ABSTRACTS.

AUTHOR INDEX.

The numbers refer to the Abstract Number.

OILFIELD EXPLORATION AND EXPLOITATION.

Geology.

1192. Genetic and Morphologic Classification of Reservoirs. S. J. Pirson. *Oil Wkly*, 18.6.45, **118** (2), 54.—A petrologic (stratigraphic or lithologic) trap is never wholly devoid of structural elements, but these are subordinate in causing trapping. In the normal process of sedimentation in a geosyncline the transgressive shoreline is the commonest type. However, most shoreline oilfields have been interpreted as formed along regressive shorelines, the commonest interpreted type being the offshore bar.

Combination petrologic-structural traps form a second category which is capable of subdivision according as truncation is erosional or deformational. The first subdivision has proved to give large fields. The second includes fields where thrusting, faulting, and intrusion have played a part. Structural traps may be subdivided into those due to deformation, changes of dip, faulting, and combined folding and faulting.

A chart with diagrams shows the different types and subtypes, and gives their palæogeographic position, the genetic processes, map and cross-section, diagnostic features and examples. G. D. H.

1193. The TXL Field. H. H. King. *Oil Wkly*, 2.7.45, **118** (4), 34.—The TXL field lies on a N.W.-S.E. anticlinal feature in western Ector County, Texas, and was indicated by dry wells and geophysical data. A deep test showed commercial production in the Devonian, topped at 7860 ft. Gas was shown in the Silurian at 8800–8847 ft., and oil with water in a test at 8848–8890 ft. The Devonian production was finally taken from 7886–8020 ft. after acidization. The second test extended Devonian production $2\frac{7}{8}$ ml. to the southeast, and flowed 2782 brl./day of 42-gravity oil with a gas/oil ratio of 1195. Northwest of the discovery well a Devonian well flowed 1435 brl./day. $\frac{3}{4}$ ml. north by east of the discovery well the Upper Devonian had been subjected to erosion, but the Silurian showed oil at 8504–8560 ft., and a flow of 1547 brl./day of 44-gravity sweet crude was obtained in the Ellenburger at 9705–9852 ft. Commercial production in the Silurian at 8420–8471 ft. was established on the apex of the structure $2\frac{1}{4}$ ml. southeast of the discovery, and the same well flowed oil in an Ellenburger test at 9597–9640 ft.

There is a possibility of a narrow barren strip between the Devonian and Ellenburger producing areas. Devonian production is confined to a truncated condition about a mile wide along the southwest flank of a steep Ellenburger high. It is not known whether the Devonian is present and productive on the northeast flank of the high. Devonian recoveries may be 9200 brl./acre. The Devonian is primarily a hard chert.

The extent of the Ellenburger production is not known. An average recovery of 20,000 brl./acre is expected.

A summary of the operations is given, and the completions are listed with brief details. G. D. H.

1194. Mississippi : Where Persistence Pays. J. D. Todd. *Oil Wkly*, 16.7.45, **118** (6), 49.—The top of the Selma was formerly thought to be a reliable marker, but erosion at the end of Selma time left so much Selma topography that it often obscures the structures. The Selma's thickness is more important than its height, for oilfields are usually indicated by a thin Selma section.

The base of the Austin Chalk is probably a better marker, and is shown by lithology, electric logging, and palæontology. Electric logs have been found good for correlation in southern Mississippi, but risky for diagnosing the contents of an uncored sand. Side-wall coring and adequate testing are needed. In some areas seismic work is less reliable than gravity surveys. Closer spacing is needed in the gravity work. Excepting Jackson, Cary, and Langsdale, all the producing areas to date are on gravity minima of varying intensities. Gravity interpretation has advanced to the stage where piercement-type domes can be determined. Twenty-five salt domes have been proved, and a further 25 are indicated by various data. Salt movement is thought to control structure throughout the salt basin. There may also be regional faults controlling production possibilities on the largest uplifts.

Surface conditions seem to be responsible for difficulties with seismic work in some areas. Continuous profiling seems indispensable. Thick weathering and a deep water-table are troublesome at times.

The Tuscaloosa has proved a good producing horizon at many places over a large area. The Glen Rose has possibilities, and the Paluxy may produce at Brookhaven. There may be thick Comanchean and Jurassic sections which do not outcrop, and have been penetrated by few wells.

There are further oil possibilities in the high area south of the basin, and the flanks of the Jackson and Sharkey uplifts are being actively prospected for pinch-outs. Northern Mississippi is largely untested. G. D. H.

1195. Mississippi becomes Major Oil Centre. G. O. Ives. *Oil Wkly*, 25.6.45, **118** (4), 33.—Since the discovery of Tinsley in 1935, 15 new oil and gas fields have been opened in Mississippi, with two in eastern Louisiana and one in western Alabama belonging to the same geological province. Tinsley and two others have reserves estimated to exceed 100 million brl., and some of the other fields may reach 50 million brl.

A new gas-condensate field seems likely as the result of a wildcat in the Fayette area, this well having cored 64 ft. of sand in the Massive Tuscaloosa horizon.

Development of the Mississippi oilfields has been orderly and on 40-acre spacing.

Prior to the discovery of Tinsley Mississippi had only 16 wildcats; from 1939 to 1944 322 wildcats were drilled.

Up to March 1945 Tinsley had produced 79,290,839 brl. Its peak production was 90,000 brl./day in March 1942. Heidelberg, discovered in January 1944, covers at least 3000 acres, and its reserves may exceed 100 million brl. The average amount of interstitial water is 40%, and the peak is 55%. It is a deep-seated graben structure, yielding oil from the Eutaw sand of the Upper Tuscaloosa. Gas-oil ratios are low, and most wells pump from the start. Gwinville is a gas-condensate field, found in July 1944. The area is 25,000–30,000 acres, and the reserves may approach 2 million million cu. ft. Two gas horizons occur in the Lower Eutaw and Upper Tuscaloosa. There is oil in the base of the Tuscaloosa, and the reserves may exceed 25 million brl. Cranfield was opened in 1943. A relatively small reserve is present in the Wilcox, and the main accumulation is in the Massive Tuscaloosa over an area of 2500 acres, with 80 ft. of sand. It is a gas-cap field.

Baxterville has 2 wells and produces condensate from the Eutaw-Upper Tuscaloosa, and 16-gravity oil from the Massive Tuscaloosa. Holly Ridge yields oil from the Massive sand at 8400 ft. on a deep-seated dome without faulting. There is oil and gas in the Wilcox at 3000 ft. The proven area is about 3200 acres, and the reserves in 27 ft. of sand some 30 million brl. Lake St. John is a badly faulted dome with gas-condensate over 7000 acres, and oil over 3500 acres. There are three oil stringers in the Wilcox, oil and distillate in the Upper Tuscaloosa, and oil in the Massive Tuscaloosa. A test at 12,765 ft. has shown oil and mud from a formation which may be the Glen Rose. The Lower Cretaceous is truncated.

The present output in Mississippi is about 54,000 brl./day. There is much unused gas-producing capacity. Practically all the current production is from the Mississippi Salt Basin province, bounded on the north by Lower Cretaceous igneous highs, and on the east by Appalachian structures. There is progressive overlap of the Selma, Eutaw, and Upper Tuscaloosa. The structures include domes, deep-seated graben-type domes, faults, and stratigraphic and truncation traps. There may be association with salt intrusions, since many structures show gravity minima. All the piercement-type domes seem to have moved since Wilcox time. There may be favourable conditions for oil occurrence in the southern area, but correlation is difficult.

Twenty-five salt domes have been found, and flank drilling is searching for Wilcox and Cretaceous production. Shallow gas has been developed on the Bruinsburg dome. Several deep-seated domes have been developed, and search is proceeding for faulted and stratigraphic traps. Geophysical activity is at an all-time high.

Brief historical sketches of the Mississippi fields are given ; the salt domes are listed ; and there are diagrams indicating production trends and geophysical activity.

G. D. H.

1196. Wyoming, General Geologic Features. P. La Fleiche. *Oil Wkly*, 9.7.45, **118** (6), 30 ; 23.7.45, **118** (8), 46 ; 23.7.45, **118** (8), 46.—Between the mountain ranges are large synclinal basins—Powder River, Julesburg, Laramie, Hanna-Carbon, Shirley, Wind River, Big Horn, Green River, Red Desert, Bridger, Washakie, and Snake River. Within most of the basins rocks of every system from Cambrian to Recent are present, but towards the uplifts erosion has removed the younger rocks, and in places pre-Cambrian granites and schists are exposed. The Cambrian contains quartzitic sandstones and shales, but the lower parts of this system are missing in many places. From the Cambrian to the Mississippian limestones are dominant. Apparently the Lower and Middle Ordovician, the Silurian and Lower Devonian are generally absent. Sandstones are dominant in the Pennsylvanian, with some shales and limestones. The Permian is mainly limestone and red shales ; the Triassic red shales, sandstones, anhydrite, and gypsum ; and the Jurassic chiefly marine shales, sandstones, and limestones. The Lower Cretaceous is primarily a fresh-water continental deposit of sandstones and shales. Continental conditions returned in the late Cretaceous and continued throughout the Tertiary. There are coals in the Cretaceous and Tertiary.

The sediments are thinnest in northeast Wyoming and thickest in the south-central and southwestern parts of the State. They attain their maximum thickness in the great basins, and in some cases probably reach 50,000 ft.

There are marked local and widespread unconformities. State-wide unconformities may occur between the Ordovician and Mississippian, the Triassic and Jurassic, and below the Tertiary. During the Tertiary there was prolonged igneous activity.

The structures were strongly influenced by the Laramide and later mid-Tertiary disturbances. The chief mountain ranges are largely long asymmetrical folds. Along the flanks of the uplifts are secondary folds which contain the known oil and gas fields, and which generally have Cretaceous or older rocks exposed. Farther into the basins the structures are more difficult to decipher because of the unconformable Tertiary cover.

Faulting is often of considerable magnitude, and two overthrust fault systems occur in the western part of the State. Dip-faults are common on the anticlines. Strike-faults are of deeper origin.

A map is given, and a table which lists the producing formations.

Wyoming has 140 oil and gas fields. Thirty-four are of little or no commercial value at present, and 39 others are approaching exhaustion. Salt Creek covers 20,500 acres and has produced 312,800,000 brl. of oil. Five fields have given over 25,000,000 brl. each, and 6 between 10,000,000 and 25,000,000 brl. Large gas reserves have been found.

Good showings of oil have been found in the Deadwood sand of the Upper Cambrian. Similarly good saturation has been met in the Big Horn limestone of the Upper Ordovician. A few fields produce from the Madison, and oil is obtained from the Tensleep in some areas. The Embar and the Chugwater produce in a number of areas. The Sundance sands give oil and gas, and the Lower and Upper Cretaceous rocks yield oil in most parts of Wyoming. Oil and gas have been obtained in the Eocene and Oligocene.

Nearly all the fields are on peripheral folds in the basins. They are generally in the first or second row from the main mountain folds, and asymmetrical with the steep flank towards the mountains. Closure ranges from a few hundred to several thousand feet. The Badger Basin field is the deepest, with production at 8200–8500 ft. The successful location of deep wells is difficult.

The Lance Creek and Elk Basin fields have shown the bearing of faulting on accumulation. In both cases there is reverse faulting. At Osage trapping is due to lenticularity. The Wasatch sands are lenticular.

Various beliefs regarding oil accumulation possibilities in Wyoming have been discredited. Deeper tests are desirable in many areas. Some structures are masked by the Tertiary. There has been little exploration in the extreme western part of the State. Wyoming has possibilities of major stratigraphic type pools. G. D. H.

1197. 4700 Exploratory Tests seen as Total for 1945. L. J. Logan. *Oil Wkly*, 25.6.45, **118** (3), 44.—In the first 5 months of 1945 exploratory drilling in U.S.A. was 9·3% above the 1944 level, 1731 wells being completed. The total completions were 13% above the 1944 level. The 1945 exploratory completions included 332 productive wells, there having been 292 successful tests in the corresponding period of 1944. In May Miocene production of 112 brl./day was established at a depth of 13,505–13,520 ft. at Week's Island, Iberia Parish, South Louisiana. May also provided new fields in Michigan, Kentucky, Illinois, Kansas, Oklahoma, and Texas. A fourth pay was found at East Pauls Valley.

Tables summarize the exploratory drilling results in May and during the first five months of 1945, and the summaries are compared with 1944. The May discoveries are listed with pertinent data. G. D. H.

1198. Bituminous Sands of Alberta. K. A. Clark. *Oil Wkly*, 13.8.45, **118** (11), 46.—The bituminous sands of the Athabasca region cover at least 1000 sq. ml., and may have a far greater extent. Along the Athabasca River the thickness is about 200 ft. They consist of unconsolidated sands, silts, and clay, more or less impregnated with very viscous asphaltic oil. Cross-bedding and lenticularity suggest deltaic deposition. The silt and clay are present as partings, or mixed with the sand. When the material passing 200-mesh exceeds 20% the oil content is low. Sand with less than 20% of fines generally contains 10–17% of oil and 2–8% of water by weight. The sand grains are largely quartz. Lignitic material is common on the parting planes, and fossilized tree-trunks have been found.

At 25° C./25° C. the sp. gr. of the oil ranges 1·005–1·025. The content of 100-pen. asphalt is roughly 65–80%. The lighter oils have 1–2% of the lighter hydrocarbons (actually the heavy end of gasoline); the heaviest crudes have practically none. The sulphur content is 4–5%. Cracking of the crude is appreciable at 650° F.

The present development techniques can utilize only the parts of the bituminous sands under thin or no overburden. Coring will be necessary to ascertain the nature of most of the favourably situated sand.

The sands are of Lower Cretaceous age and rest on Devonian limestone. They are covered by Cretaceous shales and sandstones. There is little or no evidence supporting the view that the oil came from the Devonian. A source in the overlying black marine Cretaceous shales has been suggested. McConnell assumed that the viscous oil is the residue of a more fluid migrant oil. However, wells at a depth of 740 ft., and 75 ml. southwest of McMurray showed the same viscous oil with high gas pressure. An *in situ* origin has been suggested, Hume postulating that the shoreline of the delta would have been a fairly close source, and the oil has certainly flowed under gravity.

Since the oil will not flow into the wells, electric heaters and even fires at the bottom of the wells have been tried, with a view to distilling oil out of the sand; high-pressure steam has been used in an attempt to increase the fluidity. The low heat conductivity of the sand is one of the factors which have prevented success being achieved in these ways.

The bituminous sand is capable of being made into paving material, but the process cannot compete with other methods. The separation of the oil by hot water has been investigated. In 1936 construction of the Abasand Oils, Ltd., plant began. The plant was ready in 1940. A fire in 1941 destroyed much of the plant, and it was rebuilt in 1942. Up to the end of 1942 the plant had separated about 30,000 brl. of oil and processed this into gasoline, diluent, diesel oil, heavy fuel oil, and asphalt. The diluent was used in separating the oil from the sand, clay, and water. Mining of the sand was by light blasting and power shovel excavation. In 1943 the Federal Government took over the plant in connection with work rendered necessary by the war situation.

A plant operating on the same principles was run by the International Bitumen Co. and produced diesel fuel and bitumen. The Alberta Government has taken over this plant.

Information is given concerning leasing and development of bituminous sand areas, and there is a short account of the process whereby the oil is separated and recovered from the sand. G. D. H.

1199. Socony-Vacuum Starts Magdalena Valley Test. Anon. *Oil Gas J.*, 30.6.45, **44** (8), 84.—Three 250-brl./day wells have been completed on the Cantagallo concession. 21°-gravity oil is produced with a gas-oil ratio of about 200 cu. ft./brl., from an average depth of 6000 ft. 10 ml. to the southeast a deep test is to be drilled on a seismograph prospect. 15 ml. to the southwest of Cantagallo shallow holes are being drilled in the Cimitarra area for structural data, and similar drilling is to be undertaken on the Las Monas structure, 20 ml. east of Cantagallo.

In the Sinu district of the Floresanto concession a test showed 50 brl./day from 635–650 ft., before sanding up. The well is now drilling at 6240 ft. G. D. H.

1200. Delta Amacuro, Venezuela, Field Opened by Texas. Anon. *Oil Wkly*, 25.6.45, **118** (3), 71.—A flowing well has been completed northwest of Tucupito, Delta Amacuro. The well is bottomed in a thick sandstone at 5754 ft. G. D. H.

1201. Another Serpentine Discovery for Cuba. Anon. *Oil Gas J.*, 14.7.45, **44** (10), 96.—Oil was recently discovered in serpentine near Jatibonico, about 30 km. southeast of Jarahueca. The Motembo field produces about 200 brl./day of high-grade naphtha from some 200 wells. The depths range 600–1800 ft. Over 1200 wells have been drilled in this field. The Jarahueca field yields 400 brl./day of 45° A.P.I. crude from 25 wells at depths around 1500 ft. G. D. H.

1202. First Discovery of Oil in Holland is Announced. Anon. *Oil Wkly*, 16.7.45, **118** (6), 76; *Oil Gas J.*, 14.7.45, **44** (10), 92.—In 1942 oil was discovered in northern Drente, southeast of Koevorden, near the German border. Three wells have been drilled in Dutch territory and 11 in Germany. The total yield is under 250 brl./day. Oil comes from a Lower Cretaceous sandstone at an average depth of 2650 ft. The structures are probably of the salt-dome type. Several seismograph highs have yet to be tested. G. D. H.

Geophysical and Geochemical Prospecting.

1203. Present Status of Geochemical Prospecting. V. G. Gabriel. *Oil Wkly*, 6.8.45, **118** (10), 50.—Hassler, Laubmeyer, Sokolov, and others directed the attention of the American oil industry to the possibilities of geochemical exploration. Rosaire, Horovitz, and McDermott pioneered the development of soil analysis methods, while Pirson developed the geodynamic method. Soil analysis methods determine gaseous, liquid, and solid hydrocarbons, and some inorganic substances in the soil, and their presence or absence and concentration and distribution are employed for evaluating oil possibilities. Lack of detailed knowledge on oil and gas migration in the soil and on regional distribution cause the observations to be interpreted empirically according to experience, and even geochemists disagree on the relative significance and value of different substances found in soil.

The geodynamic method measures the undisturbed rate of hydrocarbon diffusion, and is said to give information on the depth as well as on the presence or absence of oil.

The tabulated results of geochemical exploration in America show that up to 1943 very few oilfields were found by this means, but its usefulness in the extension and delineation of established and newly discovered fields was marked. G. D. H.

1204. Let's Look at Electrical Exploration. W. B. Lewis. *Oil Wkly*, 13.8.45, **118** (11), 57.—In the ground low-frequency electromagnetic waves are almost completely absorbed in one wave-length distance of travel, and dispersion is large. The speed of propagation decreases with increase in wave-length, and for wave-lengths of 10,000–20,000 feet it is of the order of 40,000–20,000 feet per second. Absorption in the ground is progressive, and in a wave-length's travel the amplitude is reduced roughly to $\frac{1}{500}$ of the original value.

In geophysical prospecting penetration to considerable depths will be possible by using suitable wave-lengths, and deep and shallow effects can be distinguished by using different wave-lengths. Horizons with a strong resistivity contrast will be good reflectors. Oil and gas will provide such a contrast, and so will salt water, but it will be of the reverse sign. Thus when a formation contains oil in one part and brine in another the reflections from it will change markedly in character in passing from the first point to the second. Thus good direct indications of oil are possible whether the trap is structural or stratigraphic.

Low frequency electromagnetic waves are sent into the ground by passing a periodically reversed current through two grounded electrodes. The effects of this current are observed in terms of the potentials it creates at two suitably disposed probe electrodes. Observations are made at different frequencies, and at stations suitably placed over the area being examined. These surveys give surprisingly constant background values over large areas, and well-defined anomalies over production. In reconnaissance, station spacing may be 1 ml. G. D. H.

Drilling.

1205. Coring with Oil Aids Water-Flood Forecasts. M. Stekoll. *Petrol. Engr*, July 1945, **16** (11), 85.—The problem of predicting flooding conditions from core analysis is discussed with illustrations taken from a particular field which is discussed in great detail. From the information available in this field it is apparent that the cable-tool cores taken with crude oil as the coring fluid will result in core data that closely represent formation conditions. Also, in this field, cores taken either by the rotary or cable-tool methods and using water as the coring fluid will produce water-flushed cores. In these water-flushed cores the measured oil saturation will more closely approach residual oil content after flooding than the oil content before flooding. Similar information on a field where the stock-tank oil was 32° A.P.I. and 20 cp. viscosity, and the permeability averages about 20 md., will be available in the near future. A. H. N.

1206. Lowering the Viscosity of Clay Suspensions. V. Baranov. *Symp. Visc. Liquids and Colloids, Acad. Sci. U.S.S.R.*, 1941, **1**, 415–425.—Experiments were first carried out with bentonite ; the viscosity was determined both absolutely in capillary viscometers and relatively by efflux from a funnel. The effect of three reagents—charcoal, vegetable tannin, and sulphite extract of cellulose—was examined, all with caustic soda. The results are presented in triangular diagrams on which are plotted viscosity and filtrability against concentration of water, caustic soda, and reagent. The use of the charcoal reagent was not very satisfactory, its general tendency being to cause an increase in viscosity, but promising results were obtained by employing a combined reagent of charcoal (with caustic soda) and sulphite extract. Such a mixed reagent is used in quantities up to 25% by vol. on the clay suspension. As the effect under consideration is essentially a change in colloidal state, and will vary with a change in the nature of the clay, there were carried out tests on six clays in addition to bentonite. These clays (analyses given) can be divided into two groups, depending on whether Na or Ca is the predominating cation in the absorbing complex; the tendency of suspensions to increased viscosity on treatment with charcoal reagent is in direct proportion to such content of Na cation. It is concluded that best results in drilling would be obtained by the use of a combined charcoal-sulphite extract reagent. Tests (at 90° C) show that a clay suspension treated with such a reagent has adequate stability. The amount of reagent to be used, and its alkalinity, varies with the type of clay. V. B.

1207. Modern Rotary Drilling Machinery and Practices. Part 3. W. S. Crake. *Oil. Gas. J.*, 21.7.45, **44** (11), 106.—Circulation of mud fluids in rotary drilling systems is studied, and charts are prepared for determining velocities, areas, pressure losses, etc., of flow systems using pipes. For maximum pumping economy on surface pipelines, design flow velocities of 5–6 ft./sec. are conventional. On 4½-in. drill pipe a circulation rate of 600 gpm. gives a velocity of 16·7 ft./sec. in the drill-pipe. This is high in the range of turbulent flow. While 6 ft./sec. is impractical as a drill-pipe velocity because of hole-drill-pipe limitations and the sizes of drill pipe involved, 16·7/ft./sec. is too high and is expensive to power, especially on deep wells. Velocities of 8–11 ft./sec. work out satisfactorily. Selection of proper drill-pipe size depends on the pump available, the depth to be drilled, and the amount of fluid needed to obtain the best bit life and performance, the latter being the operator's chief aim. Pipe size should be chosen so that the operator can pump the proper amount of fluid through the particular type of bit used, when drilling at the lower portion of the well. Annular velocity determines the following: (1) Rate at which cuttings are lifted to the surface; (2) Volume of cuttings carried by each cu. ft. of mud, and therefore the mud contamination; (3) Speed with which the mud in the well can be reconditioned, or its weight or other characteristics changed to suit emergencies or other conditions; (4) Size of cavings which can be removed from the hole and, thus, the hazard of sticking pipe; (5) Amount of gas entrained in a cu. ft. of return fluid, thus the blow-out tendency of the fluid column; (6) Amount of "bad-mud" contained in the well in case of blow-out hazard. All the mud inside the drill-pipe can be assumed to be in good condition. Design data are presented and discussed. A. H. N.

1208. Modern Rotary Drilling Machinery and Practices. Part 4. W. S. Crake. *Oil Gas J.*, 28.7.45, **44** (12), 143.—Power-operated and steam slush-pumps and their characteristics are discussed. Pump sizes and power requirements are discussed in some detail and illustrated by typical examples. A. H. N.

1209. Modern Rotary Drilling Machinery and Practices. Part 5. W. S. Crake. *Oil Gas J.*, 4.8.45, **44** (13), 83.—The power requirements of a rig for hoists and mud-pumps and power distribution and generation on the rig are detailed. Different types of prime-movers and of transmission systems are discussed and compared. A. H. N.

1210. Tall Rig Designed for Drilling Deep Wells. K. M. Fagin. *Petrol. Engr*, July 1945, **16 (11)**, 101.—One of the world's largest mechanical rigs, with its gin pole towering 204 ft. above the ground, has been especially designed by the Shell Oil Co. to facilitate the development of the 10,500-ft. Ellenberger limestone oil-producing formation in the Monahans field, 5 miles northeast of Monahans in northeast Ward County, Texas. The rig has been at work on the Sealy-Smith well No. 7 for nearly two months. Among the many innovations incorporated in the new rig, the tall derrick is the most apparent departure from customary practice in West Texas. It is about 43 ft. taller than the regular 136-ft. derricks, and has a 37 ft. 8 in. base compared to the usual 30 ft. base. The 179-ft. height was obtained by adding six special sections to the bottom of the regular 136-ft. 800,000-lb. dead load A.P.I. derrick. The base is larger because the normal taper of the regular derrick was continued. The top of the derrick is 5 ft.-6 in. square and is surmounted by a 14-ft. gin pole. The derrick is built on an 8-ft. heavy steel substructure, which rests on 3 ft. of cribbing and matting laid on the levelled sand at the well location. All the rig was specifically designed. The more important items are described. Automatic controls are fitted. In a realistic effort to provide adequate records of the performance of the new rig for study and analysis, the drilling crews have been provided with several special report forms. One of these has columns and spaces for recording all pertinent facts in connection with operation of mud-pumps. Another form has been devised for recording the necessary data on engine performance. A third special form has been provided to keep detailed information on general rig maintenance not otherwise kept on regular drilling reports. A. H. N.

1211. Extreme Precautions Taken in Drilling Well in Downtown Los Angeles. K. B. Barnes. *Oil Gas J.*, 21.7.45, **44** (11), 102.—The operation of the soundproof rig erected in the middle of Los Angeles City for deep well drilling is described. Two wells are described: one is still drilling. Regulations governing such uncommon operations are explained. A. H. N.

1212. Power-Driven Tong is New Tool for Uniform, Efficient Tubing Jobs. K. B. Barnes. *Oil Gas J.*, 28.7.45, **44** (12), 146.—The power tong handles 2, 2½, and 3-in. tubing. While much lighter, the principle used is somewhat similar to that employed in a rotary table, although the rotor or ring-gear driving-table is revolved by an air motor of the vane-impeller type. Only about 100 p.s.i. air pressure is needed to drive the motor. Air consumption is of the order of 20 cu. ft./min., the exact requirement, of course, depending on condition of the specific job handled. In services the tongs are suspended by a line from the derrick or portable mast, and a back-up line is tied from the tong handle clevis to a derrick leg or fixed member support. Rigging up takes only a minute or two, then the tong operator has little more to do than open and close a valve to have the machine make up or unscrew the joints entirely under its own power. Air supply under constant pressure regulation enters the air motor through a hand-grip throttle valve. The air motor drives a vertical spindle which is equipped with both a high- and a low-speed gear. This, through a cluster gear, turns the two driver gears which revolve the rotor.

The rotor, or ring gear, floats upon six ball-bearing mounted guide-rollers placed radially in the tong-case at the outside diameter of the gear. The ring gear has no fixed centre, and the rollers guide the ring-gear and accompanying inner anchored tong-jaws in a true circle. Both the tong-case and rotor have a slot or split area approximately 4 in. wide. When the two slots are coincided the tubing may be admitted or removed from the tongs at the side. Two driver-gears are used so that whenever the slot in the rotor is opposite one gear, the other is fully engaged and driving. Operation is described in detail. A. H. N.

1213. Compounds of Power-Driven Slush Pumps Proves Practical. E. H. Short, Jr. *Oil. Gas* J, 4.8.45, **44** (13), 79.—The displacement rate of the piston at various crank angles is studied and charts are presented showing combinations for such curves. The necessity of surge chambers is explained. The use of pumps in series in combination with a special air-chamber as used by Humble is studied in some detail. An important requisite in the series hookup of power-driven slush-pumps is that the air-chamber be installed as close to the low-stage pump as practical; and also that the piping design be such as to offer a minimum pressure drop. Although the special Humble air-chamber has not been entirely satisfactory mechanically, sufficiently satisfactory performance has been obtained to prove that the practice of operating power-pumps in series is both feasible and advantageous. The greater volume of circulation as a result of series operation of power-pumps provides an increase in drilling speed and less trouble from heaving formations and stuck drill-pipe. Two power-pumps in series have the advantage over one large pump twice their size, of less pressure differential across the valves and pistons and consequently longer valve and piston life. With the exception of the mechanical trouble on the air-chamber, the operation of the power-driven pumps in series has been satisfactory. A third pump was installed on the rig operating in the Willamar pool. It was connected with the two pumps previously used, so that any compounding arrangement could be effected, leaving the one pump for repairs or mud-conditioning service. A. H. N.

1214. Twinned Small Pumps Carry Mud Needs to 6500 ft. E. Sterrett. *Oil Wkly*, 13.8.45, **118** (11), 52–53.—The operation of two small pumps which were operated in twin arrangement to supply the requirements of a 6500-ft. well are described. Details of the manifolding are given. A. H. N.

1215. Depth Marks Tumble in Wartime Search for Oil. Anon. *Oil Wkly*, 30.7.45, **118** (9), 59–60.—During 1944–1945 drilling period new records have been set up for both drilling and production depths. Various record-breaking drilling and completing operations are discussed. A. H. N.

Production.

1216. Effect of the Rotation of the Drill-Pipe on the Flushing of Wells during Drilling. D. Z. Lozinskii, *Bull. Acad. Sci. U.R.S.S., Cl. Sci. Tech.*, 1945, 242–249.—The rate of rotary drilling depends on the rate of removal of detritus by the drilling mud. This rate of removal, as well as being influenced by the dimensions of the hole, pipe, and pump, is also greatly affected by the speed of rotation of the drill-pipe, a factor hitherto insufficiently considered and which, by imparting a helical motion to the drilling fluid, greatly influences both the size of the particles removed by the drilling mud and their total amount.

A mathematical discussion of the problem is presented, and examples are calculated for various cases. Whilst exact experimental data are not available for comparison, the indications are that there is agreement, and that the proposed method of calculation is an improvement on older methods, which did not take into account the rotation of the drill-pipe. V. B.

1217. Behaviour and Control of Natural Water-Drive Reservoirs. G. R. Elliott. *Oil Wkly*, 6.8.45, **118** (10), 54.—The principles governing water-drive reservoirs are detailed and field studies are presented. It is concluded that " degree " of water drive is controlled by both natural conditions (reservoir gas–oil relationships, extent of water body, permeability) and operating conditions (functions of the withdrawal rate). Degree of water drive is calculated by material balance, and is also observed from pressure-production graphs. The method used to compare pools on the basis of pressure-production curves involves conversion of cumulative oil production from barrels to percentage of ultimate. Examples of a calculated " water-encroachment factor " *Ka* (barrels of water influx/lb.-month/acre-ft. of oil reservoir) : Schuler (Reynolds), 0·0860; Turkey Creek, 0·0426; Ramsey, 0·0300; East Watchorn, 0·0107; Buckner, 0·0036; Magnolia, 0·0021. After a certain pressure decline, the slope angle of the pressure-production curve decreases in varying degree and in some cases approaches zero, indicating equilibrium between reservoir withdrawal and water influx. The following pressure declines from original pressure correspond to pressure equilibrium and indicate degree of water drive in the same order indicated by " water-encroachment factor "; Schuler (Reynolds), 150 lb./sq. in.; Turkey Creek, 310; Ramsey, 350; East Watchorn, 385. Yearly oil-production rate (percentage of ultimate) which corresponds to pressure equilibrium, is 11% for Schuler (Reynolds), 11% for Turkey Creek, 8% for Ramsey, 3·5% for East Texas. Midway is a case of artificially created water-drive; in order to attain equilibrium in that reservoir it was recently necessary to increase water injection to a rate approaching the rate of withdrawal of reservoir fluid. Control is exercised by adjustment of production rate, by injection of produced water, by injection of outside water. With proper control, full advantage may be taken of the high recovery efficiency inherent in the water-drive mechanism. A. H. N.

1218. Prevention and Treatment of Petroleum Emulsions. C. M. Blair, Jr. *Oil Gas J.*, 21.7.45, **44** (11), 116. *Paper presented before Illinois Society of Petroleum Engineers.*—The principles governing the formation and stability of crude oil emulsions with water in the presence of surface active reagents are briefly outlined. Particle-size distribution is shown graphically and rates of settling are calculated. The increasing stability of emulsions with age and with contact with oxygen is discussed. To prevent emulsification, the extreme importance of preventing turbulence is stressed. Treatment of emulsions in mechanical, electrical, and chemical systems is described.

A. H. N.

1219. Testing Gas Production. Anon. *Oil Wkly*, 13.8.45, **118** (11), 54–55.—Methods of determining gas–oil ratios are described. One popular method is to use an orifice in a simple apparatus. A section of light-weight pipe, with a threaded or bolted orifice flange, is constructed to the same relative specifications as a regular orifice meter loop, except only one pressure tap is made in the loop. In testing with this method the portable loop is connected to the well, separator, or stock tank and an orifice plate of suitable size inserted. A recording pressure meter is then connected to the pressure tap on the upstream side of the plate. The meter should record pressure in inches of water.

The same formula is used for calculating volumes with this method as for a regular orifice meter, since the same data are obtained. The downstream pressure is atmospheric, since the downstream end of the loop is open to the atmosphere. The upstream pressure is recorded by the pressure meter in inches of water. This is the differential pressure also, the downstream being atmospheric. This method of testing wells is very accurate, comparable to the orifice meter and its closed loop, and is becoming popular where gas to be tested is wasted. The meter and loop are relatively cheap units and simple to use.

A. H. N.

Oilfield Development.

1220. Mercedes Pushes Drilling Programme in Venezuela. Anon. *Oil Gas J.*, 30.6.45, **44**(8), 84.—The Mercedes Company has developed oil along a 7-ml. belt. An accelerated drilling programme is in prospect, and 14 more wells are expected to be completed by early 1946. No. 7 was completed for 370 brl./day. No. 8 on a separate structure, 3 ml. southwest, gives 3,000,000 cu. ft. of gas/day from one sand and 99 brl. of oil from a deeper sand in a dual completion. Down-flank from No. 8 No. 9 gives 774 brl. of oil and 1,500,000 cu. ft. of gas/day.

G. D. H.

1221. Eastern Venezuela Fields Show Big Gain. Anon. *Oil Gas J.*, 21.7.45, **44** (11), 98.—During 1944 Eastern Venezuela produced 73,839,443 brl. of oil, and Western Venezuela 183,206,225 brl. The corresponding 1943 figures were 34,515,854 brl. and 144,873,770 brl., respectively. Oficina produced 14,563,935 brl. in 1944, and Quirequire, Jusepin, and Santa Barbara produced more than 11,000,000 brl. each. Lagunillas gave 79,655,868 brl., Tia Juana 40,962,128 brl. and Cabimas 28,514,086 brl.

G. D. H.

1222. Increase for Peruvian Production in Prospect. Anon. *Oil Gas J.*, 14.7.45, **44** (10), 92.—During 1944 International Petroleum Co., Ltd., deepened 77 wells, thereby developing new production potential about twice that of 1943. Wildcats added materially to the reserves. In 1944 the company produced 11,763,083 brl. compared with 12,055,908 brl. in 1943.

G. D. H.

1223. Operations Recently Resumed in Kuwait Following Total Shutdown Caused, by War. C. O. Willson. *Oil Gas J.*, 18.8.45, **44** (15), 96.—After geological and geophysical work a dry deep test was drilled at Bahrah in Kuwait. In 1938 a successful well was completed 30 ml. south of the town of Kuwait. Production was obtained in Upper Cretaceous sands at 3692 ft.; 32·5° A.P.I. oil was produced. Eight additional wells were drilled in an area of 5 sq. ml. Their average depth was 4750 ft., oil coming from 1000 ft. of sandstone and shale. Reserves are estimated at 9000 million brl. Preparations are now under way for resuming operations stopped by the war.

G. D. H.

1224. Kuwait to Begin Production Soon. D. L. Carroll. *Oil Wkly*, 9.7.45, **118** (5), 34.—The wells of the Burgan field of Kuwait are to be reconditioned, and separators, a pipeline, storage and loading facilities are to be installed. The field could produce over 75,000 brl./day. 33-gravity sour crude is obtained.

There are four pays in the producing section of sandstones in the Lower Cretaceous shales. They may be equivalent to the producing section at Bahrein. Open-hole tests with a 1-in. choke gave 9000–10,000 brl./day in the first two wells. Nine wells have proved at least 18,000 acres. The field is likely to be extended to the north, for geophysical work indicates northerly elongation of the dome. All but one of the wells were plugged with concrete because of the war. G. D. H.

1225. Weekly Well Completion Record. Anon. *Oil Gas J.*, 23.6.45, **44** (7), 147; 30.6.45, **44** (8), 141; 7.7.45, **44** (9), 137; 14.7.45, **44** (10), 151; 21.7.45, **44** (11), 167; 28.7.45, **44** (12), 171; 4.8.45, **44** (13), 121; 11.8.45, **44** (14), 139; 18.8.45, **44** (15), 173; 25.8.45, **44** (16), 157; 1.9.45, **44** (17), 105.

Week ended.	All wells.			Wildcats.		
	Oil.	Gas.	Total.	Oil.	Gas and distillate.	Total.
16.6.45 . .	302	61	586	8	2	100
23.6.45 . .	282	57	534	6	2	85
30.6.45 . .	289	51	558	7	4	91
7.7.45 . .	287	67	552	12	2	71
14.7.45 . .	315	69	591	5	7	82
21.7.45 . .	294	55	533	8	8	75
28.7.45 . .	315	50	596	15	2	94
4.8.45 . .	276	75	589	6	5	99
11.8.45 . .	326	42	578	6	2	88
18.8.45 . .	267	48	514	4	3	60
25.8.45 . .	282	47	509	14	4	82

The tables summarize the completion results week by week by States and districts. G. D. H.

1226. Summary of June Completions. Anon. *Oil Gas J.*, 21.7.45, **44** (11), 182.—During the five weeks ended 30th June, 1945, U.S.A. had 2588 completions, 1350 giving oil and 261 giving gas. The completion results are summarized by States and districts, with the footage totals and numbers of wells in different depth ranges. G. D. H.

Refinery Operations.

Refineries and Refinery Auxiliary Plants.

1227. Welding Corrosion-Resistant Alloys to Protect Process Equipment, and Technique of Lining Pressure Vessels. J. A. Gallagher. *Refiner*, April 1945, **24** (4), 146–543. *Paper presented before Chicago Section of The American Welding Society.*—Describes different practices that have been used for installing liners for corrosion protection in process vessels. The discussion deals with application and welding of one group of acid- and corrosion-resistant alloys, but the mechanics involved in the installation are of universal application for other metals used for such purposes; differences are only in some details of welding technique. A. H. N.

Distillation.

1228. Calculation of Plate Columns for Binary Distillation by the Ponchon Method. R. R. White. *Refiner*, Aug. 1945, **24** (8), 299–302.—The theory of the Ponchon method for computing plate columns is presented. The concept of addition and difference points eleminates the necessity for involved algebraic manipulation regardless of

the complexity of the operation under consideration. Application of the theory to specific example problems include simple columns, multiple feeds, multiple products, entrainment, plate efficiency, open-steam and side-stream-recirculation. The first section of this paper deals with the fundamental theory and its application to the calculation of simple columns. The second section, to appear later, will deal with special applications, *e.g.*, open steam, multiple feed and multiple product columns.
A. H. N.

Metering and Control.

1229. Calculation of Orifice Meter Coefficients for Natural Gas. G. H. Forster, Jr. *Refiner*, Aug. 1945, **24** (8), 312–313.—The evaluation and use of coefficients of discharge for orifices used to meter natural gas are described. Typical examples illustrate the procedures of using certain charts. A. H. N.

Safety Precautions.

1230. Safe Practices in Natural Gasoline Plants. D. Attaway. *Refiner*, Aug. 1945, **24** (8), 287–292.—Safety precautions and practices adopted in natural gasoline plants are described and safety principles are explained. In general, good operation, as well as basic accident prevention, can be secured from seven factors, as follows: (1) Proper design and layout of equipment; (2) Selection of men physically and mentally fit for the job; (3) Provide proper mechanical guarding and maintenance of equipment; (4) Develop safe practices for the different jobs; (5) Instruct workers in correct methods; (6) Supervise closely to insure safe working procedure; (7) Provide and use suitable protective equipment. Every plant should have one man devote a considerable part of his time to safety. A. H. N.

PRODUCTS.

Chemistry and Physics.

1231. Viscosity of Liquid Mixtures. G. P. Luchinskii. *Symp. Visc. Liquids and Colloids, Acad. Sci. U.S.S.R.*, 1941, **1**, 41–45.—Previous work on the calculation of the viscosity of liquid mixtures is briefly reviewed. Such mixtures can be considered as "ideal" and "non-ideal," the former being mixtures in which neither change in volume nor molecular association occur on mixing. In the case of ideal mixtures the viscosity can be expressed by means of additive constants denoting the free volume of the liquids. This leads, for a binary system, to the equation:

$$\eta = \frac{a(v_A - \omega_A)\eta_A + b(v_B - \omega_B)\eta_B}{a(v_A - \omega_A) + b(v_B - \omega_B)}$$

where v_A, ω_A, and η_A are respectively the specific volume, limiting volume, and viscosity of components A (or B, as denoted by the suffix) whilst a and b are the respective weight proportions of components A and B. This expression was experimentally verified for the mixtures benzene–toluene, chloroform–benzene, and carbon disulphide–toluene yielding good agreement (maximum divergence about 1%). The relationship between viscosity and free volume is further developed to yield a formula for the viscosity of an non-ideal mixture. The formula deduced is verified for the case of a mixture of sulphuryl chloride and phosphorus oxychloride. V. B.

1232. Investigation of Anomalous Viscosity (Structure-Mechanical Properties) of Lubricants at Low Temperatures. P. A. Rebinder, N. A. Boguslavskaya, and V. B. Mokievskii. *Symp. Visc. Liquids and Colloids, Acad. Sci. U.S.S.R.*, 1944, **2**, 173–177.—Values of viscosity, measured at low temperatures, are difficult of interpretation; similarly pour point, owing to its empirical nature, is of little value as a characteristic. The yield value (θ) can, however, be considered to be truly characteristic of an oil. It is shown that yield value is independent of diameter and length of the capillary tube. Studies were made of the effect of various additives (in amounts up to 3%) on a "model" oil made by dissolving pure paraffin wax in a highly refined medicinal oil. Among the additives examined paraflow had the least effect in diminishing θ, the stearates of polyvalent metals (*e.g.*, Al, Th, Mn) had a marked action, as did also tetracetyl ammonium iodide. In many cases excess additive caused a rise in the value of θ, there being an optimum concentration for the lowest value. V. B.

1233. Viscosity of the Higher Fatty Acids and of Fats. G. B. Ravich. *Symp. Visc. Liquids and Colloids, Acad. Sci. U.S.S.R.*, 1941, **1**, 427–440.—It is only within recent years that viscosity has been recognized as an important characteristic of fatty acids and oils. Viscosity measurements (Ubbelohde capillary) are recorded on four pure C_{18} acids, linolenic, linolic, oleic, and stearic. From the results it is seen that an almost linear relationship exists between viscosity and iodine value. An expression is deduced whereby the viscosity, at any temperature, of the C_{18} fatty acids can be calculated from the iodine value, using the values given for the six constants in the equation. Experimental results on the viscosities at various temperatures of fatty acids, glycerides, and a hydrogenated oil, when plotted on co-ordinates of log-viscosity and reciprocal of temperature, show that the viscosity/temperature relationships of such substances is, as in the case of mineral oils, adequately denoted by an expression of the exponential type. The information yielded by viscosity determination as to physical properties is discussed, particularly in connection with the data obtained from other measurements such as heat of fusion, dipole moment and X-ray examination. Data are given on viscosities in the range 0–90° C. for sunflower seed, linseed and cottonseed oils and two blubbers. The progressive determination of viscosity of an oil during the hydrogenation process confirms the conclusions regarding the connection between viscosity and degree of unsaturation.

An examination of anomalous (structure) viscosity in fats and hydrogenated oils shows that this occurs to a considerable extent in the latter at temperatures near the melting point.

Irradiation of castor oil with ultra-short waves is briefly examined with regard to the effect on structure viscosity and viscosity/temperature coefficient. V. B.

1234. Heat Content of Petroleum Fractions. D. N. Hanson and C. O. Hurd. *Refiner*, April 1945, **24** (4), 127–128.—A chart is presented showing the heat contents in B.t.u./lb. for temperatures from 0° to 1200° F., for liquid and vaporized petroleum fractions. This chart involves °A.P.I. (10–80), U.O.P. characterization factor (10–12), and pressure (0–1000 psi) as parameters in a manner such that consistency with the correlations of Watson is obtained. Knowledge of the pseudocritical properties for the determination of high-pressure vapour heat contents is not required. A. H. N.

1235. Determination of Molecular-Weight Distribution in High Polymers by Means of Solubility Limits. D. R. Morey and J. W. Tamblyn. *J. Appl. Phys.*, July 1945, **16** (7), 419–424.—By means of polymer fractions of known molecular weight, dissolved in solutions of known compositions, it is possible to determine the solubility law which relates the point of solution saturation to the molecular weight and concentration of the dissolved polymer. Having established such a calibration, it is possible to determine the molecular-weight distribution in a heterogeneous sample of the polymer by suitable operation on a curve relating the mass of polymer precipitated to the amount of precipitant added to the solution. Optical means, making use of scattering from the precipitate, are used to obtain this latter curve. The method is applied to cellulose acetate butyrate, and is shown to give results in agreement with gravimetrically obtained distribution curves. A. H. N.

1236. Enthalpy-Composition Diagram for the System Ethanol–Water. D. A. Smith, J. Kuong, G. G. Brown and R. R. White. *Refiner*, Aug. 1945, **24** (8), 296–298.—The enthalpy-composition data for the system ethanol–water at 1 atm. pressure is presented in two charts (opposite and succeeding pages) showing liquid isotherms, vapour isotherms, the saturated liquid line, the saturated vapour line, and equilibrium tie lines. A. H. N.

1237. Application of Unit Operations to Fractionation and Other Vaporization Processes. Part 15. R. L. Huntington. *Refiner*, April 1945, **24** (4), 143–145.—In this part the transportation and storage of crude oil and natural gasoline blends are discussed. Weathering is also studied. A. H. N.

1238. Kinetics of Package Life. C. R. Oswin. *J. Soc. Chem. Ind.*, 1945, **64**, 67–70.—The rate of change of the moisture content of goods packed in moisture-vapour-resistant wrappings may be expressed without serious error by the equation $T = 69{\cdot}3R\mu/p$, where T is the time in days required for the moisture content of packed materials to change from the initial value to a value which is the mean of the initial and equilibrium values, R is the package resistance (the mbs. aqueous vapour pressure gradient required to change the moisture content by 1% of the dry weight of the contents in one day), μ is a constant characteristic of the material (values are given for ten materials), and p is the aqueous vapour pressure in mbs. at the storage temperature. Measurements show that this equation incorporates a safety factor of about 10 at 20° C., or 2·5 at 35° C., when R is based on laboratory measurements made at 40° C. C. F. M.

Analysis and Testing.

1239. Mass Spectrometric Analysis of Hydrocarbon and Gas Mixtures. A. K. Brewer and V. H. Dibeler. *J. Res. Bur. Stan. Wash.*, Aug. 1945, **35** (2), 125.—The basic principles underlying the mass spectrometric analysis of hydrocarbons and gas mixtures are outlined and the method of calculating the composition from the mass-abundance records described. Representative analyses are given of butadiene fractions, oil-flame fumes, helium mixtures, natural gas, etc. The method is applicable to all materials having a vapour pressure exceeding 1 mm. Stereoisomers are the most difficult to separate, and in hydrocarbon mixtures containing *cis-* and *trans*-butene 2 a separation of better than 2% cannot be expected. Duplicate determinations in general check to within a few tenths to a few thousandths of 1%. C. L. G.

1240. New Methods for the Technical Analysis of Natural Combustible Gases. II. Direct Calorimetry. G. F. Knorre, *Bull. Acad. Sci. U.R.S.S., Cl. Sci. Tech.*, 1945, 185–189.—A description of simple calorimetric technique suitable for gases of a wide range of calorific value. For gases of low calorific value it is desirable to fill them into the bomb at pressures in excess of atmospheric, in order to obtain a sufficient temperature rise on ignition. A simple means of compressing such gases for this purpose, by utilising, through a liquid seal, the cylinder pressure of oxygen is described. V. B.

1241. Peroxide Values of Motor Spirits. J. Risbey and H. B. Nisbet. *Analyst*, 1945, **70**, 50–51.—Three methods have given widely differing results on same sample (*e.g.*, 62, 84 and 332 mgm. oxygen/litre). Values obtained using two of the methods increased with time of standing before titration, but the third method showed no significant increase. Figures are quoted which demonstrate inhibiting effect of catechol. C. F. M.

1242. X-Ray Diffraction. Part 1. F. G. Firth. *Refiner*, April 1945, **24** (4), 154–160.—Basic principles of diffraction analysis for the space coordinates of particles in certain relative dispositions from each other are discussed on the basis of Laue's and Braggs' laws. X-ray spectrometry are described and a typical diffraction pattern is reproduced and studied. A. H. N.

1243. Determination of Phosphorous in Lubricating Oils. K. R. Fitzsimmons and L. Lykken. *Refiner*, Aug. 1945, **24** (8), 307–311.—A method is described for the determination of pentavalent phosphorous in new and used lubricating oils containing less than 0·5% phosphorus, without interference from lead, iron, copper, aluminium, tin, zinc, cadmium, barium, silicon, magnesium, calcium, sulphur, or chlorine. In the range from 0·001 to 0·1% phosphorus the method is accurate and reproducible to 0·001%. The procedure is also applicable, with less precision and accuracy, to the determination of the phosphorus content of lubricating-oil additives, except volatile derivatives of phosphine or phosphorus acid. The method, in brief, is: The sample, mixed with sufficient oil to give a mixture whose phosphorus content is below 0·1%, is mixed with sodium peroxide and zinc oxide. The mixture is heated to 100° C., benzene added, and the resulting mixture allowed to burn. After removal of the residual carbon by ignition, the residue is dissolved in acid, the phosphorus precipitated as the ammonium molybdiphosphate, and the precipitate titrated alkalimetrically. A. H. N.

1244. Identification of Raw and Vulcanized Rubber-like Polymers. I. "Reaction Time" in a mixture of Nitric and Sulphuric Acids. L. F. C. Parker. *J. Soc. Chem. Ind.*, 1944, **63**, 378–379.—The time taken for the start of disintegration of natural and certain synthetic rubbers in a mixture of nitric and sulphuric acids has been used as an aid in the identification of an unknown rubber. With Perbunan, Buna S, and Butyl types of rubber this test seems sufficient to establish identity, but other types, including chloroprenes, thioplasts and natural rubber, require additional data. Indication is also given of ratios of quantities in binary mixtures of known "rubbers."

C. F. M.

1245. Identification of Raw and Vulcanized Rubber-like Polymers. II. Determination of Swelling Ratios. L. F. C. Parker. *J. Soc. Chem. Ind.*, 1945, **64**, 65–67.—The ratios of the swelling of vulcanized rubber-like polymers in benzene, light petroleum (b.p 40–60°), and aniline, at 25° C., have been found to be different for different polymers, but to be within a well-defined narrow range for each polymer, the ratios being substantially independent of the state of vulcanization and the nature and amount of the fillers. Hence the ratios for an unknown sample may be utilized in its identification.

C. F. M.

1246. A Calorimetric Method for Determination of *cyclo*Pentadiene. R. Sefton. *J. Soc. Chem. Ind.*, 1945, **64**, 104–106.—This method, based on the heat of reaction of *cyclo*pentadiene with maleic anhydride, is suitable for concentrations up to 1% *v/v* in benzene and other aromatic solvents. It is not specific to *cyclo*pentadiene, and may be affected by certain other conjugated diolefines. The method has also been applied to benzole fore-runnings, fractions from cracked gasoline and coke-oven gas.

C. F. M.

1247. Thermobarometer. E. Berl, W. G. Berl, and G. A. Sterbutzel. *Refiner*, Aug. 1945, **24** (8), 305–306.—Reprinted from *Ind. Eng. Chem. Anal. Ed.*, **17** (3), 166.—The construction and operation of a thermobarometer for calculating weight percentages of constituents of a gas mixture are described in detail. A nomograph is included for use with the equations given. A. H. N.

1248. Advances in Use of Laboratory Fractionating Columns. F. Hilberath. *Refiner*, Aug. 1945, **24** (8), 314–318. Translated from *Oel u. Kohle*, by E. J. Barth.—The theory of fractionation is briefly discussed and it is shown that for binary mixtures as the difference between boiling points gets smaller, the number of theoretical plates necessary to separate them gets larger, as follows :

Temperature difference, °C.	Theoretical plates.
1·5	100
3	55
5	30
7	20

Several types of efficient columns for laboratory distillation on macro- and micro-scale are described and discussed. A. H. N.

1249. New Viscometers for Petroleum Products. M. P. Volarovich, *Symp. Visc. Liquids and Colloids, Acad. Sci. U.S.S.R.*, 1944, **2**, 192–213.—A review of the various types of instruments that are available. The paper is divided into a description of capillary (both vertical and horizontal), rotary and falling-sphere instruments, together with sections on micro-viscometers and instruments of miscellaneous types. Empirical viscometers (such as the Engler and Redwood) are briefly discussed and considered to be of very limited scope. It is concluded that the capillary design is the most reliable and that new types of instruments should be viewed with care, and approved only if they are theoretically sound and can express viscosity in absolute units. The bibliography comprises 145 references (up to 1941). V. B.

Gas.

1250. Dehydration of Natural Gas with Diethylene Glycol. G. F. Russell. *Refiner*, April 1945, **24** (4), 139–142.—The principles of dehydration of natural gas by means of absorption in liquids are outlined. Graphs are presented for design work involving the use of diethylene glycol. Typical examples are worked out in full. A. H. N.

1251. Russia Expanding Gas Production for Industrial Uses. R. A. Davies. *World Petr.*, July 1945, **16** (7). 56.—Natural gas has been produced in the Caucasian area for many years, but only in recent years has it received attention in Central Russia. In 1942 a gas-line was laid from Yelshanka to supply Saratov, and since the Yelshanka reserves were limited, drilling was begun nearby at Kurdyum, accumulations estimated at 100,000,000,000 cu. m. being found. A further pipe-line from Saratov to Moscow is being built. This will work at 50 atm.

A 450-ml. pipe-line is being built to convey gas from the Dashawa fields to Kiev. Later a line to Kharkov may be laid.

Extensive gas deposits have been located in the Pechora River Basin, the western Urals, the Middle and Lower Volga districts, Kalmyk Steppes, Northern Caucasus, Daghestan, Kuban, and the Crimea, and it is intended to make these available for use as soon as possible.

The fields supplying Saratov produce from multiple horizons, the deepest of which is at 2600 ft. Some of the wells give oil. Salt is being recovered from the brine produced. G. D. H.

Engine Fuels.

1252. Fuels for High-Speed Diesel Engines. V. A. Kalichevsky. *Refiner*, April 1945, **24** (4), 129–134.—A general discussion is made of the types of fuel required by high-, medium-, and low-speed diesel engines and of the correlation of certain physico-chemical tests—*e.g.*, diesel index, cetane index, etc., and engine performance. The use of additives to improve combustion characteristics by reducing delay, or starting conditions or both is discussed, but found lacking justifications in view of the high cost of the additives used, compared with the relatively cheap diesel fuel. The variability of the effect of additives with temperature is illustrated. Other fuel characteristics and fuel economy are studied. A. H. N.

Gas and Fuel Oil.

1253. The Laboratory is Essential in Blending Residual Fuel Oil. F. L. Smith. *Refiner*, April 1945, **24** (4), 135–138.—The properties which are of significance in the use of fuel oils are discussed—*e.g.*, pour point, sulphur content, etc. The Naval Boiler and Turbine Laboratory Heater test is described in detail. In this the oil is passed over a heated rod, and the deposits and their behaviour are studied and taken as indicative of the quality of oil in operation. A. H. N.

Lubricants.

1254. Oiliness and Dipole Moment of Lubricants. E. H. Kadmer. *Refiner*, Aug. 1945, **24** (8), 321–324. Translated from *Oel u. Kohle*, by E. J. Barth.—Dipole nature, dipole moments, and the divergence $DK - n^2$ as a deviation of Maxwell's formula have been described and the basis of such discussions have been reviewed. With this as basis it has been shown that for several series of pure hydrocarbons the presence of a side-chain methyl group attached to aromatic rings gives rise to electrical asymmetry, and therefore polarity. The determination and proof of a permanent dipole moment in the case of complicated mixtures of hydrocarbons, such as are found in the light oils and lubricants, are not of great practical significance. Such determinations yield values which represent only a cross-section or average values found for polar material more or less in dilution in the non-polar portion of the lubricant. It was therefore proposed to investigate the presence of polar material after first separating it from non-polar or diluent material by means of procedures involving the use of solvents or by selective adsorption. Dipole moments were then also determined on the extracted material thus obtained. It was shown which of these types of concentrated materials give permanent dipole moments and what the nature of such material might be, especially as regards any relationships as to oiliness, etc. The presence of permanent dipole moments in lubricating oils should in no case be used as a measure of their value, as oiliness agents or in predicting their value for practical purposes. Well-known substances, such as rosin oil and materials, found in the extracts from solvent extraction of heavy oils, and which contain oxygen, sulphur and resinous hydrocarbons, do not reduce friction and yet have been found to be polar in nature. A. H. N.

1255. **Viscosity as a Technical Characteristic of Lubricating Oils in the Conditions of their Utilization in Internal Combustion Engines.** E. G. Semenido, *Symp. Visc. Liquids and Colloids, Acad. Sci. U.S.S.R.*, 1944, **2**, 217–221.—The state of the oil in I.C. engines changes within a few minutes of its being put into use. The oil becomes a heterogeneous mixture containing suspended carbonaceous materials. The influence of these is to raise the viscosity as their concentration rises; this is in opposition to the viscosity-lowering effect of fuel dilution. Under normal operating conditions this results in an increase in the viscosity of aircraft oils (dilution 1%), a slight decrease in the viscosity of automobile oils (dilution 7%), and a marked drop in the viscosity of tractor oils (dilution up to 50%). Doubt is cast on the conventional view that suspended carbonaceous particles in the oil cause high mechanical wear. 85–90% of the particles suspended in oil have diameters of 0·0008–0·0015 mm., and wear experiments carried out in a Timken tester showed more favourable results for a used (100 hr.) aircraft oil than for the corresponding fresh oil or for the used oil after filtration. The operating conditions of oils for I.C. engines are governed more by rules applicable to suspensions than to homogeneous liquids. V. B.

1256. **Viscosity of Mineral Oils.** N. I. Chernozhukov, *Symp. Visc. Liquids and Colloids, Acad. Sci. U.S.S.R.*, 1944, **2**, 120–127.—The viscosity characteristics of various types of hydrocarbons are reviewed. The subject is discussed from the standpoint of the production of I.C. engine oils suitable for low-temperature operation. Oils cease to be pumpable when the viscosity attains 8000° E. Examination of the effect of the addition of 1% paraflow to both distillate and residual oils shows that the effect is most marked on the former, particularly when they are of medium viscosity (1·5–2·2° E. at 100° C.) Results are given showing the action of 5% of "P. 5" a "universal" additive (not further specified), which has both pour-lowering and V.I.-increasing properties. This proved more effective than paraflow in improving the flow, at low temperatures, of medium viscosity oils. It is concluded that the best results, in the production of motor oils suitable for low temperatures, are obtained by using low viscosity distillates from paraffin base crudes, which have been solvent refined and dewaxed and to which there is added a "universal" additive to increase the viscosity, improve the V.I. and lower the pour. V. B.

1257. **Viscosity of Lubricating Oils at Low Temperatures.** L. G. Zherdeva, Z. Vozzinskaya, and O. Fedoseeva. *Symp. Visc. Liquids and Colloids, Acad. Sci. U.S.S.R.*, 1944, **2**, 128–140.—Viscosity measurements were carried out in a capillary-type viscometer (under a pressure of 20 mm. Hg) down to −35° C. Comparisons were made between lubes derived from various U.S.S.R. crudes (Surakhani, Grozni, Iskin, Karachukhuri) and synthetic lubricating oils (no indication is given as to the source or mode of preparation of these latter). The flow characteristics, at low temperatures, of the synthetic oils are much superior to those of the natural ones. Thus, for samples of natural and synthetic lubes having almost the same viscosity at 100° C., and V.I., the viscosity at temperatures below 0° C. (but above the setting point of either oil) is considerably less in the case of the synthetic oil. That this is not due solely to the presence of wax is shown by the addition of 1% of paraffin to a synthetic oil. The resultant mixture has a cloud point of 8° C., as against −20° C. for a natural oil of the same viscosity, V.I. and setting point, yet, despite this, its viscosity at low temperatures (below 0° C.) is considerably less than that of the natural oil.

Examination of data shows that an increase of 10–12 units in the V.I. for a synthetic oil has the result of halving its viscosity at −30° C. Synthetic oils show a linear relationship between the logarithm of the viscosity and the temperature within the temperature range 0 to −35° C.; in the case of natural oils this relationship loses its linear character at about −15° C. The addition of 2% of paraffin to a synthetic oil causes a break at about this temperature.

In the case of synthetic oils of differing types, of two oils with the same V.I. and viscosity at 100°C. that containing aromatic rings has the greater viscosity at negative temperatures It is thus shown that, for oils of different origin, the V.I., even if coupled with the setting point, gives no indication of the viscosity/temperature relationships below about 0° C., and that the chemical nature of the oil components is the factor determining low temperature flow. The results are presented in tables and graphs. V. B.

1258. Effect of Additives on the Viscosity-temperature Relationships of Lubricating Oils at Low Temperatures. K. S. Ramaiya. *Symp. Visc. Liquids and Colloids, Acad. Sci. U.S.S.R.*, 1944, **22**, 178–191.—The viscosity of oils at low temperatures can be considered as being divisible into Newtonian and thixotropic components. This can be expressed by

$$\eta_a = \bar{\eta} + \frac{f}{\frac{dv}{dr}}$$

where η_a = apparent viscosity, $\bar{\eta}$ = residual (true) viscosity, f = yield value and $\frac{dv}{dr}$ = rate of sheer. The effect of pour-depressing additives (aluminium stearate, "paraflow," "santopour") on the thixotropic and true viscosity of lubricating oils was examined. A comparison of the rates of flow against pressure for a solvent refined motor oil (setting point 2° C.), under conditions of streamline flow, shows the beginning of thixotropy effects at 40° C. The effect of the addition of 0·5% of the above-mentioned pour-depressants is to raise the fluidity at low temperatures, without affecting the true residual viscosity. If η_a is plotted against $1/S$ (S = rate of shear) a straight line is obtained cutting the η_a axis above the zero by an amount denoting the true residual viscosity. The results obtained show "santopour" to have a much more effective action than "paraflow." An examination of the temperature coefficient of the yield value shows a linear relationship between log ΔP_E, and $\frac{1}{T}$ thus both $\bar{\eta}$ and f have temperature coefficients that can be expressed by exponential equations.

The effect of the addition of 1% of paraffin on oil fluidity was also examined; below a certain critical temperature such an addition exerts an unfavourable effect on the index of the residual viscosity of the oil.

It is suggested that the anomalous low-temperature viscosity of mineral oils is to be attributed to association occurring under these conditions. Thixotropy in oils is caused by a structure which is much finer-grained than the crystalline structure which can be observed microscopically. Pour-depressants have the effect of diminishing thixotropic forces thus caused, thereby facilitating the flow of oil, lowering the turning moment necessary at low temperatures, and so aiding engine starting. V. B.

1259. Motor Oil Recovery. Anon. *Chem. Tr. J.*, 31.8.45, **117**, 236.—An article by A. W. Lamer in *Oel und Kohle* for Nov. 1942, describes a case of spontaneous combustion in the regeneration of motor oil (15° E. at 50° C.) during filtration after treatment with bleaching earth. The oil was being filtered at 145° C., the pump pressure at the end of the filtration being 6 atm. During the blowing dry of the press with air at 3 atm., a fire started, which was attributed to spontaneous combustion of the fine carbon particles on the filter cloth. To reduce the danger, filtration at $\ngtr$ 120° C. and blowing at under 3 atm. was recommended. A subsequent article by A. Kufferath (*Oel und Kohle*, Dec. 1942) pointed out that this would make the filtration too lengthy, and ascribed the trouble to microscopic metal particles. The use of CO_2 for blowing was recommended as an alternative to air.

C. L. G.

Bitumen, Asphalt and Tar.

1260. Investigation of Viscosity of Bitumens. N. N. Korotkevich, *Symp. Visc. Liquids and Colloids, Acad. Sci. U.S.S.R.*, 1941, **1**, 457–462.—Experiments were performed with two petroleum bitumens and one naturally occurring material. The usual characteristics of these materials are given, the penetrations (25° C.) were in the range 43–369. Viscosity was measured in a Volarovich rotating cylinder viscometer, electrically heated with an accuracy of ±1·5° C. The viscometer was calibrated with castor oil at 20° C.

Determinations of viscosity were made in the temperature interval 40–100° C., yielding values from 21,210 to 25 poises. The materials examined, particularly the petroleum bitumens, had very steep viscosity-temperature curves. At the lower temperatures there is a departure from linear relationship between the loading on the cylinder and its speed of rotation, thus indicating that anomalous viscosity effects are occurring in this region. V. B.

Derived Petroleum Chemicals.

1261. Creslyic Acids from Petroleum. Anon. *Chem. Tr. J.*, 24.8.45, **117**, 209.—A review is given of the properties and applications of a range of cresylic acids from petroleum marketed in the U.S. These are obtained by close fractionation of the crude product formed during cracking operations. Tar acid contents are 98–99% and phenol coefficients 4–20%. Some of the grades are suitable for the production of phenolic resin moulding compositions, laminates, surface coatings, and adhesives, but for low-temperature setting glues the addition of small quantities of individual compounds, such as resorcin, metacresol, or 1 : 3 : 5-xylenol, appears to be necessary. Petroleum cresylic acids are also used as froth flotation agents and in disinfectants where they can replace coal-tar cresylic acids. A new use is in metal degreasing and cleansing, either alone or incorporated into soaps or sulphonated oils. They have also been used in the solvent refining of petroleum and in cattle or sheep dips. C. L. G.

Coal, Shale and Peat.

1262. Mineral Resources of the Lothians. A. G. MacGregor. *H.M. Geological Survey, Wartime Pamphlet No.* 45.—In the Lothians the oil industry began in 1851 when the famous Boghead Coal, or Torbanite, was subjected to destructive distillation. The restricted occurrence of this in Coal Measures near Armadale was worked out by the early 'sixties, but by a coincidence other bituminous material was found in the Oil-Shale Group of the Calciferous Sandstone Series (lowest division of the Scottish Carboniferous). Recently 10 pits or mines have been working at Dalmeny (1), Uphall (2), Winchburgh (3), and West Calder (4). Formerly the main products were lubricating oils, paraffin wax, and sulphate of ammonia, but of late motor spirit, solvent naphthas, diesel oil, burning oil, and paraffin wax have been produced.

Early borings for oil in 1919–21 were put down near West Calder and at D'Arcy. The former gave traces of oil and gas, but the latter at 724 ft. yielded 300,000 cu. ft. of gas (methane and ethane) per day, which was sealed off, and at 1810 ft. a small amount of good quality oil (7 tons during 2 months trial). Between 1937 and 1940 over half a dozen bores were sunk in the D'Arcy-Cousland area on the " Roman Camp Ridge " anticline, east of Dalkeith. The deepest was over 3850 ft. As a result at least 15,000,000 cu. ft. of gas and about 1 ton of oil per day were made available as the combined yield of two wells. Two other wells were also producing oil in 1940.

The reservoir rocks are in the Calciferous Sandstone Series. Only one bore (D'Arcy) penetrated to the Upper Old Red Sandstone. The West Calder bore started in the Upper Oil-Shale Group, and the others above that in the Lower Limestone Group.

A bibliography of 67 references is given. A. L.

1263. Effect of the Stratigraphic Depth of Deposition of Fundamental Coal Layers of the Kol'chuginski Deposit of the Kuzbass on the Solubility of the Coal. M. K. D'yakova and N. A. Davtyan, *Bull. Acad. Sci. U.R.S.S. Cl. Sci. Tech.*, 1945, 203–208.—This work is a continuation of the study of the thermal solution of solid fuels. The coals forming the subject of the present investigation had solubilities varying from 46 to 77% in tetralin and from 14 to 50% in naphthalene, the conditions of solution in both cases being a temperature of 420° C. and a duration of 30 min. In confirmation of previous work it was found that solubility decreased with increasing carbonisation of the coal the figure of 51% (in naphthalene) being obtained for the upper, and that of 18% for the lower deposits. With tetralin as solvent, slight anomalies were found in the rule relating degree of carbonization to solubility; these are probably due to reduction of reactive coal components by the tetralin. V. B.

1264. Theory of Wetting of Coal Layers by Micro-additions of Hydrocarbon Liquids. A. A. Agroskii and V. S. Zagrebil'naya. *Bull. Acad. Sci. U.R.S.S. Cl. Sci. Tech.*, 1945, 190–202.—A marked increase in the apparent specific gravity of damp powdered coal is caused by the wetting of the latter with kerosine in amounts up to 0·1%. In the case of material with s.g. 0·63, this quantity of kerosine increased the value to 0·75. Further additions caused a gradual fall in s.g., till the original value was regained when 1% of kerosine had been added. From a discussion of the theoretical aspects it is concluded that the effect is due to the hydrocarbon being absorbed as a film on the surface of the coal, thus acting as a lubricant and permitting of the closer packing of coal particles. Addition of surface-active materials (*e.g.*, phenols, oleic acid) lowers the effectiveness of the action of the kerosine. Numerous experimental results are presented showing the effect on the apparent s.g. of coal of wetting with a variety of reagents, including electrolytes. Hydrocarbon liquids are the most effective. V. B.

1265. Viscosity of Peat Suspensions. N. N. Kulakov. *Symp. Visc. Liquids and Colloids, Acad. Sci. U.S.S.R.*, 1941, **1**, 391–403.—The hydraulic mining of peat results in peat suspensions; these belong to the class of lyophilic colloids, in a coarsely dispersed system, and do not show the viscosity relationships of "true" liquids. The viscosity of the suspensions (water content 87–98%) was investigated by three methods, a capillary viscometer of special construction as used by Kustov and Khotuntzev (cf. Abstract 1057/1945), a rotary cylindrical viscometer and by the falling sphere method. It was found that whilst results by the capillary and rotating viscometers gave fair agreement the falling sphere method was not practicable as there is difficulty in sufficiently reducing the speed of fall so that Stokes' law would apply. Of the two methods the rotating viscometer is more suitable in practice; it enables the yield value (θ) and viscosity (η) (as pictured by Bingham) to be determined; these are the values that govern the flow of peat suspensions through pipes. The formula of Herrick (*Oil Gas J.*, 1932, **30** (41), 16) is confirmed as being applicable to such cases. V. B.

Miscellaneous Products.

1266. Study of Composition of Petroleum Waxes From Western Crudes. R. W. Moulton and V. K. Loop. *Refiner*, April 1945, **24** (4), 161–164.—Data relative to the constitution of paraffin wax are very incomplete, and the literature presents no data on the composition of the wax removed from Western crude oil by the solvent dewaxing process. The object of this work is to lay the foundation for a complete investigation of this type of material. A sample of paraffin wax from a California crude oil was subjected to a careful vacuum distillation, yielding 48 final fractions of widely varying physical characteristics. Melting point, molecular weights, cooling curves, refractive indices, and specific gravities were determined on all samples. A detailed discussion of the data is presented, and it is compared with the best accepted values for the physical constants of synthetic hydrocarbons. The lower-melting fractions probably consist principally of normal paraffins; naphthenic compounds may be present in the higher-melting fractions. A. H. N.

Engines and Automotive Equipment.

1267. Engineering Problems Involved in Gas Turbine Development. W. A. Wilson. **Refiner**, Aug. 1945, **24** (8), 293–295.—One of several papers which made up a forum, sponsored by the Elliott Co. at Jeanette, Pennsylvania, where the first gas-turbine power plant for ship propulsion was given public demonstration. Influence of the gas turbine on the refining industry is such that its development deserves close study. As a turbine it offers opportunity for harnessing process gas for power in plant operation. As a supercharger it improves the efficiency of the internal-combustion engine by so much that it will have effect on consumption of fuels. When carried to the fullness of a power plant, as described, it offers additional outlet for products of refining. The unit was demonstrated as a consumer of fuel of the diesel grade, but experts predict that it can be operated on lower-grade fuel oils and eventually on bunker oil. Its thermal efficiency of 29% is accepted as a step towards an efficiency of 32–34%, comparable with diesel performance. The paper deals more specifically with turbo-superchargers. A. H. N.

1268. Gas Operated Power Plants. A. B. Chernuishev, *Bull. Acad. Sci. U.R.S.S., Cl. Sci. Tech.*, 1945, 165–175.—A discussion, with special reference to U.S.S.R. conditions, of the conversion of I.C. engines to gas operation, and the use of both producer and hydrocarbon gases as a source of power. Ratings and comparative power output figures on gaseous and liquid fuels are given for various U.S.S.R. engines. Whilst the use of producer gas, in particular, has been much stimulated by war conditions, such use should be considered as having considerable peace-time application. In 1940 85% of the stationary power plants used in agriculture were operated on liquid fuel and only 2·4% on gas. The directions in which research and development should proceed are indicated ; particular attention should be paid to the use of low-grade mineral fuels and agricultural residues as sources of gas, to the development of new types of native I.C. engines suitable for gas operation and to the use of diesel engines on gas/liquid fuel mixtures, with the minimum quantity of the latter. V. B.

BOOKS RECEIVED.

O Genezise Uglya Leninckogo Mestorozhdeniya Kuzbassa. (The genesis of the coal of the Lenin seam of the Kuzbass.) By I. I. Ammosov, Moscow-Leningrad, 1945. 44 pp.

This booklet is published by the Institute of Combustible Minerals of the Division of Technical Sciences of the Academy of Science of the U.S.S.R. The scope is indicated by the title; a chapter on the petrography of the coal under discussion is included. V. B.

Errata.

Abstract No. 1075, Line 10 : " Strokes " should read " Stokes."

INSTITUTE NOTES

November, 1945.

PERSONAL NOTES.

Dr. N. L. Anfilogoff has been appointed a director of Messrs. Berry, Wiggins & Company, Ltd.

Mr. T. H. G. Brayfield (Fellow) has been released from the Stanley Internment Camp, after 3½ years' internment by the Japanese. His address until further notice will be: No. 3, Leighton Hill Road, Hongkong.

Dr. A. E. Dunstan has been elected an Honorary Fellow of the Institute by Council.

APPLICATIONS FOR MEMBERSHIP.

The following have applied for 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.

Halliday, David Alexander, Chemist, Sandeman Bros., Ltd. (*N. L. Skilling ; W. D. Doughty.*)

Irvine, Cyril William, Lubricating Oil Technician, Petroleum Board. (*J. L. Taylor ; E. Le Q. Herbert.*)

de Moura, Francisco, Chief Chemist, Anglo-Mexican Petroleum Co., Ltd. (*R. G. Mitchell ; S. Hunn.*)

Murphy, Harold William, Chief Engineer, National Oil Refineries, Ltd. (*R. B. Southall ; E. Thornton.*)

Turner, Charles Elkanah, Works Chemist, Chetwin, Newark & Co. (1920), Ltd. (*H. W. Chetwin ; E. R. Redgrove.*)

Weiser, Herman, Chemical Engineer, Texas Oil Co., Ltd. (*W. H. Goodhind ; W. A. Webster.*)

CANDIDATES FOR ADMISSION AS STUDENTS.

Proposed by *R. B. Southall*, Seconded by *E. J. Horley*.

Connor, Terence Michael,	National Oil Refineries Ltd.
Cossins, Donald,	„ „
Davies, William David Elfryn	„ „

Donaldson, Ian,	National Oil Refineries Ltd.
Edwards, Harold Lewis,	,, ,,
Evans, Howard Saunders,	,, ,,
Goodman, Leonard,	,, ,,
Green, Roy Clement,	,, ,,
Halsey, Colin,	,, ,,
Harry, Dennis,	,, ,,
Hollyman, Henry Clifford,	,, ,,
Hopkins, Edric,	,, ,,
Jones, Glyndwr,	,, ,,
Letman, Terence Ivor,	,, ,,
Lewis, Daniel,	,, ,,
McCarthy, Wynford,	,, ,,
McLay, John David,	,, ,,
Morgan, Gerald David,	,, ,,
Peet, Norman George,	,, ,,
Probert, John Gilroy,	,, ,,
Rees, Howard,	,, ,,
Rule, Peter Lewis,	,, ,,
Spottiswoode, John Nott,	,, ,,
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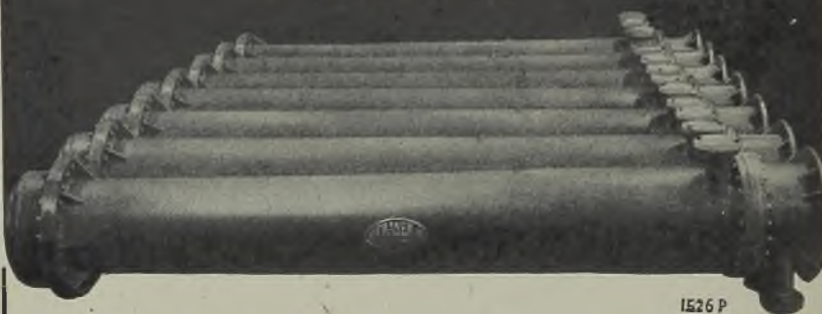

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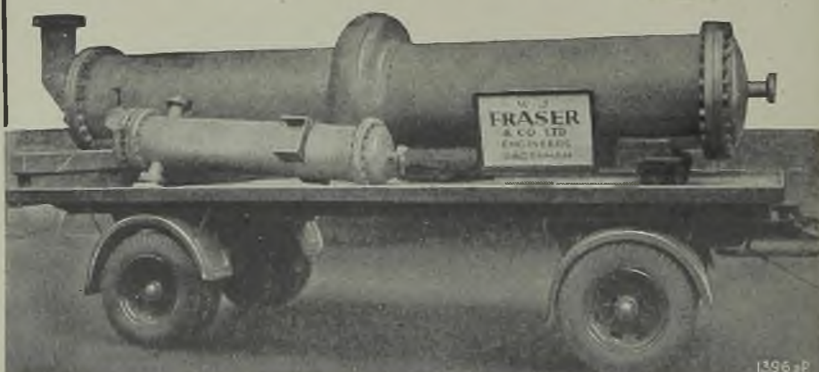

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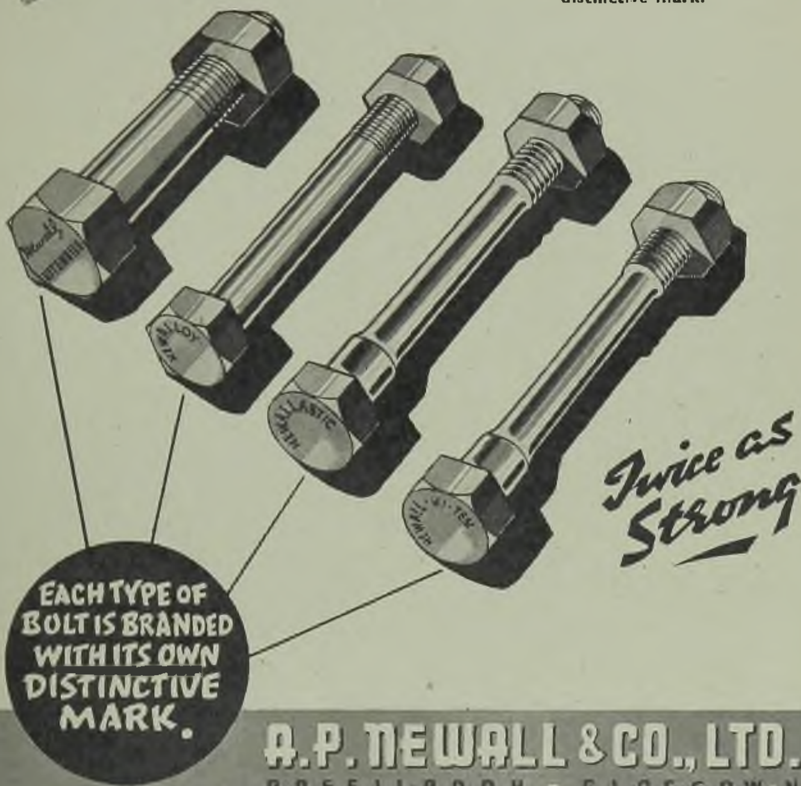

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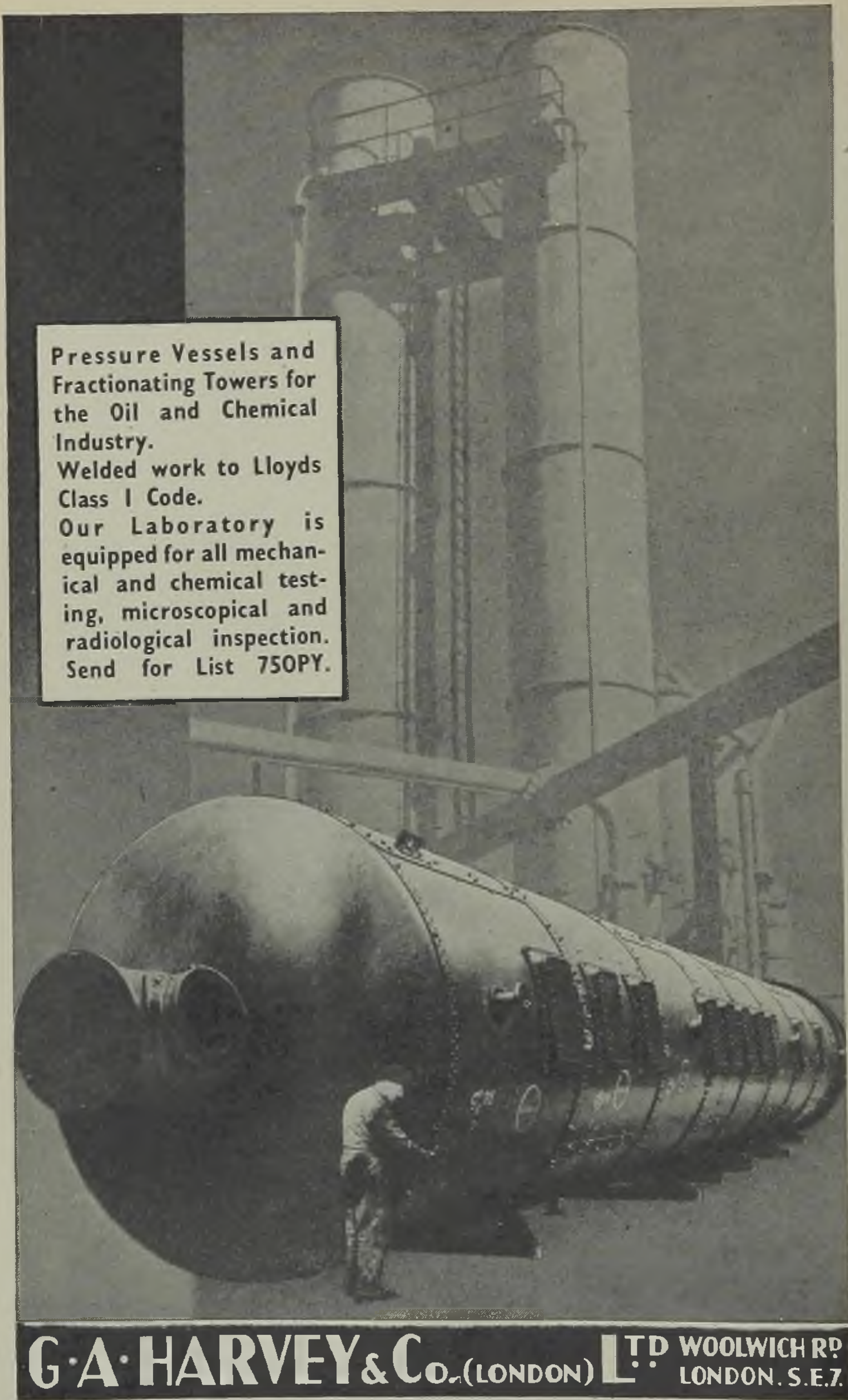
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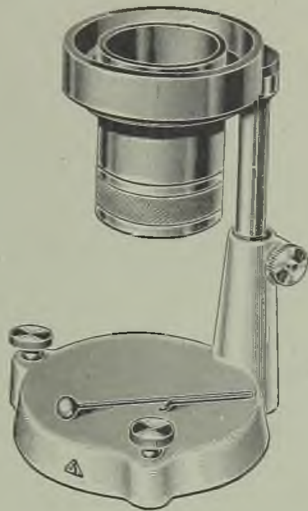

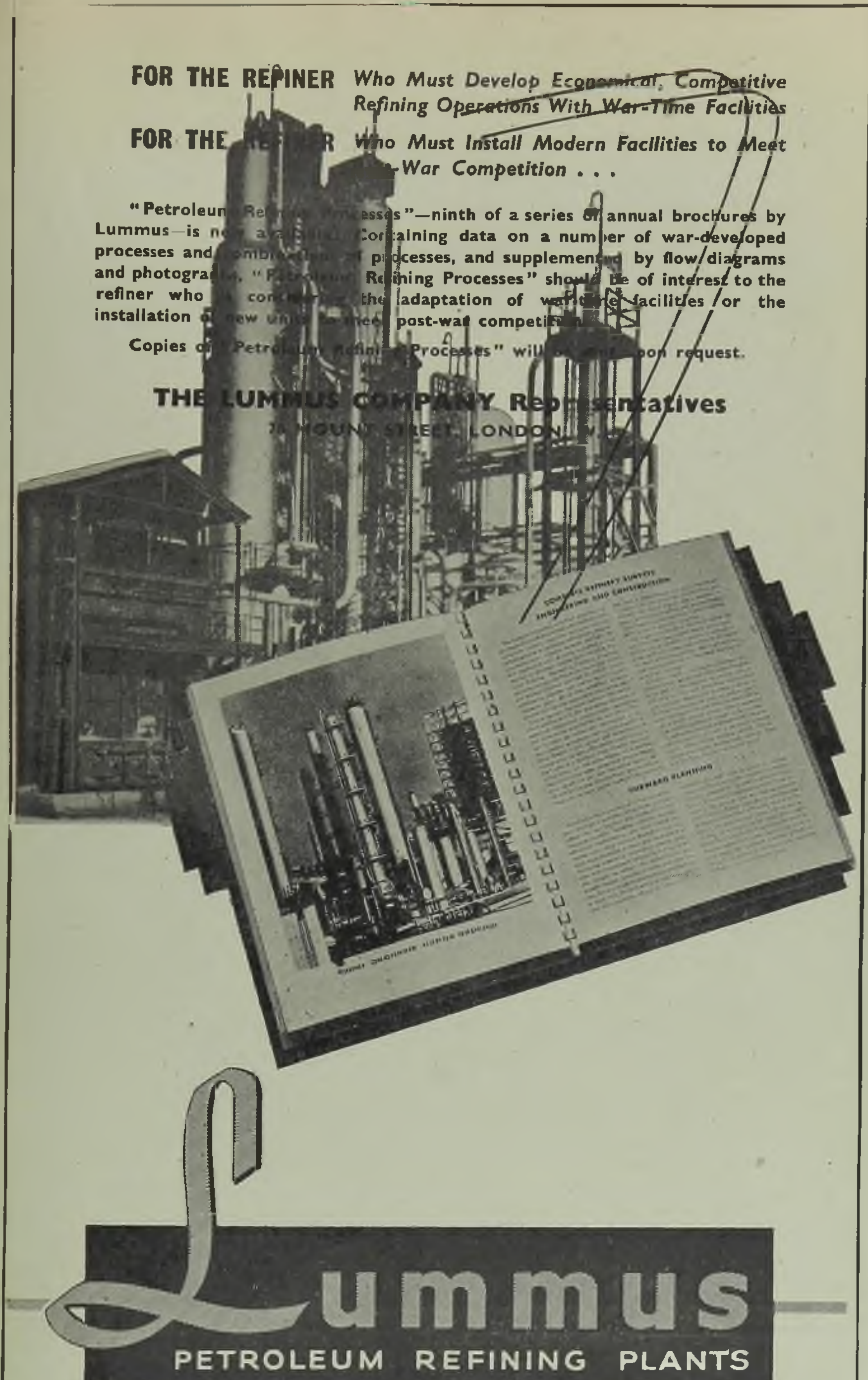
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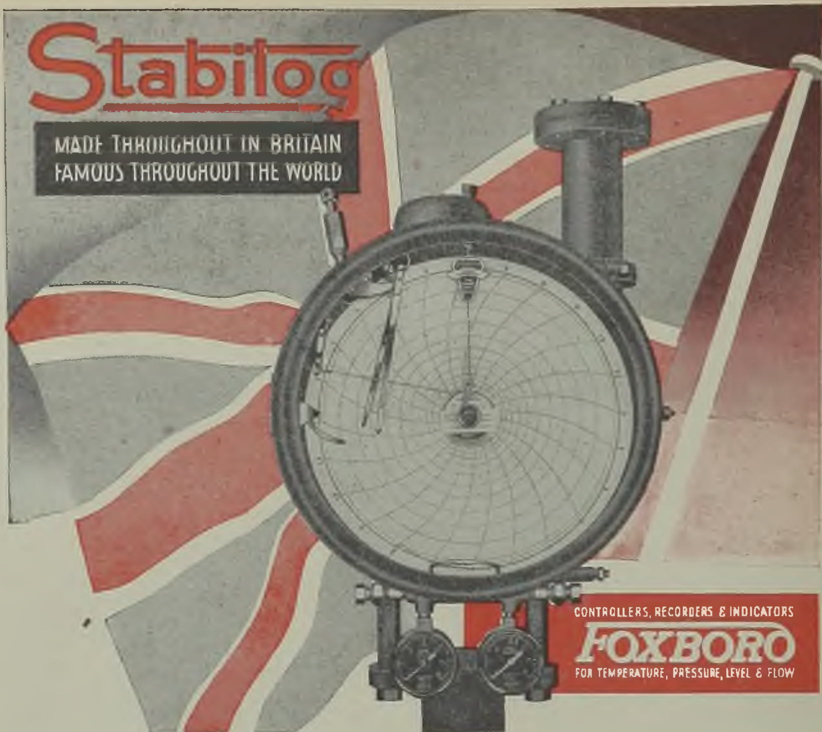

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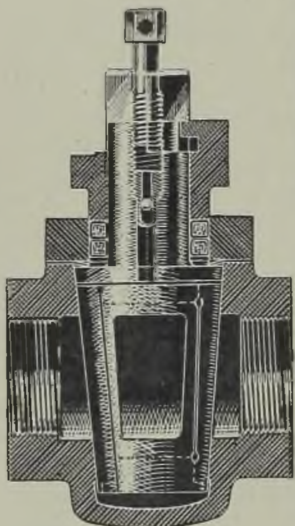

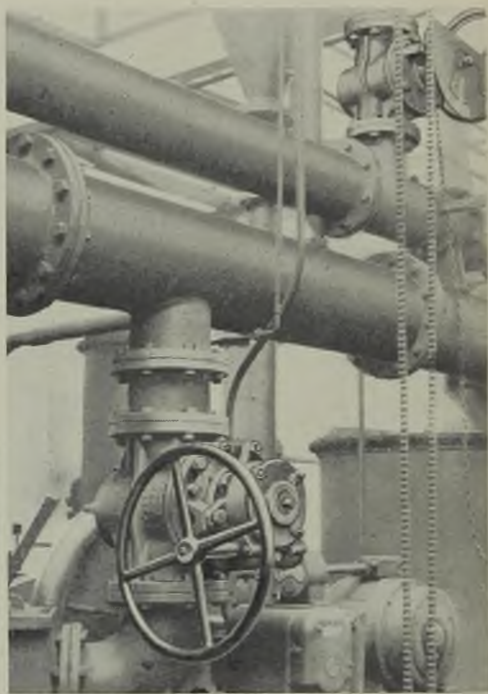

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