

Oct. 16, 1934.

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1,977,571

LIQUID FEEDER

Filed Feb. 24, 1932

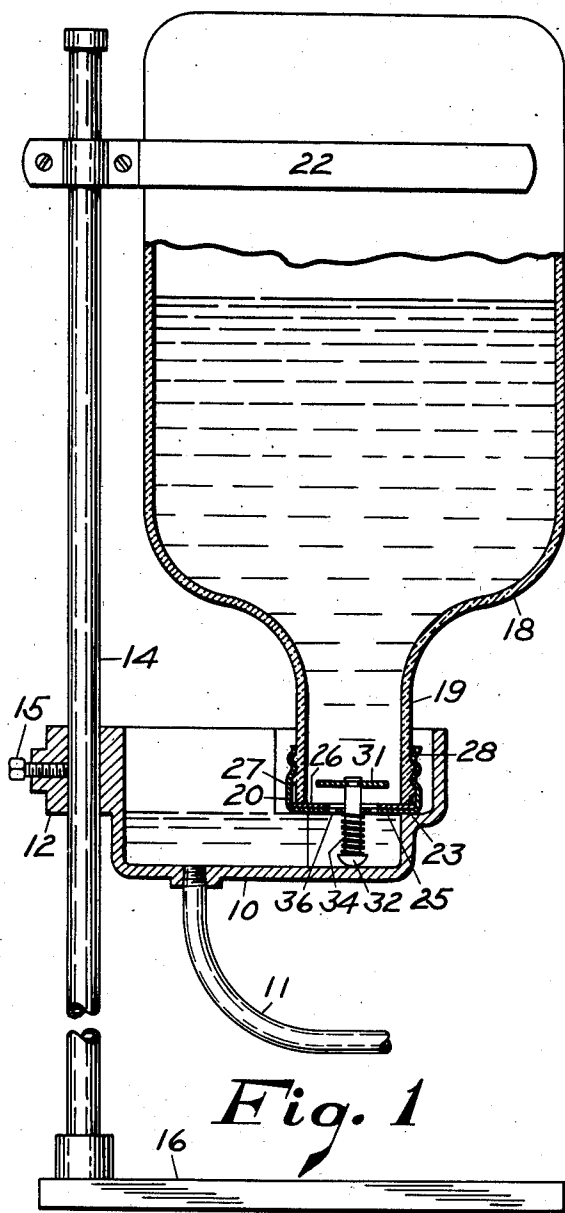


Fig. 1

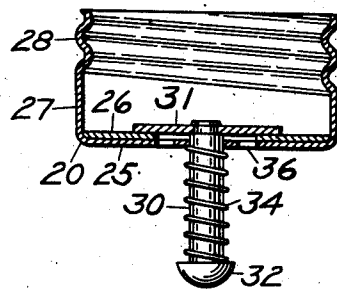


Fig. 2

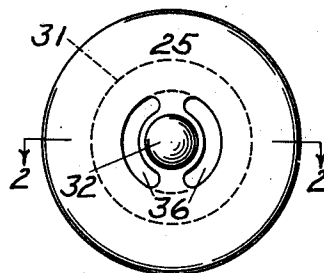


Fig. 3

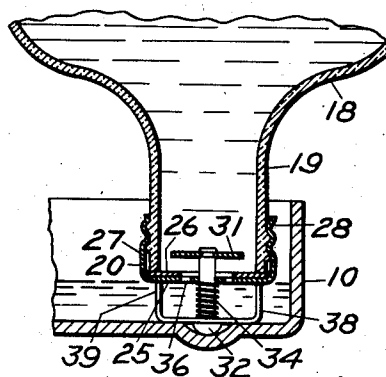


Fig. 4

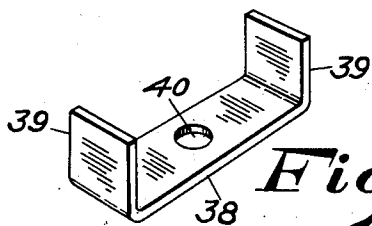


Fig. 5

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1,977,571

LIQUID FEEDER

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Application February 24, 1932, Serial No. 594,853

5 Claims. (Cl. 215—78)

This invention relates to liquid feeders, and more particularly to feeders of the type having inverted bottles or tanks which supply oil to oil stoves, or burners, of the gravity feed type.

which will ensure the maintenance of a constant level of oil in the reservoir at all times.

With these and other objects in view, as will be apparent to those skilled in the art, my invention resides in the combination of parts set forth in the specification and covered by the claims appended hereto.

In accordance with my invention, I provide, in combination with a liquid reservoir and an inverted bottle, a bottle closure comprising a cap which is adapted to be mounted on the bottle and which can be easily removed therefrom when the bottle requires refilling. The cap is preferably circular in shape and provided with an upwardly extending cylindrical shell having screw threads formed thereon to fit suitable threads on the outside of the bottle. A vertical valve stem is slidable axially through the cap, and this stem carries a valve located above the cap and arranged to control the flow through an opening in the cap. A coil spring surrounds the valve stem below the cap and urges the valve downwardly toward closed position, the spring being so located with respect to the opening that fluid may flow therethrough without passing through the coils of the spring. In the preferred construction the spring extends between the lower surface of the cap and a suitable abutment, such as an enlarged head, on the valve stem, and the opening in the cap is located outside of the spring.

Referring to the drawing illustrating one embodiment of the invention and in which like reference numerals indicate like parts,

Fig. 1 is an elevation, partly in section, showing an apparatus for supplying oil to an oil stove or burner;

Fig. 2 is an enlarged detail of the valved bottle closure, shown in section on the line 2—2 of Fig. 3;

Fig. 3 is a bottom view of the closure shown in Fig. 2;

Fig. 4 is a view similar to a portion of Fig. 1, showing a modification; and

Fig. 5 is an enlarged perspective view of the bottle supporting device illustrated in Fig. 4.

The embodiment illustrated in the drawing comprises the usual oil reservoir or pan 10 from which a pipe 11 leads to the oil burner (not shown). This reservoir 10 is formed with a laterally projecting apertured lug 12 which fits a vertical supporting post 14. A set screw 15 serves to fasten the lug 12 to the post at any desired height. The post is mounted at its lower end in a suitable base 16 arranged to rest upon the floor.

Above the reservoir 10 I have shown the usual inverted oil bottle or tank 18, which is ordinarily

5 The bottle in such a construction is inverted over a shallow reservoir from which the oil flows to the place of consumption, the arrangement being such that as oil is withdrawn from the reservoir additional oil will be discharged from the bottle into the reservoir to maintain the oil level therein constant. It is customary to provide the bottle with a cap to prevent spilling of the oil after the bottle has been filled and while it is being placed in inverted position above the reservoir.
10 The cap is usually formed with a valve therein which opens automatically when the bottle is mounted in operative position, to allow oil to flow into the reservoir. In the ordinary construction, the lower end of the valve stem contacts with the bottom of the reservoir, whereby the valve is forced open against the pressure of a coil spring.
15 It is found that under certain circumstances the valved caps of the prior art do not allow the necessary quantity of oil to flow into the reservoir. As a result the oil level in the reservoir is lowered, the combustion rate decreases, and the flame eventually becomes extinguished. I have discovered that this difficulty is caused by the formation of a film or scum of oil which prevents the entrance of air into the bottle and thus stops the feeding of oil. This film usually forms over the coil spring which is commonly used in these devices, but it may form on other parts also and particularly over openings in vertical walls. I believe that the film formation is a phenomenon caused by the surface tension of the oil, and I have found that the greatest difficulty is usually encountered at night, when the oil feed is turned low and the house is quiet. During the day there is ordinarily sufficient vibration from people walking near the burner to prevent detrimental film formation.

20 It is the main object of my invention to overcome these difficulties and to provide a liquid feeder comprising a valved bottle closure which can be applied to the usual oil bottle in common use today and which is so constructed that no oil film can form thereon to block the free delivery of oil to the reservoir.
25 It is a further object of the invention to provide a liquid feeder comprising a simple, inexpensive and easily manufactured device which will effectively prevent spilling of oil from the bottle as it is being mounted over the reservoir; and

30 as it is being mounted over the reservoir; and

formed of glass and provided with a comparatively small downwardly extending cylindrical neck 19. A valved closure 20 is attached to the lower end of this neck. The bottle is held at its upper portion between clamps 22 mounted on the post 14, and the weight of the bottle is supported on a ledge or shelf 23 formed integral with the reservoir and extending partially beneath the closure 20.

This closure 20, with which the present invention is principally concerned, is shown in detail in Figs. 2 and 3. The preferred construction illustrated comprises a cap 25 shown as a flat circular plate adapted to be applied to the lower end of the bottle neck. A flat annular gasket 26 of a suitable yieldable material is provided on the upper surface of the cap to contact with the bottle and form a tight joint. While the cap 25 may be held in place by various means, I prefer to utilize a cylindrical shell 27 which projects upwardly from the outer edge thereof. This shell is provided with screw threads 28 which are shaped to fit similar threads formed on the outer surface of the bottle neck 19, as shown in Fig. 1. The shell and cap are preferably integral, and they may be drawn from a single piece of a suitable sheet metal, such as brass. It will be apparent that this construction provides a simple, inexpensive, and readily removable closure for the bottle 18.

In order that oil may flow from the bottle into the reservoir to maintain the desired level therein, it is necessary to provide an opening in the cap 25. It is furthermore desirable that this opening should be closed automatically when the bottle is removed from the reservoir to be filled, so that no oil will be spilled during the removal or replacement of the bottle.

For this purpose I have provided a vertical valve stem 30 which is slidable axially through a central opening in the cap 25. On the upper end of the valve stem a flat circular valve disk 31 is mounted. In the preferred construction the valve stem is slightly reduced in diameter at the top to fit a small central hole in the valve, and the stem is headed over or upset to hold the disk in place. The valve disk 31 is somewhat smaller in diameter than the interior of the bottle neck 19, and yet it is larger in diameter than the central opening in the annular gasket 26, so that it may contact with the gasket and form a tight joint. The valve stem 30 is preferably made from an ordinary rivet having an enlarged head 32 at its lower end which provides an abutment. A coil spring 34 surrounds the valve stem between the head 32 thereof and the cap 25, and urges the valve 31 downwardly against the gasket 26. These parts are so arranged that when the bottle 18 is placed in operative position above the reservoir 10 as shown in Fig. 1, the head 32 of the valve stem will contact with the bottom of the reservoir, thus compressing the spring 34 and raising the valve 31.

One or more openings 36 are provided in the cap 25 so that oil may flow from the bottle to the reservoir and maintain the desired oil level therein. I have illustrated a cap having two of these openings, arcuate in shape and located on opposite sides of the valve stem, but it will be understood that the shape or number of the openings may be varied without departing from the scope of my invention. It is however important that these openings be located outside of the spring 34 and in a position to be closed by the valve disk when the bottle is removed from the reservoir. In the preferred construction

illustrated the outer edges of these openings 36 are curved in the arc of a circle having the same diameter as the central opening in the annular gasket 26, and their inner edges are curved in an arc of as small a radius as possible while retaining sufficient metal at the center to support the valve stem and spring.

In Figs. 4 and 5 I have shown a slightly modified construction for supporting the weight of the bottle 18. Instead of resting upon a shelf integral with the reservoir, the bottle is carried by a bracket 38 mounted on the valve stem 30. This bracket may be formed from a flat strip of metal by bending the end portions 39 thereof upwardly, and providing a central circular opening 40 to fit the valve stem.

The operation of the invention will now be apparent from the above disclosure. When the bottle 18 requires refilling, it is removed from the reservoir and the closure 20 is unscrewed. Oil is poured into the bottle, the closure is replaced, and the bottle is then inverted, leakage being prevented by the valve 31, which is held closed by the spring 34. The bottle is mounted between the clamps 22 with the cap 25 resting on either the ledge 23 or the bracket 38. The head 32 of the valve stem strikes the bottom of the reservoir, thus raising the valve 31 and allowing oil to flow into the reservoir through the openings 36. Whenever the oil level in the reservoir drops slightly below the lower surface of the cap 25, air is free to enter the bottle through the openings 36 and thus allow oil to flow out and restore the desired level. This incoming air does not flow between the coils of the spring 34, and there is nothing upon which a film of oil may form to block the operation. Hence the normal oil level in the reservoir will be maintained irrespective of the rate at which oil is withdrawn therefrom, and there is no possibility of the burner becoming extinguished through lack of oil, so long as there is a supply in the bottle.

The bottle closure which I have disclosed can be readily applied to the type of oil bottle which is in common use. It is constructed from a few parts and is comparatively simple and inexpensive to manufacture. Not only is the coil spring out of the path of the oil flow, but it is also well supported by the valve stem. There is nothing which can get out of order or cause trouble in operation.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In combination with a liquid reservoir and a bottle mounted in an inverted position above the reservoir to feed liquid thereto and maintain a constant level of liquid therein, a closure for the lower end of the bottle comprising a substantially horizontal cap releasably fastened to the bottle, a valve stem slidable vertically through the cap, a valve mounted on the valve stem above the cap, the cap having an opening therein which is controlled by the valve, and a coil spring surrounding the valve stem below the cap and arranged to urge the valve downwardly toward its closed position, the opening being located outside of the spring so that fluid may flow through the opening without passing through the coils of the spring.

2. In combination with a liquid reservoir and a bottle mounted in an inverted position above the reservoir to feed liquid thereto and maintain a constant level of liquid therein, a closure for the lower end of the bottle comprising a substan-

- tially horizontal circular cap, a cylindrical screw-threaded shell projecting upwardly from the outer edge thereof and serving to fasten the cap to the bottle, a valve stem slidable vertically through the cap, a valve mounted on the valve stem above the cap, the cap having an opening therein which is controlled by the valve, and a coil spring surrounding the valve stem below the cap and arranged to urge the valve downwardly toward its closed position, the opening being located outside of the spring so that fluid may flow through the opening without passing through the coils of the spring.
3. In combination with a liquid reservoir and a bottle mounted in an inverted position above the reservoir to feed liquid thereto and maintain a constant level of liquid therein, a closure for the lower end of the bottle comprising a substantially horizontal cap releasably fastened to the bottle, a valve stem slidable vertically through the cap, said stem having an enlarged head at its lower end, a coil spring surrounding the valve stem and extending between the lower surface of the cap and said head, the cap having an opening extending vertically therethrough and located outside of the spring, and a valve mounted on the valve stem above the cap, said valve when in its lowermost position serving to close said opening.
4. In combination with a liquid reservoir and a bottle mounted in an inverted position above the reservoir to feed liquid thereto and maintain a constant level of liquid therein, a closure for the lower end of the bottle comprising a circular cap, means to fasten the cap to the bottle, an annular gasket located between the upper surface of the cap and the lower end of the bottle, said gasket having a central opening therein, the cap having an opening therethrough which registers with the opening in the gasket, a vertically movable valve mounted above the cap, said valve when in its lowermost position contacting with the gasket and thus serving to close the opening in the cap, and a coil spring arranged to urge the valve downwardly toward its closed position, the opening in the cap being so located with respect to the spring that fluid may flow through the opening without passing through the coils of the spring.
5. In combination with a liquid reservoir and a bottle mounted in an inverted position above the reservoir to feed liquid thereto and maintain a constant level of liquid therein, a closure for the lower end of the bottle comprising a circular cap, means to fasten the cap to the bottle, an annular gasket located between the upper surface of the cap and the lower end of the bottle, said gasket having a central opening therein, a vertical valve stem slidable axially through the center of the cap, a coil spring surrounding the valve stem below the cap and arranged to urge the valve stem downwardly, and a valve mounted on the valve stem above the cap, the cap having an opening therethrough located outside of the spring and registering with the opening in the gasket, and the valve when in its lowermost position contacting with the gasket and thus serving to close the opening in the cap.
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