Patented Oct. 12, 1926. 1,602,703

UNITED STATES PATENT OFFICE.

RALPH C. POLLOCK, OF LONG BEACH, CALIFORNIA, ASSIGNOR TO UNION OIL COMPANY OF CALIFORNIA, OF LOS ANGELES, CALIFORNIA, A CORPORATION OF CALIFORNIA.

PROCESS OF DECOLORIZING PETROLEUM DISTILLATES.

No Drawing. Application filed April 4, 1923. Serial No. 629,874.

My invention relates to the treatment of petroleum distillates for the purpose of decolorizing the same.

The principal object of my invention is to treat a distillate of petroleum by a process which decolorizes the same without subjecting the distillate to the usual acid and alkali treatments.

The specific distillate which I treat by my process is commercial gasoline such as for instance of the grade which has an initial boiling point of 130° F. and an end point of 430° F., but I do not limit myself to the treatment of this grade of gasoline alone, inasmuch as my invention may be practiced within the limits hereinafter described and claimed.

The character of gasoline, as to its chemical components and the physical characteristics thereof, and particularly as to its color, varies largely according to the different localities from which the crude oil originates and from which the gasoline is distilled and varies with the method of distillation used. Thus the characteristics of gasoline might be said to vary with each individual crude oil well, and in general the characteristics of gasoline obtained from California crude oil are greatly different from the gasoline obtained from Pennsylvania crude oil, although in some specific points they may be alike.

Also, the so-called straight run gasoline differs largely from the gasoline obtained by the so-called cracking process, wherein a conversion of heavy oil into gasoline takes place.

It is in all cases, generally customary to treat the gasoline first with sulphuric acid of different strengths and quantities for the removal of such constituents of the gasoline as are harmful to the commercial use thereof, and included in these constituents are such compounds as cause an objectionable color to the gasoline. After treating the gasoline with acid, it is usually washed with water and then treated with an alkali and washed again.

The various acid, alkali and water washes are very expensive and I have discovered that by taking a gasoline and agitating therewith 1/40 to 1/5 lb. of sulphuric acid, 50 to 98 percent strength, for each barrel of gasoline, then adding a ground clay in the proportion of 0.1 to 2 lbs. to a barrel of gasoline then agitating the mixture thoroughly, I am enabled to thoroughly decolorize the gasoline and neutralize the same so that it is then ready for market.

The sulphuric acid used should be non-fuming sulphuric acid and I find the use of the proportions mentioned of acid and clay are such as to permanently decolorize the gasoline.

With most gasoline if an excess of acid is used, the gasoline retains a pinkish color, and with certain gasolines and under certain conditions if an excess of a neutral or alkaline earth is used, the gasoline is decolorized, but, after standing for some time, the color will return.

The clay used may be practically any of the decolorizing clays now in use, without having gone through any process whereby the clays are especially prepared for decolorizing purposes by acid treatment.

The agitation of gasoline, with acid and clay may be by mechanical means or by air etc. and I find that the action of the acid and clay on the gasoline, in the above mentioned proportion, is such that there is no acid sludge formed, or if there is such it is completely adsorbed by the clay and invisible to the eye. Thus, a great economy results in the application of my process to gasoline, whereby the cost of preparing the same for market is a minimum. For instance, in addition to eliminating the heavy acid and alkali washes, I am enabled to use a clay now costing in the neighbourhood of $25.00 per ton whereas a treated clay for the same purpose costs $65.00 per ton.

The proportions of acid and clay to each barrel (42 gallons) of gasoline may be varied within the limits mentioned in order to effect the desired results the quantity of acid required varying with the weight of the product treated, whether gasoline, engine distillate, or lubricating oil, and also varying with the relative change in color desired. The quantity of clay required varies with the amount of acid used and should always be sufficient to prevent the final product from having an acid reaction and if desired the selected proportion of acid may be used to acidify the selected proportion of clay before the same are mixed with the gasoline.

Various methods, for various purposes, are known for treating petroleum distillates with acid and clay in turn, or with an acid treated clay for decolorizing, but in the first case a heavy sludge has to be removed after acid treatment and in the latter case the chemical and physical actions are quite different from my invention.

Apparently I have invented a new method of decolorizing rectified gasoline and other petroleum distillates, in which an earth or clay is acid-treated in the presence of gasoline or distillate, and after being thus activated the earthy material brings about a permanent decolorization of the stock in contrast to the temporary result obtained by the use of raw earth alone. In this new method, by using a small amount of acid and raw earth, the activation of the earth and the decolorization of the gasoline or distillate may properly be considered as parts of a single operation.

It is evident that decolorization only is actually brought about as indicated above, because the amount of acid used, 1/40 to 1/5 pound to the barrel of gasoline, is too small to have any appreciable refining action in itself and no discernible sludge is formed from the distillate. This is particularly evident in those cases in which acid of only 50 per cent concentration is used. Also it has been shown that raw earth alone will not yield a permanently decolorized product. On the other hand it has been found that if the small amounts of acid and clay mentioned are merely mixed together before adding to the gasoline a permanent decolorization is obtained. But to mix the acid and earth in a separate operation is inconvenient and costly and would require special apparatus, therefore in my new method the acid and earth are conveniently brought together in the regular agitating apparatus in the presence of the distillate which is to be treated.

The clays used may be taken from various sources and I have successfully practiced my invention with many California clays from different localities having different compositions, but the decolorizing effected is uniform provided the proportions of acid and clay are maintained as described. Considering a barrel of gasoline of 42 gallons as weighing about 270 pounds, these proportions range from one ten-thousandths to one-thousandth part by weight for the acid and from one three-thousandth to one one-hundredth part by weight for the clay or earth, these general proportions being equally applicable to the heavier petroleum distillates, such as engine distillate and lubricating oil.

It is of course understood that after the gasoline is agitated with the acid and clay, or acid treated clay, having the proportions of acid and clay described, that any residue is removed from the treated gasoline by settling, or by running through a filter, or in any well known manner.

In referring herein to clay and earth, the terms are interchangeable with respect to the operation herein descirbed, for I have not only used raw clays, but also ordinary earth, or soil successfully. In fact, almost any earthy, or earth-like, material will proportionately serve for activation with acid to decolorize petroleum distillates with my method. The weight of a barrel of gasoline of 42 gallons is taken at 270 pounds and thus it is seen that the percentages of acid and clays used are not more than 1% each of the weight of gasoline treated.

I claim:—

1. The process of removing color from a mixture of liquid hydrocarbons of petroleum origin which consists in agitating the colored hydrocarbons with non-fuming sulphuric acid and an earth and in later separating the residue from the treated hydrocarbons, the amount of acid used depending upon the specific gravity and upon the hydrocarbons and the relative amount of change of color desired, and ranging from a ten-thousandth part by weight to a thousandth part by weight, and the amount of earth depening upon the weight of acid used.

2. The process of removing color from a mixture of liquid hydrocarbons of petroleum origin which consists in agitating the colored hydrocarbons with non-fuming sulphuric acid and earth and in later separating the residue from the treated hydrocarbons, the amount of earth required depending upon the specific gravity and upon the hydrocarbons and the relative amount of change of color desired, and ranging from a three-thousandth part by weight to one hundredth part by weight, and the weight of the acid used being insufficient to cause an acid reaction in the final product.

3. The process of removing color from a mixture of liquid hydrocarbons of petroleum origin which consists in agitating the colored hydrocarbons with from a ten-thousandth to a thousandth part by weight of sulphuric acid and with from a three-thousandth to a one-hundredth part by weight of earth, and in separating the residue from the treated hydrocarbons without first removing a portion of the acid as in the usual refinery practice method.

4. The process of removing color from a mixture of liquid hydrocarbons of petroleum origin which consists in agitating the colored hydrocarbons with from a ten-thousandth to a thousandth part by weight of non-fuming sulphuric acid and then, in the presence of all of the acid, adding from a three-thousandth to a hundredth part by

weight of clay, further agitating the entire mixture, and finally separating out the residue from the treated hydrocarbons.

5. The process of clarifying gasoline which consists in agitating the gasoline in the presence of from 1/40 to 1/5 of a pound of sulphuric acid per barrel of the gasoline, and from 1/10 to 2 pounds of clay per barrel of the gasoline, and finally separating the residue and the clarified gasoline.

Signed at Wilmington, in the conty of Los Angeles, and State of California, this 30th day of March A. D. 1923.

RALPH C. POLLOCK.