

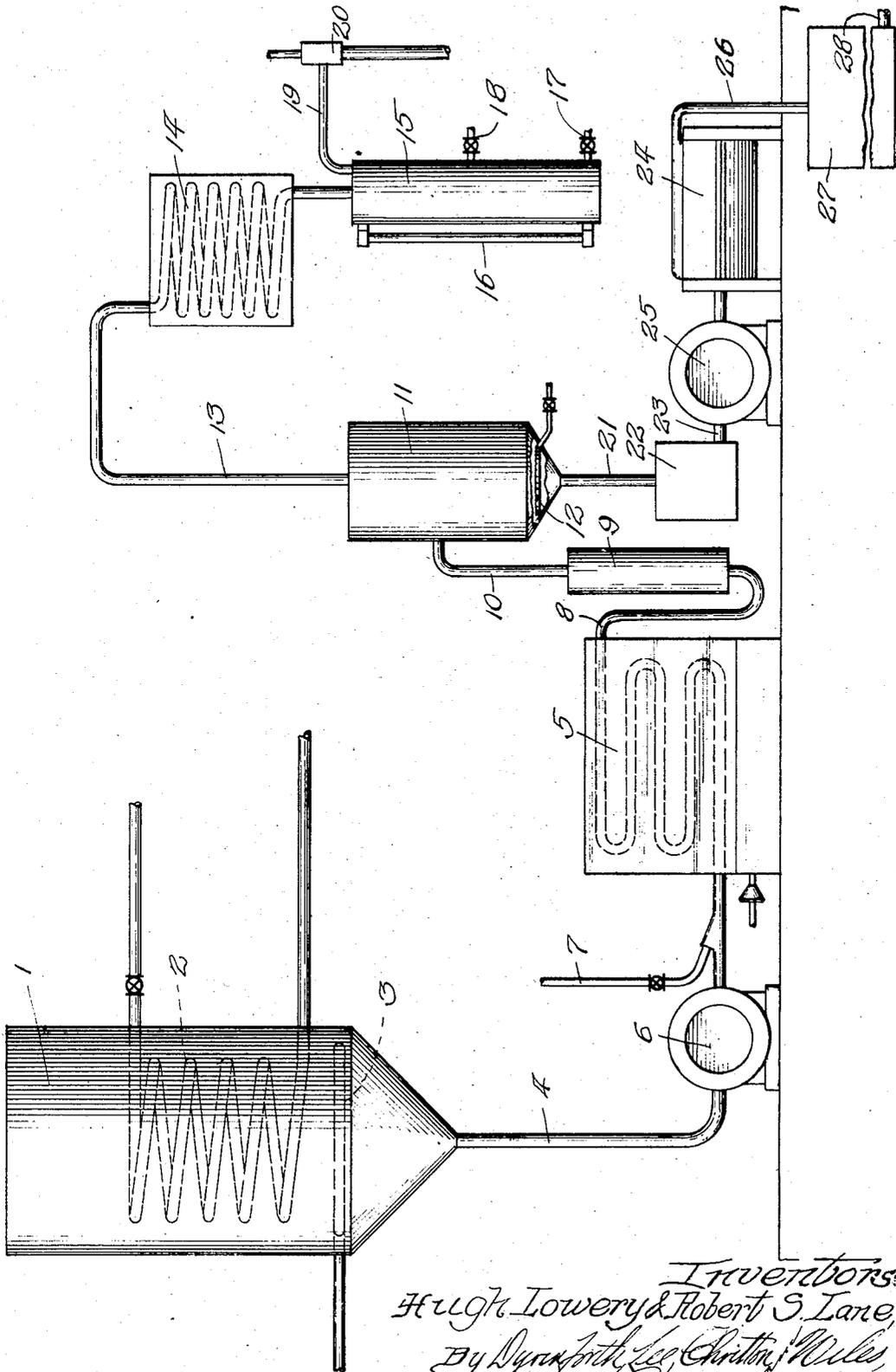
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ART OF DECOLORIZING HYDROCARBON OILS

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UNITED STATES PATENT OFFICE

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ART OF DECOLORIZING HYDROCARBON OILS

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This invention relates to decolorizing hydrocarbon oils and particularly lubricating oils, and will be readily understood from the following description of a preferred manner of operating in conjunction with the accompanying drawing which shows diagrammatically in elevation an apparatus suitable therefor.

Referring to the accompanying drawing, 1 is a mixer provided with a steam heating coil 2 and a perforated air pipe 3 for effecting agitation of its contents. A draw-off pipe 4 from the bottom of the mixer leads to a pipe-still 5 and a pump 6 may be provided in the pipe 4 to force the oil through the pipe-still. A valved pipe 7 is provided whereby steam, which may be superheated, may be supplied to the oil entering the pipe-still. The pipe-still outlet 8 leads to a mixer 9 which may suitably be an orifice-mixer of known or suitable type. The outlet pipe 10 from the mixer 9 leads into a separating chamber 11. The chamber 11 is provided with a perforated pipe 12 for injecting superheated steam thereinto, and with a vapor outlet 13 which leads to a condenser 14, from which the condensate leads to a receiver 15. The receiver 15 is provided with a gauge-glass 16, a water draw-off pipe 17, an oil draw-off pipe 18, and a gas outlet pipe 19 leading from the top of the receiver to a suction pump 20, which may suitably be a water jet ejector. From the bottom of the drum 11 a pipe 21 leads to a cooler 22. The outlet pipe 23 of the cooler 22 leads to a filter press, or other suitable filtering device 24, a pump 25 being provided in the pipe 23 for the purpose of supplying the oil to the filtering device at the requisite pressure. A pipe 26 leads oil from the filtering device 24 to the final cooler 27 from which it passes to storage by pipe 28.

The operation is as follows: Lubricating stocks are diluted and subjected to sulphuric acid treatment in a known manner. As diluent, it is preferred to employ a relatively high boiling distillate, for example, an oil in the kerosene range, such as furnace oil, in order to avoid excessive vapor formation in the subsequent heating, as will be described hereinafter. The lubricating stock is diluted

sufficiently to reduce the viscosity so as to facilitate the acid treatment and subsequent operations.

The sour oil may be settled with or without water and is passed to the mixer 1 in which fuller's earth or equivalent decolorizing material, preferably dry, is added to the extent of about 3 to 7% of the base oil. Any suitable decolorizing clay can be used, a fine clay being preferred. Decolorizing clay of 80 mesh or finer, is suitable, but it is preferred to use clay of between 150 and 200 mesh. Excellent results have been obtained, for example, with Olmstead fines and Attapulgas fines. The decolorizing clay is thoroughly mixed with the oil in the agitator, for example, by agitating with air supplied by perforated pipe 3 and may be preheated by waste steam in coil 2, if desired.

From the agitator 1, the oil with the suspended decolorizing clay is forced by pump 6 through the pipe-still 5, a small amount of steam being preferably admitted through pipe 7 into the oil entering the pipe-still.

In the pipe-still 5, the mixture is heated rapidly to a temperature of about 550 to 900° F. and then passes to the enlarged chamber 11, wherein the diluent oil and light ends of the lubricating oil are volatilized, with the assistance of steam injected by perforated pipe 12, if desired. Before entering the separating chamber 11, the mixed oil and decolorizing clay may be passed through the mixer 9 in order to obtain more perfect intermingling of the clay with the oil at high temperature. The mixer 9 may be omitted from the apparatus, if desired, since very efficient contacting is obtained in the flow through the pipe still and the pipe leading to the separating chamber.

The steam and vapors which separate in the chamber 11 pass by pipe 13 to condenser 14, the condensate being collected in receiver 15, from which it is removed by pipes 17 and 18, as desired. Vacuum may be supplied to the separating chamber by pump 20 so as to assist in the separation of diluent and light ends from the oil. The oil passing from the separating chamber is cooled, if necessary, in cooler 22 to a temperature suitable for filter-

pressing, say, from about 250° F. to 400° F., and is forced through the filter press 24 by pump 25. The filter-press retains the clay and the pressed oil is cooled in cooler 27 and is conveyed to storage.

In spite of the high temperature to which the oil is subjected no decomposition or deterioration of lubricating properties has been observed. The operation described effects the decolorizing of, and removal of bloom from the oils, the removal of the diluent oil and light ends therefrom, and the neutralization of the acid, yielding oil of greatly enhanced appearance and properties.

The process is equally applicable to steam refined and residue lubricating stocks.

The following detailed example will serve more fully to explain the invention. A steam refined stock of gravity 22.4° A. P. I., flash 420 and viscosity 140 sec. Saybolt (210° F.) was diluted with furnace oil in the ratio of 55 to 45. The diluted oil was acid treated and washed with water. The sour oil was then run into the mixer 1 and about 4% of decolorizing clay fines (on the base oil) were mixed with the oil, agitating with air. The temperature of the mixture was raised to about 160° F. by waste steam in the coil 2. The mixed oil and clay were passed through the pipe still 5, the issuing temperature being about 700° F. The unvaporized oil from the separating chamber was pressed at a temperature of 300° F. The finished oil had a gravity of 22.6° A. P. I., a flash of 480° F., a viscosity of 143 sec. Saybolt (210° F.) and a greatly improved color without bloom.

While the invention has been illustrated by describing a specific example, it must be understood that the invention is not intended to be limited thereto except by the terms of the appended claims.

We claim:

1. The method of decolorizing hydrocarbon lubricating oils, which consists in mixing the oils with decolorizing clay, heating the mixture in a confined stream to between 550° and 900° F. while avoiding substantially any decomposition of the oil, and separating the oil from the clay.

2. The method of decolorizing hydrocarbon lubricating oils, which consists in mixing the oils with decolorizing clay, heating the mixture while flowing in a confined stream to a temperature sufficient to vaporize a substantial part of the lubricating oil thereby substantially raising its flash point, separating vapors from said oil and removing clay from the unvaporized oil, said heating operation being so controlled as to prevent substantial decomposition of the oil.

3. The method of decolorizing hydrocarbon lubricating oils, which consists in dissolving such oil in a lower boiling distillate, treating the solution with sulfuric acid, mixing decolorizing clay with the sour oil, heating the

mixture while flowing in a confined stream to a temperature sufficient to vaporize said distillate, passing the heated mixture to an enlarged chamber, removing vapors from said chamber, removing unvaporized oil and admixed clay from said chamber and filtering the oil from the clay.

4. The method of decolorizing hydrocarbon lubricating oils, which consists in mixing finely divided dry decolorizing clay therewith, heating the mixture in a confined stream to a high temperature sufficient to vaporize light ends of said lubricating oil, flashing the heated mixture before a substantial portion of said oil has undergone decomposition and removing vaporized oil therefrom, and withdrawing the unvaporized oil and removing the clay therefrom.

5. The method of decolorizing hydrocarbon lubricating oils, which consists in mixing finely divided decolorizing clay with a diluted oil, passing the mixture through a pipe-still and heating the same therein to between 650 and 700° F., passing the heated mixture into an enlarged chamber wherein separation takes place, admitting open steam into said chamber, removing the vapors of the diluent and light ends from the chamber, removing unvaporized oil from said chamber and separating the clay therefrom.

6. The method of decolorizing hydrocarbon lubricating oils, which consists in mixing finely divided decolorizing clay with a diluted oil, passing the mixture through a heated coil thereby raising its temperature to between 550° and 900° F., passing the mixture into an enlarged chamber and effecting separation of vapors therein, removing the unvaporized oil and admixed clay and filtering between about 250 and 400° F.

7. The method of decolorizing lubricating stocks, which consists in diluting said stocks with furnace oil, treating the solution with acid, mixing finely divided decolorizing clay with sour oil, heating the mixture in a confined stream to between 550 and 900° F., passing the heated mixture into an enlarged chamber, supplying steam thereto, withdrawing vapors and steam therefrom under reduced pressure, withdrawing unvaporized oil from said chamber, reducing its temperature to between 250 and 400° F., filtering from the admixed clay and cooling the filtered oil.

8. In the art of decolorizing hydrocarbon lubricating oils, the step of heating such oil together with decolorizing clay in a confined stream to cracking temperatures for a period insufficient to effect a substantial decomposition of the oil.

9. The method of decolorizing hydrocarbon lubricating oils, which consists in mixing oils with decolorizing clays, heating the mixture in a confined stream to cracking temperature while causing the stream to flow with sufficient speed to avoid substantial cracking

and impairment of lubricating quality, and flashing the mixture whereby a substantial portion of the oil is vaporized and the unvaporized oil is cooled.

5 10. The method of decolorizing hydrocarbon lubricating oils, which consists in diluting such oil with a distillate of the kerosene type, mixing the solution with decolorizing clay, heating the mixture in a confined stream
10 to cracking temperature while causing said stream to move at such velocity that substantial cracking and impairment of lubricating quality are avoided, and thereafter flashing the mixture whereby the distillate oil together with part of the lubricating oil is
15 vaporized and the unvaporized oil is cooled.

11. In the art of decolorizing hydrocarbon lubricating oils the step of heating such oil together with decolorizing clay and
20 steam in a confined stream to cracking temperatures while avoiding substantially any decomposition of the oil.

12. The method of decolorizing hydrocarbon lubricating oils which comprises mixing
25 the oils with decolorizing clay, heating the mixture in a confined stream to between 550° and 900° F. for a period insufficient to effect substantial decomposition of the oil, introducing steam into the confined stream, and
30 separating the oil from the clay.

13. The method of decolorizing hydrocarbon lubricating oils which comprises mixing
the oils with decolorizing clays heating the mixture in a confined stream to cracking tem-
35 perature while causing the stream to flow with sufficient speed to avoid substantial cracking and impairment of lubricating quality, introduced highly heated steam into the stream of oil and clay, and flashing the mixture
40 to vaporize the lighter constituents of the oil.

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