

The **TEXACO STAR**



FRED
CRAFT

J U N E - J U L Y 1 9 3 1

When Good Lubrication Was a Trade Secret

ABOVE the whirring machinery of the Hope Cotton Factory came the voice of the bookkeeper, "That certainly is a saving."

The man at the desk nodded agreement, touched lightly the blob of oil on the paper in front of him.

"Mustn't let our competitors know about this," he chuckled. "Keep 'em guessing."

And so from 1845 to 1855 the first commercial use of petroleum as a lubricant in the United States remained a trade secret. Once a week Lewis Peterson delivered at the Hope factory in Pittsburgh, Pennsylvania, two barrels of the mud-colored, greasy fluid that had troubled him by coming up with the brine in his salt well. There, two men, David Anderson and Morrison Fisher, blended the crude with whale oil to produce a superior spindle lubricant for the mill. Sperm oil cost one dollar and thirty cents a gallon. The new lubricant cost seventy cents. The saving, in a plant the size of the Hope Cotton Factory, was considerable.



Today trained lubricating engineers everywhere are helping factory owners to save money by using improved lubricants—lubricants made not by a haphazard blending of mineral and animal oils, but from crude oil alone, scientifically refined and purified. Yet the incident in the Hope Cotton Factory may be said to have started our present-day industrial lubrication service, a service which provides a lubricating oil for every purpose.



THE COVER ON THIS ISSUE OF THE TEXACO STAR IS THE FOURTH IN A SERIES OF ORIGINAL PAINTINGS BASED ON AUTHENTIC DATA DRAMATIZING OUTSTANDING INCIDENTS IN THE DEVELOPMENT OF THE AMERICAN PETROLEUM INDUSTRY.



The TEXACO STAR



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Cover by Fred Craft

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BRIEF

★ By analyzing sound values and photographing their corresponding "peaks and valleys" on a celluloid film, an inventor recently found it possible to produce a synthetic voice which "spoke" words never formed by human lips nor uttered by a voice.

AND

★ The adjustable wing has taken its place in aviation. The pilot can turn a flat, high-speed wing into a thick, high-lifting-power type and back again at will.

TO

★ Federal taxes were paid on 119,624,909,900 cigarettes in 1930, an increase of 586,000,000 over the year before. The 1930 cigarette taxes brought a revenue of \$358,964,000 into the United States Treasury.

THE

★ For combining the sports of skiing and gliding, lovers of Winter sports have designed 25-pound wings for the purpose of gliding 500 feet after the take-off, or about twice the distance of a long ski jump without wings.

POINT

★ Since 1914 the shrill whistle of the railroad train that ran between Death Valley Junction and Death Valley's only town of Ryan, California, has disturbed buzzards and coyotes, who have the valley almost to themselves now that Ryan is uninhabited. The Interstate Commerce Commission recently authorized the abandonment of the 23-mile railroad spur.

★ American cities have more asphalt paving than all competing types combined. The average life of asphalt pavements is 20 years. Two out of three United States cities with a population over 25,000 use Texaco Asphalt.

★ In 30,000,000 miles of travel by air during the year ending January 31, 1931, there were only eight fatalities, according to the magazine *Aviation*. The passenger-fatality record for 1930 surpassed by 20 percent a record established in 1929, which in turn was one-third lower than that attained on any European line or group of lines with a comparable volume of traffic.



EWING GALLOWAY

**SILHOUETTE
IN STEEL**

★

Slowly the gaunt, black skeleton of this structure climbs toward the sky: Quality lubricants play no small part in facilitating such work.

UNITIZATION

By A. C. SMITH

Assistant Manager,
North Texas Division, Producing Department

Some Economic and Legal Aspects of the Problem

THE subject of unitization is of particular interest at this stage of activity in the petroleum industry. Until recent years the oil producer has been governed by an unscientific self-interest in the acquisition of lands and leases and in their intensive development, guided neither by any sound theory of conservation, nor controlled by the principles of petroleum engineering. His idea has been to drill his lease as rapidly as possible and to produce the greatest amount of oil in the shortest possible time.

Unitization is the practice of true conservation by the voluntary action of operators and land owners. It protects the public interest in that oil and gas may be properly and scientifically conserved. It protects the private interests of those concerned by the obvious prevention of actual and economic waste, with greater ultimate recovery per acre and consequent greater ultimate recovery of wealth.

Voluntary unitization is the result of private negotiation and private contract between the parties concerned. The form of the resulting contract may be as varied as the physical facts to be dealt with, coupled with the ingenuity of the negotiators. The usual types of units are:

(a) A single lease, covering or partially covering a structure, executed by a single land owner or by several land owners.

(b) The pooling of acreage by several lessees before or after the discovery of oil and gas, with or without the cooperation and consent of the royalty interests, the unit to be operated by a certain lessee in accordance with the provisions of an appropriate operating contract.

(c) The pooling of acreage by several lessees before or after the discovery of oil and gas, with or without the cooperation and consent of the royalty interests, the unit to be owned and operated by an association of lessees, or by a corporate organization created for the purpose.

The second and third types of units are being tried out, with success, in the Van Field in Texas, and in the Kettleman Hills Field in California respectively. Neither can be a complete success without the cooperation and consent of the royalty

interests, for without such consent each lease must be operated as a legal entity, regardless of any agreement between the lessees. But with or without the royalty interests' consent, more economy and more conservation can be effected under the unit plan than under open competitive development conditions.

Many difficulties in the application of these two types of units are also presented in the attempt to determine the prospective productive acreage and the consequent adjustment of private equities. These difficulties are apparent prior to the discovery of oil and gas, but become much more so afterward, when individual self-interest becomes sharpened as a result of the discovery.

After the discovery of oil and gas, trading in both lease and royalty interests becomes more active and the difficulty of forming the unit consequently is much greater. If at all possible, the plans for unitization should be perfected prior to discovery. This practice is becoming more and more feasible due to increasing knowledge of both surface and sub-surface structure prior to drilling.

The first type of unit—the single lease—is better for this particular territory (North Texas). It apparently presents little practical difficulty in its more general use here. Its advantages are obvious. The land owner or royalty interest owner is a party and is bound. The difficulties of adjusting equities between the various lessees and royalty interest owners, both prior and subsequent to discovery, so apparent in the other types of units, are not present in this type. No complicated operating contract is required unless individual interests are sold by the original lessee, and no expensive and complicated corporation or association machinery for operation is required.

This territory abounds with detailed knowledge of both surface and sub-surface conditions. The structures are relatively small and easily covered by small lease blocks. The land is held in fairly large

Unit operation of oil pools is undoubtedly a great step forward in effecting true conservation within the producing branch of the petroleum industry. The subject is of interest to land owners, operators and oil company stockholders alike. The accompanying article, an excerpt from a paper delivered recently by Mr. Smith before the Wichita Falls Chapter of the American Petroleum Institute at Wichita Falls, Texas, discusses some of the methods by which unitization can be brought about.

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tracts, in many instances by individual owners or by groups of owners. The rank and file of land owners is sufficiently "oil wise" to furnish an excellent field for education in petroleum engineering principles.

The land owner will almost invariably agree to fair principles, fairly phrased, backed up by sound business reasoning, and ably and patiently explained by a competent negotiator. Particularly is this true when undue haste in negotiating the trade is not required. This period of overproduction and reduced drilling activity certainly presents a condition where the utmost patience may be exercised in the acquisition of leases, to insure the complete enjoyment of correct principles of drilling and production practice.

We are not without precedent in this territory of a unit block on structure obtained in the form of a single lease from many individual lessors. The Texas Company has such a block upon which it is now engaged in drilling a well. The block is located partly in Foard County and partly in Cottle County, Texas, and comprises a solid block of about 9,723 acres, completely covering, we think, a well-defined, closed structure.

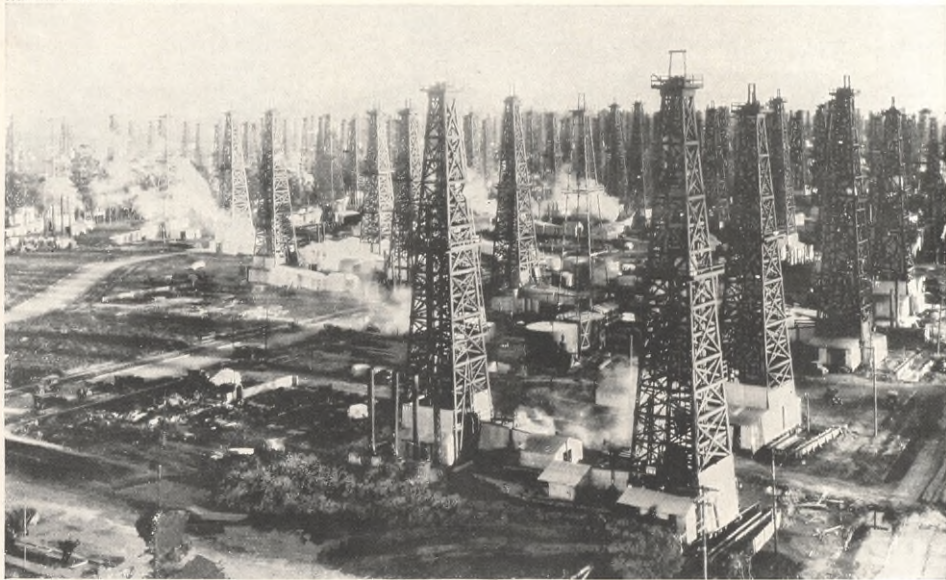
Our block is composed of a single lease, executed by about 50 individuals, firms and corporations, and contains a specific provision that each lessor is to share in the royalty provided for in the lease in the proportion that his individual interest bears

to the total mineral interest covered by the lease. So far as the lessee is concerned, the lease is a complete and, therefore, an ideal unit. It is equally ideal from the point of view of the royalty interests, as will be seen.

Prior to our acquisition of the block, another oil company owned a lease on 160 acres of the land, located almost in the center of the proposed block. We included the land covered by the other oil company's lease in our own lease. In other words, we top-leased the other lease. After our lease was executed, we advised the other company of our purpose and the latter very readily agreed to surrender its lease to us, receiving in return a transfer of a proportionate, undivided interest in our block. The rights of both companies in respect to the leasehold and its development were defined in an appropriate operating contract. The right to operate the property, of course, in this particular case, was retained by The Texas Company.

Now let us assume that the owners, instead of executing a single lease, had each executed a lease covering only their individual ownership, and that the other oil company mentioned had retained its separate lease ownership on its separate 160 acres. Let us further assume that oil was discovered in paying quantities on the block. It is apparent that the future drilling conducted on the block would not be governed so much by scientific principles as by the lines of the individual leases. A line drilling

COURTESY THE OIL AND GAS JOURNAL



campaign would very probably ensue between ourselves and the other oil company. Drilling costs would of necessity be much higher and the property drained in an unscientific manner. Both economic and actual waste would be the inevitable result. Such waste would be greatly enhanced if other lessees held individual and separate leases, as is usually the case in an oil field. This waste would be damaging to individual operators and royalty interests alike.

Now let us view the block as it actually exists—a single lease. After the discovery of oil, exploratory tests can be drilled at various points and the subsurface structure accurately determined and mapped. Additional wells can be so located and spaced as to enter the producing horizons at the proper points and drain the greatest possible areas.

The initial reservoir gas energy can be conserved by producing the oil on a proper and efficient gas-oil ratio. The oil and consequently the gas energy can be ratably and evenly drained so as to prevent "water coning" and "channeling," and full and complete advantage may be taken of hydrostatic drive. The result to the royalty owner and operator alike is the conservation of every pound of energy and every gallon and every cubic foot of product, together with the greatest possible ultimate recovery per acre.

Very probably the product, under these conditions, could be marketed in an orderly manner to

secure its most efficient use and economic worth. Above ground, water and gas lines may be more economically installed, and power stations, and houses for employes more properly located. Natural gasoline plants may be installed at the proper juncture, and this product, with its attendant residue gas, efficiently produced and properly conserved. Repressuring operations may be started at the proper time and in the proper manner.

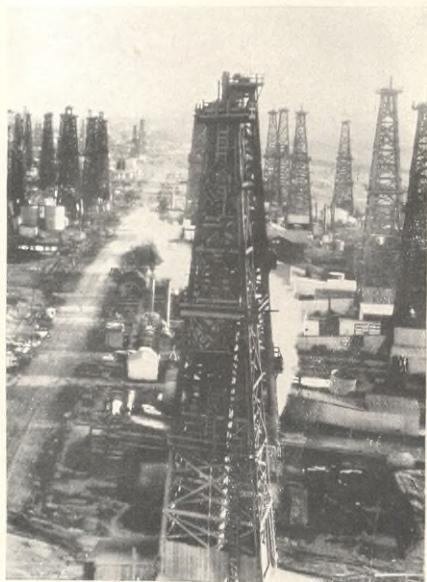
Does not this present a picture of true conservation? Is not this the type of conservation that should be of vital importance to the public? What fair-minded lessor could object to operations of this sort?

But what initial advantage to the individual lessor is there to induce him to agree to such an arrangement prior to discovery? A "wildcat" well is contemplated. All we have to go on is a structural condition. No one actually knows whether or not oil and gas will be found, or what area will prove to be more prolific. If a well is started on A's land, B participates in the prospective royalty from that well in the proportion that his ownership bears to the total ownership. If a well is drilled on B's land, A shares also, proportionately. The royalty owner first does not have to wait for the development to approach his individual land. He shares from the very beginning of development, if such development should result in production. Again, he has not placed all his eggs in one basket, but has "spread his bet" over the entire prospect. Upon the abandonment and release of the lease, his rights automatically revert to their original status prior to the execution of the lease.

When a fewer number of land owners are involved, where the desired block is much smaller, the difficulties involved and the time required for negotiation become proportionately less, and the unit, therefore, more easily acquired.

Often it is possible to work out unitization by pooling the holdings of various lessees on the same structure, with operations vested in a single lessee under an appropriate operating contract, as in the second type of unit. If the lessors are properly approached, this undoubtedly can be done in numerous instances, even though the lessors have not agreed to do so in the initial lease contracts. It is simply a matter for proper negotiation and appropriate contract.

Having considered the desirability of unit operation from the petroleum engineering point of view, with its obvious practical and economic advantages, and having studied to (Continued on Last Page)



Frenzied Over-drilling for Oil, as Shown in the Accompanying Photograph. Obviously Results in Great Waste, Both Actual and Economic

O. H. Caldwell's
Electrical Home
in Connecticut



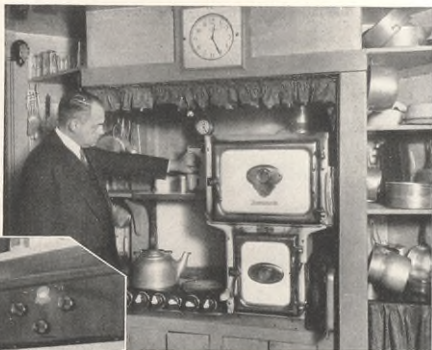
One Servant Here
Does the Tasks of
a Whole Regiment

PHOTOS BY HALBRAN

The House of a Thousand Servants



The Garage Doors Respond to
the Flash of the Headlights



It's All Done by Switches in
Mr. Caldwell's Modern Kitchen

ALADDIN, by rubbing his magic lamp, invoked a genie who would perform any task he wished. Orestes H. Caldwell, electrical engineer, does much the same thing at the touch of a switch. In Mr. Caldwell's century-old farmhouse in Cos Cob, Connecticut, electricity takes the place of 1,000 servants, putting the fantastic Arabian Nights' tales on a practical, twentieth-century basis.

All rooms in the dwelling are fitted out in colonial style with the exception of the kitchen, where an automatic electric range has taken the place of a former, wide-mouthed fireplace. One machine in the kitchen has more than 150 uses, and in the room there are 25 other outlets where electric, labor-saving devices can be plugged in. Throughout the houses are more than 100 electrical appliances for cooling, heating, ventilating, cleaning, telling time,

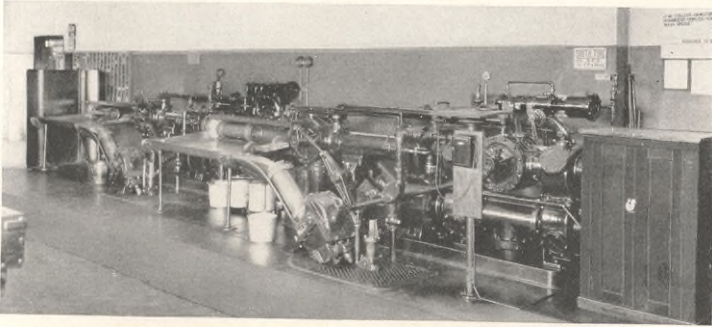


The Housewife's Right-hand Gadget
for 150 Purposes

musical entertainment, communicating with other rooms and buildings, and providing enjoyment for children. After Mr. Caldwell has retired, a radio lulls him to sleep and then shuts itself off. The furnace is electrically stoked, and in the Summer electric pumps force cold water from two wells through the steam radiators, cooling the house.

At the flash of an automobile headlight, the doors of Mr. Caldwell's garage open and the lights are turned on. At night, when the front gate is opened, the house is flooded with light, within and without. Even the trees on the 50-acre estate give out music and chimes from loudspeakers concealed in their branches.

Mr. Caldwell, formerly a member of the Federal Radio Commission, is on the electrical utilization committee of the Chicago World's Fair.



The Post Office Pipe Line's Usefulness Increases as Surface Traffic Becomes More Congested

Under the Sidewalks of New York

By ALBERT FIRMIN
Postmaster, Brooklyn, New York

IN WHAT is now the heart of New York's financial district, only a few steps from Wall Street, there stood a little more than a century ago a small frame house with two dormer windows. The building was on what was then known as Garden Street, but is now Exchange Place. It had a frontage of about 20 feet, and was slightly less than this in depth. It was then New York's only post office.

Once a day all the mail originating in New York, and that arriving from Long Island, "up state" and New England, intended for the West and South, would be gathered up and placed on a wheelbarrow. This would be trundled down to the Hudson River by one of the half-dozen clerks of the office, transferred to a skiff and rowed across the river, for dispatch to the "rest of the United States."

The wheelbarrow and the skiff have long since disappeared, and even memory of them has almost passed into oblivion. In their place are hundreds of motor vehicles, a great fleet of majestic ferry boats and, most interesting of all, the system of pneumatic tubes which bears to the important postal system of New York the same relation that oil and gasoline pipe lines bear to the products they transport.

The pneumatic tube system in New York was established 35 years ago. At the celebration marking the day of its installation, Chauncey M. Depew, then in his prime, delivered an address. It was planned to have the first container dispatched so as to arrive at a certain moment with a load of letters,

but an unidentified joker substituted a live cat for the letters. When the lid of the container was removed, out jumped the cat, almost in Depew's face. This did not disconcert the incomparable Chauncey even for the wink of an eye. Quick as a flash he said, "The cat is out of the bag."

The pipes, or "tubes" as they are called in the postal service, are of steel, approximately eight inches in diameter. They start at Station P on the southern tip of Manhattan Island, located in the Custom House. Close by is old "Castle Garden," now the Aquarium, originally known as the "Gateway to America," since through its portals millions of immigrants entered this country.

From southern Manhattan the line runs to the main post office at Thirty-third Street and Eighth Avenue, borough of Manhattan, the "midtown" area. Two branches extend as far north as One Hundred and Twenty-fifth Street, connecting one group of stations on the east side and another group on the west side of Central Park. The main post office feeds the Pennsylvania Railroad, and the Grand Central Station post office feeds the New York Central and the New York, New Haven and Hartford lines. From the City Hall Station, "downtown," there is a spur that runs to the post office in the borough of Brooklyn, so that Brooklyn and its two and one-half million residents are connected to the system.

In all there are 27 miles of double line, or 54 miles of single line, permitting a circulation of mail in both directions. The only point in the system at

*Millions of Letters Speed Daily
Through Uncle Sam's Pipe Line*

The TEXACO STAR

which the "pipe line" is visible above the surface is on Brooklyn Bridge. Passengers on the surface cars that cross the bridge can see the tubes under a narrow plank path bordering the tracks.

In addition to the main post offices in Manhattan and Brooklyn, there are 25 postal stations linked

directly by the system, but this by no means represents the extent of the service they render. For instance, the northern end of the line at One Hundred and Twenty-fifth Street is linked with the motor vehicle service in the borough of the Bronx, and the line terminating in the main office in Brooklyn connects with the motor vehicle service that supplies the 30 Brooklyn stations.

In order to transmit the letters by tube, they are placed in what are technically known as "carriers." These have much the same relation to the tubes that a cartridge or bullet has to a gun. The carriers are slightly smaller in diameter than the tubes themselves. They are made of steel and brass, bound with reinforcing bands and composition gaskets, the latter to prevent the passage of air around the carrier from stern to bow. Each carrier has an ingeniously designed lid, which automatically prevents the insertion of the carrier into the tube until the mail is safely locked in and ready to be sent on its way.

To get the carrier into the pipe line, a cradle device is employed. This can best be described as two sections of tube, each about three feet long, placed parallel with the pipe line and held together by a steel quadrant. The point of the quadrant is elevated just sufficiently above the



Manhattan's Main Post Office on Eighth Avenue

EWING GALLOWAY

line to permit both sections of tube to rock alternately into line with the system.

To operate the device, a carrier is placed in one of the two sections and rocked into position so that it lines up with the pipe line. The air valves automatically open and the carrier goes off at a speed of 30 miles an hour. When the section of the tube bearing the carrier is rocked into position it throws out of line the second section of tube on the quadrant, permitting the insertion of another carrier. In this manner carriers can be dispatched with great rapidity, using the quadrant cylinders alternately. The device resembles the cartridge chamber of a revolver, except that a quadrant instead of a complete circle is used.

Each carrier is about two feet long and holds from 500 to 700 letters. One can be dispatched about every 16 seconds, and notwithstanding the speed of transmission and the weight of carriers and their loads, the air pressure is so nicely controlled by by-passes and the like that a carrier falls out on the so-called "apron" of the "catch table" with no more jar or noise than would be made by a slap on the table with the open hand.

The rocker mechanism can be set for control or automatic operation, and in either case the frequency

of dispatch is subject to regulation. Operating at capacity, a veritable ribbon of mail is kept passing through the pipes. To lubricate the system, special carriers are sent through the tubes occasionally containing oil instead of letters. By suitable means the oil is permitted

The "Pipe Line" Starts at the Custom House

EWING GALLOWAY



The TEXACO STAR

to leak out slowly from the carrier all along the line.

Aside from the work of inserting the carriers and taking them from the apron at the point of delivery, the whole system, when once in operation, is automatic. The pressure pumps are operated electrically, and feed the air tanks, or "pressure tanks," as they are technically known. As pressure in these falls below a certain point, the pumps begin to operate and continue to do so until the required pressure is again attained. The system is so perfect, from a mechanical standpoint, that it is practically free from interruptions of any kind. More than six million letters and small parcels have been transported by the tubes in a single day.

Some years ago in New York City a policeman who had just been transferred to a new post was going his rounds late one night and chanced to stop near a bank. A moment later he heard a peculiar noise, much like the blows of a sledge hammer. After making a survey of the bank property and finding no evidence of unlawful entry through doors or windows, he surmised that burglars were cutting an underground passage to the vault. He telephoned the captain in charge and a police wagon and a corps of policemen rushed to the scene.

The building was surrounded. They searched up and down, in and through the whole place, but not a trace of the yeggs could they find. Still the noise of the sledge could be heard from time to time, and they were convinced that tunneling was going on somewhere beneath.

In the height of the excitement the policeman who had formerly covered the beat happened along.

They led him to the spot on the corner where the noise could be heard. He listened. A hearty laugh greeted his tense and excited pals.

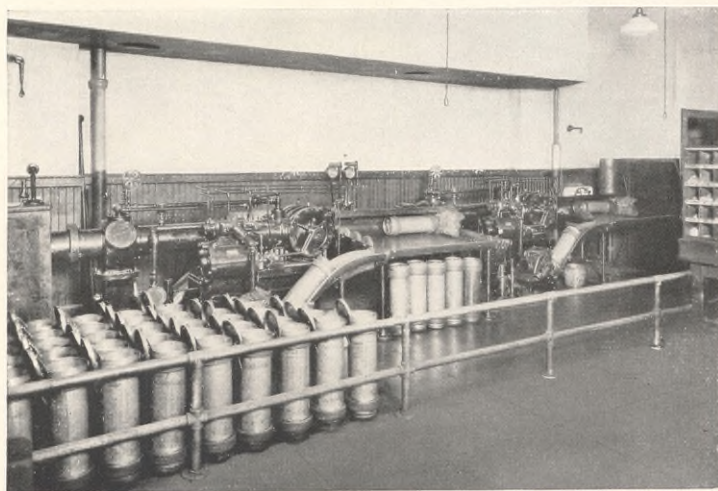
"That's no drilling or mining," he said. "That's the mail in the pneumatic tubes turning the corner."

The line came very close to the surface just at that spot and swung around a turn. In rounding the corner, every heavily-laden container struck the outer angle of the curved line and then slid on its way. The crowds dispersed, and the tubes continued their efficient functioning.

The pneumatic tubes have always been useful, but their usefulness is being daily enhanced as the congestion in our streets grows worse and worse. Of course it is essential that our post offices and post office stations be located in our busiest centers. That is where they are needed most. The congestion of our streets, therefore, is at its worst just where, from the postal standpoint, freedom of movement between our units is of greatest importance. The pneumatic tubes are the answer.

Another "pipe line" operated by the United States Government connects the United States Custom House on the southern tip of Manhattan Island with the United States Appraiser's Warehouse about two miles farther uptown. The stream that flows through this "pipe line" is a golden one; money, jewelry, manifests, and other valuables of the Treasury Department pass underground safe from the dangers of robbery.—EDITOR.

★
Closeup of Station Installation: Note the Carriers Lined Up for Action



The Lubricating Engineer

By ALLEN F. BREWER

Engineer, Technical Division, Refining Department

*In This Day and Age He Must
Be a Practical Diagnostician*

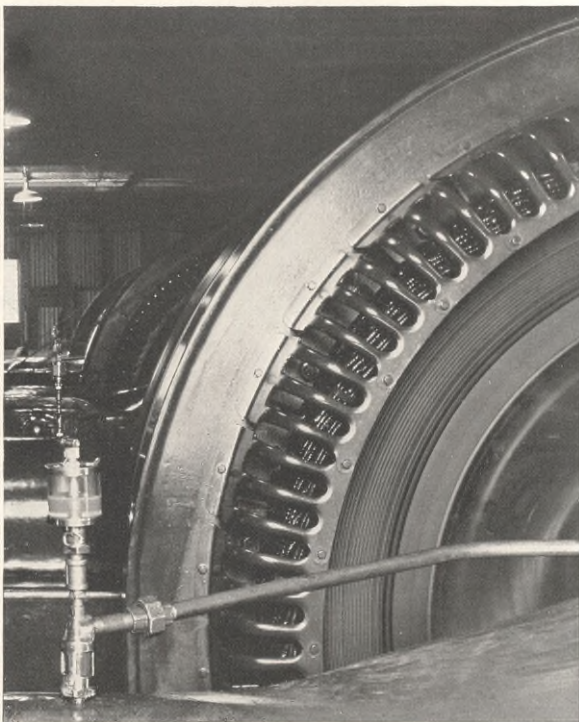
DETERMINING the suitable lubricant for any phase of machine operation is a diagnostician's job, very much the same in principle as the specification of a prescription for a human ailment. In the power plant or in industrial work the lubricating engineer is the "physician," and he will rarely prescribe a lubricant until he has studied the conditions surrounding the operation of the plant's machinery.

Were it not for the fact that several combined bodily ailments bring about the need for a totally different sort of medicine than would cure each separately, patients might write their own prescriptions. They might take quinine for fevers, essence of peppermint for stomachaches and aspirin for headaches. But if the patient had all of these at one time some other single medicine might do away with a condition that caused all three. It is for this reason that we have physicians, and for the same reason lubricating engineers are employed to diagnose and prescribe for ailing machinery so as to restore its "physical fitness."

To meet any specific condition, the purchaser of lubricants often feels that he must protect himself by specifying a rigid set of physical and chemical characteristics. This belief has become so widespread that frequently the requirements laid down for a lubricant are out of all reason.

Regardless of the original purity of any lubricant, the duty to which it may be subjected and the extent to which it may become contaminated will markedly affect its lubricating ability. Therefore it is apparent that to lay undue stress upon the original characteristics of a lubricant, without considering the service it must subsequently perform, is putting the cart before the horse.

The Texas Company has realized that this prob-



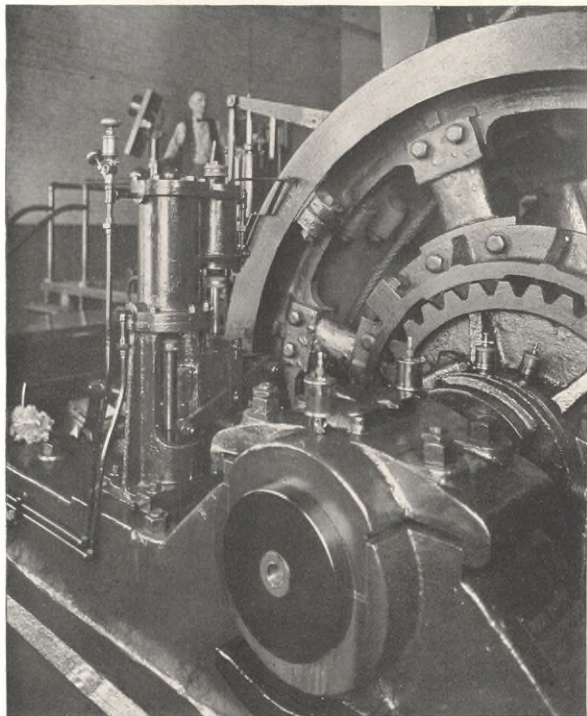
DOUGLAS CLEARLY

lem of engineers and executives who wish to write their own prescriptions exists, and has realized also that in order to bring about entire satisfaction by using the right lubricant in the right place these persons must be convinced of their error. Because plant engineers, working under intensive schedules, rarely have time to study lubrication conditions in their plants thoroughly, Texaco lubricating engineers are ordinarily in a better position to judge whether an oil should have the viscosity of a steam cylinder stock, with accompanying high carbon residue, or whether, in accordance with the duty required of the lubricant, low carbon residue should be given prior consideration.

If the lubricating engineer is an authority, he will rarely prescribe a lubricant until he has studied

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such factors as temperature, speed, and operating pressure. It is far better for the purchaser to present his case squarely and outline his operating and constructional conditions than for him to be governed by set specifications that might easily lead to increased trouble instead of a cure or the prevention of a breakdown and loss of valuable operating time.



WENDELL MCRAE

From the point of view of the practical operator, the results of lubrication research are too intricate, and require too much time for study to be fully understood. Yet he must continue to operate his machinery, meet the prevailing conditions in his plant and solve his lubricating problems daily. Instead of taking all this upon himself, the plant engineer or executive may call in the Texaco lubricating engineer, who understands the results of research and who, after checking the amount of wear in bearings and the extent to which accumulations have developed to impede the flow of oil or grease, may prescribe lubricants that will make the buying of petroleum products a safe, routine proposition.

The operating conditions of pressure, temperature, and speed each have a decided bearing upon

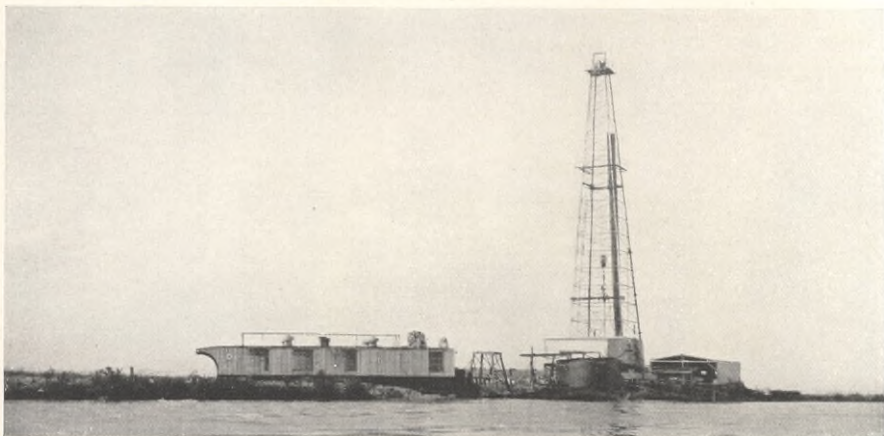
the choice of an effective lubricant. Each, however, must be studied in conjunction with the means provided for application. Research has indicated that there are certain characteristics which are essential in a lubricant in order to meet any or all of these conditions.

The utmost care must be observed in selecting lubricants of adequate pressure-resisting ability. Normally this property will be indicated by the viscosity of an oil or the consistency of a grease. On the other hand, these characteristics may be varied according to the pressure developed by the lubricating system. In other words, where a pressure-circulating oiling system or high-pressure automatic grease lubricator is employed, the working viscosity of the oil or consistency of the grease can be lower than where a drip feed or intermittent lubrication system is involved. Here, of course, unless the purchaser has studied his operating conditions carefully and experimented with a variety of grades of lubricants, he might be tempted to prescribe a product incapable of maintaining the requisite degree of lubrication.

In the case of abnormally high temperature the viscosity or temperature-resisting characteristics of a lubricant must be sufficiently high to resist the reduction which will occur in actual operation. Also, such a lubricant must be capable of resisting breakdown to carbon. In some cases this might not be detrimental, such as on a set of reduction gears, but in an internal combustion engine or the cylinders of an air compressor carbon deposits are decidedly objectionable.

Low temperatures, on the other hand, may cause an oil to congeal or a grease to solidify to such an extent that the lubricant may not be freely distributed to working parts. Pressure is important in that it may cause the squeezing out of the lubricant from between a bearing and journal, or contact surfaces.

The specialized knowledge of the Texaco lubricating engineer has been found far more effective in preventing breakdowns and loss of operating time than diagnosis by unskilled shop observation.



View of Marsh Location Showing the Barge Flouted into a Slip in the Bank of the Bayou

Floating Power for Drilling Oil Wells

By L. K. LANEY

Consulting Engineer, Producing Department

In Southern Louisiana the Barge "Energy" Seems to be Living Up to its Name

DRILLING oil wells in the marshes and bays and along the bayous of the Gulf Coast of southern Louisiana, often 30 or 40 miles from a dry land base, is a task beset with difficulties not encountered elsewhere. From the start of operations, with the driving of piling or the building of "mats" and timber foundations in the marsh for the support of the derrick, tanks and machinery, to the removal of the crude oil by means of barges, every operation involves the use of boats and marine equipment of various kinds.

It was therefore not illogical to vision a floating power plant to furnish electric power for this drilling, in an effort to avoid the expense incident to the use of steam. The operation of boilers is always expensive from a fuel standpoint, when compared with internal combustion engines, and in this locality the condition is further aggravated by the cost of transporting this extra fuel and the heavy repair cost of boiler operation due to the lack of a supply of good water.

The Texas Company's floating power plant is now a reality, the power barge *Energy* having been completed and placed in service. The first well to which it furnished power, L. L. E. Number Two Leesville,

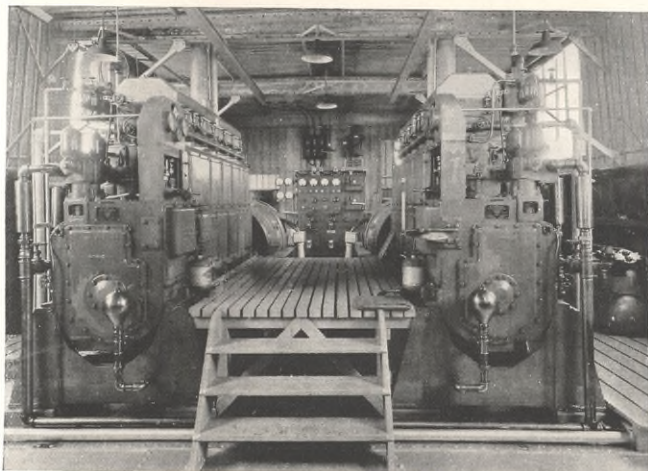
located on Bayou Lafourche about 50 miles south of New Orleans, was completed at a depth of 3,628 feet, and certain conclusions as to the practicability of the idea can now be drawn.

The experience with the plant on this first well was very satisfactory; only one or two minor changes were required to improve its operation. While with deeper drilling other difficulties may arise, indications are that the idea is entirely practical and that by the use of the floating power plant drilling costs in this area may be materially reduced.

The design of the barge and the selection of equipment was the work of the Producing Department of the Company; the actual construction was done by a New Orleans shipyard under the supervision of Company engineers. While the application of electric power to rotary drilling is not new, the idea of a floating power plant for this service was unique and no previous experience was available as a guide in working out the many problems which arose in connection with its design.

The barge itself is built entirely of steel; hull, house, roof and window frames. It carries a twin power plant capable of generating 485 horsepower, which is ample for drilling a 6,000-foot well. This

The TEXACO STAR



*Interior of the "Energy"
Showing Diesel Engines and
Control Switchboard*

power was split into two units, because at times, in the early stages of drilling, or while coring and bailing, one unit furnishes sufficient power, the other being held in reserve. At any time it is possible with one unit to keep the drill pipe rotating and the pumps operating and thus keep out of trouble, while repairs or adjustments are made on the other unit.

Each generating unit consists of a Diesel engine, driving, through a flexible coupling, a generator with direct-driven exciter. The whole unit is mounted on a steel sub-base which holds the parts in alignment and serves to distribute the 13 tons of weight over the framing of the barge hull.

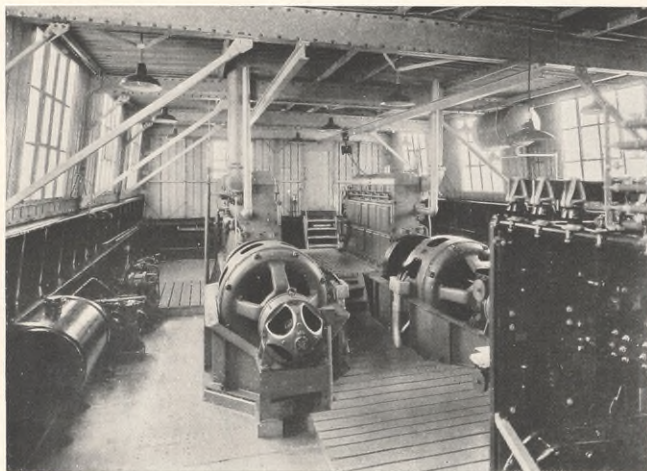
The necessary auxiliary equipment is, as far as possible, electrically driven. This equipment consists of pumps, air compressors, and a centrifuge which cleans the crude oil used for fuel.

The barge is lighted by day through 11 large windows, while at night the lighting provided is nearly as good as by day, since it is felt that plenty of light is the best insurance against accidents. In case the power units are shut down, light is furnished

with a conductor of sufficient size to carry the power output of the barge without undue loss and at the same time be flexible and easily handled was a problem that will be more apparent when it is considered that the weight of such a conductor is about 3,500 pounds.

The cable finally selected has a stranded copper core, one and one-quarter inches in diameter, made up of 427 strands of wire. This is covered with a double thickness of rubber insulation, vulcanized in place and forming a one-piece rubber covering about one-quarter of an inch thick. This makes a tough, flexible and waterproof conductor.

Three conductors are required for this circuit



*Generators and Exciters in
Foreground; Starting Air
Compressors at Left*

The TEXACO STAR

and since it was not possible to get three conductors of this size into a single cable, three cables are used. These are twisted together and handled as one.

As we approach the barge we see a square, bulky, awkward structure with a black hull and half sides surmounted by a galvanized iron superstructure, the sides of which lean inward. On the black top sides are painted the name *Energy, T. T. Co. No. 299*, and a large Red Star with the Green T in bright enamel.

As we step to the aluminum-painted forward deck, we find heavy mooring bitts at each side and a windlass for handling the anchor in the middle. Before us is a door through which we pass and go down a short flight of steps into the engine room. This place is noisy, as both units are in operation, but we feel no vibration; the engines run smoothly and without apparent effort.

The big Diesels are directly in front of us, with a raised platform between them. Beyond are the generators with their exciters, while farther in the background is the switchboard with its array of instruments. Above each unit, suspended from the beams of the house roof, is a monorail trolley, with a chain hoist for handling heavy parts in making adjustments or repairs.

At the right are located the air compressors and the lighting generators, while at the left are the centrifuge, with its clean oil tank and, overhead, the tank which feeds fuel oil to the engines by gravity.

At the left of the control switchboard is a door leading to the workshop. At the right are the sleeping quarters, which are well lighted and ventilated and should be comfortable even in the hottest weather. Under the floor of this room is a large storage space, accessible from the engine room by means of a hatch.

Passing again to the forward deck, we find a ladder leading to a walkway on the roof of the house. This walkway extends from end to end of the roof and gives access to the deck insulators and to the cable reel. On either side are the ventilators in the house roof and the air intake and exhaust pipes for the engines.

At the after end of the walkway a ladder leads to the short, open after deck, which is occupied by mooring bitts and by two tanks, one for storing lubricating oil and the other for fresh water. The lubricating oil is piped from the 150-gallon tank directly to the oil sump tank of each engine.

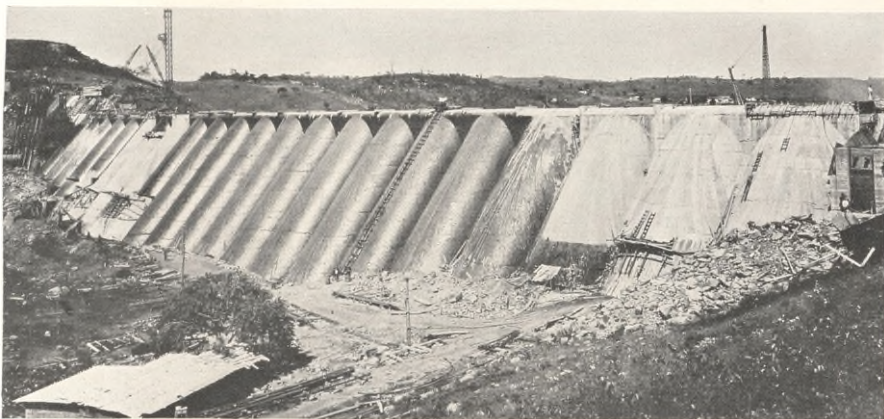
The space in the barge hull under the forward and after decks is separated from the rest of the barge by bulkheads, electrically welded to the hull plating. The bunkers so formed carry 200 barrels of fuel oil and are filled through openings in the deck. Every precaution has been taken to render the plant fireproof; the use of wood has been kept to a minimum and fire extinguishers are located at convenient points in the engine room and in the other rooms of the house.

The operation of the plant is simple: Automatic supplies of starting air and fuel relieve the operator almost entirely from concern over these two essentials, in order that his full attention may be devoted to operating the main units. The engines start from cold at once, when a single button to admit starting air is pulled. It takes but a moment to adjust the switchboard instruments, and a unit can be placed on the line within two or three minutes. This permits the shutting down of a unit or of the whole plant at any time during intervals when the power is not required, yet leaves the power quickly available.

Although the initial cost of a power plant of this kind is relatively large, it will save enough in the drilling of a few wells to pay for the expenditure.

General View of Operations on a Water Location: Lake Barre Dome, Louisiana





The Dam Will Cause the Formation of a Lake With a Capacity of 32 Billion Gallons of Water

The Jerry O'Connell Dam

By CARL AUNE

Manager, Bahia District

The Texas Company (South America) Limited

*Texaco Products Assist in
Brazilian Power Project*

WHEN the Empresas Electricas Brasileiras, a subsidiary of the Electric Bond and Share Company, acquired the light and power companies in the State of Bahia, Brazil, existing installations were found incapable of supplying the requirements of the city of São Salvador, capital of the state.

The Paraguassú River, which originates in the center of Bahia and empties into the Todo os Santos Bay, was being utilized for the service of the city and a large part of the electric energy consumed by the city was produced by the Bananeiras Power Plant. During the dry season the water level in the dam was lowered to such an extent that the turbines and generators could supply only about half the normal energy. Auxiliary plants were able to help but slightly and the consumption was constantly increasing.

An American engineer, Jerry O'Connell, prepared a report covering the situation, recommending enlargement of the capacity

of the Bananeiras dam to permit simultaneous use of all the turbines, with a margin for further increases.

There was no possibility of using the old dam for this expansion; the construction of a new one began in February 1929. The name "Jerry O'Connell" was given to it, in honor of the engineer, who died shortly after submitting his report.

Within a short time the dam site became a small city, with 1,000 inhabitants. The work lasted two years, with 2,300 men working on it day and night.

The dam is 1,148 feet long, about 200 feet wide and approximately 130 feet high. It will cause a lake having a capacity of nearly 32 billion gallons of water. The compressors, mixers, motors, trucks, cars and locomotives used Texaco products exclusively. They were supplied by The Texas Company (South America) Limited.



City of Bananeiras During Construction Work

THEY ALSO



(Above) The Job of Cleaning Up After One of New York's Parades is Often Handled by Water Wagons

The Hose is Frequently Brought to Keep New York City's Three Tho



(Below) Italy, Noted for the Picturesque, Contributes this Quaint Old Woman Street Cleaner in Mirano



(Above) The "White Wing" is a Well-Known Figure on the Streets of Many an American City or Town



(Above) Three Street Sweepers Before the Temple of Too h

SO SERVE

to Play in the Continual Battle
 ousand Miles of Paved Streets Clean



(Above) In Belgrade, Jugo-
 Slavia, These Husky Women
 Ply Their Native Brooms
 Along the Paved Streets



Women
 Before the
 in Ceylon



(Below) It Really Isn't
 George Bernard Shaw, Just
 a Street Cleaner at Work
 in Innsbruck, Austria



The Nonchalant Gentleman
 with the Cigarette (Above)
 is a Street Sweeper in
 Spain's Capital, Madrid

Quinquireme of Nineveh from distant Ophir
Rowing home to haven in sunny Palestine,
With a cargo of ivory,
And apes and peacocks,
Sandalwood, cedarwood, and sweet white wine.

Stately Spanish galleon coming from the Isthmus,
Dipping through the Tropics by the palm-green
shores,
With a cargo of diamonds,
Emeralds, amethysts,
Topazes, and cinnamon, and gold moldores.

Dirty British coaster with a salt-caked smoke
stack,
Butting through the Channel in the mad March
days,
With a cargo of Tyne coal,
Road rail, pig lead,
Firewood, iron-ware, and cheap tin trays.

(Cargoes: John Masefield)



Rolling Home to Norway— Hull Down

By R. D. WELSH

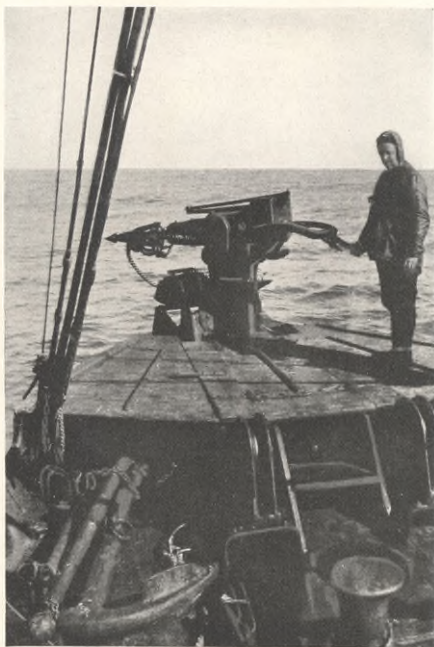
District Manager, The Texas Company (Australasia) Limited

THE 1930-31 whaling season in the Antarctic is over, and 36 whaling factory ships are rolling home to Norway—hull down—bringing not the wealth of ancient India, but the treasure of the deep from the barren, ice-bound wastes of much water and little land—Antarctica.

Antarctica, the modern region of adventure, where such men as Scott, Shackleton, and Byrd have gone in response to the call of the unknown, and have performed deeds of daring which make them heroes, and where, on the outer fringes, the hardy Norseman, a sturdy and true son of the Viking breed, vigorously pursues an ancient trade in the modern manner, with the help of science and the creative genius of man.

Not now "A dead whale or a stove boat"—the stout little chasers are all that a whaler's heart could desire. Not now the ceaseless grind by eager, sweating men at back-breaking oars in an open boat with an even chance of being the victim, instead of the conqueror, when the quarry was overhauled.

Today the mother ship has a very maternal air,



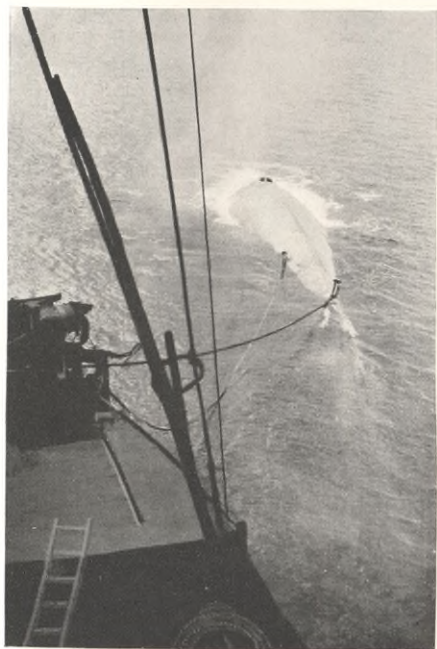
This Powerful Modern Equipment Has Replaced the Old-time Hand Harpoon

with from five to 10 fussy little whale chasers feeding from her in coal and supplies, and in turn bringing to her whales, whales and still more whales; 1,000 to 1,500 in the season—10 to 1,500 carcasses, each perhaps 100 feet long, representing in all a currency value of millions.

The factory whaling ship of today, with her brood of steam chasers and her modern machines for extracting the oil from blubber, meat, and bone, is a totally different ship from the sailing vessel of old, with her oar-powered, open boats and deck kettles for boiling down.

The modern whaler has airplanes for spotting the schools of whales; the very latest type Diesel engines for power; huge winches which haul the whales up through an aperture in the stern; electrical equipment throughout; a crew of about 200 men to man the mother ship, the chasers, and to tend the machines; radio communication with the outside world and home, and—to the visitor, most wonderful of all—radio-telephone connection with each chaser. From hundreds of miles away the skipper

The TEXACO STAR



(Above) Held Fast and Blowing Wildly the Big Whale Fights for Life

of a chaser can report, "Five whales in tow and four of 'em blue."

The blue whale is most valued of all, and the gunner who gets a "blue" receives a larger bonus than for the more plentiful type of whale.

The growth of the whaling industry in the Antarctic in the last few years has been phenomenal. The 36 huge factory ships operating each season in Antarctic waters are not ships of pleasing line, spreading sail or artistic appearance, but steel ships, long, squat, and square, with the beauty of utility.

The bridge is well forward, and the engines aft; there is a long expanse of deck—several hundred feet—unbroken except for an overhead structure amidships carrying hoisting gear; for flensing, or stripping blubber, ample space is needed.

The ships leave their homeland, which is generally Norway, in July, sailing for their base of operations, which may be South Georgia, South Africa, Tasmania, or Stewart Island, New Zealand, where the whale chasers, which had been left at the base at the end of the previous season for overhaul, are waiting and "raring to go."

In early October, when the pack-ice begins to break, a start is made and "the roaring sixties" are soon passed. They are not on any pleasant, tropic cruise but plugging through Southern latitudes where it is bitter cold, and where winds howl from the Pole. Soon icebergs are met—last season they were exceptionally far north—and soon the pack is reached. Here again last season conditions were unusual, as the ice was slow to break up and was thick and heavy several degrees of latitude farther north than usual.

When the ice is reached, the hunting begins, and the gunners of the chasers vie with one another for the honor of the first whale.

One of the ships of the Rosshavet Whaling Com-



The Factory Whaling Ship of the Present Day, with her Brood of Steam-Powered Chasers, Breaking Through the Ice

The TEXACO STAR

pany, Norway, M.V. *Sir James Clark Ross*, named after the discoverer of the Ross Sea, a dependency of New Zealand, has for its base of operations Stewart Island, the southernmost of the three islands which comprise New Zealand, known to the native Maori as *Ao-te-roa*, or "long white cloud." In October of last year this ship sailed southward with seven chasers, named *Star 1*, *Star 2*, et cetera. The keenest rivalry exists between the gunners of the chasers to secure the biggest catch, and last season Gunner E. Jorgensen of *Star 2*, the champion gunner of the whaling fleets of the Southern Hemisphere, not only brought alongside the first whale, but headed the list for his ship of the season's catch with the creditable total of 254 whales. The total catch for this one factory ship was 1,443 whales. This gigantic motor ship, 18,500 tons, was on its maiden voyage, and is one of several operated by the Rosshavet Whaling Company.

The *Sir James Clark Ross* has a capacity cargo of 113,000 barrels, and it was found necessary to jettison 1,000 tons of fuel oil to make room for the more valuable whale oil. The factory ship *Kosmos* sailed north with 160,000 barrels; the

factory ship *Nielson Alonso*, with a capacity of 56,000 barrels, reports a season catch of 107,000 barrels, a tanker transport having relieved her of a full load early in the season, and this in mid-ocean, 'way down South, with whales used as bumpers between the vessels. The factory ship *C. A. Larsen* set a course for Capetown with a full cargo of 105,000 barrels. These quantities represent a total catch for these four vessels of 553,000 barrels, valued at no less than £2,000,000 sterling (about \$10,000,000). It is estimated that the total catch of all the factory ships operating in the Antarctic during the season past is 45,000 whales, which have yielded 3,500,000 barrels of oil of a total value of £15,000,000 (\$75,000,000).

This rich harvest is made more secure by the aid of the Red Star with the Green T. Some 20 whaling factory ships and their chasers use Texaco marine products. These sailormen of Norway know that to insure reliable operation of their floating factories and speedy chasers, only the most dependable lubricants can be used, and they hitch, not their wagons, but their vast, modern ships, to the Red Star with the Green T.

The Factory Whaling Ship M. V. "Sir James Clark Ross"



★
Texaco
at Home

★
VI

★
BALTIMORE

★



The Baltimore Trust Company's Tower Crowns the Skyline

AHUNDRED years or so ago Francis Scott Key, aboard a British warship, watched the red glare of the rockets over Fort McHenry in Baltimore Harbor, and by that sanguinary illumination perceived that the American colors were still flying; which is a long-winded way of telling how *The Star Spangled Banner* came to be written.

That, however, was in 1814 and Baltimore has no time for idle dreaming. Today it is busy maintaining its reputation as one of the largest seaports in the country, and the flags of 19 maritime nations pass beneath the old fort in the harbor.

Situated at the head of tidewater on the Patapsco River, which divides and redivides itself into many creeks and bays, Baltimore has the advantage of a fine natural harbor. One may find ocean-going vessels almost in the heart of the city, for there are more than 10 miles of waterfront within the city limits.

Although from earliest colonial days it had been decided to found a city named for the Calverts (Lords Baltimore) two attempts at such a founding were abortive. In 1729 the provincial legislature directed seven commissioners to buy land on the north

shore of the Patapsco River and lay out a townsite. The choice of location was fortunate; the city prospered and by 1750 Baltimore's prestige as a shipping point was well established.

At the outbreak of the American Revolution, Baltimore had a population of 6,755, a goodly proportion of whom were lusty sailormen, venturing forth on privateering expeditions, to the extreme discomfiture of certain British merchants. After the capture of Philadelphia by the British in 1776, the Continental Congress met in Baltimore for a time.

Baltimore was incorporated as a town in 1797 and after active participation in the War of 1812, settled down to the serious business of making money. In time it came to be recognized as the principal market for Virginia planters, and for those even farther afield. Baltimore's citizens prospered and when their financial well-being was threatened by the completion of the Erie Canal in New York State, they built the Baltimore and Ohio Railroad.

On February 7, 1904, a disastrous fire nearly obliterated the city, which had remained practically

The TEXACO STAR

the same in appearance since the Civil War. Few buildings remained and great changes were effected during the ensuing reconstruction period. Narrow streets were widened, sewers were installed, modern paving was laid, the water supply purified. The old red brick Georgian houses had nearly vanished with the fire;

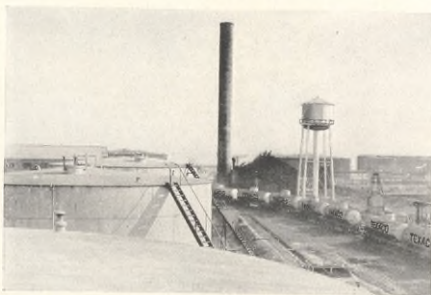
Baltimore became a bustling, business-like city.

Although agricultural exports from Baltimore, with the exception of wheat, have declined in the past few years, coal, iron and steel manufactures, copper, and chemicals have shown a steady growth. Imports; sugar, petroleum, copper ores and copper manufactures, rubber, and coffee, all have increased since 1900.

Baltimore's harbor is never idle; tugs puff busily here and there in pursuit of giant, ocean-going freighters, and having caught them, nose them gently against the concrete piers of the waterfront. Great overhead cranes dump tons of merchandise into squat steamers; wheat, at the rate of 18,000 bushels an hour, hisses through pipe lines to emerge at the bottom of a bin in a freighter's hold.

Shippers know that Baltimore's harbor will always be 35 feet deep at mean low water, and dredges are always in operation to maintain this depth. One of the newest shipping terminals is that of the Western Maryland Railroad, which, when completed, will have four pier units, with transit sheds and warehouses. The first unit of this terminal has been finished, was built at a cost of \$3,500,000. It is the first construction under the \$50,000,000 Port Development Enabling Act, passed by the Maryland Legislature in 1920.

The population of Baltimore, approximately 900,000, is governed under a grant of power from the State of Maryland, known as the City Charter. Much authority remains with the state legislature; although



Texaco Tank Cars at Our Baltimore Terminal

more than half the residents of Maryland live in Baltimore, less than one-third of the state legislators are elected by the city's vote. The control of the legislature is, however, largely theoretical; municipal requests are rarely questioned or denied.

During the World War, great industries; steel plants, chemical

and fertilizer companies, copper works, sprang up. The mammoth plant of the Bethlehem Steel Company there and the drydocks of the Bethlehem Shipbuilding Corporation in Baltimore are among the largest in the world. Other important plants in or near Baltimore are those of the Union Shipbuilding Company (manufacture and repair of vessels) the Glenn Martin Company (aviation) and the Western Electric Company (electrical equipment).

On Curtis Bay is located the Baltimore Terminal of The Texas Company, where Texaco tankers, bearing Texaco gasoline and kerosene from the Company's refineries, discharge their cargoes. Facilities at the terminal include storage tanks with a total capacity of 240,000 barrels, an office, tank car loading rack, and pier.

From the Company's Baltimore Terminal, which handles only gasoline and kerosene, shipments are made by tank car into all of Maryland, the entire District of Columbia, parts of Pennsylvania, and points in northern Virginia and West Virginia. Gasoline shipments are also made into sections of Ohio.

The terminal, in common with all other properties of The Texas Company, is kept scrupulously clean and neat. Aluminum paint is much in evidence and the small office building, built within the past few years, is a compact but efficient Company unit.

At the corner of Front and Fay-



The Shot Tower, a Landmark that Survived the Baltimore Fire



Charles Street, one of Baltimore's Principal Thoroughfares

EWING GALLOWAY

ette Streets, in Baltimore, stands one landmark of the old city, the shot tower. The cornerstone of the old tower was laid in 1828; the tower itself is 250 feet high. More than one million bricks were used in the construction and the entire structure was built without scaffolding.

On the morning of September 22, 1878, Number One Hook and Ladder Company was informed that the old shot tower was on fire. The sight was magnificent, with flames from the top of the tower lighting up the city for blocks around.

As the firemen prepared to carry their hose into the tower, Simon V. Cullen, then superintendent of the works, shouted that there were 15 tons of lead, used in the manufacture of bullets, at the top.

"Run for your lives!" came the order, and scarcely had the last man reached the sidewalk when the entire mass of molten lead crashed to the ground.

Today the old shot tower stands in the midst of modern buildings; Baltimore has grown up, and the tower, like old Fort McHenry in the harbor, is simply a milestone in the progress of a great metropolis.

In the field of education, Baltimore boasts Johns Hopkins University, famous for its medical school; the University of Maryland, a state institution; Peabody Institute, noted for its library and music conservatory; Goucher College, formerly the Woman's College of Baltimore; Loyola College, conducted by the Jesuits (*Continued on Last Page*)

This Coal Pier in Curtis Bay Loads Freighters in Record Time

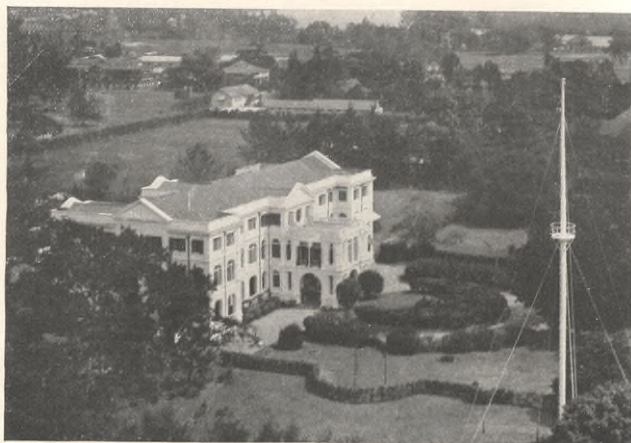
EWING GALLOWAY



★
Globe-
Trotting
with
Texaco

★
XXI

★



The Governor's Palace at Lagos, Nigeria

WEST AFRICA

By ALBERT E. ERNST

Representative, The Texas Company (Overseas) Ltd.

WEST AFRICA is a name which, even with the present-day tendency toward broadened general interests, is still associated with few definite impressions in the mind of the average reader. Gold Coast, Ivory Coast, Cameroons, are names which we have heard, but, for most of us, even those widely traveled, West Africa is a far, far country, farther in interest if not in distance than Polynesia, Thibet or other unfamiliar lands.

This, of course, is largely the result of the fact that the literature of the country, like the world's acquaintance with it, is young and immature. There are, to be sure, books on the fauna and flora, but there is little evidence that these have been much read. And there are volumes on the heroes and their exploits—mystery and adventure aplenty, even juju, that conjurers stir native imaginations with—but many of these tales have been too obviously fantastic.

This lack of intimacy which the world at large feels with respect to the facts about West Africa finds expression in the habit of calling practically every student of the country, who comes here for information only, an "expedition." It may be well, therefore, to glance at the map to see just where we are.

West Africa is found in the lower half of the large protuberance that projects to the left, on the map,

of the continent of Africa. It extends from the sea-coast, which is near and parallel to the equator, northward well into the Sahara and to Lake Chad. East and west, it spreads about 18 degrees in both directions from the meridian of Greenwich. Its dimensions, roughly 2,000 by 1,000 miles, make it a little less than two-thirds the size of the United States.

The country itself sustains the impression of immensity which these dimensions give it. Far inland there are deserts so vast that only the hardy and well-equipped dare risk a crossing. Nearer the sea are dense forests, whose luxuriance and grandeur make one comprehend words like "mighty." Winding partly around, partly through this varied country, is the Niger River (one of the great waterways of the world), broad and lengthy, with its humid, languorous atmosphere. Here, too, one may find high mountain peaks rising precipitously from deep seas, rain pouring by hundreds of inches every year, sun temperatures mounting to fray the nerves of white men. Everywhere, the gigantic and extreme—a happy hunting ground for seekers of the unusual and the strange.

If a further look be taken at the map, it will be seen that West Africa is divided into segments or slices, which run inland from the sea. These are the political divisions of the country, known as colonies, this slicing being the device by which this part



A Street in One of the Europeanized Towns of West Africa

of Africa has been divided among certain European powers. Of the colonies which border on the coast, France owns or controls six, England four, Spain two and Portugal one. Only a single area, Liberia, is ostensibly independent.

West Africa is peopled by tribes as varied in their languages and customs as the land they inhabit. With few unimportant exceptions, these tribes are black. Near the coast, they are characteristically Negroid, with the same general features as the majority of American Negroes; back near the desert are other important tribes which show Arabic, Berber and other influences.

The economic organization of these tribes is essentially communistic, lands and the means of production usually being the property of the tribe, not of the individual. Tribal government is, ordinarily, by the family system, with the chiefdom descending through the female line, although the active administration of the government of a tribe is, in most cases, in the hands of a man, closely related to the female holding title, who acts with the elders of the tribe.

The occupations of these people are of the simplest; farming, fishing, hunting, and herding. Lavish nature has made unnecessary to existence any concentrated, thoughtful effort. Native life is easy and serene. Hungry lions sometimes cause consternation among the villagers in the Soudan and a straying herd of elephants may, from time to time, trample plantations in the Cameroons, but



these occurrences are scattered and rare. Only the superstitions, born of native imaginations, emerge and survive as cogent causes of occasional ripples on the quiet waters of existence.

However, with the coming of the white man and more especially during the past 30 years, there have been developed both greater wants among the people and a more integrated economic system for filling these wants. To satisfy newly-aroused desires, the native now exerts himself to gather the fruit of the palms, presses it for oil,

plants and harvests cocoa, peanuts, and cotton. These products he carries to trading centers where European companies operate stations called factories. Here he sells his produce and buys goods to fill his needs. In some places the transactions are made by barter.

These trading centers are scattered

An Enterprising Distributor of Texaco Products in the Native Quarter of Dakar





A West African Motorist Stops at a Highway "Service Station"

over the length and breadth of the country, in every corner where a significant volume of business can be done. Some companies operate factories in hundreds of such places. To assemble and export economically the produce bought at these factories and to facilitate the distribution of imported goods, chiefly cotton cloth, petroleum products, spirits, and flour, more than 40 seaports have been opened on the coast. In addition 16 railway lines have been built inland, some of which penetrate the interior for nearly 1,000-miles. Use is also made of numerous rivers, lagoons and the rapidly developing system of roads.

Petroleum products follow these avenues of distribution and the extended arms and fingers of these organizations, to make their way to the West African consumer. It is by these routes that tins of kerosene find their way to the native huts of Kano and Kouroussa, and by them also that gasoline and oil are made available to native motor truck drivers, busy hauling produce to the ports or to the railway line.

Kerosene is one of the principal commodities used in exchange for native produce consisting of palm oil, cocoa, and peanuts. This is one of the rea-

sons the larger European firms engaged in the purchase of such native produce find it essential to handle various lines of manufactured articles, especially kerosene.

In a number of places, the retailing of kerosene is entirely in the hands of women traders, known as "mammies." These women buy quantities of kerosene on credit and transfer it into small bottles which they actually sell at a loss, but for cash, and then use the money so obtained for trading in other lines.

Practically all kerosene sold in West Africa is used for lighting and it is interesting to note that the consumption of this commodity serves as a barometer of economic conditions in the country. When the native lacks money he reverts to the use of candles and palm and peanut oils for light. No lamp is necessary to obtain light from either of

these oils as the usual vessel consists merely of an empty cigarette tin with a piece of cloth or rag for a wick. While facilities for electric lighting which have been provided in a number of the larger communities tend to



Ultimate Consumers of Texaco Kerosene in West Africa Get It by the Bottle

The TEXACO STAR

lessen the consumption of kerosene, this decline is more than offset by the increasing use of this product in places far removed from the coast where the white man and civilization are rapidly penetrating.

Limited telephone and telegraph communication is possible throughout West Africa now and is being rapidly extended.

Empty kerosene and gasoline tins are put to a variety of uses. They are made into water pails and receptacles for transporting palm oil and ground nuts into the trading centers. Some tins are flattened out and used to build native huts. The empty cases are used for firewood and in making furniture.

Drastic changes have taken place in West Africa since the first case of Texaco found its way into that country several years ago. Modern harbor facilities have been provided at a number of points, railroads and motor roads have been constructed, airplane fields have been planned and before long a regular air service linking Europe with Madagascar will pass through the heart of West Africa.

American motor cars have met with great favor and constitute by far the majority of cars in operation.

Fever, the dread of the white man, which has long infested the coast, acting as a deterrent to the progress of civilization and commerce, while still existent, has been brought under moderate control through the untiring efforts and sacrifices of organizations such as the Pasteur Institute and the Rockefeller Foundation. The *tsetse* fly, the cause of sleeping sickness, has been the subject of extensive

research and experimentation and it was during such experiments at Accra in the Gold Coast that a prominent Japanese doctor connected with the Rockefeller Foundation exposed himself to this insect, with fatal results.

Texaco petroleum products, packed usually in "two-five" gallon cans and cases, arrive in West Africa at most important ports along the coast. From these points they are distributed by our chief agents, Compagnie Française de l'Afrique Occidentale, and other important companies acting as agents, sub-agents and dealers, to about 500 different centers throughout West Africa. In Zinder, Navrongo, Djang, Timbuctoo—the Red Star with the Green T is familiar and many of the important roads of West Africa, like the highways of the United States, are truly "Texaco Trails."

Thus Texaco, too, plays its part as the bloodless conquest of Africa goes on; able, through its high quality, to contribute to the victories.

Life and work on the coast have naturally changed somewhat in character in the sweep of modern advancement and improvement. The fortresses and castles of the adventurers of an earlier day may still be seen dotting the coast at Bathurst, Elmina, Accra, Ouidah and other places but the guns on their ramparts are rusty and neglected. Today's invaders push on, in humanity's campaign for wealth and happiness, with means less picturesque, though more efficient—the warehouses, railways, motor cars and other machinery of modern business. But the romance, the thrill of conquest, still is here.

Three West African Dandies: The Young Gentleman in the Frock Coat No Doubt Causes His More Conventionally Attired Brothers to Feel Rather Envious



School Days in West Texas

By SAM ASHBURN

THE first offset to a wildcat oil well is a boom town; the second is a bond issue for a school building. The people who produce and deliver oil to the pipe lines of the nation see to it that their children are properly schooled.

In the ranch country of West Texas, where houses are few in number, schools are almost out of the question and governesses are employed to teach the children of ranch families. The oil field settlement is different. It forms quickly and brings not only the single man but the man of family who has children of school age. A town springs up quickly, children appear on the streets and are seen kissing their father goodbye as he leaves his little home for duty in the field.

If the field is successful, the rule is that within two years and usually within a period of 14 to 18 months there will be a well-equipped school building, headed by university graduates, and performing the function of a community center.

People living in the cities have no need to pity children of the oil fields, for a glance at any of the school systems founded in the Permian Basin of West Texas shows that these schools compare well with veteran systems of cities boasting large populations. The oil companies are glad to join in these programs of civic betterment, and in practically every town of the oil country an oil man is president of the school board, while other oil leaders are members of its board of governors.

The day is past when men who had failed in the teaching profession in other quarters could come to the frontiers of the nation and get leading positions as teachers. Only the best teachers are taken and the salaries are much above the wage paid teachers in other communities. Thus these frontier towns have established some of the best school systems to be found in the nation. They teach everything; not only the arts and sciences but domestic science, practical geology, first aid, physical culture, machine shop work, public speaking and in some of the towns night schools have drawn a large enrollment of oil workers who desire to better their position in life.

It's an erroneous idea altogether that the oil fields are like the Tropics—that they teem with vice and crime and that men who work in them

Children of the Oil Field Worker Today Are Assured of a Good Education

are hard, unfeeling and desperate. Rather, the oil towns are becoming more or less centers of culture and the students turned out of the schools rate well in the universities. Athletic teams from these institutions are often winners of district and even state titles in interscholastic competition.

These teams go from one town to another through a long and empty country and are supported by a large crowd of fans. In the first year of the operation of these schools the board of governors may be composed of the oil field politicians who travel from one town to another. Often this first board, whether justly or not, is accused of graft, and charges are finally brought before a mass meeting. Rarely, if ever, however, are these charges productive of indictments before grand juries. After the first year, the board is usually changed and the town and the school go on their way of being businesslike and efficient without street-corner accusations.

Often the creation of a new school district may occasion a lawsuit with the district from which the new unit has been lifted, but this, too, usually is settled by compromise after two or three years of litigation. Building a school system, therefore, is as difficult as working out the geology and defining the structure of an oil field.

Usually the school building is the biggest in the town; fireproof, and with a large auditorium. Often the chamber of commerce is actively identified with the school during the first few years and many columns are printed in the local paper about the progress of the new institution.

Delinquent taxes in oil field school districts are usually slight indeed, while the usually turbulent city government may find a large sum of unpaid taxes on its books.

Take the case of the town of McCamey, established four years ago on an alkali flat, hemmed in by mountains: The nearest school was 20 miles away, but before the town had grown beyond a population of 50, with two filling stations, one hotel, a townsite office, and two dozen tents to which water was hauled 100 miles, plans were made for the creation of a school. Today that school has an investment of half a million dollars in buildings and equipment and an enrollment of more than

1,200 students. Tryon Lewis, square-jawed cowman who went through the drought of 1917 and 1918, E. S. Hornbeck, who helped Arthur Stilwell promote the Orient Railroad, and Harry Odenall, a Texas ranger, traced the boundaries of the new school district by candle light in the townsite office, and the next day Mr. Odenall left for the state capital where the district was created immediately.

The seats for the new school came from the goat town of Upland, 60 miles away, and public subscription paid for the erection of the first building. There were two teachers at first, but as the field expanded more were added and additional buildings erected.

The county school board lent its aid to the development of the school and the next year a brick school arose out of a bond issue.

The stucco school building in Crane City, where The Texas Company has holdings, would look well in any city, and they give a course there in nearly every practical scholastic subject. A patio in this school contains the only bermuda grass in the county and cowpunchers have come miles to

see a curiosity so rare in this part of the state.

Winkler County, following its oil discovery, built handsome schools, both at Wink and at Kermit. Kermit, a town of about 300 population, has a \$250,000 school building and a \$200,000 courthouse. Oil "paid the freight" and gladly, carrying the banner of progress to a new and undeveloped country.

Only one mile from the pumping station of The Texas Pipe Line Company in the Yates Oil Field of Pecos County stands the school house of Iraan, Texas. Its teachers come from many universities and its pupils are brought in buses from the high hills and deep canyons of the mighty field. When another school in this district desired to appropriate about \$5,000,000 evaluation there was no protest. The school district has a tax rate of 25 cents on the hundred and a valuation of about \$30,000,000.

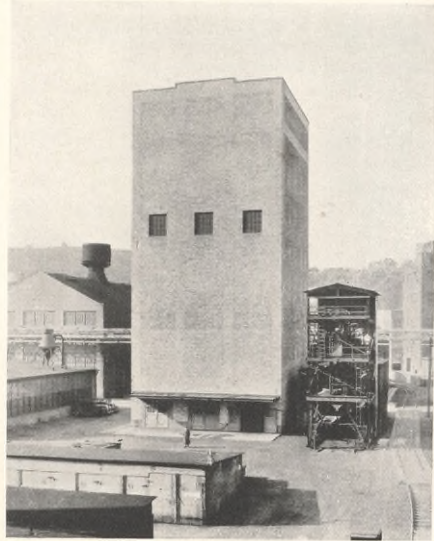
Oil field workers are well paid and their children are well schooled. The oil companies do what they can to answer the prayer in the heart of every man that his child may be a better man than he, with a better chance to make his way upward in the world.

Coin-in-the-Slot Parking

A CONVENIENT spot in mid-air for parking your car at the push of a button, the turn of a key or the insertion of a coin in a niche in the wall, is one of the latest contributions of science to the motorist who now has to drive around block after block looking for a spot to leave his automobile while he is at business or the theater.

Less than a minute is required for the driver to park his car or recover it, and he may be sure that while he is gone no other motorist will have an opportunity to run against its fenders, that it will be handled by no garage attendant, and that no other person will have access to it. Such are the advantages of the vertical parking garage, recently developed by the Westinghouse Electric and Manufacturing Company.

This device, which permits the parking of 24 automobiles on a ground space little larger than that required by an ordinary two-car garage, is made up of cradles, one for each car, running on endless chains to a height of 105 feet. These chains, driven by electric motors, travel 100 feet per minute; the average time for bringing a cradle to the ground



level is 30 seconds. When a cradle is called to the driveway level, by pushbutton, key or coin, it automatically takes the shortest route, and 30 seconds later the driver will be in his seat with his foot on the starter, ready to go his way.

Where Custer Stood

*Famous Battlefield Easily
Accessible to the Tourist*

By W. D. FISHER

THOUSANDS of automobile tourists, aided by products sold under the Red Star with the Green T, are discovering interesting, out-of-the-way places on roads of history radiating from the Custer Battlefield highway, the motor route extending from Des Moines, Iowa, to two great national parks, Yellowstone and Glacier. Along its 1,500 miles, which save a day's traveling from Chicago to Glacier National Park, are many good automobile byways leading to these historic and scenic treasures.

One point of interest is the Custer Battlefield, after which the highway is named. This field of honor, among the hills that mark the course of the Little Big Horn River in southern Montana, is the resting place of Custer's last command, massacred by the Sioux Indians on June 25 and 26, 1876.

Near Sheridan, Wyoming, is Massacre Hill, and a sentinel monument atop a foothill of the Big Horn Mountains proclaims that "there were no survivors" of the engagement on December 21, 1866, when three officers and 76 men of the Eighteenth United States Infantry and Second United States Cavalry, together with four civilians, were killed by Sioux led by Chief Red Cloud. Not far away is the scene of the famed Wagon Box fight.

Wyoming has known six flags and the envy of a seventh. The colors of Spain, England, France, Mexico, Texas, and the United States have protected its people, and Russia once looked upon its territory with a view to establishing a foothold there.

Medicine Wheel Mountain, in the Big Horns, is another unusual feature of this region. A gigantic stone wheel, crowning the summit of an isolated peak, is believed to antedate the history of the present Indian race. No tribe found by anthropologists gives a hint to the origin of this unique construction supposed to have been the mecca of some ancient people. A giant wheel, varying in diameter from 74 to 80 feet, has 23



Needles Road, Custer State Park

lines of white, flat stones laid out as spokes to an inner circle, or hub, 12 feet in diameter. A center ring is seven feet in diameter, and raised two and one-half to three feet high, like a sacrificial altar.

Across the range is the Beartooth country, ancestral home of the Crow Indians, numbering among its mountain ranges more than 20 peaks 11,000 to almost 13,000 feet in height, the highest elevations in Montana. This area, immediately to the north and east of Yellowstone National Park, contains the famous Grasshopper Glacier, where prehistoric grasshoppers may be found imbedded in eternal ice.

Between Sundance and Moorcroft, Wyoming, is a geological phenomenon unduplicated by nature. This is Mato Teepee or the Devil's Tower, a column of varicolored, basaltic rock 300 feet above a 400-foot eminence of sedimentary rocks along the Belle Fourche River. It stands in silent grandeur and majesty, its fluted sides of pentagonal and hexagonal columns nearly perpendicular, defying ascent. A Kiowa Indian legend ascribes its origin to the gods who pushed a flat rock upward to save seven Indian maidens corralled by bears. When Winter comes to Wyoming's range land, the Indians know that it is the middle of the night when the seven stars of the Pleiades are directly above the Devil's Tower, for these stars are the little Indian girls that the gods sent into the heavens to protect them from the bears.

Back in the Black Hills is Mount Rushmore, where a 500-word history of the United States is to be carved upon the 1,000-foot granite mountain face as part of the Mount Rushmore Memorial. Here, too, is Harney Peak, highest elevation in the United States east of the Rockies.

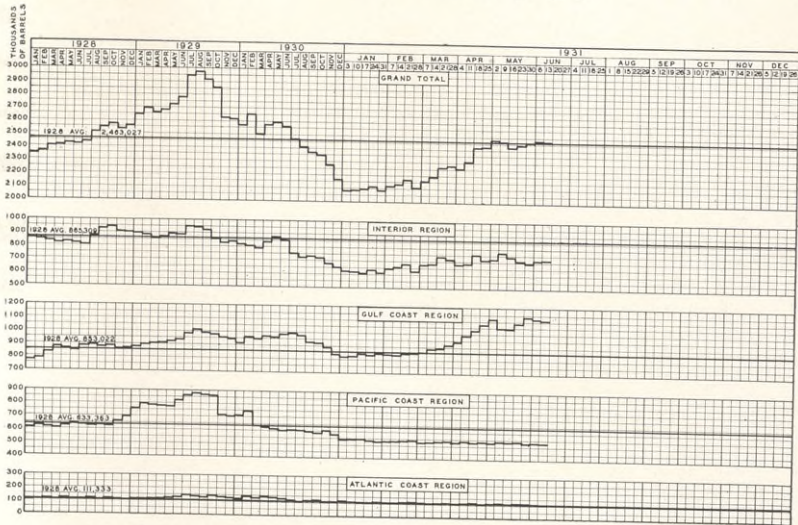
These are a few of the unusual places the motorist finds on this highway, the scenic route to the heart of one of the playgrounds of America, the land of the great Northwest.

GENERAL GEORGE A. CUSTER



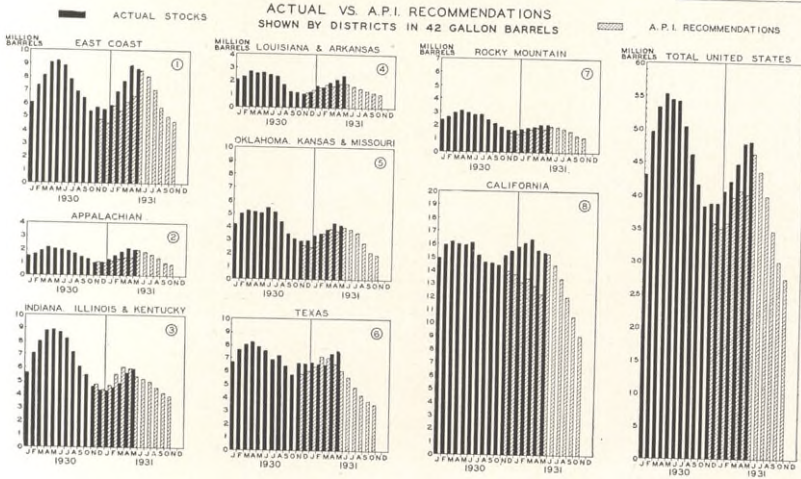
DAILY AVERAGE CRUDE OIL PRODUCTION TOTAL UNITED STATES

Up to and including June 13



GASOLINE STOCKS FIRST OF EACH MONTH IN UNITED STATES

As of May 1



OUR WHO'S WHO



L. K. LANEY, whose interesting article concerning The Texas Company's floating power plant appears in this issue of *THE TEXACO STAR*, was born in Bolivar, New York, and received his early education at

Lima, Ohio. After attending the University of Michigan he worked as a machinist, automobile repair man, ship draftsman, machinery salesman, contracting designer, and builder of natural gasoline plants. For the past 10 years he has been employed by The Texas Company, first as gasoline plant superintendent, later as Superintendent of the Gasoline Division of the Producing Department and now as Consulting Engineer for the Producing Department. He is married and has two sons.

ALBERT FIRMIN,

author of the article on post office pipe lines in this issue, is Postmaster of Brooklyn, New York, one of the five boroughs of New York City. He was born in Manhattan, another borough, in 1858, and left school when 12 years old to go to work. He soon realized that further education was necessary for advancement, and continued his studies in evening school and under private tutors.

In 1883 Mr. Firmin became a junior clerk in the New York Post Office, and after some years attained the position of Superintendent of the Division of Money Orders and Postal Savings, entrusted with financial transactions comparable in volume to those of the largest banks in the country.

In Brooklyn, where he moved in 1899, Mr. Firmin is responsible for mail service over 84 square miles of densely-populated territory.



BALTIMORE

(Continued from page 23)

for the education of Roman Catholic youth; Morgan College, for Negroes, with a student body of about 400.

Baltimore is closer to the great industrial territory of the Middle West than any of the five Atlantic Coast seaports, and Baltimore means to make much of that fact. Baltimore is proud of its port, proud of its history, proud of its educational facilities, proud of its own industries. Baltimore is a progressive city—ask any Baltimorean.

A LIMITED number of copies of the front cover of this issue of *THE TEXACO STAR*, suitable for framing, are available to our readers. Address The Texas Company, Publications Division, 135 East Forty-second Street, New York City.

UNITIZATION

(Continued from page 5)

some extent, the various types of units and the mechanics of their formation, it now becomes important for us to consider a method by which the principle of unitization may be placed in more general usage in the industry and particularly in this territory. The following methods are recommended:

FIRST: Continue the studies so that a greater proportion of the oil producers may be informed on the subject. Particularly is this important to that class of producer whose leasing activity is an important feature of his business.

SECOND: More careful attention should be given to training the personnel concerned in trading and leasing throughout the industry, both in the fundamental principles of petroleum engineering and in the fundamental legal principles involved in leasing, with particular stress upon the practical and legal desirability and feasibility of the formation of unitized blocks. This is a most important suggestion, as it is largely through the medium of this personnel that lessors receive their ideas as to desirable policy and the mechanics of leasing. Unless the lease man thoroughly understands the principles and is thoroughly sold on himself, he is not qualified to sell the principles to others. The lease negotiator is the most important salesman an oil concern can have. It is upon his work that the business structure is erected. He is in truth and in fact an ambassador to whom is delegated that most important duty of negotiating and constructing the framework of the whole fabric of the public relations of an industry. Certainly no effort should be spared in his careful selection and proper training.

THIRD: More careful consideration should be given to planning one's mission in the acquisition of leases. Often consultation with a competent lawyer prior to definite commitment as to the terms of a trade would be conducive to more constructive progress. First, the practical result sought to be accomplished should be carefully analyzed and thoroughly planned, and then a proper legal structure devised to render these results possible.

FOURTH: No pains should be

spared to educate the rank and file of our present and prospective lessors in the desirability and even the economic necessity of correct production practice. Perhaps we do not take them into our confidence sufficiently. In one sense they are our partners. As a general rule their interests and ours are mutual and governed by identical principles and economic influences. More attention given to cultivating relations with the lessor with utter frankness would undoubtedly remove many misunderstandings that have arisen or might be anticipated.

FIFTH: More care should be given to buying leases on assignment. Brokers and other lease dealers should be impelled to a more careful study of this work by the refusal upon the part of their assignees to accept a transfer of just any lease form, regardless of its efficiency and desirability. This class of dealer should be encouraged to equip himself thoroughly as a competent lease man with a thorough knowledge of his work. Leases should not be purchased as a standard article of merchandise, as one would purchase a package of cigarettes, but should be purchased with due consideration to their importance and far-reaching influence in the economic structure.

The whole industry is very rapidly becoming "petroleum engineering-minded." The more we can assist this process and the more rapidly we can attain our business custom and the resulting legal structure to it, the more rapidly will we attain a stabilized condition in the industry.

THERE is no mystery in the principles involved in the use of geophysical instruments in the search for oil. Furthermore the men who use these instruments do not pretend that the instruments will find oil, says *The Oil and Gas Journal*.

"All that the devices are expected to do is reveal underground structural conditions that are likely to be favorable for petroleum deposits. The drill must do the rest. Geophysical instruments of recognized value in the search for subsurface conditions include the torsion balance, magnetometer, seismograph, and geophone, which employ gravitational, magnetic, seismic, and electrical principles respectively.

"Any disinclination on the part of oil companies to tell the public all they are doing in their search for new oil areas, whether by geophysical methods or otherwise, may be attributed quite safely to common business prudence and not to any disposition to be mysterious. As for so-called oil-finding devices that have no scientific standing, the hazel twig and the clairvoyant still have their devotees."



THE HIGHWAYS ARE INVITING AND
THOUSANDS OF TEXACO SERVICE
STATIONS THE COUNTRY OVER ARE
PREPARED TO MAKE YOUR SUMMER
VACATION TOUR A PLEASANT ONE

WET GAS makes your car BUCK



use dry*

"Engine-buck" is most noticeable in starting and shifting.

TEXACO-ETHYL

eliminates engine buck

A bucking car is uncertain as a bronco fresh from the plains. You can break your car of this habit. Nine times out of ten wet gas is to blame. It flows unevenly to the cylinders. Some of them flash into power—others fail to fire. Bucking is hard on any car.

Texaco-Ethyl, the dry* Ethyl Gasoline, smooths out engine-buck. It enters the cylinders completely vaporized—a dry* gas which fires instantly. The result is uniform power—which means even pick-up, gliding acceleration and smooth engine pull at every speed.

Drive to the near-by Texaco-Ethyl pump for matchless dry-gas power. Use this dry* Ethyl gasoline always.

THE TEXAS COMPANY

Refiners of a complete line of Texaco Petroleum Products, including Gasoline, Motor Oil, Industrial, Railroad, Marine and Farm Lubricants, Road Asphalts and Asphalt Roofing.

DRY + ETHYL = DRY
TEXACO COMPOUND = TEXACO-ETHYL

THERE IS NO BETTER GASOLINE

* Dry gas vaporizes completely because it is properly refined. Wet gas vaporizes only in part. Wet gas carries an uneven spray of raw wet gasoline which chokes some cylinders at the expense of others, causes crankcase dilution and wasted power. Dry gas goes through the manifold evenly. It burns completely, delivering all its power into every cylinder.



LISTEN
—and for perfect lubrication, use
"CRACK-PROOF"
TEXACO MOTOR OIL

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