
"On Tour"

On Tour

September 1949
Vol. 11, No. 9

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ON TOUR is published monthly by Union Oil Company of California for the purpose of keeping Union Oil people informed regarding their company's plans and operations. Reader participation is invited. Address communications to ON TOUR, 617 West 7th Street, Los Angeles 14, California.

Excerpts From
The Congressional Record

THIS is what Lord Macaulay told the British people in 1830:

"'Our rulers will best promote the improvement of the people by strictly confining themselves to their own legitimate duties—by leaving capital to find its most lucrative course, commodities their fair price, industry and intelligence their natural reward, idleness and folly their natural punishment—by maintaining peace, by defending property, by diminishing the price of law, and by observing strict economy in every department of the state. Let the Government do this—the people will assuredly do the rest.'

"Abraham Lincoln expressed the thought in simple terms:

"'In all things which the people can do for themselves as well as or better than the Government—the Government should never interfere.'

"The whole history of the world shows that the more Government invades the field of regulating human relationship and action, the more it curtails the liberties of its people. When that intrusion has gone far enough, the Government becomes the master and the people have lost the freedoms and rights of action which made possible the development of the United States of America.

"I have been alarmed at the growing tendency of different citizens and groups, which make up our American economy, to ask the Government to solve all their problems and guarantee them against the ordinary contingencies which free men under our system of free competitive enterprise have, up to the last quarter of a century, accepted as their own responsibility. Our system is not a *profit* system, but is a *profit and loss* system. We seem to be trying to get rid of the loss and turn it over to the Government, and keep the profits. That is something for all Americans to think about.

"If we are to remain a free people, the solution of the greater part of all human relations problems must be left to the people, and must be brought about by voluntary action."

Quoted from remarks of Hon. Albert W. Hawkes of New Jersey in the Senate of the United States, June 19, 1948.

Dusting

Knee High to a Grasshopper

LONG BEFORE THE BREAK OF DAWN—3:30 a.m. to be exact—you arrive at Sky Harbor Airport, adjacent to Phoenix, and find the crop dusters warming up over cups of coffee. There is no evidence of excitement or hustle. But soon you find yourself moving on the double to keep up with an aviation routine that occurs almost daily at this surprisingly busy field.

Somewhat reminiscent of a wartime dawn patrol, the business part of crop dusting, as practiced by Marsh Aviation Company, begins with a pre-dawn briefing session. The pilots finish zipping up their flying togs while Johnny Neace, busiest man in sight, deals out dusting orders informing each flyer where, when and how he is to operate.

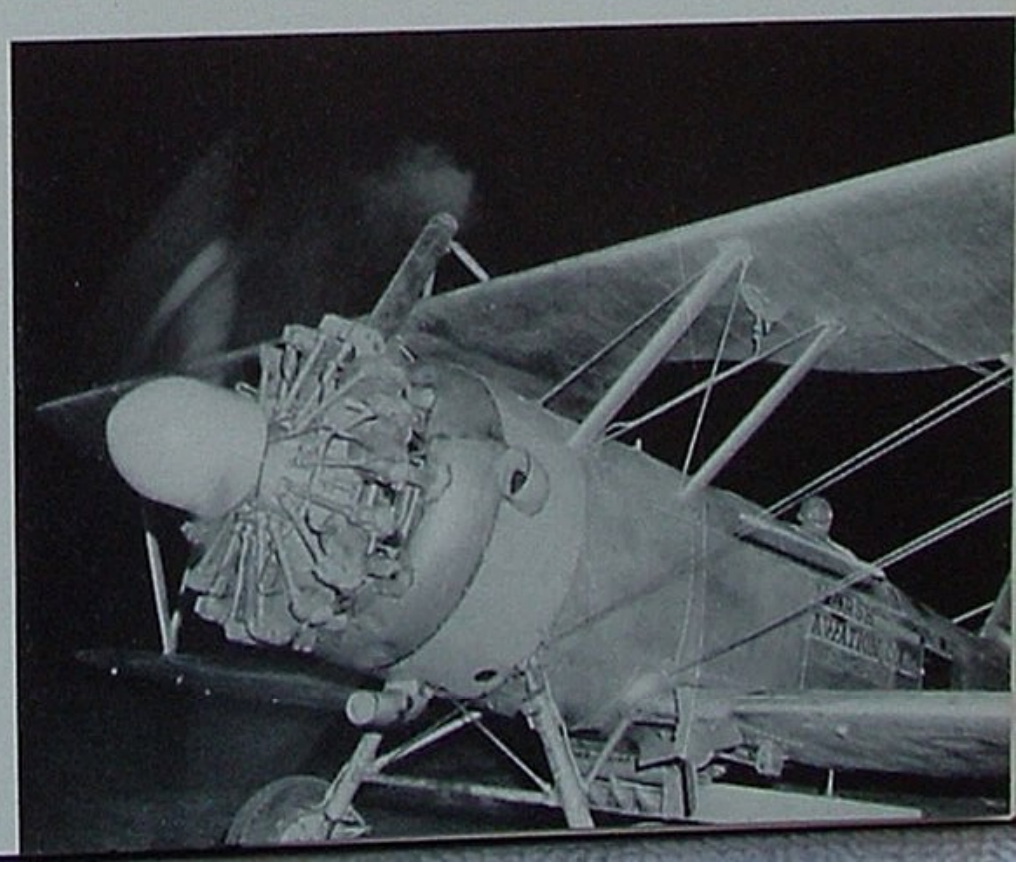
Within five minutes the briefing room is empty again and the center of activity moves out-of-doors to a parking strip. Here some 25 biplanes stand in military alignment, three deep, waiting the day's command. They are converted Navy N3N's, designed for use as primary trainers during World War II. However, at the first turn of a propeller, an experienced airman guesses correctly that the original 235 horsepower engine has been replaced with a 450 horsepower Pratt-Whitney.

The cranking of 25 airplane motors breaks the stillness of early morning without disturbing the darkness. Whirling props cast a dim reflection now and then but, as the planes move out to the take-off strip, you see only their position lights. At a signal from the field control tower, the dusters take off at about 30-second intervals, each spouting a short burst of flame from its overhead exhaust, then disappearing into the infinity of night.

When the last set of lights has vanished and the last roar has subsided, you turn to escort Johnny Neace again and inquire, "Where do they go from here?" The gist of Johnny's reply is, "I'll show you, but we'll have to hurry."

Actually the planes spread out in every direction to handle a dozen different dusting jobs, some of them located 50 or 60 miles from Sky Harbor. So Johnny picks the least remote operation and soon has you hurt-

Crop dusters are the earliest of the early birds. Dawn was an hour away as this airplane took off for the war.



The largest group of Marsh Aviation Co.'s fifty-plane fleet operates from this Sky Harbor base near Phoenix.

Pemberton, Templeton, McVey, Graham, Parks and Hirst, pilot veterans of many insect battles, study a map of Arizona farmlands before starting on their dawn patrol.

(Above) Liquid spray is often mixed near the field of operations, then pumped by auxiliary unit into hopper. (Right) At such low altitudes, the propeller-wash thoroughly stirs liquid or dust spray into an infested crop.

ling over 25 miles of country roads, ranging from smooth pavement to the cleat marks of a tractor in virgin earth. Meanwhile, the eastern sky takes on a glow of light and the day of July 20th is born.

On arriving at the working strip—a mere 500-yard pasture with a "crew" weed-cut—you find two airplanes idle and the pilots literally sitting on their wings. Johnny glances at the drifting smoke from his cigarette and guesses the reason immediately. "Too windy," he explains, "for dry dust. Drop dust in a wind like this and half of it blows over to the wrong field. I can see Charlie Hirst working down the country a couple of miles. He's putting liquid spray on a cotton crop. Liquid doesn't drift. Let's go or he'll be finished before we get there."

You hadn't noticed the wind blowing and you can't see Charlie working two miles away, but in jig time you're hopping out of the car at one end of a beautiful cotton field. Nearby, the farmer-owner lifts Johnny a hand of recognition, then begins waving a bamboo pole, the upper end of which bears a small white flag. Following the farmer's gaze across the cotton field, you catch sight of a second flag wig-wagging on the field's opposite end. Immediately the drone of an airplane reaches your ears and you see it drop steeply out of the sky directly in line with the two flagmen. Down it drops from two or three hundred feet until its wheels skim the cotton and its altimeter must register knee-

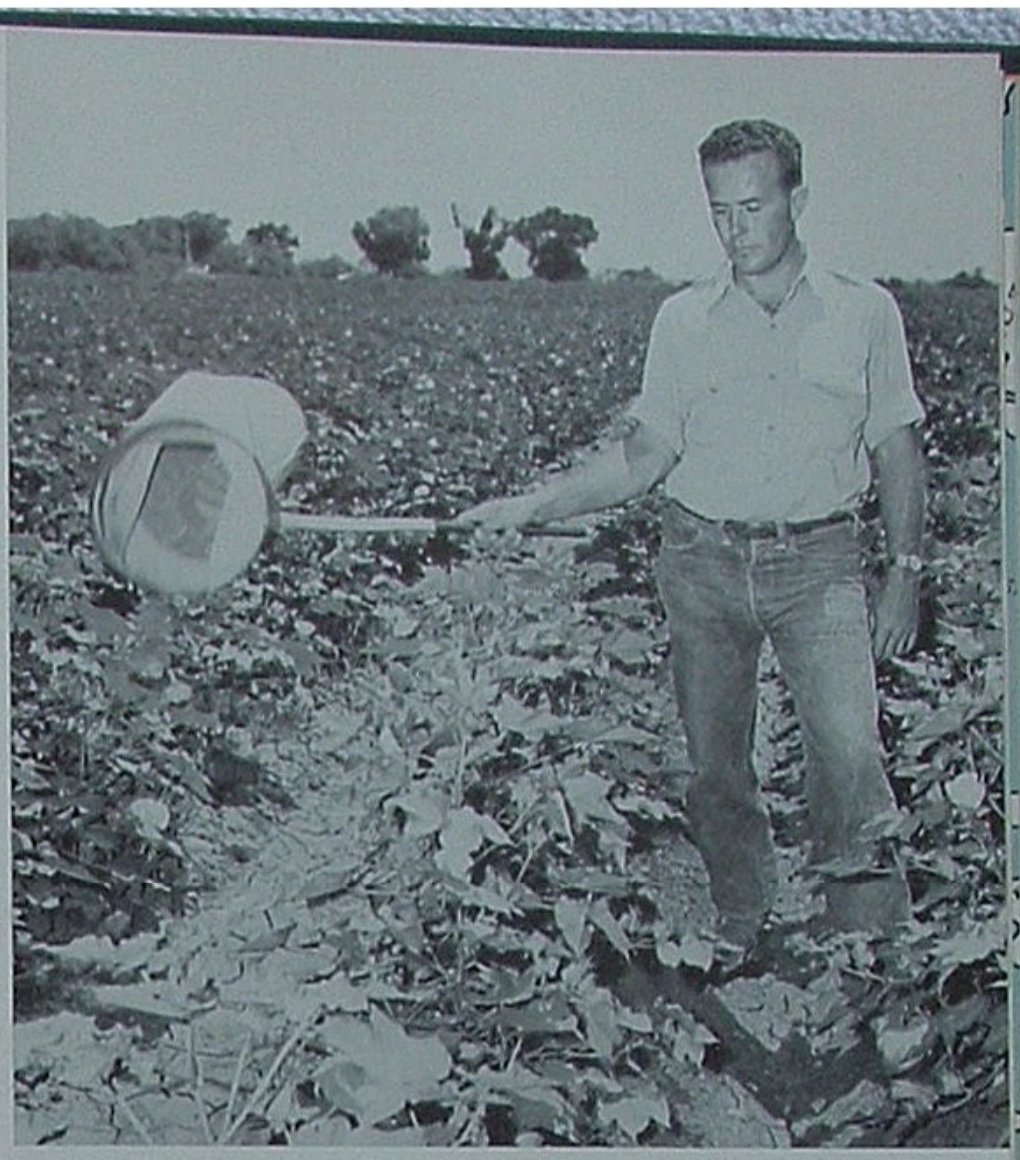
high-to-a-grasshopper. There is no indication of the craft's speed or its function until, just as you are about ready to dive for the ditch, it pulls up into a steep climb, clearing trees and a power line by inches. Simultaneously, you see a ribbon of spray issuing from jets under its lower wing and are readily convinced that the plane drops its lethal load at about 80 miles an hour.

Only a few seconds are lost as the pilot makes a skillful wing-over to re-cross the field. Both flagmen have barely taken positions a few yards farther away when the airplane hops down from treetop heights again to spray another swath of death upon some of mankind's worst enemies—the bollworm, the Lygus, the stink bug, the red spider, the thrip, the salt marsh caterpillar and many other such devourers of crops. Back and forth it roars until its insecticide hopper is empty. Refilling is accomplished a mile or two away at a rural strip where chemicals have been delivered the day before and are being properly dissolved in water by one of the loaders. In 15 minutes the plane is back over the cotton patch crossing, recrossing and "trimming the ends" until hardly a bug in the entire field has escaped the wrath of airpower.

By the time Johnny lights his third cigarette, the early breeze has subsided to ideal dusting weather. Hardly does he mention the fact before the wind-grounded dusters come hurrying across the fields to dust another 80 acres of cotton.

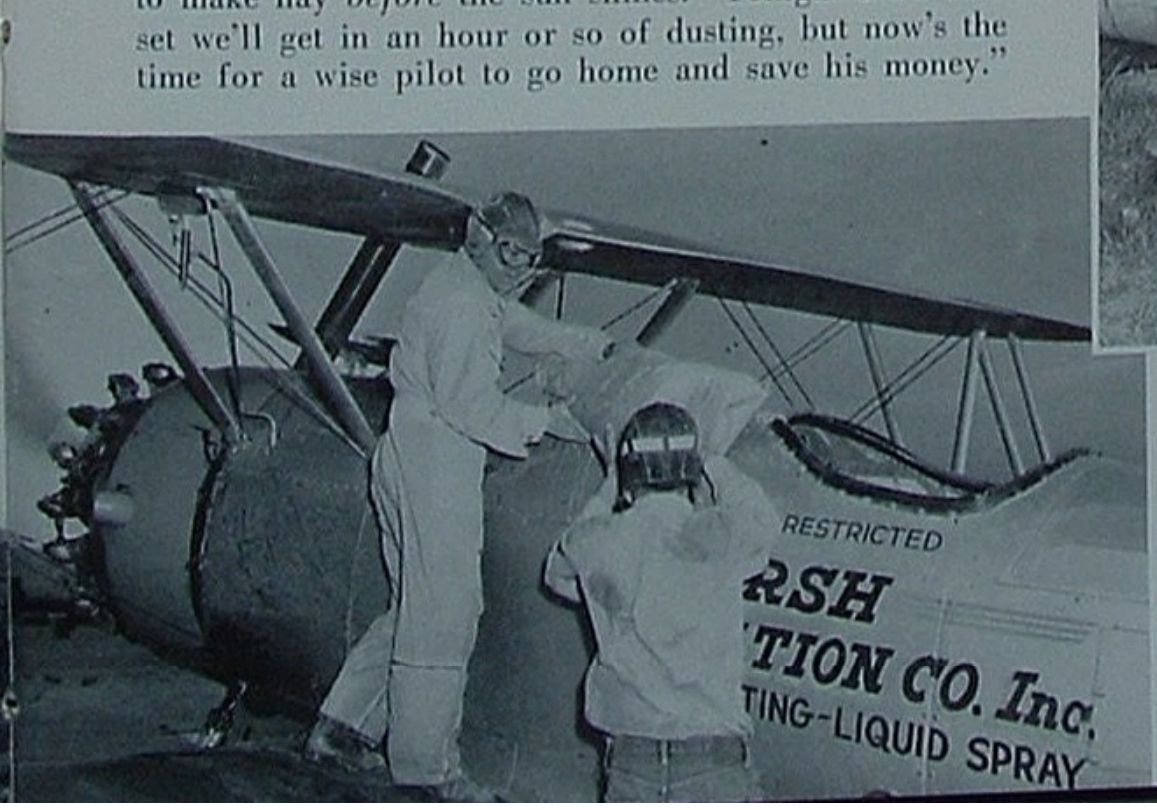
Now you see a thrilling example of teamwork. One airplane leaves the field to make its turn as the other enters from the opposite end. Each roars a mile in 40 seconds, covering six acres per run. Together, in from 10 to 15 minutes, they dust the entire 80 acres, leaving a solid pattern of dry fog throughout the cotton to indicate the thoroughness of their work. A tractor, working under ideal conditions, would require between four and five hours to complete the same job.

It's now hardly 9 a.m. and to most workers the day is only beginning. But the crop dusters empty their hoppers for the last time and head back toward breakfast at Sky Harbor. "You see," explains Johnny, "when the ground warms up, heat begins to rise, carrying with it any dust that's applied too late. That's why we have to make hay *before* the sun shines. Tonight after sunset we'll get in an hour or so of dusting, but now's the time for a wise pilot to go home and save his money."



Entomologist Murray Rudd is seen "'sweeping" a cotton field to determine the kinds and number of bugs present.

John Neace, fieldman for Marsh Aviation, and Rice Ober, manager of the J. G. Boswell ranch, admire expert flying while two airplanes dust 80 acres in 15 minutes.



(Left) Pilot and helper team up for quick reloading so that job may be completed before heat interrupts.

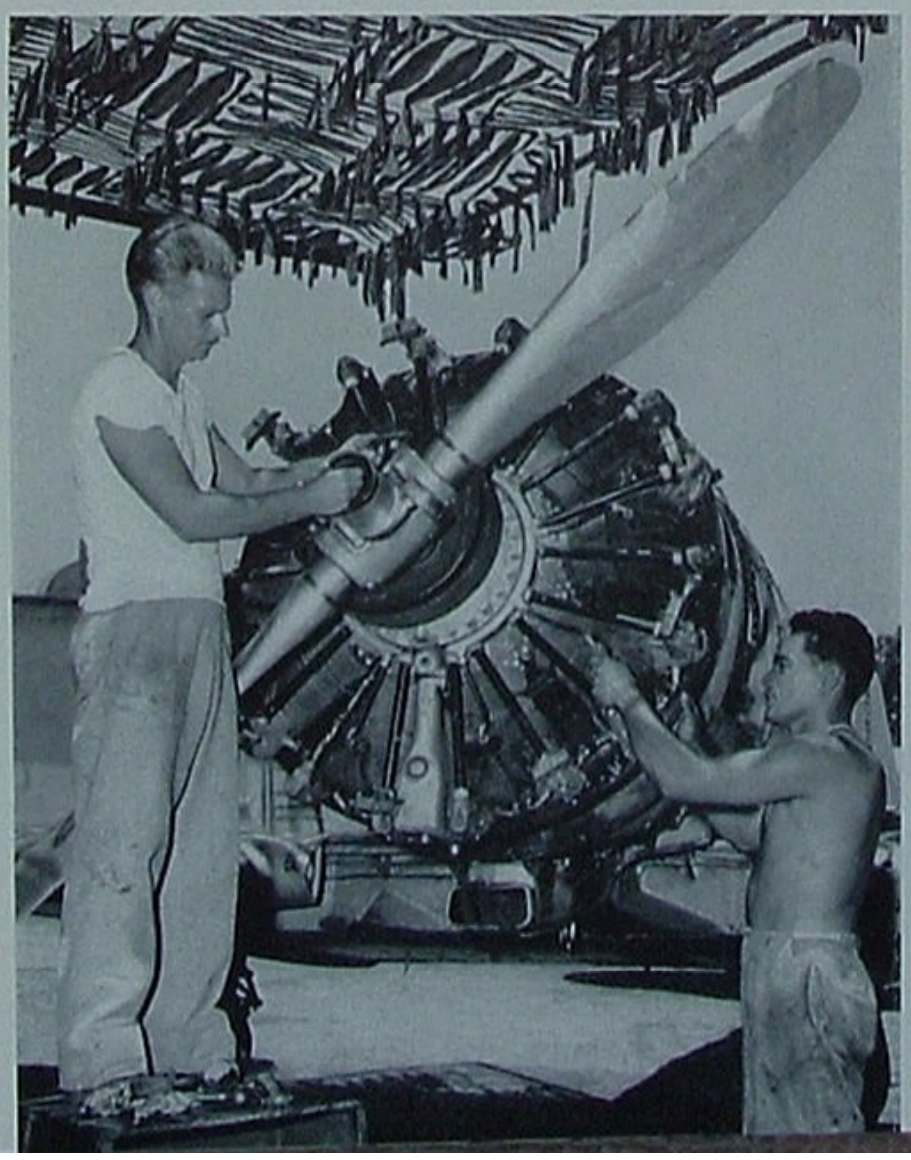
Strictly Big Business

Enroute back to Phoenix you ask questions and get answers to your mind's content, for Johnny knows crop dusting inside and out all the way from Canada to Mexico:

Dusting and liquid spraying by airplane have already become big business and of great importance to the nation's agricultural economy. In some localities, certain crops and vegetables could not survive the insect hordes without applications every week or 10 days of insecticides. Other hardier crops would survive, but regular dusting and spraying during the growing season, principally May to October, are often given credit for a 50 per cent larger harvest.

Both speed and economy are behind aviation's successful venture into agriculture. The much faster speed of airplanes in comparison with other methods makes it possible to halt a pest infestation in minutes rather than hours. This is particularly important when dealing with insect swarms, some of which have been known to destroy a crop overnight. Moreover, airplanes do not damage fields by leaving wheel marks or breaking stalks. They can handle dusting assignments on steep hillsides or other types of difficult terrain. Regardless of whether a field is being irrigated or is not accessible to ground equipment for other reasons, the plane can work without disturbing or being disturbed.

Among insecticides most commonly used to fight agricultural pests are many manufactured products containing such toxic ingredients as sulfur, chlorine, benzidene hexachloride and the war-developed DDT. These are used individually or in many combinations. DDT has been very successful generally. However, in at least one instance a species of fly demonstrated an amazing ability to build up immunity. The flies were hardly annoyed by doses of DDT that had practically wiped out their parents the previous year. It is interesting also that the insecticide prescriptions must be varied to cope with bugs of the same family dwelling in different areas. Apparently, one bug's schnapps is another bug's poison.



Joe Sestak and John Montano are responsible for keeping the Marsh airplanes in perfect operating condition.

The job of taking an insect census is generally handled by entomologists employed by the government or by various manufacturers of insecticides. These men make regular inspections of fields and count the bug population by sweeping rows of plants with a stocking-cap net. After a given number of sweeps or strokes, they carefully identify and count each catch of bugs, reporting the average number caught per 100 net strokes. A systematic check of several areas in each field reveals whether or not the various types of insects are numerous enough to justify dusting. Government entomologists, such as those of Arizona's Agricultural Extension Service, issue weekly bulletins containing such pest information. Entomologists employed by manufacturers perform similar services and also solicit orders for their particular brands of insecticides. The farmer buys his chemicals directly from the manufacturer and contracts with airplane operators only for dusting and spraying.

Airplanes can handle a job that would engulf other types of equipment available on even the best equipped ranches. For example, under average conditions, one airplane is capable of spreading 4,000 pounds of insecticide per hour. Ten airplanes in one four-hour operation can spread 160,000 pounds of dust, 20 pounds to the acre, over 8,000 acres. No farmers have, nor could they afford, enough ground equipment to duplicate that job.

Johnny, who is a good salesman as well as a first-class answer man, tells you that dusting is only a part of Marsh Aviation Company's enterprises. They are equally adept at applying phosphate, ammonium nitrate and other commercial fertilizers to farmers' fields. They have seeded large areas of the West with rice, alfalfa, wheat, oats, flax, green peas. They seeded the largest barley crop ever grown in Arizona. Their planes have engaged in experiments to seed range land by dropping pellets of grass seed and fertilizer, and in rain-making experiments by scattering dry ice among the clouds.

One of their big jobs is that of defoliating cotton just prior to picking. This facilitates machine picking and improves the grade of lower cotton bolls by admitting more sunlight. Another of their successful flying services is selective weed control, wherein they can kill one or several varieties of weeds in a field without injuring the desired crop. With dusts and sprays they have stopped the growth of weeds along canal banks; eradicated flies and mosquitoes from entire towns and cities; brought pest relief to corralled herds of livestock. Per-

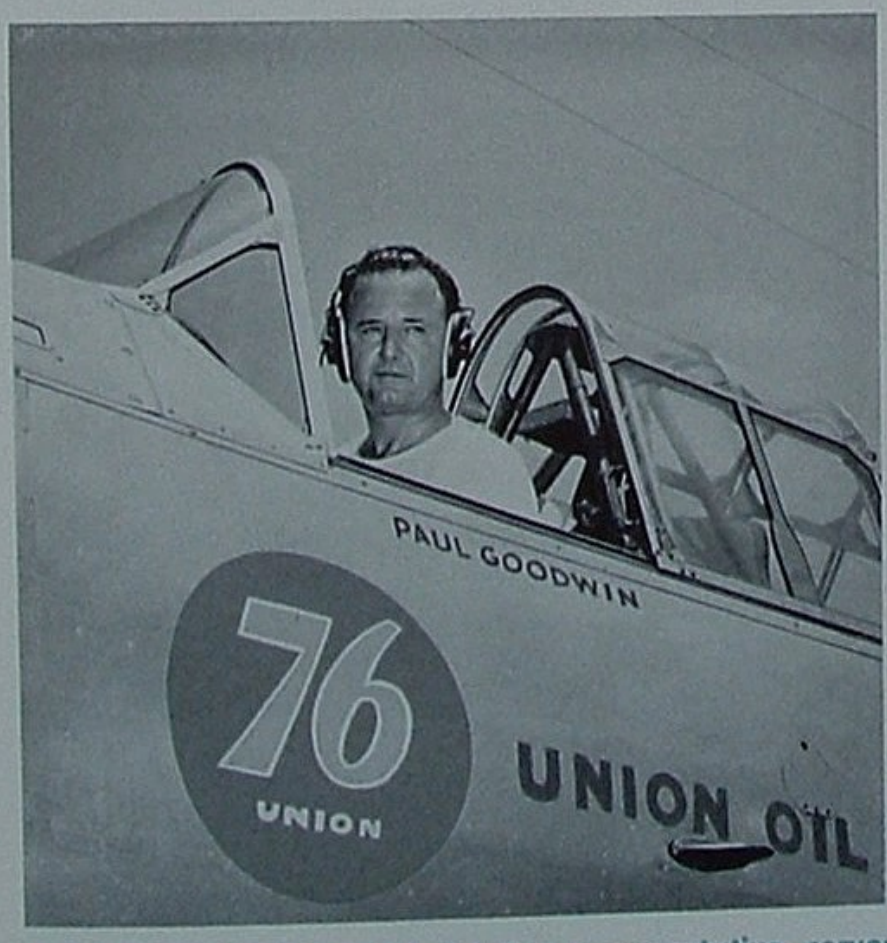
haps their most novel job is that of applying hormone sprays to apple trees. These sprays retard the falling of apples, making it possible for the grower to regulate and extend his picking season.

Bill Marsh

Already you're back at Sky Harbor Airport, more pleased than surprised to see a "76" monogrammed Navy SNJ anchored to the apron. It turns out that Paul Goodwin, Company aviation representative, has just dropped in to call on the Marsh Aviation account, bringing with him as passenger Bill Wilcox, manager of their Yuma branch. You find them seated in an office with William O. Marsh, owner-manager of the crop dusting concern, talking of course about airplanes, gasolines and lubricants.

Bill Marsh, the man, somehow even exceeds your expectations of Bill Marsh, the flyer, who has built some 21 years of aviation experience into an important business. He is tall, slender, brown eyed. You can readily imagine him sliding into the cockpit of any airplane for the ten-thousandth time—or showing the folks every flying and wing-walking trick at some county fair—or flying a burning ship down to the fire extinguishers—or doing acrobatics in a P-38 for the movie cameras. He has been through the entire apprenticeship mill after spending a hard-earned $30 an hour for his four hours of pre-solo flying lessons at Sacramento in 1928.

On the more practical side, he has also personally pioneered much of the West's dusting and dusting techniques. As director of training and chief pilot of Southwest Airways, Inc., he had charge of training 15.000 pilots during World War II, including Chinese, British,



Paul Goodwin, Union Oil aviation representative, serves the Marsh account and others from Alaska to Mexico.

William O. Marsh, founder of Marsh Aviation Co., Inc., has been "at home" in an airplane cockpit since 1928.

Latin-American and other foreign flyers. Today with an organization of 50 airplanes and over 70 employees based at Phoenix and Yuma in Arizona, Holtville in California, Walla Walla in Washington, Ysleta in Texas, and Las Cruces in New Mexico, he can be described as one of the foremost guardians of American agriculture.

Bill isn't one to relate any of these facts about himself. You have to glean them from old friends and newspaper files. Instead, he keeps his feet pretty much on the solid ground of today and his gaze intent upon the future. His fondness for airplanes can be described by no less a word than love; and if ever a man and motto were made for each other, Bill's literary tag is "Don't give up the ship."

While pioneering in the crop-dusting field in 1938, he made 28 forced landings in 12 months, one of them with his airplane afire and his flying suit burning by the time he landed and performed a hasty undress. He has flown through the years uninjured.

He is now writing an article on how to save an airplane from supposedly certain doom because of carburetor ice. Most airplanes have a heat-control device to prevent such freezing, which generally occurs when the humidity is just right and the temperature is between 32 and 70 degrees. The vaporizing gasoline in a carburetor causes incoming moisture in the air to freeze. But, as occasionally happens, the heat-control device fails. What then? "Just reach down and close

Marsh and Goodwin, currently interested in the "bugs" of engine performance under severe operating conditions, give studious attention to one of the crop dusters as it prepares to make a typical cow-pasture landing.

the fuel cut-off valve to the engine," Bill advises. "Keep the craft in a gliding position with the propeller windmilling. As soon as the flow of gasoline into the carburetor stops, so do the vaporizing and freezing. In a few seconds the inrushing warm air will melt the ice. Then, reopen the fuel valve, start your engine, and regain any altitude you have lost in the meantime."

Bill solved this problem one day while flying at high altitude and discovering that his own engine was succumbing to carburetor ice. With two or three thousand feet of altitude to experiment in, he thought out and tried this common-sense solution. The remainder of his journey home was a series of ups and downs, but he landed safely.

Pilots who are mortally afraid of being caught in a downdraft on the lee side of a mountain could well afford another half-minute of Marsh advice. When caught and pitched downward toward the rocks by one of these turbulent air currents, most pilots automatically try to climb. Bill's advice is not to climb. Put the nose down and go down-wind with the rough air. The air current, following the ground contour, often slackens as it descends. Eventually, it has to move up again over any hill or mountain it approaches. By following the current, an airplane can maintain its speed and ride the updraft to gain altitude for the next ridge.

Where Petroleum Comes In

Bill has whipped enough other aviation problems to keep a "hangar-flying" confab in session for many hours. However, his attention, as you find him seated with Wilcox and Goodwin, is centered upon a problem of great interest to the petroleum industry.

You have tinkered with a car, undoubtedly, and know that a carbon-like deposit always forms in the combustion chamber of a motor and around the spark plug points. This is attributed to a combination of factors, among which are the presence of impurities in air reaching the combustion chamber, the leakage of oil vapors through piston rings, and the hardly avoidable presence of non-combustible material in engine fuels. The deposit condition becomes more serious if the engine is in poor mechanical shape or is exposed to severe operating conditions. Eventually the plugs have to be cleaned or replaced.

Airplanes have similar problems and the crop dusters operate under the severest conditions encountered by any commercial aircraft. Overheating is a constant problem. In the eyes of plane manufacturers, the engines operate at a relatively slow air speed in relation to their high power settings, thus the engine gets less air-cooling than the designer intended. Cowl rings, which are designed to force a cooling current of air toward the backs of cylinders, have been removed to provide the dusting pilot with better visibility. The planes carry maximum loads of insecticides, and fly mostly in hot weather, in hot areas, and through the higher temperatures at ground level. Also, they land and take off frequently in dusty fields and are obliged to fly through clouds of their own dust or insecticides, none of which is beneficial to engine performance.

Bill Marsh, whose chief concern is the safety of his pilots, insists on optimum engine performance at all times and began some two years ago to study the problem of combustion-chamber deposits. When one of his pilots reported that a plane had started without warning to sputter and backfire, Bill investigated. The plane seemed to run all right on the ground, so he hopped into the cockpit and took off on a dusting test. He too soon ran into backfiring trouble and on the second test run had to make a forced landing.

It was through this experience that Marsh immediately called in the most expert help available from plane factories and oil companies. Everybody agreed

(*Continued on Page* 23)

6th and Mateo Keeps Pace

ONE of the best known addresses in Company memory is 6th and Mateo Street, Los Angeles. At this location was established Union Oil's second marketing outlet, the first having been a Hardison and Stewart station at East San Pedro, built in 1889 and prior even to the Company's incorporation.

The plant erected at 6th and Mateo in 1901 consisted of two large storage tanks, a pump house and a small, one-room, tin-roofed office to shelter the superintendent and some five clerks. Fuel oil was pumped in by pipe line from Stewart Station in our newly discovered Orange District fields, and this product represented the major source of Union Oil's marketing income. From Oleum, and to a small extent from the Santa Paula Refinery, came such products as kerosene, axle grease and lubricating oil. Gasoline was then largely a nuisance and waste. All of these products were distributed throughout Los Angeles in tank wagons drawn by teams of mules and horses. Business grew to the point where, for several years, a stable of more than 125 horses was kept at the plant.

It was here also that the Company in 1913

Introductions are in order as P. E. Ethridge, resident manager in Los Angeles, opens new office building at 6th and Mateo, our largest and oldest sales terminal.

Nearly a half-century ago, in 1901, fuel oil, delivered throughout Los Angeles in these tank wagons, represented a major source of Union Oil income and gasoline was a surplus product. Today the situation is reversed.

First off, meet the Terminal's supervisory group, (L-R) D. A. Reed, superintendent, and A. F. Van Nest, A. G. Roseman, L. E. Woodley, G. W. Schnittker, plant foremen.

opened its first Los Angeles service station, dispensing Union "Speed and Power" Gasoline, Aristo Motor Oil, free air and free water to any man who dared drive.

And it is from 6th and Mateo today that the Company markets its largest volume of products to the West's greatest metropolitan area. Despite the recent transfer of service station gasoline distribution (representing more than 12 million gallons a month to our new Rosecrans terminal), the monthly throughput at the Los Angeles terminal amounts to approximately 1¾ million units. Around a half-million gallons of lubricating oil and a half-million pounds of grease are combined with lesser quantities of several hundred other bulk and packaged products to make up this total. In addition, this plant does the canning of all Triton and Royal Triton sold throughout the Southwest Territory.

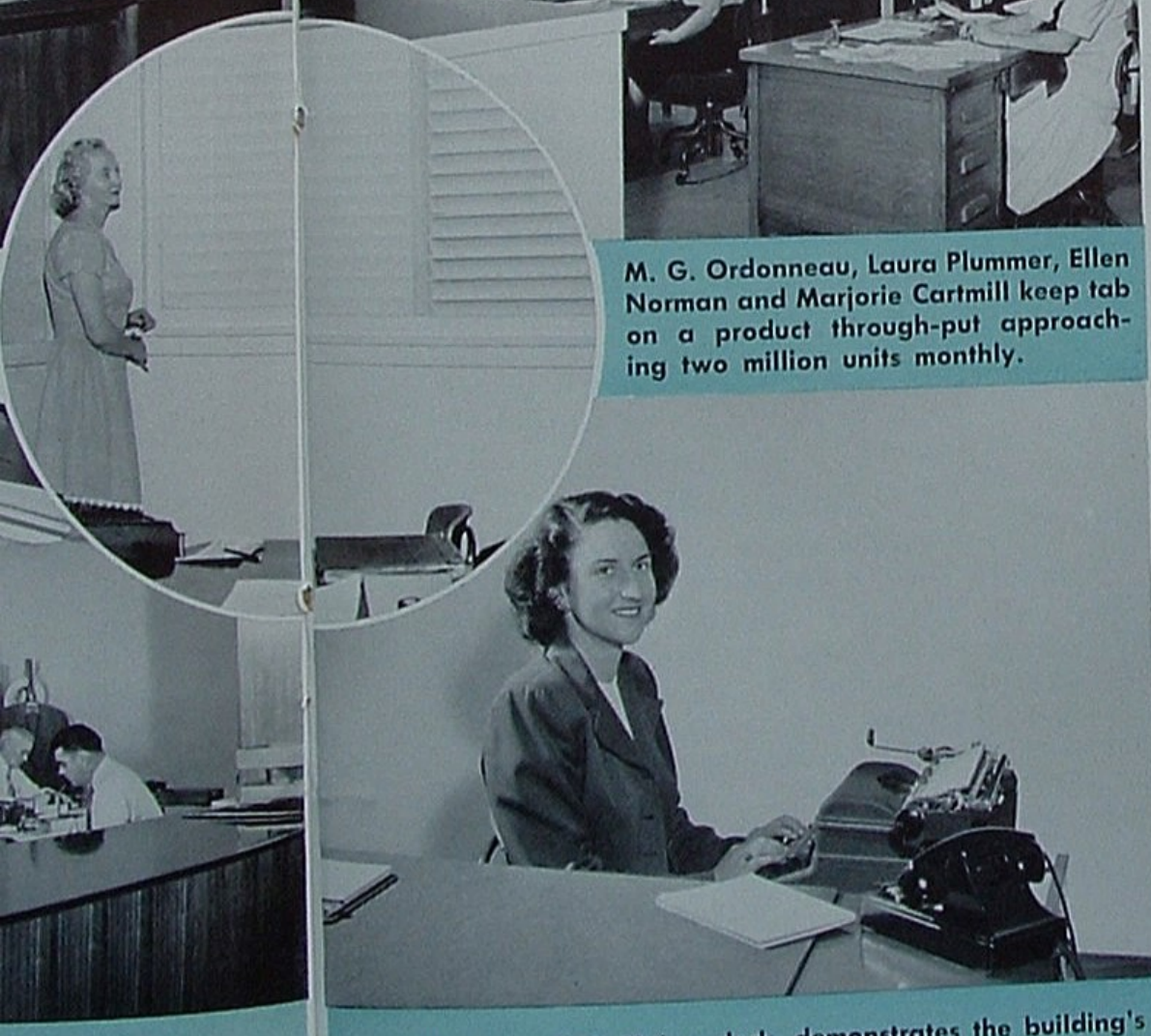
Another significant milestone in 6th and Mateo's important history was marked during July. The process of moving from old office quarters in a corner of the plant garage was completed, and employees, pictured on these pages, had the pleasant experience of initiating a new office building.

The new structure—another architectural product of Raymond Loewy Associates—has a plain and inconspicuous exterior, quite in good taste for a neighborhood of plants and warehouses. Inside, the lighting, air-conditioning, color scheme, furnishings and general arrangement leave nothing to be desired. Front and rear stairways leading to the second floor, provide a new note in office convenience. A large supporting pillar just inside the front entrance has been converted from an

Above, A. D. Gass, district manager, sits down to marketing and operating challenges that are still formidable despite new offices and old successes.

Laura Byrnes handles receptionist and clerical duties at lobby counter while Harold Campbell, Tip Randel and Lewis Trellue are kept busy with orders via telephone.

Here in Monday morning sales conference are R. R. Spiro, R. D. Davis, F. G. Payne, J. G. Myers, J. Sanford, J. K. Steele, P. Vandenburg, E. E. Jones, M. K. Carter, W. E. Rich, M. E. Walsh, Jr., W. R. Ralph, T. S Argyle, V. E. Robinson and L. V. Penney, all field salesmen.



M. G. Ordonneau, Laura Plummer, Ellen Norman and Marjorie Cartmill keep tab on a product through-put approaching two million units monthly.

d clerical duties
, Tip Randel and
s via telephone.

In circle, Ruth Meier, clerk, demonstrates the building's cordless Venetian blinds, while Vivian Smith, above, strikes a working pose that's pleasingly stenographic.

obstruction to a decorative asset merely through giving it a coat of institutional orange enamel. A combination lounge and coffee shop provides luxuries that appear to have won a steady job in our present-day industrial scheme of things.

The new building will become known as "the office" to a staff of approximately 125 distribution and marketing employees. The services of some 75 men and women, including the terminal superintendent and four foremen, are required within the plant to handling warehousing, packaging, accounting and related operations. The separate sales organization includes about 15 tank-truck and package-truck salesmen, 15 field salesmen, 4 retail representatives, a lube engineer, the resident manager and his assistant, the district manager, and several stenographers.

A Los Angeles marketer who probably most appreciates these new office headquarters is Art Roseman, the plant's present shipping foreman. Art was only 15 when he came to work at this plant as an office and errand boy in 1913. He has witnessed the coming of our first tank trucks, the retirement of our last teams of mules and horses. He helped to get the first service station stocked and open for business. He not only knows most wholesale buyers of Company products in Los Angeles —name, address and how to serve the account—but can recall many of their business predecessors. Art, who still has more than a decade of service before retirement, wouldn't have the old days back again, except as refresher course to stimulate our appreciation of the many advantages we enjoy today.

From 1859

ON AUGUST 27, 1949, America celebrated the 90th anniversary of one of its great industries—one that has transformed the lives of all of us. In nine short decades the oil industry has brought undreamed-of comforts, and an industrial miracle such as never before occurred in history. This is how it all began—near a muddy, backwoods town in the hills of western Pennsylvania.

A century ago, the American people depended on brine wells for their salt, and the founding of the oil industry is intimately linked with one of these brine well operators—Samuel Kier, of Pittsburgh. Kier was obtaining not only salt from his wells but a small amount of obnoxious crude oil. Remembering that the Indians had used this oil for medicine, Kier hit on the idea of putting it up in half-pint bottles, labeled "Kier's Petroleum, or Rock Oil, Celebrated for its Wonderful Curative Powers." His advertisement carried a sketch which showed the derricks used in boring and pumping brine wells.

One day in the summer of 1857, while in New York, a New Haven businessman named George Bissell saw one of Kier's bottles of Rock Oil in a Broadway drug store. Bissell was part-owner of a tract of 100 acres near Titusville, Pa., and the picture of the derricks on the label gave him the idea of boring for oil just as other operators bored for brine. To carry out the work he engaged Edwin L. Drake, a former railroad conductor who had retired from that occupation because of ill health.

On reaching Titusville in May, 1858, Drake soon realized the difficulties that lay ahead. To begin with, he needed a reliable, experienced driller, but there was none to be found, and it was not until nearly a year later, in April, 1959, that he found his man, William A. (Uncle Billy) Smith. Smith, who brought along his two sons to assist him, had had long experience as a driller of brine wells, and by June, 1959, the actual operations were under way.

One problem followed another. When they had drilled down a short distance, the hole caved. But this obstacle turned out all for the good—it led Drake to his greatest achievement. He originated the idea of driving a heavy iron pipe to the surface of the rock, 39 feet down, thus protecting the "soft" hole. This, in turn, led to the practice of "casing," which today is universal in the oil fields. Drake further showed his ingenuity by using a steam engine to furnish the power for drilling, which proceeded at the rate of about three feet a day.

On a sultry Saturday afternoon, August 27, 1859, Uncle Billy Smith and his son Sam started to measure the depth of the well, which was then 69½ feet. When

they looked down, there—just below the surface—gurgled an oily black fluid. Greatly excited, they converted a tin pitcher into a bailer, and Uncle Billy and Sam raised several barrels of the substance. At sunset Uncle Billy climbed on a mule and set out posthaste for Titusville with a sample of the oil. Drake's Folly had become Drake's Wonder! A new era had been born!!

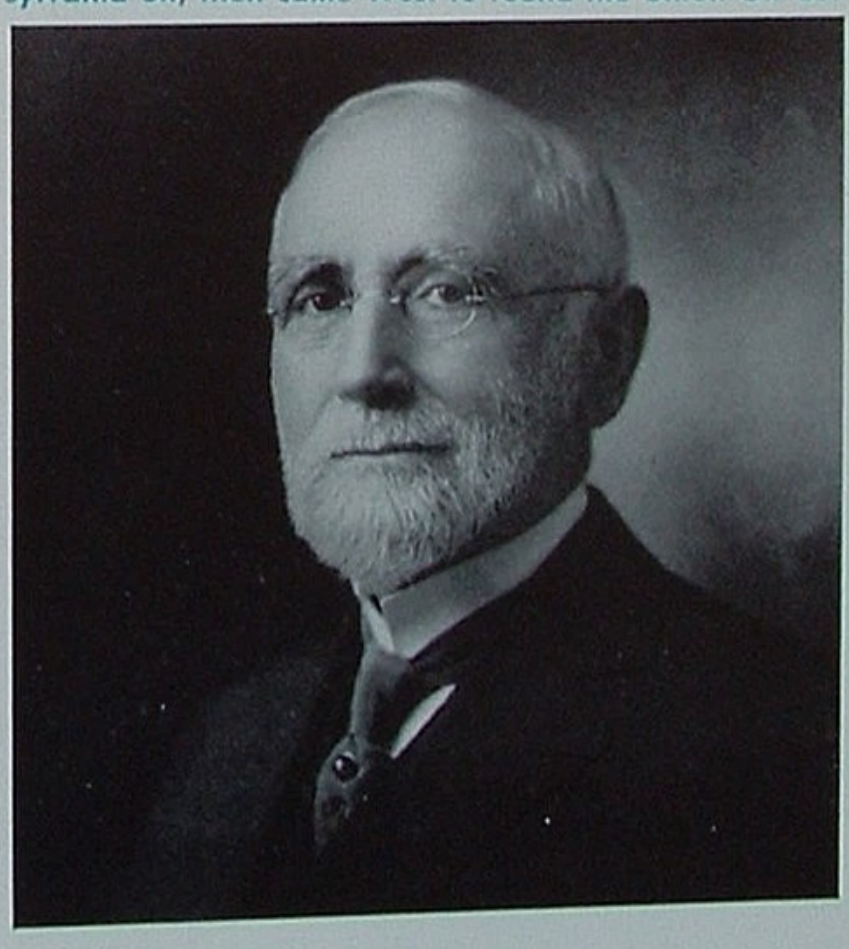
Lyman Stewart

One of the first persons in Titusville to learn about Drake's discovery was a young man of 19 years who was in the process of earning his first $100 by working as a tannery helper in his father's place of business. This young man became so enthused about the possibilities of oil prospecting and development that, within three months after Uncle Billy's announcement, he invested his entire $100 savings in another drilling venture. He emerged from this first attempt with nothing to show for his investment but a dry hole.

However, the young man's ambitions were hardly dampened. Returning later, after three years of Civil War duty in the 16th Pennsylvania Cavalry, to the growing excitement at Titusville and along Oil Creek, he plunged again. Now success awaited him. Within a few years he became a stalwart leader of the petroleum industry in Pennsylvania, gaining wide recognition not only for his personal success but for a number of technical contributions to drilling.

Lyman Stewart, the young man of whom we speak,

Lyman Stewart, when only 19, was among the first to share Drake's excitement. He made his stake in Pennsylvania oil, then came West to found the Union Oil Co.



America's first commercial oil well was two years old when it posed with Col. Edwin Drake, wearing the top-hat, and a group of his associates for an 1861 picture.

devoted the remainder of his life to the building of this great industry. In 1883 he transferred his interests from Pennsylvania to California, where as yet no oil discoveries of any consequence had been made. A zealot rather than a gambler at heart, Stewart at first saw his entire fortune consumed in a disheartening quest for California's elusive oil reservoirs. It was not until he had gone deeply in debt and lost everything except his confidence that he and his partner, Wallace Hardison, drilled their first profitable oil wells in this state. He lived to found the Union Oil Company of California and guide its development into one of the West's greatest industrial enterprises.

The Impact of Oil on Our Lives

When Lyman Stewart was a boy, one writer says, "A candle burning in the cottage, the sound of horses' hoofs upon a dirt road, the muffled thump of the water wheel at the mill represented the light, transportation and power of America." To a great extent this was still true when oil was discovered.

The invention of the wick-type oil lamp led to a search for a low-priced substitute for whale oil—the most satisfactory illuminant of the early 19th century. Chemists had long been at work trying to supply the world with a cheap, safe and efficient illuminant. Beeswax and tallow candles gave poor light. Camphine was dangerously explosive. Whale-oil lamps were doomed to follow the steady decline of whaling. Mineral oils closely allied to petroleum were being obtained by distillation of bituminous coal and shale; but the cost of coal oil in 1859 was $1 a gallon. It was largely for economic reasons that people of that era "went to bed with the chickens."

With the announcement by Professor Benjamin Silliman, Jr., of Yale that kerosene and a number of other products could readily be made from petroleum, the gropings of a century were ended. The coal oil lamp quickly became the kerosene lamp and began to lengthen the days and widen the horizons of mankind.

Then, in 1879, George B. Selden filed a patent on a device for driving a vehicle by the power of an internal combustion engine. At about the same time, Otto, a German, had invented a four-cycle internal combustion engine. Later Daimler, another German, perfected an ignition system, and Carl Benz built a car that was actually driven by gasoline. And, in 1893 George Duryea, inventor of the Benz-built car, drove the first American automobile along the streets of Chicopee Falls, Massachusetts.

In 1896 there were only four gasoline motor cars in this country—one built by Haynes, one by Henry Ford, one by Duryea and one by Benz of Germany. Today we travel anywhere and everywhere in approximately 40,600,000 automobiles, trucks and buses, and in 90,000 commercial and private airplanes. Gasoline has converted a continent into a neighborhood.

Yet the automobile is but one of the benefits that oil has brought us in a brief span of 90 years. Our entire industrial system moves on a film of oil. Without it there would be nothing "modern" in our lives—no great factories, no mechanical transportation systems, no machines for our water and sanitation plants, no asphalt-surfaced highways. The kerosene light has nearly vanished, but its successor, electricity, depends heavily upon petroleum for power and lubrication.

Look about us at all of the objects made or fashioned by man. It is difficult to find a single item that does not owe at least its production, manufacture and transportation in part to the aid of oil.

Production

Edwin Drake's first well was a mere 69½ feet deep. Since 1859, American oil producers have drilled the amazing total of 2½ billion feet, a distance equivalent to 60 times the earth's diameter. More than 400 wells have been drilled below 12,000 feet, and a well in Sublette County, Wyoming, has recently exceeded 20,000 feet in depth.

Today there are 425,000 wells producing oil, along with 65,000 more producing gas. In 26 of our states both oil and gas are produced, while two additional states produce gas alone. All in all, since Uncle Billy bailed out the first pitcher of oil, the American oil industry has produced an astonishing total of 37 billion barrels.

Despite the fact that an average oil well costs more than $40,000 to drill and some individual wells have been known to cost a million dollars, the search for new reserves goes on. Some 13,000 companies are engaged in the production phase of the oil business alone!

Transportation

When Drake's well, producing at a rate of 20 barrels a day, was followed by many other wells along Oil Creek—whose total annual yield had mounted to an estimated 500,000 barrels by 1860—transportation became the big immediate problem. Wagon trains were tried and found wanting due to hopelessly bad roads. Barging experiments on the rivers cost many lives and many large cargoes. In 1865 Samuel Van Syckel built the first pump-operated pipe line—a five-mile installation of two-inch wrought iron tubing, extending from Pithole to the Miller Farm, and carrying 800 barrels of oil a day. By 1865 railroads had mounted heavy wooden tanks upright on flat cars and made their first successful bid for the hauling job. The first transoceanic shipment of oil was made in 1861, when five barrels were delivered from Philadelphia to London. However, the first vessel fitted with iron tanks for the transport of petroleum was the CHARLES, a Belgian sailing ship which began carrying 7,000 barrels of oil per voyage from the United States to Europe in 1869.

Amid these humble attempts modern oil transportation served its apprenticeship. Today more than 110,000 tank trucks serve this nation. Oil barges, each capable of handling the entire 1860 production, are a familiar sight on every major river and in coastal harbors. Pipe lines, some of them 36 inches in diameter, cross the continent in every direction, exceeding even our railroads in total mileage. Well over 100,000 tank cars, mostly privately owned, have replaced the original flat cars and continue an important service. And America has nearly 900 ocean-going tankers with capacities of 2,000 tons and over.

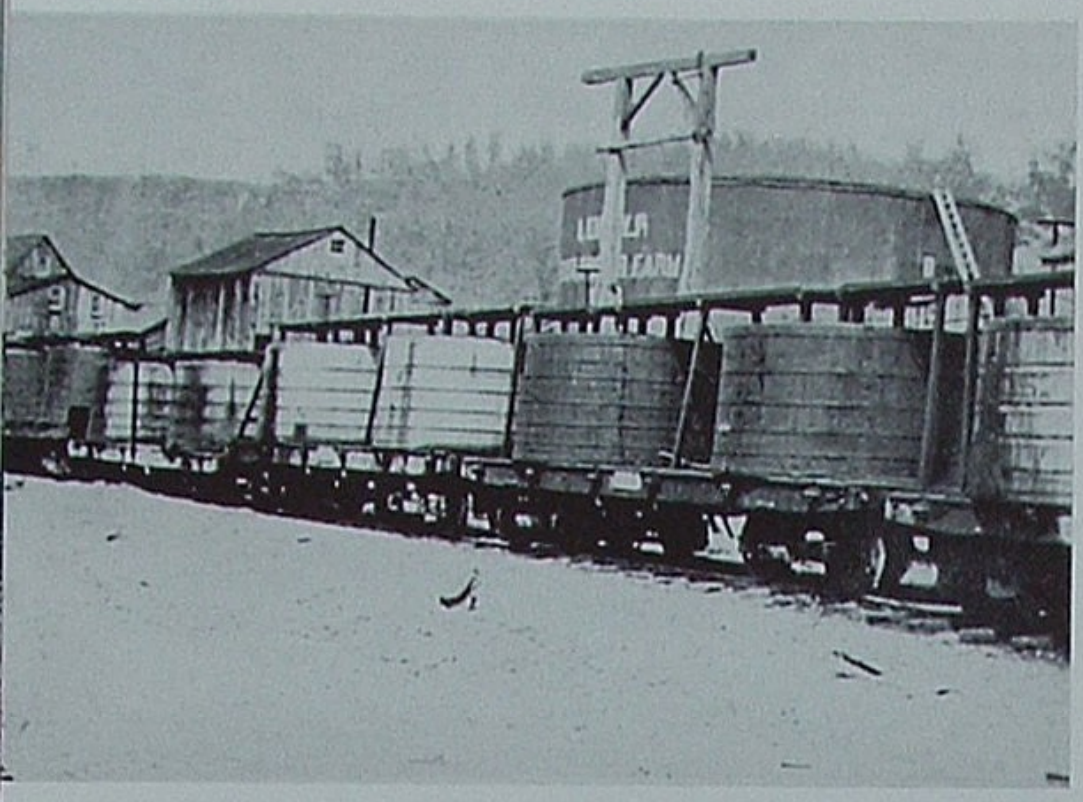
Refining

Coal oil refiners were among the purchasers of the 20 barrels of crude produced daily from the Drake well. Some quickly adapted their plants to distill the new oil; others were forced out of business by the low prices which shortly prevailed, the market dropping from $20 a barrel in 1859 to 10c in 1861.

The first oil refinery built in the Oil Creek region was constructed in 1860-61, one mile below Titusville. The first crude that went into the still cost $10 per barrel, and before the product could be placed on the market, the same type of crude could be bought at $2 a barrel. Within six or seven years more than 100 refineries were built. Many of these consisted simply of an iron drum, which was quickly set up, and a condenser, with which the operator secured distillate, or kerosene. Many fires and explosions occurred. Several plants never completed their first run of crude.

It is a far cry from those early days of wasteful dis-

Transportation was a tough problem in the early days of oil. At Funkville, Pa., these cumbersome flatboats loaded with barrels of crude were floated downstream.



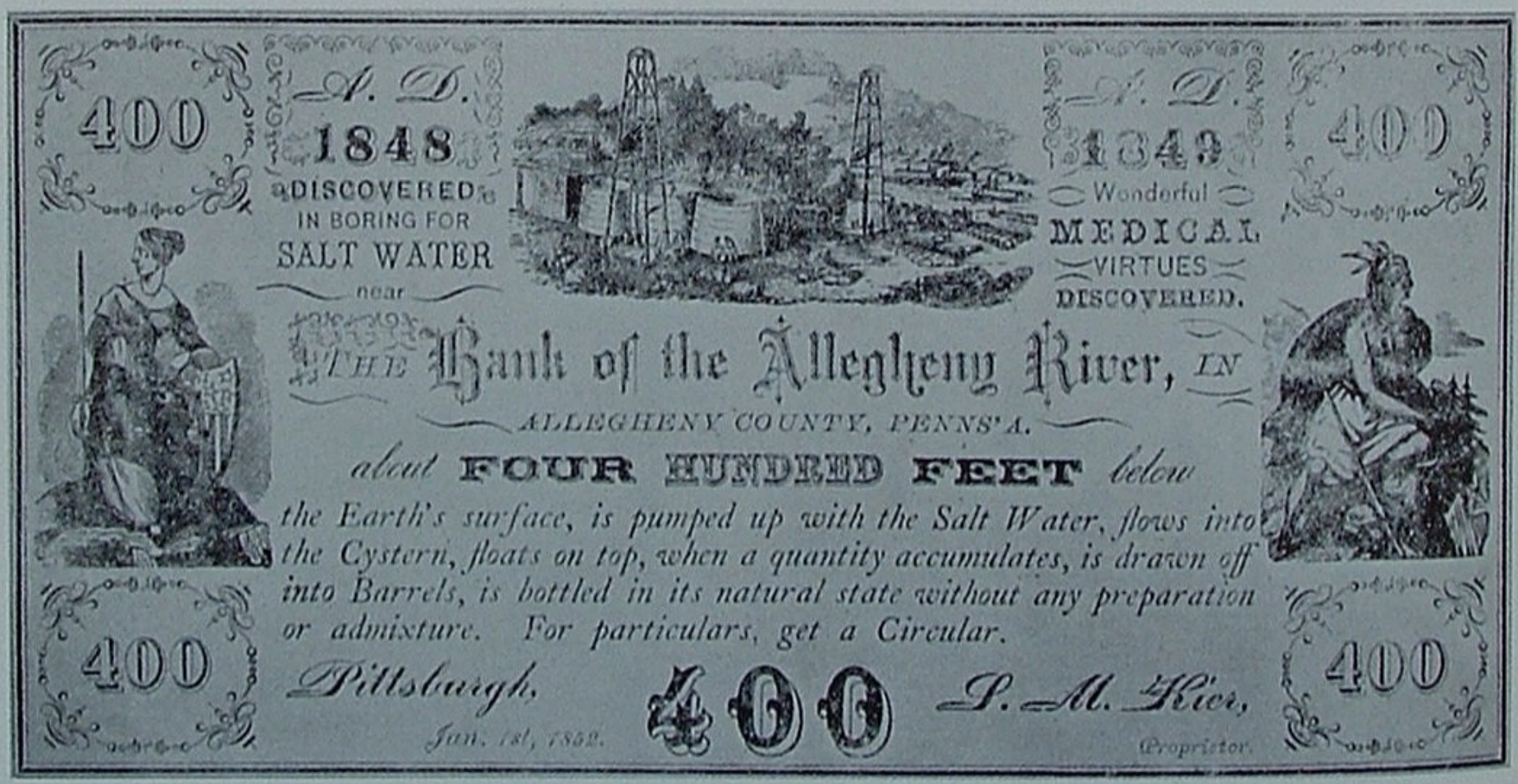
The first railroad tank cars were merely two large wooden tanks mounted on a flat car, the two tanks holding from 1,700 to 1,900 gallons when out-gauged.

tillation, which saved only the kerosene, to modern refining, which utilizes 100 per cent of the crude stock. Although refining processes in recent years have become complex chemical operations, simple distillation remains the basis. Crude oil is placed in large tanks and heated slowly. The more volatile products vaporize first, leaving the heavier ones as residue. Redistillation of some of these products accounts for still others, and when these, in turn, are subjected to further manufacturing processes, the total number of products obtained mounts into the hundreds.

The most important petroleum products secured by modern refining methods are gasolines, domestic diesel and heating oils, industrial fuel oil, bunker oils for ships, lubricating oils and greases, solvents, kerosene, waxes, coke and asphalt. Chemical products from petroleum are becoming increasingly important, with synthetic rubber and plastics among the best known. Oil also finds its way into cosmetics, medicines, insecticides, ink, paints, and thousands of other articles of daily use.

None of these products could be created were it not for huge, complex refineries that have been developed from the first primitive stills. Some of today's multi-million-dollar catalytic crackers tower 25 stories high and cover an area of 30 acres. In addition to manufacturing large quantities of base stock for motor fuel, a "cat cracker" will produce enough fuel oil to heat 50,000 homes. Each consumes practically enough electric energy to light a city of 10,000 homes; uses as much water as the cities of Kansas City and Omaha combined; contains enough steel to build 35,000 automobiles; and requires 22,500,000 man-hours to build.

Yet, men of learning and vision today tell us that the history of oil is only beginning!



In 1849, Samuel Kier attributed "wonderful medical virtues" to a substance (crude oil) pumped up with salt water from 400 feet below the earth's surface. This medical ad inspired Drake to drill first oil well.

Santa Paula Building To House Oil Museum

MANAGEMENT BULLETIN #29

The ground floor of the Union Oil building in Santa Paula, which was the birthplace of the Company in 1890, will be converted into a museum to house an historical display of oil industry equipment, photographs, documents and other material pertaining to the development of the oil industry in the West.

Although the California oil industry will be 80 years old in 1950, there has been no one gathering place for the materials used in the development of the industry. The time is rapidly approaching when many of the "museum pieces" of the industry will be gone forever if no effort is made to preserve them. In order to prevent this and provide a permanent public display, we are establishing this museum.

The museum will not be limited to Company exhibits alone. We are anxious to obtain material for this collection from all sources either on a loan basis or as an outright donation to the museum. It is hoped that over a period of time we will be able to develop historical exhibits on geology, exploration, production, transportation, refining and marketing.

In all probability, there is a great deal of suitable material located in the various departments throughout the Company. Suggestions for exhibits should be passed along to the Field Department or Public Relations Department.

The museum will be formally opened in 1950 as a part of our 60th Anniversary Celebration. However, it will take a considerable period of time to prepare the necessary exhibits, and the collection of material will be started immediately.

COKING PLANT FOR LOS ANGELES REFINERY

As part of the long-range program to ease the surplus of heavy fuel oil, a 25,000-barrel-per-day coking plant will be constructed at the Los Angeles Refinery at Wilmington and new refinery boilers will be installed to consume coke. This part of the program will be commenced in the near future, while research and engineering studies will be continued on the hydrogenation and desulfurization plants which will be added in the future. The first modern coking facilities on the Pacific Coast were installed at the Company's Oleum Refinery in 1940.

In the coking process, crude oil is "cracked," leaving a residue of less than 15 per cent of the barrel as coke. The distillate from the coking operation is further processed, producing gasoline, diesel oil and other middle-of-the-barrel products. The process is almost completely flexible, producing the quantities of these products needed to meet the market demand.

With 16,000 barrels per day of heavy crude oil production currently shut in, it is anticipated that the new coking plant will bring the Company's fuel oil production well in balance with the demand. If the shut-in wells were to be opened up, it would require construction of another coking plant of the same size to avoid accumulating a new surplus. Our estimates indicate that the overall long-range program necessary to convert our heavy crude oil into the products for which there is a demand will cost between $40,000,000 and $70,000,000.

This points up the problem of the tremendous sums of capital the oil industry requires continually if it is to do a job of meeting the petroleum demands of the public. Because of double taxation on dividends and the high capital gains tax, people are reluctant to invest their savings in industry. Therefore, the oil industry has had to generate through earnings a large part of the money necessary to provide the modern plants and equipment needed in our business. Excessive taxation and punitive government regulations could well make it impossible for the industry to pass on to the public the benefits of its technical know-how. This could only result in a decline in our service to the people.

from Reese H. Taylor

FIELD The Field Department currently has 31 active drilling rigs working on new wells, 16 of which are located in California. The principal sites of operations in California are the Wreden Ranch located on the Carizzo Plains and in the Los Angeles Basin. A good well was completed in Hole No. 29 at East Coyote, Los Angeles Basin, for an initial production of 256 B/D. Emphasis is being placed on the development of light refining crude.

Of interest outside of California are developments in the State No. 3 well at Ocean City, Washington, which has several encouraging showings to the present depth of 7,956 feet. Tribal 194-12, a prospect well to the Devonian on the Black Foot Indian Reservation in Montana, is indicating to be a producer in the objective horizon. At Moxa, in southern Wyoming, Government No. 1 at 12,322 feet had no indications of commercial production. In the Gulf Coast, an especially good gas well was completed at A. D. LeBlanc No. 1 with 92 net feet of gas sands.

The Dry Ice Plant at Santa Maria, which was completed last October, is operating at capacity—better than 50 tons a day—during its first summer season.

from Sam Grinsfelder

MANUFACTURING An arrangement has been concluded with General Chemical Company whereby they will install facilities to convert hydrogen sulfide from the Los Angeles Refinery into sulfuric acid. This disposes of a material which purportedly causes smog upon combustion. Actually, however, it appears highly questionable, after recent research, that sulfur dioxide produced by burning the hydrogen sulfide is a contributor to smog. The Company has, however, installed facilities for separation of hydrogen sulfide in order to cooperate to the maximum with the Los Angeles County smog program.

Our Marketing Department was successful in bidding on 175,000 barrels of jet propulsion fuel meeting the new military specifications, and Manufacturing is now preparing this material. It is interesting to note that the requirements for this fuel are now becoming significant quantity-wise.

Asphalt liftings out of Maltha have reached such a high peak that it has been necessary to authorize installation of an additional asphalt loading rack for this refinery.

from Basil Hopper

MARKETING In the near future, uniforms harmonizing with the new truck colors will be used by all truck salesmen, transport drivers, consignees' employees and other operating truck equipment. The basic color will be very similar to the new Air Force uniforms, and will replace the forest-green uniforms at present used. The material is outstanding in quality and the items will be supplied in different weights and types of material to suit all climatic and operating conditions, each fabric having been field tested. These uniforms will be sold to Company and consignees' employees at actual cost without the addition of overhead. The procedure for ordering uniforms will be simplified, but at no sacrifice to individual fitting from the standpoint of comfort and appearance.

Under the joint sponsorship of Sales Services and Research Departments, sales training courses have been held at Oleum Refinery during the past 18 months and 217 sales representatives have participated, including district managers, resident managers, salesmen, lubrication engineers and retail representatives. The classes have also been attended by a number of our Foreign Sales representatives and distributors, providing them with a type of training not available in their respective countries. The course lasts two weeks, and members of the Research Department staff cover such subjects as lubricating oil and grease manufacture, laboratory testing, application of products and kindred matters. These subjects are discussed in the classroom and then demonstrated throughout refinery operations. Classes usually consist of 12 men.

In addition to the sales training course, there is in operation a technical trainee program, a project of Sales Services, Employee Relations and Manufacturing Departments. Likely candidates with adequate personal and educational qualifications are selected jointly by Employee Relations and Marketing for training in a marketing territory for one year, comprising all types of sales activities. If during the year the trainee comes up to expectations, he is given training at both Wilmington and Oleum Refineries for one year, after which he is given a permanent assignment in one of the territories or Head Office. This program is limited to three or four men a year. Last year the technical trainees received their research and refinery training first and were then assigned to the field. The present method was adopted in order to determine the trainee's aptitude for sales work before making the investment in his technical training.

from W. L. Spencer

MARINE Early in July the tanker PAUL M. GREGG delivered a cargo to the U. S. Smelting, Refining & Mining Company at Nome, Alaska. This port, located on the Bering Sea and within a few miles of the Arctic Circle, is seldom free of ice before July and has no harbor. Cargo was discharged into small barges manned by Eskimos. The vessel anchored 1½ miles off the mouth of Snake River and the barges were towed by tugs over the bar and out to the tanker. Handling of cargo in this manner, although a hazardous and time-consuming operation, was accomplished without undue delay.

from Capt. J. B. Stene

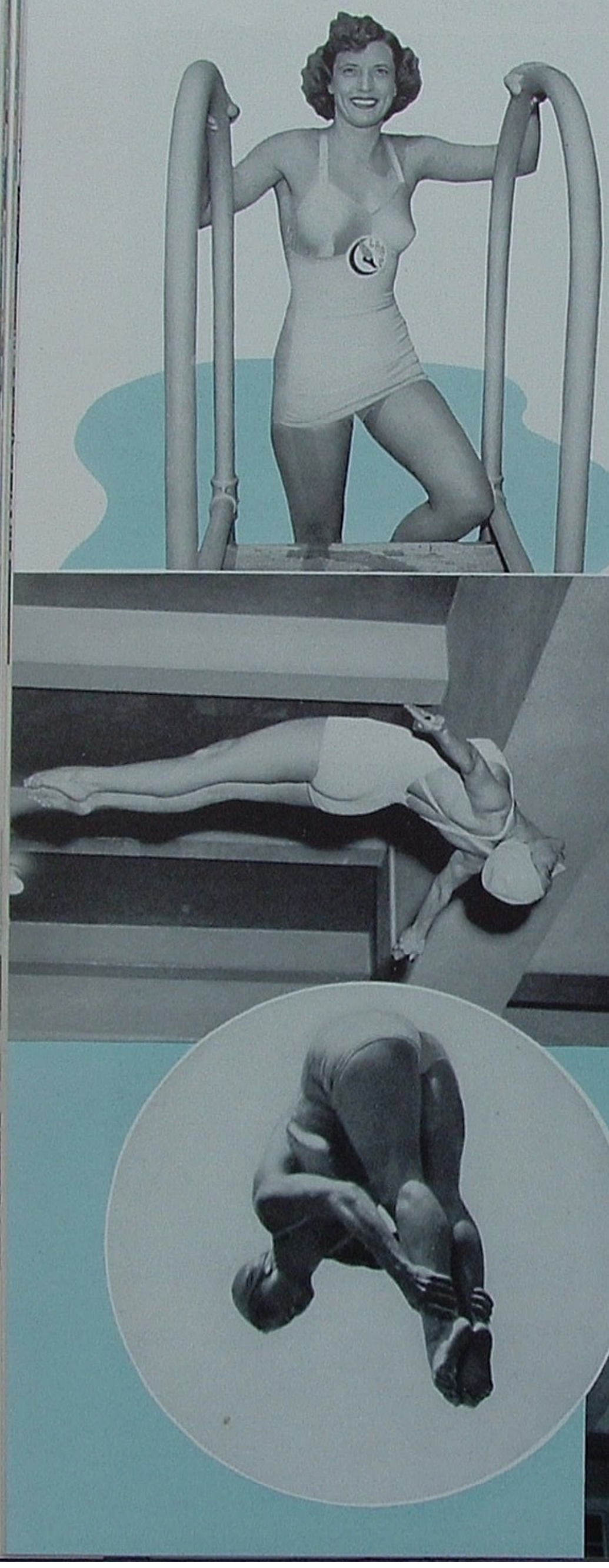
Organization Changes

S. J. MEARES was appointed division manager of our Central American Division July 15 by the Company's Foreign Sales Department. Meares. a graduate of Georgia Institute of Technology, worked for a number of years in Panama and Central America before joining Union Oil in January, 1946, as division engineer. He became assistant manager early this year.

W. S. CHRISTOPHER has been appointed by Central Territory as district manager at Fresno, effective July 12. It was in Fresno that Christopher joined the Company as an assistant agent in 1932. Later he served as resident manager at Hanford, Fowler, Monterey, Woodland and Fresno, as well as in other sales capacities.

R. H. McGOUGH is the new technical representative, New York office, effective July 19. He joined the Company in 1943 as a technical trainee upon obtaining his degree in chemistry at the University of Washington. After several chemical and engineering assignments at our refineries, he was appointed supervisor of employee relations at Oleum in 1946.

D. P. HUNTER returned to California to his new assignment as manager refinery sales on August 16 after serving a year in Chicago as our special representative. Starting with the Company as a service station operator in 1927, he later served as resident manager in several Southwest Territory locations and as district sales manager in Portland and San Jose.



High In Diving

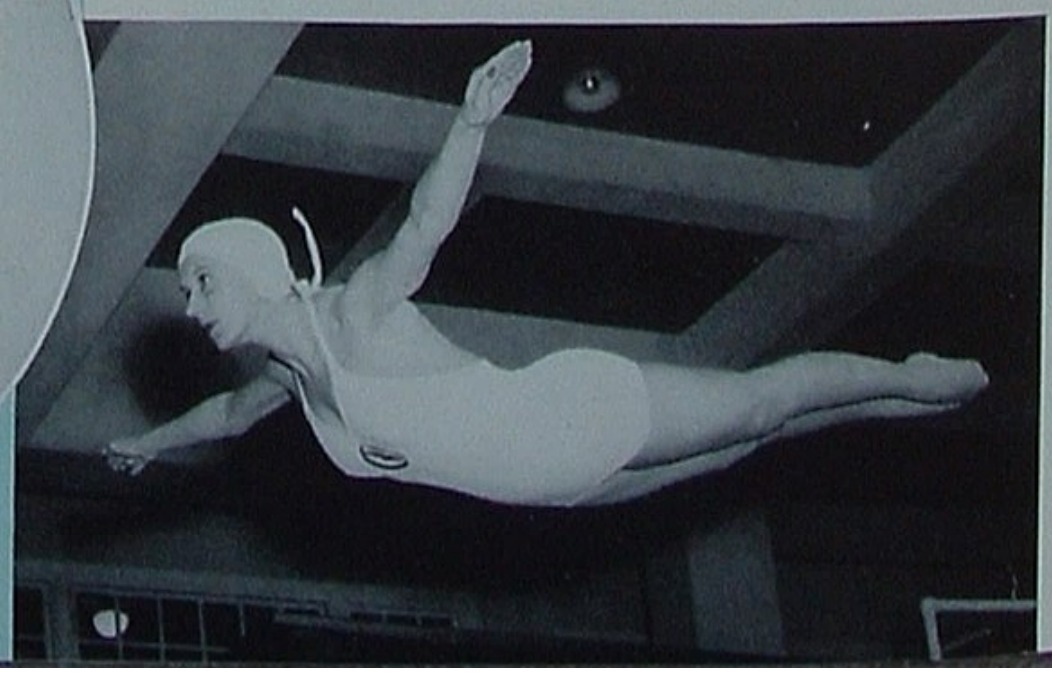
WE have a girl in our midst who has no trouble whatever in making oil and water mix—occupationally, that is. She is Betty Colvin, who divides most of her daylight and evening hours between a typewriter keyboard in Head Office Employee Relations and a diving board at the Los Angeles Athletic Club.

Betty began her athletic career when a high school freshman in Waterloo, Iowa. She took to Waterloo like a duck (excuse our pun), soon becoming springboard champion of the entire state and gathering in the backstroke swimming title as well. She continued as queen of Iowa's divers for four years, winning a number of mid-West titles in the meantime. At national diving meets in 1946 and 1948, she placed sixth nationally in the springboard events.

It was in 1947 that Betty migrated to California and climbed to tower diving. This branch of the sport remains aloof to dives of less than 16 feet and places principal emphasis on graceful executions from a platform altitude of 33 feet. She mastered the higher technique with sufficient speed and grace to be ranked second in the junior nationals and third in the senior nationals for 1947.

As is evident, Miss Colvin has competed in some of the biggest meets and against the world's foremost women divers, including Vicki Draves, the 1948 Olympic champion, who has now turned professional. Betty is steadily improving under the expert coaching of "Rusty" Smith, athletic director at the Los Angeles Athletic Club.

(From top) The climb of Betty Colvin, Union Oil stenographer, to a high ranking among American divers is accounted for by this camera evidence. From the 10 foot springboard and the 33 foot tower as well, she does the half gainer, front jack-knife, swan and a full repertoire of other difficult dives as only champions can.



Petroleum was greatly in evidence at this Independence Day Regatta. It meant a livelihood and more leisure to many celebrants. It powered their comfortable transportation and racing thrills. We provided the trophies.

IN THE SPORTLIGHT

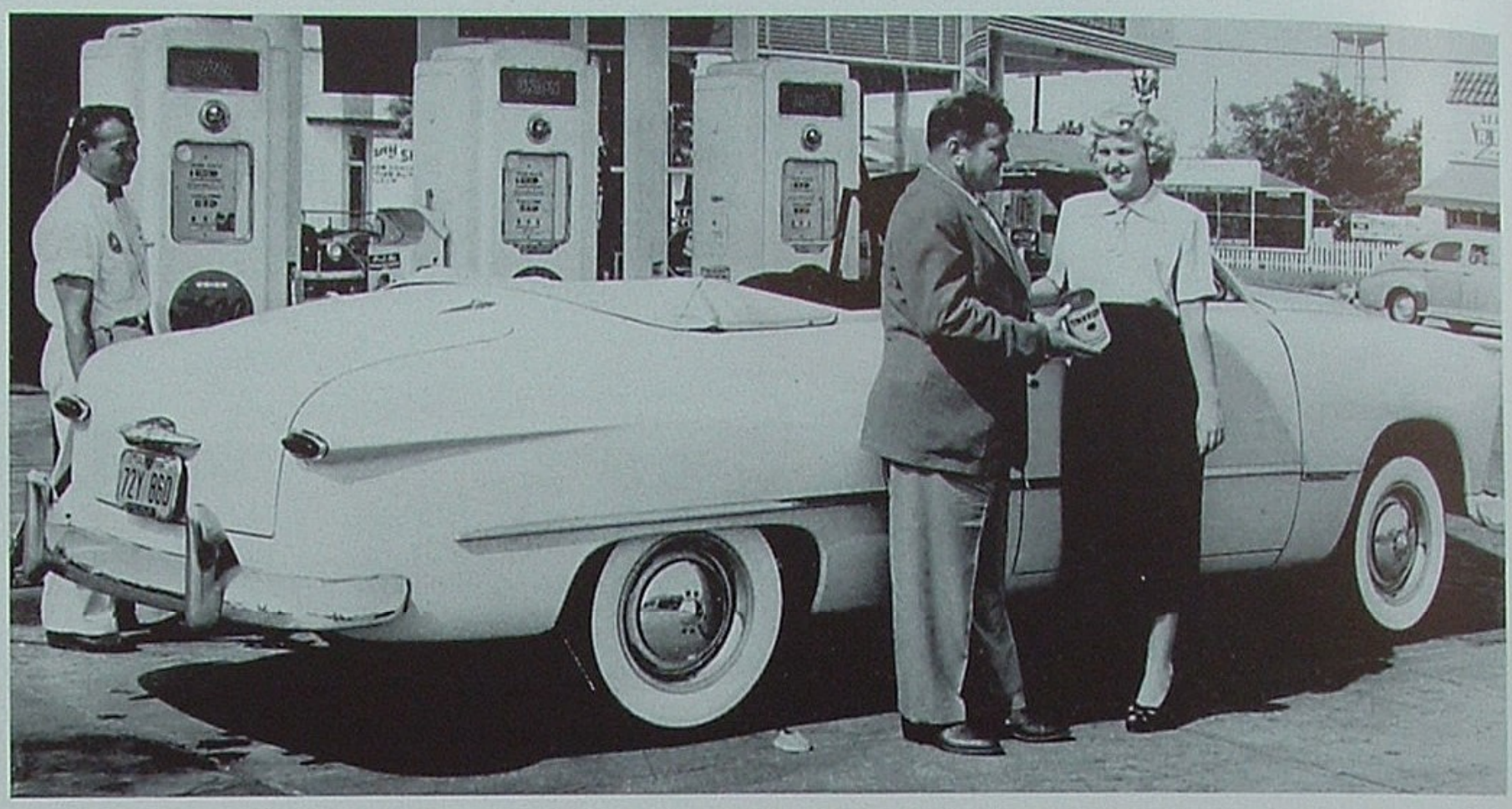
"FIGHTING to win a trophy in any contest always adds to the competitive spirit of the participant. Union Oil Company of California has generously donated the 19 beautiful trophies now on display at the judge's stand. To show your appreciation to Union Oil Company, we suggest that you stop at one of their fine service stations on your way home and fill your car with '7600' Gasoline and that fine Triton Motor Oil."

Such was the good advice offered by the Long Beach Junior Chamber of Commerce announcer at their July 4th Regatta, held in the Long Beach Marine Stadium. Listening was a great holiday crowd of 12,000 people who had gathered to watch some of the world's fastest hydroplanes compete for the coveted mantel ornaments.

The boats used in these thrilling races are classified according to design, length of hull, cost of power plant and piston displacement. One boat in the "225-open" class has set a world's straight-away speed record of 92.54 miles per hour. However, when two single-buoy turns are injected into a race, the small craft do exceedingly well to approach an average of 63.604 miles per hour, the Stadium record.

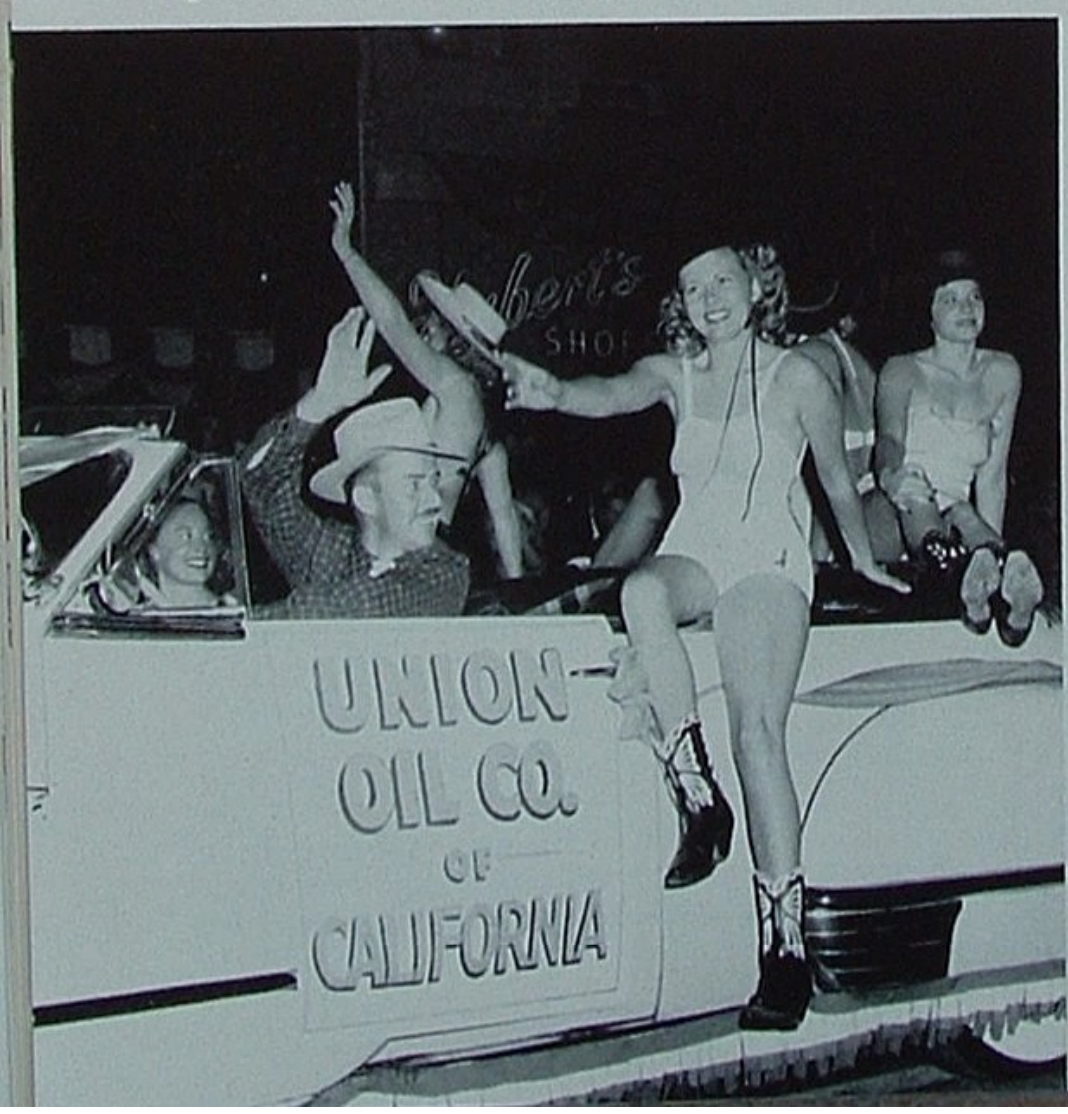
This year's regatta, at which handsome Union Oil-engraved trophies were presented to all winners, was one of the most successful ever. Gate receipts are being used by the Junior Chamber to develop a public recreation area and small boat harbor second to none.

Ray Ingram, Long Beach district manager, handled the trophy presentations faultlessly, although it turned out that his assistant, Chris Talbot, hails from Richfield.



THE LUCKY WINNER, Miss June Meeks, of this 1949 Ford, received also a free Triton oil change and Stop-Wear lube job on demand. Making the oil presentations were M. L. Stevenson, lessee, and Wynn Monroe, resident manager, both of Watts.

At a gala drawing the previous evening, (L-R) Jack Hornsby was emcee, Miss Meeks came up with the right number, Dennis Day drew the winning stub, and Forrest Smith, former Union Oil service station manager who now owns a chain of "The Clock" restaurants, was the generous automobile donor.



"PULLING LEATHER" in this year's Colmo del Rodeo night parade at Salinas was McLean Small, our resident manager. His following of comely "bare-back" riders included Jean Carter, Marian Smith, Jerry Blair and Lita Harvel, all peaches from "America's Salad Bowl." Unsuccessfully keeping Max's eyes riveted to the driving chore was Mrs. Small, who obviously takes no back seat in any beauty parade.

CROP DUSTING—continued from page 8

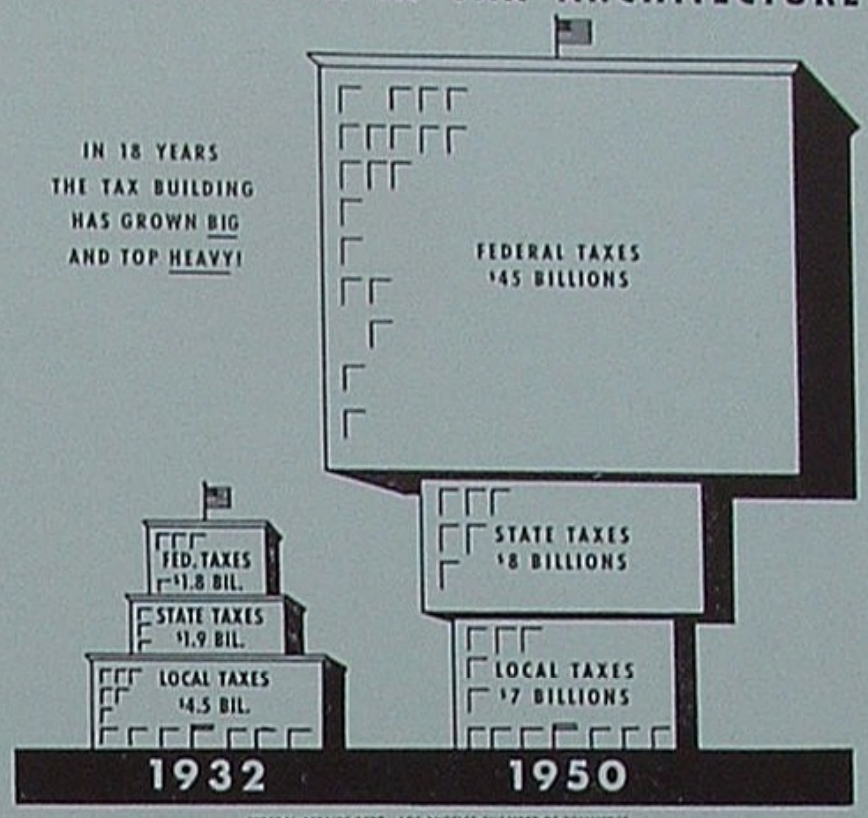
that overheating, due to severe flying conditions, was largely to blame. But Marsh had a job to do despite the conditions. All he wanted to know was, "How can we live with it?"

As you sit in on the conversation at Sky Harbor today, it is pleasing to hear that the crop dusters now *do live with it* despite an occasional inclination of their planes to backfire when overheated. Each Marsh engine now uses larger carburetor jets and can quickly be adjusted to a richer fuel-air ratio. The richer mixture promptly reduces head temperatures to normal and permits plane and pilot to get home safely at no greater cost than a few more pints of Union aviation fuel.

Bill Marsh is highly complimentary of the Union Oilers from Research and Marketing who have come to his technical rescue. Often the names of our "Dinty" Moore, Paul Goodwin, Ray Ingram and Bert Goughnour fit into this aviation success story.

Besides relying 100 per cent on our aviation gasolines to power his planes, this loyal customer has a Union Oil salesman's enthusiasm for T5X Aero Oil. He was one of the first customers to test our compounded lubricating oil in airplanes and has used it exclusively since the first experiment. He tells you that the new oil has eliminated yesterday's ring sticking and valve sticking problems. The engine life of his planes has been increased. All of this adds up to lower maintenance costs and, most important, greater security for the pilots.

THE NEW LOOK IN TAX ARCHITECTURE



The above represents total taxes, collected in the United States by Federal, State and Local (counties, cities) Governments. Federal taxes for 1950 are as included in the President's Budget including existing payroll taxes but excluding any proposed increases.

SERVICE BIRTHDAY AWARDS

September 1949

Forty Years

Anderson, Arthur W., H. O. Comptroller's

Thirty-Five Years

Lazear, Woodson, Central Territory
Smith, Arthur A., Oleum Refinery Mfg.

Thirty Years

Alger, George H., So. Div. Field
Butler, Wm. O., Coast Div. Field
Cederlof, Francis H., H. O. Comptroller's
Limbocker, Lyman E., H. O. Comptroller's
Petersen, John E., Southwest Territory
Wilson, Joseph A., H. O. Legal
Witter, Merlin C., H. O. Treasury
Woods, Gerald A., H. O. Manufacturing

Twenty-Five Years

Dunn, Herbert C., So. Div. Pipe Line
Holbrook, Delbert, Coast Div. Field
Keahey, Louis E., Central Territory
Rockwell, Robert H., Southwest Territory

Twenty Years

Bakala, Chester C., No. Div. Automotive
Benham, Grant A., Research-Wilmington
Boyd, Paul H., Northwest Territory
Hammer, Harry G., L. A. Refinery Mfg.
Koogle, Jonothan E., H. O. Land
Leonard, Lawrence C., Central Territory
Ordronneau, Marcel G., Southwest Territory
Patterson, Robert H., Oleum Refinery Mfg.
Stea, Salvatore, So. Div. Field
Svensen, Sverre M., No. Div. Pipe Line
Wills, Roy J., L. A. Refinery Mfg.

Fifteen Years

Barth, Florence M., Central Territory
Cheesebrough, Floyd C., Valley Div. Field
Hagner, Gertrude A., H. O. Mfg.
Hicks, Ewing W., Coast Div. Field
Hockenberry, Jerry I., So. Div. Field
Holt, Fred T., Central Territory
Livingston, John A., Oleum Refinery Mfg.
Lundin, John A., Cut Bank, Mont.
Meldrum, Gilbert W., Oleum Refinery Mfg.
Norton, John W., Oleum Refinery Mfg.
Richardson, Lessie J., So. Div. Field
Steele, Marion D., So. Div. Automotive
Woodley, Livingstone, Southwest Territory

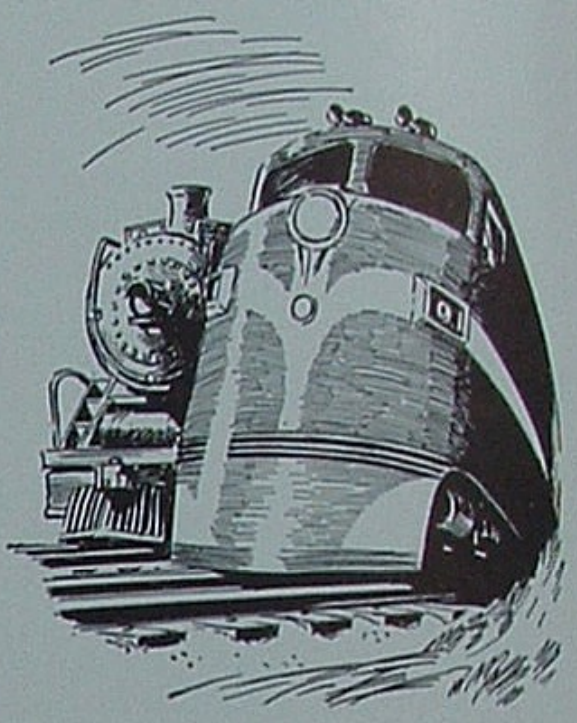
Ten Years

Cambra, Lawrence, Central Territory
Gibson, Ralph H., Northwest Territory
Green, Glenn G., Cut Bank, Mont.
Snodgrass Agnes K., H. O. Comptroller's
Steele, Alice, H. O. Comptroller's
Sutherland, Wm. Audley, Marine-Wilming.
Tufts, William M., Southwest Territory

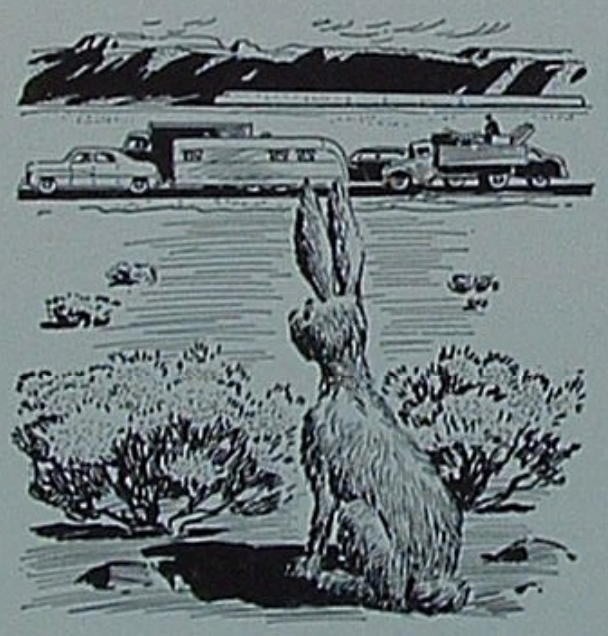
How the profit system forces improvement

1. Historically, natural gas has always been a cheaper fuel for industrial plants than fuel oil. West Texas has an abundant supply of natural gas but few industrial plants. Southern California, at the end of the war, had a limited supply of natural gas and many industrial plants.

2. Therefore, it made good economic sense to build a natural gas pipe line from West Texas to Southern California. And as soon as the pipe line was in operation—late in 1947—industrial consumption of fuel oil in the Southern California area dropped off 51,000 barrels per day.



3. During this same postwar period, western railroads began an intensive program of converting from steam locomotives to Diesels. This made good economic sense too. But it also meant that railroad consumption of fuel oil dropped from 126,000 barrels a day in 1945 to 57,000 barrels per day currently.



4. To complicate matters further, more and more people continue to move to the West. So more and more gasoline is needed to meet their requirements. Now you can't get gasoline out of a barrel of crude without producing some fuel oil. As a result *more* fuel oil is being produced at a period when *less* is needed. And time will make the maladjustment worse instead of better.

5. So the industry is faced with a major change in refining techniques. Several processes that will enable us to convert fuel oil stocks into gasoline have already been blueprinted. But building the equipment is going to cost a whale of a lot of money. Estimates for such installations at Union Oil alone range from 40 million to 70 million dollars. But they will be built because they have to be built if we're to stay in business.

6. We don't like unexpected expenditures any more than anyone else. But we do think this is an excellent example of: (1) the way our American free economy forces improvement and *automatically* controls the production of different products; (2) the necessity for adequate profits and adequate incentive for new capital. For these two sources provide money we continually require to keep our industrial equipment up to the tasks which face it.

UNION OIL COMPANY

OF CALIFORNIA

INCORPORATED IN CALIFORNIA, OCTOBER 17, 1890

This series, sponsored by the people of Union Oil Company, is dedicated to a discussion of how and why American business functions. We hope you'll feel free to send in any suggestions or criticisms you have to offer. Write: The President, Union Oil Company, Union Oil Building, Los Angeles 14, California.