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The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are *sharp*, the articles *short*, and the facts *authentic*, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.

LOCAL MAGNETIC DISTURBANCES AND THE GENESIS OF PETROLEUM.

In a bulletin recently published by the Geological Survey, Mr. George F. Beiker ingeniously inquires whether there is not a hitherto unsuspected relation between magnetic disturbances as manifested by the compass needle and petroleum deposits. Any such attempt must necessarily be based on some definite theory of petroleum's origin. Accordingly Mr. Beiker summarizes the condition of knowledge with reference to the origin of petroleum and other bituminous substances. The result is thoroughly unsatisfactory. Some oils are undoubtedly organic and some are beyond question inorganic. The evidence shows that neither variety can properly be regarded as unimportant. Mr. Beiker's review, however, does not elucidate the source of the principal deposits, the great petroleum pools. They may have been derived from carbonaceous matter of vegetable or animal origin, and they may have been derived from carbides of iron or other metals. It is also barely possible that the hydrocarbons exist as such in the mass of the earth.

In thinking over this situation it occurred to him to inquire whether any relation could be detected between the behavior of the compass needle and the distribution of hydrocarbons. Not very much could be expected from a comparison of these phenomena, for magnetite exerts an attraction on the needle whether this ore occurs in solid masses or is disseminated in massive rocks; and again, many if not all volcanic rocks possess polarity, so that repulsions are involved as well as attractions. Even if the iron carbide theory of genesis were known to be correct, and exclusively correct, no one would think of maintaining that all bodies of magnetite have a connection, however remote, with the occurrence of petroleum. Hence any indications of iron carbides and associated petroleum which the compass might be supposed to afford would be obscured by the local attraction of independent masses of magnetite. Earth currents are also to some extent local and thus produce irregularities in declination.

Nevertheless, irregularities of the curves of equal declination on Bauer's map of the magnetic declination in the United States, are strongly marked in the principal oil regions. When this map is compared with one prepared by Mr. David T. Day showing in detail the known hydrocarbon deposits of the United States the coincidences recognized become more striking and other agreements become evident.

The most marked agreement is found throughout the great Appalachian oil field, which is the area of greatest variation in declination. In California, also, strong deflections of the isogonal lines accompany the chain of hydrocarbon deposits. In the interior of the country the coincidences are less marked, but they are very noticeable.

There are other systematic irregularities, wrinkles in the isogonic topography, which can not be connected with oil. One such wrinkle runs down the Atlantic coast and contains the New Jersey native iron as well as known deposits of magnetite. Another lies near latitude 47 deg. and is doubtless due to the great northern iron belt.

No detailed chart of the magnetic declination in the petroleum fields of the Caucasus has yet been prepared. Mr. Bauer states that great magnetic disturbances exist in that region, so that relations not dissimilar to those in this country are probable.

On the whole, coincidences between the occurrence of petroleum and local disturbances of the compass needle are too numerous to be attributable to mere accident or chance. There must therefore be a direct or an indirect historical connection between the two phenomena in the regions of coincidence.

No one doubts the vast industrial importance as well as the deep geological interest of the petroleum question. As time elapses it will grow more and more important, for the pinch of dwindling coal resources will probably affect children of those already born. In the interest both of the development and the conservation of our natural resources all the means at the command of science should be brought to bear on this mysterious subject. A geologist and a chemist each of the highest order should be coupled in the long and difficult investigations needed to elucidate the genesis of petroleum. The initial expense would be considerable, but the ultimate economy would be enormous.

THE FIFTH VANDERBILT CUP RACE AND THE GOOD ROADS TOUR FROM NEW YORK TO ATLANTA.

It is seldom that the public has an opportunity to witness notable speed and reliability contests contemporaneously, but such was the case this year when the Vanderbilt cup race was run on Long Island on October 30th, while the reliability tour promoted by the New York Herald and the Atlanta Journal was also being conducted.

Although the race has lost much of its former glamor through the substitution of high-powered stock chassis for the huge racers that used to compete, it nevertheless gives a good idea of the speed and endurance qualities of the machines that are being regularly produced for the market.

The fifth annual race was run over a 12.64-mile course, which included the cement motor parkway, upon Long Island, and consisted of 22 laps (278.08 miles). There were 15 competitors, while the four stock cars that took part in the Wheatley Hills Trophy race and the six in the race for the Massapequa Trophy, both of which were run simultaneously, made a total of 25 machines that were traveling around the course at the start. The two secondary races were 189.6 and 126.1 miles in length respectively, and were for cars of smaller horse-power and lighter build.

The Vanderbilt race was won by the 60-horse-power 6-cylinder Alco car driven by H. F. Grant. The time was 4 hours, 25 minutes, and 42 seconds. The average speed maintained was 62.77 miles an hour, as against 64.38 made by Robertson last year on a better course with a 120-horse-power Locomobile. During the last four rounds an average of over 70 miles an hour was maintained, the last one being covered in 10:33 at the rate of 71.9 miles an hour. This machine—an improved American model of a well-known French car—has always done well in all contests in which it has been entered, and it was not at all surprising that it should win America's premier racing event.

The only other car to finish was Parker's Fiat, which averaged 61.55 miles an hour. Only two other cars—an old Mercedes and the two-cycle Atlas—were running at the end. This is said to have been due to the use of the motor parkway as more than half the course, which was only half the length of those used in previous years. The cement surface of this road has slight undulations that make it a very severe test of both tires and mechanism. Two cars broke their steering knuckles, four had cracked cylinders, and three sustained a broken crankshaft, a broken rear axle, and a damaged radiator, respectively.

The 189.6-mile race was a walkover for Harroun on a Marmon, as the three other cars in the race lost many minutes making repairs, and one of them withdrew when the race was half done. The average speed of the winner was 59.76 miles an hour.

The 126.4-mile race was won by a Chalmers-Detroit 30-horse-power car in 2 hours, 9 minutes, 52 2/5 seconds at an average speed of 58.4 miles an hour. Two Maxwell machines were second and third with an average of 51.1 and 50.4, respectively, while a 22-horse-power Hudson secured fourth place with a 50-mile-per-hour average.

The reliability tour which was promoted for the purpose of spreading the good roads doctrine by giving the farmers of the South an ocular demonstration of the value and usefulness of the automobile, especially where good roads obtain, was carried out with marked success. Forty-seven cars left New York on the morning of October 25th and covered the 1,100 miles of varying kinds of roadway passing through nine States and leading to Atlanta in ten days without serious trouble. Twenty-six of these machines made the journey on schedule time with a perfect score. They were divided into six classes, ranging in price from $4,000 down to $850. The Maxwell runabout was the sole prize-winning representative of the lowest priced class. This reliability run had been well planned by the newspapers which conducted it. Many roads on the route were improved especially for the tourists, and in all probability there will eventually be established a national highway from New York to Florida as a result of the impetus given the movement for such a road by the tour which has just been completed.

NON-TOXIC COFFEE AND TEA.

It is a somewhat singular fact that each of the staple household beverages, coffee, tea, and cocoa, contains an alkaloid, a poison. In small doses these alkaloids have a certain stimulating effect upon the system, and it is presumably on this account that the beverages which contain them have acquired such popularity. At the same time there seems to be no room for doubt that these beverages act as aids to the digestion. Still, the fact remains that the alkaloids of coffee, tea, and cocoa are toxic substances. Their ingestion in excess may become harmful even to strong and healthy persons. For this reason endeavors have been made to find suitable substitutes, which should possess the advantages and pleasing properties of our common household beverages, but free from the poisonous constituents which these latter contain.

We must look to special processes of treatment of ordinary coffee for our supply of a non-toxic product free from alkaloids. One such process, the product of which is upon the market, consists first in a preliminary treatment of the coffee beans, whereby their cell tissue is loosened. They are next subjected to the action of acid or alkali, and the caffein can then be extracted with a volatile solvent, such as benzene, ether, chloroform, petroleum ether, etc. The residue of solvent left in the material after the extraction is expelled by treatment with high-pressure steam or *in vacuo*.

A new process, invented by Prof. Kippenberger, who has abandoned his patent claims and made the method public property, consists in treating the coffee with oil, and subsequently with acetone or glycerine.

The inventor has found that caffein is insoluble in oil at ordinary room temperature, but is readily soluble in hot oil. Furthermore, caffein tannate, which is present in coffee side by side with free caffein, while practically insoluble in ether, benzene, and chloroform, is readily soluble in glycerine and acetone.

The new process accordingly consists in treating the coffee with fatty oils (glycerides) at temperatures and pressures at which the glycerides are not decomposed. After this step the coffee is freed from adhering liquid in any suitable manner, e. g., by centrifugal action. The oil may be freed from caffein either by simply allowing it to cool, when the alkaloid is precipitated, or by extracting with a suitable solvent. After this treatment the coffee still contains a small proportion of caffein, namely, that which is present "bound" in the form of tannate. This can be eliminated by treatment with glycerine or acetone or both. If preferred this step can be carried out before the treatment with hot oil. The temperature in this latter should not exceed 200 deg. C., for decomposition of the glycerides must at all events be avoided.

In place of the glycerides (oils) it has been found that quite a large number of other substances can be used. One condition which they must satisfy is that they should be liquid at say 100 to 150 deg. C. Among substances may be mentioned the aliphatic hydrocarbons, and those of the aromatic series; also derivatives of the latter, especially their alkyl and chlorine substitution products; further, the higher alcohols, ethers, and esters, such as amyl alcohol, amyl ether, and ethyl acetate. But none of these substances is quite as well adapted as the glycerides for the extraction of the caffein, as they leave a residue behind the complete elimination of which is attended with some difficulty.

The treatment with oil does not only extract the caffein, but also certain resinous substances. As the result of this the taste of the coffee is improved. In the case of tea the conditions are less fortunate. Here the process causes the loss of certain of the constituents which impart its characteristic aroma to the tea. The results of the extraction of coffee with glycerine and acetone also are not entirely satisfactory. To an expert taster the product appears not quite faultless. To the ordinary consumer, however, it is quite indistinguishable from the natural untreated ware.

The principal object of a recently designed clock is to show at a glance, says the Journal of the Royal Society of Arts, the time all over the world. In front of it a disk is mounted, which revolves with the earth once in 24 hours, having the hours 1 P. M. till 12 midnight, and 1 A. M. till 12 noon, painted on its outside edge, the hours being divided into intervals of five minutes each. In the same plane as the disk is a fixed dial, with a circular aperture to accommodate the disk. The dial has Greenwich painted on the top, the names of the other places being arranged at such distances from Greenwich that at any moment the corresponding time for any part of the world is shown. The clock it set by turning the disk, so that the time at any place abroad at a given time in London, or other place, can be easily read off.