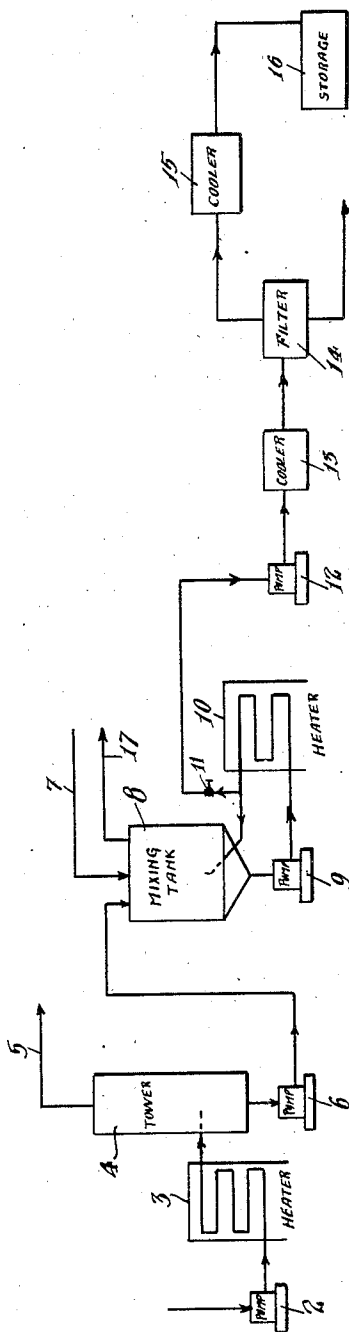


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A. R. MOORMAN ET AL

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PROCESS OF TREATING FRESH UNUSED PETROLEUM OILS
TO PRODUCE DECOLORIZED LUBRICATING OIL STOCKS
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Inventors

Arthur R. Moorman
Irving C. Carpenter

Lyou & you

Attorneys

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PROCESS OF TREATING FRESH UNUSED
PETROLEUM OILS TO PRODUCE DECOL-
ORIZED LUBRICATING OIL STOCKS

Arthur R. Moorman, Woodrider, Ill., and Irving
C. Carpenter, New Rochelle, N. Y., assignors to
Contact Filtration Company, San Francisco,
Calif., a corporation of Delaware

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This invention relates to the art of treating hydrocarbon or mineral oils to decolorize (improve or lessen color) oils and refers particularly to the art of decolorizing lubricating oils, especially those oils which are derived from crude mineral oils as a residuum from the distillation of lighter oils.

Hitherto lubricating oils manufactured from residuals have generally been decolorized by percolating the oils through a decolorizing clay at low temperatures. When the hot contact method of treating oils to decolorize the same was applied to lubricating oil stocks derived as a residuum from reducing crude petroleum oil, it was found that excessive quantities of clay were required to decolorize the oil.

Basically, the hot contact process of decolorizing oils differs from the percolation operation in the following respects. In a percolation process the clay is maintained in a bed of comparatively coarse particles while the oil at from normal temperature to about 250° F. percolates slowly through the bed. In the hot contact process comminuted clay is used and agitated with oil at elevated temperatures over 250° F. and generally from 350 to 550° F.

We have discovered that the amount of clay required to decolorize certain residuums may be reduced from 25% to 50% by the following procedure.

The neutral oil is first passed through a heating chamber to vaporize a portion of the oil; the heated oil is then passed to a chamber in which the vaporized portion of the oil is separated from the unvaporized portion of the oil, which unvaporized portion is thus reduced to a suitable residuum for the manufacture of lubricating oils, the residuum so derived while still hot is agitated with the comminuted decolorizing agent, cooled, and the agent separated from the oil. This procedure produces at a low cost a decolorized oil by the hot contact method where previously the cost of treatment has been excessively high.

The process has been found particularly effective on Pennsylvanian residuum consisting of from 12% to 35% of the original crude whose asphaltic content is sufficiently low as to permit of complete decolorization with the use of clay only. Also the process is found effective on treated, clay neutralized topped crude. The latter covers the use of mid-continent stocks in which the crude is topped taking off the gasoline and kerosene and the residuum from this operation is acid treated and the oil neutralized by

treatment with clay, filtered from the clay, the oil thus prepared requiring further reduction and decolorization to produce a residuum of the generally accepted specifications. In any event, the oil processed is either inherently neutral or is neutralized prior to its introduction into the process.

The method of treating the oil to decolorize the same and produce lubricating oils of acceptable specifications in accordance with the present invention will best be understood from a description of a preferred form or example of a process embodying the invention. For this purpose there is hereafter described a preferred form or example of a process embodying the invention. It should be understood, however, that the particular details of treatment will vary somewhat widely depending on the particular oil processed and the kind of lubricating oil and color to which the lubricating oil is to be decolorized. The process is described with reference to the accompanying drawing, in which:

The figure represents a diagrammatic view on flow sheet of an apparatus suitable for conducting the process.

Referring to the drawing, the raw material is picked up by pump 2 which discharges through a heater 3 where sufficient heat is imparted to the oil to permit of the vaporization and fractionation of sufficient of the charge in fractionating tower 4, as to leave a residuum of the required physical specifications for lubricating oil. The fractionating tower 4 may be of any design suitable for this operation and well known in the art for fractionation of vapors in oil discharged from a heater such as the heater 3. The lighter fractions leave the fractionating tower 4 to a suitable condensing device (not shown) through line 5, leaving as a residue in tower 4, an oil or residuum satisfactory with regard to physical tests but requiring decolorization to produce a finished product.

The pump 6 takes suction on the bottom of tower 4 and discharges the hot residuum into a mixing chamber or tank 8 into which clay from a source (not shown) is introduced at 7. In order to supply the necessary agitation or turbulence to insure intimate contact and at the same time, supply the heat lost by the oil heating the clay and vaporizing any water in the clay, pump 9 takes suction on mixing tank 8 and discharges through heater 10 back into mixing tank 8, such vapors as may be produced being drawn off at 11.

The outlet to heater 10 is provided with a valve

11 by means of which the clay and oil mixture is removed from the system by opening valve 11 and starting pump 12. The amount removed by this means is proportional to the quantity entering the mixing tank 8 through pump 6. Pump 12 discharges through a cooler 13 and filter 14, where the clay and oil are separated, the clay being discarded and the oil passing through a cooler 15 into storage 16.

Various comminuted decolorizing agents well known in the art may be used and these may be applied either dry or in the wet state. Acid treated clay of the montmorillonite class are especially suited for the process.

To illustrate the specific temperatures existing throughout the system when operating on a typical example of a 42 Baumé Pennsylvania crude, the following temperatures are given. Crude enters heater 3 at 70° F. Crude leaves heater 3 at 750° F. Vapors leave tower 8 at 550° F. Residuum leaves pump 6 at 500° F. Clay and oil mixture is maintained in tank 8 at 475° F. Clay enters tank 8 at 70° F. Oil-clay mixture leaves pump 9 at 475° F. Oil-clay mixture leaves heater 10 at 500° F. Oil-clay mixture leaves cooler 13 at 200° F. Oil leaves cooler 15 at 110° F.

The amount of clay used per gallon of oil to produce an oil of 6 N. P. A. color varies from 0.5 pound to 1.25 pounds; whereas, the same oils previously had required from 0.65 pound to 1.7 pounds of clay per gallon of oil. These figures represent a saving in the present process of from 30% to 40%.

In certain cases, in order to maintain complete continuous operation of the process and to adjust the reducing operations relative to the decolorizing operations it may be desirable to insert a surge tank between the tower 4 and mixing chamber 8 to compensate for slight fluctuations in capacities between these units. This may be done without seriously effecting the operation as a whole. The temperature of the oil entering the mixing tank 8 should be as near that of the oil leaving tower 4 as practical operations will permit. Any reduction in temperature results in an increase in the amount of clay required in tank 8. Thus if the stock is cooled to 200° F. before entering the chamber 8, there is a marked increase in the quantity of clay required to produce any given color as compared to the same oil where the cooling has not been allowed to go below 400° F. Even where the oil enters the mixing chamber 8 at temperatures as low as 200° F., a much more economical operation is effected than the general practice of the prior art where the oil is introduced at atmospheric temperature into the mixing tank.

Preferably, agitation in mixing tank 8 takes place in absence of air and the introduction of wet clay facilitates the operation due to the evaporation of the water from the clay forming a blanket of steam which prevents oxidation of the oil.

The oil may be stored at temperatures as high as 500° F. for several hours after leaving the tower 4 and before entering mixing chamber 8 if desired without darkening in color, especially if the oil is blanketed with steam at all times to prevent oxidation. Long standing of the oil at high temperatures, however, is to be avoided with oil rich in unsaturated straight chain and

cyclic compounds which tend to polymerize under heat.

Pennsylvania oils almost without exception may be more economically decolorized without than with the use of acid. Other oils such as reduced mid-continent crude may be acid treated and then neutralized by hot clay treatment prior to its introduction into the distilling unit of this process.

No particular explanation of the saving of clay effected by the present process is set forth for the reason that cause of or reason for such saving is not entirely known.

While the particular process herein described is well adapted to carry out the objects of the present invention, various modifications may be made without departing from the principles of the invention, and all such modifications and changes come within the scope of the appended claims.

We claim:

1. A process of treating fresh unused petroleum oils to produce decolorized lubricating oil stocks, which comprises passing an oil a member of the group including neutral paraffine base crudes and acid treated clay neutralized topped asphaltic base crudes through a heating chamber to vaporize a portion of the oil and reduce the residuum to lubricating oil stock, and promptly thereafter while the oil is still hot adding thereto a decolorizing clay, agitating the clay and oil, and finally cooling and separating the oil from the clay.

2. A process of treating fresh unused petroleum oils to produce decolorized lubricating oil stocks, which comprises passing an oil a member of the group including neutral paraffine base crudes and acid treated clay neutralized topped asphaltic base crudes through a heating chamber to vaporize a portion of the oil and reduce the residuum to lubricating oil stock, and promptly thereafter while the oil is still hot adding thereto a decolorizing clay, agitating the clay and oil while heating the mixture, and finally cooling and separating the oil from the clay.

3. A process of treating fresh unused petroleum oils to produce decolorized lubricating oil stocks, which comprises passing an oil a member of the group including neutral paraffine base crudes and acid treated clay neutralized topped asphaltic base crudes through a heating chamber to vaporize a portion of the oil and reduce the residuum to lubricating oil stock, and promptly thereafter while the oil is still hot adding thereto a wet decolorizing clay, agitating the clay and oil while heating the mixture, and finally cooling and separating the oil from the clay.

4. A process of treating fresh unused petroleum oils to produce decolorized lubricating oil stocks, which comprises passing an oil a member of the group including neutral paraffine base crudes and acid treated clay neutralized topped asphaltic base crudes through a heating chamber to vaporize a portion of the oil and reduce the residuum to lubricating oil stock, and promptly thereafter while the oil is still hot adding thereto a wet decolorizing clay and circulating the oil through a heating zone, and finally cooling and separating the oil from the clay.

ARTHUR R. MOORMAN.
IRVING C. CARPENTER.