ABSTRACTS.

AUTHOR INDEX.

The number refer to the Abstract Number.

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Oilfield Exploration and Exploitation.

Geology.

532.* The Future of Oil Finding. P. D. Krynine. *Oil Wkly*, 15.1.45, **116** (7), 26.—The problem of providing adequate oil supplies can be tackled by discovering new fields, and by increasing production from existing fields. These are long-term measures, but present shortage requires a quicker solution, involving measures which may be uneconomic. The simplest methods are to increase drilling and to keep in production wells which would normally be abandoned. This means operation at a loss unless the price of oil be raised.

Under normal conditions the future oil supply can be guaranteed at a reasonable price by improvement in the ability to find oil.

Oil is an integral part of sedimentation processes, occurring mostly disseminated in rocks of all ages, while commercial concentrations cover only 1–3% of the areas underlain by sedimentary rocks.

Many oil-traps are not obvious "structures," and apparently anticlines are not capable of concentrating oil in adequate amounts without a preliminary concentration through up-dip wedge-belts of porosity. In addition, oil occurs in stratigraphic traps—petrologic oilfields in which oil is related to primary sedimentary processes. Many fields are of this type, as in Pennsylvania, and little is known about locating them other than by random drilling. Some geophysical or geochemical method might point to such fields directly, though this is a remote possibility, or fundamental laws of oil accumulation and the pattern of these petrologic fields might be worked out to give criteria for their discovery. This requires a thorough understanding of the principles of sedimentology.

Sedimentary rocks are a mixture of chemical and detrital end members and originate along three main lines—the quartzite-limestone series, the greywacke series, and the arkose series. Oilfields can occur in each one of these major rock series, but are generally connected not with the predominant normal rock type but with certain, rather infrequently found, and abnormal types, termed sedimentary end-phase concentrates. These abnormal sedimentary processes leave in the rock many imprints besides producing oil. Search for these may be on a petrographic basis through a detailed study of drill cores, or by geophysical methods.

Sedimentary rocks have at least 93 basic inorganic properties or parameters, 25 of which are exhibited by the constituent particles, 33 by the rock aggregate (*e.g.*, porosity), and 35 by the rock formation (bedding). Each of these properties varies widely, but in oilfields a few vary in only a limited manner, and these are the properties of value in oil-search. This involves exhaustive studies and becomes especially important when structural methods fail.

Petrographic methods can also be applied in the producing stage, whether primary or secondary, for porosity, permeability, yield, retentivity, the behaviour of electrical logs, etc., are controlled to a large extent by the texture and composition of the reservoir. The reservoir rock is not merely an inert framework of silica particles, but often reacts vigorously with fluids, both connate and especially introduced.

G. D. H.

533. **Prospecting for Oil and Gas in Georgia.** G. Peyton. *Oil Gas J.*, 23.12.44, **43** (33), 62; *World Petrol.*, Feb. 1945, **16** (2), 54.—The Coastal Plain of Georgia covers nearly half the State, and has Cretaceous to Recent rocks. Leasing, geophysical prospecting and wildcat drilling were at a peak in 1944. Spasmodic work has gone on for 30–35 years, but only in 1938 was the first adequate test drilled; two dry holes were bottomed in granite at a little over 4350 ft. Shallow tests in Clinch and Montgomery Counties had oil and gas showings at 400, 900 and about 1000 ft. Wells in Dougherty County have shown over 5000 ft. of sediments. In 1943 a well drilled to 6320 ft. in Early County stopped in a hard quartzite, probably of Palæozoic age. A well in Wayne County is reported to have shown oil at less than 1900 ft. A number of dry wells were drilled during 1944.

The thinnest sedimentary section in the Coastal Plain seems to be over what may be a granite ridge running from Echols County northeast through Clinch and Pierce counties. Here the thickness may be under 5000 ft. To the south, Pennsylvanian or Mississippian formations have been found at about 5000 ft. To the west the beds thicken.

A few tests have been drilled in the Palæozoic area near Rome, Floyd County, but there is little to encourage hope of finding oil there.

G. D. H.

534.* **Six Wells Drilling in Florida: five to go below 10,000 ft.** H. Gunter. *Oil Gas J.*, 23.12.44, **43** (33), 63; *World Petrol.*, Feb. 1945, **16** (2) 56.—The first Florida wildcats were drilled in 1901, and up to 1939 more than 70 were drilled. In 1939 a 10,000-ft.

well was drilled. Eight wildcats were drilled in 1943, 7 to less than 3000 ft.; the eighth, at Sunniland, Collier County, reached 11,626 ft. and produced by pumping 100 brl./day of 20° gravity oil with salt water. There is little gas. In six months output fell to 30 brl./day and salt water rose to 90% fluid pumped. Five wells are being drilled in this area and 1 in the Panhandle.

It is not easy to work out the subsurface geology of Florida from surface data. The oldest beds exposed are of Middle Eocene age, being porous and dolomitic limestone and even true dolomites. Overlying these is the Ocala limestone, an important aquifer. On the west flank of the Ocala uplift the Suwannee limestone of Oligocene age rests on the Ocala limestone. To the north the Ocala limestone is overlapped by the Miocene Hawthorn limestone and the Pliocene Citronelle formation.

The Lower Eocene is represented by limestones. The Upper Cretaceous contains dolomites and dolomitic limestones with shale and sandstone beneath in the north. A well in the northeast did not find Lower Cretaceous beds, nor did one on the south-eastern nose of the Ocala uplift. The Sunniland well encountered Lower Cretaceous beds consisting of limestone and evaporites. The Upper Cretaceous appears to overlap a thick wedge of Lower Cretaceous.

The main structural feature of Florida is a gentle doming. The dome is elongated N. 30° W.–S. 30° E. The structure is about 250 ml. long. There is an angular unconformity at the base of the Ocala limestone. Dips are gentle on the northeast flank of the uplift and along the northerly plunge. To the northwest there is the Appalachicola basin, a pronounced structural depression with the small Chipley–Marianna uplift on the northwest. South of the Ocala uplift the regional dip is 7 ft. per mile to the south-southeast. The 5000 ft. of Lower Cretaceous beds known at Sunniland must wedge out up-dip to the north. G. D. H.

535.* Great Activity for Anadarko Basin in 1945. A. Gibbon. *Oil Wkly*, 6.1.45, **116** (6), 20.—The efforts to test the oil possibilities of the Anadarko basin began in 1943, and have given two Ordovician sand discoveries on its eastern flank. Deep and expensive test wells are required. Most previous oil search has been east of the Nemaha granite ridge, an area by no means exhausted.

Only about one-third of the Anadarko basin is in Oklahoma. It is bounded on the south by the Wichita mountains, on the north by the Central Kansas Uplift, on the west by the Las Animas Arch, on the east by the southwest dipping homocline of central Oklahoma. The geology of the Anadarko basin is still comparatively unknown, for the surface rocks are not easy to map, and evaporites make geophysical interpretation difficult. Although other factors have delayed exploration of the Anadarko basin in the past, shortage of equipment is now the obstacle.

The Anadarko basin sediments are chiefly marine, of Cambrian to Permian age, with a thin cover of Mesozoic, Tertiary, and Recent. The average thickness of sediments is 10,000 ft.; maximum probably 15,000 ft. The deepest part is just north of the Wichitas. Considerable drilling has been done round the edges of the basin. Few wells have been drilled within the area, and several have had oil showings. Around the edges many oilfields occur, yielding oil from Ordovician to Permian rocks, which underlie the Anadarko Basin.

There are three important unconformities within the Anadarko basin, at the bases of the Pontotoc, the Pennsylvanian and the Chattanooga. G. D. H.

536.* Explorations Being Pushed in Maturin-Monagas Area. Anon. *Oil Wkly*, 8.1.45., **116** (6), 53.—Core tests have recently been drilled north and east of the Jusepin field, and a wildcat is being drilled west of Maturin, Venezuela.

Seismic surveys are being carried out in the Cedeno district of Sucre State, some 12 km. north of the Santa Barbara field, and tests are to be drilled to the west.

G. D. H.

537. Oil in Alabama. S. Lloyd. *World Petrol.*, Feb. 1945, **16** (2), 52.—In Feb. 1944 oil production was first obtained in Alabama, near Gilbertown, Choctaw County. About ten producers have been completed and 10–15,000 of Alabama's 53,000 square miles are believed to have promising oil prospects.

The Coastal Plain sediments thicken from zero at the northern outcrop to 12,400 ft. in Clarke County, 90 ml. from the coast, where a well was apparently bottomed in

Jurassic. It is possible that on the coast there are 18–20,000 ft. of post-Palæozoic sediments. Relatively little drilling has been done on the Coastal Plain.

The main structural feature is the Hatchetigbee Anticline, which runs southwest for 50 ml. from the Mississippi line. The anticline is 20–25 ml. across from northeast to southwest. The Gilbertown oilfield is on the northern flank near the apparent axis, and is possibly associated with a fault running parallel with the axis. There are other smaller structures.

The Tuscaloosa formation, which produces at Heidelberg, Mississippi, is being mapped in detail in Alabama.

Production at Gilbertown is from the Selma Chalk at 2500–2600 ft. One well produces from the deeper Eutaw. The oil is heavy, and the wells are not large producers.

In the Palæozoic area of the north bituminous sandstones and limestones outcrop, and have been found in wells. There are numerous structures. Two short-lived gas-fields have been found in this area, but no commercial oil production has been obtained. The possible producing sands have proved to have low porosity. The Fayette gas-field produced from the Pennsylvanian at 2200 ft. The edges of the Warrior Basin are obscured by a thin covering of Coastal Plain rocks. Geophysical work is needed to work out the structure of the underlying Palæozoic. There seems little object in drilling more than about 4000 ft. deep, although the Palæozoic area may yield small oilfields.
G. D. H.

538. Mississippi Oil Resources. W. C. Morse. *World Petrol.*, Feb. 1945, **16** (2), 53.—In five years Mississippi has discovered oilfields at Tinsley, Vaughan-Pickens, Cary, Cranfield, Brookhaven, Flora, Eucutta, Heidelberg, Mallalieu, Gwinville, and Baxterville. There are three gas-fields—Amory, Jackson, and Bruinsburg.

Amory gas-field produces from the Palæozoic at about 2400 ft. The Jackson dome gives gas from a formation which is possibly of Navarro-Selma age, and has produced a little dead, heavy black oil. Like the Jackson dome, the Tinsley dome was discovered by purely geological methods, and produces from the Selma mainly, but also from the Eutaw and Tuscaloosa. Its cumulative production is about 75,000,000 brl. The Vaughan–Pickens field produces from the Eutaw.

Cary field was discovered geophysically and produces from the Jackson gas rock of the Cretaceous at 3275 ft. The faulted Cranfield structure was located geologically and checked geophysically. It yields oil from the Wilcox at 5880 ft., and the first well showed gas distillate in the Lower Tuscaloosa at 10,300 ft. The Brookhaven field produces from the Lower Tuscaloosa at over 10,000 ft. One well produces oil from the Jackson gas-rock at Flora. The Lower Tuscaloosa yields oil from a depth of 6660 ft. at Eucutta. The Heidelberg field produces from the basal Eutaw. Two wells have been completed in the Lower Tuscaloosa at 10,522 ft. at Mallalieu.

The Gwinville gas and distillate field produces from the Lower Eutaw, and Upper and Lower Tuscaloosa at depths between 7855 and 9250 ft. The Baxterville oilfield produces from the basal Tuscaloosa at 8690–8714 ft. and 8734–8744 ft.

Twenty-two salt domes are known in Mississippi, and gas is produced from the basal Jackson and Cockfield of the Bruinsburg salt dome at depths less than 1000 ft.
G. D. H.

539.* Exploration Continues Too Low in November. L. J. Logan. *Oil Wkly*, 25.12.44, **116** (4), 50.—There are indications that the 1944 total for exploratory wells will be only 4300, 700 below the Government goal of 5000. 27,000 completions are planned for 1945, against 24,000 in 1944, but the exploratory well figure is unchanged. Wildcatting is impeded by the inadequate crude-oil price. All costs have risen, and during the past two years it has become necessary to do more exploration and drilling to establish a given volume of reserves.

While 1944 discoveries may exceed the 1943 total of about 750,000,000 brl., it is unlikely that they will offset this year's heavy draft on reserves.

During the first eleven months of 1944, 3982 exploratory wells were completed, 17·4% more than in the same period of 1943. Drilling generally in 1944 has been 26·6% above the 1943 level. 17·3% of the 1944 exploratory wells have been successful, against 18·8% in 1943. The year 1944 was relatively less successful in establishing new reserves by extending fields or finding new pay-zones than by opening entirely new producing areas. New pay discoveries are up 4·2%, extensions up about 1%, and new fields up by 16·5%. Extensions of distillate and gas-fields have been comparatively numerous.

Only a few discoveries of major importance were made in November. The Pickton discovery of Hopkins County, East Texas, will probably cover a large area and have several pay-zones. Oil is found in the upper Rodessa limestone at 7888–7896 ft. Commercial production has been found in Robertson County at Calvert.

Important Bend limestone production has been found at Madden, Wichita County, North Texas. A new producing area in West Texas has been opened 10 ml. northeast of the Fullerton field, in the Clear Fork at 7080 ft.

Deeper production has been found in the Big Sand Draw field of Wyoming. The Tensleep yields oil at 7285–7338 ft. The Embar at 7896–7060 ft. is also productive. The structure has 1300 ft. of closure. ½ ml. away a big gas-well was completed in the Frontier at 2917 ft. in 1928. Other fields in the Wind River basin may have deeper pay possibilities.

Tables summarize the results of exploratory drilling in U.S.A. during November and the first eleven months of 1944, while the November discoveries are listed with pertinent data.

G. D. H.

540. Search for Oil in the Chaco. Anon. *World Petrol.* Feb. 1945, **16** (2), 38.—The Chaco Territory of Paraguay is to be prospected for oil and exploited jointly by the Government and the Union Company of California. The area involved covers 54–58 million acres. Seismic investigations are in progress. The area is devoid of known seeps.

The western part of the Chaco is adjacent to producing areas in Argentina and Bolivia. Outcrops are unknown, and it is necessary to depend on seismic work for mapping structures and deducing the thickness of the sedimentary sections.

G. D. H.

541. Bolivia Proceeding with Program to Make Nation Self-sufficient in Oil. Anon. *Oil Wkly*, 11.12.44, **116** (2), 113.—At present Bolivia's crude production and refinery output fall far short of consumption needs, which have increased sharply. U.S.A. is providing the Bolivian Government with funds for oil development. The present crude production is 1300 brl./day, 300 brl. of which is exported to Argentina. A few wells are being drilled in the Sanandita, Camiri, and Santa Cruz area, where there are Middle Devonian prospects.

Drilling is to be undertaken in the Saipuru field in 1945–46. Camatindi has three wells closed in, and may cover 2000 acres. Buena Vista has shown oil, but has not been developed commercially. In addition, there are promising prospects at Tatarenda, Santa Cruz, where there is a large anticline with oil-seeps. In 1928 a well drilled to 3220 ft. found six gas-sands.

The Bolivian fields produce at depths of 500–4800 ft., from beds of Lower Tertiary to Devonian age. The Saipuru field was discovered in 1924. The discovery well produced from the Tertiary at 500 ft., and had deeper oil- and gas-shows. The Camiri field was opened in 1927, and produces from several Devonian horizons, the chief of which were at 3200–3300 ft. There are four flowing wells and a pumping well. The field may cover 5000 acres, and 29 wells are scheduled to be drilled in 1945–46.

The Buena Vista prospect is on a pronounced fold marked by oil-seeps. In 1926 a well was completed at 3165 ft. with a potential of 250–500 brl./day, but there was no further development. Camatindi was discovered in 1929. Pays are found at 2350, 4100, and 4800 ft. Sanandita produces from 2000 to 2100 ft., probably from the Triassic. There are 9 pumping and 3 flowing wells. The field has given over 1,000,000 brl.

The Bermejo field extends across the Bolivian–Argentina border. Oil is obtained from the Triassic at 2100–2200 ft., 2850–2900 ft., and 3600 ft. The field was discovered in 1927, and has 3 producing wells.

Tables give current and cumulative oil production, refinery production, domestic consumption in 1943 and 1941, and the drilling schedules. G. D. H.

542. Search for New Fields Intensified in Ecuador. Anon. *Oil Wkly*, 11.12.44, **116** (2), 122.—No important oilfield discoveries have been made in Ecuador for 25 years, but during the war the production has been kept above 5000 brl/day.

In eastern Ecuador, Shell is drilling a wildcat in the province of Oriente, near Arajuno, on a site not easy of access. International Petroleum Company is drilling a wildcat near Rio Verde, on the Pacific concession, up the coast from Esmeraldas. Other wells are being drilled 40 km. west of Guayaquil, and 30 km. from Camarones. In 1943 the same company drilled dry holes in Daular, 10 ml. southwest of Guayaquil; at Cordero, 45 ml. northwest of Guayaquil; at Solano, 40 ml. east of Portoviejo; and on Puna island in the Gulf of Guayaquil. In 1944 a test was abandoned at Engunga, 4 ml. southeast of Chanduy. G. D. H.

543.* Cretaceous Formations in Canada. G. S. Hume. *Oil Wkly*, 25.12.44, **116** (4), 36.—Northeastern Alberta is occupied by Pre-Cambrian rocks with Palæozoic beds outcropping on their western margin in the north. The regional dip is southwest, and younger beds appear in that direction. Over all the southern Plains there are no exposures of Lower Cretaceous, and their thickness and nature are known only from drilling. In the foothills belt Lower Cretaceous beds are exposed, and these beds run northwest for about 900 ml. At and near the Athabaska tar-sand exposures Lower Cretaceous is seen in a relatively narrow outcrop. Hence little is known of the Lower Cretaceous over much of the area.

In southern Alberta the Lower Cretaceous varies much in lithology and thickness. The basal sand produces oil at Taber, and this may be equivalent to the Sunburst sand of Montana, and the Dalhousie sand of Turner Valley. Small amounts of oil and gas have been produced from the Lower Cretaceous beds of Turner Valley. These beds of Southern Alberta are non-marine. It is unlikely that oil has originated in them, and Jurassic or Mississippian oil-sources have been suggested. The Lower Cretaceous sands are widespread, and if the oil is of Jurassic origin their functioning as reservoir rocks will depend on the distribution of Jurassic beds. Jurassic beds extend from Southern Alberta to north of the Peace River in British Columbia, but they thin rapidly eastwards and are not known in east-central or northern Alberta. However, in southern Alberta, Devonian or Mississippian beds may have contributed oil to basal Cretaceous sands. Mississippian beds are restricted to southern and western Alberta and to northeast British Columbia.

The Lower Cretaceous stratigraphy in central and northern Alberta and northeastern British Columbia differs widely from that of southern Alberta. The northerly areas have alternations of marine and non-marine beds. Hence source rocks may occur in the Lower Cretaceous. The Lower Cretaceous oil of the Wainwright–Vermilion–Lloydminster area and in the McMurray tar sands may therefore be of Lower Cretaceous origin. The sandstones of the Wainwright–Vermilion–Lloydminster area represent in part the shorelines of the Lower Cretaceous seas which provided marine sediments farther north. In the Wainwright–Vermilion–Lloydminster area the oil so far developed is in the upper 165 ft. of beds below the strictly marine beds, suggesting a Lower Cretaceous source. These fields are on structures of extremely low relief, with thin sands and heavy oil. There is a suggestion of thicker sands to the north.

The oil impregnation of the McMurray tar sands is very variable, but the total oil content is extremely large. The sands are partly deltaic, and the bitumen is very viscous and slightly heavier than water. If this was its original state it could not have migrated far, but might have formed in the delta fringe, where marine and deltaic beds interfinger. The sand grains have a water film around them. The impregnation is richer at the outcrop than a depth. The oil cracks at relatively low temperatures and pressures, facts which are taken to mean that the oil is young. Hence, Lower Cretaceous origin is likely. However, some consider that the oil originated in the Devonian, and the impregnation of the lower part of the McMurray is higher than in the upper part. The greater density than water may explain this condition. To the southwest Mississippian, Triassic, and Jurassic beds occur, but there is no increase in richness of McMurray impregnation in this direction. Moreover, long-distance migration does not seem probable.

Thus the Lower Cretaceous of northwest Alberta and northeast British Columbia seems to offer opportunities for the formation and retention of oil. G. D. H.

544. War Advances Development in Northwest Canada. C. T. Fillan. *Oil Wkly*, 11.12.44, **116** (2), 92.—The Norman Wells field was discovered in 1920, near oil and gas seepages. There are now 54 wells in a developed area of 3700 acres. Production is from a large lens of porous reef limestone. Similar conditions are considered probable intermittently in a belt running W.N.W.–E.N.E.

Several large anticlines have been noted between the Beatton and Prophet rivers, west of the Alaskan highway. Suitable reservoir rocks have been found. There are seepages near the confluence of the Dease and Liard rivers in British Columbia, and many large anticlines in Tertiary and Cretaceous sediments in the Mackenzie River basin.

G. D. H.

Drilling.

545. Mud Treatment and Programme Become Integral Part of Sound Drilling Practices. E. R. Albert, Jr. *Oil Wkly*, 4.12.44, **116** (1), 30.—Careful selection of mud-water is considered very important in drilling. Tabulation of extensive data on waters is presented and studied in some detail.

Practices to be adopted to avoid blowouts, cave-ins, and other troubles are discussed, with typical examples as illustrations. Difficulties met and overcome in different fields are discussed. In conclusion, it is believed that consideration of the following points will result in increased drilling efficiency and reduced costs : (1) careful selection of all make-up waters ; (2) keeping hole filled when making trips ; (3) preventing enlarged shale caves by low water loss muds and/or drilling with drill pipe in tension opposite sections ; (4) using good judgment in the mechanics of coming out of the hole prior to coring, drill-stem testing, and electric-logging.

A. H. N.

546.* Three Miles Down with Medium-Duty Equipment. E. Sterrett. *Oil Wkly*, 2.1.45, **116** (8), 16.—A new record set for depth of wells is 16,246 ft., the depth of well KCL 20–13 of Standard Oil Co. of California. This is 967 ft. deeper than the last record depth of Phillips Petroleum Co.'s Ada Price No. 1 in Texas. The equipment and practices used are described. A great number of photographs are also given in this issue of *Oil Weekly*, describing this feat.

A. H. N.

547.* East Pauls Valley Pool Presents Study of Modern Drilling and Completion Practices. P. Reed. *Oil Gas J.*, 13.1.45, **43** (36), 58.—The East Pauls Valley pool development in Garvin County, Oklahoma, presents an opportunity for observing the application of modern practices for an area where wells are drilled to depths seldom below 3100 ft. Because of the unusual and irregular nature of formations it is a general practice there to treat each well as though it is a wildcat. In the drilling of nearly all the wells two to five cores and drill-stem tests are taken. Drilling equipment and methods, as well as completion practices, are described.

A. H. N.

548.* Provision of Drilling Sites Poses Difficult Engineering Problems in Louisiana Field. N. Williams. *Oil Gas J.*, 20.1.45, **43** (37), 72.—Local difficulties encountered in a Louisiana field are discussed. The field is located in the condemned spillway of the Atchafalaya River flood basin, where water rises to a depth of from 3–4 ft. above normal ground level during flood seasons, lasting from 4 to 5 months each year. Entirely isolated from roads, it is serviced by boats through adjacent navigable streams and dredged canals, in which the water level drops as much as 18 ft. below the normal ground surface during periods of low water. Ground conditions during low-water seasons are such that mat foundations could be used for standard land-rig operations. However, the periodic overflows prevent this and make necessary the elevation of all structures above the anticipated high-water level. Also, sedimentation is very rapid. During a single overflow as much as 1 ft. of silt has been deposited. Within the past 11 years the average ground level where the field is now located has been raised more than 7 ft. by silt depositions. Methods used to overcome these difficulties are given.

A. H. N.

549.* Mechanical Drilling-Time Recorder Improves Efficiency. P. Reed. *Oil Gas J.*, 20.1.45, **43** (37), 80–82.—The recording instrument itself of a geolograph installation may be placed at any point that is convenient, such as a location near the draw-works, in the doghouse, or at a short distance from the derrick in the geologists shack or trailer. The recording is done automatically and continuously on a strip chart similar in size and shape to a geologist's log. This geolograph chart or log is marked to indicate 5-minute intervals in a 12-hour period, and is turned on a drum operated by a clock mechanism. Two parallel records are kept on the geolograph chart, one by a pen which makes a mark at an angle to the left each time a foot has been drilled; the other makes a mark at right angles to the right side whenever the bit is raised off bottom. By referring to the time-scale in the geolograph log, it is possible to tell how long it took to drill each foot and the time of day each foot was dug. A meter on the geolograph shows the depth at all times. A running check is maintained with the pipe tally. When and how long the bit has been off bottom can also be observed. Space is provided on the geolograph chart or log for recording notations by driller, geologist and engineer regarding weight, mud, formations, etc. Since the rate of drilling quickly reflects changes in the nature of formations, this chart is useful as a continuous log made automatically while the well is being drilled, which gives many data in more detail than can be obtained by other means. A graphic record is also made of such items of drilling operations as round trips, connections, and shutdown time. The use of such a record to the driller is described. A. H. N.

550. The Trend in Portable Drilling Equipment is toward Added Power, and Greater Flexibility of Control. J. Moon. *Petrol. World*, 21 (12), 51–53.—A number of portable rigs are briefly described, and the chief point of interest in each rig is brought out. A. H. N.

Production.

551.* Gas Drive Mechanism in Secondary Recovery. R. J. Day and S. T. Yuster. *Oil Wkly*, 1.1.45, **116** (5), 24.—A detailed account, fully illustrated by graphs, of data obtained on oil recovery by gas. The following conclusions are reached: It has been found that the driving gas first appears at the producing end at very high oil saturations (approximately 95%), thus indicating, at best, a very diffuse flood front. This was followed by production of oil in the form of segments or slugs interspersed between bubbles of gas. Along with this, and directly following, the oil is moved in the form of a film by the action of the gas-stream, which subsequently leads to the formation of the oil-fog. Accompanying the movement of air through the formation is the process of evaporation of the lighter ends and their entrainment in the gas stream. This increases as the volume of gas put through increases. Owing to the nature of the oil used in these experiments, nothing could be said concerning the effect of a dissolved gas drive such as occurs in flush production. Even assuming that this had taken place initially, the overall picture just portrayed should not be changed to any great extent.

It has been shown that an increase in pressure gradient results in a greater ultimate recovery, a faster recovery, with the use of less gas. A linear relationship seems to exist between the saturation and the logarithm of the gas volume necessary to reduce the saturation. It is thus possible to predict the volume of gas necessary to go from one saturation to another. It also appears that this relationship is dependent upon the pressure gradients employed, the permeability, and the viscosity. Numerous other factors will doubtless be found that will also effect the relationship, as the subject is perused. A greater ultimate recovery at a faster rate with the use of less gas is obtained from higher permeabilities. Finally, the production rate is faster and less gas is necessary for the recovery of less viscous oils. In the range of viscosities found in Pennsylvania crude, the volume of gas necessary for production, at any given saturation, is approximately proportional to the viscosity. A. H. N.

552. California's First Condensate Plant Approaching Peak Operation. I. B. Funk. *Petrol. World*, **41** (12), 41–43.—This plant is working at present very near its maximum capacity of 50,000 m.c.f. per day. The wells are each connected to the plant through a separate line, and tie in to a general manifold. They are so connected that each individual line may be used for flowing the well to the plant, or for returning the dry gas to the well. All controlling of the condensate and gas-flow is handled by means of valves at the manifold. Each gas-line is equipped with a meter, and all lines are so connected that the stream may be passed through an oil and gas separator, whereby each well's flow may be turned through individually, the amount of oil and gas determined, and samples taken for quantity and quality of the oil and the gasoline content or royalty settlements. The gas is reduced in pressure in stages to 2000 lb./sq. in., 800 lb./sq. in., 300 lb./sq. in., and 75 lb./sq. in., and scrubbed at each stage. The lean gases from the 2000 and 800 lb./sq. in. absorbers are recompressed to 4000 lb./sq. in. and reinjected. A. H. N.

553.* Mechanics of Producing Oil, Condensate, and Natural Gas. Part 9. Application of Electric-Log Data. P. J. Jones. *Oil Gas J.*, 30.12.44, **43** (34), 270–273.—Probably the first step in the application of electric-log data to production is to check the reliability of the resistivity recorded on an electric log. The next step may be an estimate as to the top and bottom of the pay in a given well and reservoir. The bottom of a pay may be water contact or a gas contact. Deductions for non-pay within the interval between the top and bottom of a pay can amount to a sizable fraction of the interval. Non-pay may be more resistant or less resistant than pay A dense non-pay having a high resistivity is sometimes mistaken for pay. The more important criteria for distinguishing pay from non-pay are discussed. A procedure for estimating interstitial water for the pay found in a well is considered in detail. A. H. N.

554.* Mechanics of Producing Oil, Condensate, and Natural Gas. Part 11. Composition and Physical Constants of Hydrocarbons. F. J. Jones. *Oil Gas J.*, 13.1.45, **43** (36), 64.—An extensive knowledge of hydrocarbons is not essential in production. But a knowledge of the rudiments on the composition of natural gas and oil is helpful. These are briefly discussed. Physical constants of hydrocarbons are used in estimating gas–oil ratios, grains/million content of a gas, barrels of condensate in a million cubic feet of gas, and many other material balance calculations in general. The constants commonly used in production for hydrocarbons, and for the impurities found in hydrocarbons, are given in terms convenient for field purposes. The application of the constants will be illustrated in later articles. A. H. N.

555.* Mechanics of Producing Oil, Condensate, and Natural Gas. Part 12. Molal, Weight, and Volume Consumption. P. J. Jones. *Oil Gas J.*, 20.1.45, **43** (37), 64.—Hydrocarbon analyses are commonly reported by components through hexanes. Heavier components, if present, are usually lumped together and reported as heptanes plus. The specific gravity and molecular weight of the heptanes plus component are required for the purposes of material balance calculations. Small quantities of impurities may be included with methane; if significant quantities are present, they are considered as separate components. In practice, compositions are expressed on a molal and liquid volume basis. The various steps in converging from one basis to any other basis are illustrated by examples. If the production from a well is passed through a separator, and the separator liquid and gas are metered and analysed, the gas and liquid can be recombined to obtain the composition of the production. If the separator liquid is not metered, its volume can be estimated from the composition of the corresponding stock-tank liquid. A. H. N.

556.* Varied Pumping Problems in the Seminole Area. C. D. Borland. *Oil Wkly*, 1.1.45, **116** (5), 36.—Specific troubles met in pumping wells in the Seminole Area are discussed. These include problems due to limited fluid volumes, gas, paraffin and other deposits, sucker-rod failure, crooked holes, and sand. A. H. N.

557.* Water-Injection Wells and their Behaviour. Part I. S. T. Yuster and J. C. Calhoun, Jr. *Oil Wkly*, 18.12.44, **116** (3), 28.—Equations are developed for the flow of water underground, based on Darcy's law of flow of homogeneous fluids in porous media. The equations are then used to study various patterns of well spacing and other variables of water injections. No conclusions are reached; a second part will conclude the studies. Examples are worked out completely for homogeneous and heterogeneous sands. A. H. N.

558.* Water-Injection Wells and their Behaviour. Part II. S. T. Yuster and J. C. Calhoun, Jr. *Oil Wkly*, 25.12.44, **116** (4), 44.—The examples worked out in the first part are followed by others for computing quantities of water injected and power used. Certain erroneous steps, or approximations, are pointed out. The long study

is summarized as follows : (1) a method has been developed for predicting the behaviour of a water input well combining the equations for radial encroachment with that of the steadied rate for various patterns; (2) the graphs obtained have general application, and can be corrected for such variables as permeability, pressure, sand thickness, and porosity to give the cumulative volume and rate of input as a function of time; (3) using this method, the standard water-flooding patterns were compared on a constant well density basis, and the seven-spot was found to have the following advantages : (a) the largest number of inputs and the fewest number of producers/unit area; (b) lowest flood-out time; (c) fairly low steadied input rates, which, when coupled with the behaviour listed under heading (b), means low water-oil ratios; (4) water requirements on a lease may be predicted using this method of analysis; (5) power necessary for water injection can also be predicted.
A. H. N.

559. Control and Detection of Reservoir Gas Movement in Pressure Control Operations. N. Van Wingen and E. P. Valby. *Oil Wkly*, 27.11.44, **115** (13), 32. *Paper Presented before California Natural Gasoline Association.*—Methods in use and proposed have been to add gases, called tracers, foreign to the hydrocarbons in known proportions to the injection gas. By determining the amount of tracer in the gas produced by surrounding wells, it is possible to calculate the amount of injected gas being produced. The tracer can be added to the low stage intake of the compressor, in which case all the injected gas will contain the tracer. However, in some cases it may be desirable to add the tracer into the gas going to only one injection well. This would mean introduction at high pressures, in some cases over 3000 and up to 4500 lb./sq. in. Periodic testing of the produced gas at frequent intervals to determine the amount of the tracer would be needed to show how much injection gas is present in the gas produced. Typical results from such practice are given. Carbon monoxide is used in one field. Another suggested means has been to use mercaptans as a tracer. These compounds have a very distinctive odour, even at a low concentration of one part in one billion parts of air. The quantity of mercaptan can be determined by chemical means; however, they have boiling points in the range of the butanes and heavier portion of the wet gas, and are also soluble in crude oil, so that it might be necessary to test the trap fluid as well as the wet gas to determine the amount of mercaptans in the well effluent. In one case where ethyl mercaptan was used, the odour was noticed in the production from edge wells where injection gas was not expected by evidence of no increase in gas–oil ratios. It is thought that the mercaptans diffused through the oil-sands to the outer edges of the reservoir. If so, and also because of its obnoxious odour, the use of mercaptans for tracing injection gas is not advisable for continued use. It might be suitable for a single test in small quantities. Nitrogen, helium, and carbon dioxide have also been used. Another method uses the gas cap and dark oil effluents from the wells for measuring the migration of gas. This is briefly described and is to be described in greater detail later.
A. H. N.

560.* Utilization of Salt Water in Illinois Oilfields. S. F. Peterson. *Oil Gas J.*, 13.1.45, **43** (36), 69.—The author advocates that salt water produced with the oil should be returned to the formation. Such a procedure will help restore reservoir pressure; wash the residual oil from the stratum, and force it up the structural dip, where it will accumulate at the well-bores. At present there is no better method known than to use salt water for this flushing and driving purpose. It is generally conceded that when an oil-pool has reached the depletion stage and is ready for abandonment, between 50 and 75% of the oil still remains in the producing formation. It is argued that salt water returned to the formation would drive this remaining oil for further production.
A. H. N.

561. Acidizing Success in Northern Oklahoma. E. S. J. Villines. *Oil Wkly*, 4.12.44, **116** (1), 54–55.—One of the more recent outstanding developments in acidizing services is the electric pilot, designed to make permeability surveys and selective acid treatments. In making a permeability survey the permeable zones of a formation can be located and their respective injection rates determined. From this information the pilot can again be used in making a selective acid treatment of the formation to direct and concentrate the acid into the desired portion of the pay-zone. The main reaction of acidizing is explained, followed by a study of acidizing in Oswego, Dutcher, and Hunton limes in North Oklahoma. A. H. N.

562.* Blasting Method of Closing Off Sand Channels. F. R. Cozzens. *Oil Wkly*, 8.1.45, **116** (6), 30.—Near the end of secondary recovery by gas drives large quantities of gas may bypass oil through open channels. There are now available as spoil for sand-plugging purposes some 30 different materials, each capable of doing a fairly satisfactory closing job, providing it reaches the proper zone and can be forced far enough into the sand so that the plug will not be destroyed by back-flow when normal pressuring is resumed. The nature of the agent used is dependent on the type of sand, but generally the big problem is to seat the plug properly. The average air-pressuring equipment alone is seldom capable of doing this, and unless the operator is especially favoured by luck, he usually finds it necessary to cause a certain degree of collapse or a breakdown in the walls of the channels themselves before a plug can be safely anchored. Blasting the well face can be used.

The blasting method of channel closing is carried out by first treating input wells, and best results are obtained when done as soon as possible after by-passing has become troublesome. The well to be treated is blown-off and left open until pressure recedes. Tubing and pressuring equipment are then removed, and accurate measurements are taken from bottom of casing to base of shot-hole. If the well has a sand-column of 10 ft. or more, with a shot-hole of average dimensions, a torpedo shell or similar container is loaded with 15–20 lb. gelatin extra L.F., and usually of 90% strength. In most cases 4 × 16-in. gelatin cartridges are used, being placed end to end in the shell. This pack, containing a No. 8 electric blasting cap attached to a copper wire line, is lowered down the casing to a point about midway between bottom of casing and base of shot-hole. The shell is suspended at that point, the wire line insulated, and all connections wrapped in waterproof tape. After the pack of explosives has been seated a slurry of finely pulverized native clay and water is prepared on the job, and agitated in a tank until the mixture is the consistency of soup. Enough of this material is inducted down the well to fill the shot-hole, and to extend 3–6 ft. up in the casing. After pouring is done the pack is exploded. The spoils are removed, the well cleaned, and the plug seated. A. H. N.

563. Patents on Drilling and Production. R. S. Hyer, assr. to Sperry-Sun Well Surveying Co. U.S.P. 2,357,330, 5.9.44. Appl. 2.4.40. Whipstock assembly.

A. L. Leman and G. E. Nevill, assrs. to the National Supply Co. U.S.P. 2,357,411, 5.9.44. Appl. 12.2.42. Auxiliary flange for control heads.

D. C. Bond, assr. to Pure Oil Co. U.S.P. 2,357,497, 5.9.44. Appl. 4.6.43. Drilling mud.

T. O. Smith, assr. to Odessa Chemical and Equipment Co. U.S.P. 2,357,599, 5.9.44. Appl. 24.8.42. Methods of sweetening sour gas and preventing corrosion of oil-producing wells.

W. V. Vietti and A. D. Garrison, assrs. to the Texas Co. U.S.P. 2,357,565, 5.9.44. Appl. 5.10.35. Method of drilling wells.

H. H. Holmes and W. E. Lawson, assrs. to E. I. de Pont du Nemours and Co. U.S.P. 2,357,589, 5.9.44. Appl. 22.10.41. Oil-well filter.

D. S. Kaufman, assr. to Texaco Development Corpn. U.S.P. 2,357,660, 5.9.44. Appl. 28.5.43. Method of pumping oil.

L. R. Leissler, assr. to Carl C. Cawthon and L. R. Leissler. U.S.P. 2,357,835, 12.9.44. Appl. 20.7.42. Drilling bit.

R. A. Phillips, assr. of one-half to M. L. Clopton. U.S.P. 2,357,907, 12.9.44. Appl. 6.5.40. Retractable core taking device.

P. B. Brown. U.S.P. 2,358,052, 12.9.44. Appl. 27.8.42. Arc bit-point for rock-drills.

J. R. Yancy, assr. to Gray Tool Co. U.S.P. 2,358,122, 12.9.44. Appl. 11.6.41. Wellhead equipment.

M. C. Bowsky, assr. to Lane Wells Co. U.S.P. 2,358,441, 19.9.44. Appl. 12.7.41. Inductive-capacitive electrical logging.

I. A. Miller, assr. to H. C. Otis. U.S.P. 2,358,466, 19.9.44. Appl. 12.9.40. Well tool.

A. B. Dismukes, assr. to Standard Oil Development Co. U.S.P. 2,358,562, 19.9.44. Appl. 6.12.41. Acid-treating well.

L. G. Howell, assr. to Standard Oil Development Co. U.S.P. 2,358,574, 19.9.44. Appl. 8.7.40. Gamma-ray well logging.

A. W. Kammerer. U.S.P. 2,358,642, 19.9.44. Appl. 8.11.41. Rotary drill-bit.

J. R. Yancy, assr. to Gray Tool Co. U.S.P. 2,358,677, 19.9.44. Appl. 8.9.42. Wellhead equipment, including back-pressure valve and removal tool.

C. S. Crickmer. U.S.P. 2,358,908, 26.9.44. Appl. 3.3.41. Well-swab.

A. D. Garrison, assr. to Texaco Development Corpn. U.S.P. 2,358,920, 26.9.44. Appl. 27.11.41. Production of distillate.

R. G. Taylor, Jr., assr. to The Guiberson Corpn. U.S.P. 2,358,944, 26.9.44. Appl, 2.4.41. Surface operated valve for oil-wells.

C. F. Teichmann, assr. to Texaco Development Corpn. U.S.P. 2,358,945, 26.9.44. Appl. 31.8.40. Method of determining the porosity and location of permeable formations in oil-wells.

B. Henderson. U.S.P. 2,358,974, 26.9.44. Appl. 7.4.41. Pumping unit.

R. Warren, assr. to Houston Oil Field Material Co. U.S.P. 2,359,067, 26.9.44. Appl. 21.10.40. Orienting apparatus for wells.

E. Merten, assr. to Shell Development Co. U.S.P. 2,359,147, 26.9.44. Appl. 19.10.42. Hydraulic drilling device.

H. Brown and H. S. Ribner, said Ribner assr. to said Brown. U.S.P. 2,359,894, 10.10.44. Appl. 10.2.41. Well-logging method and apparatus.

C. R. Dale. U.S.P. 2,360,041, 10.10.44. Appl. 26.6.43. Apparatus for subsurface pressure determinations in wells.

C. L. Walker. U.S.P. 2,360,088, 10.10.44. Appl. 23.11.42. Drilling tool.

W. A. Clark, assr. to The Texas Co. U.S.P. 2,360,200, 10.10.44. Appl. 8.9.41. Method for gravel packing.

F. P. Ausburn and C. C. Winstow. U.S.P. 2,360,311, 17.10.44. Appl. 19.4.41. Cementing tool.

E. H. Dickenson, assr. to Ingersoll-Rand Co. U.S.P. 2,360,318, 17.10.4. Appl. 27.4.44. Supporting device for rock-drills.

L. H. Bailey and W. Ludwell Owen, Jr., and W. L. Owen. U.S.P. 2,360,327, 17.10.44. Appl. 22.1.42. Production of mud-laden drilling fluids.

D. C. Bond, Assr. to The Pure Oil Co. U.S.P. 2,360,544, 17.10.44. Appl. 29.5.43. Drilling mud.

M. H. Halderson, assr. to Phillips Petroleum Co. U.S.P. 2,360,561, 17.10.44. Appl. 30.12.40. Control for oil-well pumping equipment.

B. E. Parrish. U.S.P. 2,360,577, 17.10.44. Appl. 15.6.40. Swab rubber.

F. J. Toth and D. S. Nutter, assrs. to Shell Development Co. U.S.P. 2,360,742, 17.10.44. Appl. 8.3.41. Apparatus for determining production potentials of oil-wells.

W. J. Weiss, assr. to The Texas Co. U.S.P. 2,360,992, 24.10.44. Appl. 14.8.41. Oil-base drilling fluid.

H. S. Cole, Jr., and E. R. Filley, assrs. to The Texas Co. U.S.P. 2,361,012, 24.10.44. Appl. 12.9.42. Method of storing oils.

M. Schlumberger, assr. to Schlumberger Well Surveying Corpn. U.S.P. 2,361,064, 24.10.44. Appl. 29.12.42. Depth measuring apparatus.

O. Hammer, assr. to Security Engineering Co. Inc. U.S.P. 2,361,094, 24.10.44. Appl. 9.5.41. Setting tool for use in wells.

J. J. Grebe, assr. to The Dow Chemical Co. U.S.P. 2,361,194, 24.10.44. Appl. 28.8.40. Apparatus for treating wells.

J. J. Grebe, assr. to The Dow Chemical Co. U.S.P. 2,361,195, 24.10.44. Appl. 28.8.40. Method of and apparatus for treating wells.

J. G. Campbell, assr. to Ralh H. Fash. U.S.P. 2,361,261, 24.10.44. Appl. 9.10.40. Method of detecting the penetration of an oil-bearing horizon.

A. M. Cravath and G. L. Hassler, assrs. to Shell Development Co. U.S.P. 2,361,274, 24.10.44. Appl. 29.1.40. Radiological exploration system.

R. E. Fearon, assr. to Well Surveys, Inc. U.S.P. 2,361,389, 31.10.44. Appl. 16.10.39. Well-survey method and apparatus.

J. C. Mason. U.S.P. 2,361,558, 31.10.44. Appl. 30.11.40. Hydraulic surge method.

E. G. Taylor, Jr., assr. to The Guiberson Corpn. U.S.P. 2,361,718, 31.10.44. Appl. 2.4.41. Removable gas-lift unit.

A. D. Garrison, assr. to The Texas Co. U.S.P. 2,361,760, 31.10.44. Appl. 25.8.44. Drilling muds.

A. H. N.

Development.

564.* Summary of November Completions. Anon. *Oil Gas J.*, 23.12.44, **43** (33), 118.—U.S.A. had 2192 well completions in the four-weeks ended 25th November, 1944. 1154 obtained oil and 251 gas. Completion results are summarized by States and districts, together with data on footage, rigs, production, and the numbers of wells in depth ranges.

G. D. H.

565.* Wildcat Completions and Discoveries. Anon. *Oil Gas J.*, 23.12.44, **43** (33), 119.—During the week ended 16th December, 1944, U.S. wildcat completions totalled 93, of which 14 found oil and 5 gas. Results are summarized by States and districts.

G. D. H.

566.* Wells Completed in the U.S. in Week ended January 6, 1945. Anon. *Oil Wkly*, 8.1.45, **116** (7), 54.—In the week ended 6th January, 1945, U.S.A. had 326 field completions (224 giving oil and 19 gas) and 95 wildcat completions (13 giving oil and 3 gas). Results are summarized by States and districts.

G. D. H.

567.* Wells Completed in the U.S. in Week Ended January 13, 1945. Anon. *Oil Wkly*, 15.1.45, **116** (7), 52.—332 field wells and 95 wildcats were completed in U.S.A. during the week ended 13th January, 1945. 227 of the former and 21 of the latter found oil, while 35 of the former and 1 of the latter found gas. Results are summarized by States and districts.

G. D. H.

568.* U.S. Completions Continue to Decline but at Lower Rate than in November. Anon. *Oil Wkly*, 15.1.45, **116** (7), 46.—U.S.A. well completions in December, 1944, at 498 per week showed a higher weekly average than in November. More wells were drilling at the end of 1944 than at the end of 1943.

Due to labour and other shortages the rate of completing wells is considerably below the 1941 figure.

In 1944 24,451 wells were completed, compared with 19,245 in 1943. Of the 1993 December completions 554 were failures, 193 gas producers and 1088 oil or distillate producers.

Completions in December and 1944 are analysed and compared with other periods.

G. D. H.

569.* Two Producers Completed in Barco Concession. Anon. *Oil Wkly*, 15.1.45, **116** (7), 50.—Two more producers have been completed in the Socuavo field, Tibu area, of the Barco concession. Socuavo now has 12 producers.

G. D. H.

570.* Operations Back to Normal in Colombia and Better Year Ahead. Anon. *Oil Wkly*, 11.12.44, **116** (2), 122.—Colombia's production in 1944 has been on a similar scale to that of 1941, and may amount to 23–24 million barrels.

In the Casabe field, which now has a potential of 20,000 brl./day, 21 producers have been completed. It is likely that 15,000 brl./day may be shipped by the Andian pipe-line to Cartagena. This line also ships oil from the La Cira and Infantas fields. The Dificil field, a 1944 discovery, has two closed-in wells. A further promising development in the Barranca Bermeja area is the proof of good production in the Cantagallo concession. Three dry holes and two 3000-brl. wells have been drilled, and the field may extend to the Magdalena, and even on to the east bank.

The Tres Bocas and Socuavo fields of the Barco concession represent a double closure on the large Tibu structure, which has 12 producers. The Petrolea field gave about 11,000 brl./day from 83 wells in 1944.

Two wildcats are to be drilled on the La Dorada concession, 150 ml. south of Barranca Bermeja, and another in western Bojaca, some 110 ml. south of Barranca Bermeja. A wildcat is planned on the Caraballo tract south of the Bay of Salamanca. Wildcats are under way in the Sinu valley of western Bolivar, and in western Meta. G. D. H.

571.* Colombia Production Back at Pre-war Level. Anon. *Oil Wkly*, 15.1.45, **116** (7), 50.—During the first nine months of 1944 Colombia produced 16,749,406 brl. of oil from the Barco concessions. Estimated yield for 1944 is 23,000,000 brl., almost as much as in 1939, and 1945 output is expected to be higher because of shipments from the Casabe and Tibu fields. G. D. H.

572. Government's Exploratory Activities Adds to Oil Reserves of Peru. Anon. *Oil Wkly*, 11.12.44, **116** (2), 104.—Peru's oil output was 17,593,000 brl. in 1936, but fell to 11,922,000 brl. in 1941. This situation combined with reduced imports caused the Government to reorganise the oil industry. Additional wells were drilled in the old producing areas and improved producing technique was employed. Thus, production rose to 13,500,000 brl. in 1942, and 15,700,000 brl. in 1943. Aerial, geological and geophysical surveying, and test drilling were undertaken.

A major discovery seems to have been made at Constancia, mid-way between the Lobitos and Zorritos fields. Four wells have been completed with a production of 1200 brl./day. Two tests are under way near Pirin, in Puno, and tests are to be drilled in the Ucayali valley, north and south of the Agua Caliente field. Drilling is to be done on promising structures in the Sechura Bay area of Piura. G. D. H.

573. Decided Pickup Registered in Near East Oil Activities. Anon. *Oil Wkly*, 11.12.44, **116** (2), 80.—Although war has prevented much activity planned in Iran, Iraq, Arabia, and Egypt, there has been moderate exploration and development in several areas in 1944. Full producing possibilities of most of the fields remain to be established. Production potentials greatly exceed the existing refining, transportation, and marketing facilities.

In Saudi Arabia there are indications that the oil necessary to keep a large size pipe-line in operation will be available before such a pipe-line can be built. There is, or will be more oil than will satisfy the new and expanded refining plants at Ras Tanura and Bahrein Island. Dammam is the only operating field, although there are 3 producing fields. Abu Hadriya has only the discovery well, and Abqaiq, 100 ml. south of Dammam, has 5 closed-in wells. A fourth field may shortly be opened a few miles from Ras Tanura. The surface structure of the Qatif dome has considerable closure.

The Dammam field can use wide spacing because of high porosity and permeability of the oolitic limestone pays. There are 4 pays, with water-drive in the lower horizons. In 1944, Dammam is estimated to have produced 5,000,000 brl. of oil. Its aggregate production is over 30,000,000 brl. Abqaiq has as large a structure as Dammam, and higher pressures.

The Bahrein Island field is believed to be largely drilled up with 74 wells.

The Hurghada and Ras Gharib fields of Egypt have been forced during the war. Efforts to extend the producing areas of the fields at the head of the Red Sea have not been successful, and interest has moved to the Mediterranean coastal strip, including the Nile Delta and areas to the east and west. Surface geology and geophysical surveys have confirmed the existence of large closed structures along at least 3 east–west trend lines, involving a thick series of Mesozoic rocks. A wildcat has been started west of Cairo, and another is planned in the centre of the Sinai Peninsula, 200 ml. to the south.

Russia has been seeking concessions in the Samnan area of north Persia, where a discovery well was drilled before the Revolution. The nearest commercial production is at Chikishlar, just across the Atrak river, in Russia, 150 ml. to the north. Some years later a wildcat discovered oil near Asterabad on the Persian side of the border. This discovery has not been developed further, although certain plans were made before the war.

G. D. H.

Refinery Operations.

Refineries and Auxiliary Refinery Plant.

574.* Cooling-Water Systems and their Chemical Treatment. W. A. Tanzola. *Refiner*, Oct. 1944, **23** (10), 375–380.—Water-cooling systems are classified into: (1) once-through systems; (2) open circulating systems; and (3) closed circulating systems. Problems in each system are discussed from the viewpoint of scale-formation, corrosion, and biological fouling.

A. H. N.

575.* Countercurrent Apparatus for Gaseous and Liquid Phases. J. Piazza. *An. Inst. invest. cient. tecn.* (*Santa Fè*), 1942–1943, **12–13**, 81–89.—An apparatus is described consisting of two parallel circular plates with concentric and entering rings, the lower plate being arranged to rotate at several hundred r.p.m. and the upper plate stationary. Liquid flows from centre to outside of rotating plate by centrifugal force, and gas is fed by pressure difference from outside to centre, being obliged to zigzag through the liquid.

A very active surface of contact is obtained, and entrainment of liquid by gas is shown to be negligible, even when the counter-current velocities of gas relative to liquid are made very high. Mainly theoretical.

A. C.

Distillation.

576.* Application of Unit Operations to Fractionation and Other Vaporization Processes. Part 9. R. L. Huntington. *Refiner*, Oct. 1944, **23** (10), 400–403.—The principles of distillation in system using batch still units and continuous distillation and fractionation in refining petroleum products are briefly given.

A. H. N.

577.* Fractional Distillation in Concentric Rings with Temperature Gradient. J. Piazza. *An. Inst. invest. cient. tecn.* (*Santa Fè*), 1942–1943, **12–13**, 187–188.—A modification of an apparatus previously described, consisting of a corrugated plate rotating at a small distance below a stationary plate with parallel corrugations. Contact between up-going vapours and down-coming liquid is effected by making the gas pass through the liquid contained in the annular spaces between the corrugations. The upper corrugated plate is fixed to the cover of the apparatus forming enclosed annular rings through which can be circulated liquid or vapour, thus producing a temperature gradient. The degree of fractionation can be varied by the number of corrugations and the distance between stator and rotor, and the fractionation is claimed to be very effective. No data are given.

A. C.

Absorption and Adsorption.

578.* Operation of the Central Gas Plant at the General Petroleum Refinery. R. Maass. *Oil Gas J.*, 9.9.44, **43** (18), 59; *Petrol. Engr.* Dec. 1944, **16** (3), 178; *Nat. Petrol. News*, 4.10.44, **36** (40), R. 698.—Gas plant at Torrance Refinery was designed to handle 11,000 M. cu. ft. per day of refinery gases from various units contributing to 100 octane production. For a period oil-circulating capacity was in excess of requirements, therefore the opportunity was taken to ascertain whether extraction could be increased above the designed figure. Results are shown in tabular and graphical form, and curves are shown for the overall plant extraction and four-plate theoretical absorption-per cent. extracted/absorption factor, for the various constituents in the gases. These show that average propane extraction was 78·5% and *iso*butane extraction, 97·8%. The graph can be used to give percentage of other extractions when a known propane extraction is obtained. With a 90% propane extraction, *iso*butane extraction would be 98·4% and propylene 73%. Constituents heavier than *iso*butane are practically all absorbed. Absorption factor for propane is 1·21, and for normal butane 4·07; these factors are necessary to obtain the results shown, and are considerably higher than those usually employed in adsorption units.

Gas processed contained 68% of components lighter than ethane, of which 20% is H_2, 3% N_2 and 30% CH_4. The extract is composed mainly of C_3 and C_4 hydrocarbons; the C_5 hydrocarbons amounted to 7½%.

The plant is described and a flow-sheet given. It consists of an H.P. absorber, 72 × 6 ft., with 26 single crossflow trays, 2 ft. apart, with two intercoolers; an L.P. absorber 72 × 5 ft., with trays and intercoolers as for the H.P. absorber (one intercooler only, however, is used); a rich oil fractionator consisting of (1) a 7-ft. section, with 15 trays (as described), (2) a 9½-ft. stripping section, with 15 double crossflow trays, the height being 83 ft. and a circulating furnace.

Operating conditions for producing 80% propane extraction are detailed. In the plant high volatility of the extract requires a high operating pressure, and consequently high lean oil vapour pressure, with its resultant small loss. Because of the higher pressures used at the reflux accumulator and the rich oil-vent tank, the intermediate flash vapours are kept at reasonable size. They are, however, sufficient to very effectively remove the greater portion of the ethane and lighter constituents from the extract. Application of the plant to natural gas extraction is discussed, and analyses and results of operating natural gas for 77% propane extraction are given. 3500 M. cu. ft. per day of wet natural gas produced 2400 M. cu. ft. dry gas and 38,000 gallon liquid extract. W. H. C.

Cracking.

579.* Conversion of Thermal Cracking to the Cycloversion Process. A. E. Buell and P. M. Waddill. *Refiner*, Oct. 1944, **23** (10), 363–367.—A general arrangement for converting a thermal reforming plant (assumed to consist of certain components) into a cycloversion plant is given. In the latter plant the gas/oil charge is preheated in a waste-heat exchanger and then passed into the furnace. Superheated steam is injected into the coils preceding the high-temperature radiant section of the furnace. The mixture of steam and oil vapours flows through the catalyst chambers, where cracking takes place. The chamber effluent passes through a pair of waste-heat exchangers in series and on to conventional distillation and recovery equipment. While one chamber is on stream, the second is being regenerated, by passing a mixture of steam and air through the catalyst to burn off the carbonaceous deposit. The steam produced in the waste-heat exchangers is superheated in a small coil in the furnace and then injected into the oil-vapour lines. Schematic diagrams are given. A. H. N.

Chemical and Physical Refining.

580.* Processing of West Texas Sour Crudes. L. R. Gray. *Refiner*, Oct. 1944, **23** (10), 388–394.—A technical report on the operations, difficulties, and special points of significance to the refining of sour West Texas Crudes. Corrosion results in the topping and cracking units are summarized. Desalting the crude is discussed. Finally, maintenance and safety practices adopted in this particular refinery are given. A. H. N.

Special Processes.

581.* Fischer-Tropsch Synthesis May Prove a Major Refining Process. Part 3. Catalysts and their Preparation. A. L. Foster. *Oil Gas J.*, 9.9.44, **43** (18), 66.—A survey of 32 patents and 12 literature references on catalysts for the Fischer–Tropsch process indicates that the main constituent of most catalysts specified is usually one or more of the metals of the eighth periodic group, Fe, Ni, Co., with or without a promotor, such as an alkali oxide or alkaline-earth oxide. Titanium or silicon or their compounds, alumina, or the oxides or sulphides or copper, manganese, tungsten, or uranium, have been specified as promoters. The catalyst metal is usually obtained by reducing the oxide at elevated temperatures, in the presence of hydrogen or carbon monoxide, usually after precipitation of the metal hydroxide on an inert supporting material, such as a prepared clay, kieselguhr, infusorial earth, etc., before calcining and reducing. Some specified catalysts contain several metals, *e.g.*, Co, Cu, ThO_2 (or U); or Ni, Mn, and Cu. In some specifications emphasis is laid on the control of the physical conditions during precipitation and reduction periods; and sintering of the catalyst before or after reduction is recommended in two patents.

Two ways of using metal carbonyls as catalysts are outlined: (1) by adding a carbonyl to an inert oil and decomposing it at about 200° F., the finely divided metal is kept in suspension. This suspension in oil is used for the synthesis of hydrocarbons from CO and H_2; (2) carbon monoxide and hydrogen are passed into a chamber either lined with, or which contains the same metal as that of the carbonyl used. The metal carbonyl catalyst is introduced at regular intervals to further catalyse the reaction, the carbonyl being decomposed at the temperature of the reaction chamber. Such a procedure is of great advantage when the yield of product falls. W. H. C.

Metering and Control.

582.* Characteristics of the Differential Type Flow-Meter and Conditions Affecting its Operation. L. K. Spink. *Refiner*, Oct. 1944, **23** (10), 370–374.—The errors, constant and accidental, which are apt to enter differential type flow-meters are discussed and analyzed. Curves give the influence on flow factors of such things as errors in the differential readings, and in pipe run size. A table lists primary devices—*i.e.*, venturi, nozzle, pitot, eccentric or segmental orifice, and concentric orifice, and their characteristics. A. H. N.

Safety Precautions.

583.* How Foam Conquers Fire. F. S. Mabbatt. *Refiner*, Oct. 1944, **23** (10), 395–396.—The principles and practice of extinguishing fire by foam are given. A. H. N.

Products.

Analysis and Testing.

584. Improved Reflux Regulator and Head for Laboratory Distilling Columns. C. B. Willingham and F. D. Rossini. *Bur. Stand. J. Res. Wash.*, Nov. 1944, **33** (5), 383.—A description of a reflux regulator and head for laboratory distillation columns which is an improvement over that previously in use in connection with work on A.P.I. Research Project No. 6 (see *Bur. Stand. J. Res. Wash.*, 1939, **23**, 509). The improvements are in respect of better measurement of the temperature of the liquid-vapour equilibrium, reduction of hold-up, and increase in mechanical strength. When distilling pure compounds, temperature readings constant to ±0·01° C. have been recorded over a period of 200 hrs. C. L. G.

Crude Oils.

585.* Cracking of Latin American Crude Oils. No. 5. Poza Rica (Mexico). G. Egloff. *Oil Gas J.*, 18.11.44, **43** (28), 218.—The Poza Rica district and the Isthmus fields of Mexico now provide about 25% of the oil produced in Mexico. The Poza Rica crudes have specific gravities around 0·8708, with sulphur contents of 1·6–1·8% and yield about 25% of gasoline. They are paraffinic in character.

The properties of three crude oils and various products obtained by semi-commercial distillation, and of five cracking stocks: (1) gas oil; (2) blend of reduced crude and kerosine; (3) blend of 87·5% topped crude and 12·5% gas oil; (4) wax distillate; (5) pressed distillate; are tabulated. Cracking was conducted in a two-coil pilot plant to produce 400° F. end-point gasoline and residual fuels conforming to A.S.T.M. No. 6 fuel specification. Operating conditions and yields from the various cracking stocks are shown. Gasoline yields ranged from 52% to 58%, having A.S.T.M. octane numbers from 70 to 73, and their properties after various refining treatments are given. In all cases refining slightly reduced the octane numbers; copper-dish gum test, with 0·025% inhibitor No. 1, gave 2–12 mgr. per 100 ml.; induction period with 0·025% No. 1 inhibitor ranged from 240–1250 hours; five out of eight being over 510 hours. Complete analyses of the gases were made on the gases produced in cracking blend (3) and the wax distillate (4), and from these (*a*) the polymer gasoline producible by the H_3PO_4 process were calculated to be 3·38–4·22% with A.S.T.M. octane rating of 82; (*b*) the alkylates producible by the H.F. or H_2SO_4 process, if sufficient *iso*butane were available, were calculated to be 6·16–7·61%, the propylene alkylate having an A.S.T.M. octane nymber of 91 and the butylene alkylate 93. W. H. C.

Engine Fuels.

586.* *N*-Butanol as Stabilizer for Wet Alcohol/hydrocarbon Mixtures. J. Piazza. *An. Inst. invest. cient. tecn.* (*Santa Fè*), 1942–1943, **12–13**, 5–38.—A study of mixtures of 94–96·5% alcohol with gasoline and light kerosine; using *n*-butyl alcohol as an additive to prevent separation of water (94–96·5% alcohol and *n*-butyl alcohol are both available within the Argentine by fermentation processes, but absolute alcohol is not).

The following mixtures were homogeneous at temperatures down to −15° C., all percentages by volume :—

% *n*-Butanol.	Grade of alcohol.	Hydrocarbon.	% of alcohol.
5	96·5%	Gasoline	≯50
7	95·7%	,,	≯50
12	94·5%	,,	≯50
20	96·5%	Lt. Kerosine	25

A series of experiments was also carried out on the amount of water that could be added back to the ternary hydrocarbon/alcohol/*n*-butanol mixture, up to the point where turbidity appears at atmospheric temperatures (usually 0·5–1·5% water). It was shown that *n*-butanol was more hydrophilic than alcohol, although this is doubtful, since the author bases this conclusion on graphs where the initial water content of the alcohol is not taken into account.

A bibliography of recent work on stabilisers for mixtures of hydrocarbons with wet alcohol is given. A. C.

587.* Relation of Aviation-Fuel Quality to Engine Performance. W. J. Sweeney. *Refiner*, Oct. 1944, **23** (10), 383–387.—The origin of knock—on the detonation theory of shock wave formation—is given, followed by a discussion of the significance of knock in terms of economy of fuel, and its performance. Effects of operating conditions are briefly indicated. A. H. N.

Lubricants.

588.* Economy in Lubricants. Anon. *Form. y. Document. Prof.*, 1944, **9**, 33.—A plea for rigorous economy in use of lubricants. It is claimed that by using emulsions for lubricating gas engines, steam cylinders and air-driven tools, savings of up to 50% can be made. No data given. A. C.

589. Prevention of Industrial Dermatitis. N. H. Mummery. *Brit. Med. J.*, 13.5.44, 4349, 660.—A considerable reduction in acne from machine-cutting oils and paraffin dermatitis from degreasing and cleaning agents has been effected in a factory by the use of a cleansing agent by operators after work, consisting of neutralised sulphonated castor oil containing 2% of a wetting agent. It was found that barrier creams gave disappointing results, as it was difficult to ensure their consistent use, and they were removed by the paraffin degreasing agents. The soap is supplied in dispensers, and after use leaves the skin clean, supple, and comfortable. In the factory in question, use of the soap reduced dermatitis incidence from 12·5% to 5·7% and, in the machine-shops only, from 14·2% to 3·5%. Its use has been extended to other processes involving chemical agents, to the rubbing down of plaster castings and in stores handling sheet metal, with equally satisfactory results. Oil acne affecting the front of the thighs due to oil saturated aprons has been prevented by waist-high metal guards on the automatic cutting machines. It is pointed out that at present the sulphonated castor oil is in very limited supply. C. L. G.

390.* Cutting Oils and Fluids. D. W. Forster. *Petroleum*, March 1945, **8** (3), 48.—The use of a stream of water as a cutting fluid was first demonstrated by Taylor in 1883. Since that time cutting fluids have been extensively developed. Straight mineral oils and straight fatty oils; mineral oil–lard oil blends, sulphurized mineral oil–lard oil blends, and soluble oil form the four main groups of cutting fluids. Straight oils, non-emulsifiable, originally consisted of fatty oils, but are now compounded mineral oils containing—*e.g.*, olein, lard oil, and sulphur.

Sulphurized oils, usually a blend of mineral and fatty oils into which sulphur is permanently introduced during manufacture to produce a heavy bodied concentrate, are much used.

There are two types of soluble oils: the milky-white emulsion with water, and the clear and translucent type which forms a finely dispersed emulsion with water.

Colloidal graphite has been found to improve the performance of cutting fluids. A fluid incorporating a vegetable oil, and one of the halogen derivatives of the paraffins has also been found successful on thread-cutting machines.

Cutting fluids should possess high specific and latent heats; good thermal conductivity, good wetting and lubricating properties, high flash point, chemical stability, and low viscosity.

Correct selection of a suitable fluid is necessary to obtain the best results.

Dermatitis is sometimes caused by irritation of the skin of operators by fine metallic particles suspended in the cutting fluid; but penetration by bacteria from other sources, when the skin is inflamed or the surface scratched, is frequently the cause of skin infections.

Such diseases may be counteracted by personal cleanliness, purification of the oils, addition of disinfectants, and the application of a "barrier substance" to the skin of the operators before starting work. G. A. C.

591.* Lubricating Vade Mecum. E. W. Steinitz. *Petroleum*, March 1945, **8** (3), 52.—A "Lubrication Vade Mecum" has been compiled to assist refiners, distributors, and users of lubricants to choose the correct grade for a specific purpose. Part I gives a table of comparisons between the British Standard Classification of Lubricating Oils B.S.I. 210—1939 and the lubrication code of the Vade Mecum. The latter groups lubricating oils into 10 classes, according to the type of application, with a special class for greases, and indicates the grade of oil, viscosity, and preferred composition for different purposes.

Parts II and III (Lubrication Charts and Alphabetical Index of Machines, respectively) to be published later, will indicate the code number giving the lubricant specified for any particular machine. G. A. C.

592. Aviation Engine Lubricants. F. L. Miller. *Petrol Eng.*, Dec. 1944, **16** (3), 112.—An outline is given of research developments of the Standard Oil Co. of New Jersey, on solvent refining methods and full-scale engine tests on aviation lubricants commenced in 1926 in co-operation with the Pratt and Whitney Co. As a result it was established that the new propane solvent-treating technique enabled good aviation lubricating oils to be manufactured from many crude oils previously considered unsatisfactory, and that outstanding products could be obtained from selected crudes.

Solvent refined Mid-Continent oil was given an excellent rating when officially tested by the Wright Aviation Corporation, and also gave high performance with other approved official and full-scale engine tests. Despite such quality improvements, it is evident that lubricants of even higher performance will be necessary to stand up to severe conditions met with in more powerful engines under combat conditions, and to allow for certain mechanical changes in engines for power improvement. It is probable that the upper limit has been reached in the quality that can be obtained through selection of the crude and the method of refining, and that improved performance characteristics will have to be obtained by other means. Three methods are outlined : (1) the use of synthetic additives ; (2) development of oil, partly or wholly synthetic in character ; (3) the addition of a voltoloized fatty oil concentrate. Engine ratings on oils of the above types are given and photographs of the engine cylinders after tests shown. Merits of such additives are discussed, emphasis being laid on their value in allowing engine overhaul periods to be lengthened. W. H. C.

Special Hydrocarbon Products.

593. Liquid Gas Aerosols—Postwar. W. W. Rhodes. *Soap*, July 1944, **20** (7), 108.—The economics of the marketing of aerosols and fly-sprays are discussed, and it is considered that the former should have a very promising future in view of their greater effectiveness and convenience. It is calculated that the 1 lb. aerosol loader could be marketed at $0.75 and the charge at $1.25. On the basis of 1 lb. of aerosol giving comparable results to 2 gal. of oil spray, the aerosol costs only half as much as the oil-spray. The greater convenience of the former may, however, lead to its more frequent use. It is suggested that loading stations should be erected to cover areas within 100–150 miles, an estimate of $50,000–$75,000 for a plant of capacity 300,000 lb. per month being given. For post-war uses, questions such as transport and specifications for containers for gases under pressure will have to be considered. Effective tests must also be made for toxicity to man, in view of the persistence of aerosol mists. If inflammable carriers are used, instead of Freon, the fire risk will have to be taken into account. C. L. G.

594.* American Corrosion-Preventive Materials. S. A. Richardson. *Petroleum*, Feb. 1945, **8** (2), 29–37.—The corrosion preventives described are materials applied to unpainted metal surfaces for protection, and must be removable with petroleum solvent or petrol, leaving the surface in as good a condition as when the part was originally made. Usually of petroleum origin, they fall into three general classifications—thick film, thin film, and fluid types.

American Army specifications for rust-preventive compounds and for preservative lubricating oils are tabulated, and descriptions given of the methods of test applied in the examinaton of products. There are four different petroleum jelly or petrolatum-type corrosion preventives of varying consistency adjusted by controlling the oil content. These materials usually require added corrosion-inhibiting agents, and one is designed especially for protection of antifriction bearings. Thin film rust-preventive compounds consists of a corrosion-preventive base of high melting point dissolved in about 50% Stoddart-type petroleum solvent to render it fluid. Four grades of preservative lubricating oils, consisting of lubricating oils of proper viscosity and low-temperature characteristics to which appropriate corrosion inhibitors are added, in proportions sometimes as high as 5%. Based on experience, the use of rosin in rust-preventive compounds is prohibited, but otherwise a wide latitude in composition is permitted provided finished products meet specification requirements based on performance tests.

Applications of the various types fall into three categories : (1) For use on exposed surfaces in outdoor storage or for any storage of long duration ; (2) for use on surfaces of equipment or supplies in indoor or shed storage or tenporary outdoor protection ; (3) for use as special lubricants for any temporary protection or for preservation of internal or shielded surfaces in storage.

The division of the eight materials into these three categories is given. R. A. E.

595. Economic Changes in Aromatic Hydrocarbons. J. M. Weiss. *Chem. & Eng. News*, 10.1.45 ; *Chem. Tr. J.*, 9.3.45, **116**, 253.—Production of pure benzene in the U.S. amounted to 36 million gal. in 1940, out of a potential production of 125 million gal. from coke-oven light oil, the balance being used mainly for motor fuel, as solvent, etc. Recent requirements for synthetic phenol manufacture (32 million gal.) for styrene (55 million gal.), etc., are likely to raise the demand for pure benzene to the present potential of 150–160 million gal. per year. In post-war years the demand is likely to increase further (*e.g.*, for production of adipic acid for Nylon), and a new source must be sought. Production from petroleum is more difficult than in the case of toluene, and costs may not be economic.

In pre-war days requirements for toluene as solvent and chemical raw material were easily met from potential production of 30–40 million gal. from coke-oven light-oil crudes, but war-time requirements have necessitated very large production from petroleum for which it is difficult to visualize a market after the war. One possibility is for the production of chemicals now made from benzene.

In 1940 U.S. production of naphthalene amounted to 160 million lb., out of a potential of 300–350 million lb., being used for moth-balls, dyestuff intermediates, phthalic anhydride, phthalates, anthraquinones, benzoic acid, etc. Increases in requirements for phthalic anhydride used in alkyd resins, for phthalate esters as plasticizers and insect repellants, have brought naphthalene requirements to at least 260 million lb. Further requirements for phthalic anhydride are likely to increase production to 165 million lb., and further sources of supply, apart from naphthalene, are being sought. Thus a projected plant is being based on *o*-xylene from petroleum, and as phthalic anhydride requirements grow, it is likely to become a more important source. Production, with toluene, from controlled cracking of petroleum hydrocarbons, is believed to be competitive with naphthalene. C. L. G.

596. Aerosols versus Oil Spray Insecticides. A Study of Comparative Efficiency. J. M. Fales and L. D. Goodhue. *Soap*, July 1944, **20** (7), 107.—Biological tests in the Peet Grady chamber have been carried out on flies using aerosols and kerosine sprays containing similar quantities of pyrethrins. For the aerosol tests a dosage was used of 1 gm. of Freon containing 20 mg. pyrethrins (*i.e.*, 100 mg. 20% pyrethrum extract) and for the spray tests, 10 mls. of kerosine containing 20 mgm. pyrethrins. The tests were designed to determine (*a*) comparative periods of effectiveness after spraying and (*b*) comparative rapidity of action. With regard to (*a*) introduction of flies immediately after spraying resulted in kills of 64% and 47% for the aerosol and spray, respectively, but after 20 minutes the aerosol still gave a kill of 20%, whereas the spray gave kills after 2–4 minutes of 31/14%. With regard to (*b*) rapidity of knockdown was tested by exposing flies in the chamber for 1, 5, and 10 minutes to the two sprays. With the kerosine the kill (52–55%) was independent of the period of exposure, though there was some increase in knockdown at the longer exposures. With the aerosol a higher kill (60%) was given after 1 minute's exposure, this increasing to 72% and 77% on increasing the exposure to 5 and 10 minutes. The conclusion is thus that the fine particles in the aerosol remain suspended and effective for a longer time than in the spray, it being emphasized that differences exist both in particle size and in concentration of insecticide. Thus a small particle of high concentration of toxicant can still be effective. C. L. G.

597. Another View of Aerosol Efficiency. N. J. Gothard. *Soap*, July 1944, **20** (7), 113.—So far D.D.T. has not been used in aerosol bombs, the present formula being 2% of pyrethrum extract (20%), 8% sesame oil, and 90% Freon. It has been claimed that spraying for 4 seconds will kill insects in 1000 ft. of confined space. Practical tests in a room containing 2500 cu. ft. have shown that in 10 seconds about 44 gm. of fluid are ejected, containing 175 mgm. of pyrethrins. 1000–1200 flies were introduced into the room before spraying, and after exposure to the spray for 10 minutes, a knockdown of 82–84% was obtained, the 24-hour kill being 81%. It was considered that knockdown was slow, but recovery negligible. Comparable tests were made with an A.A. grade of kerosine spray at the rate normally considered effective—*i.e.*, 1 fluid oz./1000 cu. ft. This spray contained 160 mgm. pyrethrins per 100 ml. so that 118 mgm. pyrethrins were used in the test. This gave much more rapid and effective knockdown than aerosol (knockdown 98/99%) and kills of 91/92%. In five minutes half only of the flies were knocked-down by the aerosol, whereas with the spray practically all were knocked down. This slow knockdown is considered a definite drawback from the customer's point of view. Similarly roaches in dishes were only slightly affected by the aerosol mist, there being no kill. As it was considered that the pyrethrin concentration of the present aerosol is insufficient, repeat tests, but in the Peet Grady chamber, were carried out at double the above concentrations. The A.A. grade spray, using 12 ml. containing 19·2 mgm. of pyrethrins gave a knockdown of 98% and a rating of +18, whereas 2·4 mgm of a double strength aerosol, containing also 19·2 mgm. of pyrethrins, gave a knockdown of 83% and a rating of −11. In spite of the presence of the synergist, sesame oil, in both the aerosol sprays, lower toxicity was shown than with equivalent or lower quantities of pyrethrins in a kerosine spray. C. L. G.

598. Aerosol Bombs *versus* Spray Insecticides. R. O. Corvin. *Soap*, July 1944, **20** (7), 111.—Present widespread military use of aerosol bombs against insects will undoubtedly encourage post-war development, but it is doubted if the cost will not be prohibitive, \$3–\$4 being a likely retail price. The possibility of smaller one charge capsules is being considered, but even if these could be sold for 25 c. it is doubtful if there would be a large market for them. It is also felt that more thorough examination should be made of the toxic possibilities of Freon, particularly if used with thiocyanates—*e.g.*, lethane and thanite—and attention should be directed to the irritant effects of products from the decomposition of Freon on hot surfaces. C. L. G.

599.* Petroleum Extracts in Core-Making. Substitution for Linseed Oil. Anon. *Petrol. Times*, 17.3.45, **49**, 194.—Paper 9/1944 of the Iron and Steel Institute's Steel Castings Research Committee described an investigation into the part replacement of linseed oil in core-sand mixtures by petroleum extracts. The products tested ranged in viscosity from 175 to 3270 sec. R.I. at 140° F. In sand mixes containing 2% of linseed oil, a 40% substitution could be tolerated (except with Grade 1A (140)) without effect on properties, treatment required or stripping qualities, premixing of the linseed oil and extract being desirable. In mixes rich in starch, dextrin, molasses, or sulphite lye a 40–50% reduction of linseed oil was possible with, in some cases, an increase in green strength, and in some a loss of dry strength, but 100% replacement gave very friable mixes. Of the extracts tested, Group 1 (72) gave the best results and could be easily handled.

Special Publication No. 10, " Petroleum Extracts as Partial Substitutes for Linseed Oil," of the British Cast Iron Research Association, describes a similar investigation. It was found that two-thirds of the linseed oil could be replaced by extract Group 1 (72), or one-third by other extracts without effect on the dry strength or method of handling the mix, except that at low baking temperatures it was necessary to increase the time of baking. Some difficulties were also experienced in mixing at low temperatures, and premixing with the linseed oil was desirable. C. L. G.

Derived Chemical Products.

600. Chemicals in Timber Treatment. Prevention of Dry Rot and Fungus Growth. B. Hickson. *Chem. Tr. J.*, 9.3.45, **116**, 251; 16.3.45, **116**, 302.—Types of timber used in building are discussed with information on the different types of fungi, their requirements, and methods of protecting timber against them. For outdoor timber, creosote or preparations containing it is considered the standard preservative. Of the spirit soluble type, solutions in petroleum spirit of copper naphthenate or pentachlorphenol are used for existing structures, but afford only surface protection, and present a fire hazard in application. Many water-soluble preservatives have been used, including zinc chloride, fluorides, chrome salts, and arsenates; zinc in conjunction with arsenic or chrome salts is widely used, while a newer product incorporates a fungicide, dinitrophenol. It is considered that mixtures of products are of the most value. Vacuum and pressure methods of application, using 2–4% solutions, give best results, but dipping or brushing with concentrated solutions may be used for timber in buildings. Hot and cold soaking has been found fairly effective if properly applied. Pressure impregnation is carried out in cylinders, 6 ft. diameter and 35–100 ft. length, which are loaded with timber, evacuated to 24–26 ins. mercury and flooded with preservative solution at 60–80° C. Pressure is then built up until an absorption of 1–1½ gal. per cu. ft. is obtained. With water-soluble solutions, the timber is then kiln dried or stacked for 3–5 weeks.

A further method, the Boucherie process, consists of connecting pipes fed from an overhead tank to a hole drilled in the base of a vertical log. Hot soaking is carried out in tanks heated to 60–80° C. for 4–5 hours, the timber remaining in the tank for 24 hours, absorptions of ⅓–½ gal. per cu. ft. being obtained with permeable soft woods. Cold soaking for 7–10 days gives only limited penetration. Some protection of boxes and cases can also be obtained by quick dipping for 2–10 minutes in special water-soluble preservatives. C. L. G.

601. Rôle of the Wetter in Apple Sawfly Control. G. A. Carter and C. H. Hardy. *Agriculture*, March 1945, **51** (12), 563.—Successful control of an insect such as the Apple Sawfly (*Hoplocampa testudinea* Klug) depends on the choice of a suitable insecticide, the correct timing of its application, and the efficacy with which the wash can be brought into contact with the insect.

Previous experiment showed that with correct timing nicotine gives better results than derris; and that for best control the spray should be applied at the 80% Petal Fall stage of Worcester Pearman. Efficacy of the wash depends largely on inclusion of a wetter.

From the life history of the Apple Sawfly it is evident that the penetration of the sprays to the bottom of the calyx cup, where the female lays her egg, is essential. This is achieved if the advancing contact of the spray fluid is reduced to as low a figure as possible.

Field experiments were carried out in an orchard consisting mainly of Worcester Pearmain, using nicotine and a wetter, Ester Salts solution, derived from petroleum, the wash being applied to twelve randomized blocks. Three different treatments were given, with varying concentrations of Ester Salts solution. Approximately 9000 fruits were examined for sawfly attack in each replicate block, and the percentage of attack calculated. Results confirmed that the addition of a wetter to a nicotine wash improves the control of Apple Sawfly and at a concentration of 0·125% the best control is obtained. G. A. C.

602. Sulphonates from Petroleum. Anon. *Soap*, Feb. 1945, **21** (2), 71.—U.S. Pat. No. 2,354,359 describes the preparation of products suitable for use as detergents by the reaction of nitrosyl chloride with an olefine containing mixture of petroleum hydrocarbons. The addition products are reacted with an alkali metal sulphate, to replace chlorine with a sulphonate group, and the water-soluble sulphonates separated. C. L. G.

603. Fatty Acids from Paraffins. Anon. *Chem. Tr. J.*, 23.3.45, **116**, 309.—An article by L. Mann in *Die Chemie*, 1944, 1–2, reviews briefly developments in Germany in production of fatty acids by oxidation of paraffins, mainly Fischer-Tropsch wax, and discusses in more detail attempts to find applications for large quantities of by-products. Fischer-Tropsch waxy fractions are most suitable raw material, being widely available and wholly paraffinic, though containing branched-chain hydrocarbons, particularly in the higher fractions. Best results are given by oxidation of normal paraffins with 20–30 carbon atoms, unsaturated hydrocarbons requiring a preliminary hydrogenation, while naphthenes are unsuitable, as they give rise to naphthenic acids. Branch-chain paraffins tend to rupture at the point of the branch, yielding acids of too low a chain length. The raw material is catalytically oxidized at controlled temperatures, the process being interrupted before all material has been converted to reduce formation of over-oxidized products. Washing the reaction product with water and saponifying removes the catalyst and water-soluble acids. Unsaponifiable constituents are removed, partly mechanically and partly by steam distillation at over 300° C. During the latter stage over-oxidized products, particularly oxy-acids, are converted into unsaturated fatty acids, and to some extent to unsaponifiable matter. All unsaponifiable matter is re-subjected to oxidation. The crude fatty acids originally obtained have carbon chain lengths of 4–25, and are separated by vacuum distillation into (*a*) fore-runnings, consisting of straight-chain fatty acids of C_4 to C_9 chain length; (*b*) soap acids; (*c*) after-run fatty acids consisting of unsaturated, oxy, and fatty acids of C_{18} to C_{25}, and (*d*) a distillation residue containing fatty acid esters, oxy acids, unsaponifiable constituents, and very high-molecular-weight fatty acids. Many attempts have been made to utilize the by-products under (*a*), (*c*), and (*d*); thus from the fore-runnings surface active products for use in the textile field, and as emulsifiers for pharmaceutical and cosmetic products have been made by chlorination and interaction with secondary alcohols (produced from the fatty acids by petonisation and hydrogenation) to ether carboxylic acids and followed by alkali neutralization. Sulphated products, useful as defatting agents, have also been obtained from the primary alcohols obtained by reduction of the fatty acids. The acids cannot be used directly owing to their strong odour and corrosive properties. Some esters of the alcohols have also been used as plasticisers.

The after-run fatty acids can be reduced in molecular weight to soap acids by repeated saponification, heating, and steam treatment, but this reduces capacity of the plant. Similarly the yield of distillation residues can be reduced by sulphonating the crude fatty acids and removing the acid with hot water and steam before distillation. Not much progress has been made in the utilization of the residue, though some lubricants and products of shellac or rubber substitute type have been obtained.

Laboratory obtained yields are quoted of 55–60% total fatty acids, of which 20–25% represent C_1 to C_9 fatty acids, while 10% of the paraffin is oxidised to carbon dioxide and monoxide.

It is not clear how many of the processes mentioned have reached the commercial stage, but it is doubtful whether this means of producing fatty acids would be of interest to a country possessing reasonable supplies of natural fatty acids.

C. L. G.

Miscellaneous Products.

604. The Properties and Uses of Polythenes. Part I. E. Hunter and W. G. Oakes. *Brit. Plastics*, March 1945, **17** (190), 94.—A range of ethylene polymers, marketed under the name Alkathene, has been in commercial production since 1939, the products being used mainly as cable dielectric. All are straight-chain paraffins of similar electrical properties and density to paraffin wax, but possessing remarkable toughness and flexibility. They are marketed in grades 2, 7, 20, 70, and 200, these numbers being related to the fluidity at 190° C. (*i.e.*, grade 2 is 100 times as viscous as grade 200), and have molecular weights of 13,000 to 25,000 and softening points, under low load of 107–190° C. and under high load of 80–101° C. All grades, including some new higher viscosity grades, can be milled on heated rolls (125–145° C.) or in Bridge-Banbury mixers, but in Pfleiderer action mixers only grades 7 and softer can be conveniently handled. All can be injection or intrusion moulded at 160° C. Grade 20 is preferred for polythene cables, the average brittleness temperature being −25° C., though this can be improved to −45° C. by incorporation of 12½% poly*iso*butylene. The new experimental grades can be flexed at −100° C. and lower. For the application of coatings by dipping, the lowest viscosity grade, 200, is used. The high resistance to moisture and chemicals, low solubility, and good mechanical properties offer possibilities in the field of protective coatings and chemically resistant containers. Tables are reproduced showing the electrical, mechanical, etc., properties of polythenes.

C. L. G.

605. History of Polythene. P. C. Allen. *Plastics*, 1945, **9** (93), 68.—Polythene was discovered as a result of a programme of fundamental research laid down by an I.C.I. Research Department in 1930. It was decided to study the effect on certain chemical reactions, of extreme pressures of 15,000–300,000 lb./sq. in. In most cases, little effect was observed, but in 1933 it was found that ethylene gas would polymerise to the extent of 500 units or more when subjected to high pressures and temperatures and in the presence of a catalyst. The white solid product could not be intensively studied until 1935, when extreme pressure technique had sufficiently improved, and even then explosive decompositions made the work dangerous and tediously slow. By 1938 a pilot plant unit had been evolved in which polymerization, at 15,000 lb./sq. in. was continuous. The product had remarkable electrical properties, was extremely tough and flexible, light and water-resistant. It showed a great similarity in both properties and handling characteristics, to gutta-percha, and the British Post Office showed great interest in the experimental use of the polymer as a covering for submarine telephone and telegraph cables. Its properties at extremely high frequencies also made it promising for use in television. The first full-scale plant was erected in 1939, and its production was turned over to the needs of Radar. In 1940 a second plant came into production, and due to the excellent properties of polythene, the whole output was earmarked for Radar cables. Construction was started in 1940 on a third, and much larger plant, and this commenced production in 1942, in spite of great operating difficulties. In the U.S. full production commenced only in 1943, after a delegation had visited the I.C.I. plants and received valuable help. Earlier in 1940 polythene had been shipped to the Bell Telephone Co., and experimental telephone cable was laid down with very satisfactory results. British production is now 200 times that of 1939 and 2000 times that of 1938, and all Radar requirements are being met with ease. Photographs of the plant are shown. S. J. L.

606.* Manufacture, Blends and Uses of Sulphated Oils. Part I. S. Glicher. *Petroleum*, Feb. 1945, 8 (2), 32/5.—A general description of manufacturing conditions suitable for production of sulphated oils from castor, cod, neatsfoot and sperm oils, oleic acid and fatty alcohols. Reference is made to conditions necessary for production of the corresponding sulphonic acid derivatives and also to production of water-soluble and oil-soluble petroleum sulphonates. R. A. E.

607. An Expanded Polystyrene. D. W. McCuaig and O. R. McIntire. *Modern Plastics*, March 1945, **22** (7), 106.—Polystyrene is now available in an expanded multicellular form, weighing 1½–2 lb. per cu. ft., *i.e.*, with approximately $\frac{1}{42}$ of the density of the original polystyrene. It is highly resistant to mould growth, rot, decay, weather exposure, and loses none of its strength at low temperatures. It may be used for extended periods at temperatures up to 170° F. It is at present colourless, and can be easily shaped, cut, or bonded to other materials. The independent cell structure gives the expanded product a high degree of water resistance and buoyancy. At present it has a number of war-time applications, including rafts, boats, and floats, but has future possibilities in boating, refrigeration, decoration, toys, etc.
C. L. G.

608. Conservation of Linseed Oil by Substitution. Sub-committee 46. New York Paint and Varnish Production Club. *Paint Oil and Chemical Review*, 16.11.44, **107** (23), 10.—Results are given of exposure tests for 12 months on a series of exterior paints in which linseed oil has been replaced to the extent of 20% and 50% by : (1) tall-oil pitch ; (2) vegetable oil pitch ; (3) tall-oil linseed oil varnish ; (4) marine (fish oil) pitch ; (5) linseed rosin ; (6) petroleum drying oil ; and (7) processed rosin. It was concluded that none of the substitutes were suitable for use in white paints but that in paints containing the more durable pigments, blacks, iron oxides and chrome-greens, substitutes (1) and (4) could be used to the extent of 20% without too serious a sacrifice of durability. In northern areas a wider range of substitutes, and possibly higher percentages could be used. Substitute (2) has possibilities, but its colour is poor, while (3), (5), and (7) are less satisfactory, tending to cause fading and checking. The petroleum drying oil (6) was regarded as the worst in checking properties, but might be used in limited amounts in certain formulations. C. L. G.

609. Developments in the Petroleum Industry. E. J. Dunstan, *Indust. Chem.*, 1945, **21**, 113–116.—The general trend of development in the production of petroleum products to possess characteristics required by present conditions, is dealt with. Some uses of extracts are mentioned, together with the utilization of olefines from cracked hydrocarbons. F. S. A.

610. A New British Insecticide. The Gamma Isomer of Benzene Hexachloride. R. Slade. *Chem. Tr. J.*, 16.3.45, **116**, 279.—Details are given of preparation and toxic properties of a new insecticide developed by I.C.I., Ltd. This is 1 : 2 : 3 : 4 : 5 : 6-hexachlorcyclohexane (known as 666), which contains 10–12% of the active principle, the gamma isomer (known as gammexane). The original crude product was tested in 1942 against the flea-beetle, with encouraging but inconsistent results. It was then found that the α and β isomers were inactive, while the γ isomer was highly toxic to weevils. This can be separated by extraction with methanol, in which γ and β are insoluble, followed by evaporation of the solvent, γ then crystallising out. The isomers are highly stable, colourless crystals, practically insoluble in water, but soluble in organic solvents. The γ derivative melts at 108–111° C. The isomers are probably harmless to man, but tests are still in progress. Hundreds of tons of the crude product mixed with 4 vols. of gypsum have been successfully used against the flea beetle. It has also been found in trials a highly toxic locust bait, and mosquito larvicide (in quantities of 10 oz. per acre). It controls poultry and livestock pests, bed bugs, crickets, cockroaches, flies (not giving, however, an immediate knockdown), mosquitoes, soil pests, grain weevils (1 part gammexane per million of wheat). It is at the same time a stomach and contact insecticide and a fumigant. Its action may be connected with its similarity to inositol, a metabolite found in many cells, the toxic action being the result of adsorption and distribution through the organism to the cells where a vital reaction depending on inositol is blocked. A similar effect may occur with D.D.T., but as this appears to have only a fifth of the power of gammexane, it may block a quite separate vital reaction. C. L. G.

611. New Weed Killer. Anon. *Chem. Tr. J.*, 9.3.45, **116**, 271.—The U.S. Dept. of Agriculture have announced discovery of an effective weed killer, 2 : 4-dichlorphenoxy acetic acid, a solution of 1¾ lb. of which in 225 gal. of water containing 9 lb. of a spreader will control the weeds in one acre of grass without damaging the grass. C. L. G.

612. Polystyrene. Part I. S. Booth. *Brit. Plastics*, March 1945, **17** (190), 130.—Methods of manufacture of the styrene monomer and polymer are discussed and theories on the chemical reactions during polymerization reviewed. Ethyl benzene is prepared commercially by the reaction of ethylene and benzene in the presence of a catalyst at 90° C. and 1 atm. pressure, an almost theoretical yield being obtainable. Mixtures of ethylene with other hydrocarbons may be used, provided propylene is absent. The ethylbenzene is separated by distillation and any polyethyl benzenes separated by distillation and recycled. Production by the Friedel–Crafts reaction from ethyl chloride and benzene gives a lower yield and is limited by availability of ethyl chloride. The main method for producing styrene is by pyrolytic dehydrogenation of ethylbenzene at 850° C., separation of the two products being effected by high vacuum distillation. A further method, chlorination, followed by dehydrochlorination, is less suitable requiring more complicated plant and large quantities of chlorine.

The styrene monomer is usually inhibited with, *e.g.*, hydroquinone to prevent polymerization in storage. Industrial polymerization of the monomer is carried out: (*a*) in bulk; or (*b*) in water emulsion or dispersion. Bulk polymerization requires a very pure monomer and is difficult to control, as rise in temperature gives material of lower molecular weight. Emulsion polymerization (catalytic for 4–7 hours at 80–90° C.) is rapid and more easily controlled, and the polymer can be recovered in a pure state by steam distillation and washing. The main disadvantages are the fine state of division of the polymer and the presence of emulsifiers in the product. Polymerization of a dispersion containing stabilizers such as talc, in the presence of a catalyst for 3–6 hours gives products of molecular weight 80,000–100,000 and has the great advantage of giving a pure product in a convenient form—spherical beads.

A variety of theories on the mechanism of polymerization have been put forward. The initial reaction may result from activation of the double bond, or its severance, giving two carbon atoms capable of undergoing further reaction. While period of nucleus formation may amount to several days, individual chains attain their final size in a very short time; thus, while rate of reaction depends on rate of activation, molecular weight depends on relative rates of chain growth and chain formation. It is considered that hydrogen transfer along the chain does not take place, as this would lead only to low polymers. Termination of the reaction is probably not due to reduced activity with increasing chain length, as this would give rise to uniform molecules, but there may be a double bond left in the chain or an intramolecular ring may be formed (*e.g.*, of cyclobutane), but high-molecular rings by combination of chains is regarded as unlikely. Branching appears to be facilitated at higher temperatures and in the presence of catalysts. It is possible that the catalyst to some extent remains combined with its chains during polymerization, while peroxides of styrene may be formed, behaving as free radical donors. C. L. G.

613. Phenol-modified Resin Production. Anon. *Paint Tech.*, Jan. 1945, **10** (109), 22.—U.S. Pat. 2,237,634 describes the preparation of a range of resinous products by condensation of aromatic hydrocarbons with aldehydes, followed by modification with phenols. An example is production of a dark red, brittle, benzene-soluble resin by reacting 40 c.c. of 80% H_2SO_4, 500 c.c. of an aromatic-extract (boiling range 132/142° C.)

and 250 c.c. of formalin at 80° C. for 1½ hours. 250 c.c. of phenol are then added, the mixture heated at 80° C. for 10 minutes, and a further 110 c.c. of formalin added, followed by heating for 1 hour. The resin is extracted with ether, which is removed by vacuum distillation, temperature conditions during this stage greatly affecting the product. Resins soluble in tung oil can be obtained by the use of tertiary amyl phenol, etc., in place of phenol, solutions in tung oil giving slow-drying varnishes. A range of products can be obtained varying from heavy viscous oils for use in rubber compounds, adhesives, plastics, etc., to high-melting-point solids for coating compositions, cast, and moulded articles, inks, waterproofing and insulating compositions.

C. L. G.

Engines and Automotive Equipment.

614. Possibilities of Gasoline-Engine Development. F. S. Baster. *Refiner*, Oct. 1944, **23** (10), 404–408. *Paper Presented before Society of Automotive Engineers.*—The thesis is that war-time development in engines and fuels will influence post-war truck and bus-engine design. One of the greatest influences for gasoline engine improvement will be the greatly improved fuels available. High-octane gasolines perfected during the war are bound to precipitate changes in engine design, so that the new opportunities can be realized. Widespread war development of processes and materials will open the way for many advancements. In the material field alone the possibilities are almost unlimited. Not only are new alloys available to work with to-day, but the expansion of production facilities has put aluminium within reach of all. The lighter, stronger metals will exert a considerable influence in post-war design. The degree of progress during the war has been much greater than during any like peace-time period, because of the unusual stimulation. Thus, the advancement in gasoline engines in the next few years should be greater than for any normal period. The era up to 1925 was one of four-cylinder engines and low compression ratios, whereas the period from 1925 to 1940 was one of six-cylinder engines and increasing compression ratios. The trend was in the direction of more power and greater speed. The engine of the future will have greater power with less weight, and the compression ratio will be increased from the present average 6 : 1 in line with high-octane-fuel opportunities. Developments of the aircraft industry will have their influence in many ways. High-octane fuels were developed for aviation, and after the war 90-octane gasoline should be obtainable for trucks and buses. Even the super-charger as used on planes has its possibilities on truck and bus engines. The aircraft influence will be found in better bearing materials, in better rings, and various other parts. Higher speeds and greater bearing loads in general will call for oil-pumps of greater capacity to insure adequate lubrication. Carburettors will be improved to give more accurate and constant mixture ratios, with more even distribution in the cylinders. Direct-injection has its possibilities also, but much remains to be done, including the development of adequate controls. Gasoline engines of the future will be more durable and rugged to withstand the increased heat, and better cooling systems will be provided. Oil-cooling of pistons and the use of sodium-cooled valves are possibilities. As such developments are incorporated the efficiency of transportation is bound to rise. While the cost/horsepower should show a comparative decrease, the payload carrying ability of such vehicles will increase. A. H. N.

615. "Supercharger," a Powerful Weapon in War, will Offer Bigger Payloads, Lower Costs in Peacetime Engines. Anon. *Nat. Pet. News*, 6.12.44, **36** (49), 19–26.—Based on three papers by technical men associated with B-W Superchargers, Inc., this article surveys supercharging as applied to airplane engines, etc., up to the outbreak of the war. Many improvements have occurred since then and now a large proportion of 4-cycle engines in military service is supercharged and manifold pressures of 10–20 p.s.i. gauge are not uncommon.

As regards the future, improvements in 2-cycle diesel engines will necessitate supercharging of 4-cycle diesels in order to meet such competition, and combined with increase in rotational speeds is expected to increase ratings by 75–100% over normally aspirated pressure engines.

As regards gasoline engines, the most promising field for supercharging is the heavy duty class of engine of 150 h.p. and upwards.

The relative merits of turbo and mechanically driven centrifugal superchargers and mechanically driven positive displacement blowers for specific purposes are discussed, and indications of the probable limitations of each system given.

Whilst supercharging will not affect fuel requirements for diesel engines, it does increase the antiknock requirement of the fuel needed for a given gasoline engine.

Modern gasoline engines are approaching the point where further increase in compression ratio produces little gain in economy, so that greater advantages may be expected from the introduction of supercharging. R. A. E.

Miscellaneous.

616.* How to Determine the Amount of Concrete Needed. E. N. Kemler. *Refiner*, Oct. 1944, 23 (10). 368–369.—A chart for determining volumes of concrete and its ingredients in building blocks for foundations. A. H. N.

INSTITUTE NOTES.

May, 1945.

FORTHCOMING MEETING.

Wednesday, 13th June, 1945, at 26, Portland Place, W.1, at 5.30 p.m. "H.D. Lubricating Oils," by Special Sub-Committee of the Standardization Committee.

PERSONAL.

Professor V. C. Illing (Fellow), Professor of Geology (Oil Technology) at the Imperial College of Science & Technology, has been elected a Fellow of the Royal Society.

MEETINGS OF COUNCIL.

An Ordinary Meeting of Council was held at 26, Portland Place, W.1, on Wednesday, 14th February, 1945, with Professor F. H. Garner (President) in the Chair. There were also present: Lt.-Col. S. J. M. Auld, Messrs. G. H. Coxon, T. Dewhurst, A. E. Dunstan, E. A. Evans, E. B. Evans, H. Hyams, J. S. Jackson, J. A. Oriel, E. R. Redgrove, C. A. P. Southwell, H. C. Tett, F. B. Thole, A. Beeby Thompson, R. R. Tweed, W. J. Wilson, C. W. Wood.

Professor F. H. Garner was unanimously re-elected President of the Institute for 1945–46.

The Council received with regret notification of the death of Mr. Alexander Duckham.

Reports were received from the Election, Engineering, Finance, Publication, Research and Standardization Committees.

Six Fellows, twelve Members and five Associate Members were elected, and six transfers to Fellow, one transfer to Member and two transfers to Associate Member were approved.

An Ordinary Meeting of Council was held at 26, Portland Place, W.1, on Wednesday, 14th March, 1945, with Professor F. H. Garner (President) in the Chair. There were also present: Messrs. G. H. Coxon, T. Dewhurst, A. E. Dunstan, E. B. Evans, H. Hyams, J. S. Jackson, J. S. Parker (Stanlow Branch), E. R. Redgrove, C. A. P. Southwell, H. C. Tett, A. Beeby Thompson, R. R. Tweed, W. J. Wilson, C. W. Wood.

Reports were received from the Awards, Finance and Publication Committees.

The following were declared elected to Council as the result of Ballot: Messrs. M. A. L. Banks, R. Crichton, E. J. Dunstan, R. I. Lewis, J. S. Parker, E. R. Redgrove, F. B. Thole, G. H. Thornley, E. Thornton, W. J. Wilson.

SOUTH WALES BRANCH

On 16th January, 1945, Mr. C. A. P. Southwell delivered, at the Guildhall, Swansea, a lecture on the Anglo-Iranian Oil Co.'s share in the drilling operations which have been undertaken in Britain, illustrated by lantern slides and followed by a descriptive film.

The lecture, which was held under the auspices of the South Wales Branch of the Institute of Petroleum, under its Chairman, Mr. R. B. Southall, attracted over 300 people, which included members of all the scientific societies, as well as representatives of local industrial associations, Swansea and Neath Chambers of Commerce, colliery owners, and the technical staff of the Swansea University, together with senior officers of the various Government Departments represented in the South Wales district and departmental managers of the L.M.S. and G.W. Railways.

The variety of questions asked after the lecture by many of those present was indicative of the interest shown.

APPLICATIONS FOR MEMBERSHIP OR TRANSFER.

The following have applied for transfer or admission to the Institute. In accordance with the By-Laws, the proposals will not be considered until the lapse of at least one month after the publication of this *Journal*, during which time any Fellow, Member, or Associate Member may communicate by letter to the Secretary, for the confidential information of the Council, any particulars he may possess respecting the qualifications or suitability of the candidate.

The object of this information is to assist the Council in grading the candidate according to the class of membership.

The names of candidates' proposers and seconders are given in parentheses.

Membership.

Baker, Harry, Deputy General Manager, Lubricating Oil Pool. (*S. J. M. Auld ; C. Chilvers.*)
Blight, Harold Charles, Installation Manager, Petroleum Board. (*A. Harland ; F. N. Harrap.*)
Burton, Alma Victor, Lieut., R.E.M.E. (*J. Cullinane ; A. E. Allen.*)
Chanter, Edward Ernest, Fire Adviser, Shell Refining & Marketing Co. (*J. A. Oriel ; E. LeQ. Herbert.*)
Dixson, Herbert George, Cargo Supervisor, Petroleum Board. (*E. Evans-Jones ; F. Tipler.*)
Elsden, James Inkon Gemmell, Assistant Installation Superintendent, Petroleum Board. (*E. Evans-Jones ; F. Tipler.*)
Fox, Anthony Francis, General Staff Officer, Military College of Science. (*S. E. Coomber ; G. D. Hobson.*)
Munt, Fred Henry Lawrence, Analytical Chemist, Plessy Co., Ltd. (*L. O. Maskell ; A. F. Goodwin.*)
Protheroe, Robert George, Assistant Superintendent, Anglo-American Oil Co., Ltd. (*F. Tipler ; P. Low.*)

RAE, Norman Sidney, Chemist, Esso European Laboratories. (*W. E. J. Broom ; A. Osborn.*)
RAGSDALE, Leslie Albert, Chemist, Pressure Lubricants, Ltd. (*J. E. Walker ; Harold Moore.*)
SCORGIE, Eric Scott, Assistant Installation Manager, Petroleum Board. (*F. Tipler ; P. Low.*)
STURGESS, Eric John, Assistant to Chief Engineer, Asiatic Petroleum Co., Ltd. (*E. LeQ. Herbert ; R. I. Lewis.*)
UDALL, William Victor John, Works Inspector, Petroleum Board. (*E. Evans-Jones ; F. Tipler.*)
WALSH, Eric Thomas, Senior Assistant, Petroleum Board. (*R. J. Bressey ; C. Chilvers.*)

Transfers.

BERTENSHAW, Stanley Weaver, Fuel Oil Technologist, Petroleum Board. (*J. S. Parker ; D. M. Glendinning.*)
BRADFORD, Job Ronald Tremellen, Technical Representative, Anglo-Mexican Petroleum Co., Ltd., Brazil. (*A. E. Hope ; H. E. Priston.*)
McCUE, Cyril Frederick, Analytical Chemist, Petroleum Board. (*C. Chilvers ; W. A. Woodrow.*)
McLAUGHLIN, Michael Luckyn, Chemist, Petroleum Board. (*C. Chilvers ; W. A. Woodrow.*)
PATERSON, Edward Victor, District Manager, Valvoline Oil Co., Ltd. (*L. Ivanovsky ; L. R. Paterson.*)
POTTIER, Auguste William, Chemist, Dalton & Co., Ltd. (*C. I. Kelly ; J. L. Taylor.*)
SIGSWORTH, William, Superintendent, Petroleum Board. (*F. Tipler ; C. Chilvers.*)

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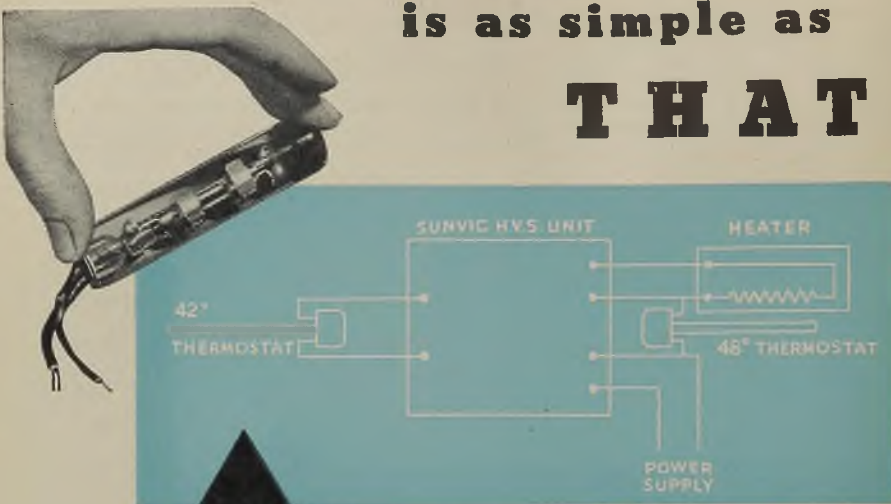

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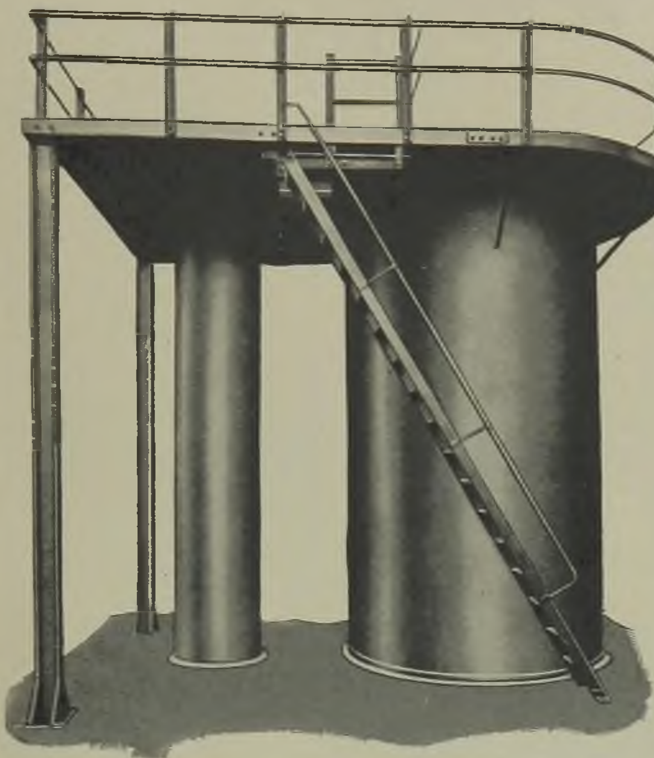

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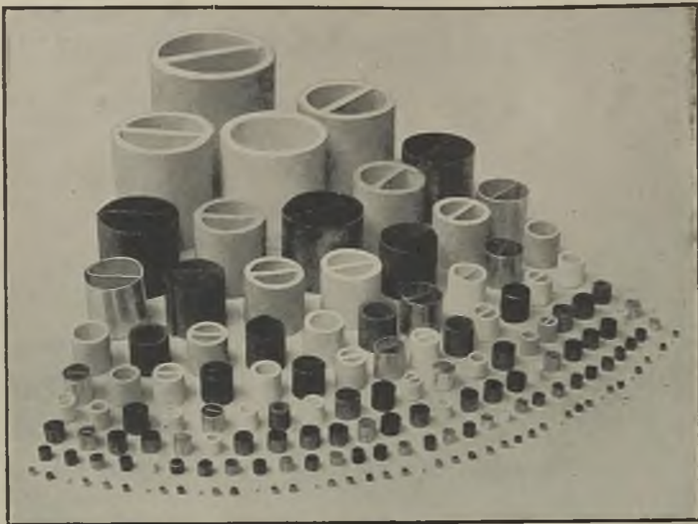

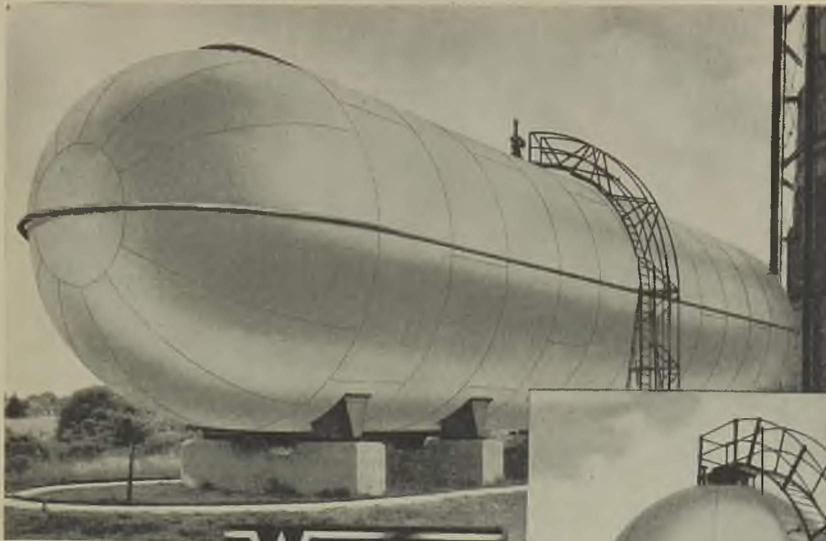

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