Feb. 19, 1935. K. E. BERRAY 1,991,722

LUBRICATOR

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Fig. 1

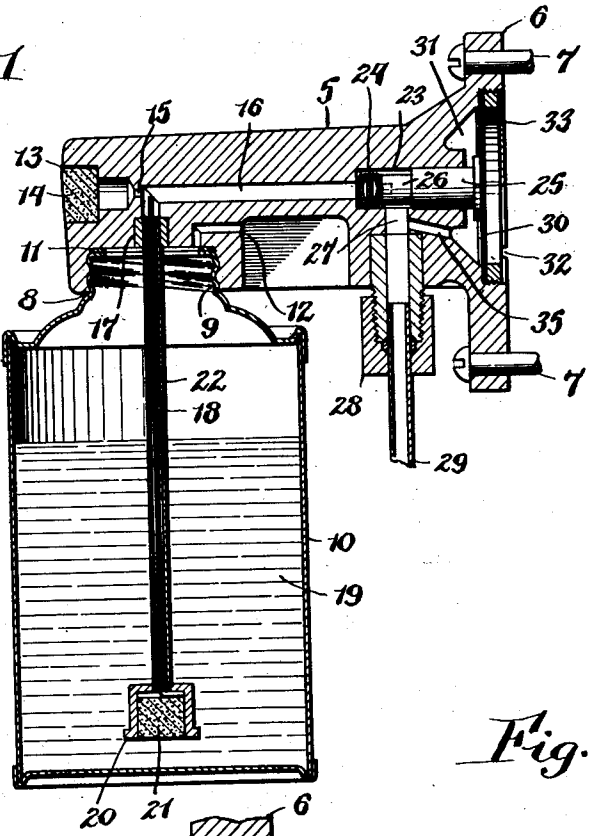


Fig. 2.

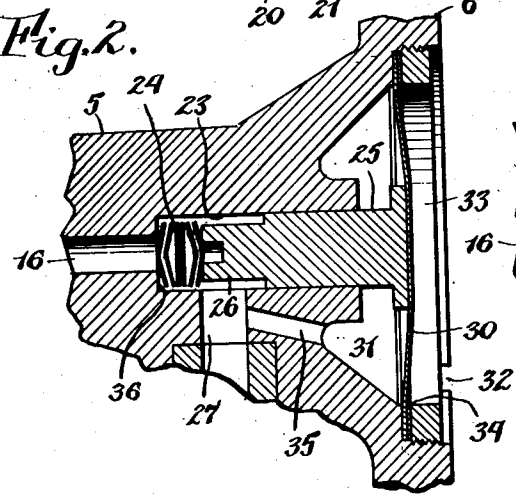
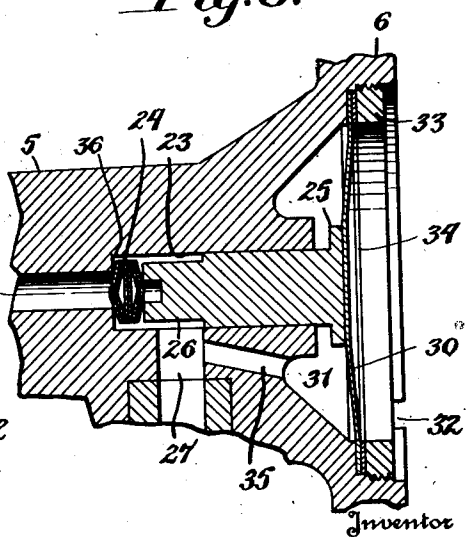


Fig. 3.



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LUBRICATOR

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9 Claims. (Cl. 123—196)

This invention relates to a lubricator and more particularly to a lubricator adapted to be used in conjunction with the intake manifold of an internal combustion motor and which mixes a small quantity of liquid with the gas passing through the intake manifold so that the liquid is drawn into the combustion chambers or cylinders of the motor along with the explosive charge. Such liquids generally comprise an oil which lubricates the valves and valve seats and other parts and prevents the deposit of carbon thereon and may also contain other compounds which neutralize any acids formed during combustion, retard detonation so as to prevent knocking of the motor and also act to prevent the formation of carbon in such form that it will adhere to the valves, valve seats, piston, spark plugs or interior of the combustion chamber.

As is well known, the vacuum or depression in the intake manifold of an internal combustion motor varies inversely with the motor speed. Thus, when a motor is travelling at very slow speed or is idling, the vacuum in the intake manifold is much greater than when the motor is travelling at high speed when the vacuum in the intake manifold is comparatively small.

It is an object to provide an oiler of this character which feeds greater amounts of the liquid at higher engine speeds, or, in other words, feeds greater amounts of liquids as the motor speed increases and as the vacuum in the intake manifold decreases.

Another purpose is to effect this result through the variation in the vacuum or depression in the intake manifold, or, in other words, to provide a valve which opens as the vacuum in the intake manifold lessens.

Another object is to provide such an oiler which can be made at extremely low cost and will give satisfactory and efficient service for a long period of time notwithstanding the vibration to which it is constantly subjected.

In the accompanying drawing:

Figure 1 is a vertical, longitudinal section through an oiler embodying my invention and showing its connections with the motor block and with the intake manifold of an internal combustion motor.

Figure 2 is an enlarged fragmentary section similar to Fig. 1 showing the position of the parts when the motor is travelling at a high speed and a comparatively large quantity of liquid is being fed into the intake manifold.

Figure 3 is a view similar to Fig. 2 showing the position of the parts when the motor is travelling at low speed and the feed of liquid to the intake manifold is reduced.

The body 5 of the oiler can be made of any suitable material such as a phenol-formaldehyde condensation product and is formed to provide a flange 6 through which screws 7 pass for attaching the body 5 to the cylinder block (not shown) of the motor or any other adjacent stationary support. At its outer end the body 5 is formed to provide a downwardly facing internally threaded mouth 8 into which the threaded neck 9 of a metal can or reservoir 10 is screwed, a suitable gasket 11 being provided between the neck of the can and the inner end of the recess 8, as best shown in Fig. 1. Air at atmospheric pressure is admitted to the can or reservoir 10 by means of a vent 12 in the body 5 which vent leads from the atmosphere to the upper end of the recess 8.

The body 5 is provided with an air inlet 13 in which a relatively large plug of felt 14 is placed so that the air drawn into the body 5 is first cleaned. This air passes through a port 15 of very small diameter and into a horizontal conduit 16. In passing from the small port 15 into the horizontal conduit 16 a small amount of liquid from the reservoir 10 is picked up by means which are preferably constructed as follows:

Molded in the body 5 within the threaded recess 8 is a metal sleeve 17 which communicates with the conduit 16. In this sleeve 17 is fitted a tube 18 which extends downwardly into the body 19 of oil or liquid within the reservoir 10. Adjacent to the bottom of the reservoir or can 10 an inverted cup or cap 20 is secured to the lower end of the tube 18 and in this inverted cup or cap 20 a filtering plug of felt 21 is pressed. In the tube 18 is arranged a piece of wire 22 the presence of which causes an elevation of the liquid in the can 10 up the tube 18 and around the wire 22 through the difference between the atmospheric pressure on the oil in the oil reservoir and the sub-atmospheric pressure in the passage 16 and also through the capillary action of the wire 22 in the tube 18. This liquid, upon reaching the top of the tube 18 is drawn into the air stream passing from the small port 15 to the horizontal conduit 16. The flow of oil of the capillary tube 18 is principally influenced by the difference between the atmospheric pressure on the oil in the reservoir and the pressure in the passage or chamber 16, which latter is in turn determined by the manifold depression and the resulting action of the diaphragm valve hereinafter described. The pressure in the passage 16 is always less than atmospheric whenever the motor is running and

a sub-atmospheric pressure exists in the intake manifold and therefore the resulting flow of oil through the capillary tube 18 is always in proportion to the degree that the pressure in the passage 16 is below atmospheric pressure.

The air laden with liquid then passes into a valve chamber 23 and past a series of thin phosphorbronze valve disks 24. These valve disks are in the form of thin phosphorbronze washers having openings in their centers and some of which are troughed, as best shown in Fig. 2. As shown in Fig. 2, six of such washers are preferably employed, the center two being perfectly flat while the outer two at each side are troughed so that their centers bulge outwardly. These washers are adapted to be compressed by a plunger 25 which slides in the valve chamber 23 and has a reduced end 26 which bears against the endmost spring washer 24. The air, after passing the spring washers 24, passes around the reduced end 26 of the valve stem into a conduit 27 which is connected by means of a suitable fitting 28 and piping 29 with the intake manifold of the internal combustion motor, this intake manifold not being shown.

The plunger 25 is operated by means of a diaphragm 30 which forms one wall of a chamber 31, the outer side of the diaphragm 30 being open to the atmosphere through small channels 32 provided on the adjacent face of the body 5. The margin of the diaphragm 30 is held against the rim of the chamber 31 by means of a threaded ring 33 and a gasket 34 is also preferably provided between the ring 33 and the margin of the diaphragm 30. The diaphragm is secured at its center to the outer end of the plunger 25 in any suitable manner and a control passage 35 is provided between the conduit 27 and the chamber 31 so that the pressure in the chamber 31 is always the same as the pressure in the intake manifold.

In operation, assuming the motor to be operating at low speed, the vacuum or depression in the intake manifold is very great and consequently the vacuum or depression in the chamber 31 is also very great and draws the diaphragm 30 inwardly to the position shown in Fig. 3. This draws the plunger 25 inwardly and compresses the spring washers 24 so that they are moved tightly into engagement with one another and into engagement with the shoulder or valve seat 36 of the valve chamber 23. In this condition of the parts only a small amount of air is permitted to pass through the port 15, conduit 16, past the spring washers 24 and reduced end 26 of the plunger 25, into the conduit 27 and through the line 29 to the intake manifold, and consequently only a small amount of oil or liquid will be picked up from the upper end of the tube 18 and drawn into the intake manifold.

As the motor speed increases the vacuum or depression in the intake manifold decreases and consequently the vacuum or depression in the chamber 31 also decreases and the diaphragm 30 draws the plunger 25 out and decreases the pressure upon the spring washers 24 and their pressure against the valve seat 36. This permits a greater amount of air to pass from the conduit 16 to the conduit 27 and consequently a greater amount of air and oil will be fed to the intake manifold.

It has been found that by the use of these spring washers the oiler is very sensitive to slight variations in the vacuum or depression in the intake manifold and will accurately feed proportionately greater amounts of air and liquid as the motor speed increases. It has also been found that by the use of thin phosphorbronze washers this feed can be accurately controlled. By the use of phosphorbronze washers of approximately .003 inch gage stock the exact quantity of oil desired will be fed by the lubricator.

It is also obvious that the present invention lends itself to low cost production methods since no adjustments are required. Furthermore, by the elimination of all adjustments the lubricator cannot be tampered with by the owner of an automobile and will work at full efficiency for a long period of time without getting out of order.

I claim as my invention:

1. A lubricator of the character described, comprising a conduit having a gas inlet at one end and adapted to be connected to an intake manifold or the like at its other end, means for charging the gas passing through said conduit with a liquid and means responsive to the differential between atmospheric pressure and the pressure in said manifold for regulating the amount of liquid admitted to said manifold through said conduit, comprising flexible valve means arranged in said conduit and controlling the flow of fluid through said conduit in accordance with the degree of deflection thereof, and a movable element imposing constant pressure on said flexible valve means, said movable element being subject to atmospheric pressure on one side and intake manifold pressure on the other and being moved by the differential between these pressures to impose varying pressures on said flexible valve means to deflect the same accordingly.

2. A lubricator of the character described, comprising a body forming a chamber having a gas inlet and an outlet, means actuated through the movement of the air passing through said chamber for charging said air with liquid, means adapted to connect said outlet with a manifold or the like and means for controlling the flow of gas through said chamber comprising flexible valve means freely floating in said conduit, a diaphragm carried by said body and having one side exposed to the atmosphere and enclosing a diaphragm chamber on its opposite side, said diaphragm chamber being in communication with said conduit at a point between said valve means and said manifold and means operatively connecting said diaphragm and said valve means whereby the movement of said diaphragm in response to the differential in pressure between the atmosphere and the intake manifold opens and closes said valve means.

3. A lubricator of the character described, comprising a body forming a chamber having a gas inlet and an outlet, means actuated through the movement of the air passing through said chamber for charging said air with liquid, means adapted to connect said outlet with a manifold or the like and means for controlling the flow of gas through said chamber comprising valve means arranged in said conduit and controlling the flow of the charged gas therethrough, a diaphragm carried by said body and arranged entirely to one side of said valve means and having one side exposed to the atmosphere and enclosing a diaphragm chamber on its opposite side, said diaphragm chamber being in communication with said conduit at a point between said valve means and said manifold and a plunger guided in said body and operatively connecting said diaphragm and said valve means whereby

the movement of said diaphragm in response to the differential in pressure between the atmosphere and the intake manifold opens and closes said valve means.

4. A lubricator of the character described, comprising a conduit having a gas inlet at one end and adapted to be connected with an intake manifold or the like at its other end, means for charging the gas passing through said conduit with a liquid, a plurality of flexible members arranged in said conduit and engaging one another and adapted, when flexed, to vary the flow of gas through said conduit and means responsive to variations in the pressure in said manifold for flexing said members to control and regulate the supply of liquid admitted thereto.

5. A lubricator of the character described, comprising a conduit having a gas inlet at one end and adapted to be connected with an intake manifold or the like at its other end, means for charging the gas passing through said conduit with a liquid, a plurality of flexible members arranged in said conduit and engaging one another and adapted, when flexed, to vary the flow of gas through said conduit and means for flexing said members to control and regulate the supply of liquid admitted thereto.

6. A lubricator of the character described, comprising a conduit having a gas inlet at one end and adapted to be connected with an intake manifold or the like at its other end, means for charging the gas passing through said conduit with a liquid, said conduit being provided with a seat, a free floating spring disk engaging said seat and adapted, when flexed, to vary the flow of gas through said conduit and means responsive to the variations in pressure in said manifold for flexing said disk to control and regulate the supply of liquid laden gas passing through said conduit.

7. A lubricator of the character described, comprising a conduit having a gas inlet at one end and adapted to be connected with an intake manifold at its other end, means for charging the gas passing through said conduit with a liquid, a plurality of troughed spring disks arranged in said conduit some of said disks being arranged to face in opposite directions, said disks being adapted, when compressed, to retard the flow of gas through said conduit and means responsive to the variations in pressure in said intake manifold for compressing said disks to control and regulate the supply of liquid admitted thereto.

8. A lubricator of the character described, comprising a body formed to provide a chamber having a gas inlet and an outlet, means actuated through the movement of the air passing through said chamber for charging said air with liquid, means adapted to connect said inlet with a manifold or the like, and means for controlling the flow of gas through said chamber, comprising a seat formed therein, a plurality of troughed spring washers arranged against said seat, said washers having openings in their centers and some of said washers being arranged so that their concave faces face in opposite directions, said spring washers, when compressed against said seat, retarding the flow of gas passing through said chamber, a plunger engaging the center of the spring washer most remote from said seat and means for moving said plunger in response to variations in the pressure in said manifold.

9. A lubricator of the character described, comprising a body formed to provide a chamber having a gas inlet and an outlet, means actuated through the movement of the air passing through said chamber for charging said air with liquid, means adapted to connect said inlet with a manifold or the like, and means for controlling the flow of gas through said chamber, comprising a seat formed therein, a plurality of troughed spring washers arranged against said seat, said washers having openings in their centers and some of said washers being arranged so that their concave faces face in opposite directions, said spring washers, when compressed against said seat, retarding the flow of gas passing through said chamber, a plunger engaging the center of the spring washer most remote from said seat and means for moving said plunger in response to variations in the pressure in said manifold comprising a diaphragm carried by said body and connected with said plunger, said diaphragm having one side exposed to the atmosphere and enclosing a diaphragm chamber on its opposite side, said diaphragm chamber being in communication with said intake manifold whereby the movement of said diaphragm in response to the differential in pressure between the atmosphere and the intake manifold compresses and releases said spring washers to vary and control the amount of liquid admitted to said intake manifold.

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