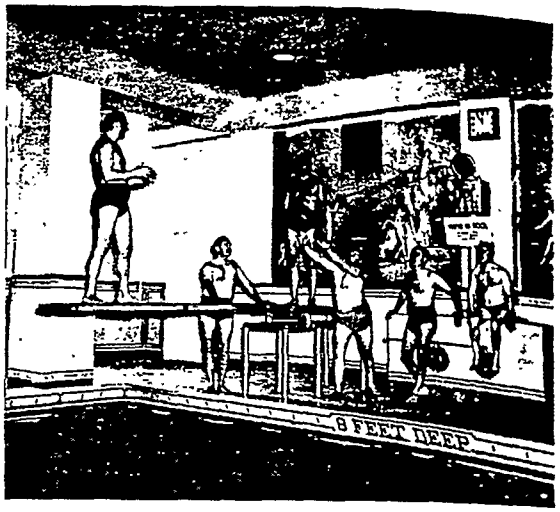
Golf in the Rockies. Enthusiasts lay plans on the station platform at Colorado Springs

High jinks at Colorado Springs. Two gun girls hold up the Caravan and take off Dick Wotowitch

The welcome at Colorado Springs was strictly western... horses, gun girls and everything

ETC 31478

W. P. Laseter takes advantage of the stopover to take some pictures near the Broadmoor Hotel



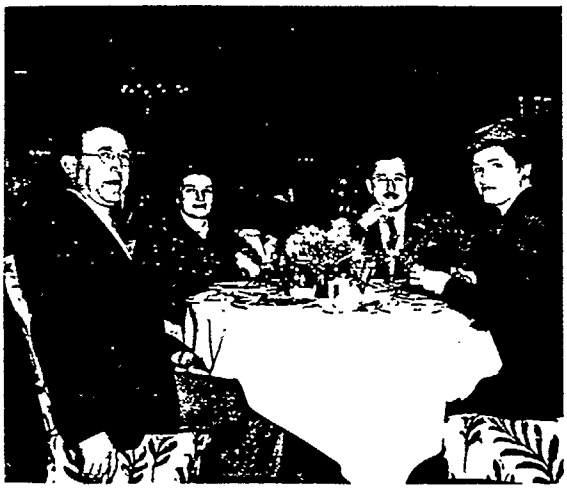
Alley oop! Oil men toss the ball around between swims in the pool at the Broadmoor Hotel

Lunch—with welcome by Governor Ralph Carr and friend Joe Moorhead listening

After lunch the two old friends enjoy a brief chat with other acquaintances

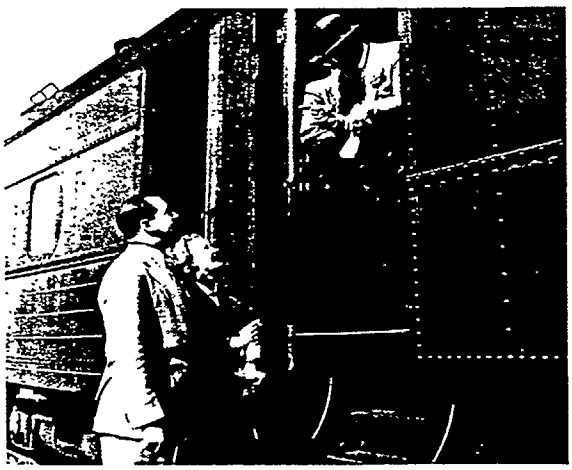
George Snyder leads Messrs. Romer, McCullough and Glendenning in song

The stop at Colorado Springs included a dinner dance at the Broadmoor Hotel. There were a few speeches and some singing, but the emphasis was on eating and dancing

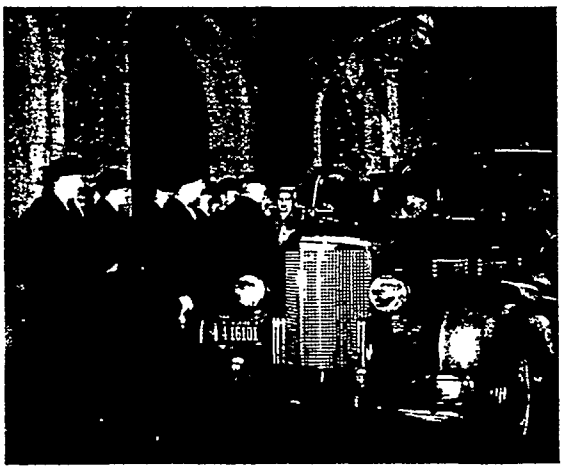


Mr. and Mrs. I. B. Dworman and Mr. and Mrs. William Loufman obligingly pose for a picture

Mr. and Mrs. Dale W. Moore had the floor to themselves when the band struck up a rhumba

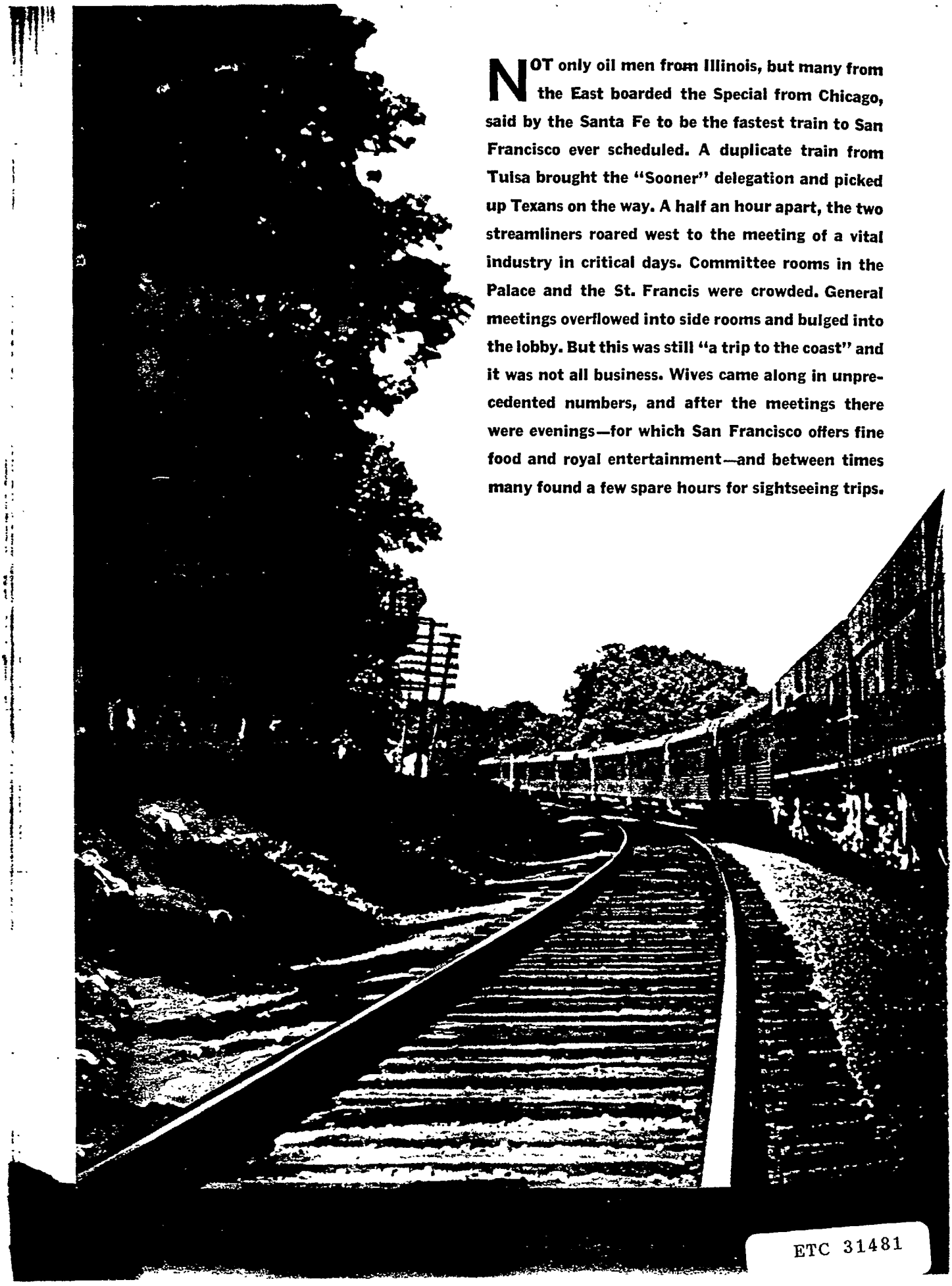


Mr. and Mrs. Coard Taylor with Dick Wotowitch, who organized the 1941 "Oil Men's Caravan"



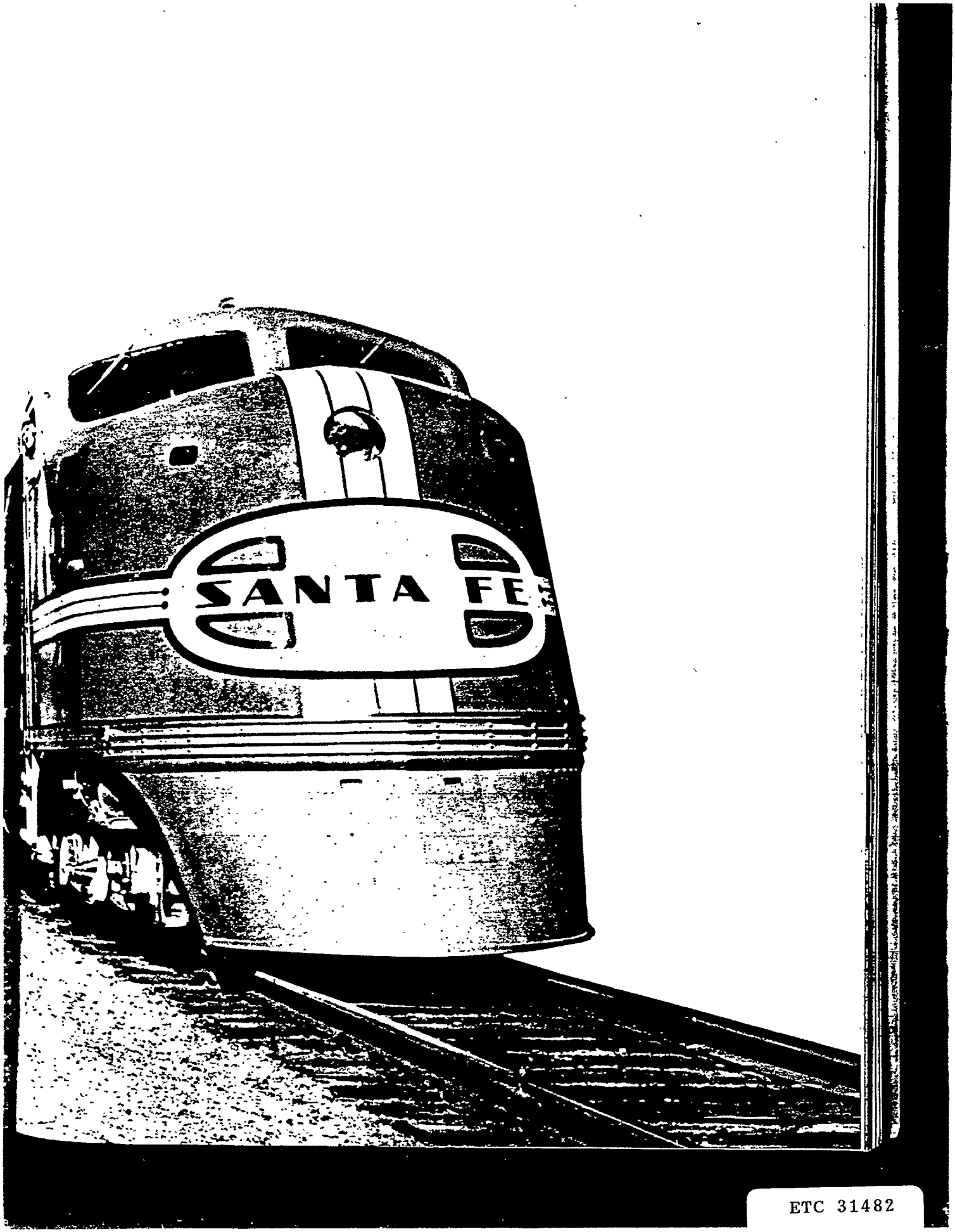
A sightseeing bus loads up for a trip to some of the scenic spots near Colorado Springs

ETC 31480



NOT only oil men from Illinois, but many from the East boarded the Special from Chicago, said by the Santa Fe to be the fastest train to San Francisco ever scheduled. A duplicate train from Tulsa brought the "Sooner" delegation and picked up Texans on the way. A half an hour apart, the two streamliners roared west to the meeting of a vital industry in critical days. Committee rooms in the Palace and the St. Francis were crowded. General meetings overflowed into side rooms and bulged into the lobby. But this was still "a trip to the coast" and it was not all business. Wives came along in unprecedented numbers, and after the meetings there were evenings—for which San Francisco offers fine food and royal entertainment—and between times many found a few spare hours for sightseeing trips.

ETC 31481



ETC 31482

ETC 31483

F. P. Walter, Burdette Blue, H. S. McClintock and A. E. Bradshaw leave Union Station, Tulsa

It's a long flight of steps down to the trains when you have to take them one at a time!

Mr. and Mrs. Wirt Franklin ready to board the Oil and Gas Journal Special for San Francisco

ETC 31484

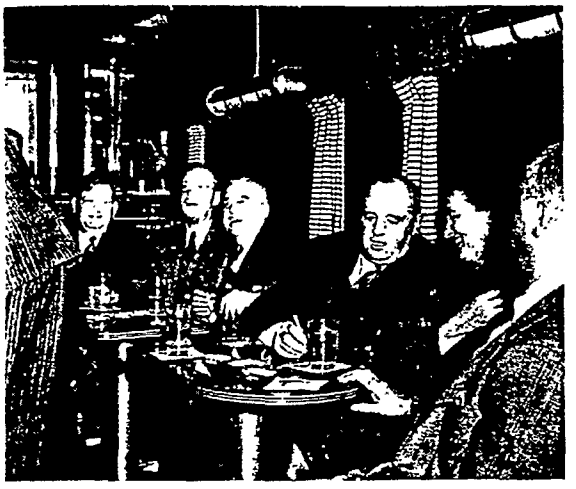
Leaving Tulsa—and most of the way out—the lounge was crowded and companionable

"Yassuh—cheese, ham on white or rye, smoke' turkey... mos' anything you want, we got!"

H. N. Greis, Mrs. George Bole, Mr. and Mrs. R. O. McClintock and Mr. and Mrs. J. L. Shakely

P. C. Lauinger and Santa Fe officials who arranged the trip; "Bones" Foster in foreground

ETC 31485



Ernest Klappenbach, Joseph Bowes, L. C. Collins, W. G. Selby, Mrs. Bole and R. O. McClintock

1 P. M.—Mr. & Mrs. W. K. Warren find a secluded spot in the lounge car for a quiet tete-a-tete

J. C. Stirling and D. E. Horrigan photographed in the lounge car with Mr. and Mrs. B. W. Vinson

2. P. M.—Mr. & Mrs. D. E. Buchanan find a secluded spot in the lounge car for a quiet tete-a-tete

J. F. McManmon shows how bankers can hold your interest in lots of other places than a bank

3 P. M.—Mr. & Mrs. L. F. McCollum find a secluded spot in the lounge car for a quiet tete-a-tete

ETC 31486

At Albuquerque, all hopped off to pick up post cards or stamps and stretch their legs a bit

FOOD DELICIOUS EVERYBODY HAVING GRAND TIME STOP LOTS OF LOVE

Mr. and Mrs. Howe Walker as they stepped off the Tulsa section of the O & G Journal Special

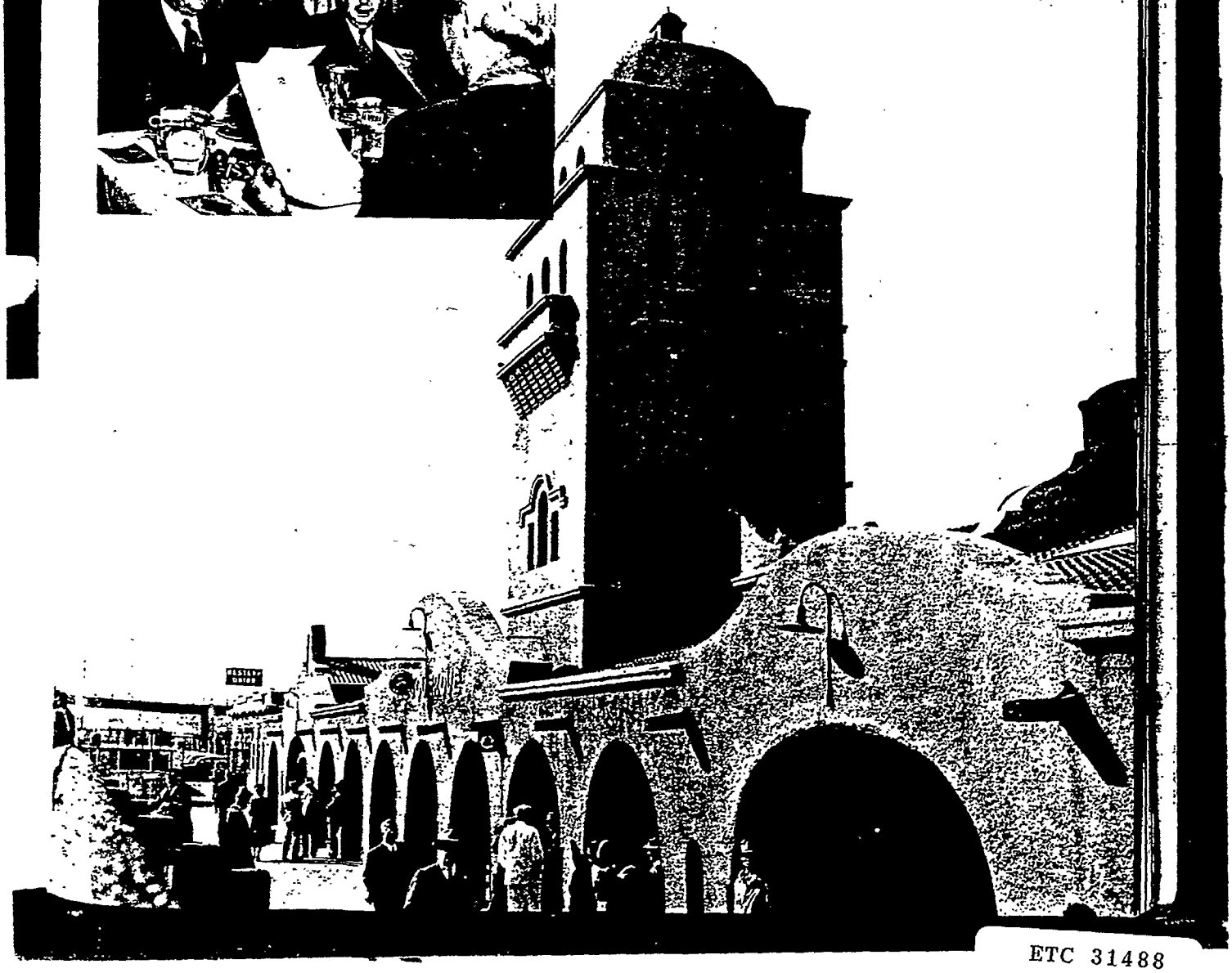
Emby Kaye in the foreground paying strict attention as the train leaves Albuquerque

ETC 31487

Victor de Palma, the Black Star photographer on the train, enjoyed "crowd shots" like this

The "Journal Special" served leading football scores as first course in the diner–

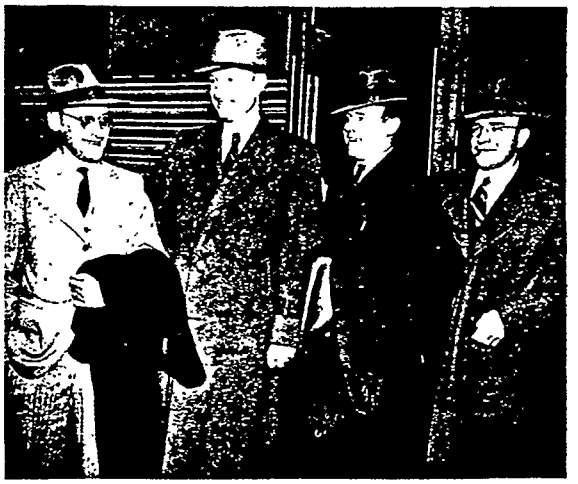
Howe Walker, H. L. Putnam, W. K. Warren, O. A. Bergman and W. B. Way pictured at the station



ETC 31488

Leaving Albuquerque, the group sped westward to Oakland, where they ferried to San Francisco

F. P. Walter, A. E. Bradshaw, Clyde H. Pape and Burdette Blue were in the Tulsa delegation



M. E. Foster, C. O. Stark, R. L. Doan and Paul Endacott as they arrived in Oakland November 2

Phil H. Bohart, Rush Greenslade and Elmo Thompson are snapped by a Santa Fe photographer

F. H. Dunn, J. C. Day and H. D. Skyrm exchange greetings at the station with R. F. Pielsticker

ETC 31489

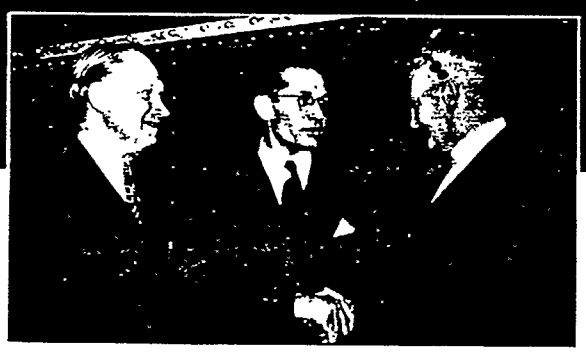
The photographer's flash catches C. S. Sanders and Cecil Forbes leaving the A. P. I. Special

J. F. McManmon, E. I. Hanlon, Dana Kelsey, E. H. Moore and D. E. Horrigan pose in a group

ETC 31490

CHICAGO

Easterners joined middle-western oil men on the Chicago "Oil and Gas Journal Special"



B. H. Markham and J. H. Bivins of the A. P. I. greet P. R. Applegate with a friendly shake

From Cleveland came a Sohio foursome: A. Kidd, Dr. R. E. Burk, Mac McDonald, E. B. McConnell

J. R. Sloan and R. A. Ludlow were in the Chicago group on one of the Santa Fe streamliners

ETC 31491

L. G. Croady, Richard Rollins and B. Wallace as they arrived in Oakland with the others

Watching the scenery from the observation car were W. R. Boyd, Jr., B. H. Markham and W. H. Hubner

R. A. Hendrickson and W. H. Pape are pictured in the station at the rear of the "Special"

Below: *Fay Dow, Mrs. C. R. Athy, Baird Markham, George Holton, Mary Mallon, W. R. Boyd, Jr. and E. J. Irwin*

ETC 31492

SAN FRANCISCO

OAKLAND . . . where every one took the ferry to 'Frisco. Here is the New York "Caravan"

Bill Simpson photographs C. E. Malley and Mrs. Malley at the refreshment stand on the boat

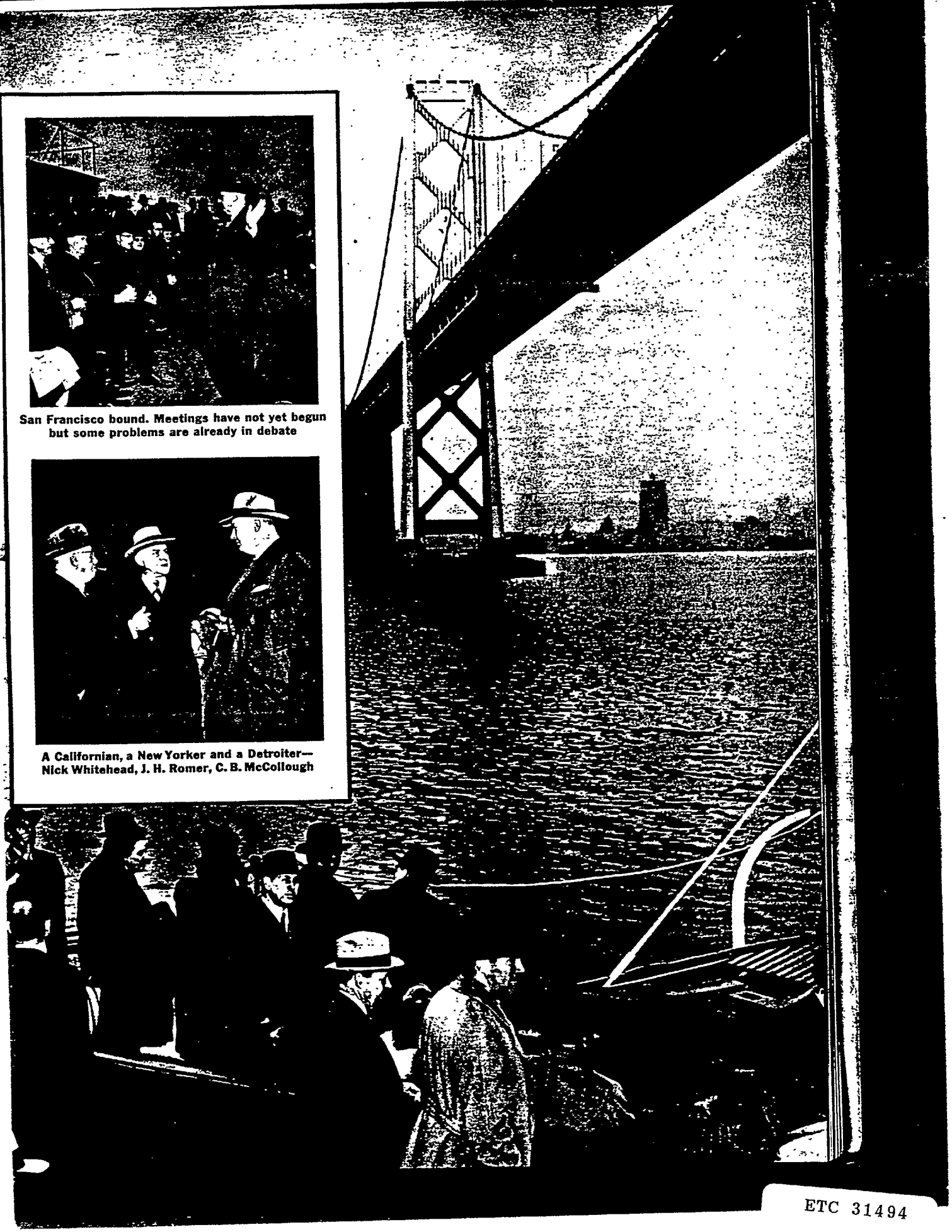
George Snyder pitching nickels while the crowd waits for the ferry to cross to San Francisco

Little Connie Bergfors takes her turn waiting with Mrs. Dale Moore and George D. Snyder

ETC 31493

San Francisco bound. Meetings have not yet begun but some problems are already in debate

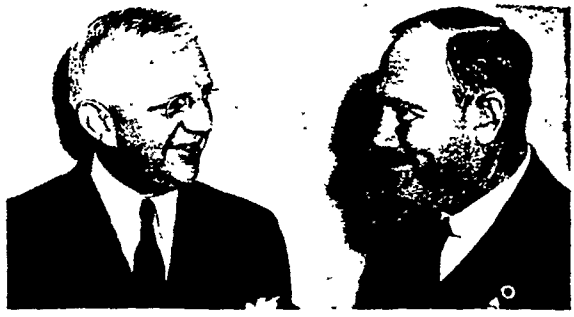
A Californian, a New Yorker and a Detroiter—Nick Whitehead, J. H. Romer, C. B. McCollough



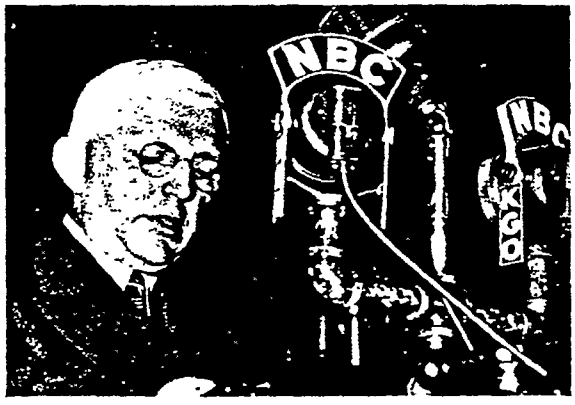
ETC 31494

Gateway to the convention was Oakland

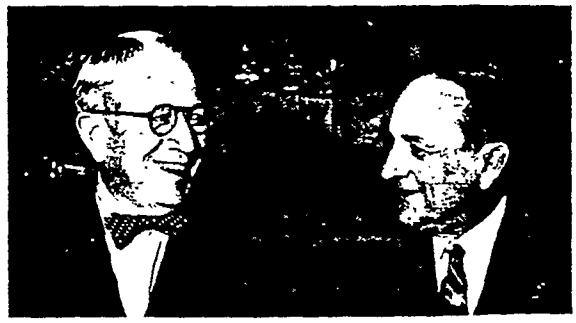
William R. Boyd, Jr., new A. P. I. president, with Petroleum Coordinator Harold L. Ickes



Hon. William P. Cole, Jr., congressman from Maryland, with A. P. I. director J. C. Hunter

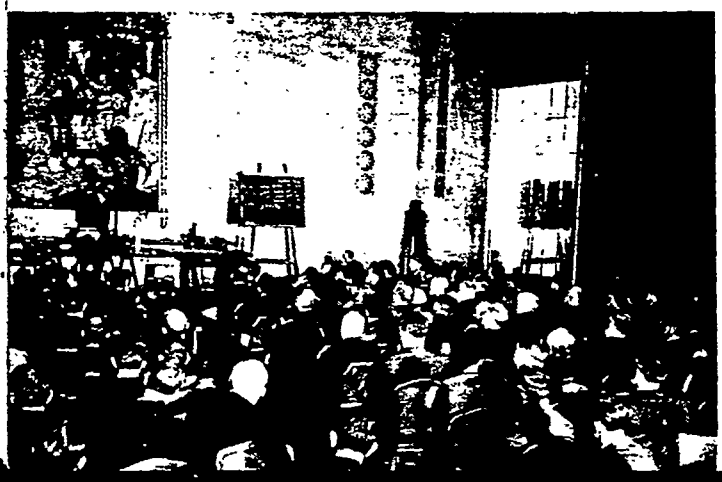


Congressman W. P. Cole, Jr. of Maryland—one of the principal speakers at the convention



T. A. O'Donnell, first president of A. P. I. from 1919 to 1924, chats with W. R. Boyd, Jr.

Below: a typical meeting—the session on Fire Protection. C. E. Townsend presiding

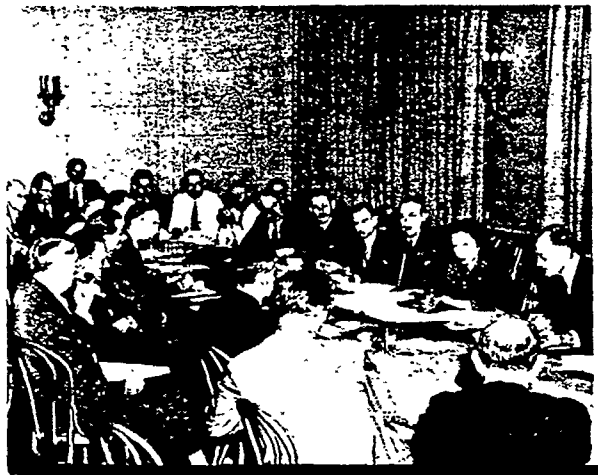


Below: meeting of the special advisory committee on A. P. I. research projects

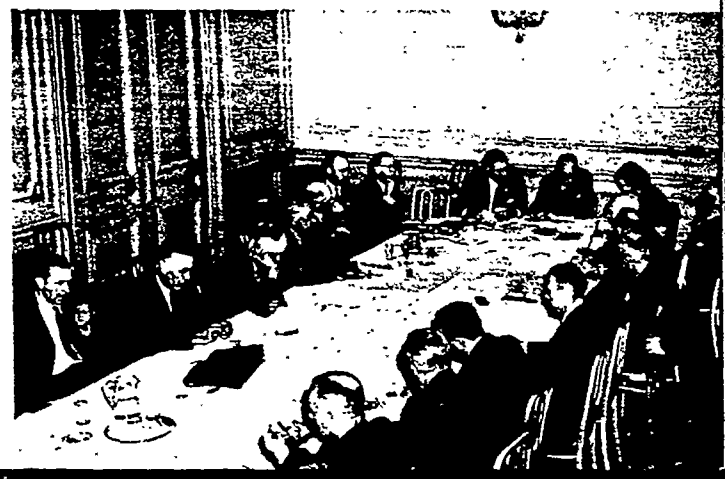
ETC 31495

A. P. I. information booth in the Palace Hotel lobby. Everyone registered here for sightseeing trips

Below: the Legal Advisory Committee on Well Spacing holds a meeting in one of the hotels

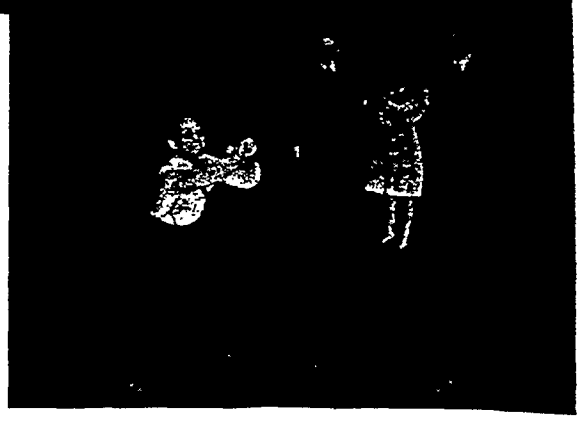


Below: the Correlating Committee on Measuring, Sampling and Testing Crude Oil in session

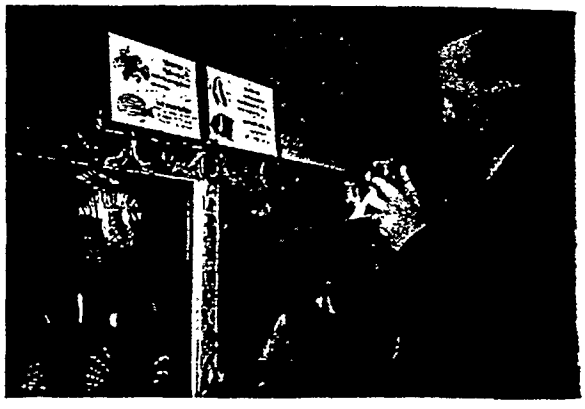


ETC 31496

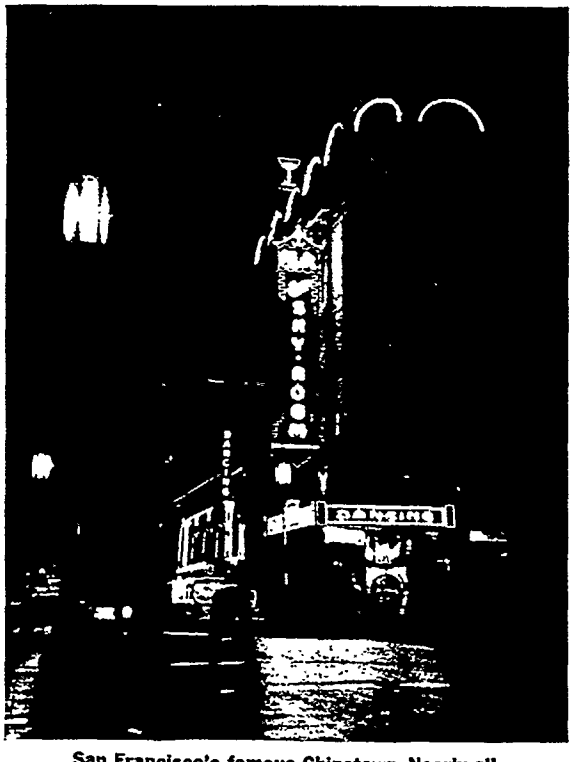
And the band played on . . . Paul Whiteman and his famous orchestra were at the Palace Hotel



J. A. Connelly and the Wally Grebes learn at first hand why China is so hard to conquer



W. P. Gee prepares to photograph some exotic specimens of highly-colored tropical fish



San Francisco's famous Chinatown. Nearly all visitors made at least one trip there

Above: Preston Sinclair, T. A. O'Donnell, W. A. Boyd, Jr. Below: M. B. Anfenger and Dr. O. W. Johnson speaking on fire prevention

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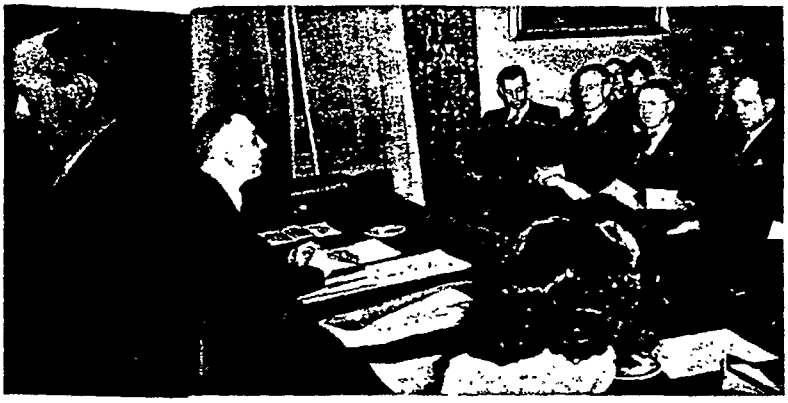
D. B. Spanogle and Richard Rollins on a sightseeing bus provided by the California oil hosts

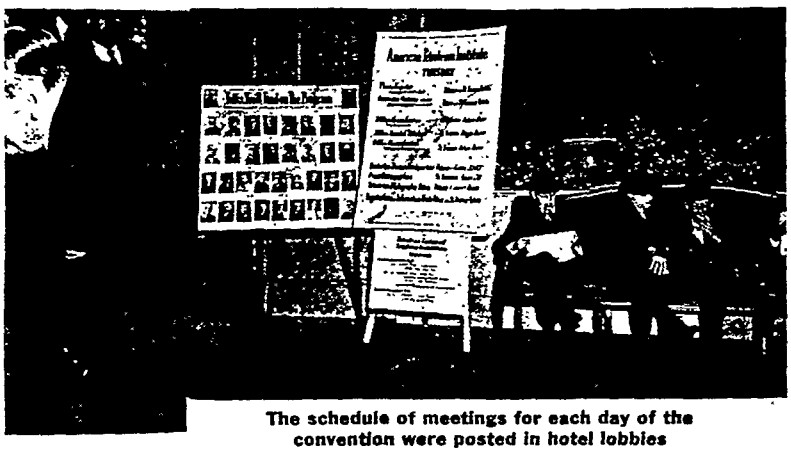
A. E. Watts and J. R. Sloan photographed in a quiet corner of the lobby of the Palace



ome exotic
ical fish

Group 2 Subcommittee on Measuring, Sampling and Testing Natural Gas; George P. Bunn presiding

The Sieverts, the Loufmans and the Dwormans in a group at the "Top of the Mark"



The schedule of meetings for each day of the convention were posted in hotel lobbies

inell, W. A.
Dr. O. W.
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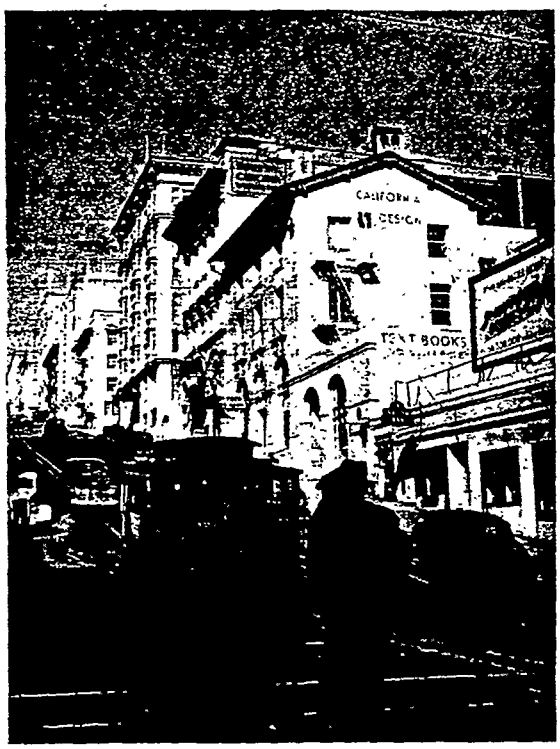
Below: J. A. Connelly, a pretty fair prestidigitator in his own right, learns a new Chinese trick

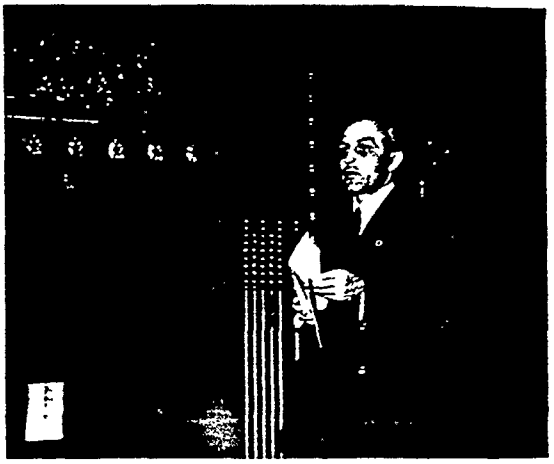


One of the things all San Francisco visitors usually do is take a ride on the cable cars

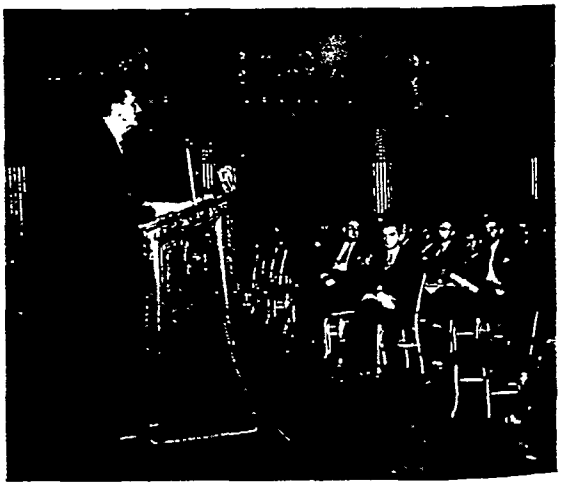
It was an important convention and delegates listened attentively to the principal speakers

Sheldon Clark, Harry Sinclair, W. H. McFadden and W. T. Holliday in the general session

Petroleum Coordinator Harold L. Ickes addressing members of the American Petroleum Institute

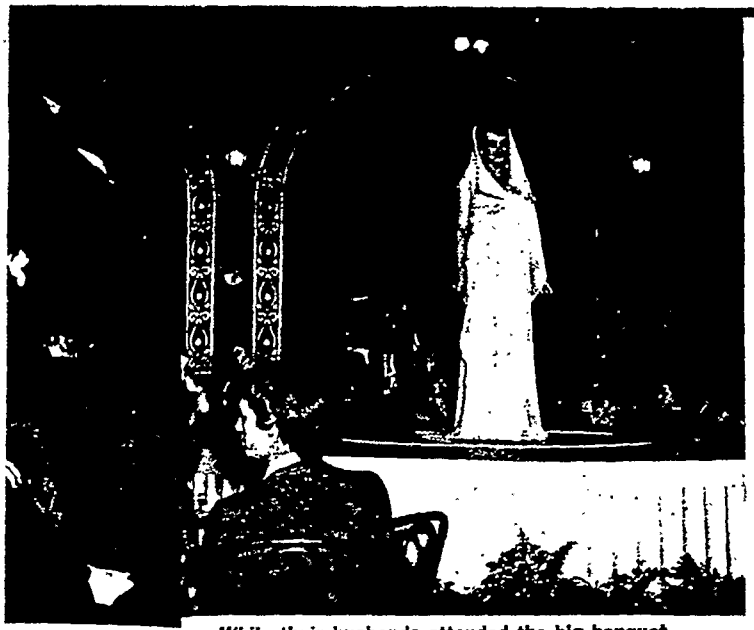


C. R. Wagner answers discussion on his paper on fuel improvements through selective blending

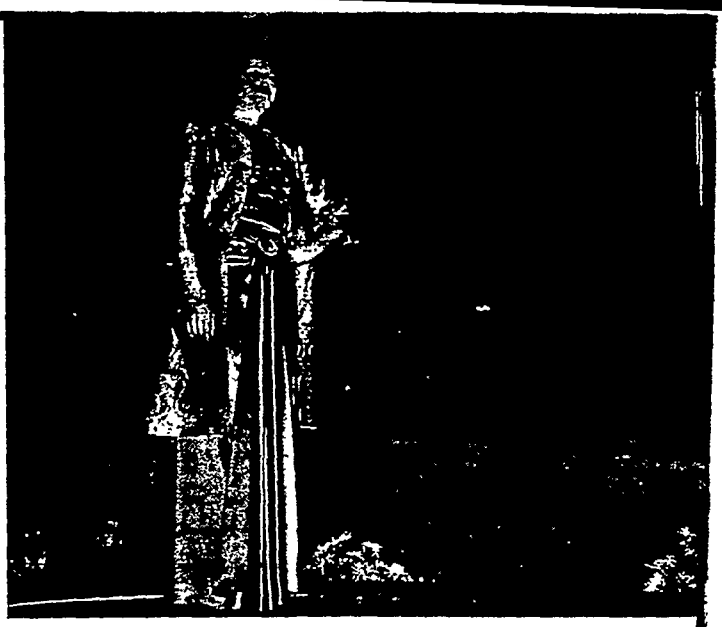


A. L. Clayden reporting for the Committee on Automotive Survey during a work conference

ETC 31499



While their husbands attended the big banquet, wives had their own dinner and fashion show



A stunning model in a stunning gown . . . one of many displayed at the fashion show for wives

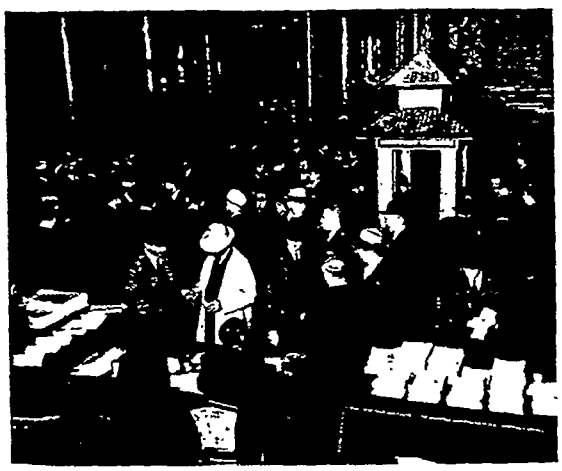
McFadden
session

The Socony-Vacuum reception rooms were a very popular rendezvous at the Palace Hotel

One of the many wives who enjoyed the ladies' dinner and Fashion Show, Mrs. S. F. Bowlby

paper on
ending

tee on
erence



Crowds in the lobby of the St. Francis Hotel on opening day of the A. P. I.'s largest convention

Another shot of the ladies' dinner and fashion show which was held at the Fairmont Hotel

ETC 31500

1 meeting of
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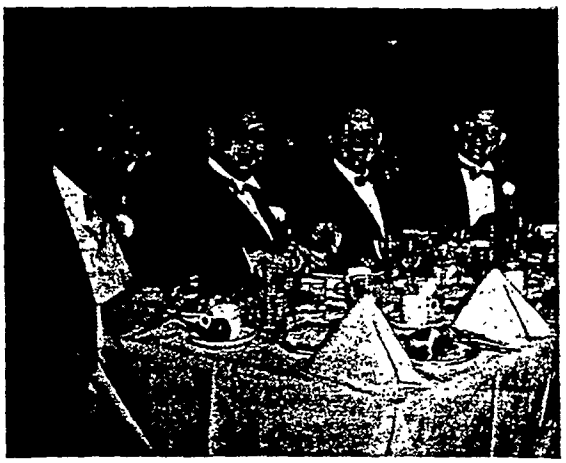
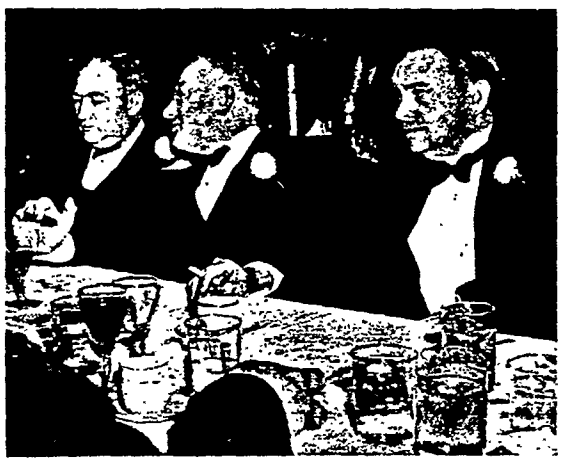
Vic Scales and J. A. Crawford chat quietly over their post-prandial cigarettes and coffee



Cal Lewis, Shelby Wiggins, John H. Bivins and Herbert Galloway at the Annual A. P. I. banquet



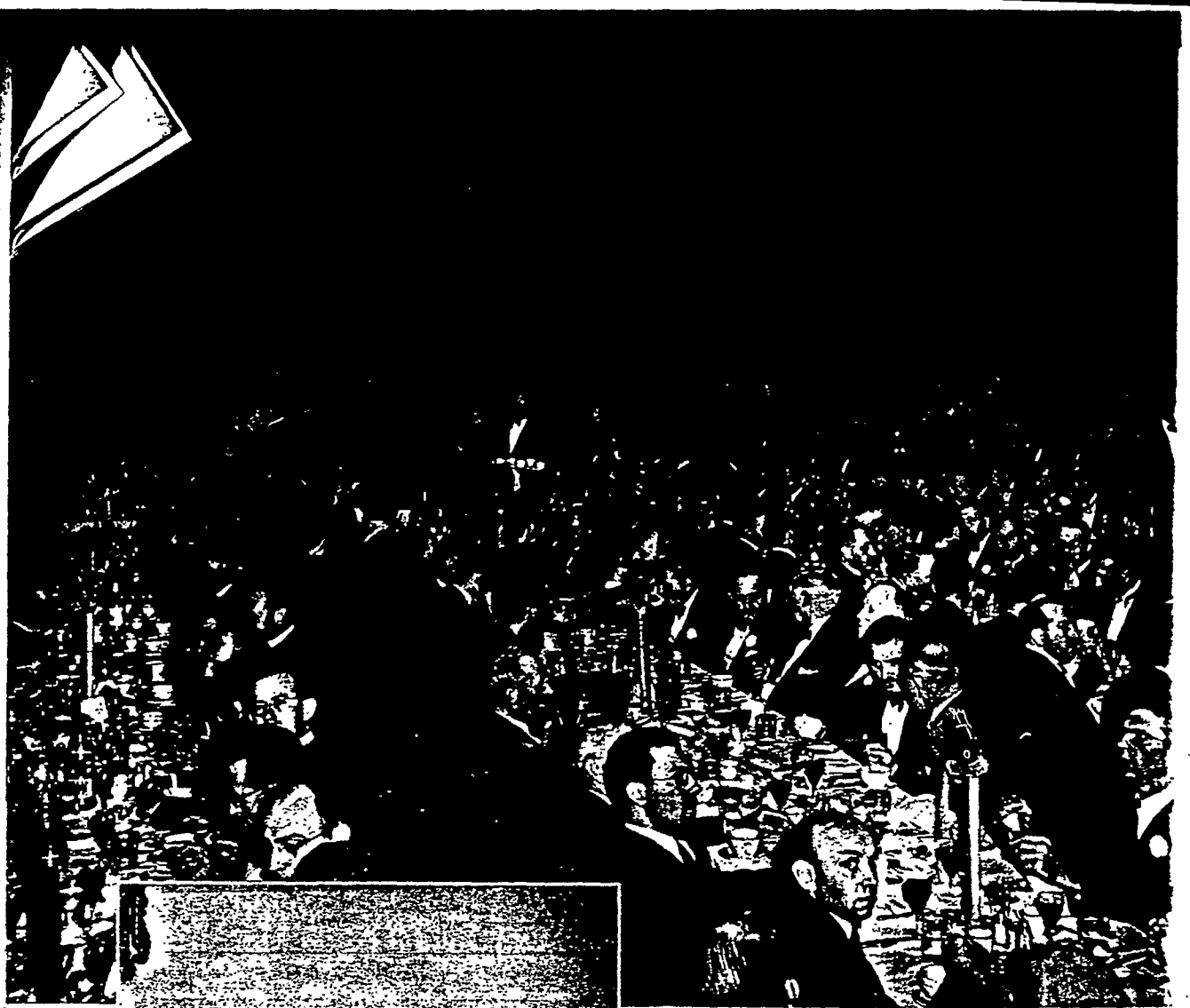
Lacey Walker, John Bowman and Doc Cooke just after the big banquet was over

I. Terao, of the Mitsubishi interests, and his friends enjoy the show which followed dinner

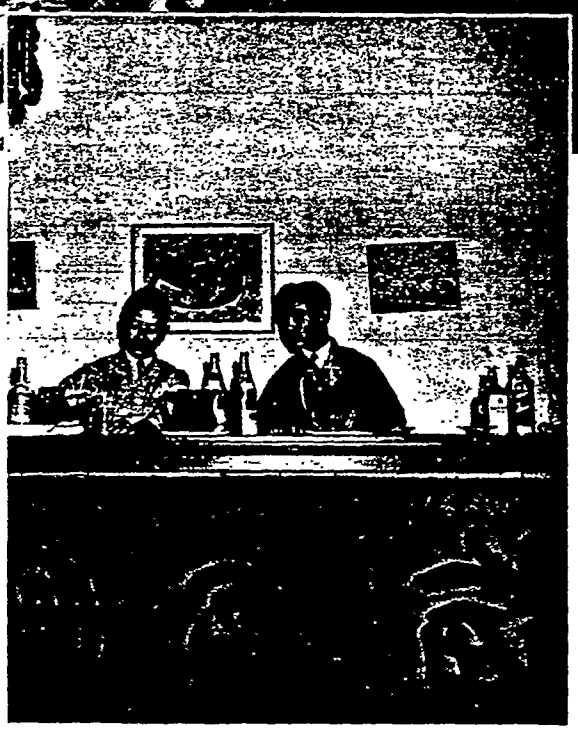
of California,
he Coast

Another view of the big room at San Francisco provided for the annual A. P. I. banquet

ETC 31501



At the annual banquet of the 1941 meeting of the American Petroleum Institute

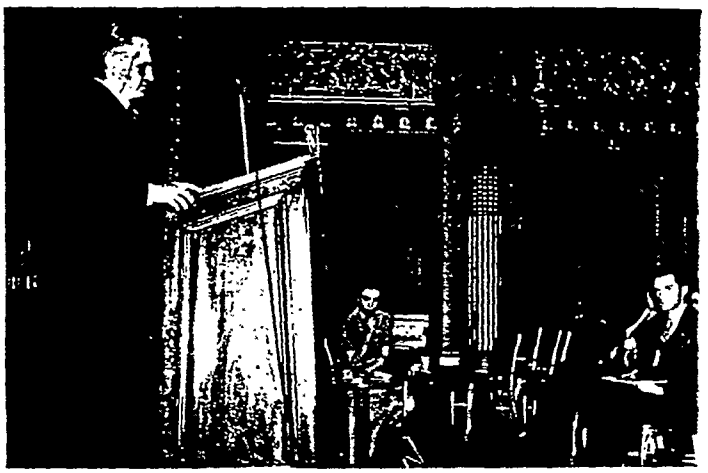


Friends of Tidewater-Associated will remember this pleasant corner in the St. Francis Hotel

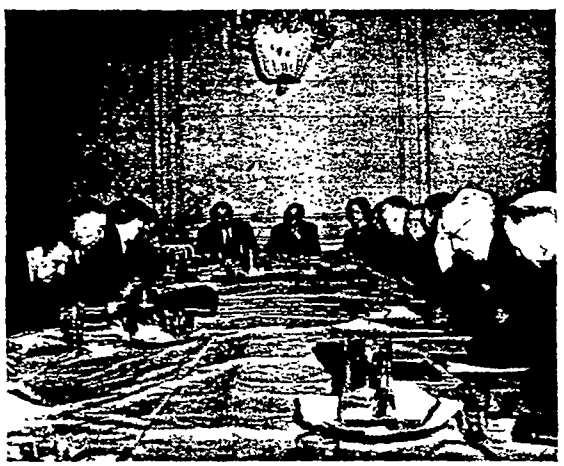
H. D. Collier, president of Standard of California, welcomes A. P. I. members to the Coast

Leave it to San Francisco to produce this pretty Chinese girl for the show after the banquet

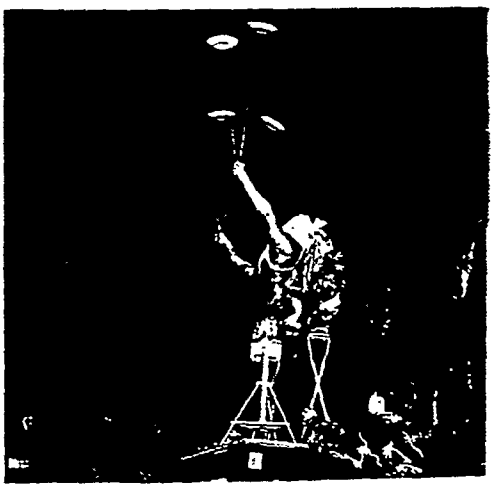
J. E. Thomas, special assistant to the Petroleum Coordinator, and F. Van Covern of A. P. I.



J. A. Moller addressing a group session of the Division of Refining at the St. Francis Hotel on Friday



Men who had attended meetings all week turned with relief to the entertainment Thursday night



A breathless moment during a juggling act whi was part of the dinner entertainment

ETC 31503

which

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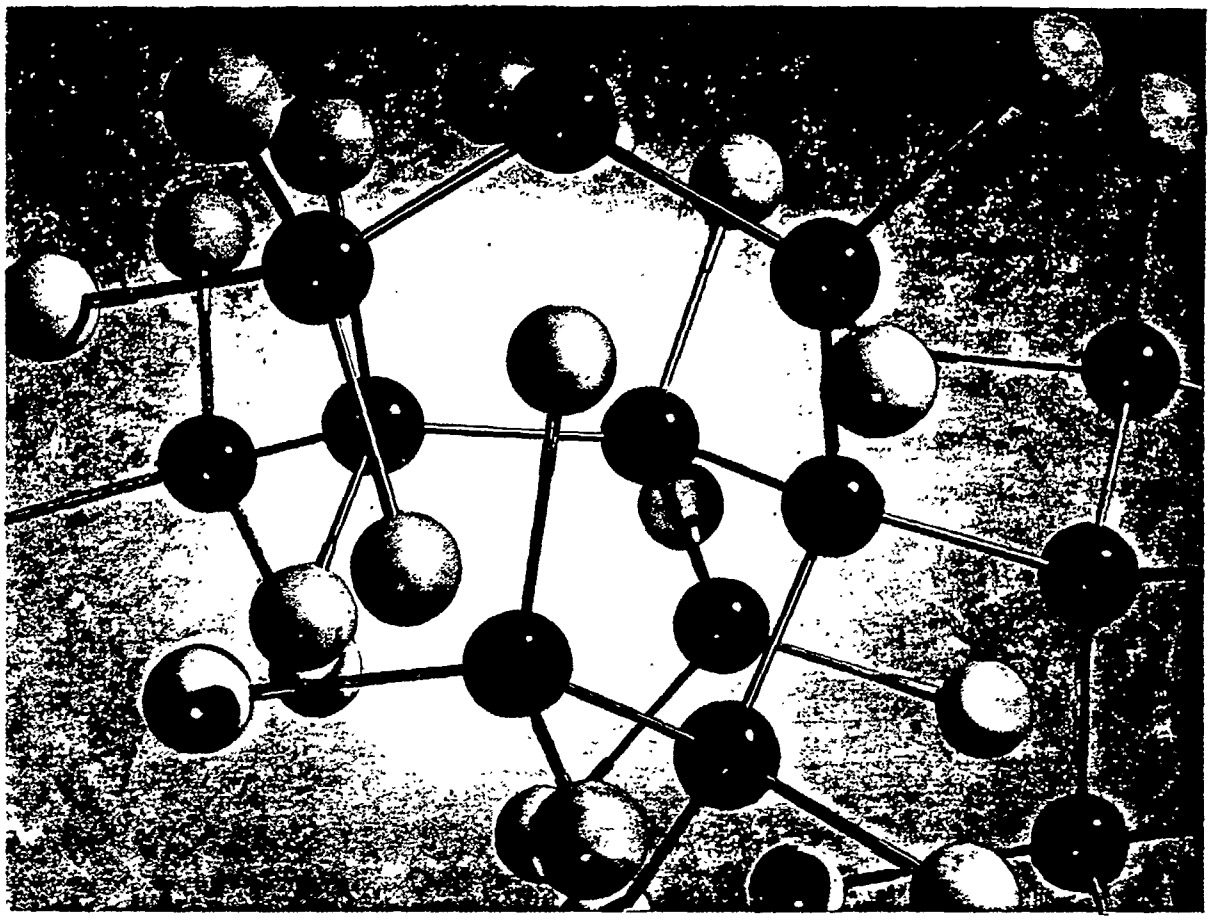
ETC 31504



Power Puzzle

Do you know that the mileage you'll get from tomorrow's automobiles, the speed of tomorrow's airplanes and the power of tomorrow's tractors depend largely upon "puzzles" like the one in the picture?

Actually this "puzzle" is a chemist's model. It shows the arrangement of the hydrogen and carbon atoms in one type of hydrocarbon molecule. Gasoline is a mixture of hundreds of different kinds of hydrocarbons—each with its own complicated molecular structure and each with its own special way of behaving inside a gasoline engine.

The petroleum industry, through research costing millions of dollars, has already learned how to produce gasoline that contains high proportions of the kind of molecules which work best in engines. Furthermore, they have learned how to control the combustion of many of these molecules through the use of "gasoline additives."

For instance, a single molecule of tetraethyl lead, the basic ingredient of Ethyl's anti-knock fluids, will control the chemical reaction of 100,000 molecules of fuel and air.

However, in spite of the rapid progress which has been made, there is still a great reservoir of unused power in gasoline. As research in fuels continues —as the puzzles of the molecules are solved—a greater amount of this power will be made available and engine makers will design engines to utilize it.

While Ethyl is not directly engaged in either the refining of fuels or the manufacture of engines, our business of making "gasoline additives" for the control of combustion takes us far into both fields. Ethyl research workers in Detroit and San Bernardino are cooperating with both the automotive and petroleum industries in their efforts to improve engines and fuels—and our research engineers are working with many commercial users in order that laboratory progress may be reflected in day-to-day operation

We extend an invitation to technologists and executives in all phases of the automotive and petroleum industries to avail themselves of our research and service facilities.

ETHYL

ETHYL GASOLINE CORPORATION

Chrysler Bldg., New York, N. Y.

ETC 31505