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COMPILED BY
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GEOPHYSICAL ABSTRACTS 110, JULY–SEPTEMBER 1942

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1. GRAVITATIONAL METHODS

6587. Barnes, Virgil, and Romberg, Frederick, Gravitational and magnetic anomalies over a body of magnetite [abstract]: Geophysics, vol. 7, No. 3, p. 338, Menasha, Wis., 1942.

This paper gives the results of gravimetric and magnetic surveys over Iron Mountain, a magnetic body in Llano County, Tex. The observed anomalies are compared with the known extent of the ore. This comparison suggests that there is more ore than was supposed, and this possibility is examined quantitatively.

6588. Heiland, C. A., A rapid method for measuring the profile components of horizontal and vertical gravity gradients [abstract]: Geophysics, vol. 7, No. 3, p. 338, Menasha, Wis., 1942.

The trend in gravity exploration in past years indicates the rather remarkable fact that a method of low resolving power (the gravity meter) has replaced one of a higher resolving power (the torsion balance). This is entirely due to the superior speed of the former and suggests an instrument and procedure in which observation time is reduced by (1) reduction in number of quantities measured; (2) use of a reference direction near that of the maximum effect; (3) elimination of the torsionless position as unknown; (4) reduction in period, with compensating increase in optical sensitivity; and (5) stabilization of thermal conditions. These objectives are attained by (1) measuring the profile components of gradients and curvature values, preferably at right angles to the assumed strike, whereby, for an ideal two-dimensional feature, the vertical gravity gradient is also obtained, and the vertical and horizontal gravity components may be calculated by integration; (2) holding the torsionless position constant with temperature control; (3) decreasing the period and observation time to 3–4 min., and (4) using a beam arrangement which will give the gradient in only one azimuth, and the profile gradient of the horizontal gravity component in a second azimuth if desired. Latitude and terrain corrections are also somewhat simplified by the proposed procedure.

6589. Hughes, D. S., The analytic basis of gravity interpretation: Geophysics, vol. 7, No. 2, pp. 169–178, Menasha, Wis., 1942.

One method of gravity interpretation involves the use of analytic continuation processes. In this discussion the resolving power of this method is tested numerically. Using hypothetical structures comprising single and double blocks, a surface-gravity profile is derived. Using these values as an "observed gravity" profile, the "continuation" method

is applied to compute the gravity at intermediate depths. Comparing these computed values with the actual (directly computed) gravity profile at these depth-planes, the resolving power of the continuation method is demonstrated. It is shown that a very high precision in the observed data is necessary for very accurate resolution of structures.—*Author's abstract.*

6590. McCollum, E. V., Gravity expression of the Hatchetigbee anticline [abstract]: Geophysics, vol. 7, No. 3, p. 337, Menasha, Wis., 1942.

Gravity data are presented showing a local minimum of gravity over the Hatchetigbee anticline, which leads to the conclusion that, associated with this feature, there is probably a very substantial thickening in the salt section.

6591. McLemore, E. W., Weaver, Paul, and Barton, D. C., The Crosbyton anomaly, southeastern Crosby County, Tex.: Geophysics, vol. 7, No. 2, pp. 179–191, Menasha, Wis., 1942.

The purpose of this study was the interpretation of the most probable structure of the Crosbyton anomaly. Work was begun in 1935 under the direction of Barton and was completed in 1938, except that the geologic interpretation was not written until after Barton's death, July 8, 1939.

An abstract of the projected paper written by Barton in 1937 reads as follows: "A large slightly subcircular anomaly has been mapped by pendulum, torsion balance, magnetometer, and dip needle near Crosbyton, in northwest-central Texas. The width of the anomaly is approximately 40 miles, its gravitational amplitude 45 milligals, and its magnetic amplitude 2,500 gammas. A well which was drilled to a depth of 5,105 ft., near the crest of the anomaly, is carried as normal by the subsurface geologists. According to mathematical calculations, the anomaly must be the effect of a flattened stocklike mass whose vertical dimension is several miles. From geological considerations it must be the effect of a plutonic rock."

The geophysical interpretation is discussed in detail, and the geologic interpretation is given by Weaver as follows: "The combination of a magnetic high and a gravity high in an area where the sediments were already known to have density at least the average of sedimentary rocks suggests a basement rock of plutonic source that was either a large monadnock or an intrusion into the sedimentary rocks. The No. 1 B Swenson well found granite at a depth of 5,810 ft. subsea, which was within 40 percent of the depth to the plutonic rock calculated at the point where the well was drilled. The No. 1 C Swenson did not reach granite at 5,936 ft. subsea, showing that the mass is dipping to the west, as was calculated. It would not have been expected that granite could give such density contrast with the limestones and shales above it as is actually found, and this would suggest that the granite is not the main constituent of the plutonic mass, but that the mass is principally a more basic rock than granite. Since the No. 1 B Swenson drilled only 19 ft. into the mass, we have no confirmation of this deduction."—*W. A.*

6592. Nettleton, L. L., Gravity and magnetic calculations: Geophysics, vol. 7, No. 3, pp. 293–310, Menasha, Wis., 1942.

Formulas and curves are given for calculating gravity and magnetic effects for various geometric forms. For the most part they are not

new, but they are assembled into convenient form with a convenient set of master curves. The units and constants are chosen to facilitate rapid calculations to test possible causes of observed gravity and magnetic anomalies. For certain bodies, use is made of the principle of considering the matter as condensed into a thin sheet, which results in great simplification of the formulas without important loss of precision for most geophysical purposes. This principle does not seem to have received the attention which it deserves in connection with geophysical calculations. The application of solid angles to gravity and magnetic calculations, together with a chart of solid angles, is included.. Finally, there is given an example of the application of some of the methods presented. In view of the inherent ambiguities in the various mass of magnetic distributions which can account for a given gravity or magnetic anomaly, the approximate methods given should serve for all necessary calculations in connection with the interpretation of any but quite detailed surveys where control in addition to the magnetic or gravity data is available.—*Author's abstract.*

6593. Siegert, A. J. F., An instrument for the computation of gravity anomalies [abstract]: Geophysics, vol. 7, No. 3, p. 338, Menasha, Wis., 1942.

A mechanical device has been designed to evaluate the gravity anomaly caused by an arbitrarily given finite body. It can be used as an aid in gravity and magnetic-interpretation work and for the computation of terrain corrections in gravity work.

6594. Skeels, D. C., The value of quantitative interpretation of gravity data [abstract]: Geophysics, vol. 7, No. 3, p. 337, Menasha, Wis., 1942.

Although there is no unique interpretation of a given set of gravity data, there are many cases in which quantitative interpretation is decidedly worth while. This is especially true in cases where the gravity data are supplemented by a certain amount of geological data, or where the gravity anomaly is of such a shape that the range of possible solutions can be rather closely limited. Three examples are given of interpretations of actual data.

2. MAGNETIC METHODS

Barnes, Virgil, and Romberg, Frederick, Gravitational and magnetic anomalies over a body of magnetite. *See* Geophys. Abstract 6587.

6595. Benkova, N. P., The 27-day recurrence tendency of magnetic storms: Terres. Magn. and Atmos. Electr., vol. 47, No. 2, pp. 147–154, Baltimore, Md., 1942.

The aim of the present work is to verify the results of the former investigators concerning the dependence of the recurrence upon the intensity of the disturbance, as well as to give a more precise definition of the length of the recurrence interval and its fluctuation during the 11-yr. cycle of solar activity. Investigations made by the author are based mainly on the Sloutzk (U. S. S. R.) catalog of magnetic storms. A total of 1,073 storms recorded by the Sloutzk Observatory during 1878–1939 were examined. The following conclusions were drawn: "(1) The results corroborate the conclusions of Greaves and Newton as to the decrease of the recurrence tendency in case of very great storms, but this conception does not seem to apply to the extra storms, which are the most stable; (2) the impulsive character of the

geomagnetic intensity in the sequence is revealed with characteristic features of a short branch of the increase of activity and more sloping branch of the decrease; (3) the recurrence tendency varies during the 11-yr. cycle, together with the change of the average duration of the existence of the spots, being most pronounced in the years of decrease of magnetic activity; (4) there is no systematic variation of the length of the interval during the 11-yr. cycle."—*W. A.*

6596. Chapman, Sydney, Notes on isomagnetic charts, Part 7, Mathematical notes on isoporic charts and their singular points: Terres. Magn. and Atmos. Electr., vol. 47, No. 2, pp. 115–138, Baltimore, Md., 1942.

The nature of the isoporic lines is examined for the magnetic potential V and for the magnetic elements D, H, I, Z, and F. In general, the singular points on an isomagnetic chart are not singular points on the corresponding isoporic chart, and vice versa. In particular, the singular points for V, which are dip-poles, are usually not singular points for its rate of change $\dot{V}$. But the dip-poles are singular points not only for D, H, and I (though not in general for Z and F) but also for $\dot{D}$, $\dot{H}$, and $\dot{I}$ (though not in general for $\dot{Z}$ and $\dot{F}$).

If the dip-pole is moving, it is a double focus for D (which there takes all values from $-\infty$ to $+\infty$), and a nonuniform ray pole for $\dot{H}$ and $\dot{I}$; the relation of the isopors to the velocity of the dip-pole is indicated. If the dip-pole is stationary, it is a nonuniform ray pole for $\dot{D}$, and a conical focus or node for $\dot{H}$ (which there is zero) and for $\dot{I}$. The isopors for V, D, H, I, Z, and F for the field of a varying centered dipole are determined and illustrated. It is shown that in the region around an associated pair of local dip-poles the isopors must be very complicated, those for D, for example, having at least eight singular points in the region. The isopors near the principal geomagnetic dip-poles are discussed, and it is shown that in these regions certain isoporic charts appear to be inconsistent with theory. The isoporic charts for 1922 for D and H given by the Admiralty and by H. W. Fisk are compared and discussed. For 126 points uniformly spaced at 20° intervals the average numerical difference between the indications of the two charts is 56 percent for D, and 69 percent for H, of the average numerical value of D and H, respectively, at these points.—*Author's summary.*

6597. Chapman, Sydney, Notes on isomagnetic charts, Part 8, The mutual consistency of the declination and horizontal-intensity isoporic charts: Terres. Magn. and Atmos. Electr., vol. 47, No. 2, pp. 139–146, Baltimore, Md., 1942.

The rate of change of the vertical component of the earth-air electric current-density i is expressed in terms of the surface gradients of the rates of change of the horizontal magnetic elements X and Y or D and H; the formulas enable (di/dt) to be calculated from the distribution of the isomagnetic and isoporic lines for these elements. It is shown that if the directions and spacing of the isoporic lines are seriously uncertain, (di/dt) should be found from the magnetic charts to have a value of order of 5 milliampers per km.^{2} per year; this is confirmed by calculations based on the Admiralty charts for 1922, the Fisk isoporic charts for the same epoch, and the Swedish magnetic surveys of epochs 1929.5 and 1936.5. The actual value of

(di/dt) is inferred, from atmospheric-electric observations, to be at most 10^{-4}, so that these much larger calculated values of (di/dt) indicate errors in the isoporic charts.—*Author's summary.*

6598. Evans, Foster, Electric and magnetic effects of cosmic rays: Phys. Rev., vol. 61, No. 11/12, pp. 680-683, Lancaster, Pa., 1942.

It is found that slow interstellar electrons moving in the vicinity of the earth under the influence of a radial electric field caused by the earth's interception of cosmic rays as charged particles predominantly of one sign and the magnetic field of the earth's dipole will produce a continuous series of shell currents concentric with the earth. The current density in the shells varies with the inverse fifth power of the distance from the earth's center and the cosine of the latitude. These currents contribute to the earth's field a uniform component parallel to the magnetic axis in a direction from south to north. It is found that if either cosmic-ray intensity or the density of positive ions in the vicinity of the earth varies, there will result a variation in magnetic-field intensity at the earth's surface. It is shown that the ratio $(\Delta I/I)/(\Delta H/H)$, where I represents cosmic-ray intensity and H the horizontal component of the earth's magnetic-field intensity, for a variation caused by a change in cosmic-ray intensity is of the same order of magnitude as observed experimentally.—*Author's abstract.*

6599. Galbraith, F. M., The magnetometer as a geological instrument at Sudbury: Am. Inst. Min. Met. Eng. Tech. Pub. 1482, 6 pp., New York, 1942.

This paper describes the use of the magnetometer, under geological direction, in exploration of the Sudbury nickel district. The writer's experience at Falconbridge has led him to the belief that only through detailed work, and by careful correlation of both geological and geophysical results, can geophysical prospecting methods be applied successfully to mining-exploration problems. It is hoped that the basic technique described in the paper will be found to have general application.—*Author's abstract.*

6600. Gebhardt, R. E., Investigation of height of local magnetic anomaly at Port Snettisham, southeastern Alaska: Terres. Magn. and Atmos. Electr., vol. 46, No. 4, pp. 451–454, Baltimore, Md., 1941.

The geological structure of the area is described. Observations were made of the declination during aircraft flights over the area at heights 100, 500, 1,000, 2,000, and 3,000 ft., and the results are shown in curves. An appreciable effect was found over about 20 sq. miles of land and water, but vertically it does not extend above 3,000 ft.—*R. S. R., Sci. Abstracts, vol. 45, No. 532, 1942.*

6601. Gotsman, B., Main features of the daily magnetic variations at Cape Town: Terres. Magn. and Atmos. Electr., vol. 47, No. 2, pp. 165–170, Baltimore, Md., 1942.

A set of graphs has been provided for observatories that collaborated in supplying 3-hour-range indices (K), which express, in condensed form, the main features of the solar daily variations in the magnetic elements H, D, Z, or in the force-components, X, Y, Z. This set of graphs for Cape Town is considered to be very desirable because Cape Town Observatory is far removed from the other observatories for which such graphs have been published—Potsdam, Sitka, Cheltenham, Tucson, San Juan, Honolulu, Huancayo, and Watheroo.—*W. A.*

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6602. Harradon, H. D., The variations of geomagnetism: Sky and Telescope, vol. 1, No. 8, pp. 12–21, Cambridge, Mass., 1942.

After a brief historical outline of geomagnetism the author discusses the secular, diurnal, and annual variations of geomagnetism, as well as the variations caused by magnetic storms.—*W. A.*

6603. Hawkins, J. E., and Stommel, H. E., The results of a geophysical survey: Mining Jour., vol. 25, No. 24, pp. 2–4, Phoenix, Ariz., 1942.

The authors describe the experimental geophysical survey conducted by them at the Old Dougherty mining properties near Central City, Colo., in April 1941. The area was surveyed with the spontaneous-polarization method and the vertical magnetometer. Figures illustrate the vein systems on the first and second levels and the positions of the stronger spontaneous-polarization and magnetic anomalies.—*W. A.*

6604. Jenny, W. P., Micromagnetic surveys in the Sparta-Wilcox trend of Texas and Louisiana: Oil Weekly, vol. 106, No. 2, pp. 20–24, Houston, Tex., 1942.

The writer gives examples of surveys to help his readers to understand the micromagnetic method, which, in his opinion, may be useful in the search for stratigraphic traps. A map containing a compilation of surveys made by the writer between 1935 and 1940 shows how a detailed and an accurate survey by the micromagnetic method may improve the interpretation of the local structure.—*W. A.*

6605. Jones, J. H., A proposed method of measuring the derivatives of the earth's magnetic field [abstract]: Geophysics, vol. 7, No. 3, p. 340, Menasha, Wis., 1942.

The method of measuring the derivatives of the earth's magnetic field, which is proposed, depends on the fact that a small steady magnetic field will modify the e. m. f. induced in the secondary coil of a detector with a core of magnetizable material possessing a high initial permeability coefficient and a high rate of increase of this coefficient with the strength of the magnetizing field. It is shown that a detector of this type is equivalent to an inductor coil rotating with angular speed equal to the periodicity of the alternating magnetizing field.

6606. Kutscher, Fritz, Erdmagnetische Versuchsmessungen auf Kieslagerstätten im südlichen Riesengebirge [Geomagnetic investigations on pyrites deposits in the southern Riesengebirge]: Beitr. angew. Geophysik, vol. 9, No. 2, pp. 187–197, Leipzig, 1941.

During 1940, experimental geomagnetic measurements were conducted on various sulfidic deposits in the southern Riesengebirge of Silesia. Deposits of arsenopyrite, pyrrhotite, and chalcopyrite were examined, those of arsenopyrite being most important. Susceptibility tests carried out in the laboratory on several ore specimens led to very divergent values differing from 660×10^{-6} to $26{,}400\times10^{-6}$. Pyrrhotite was considered to be the principal carrier of the magnetic properties of the sulfidic ores mentioned. The results of the geomagnetic field investigation obtained with the sulfide deposit of the "Bergschmiede" locality are discussed. Attention is drawn to the fact that the ΔZ disturbances in neighboring deposits of pyrrhotite and other sulfides are frequently equal, so that no conclusions can be drawn as to the type of the deposit solely from the results of geomagnetic observations.—*Author's summary.*

6607. Kutscher, Fritz, Measurements of earth magnetism in the magnetite deposits of the southern Riesengebirge: Zeitschr. prakt. Geologie, vol. 49, No. 1, pp. 39–45, Halle, 1941.

The syngenetic regional metamorphic deposits are associated with series of green shales and crystallized limestone. The deposits were formerly exploited. The measurements, which proved to be an excellent method of prospecting, showed that most of the deposits are of no economic importance.—*T. T., Chemical Abstracts, vol. 36, No. 10, 1942.*

6608. Puzicha, Kurt, Der Magnetismus der Gesteine als Funktion ihres Magnetit Gehaltes [The magnetism of rocks as a function of their magnetite content]: Beitr. angew. Geophysik, vol. 9, No. 2, pp. 158–187, Leipzig, 1941.

By means of a sensitive ballistic process, the hysteresis loops of eruptive rocks have been measured, and from the results obtained susceptibility, coercive force, and relative remanence were read off. Of three different types of rock investigated, the first group showed low susceptibility (up to 80×10^{-6} C. G. S.) independent of field intensity, low hysteresis loops, and low relative remanence. The magnetic properties were determined by the chief rock-forming minerals. In the second group, growing field intensity was accompanied by increasing susceptibility, while in the third group the susceptibility rose simultaneously with increasing field intensity, and often reached the amount of 250 Oe. The hysteresis loops are partly narrow, hence with only a low relative remanence, partly broad and then with a high relative remanence. The magnetic phenomena are based on the percentage of magnetite present. Measurement on artificial low-concentration mixtures of magnetite served to supplement this investigation. One percent by volume effected a susceptibility of 2,500 to $3,000\times10^{-6}$. Taking K as the susceptibility of pure, undiluted magnetite, V as the percentage by volume in the mixture, and P as the demagnetization factor, the susceptibility of the mixture is:

$$K_p=V\times K=[1+PK(1-V)]$$

Experimentally, P was found to range from 3.2 to 3.9.—*Author's summary.*

6609. Quitzow, H. W., Modern investigations of the iron deposits of the Niedere Gesenke: Zeitschr. prakt. Geologie, vol. 49, No. 1, pp. 51–53, Halle, 1941.

Iron ores of the Lahn-Dill type are bound to a schalstein formation consisting mainly of diabase and diabase tuffs, occurring chiefly on the hanging wall. The iron content varies between 29 and 56.5 percent. The prospecting was partially carried out by magnetic measurements.—*T. T., Chemical Abstracts, vol. 36, No. 10, 1942.*

6610. Reich, Hermann, Uber die natürliche Magnetisierung von Gesteinen auf Grund von Messungen an Bohrkernen. [The natural magnetization of rocks on the basis of measurements of drill cuttings]: Beitr. angew. Geophysik, vol. 9, No. 1, pp. 40–64, Leipzig, 1941.

By means of a simple magnetic method, the remanent and the inductive portion of magnetization of several hundred samples of ore drill cuttings (in depths ranging from 2 to 1,365 m.) has been estimated. In five of six cores the remanent portion was found to be considerably higher than the inductive portion, the susceptibility being of the order 0.2–0.3, as well as 0.01 and 0.001. The magnetic part was furnished in one case by titanium-free magnetite, in the second case by titaniferous magnetite,

and in the third, by pyrrhotite. Only the samples from the sixth core containing magnetite were, in the main, inductively magnetized. By suitable experiments it was proved that mechanical treatment lowers, but by no means suppresses, remanent magnetization. A noteworthy change in the magnitude of this property on account of the drilling process is, therefore, not to be expected. Finally, the influence of time plays an important role as to the preservation or the decrease of remanent magnetism.—*Author's summary.*

6611. Sherman, K. L., Comparison of methods for computing air-earth current: Terres. Magn. and Atmos. Electr., vol. 46, No. 4, pp. 401–407, Baltimore, Md., 1941.

Average hourly values of air-earth current determined by the indirect method at College, Alaska, for 11 mo. in 1932–33 are tabulated. It is shown that, because of the usual negative correlation between gradient and conductivity, the values of current derived from these elements, if averaged over periods greater than 1 hr., will generally exceed those derived from values averaged over hourly intervals. The magnitude and variation of this excess at College are given in detail for the case where the longer period is 1 hr. from all the days selected in each month. The maximum excess in an hourly mean value is 29 percent. The effect upon the amplitude of the diurnal variation would be approximately 25 percent of the true variation in current. The excess computed from values of gradient and conductivity averaged over other periods of time and for some other places is also given and discussed. The maximum excess in the daily mean values at College would be approximately 50 percent, whereas at other stations it may often be greater than this. These considerations suggest that, because of the difficulty of computing exact values, the indirect method of measurement may be expected to yield greater values of air-earth current than the direct method.—*Author's abstract.*

6612. van Wijk, A. M., Adjustment of horizontal-intensity and declination variometers at the magnetic observatory, Hermanus: Terres. Magn. and Atmos. Electr., vol. 47, No. 2, pp. 171–172, Baltimore, Md., 1942.

The method used by D. la Cour and E. Sucksdorff was adopted for the adjustment of the variometers at the magnetic observatory at Hermanus, South Africa. The method consists in determining H values and the corresponding scalings of the H and D variometers. An analysis, by the method of least squares, is given.—*W. A.*

6613. Vestine, E. H., The reduction of magnetic observations to epoch, part 1: Terres. Magn. and Atmos. Electr., vol. 47, No. 2, pp. 97–114, Baltimore, Md., 1942.

The author discusses the removal of the effects of various geomagnetic variations from the field measurements of magnetic surveys. The removal of these effects is considered when surveys are undertaken on a world-wide scale and when the undesired effects themselves appear fairly simple and widely distributed over the earth. The approximate removal of the magnetic postperturbation from field measurements is considered, or the correction from mean of day to mean of year. Tables and diagrams complete the article.—*W. A.*

6614. Wantland, Dart, Magnetic interpretation [abstract]: Geophysics, vol. 7, No. 3, p. 339, Menasha, Wis., 1942.

The quantities measured in magnetic prospecting are considered, and a classification of magnetic anomalies is presented. Pole-depth calculations and their limitations, the shift of magnetic and structural axes, and other relationships between subsurface geologic conditions and magnetic anomalies are discussed. The usefulness of magnetic work in an exploration program and the idea of magnetic stratigraphic changes and their significance in interpretation are treated.

3. SEISMIC METHODS

6615. Billings, M. P., Geology of the central area of the Ossipee Mountains, N. H., earthquakes: Seismol. Soc. America Bull., vol. 32, No. 2, pp. 83–92, Berkeley, Calif., 1942.

The earthquakes of December 20 and 24, 1940, are described in the paper by Leet and Linehan (see abstract 6624). The author of the present article describes the areal geology and indicates what speculations the field geologist may make concerning the crust beneath the Ossipee Mountains area.—*W. A.*

6616. Deacon, L. E., An analysis of abnormal reflections [abstract]: Geophysics, vol. 7, No. 3, pp. 335–336, Menasha, Wis., 1942.

During the course of a reflection survey of an area in southwest Texas, a group of seismograms was obtained on which were recorded a number of events having abnormal apparent velocities. The dips computed from these events on the assumption that they were conventional reflections in the plane of the profile were much larger than the anticipated stratigraphic dip. This paper presents a discussion of the possible origins of these events and an analysis which affords considerable evidence that they originated on fault planes.

6617. Devlin, J. J., Langguth, L. C., and Arringdale, R. L., Macroseismic study of the New Hampshire earthquakes of December 1940: Seismol. Soc. America Bull., vol. 32, No. 2, pp. 67–73, Berkeley, Calif., 1942.

The writers have investigated the two principal shocks of December 20 and 24 in the Ossipee Mountains district. An accompanying map of isoseismal lines shows the results of the study. The scale used in determining these lines is the Modified Mercalli Intensity Scale of 1931. Assuming that the boundary of the area classified as belonging to intensity II is the limit of the area over which the shocks were felt, the writers believe that the figure of approximately 500,000 sq. miles is not too large.—*W. A.*

6618. Dix, C. H., Dip computations below unconformities [abstract]: Geophysics, vol. 7, No. 3, p. 337, Menasha, Wis., 1942.

It is often found that an unconformity separates sections of appreciable velocity differences. In such cases the computation of dips of reflectors below the unconformity will generally be influenced by the dip of the unconformity interface. The present note shows how this computation can be made and illustrates the effects involved in a particular case.

6619. Dobrin, M. B., An analytical method of making weathering corrections [abstract]: Geophysics, vol. 7, No. 3, p. 336, Menasha, Wis., 1942.

A method of correction for weathering is described by which intercept times can be rapidly and accurately computed from first arrival times without the plotting of time-distance curves. The velocities are determined by a mechanical procedure, based on least squares theory, which normally requires no exercise of judgment on the part of the computer. The application of the method to actual field set-ups is illustrated by sample calculations.

6620. Gillin, J. A., Shock, Lorenz, and Alcock, E. D., An application of seismic surveying to the location of bauxite in Arkansas [abstract]: Geophysics, vol. 7, No. 3, p. 336, Menasha, Wis., 1942.

Exploration for bauxite has been greatly stimulated by the increased demand for aluminum. The geology of the bauxite area in Arkansas is closely related to the syenite exposures on the old land surface at the end of Midway time. A refraction-seismic survey mapped the altitude of the high-velocity formations identified as syenite or Paleozoic rocks. By combining this map with a map of the Midway from scattered core holes, a map of the old land surface at the end of Midway time was obtained. By interpreting this map, future explorations by core drilling can be guided to the most favorable locations.

6621. Gutenberg, Beno, Seismology, in Geology, 1888–1938, 50th anniversary vol., pp. 439–470, New York, Geol. Soc. America, 1941.

In the chapter on seismology, Gutenberg discusses the classification, causes, mechanism and depth of focus, energy, effects, foreshocks and aftershocks, and distribution in space and time of earthquakes, as well as instruments, theory of earthquake waves, interpretation of seismograms, prevention of damage by earthquakes, earthquake scales, microseisms, and organizations for the investigation of earthquakes. In describing the rapid development of the study of earthquakes, he mentions, among the practical aspects, the reduction in loss of life due to earthquake-proof buildings and the economic value gained by "applied" seismology. As to scientific results, seismology has aided and inspired many investigations on elasticity, and it has furnished the best data on the structure of the earth. A bibliography completes the chapter.—*W. A.*

6622. Klotz, R. L., Seismic shooting near power lines: Explosives Eng., vol. 20, No. 4, pp. 108–112, Wilmington, Del., 1942.

The writer emphasizes the necessity of using a detonating fuse to reduce the number of accidents caused by shooting near transmission lines. He describes the primacord and the results of field trials.—*W. A.*

6623. Lawrence, R. W., Basic research on explosives: Explosives Eng., vol. 20, No. 5, pp. 131–136, Wilmington, Del., 1942.

The facilities, problems, and utility of basic research on explosives are examined, and the application of explosives in seismic prospecting is discussed.—*W. A.*

6624. Leet, L. D., and Linehan, Daniel, Instrumental study of the New Hampshire earthquakes of December 1940: Seismol. Soc. America Bull., vol. 32, No. 2, pp. 75–82, Berkeley, Calif., 1942.

A study of original records and bulletin readings for two strong earthquakes in the Ossipee Mountains district of southeastern New

Hampshire in December 1940 gave for both ϕ=43°50'N, λ=71°17'W.

S started from a depth of approximately 35 km., and *P* at the same time from a depth of 15 km. The second shock was multiple. Times at the focus were: 1940 December $20^d07^h27^m26^s$; $24^d13^h43^m45^s$, 47^s, and 57^s. The velocities observed, in km/sec., were: P_{1+2}—6.44, P_3—7.30, P_n—8.44; S_{1+2}—3.82, S_3—4.02, S_n—4.43.

Mechanism at the focus probably differed from that of earthquakes which involve surface faulting but is not discussed in detail in this paper. First motion from the second earthquake was reversed from that of the first at nearby stations. No foreshocks preceded the first earthquake; there was a small one just before the second; and there were only 10 aftershocks, the last one occurring on February 12, 1941. The Richter magnitude was at least 6 for the first and slightly greater for the second main shock. From this the energy can be computed as 10^{20} ergs or 7.4×10^{12} ft.-lb. This ranks both shocks as potentially destructive. They were felt to a distance of 350 miles, which means an area of potential perceptibility of the order of 385,000 sq. miles.—*Authors' abstract.*

6625. McAfee, J. C., Spiralok—a new shell for seismic shooting: Explosives Eng., vol. 20, No. 4, pp. 105–107, Wilmington, Del., 1942.

The "spiralok" shell is especially designed to meet the seismograph industry's need for dynamite cartridges, which can be simply joined together to form a column of powder possessing the strength and rigidity adequate to withstand the most severe conditions encountered in shot-hole loading. The writer describes principles of spiralok design, spiralok priming advantages, and special properties and uses of the spiralok. Figures illustrate the article.—*W. A.*

6626. Mott-Smith, L. M., Curved-path methods applied to vertical and to wide-shot spreads: Geophysics, vol. 7, No. 2, pp. 133–141, Menasha, Wis., 1942.

The ray path-wave front chart and similar methods used for vertical shots are briefly described, and the possibility and the advantages of applying the linear time law to these methods is pointed out. A short method of fitting the linear depth law to the observed velocity is described. The possibility of extending any method applicable to verticals to wide-shot spreads is shown, and a method of correcting straight path dips for curvature in the case of verticals is pointed out.—*Author's abstract.*

6627. Nasu, Nobuji, Studies on the propagation of an artificial earthquake wave through superficial soil or sand layers, and the elasticity of soil and sand: Tokyo Imp. Univ., Earthquake Research Inst., Bull., vol. 18, No. 2, pp. 289–304, 1940.

The traveltime curves of a seismic wave propagated through various sediments are discussed. The curves are expressed by equations of the form $\Delta=at+bt^2$. The depths of penetration Z_B of the ray may be computed by the expression

$$Z_B=\frac{a^2}{8\pi b}(\sin hq-q).$$

—*Author's abstract.*

6628. Piety, R. G., Interpretation of the transient behavior of the reflection seismograph: Geophysics, vol. 7, No. 2, pp. 123–132, Menasha, Wis., 1942.

This paper discusses a method of design for the reflection seismograph based on the galvanometer response when the geophone is subject to a

unit impulse. A graphical method of obtaining the actual response to an arbitrary geophone motion in terms of the impulsive response is given. A family of desirable types of impulsive response is obtained by analyzing the implications of this graphical computation when strong low- and high-frequency interference is present. The application of this method of computation to the evaluation of corrections in the apparent arrival time of reflections obtained with different instruments is outlined.—*Author's abstract.*

6629. Sharpe, J. A., The effect of charge size on reflection records [abstract]: Geophysics, vol. 7, No. 3, p. 336, Menasha, Wis., 1942.

The writer has collected a large number of recordings, made under carefully controlled conditions, in which the size of charge has been changed by a factor of 5:1 or 10:1. Sample recordings illustrate the effect of charge size on the ratio of reflected energy to ground roll and other nonreflection interference, and the effect of charge size on the frequency content of reflected motion.

6630. Sharpe, J. A., The production of elastic waves by explosion pressures, Part 1, Theory and empirical field observations: Geophysics, vol. 7, No. 2, pp. 144–154; Part 2, Results of observations near an exploding charge: Geophysics, vol. 7, No. 3, pp. 311–321, Menasha, Wis., 1942.

A solution for the problem of the wave motion produced when a pressure of arbitrary form is applied to the interior surface of a spherical cavity in an ideally elastic medium is derived. This solution is shown to be in qualitative agreement with a number of field observations of the effect of shot-point conditions on the characteristics of reflection-seismograph records.—*Author's abstract of part 1.*

A high-fidelity recording system has been used to observe the elastic-wave motion at vertical separations from an exploding charge ranging from 15 to 300 ft. The motion near the charge has a predominant frequency of about 1,000 cps. for rigid material and a duration of a few milliseconds. The motion becomes increasingly complex, and low-frequency components become dominant as the point of observation recedes from the source. A secondary wave which may be a bound wave associated with the fluid in the drill hole was observed.—*Author's abstract of part 2.*

6631. Sparks, N. R., A note on a rationalized velocity-depth equation: Geophysics, vol. 7, No. 2, pp. 142–143, Menasha, Wis., 1942.

An average velocity-depth equation of the form $V=V_0(1+aZ)/(1+bZ)$ is suggested, and its properties relative to the generalized velocity variation within the sedimentary column are discussed.—*Author's abstract.*

6632. Swan, B. G., Areal distribution of velocities in the Texas Gulf coast [abstract]: Geophysics, vol. 7, No. 3, p. 335, Menasha, Wis., 1942.

Contoured maps showing areal distribution of velocities at constant time are presented for three areas on the Texas Gulf coast, namely, League City, Northwest Manvel, and an area extending a considerable distance north from the West Citrus Grove structure. Data were obtained in the regular course of operations, a procedure being followed which allowed velocity computations from reversed spreads of 0 to 4,500′ and 0 to 5,400′. The basic formula,

$$V^2=\frac{x^2-x_1^2}{t^2-t_1^2}$$

was used in the construction of time-depth curves for each determination. Comparisons of two of these curves with nearby well-survey curves are shown. From the time-depth curves depths at constant times were read and plotted on maps for contouring and correction purposes. Comparison between the regular seismic maps and those corrected for the varying velocity distribution, as well as with the generalized subsurface maps, can be made by referring to the various maps presented.

6633. Swartz, C. A., Seismograph evidence regarding the depth of the salt in the salt-dome province of southern Mississippi [abstract]: Geophysics, vol. 7, No. 3, p. 336, Menasha, Wis., 1942.

In the salt-dome province of southern Mississippi, wherein numerous shallow piercement-type salt domes are present, fairly convincing seismograph evidence has been obtained as to the depth of the mother salt bed. Reflection records shot and recorded directly over several domes show a number of shallow reflections from the sedimentary beds above the dome, followed by a long blank space at the end of which strong reflected events appear. It is assumed that the blank reflection-free space represents traveltime in the uniform salt mass and that the prominent reflection immediately following is from the source bed of salt. Calculations show the base of the salt to be at subsea depths of 23,000 to 25,000 ft.

6634. Tsuya, H., and Minakami, Takesi, Minor activity of Volcano Sakurazima in October 1939: Tokyo Imp. Univ., Earthquake Research Inst., Bull., vol. 18, No. 2, pp. 318–339, 1940.

On October 26, 1939, an eruption broke out at Sakurazima, an active volcano in the northern part of Kagosima Bay, southern Kyusyu. The activity lasted for about 2 weeks, during which period explosions were observed more than 200 times from Arimura on the southern foot of the volcano, and 44 volcanic earthquakes were recorded by the seismometer at the Kagosima meteorological station. The eruption occurred on the east flank of Minami-dake (south cone), about 500 m. from and 300 m. below the top of the volcano, where a pitcrater, about 25 m. across and 30 m. deep, was newly opened. Incandescent lava blocks, together with accessory rock fragments, were not only scattered around the crater as volcanic ash, lapilli, and bombs, but also descended en masse as a hot volcanic avalanche from the crater for a distance of about 700 m. The authors visited the volcano and studied the results of the eruption in the middle of December the same year, when the new crater was almost completely inactive except for two weak fumaroles on the crater wall. A summary of the events during the activity is given, together with the results of geologic observation and magnetic survey of the volcano, and petrographic notes of the juvenile ejects.—*Authors' abstract.*

6635. Waters, K. H., and Arnett, R. D., Aspects of seismic curved-path computations [abstract]: Geophysics, vol. 7, No. 3, p. 337, Menasha, Wis., 1942.

Based on measured velocity data from a south Arkansas well, curved rays normal to the reflecting horizons at the point of incidence are determined using curved-path formulas for subsurface formations with inclinations of varying magnitudes. These data are compared with "straight line" data derived by using several velocity stratification assumptions. Curved-path data concerning the position of the reflecting

point and the angle of inclination are seen to agree closely with data obtained using certain "straight line" paths.

6636. Wolf, Alfred, The limiting sensitivity of seismic detectors: Geophysics, vol. 7, No. 2, pp. 115–122, Menasha, Wis., 1942.

The theory of Brownian motion is applied to the problem of determination of the limiting sensitivity of seismic detectors. It is shown that a certain minimum suspended mass is required for the recording of small ground motions. Electromagnetic geophones are studied in detail, and it is shown how spontaneous thermal fluctuations in voltage limit the performance of these instruments. Under certain conditions, a geophone may be treated as a power generator, and the necessary suspended mass is then determined by the power requirements of the recording apparatus.—*Author's abstract.*

6637. Wood, H. O., A chronologic conspectus of seismologic stations: Seismol. Soc. America Bull., vol. 32, No. 2, pp. 97–159, Berkeley, Calif., 1942.

Seismologic stations in existence and presumably in operation at different times are listed in tabular form. The successive columns of the table give country, state, or province; symbols that denote the present known status of activity; station name; date of inauguration where known, or reference to a special list; geographic coordinates; and symbols that indicate the inclusion of the stations in chronologic lists.—*W. A.*

4. ELECTRICAL METHODS

6638. England, C. M., A resistivity survey of the Monument oil field [abstract]: Geophysics, vol. 7, No. 3, p. 339, Menasha, Wis., 1942.

This paper describes an electrical-resistivity survey made in 1935 of an area in New Mexico now known as the Monument field. From the data obtained a map showing the structure at the base of the "Red Beds" was prepared, which is in good agreement with structure disclosed by wells later drilled.

Evans, Foster, Electric and magnetic effects of cosmic rays. *See* Geophys. Abstract 6598.

6639. Harper, J. L., Resistivity method of locating oil and gas pays: Oil and Gas Jour., vol. 41, No. 5, pp. 64–66, Tulsa, Okla., 1942.

The writer outlines the principles that he followed in the use of resistivity methods in exploring for oil. He describes the equipment and the procedure in the field, discusses resistivity profiles, and compares them with electrical logs. Having examined depths to over 7,800 ft., he concludes that, under favorable geologic conditions, oil and gas can be located by the resistivity method from the surface before drilling.—*W. A.*

6640. West, T. S., and Beacham, C. C., Precise measurement of the electrical-resistivity anomaly resulting from oil or gas saturation [abstract]: Geophysics, vol. 7, No. 3, pp. 339–340, Menasha, Wis., 1942.

A precise determination of deep elctrical-resistivity anomalies is obtained by a method of accurately correcting direct-current electrical-resistivity data for the influence of shallow inhomogeneities. This procedure, when employed with precise measurement of current and potential difference in areas of identical subsurface conditions, permits the obtaining of curves indicating the rate of variation of apparent resistivity with

electrode separation which may be duplicated as to form to within one-fourth of 1 percent. Methods are described of determining under field conditions the depth of prospecting, the location of the subsurface area prospected, and the fact that curves are independent of shallow inhomogeneities. Correction for shallow inhomogeneities results in curves indicating the variation of apparent resistivity with electrode separation (i. e., depth), which have relatively minute but persistent features. Such curves may be correlated over considerable areas. Detailed surveys of the Sam Fordyce, Oakville, and Seven Sisters fields, as well as other areas in southwestern Texas, are shown. Features on curves are believed to be of electrochemical origin rather than a result of variation of ohmic resistivity. This conclusion is supported by the fact that the largest and sharpest features are obtained in areas in which subsurface beds are practically homogeneous as to resistivity as measured by electrical well-logging devices. Features also appear to increase in magnitude as current density is decreased.

6641. Wolf, Alfred, The impedance of a grounded wire [abstract]: Geophysics, vol. 7, No. 3, p. 339, Menasha, Wis., 1942.

The impedance of an insulated wire stretched along the surface of the earth, regarded as a homogeneous conductor, is a function of frequency and of the conductivity of the earth. Formulas are given for the inductance and the resistance of such a wire, which are applicable under conditions met with in geophysical prospecting.

5. RADIOACTIVE METHODS

6642. Brown, S. C., Eliott, L. G., and Evans, R. D., Detection of radon by means of a proportional counter: Rev. Sci. Instruments, vol. 13, No. 4, pp. 147–161, Lancaster, Pa., 1942.

The detection of quantities of radon of the order of 10^{-12} curie by means of a proportional counter is discussed. Two methods are investigated. In one the radon is concentrated in a liquid-air trap before it is put into the counter, and in the other the volume of the counter is made sufficiently large so that the radon can be swept into the counter with a few liters of inert gas. The first method has the advantage of requiring only small counters, which work at conveniently low voltages, but has low efficiency. The second method has the advantage of simplified filling technique and higher efficiencies but suffers from the difficulty of obtaining stable operation unless the sweeping and filling gas is helium.—*Authors' abstract.*

6643. Goodman, Clark, Geological applications of nuclear physics: Jour. Applied Physics, vol. 13, No. 5, pp. 276–289, Lancaster, Pa., 1942.

Fully a decade before nuclear phenomena were recognized as such, radioactivity was improving our knowledge of the earth's heat. Since this beginning, nuclear physics has aided to some extent in understanding each of the three major branches of geologic study, that is, the history, the structure, and the composition of the earth. In the discussion that follows, these applications are briefly reviewed, and possible future developments are outlined. It should be emphasized at the outset, however, that the benefits have not been unidirectional. Nuclear physicists have acquired new knowledge of their own field through collaborative research with geologists.—*Author's abstract.*

A table shows the physical properties and the abundance and occurence of the geologically important radioactive elements; diagrams show (1) schematic classification of igneous rocks; (2) radioactive series; (3) representative radioactive content and decay products of terrestrial materials; (4) lead and helium time scales; (5) electrical and gamma-ray logs; (6) correlation between electrical logs and gamma-logs; (7) gamma-logs reveal radioactive cement; and (8) radioactive relations in the ocean.—*W. A.*

6644. Jeffreys, Harold, On the radioactivities of rocks (2d paper): Royal Astron. Soc. Monthly Notices, Geophys. Suppl., vol. 5, No. 2, pp. 37–40, London, 1942.

For the first paper see Geophys, Abstracts 87, No. 3418.

A discusssion of the proportional scatter of the amounts of Ra and Th in relation to the means for North American rocks, recently published by R. D. Evans and C. Goodman (see Geophys. Abstracts 105, No. 6050), shows that it is larger than in series for rocks of the same types given by the earlier workers when the rocks are classified by regions before making summaries. This is contrary to what would be expected if the earlier work contained larger random errors and systematic errors different for different experimenters and if North America was correctly treated as a single unit. One possible systematic error suggested by Evans and Goodman in the work of Joly and Poole has been examined and produces an effect the correction of which by itself reduces the discrepancy but does not remove it. It is concluded that North America cannot be regarded as a single unit in the discussion of terrestrial radioactivity and that progress in the subject requires more detailed attention to the problem of regional variation.—*Author's abstract.*

6645. Silverman, Daniel, and Sheffet, David, Note on the transmission of radio waves through the earth [abstract]: Geophysics, vol. 7, No. 3, p. 339, Menasha, Wis., 1942.

Experiments are described and data reported on the attenuation suffered by radio signals in passing through shallow layers of earth. Comparison is made between the measured attenuations and values computed from published formulas.

6646. Urry, W. D., The radio elements in nonequilibrium systems: Am. Jour. Sci., vol. 240, No. 6, pp. 426–436, New Haven, Conn., 1942.

An equation is derived for the relative amounts of the long-lived members of the uranium-238 series at any time prior to the establishment of radioactive equilibrium. The equation is valid for all possible initial conditions, and in its derivation no assumptions need be made for the relative amounts at zero time. The equation is general for any succession of three radio elements.—*Author's abstract.*

6647. Weaver, Paul, A theory of the distribution of radioactivity in marine sedimentary rocks: Geophysics, vol. 7, No. 2, pp. 192-198, Menasha, Wis., 1942.

Gamma-ray measurements of marine sedimentary rocks indicate that in general the slower the rate of deposition the greater the radioactivity. The most recent measurements of the radioactivity of sea water suggest an increase with depth, which indicates a very slow

settling of small particles. It is believed that a geologic time-scale of sedimentation can be established, subject to certain corrections due to fixation of radioactive minerals by organisms.—*Author's abstract.*

6. GEOTHERMAL METHODS

6648. Dale, C. R., Thermal logging of producing oil wells: California Oil World, vol. 35, No. 5, pp. 13-15, and No. 7, pp. 24-25, Los Angeles, 1942.

Interpretations of temperature anomalies observed and recorded in producing oil wells can be employed as an aid in solving such problems as locating the source of water, gas, and oil production, tracing the migration of fluids from one zone to another, and locating casing or tubing leaks. The temperature record must be taken when the well conditions are under careful control in order to recognize and locate the anomalies. A normal geothermal gradient may serve as a basis for interpretation, but if one is not available or cannot be relied upon a technique of making two successive temperature traverses, one while the well is flowing and the other with the well shut in, will permit accurate interpretation of the record. Six graphs and descriptions of problems involved in producing wells are shown.—*Author's abstract.*

6649. Hersey, J. B., A method of measuring the thermal conductivity of rock cores: Jour. Applied Physics, vol. 12, No. 7, pp. 498-501, Lancaster, Pa., 1941.

A method of measuring the thermal conductivity of long rock core samples is described. It is an adaptation of Bidwell's method of measuring the thermal conductivity of metals. The core is packed in silocel in a cylindrical container. Heat is supplied by a flat electric heater on one end of the core sample, and measurements of temperature are made along the core and at several radial distances in the insulator. Isothermal surfaces in the insulator are determined and found to be conical surfaces within several centimeters of the core. These are parallel for some distance along the core. Using this fact, the conductivity of the core is computed relative to that of the silocel. A value 5.92×10^{-3} cal./cm. deg. sec. was obtained for a sample of norite and 2.59×10^{-3} for a pyrex rod at a room temperature.—*Author's abstract.*

7. GEOCHEMICAL METHODS

6650. Rosaire, E. E., and Horvitz, Leo, The sedimentary hydrocarbon survey of the Washburn ranch oil field, La Salle County, Tex. [abstract]: Geophysics, vol. 7, No. 3, p. 337, Menasha, Wis., 1942.

Data obtained during a sedimentary hydrocarbon survey of the Washburn ranch oil field in La Salle County, Tex., are presented showing the anomaly mapped in this area.

6651. Wilson, R. W., Application of mud-analysis logging in Gulf coast area: Oil and Gas Jour., vol. 41, No. 7, pp. 86-87, 164, Tulsa, Okla., 1942.

The writer discusses the application of mud-analysis logging in the Gulf coast area and gives a brief description of improvements in the apparatus and method. Mud-analysis logs illustrate the method.—*W. A.*

8. UNCLASSIFIED METHODS AND TOPICS RELATED TO GEOPHYSICS

6652. Bradford, D. C., Geophysical education: Am. Inst. Min. Met. Eng. Tech. Pub. 1488, 9 pp., New York, 1942.

The place of geophysics in the curriculum of a college or an engineering school is discussed from two points of view: (1) That of a prospective employer, who visualizes the graduate in terms of the routine work he will do in the field; and (2) that of members of a university faculty, who visualize the graduate in terms of his position in a political and cultural society, as well as in his work as a professional geophysicist. These viewpoints are treated separately, and the conclusions are integrated as a set of conditions that should be fulfilled as far as possible in the ideal curriculum.

At the end, the relations of the findings of the author to the curriculum that has been tentatively adopted at the University of Pittsburgh are considered.—*W. A.*

6653. Brunner, W., Final relative sunspot numbers for 1941: Terres. Magn. Atmos. Electr., vol. 47, No. 2, pp. 155–158, Baltimore, Md., 1942.

Tables show the final relative sunspot numbers for the whole disk of the sun for 1941 and the mean of yearly relative numbers. Graphs show the daily relative sunspot numbers for 1941 and the observed and smoothed monthly relative numbers for 1933.—*W. A.*

6654. Eckhardt, E. A., Striking expansion in geophysical operations: Oil Weekly, vol. 105, No. 7, pp. 38–40, Houston, Tex., 1942.

On May 27, 1941, an unlimited emergency was proclaimed by the President of the United States. Since then, geophysical prospecting has undergone the most striking expansion witnessed in the past 5 years. From 181 seismograph parties reported to be operating in the United States in April 1941, the number had increased to 230 parties in February 1942, an increase of 27 percent. A detailed chart shows the number of geophysical seismograph parties operating in the United States during the year 1938. The number of gravimetric parties operating in 1941 averaged somewhat more than 54 and remained about the same in 1942; the number of magnetometer parties in 1941 averaged 19.1, declining gradually during 1941 but picking up again in 1942. Geochemical, electrical, and torsion-balance operations were restricted.—*W. A.*

6655. Kelly, S. F., Integration of geology, physics, and chemistry for the solution of earth problems: Am. Inst. Min. Met. Eng. Tech. Pub. 1483, 20 pp., New York, 1942.

This is a report of the Geophysics Education Committee of the American Institute of Mining Engineers that was made at the meeting held in New York in February 1942. It represents the conclusions drawn from the investigations and deliberations undertaken, since the committee was first organized 4 years ago, with regard to problems concerning the educational preparation of professional geophysicists. The report is followed by discussions.—*W. A.*

6656. Weaver, Paul, The relative place of empirical and analytic methods of geophysical interpretation: Geophysics, vol. 7, No. 3, pp. 281–292, Menasha, Wis., 1942.

The pioneer in geophysics has, in most cases, used empirical methods on his first jobs in the field. Frequently, such an initial campaign has been successful in that valuable evidence has been obtained as to the position of a new ore deposit. Thereupon the method has received recognition so that additional parties have gone into field work; also, analytic methods have then been applied to show why the particular method succeeded in some cases and how far it would be likely to succeed in border-line problems.

After a discussion of the difference between empirical and analytic procedure, the author reviews the history of one geophysical project—the search for iron ore in the Lake Superior region by magnetic methods—describing the empirical efforts and the subsequent analysis. He then suggests that failures on certain other jobs might be less if the analysis be made earlier, and that there will be an economy if this analysis be made before field work begins.—*Author's abstract.*

This paper, which was read at the annual meeting of the Society of Exploration Geophysicists at Denver in April 1942, is followed by a discussion (pp. 288–292) conducted by L. L. Nettleton, Frank Goldstone, J. B. Macelwane, R. C. Coffin, and W. T. Born.—*W. A.*

9. NEW PUBLICATIONS

6657. Birch, Francis, Shairer, J. F., and Spicer, H. C., Handbook of physical constants: Geol. Soc. America Special Paper 36, 325 pp., New York, 1942. Price, $1.40.

The Handbook of physical constants contains 21 sections prepared by 19 specialists, who cooperated through the divisions of chemistry, physics, and geology of the National Research Council.

6658. Earthquake notes, A. K. Ludy, editor, vol. 13, No. 4, 8 pp.: Seismol. Soc. America, Eastern Section, Washington, D. C., 1942.

This issue contains the following notes: (1) Captain Heck honored; (2) 1942 annual meeting of the Eastern Section of the Seismological Society of America; (3) The Lewiston-Auburn, Maine, earthquake of March 8, 1942; (4) Surveys at Long Beach, Calif.; (5) The Golden Gate Bridge; (6) A correction of the number of seismological stations in New Zealand as shown on p. 5, vol. 11, No. 3 of Earthquake notes; (7) International seismological summary; (8) Earthquakes registered in New South Wales; (9) Recent earthquakes; (10) More notes on the earthquake of November 25, 1941; (11) New items from New England; (12) Amateur seismology; (13) Earthquakes in central United States; (14) Earthquakes registered at Kew; (15) Epicenters; and (16) Officers of the Eastern Section, Seismological Society of America.—*W. A.*

6659. Meinzer, O. E., Hydrology, 712 pp., illus., New York, McGraw-Hill Book Co., Inc., 1942. Price, $7.50.

This is volume 9 of the series known as Physics of the earth, and it was prepared under the direction of the National Research Council and edited by Meinzer. It gives full information about the waters of

the earth and about the development, present status, and problems of the science relating to them. Each of the 15 chapters of the book has an extensive bibliography.—*W. A.*

6660. Poldini, E., Quelques résultats de prospection électrique [Some results of electrical prospecting]: Univ. Lausanne, Lab. géologie, géographie, physique, mineralogie, et paleontologie, Bull. 69, 77 pp., Vevey, 1940.

After an introductory chapter dealing with heterogeneous subsoil from the electrical prospector's viewpoint, the author describes the technique of electrical-prospecting methods; the measurement of apparent resistivities; various possibilities of prospecting for minerals, oil, and water; and the application of electrical methods in the solution of engineering problems. He mentions the advantages of electrical methods, especially their rapidity and economy.—*W. A.*

6661. Stumpff, K., Ermittlung und Realität von Periodizitäten. Korrelationsrechnung [Determination and reality of periodicities—Calculation of correlations], Handbuch der Geophysik, vol. 10, No. 1, 117 pp., Verlag von Gebrüder Borntraeger, Berlin, 1940.

This is the latest addition to the Handbook of geophysics. The contents of the volumes issued previously are given in Geophys. Abstracts 93, No. 4405.—*W. A.*

6662. Twenhofel, W. H., and Tyler, S. A., Methods of study of sediments, 183 pp., 24 tables, illus., New York, McGraw-Hill Book Co., Inc., 1942. Price, $2.

This book states the objectives of studies of sediments and outlines specific methods by which these objectives may be attained. Standard methods of sampling for various types of sediments and rocks are described, methods for analyses are given, and miscellaneous forms of graphic representation of the characteristics of sediments and sedimentary rocks are shown.—*W. A.*

10. PATENTS

6663. Auxiliary electrode for ground-resistance measurement; Norris Whitney Matthews, Caldwell, Ohio: U. S. patent 2,270,325, issued January 20, 1942.

This invention relates to an auxiliary ground electrode adapted to be inserted in the earth to the proper depth for testing ground resistance and then removed after the test is completed, said electrode comprising a shank having a lower portion adapted to be inserted in the earth and having an upper portion adapted to protrude above the surface of the earth, anvils spaced along the upper portion of the shank and fixed in position thereon, said anvils having opposed substantially radially disposed impact receiving surfaces extending around the shank for transmitting a substantially axial thrust thereto when impacted, and an annular hammer disposed about the shank between said anvils for selectively impacting the latter. Claims allowed, 3.

6664. Method for electrical investigation of cased drill holes; Edward Lipson, Houston, Tex.: U. S. patent 2,273,363, issued February 17, 1942.

This invention relates to a method of determining the location, nature, and extent of formations penetrated by a cased borehole, comprising the steps of successively passing from points within the casing to a point in the earth exteriorly of the casing and in spaced relation with the borehole an electric current between substantially the limits of 0.2

ampere and 1.0 ampere and measuring the fluctuations of the potential between the said points within the casing and a point exteriorly thereof but in spaced relation with the well bore and the exterior point of current application. Claims allowed, 2.

6665. System for making weathering corrections; Herbert Hoover, Jr., Sierra Madre, and Hugh C. Schaeffer, Tulare, Calif., assignors by direct and mesne assignments to Consolidated Engineering Corporation, Pasadena, Calif., a corporation of California: U. S. patent 2,276,306, issued March 17, 1942.

This invention relates to the method of obtaining data for making weathering corrections in an area where a weathered layer and a contiguous subweathered layer have different seismic-wave velocities on opposite sides of the interface separating the layers, which comprises the steps of generating at a point adjacent the surface a seismic wave which travels through the weathered layer into the subweathered layer along a path which is substantially perpendicular to the interface separating the two layers; receiving the wave at a plurality of spaced points within the layers at known depths; and measuring the time elapsed between the instant of wave generation to the instant of wave reception at each of the reception points, whereby the location of the bottom of the weathered layer and the time required for the wave to travel therethrough may be determined from a discontinuity in the relationship between wave traveltime and reception-point depth. Claims allowed, 8.

6666. Method of making weathering corrections; Raymond A. Peterson, Altadena, Calif., assignor by mesne assignments to Consolidated Engineering Corporation, Pasadena, Calif., a corporation of California: U. S. patent 2,276,335, issued March 17, 1942.

In the method of locating the bottom of a weathered layer having a relatively low seismic-wave velocity and overlying a contiguous subweathered layer having a relatively high seismic-wave velocity, the improvement which comprises generating a set of seismic waves which travels in the subweathered layer and substantially parallel to the interface separating the layers, some of which waves are refracted at the interface into the weathered layer at substantially the critical angle; receiving at a line of collinear points within the layers and at known depths both the refracted waves and waves which have traveled in the subweathered layer without refraction; and measuring the relative times of arrival of the waves at the respective reception points to locate the interface between said layers. Claims allowed, 4.

6667. Recording system; Daniel Silverman, Tulsa, Okla., assignor to Stanolind Oil & Gas Co., Tulsa, Okla., a corporation of Delaware: U. S. patent 2,276,423, issued March 17, 1942.

A recording system for a plurality of electrical signals to be recorded as a plurality of indicia on a moving record strip so that the records of signals occurring simultaneously are alined with each other, which comprises a plurality of time-lag elements adapted to delay the transmission of various of said signals and a plurality of record-drawing elements, at least some of said record-drawing elements being constructed and arranged to record said delayed signals as indicia on said record strip, the width of said record strip on which said signals are

to be recorded being less than the aggregate effective width of said plurality of record-drawing elements, said plurality of record-drawing elements being arranged in a plurality of lines in staggered relationship with each other, said time-lag elements being constructed and arranged to produce displacements of said indicia equal and opposite to the displacements of said indicia caused by the staggered relationship of said record-drawing elements constructed and arranged to record said delayed signals, thereby compensating for the differences in position of said plurality of record-drawing elements measured in the direction of motion of said record strip. Claims allowed, 8.

6668. Method of determining where pipe is stuck in a well; Curtis H. Johnson, Santa Monica, Calif.: U. S. patent 2,277,110, issued March 24, 1942.

In a method of determining the condition of a pipe in a borehole, the improvement which comprises imparting to the solid material forming the wall of the pipe at a point adjacent the upper end thereof an impulse which travels downward in the pipe wall and is partially reflected upward at reflection points at different depths in the pipe wall, at least one of the reflection points being at an unknown depth; receiving the reflected impulses at a point adjacent the upper end of the pipe; and measuring the time required for impulses to travel from the point of impulse origin to the respective reflection points and from there to the receiving point. Claims allowed, 8.

6669. Timing device; Malcolm McCarty, Dallas, Tex., assignor by mesne assignments to Socony-Vacuum Oil Co., Inc., New York, N. Y., a corporation of New York: U. S. patent 2,277,521, issued March 24, 1942.

In an electric timing device for oscillographs, a vibrating element; a thin armature supported on the moving end of said vibrating element parallel to the plane of vibration of said element; a disk-shaped member provided with a slot intermediate the peripheral edges thereof, in which a portion of said armature moves during vibration of said element; a plurality of coils coaxial with said disk-shaped member; and means completing a magnetic circuit about said coils at each side of said disk-shaped member from the center to the periphery thereof. Claims allowed, 2.

6670. Apparatus for geophysical prospecting; Theodor Zuschlag, West Englewood, N. J., assignor by mesne assignments to Lundberg Exploration S. A., Panama City, Panama, a corporation of Panama: U. S. patent 2,278,506, issued April 7, 1942.

This invention relates to apparatus for detailed analysis of electrical ground transients, comprising a source of direct electrical current flow; means for intermittently reversing said flow; pick-up means; means for reversing the output of the pick-up means; an indicating device which is normally nonconductive; periodically operating timing means for rendering said device conductive for short and preselected time periods during the current flow; means to balance said indicating device; and means for reading the time and amplitude constants of the measured ground transients. Claims allowed, 9.

6671. Geochemical prospecting; Leo Horvitz, Houston, Tex., assignor to Esme E. Rosaire, Houston, Tex.: U. S. patent 2,278,929, issued April 7, 1942.

This invention relates to a method for locating subterranean carboniferous deposits, which comprises systematically collecting samples of

soil at spaced intervals in an area to be explored, subjecting each sample to the action of an acid capable of reacting with a free metal to liberate hydrogen, and measuring the hydrogen evolved. Claims allowed, 16.

6672. Method and apparatus for seismic surveying; Joseph L. Adler, Houston, Tex., assignor to Fabian M. Kannenstine, Houston, Tex.: U. S. patent 2,279,191, issued April 7, 1942.

In the seismic method of geophysical prospecting wherein a plurality of spaced detectors convert arriving seismic impulses into pulsations of electrical energy to obtain frequency-analyzed seismic records, the steps of transmitting the pulsations from each point of detection to an amplifier; coordinating a series of band-pass filters; conducting the amplified impulses through such series of band-pass filter, the band of frequencies passed by each individual filter being different from that passed by each of the other filters so that the series of filters when coordinated together pass the spectrum of frequencies present in the arriving seismic impulses; and recording in separate traces the impulses passed by the respective filters. Claims allowed, 3.

6673. Torsion gravimeter; John Marion Crawford and Harold Raymond Prescott, Ponca City, Okla., assignors to Continental Oil Co., Ponca City, Okla., a corporation of Delaware: U. S. patent 2,279,261, issued April 7, 1942.

A gravity-surveying instrument including in combination a supporting means; a first torsion fiber supported by said means; a second torsion fiber supported by said means in spaced relation to said first fiber; a weight arm extending substantially in a horizontal plane fixed to and carried by said first torsion fiber; a labilizer arm extending substantially in a vertical plane fixed to and carried by said second torsion fiber; and a labilizer fiber extending between said labilizer arm and said weight arm. Claims allowed, 7.

6674. Gravity meter; Dayton H. Clewell, Dallas, Tex., assignor by mesne assignments to Socony-Vacuum Oil Co., Inc., New York, N. Y., a corporation of Delaware: U. S. patent 2,281,001, issued April 28, 1942.

In a gravity meter that comprises a support, a main mass, means for pivotally securing the mass to the support in such a manner that the pivotal point and the center of gravity of the mass are in different vertical planes, elastic means for supporting the mass against the action of vertical components of gravitational force, means for indicating the disposition of the mass relative to the support, and means for nulling the gravity meter by returning the mass to a predetermined indicated position, said means comprising an auxiliary mass pendulously fixed to the main mass and means for shifting the auxiliary mass in a substantially horizontal direction to effect a change in the location of the center of gravity through which gravitational forces act. Claims allowed, 7.

6675. Seismic-wave-generation apparatus; Raymond T. Cloud, Tulsa, Okla., assignor to Stanolind Oil & Gas Co., Tulsa, Okla., a corporation of Delaware: U. S. patent 2,281,751, issued May 5, 1942.

This invention relates to apparatus for generating seismic waves for use in geophysical prospecting, comprising a localized body of fluid substantially completely confined beneath the surface of the earth; a conduit enclosing a fluid column communicating with said localized body of fluid and extending therefrom upwardly to a point

above the surface of the earth, said localized body of fluid being in intimate pressure-responsive relationship with the earth surrounding said body, said fluid column being relatively free from pressure-responsive relationship with the earth surrounding said column; and means for applying pressure stresses to the upper part of said fluid column for transmission through said fluid column to said localized body of fluid and thence to the earth surrounding said localized body of fluid. Claims allowed, 18.

6676. Logging of permeable formations traversed by wells; Paul F. Hawley, Tulsa, Okla., assignor to Standard Oil & Gas Co., Tulsa, Okla., a corporation of Delaware: U. S. patent 2,281,766, issued May 5, 1942.

This invention relates to the method of logging permeable earth formations traversed by a fluid-containing well, which comprises measuring a function of the natural potential difference between a point located substantially on the axis of said well and at least one point adjacent the wall of said well. Claims allowed, 6.

6677. Apparatus for seismograph prospecting; Otto F. Ritzmann, Pittsburgh, Pa., assignor to Gulf Research & Development Co., Pittsburgh, Pa., a corporation of Delaware: U. S. patent 2,281,949, issued May 5, 1942.

This invention relates to seismograph-prospecting apparatus, comprising in combination means for detecting seismic waves in the earth and arranged to produce electrical signals corresponding to such waves; amplifying means having the input thereof connected to the detecting means; recording means for the amplified signals; electrically operable control means for the amplifying means and adapted to control a characteristic of the amplifying means in accordance with the magnitude of electrical energy applied to the control means; and means for delivering signal energy from the detecting means to said control means for operation of said control means at a time not later than the delivery of signal energy from the detecting means to the input of said amplifying means, said means for delivering signal energy to said control means comprising a detecting means nearer the source of seismic waves than the remaining detecting means, means for rectifying signals from said detecting means, and means for applying the rectified signal energy to the amplifier-control means. Claims allowed, 13.

6678. Apparatus for logging bores; Victor V. Vacquier, Oakmont, Pa., assignor to Gulf Research & Development Co., Pittsburgh, Pa., a corporation of Delaware: U. S. patent 2,281,960, issued May 5, 1942.

This invention relates to apparatus for logging earth bores, comprising a supporting member adapted to be lowered in an earth bore; means for suspending the supporting member in the bore; a stylus resiliently supported on the supporting member for pressure against the bore wall; means for recording vibrations of the stylus as the stylus moves over the bore wall; and depth-measuring means for measuring and exhibiting the depth of the stylus at various positions in the bore. Claims allowed, 3.

6679. Method and apparatus for soil-gas analysis: Henry N. Herrick, Berkeley, Calif., assignor to Standard Oil Co. of California, San Francisco, Calif., a corporation of Delaware: U. S. patent 2,284,147, issued May 26, 1942.

This invention relates to apparatus for collecting hydrocarbon gases from a shallow bore in the earth, comprising an open-ended conduit

adapted to be sealed in a bore hole in the earth; a container connected to said conduit; and absorption means in said container, said absorption means arranged to offer substantially low resistance to the passage of gas through said container and said conduit under the pressure differentials caused by variations in atmospheric pressure. Claims allowed, 7.

6680. Method and apparatus for geophysical prospecting; Carleton H. Schlesman, Camden, N. J., assignor to Socony-Vacuum Oil Co., Inc., New York, N. Y., a corporation of New York: U. S. patent 2,284,345, issued May 26, 1942.

This invention relates to geophysical-prospecting apparatus, comprising a plurality of closely adjacent coaxially arranged radiation detectors; means for accumulating detections from said detectors in sequence and at a predetermined rate; means for indicating the accumulated detections as an index of the character of geophysical formations in the vicinity of the apparatus; and correlating the delay interposed in the signals of the detectors with the rate at which the detectors are moved past a point. Claims allowed, 15.

6681. Method and apparatus for electrical prospecting; Marcel Schlumberger, Fabert-Paris, France: U. S. patent 2,284,990, issued June 2, 1942.

This invention relates to a system for the electrical prospecting of the undersoil, which comprises, in combination, at least two grounding means; recording means electrically connected with said grounding means for recording variations of the potential difference between said respective grounding means; and additional means, associated with said recording means, for preventing telluric oscillations of frequencies ranging with at least one band from influencing said recording means. Claims allowed, 8.

6682. Method and apparatus for seismic surveying; Olive S. Petty, San Antonio, Tex.: U. S. patent 2,285,610, issued June 9, 1942.

An apparatus for use in seismic surveying, the combination with means for converting seismic impulses into electrical wave-form energy; means including a plurality of thermionic valve circuits for amplifying said wave-form energy, one of said circuits having associated therewith means for obtaining a derivative of said energy; an interstage transformer between adjacent circuits; means for selectively establishing a direct or a capacitive coupling between the transformer and the preceding one of said adjacent circuits; and means for recording the energy thus differentiated to produce a record generally representative of a derivative of the initial wave-form energy. Claims allowed, 4.

6683. Well-surveying method and apparatus; Robert F. Davis, Washington, D, C., assignor to Well Surveys, Inc., Tulsa, Okla., a corporation of Delaware: U. S. patent 2,285,809, issued June 9, 1942.

This invention relates to a method of geophysical prospecting that comprises determining the natural radioactivity of formations adjacent a well bore or similar opening in the ground at various depths in the opening; continuously generating mechanical vibrations at the place where the determinations are being made; altering the frequency of the vibrations in accordance with the measurement; transmitting the altered mechanical vibrations to the surface of the earth; simulta-

neously determining the position of the measuring instrument in the opening; and recording the alteration of the mechanical vibrations in correlation with determination of depth. Claims allowed, 18.

6684. Well-survey method and apparatus; Serge Alexander Scherbatskoy, Tulsa, Okla., assignor to Well Surveys, Inc., Tulsa, Okla., a corporation of Delaware: U. S. patent 2,285,840, issued June 9, 1942.

This invention relates to a method of geophysical exploration utilizing radiations of the type that emanate from radioactive materials, which comprises measuring the intensity of the radiations, both of the hard and soft variety, present at various locations adjacent to the formations to be explored; measuring the intensity of the hard radiations only at the same locations; and combining said two measurements at each location to obtain a differential measurement for each location. Claims allowed, 21.

6685. Apparatus for and method of receiving and recording vibrations; Otto F. Ritzmann, Pittsburgh, Pa., assignor to Gulf Research & Development Co., Pittsburgh, Pa., a corporation of Delaware: U. S. patent 2,286,106, issued June 9, 1942.

In apparatus for receiving a series of mechanical vibrations that begins with a relatively high amplitude portion, followed by a portion of generally less amplitude, which apparatus includes detector means adapted to detect such vibrations and to produce oscillating electrical signals of fluctuating amplitude in response to such vibrations; a signal amplifier coupled to the detector means; a signal recorder coupled to the amplifier; a primary amplifier-characteristic control circuit associated with the amplifier circuit and adapted on supply to said control circuit of signal energy to vary a characteristic of the amplifier in proportion to said signal energy, and on suppression of said supply to gradually produce progressively less variation in said characteristic; and means for supplying signal energy to said circuit; the improvement comprising a secondary control circuit associated with said primary control circuit and adapted on supply of signal energy to said secondary control circuit, above a predetermined amplitude, gradually to suppress and maintain suppressed said supply of signal energy to the primary control circuit and means supplying signal energy to said secondary control circuit, whereby beginning after receipt of signal energy above said predetermined amplitude said amplifier characteristic is gradually restored to its uncontrolled value. Claims allowed, 7.

6686. Seismometer; Daniel Silverman, Tulsa, Okla., assignor to Standard Oil & Gas Co., Tulsa, Okla., a corporation of Delaware: U. S. patent 2,286,386, issued June 16, 1942.

A seismometer comprising a case; two coils; two magnets, one of said coils being disposed in the field of one of said magnets and the other of said coils in the field of the other of said magnets; an elastic suspension constructed and arranged to restrain relative motion between one of said coils and its associated magnet except in a single degree of freedom; a second and independent elastic suspension constructed and arranged to restrain relative motion between the other of said coils and its associated magnet except in a corresponding single degree of freedom such that small relative motions between each of said coils and its associated magnet are at least approximately parallel to the same straight line; and means for electrically inter-

connecting said coils to combine their outputs when relative motions between the two coils and their respective associated magnets are in the same sense and to oppose their outputs when relative motions between said coils and their respective associated magnets are in opposite senses, whereby said seismometer is responsive only to forces having a translational component in the direction of said straight line and is not responsive to rotational forces. Claims allowed, 15.

6687. Seismic surveying; Josephus O. Parr, Jr., San Antonio, Tex., assignor to Olive S. Petty, San Antonio, Tex.: U. S. patent 2,286,567, issued June 16, 1942.

In apparatus for use in seismic surveying, the combination with a plurality of groups of seismometers, of a plurality of electrical circuits, each circuit including a plurality of thermionic valves, said valves in each of said circuits being biased to cut-off and being arranged in series in their respective circuits, the anode of each valve being connected to the cathode of an adjacent valve, and means feeding the output of the seismometers in each group to the respective valves of one of said circuits and recording means operable by the output of each circuit for concurrently recording the outputs of said circuits on a common record sheet. Claims allowed, 10.

6688. Means and method for analysis; Leo Horvitz, Houston, Tex., assignor to E. E. Rosaire, Houston, Tex.: U. S. patent 2,287,101, issued June 29, 1942.

This invention relates to a gas-analysis apparatus, comprising a closed cycle through which gas may be continuously circulated; a refrigerating zone in said cycle; a combustion zone in said cycle; means for circulating gas around said cycle; a pressure-indicating means in said cycle; means for introducing gas to be analyzed into said cycle; and means for withdrawing gas from said cycle. Claims allowed, 8.

6689. Core-taking projectile; Marcel Schlumberger, Paris, France: U. S. patent 2,288,210, issued June 30, 1942.

This invention relates to a coring tool, comprising a hollow member adapted to be driven into a formation and an element detachably secured to the hollow member, said element having means extending outwardly from the said hollow member for making a hole in a formation, of greater cross-sectional area than the outer cross-sectional area of the hollow member, and being adapted to be loosened by the impact of the tool with the formation in order to facilitate the removal of the hollow member from the formation. Claims allowed, 16.

6690. Gamma-ray well logging; Lynn G. Howell, Houston, Tex., assignor to Standard Oil Development Co., a corporation of Delaware: U. S. patent 2,288,278, issued June 30, 1942.

This invention relates to a method for logging boreholes by measuring gamma-ray intensity along the borehole by the use of a Geiger-Muller counter, which comprises lowering a plurality of Geiger-Muller counters in the borehole; isolating from the pulses generated by each counter a band of the frequencies contained in said pulses, said band so isolated being different for each counter and the various bands so selected as not to overlap; transmitting the bands so isolated to the surface through a single conductor; separating the bands at the surface; and separately recording a plurality of values, each of which is a function of the frequency of the pulses of an individual counter. Claims allowed, 2.

6691. Apparatus for geoelectric and seismic investigations; Theodor Zuschlag, West Englewood, N. J., assignor by mesne assignments to Lundberg Exploration S. A., Panama City, Panama, a corporation of Panama: U. S. patent 2,288,310, issued June 30, 1942.

This invention relates to apparatus for determining the amplitude ratio and phase difference of sine-wave electromotive forces of the same frequency, comprising a plurality of sources of electrical waves of the same frequency which may differ in amplitude and phase; a nonreactive resistance network constructed and arranged to measure amplitude and phase comprising a plurality of nonreactive electrical impedances connected in series, respectively, with said sources; a plurality of similar electrical amplifiers connected in circuit with said impedances; and an indicating device connected in bridge relationship with said amplifiers. Claims allowed, 4.

6692. Soil-sample analysis for oil; Ralph H. Fash, Trustee, Fort Worth, assignee of John G. Campbell, Houston, both in Texas, United States of America: Canadian patent 402,695, issued February 3, 1942.

This invention relates to a method of locating oil deposits, which consists in determining the oil content of earth samples by measuring the fluorescent light produced when an extract from each sample is subjected to ultraviolet light, and in adjusting the data thus obtained on the basis of the surface area of the particles comprising each earth sample. Claims allowed, 11.

6693. Geochemical well-logging method; Standard Oil Development Co., Linden, N. J., assignee of Leo Horvitz and Esme E. Rosaire, both of Houston, Tex., both in the United States of America: Canadian patent 404,298, issued April 21, 1942.

This invention relates to a method for logging a borehole drilled for the production of petroleum, which comprises securing samples of earth at selected points along the borehole and analyzing each sample for its content of at least one constituent significant of the proximity of a petroleum deposit, whereby the concentrations of the constituents so determined may be correlated with depth. Claims allowed, 15.

6694. Well-logging apparatus; Standard Oil Development Co., Linden, N. J., assignee of Ludwig W. Blau and Robert R. Thompson, both of Houston, Tex., United States of America: Canadian patent 404,738, issued May 12, 1942.

This invention relates to a method for producing a composite well log, which comprises moving a pair of spaced conductive elements along a borehole filled with an aqueous fluid; feeding to one of said conductive elements a unidirectional current having a wave form varying between a minimum and a maximum value; picking up said current after its passage through the substrata around the borehole by said other conductive element at successive points along said borehole; simultaneously picking up, by said other conductive element, the natural earth potential between each of said successive points and a fixed point; simultaneously applying said picked-up current and potential to a recording instrument having a movable element sensitive to both; and recording the movement of said element. Claims allowed, 15.

6695. Seismograph-amplitude control; Shell Development Co., San Francisco, Calif., assignee to John Price Woods, Houston, Tex., both in the United States of America: Canadian patent 405,035, issued May 26, 1942.

In a system for controlling the output of a vacuum-tube amplifier for seismic recorders a stationary base; a carriage movable thereon by gravity over a limited path; a member supporting a source of light and a light-sensitive element; means for energizing said element, whereby said element is caused to generate an electromotive force as a function of the amount of light received by said element, the circuit comprising said energizing means and said light-sensitive element being connected to the grid of said amplifier; a screen member transversely insertable between said source of light and said light-sensitive element, one of said members being stationary, whereby the gravity-responsive motion of the carriage displaces the screen with regard to the light source and the light-sensitive element; and means for adjustably varying the light-arresting area of said screen, whereby the amount of light received by said light-sensitive element is modified as a predetermined controllable function of time during the period of motion of the carriage. Claims allowed, 9.

6696. Core-orienting apparatus: Sperry-Sun Well Surveying Co., Philadelphia, assignee of John M. Pearson, Swarthmore, both in Pennsylvania, United States of America: Canadian patent 405,970, issued July 7, 1942.

This invention relates to the method of determining the magnetic properties of cores from boreholes, comprising rotating a core about its axis adjacent a suspended magnetic system with at least one end of said core adjacent one pole of the magnetic system; noting the deflections of said system during rotation of the core; again rotating the core about its axis adjacent to and similarly placed with respect to the suspended magnetic system but with said end of said core adjacent an opposite pole of the magnetic system; and again noting the deflections of said system during rotation of the core. Claims allowed, 8.

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