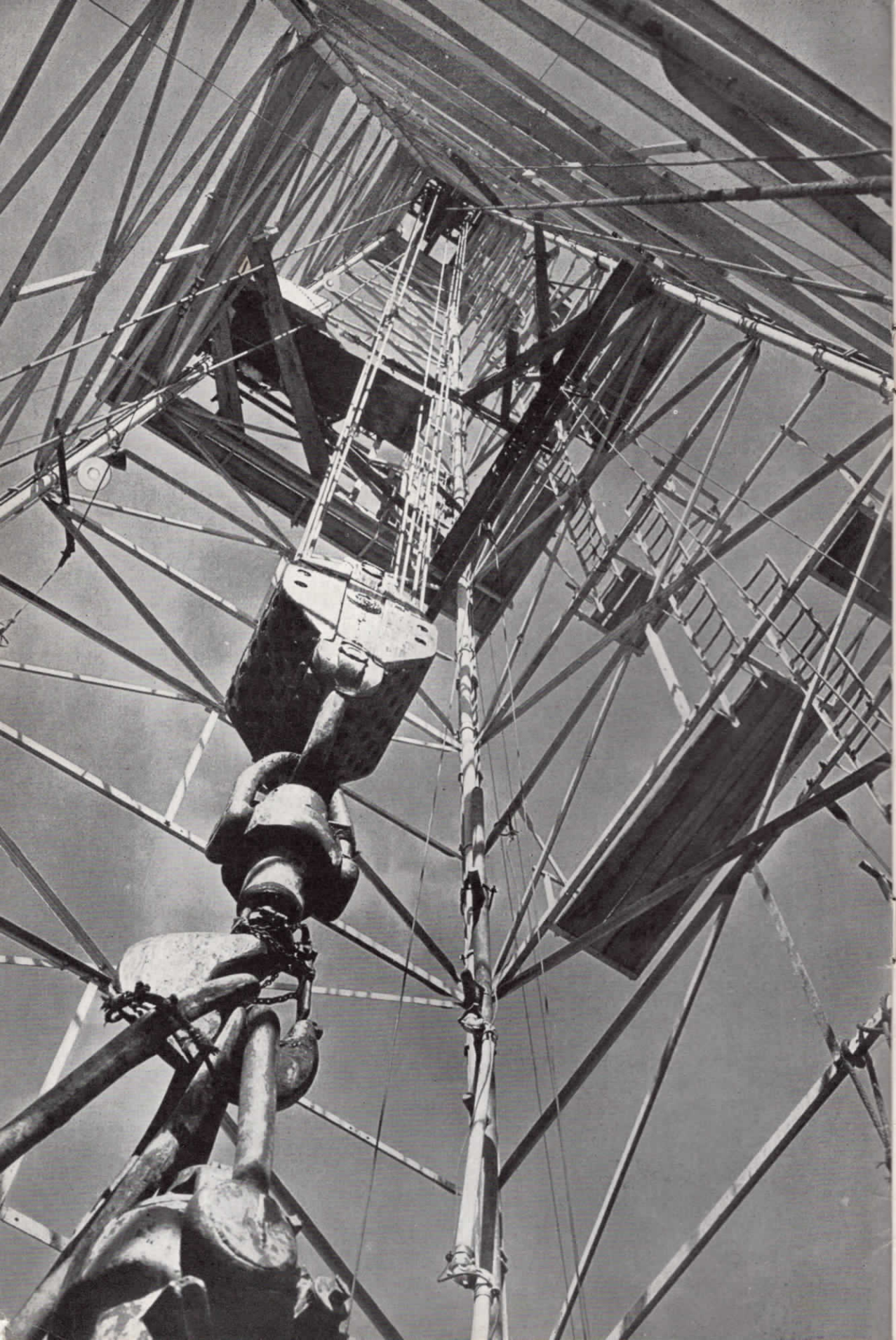


UNION OIL BULLETIN



SEPTEMBER 1934





UNION OIL BULLETIN

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VOLUME XV

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BULLETIN No. 4

In Memoriam

Margaret Elizabeth Chichester Stewart

ON August 31, Mrs. Margaret Elizabeth Chichester Stewart, widow of the late William Lyman Stewart, Sr., and mother of William Lyman Stewart, Jr., and Arthur Chichester Stewart, passed away after a rather short illness at the age of sixty-seven.

Borne in Larne, County Antrim, Ireland, in 1867, Mrs. Stewart, nee Miss Chichester, first came to the United States in 1894 to visit her cousin, the Reverend William Chichester. During her visit, Miss Chichester met William Lyman Stewart at the home of his father Lyman Stewart, and the two were married that year.

The first seven years of their married life were spent in Santa Paula, California, the birthplace of the Union Oil Company. They later moved to the family estate in Pasadena, on which now reside Mrs. Stewart's two sons and one of her three daughters, Mrs. Sarah Arnold Bender. The other two daughters live elsewhere, Mrs. Dorothy Stewart Elliott in Haiti, West Indies, and Mrs. Adelaide Stewart MacAlpine in Fresno, California.

Perhaps it will never be known to what extent Mrs. Stewart, as the wife of the man who directed the destinies of the company for sixteen years and the mother of

the two sons now prominently identified with the company, aided in the progress of the Union Oil Company. Were one to know the true personal tasks of those closest to our business leaders, undoubtedly there would be revealed wherefrom emanates much of the human side of what usually is termed American resourcefulness. Mrs. Stewart was just such a wife and mother, standing always ready to offer what assistance was in her power, following principles based on human understanding.

Mrs. Stewart had many hobbies, among which was cultivation of the flowers, notably orchids, which she loved. And as one result of her efforts, Mrs. Stewart won the Sweepstakes prize for many years at the Pasadena Flower Shows.

The passing of Mrs. Stewart is a distinct loss to the thousands associated with the Union Oil Company, for, until her passing, it can be said she had been with the company since the time her father-in-law, Lyman Stewart, assumed the presidency in 1894. In recent years, Mrs. Stewart was extremely interested in the Union Oil Girls' Club, the maternal instinct which reached far beyond the immediate circle of her own family finding its expression in the entertainment of club members from time to time.

Coincidental with her passing was the death within a week of her closest friend in the forty years spent in California, Mrs. Sarah Louise Shaw Clark, widow of the late E. W. Clark who culminated twenty years of service with the company as its chairman.

Sarah Louise Shaw Clark

ENDING years of failing health, Mrs. Sarah Louise Shaw Clark, widow of the late E. W. Clark, died September 8 at the age of seventy-eight.

Mrs. Clark was born in New York in 1856 and, while a young lady, moved to San Luis Obispo, California, where later she met and subsequently married Mr. Clark in 1904. At the time, Mr. Clark was manager of the Pacific Coast Railway Company line extending from Los Olivos to Port San Luis. In 1913 Mr. and Mrs. Clark moved to Los Angeles, upon the transfer of Mr. Clark to duties with the company which necessitated his becoming established in the head offices. For the last ten years Mrs. Clark has made her home at the Talmadge Apartments, Los Angeles, remaining at the same establishment after

her husband's death in 1931.

Although having no children, Mrs. Clark nevertheless possessed great affection for young people, and was ever seeking opportunities to help some boy or girl. Her charitable contributions were as unostentatious as they were numerous. Deeply, but unobtrusively religious, Mrs. Clark devoted considerable time to church work. It was such mutual interests which first drew together Mrs. Clark and Mrs. Stewart, whose friendship for each other was of an enduring nature until their deaths.

As in the instance of the passing of Mrs. Stewart, the death of Mrs. Clark took from the associates of the company a true friend of many, many years, a friendship which will be difficult, if ever possible, to replace.

Elected Secretary

W. R. Edwards

On August 27, W. R. Edwards was elected secretary of the company, succeeding the late John McPeak who died suddenly on June 20.

Mr. Edwards came to the United States from Canada in December, 1914, becoming associated with the company in January, 1915 as a member of the secretarial staff. He was elected assistant secretary on April 28, 1922 and served in that capacity until his election as secretary.

Born in Norwich, England, 48 years ago, Mr. Edwards became an American citizen in 1922. Prior to his association with the Union Oil Company he was engaged in accounting and auditing work. Mr. Edwards has now been with the company almost 20 years.

Elected Ass't Treasurer

H. W. Sanders

H. W. Sanders, associated with the company since April 6, 1926, was elected an assistant treasurer on August 27.

Born in March, New York, in 1895, Mr. Sanders first came to Los Angeles in 1909, but left shortly afterward for the Telluride Association, an endowed institution with headquarters at Cornell University, to study business administration and economics. In 1916, he was a delegate to the National Conservation Congress at Washington, D. C.

Shortly after the United States entered the war, Mr. Sanders enlisted and served one year with the A.E.F. in France and England. After being discharged, he engaged in the grain and live stock brokerage business in Oklahoma, and later became president and a director of the Citizens State Bank at Minco, Oklahoma.

This Month's Cover

The photograph reproduced on the front cover of this month's Bulletin is of Belridge 18, in the North Belridge field. This well has tapped the deep sands and is expected to be one of the field's biggest producers.

The photograph on the back cover is of the same well, the effect was achieved

through what might be termed trick printing. Instead of printing the original negative on a positive stock it was printed on a negative stock, and the two negatives slightly offset and double printed on positive stock. But, it's not that easy, as "Dick" Whittington, photographer, will testify.

Naval Fuel Oil Award

AWARD of an order to the Union Oil Company for delivery of 1,003,200 barrels of fuel oil to the U. S. Navy was announced Sept. 22 by J. B. Arthur, manager fuel oil and export sales. The award represents a monetary value in excess of \$800,000.

The order constitutes virtually all the fuel oil needs of the Navy on the West Coast during the balance of the calendar

year. Bid specifications call for delivery at various Pacific Coast ports, the largest amount—670,000 barrels—being allocated to San Pedro. San Diego is apportioned 107,000 barrels, San Francisco, 100,000, and Honolulu, 35,000. The balance of approximately 90,000 barrels is to be delivered at Oregon and Washington harbors.

Bids for supplying the fuel were opened Sept. 15 in Washington and the award made a week later.

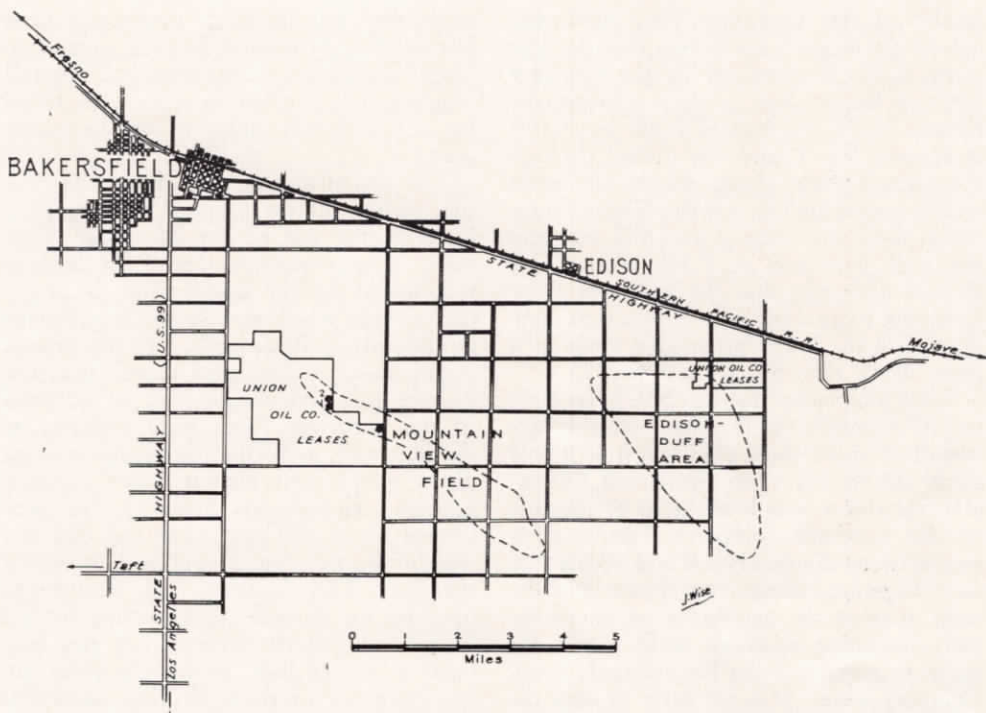


Union's Discovery Extends Mountain View Field

ON September 7, approximately five miles southeast of Bakersfield, California, the Union Oil Company brought in its Kernco No. 2 well with an initial flow of 3,240 barrels a day of 30.8 degrees gravity clean oil. Subsequent tests have shown the well capable of producing 4,000 barrels a day. It will, however, be cut back after completion of the production tests in accordance with the State's curtailment rulings.

Kernco No. 2 is located on a block of acreage consisting of two independent but adjoining leases totalling 2,467 acres, with a northwest-southeast extent of approximately three miles. Due to the formations found, which are comparable to those found in the Mountain View oil field, the discovery has extended that field for several miles to the northwest, and has proven up a substantial portion of the company's acreage.

During the last year, the area southeast of Bakersfield has been the scene of considerable drilling activity. Some years ago a well, located several miles east and a little south of Kernco No. 2, was completed for what appeared for a time to be a substantial producer, but was killed and deepened, and subsequent efforts to bring it back on production were not particularly successful. Two or three other wells were drilled at about the same time, but, while there were oil showings, results were not considered satisfactory and the area lay dormant for some time. Many leases expired and were not renewed. About two years ago, a well was begun less than half a mile south of the original test well, and on May 13, 1933, was completed at 5,800 feet with an initial production of 1,800 barrels a day of 34 degrees gravity oil. This, the Hogan well, usually is considered the discovery well of the field, as it pre-



Map of Mountain View oil field, showing how the company's activities have extended the field. Wible No. 1 is located on the eastern boundary of the Union Oil Co. leases, with Kernco No. 1 and No. 2 to the northwest. Acreage surrounded by dotted line is proven oil property, but includes only the acreage proven by actual drilling to date. The same is true in the case of the Edison-Duff area, shown at the right.

precipitated recent drilling activities in that locality.

Upon completion of this well, Union Oil Company leased the Wible property, consisting of 580 acres approximately three miles northwest from the discovery well. Shortly afterward, the company leased an additional 1,887 acres from the Kern County Land Company, which acreage adjoins the Wible property to the northwest. A well, Kernco No. 1, was started on the east side of the second lease, and at a depth of 5,338 feet oil showings were excellent, but the sand was recognized as not being the same as the zone from which the Hogan well was producing, so the well was drilled deeper to ascertain if the Hogan sand was productive in this area. At 5,609 feet the Hogan sand was encountered and a production test was made, which showed considerable oil, but, also, considerable water. Because of this latter condition, it was decided to test the first zone, and on April 18, 1934, the well began producing,

subsequent tests showing a potential of about 700 barrels a day of 21 degrees gravity oil. While the well indicated the possibilities of the acreage under lease, it was still a question as to whether a new field had been discovered, or whether the Mountain View field had been extended.

In order to determine the relationship of this property with the Mountain View field, another test well, Wible No. 1, was started on the eastern edge of that lease, approximately a mile east and a quarter of a mile south of Kernco No. 1. At 5,249 feet down, the well encountered the oil zone that is now producing in the Kernco No. 1, but the well was carried down to make a test of the equivalent of the Hogan zone, which was found at 5,554 feet. This well blew out once, and several times has shown considerable pressure, however, it still is being tested, the oil so far recovered averaging 30 degrees gravity.

Wible No. 1 proved the company's acreage actually was on a northwest ex-

tension of the Mountain View field, and upheld the original contention that the best wells would be obtained by the company north of Kernco No. 1. As a consequence, Kernco No. 2 was located 1,000 feet north of Kernco No. 1, and was drilled through the Kernco zone (from which the latter well is producing) to test the Hogan sands, which were encountered at 5,482 feet and the well bottomed at 5,546 feet. This showed definitely that the well was more favorably located for good production, having found the lower productive sands at a lesser depth than did Kernco No. 1.

Since completion, Kernco No. 2 has built up its potential production, with a gas output of more than a million and a half cubic feet a day. On September 10 another producer was brought in to the east of the company's property, located midway between Kernco No. 2 and Wible No. 1. Together, these two latest completions suggest the possibility of the company obtaining excellent wells along the northern portion of the Kern County Land Company lease. It is too early to state the exact acreage that ultimately will prove

productive, but the large production from Kernco No. 2 certainly does not suggest an "edge" condition; on the contrary, the well suggests that production should be found for a considerable distance to the northwest.

The accompanying map shows the relative position of the Union Oil Company's leases to the rest of the Mountain View field. The productive area of the field, as surrounded by the dotted line, is simply that acreage which already has been proven by actually drilled wells. From present completions, as has been stated, this productive area undoubtedly will be extended to the northwest, and quite probably to the southeast, as further development takes place, which will include more company acreage. Kernco No. 3 already has been located about 660 feet north and 660 feet west of Kernco No. 2, and will be drilled shortly. This location was determined upon for the purpose of prospecting further in a northwesterly direction; it has been made a "second line" location in order not to precipitate excessive drilling operations in that vicinity.



The above photograph, taken from the floor of Kernco No. 1, the Union Oil Company well that extended the Mountain View field nearly three miles, shows Kernco No. 2, 1000 feet distant, recently completed at a depth of 5546 feet with an initial flow of 3,240 barrels a day of 30.8 gravity clean oil.

In considering the activities of the Union Oil Company southeast of Bakersfield, the development of the Edison-Duff area should not be overlooked. It appears there is a new field being developed in that area, which probably will be referred to in the future as the Edison field. Two wells were drilled some time ago, one being completed as a small producer of heavy oil. Another well was drilled, which found good production below the heavy oil zone. The gravity of the oil was about 22 degrees, and the zone from which the oil came probably corresponds with the producing zone of the Round Mountain field. This well, the first to find good production, is considered the discovery well for that area.

Some time before drilling of the discovery well, the Union Oil Company acquired an 80 acre lease; after completion of the discovery well, the company leased an additional 320 acres, the leases adjoining and making a parcel of land one and a quarter miles long in a north-south direction. The map shows the relative position of the Edison-Duff to the Mountain View

field, and also shows the location of the company's leases. As in the case of the Mountain View field, the outline of the Edison-Duff area includes only that area considered as proven by actual drilling operations.

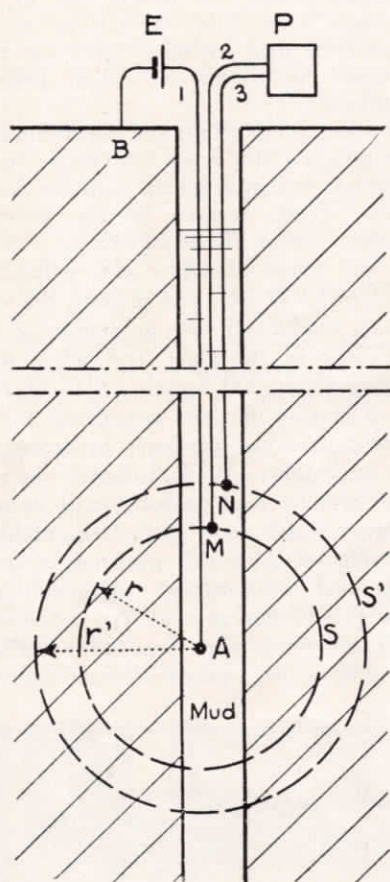
In order to ascertain the possibilities of the company's 400 acres held under lease, a joint test well was drilled with the A. T. Jergins Trust, located at the extreme southwest corner of the 400 acres. An oil sand was found at 1,112 feet, which extended to 1,560 feet. At present, the well is on a production test to determine the possibilities of the zone, and while it is pumping about 300 barrels a day of 17.2 degrees gravity oil, it is considered an excellent commercial producer by reason of being so shallow. Wells drilled to the east of the present well probably will become shallower in this zone, so that the problem of development of this property is quite simple and inexpensive. Although the lower possibilities are, as yet, unknown, the known upper zone proves the Edison-Duff area to be commercially satisfactory.

Field Development Operations Go Scientific

FOR many years scientific apparatus, such as torsion balances, seismographs and other geophysical instruments, has aided the petroleum geologist in his search for new oil fields, but only very recently have similar means been adopted in actual drilling operations.

In the past two years "electrical coring" has assumed major importance in drilling operations as a means of correlating geological formations from well to well in the same oil field. In order to determine the nature of the subsurface material penetrated by the drill, in the past it has been necessary to resort to the laborious practice of taking cores which, when brought to the surface, indicate the nature of the formation found at a known depth.

A comparatively recent development, known as the Schlumberger electrical coring device, eliminates a great deal of coring and enables an operator, after having drilled a well and prior to setting the casing, to determine by electrical measurements the nature of the formation, whether it is sand, shale or other material. At the same time, a fairly accurate indication of the porosity and fluid content of the formation is obtained. These measurements are made by running three electrodes into the well and plotting in terms of electrical units of "resistivity" and "voltage" two synchronized curves which indicate, respectively, the type of formation and porosity. Such curves in any given oil field, when compared with a cored section from one



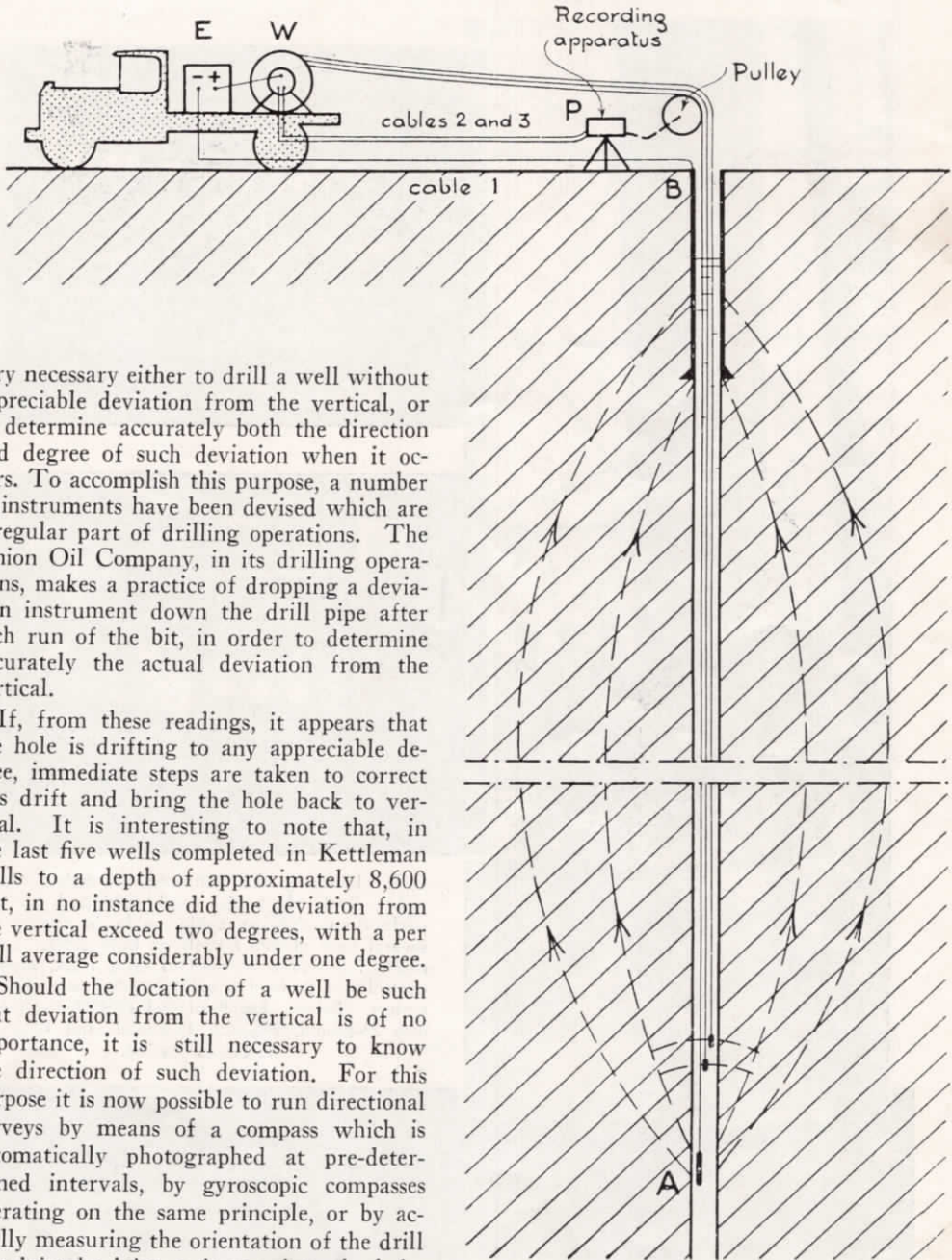
The device usually employed for taking resistivity measurements is shown above. It comprises three insulated cables 1, 2 and 3 (see opposite page), which are lowered into the well. Three electrodes A, M and N are attached to the cables, which dip into the water or mud filling the hole. Distances AM (r) and AN (r') are from 10 to 20 times the diameter of the hole. Electrode A is used to send the current into the ground, and electrodes M and N to measure the difference of potential caused between these two points by passage of the current through the ground. To cause the current to flow into the ground (next page), electrode A is connected with cable 1 to one pole of battery E, the other pole being grounded to any given earth contact B—frequently the casing. To measure the differences of potential between M and N, these electrodes are connected by cables 2 and 3 to terminals of the potentiometer P. Knowing the distances r and r' , the intensity of the current passed through the ground, and the difference of potential voltage between M and N (as measured by the potentiometer), the average resistivity of the ground in the region of AMN can be calculated.

of the first wells, enables the operator to determine, with a surprising degree of accuracy, the position of sand and shale bodies without further coring other than to check the electrical readings. The device is very quickly and economically run in a well, and does much to speed up, and reduce the cost of drilling operations. Plotting of the curves is done automatically, as the electrodes are lowered down the well.

An excellent example of how the findings of the electrical coring device are plotted in composite form for an oil field is pictured in an accompanying chart. The curves shown are those taken from actual operations in the Dominguez oil field, California, by the Union Oil Company. The line to the left denotes the "resistance curve," whereas the line to the right of the center multi-divided bar is the "porosity curve." High resistance is recorded by the curve swinging to the extreme left; conversely, high porosity is recorded by the curve swinging to the extreme right. In reading the chart both lines must be taken at the same well depth. Generally speaking, shale formation is indicated by low porosity and relatively high resistivity; sand formation, either with or without oil content, is indicated by high porosity and relatively high resistivity, while high porosity and low resistivity may be indicative of the presence of water. Other readings may mean the presence of any one of a number of other materials.

The bar between the lines is a charting of composite corings taken, in this instance, from the three wells to the right—the first well giving information down to its bottom, the next well from there to its own lower depth, and so on, to the lowest depth drilled in that field. The letters to the left of the "resistance curve" are comparable to a general filing system, for reference to specific formations. What is not shown in the chart is a paleontological bar similar to the bar shown, but divided according to paleontological analyses of actual cores taken from the well. This latter information is referred to by the operator, when comparing findings from electrical coring with those from actual coring.

In addition to determining the type of formation penetrated, it now has become



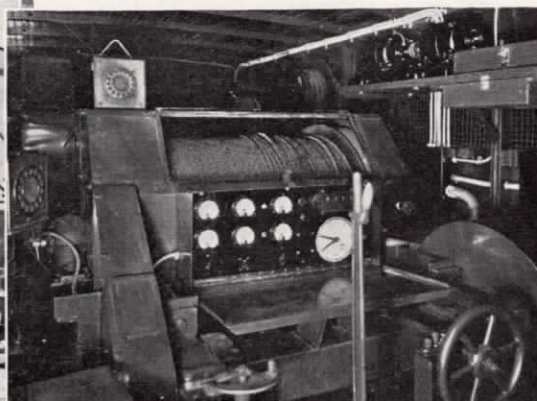
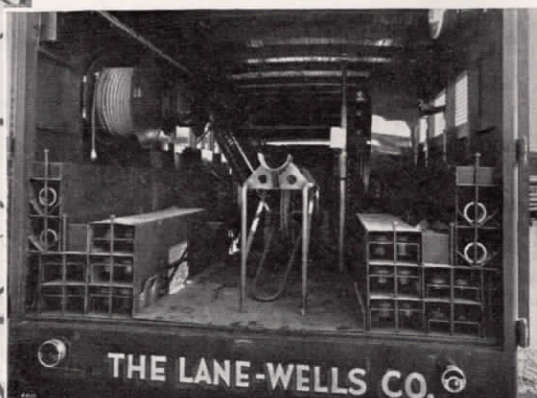
very necessary either to drill a well without appreciable deviation from the vertical, or to determine accurately both the direction and degree of such deviation when it occurs. To accomplish this purpose, a number of instruments have been devised which are a regular part of drilling operations. The Union Oil Company, in its drilling operations, makes a practice of dropping a deviation instrument down the drill pipe after each run of the bit, in order to determine accurately the actual deviation from the vertical.

If, from these readings, it appears that the hole is drifting to any appreciable degree, immediate steps are taken to correct this drift and bring the hole back to vertical. It is interesting to note that, in the last five wells completed in Kettleman Hills to a depth of approximately 8,600 feet, in no instance did the deviation from the vertical exceed two degrees, with a per well average considerably under one degree.

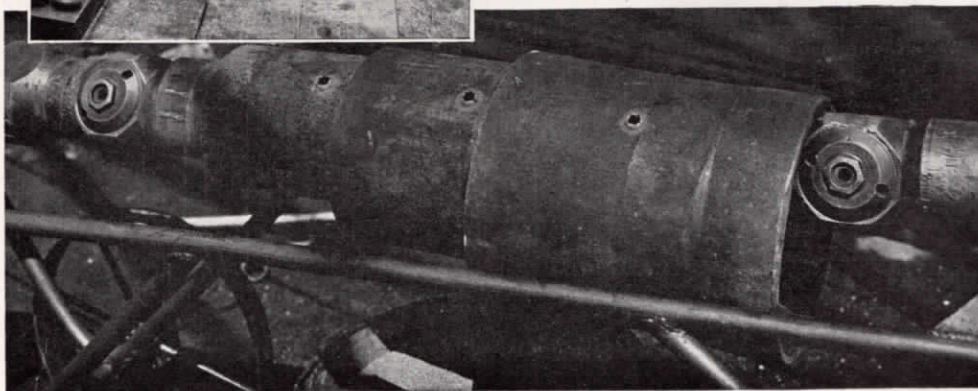
Should the location of a well be such that deviation from the vertical is of no importance, it is still necessary to know the direction of such deviation. For this purpose it is now possible to run directional surveys by means of a compass which is automatically photographed at pre-determined intervals, by gyroscopic compasses operating on the same principle, or by actually measuring the orientation of the drill pipe joint by joint as it goes into the hole. A combination of inclination and direction determinations enables the operator to plot the course of his well in the same manner that a surveyor plots the course of an ordinary survey.

Another device which has contributed considerable in the promotion of scientific

Cross section of method of setting up instruments for resistivity measurements. E—battery; W—winch carrying insulated cables; P—potentiometer; B—ground for cable 1; A—one of the three electrodes.



Left: Lowering the gun into the hole. Upper right: Back of special truck equipped for gun perforating, showing cable guide in center and several tiers of gun barrels on both sides. Lower right: Front of equipment of same truck, showing control board, loud speaking system and electric motors. Below: Result of test shot through 6 $\frac{5}{8}$ -inch 26-pound, 8 $\frac{5}{8}$ -inch 36-pound, and 10 $\frac{3}{4}$ -inch 45-pound casing.



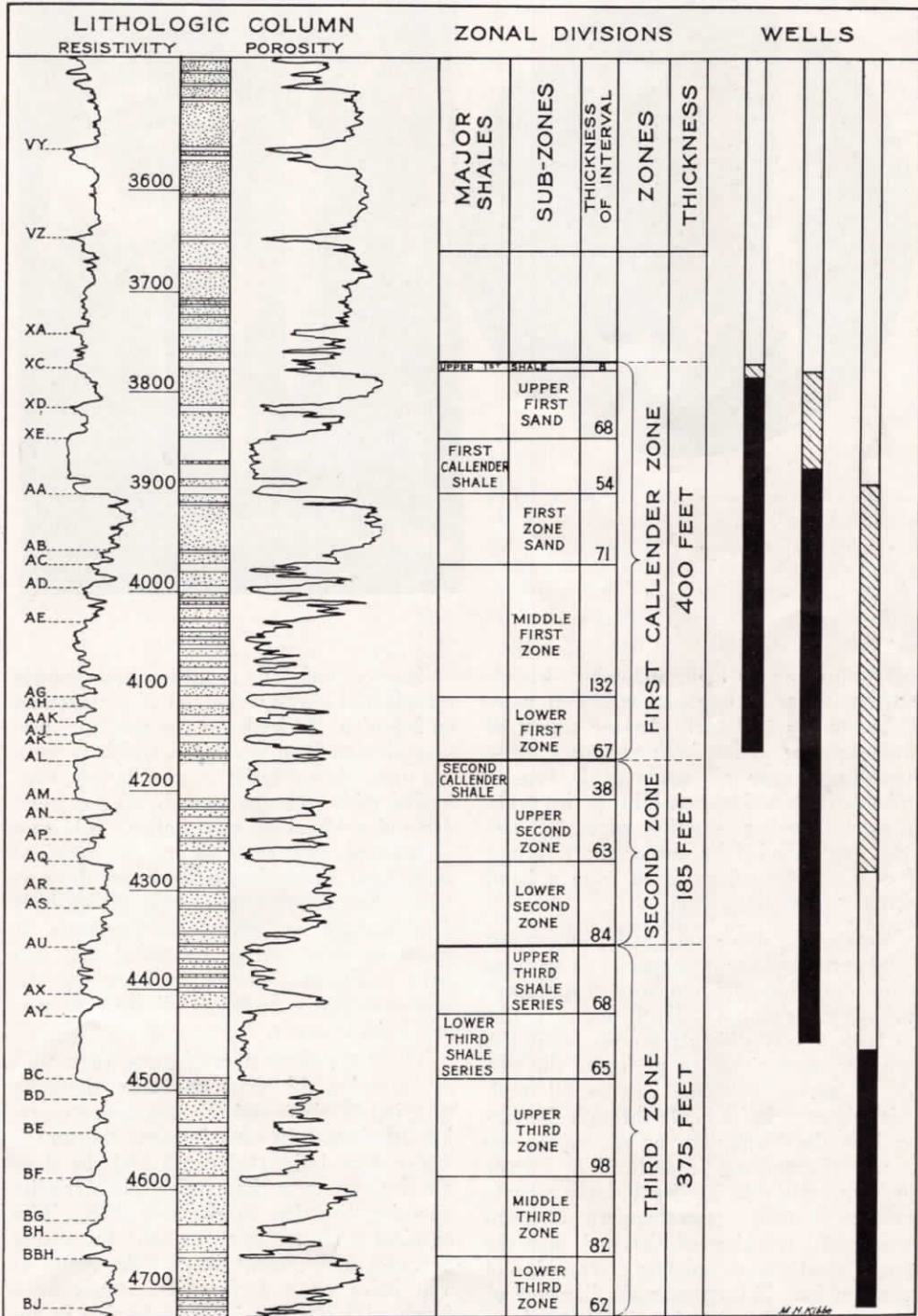


Chart shows a section of composite tabulation of "electrical corings" taken in the company's Dominguez oil field wells. From left to right: Letter index of formations; resistivity curve—high resistivity to the left, low to the right; composite bar showing sands (dotted portions) and shale as indicated by resistivity and porosity readings; porosity curve—high porosity to the right, low to the left; zonal divisions data and wells from which "electrical corings" were taken.



A core, taken with a regular formation coring device, is being removed from core barrel in the upper photograph, while at the right is core bit.



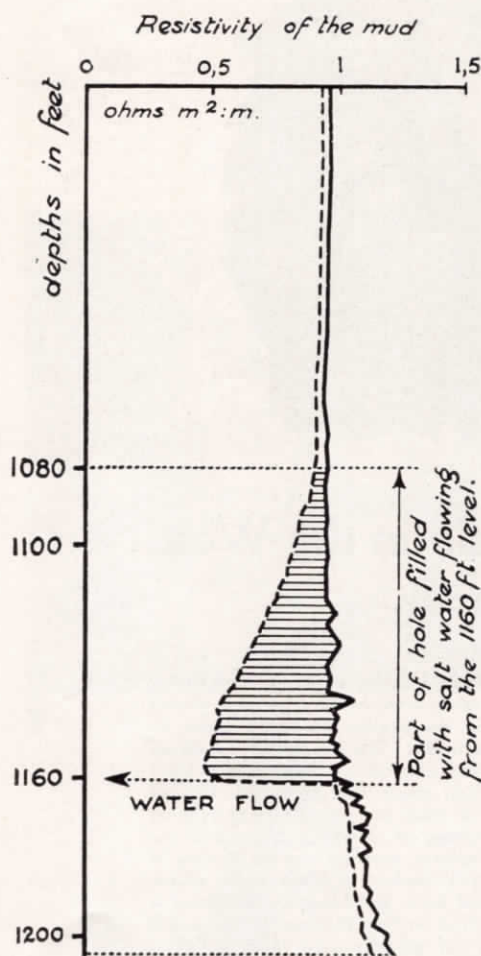
operation of an oil field, and which has effected noteworthy economy wherever used, is the "gun perforator." In the course of past operations it has been necessary many times to pass up oil sands of known or probable productive possibilities, in order to reach lower productive zones. These sands are excluded by one or more strings of casing cemented so as to form a bond with the formation.

With the depletion and subsequent abandonment of the lower zones, it becomes highly desirable again to open these upper sands to production. Until recently this has been a very difficult process, as it has been necessary either to perforate the casing by means of some mechanical tool, which drove a knife blade through the casing into the formation, or to assume the expense of re-drilling the well. The former operation, while in itself relatively easy to perform, in many cases required so much jarring and working of the tool that the cement bond was completely destroyed, and water let in. With the small diameter of the average well and casing, it also has been difficult to secure a knife of sufficient length and strength to penetrate more than one string of casing and the cement bond with the formation.

To overcome this condition and provide a rapid and effective method of perforating, an ingenious device known as the "gun perforator" has been developed which is nothing more than a series of gun barrels, each loaded with a charge of high velocity powder and a 45-caliber steel bullet. The gun is lowered into the hole to the required point, and fired electrically from the surface. Numerous tests of this device have demonstrated its ability to penetrate as many as three strings of casing and still have sufficient velocity to open up the formation for a sufficient distance to permit fluid to enter.

There are three sizes of guns, the smallest carrying 12 shots per trip, the next carrying 15 shots and the larger size carrying 10 shots. In each instance the gun is lowered to designated depth and the shots are fired one at a time and in diametrically opposite direction to the last shot. This eliminates all tendency to split the casing or crack the cement bond. As many as 180 holes were perforated recently at a depth of 3,200 feet in seven hours; in another case, 136 holes were made at 4,400 feet in five hours and twenty minutes.

The greatest enemy to production in California is water, which may occur either



— Readings taken after an injection of non salted mud.

- - - Readings taken after allowing salt water to flow into well.

Location of a water flow.

by encroachment due to the withdrawal of oil, by failure to properly protect producing sands with casing and cement, or by leaks in the water string due to failure, wear and other causes. When water appears in any quantity in an oil well, the producing life of that well is seriously threatened and, unless immediate corrective measures are taken, the complete loss of the well may result.

To locate the entry of this water has been a very serious problem, but it has been solved to a great extent by the development of an electrical device known in the parlance of the oil field worker as a "water witch." Two methods are used for making these determinations. The first consists of washing the well with fresh water, so that all formation water is removed from the hole. The hole then is bailed to a point where the head of the encroaching water is sufficient to allow it to enter the well, then a pair of electrodes is run into the hole carrying a small current. Because of the relatively greater conductivity of salt water, as compared with fresh water, the point of entry of formation water is determined with extreme accuracy by noting the point of maximum increased flow of current between the electrodes.

The second method, also much favored by operators, is to convert that part of the well in the vicinity of the suspected water entry into a galvanic cell by the injection of certain electrolytes (a compound decomposable by an electric current). Two electrodes then are run into the fluid, causing a galvanic action which generates a current measured at the surface. The fluid head again is bailed, until formation water enters. The entrance of this water dilutes the electrolytes and correspondingly reduces the amount of galvanic action, the point of minimum action under this system indicating the point of entry of water.

With the aid of these and other devices of similar nature which gradually are replacing guess work in underground operations, the Union Oil Company is maintaining its strong position in the industry, with respect to the development and use of scientific instruments in drilling and production operations.



Rediscovery of Gold in the West

By HOWARD KEGLEY

Editor's Note:—The gold and silver mining industry of the West is today experiencing its greatest activity in the past quarter century. A new stream of permanent wealth is being poured into the country's treasure house to permanently enrich its people and quicken trade. Old mines and oil claims—abandoned years ago—are being reworked profitably, due to the present high price paid for gold and silver. Ghost towns that since the turn of the century have been crumbling into dust of their own streets are re-echoing the clatter of carpenters' hammers, the rumble of dynamite blasts and the clanking of picks and shovels. New gold seekers, new workers are moving in to retrace the phantom footsteps of the gold hunters of the covered wagon era. Mr. Kegley, whose article is presented here, just recently completed a survey of the precious metal mining activities in the Western states, which we believe you will find of real interest, not only because these activities have opened up new outlets for petroleum products, but because of their economic importance to the West.

THERE is a strip of highway in northern California which is paved with virgin gold. Many a hitch-hiker has panned his way over this stretch of pavement, and countless vagabonds have trudged the weary stretch without suspecting they were trampling a fortune under foot, but the fact is that a stretch of road between Colfax and Grass Valley rests upon a gravel foundation which assays \$1,500 a mile. This road, surfaced two years ago,

obtained its gravel from the mine dumps at Grass Valley. The construction men spread the gravel, rolled it down, and then sprinkled it. The man on the water wagon saw something shiny. He picked it up and took it to an assayer who bought the chunk of quartz for \$2.50. Next day the highway was freckled with gold-seekers, gleaning pieces of promising rock from the roadbed.

Some day, if the price of gold continues

to ascend, we need not be surprised to see an army of unemployed persons tearing up this strip of highway, as well as the principal streets of Grass Valley, for it has been estimated that at least \$250,000 worth of gold in rock and gravel from the mine dumps of that city has been used as base material in paving its streets. So, after all, there really are some streets paved with gold.

For that matter a good share of California is made of gold, and people are now engaging in a lively scramble to recover it,

for instead of being worth \$20.67 per ounce, as it was two years ago, it is worth \$35 per ounce, and may even be higher than that before many weeks elapse. There are not a few mining authorities who believe it will reach \$41 an ounce.

Gold has been rediscovered. All over the world they are scrambling for it, but the widest search in the western hemisphere is being made in the western part of the United States, chiefly in California, South Dakota, Nevada, Idaho and Montana. California leads the country in value of



At the top is the Empire Mine at Grass Valley, one of the most noted producers in the country. The hoist of the famous North Star Mine near Grass Valley is shown at the left. On the right a crew is about to be lowered in the shaft of the North Star mine. (Photo by Southern Pacific.)

gold produced, from year to year, and she is leading all the states in the search for larger quantities of the precious metal. Coupled with the scramble for gold goes a vigorous search for silver, that metal having recently been advanced in price to approximately 64 cents per ounce for the newly mined metal, a figure which undoubtedly will again make profitable the operation of some of the silver mines in the country.

Economists seem fairly well agreed that intense development of silver and gold stores have helped to lead the way out of practically every depression this country has experienced. Silver and gold from the Comstock Lode in Nevada were an important factor in lifting the clouds of debt from this nation after the Civil War. Colorado silver paved the way to prosperity following the march of Coxe's Army in the Nineties, and South Dakota gold was a big help in the dark days of the late Seventies and Eighties. Many are of the opinion that the return to prosperity will be quickened by creating new wealth—by digging out of the ground new money—gold, and pouring it into the blood stream of the country.

So we have a new gold boom in full swing. It starts at Mojave and Havilah in Kern county, and winds along upstate, through Grub Gulch, Poker Flat, Mariposa, Jimtown, Sonora, Chinese Camp, Tuttle town, Melones, Columbia, Angels Camp, San Andreas, Mokelumne Hill, Jackson, Amador City, Sutter Creek, Drytown, Shingle Springs, Placerville, Coloma and Georgetown, to Auburn, Alleghany, Michigan Bar, and countless other mining centers along the quartz strike which runs east and south from Redding to Sutter's Mill.

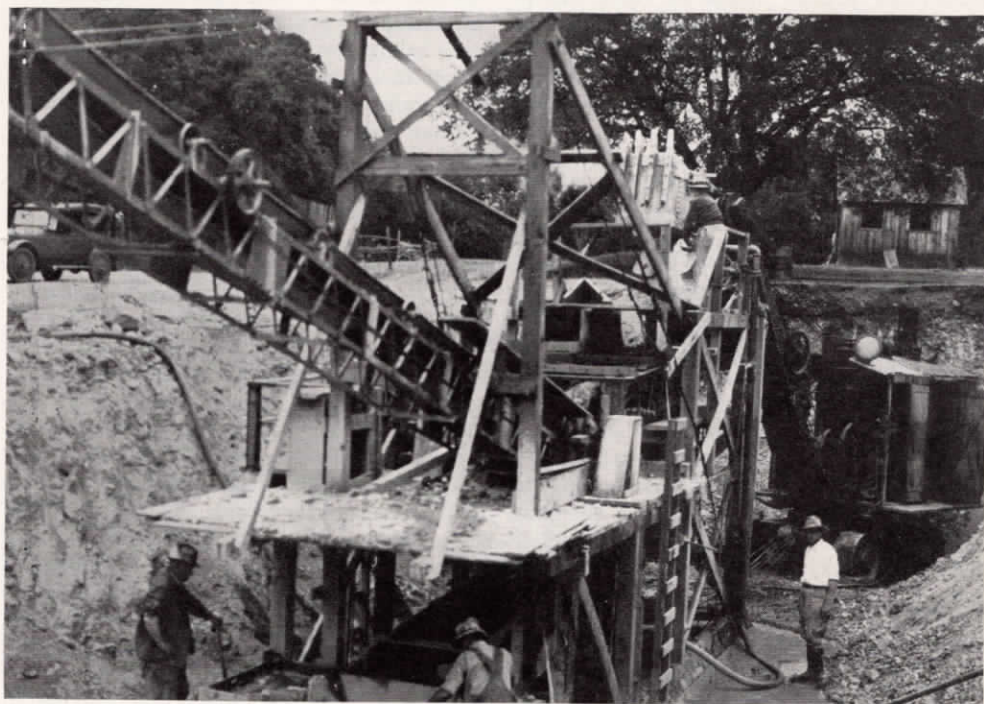
Nor does the scramble for gold cease with the Mother Lode and its upper extension. It extends into many districts of Idaho and Montana, loops around into Utah, and winds up with a flourish in Nevada, where there is at this moment some of the liveliest gold mining to be seen anywhere. It is only fair to say that this activity is not the result of any new gold strike of large proportions, such as that which turned the whole world topsy-turvy in 1849. On the contrary, this new era of mining is as conservative and orderly as

the gold rush of eighty-five years ago was feverish and disorderly.

There have actually been three distinct eras of gold-mining on a large scale in the western states. The first began in 1848, when 70,000 gold-seekers swarmed over the Mother Lode with rocker, Long-Tom, pick, pan and crevice spoon, seeking their fortune single handed. In those days if a prospector couldn't pan from the creek or dig out of quartz seams \$100 to \$300 worth of gold in a day he moved on to better pickin.' The El Dorado petered out in the Seventies and Eighties. The surface stuff played out.

By that time the swarms of miners had dug into the hills far enough to discover that great veins of gold quartz extended for 125 miles along the Siskiyou and Sierras, but this material required crushing, and it was no job for a handful of men. So the lode mines came into being. They first were equipped with the crudest kind of mechanical facilities, the ore being crushed in some cases by a large boulder, bound with rawhide thongs to the end of a teeter pole. In some cases crude arrastras were employed to crush the ore. Later the rod and ball mills were devised. These made a reasonably good recovery from rich ores, but between 1900 and 1920 the mounting cost of operating—notably higher wage scales, workingmen's compensation insurance, and unfavorable legislation, coupled with the pinching-out of veins which had been worked for years, carried the profits of many noted mining properties to the vanishing point, and gold mining on an extensive scale passed out of the picture, making ghost towns of many picturesque cities, and leaving only a few such noted producers as the Argonaut and Kennedy at Jackson, the Idaho-Maryland, North Star and Empire at Grass Valley, and the Homestake in South Dakota.

The third era is that which dawned in 1933 when the late Secretary of Treasury Woodin began increasing the price of gold. As soon as it became evident that gold would go as high as \$30 an ounce, mine operators began planning to reopen properties which had starved to death with gold at \$20.67. As the price of gold has stepped up to \$35 an ounce the mining revival has gained fresh impetus until today gold mining has attained substantial momentum.



Dry-land dredge at Hosig placers near Jamestown, California.

Meanwhile the recent silver policy, raising white metal to 64 cents an ounce has breathed new life into that branch of the industry.

Today we have the third great era of mining in this country well launched. Students of the money situation are of the belief that there will be a strong demand for gold and silver for at least ten years to come. A mine producing \$7 ore ten years ago, and left idle because it failed to return a margin of profit, may now be exceedingly profitable. The value of its ore has probably advanced from \$7 to \$11 a ton, and closer recovery of values, coupled with much greater through-put, may increase the value of such ore to \$13 per ton.

There are three important factors in today's mining picture which were not present twenty years ago. Modern machinery, particularly the diamond drill, pneumatic jack, electrified ore trains, and improved crushing and grinding facilities

have made it possible to triple, even quadruple the output of some of the old mines. Highly improved methods of reducing the ores, such as the cyanide and amalgamation processes and the oil flotation method have made possible a much closer recovery of values. Modern chemistry has brought into play systems which enable gold and silver miners to take, in some cases, from four to eight other minerals from their ore, thus adding greatly to the net return of the operation. The principal gold mines recover chiefly gold and silver, but some also recover lead, zinc, a little platinum and various other valuable by-products. One enterprise in Los Angeles is successfully using a new invention which removes large quantities of gold from the black sands of some of the stream beds in California, Arizona, Nevada and New Mexico.

At least 25 per cent of the gold properties now operating in California and Nevada are reworking their old dumps at a

substantial profit. Some of these dumps contain as much as 10 to 20 per cent of the original ore value, and modern methods enable the operators, in most cases, to recover from 95 to 97 per cent of the total value in a ton of ore.

One of the new wrinkles used by some of the mills is known as gold-cloth. It is made of fiber, in wide strips, and resembles corduroy, but the ribs have a definite slant toward the laundry, where the gold is being washed, thus serving as baffles to catch the finer particles of gold, which escape from the riffles. This device is nothing more or less than an efficient twist of the ancient idea, for at Virginia City, in the Sixties and Seventies, the Chinese used to tie their socks at the tail end of the mill to accomplish the same thing. Each day the Orientals would gather in the socks and remove the gold from them, and in like manner the modern mill cleans up the gold cloth once or twice a week, usually with pleasing result.

If the price of gold reached \$41 per ounce it may reasonably be expected that the world will produce in 1934 \$1,117,660,000 worth of new gold. This estimate is based upon the 1933 output of 21,807,500 ounces, coupled with the probability that production this year will be stepped up not less than 25 per cent, to a total of 27,260,000 ounces.

On that basis the United States output in 1933, which was 2,212,000 ounces,

would advance this year to 2,765,125 ounces, having a value of \$113,370,000 at the arbitrary figure of \$41 per ounce. Prominent mining men are of the belief that gold will yet move up to \$41 per ounce, and that gold and silver mining will experience healthy development for at least ten years.

When one stops to consider that the United States and its possessions produced \$70,000,000 worth of gold in 1932, at \$20.67 per ounce it requires no great stretch of the imagination to picture an industry producing upwards of \$150,000,000 worth of gold annually, during the next five years. Nor does this take into account the silver, platinum, tungsten, copper, zinc and other valuable metals.

It has been estimated that within the last fifteen months upwards of 700 old and new mining properties in California and Nevada have been placed on a production basis. These mines each employ from ten to 300 workmen. The effect of this mining revival upon many of the old gold and silver camps has been almost magical. A few years ago the creeks and gulches of northeastern California and western Nevada were lined with ghost towns—communities like Columbia.

This town once boasted a population of 15,000, and failed of being chosen as the site for the State capitol by only two votes. Today Columbia has three or four stores, and probably less than fifty inhabitants, but



Typical view of Virginia City hills from which a great store of gold has been taken in the past half century.

the town is coming back. A few years ago Drytown was a little settlement of dilapidated shanties flanking a thread of a stream. Today the sound of carpenters' hammers greet the ear as the car speeds along the highway. Ancient stores are being remodeled, houses are being rebuilt, fresh paint is everywhere. San Andreas and Angels Camp have actually gone Hollywood. On every hand, instead of seeing tumble-down dwellings, one sees new stucco houses. The mining engineers from Los Angeles have taken their house plans with them into the gold country.

In Grass Valley they will tell you they built 100 new dwellings in 1933, are putting up 50 new ones this year, and still are short 100 houses. One might name twenty towns on the Mother Lode where it would be difficult to rent a room in a private residence. A few years ago one seldom saw a freshly painted house in the mining districts. Today in cruising through the residence sections of such communities as Alleghany, Grass Valley, Jackson and Amador City one notices that paint is the rule rather than the exception.

It is impossible to estimate the number of persons actually engaged in mining this year in California, Nevada, Idaho, Oregon, and Arizona, but it probably runs close to 100,000, including camp help. There are believed to be more than 15,000 "snipers" or individual placer and pocket miners.

The Grass Valley and Nevada City district alone is employing 2000 miners, with a payroll of \$259,400 per month. The Brunswick and Idaho-Maryland property employs 390 men. North Star, Empire and Pennsylvania hire 740. Gold Center has 100, Lava Cap uses 100, and the Murchie has 265. The Empress, a property opened up in the last two years, and said to be showing real promise, is employing 50 men and soon will double the number.

In the Virginia City area three new mills have been built and placed in operation within a year. One is 300-ton capacity and two are 200-ton plants. In the Gold Circle area a new mill is at work on gold. Donovan's custom mill at Silver City, below the Comstock Lode, is running full blast on tonnage from Comstock leasers. The Montezuma at Silver City,

is going full capacity. At Lovelock, Nev., the Ore-Neva Company has begun washing placer gravel in the Sawtooth district at the rate of 150 cubic yards each eight-hour shift, using 50 per cent of the water twice. The gravel deposit is twenty feet thick, and the recovery is reported to be close to \$1.75 per cubic yard.

In the Jarbidge district of Nevada the old Bluster mine has just started turning the wheels of a 100-ton flotation mill. Substantial veins of milling grade ore are said to have been opened there in recent weeks. Just south of the Bluster, at the Williams-Hawkinson group, the Cripple Creek Mining Company is installing a 100-ton flotation mill. In the Lynn district, north of Carlin, the Hammond Mining Company is making preparations to erect a 50-ton custom mill at the Junction of Lynn and Simon creeks, where water is available for the plant.

One of the most active properties on the recently-rejuvenated Comstock Lode is the Dayton Consolidated in the Silver City area. The mill is handling approximately 150 tons of ore per day, and making a remarkably close recovery of values. Recent work below the main levels in this property has opened up ore sampling around \$20 per ton. Comstock Keystone Company, headed by E. A. Montgomery of Los Angeles, is grading location for a 50-ton mill at the Garrett gold property in Dixie Valley, seventy-five miles from Fallon.

Although Nevada is staging a big comeback in gold and silver mining, at this time her principal mining activity still is copper, with precious metals as a byproduct. The Nevada Consolidated Copper Corporation's big operation in that state, which has been going uninterruptedly since 1906, employs several thousand men, and draws its ore both from open pit and underground workings. All through the depression this enterprise has kept going, on a reduced basis, chiefly to hold its organization together. The byproducts of it are gold, silver and some platinum, with a little lead and zinc. The production of copper there today is about one-eighth its output fifteen years ago, but it could easily be quadrupled in a year or two.

In the vicinity of Redding, Calif., the Atlas Consolidated Mining Company is installing equipment with which it expects

to be able to work, at comparatively low cost, tremendous quantities of gossan overlying the vast copper deposit in the Greenhorn property, between Redding and Weaverville. This material is reported to carry gold values ranging around \$5 per ton, and there is thought to be \$1,000,000 worth of it in sight.

ly been installed. The company plans to work-over the tailings from its old cyanide pond in the expectation of recovering many thousands of dollars worth of gold.

In the Yuba district government engineers are boring to make tests of the rock formation for the Narrows dam on the Yuba river. This is being done under a



One of the original arrastras used to pulverize the gold quartz.

At Georgetown, Calif., which is the northerly tip of the Mother Lode, the North Star Mining and Development Company of Los Angeles had its ten-stamp mill pounding ore in the Georgetown properties early in September. The territory to be worked embraces the Cincinnati and Jacobson mines, which are traversed by a large low-grade vein exposed for 3000 feet at surface, and reported to be assaying from \$3 to \$5 per ton. Since the vein material is quite soft, the company expects to be able to mill it for not to exceed 50 cents per ton, the mine work costing approximately the same figure. The same company is operating the Ideal mine in the Pine Grove area, near Jackson.

One of the oddest mechanical twists to be found along the Gold Road is at the Idaho-Maryland mine near Grass Valley, where considerable new equipment has late-

congressional appropriation. When the dam is done it will be used for irrigation and power as well as for storing the tailings of hydraulic mining operations along the Yuba. Generally speaking this has been rather a poor year for hydraulic mining, owing to the low stage of water in northern California and Nevada streams.

Gold dredging has been moderately successful this year, because the gold boats use their water supply over and over. On the McDerby pond near Folsom the Gold Hill Dredging Company is working gravel which carries excellent values. The Hill-Con Steamship Company interests are just now installing a large dredger on a pond near Loomis. The Snelling Gold Dredging Company is operating a large gold boat on the Merced river, and is making preparations to build another boat before the close of the year.

Dredging activities extend into several

districts of Idaho and Montana, and are being carried on in parts of Arizona and New Mexico. Idaho's biggest mining activities are the silver mines of the Coeur d'Alene, where enormous quantities of the white metal will be produced, now that the United States has adopted a definite silver-buying policy, but all through Idaho placer mining is being pursued with splendid results. On some of the gravel bars some exceptionally fine nugget discoveries have been made this season. Idaho's gold output is expected to step up from 61,640 ounces in 1933 to 75,000 ounces, worth \$2,625,000, this year. Central Idaho is particularly active, with hundreds of miners employed. Whole families, camping out, are sluicing the creeks. The 800-ton mill of the Oro Grande-Frisco organization should be ready to begin work in a few weeks. The Penman Mining Company is operating a mill on the Homestake group. At Golden the Miller interests are equipping their mill with electric power. The War Eagle and Old Union properties near Dixie are running full blast. At Falls Creek the Woldson property is being worked by lessees, and the Summit Flat mine in the same area is undergoing a great deal of development work. Harr Brothers are putting together their new mill on Bayer creek. The Gilt Edge mill in that area is now in operation. Steam-shovels and washing-machines are being operated on Deadman Creek.

Without doubt the outstanding example of gold dredging anywhere in the world is to be found on a bayou of the Yuba river, near Hammonton, a few miles out of Marysville. This dredger, which was built and is operated by the Yuba Consolidated Goldfields Company, is as big as an ocean liner. It had been in operation only four days when the writer paid it a visit.

The gold boat is made of steel, and is 550 feet long. It has a beam of 68 feet, and it takes 30 feet of water to float it in the pond. It is electrically operated throughout and is capable of digging gravel to a depth of 150 feet. On a traveler which moves like an endless belt at the tail end of the dredge 130 gigantic steel buckets, each weighing 5000 pounds, travel over and under the boat, scooping up gravel and rock at the rate of 18 cubic feet per bucket, and delivering it to a huge hopper at top



Robert Newmeyer has taken thousands of dollars in gold from his shaft on Jackass Hill, made famous in early Western mining history. He holds the record for profitable bucket mining in that area.

center of the boat, where it passes into a great circular screen which sifts through onto the gold-saving tables everything measuring five-eighths of an inch or less. The remainder, including boulders as large as a bushel basket, is delivered to an endless belt which carries it out to the end of the stacker and dumps it into the waste pile.

The finer materials are washed across the gold tables and carried over set after set of riffles, where the heavy particles of gold drop down and are picked up by quicksilver. Once a week the boat has a cleanup, all riffles being washed and cleaned. Officials have not made known the values which are being recovered, but the pond in which the boat is operating was dredged for twenty years, without going below 64 feet. The boat is now deepening its pond, and shortly it is to be moved forward and sent through the waste heaps which former dredging operations have left



Salvaging of the dumps of the old Comstock Lode at Virginia City (shown above) is soon to be started. At the right Eugene Coparo and M. V. Bandholtz pan half an ounce of gold in an egg skillet for Mrs. Howard Kegley, whose father participated in the first gold rush in the Virginia City country.



banked high around the pond. This will be done to make available the auriferous gravels beneath the heaps of debris. The gold boat operates twenty-four hours a day, handling 15,000 cubic yards. The debris stacker carries discarded material 275 feet from actual operations.

For purposes of comparison we swing from this titanic operation to that of Robert Newmeyer and two associates, on Jackass Hill. Little more than a year ago Mr. Newmeyer took a lease on a small portion of this brush-cluttered hill, and began digging a shaft. He went down twenty or thirty feet and found nothing. Cash was running low, and he was about to quit when someone asked why he didn't resume work in an old deserted shaft a few feet away.

He decided to try it for a week or two. It was flanked by brambles and poison ivy. This finally was cleared away, and in another week he was into a slate formation, where an occasional pocket of nuggets was found. He worked with pick, shovel and crowbar, climbing up out of the hole to wind the bucket up on the windlass and dump it into a pile where the material could be sorted. One day he got into rich stuff, and in two weeks took out more than \$10,000. During our visit he held a coffee can into which he was dropping particles of

gold which resembled burned brass. Before the end of the week he had gathered more than \$1,000 worth of these nuggets. In recent months he has taken on two partners, and their cleanup to August 1 was estimated at \$26,000.

Jackass Hill today is honey-combed with pocket-hunters. In some places the shallow shafts are not over twenty feet apart. Miners bobbing up and down from them remind one of ground squirrels in a meadow. The evidence of their success is chiefly to be found in the office of Charles R. McKibbin, a gold-buyer at Sonora. Most of the yellow metal, which comes to him at the rate of \$1,800 a week, he ships to the Mint, but the finest pieces, in odd shapes and filigreed, are laid away for exhibition purposes. Some of these pieces of leaf and wire gold, gathered from the quartz seams along the Mother Lode, are almost as attractive as though they had been fashioned by an art jeweler. Some will weigh as much as an ounce.

Mark Twain added lasting fame to

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possible a cleanup of \$110,000.

In the early days there was an exceedingly rich mine on the Stanislaus river, which produced particles of gold resembling melon seeds. Mexicans who were operating the property, called it Melones, for that reason, it is said. The mine was fabulously rich, and for a time was run by Mexicans bossed by a woman. A couple of years ago this property suddenly came to life under the direction of the Carson Hill Gold Mining Corporation. A new mill was built, and today it is putting ore through at the rate of 20,000 tons per month, working both from underground and glory-hole. Development is proceeding on levels all the way down from 300 to 1600 feet, and development of ore bodies between 2700 and 3000 feet is

shaft extends down into conglomerate for fifty-four feet, and they have tunneled twenty-five feet. They bring the rock and gravel up and dump it onto a board platform. Trucks from a custom mill pick it up. In eleven months these two young men have taken out of that hole \$30,000. They are averaging \$20 to \$35 per ton.

A little farther up the gulch, toward Gold Hill, Howard W. Squires, Jr., and Ed Shultz are working a long strip of gulch which they bought outright. They hung a rattle-trap sort of ball mill and concentrator over the brow of a gully, and are mining the entire gulch, from surface to bedrock. The common run, as shoveled right off the side of the gully into the screen, runs \$3.50 a ton, and some of it ranges as high as \$20 a ton. They are putting through ten tons a day. Mr. Squires, who quit a good job as assayer at Virginia City to tackle this enterprise, says they have 120,000 tons to put through.

In the north end of California, notably in Nevada county, \$250,000,000 worth of gold has been extracted from the quartz since gold was discovered there, yet they continue taking it out in the Grass Valley and Nevada City area at the rate of \$10,000 a day.

One morning in October, 1850, George McKnight, shambling along at the base of Gold Hill on the outskirts of Grass Valley, stubbed his boot so hard he kicked out a piece of quartz. He picked it up to give it a throw, but noticed that it was peppered with gold. That started the gold rush to Grass Valley. The town was so named because when the gold-seekers arrived by bull-train they found the grassy valley just below the town practically the only place they could pasture their stock, so they called the community Grass Valley.

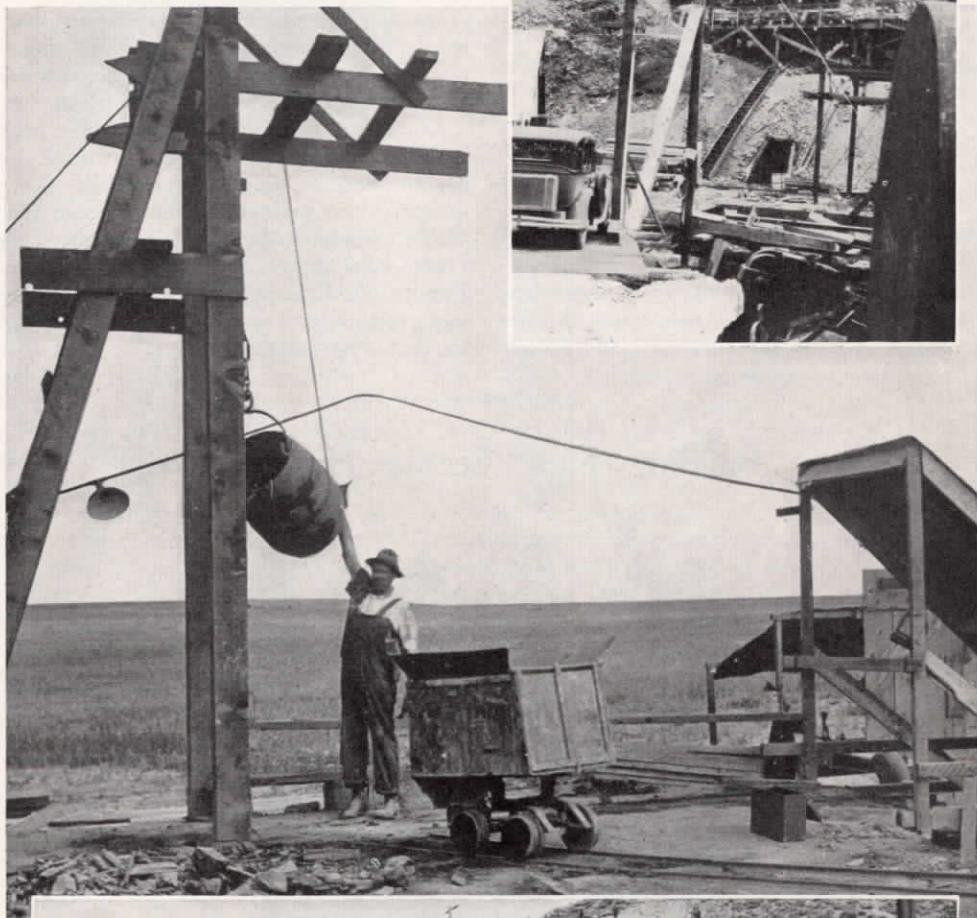
More than \$4,000,000 worth of gold was taken out of Gold Hill in the next fifteen years, by the Gold Hill mine. The community finally went to the trouble to erect upon the scene of the discovery a monument commemorating the remarkable event. On top of this memorial they cemented in an immense chunk of the richest quartz they could obtain from the mines in that district. Once a year they celebrate discovery day. Not long ago someone went to take a look at the monument and behold! some modern gold-seeker had gotten in a hurry to grow rich, and

had chiseled the big chunk of gold quartz from the top of the monument and carried it away.

So widely dispersed is the army of gold-seekers, throughout the western states, that it is impossible to arrive at anything like an accurate estimate of the number, but they run into a group which probably embraces 50,000 to 100,000 persons.

There are undoubtedly 10,000 men actually working in California mines, and probably 3,000 or more in Nevada. There are easily 5,000 in Arizona. Those on payrolls earn from \$4.50 to \$5.75 per day. Working one and two in a place there are undoubtedly 50,000 prospectors combing the western country for new sources of

Gaylord Wilshire of Los Angeles once operated the Bishop Creek Mine at the right. Below is a hoist for a Mojave desert line. At the bottom is a view of Main street in Gold Hill.



gold and silver. Each community is re-absorbing its unemployed miners as they are needed.

Along the streams of Idaho, Nevada and California thousands of tents, under shady trees in the river bottoms, shelter families which are eking out a living with the pan and rocker. Last year 10,000 of these gold-panners gathered in \$600,000 in California. This year, with higher gold prices, their harvest probably will reach \$1,000,000. Mine operators are of the belief that California will produce \$25,000,000 worth of gold this year and perhaps double that amount next year when new mills get into action.

There is no doubt that we are launched into a new mining era which may be expected to endure for from seven to fifteen

years. In that time the mines of the West may add from one to two billions of new money to the nation's wealth. In a year more than \$5,000,000 worth of supplies and materials for mines in the Southwest have been sold and delivered. This demand will continue for years. It calls for everything from oils, greases and gasoline, to electric dynamos, mine timbers, dimension lumber, furniture for camps, kitchen supplies, and even electric ice boxes.

Out of it all will come a greater business impetus, but something even more important may be the ultimate result. Some inexperienced prospector like the man who stubbed his toe at Grass Valley eighty-four years ago, may stumble onto another Deadwood, Cripple Creek, Tombstone or Comstock Lode, to enrich the nation for another 100 years.

Building New Scenic Highway



COMPLETION of the four mile section of the Angeles Crest Highway between Colby Canyon and Red Box, in the Angeles National Forest, opens to motorists an extensive recreational area in the San Gabriel mountain range adjacent

to Los Angeles. Construction of this highway began in 1929 and, to date, 11¾ miles have been completed. It is oil surfaced, is from 26 to 40 feet wide with standard superelevation on all curves, and the gradient is such as to permit easy "high-



N. F. Jahn



Vincent Bressi

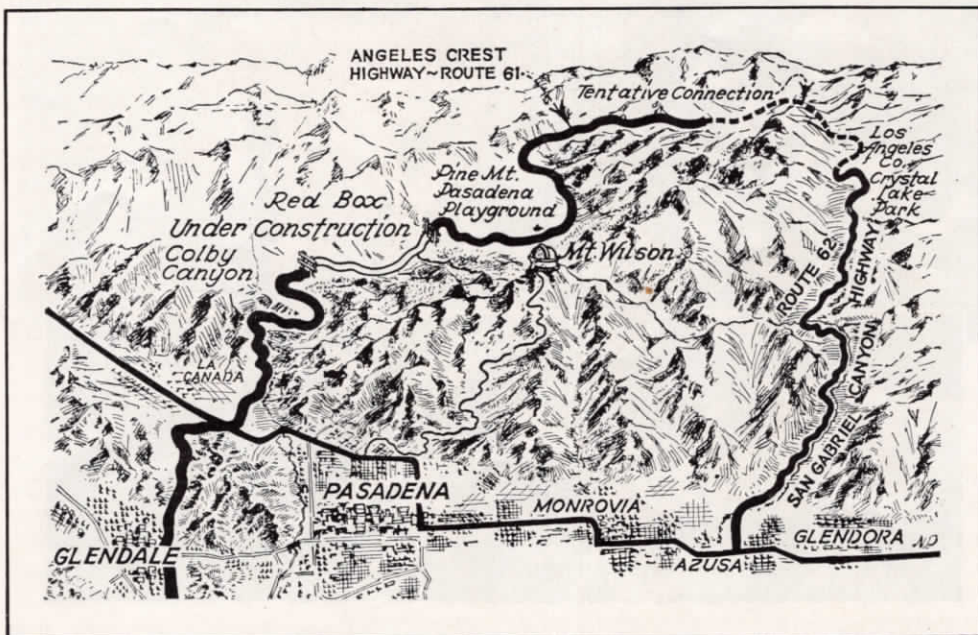
gear" motoring the entire distance.

The highway is to be continued to a connection with the San Gabriel Canyon High Line Highway on the easterly slope of Mt. Islip, will be of the same construction, and, by its connection with the San Gabriel Canyon High Line Highway, will provide a beautiful scenic route through the mountains from La Canada, on the Foothill Boulevard, to Azusa, also on the Foothill Boulevard—a distance of about 65 miles. Also, eventually the Angeles Crest Highway will connect with the present highway to Mojave, via Little Rock and Palmdale.

One of the important facts regarding the recently completed section of the Angeles

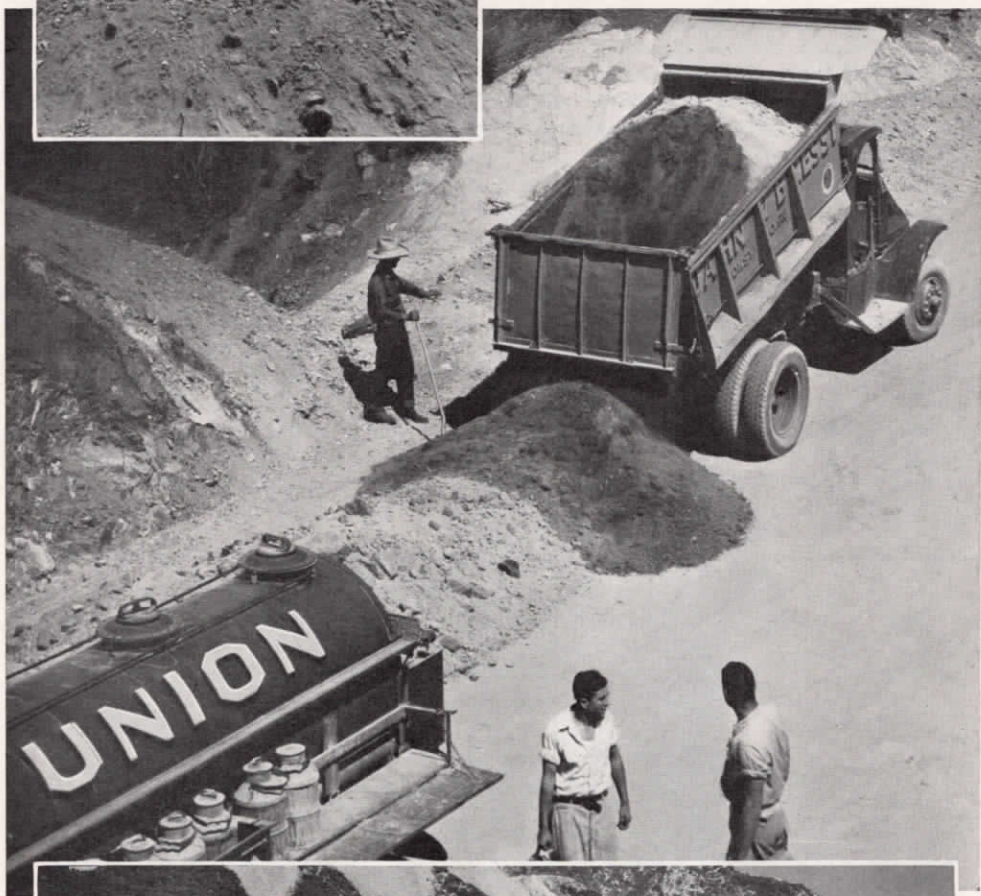
Crest highway, is that it connects with the National Forest Road between Red Box and the top of mile-high Mt. Wilson. A contract has been awarded for the regrading and widening of the present National Forest dirt road, and, when completed, will provide motorists with a "highgear" highway from La Canada to the top of Mt. Wilson, a distance of 21½ miles.

Previously, the top of Mt. Wilson was to be reached only by the 9-mile toll road from Altadena, which is a narrow, one-way road little travelled by reason of its sharp curves, steep grades ranging up to 14 per cent, and a rocky road bed. Consequently, few motorists have discovered the National Forest Road which extends north into the





Completing the last gap in the Angeles Crest highway between Colby Canyon and Red Box, opening a new route to Mt. Wilson via the National Forest road. Both the grading and surfacing of the four-mile gap is being done by Jahn & Bressi, contractors. All petroleum products used on the project are supplied by Union Oil Company.





Joe Muscola, left, Jahn and Bressi superintendent of Ramona boulevard project, and C. A. Wilson, office manager.

mountains from Mt. Wilson for 26 miles, via Red Box (the divide between Arroyo Seco and the San Gabriel), Barley Flats and Chilao Flats to Buckhorn Flat, passing through the city of Pasadena playground and extending into the heart of the Angeles National Forest. However, motorists now are able to reach these interior locations by travelling the Angeles Crest Highway to Red Box, and thence along the National Forest Road.

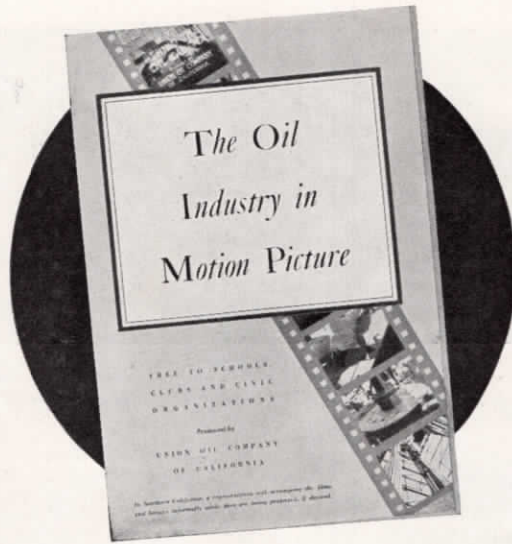
In detail, the 65-mile drive to be known as the Angeles Crest Highway will begin from La Canada, thence to Red Box and along the National Forest Road northeasterly through the city of Pasadena playground, Barley, Chilao and Buckhorn Flats, connecting with the San Gabriel Canyon Highway on the northeasterly slope of Mt. Islip near the Los Angeles County playground at Crystal Lake, and, continuing along the latter highway, to Azusa. Thus, not only can Mt. Wilson be reached easily for the first time, but another route to the famed Los Angeles County playground will be provided, which will have many interesting spots along the way.

As the ascent is made along the completed $11\frac{3}{4}$ miles of the highway, motorists find themselves on the precipitous sides of the Arroyo Seco, travelling toward the divide between the Arroyo Seco and Big Tujunga watersheds. Along the way a beautiful vista is unfolded. From certain points of vantage, a view can be had of Los Angeles, Pasadena, Glendale and

many other cities and towns on the coastal plain. On exceptionally clear days, the Pacific Ocean and Santa Catalina Island can be seen.

Viewed from below, the highway does not seem so prominently outlined as do other mountainous routes. This is due to the care with which the highway was constructed, so that only the necessary defacing of the mountains and natural beauty would take place. Fleets of trucks were utilized for hauling excess material to secluded canyons, where parking places and picnic grounds were made. As a result, all unnecessary and unsightly gashes in the natural forest cover are entirely missing.

Jahn & Bressi, of Los Angeles, is general contractor on the Colby-Red Box section of the Angeles Crest Highway, constructing and paving the section. N. F. Jahn and Vincent Bressi entered in the construction business in 1919, and during the ensuing 15 years have handled many major, as well as smaller, road construction and paving jobs on the Pacific Coast. Throughout these years, the firm has used Union Oil Company products exclusively on all jobs specifying the use of petroleum, and have operated their entire equipment only with company products. Completion of their contract for the Colby-Red Box section of the new highway within the specified time limit, was, according to both members of the firm, attributable in part to the splendid service accorded by the Union Oil Company and its various products used.



WITH the sole idea of furnishing employees and foreign representatives with an accurate conception of its scope of operations, the Union Oil Company, some three years ago produced two motion pictures: "Behind the Oil Cargo," and "Refining Crude Petroleum." Before it was possible to complete the program, letters were received from schools and civic organizations all over the Coast requesting the use of the films which, they had heard, dealt authentically with the West's number one industry.

The company felt that, in their original form, the films were not suitable for public showings, for they dealt generously with specific properties, products, and personalities. Consequently, the pictures were not immediately released. But urgent and repeated requests kept pouring in. Finally, just a year ago, the two pictures were completely re-edited for public consumption

and made available in both 35 mm. and 15 mm. film.

Acceptance of the films was immediate and far exceeded all expectations. Special interest was manifested in the origin of petroleum and other phases of geology. Accordingly, last fall, a new and entirely educational film, "Petroleum Geology," was produced. Except for a professional cameraman, all three pictures were products of

Union Oil Company employees, technical assistance being given by the refining, research, field and geological departments.

Petroleum Geology proved to be the "hit" of the year among instructive motion pictures. Letters of approval and endorsement were received by the hundreds. In fact, so hearty was the response that 34 prints of the film were found necessary to take care of the requests. These prints were scheduled fully two months ahead during the entire school year.

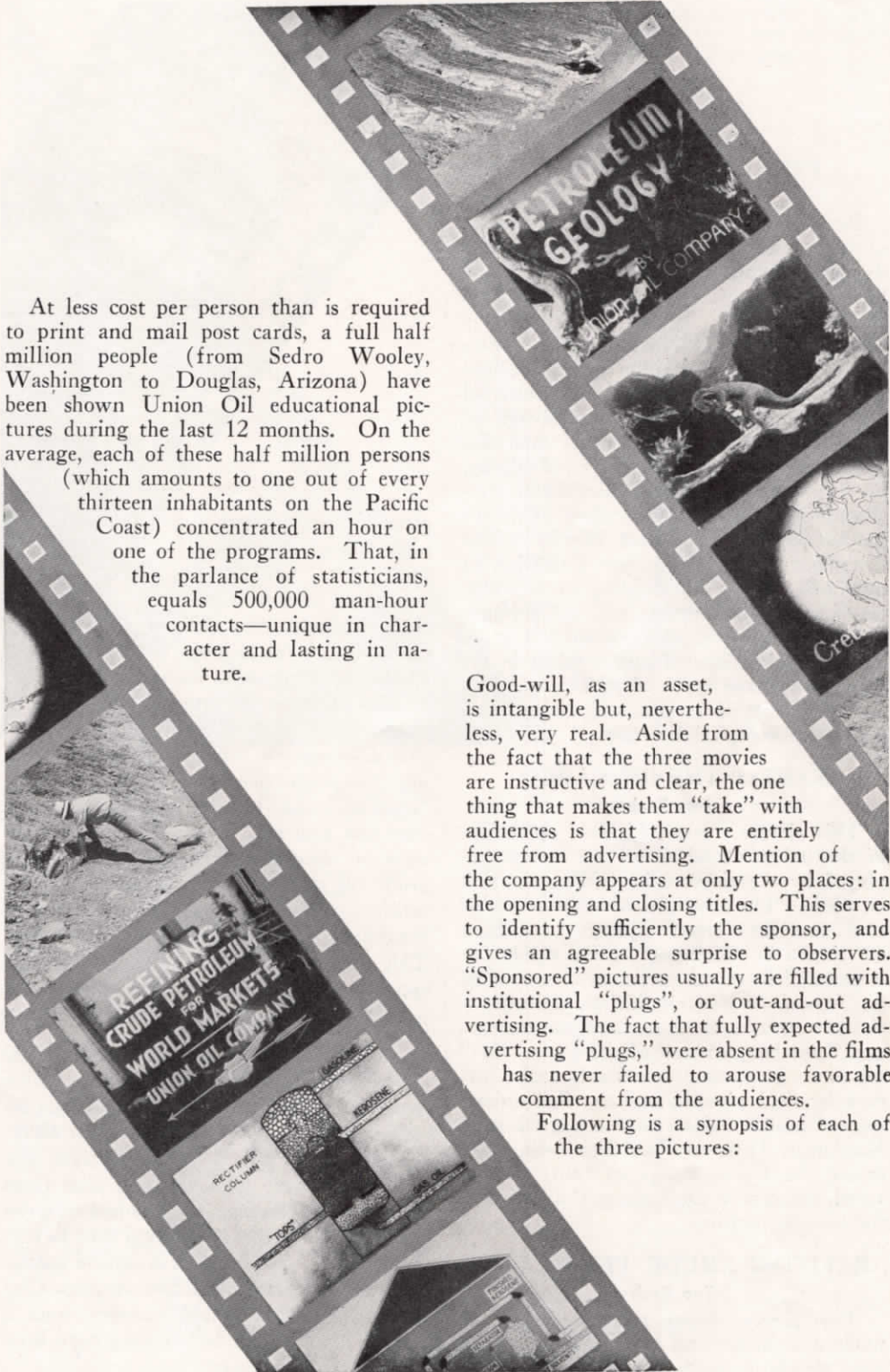


Don M. Cameron as he has presented company's educational films to scores of schools and service organizations.

At less cost per person than is required to print and mail post cards, a full half million people (from Sedro Wooley, Washington to Douglas, Arizona) have been shown Union Oil educational pictures during the last 12 months. On the average, each of these half million persons (which amounts to one out of every thirteen inhabitants on the Pacific Coast) concentrated an hour on one of the programs. That, in the parlance of statisticians, equals 500,000 man-hour contacts—unique in character and lasting in nature.

Good-will, as an asset, is intangible but, nevertheless, very real. Aside from the fact that the three movies are instructive and clear, the one thing that makes them "take" with audiences is that they are entirely free from advertising. Mention of the company appears at only two places: in the opening and closing titles. This serves to identify sufficiently the sponsor, and gives an agreeable surprise to observers. "Sponsored" pictures usually are filled with institutional "plugs", or out-and-out advertising. The fact that fully expected advertising "plugs," were absent in the films has never failed to arouse favorable comment from the audiences.

Following is a synopsis of each of the three pictures:



PETROLEUM GEOLOGY

Three Reels

Reviews briefly and authentically, some of the major facts concerning the earth's dynamic history which have been established by geologists through interpretation of rock records. Changes in physiography taking place in the North American continent since the deposition of the earliest fossil-bearing sediments, which occurred over 550 million years ago, are shown by animated paleogeographic maps and diagrammatic cross-sections. A vivid concept of life during the Mesozoic era is presented in dinosaur scenes taken from the motion picture, "The Lost World." The deposition of sediments, the formation of mountain ranges, the folding of sedimentary beds, "fault" action, and the accumulation of oil in an anticline are all made clear by animation. Pictures taken in the field show many types of rock formations, oil well coring operations, and the function of a paleontological laboratory.

BEHIND THE OIL CARGO

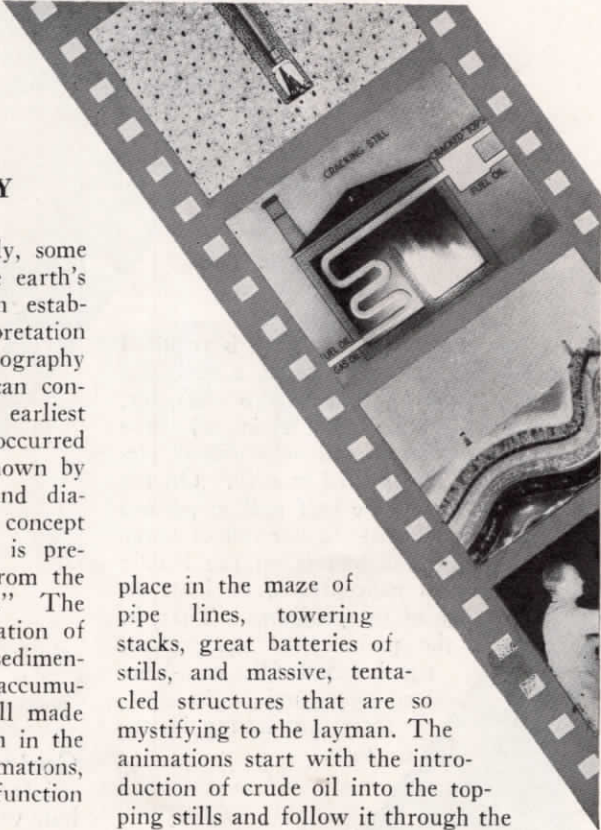
Three Reels

This picture treats with field operations of the industry and shows the means employed by the pioneers in drilling the first oil wells. The principles of both the "cable tool" and the "rotary" systems of drilling are shown by animation. Field equipment is pictured in actual operation in several of California's largest oil fields. The separation of natural gasoline from natural gas and the subsequent use of the gas to "lift" oil from low-pressure wells is fully covered by field pictures and detailed animation. Pipe-line shipment of crude oil from Kettleman Hills to Port San Luis, traversing the Coast Range en route, is pictured, along with the loading of a tanker at the marine terminal.

REFINING CRUDE PETROLEUM

Two Reels

This picture shows general views of a modern refinery, and by means of animation clearly presents the processes taking



place in the maze of pipe lines, towering stacks, great batteries of stills, and massive, tentacled structures that are so mystifying to the layman. The animations start with the introduction of crude oil into the topping stills and follow it through the various stages of refinement, including the production of "straight run" "cracked," and "blended" gasolines, kerosene and fuel oil. The various laboratory tests to determine characteristics of the crude oil and to check the quality of the finished products, are also shown—among these being the anti-knock test for gasoline. This picture removes the mystery that appears to surround the production of petroleum products.

Fully 900 schools and approximately 100 civic organizations have used the Union movies to date. Their wide usage is the result of gradual growth in popularity. Geology classes in several junior colleges and universities have used them in class-room instruction. The films and the lecture notes that accompany them, are being used as text material in a special course in applied science recently inaugurated in Los Angeles City high schools. Here are excerpts from a few of hundreds of letters that have been received from schools:

We want to congratulate you on the high quality of the pictures. We have seldom had as warm reactions to any film on the part of the Course of Study Division. They will be put to excellent use in the schools.

MARY ANNETTE GLICK,
Acting Director
Visual Education Section,
Los Angeles City Schools.

In my five years of experience with the use of visual aids in teaching, I have seen nothing finer in the fields of science and geography.

FRANK MIXSELL,
Woodrow Wilson Junior H. S.
Glendale, California

We all agree that these pictures are the best and clearest we have ever seen.

F. C. SUITER,
Tulare Union High School



Their full explanation and the use of animation have made them, in my opinion, most excellent films.

M. E. POST,
Head of Science Department
Berkeley High School

We use visual methods of education in our work, but have found nothing that compares to the moving pictures you sent us. They are the most scientifically organized pictures in connection with industry that we have used.

A. EIDELSON,
Science Department,
Garden Grove Union High School

We are unanimous in our enthusiastic endorsement of these films. They are authentic and educational. The animated method of showing how the sedimentary beds were arched and faulted is the best thing of its kind I have seen. The distillation and cracking processes are very well portrayed. It is most encouraging to find large business organizations deeply interested in sound educational programs.

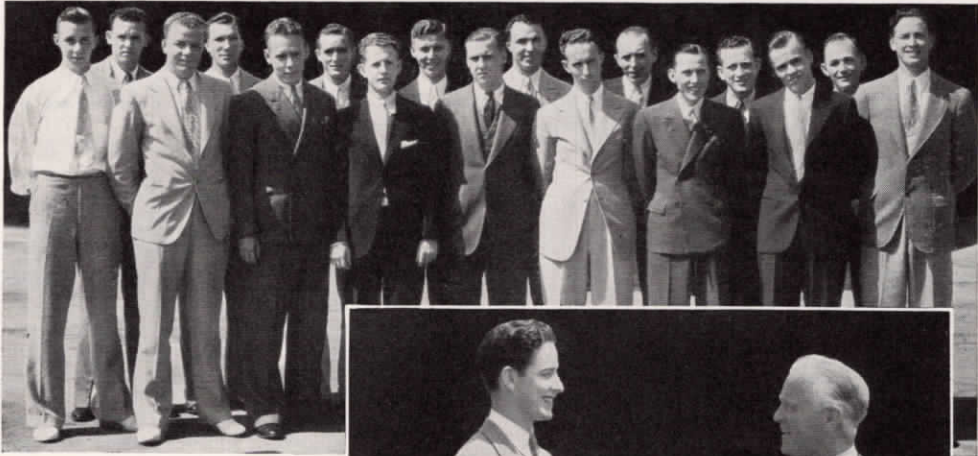
GEO. W. BLOUNT,
Head of Science Department,
Lincoln High School, Los Angeles

"Petroleum Geology" has been presented in the form of an illustrated lecture before school assemblies and service clubs one hundred and sixty-five times in ten months. Twenty-six presentations a week were made for several consecutive weeks. Ten lectures a week is a common occurrence. On one tour covering the central part of the state during the Spring, 20,000 people were reached in twenty days. That equals the total weekly admissions for a metropolitan theatre. By means of an electric turntable and an electric pick-up, which is plugged into the motion picture projector, recorded music is played through an amplification unit, while the audience is being seated. The show starts with an animated sound cartoon which serves to settle the audience and get it into a favorable frame of mind. This picture is spliced onto the feature film, the two together completely filling a 1600 foot reel. A microphone is plugged into the amplifier, into which the lecturer speaks while the picture is being shown. This arrangement permits one man to lecture as well as project the picture.

Reports of the lecture presentation also are very gratifying. David D. Morris, chairman of program committee, Santa Monica Lions Club, writes: "I assure you that it (Petroleum Geology) is one of the best programs, both from an entertainment and educational viewpoint, I have ever seen."

Within the last month, the three pictures have been added to the library of the University of California Extension Division, Department of Visual Instruction, and are listed in their new catalog, "Visual Aids to Education."

Head Office Employees Hold Track Meet



Above is a group of the contestants, and, at the right, A. C. Galbraith is presenting trophy to Bob Ricketts.



ON July 28 athletically inclined employees from the Head Office participated in a decathlon contest held at the Fremont High School, Los Angeles. The meet consisted of ten events, in which fourteen enthusiastic entrants competed, only four in the group failing to place in some event. As was expected, no world records were broken, but the marks set were considered excellent, particularly since not one track shoe was worn throughout the afternoon. Points were awarded on the basis of three, two and one for first, second and third places, respectively. Bob Ricketts, of the Fuel Oil and Asphalt Sales department, was high point winner, annexing 19 points out of a possible 60, and thereby winning the Galbraith Trophy, donated and presented personally by A. C. Galbraith, assistant vice-president.

Following are the names of contestants who took part in the decathlon meet: Herb Giese, Roy Talbott, Ralph Nevens, Bill Miller, Vernon Charnley, Jr., Frank Bescos, Nelson Arn, Gordon Reid, Paul Michaels, Bob Ricketts, Bob Roginson, Metcalf Owen and James Harasta.

First in Specialty Sales



Above is B. H. Gimblin, Stockton District salesman, who was winner of recent specialty sales contest in that district. He is shown in front of one order of thirty "Home Heips" which he placed, the largest individual sale made.



A. R. Heise

25 Years



C. R. Austin



Service Emblem Awards

THE ranks of twenty-five year employees were swelled during August with the addition of A. R. Heise, manager Oleum refinery, and C. R. Austin, southern region district accountant for Union Service Stations.

During the past three months, fifteen employees of the company joined the ranks of the 20-year service pin wearers.

In August, 1909 Roy Heise was first employed at the old Port San Luis refinery as superintendent. He saw the abandonment of the old refinery and supervised the building of the new one at Avila and remained superintendent of the plant until 1919, when he was transferred to the Los Angeles refinery at Wilmington. Going to the Los Angeles plant as superintendent, he completed its construction and operated it during its period of growth. In 1926 he was sent to Oleum as manager, where he has since filled that position. While at Avila, Heise put into operation for the first time a process for breaking the emulsion in oils. The process is now generally used by oil companies throughout the country.

To C. R. Austin goes the distinction of being the second youngest 25 year employee in the company ranks. At seventeen he started in the purchasing department when head offices were in the Securities Building at Fifth and Spring, Los Angeles. For a time he worked at the Stewart tank farm as gauger and office clerk, and in 1915 worked with the chief dispatcher in Los Angeles. For nearly two years Austin served in the army spending nine months on French soil. From 1919 to 1929 he worked in the engineering department and then was shift-

ed to the Provident Fund and placed in charge of field department accounts. Two years ago he transferred activity to Union Service Stations as district accountant, the position he now holds.

James S. Goodale, district sales manager, Santa Rosa, Calif., heads the list of 20-year service pin awards in June. Goodale went to work for the company as office boy and mail clerk in the Portland office, progressed through the Willbridge plant, where he first drove a team of horses on "coal oil" deliveries and then took over the first trucks operated in the area. He has spent the intervening years in the sales organization of the company and when the divisional re-organization occurred in December, 1933, was assigned to his present post at Santa Rosa.

R. W. Martin, secretary to L. P. St. Clair, president of Union Oil Company, started in the oil business with the Indian Refining Company at Cincinnati, Ohio during February, 1910, with which concern he remained until September, 1913, when he became associated with the Niotaze Refining Company at Niotaze, Kansas. He entered the employ of the Union Oil Company in the sales department at San Francisco as assistant to C. W. Ralph, with whom he had been associated during his previous employment in the oil business. He was transferred to Los Angeles July 1915 and remained in the sales department as assistant to Mr. Ralph, director of sales and transportation, until the latter passed away in 1926. Martin continued in the sales department and was appointed manager refined oil export sales December 1, 1928. For a time he served as Secretary of the American



Honoring L. P. Bayha, who completed his twenty-fifth year of service with the company in July, fellow employees in the head office comptroller's division entertained with a surprise dinner in Los Angeles on July 27. Mr. Bayha may be seen in the center of the picture in the rear, seated and looking toward the camera.

Petroleum Institute Committee on Conciliation. From April, 1930 to Aug., 1933, he worked in the export sales department. Since the latter date he has been secretary to the president.

Employed as a chemist at Oleum refinery, W. H. A. Martindale worked as assistant to A. G. Page, George Helme, T. F. Ott, R. E. Haylett, and W. A. Raine. When the research department of the manufacturing division was moved to Los Angeles in 1922, Martindale took charge of the chemical and inspection laboratories at Oleum, and is at present acting in that capacity.

Entering the treasurer's office in a stenographic capacity in 1914, A. C. Marshall has been identified with that department and is now assistant treasurer. He served for two years with the 91st Division overseas and then returned to the company. April, 1930 he was made assistant treasurer of the company.

June 6, 1914 Antone E. Rogers went to work for the company driving a team in making deliveries over a small territory. Rogers recalls that "there was not much gallonage made in those days because most of the time was spent on the road." Rogers left the company to serve with Uncle Sam overseas, returning to duty in the sales department in 1919. He is at present in the sales delivery fleet of the San Francisco office.

Starting his employment with the company as salesman at Fresno, M. W. McAfee during his twenty years of service with the company has progressed through virtually every position

in the sales organization. Since 1925 he has been successively manager of the Fresno district, manager Los Angeles district, central division manager, Seattle district manager, northern division manager, and since January 1, 1934, has been southern division manager, in which position he has executive jurisdiction over all sales in Southern California, Southern Nevada, and Arizona.

Roustabout on the Stewart Tank Farm, San Luis Obispo, was the first job George D. Faustino had with the company. In 1916 he became engineer at the tank farm, and after working several years in that position, was promoted to the rank of senior engineer, the post which he now holds.

The old horse-drawn wagons were where M. W. Smith first served the company, taking a job as driver at the San Francisco Potrero plant. From 1917 Smith served as agent at Petaluma, Potrero plant superintendent, special salesman, San Francisco field, Los Angeles main station dispatcher, Los Angeles salesfax organization, tank truck superintendent, Seattle; and is now tank truck inspector in the northern division.

R. C. Worsley opened the Union Oil Company plant in Panama, Canal Zone, twenty years ago and has been Panama district manager ever since. The growth of the company's activity in the Zone has been directly under Worsley, whose long service there and wide acquaintance has consistently been reflected in a growing sales volume. Originally established to service ships and industrial concerns utilizing the Canal, the

20 Years



R. W. Martin

W. H. A.
Martindale

A. E. Rogers



J. S. Goodale



A. C. Marshall



G. D. Faustino



M. W. Smith



M. W. McAfee



R. C. Worsley



Oscar Andersen



W. A. Cole



Eugene Power



G. W. Schattner



George Anderson

company's facilities under Worsley have been gradually expanded until a large volume of retail sales is annually made to consumers in the government strip. Worsley is extremely popular with Panamanians and his friends and associates in the Zone are legion.

The entire period of George Anderson's service with the company has been devoted to head office accounting work. He entered the production and transportation accounts division August 18, 1914, in which he worked for sixteen years. February 24, 1930 he was promoted to the general accounts division, where he has since been engaged.

August 1, 1914 Oscar Andersen joined the company as bargeman on old Barge 42. When the M. S. Olinda was commissioned in 1915, Andersen went aboard as mate, became master of the craft in 1916, and kept that charge until the ship's registry was changed. From 1926 to 1932 he was master of the barge Erskine M. Phelps and the Santa Paula. October of the latter year he was made master of the M. S. Olinda when she again came under American registry, and since July, 1934 has been master of the M. S. Red Line.

Monrovia, Calif. boasts of Wiley A. Cole, Union Oil Company agent. Cole has taken an active part in civic affairs and was for a time

commander of the local American Legion post. Burbank, Calif., was the first substation at which Cole worked. He has served in a number of sales department capacities, and prior to becoming agent at Monrovia was agent at Van Nuys, special agent at Santa Barbara, and agent at Burbank.

Eugene Power has been identified with the properties and facilities department of the sales division since joining the Union Oil Company 20 years ago last month. He is intimately versed in sales equipment and rolling stock, and as such has a wider knowledge of the distribution problem involved in the sales organization than any other man. Since 1926 he has served as manager of properties and facilities.

G. W. Schattner started his employment with the company in the San Francisco district in 1914. He later served in the army, returning to the company as special salesman in San Francisco. He has filled the positions, successively, of agent, San Francisco; sales supervisor, assistant district manager, Fresno; district manager, Fresno; district manager, Portland. When the divisional organization was put in operation December, 1933, Schattner went to San Francisco as district manager and has since filled that post.

Advertising Department Changes

THE appointment of E. H. Badger as manager of advertising and publicity to fill the vacancy caused by the resignation of Don Forker, for the past six years manager of the department, was announced August 31 by V. H. Kelly, director of sales. Mr. Forker, a member of the staff of Lord and Thomas, international advertising agency, prior to coming to the Union Oil Company, and for a number of years head of his own advertising business, is going East to engage in special radio work. Some of the company's most successful advertising campaigns were launched under Mr. Forker's direction.

Mr. Badger has been a member of the department since November, 1928, coming to the company from the editorial staff of the Los Angeles Times. He has engaged in advertising and newspaper work since February, 1919, when he resigned a commission of lieutenant of infantry at the close of the world war. He entered the service from the University of Washington.

T. L. Stromberger, who has been a member of the department since June, 1929, has been advanced to the position of assistant manager. He has in the past few years given general attention to service station merchandising and assisted in editing the Union Oil Bulletin and Dealer News. He is a graduate of the University of Southern California.

Other members of the depart-

ment include Don M. Cameron, who, since March, 1933, has engaged in visual educational work among the schools of the coast and general sales promotional work; K. R. Clarke, recently transferred from the Comptroller's department to assist in editing the Bulletin and the preparation of newspaper and magazine publicity, and Robert Byrne, transferred to the department a few months ago to handle the distribution of advertising materials to marketing stations.

Prior to joining the advertising department Cameron was engaged in special sales work with Union Service Stations, and also served an apprenticeship behind a gasoline pump. He is a graduate of the University of Southern California where he was student body president in 1926.

Clarke came to the company in 1931 to assist in the preparation of statistical data and financial articles. He was formerly a financial writer for the New York News Bureau and statistician for one of the West's largest brokerage firms. He is a graduate of the University of California at Los Angeles.

Five years ago "Bob" Byrne, an art student was employed by the company as an office boy. Three months ago when the advertising department needed a man to take charge of the distribution of advertising materials and turn out an occasional sketch Byrne was selected and became the junior member of the department.



E. H. Badger
Manager



T. L. Stromberger
Assistant Manager



Don M. Cameron
Sales Promotion



K. R. Clarke
Bulletin—Publicity



R. M. Byrne
Advertising Materials

Modernity and simplicity are combined in the architecture of this new all steel and glass Union Service Station which was opened last month at Olympic and La Cienega boulevards, Beverly Hills, Calif.



REFINED AND CRUDE

By RICHARD SNEDDON

The old narrow trials where two cars could barely pass without colliding are happily being replaced by splendid wide highways on which six or eight cars can collide at the same time.

And the knee-action wheels are just dandy. You can now run over a good sized pedestrian and barely feel it.

It is very easy, incidentally, to identify the owner of the car. He's the fellow who, after you've pulled the door shut, always opens it again and slams it louder.

In addition to the above startling items we have just learned that garlic is an excellent preventive of the common cold. The system is to eat some of the fragrant root, and people with colds will stay away from you.

Then again, the case of the Scotchman who dislocated his neck in a street car will surely serve as a dire warning to the birds who won't buy their own newspapers.

And when we asked one Union Oiler where he went for vacation, he replied "Heck I don't know. I was driving."

The peculiar pose of the stone cowboy that stands in the main square of a western town is accounted for by the fact that it was originally intended to be a statue of a cow person on horseback, but before the sculptor had completed the job the town council found they couldn't afford the horse.

A well known scientist declares that no new sin has been discovered in the last 5000 years. Maybe, but our college boys are working hard on the problem.

By the way, to the young man just graduating from college, we wish to tender this sterling advice: Marry the first girl you meet who has a steady job.

Which reminds us of the colored gentleman who called his sweetie to enquire, "Mandy, will you marry me?" and received the prompt reply, "Sure. Who's speaking?"

During the progress of a funeral in a small Scotch village, the grave digger suddenly expired. "This," according to local newspaper, "cast quite a gloom over the proceedings."

Still we continue to wonder; since persons with weak eyes must wear eye glasses, why is it that other persons don't have to wear glass hats?

By the same token, coffee is not the only thing that's fresh when it's dated.

And until you've had a good look at the father it's usually difficult to understand why a baby always cries for its mother.

Another thing we've never been able to understand is why a man should indulge in the extravagance of having his face lifted, when all he has to do is exercise a little patience and it will grow up through his hair anyhow.

When the teacher asked Junior how many nations were involved in the great war, he hazarded the reply "Six." "Enumerate them, please," was the next request, and the precocious one blithely proceeded, "One, two, three, four, five, six."

Carnera, by the way, prepared for his fight with Baer by chopping down trees. He might have won the bout, too, if they had been decent enough to let the big boy take his axe into the ring.

Also, for your information, a socialist is a bird who has given up hope of ever becoming rich.

Lately, these movie stories that conclude with the wedding of the hero and heroine have fallen into disfavor. The public apparently likes a happy ending.

The book with perhaps the saddest ending of all, however, is still the old check book.

Her husband had given her a vacation in Europe, and wishing to send him some artistic expression of her appreciation, the devoted wife wrote to enquire whether he preferred a Rembrandt or a Titian. She received the reply: "Either one, honey. Them French cars is all good."

In conclusion we might inform you that the ordinary camping trip may be financed accurately and adequately in the following simple manner: Figure up your expenses, multiply the result by four, and add fifteen dollars.

And if you must sport a loud suit, for pity's sake wear a muffler.

New Southern California mountain
highway in the making.

