

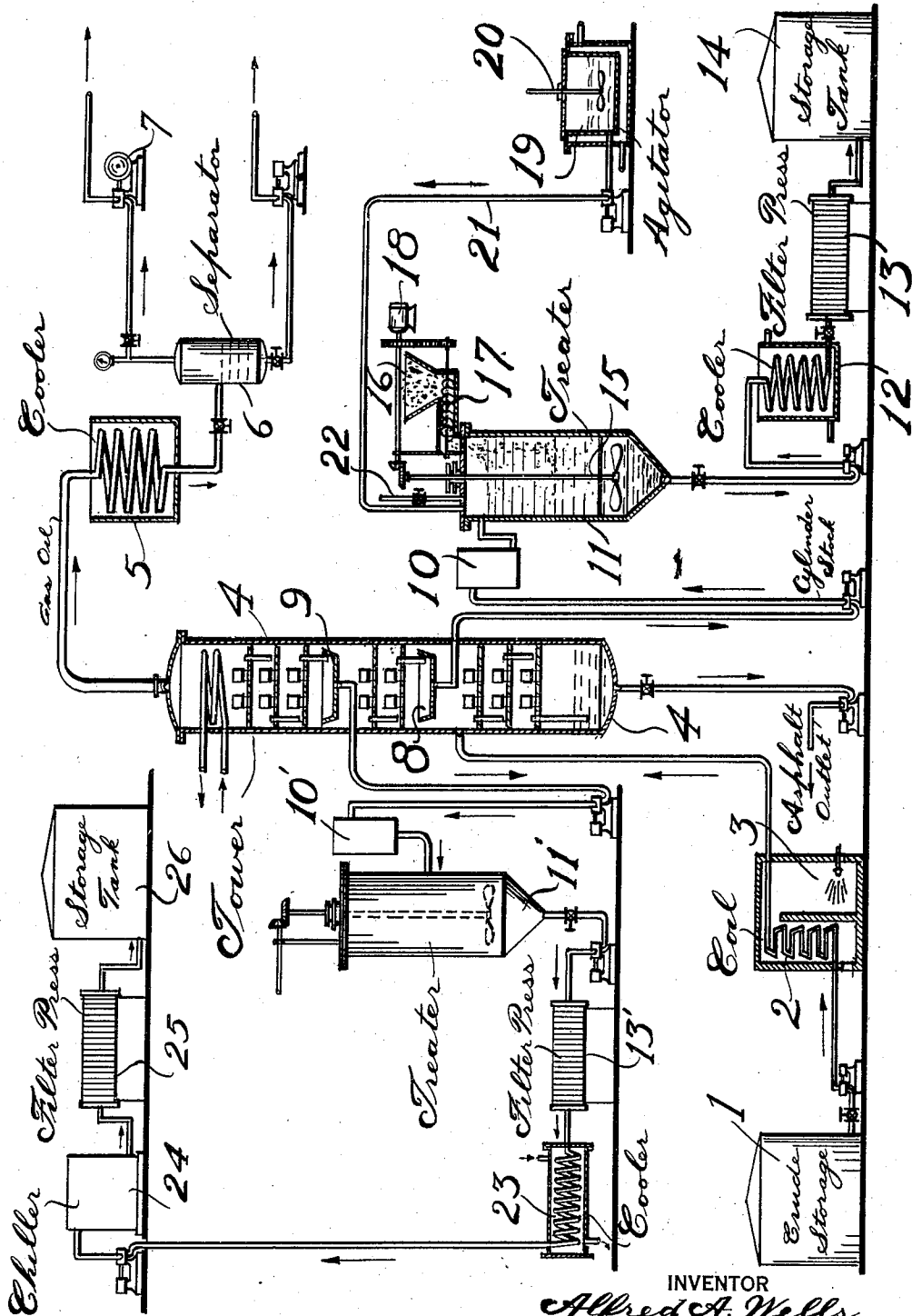
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PROCESS OF TREATING OILS

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PROCESS OF TREATING OILS

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This invention relates to a process of treating oils, and more particularly to a process of treating lubricating oil or cylinder stock fractions with decolorizing agents, such as fuller's earth, various acid treated clays, e. g. Filtrol, etc.

One object of the invention is to treat lubricating oil and cylinder stock fractions in the liquid phase directly as they are obtained in the distillation and without first cooling these stocks to atmospheric temperature, with decolorizing clay and to effect considerable saving by eliminating cooling and reheating steps between the distillation and the actual treating processes.

Another object is to decolorize lubricating oils and cylinder stocks without subjecting them to a prior acid treatment.

Other objects and advantages of my process will be obvious in the course of the following specification, read in conjunction with the drawing in which the single figure is a vertical elevation partly in section representing one of the methods of carrying out my process.

In the finishing of lubricating oils it has been common practice to cool and remove the lubricating distillate from the distillation equipment and finish this oil either by acid treating and neutralizing, or by acid treating and contacting with clay. In the present invention the lubricating oil distillate or cylinder stock is cut to proper specification in the crude distillation equipment, for example, in a pipe still run either under atmospheric pressure or under vacuum. The desired lubricating stream may be either a bottoms cut from one of the fractionating towers or may be a side stream in case there is only one tower. The hot lubricating distillate is then passed to a treater in which it is thoroughly mixed with finely divided clay. The oil and clay mixture is removed, after the proper length of treating time, from the treater and is subjected to filtration and cooling. The exact treating time can be best determined by experiment, and it may be stated in a general way that its order of magnitude is usually not more than a few minutes. The filtration process may

be carried out either before or after the cooling.

Fine fuller's earth, activated clay such as German G. B., Filtrol, etc., may be used depending upon the desired quality of finished oil. Acid treated clays containing both acid and water may also be used as will be described later in more detail.

The temperature of treating will depend on the stock to be treated and also on the desired quality of the finished product. No general rule can, therefore, be given since the best treating temperature will be determined by actual experiments in each case. However, it may be stated in a general way that the treating temperature will not be very different from the temperature at which the stock to be treated is obtained in the distillation process. This temperature will, therefore, be somewhere in the neighborhood of 350°-500° F., and in no case will it be lower than about 220°-250° F., or higher than the temperature at which substantial cracking takes place during the treating time.

It becomes apparent from the foregoing description of the process that my invention eliminates the necessity of cooling the lubricating distillate and heating it again to the proper treating temperature and also the acid treatment required in conjunction with ordinary clay treating processes.

The drawing is a diagrammatic side elevation of apparatus suitable for carrying out the process. The apparatus will be described in conjunction with the method of operating the same.

Numeral 1 designates a storage tank for the raw material which may be reduced crude or a similar oil stock. The stock is pumped from the storage tank through the heating coils 2 of the pipe still arranged in the furnace 3, and after heating to the proper distillation temperature the stock is discharged into the tower 4. The tower is held under vacuum and is provided with fractionating means, as well known in the art. Asphalt may be obtained as bottoms, cylinder stock, or lubricating stocks may be obtained as side streams, and gas oil as overhead distillate

from the tower. The overhead distillate may be cooled in cooler 5 and discharged into container 6 connected to a vacuum pump 7 by which the required vacuum is maintained on the apparatus. The condensed gas oil is discharged from container 6 into a storage tank (not shown). Several side streams may be taken from the tower. Two pans, 8 and 9, are shown by way of illustration. Pan 8 yields a cylinder stock which is subjected to treating according to the present invention. It will be understood that when the several side streams are desirable lubricating oil fractions they may all be subjected, either separately or after uniting some of the streams, to my treating process. Furthermore, the distillation may be carried out under atmospheric or any suitable pressure.

The stock to be treated, such as cylinder stock in the case illustrated, is pumped through temperature control means 10 into the treater 11 where it is contacted with the clay. The temperature control means consists usually of a cooler in which the hot stock is cooled somewhat to bring its temperature to the optimum treating temperature. It will be only very seldom necessary to heat the stock instead of cooling in the temperature control means. The oil and clay mixture is pumped from the bottom of the treater through the cooler 12 to the filter press 13 in which the clay is retained allowing the filtered and treated oil to be discharged into the storage tank 14. The position of the filter press and cooler may be reversed or two coolers may be employed one before and one after the filter press in which case the first cooler serves only as a partial cooler and the final cooling is obtained in the second cooler.

The treater is provided with an agitator 15 and a hopper 16 into which the clay may be dumped and forwarded by means of screw conveyor 17. A motor 18 provides the necessary driving force for the treater and screw conveyor.

An alternate arrangement is also shown in which the clay is not charged in a dry state to the treater but is first thoroughly admixed with a comparatively small quantity of an oil having approximately the same characteristics as the oil to be treated. This second method has the advantage that an acid treated clay may be employed which has been only partially washed from the treating acid and contains both acid and water. Such a clay may be admixed with oil in a vessel 19 provided with a heating jacket and an agitator 20. The oil and wet clay mixture is thoroughly agitated and heated to a temperature high enough to remove the major part of the water after which the slurry is pumped through line 21 into the treater 15, which may be provided with a vent pipe 22 to allow the escape of steam.

If a paraffin distillate is obtained as one

of the cuts, it is passed through the temperature control means 10', treater 11' and filter press 13' to remove the clay from the oil. The oil thus treated and freed from the clay is then passed through a cooler 23, chiller 24, and a second filter press 25 for the removal of wax into the storage tank 26. The wax crystallizes out very easily from the paraffin distillate treated according to my invention yielding a lubricating oil stock of good cold test.

There are tabulated in Table 1 the experimental conditions, and the tests, of the untreated and treated oil which in this case consisted of a mid-continent cylinder stock. Table 2 contains similar data and results obtained with a lubricating oil stock.

Table 1

Cylinder stock	Original		Treated oil		
Lbs. clay (Filtrol) per gal. oil.....	1/2	1	1	1	2
Treating temp., °F.....	500	500	500	500	500
Treating time in minutes.....	5	5	10	10	5
Gravity, °A. P. I.....	20.7	21.0	21.1	21.2	-----
Flash, °F.....	545	545	550	545	-----
Viscosity @ 210°F., seconds.....	148	147	146	146	-----
Pour, °F.....	105	100	90	110	-----
Color on the Tagliabue-Robinson colorimeter (dark glass).....	3/4	1	1 1/4	1 1/4	1 1/2
Color hold (color after 10 hours at 175° F.).....	1/2	3/4	1	3/4	1 1/4

Table 2

Lubricating oil	Original	Treated oil			
Decolorizing agent		Filtrol		Palex pulp (75% Solids)	
Lbs. clay per gal. oil.....	1/2	1/2	1/2	1/2	1/2
Treating temp., °F.....	450	450	550	350	-----
Treating time in minutes.....	5	10	10	10	-----
Gravity, °A. P. I.....	28.3	26.9	26.8	26.4	-----
Flash, °F.....	500	515	515	520	-----
Viscosity @ 100 °F. seconds.....	878	799	904	925	-----
Viscosity @ 210 °F. seconds.....	76	75	75	75	-----
Pour, °F.....	20	65	65	40	-----
Color on the Tagliabue-Robinson colorimeter (dark glass).....	3/4	8 3/4	9	8 3/4	8 3/4
Color hold (color after 16 hrs. at 175° F.).....	3 3/4	8 3/4	3 1/2	2 1/2	-----

It is evident from the above tables that both the color and the color stability depend largely on the selection of the right treating conditions, especially the treating temperature, the treating time, and the amount of clay used. In general, cylinder stocks are more improved at higher and lubricating oil stocks at lower treating temperatures. It seems that the optimum treating temperature for lubricating stocks is somewhere in the neighborhood of 450° F.

In the following claims the term "lubricating oil" is meant to designate both lubricating oils proper and cylinder oils.

Having thus described my process and the method of carrying it out what I claim is:

1. Process of treating lubricating oil comprising passing an oil stock containing lubri-

cating oil through a narrow heated passageway into an enlarged fractionation zone to obtain a fraction consisting of the lubricating oil, removing the fraction from the fractionation zone and directly agitating it in an unheated treating zone with a solid absorbent decolorizing agent at a temperature not less than 220° F., and separating the fraction from the decolorizing agent.

2. Process of treating lubricating oil comprising passing an oil stock containing lubricating oil through a narrow heated passageway into an enlarged fractionation zone to obtain a fraction consisting of the lubricating oil, removing the fraction from the fractionation zone, passing the removed fraction through a temperature controlling zone, directly agitating it in an unheated treating zone with a solid absorbent decolorizing agent at a temperature not less than 220° F., and separating the fraction from the decolorizing agent.

3. The process according to claim 1 in which a temperature of from 350° F. to 500° F. is maintained in the treating zone.

4. The process according to claim 1 in which the fraction agitated with the decolorizing agent consists of a lubricating oil proper and the treating temperature is maintained in the neighborhood of 450° F.

5. Process of treating lubricating oil, comprising passing an oil stock containing said lubricating oil through a narrow heated passageway into an enlarged fractionation zone to obtain a fraction consisting of said lubricating oil, removing the fraction from the fractionation zone and passing the removed fraction through a cooling zone in which its temperature is reduced to a temperature of not less than 220° F., directly agitating the cooled fraction in an unheated treating zone with a solid absorbent decolorizing agent, and separating said fraction from the decolorizing agent.

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