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SPRAYER

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FIG. 1

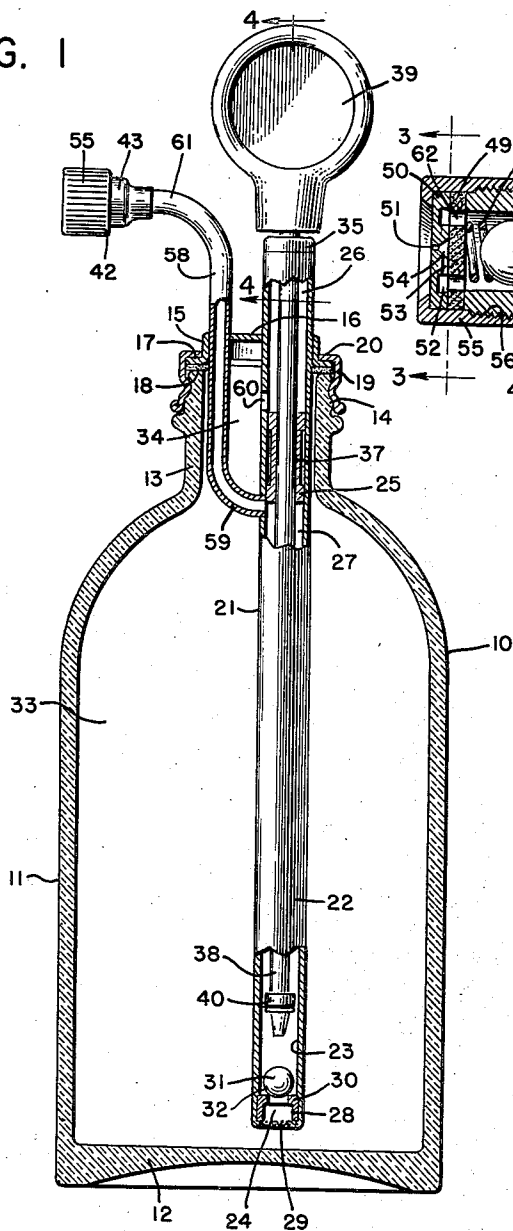


FIG. 2

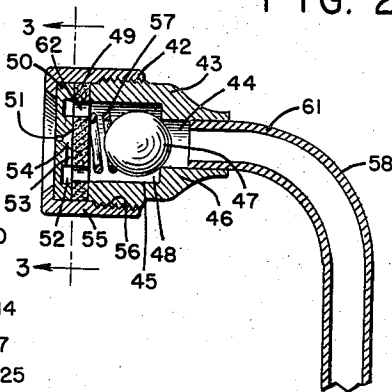


FIG. 4

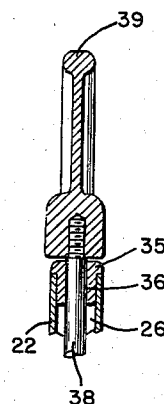
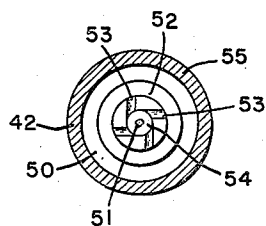


FIG. 3



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SPRAYER

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The herein disclosed invention relates to sprayers and has for an object to provide a sprayer using a plunger type pump and in which the usual stuffing box is dispensed with.

Another object of the invention resides in providing a chamber in which the liquid passing the plunger guide is collected and communicating with the interior of the receptacle of the sprayer for returning the liquid so collected back into the receptacle.

A still further object of the invention resides in bringing said chamber into communication with the exterior whereby the flow of air into the receptacle for replacing the liquid sprayed passes through said chamber and into the receptacle in the same direction as the liquid returned from said chamber into the receptacle.

An object of the invention resides in providing a barrel having a bore and extending into the receptacle and in further providing a barrier therein dividing said bore into an upper and a lower chamber.

Another object of the invention resides in providing pumping means for drawing the fluid to be sprayed into the lower chamber and having an operating member extending through said barrier.

A still further object of the invention resides in providing fluid conducting means bringing the nozzle of the sprayer into communication with the lower chamber and other fluid conducting means bringing the upper chamber into communication with the interior of the receptacle.

An object of the invention resides in utilizing a plunger as the pumping means and in guiding said plunger for sliding movement in a longitudinally extending bore in the barrier and in further guiding said plunger in a bore in a bushing attached to the outer end of the barrel.

A feature of the invention resides in making said bore in the bushing sufficiently free to conduct air into the upper chamber from the exterior and through said bore.

Other objects of the invention reside in the novel combination and arrangement of parts and in the details of construction hereinafter illustrated and/or described.

In the drawings is disclosed a sprayer comprising a receptacle having a neck and closed by a cap. A tube serving as a barrel extends through the cap and down into the interior of the receptacle toward the bottom thereof. In this tube is formed a barrier dividing the bore of the tube into an upper and a lower chamber. At the outer end of the barrel is provided a bushing. The bar-

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rier and said bushing have coaxial bores in which is slidably mounted a plunger adapted to enter the lower chamber and forming in conjunction therewith pumping means for drawing liquid into the lower chamber. At the lower end of the barrel is an inlet to the lower chamber, flow through which is controlled through a check valve at the said inlet. Communicating with upper end of lower chamber is a discharge conduit which extends through the cap and is connected to a discharge nozzle. The barrier is situated below the cap and a hole in the barrel brings the lower end of the upper chamber into communication with the interior of the receptacle. The bore in the bushing is of sufficient dimensions to permit air to enter the upper chamber and flow into the receptacle to replace the liquid sprayed.

In the drawings:

Fig. 1 is an elevational sectional view of a sprayer illustrating an embodiment of the invention.

Fig. 2 is a fragmentary sectional view of the nozzle of the invention drawn to a greater scale.

Fig. 3 is a cross sectional view taken on line 3-3 of Fig. 2.

Fig. 4 is a fragmentary sectional view of a portion of the pumping means of the invention taken on line 4-4 of Fig. 1.

The invention comprises a receptacle 10 having a lateral wall structure 11 and a bottom 12. The upper portion of the wall structure 11 narrows into a neck 13 having a passageway 34 which communicates with the interior 33 of said receptacle. The neck 13 is formed with threads 14. For closing the receptacle a cap 15 is employed which is constructed with a top 16 and a flange 17 overlying the upper end of the neck 13. A gasket 18 disposed between this flange and the neck 13 forms a tight connection therebetween. The top 16 is held in place by means of a nut 19 which is adapted to screw upon the threads 14 of neck 13. This nut has an intumed lip 20 adapted to bear down upon the flange 17 and hold the parts in position.

The sprayer includes a pumping device 21 which consists of a barrel 22 formed from a tube of metal. This barrel extends through the top 16 and is soldered thereto. The barrel 22 has a bore 23 which is open at the bottom to form an inlet to the said barrel indicated at 24. In the bore 23 of barrel 22 is provided a barrier 25 which divides the bore 23 into an upper chamber 26 and a lower chamber 27. A fitting 28 in the lower end of the bore 23 supports a strainer 29 and forms a seat 30 on which a ball 31 may seat.

This ball and seat form a check valve indicated in its entirety by the reference numeral 32 and which admits liquid from the interior 33 of receptacle 10 into the lower chamber 27 but excludes the passage of the liquid back into the receptacle through the inlet 24.

The barrel 22 has a bushing 35 mounted in the upper end of the same. This bushing has a bore 36 while the barrier 25 has a bore 37. The bores 36 and 37 are coaxially disposed and are substantially the same diameter. Slidably mounted in the two bores 36 and 37 is a plunger 38 which is of uniform diameter throughout its length. The barrier 25 may be constructed of metal or the same may be constructed of some suitable plastic material having a limited degree of resiliency. The bore 37 snugly receives the plunger 38 while the bore 36 is of slightly larger dimensions to form an air passageway between the bushing 35 and the plunger 38 admitting the flow of air through said passageway and into the upper chamber 26. The upper end of the plunger 38 has attached to it a knob 39 by means of which the same may be manipulated. At the lower end of the plunger 38 is provided a stop 40 which is adapted to engage the lower end of the barrier 25 and prevent the plunger from being pulled out of the barrel and which limits upward movement of the ball 31.

For the purpose of discharging the liquid from the sprayer a nozzle 42 is employed which is shown in detail in Fig. 2. This nozzle comprises a body 43 which has a bore 44 in the same. The said bore is enlarged as indicated at 45 and which forms an annular shoulder 46 serving as a valve seat. A ball 47 is adapted to seat on this seat and forms in conjunction therewith a check valve indicated in its entirety by the reference numeral 48. At the end of the body 43 is a disc 49 of plastic or similar material. This sheet overlies a disc 50 constructed of metal or plastic material and which has in the same a central discharge opening 51. An annular groove 52 in this disc communicates through a number of tangentially extending grooves 53 with a conical cavity 54 concentric with the discharge opening 51. In the disc 49 is formed holes 62 which communicate with the groove 52 in disc 50. A threaded cap 55 screwed on threads 56 on the exterior of the body 43 clamps the parts together. The ball 47 is urged against the seat 46 by means of a compression coil spring 57 which is seated at one end against said ball and at its other end against the sheet 49 of pervious material. The nozzle 42 has attached to it a tube 58 of metal which is disposed in the bore 44 of body 43 and soldered thereto. This tube extends through the top 16 of cap 15 and is soldered thereto. The inner end of said tube which is designated by the reference numeral 59 is bent toward the barrel 29 and extends through the said barrel and is soldered thereto. This end is brought into communication with the lower chamber 27 of the barrel 22 and at a locality near the upper end of the same and immediately below the barrier 25. In the barrel 22 and directly above the barrier 25 is formed a hole 60 which brings the upper chamber 26 into communication with the interior 33 of the receptacle 10. The upper end 61 of the tube 58 may be bent as desired to give the nozzle 42 the requisite angularity.

The operation of the invention is as follows: When the plunger 38 is raised the volume of the lower chamber 27 is increased and a partial vacuum created in the same. This raises the ball

31 off from the seat 30 and draws liquid from the interior 33 of receptacle 10 into said chamber. The check valve 48 being closed prevents the entry of air from the exterior and into said chamber through the tube 58. When the plunger reaches the uppermost position, movement of the same is reversed. This creates pressure in the chamber 27 and the check valve 32 is closed while the pressure in the tube 58 causes the ball 47 of check valve 48 to leave the seat 46. As the plunger 38 descends part of the liquid in chamber 27 is displaced and forced outwardly through the nozzle 42 where the same is converted into a fine spray as it leaves the sprayer. Any liquid which passes through the bore 37 of barrier 25 is collected in chamber 26. When the plunger 38 is moved upwardly suction is created in the chamber 27 and likewise in the interior 33 of receptacle 10. This correspondingly creates a suction in the chamber 26 and air from the exterior passes through the bore 36 of bushing 35 into the chamber 26 and through the hole 60 and into the interior 33 of the receptacle 10. This air draws with it any liquid which may be disposed within the chamber 26 and discharges it back into the receptacle 10. In this manner leakage through the bore 37 is taken care of without the use of a stuffing box and the liquid so collected returned back to the receptacle.

The advantages of the invention are manifest. The sprayer is extremely simple in construction and can be manufactured at a nominal expense. With the invention leakage past the barrier is returned to the receptacle without being discharged exteriorly of the sprayer. The pumping device may be easily and conveniently removed from the receptacle by unscrewing the nut forming part of the cap.

Changes in the specific form of my invention, as herein described, may be made within the scope of what is claimed without departing from the spirit of my invention.

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

1. In combination, a receptacle having a body and a neck of reduced dimensions, a cap attached to said neck and closing the receptacle, a barrel of uniform diameter throughout its extent having a bore and extending through said cap and into said receptacle and attached to said cap, a barrier extending across the bore of said barrel at a locality below said cap and substantially within said neck and forming in said barrel an upper and a lower chamber, said barrier being fixed relative to said barrel and having a longitudinally extending bore therein, a plunger within said barrel and slidable along and guided by the wall defining the bore in said barrier, a discharge conduit extending through said cap and connected to the barrel at a locality immediately below said barrier and communicating with said lower chamber, said barrel having an opening therein situated between said cap and barrier and bringing the lowermost portion of said upper chamber in communication with the interior of the neck of said receptacle.

2. In combination, a receptacle having a body and a neck of reduced dimensions, a cap attached to said neck and closing the receptacle, a barrel of uniform diameter throughout its extent having a bore and extending through said cap and into said receptacle and attached to said cap, a barrier extending across the bore of said barrel at a locality below said cap and substantially within said neck and forming in said barrel an

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upper and a lower chamber, said barrier being fixed relative to said barrel and having a longitudinally extending bore therein, a plunger within said barrel and slidable along and guided by the wall defining the bore in said barrier, a discharge conduit extending through said cap and connected to the barrel at a locality immediately below said barrier and communicating with said lower chamber, said barrel having an opening therein situated between said cap and barrier and bringing the lowermost portion of said upper chamber in communication with the interior of the neck of said receptacle, said opening lying adjacent the upper end of said barrier and forming a drain for draining into the receptacle the liquid collected in said upper chamber.

3. In combination a receptacle open at the top, a cap attached to said receptacle and closing the same, a barrel of uniform diameter throughout its extent having a bore and extending through said cap and into said receptacle and attached to said cap, a barrier extending across the bore of said barrel and at a locality shortly below said cap and forming therein an upper and a lower chamber, said barrier being fixed relative to said barrel and having a longitudinally extending bore therein, a bushing at the upper end of said barrel and having a bore therein concentric with the bore of said barrier, a plunger within the barrel slidable along the bores in said bushing and barrier and guided by the walls defining said bore, a discharge conduit extending through said cap and connected to the barrel at a locality immediately below said barrier and communicating with said lower chamber, said barrel having an opening therein situated between said cap and barrier and bringing the lowermost portion of said upper chamber in communication with the interior of said receptacle.

4. In combination, a receptacle having a body and a neck of reduced dimensions, a cap attached

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to said neck and closing the receptacle, a barrel of uniform diameter throughout its extent having a bore and extending through said cap and into said receptacle and attached to said cap, a barrier extending across the bore of said barrel at a locality below said cap and substantially within said neck and forming in said barrel an upper and a lower chamber, said barrier being fixed relative to said barrel and having a longitudinally extending bore therein concentric with the bore of said barrel, a bushing in the upper end of said barrel and having a bore therein coaxially disposed with reference to the bore of said barrier and of substantially the same diameter, a plunger within said barrel and of uniform diameter and slidable along the bores in said barrier and said bushing and guided by the walls defining said bores, an operating member attached to the outer end of said plunger, a discharge conduit extending through said cap and connected to the barrel at a locality immediately below said barrier and communicating with said lower chamber at its upper end only, said barrel having an opening therein situated between said cap and barrier and bringing the lowermost portion of said upper chamber in communication with the interior of the neck of said receptacle.

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