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W. SCHECK

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REFILLABLE PRESSURE SPRAY DEVICE

Filed Jan. 14, 1957

3 Sheets-Sheet 1

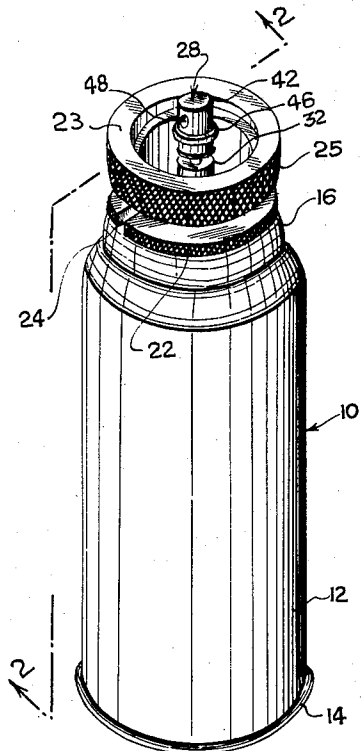


Fig. 1.

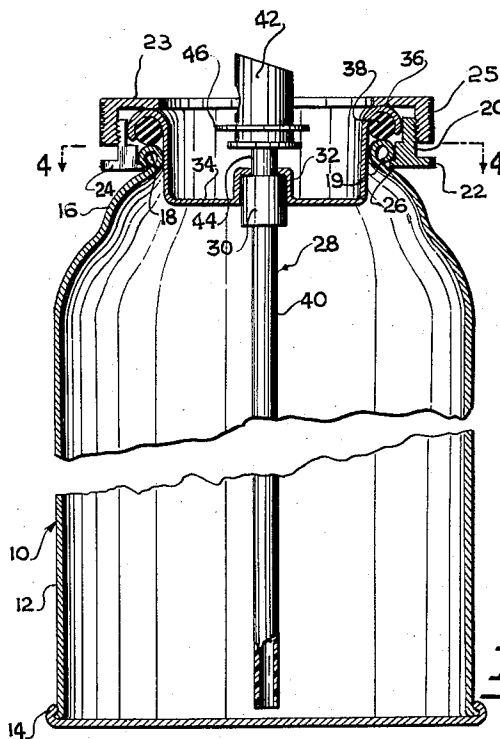


Fig. 2.

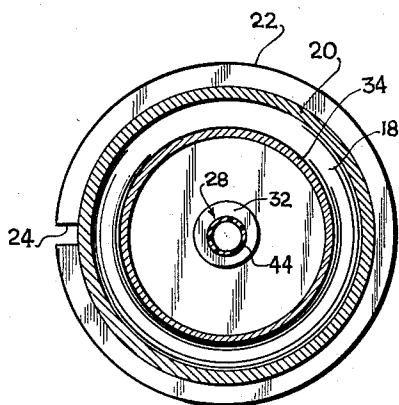


Fig. 4.

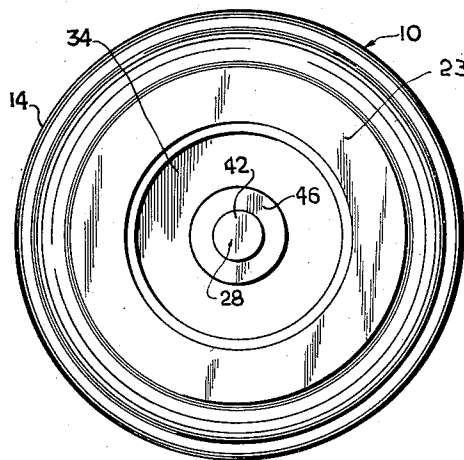


Fig. 3.

INVENTOR.
WILLIAM SCHECK
BY

John H. Polach
ATTORNEY

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W. SCHECK

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3 Sheets-Sheet 2

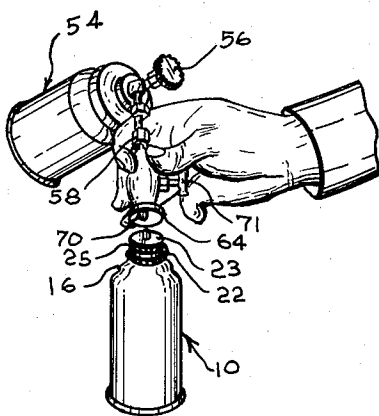


Fig. 5.

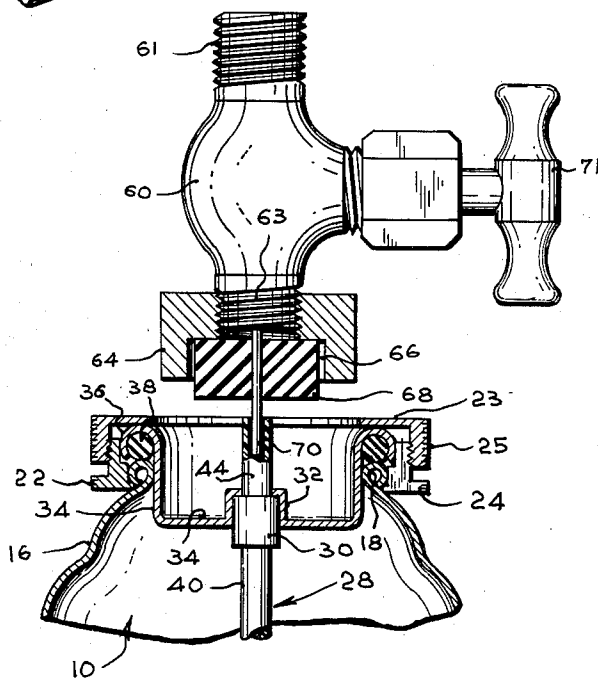


Fig. 6.



Fig. 7.

INVENTOR.
WILIAM SCHECK
BY *Golden Holschek*
ATTORNEY

July 1, 1958

W. SCHECK

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3 Sheets-Sheet 3

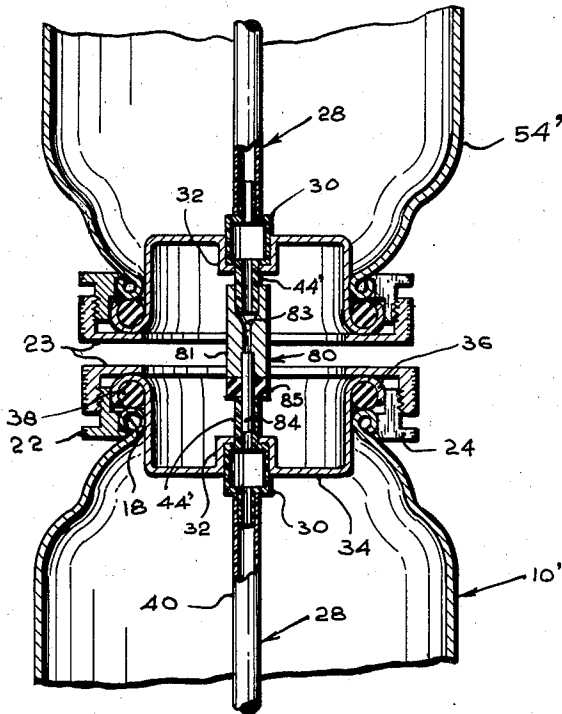


Fig. 8.

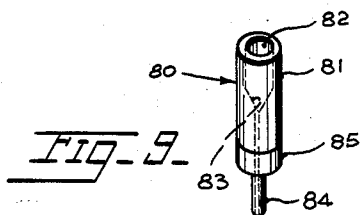


Fig. 9.

INVENTOR.
WILLIAM SCHECK
BY *John A. Plachsky*
ATTORNEY

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REFILLABLE PRESSURE SPRAY DEVICE

William Scheck, New York, N. Y.

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3 Claims. (Cl. 141—20)

This invention relates to pressure spray devices, such as are conventionally employed for spraying insecticides, deodorants, paints, perfumes, and other products. More particularly, the invention has reference to a device of this nature characterized by its adaptability to be refilled and recharged, rather than disposed of after it has been emptied of its contents or has lost pressure. Conventionally, an aerosol bomb or pressure spray device contains the product that is to be dispensed, together with a suitable propellant such as Freon. Ordinarily, a device of this type is charged with the propellant and with the product during the manufacture thereof, and following exhaustion of the contents or loss of the pressure-supplying propellant, the entire container is usually disposed of, together with its valve assembly, etc.

The above is the most usual form of a device of the character stated, but it is known that it has been heretofore proposed to permit recharging of the container with a suitable propellant and the present invention does not encompass in its broadest aspects the mere refilling or recharging of a container. Rather, the present invention is directed to an improved means for refilling or recharging containers of the type described, so that they will be usable over and over again.

One object of importance, in this regard, is to provide a pressure spray device of the character described that will have an improved capping and valve-supporting means, particularly designed to permit manufacture of the device at a relatively low cost.

Another object of importance is to so form the capping and valve-support means as to facilitate recharging of the device by the consumer. In this connection, the construction is such that the recharging of the device may be effected directly through the valve that is ordinarily employed for the purpose of discharging the container contents under pressure, the recharging or refilling means constituting a part of the invention and being so designed as to hold the valve in open position, while maintaining a seal thereabout, concurrently with the forcing of a new supply of propellant through the unseated valve, with the valve moving automatically to a closed position responsive to removal of the refilling means.

Another object of importance is to so form the pressure spray device that it can be easily refilled either as described immediately above or alternatively by means of complete removal of the capping and valve-support assembly, in a manner adapted for recharging the container with the product to be dispensed, and with the propellant while the propellant is in an inactive condition, the capping and valve-support means being so designed as to permit its being readily returned to position so that the device is readied for reuse.

Still another object of importance is to form a pressure spray device of the character described that will be particularly designed to have the desirable characteristics set forth above, while at the same time being capable of manufacture at a cost no greater than that required for

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the manufacture of similar devices not having the desirable characteristics of the present invention.

Still another object is to achieve the objects set forth above, while at the same time permitting use of certain components which are generally conventional per se, such as a depressible valve mechanism, a container-housed flexible valve stem, etc.

For further comprehension of the invention, and of the objects and advantages thereof, reference will be had to the following description and accompanying drawings, and to the appended claims in which the various novel features of the invention are more particularly set forth.

In the accompanying drawings forming a material part of this disclosure:

Fig. 1 is a perspective view of a pressure spray device made according to the present invention.

Fig. 2 is an enlarged longitudinal sectional view thereof substantially on line 2—2 of Fig. 1, a portion of the container being broken away.

Fig. 3 is a top plan view of the device, on the same scale as Fig. 2.

Fig. 4 is a transverse sectional view through the device, on the same scale as Fig. 2, substantially on line 4—4 of Fig. 2.

Fig. 5 is a perspective view showing a recharging means being brought in position for charging the same with propellant.

Fig. 6 is an enlarged, fragmentary, longitudinal sectional view on the same cutting plane as Fig. 2, showing the recharging means in operative position for filling the container.

Fig. 7 is a part elevational and part sectional view of the actuator cap for the container valve.

Fig. 8 is an enlarged, fragmentary, longitudinal sectional view on the same cutting plane as Fig. 2, showing a modified form of recharging means engaged with the valve of the container in position to unseat the container valve for flow of the propellant into the container.

Fig. 9 is a perspective detail view of the valve actuating device of Fig. 8.

Referring to the drawings in detail, designated generally at 10 is a container, formed of metal or any other suitable material, and having any desired shape. In the illustrated example, the container includes a cylindrical side wall 12 connected at its lower end to a peripherally beaded bottom plate or lower end wall 14 and being open at the top end. At its upper end, side wall 12 is integral with a stepped, tapering upper end portion 16 terminating at the upper end of the container in an outwardly directed, rolled edge or bead 18 defining immediately below the same a correspondingly outwardly directed, peripherally extending clamping groove 19.

A closure for the top of the container includes a clamp ring 20 removably applied to the upper end of the container, and integrally formed on its bottom edge with an outwardly directed, planiform, circumferentially extending lip 22, the outer edge of which is knurled or otherwise roughened. Ring 20 is of the split, snap ring type, being formed of a slightly springable material and having a portion cut away as at 24.

It can thus be seen, from the description so far provided, that the ring 20 can be grasped at opposite sides of the radial slot 24, to temporarily spread the ring slightly against the restraint of its inherent springability, thus to permit the ring to be applied to the upper end of the container. The ring is adapted to snap into place, in engagement with the bead 18, and as will be noted from Fig. 2, the ring is formed, in the plane of the lip 22, with an inwardly directed flange 26 adapted to snap into the groove 19.

Designated at 23 a planiform retaining ring, having a depending, peripheral flange 25, the outer surface of

which is knurled or otherwise roughened. The inner surface of flange 25 is threaded, and the outer surface of the clamp ring 20 is complementarily threaded so that upon screwing the ring 23 onto clamp ring 20, the assembled closure is held in place.

A valve assembly has been generally designated at 28, and includes a cylindrical housing 30, which is adapted to contain the inner components of the valve mechanism. A valve mechanism of the type illustrated is per se conventional, and it is merely important to note, for the purposes of the present invention, that the housing 30 is fixedly engaged in a downwardly opening, cylindrical boss 32 centrally formed in a flat cap element 34 shaped as a deep, upwardly opening cup member the side wall of which, at the upper end of the cap element, is formed with a continuous, circumferential flange 36 transversely curved and opening downwardly. This defines at the underside of flange 36 a correspondingly transversely curved groove, and clampably engaged in said groove is an O-ring 38, formed of soft rubber or the like and defining a sealing gasket bearing against the bead 18 as shown in Fig. 2.

Connected to the lower end of the valve housing 30 is an elongated, flexible, plastic tube 40 the inlet end of which is permanently open and is disposed in closely spaced relation to the bottom of the container.

Axially shiftable within the upper end of the housing 30, and projecting upwardly through a center opening formed in boss 32 is a tubular plunger 44, and removably seated on the upper end of said plunger is a cylindrical, manually depressible hollow cap 42 formed intermediate its ends with a circumferentially extending, outwardly directed, annular flange 46. As shown in Fig. 1, above flange 46, cap 42 has a circular depression, in which is centrally formed a discharge opening 48, communicating with a central discharge passage 49 therethrough.

The valve mechanism is of the type such that the cap 42 is spring biased by a spring contained within the housing 30 upwardly, to its Fig. 2 position, with the valve being closed or seated in this position of the cap. By manually pressing downwardly on the cap 42, the valve is unseated, and a pressurized propellant within the container is thus adapted to force the container contents upwardly through tube 40, past the unseated valve, and out the discharge port 48 in a fine spray.

It will thus be seen that in initially charging the device, one would first, with the valve assembly, container ring, and clamp ring removed, deposit within the container a liquid deodorant, paint, insecticide, or other material to be dispensed. Ordinarily, said material would be deposited in a cold state, and a propellant in liquid form, also in a refrigerated state, would be deposited in the container with the contents. The container itself would be in a refrigerated state. This is known as "cold filling," the practice being followed to maintain the propellant in an inactive state.

After the container has been filled and charged in the manner described, the first step is to attach the clamping ring to the upper end of the container. The manner in which this is done has been previously described, and after the split clamping ring has been snapped into place under bead 18, the valve assembly 28 is mounted in the open end of the container, with the O-ring seating at this stage of the operation lightly upon the bead 18.

It is then merely necessary to apply the retaining ring 23. The retainer ring is threaded onto the clamping ring 20, causing the planiform body of the retainer ring to force the flange 36 downwardly, compressing the O-ring 38 between flange 36 and bead 18 to seal the container.

The container is now ready for use, and to dispense the contents, one merely depresses the cap or button 42, the contents being discharged through vent 48 in a fine spray in a manner well known in the art.

Assuming that refilling of the container is desired, one can follow the "cold filling" method once again, by re-

moving the retainer ring and valve assembly. The clamping ring 20 can be left in place during refilling of the device in this manner. The parts are then returned to their normal position shown in Fig. 2, so that the device is again ready for use.

Alternatively, the device can be recharged with a propellant in a manner shown in Figs. 5 and 6. In this situation, it is not necessary that the container 10 be refrigerated, nor is it necessary that the propellant be placed in the container in a refrigerated state. Instead, the device can be readily recharged by the ordinary householder, through the use of a separate container, generally designated at 54, containing a supply of propellant, such as Freon. Container 54 has a main valve 56 which is manually rotated between closed and open positions, and which, when open, permits flow of the Freon into a series of connected fittings providing an outlet conduit generally designated at 58, that projects laterally from the valve 56 as shown in Fig. 5. Passage of the Freon through the conduit 58 is controlled by a valve assembly attached to the outer end thereof. This assembly includes a hollow valve body 60 containing the valve mechanism, the body having a threaded inlet neck 61 connected to the conduit 58 and a threaded outlet neck 63. An aluminum cylindrical member 64 is threaded on the outlet neck 63 and is formed with a central countersunk recess 66. A rubber pad 68 is fitted in the recess 67 and is provided with a central bore through which extends a tubular member 70 depending from and in communication with the interior of the valve body 60. The tubular member protrudes below the pad 68. A handle 71 operates the valve mechanism and is adapted to be manually turned to either open or close the valve.

In use, the cap 42 of the container valve is removed and the tubular member 70 is inserted into the tubular plunger or stem 44 of valve 28, the cylinder 64 slidably contacting the side wall of the cap element 34 permitting this operation, the cylinder serving as a guide. The handle 71 is turned to open the valve and the pad 68 is pressed against the top of the tubular plunger 44 thereby depressing the same and opening the valve 28 permitting the Freon to flow through the tube 40 into the container 10 to refill the same.

Of course, before recharging of the device with a propellant, the container 10 would be refilled with the product that is to be dispensed. This is done merely by removing the retainer ring and valve assembly, and depositing a suitable quantity of the product within the container. In these circumstances, the container and the product need not be specially refrigerated, since the propellant will not be added until after the container has again been sealed, the propellant then being added in the manner shown in Figs. 5-6.

It will be seen that the arrangement shown in Figs. 5-6 embodies the novel feature of permitting recharging of the pressure spray device with a suitable gaseous propellant directly through the dispensing valve of the spray device, with said valve being unseated responsive merely to application of the recharging means thereto. The valve, thus, is opened only responsive to downward pressure exerted through the medium of the pad 68, which downward pressure at the same time causes the pad to compress to effect a seal about the tubular plunger 44. The seal is broken and the valve assembly 28 is automatically closed responsive to removal of the recharging means.

This arrangement, of course, has the highly desirable feature that it permits recharging of the device by an ordinary, unskilled person such as the average householder, without requiring special refrigerating of the propellant, the container or the product. A suitable quantity of propellant can be kept in the household, and from time to time, whenever the propellant within the pressure spray device is exhausted, the same can be recharged so that the aerosol bomb or spray device can be used

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over and over again without the necessity of its being discarded, which necessity obtains in almost all instances where aerosol bombs are used at the present time. The number of products that can be employed are of course almost limitless, and can constitute sun tan preparations, inks, hair sprays, antiseptics, and even ingredients for cocktails or other beverages. The construction has the further desirable characteristic that one is permitted to concoct his own compounds of paint, private formulas, etc., for dispensing in a spray. Still further, companies manufacturing propellants, and which may desire to increase the areas in which their products are merchandised, are by reason of the invention, provided with a new field within which to expand their activities.

In the modification of Figs. 8 and 9, another manner of refilling a container such as the container 10' shown therein is disclosed. Here again it is not necessary that the container 10' be refrigerated, nor is it necessary that the propellant be placed in the container in a refrigerated state. Instead, the container can be readily refilled by the user, through the use of a separate container 54' containing a supply of propellant, such as Freon, and a valve actuating member 80. The container 10' has no cap or head 52 closing the plunger 44'. Container 54' is identical in construction with container 10' including the valve mechanism thereof with the plunger 44'.

The valve actuating member 80 serves also as a means for connecting the tubular plunger members 44' and provides a pipe line between the supply container 54' and the container 10' being refilled.

This valve member 80 has a cylindrical body 81 formed with an axial bore 82 having a restricted inner end portion leading to a central narrow hole in the closure wall at the end of the body. A tubular stem 84 substantially of the same diameter as the narrow hole is secured to the closure wall and protrudes outwardly therefrom, leaving a shoulder therearound. A washer 85 of cushioning material such as rubber is seated on the shoulder formed by the stem.

In order to refill the container 10', the valve actuating and connecting device 80 is mounted on the plunger 44' of the container 10' with the stem 84 thereof inserted into the axial opening in the plunger and with the washer 85 seated on the outer end of the plunger. The supply container 54' is inverted and its plunger 44' inserted into the bore 82 of the device 80 until it is seated on the shoulder formed by the restricted portion 83 of the bore of the device. Downward pressure upon the supply container will force the plunger 44' of the supply container 54' inwardly unseating the valve mechanism therein to permit the contents thereof to become discharged. Simultaneously, upon such pressure, the plunger 44' of the container 10' being refilled will be forced inwardly to unseat the valve mechanism in said container whereby the discharged contents will pass through the device 80 and into and through the plunger 44' of the container 10' to the interior thereof to refill the same. The containers may readily be disconnected when the container 10' is refilled. In all other respects, the form of invention shown in Figs. 8 and 9 is similar to the form shown in Figs. 1-7 and similar reference numerals are used to indicate similar parts.

While I have illustrated and described the preferred embodiments of my invention, it is to be understood that I do not limit myself to the precise constructions herein disclosed and that various changes and modifications may be made within the scope of the invention as defined in the appended claims.

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

1. In combination, a pressure spray device and recharging means therefor, said spray device comprising a container having an open end, a closure for said open end including a dish-shaped cap having a central opening, a

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dispensing valve assembly supported on said cap, said assembly including a tubular outlet plunger in the central opening in the cap communicating with the interior of the container and protruding outwardly thereof, a depressible valve actuating cap removably seated on the outer end of said plunger outlet, said actuating cap having a discharge port, said recharging means including a propellant container holding a gaseous propellant under pressure, a dispensing valve assembly attached to the propellant container, a recharging valve assembly attached to said latter dispensing valve assembly, said recharging valve assembly including a hollow valve body having an outlet neck portion, a cylindrical member mounted on said neck portion, a resilient pad carried by said cylindrical member, said member and pad having aligned central bores, a tubular outlet member depending from the valve body and extending through said bores outwardly of the pad, said tubular outlet member extending into the tubular plunger outlet of the container forming a pipe line therewith, said pad contacting the outer end of said plunger outlet for actuating the same when the depressible cap is removed to open the valve in the spray device container, said cylindrical member contacting the side wall of said inner surface of the dish-shaped cap for guiding the movement of the tubular outlet member of the recharging valve assembly into the tubular plunger of the container valve assembly.

2. In combination, a pressure spray device and recharging means therefor, said spray device and recharging means each comprising a container open at one end, a valve assembly seated in said end of each container for opening and closing said end, each valve assembly including a tubular plunger member, and a valve operating device seating on the ends of the tubular plunger members when the containers are in closely spaced opposed end to end relation, said valve operating device comprising a cylindrical body having an axial bore and being open at one end and closed at its other end with the bore passing through said closed end, said bore having a restricted end at the closed end of the body, and a stem of narrower diameter than the body and having an axial bore therethrough, said stem being secured to the closed end of the body and in communication with said bore, and a rubber washer around the stem and being seated on the closed end of the body, the open end of said body receiving the tubular plunger of one of said containers, the stem of the device extending into the tubular plunger of the other container with the washer interposed between said latter plunger and body whereby said plungers are connected and whereby upon endwise pressure on one of said containers, the plungers of both containers are moved inwardly to unseat the valve mechanism in said containers for passage of the contents of one container to the other container when the containers are in vertical position.

3. In combination, a container for holding liquid under compression, recharging apparatus therefor comprising a container holding a gaseous propellant under pressure, a dispensing valve assembly attached to the propellant container, a recharging valve assembly attached to said dispensing valve assembly, said liquid container being provided with an open end, a closure for said open end of the container, a dispensing valve assembly supported on said closure, said latter assembly including a tubular outlet plunger communicating with the interior of said liquid container, a depressible valve actuating cap having a discharge port, said recharging apparatus including a hollow valve body having an outlet neck portion, a cylindrical member mounted on said neck portion, a resilient pad carried by said cylindrical member, said member and pad having aligned central bores, a tubular outlet member depending from the valve body and extending through said bores outwardly of the pad, said tubular outlet member extending into the tubular plunger outlet of the liquid container forming a

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pipe line therewith, said pad contacting the outer end of said plunger outlet for actuating the same when the depressible cap is removed to open the valve in the container.

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