

UNITED STATES PATENT OFFICE

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PROCESS OF REFINING USED OIL

No Drawing.

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This invention relates to the refining of used mineral lubricating oils and has for its object to produce a simple and economical process by which used mineral oils which have been subjected to dilution by unsaturated hydrocarbons or water, but more particularly those drained from the crank case of an automobile, may be refined and the oil returned to as good, or better, lubricating value than when new.

It is well known that oil as drawn from the crank case of an engine has not been worn out, but is merely unfit for use as a lubricant because of tarry asphaltic compounds, unsaturated hydrocarbons, dust, dirt, diluents, free water, free carbon, and metals both in colloidal and free form as worn or chipped from the bearings of the engine.

The purpose of the invention, therefore, is to produce a process by which all of the above impurities will be removed from the oil, the oil being completely refined and returned to substantially its original color and non-malodorous condition, the lubricating value of the oil being in fact better than that of the original oil.

In carrying out the invention, I first separate from the oil all free water, that would otherwise dilute the concentrated acid later used in the process, preferably by permitting the oil to stand quiescent for from one to two days.

The oil is then drawn off to an acid treating tank and heated to a temperature of approximately 120° F., then 2% by volume of 66° Bé. commercial sulphuric acid is added; the mixture of oil and acid is then agitated from fifteen minutes to a half hour, the temperature of approximately 120° F. being maintained. The elevated temperature increases the fluidity of the oil, insures a more intimate contact with the acid and accelerates the reaction. The acid coagulates the free carbon, removes tarry coloring bodies, partially removes the unsaturated hydrocarbons, and partially dehydrates the oil, forming all of the above contaminations into a heavy sludge that settles within a few hours to the bottom of the tank.

The supernatant oil is now drawn off from

the acid treating tank to a suitable still where it is heated under a high degree of vacuum to approximately 450° F. This temperature, under a high vacuum, is sufficient to vaporize the diluents (unsaturated hydrocarbons and entrapped water) in the oil, but is not sufficiently high to distill the lubricating oil or break down or crack the desired lubricating components of the oil.

After the oil has been subjected to distillation, it is withdrawn while hot and immediately treated with from 15% to 18% by weight of fuller's earth in such a manner as to insure intimate contact. It is to be understood that the fuller's earth reacts violently with oil and that the two must be mixed with care by periodic addition of a small quantity of one to the other. The fuller's earth reacts with the colloidal metals, effects neutralization by adsorption, and coagulates all such materials and suspended impurities, and such material being of greater specific gravity than the oil, will settle to the bottom of the tank.

It is also advisable to add to the fuller's earth an anhydrous oxide, such as lithium oxide, in sufficient quantity to absolutely insure that all traces of acid in the oil shall be neutralized. It has been found however, if a sufficient quantity of fuller's earth has been added, that it will efficiently neutralize the acid without the addition of an anhydrous oxide, whose carbonate is not soluble in water.

The coagulated mixture above described settles to the bottom of the tank as a heavy sludge and after substantially forty-eight hours the supernatant oil may be withdrawn from the sludge. The oil thus treated will be found to have returned to substantially its original or improved condition, and to possess a better color and lubricating value than the original oil.

From the above description it will be apparent that I have produced a process of refining used oils which possesses all of the features of advantage set forth as desirable, and while I have described and claimed the preferred embodiment of the invention, it is to be understood that I reserve the right to make

all such changes as properly fall within the spirit and scope of the appended claims.

I claim:

1. The method of refining used mineral lubricating oil containing water and hydrocarbon diluents which consists in removing free water from the oil, heating the oil to approximately 120° F., adding sulphuric acid to the oil while hot, agitating the mixture, removing the oil from the resultant sludge, vaporizing diluents from the oil, and then adding sufficient active adsorptive reagent to clarify, decolorize and neutralize the oil, and finally drawing off the purified oil.
2. The method of refining used mineral lubricating oil containing water and hydrocarbon diluents which consists in removing free water from the oil, heating the oil, adding concentrated sulphuric acid to the oil while hot, removing the oil from the resultant sludge, heating the oil to a temperature above 450° F. but below cracking temperature, then adding an active adsorptive reagent and finally drawing off the purified oil.
3. The method of refining used mineral lubricating oil containing water and hydrocarbon diluents, which consists in removing free water from the oil, heating the oil to approximately 120° F., adding sulphuric acid to the oil while hot, removing the oil from the resultant sludge, heating the oil thereby vaporizing the diluents, adding to the oil while hot an active adsorptive reagent to clarify, decolorize, and neutralize the oil and finally drawing off the purified oil.
4. The method of refining used mineral lubricating oil containing water and hydrocarbon diluents which consists in removing free water from the oil, heating the oil to approximately 120° F., adding 2% by volume of 66° Bé., commercial sulphuric acid, agitating the mixture while maintaining it at said temperature, removing the oil from the resultant sludge, vaporizing diluents from the oil, adding to the oil while hot 15 to 18% by weight of fuller's earth and finally drawing off the purified oil.
5. The method of refining used mineral lubricating oil containing water and hydrocarbon diluents which consists in removing free water from the oil, heating the oil to approximately 120° F., adding sulphuric acid to the oil while hot, agitating the mixture, removing the oil from the resultant sludge, vaporizing diluents from the oil, and then adding sufficient active adsorptive reagent to clarify, decolorize and neutralize the oil, adding an anhydrous oxide to neutralize the oil, and finally drawing off the purified oil.
6. The method of refining used mineral lubricating oil containing water and hydrocarbon diluents which consists in heating the oil to approximately 120° F., adding sulphuric acid to the oil while hot, agitating the mixture, removing the oil from the re-

sultant sludge, vaporizing diluents from the oil, and then adding sufficient active adsorptive reagent to clarify, decolorize and neutralize the oil, and finally separating the reagent and adsorbed impurities from the purified oil.

7. The method of refining used mineral lubricating oil containing water and hydrocarbon diluents, which consists in heating the oil to approximately 120° F., adding sulphuric acid to the oil while hot, removing the oil from the resultant sludge, heating the oil thereby vaporizing the diluents, adding to the oil while hot an active adsorptive reagent to clarify, decolorize, and neutralize the oil, and finally separating the reagent and adsorbed impurities from the purified oil.

In testimony whereof I affix my signature.

JOSEPH C. PATRICK.