July 2, 1929. G. WOFFORD, SR 1,719,254

TOP CYLINDER LUBRICATOR

Filed June 29, 1928

Fig. 1.

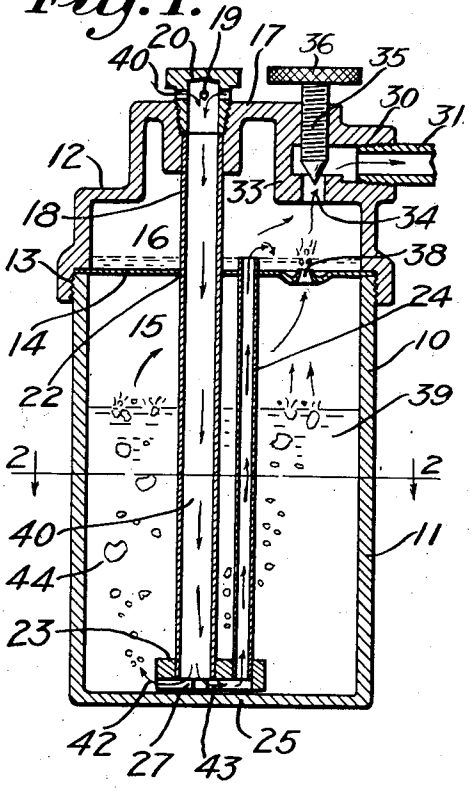


Fig. 3.

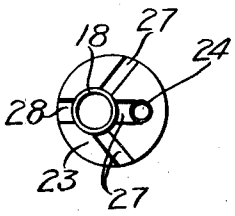


Fig. 2.

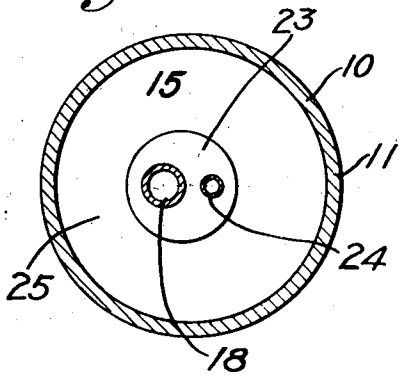
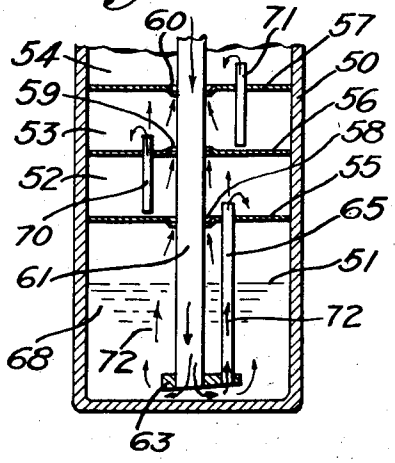


Fig. 4.



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UNITED STATES PATENT OFFICE.

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TOP-CYLINDER LUBRICATOR.

Application filed June 29, 1928. Serial No. 289,250.

This invention relates to a device for injecting materials into an air stream or body of fluid substance, and relates particularly to an injector device especially suitable for adding a fluid, such as oil, in atomized form, to the fuel mixture being drawn into the cylinders of an internal combustion motor.

The most extensive utility of my invention is in combination with internal combustion motors, as above indicated, wherein it is employed to deliver continuously a predetermined amount of atomized lubricant into the air and hydrocarbon mixture constituting the fuel stream of the motor, for the purpose of lubricating those parts of the motor forming part of, or being associated with, the upper part of the engine cylinder, or what is commonly known as the top cylinder.

It is an object of the invention to provide a device of the character designated, in which a very efficient and constant delivery of oil is accomplished, in which the quantity of oil delivered may be controlled to suit the conditions required by any gasoline engine, in which all of the lubricant placed in the device is used, and in which simplicity and economy of production of a device of this character is accomplished.

Further objects and advantages will be made evident throughout the following parts of the specification.

Referring to the drawing which is for illustrative purposes only,

Fig. 1 is a vertical cross-section through a device embodying the principles and elements of the invention.

Fig. 2 is a section derived on the plane represented by the line 2—2 of Fig. 1.

Fig. 3 is a view showing the bottom of the juncture plate used in this preferred form of the invention at the lower ends of the induction and transfer tubes.

Fig. 4 is a fragmentary sectional view indicating another form of device embodying the invention.

In the embodiment of the invention shown in Fig. 1, I employ a hollow receptacle 10 consisting of a cup-like body or vessel 11 and a cap portion 12 secured to the upper open end of the vessel 11 by some suitable means such as by interengaging threads 13, there being a dividing plate 14 situated between the vessel 11 and the cap 12 serving to divide the interior of the receptacle into a primary compartment 15 and a secondary compartment 16. Extending down from the upper part 17 of the cap 12 is an air inlet pipe 18 which has communication with the exterior through suitable apertures such as the holes 19 which extend laterally through the wall of a recessed plug 20 threaded into the upper wall 17 of the cap 12, this plug 20 being removed when it is desired to fill the lower chamber 15 with a liquid. The inlet pipe 18 projects through an opening 22 in the dividing wall 14 and has on its lower end the juncture plate or body 23.

A member 24, which for the purpose of description shall be termed the elevator or transfer tube, extends upwardly from the juncture plate 23 in position adjacent and parallel to the inlet pipe 18 and projects through the dividing plate 14. The juncture plate 23 is proximate to contact with the bottom 25 of the vessel 11 and has recesses 27 formed in the bottom thereof which are preferably in the form of grooves communicating with the lower open ends of the members 18 and 24 and extending to the sides 28 of the juncture plate 23. The receptacle 10 is provided with an outlet 30 situated in the cap 12, this outlet being threaded or otherwise suitably equipped for attachment of a tube 31 for connecting the device with the suction side of an internal combustion motor. Disposed between the outlet 30 and the compartment 16 is a wall 33 having an opening 34 which may be fully or partly closed by a flow regulating screw 35 threaded into the upper wall 17 of the cap 12 and having an engagement portion preferably in the form of a knob.

When the combustion motor to which the device is attached is in operation, a suction is exerted through the tube 31 on the interior of the compartment 16, creating therein a condition of partial vacuum which is in turn transmitted through a nozzle orifice 38 in the dividing plate 14 to the upper portion of the primary compartment 15 in which a body of oil is placed as indicated at 39. The greater pressure existing on the exterior of the receptacle 10 causes air to flow inwardly through the inlet pipe 18 as indicated by arrows 40. Owing to the fact that the air discharged from the lower end of the inlet 18 flows laterally under the juncture plate 23, part of the air is brought to the opening

of the elevator pipe 24 through which it may rise into the chamber 16; therefore, it will be recognized that by the juncture plate 23 the inward flow of air is caused to divide as shown by arrows 42 and 43, part of it passing up through the elevator tube 24 into the secondary compartment 16 and part passing up through the body of oil, as illustrated by bubbles 44.

That portion of the air which passes up through the elevator tube 24 is in open contact with the liquid in the lower compartment, owing to the fact that the intercommunicating channel 27 is open on its lower side. Such condition results in liquid being lifted or elevated through the tube 24 into the upper compartment 16, from which it normally would flow back into the lower compartment 15 through the orifice 38, by gravity. The portion of air which bubbles up through the liquid body in the lower compartment, as indicated at 44, picks up fine particles of liquid from the liquid body filling or partly filling the lower chamber 15. This flow of air in seeking outlet must pass through the orifice 38 which is provided with upwardly turned enclosing walls whereby to give a nozzle effect and to produce a decided atomizing effect on the liquid which is seeking to flow down through the orifice 38, thereby subjecting the air to an additional and principal impregnation by atomized particles of liquid, which liquid in the present illustration of the invention may be understood to be lubricating oil. The flow of air which passes through the elevator tube 24 also causes atomization of particles of oil which is being elevated, therefore, all of the air stream which passes out through the outlet 30 of the device is amply impregnated with lubricant suitable for treatment of the engine cylinders and their associated parts. The amount of lubricant delivered to the engine may be regulated by manipulation of the member 35.

Although I have in Figs. 1, 2 and 3, shown the preferred form in which I desire to practice the invention, it is possible to employ the several combinations of elements comprising the inventions in other forms, as will be recognized from Fig. 4 in which 50 indicates the lower portion of a cup or container which is divided by horizontal wall members into chambers 51, 52, 53 and 54. The wall members 55, 56 and 57 are respectively perforated at 58, 59 and 60, to permit the air inlet pipe 61 to project down into the bottom chamber 51. The lower end of the member 61 projects through a plate 63 having a flat lower surface instead of the grooved lower surface employed in the preferred form of the invention. The air which flows through the inlet pipe 61 into the lower chamber is spread out laterally by the plate which surrounds the discharge end of the air inlet member, part of this air flow entering and rising through a transfer or elevator tube 65, through which the flow of air carries liquid into the second chamber 52. A part of the air which has entered through the inlet pipe 61 bubbles up through the body of liquid 66 which has been placed in the chamber 51 and passes successively through the orifices 58, 59 and 60 which may or may not be provided with upwardly or downwardly directed enclosing lips, and which orifices are shown of annular form owing to the passage therethrough of the inlet pipe 61. Each of the chambers 52, 53 and 54 may be fed with liquid which is drawn up through interconnecting elevator tubes 70, and 71, as shown. In Fig. 4 the progress of the air in upward direction is indicated by arrows 72. It will be noted that in this alternative form of the invention the various principles of the invention are employed, although the general appearance of the structure may differ from the preferred form. It is intended that the scope of the invention shall not be considered as confined to this simple disclosure, but is to be limited only by the claims.

I claim as my invention:

1. In a device of the character described: a receptacle having its interior divided into a primary and a secondary chamber, there being a restricted opening between said chambers; walls providing an inlet member discharging at a point below the level of a liquid placed in said primary chamber; walls providing an outlet from said secondary chamber; and a transfer tube extending from a point adjacent to the discharge end of said inlet member to the interior of said secondary chamber, whereby a portion of the medium entering through said inlet member may pass through said transfer tube into said secondary chamber.

2. A device as defined in claim 1, including an orifice nozzle surrounding said restricted opening between said chambers.

3. A device as defined in claim 1, including means between the lower ends of said inlet member and said transfer tube for directing a part of the entering medium to the mouth of said transfer tube.

4. In a device of the character described; walls forming a container for a liquid, and a secondary chamber above said liquid container separated from said container by a wall, there being an orifice in the wall; an inlet member leading into said device and adapted to discharge within said container at a point below the normal liquid level therein; walls forming an outlet for said device leading from said secondary chamber; and means between said container and said secondary chamber adapted to transfer liquid from said container to said secondary chamber, the transferred liquid nor-

mally tending to flow back into said container through said orifice.

5. A device as defined in claim 4, in which said means adapted to transfer liquid consists of a tube extending from a point adjacent to the discharge end of said inlet member to the interior of said secondary chamber.

6. A device as defined in claim 4, in which said means adapted to transfer liquid consists of a juncture member at the discharge end of said inlet member and a transfer tube extending from said juncture member to the interior of said secondary chamber.

7. In a device of the character described: a vessel; a cap secured to the upper end of said vessel; a dividing wall between said vessel and said cap, said dividing wall having an orifice connecting said vessel and the interior of said cap; an inlet pipe extending from the upper wall of said cap, through said dividing wall, to a point proximate to the bottom of said vessel, there being an opening in the top of said cap constituting an entrance to said inlet pipe; a transfer tube extending from a point adjacent to the lower end of said inlet pipe to the interior of said cap; and walls forming an outlet leading from the upper part of said cap.

8. A device as defined in claim 7, including means at the lower end of said inlet pipe for directing a part of the entering medium to the entrance to said transfer tube.

9. A device as defined in claim 7, including a juncture member at the lower ends of said inlet pipe and said transfer tube having a recess in the bottom wall thereof for directing a part of the entering medium to the entrance of said transfer tube.

10. In a device of the character described: a receptacle adapted for the flow of a gaseous medium therethrough; a wall in said receptacle in the path of flow of said gaseous medium having an orifice through which gaseous medium must pass in its progress through said receptacle; and means operative in consequence of the flow of gaseous medium for delivering liquid contained in said receptacle to said orifice through which a stream of gaseous medium is flowing.

11. In a device of the character described: walls forming a primary chamber and a secondary chamber above said primary chamber, there being a restricted opening between said primary and said secondary chambers; and a transfer tube extending from the lower portion of said primary chamber to the interior of said secondary chamber through which liquid may pass from said primary chamber to said secondary chamber when a condition of vacuum is exerted on said secondary chamber.

12. In a device of the character described: a liquid receptacle having an opening in its upper portion; a cap secured over said opening, said cap having an outlet port; a dividing plate between said receptacle and said cap said plate having a perforation therein; inlet means leading into said receptacle; and a transfer tube extending from said receptacle to said cap for transferring liquid from the interior of said receptacle to the interior of said cap when a condition of vacuum is exerted on the interior of said cap.

13. A device as defined in claim 12, in which said inlet means discharges at a point below the level of liquid placed in said receptacle.

14. In a device of the character described: walls forming a receptacle having an inlet discharging into the lower portion thereof and an outlet leading from the upper portion thereof; a perforate dividing plate between said lower and said upper portion, and a transfer tube for transferring liquid from said lower portion of said receptacle to the upper side of said plate when a condition of vacuum is exerted on the outlet of said receptacle.

15. A device as defined in claim 14, including valve means operative at said outlet for controlling the outlet flow therethrough.

Signed at Los Angeles, in the county of Los Angeles and State of California, this 11th day of June, 1928.

GEORGE WOFFORD, Sr.