

UNITED STATES PATENT OFFICE

2,337,443

PROCESS FOR LOCATING VALUABLE
SUBTERRANEAN DEPOSITSLudwig W. Blau, Houston, Tex., assignor to
Standard Oil Development Company, a corpo-
ration of DelawareNo Drawing. Application December 10, 1941,
Serial No. 422,425

1 Claim. (Cl. 250—71)

The present invention is directed to a method for locating subterranean deposits of oil. This application is a continuation-in-part of my co-pending application, Serial No. 258,811, filed February 27, 1939.

For the past several years prospecting for oil has been based mainly on geological and geophysical methods, the latter being used almost exclusively in certain areas having a topography unsuitable for geological investigation. Geophysical methods do not directly locate an oil deposit, but locate only substructures which are adapted for the accumulation of oil. It is not rare to find a suitably adapted substructure which is not accompanied by a deposit of oil in commercially producible quantities. Consequently it is of vital interest to the oil prospector to have at his disposal a method by which oil deposits can be directly located.

It is an object of the present invention to provide an oil prospecting method by means of which it is possible to locate subterranean deposits of oil without regard to the geological structure in which they occur.

It is a further object of the present invention to provide such a method in which careful chemical analyses are not necessary and which does not require scientific training for its application.

The oil prospecting method of the present invention is based on the discovery that a subsurface deposit of oil imparts to the surface soil above it the property of fluorescing under ultra violet light. It is not to be understood from this that the surface soil above the oil deposit is impregnated with oil. On the contrary, it is known that the oil itself does not diffuse to the surface. Hydrocarbon gases, however, do diffuse to the surface, and these hydrocarbon gases appear to act on certain organisms in the ground, which are known as *Bacillus methanicus* and *Bacillus ethanicus*, or *Bacillus parafinicus*, with the result that these bacteria are multiplied and at the same time the hydrocarbons appear to be converted into bodies of high molecular weight, which appear to be carboxylic acids. It is apparently these high molecular weight organic bodies which fluoresce under the influence of ultra-violet light. Since these bacteria are aerobic in character, soils close to the surface, or not further away from the surface than the breathing depth, which may be taken to be about five feet, yield the most interesting information in the practice of the present invention.

In the practice of the present invention the

soil samples are collected along certain selected lines or at certain selected points in the area under investigation. The soil used for the sample is preferably that obtained at the surface to a depth preferably within the first four inches. In taking the sample the exposed surface of the soil together with any vegetation it may carry, is scraped away and the soil sample collected immediately below the surface. The scraping away of the surface is only for the purpose of avoiding the occurrence of roots and vegetation in the samples. In some areas this is not necessary. In any given area all samples should be collected at the same depth.

Each sample is subjected to the action of ultra-violet light to ascertain if it fluoresces and to determine the degree of fluorescence. This may be done with a fair degree of accuracy by visual inspection. A useful procedure is to prepare a number of standard samples by impregnating soil with fluorescent oil, such as crude oil. Very minute amounts of oil can be deposited in said soil samples by using dilute carbon tetrachloride solutions of the oil for the preparation of these standard samples. It requires only a very small amount of oil to impart fluorescence to the soil. By preparing such standard samples containing, for examples, 10, 20, 30, 40, 50, etc., parts per million, by weight, of oil per part of sample, it is easily possible to select a range of degrees of fluorescence which will provide a basis for comparison with the soil samples to be examined. It will, of course, be advisable to use the same amount of soil sample from the prospect as is contained in the standard. In using this procedure it is advisable to arrange the standards in a dark box provided with a source of ultra-violet light and a sight glass, and to place the sample to be examined in position in the dark box adjacent the standards so that the standard which most nearly approximates it can easily be selected.

Since the method of the present application is more useful as a reconnaissance method than as an ultimate method of prospecting, precise measurements of the fluorescence of the samples is not necessary. Samples collected off of production will generally be wholly non-fluorescent, so that the samples which are collected over production will stand out. At least there will be a sufficient difference between the samples collected over production and those collected off production that it will be possible to mark off an area which will warrant further, more intensive study by other methods. The present method is extremely

cheap and easily carried out. The samples need not be carried to the laboratory at all, since the apparatus used for the performance of the method is so simple and light that it can be carried around with the operator.

As is usual in methods of this type, the samples will be collected at points laterally spaced from each other and arranged in such a way preferably as to form a more or less symmetrical pattern over the area to be investigated. The results obtained by the examination of the samples are then noted on a map of the area adjacent the sample locations. After the results have been fully tabulated the samples which fluoresce, as distinguished from those which don't, or those which fluoresce the most may be connected by

lines which will generally be found to outline a sort of halo, which may be assumed to be the edge of production.

The nature and objects of the present invention having been thus described, what is claimed as new and useful and is desired to be secured by Letters Patent is:

A method for prospecting for oil which comprises, selecting samples of soil at laterally spaced points over an area to be investigated remote from the oil sought for and examining these samples under ultra violet light whereby the relative fluorescence of such samples may be correlated with sample locations to yield data useful in determining the location of the oil sought for.

LUDWIG W. BLAU.