Sept. 29, 1925. 1,555,664

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APPARATUS FOR REMOVING LIQUID DILUTENTS FROM LUBRICANTS

Filed Jan. 30, 1925 2 Sheets-Sheet 1

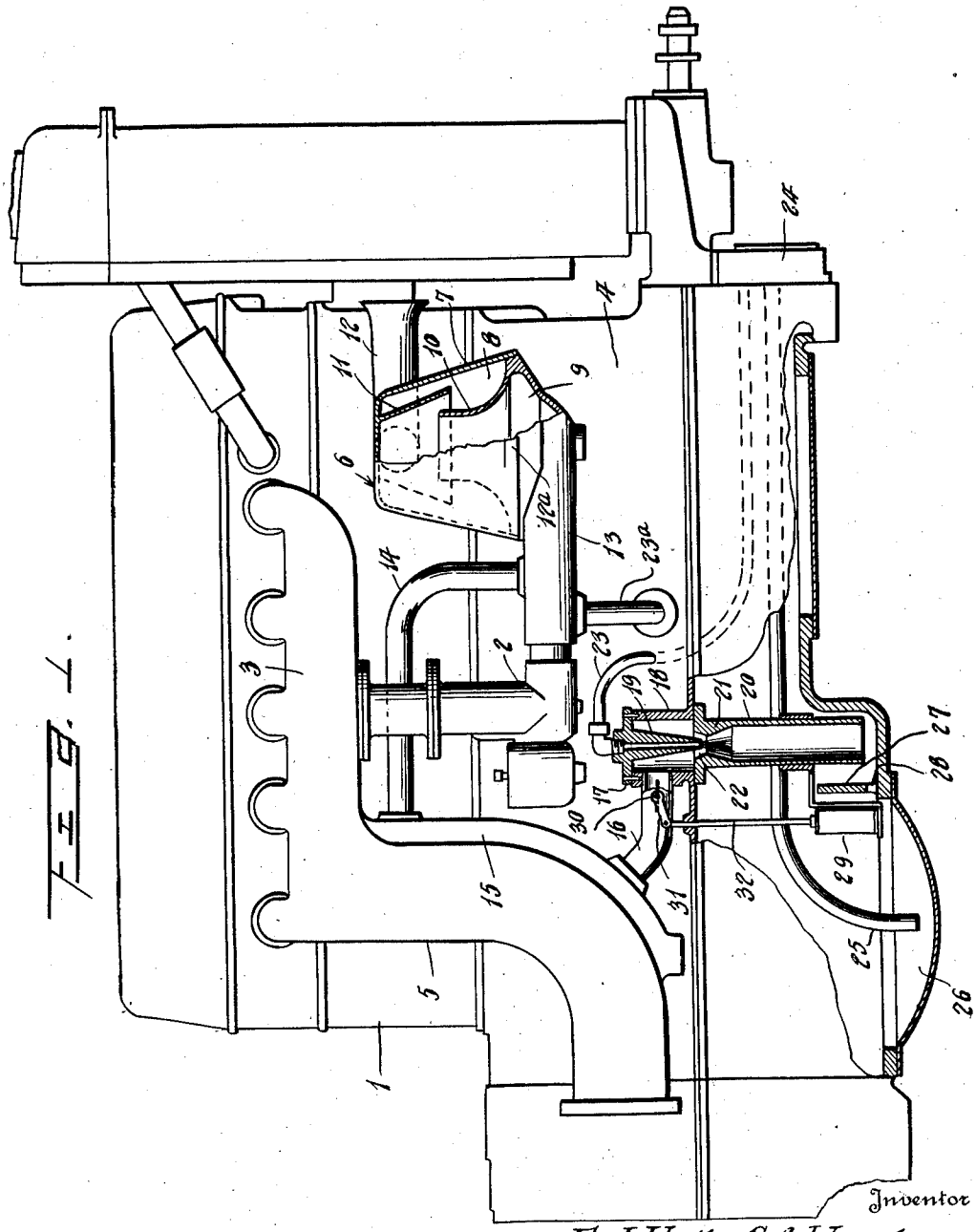

Fig. 1.

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Fig. 3.

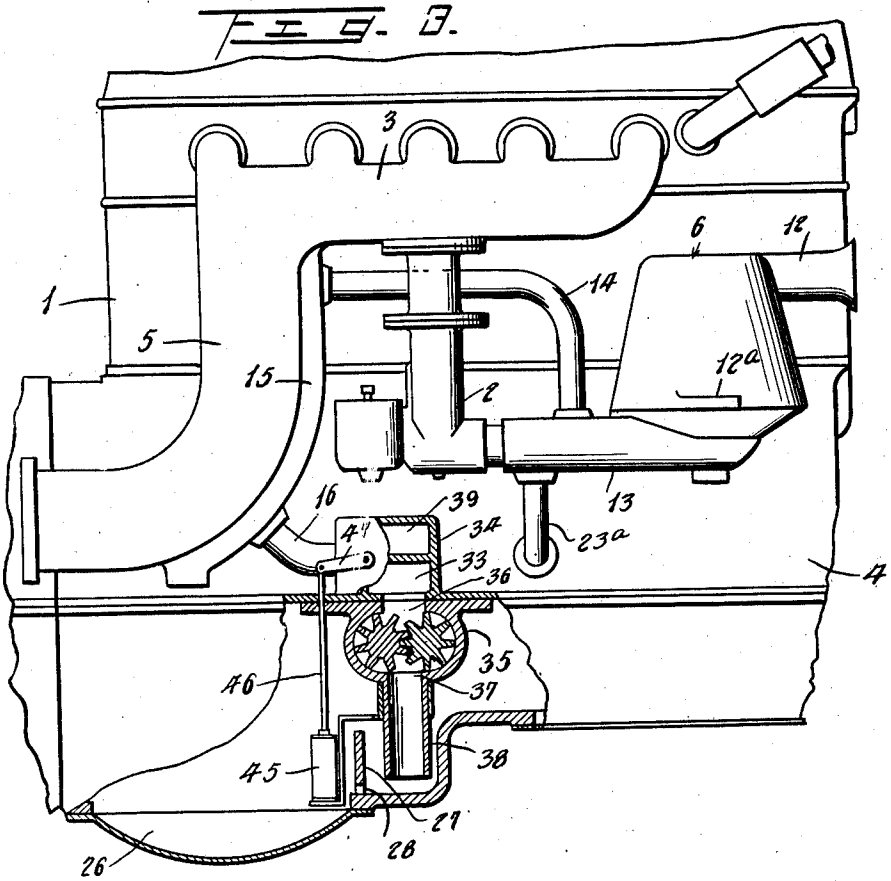


Fig. 2.

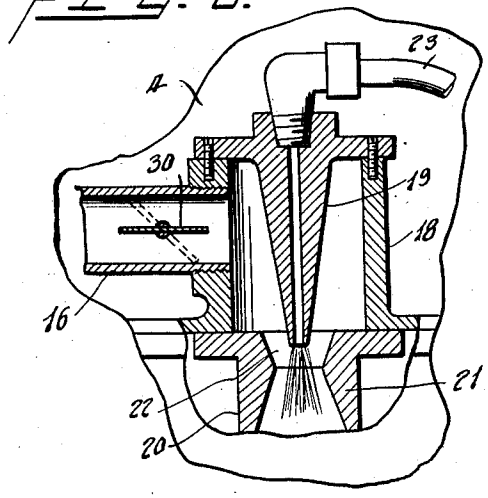
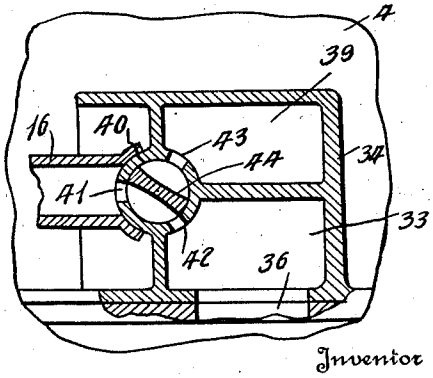


Fig. 4.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR REMOVING LIQUID DILUTENTS FROM LUBRICANTS.

Application filed January 30, 1925. Serial No. 5,889.

To all whom it may concern:

Be it known that we, ELBERT J. HALL, of Berkeley, in the county of Alameda and State of California, and CHARLES A. WINSLOW, of Vallejo, in the county of Solano, State of California, citizens of the United States, have invented certain new and useful Improvements in Apparatus for Removing Liquid Dilutents from Lubricants; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to apparatus for maintaining the lubricant of hydro-carbon engines at an efficient value.

In the operation of hydro-carbon engines, it is commonly found that a sufficient quantity of water of condensation and unburned fuel leaks past the pistons into the crank case to so dilute the lubricant therein that its lubricating efficiency is materially reduced. This leakage takes place in varying amount at all times during the operation of the engine but it is most noticeable in cold weather and when starting the engine when cold. This dilution of the lubricating oil by the admixture of water and unburned fuel is very undesirable as even a small percentage of dilution materially lowers the lubricating qualities and thus lessens the efficiency of the engine. It is easily seen that if no means is provided whereby these undesirable dilutents are removed the lubricant will quickly become totally unfit for lubrication and must then be removed or serious damage to the engine result.

The present invention has for one of its objects the provision of a novel and simple apparatus for removing liquid dilutents from the lubricant of a hydro-carbon engine without removing the lubricant from the engine.

A further object of the invention is the provision of an apparatus of the character stated through the medium of which a vaporizing or distilling medium for the liquid dilutents may be caused to flow through the lubricant.

A further object of the invention is the provision of an apparatus of the character stated for conducting the vapor resulting from the vaporization or distillation of the dilutents out of the lubricant, together with the vaporizing or distilling medium employed, into the carburetor or other fuel mixing device of the engine.

A further object of the invention is the provision of an apparatus of the character stated which shall include means adapted to automatically control the flow of the vaporizing or distilling medium through the lubricant.

A still further object of the invention is the provision of an apparatus of the character set forth which shall not introduce any foreign matter, such as dust and the like, into the lubricant.

With the above and other objects in view, the invention consists of the construction, combination and arrangement of parts hereinafter fully described and claimed, and illustrated in the accompanying drawings, wherein:

Figure 1 is a view in side elevation of a hydro-carbon engine equipped with an apparatus constructed in accordance with our invention, parts of the apparatus and engine being in section,

Figure 2 is a detail sectional view on an enlarged scale of the nozzle and controlling valve of the apparatus,

Figure 3 is a view similar to Figure 1 illustrating a slightly modified form of the apparatus, portions of the apparatus and engine being in section, and

Figure 4 is a detail sectional view on an enlarged scale of the controlling valve of the modified form of the apparatus.

Corresponding and like parts are referred to in the following description, and indicated in the accompanying drawings, by similar reference characters.

In the drawings, 1 designates the cylinder block, 2 the carburetor, 3 the exhaust manifold, and 4 the crank case of a hydro-carbon engine. A pipe 5 connected to one end of the manifold 3 conveys the exhaust gases away from the engine.

The apparatus comprises an air cleaner 6, which while it may be of any suitable construction, preferably involves the construction and principle of operation of the device forming the subject matter of our co-pending application, filed on the 25th day of September, 1924, and serially numbered 739,960. The air cleaner 6 comprises a casing 7 within which is formed a dust separating chamber 8 and clean air chamber 9.

A nozzle 10 communicating at one end with the clean air chamber 9, extends into the dust separating chamber 8, and a hood 11 is arranged within the chamber 8 over the nozzle 10. An air supply pipe 12 and a dust outlet tube 12 communicate tangentially with the dust separating chamber 8, and a clean air outlet pipe 13 communicates at one end with the clean air chamber 9 at its other end with the intake of the carburetor 2. A tube 14 communicates at one end with the pipe 13 and at its other end with a heater 15 secured to the discharge pipe 5 of the manifold 3, and a tube 16 extends from the heater to an injector 17. The injector comprises a casing 18 and a nozzle 19. A tube 20 communicates at one end with the casing 18 and extends therefrom to a point considerably below the level of the lubricant in the crank case 4, and is provided with a venturi 21 in the throat 22 of which the tip of the nozzle 19 is disposed. A tube 23 is connected at one end to the upper end of the nozzle 19 and at its other end to the excess or by-pass port of the lubricant circulating pump 24. A tube 25 which dips at one end into the sump 26 of the crank case 4 has its other end connected to the intake of the pump 24.

When the engine is in operation, the lubricant taken into the pump 24 in excess of the amount passing to the parts of the engine to be lubricated is returned to the crank case 4 by way of the tube 23, nozzle 19, venturi 21 and tube 20. The passage of the oil through the venturi 21 creates a suction in the tube 14, heater 15 and pipe 17, with the result that clean air is drawn from the tube 13 into the heater 15 and from the heater 15 into tube 20. The hot air passes from the tube 20 into the crank case 4 below the level of the lubricant therein, and flows upwardly through the lubricant. As the air is heated to a high degree during its passage through the heater 15, it will during its passage through the lubricant vaporize or distill the liquid dilutents thereof. The vaporized or distilled dilutents, together with the vaporizing or distilling medium, are valuable as fuel, and to enable them to be utilized as such, a tube 23 communicating with the crank case 4 and with the pipe 13, is provided in order that they may be drawn from the crank case 4 into the carburetor 2 by the suction of the engine. The discharge end of the tube 23 and the intake end of the tube 14 communicate with the pipe 13 in different zones in order to prevent the vaporized dilutents from being drawn into the tube 14 and in order to prevent any back pressure in the tube 14. As the heated air must be introduced into the lubricant at a high temperature in order to effectively vaporize some of its liquid dilutents, it is necessary to localize the effect of the heat, and to attain this end a wall or dam 27 is located in the crank case 4 adjacent the discharge end of the tube 20. The wall or dam 27 is provided with openings 28 through which the lubricant circulates.

The rate of flow of the vaporizing or distilling medium to the lubricant is under the control of a thermostat 29 located in the crank case 4 adjacent the discharge end of the tube 20 and a valve 30 located in the tube 17. The valve 30 is provided with a lever 31 to which the link 32 of the thermostat is connected. When the temperature of the oil rises to a predetermined degree the thermostat 29 functions to close the valve 30. As will be apparent from the drawings, the closing of the valve 30 will not interfere with the free circulation of the oil by means of the pump 24 and the flow of the vapor from the crank case 4 into carburetor 2 as the result of engine suction.

In the modified form of the apparatus shown in Figures 3 and 4, air is drawn from the cleaner 6 by way of the tube 14, heater 15 and tube 17 into the lower chamber 33 of a casing 34 by means of a mechanically driven gear pump 35. The intake port 36 of the pump 35 communicates with the chamber 33 and communicating with the discharge port 37 of the pump is a tube 38 through which the vaporizing or distilling medium is discharged into the crank case 4 below the level of the lubricant therein. The casing 34 is provided with a second chamber 39 which communicates with the crank case above the level of the lubricant therein. The tube 17 communicates with a valve casing 40 by way of a port 41. The valve casing 40 communicates with the chamber 33 by way of a port 42 and with the chamber 39 by way of a port 43. A valve body 44 is rotatably mounted in the casing 40 and is adapted to be actuated by a thermostat 45 to establish communication between the tube 17 and chamber 33 when the temperature of the lubricant is below a certain degree. When the temperature of the oil rises to a predetermined degree, the thermostat 45 will swing the valve body 44 into position to cut off communication between the tube 17 and chamber 33 and establish communication between this chamber and the chamber 39 by way of the ports 43 and 42. When the valve 44 is in position to cut off the flow of the vaporizing or distilling medium to the lubricant, the pump 35 is in communication with the crank case at points above and below the level of the oil therein, and due thereto, the pump is not subjected to strain when the valve is in this position.

The link 46 of the thermostat 45 is connected to the lever 47 of the valve 44.

From the foregoing description, taken in connection with the accompanying drawings, it should be apparent that, when the engine is in operation, a supply of clean hot air is delivered to the crank case 4 below the level of the lubricant therein, that this heated air passes upwardly through the lubricant and in doing so vaporizes or distills the liquid dilutents of the lubricant, and that these vaporized or dilutents, together with the vaporizing medium which has now become saturated with the lubricant, rise in the crank case 4 above the level of the lubricant therein. The use of the vaporized dilutents and the lubricant saturated vaporizing medium reduces the risk of fire to the minimum, results in an appreciable saving of fuel, and materially increases the efficiency of the apparatus. As the heavier constituents of the lubricant occupy the lowest position in the crank case 4, the manner in which the vaporizing or distilling medium is introduced into the lubricant produces the best possible results.

The casings 18 and 33 may be formed integrally with the crank case 4 or made separately and attached thereto.

While we have described the principle of operation of the invention, together with the devices which we now consider to be the best embodiments thereof, we desire to have it understood that the devices shown are merely illustrative, and that such changes may be made therein when desired as are within the scope of the invention as claimed.

What is claimed is:—

1. Means for removing liquid fuel dilutents of lubricating oil in internal combustion engines comprising in combination, means for circulating heated air through the oil in the engine crank case and means for removing the air together with the vapor from the liquid dilutents from the crank case and conducting them to the engine combustion chamber, and means for thermostatically controlling the amount of hot air passing through the oil.

2. Means for removing liquid dilutents from lubricating oil in hydro-carbon engines comprising in combination, means for circulating an evaporative flow of heated gaseous medium through the lubricant and means for controlling the flow of same.

3. Means for removing liquid dilutents from lubricating oil in hydro-carbon engines comprising in combination, means for circulating an evaporative flow of clean, heated, gaseous medium through the lubricant and means for controlling the flow of said gaseous medium.

4. Means for removing dilutents from lubricating oil of hydro-carbon engines comprising in combination, means for heating a clean, gaseous evaporative medium, means for circulating the heated gaseous evaporative medium through the lubricant of the engine, means for controlling the temperature of the lubricant, and means for conducting the gaseous mixture of the evaporative medium and the vapor of the dilutents to the combustion chamber of the engine.

5. An apparatus for removing liquid dilutents from the lubricant of a hydro-carbon engine, comprising a heater having an air inlet, and means adapted to draw air through the heater and discharge it into the crank case of the engine below the level of the lubricant therein.

6. An apparatus for removing liquid dilutents from the lubricant of a hydro-carbon engine, a heater having an air inlet, means for drawing air through the heater and discharging it into the crank case of the engine below the level of the lubricant therein, and a thermostatically controlled valve for regulating the rate of flow of the air through said means.

7. An apparatus for removing liquid dilutents from the lubricant of hydro-carbon engines, comprising a heater provided with an air inlet, a casing in communication with the heater, a tube in communication with the casing and extending into the crank case below the level of the lubricant therein, and means for drawing air into the heater and discharging it through said tube.

8. An apparatus for removing liquid dilutents from the lubricant of hydro-carbon engines, comprising a heater provided with an air inlet, a casing in communication with the heater, a tube in communication with the casing and extending into the crank case below the lever of the lubricant therein, means for drawing air through the heater and discharging it through said tube, and a wall or dam within the crank case adjacent the tube.

9. An apparatus for removing liquid dilutents from the lubricant of hydro-carbon engines, comprising a heater provided with an air inlet, a casing communicating with the heater, a tube communicating with the casing and extending into the crank case of the engine to a point below the level of the lubricant therein, said tube being provided with a venturi, and means for causing the circulation of the lubricant through said tube to draw air into the heater and discharge it into the lubricant below the level thereof.

10. An apparatus for removing liquid dilutents from the lubricant of a hydro-carbon engine, comprising a heater, means for supplying clean air to the heater, and means for drawing the air through said means and through the heater and discharging it into the crank case below the level of the lubricant therein.

11. An apparatus for removing liquid dilutents from the lubricant of a hydro-carbon engine, comprising a heater, means for supplying clean air to the heater, and means for drawing the air through said means and heater and discharging it into the crank case below the level of the lubricant therein, and a tube communicating with the crank case above the level of the lubricant therein and with the carburetor of the engine.

12. An apparatus for removing liquid dilutents from the lubricant of a hydro-carbon engine, comprising a heater provided with an air inlet, a casing having a chamber communicating with the crank case below the level of the lubricant therein and having a chamber communicating with the crank case above the level of the lubricant therein, a tube extending from the heater to said casing, means for drawing the air through the heater, tube and casing and discharging it into the lubricant below the level thereof, and means adapted to cut off communication between the tube and the first named chamber and establish communication between both of said chambers.

In testimony whereof we affix our signatures.

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CHARLES A. WINSLOW.