Aug. 20, 1940. I. JEPSON 2,211,823

SPRAYER

Filed June 13, 1938

Fig. 1

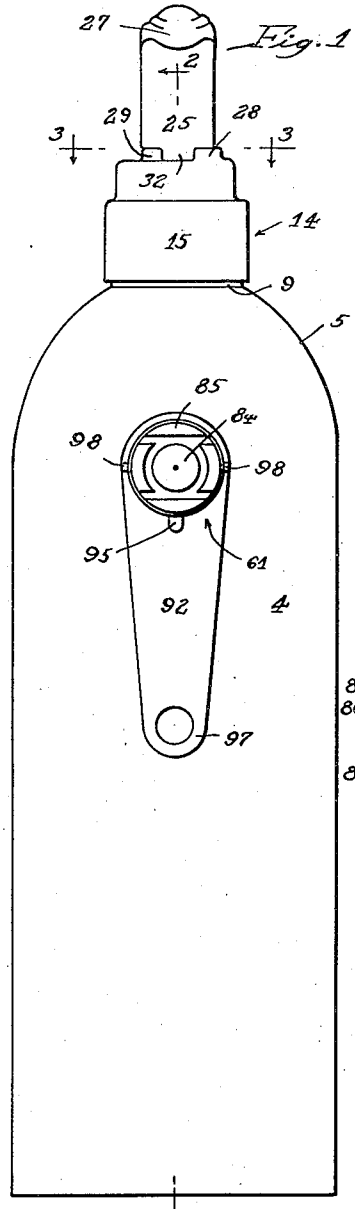


Fig. 3

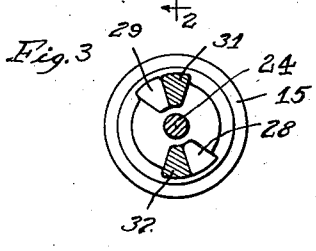
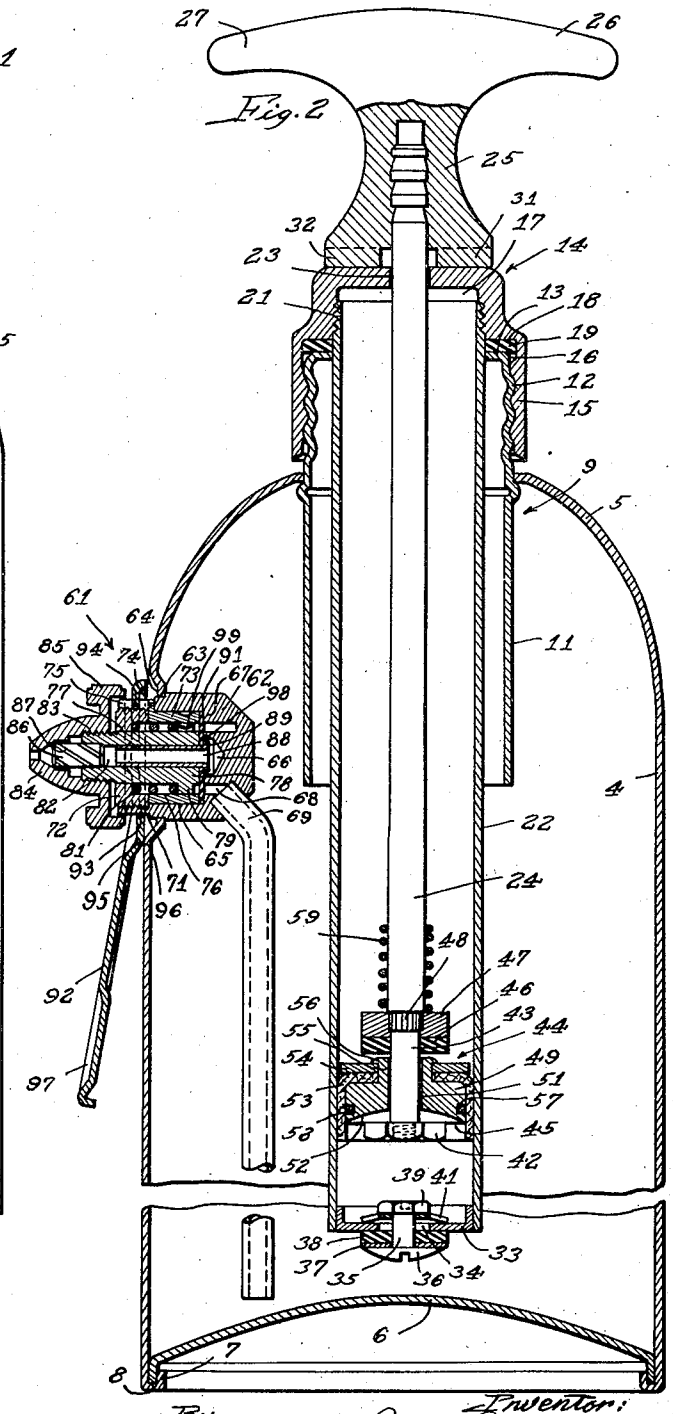


Fig. 2



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SPRAYER

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Application June 13, 1938, Serial No. 213,376

4 Claims. (Cl. 299—96)

This invention relates to spraying devices and has special reference to a portable liquid sprayer of novel characteristics of the type particularly adapted for spraying clothes or similar uses where extreme portability is important.

An object of the invention is the provision of a generally improved hand sprayer having improved features of dependability and simplicity in operation.

Another object of the invention is the provision of a sprayer having improved means for filling the same, and for developing suitable pressure within the sprayer.

Another object of the invention is the provision of a device of the character described having improved means for preventing overfilling of the container, and for sealing the opening through which filling is accomplished.

I have also aimed to provide a novel arrangement and combination of elements wherein the valve container functions as a handle in the combination, and having a novel functional cooperation between the pump handle and the closure member.

Other objects and advantages will become apparent from the following description and the accompanying drawing, in which—

Figure 1 is a side view of a sprayer embodying my invention;

Fig. 2 is a vertical section therethrough taken on the line 2—2 of Figure 1, and

Fig. 3 is a view on the line 3—3 of Figure 1.

The form of the invention herein shown is intended primarily for hand use, in this instance the spraying of clothes for dampening prior to the ironing thereof, but is, of course, suitable for numerous other spraying operations of similar nature. Referring to the drawing, the present embodiment has a tank or container 4, in this instance, cylindrical in shape and tapering inward somewhat as shown at 5 to the neck of the container, which is axially disposed at the top thereof. The lower end of the container is closed by means of a bottom 6 secured against the walls by a flange 7 crimped over the periphery 8 of the bottom member, and where necessary, soldered, brazed or welded into position to form a fluid-tight joint. Secured in the neck of the container is a sleeve designated generally by the numeral 9 rigidly fastened to the side walls by soldering, welding or the like to provide a fluid-tight joint. The tube extends downward into the container as shown at 11 and upward beyond the end of the container as shown at 12, the portion 12 being bent inwardly at its upper end as shown at 13 to provide an annular flange or shoulder. The portion 12 has formed thereon screw threads, the threads in this instance being pressed into the metal, but it will be obvious that these can be formed in any well known manner. The portion 12 forms a neck for the container adapted to receive a cap indicated generally by 14, the cap having an internally threaded sleeve 15 adapted to be screwed down over the neck portion 12 for the purpose of sealing the opening to the container through the tube 9, which opening serves as a filling opening therefor. The cap has a bore 16 forming the sleeve 15 and a counterbore 17 forming an intermediate shoulder 18 upon which is positioned an annular gasket 19 of suitable material, in this instance of rubber. The inner wall of the counterbore 17 is threaded as shown at 21 for the reception of a pump cylinder 22, the end of the pump cylinder being threaded for engagement at 21. The cylinder projects out of the cap in concentric relationship with the sleeve portion 15 as appears from Fig. 2, and the gasket 19 is of such width as to be confined between the cylinder and the sleeve portion 15. As a result of this confinement, it will be observed that the gasket is prevented from lateral distortion or creepage when the cap is screwed down so that the gasket presses against the flange 13 to seal the junction between the cap and the container. The cap also has a second counterbore 23 axially positioned with respect to the bore 16 and counterbore 17 for the reception of a stem 24 of an air pump presently to be described more fully. The upper end of the stem 24 is in this instance embedded in a handle 25 of somewhat T-shaped structure having laterally disposed arms 26 and 27, the handle serving to reciprocate the stem 24 within the tube 22. The upper surface of the cap 14 has two radially disposed and circumferentially spaced lugs 28 and 29 serving as abutments for similar lugs 31 and 32 disposed on the bottom surface of the handle 25. When the handle is in its lowermost position as shown in the figures, the lugs 31 and 32 are on different radii from the lugs 28 and 29 so as to come into contact with the top of the cap intermediate the lugs 28 and 29. In this position of the parts, when the handle 25 is rotated, the lugs come into the position shown in Fig. 3, and continued rotation of the handle brings about rotation of the cap. This arrangement facilitates the tightening of the cap onto the container because of the greater leverage obtained in this way, and likewise facilitates the removal of the cap and permits the

flange 13 to be pressed against the gasket 19 under a considerable sealing pressure with very little force on the handle 25. Contrariwise, very little force is required to break the seal.

The lower end of the cylinder 22 extends into the container and when the cap 14 is seated, extends to a point in relatively close proximity to the bottom of the container as shown in Fig. 2. The lower end of the tube has a transverse end piece 33 secured therein and provided with a central opening 34 for the passage of air from the interior of the cylinder out into the container. A screw 35 having a large head 36 passes through the opening 34 and carries a washer 37 having secured thereto a disk of gasket material 38 of such size as to cover the opening 34. The opposite end of the screw 35 has a nut 39 secured thereto and supports a spider 41 which bears against the inner side of the element 33, the spider having spring legs which normally urges the gasket into closed position over the opening 34 but permits opening of the valve thus formed when more than a minimum pressure is developed within the cylinder.

The lower end of the stem 24 has a nut 42 threaded thereon above which is a portion 43 upon which a piston 44 has sliding movement, the end 45 of the piston abutting against the nut 42 to limit its movement in one direction and against a disk 46 of gasket material positioned on a metallic backing member 47 secured in turn to the stem at 48, to limit its movement in the opposite direction. The piston 44 has a body portion 49 provided with a central opening 51 through which the stem portion 43 passes, the opening being such as to provide a loose fit and to permit the passage of air therethrough when the piston is drawn upward under the action of the stem. The lower end of the piston has a slot 52 which permits movement of the air past the nut 42. A piston leather 53 or similar packing is secured to the upper side of the piston by a washer 54, seated against a hub 55 on the upper side of the body, the upper end of the hub being spun over as shown at 56 to secure the washer and leather in place and to provide an annular shoulder for abutment against the gasket 46 to facilitate the sealing action between these parts. The piston body has an annular recess 57 within which is provided an expanding ring 58 adapted to exert outward pressure against the leather 53 and urge the skirt of the leather against the inner surface of the cylinder 22. It will be seen that as the stem 24 is reciprocated by means of the handle 25, the nut 42 comes against the piston at the start of the upward movement opening the space between the piston and the gasket 46. Continued movement of the stem moves the piston upward to the top of the cylinder or until a spring 59 abuts against the inner surface of the cap 14 to cushion the upper end of the stroke. During this movement air passes from the upper side of the piston downward along the stem portion 43 through the slot 52 into the lower end of the cylinder, the valve at the lower end of the cylinder remaining closed. When the stem 24 starts downward, the stem moves with respect to the piston until the packing 46 abuts against the piston, preventing the passage of air in an upwardly direction. Upon continued downward movement of the piston air is compressed in the lower end of the cylinder and is forced out into the container through the passage 34 against the spring action of the spider 41. In this manner the pressure in the container may be built up to the required extent. Normally the container will contain a substantial amount of water or other liquid, as will presently be described, the liquid being introduced through the tube 11.

A discharge valve, indicated generally by the numeral 61, is positioned on the side of the container adjacent the top thereof, as shown in the drawing, and includes a valve body 62 positioned in an opening 63 in the side of the container, the valve body being soldered, welded, brazed, or the like, or attached in any other manner to provide a fluid-tight connection. In this instance, the metal of the container is formed inwardly adjacent the opening as shown at 64 for a purpose which will presently appear. The body 62 has a bore 65 and a counterbore 66 providing an intermediate shoulder 67 within which is positioned an annular recess 68 forming a port with which communicates a pipe 69 carried in the body member and projecting to a point adjacent the bottom of the container, the pipe serving to supply liquid to the port 68. The bore 65 is internally threaded as shown at 71 for the reception of an externally threaded nut 72 which bears against a sleeve 73 positioned in the bore, the sleeve having a tab 74 projecting laterally outward for reception in a slot 75 in the threaded portion of the body member, the tab and slot serving to prevent rotation of the sleeve. The sleeve 73 and nut 72 have a bore 76 and a counterbore 77 for the reception of a nozzle member 78, the nozzle member having an annular flange 79 bearing in the bore 76 and a tubular portion bearing in the counterbore 77 to support and guide the nozzle member in longitudinal movement. A spring 81 is positioned in the bore 76 and acts against the flange 79 to urge the nozzle member inwardly, that is, toward the right facing Fig. 2. The nozzle member has a central bore 82 for the passage of liquid therethrough and is externally threaded as shown at 83 for the reception thereon of a nozzle tip 84, the nozzle tip having a wide flange 85 for a purpose which will presently appear. Between the bore 82 and the nozzle tip is a cylindrical element 86 having grooves 87 on the outer surface thereof for the passage of liquid therealong prior to its discharge from the nozzle tip, the purpose thereof being to give directional motion to the liquid as it emerges from the nozzle tip as is known in the art. A tube 88 is pressed into the inner end of the bore 82 and is spun over at its end as shown at 89 to secure against the end of the nozzle member 78 a rubber or similar diaphragm 91. This diaphragm is of substantially the same area as the bore 65 and is secured at its periphery against the shoulder 67 by means of the sleeve 73, the sleeve pressing thereagainst with considerable force and preventing movement of the periphery of the diaphragm. A handle 92 has an opening 93 for loose reception on the outer surface of the body member 67. The handle has a tab 94 for reception in the slot 75 to prevent rotation of the handle about the axis of the nozzle. The handle also has a projection 95 pressed therein for abutment against the shoulder 96 in the container formed by the recess 64 which serves as a fulcrum about which the lever may be rotated by movement of the remote end 97 of the lever. The lever likewise has projections 98 formed adjacent the opening 93 for abutment against the flange 85 of the nozzle tip. It will be seen that when the end 97 of the handle is drawn inwardly toward the

container the projections 98 pressing against the flange 85 will urge the nozzle tip and the nozzle member 78 to the left facing Fig. 2, thereby establishing communication between the port 68 and the bore 82 by way of the bore 65 and the counterbore 66 in the body member so that the liquid may pass from the port 68 into the bore 82 and out through the nozzle tip. When the handle is released, the spring urges the nozzle member to the closed position shown in Fig. 2. The flange 79 has spaced slots 98 which ride along projections 99 formed in the sleeve 73 whereby to prevent rotation of the nozzle member with respect to the body. The annular flange 85 of the nozzle tip is knurled for convenience in removing the tip for cleaning of the nozzle. It will also be seen that the flange serves to cover the remainder of the valve and nozzle mechanism but to permit access to the entire mechanism upon its removal.

Attention is directed to the numerous advantages and structural features of the invention. It will be seen that the cap is constructed to carry the pump in such manner that the gasket 19 is confined for effective operation and that the handle of the pump functions not only for reciprocation of the pump rod, but also functions in the removal of the cap from the container. Likewise, the tube 9 serves not only as a filling spout, but also forms with the side of the container an air trap in the top of the container to prevent the sprayer from being completely filled and to provide a compressible quantity of air within the container. Attention is also directed to the fact that the container is of such circumference as to be conveniently encircled by the hand of the operator to an extent sufficient for ease in manipulation of the container, as a result of which the necessity for a handle is avoided together with the various operating instrumentalities from the handle to the valve. This structure also permits of combining the nozzle and the valve in a unitary assembly since the valve is operated from the side of the container directly adjacent to the nozzle.

Another feature of the invention is the unitary valve and nozzle structure whereby a portion of the valve is caused to function as a portion of the nozzle, or vice versa, and the arrangement is such that a very simple and effective means may be employed for actuating the valve.

I claim:

1. The combination in a sprayer of a container for liquid having a top opening, a sleeve secured intermediate its ends in said opening to project upward from said container and downward into said container, the downwardly extending portion forming an air trap in the top of the container when the latter is filled with liquid through the sleeve, a closure for said container comprising a cap having a flange arranged to be received over the end of said upwardly extending portion, a pump cylinder within the flange in spaced relation thereto, the upper end of the sleeve extending inwardly into close relation with the cylinder, means for drawing the cap against the inwardly extending end of the sleeve to seal the container, and a gasket between the flange and the cylinder for engagement with said upper end of the sleeve when the cap is drawn down whereby the flange and cylinder prevent lateral distortion of the gasket, and means in said cylinder for injecting air into the container.

2. The combination in a sprayer of a container for liquid having a top opening, a sleeve secured intermediate its ends in said opening to project upwardly from said container and downwardly into said container, the sleeve serving as a communication for filling the container, the downwardly extending portion forming an air trap in the top of the container when the latter is filled with liquid, a closure for said container comprising a cap having a flange threaded over the end of said upwardly extending portion and tightened thereon by rotation of the cap, said cap having a cylindrical threaded portion and a central opening therethrough, a pump cylinder threaded into said threaded portion within the flange in spaced relation thereto, a gasket confined between the flange and the cylinder for engagement with the end of the tube when the cap is tightened thereon, a pump piston in said cylinder for injecting air into the container, the piston having a reciprocable rod extending loosely through said cap opening, a handle positioned on the rod for reciprocating the same, and means on the cap and on the handle engageable in one position of the handle for rotating the cap in response to rotatior of the handle to tighten and loosen the cap.

3. The combination in a sprayer of a slender body, a relatively small upstanding neck at the upper end of the body, the body tapering inwardly at its upper end to said neck, a one-piece cap covering said neck and having a rib at its upper end, a threaded bore for reception of the neck, a threaded counterbore, and a shoulder between the bore and the counterbore, a pump cylinder threaded into the counterbore and depending from the cap into the body, a gasket seated against said shoulder and confined between the bore and the cylinder to seal the neck, the neck being inturned substantially to the cylinder to provide a flat surface for contact with the gasket, a plunger rod extending through the center of the cap, and a handle on the outer end of the plunger having a rib for engaging the rib of the cap for rotating the same to tighten and loosen the cap on the neck.

4. The combination recited in claim 3 wherein a combined valve and nozzle is positioned in the side wall of the body having a spring pressed member slidable radially for opening and closing the valve, and a lever extending longitudinally of the container, said lever and body having abutment means providing a fulcrum for the rotation of the lever to open the valve when the lever is squeezed toward the body.

IVAR JEPSON.