

Oct. 18, 1932.

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1,883,202

OIL FEEDING APPARATUS FOR ENGINES

Filed Jan. 22, 1931

2 Sheets-Sheet 1

Fig. 1.

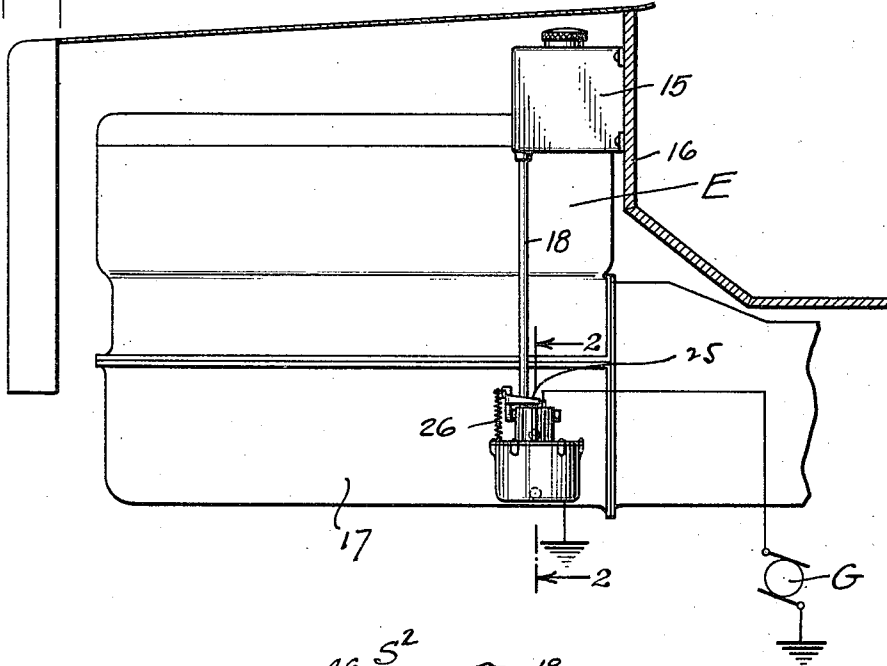


Fig. 2.

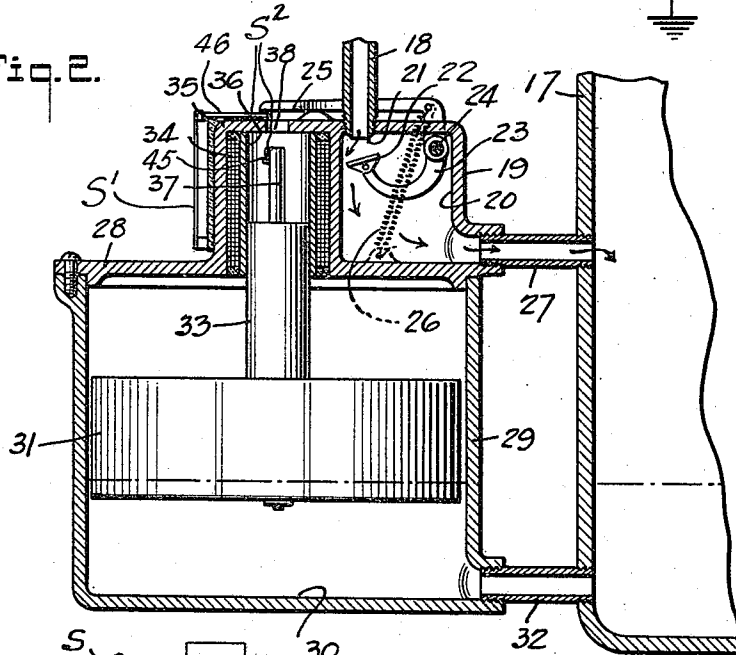
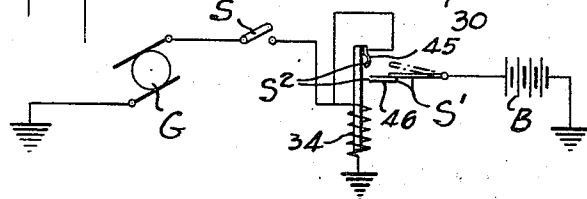


Fig. 3.



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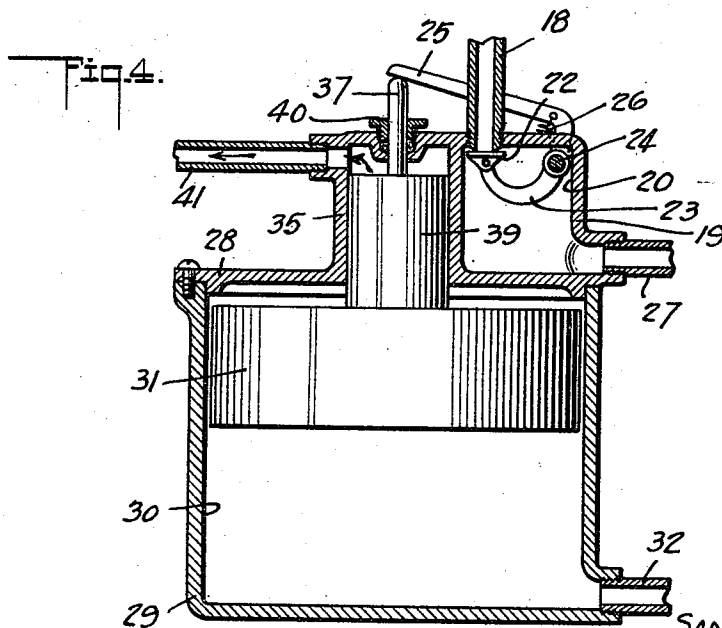
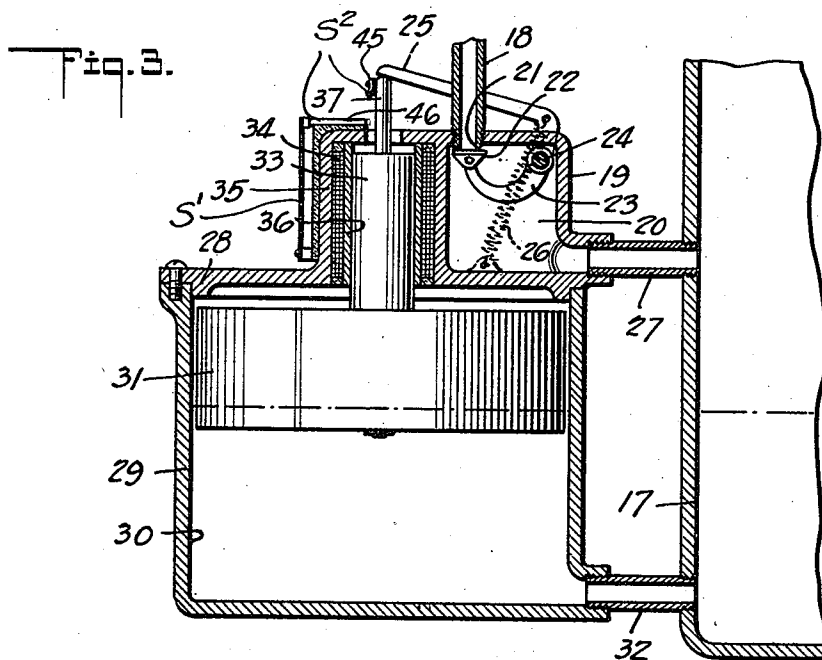
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2 Sheets-Sheet 2



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## UNITED STATES PATENT OFFICE

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## OIL-FEEDING APPARATUS FOR ENGINES

Application filed January 22, 1931. Serial No. 510,574.

My invention relates to apparatus for feeding a liquid to a point of consumption, and it particularly refers to an apparatus for feeding lubricating oil to the crank case of an engine.

It is a purpose of my invention to provide an apparatus by which the feeding of a lubricating oil to the crank case of an engine can be effected automatically and in a manner to maintain in the crank case oil at a predetermined level.

My invention is particularly adapted for use in conjunction with the engine of an automobile to eliminate the now present necessity of frequently replenishing the crank case of an engine with oil in order that a sufficient supply of oil may be maintained in the crank case to effect the proper lubrication of the engine.

In its association with an engine, my invention is functionally characterized by its ability to feed oil to the crank case only when the engine is not in operation in order that the normal maximum level of oil in the crank case can be restored.

I will describe only two forms of oil feeding apparatus embodying my invention, and will then point out the novel features thereof in claims.

In the accompanying drawings:

Figure 1 is a view showing in vertical section the forward part of an automobile, and having applied to the engine thereof one form of oil feeding apparatus embodying my invention.

Figure 2 is an enlarged vertical sectional view taken on the line 2—2 of Figure 1, and showing the parts of the apparatus in position to cause oil to be fed to the crank case of the engine.

Figure 3 is a view similar to Figure 2 showing the parts of the apparatus in non-feeding position.

Figure 4 is a view similar to Figure 3 showing another form of apparatus embodying my invention.

Figure 5 is a diagrammatic view of the circuits employed in the apparatus.

In carrying out my invention I provide a tank 15 which constitutes a reservoir for a

supply of lubricating oil, and which tank is adapted to be secured to any suitable part of the automobile such as the inner side of the instrument board 16, as shown in Figure 1 and at an elevation which is above that of the crank case 17 of the engine E in order that there may be effected a gravitational flow of oil from the tank 15 to the crank case 17. Extended downwardly from the bottom of the tank 15 is a pipe 18 which leads into the top of a body 19 which is hollow to provide a compartment 20. Thus oil from the tank 15 is delivered by gravity to the compartment 20.

As illustrated to advantage in Figure 2, the lower end of the pipe 18 is constructed to provide a seat 21 for a valve 22 situated in the compartment 20 and pivoted on one end of a lever 23. This lever 23 is fulcrumed in the body 19 at the point indicated at 24, and extending from the lever is an arm 25 disposed exteriorly of the body 19 so that it can be operated to open or close the valve in respect to the end of the pipe 18. A spring 26 is secured to the body 19 and to the arm 25 in such manner that it constantly tends to open the valve 22 and to thereby permit oil from the pipe 18 to flow into the compartment 20. From this compartment the oil is conducted to the crank case 17 through a pipe 27.

The body 19 is formed on a lid 28 removably fitted on a container 29, the interior of the container providing a chamber 30 for a float 31. This chamber is at all times in communication with the crank case 17 at a point below the pipe 27 and by means of a pipe 32. This is for the purpose of permitting oil from the crank case to flow into the chamber 30 and assume the same level as that in the crank case.

The float 31 is of any suitable form and material to respond to the fluctuation and level of oil in the chamber 30, and the resultant movement of the float is utilized to effect opening of the valve 22 by the following elements: A stem 33 is fixed to and projects upwardly from the float, and in the embodiment of the invention illustrated in Figures 2 and 3, this stem constitutes a core of a solenoid. The winding of the solenoid is indicated at 34, and in Figure 2 is shown as secured within a housing 35, a cylinder 36 of

magnetizable metal being secured within the winding and of a diameter to receive the core 33. The housing 35 is formed on the lid 28, and in the present instance, the housing 35 and the body 19 are shown as integral parts of the lid 28.

On the upper end of the core 33 is secured a rod 37 which is moved vertically with the core to be extended through an opening 38 in the housing 35 to engage the free end of the arm 25. With the rod 37 elevated to the position shown in Figure 3, the arm 25 is lifted to actuate the lever 23 and thus move the valve 22 to closed position against the action of the spring 26.

The rod 37 only assumes this elevated position to close the valve when the float 31 occupies an uppermost position within the chamber 30, or the position shown in Figure 3. The float is adapted to be lifted to this uppermost position by the oil in the chamber 30, or by energizing the solenoid winding 34 to draw the core upwardly within the cylinder as will be understood.

The solenoid winding is adapted to be energized from any suitable source of current but preferably from the generator of the ignition system for the engine in order that the apparatus be operated as intended to supply oil to the crank case only when the engine is at rest. In Figure 5 I have shown diagrammatically the generator G provided with a circuit in which is included a switch S and the winding 34 of the solenoid, one side of the generator being grounded as well as one terminal of the winding. Thus when the switch S is closed and the generator operating, current will be supplied to the winding 34 to energize the solenoid.

The operation of the apparatus shown in Figures 1, 2 and 3 is as follows:

Let it first be assumed that the normal or acquired quantity of oil has been supplied to the crank case 17. Through the connection 32 a part of this oil is conveyed to the chamber 30 to assume a level corresponding to the level of oil in the crank case and as a consequence the float 31 is elevated to its uppermost position in which the rod 37 engages the arm 25 and moves the valve 22 to closed position to prevent oil from the tank 15 being fed to the crank case. As long as the oil remains at this normal level the valve 22 remains closed, but as soon as the oil drops below this normal level by reason of the oil being consumed by reason of lubrication of the engine, the float starts to descend to impart a corresponding movement to the rod 37 thereby allowing the spring 26 to act in returning the valve 22 to open position. Once the valve is opened oil can flow from the tank 15 into the crank case to replenish the latter with sufficient oil to restore the oil to the normal level. With replenishing of the crank case the level of oil in the chamber 30

naturally rises until the rod 37 again engages the arm 25 to return the valve 22 to closed position and thereby discontinue further supply of oil to the crank case.

Because of the fact that the oil in the crank case is agitated during operation of the engine, its level naturally fluctuates, and thus the possibility is precluded of accurately determining the amount of oil in the crank case and hence the amount to be supplied to the crank case to restore it to its normal level. It will be understood therefore, that the valve 22 must be maintained closed while the engine is operated in order to prevent oil being supplied to the crank case and irrespective of the position of the float. This result is accomplished through the medium of the solenoid for when the motor is operating the solenoid is energized by current from the generator to lift the core 33 and thus elevate the rod 37 to close the valve against the tension of the spring. Thus as long as the motor is operating the valve 22 is maintained closed. However, when the engine ceases to operate the solenoid becomes de-energized to permit the float to fall to the level of oil in the chamber 30, and if this level is below the normal level, the valve 22 will open to permit oil to be supplied to the crank case from the tank 15. Once the original level of oil has been restored in the crank case, the valve 22 closes under the action of the rising float 31.

In actual practice, I find it necessary to delay de-energization of the solenoid with cessation in operation of the generator in order to maintain the valve 22 closed for a time sufficient to allow that oil, thrown upward from the crankcase of the engine, to drain back to the bottom of the crank case so that all oil in the crank case will be accurately measured by the oil level indicated in the chamber 30. This is done for the purpose of securing a true indication of all oil contained in the crank case before the apparatus becomes operable to replenish the crank case with oil, and to thereby prevent more than the necessary quantity being supplied to the crank case to restore the original level of oil.

To effect such a mode of operation, I provide a thermostatic switch S' and a second switch S<sup>2</sup> both of which are connected in a circuit including a battery B and the solenoid winding 34, all as shown diagrammatically in Figure 5.

The switch S<sup>2</sup> includes a movable contact 45 fixed to and insulated from the rod 37 and a stationary contact 46 fixed to and insulated from the body 19.

The circuit just described is auxiliary to the main circuit defined by the generator G and appurtenant parts.

Normally, the auxiliary circuit is open, as illustrated in Figure 3, because the contact 45 is out of engagement with the contact 46, yet the thermostatic switch S' is

closed. However, when the main circuit is disrupted by opening of the switch S; closure of the switch S<sup>2</sup> immediately follows by downward movement of the rod 37, thereby instantly closing the auxiliary circuit to re-energize the solenoid and thus prevent opening of the valve 22. Thus no oil is yet delivered to the crank case.

With closure of the auxiliary circuit, current traverses the thermo-sensitive elements of the switch S', heating them, and thus causing the switch to open. Opening of the switch de-energizes the solenoid and thus allows the float to descend to a position determined by the level of oil in the float chamber, which is now a true indication of the amount of oil contained in the crank case. If this oil level is below the normal level then the valve 22 opens to replenish the crank case until the normal oil level is restored.

Referring now to Figure 4 I have herein shown another form of apparatus embodying my invention which is identical to that shown in Figure 2 with the exception that the housing 35 constitutes a cylinder in which a plunger 39 operates, the plunger being secured to the float 31, and the rod 37 extending through a packing gland 40 in the top of the housing. Through the medium of a pipe 41 the cylinder 35 is adapted to be placed in communication with the intake manifold (not shown) of an engine so that when the engine is operating the suction produced in the manifold will operate to lift the plunger 39 in the cylinder and thereby cause the rod 37 to engage and lift the arm 25 to move the valve 22 to closed position. Thus it will be seen that this apparatus operated in the same manner as the first apparatus but that the suction produced in the manifold during operation of the engine operates to maintain the valve closed.

Although I have herein shown and described only two forms of oil feeding apparatus embodying my invention, it is to be understood that various changes and modifications may be made therein without departing from the spirit of the invention and the spirit and scope of the appended claims.

I claim:

1. An apparatus of the character described comprising a source of oil supply, a line by which said oil source is adapted to be connected to a crank case of an engine, a valve in said line for controlling the passage of oil from said source to the crank case, means tending to open said valve, a member having a chamber adapted for communication with the crank case so that oil will flow from the crank case into said chamber and to a level corresponding to the oil level in the crank case, a float in the chamber, coacting means correlated to the valve and the float for closing the valve against the action of said valve opening means when the float is elevated to

an uppermost position by oil rising to a predetermined level in the chamber, and means independent of the oil in said chamber for lifting the float to its uppermost position to maintain said valve closed, said float lifting means having an element adapted for correlation to the engine so as to be operative only when the engine is operating.

2. An apparatus of the character described comprising a source of oil supply, a line by which said oil source is adapted to be connected to a crank case of an engine, a valve in said line for controlling the passage of oil from said source to the crank case, means tending to open said valve, a member having a chamber adapted for communication with the crank case so that oil will flow from the crank case into said chamber and to a level corresponding to the oil level in the crank case, a float in the chamber, coacting means correlated to the valve and the float for closing the valve against the action of said valve opening means when the float is elevated to an uppermost position by oil rising to a predetermined level in the chamber, and electro-responsive means for lifting the float to maintain the valve closed irrespective of the oil level in the chamber.

3. An apparatus of the character described comprising a source of oil supply, a line by which said oil source is adapted to be connected to a crank case of an engine, a valve in said line for controlling the passage of oil from said source to the crank case, means tending to open said valve, a member having a chamber adapted for communication with the crank case so that oil will flow from the crank case into said chamber and to a level corresponding to the oil level in the crank case, a float in the chamber, coacting means correlated to the valve and the float for closing the valve against the action of said valve opening means when the float is elevated to an uppermost position by oil rising to a predetermined level in the chamber, electro-responsive means for lifting the float to maintain the valve closed irrespective of the oil level in the chamber, and means adapted for connecting the electro-responsive means in the electric generating system for the engine so that said means is made responsive only when the engine is operating.

4. An apparatus of the character described comprising a source of oil supply, a line by which said oil source is adapted to be connected to a crank case of an engine, a valve in said line for controlling the passage of oil from said source to the crank case, means tending to open said valve, a member having a chamber adapted for communication with the crank case so that oil will flow from the crank case into said chamber and to a level corresponding to the oil level in the crank case, a float in the chamber, coacting means correlated to the valve and the float for closing

ing the valve against the action of said valve opening means when the float is elevated to an uppermost position by oil rising to a predetermined level in the chamber, and means responsive to suction produced by the engine for lifting the float to maintain the valve closed irrespective of the oil level in the chamber.

5 5. In combination with an internal combustion engine, a source of oil supply, means tending to feed oil from said source to the crank case of the engine to maintain a predetermined level of oil in the crank case, and means responsive to operation of the engine for rendering the feeding means inactive to feed oil to the crank case.

10 6. An oil feeding apparatus for engines, comprising a source of oil supply adapted for connection to the crank case of an engine, means tending to feed oil to the crank case from said source to maintain a predetermined level of oil in the crank case, and means adapted to respond to operation of the engine for rendering the feeding means inactive to feed oil to the crank case.

15 7. An apparatus of the character described, comprising an oil feed line, a valve for controlling flow of oil in said line, said valve being urged to open position, a chamber, a float movable in the chamber to respond to the level of oil therein, a member on the float for closing the valve when the float is in its uppermost position in the chamber, and a solenoid correlated to the float for lifting the latter to its uppermost position to cause said member to close the valve irrespective of the level of oil in the chamber.

20 8. An apparatus of the character described, comprising an oil feed line, a valve for controlling flow of oil in said line, said valve being urged to open position, a chamber, a float movable in the chamber to respond to the level of oil therein, a member on the float for closing the valve when the float is in its uppermost position in the chamber, a cylinder, a plunger movable in the cylinder in response to suction produced in the latter for lifting the float to its uppermost position to cause said member to close the valve irrespective of the level of oil in the chamber.

25 9. In combination with an internal combustion engine, a source of oil supply, means tending to feed oil from said source to the crank case of the engine to maintain a predetermined level of oil in the crank case, means responsive to operation of the engine for rendering the feeding means inactive to feed oil to the crank case, and means for delaying operation of the oil feeding means for a predetermined time following discontinuance in operation of the engine.

30 10. An oil feeding apparatus for engines, comprising a source of oil supply adapted for connection to the crank case of an engine, means tending to feed oil to the crank case

from said source to maintain a predetermined level of oil in the crank case, means adapted to respond to operation of the engine for rendering the feeding means inactive to feed oil to the crank case, and means for delaying operation of the oil feeding means following discontinuance in operation of the engine.

35 11. An apparatus of the character described, comprising an oil feed line, a valve for controlling flow of oil in said line, said valve being urged to open position, a chamber, a float movable in the chamber to respond to the level of oil therein, a member on the float for closing the valve when the float is in its uppermost position in the chamber, a solenoid correlated to the float for lifting the latter to its uppermost position to cause said member to close the valve irrespective of the level of oil in the chamber, means adapted for correlation to the generator of an ignition system of an engine for energizing the solenoid concurrently with operation of the engine, and means adapted for connection with the battery of the engine for delaying de-energization of the solenoid following discontinuance in operation of the engine.

40 12. An apparatus of the character described, comprising an oil feed line, a valve for controlling flow of oil in said line, said valve being urged to open position, a chamber, a float movable in the chamber to respond to the level of oil therein, a member on the float for closing the valve when the float is in its uppermost position in the chamber, a solenoid for lifting and holding the float in its uppermost position to cause the member to close the valve, a main circuit for the solenoid including a source of current and a switch, and an auxiliary circuit for the solenoid including a thermostatic switch and a second switch having a contact secured to said member and another contact in the path of movement of the first contact.

45 13. The combination with an engine: of a source of oil supply; means for maintaining a predetermined level of oil in the engine crankcase by feeding oil thereto from the source of supply as required; and means by which the feeding of oil from the source of supply to the crankcase is prevented during operation of the engine.

50 14. The combination with an engine: of a source of oil supply; means for maintaining a predetermined level of oil in the engine crankcase by feeding oil thereto from the source of supply as required; means by which the feeding of oil from the source of supply to the crankcase is prevented during operation of the engine; and means by which the feeding of oil is delayed for a predetermined interval of time after operation of the engine ceases.

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