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MEANS FOR REDUCING CRANK CASE DILUTION IN INTERNAL COMBUSTION ENGINES

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Fig. 1.

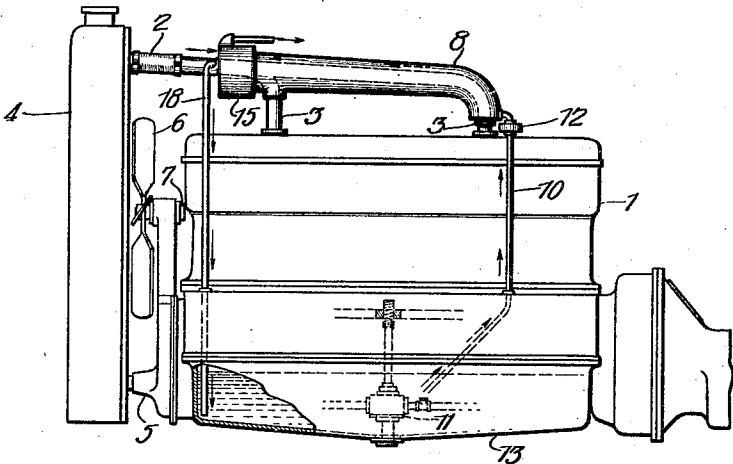
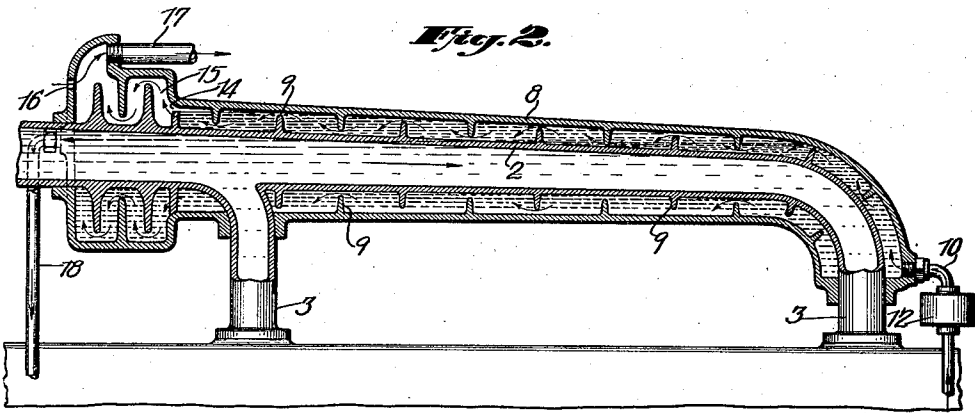


Fig. 2.



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MEANS FOR REDUCING CRANK-CASE DILUTION IN INTERNAL-COMBUSTION ENGINES.

Application filed August 9, 1927. Serial No. 211,689.

This invention relates to internal combustion engines and provides a means for constantly maintaining the lubricating oil in a condition for proper lubrication of the engine. This object is accomplished by heating the oil, preferably in the manner as is hereinafter set forth in detail, whereby any portions of the fuel admixing with the oil are substantially or completely removed therefrom and the temperature of the oil is maintained at a point necessary for most efficient operation of the engine.

Internal combustion engines when first started and until heated to the proper operating temperature, or when operating under certain service conditions, usually fail to run efficiently until the temperature of the engine and of the lubricating oil employed therein have been raised considerably above the atmospheric conditions. During this time the lubricant generally undergoes dilution by the addition thereto of unconsumed or heavier ends of the fuel employed in the engine. Continued dilution of the oil soon impairs its lubricating qualities to such an extent that great damage may be done to the engine unless the oil is frequently changed. The changing of the oil in an engine can be made less frequent and necessary if means are employed for removing the diluting fractions in the lubricant, for example by heating means. Although various means of heating the oil used in an internal combustion engine have been proposed heretofore, none of these earlier means have been particularly successful in accomplishing the objects desired.

In an application, Serial No. 206,161, filed July 16, 1927, I have shown that crank case dilution can be substantially prevented by maintaining the oil in the crank case in heat exchange relationship with the medium employed as a cooling means in the engine by by-passing the radiator and flowing the heated medium from the cooling jacket of the engine through an heat exchange unit in contact with the lubricating oil, preferably in the oil sump. I have now further found that equally efficient engine operation can be realized by withdrawing the oil from the engine crank case and flowing the oil through a jacket surrounding the outlet manifold from the cylinder head water jacket of the engine, whereby the oil is placed in an indirect heat exchange relationship with the hot water or steam flowing from the water

manifold to the radiator. By these means, the lighter diluent fractions of the oil are removed therefrom while the original properties of the oil are practically completely restored thereto. Moreover, the temperature of the oil is thereby maintained at a point necessary for most efficient engine operation.

Other means and novel features in the construction and arrangement of the various parts of the device are brought out and explained in more detail in the following description, which for a clear understanding of the invention should be considered in connection with the accompanying drawings forming a part thereof, and wherein is disclosed for the purpose of illustration a convenient and satisfactory embodiment of the invention. It is to be noted in this connection, that minor changes in the construction and arrangement of parts may be made without departing from the principle of operation of the various parts.

The invention is clearly illustrated in the accompanying drawings in which Figure 1 is a diagrammatic side elevation of an engine embodying the invention, and Figure 2 is an enlarged view in section of details of the heat exchange unit.

Referring to the drawings, an internal combustion engine 1 is provided with the usual cylinder head outlet manifold 2, connected by pipes 3 with the engine cooling jacket and also connected to the radiator 4. At the bottom, the radiator 4 is connected by a pipe 5 to the water pump (not shown) or in the thermosyphon type of engine cooling is connected directly with the engine cooling jacket. A fan 6 carried by the shaft 7 and driven in the ordinary manner is located as usual back of the radiator 4 to draw air through the same. This system as described comprises the ordinary circulating system for a cooling medium found in internal combustion engines used in automobiles or otherwise.

The cylinder head outlet manifold 2 through which the heated engine cooling medium is conducted from the engine to the outlet, is surrounded by a jacket 8 which is interiorly provided with a plurality of baffles 9 spaced apart and alternately projecting as shown from the header 2 and enveloping jacket 8 so as to provide a circuitous course for liquid and vapors flowing therethrough. A pipe 10 leads from the main oil circulating line or preferably from

the oil pump 11 and discharges into the jacket surrounding the header 2. A thermostat 12 controls the rate of flow of liquid through this pipe.

By the means described, oil from the engine crank case 13 is withdrawn therefrom and pumped through the line 10 into the jacket enveloping the outlet header 2. The oil so flowing through the jacket is maintained in the jacket under the pressure imposed thereon by the pump. Lubricating oil usually becomes more or less diluted during its use in engines due to the addition thereto of unconsumed portions of the fuel employed. Such oil, upon flowing through the jacket 8 in the manner as described, becomes heated by the hot water or steam passing through the outlet header 2 and the lighter fractions admixed in the oil are vaporized. These vapors, together with the hot non-vaporized lubricating oil, are discharged from the jacket through an opening 14 leading into an expansion chamber 15 maintained substantially at atmospheric pressure or at a pressure lower than that exerted in the jacket. An opening 16 at the front portion of the expansion chamber permits a gas, such as air, to enter the chamber and sweep out the vapors therein away from the chamber through line 17 which may be connected with the carbureter or may discharge such vapors into the air. Residual lubricating oil substantially free from all lighter fractions then overflows from the expansion chamber 15 through line 18 and discharges below the surface of the oil in the engine crank case 13.

Instead of providing the expansion chamber 15 with the air inlet port as shown, it has been found possible to maintain a slight but sufficient suction on the chamber by connecting the line 17 with the intake manifold thereby transferring the vapors directly from the chamber 15 to the carbureter. Moreover, if desired, the line 18, through which the hot oil is conducted from the expansion chamber to the oil sump, may be placed in heat exchange relationship with the fuel line to the carbureter whereby the fuel may be preheated.

By the means described, the oil is substantially stripped of the lighter diluting fractions present and the lubricating oil in the sump is maintained in a condition most suitable for efficient lubrication. Furthermore, the use of the construction set forth causes the engine to attain normal operating conditions more quickly than is possible with the ordinary engine.

It is known that an internal combustion engine does not operate in the most efficient manner until the engine and lubricant have reached a temperature considerably above atmospheric. The heating of the engine to the necessary temperature takes place rather

slowly, particularly in cold weather. It is during the period of operation while the engine is heating up that crank case dilution occurs since the engine temperature is not high enough to vaporize the higher boiling fractions of the fuel supplied thereto. Consequently, by the use of the means described, the lubricating oil is quickly heated and the possibility of excessive crank case dilution is lessened. Moreover, what dilution may occur is removed in the manner hereinbefore explained. These advantages may be realized even more quickly by interposing a thermostatic valve in a water line 2 leading to the radiator whereby the return of cooling medium to the radiator is prevented until the temperature of the engine has reached the point desired.

Another advantage realized from the use of the invention set forth is the more uniform operation of the engine due to the continuous heating of the lubricant. Where no oil heating means are provided, the engine temperature fluctuates between wide limits due to varying conditions met in service. By heating the oil, however, in the manner set forth, the engine temperature is constantly maintained more nearly uniform than has heretofore been considered possible. If, however, the engine should become overheated, the thermostatic valve 12 in line 10 closes thereby shutting off the flow of oil through the heating jacket until the temperature of the engine has been lowered to a point where further heating of the lubricant is desirable.

As many changes can be made in the above construction and many apparently widely different embodiments of the invention can be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative only and not at all limitative of the scope of my invention.

It is also to be understood that the language employed in the appended claims is intended to cover all the generic as well as the specific features of the invention herein described.

What I claim is:—

1. In an internal combustion engine, in combination, a cooling fluid outlet header, a jacket enveloping said header, an expansion chamber connected with said jacket, an oil sump, a line from said main oil circulating system to the jacket and a line from the expansion chamber to the oil sump.

2. In an internal combustion engine, in combination, a cooling fluid outlet header, a jacket enveloping said header, an expansion chamber connected with said jacket, an oil sump, an oil pump, a line from said pump to the jacket, and a line from the expansion chamber to the oil sump.

3. In an internal combustion engine, in combination, a cooling fluid outlet header, a jacket enveloping said header, means within said jacket for causing the liquid flowing
5 therethrough to assume a circuitous course, an expansion chamber connected with the jacket, means for removing vapors from said expansion chamber, an oil sump, an oil pump, a line from said pump to the jacket
10 and a line from the expansion chamber to the oil sump.

4. In an internal combustion engine, in combination, a cooling fluid outlet header, a jacket enveloping said header, baffles within said jacket, an expansion chamber connect-
15 ed with the jacket, pressure reducing means connected with the expansion chamber, an

oil sump, an oil pump, an oil conduit from the pump to the jacket and a line from the expansion chamber to the oil sump.

5. In an internal combustion engine, in combination, a cooling fluid outlet header, a jacket enveloping said header, baffles with-
20 in said jacket, an expansion chamber connected with the jacket, an air inlet port in said chamber, a vapor outlet line from the expansion chamber to the carburetor, an oil
25 sump, an oil pump, an oil conduit from the pump to the jacket, a thermostatic valve in said conduit and a line from the expansion
30 chamber to the oil sump.

In testimony whereof I have affixed my signature.

EARLE W. EVANS.