

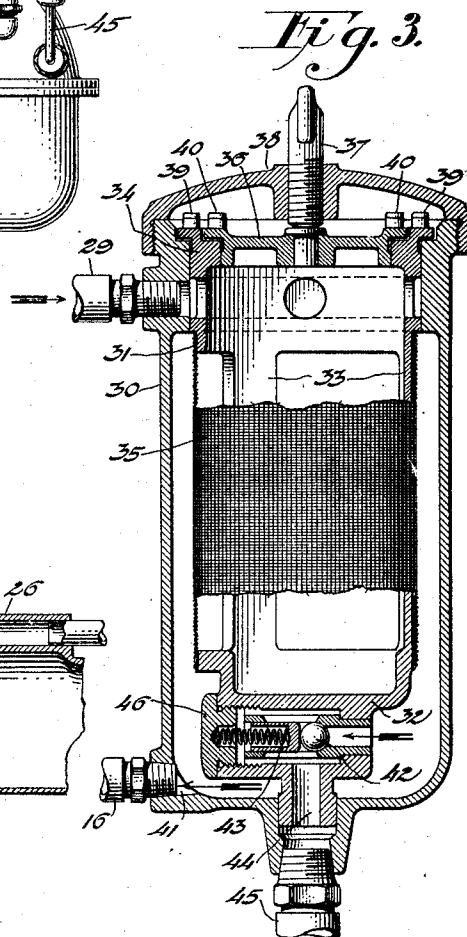
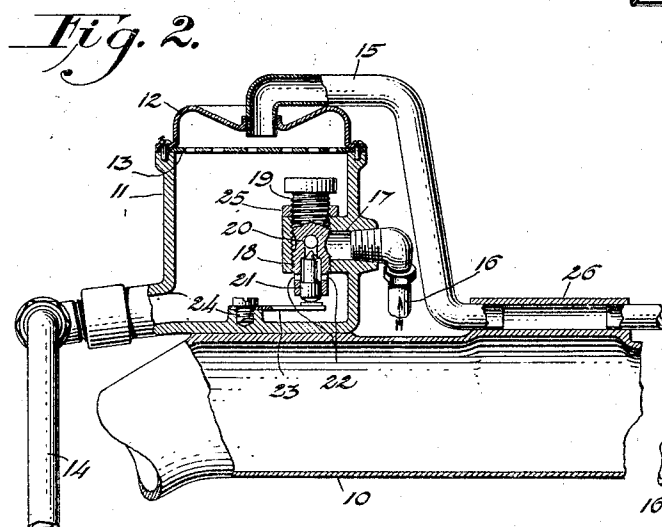
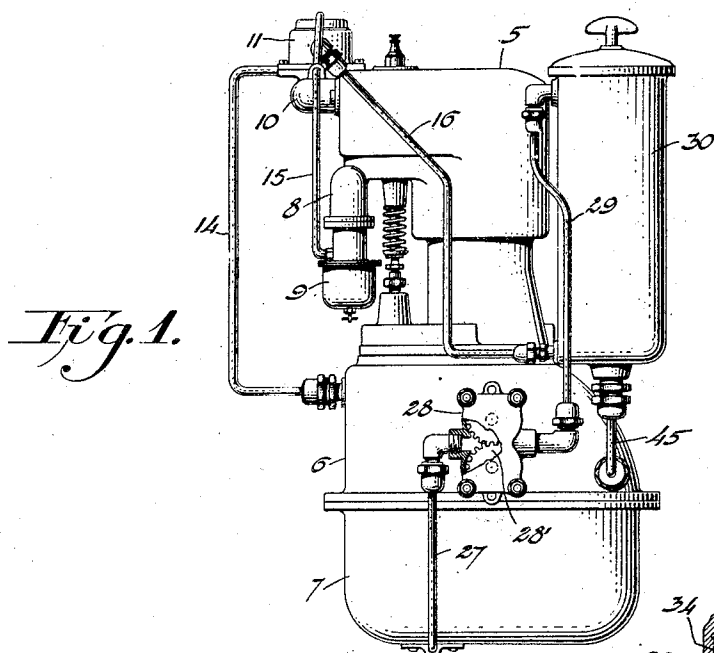
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OIL RECLAIMING MECHANISM

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UNITED STATES PATENT OFFICE

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DELAWARE

OIL-RECLAIMING MECHANISM

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The invention relates to the treatment of oils or other materials of similar characteristics, and more specifically the application of filtering and heat treatment to lubricating oils such as are employed in connection with internal combustion engines.

The deterioration of lubricating oils as ordinarily employed in the crank case of an internal combustion engine, due to the condensation therein of water and hydrocarbons forming constituents of the explosive charge either before or after combustion, is a well known difficulty attending the operation of such engines. The difficulty has been enhanced and will probably tend to increase further by reason of the use of fuel oils of higher boiling points. We have found by actual test that after only a five hundred mile run, samples of oil from the crank case of an automobile engine have contained as high as forty percent of water and ten percent of fuel oil. The water tends to form a jelly-like emulsion with the oil which collects on the walls of the crank case and oil pan and reduces the space for free oil, while the fuel oil reduces the viscosity of the mixture to such an extent that the oil film on the bearing members is liable to break under pressure and thereby entirely fail in effecting its desired lubricating function.

It has been proposed to apply to the lubricating oil during the operation of the engine, a heat treatment whereby the portions of lower boiling point, and which constitute impurities in the lubricant, may be eliminated. Our invention is concerned more particularly with apparatus of this type, and has for its principal object the provision of means applicable to an internal combustion engine and adapted to remove oil from the crank case thereof; purify the oil, and return the same to the crank case.

A further object is to provide an oil-treating apparatus of the type referred to which shall include thermally controlled means for

determining the flow of oil to the heat treating elements of the apparatus.

A further object is to provide in connection with the heat treating apparatus, a filtering device whereby the oil may be both filtered and freed of impurities removable by vaporization.

A further object is to provide for the constant supply of oil from the crank case to the purifying mechanism and the utilization of the useful separated constituents.

With the above and other objects in view, as will appear more fully from the following description, the invention comprises the features of novelty herein described, together with such variations and modifications thereof as fall within the scope of the appended claims.

In the accompanying drawings in which is illustrated one embodiment of our invention—

Fig. 1 is an elevation of an internal combustion engine having associated therewith an oil treating apparatus;

Fig. 2 is a vertical sectional view of the heat treating elements; and

Fig. 3 is a vertical sectional view of the oil filter.

In the drawings, 5 indicates an internal combustion engine having a crank case 6 and oil pan 7, also an intake manifold 8 leading to the engine from the carburetor 9 and an exhaust manifold 10. These parts may be of any usual or desired construction, inasmuch as the invention is in no way concerned with the specific details of the engine per se. Mounted upon the exhaust manifold 10, and in intimate heat conducting relationship thereto, is mounted a distilling vessel 11 provided with a cover 12, between which and the body of the receptacle is a perforated baffle 13. An outlet conduit 14 leads from the vessel 11, and preferably from the lowest point thereof, to the crank case 6. A vapor conduit 15 is connected to

the upper portion of the vessel above the baffle 13, as to the cover 12. An oil inlet pipe 16 is arranged to supply the oil which is to be treated to a chamber 17 formed in or
 5 connected to a side wall of the vessel 11. In a cross bore 18 connecting with the chamber 17 is mounted, preferably by screw threaded engagement with the walls of the bore, a valve body 19 having therein a pas-
 10 sage 20 communicating with the chamber 17. A valve plug 21 is slidably mounted in the passage 20 and arranged to engage with a valve seat formed in the said passage. Apertures 22 may be provided to permit oil
 15 which passes the valve 21 to escape into the interior of the vessel 11.

A thermostatic body 23, suitably secured to the bottom of the vessel 11, as by a screw 24, is so positioned that it engages at its free
 20 end with the head of the valve plug 21. The thermostatic body 23 is so constructed and mounted that it will retain the valve 21 in closed position when the temperature in the vessel is at or below a certain predetermined
 25 minimum, but will allow the valve to open when the temperature has reached the point at which desired action upon the oil will take place. Adjustment may be made to determine the temperature at which the valve
 30 will be permitted to open by rotation of the valve body 19, thus carrying the valve toward or away from the thermostat 23, a lock nut 25 being provided to retain the member in the adjusted position. The ther-
 35 mostatic body 23 is preferably mounted in such relation to the wall of the vessel 11 that its movement away from the valve body 19 will be limited by engagement with the said wall, thereby preventing the bending of
 40 the thermostat beyond its elastic limit.

While I have described the vessel 11 as being mounted upon the exhaust conduit 10, it will be understood that the vessel, or a portion thereof, may be formed integrally with
 45 the walls of said conduit.

The vapors of water and of low boiling hydrocarbons which escape from the distilling chamber through the conduit 15 may be led to any desired point, but preferably to
 50 the intake manifold 8, where they may be utilized in the formation of an explosive mixture for use in the engine. In order to prevent the condensation of the vapors as they pass to the intake, we may provide a
 55 heating chamber 26 so associated with the conduit 15 and with the exhaust manifold 10 as to maintain the desired temperature of the vapors. As shown, we have formed the heating chamber integrally with the walls
 60 of the exhaust manifold and adapted to receive the ends of the sections of the vapor conduit 15.

The oil which is to be treated is drawn from the crank case, as from the lower portion of the oil pan 7, through a pipe 27 by

means of a pump 28. The pump is preferably of the positively acting (gear) type, as indicated at 28', and may be arranged to be driven by the same shaft as the pump now employed for circulating the lubricating oil, although, obviously, any desired means of
 70 actuation may be employed.

The oil drawn from the crank case is forced by the pump through the conduit 29 to a filter casing 30, being discharged to the interior of the strainer body 31.
 75 This body is shown as comprising a lower closed portion 32 connected by standards 33 to an upper end portion or ring 34, a screen 35 being arranged around the intermediate or open portion of the strainer body. The strainer body may be closed at the upper end by a cap 36 held in position by a screw 37 passing through the cover 38
 80 of the filter casing. Lugs 39, 40 may be provided respectively upon the strainer body and the cap to facilitate removal of the same from the interior of the filter casing when desired for the purpose of cleaning or inspection. The strainer body is spaced from the interior of the walls of the casing a sufficient distance to provide free passage for the oil flowing therethrough. An exit pas-
 85 sage is provided in the lower portion of the casing, as at 41, communicating with the conduit 16 leading to the distilling chamber 11. In the end or head 32 of the strainer body 31 is mounted a relief valve comprising a ball 42 held to its seat by a spring actuated plunger 43 and controlling the flow
 90 from the interior of the filter casing 30 to the bypass or overflow passage 44, which latter communicates with the conduit 45 leading back to the crank case. The pressure exerted by the spring plunger 43 may be adjusted, as by the plug 46, so as to permit the escape of oil when a predetermined
 95 pressure in the filter is exceeded. The pressure existing in the filter must, of course, be sufficient to cause the flow of oil therefrom to the vessel 11 when the opening of the valve 21 permits such flow.
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The operation of the apparatus described is as follows:

The pump being set in operation, either
 115 by direct connection to the engine or in any other desired manner, the oil is drawn from the crank case and forced through the screen in the filter. As long as the valve 21 remains closed, the oil all returns to the crank case through the passage 44 by way of the relief valve 42. When, however, the valve 21 has been opened by the operation of the thermostat, i. e., when the temperature in the distilling vessel 11 has reached the point
 120 necessary to cause vaporization of the lower boiling impurities, which temperature may be approximately 310° F., the oil will flow through the conduit 16 into the vessel 11. The oil entering the vessel is subjected to a
 125 130

heat treatment therein, and also, if the vapor outlet 15 is connected to the intake manifold, to a certain degree of vacuum, with the result that water, gasoline, and kerosene, or like low boiling constituents, are removed. The baffle 13 prevents the ebullition of the oil from causing particles of heavy oil to be carried out through the vapor conduit. We have found that at different throttle openings and load of the engine, the temperature in the distilling chamber is maintained practically constant, since more oil is admitted when the temperature starts to rise and the increased quantity of oil absorbs more heat in its distillation.

It will be understood that the vapors may, if desired, be permitted to escape into the open air, or may be subjected to any further separating or condensing treatment necessary to facilitate further utilization.

Any excess of pumped oil above the amount permitted to enter the distilling chamber will return to the crank case after passing through the screen 35, the apparatus serving thus either to constantly filter the oil or to both filter and heat the same.

While we have referred herein to the treatment of lubricating oil, and to the use of the apparatus in connection with an internal combustion engine, it will be understood that the invention is, in some respects, of much broader application, and also that various changes in details of construction and arrangement may be made within the ability of one skilled in the art, and, therefore, we do not wish to be limited to the specific disclosure herein except as required by the language of the subjoined claims.

We claim:

1. The combination of an engine, a distilling vessel, a filter, means for causing oil to flow from the engine through said filter, means for permitting a portion of the filtered oil to pass to the distilling vessel, and means for returning the remainder of the filtered oil to the engine.

2. The combination of an internal combustion engine, a distilling vessel, a filter, a pump arranged to supply oil from the crank case of the engine to the filter, a conduit from the filter to the distilling vessel, a conduit from the filter to the engine crank case whereby filtered oil may be returned directly to the crank case, a vapor conduit from the distilling vessel to the engine intake, and a residue conduit from the vessel to the crank case.

3. The combination of a distilling chamber, a filter, a source of supply, a pump arranged to force material from said source to said filter, means for conveying a portion of the filtered material from said filter to said distilling vessel, and means for returning

the remainder of the filtered material to the source.

4. The combination of a distilling vessel, a filter chamber communicating with said vessel, pumping means adapted to supply lubricating oil to said chamber under elevated pressure, means for controlling flow from said chamber to said vessel and for maintaining the oil in said vessel under a lower pressure than the oil in said chamber.

In testimony whereof we affix our signatures.

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