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E. E. SWEET

APPARATUS FOR DISTILLING VOLATILE IMPURITIES FROM THE LUBRICATING OIL OF INTERNAL COMBUSTION ENGINES

Filed Sept. 30, 1919

FIG. 1.

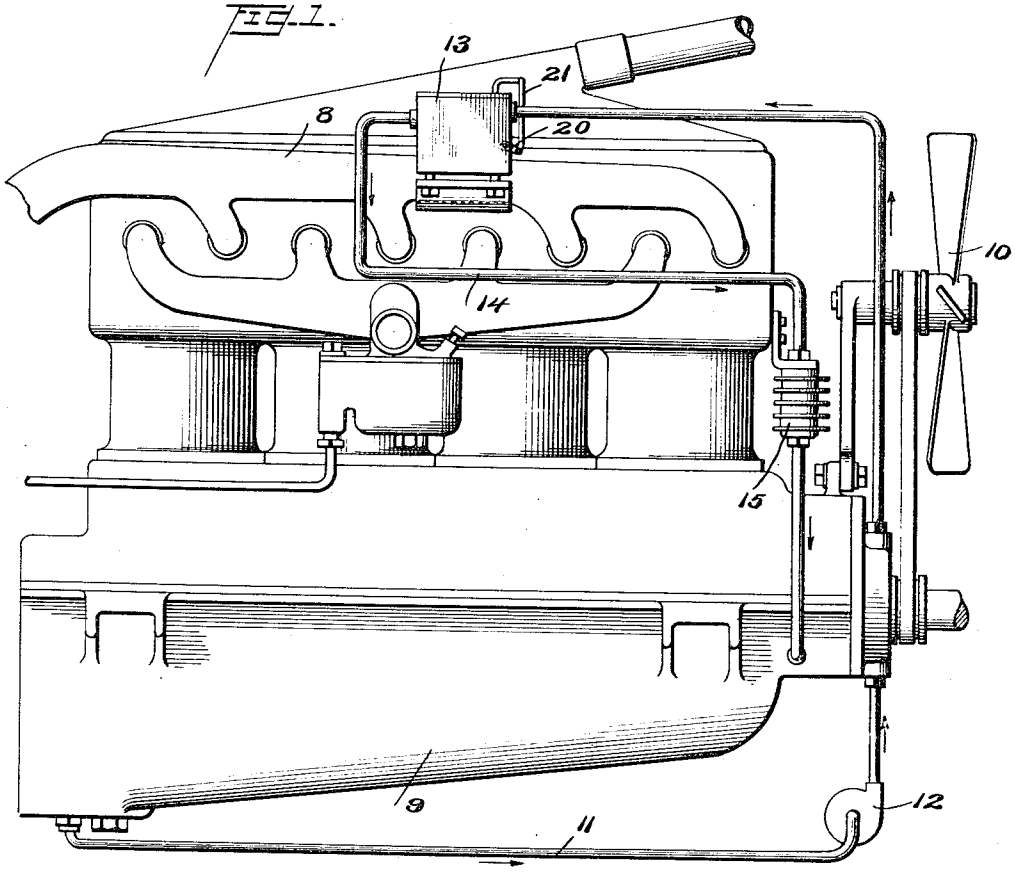



FIG. 2.

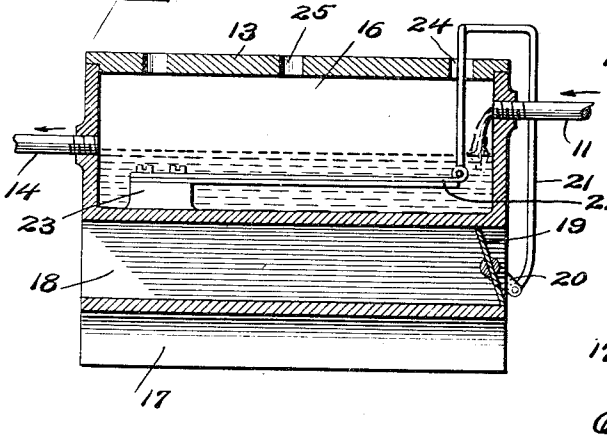
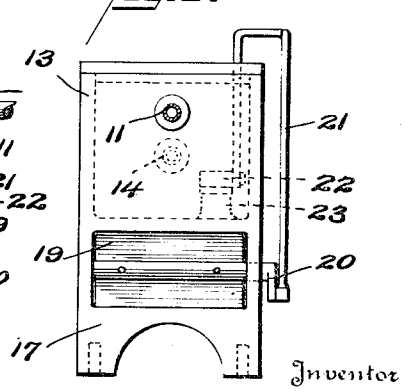



FIG. 3.




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# UNITED STATES PATENT OFFICE.

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## APPARATUS FOR DISTILLING VOLATILE IMPURITIES FROM THE LUBRICATING OIL OF INTERNAL-COMBUSTION ENGINES.

Application filed September 30, 1919. Serial No. 327,444.

*To all whom it may concern:*

Be it known that I, ERNEST E. SWEET, a citizen of the United States, and residing at Detroit, Wayne County, State of Michigan, have invented certain new and useful Improvements in Apparatus for Distilling Volatile Impurities from the Lubricating Oil of Internal-Combustion Engines, of which the following is a specification.

The object of this invention is to provide a simple efficient apparatus for removing by distillation the water and gasoline or other fuel, which has become intermingled with the lubricating oil of an internal combustion engine.

In the operation of internal combustion engines it is nearly always the case that a considerable quantity of water of condensation and unburned fuel leaks by the pistons into the crank case, thereby diluting the oil and rendering it less efficient for the purposes of lubrication. This leakage occurs to some extent during all seasons of the year, but is particularly noticeable in cold weather and especially when starting the engine when cold. In gasoline engines a part of the gasoline, and especially the heavier part resembling kerosene is not fully vaporized and finds its way past the pistons into the crank case. When the engine is cold part of the burned gases condense as water in the cylinders, and this water also runs down the cylinder walls into the crank case. This admixture of water and hydrocarbon fuels with the lubricating oil, is very undesirable, and if the impurities mentioned are present in sufficient volume, the efficiency of the oil is very materially reduced, thereby increasing the friction between the moving parts of the engine.

The present invention provides an apparatus whereby the oil is continuously withdrawn from the crank case when the engine is running, the water and gasoline or other fuel distilled off by heat, the heated oil cooled, and then returned to the crank case. The invention further contemplates the use of a device for regulating the temperature to which the oil is heated in the distillation process, this temperature regulating means being necessary as the oil must be prevented from reaching too high a temperature, 250° Fahrenheit being considered the highest desirable temperature at which the distillation should take place.

The invention will be fully disclosed in the following description when taken in connection with the accompanying drawings, in which—

Fig. 1 is a side elevation of an internal combustion engine having the present invention incorporated therewith;

Fig. 2 is a longitudinal section through the oil heating or distilling element;

Fig. 3 is an end view of the same from the right (Fig. 1).

The invention may be used in connection with any internal combustion engine which has a lubrication system in which the oil is distributed by the splash system or the pump system, to the bearings of the engine and is collected in a reservoir such as the crank case. In the drawings I have illustrated an ordinary four cylinder gasoline engine, such as commonly used on automobiles and other motor vehicles and which has an exhaust manifold indicated at 10, a crank case at 11 and a fan at 12. To the lowest part of the crank case 11 is connected the inlet end of a pipe 12 through which the crank case oil is adapted to be pumped by means of a rotary or other pump 13 to one end of the distilling receptacle or heating element 13 secured to the exhaust manifold 10. A pipe 14 connected to the opposite end of the heating element 13 leads the oil back to the crank case. Intermediate the ends of the pipe 14 is a cooling device 15 preferably located directly behind the fan, for cooling the oil after it has passed through the heating element and before it is returned to the crank case. This cooling element 15 may be of any well known design. In the drawings I have illustrated it as being simply a cylindrical chamber of considerably larger diameter than pipe 14 and having heat radiating fins on its exterior surface.

The heating element itself has a heating or distilling chamber 16, the bottom of which is separated from the supporting base 17 by an air space 18. As the temperature of the exhaust manifold varies in accordance with the work being done by the engine, it sometimes rises, when the vehicle is climbing a hill, to a very high degree and if the heat-

ing chamber had the temperature of the exhaust manifold, the oil would sometimes be burned and rendered unfit for use.

When the engine is very hot, therefore, it is desirable that a current of air from the fan be passed through the air conduit 18 preventing overheating of the chamber 16, while when the engine is cool no cooling air should pass through to perhaps reduce the temperature of the chamber 16 below that necessary to distill off the water and fuel contained in the oil.

Means is therefore provided for controlling the amount of air from the fan passing through air conduit 18 and this means is automatically regulated in accordance with the actual temperature of the oil in the heating element. A shutter 19 is pivoted horizontally across the front end or mouth of air conduit 18 and this shutter is connected by means of arm 20 and U-shaped rod 21 with one end of a thermostat 22, the other end of which is secured by screws to a boss 23 within the chamber 16. The U-shaped rod 21 is as shown pivotally connected to both the arm 20 and the thermostat 22, and the shutter 19 is opened and closed as the free end of the thermostat rises and falls. A suitable opening 24 is, of course, provided in the top of the heating element to allow free passage for the rod 21 and openings 25 are provided for the escape of the gasoline and water vapors distilled from the oil.

From the above explanation, the operation of the apparatus will be apparent. Whenever the engine is in operation, the pump 12 which is operated from the crank shaft by mechanism of the usual character, not shown in the drawings, continually draws the oil from the bottom of the crank case and pumps it into the right hand end of the distilling chamber 16. This chamber is of such size that the flow of the oil therethrough is quite slow and the oil remains therein for a sufficient length of time to enable it to become heated to the desired temperature. During its passage through chamber 16, the water and gasoline or kerosene vapors are distilled off and pass out through the openings in the top of the heating element. The oil then flows by gravity through pipe 14 and cooling device 15 back to the opposite end of the crank case.

As the temperature of the exhaust pipe 10 varies, the thermostat automatically adjusts the shutter 19 in accordance with the actual temperature of the oil in chamber 16, thereby insuring proper heating of the oil when the engine is doing little work and preventing burning when the engine is working hard and the exhaust gases are very hot.

It is obvious that many changes may be made in the apparatus as illustrated, and I do not limit myself, therefore, to the exact form shown and described. The scope of the invention will be apparent from the appended claims in which I clearly point out and briefly describe what I desire to secure by Letters Patent.

What is claimed is:

1. In an internal combustion engine, in combination, a fan, an oil heating chamber in rear of the fan, a source of heat adjacent the heating chamber and separated therefrom by a channel adapted to convey air from the fan, means for conveying oil to and from the heating chamber, and means for controlling the flow of air through said channel in accordance with the temperature of the oil in the heating chamber.

2. In an internal combustion engine, in combination, a fan, an oil heating chamber in rear of the fan, a conduit for cooling air adapted to conduct air from the fan along the wall of the heating chamber, and means for controlling the flow of air through said channel in accordance with the temperature of the oil in the heating chamber.

3. In an internal combustion engine, in combination, a fan, an exhaust pipe, an oil heating chamber in rear of the fan and mounted on the exhaust pipe, a conduit for leading cooling air between the heating chamber and exhaust pipe, and means for controlling the flow of air through said channel, in accordance with the temperature of the oil in the heating chamber.

4. An oil heating device for internal combustion engines comprising, a heating chamber, a passage below said chamber for cooling air, and means for automatically controlling the effective area of said passage in accordance with the temperature of the heating chamber.

5. An oil heating device for internal combustion engines comprising, a heating chamber, means for conducting a cooling fluid along the wall of said chamber, and means for controlling the flow of cooling fluid through said conducting means in accordance with the temperature of the heating chamber.

6. An oil heating device for internal combustion engines comprising, in combination, a heating chamber, means for securing the heating chamber to an exhaust pipe and in spaced relation thereto so that cooling fluid may flow between the heating chamber and exhaust pipe, and means for controlling the flow of fluid through said conducting means in accordance with the temperature of the heating chamber.

7. An oil heating device for internal combustion engines comprising, a heating chamber, means for conducting a cooling fluid along the wall of said chamber, and a

thermostatically governed means for controlling the flow of fluid through said conducting means in accordance with the temperature of the heating chamber.

8. An oil heating device for internal combustion engines comprising, a heating chamber, means for conducting a cooling fluid along the wall of said chamber, and a shutter or valve for controlling the flow of fluid through said conducting means, and a thermostat connected thereto for regulating the position of the shutter in accordance with the temperature of the heating chamber.

9. An oil heating device for internal combustion engines comprising, a heating chamber, means for conducting a cooling fluid along the wall of said chamber, and means for controlling the flow of cooling fluid through said conducting means in accordance with the temperature of the heating chamber, including a valve in said conducting means, a thermostat in said heating chamber, and a connection between the thermostat and valve.

10. An oil heating device for internal combustion engines comprising, a heating chamber, cooling means associated therewith for preventing overheating of the oil, and thermostatic means for regulating said cooling means in accordance with the temperature of the oil.

11. An oil heating device for internal combustion engines comprising, a heating chamber having oil inlet and outlet ports and ports for the escape of vapors, cooling means associated therewith for preventing overheating of the oil, and thermostatic means for regulating said cooling means in accordance with the temperature of the oil.

In testimony whereof I affix my signature.

ERNEST E. SWEET.