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METHOD OF PURIFYING OIL

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Fig. 1.

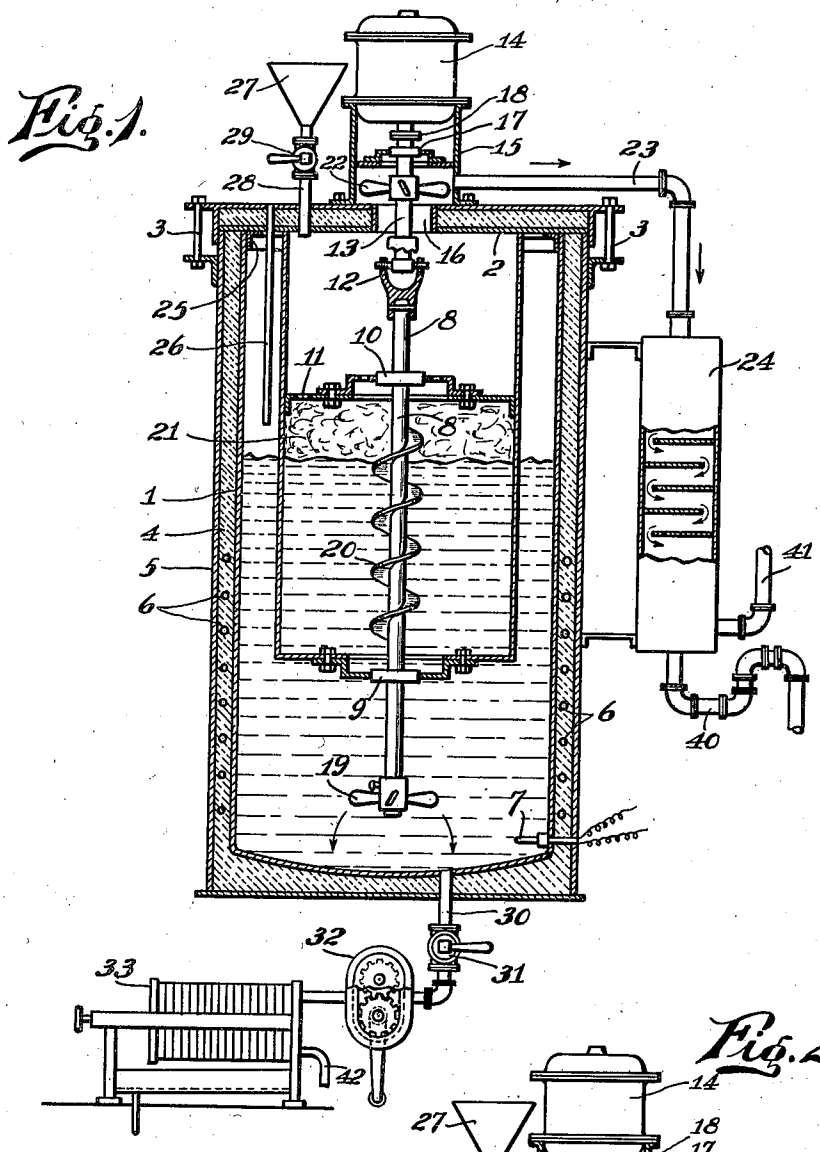
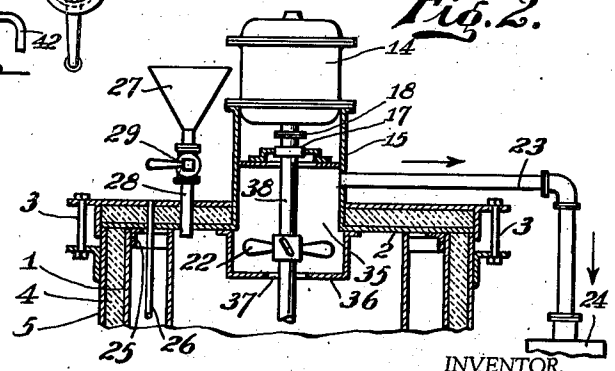


Fig. 2.



WITNESSES

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METHOD OF PURIFYING OIL

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3 Claims. (Cl. 196—16)

This invention relates to oil purification and particularly to the purifying or renovating of crank-case oil of motor vehicles, and this application is a division of my application Serial No. 506,169, filed January 2, 1931, and which has issued as Patent 2,061,666, Nov. 24, 1936.

An object of my invention is to provide a method of oil purification that is simple and inexpensive, is capable of extended use by owners of both relatively small and also large numbers of vehicles, or owners of garages, which is capable of practice in simple, relatively inexpensive and non-bulky apparatus, and which rectifies used lubricating oil by removing volatile agents contained in or carried by the oil and returns it to condition for satisfactory re-use.

Heretofore devices for purifying used lubricating oils have been so complicated and expensive in construction that their field has been limited to owners or operators of relatively large fleets of trucks or automobiles. The initial investment for such devices has been so high that the savings effected by its use must be relatively large.

The method provided by my invention is of such simplicity that the apparatus needed is simple and the number of parts has been so reduced, compared with prior apparatus, that it may be constructed and operated at a cost that will render it available to the operator of a relatively small number of trucks or automobiles, and the method is sufficiently simple as to permit it to be operated by relatively unskilled labor.

In the accompanying drawing Fig. 1 is a vertical sectional view of an oil purifier constructed to operate in accordance with my invention; and Fig. 2 a similar view of a portion of a modification.

In accordance with the method provided by this invention used lubricating oil, such, for example, as that from the crank case of an internal combustion engine is purified and rendered fit for further use by heating the oil to a temperature adapted to drive off or cause the liberation of volatile impurities, such as water, fuel, light hydrocarbons, and the like, and while thus heated agitating it in contact with an impurity-absorbing substance. The volatile impurities liberated are withdrawn, thus improving the oil, and the improvement is aided by removal of non-volatile impurities by the absorbing substance. When the treatment has progressed far enough to produce the desired result, the oil is treated, as by filtration, to separate the purified oil from solid matter.

In this manner the oil is purified, or conditioned, for re-use. The extent of improvement is controllable to return the oil to at least its original viscosity, and depending upon the temperature of treatment, extent of agitation, and duration of exposure thereto, the original viscosity may be exceeded, although that result will ordinarily not be needed.

In the preferred embodiment of the invention the surface of the oil is contacted with air, whereby better control of final viscosity characteristics is attained.

The volatile constituents may be condensed and recovered, and this will be desirable particularly where large amounts of oil are treated.

The invention may be described further by reference to the drawing, which illustrates apparatus for practicing the method. Having reference thereto, an upright cylindrical metal tank 1, which receives the oil to be treated, is provided with a removable top or cover 2 that is secured thereon by bolts 3. The body of tank 1 and the cover 2 each have a jacket 4 of asbestos or other suitable heat-insulating material and an outer steel covering 5 for protecting jacket 4. Substantially the lower half of tank 1 is surrounded by an electric heating element 6 that is electrically insulated from tank 1 and outer covering 5. The heating element 6 is connected to any suitable source of current (not shown). A thermostat 7 automatically controls the maximum temperature of the contents of the tank to prevent overheating.

A vertical shaft 8, which extends centrally of tank 1, has a lower outboard bearing 9 and an upper outboard bearing 10 which are supported by a framework 11 that is secured to and removable with cover 2. Shaft 8 is connected through a universal joint 12 and a short shaft 13 to an electric motor 14 mounted on the upper end of a gas-tight cylindrical casing 15. Shaft 13 extends through an aperture 16 in cover 2 and a stuffing box 17 in the casing 15 and is connected to the motor shaft by means of a coupling 18. Shaft 8 is provided at its lower end with an agitating device in the form of a propeller 19 for the purpose of producing a turbulent agitation of the oil and preventing the deposition of sediment in the bottom of the tank.

Shaft 8 may be provided also with a spiral fin 20 which serves to actuate a stream of oil upward around the shaft and fin to be thrown outward at the end of the spiral fin in the form of spray, as indicated at 21, to facilitate the escape of vapors from the oil.

A fan 22 is mounted on shaft 13 within the casing 15 and above aperture 16. Fan 22 draws vapors upwardly through aperture 16 and forces them to flow through an outlet pipe 23 into a condenser 24. Cover 2 is provided with an inner circular flange 25 for preventing the escape of vapors between cover 2 and the tank.

Cover 2 is provided with an air inlet pipe 26, and also with an inlet for oil to be treated comprising a funnel 27 and a pipe 28 having a valve 29. The bottom of the tank is provided with an outlet pipe 30 having a valve 31 and that is connected to a gear pump 32 and a filter press 33.

The apparatus of Fig. 2 differs from that of Fig. 1 in that cover 2 is provided with a larger central aperture 35 which is of substantially the same diameter as that of casing 15. A cylindrical casing 36 is suspended from the cover and is provided with a central opening 37, through which extends a shaft 38 that replaces shaft 13 of Fig. 1. Fan 22 is mounted on shaft 38 within casing 36. In other respects, the apparatus of Fig. 2 is substantially similar to that of Fig. 1.

In the operation of the purifier, oil to be treated is poured in at the top by means of funnel 27 until the tank is filled to a desired level, for example as indicated in the drawing. The tank is ordinarily adapted to receive from five to ten gallons of oil.

A suitable quantity of clay or fuller's earth or other impurity-absorbing material of like nature is added for the purpose of absorbing tarry constituents of the oil and the valve 29 is closed. The clay or fuller's earth may, however, be added later, if desired.

The tank is then heated to raise the temperature of the oil to between 350° F. and 450° F., depending upon the character of the oil being treated and the degree to which the lighter or more volatile constituents are to be removed. Thermostat 7 may be adjustable or designed for the maximum temperature desired.

Motor 14 is in operation during the heating of the oil. Propeller 19 actuates oil downwardly against the bottom to prevent the deposition of sediment and to keep the fuller's earth or clay in suspension. Spiral fin 20 produces oil spray to increase the surface exposure of the oil and the liberation of vapors of the volatile elements.

Fan 22 withdraws air and vapors upwardly through aperture 16 into casing 15 and forces them out through pipe 23. Air flows in through the air inlet pipe 26 adjacent the surface of the oil and the circulation of air thus caused by fan 22 assists in the liberation of vapors of gasoline and other volatile ingredients.

Condenser 24, which may be of any suitable or usual type, collects the liquid resulting from the condensable vapors; the condensate flows out through a pipe 40. The non-condensable vapors and gases escape through a pipe 41.

When the oil has been sufficiently treated, valve 31 is opened and gear pump 32 is operated to withdraw the oil from the tank 1 and force it through a filter press 33. All sediment and solid material are removed from the oil and the latter thus entirely purified and renovated is drawn off through pipe 42.

The purified oil is now in condition for the same uses for which it was suitable in its original state. In fact, the treated oil may have an even higher viscosity than that of the original oil.

The purifier may be refilled after the treated oil is withdrawn and the operation repeated as often as desired.

The invention thus is simple, easily practiced, requires only simple and uncomplicated apparatus, and efficiently removes undesirable ingredients of used crank-case oil or oil employed for similar purposes and restores it to at least its original state of purity and viscosity. The apparatus required for practicing the method is extremely simple and may be operated with entire safety by relatively unskilled labor.

According to the provisions of the patent statutes, I have explained the principle and mode of practicing my invention, and have illustrated and described what I now consider to be its best embodiment. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

1. The method of purifying used lubricating oil, comprising mixing a solid impurity-adsorbing material with said oil, mechanically agitating the mixture heated to a temperature to cause volatile impurities to be liberated from the oil, while contacting the surface of the oil body with air, withdrawing vapors of volatile impurities from the oil, and treating the oil to separate solid material therefrom.

2. The method of purifying used lubricating oil, comprising mixing a solid impurity-adsorbing material with said oil, simultaneously mechanically agitating the mixture and heating it to a temperature at which volatile impurities are liberated from the oil, while contacting the surface of the oil body with air, withdrawing the vapors of volatile impurities from the oil, separating the solid material from the treated oil, and recovering oil free from volatile impurities and solid matter.

3. The method of purifying used lubricating oil, comprising mixing a solid impurity-adsorbing or collecting material with said oil, mechanically agitating the mixture and simultaneously heating it at a temperature at which volatile materials are liberated from the oil, while contacting the surface of the oil body with air, withdrawing the vapors of volatile impurities from the oil for condensation of condensable constituents, filtering the oil to separate solid matter therefrom and thereby recovering purified oil free from solid and volatile impurities.

JAMES R. MILLER.