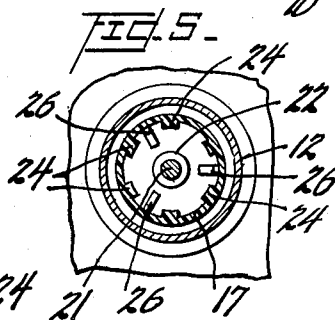
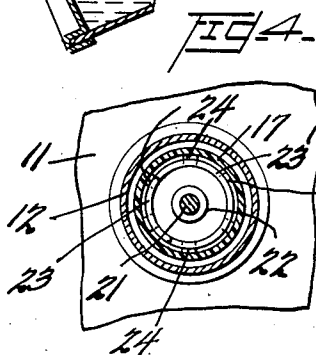
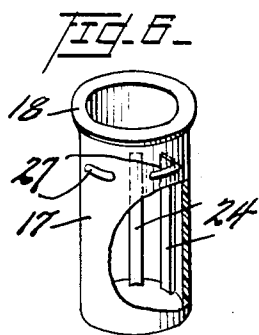
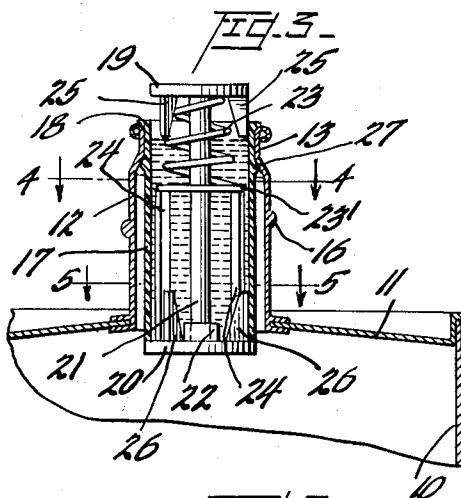
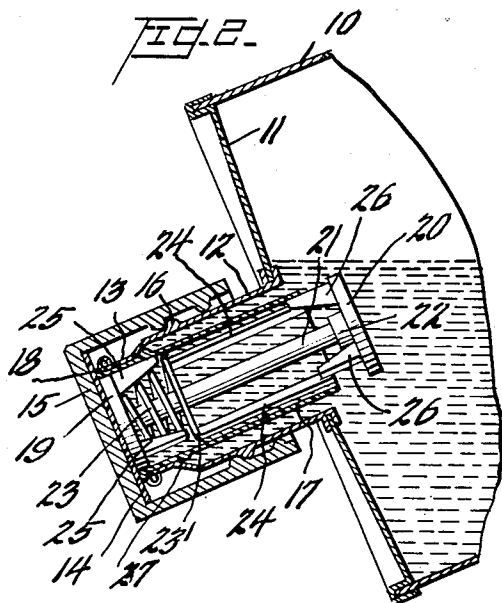
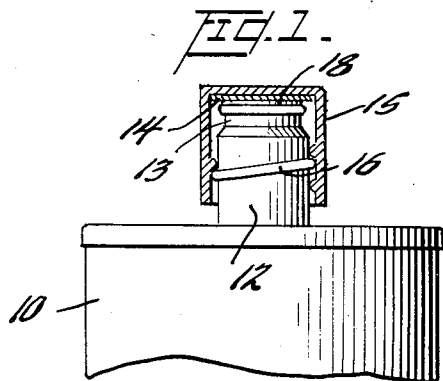


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LIQUID DISPENSING AND MEASURING VALVE FOR
LIQUID CONTAINERS
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**LIQUID DISPENSING AND MEASURING VALVE
FOR LIQUID CONTAINERS**James U. Stewart, Whittier, and Rex C. Coopridge,
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10 Claims. (Cl. 222-453)

This invention relates to a liquid dispensing and measuring valve for liquid containers, and more particularly to such a valve which, though capable of more general use, is especially adapted for application within the pouring spouts of existing types of containers.

In at least one such container now in use the pouring spout thereof is of tubular construction and has a closure cap removably applied over its open end.

In its preferred form the valve of the invention is adapted for snug reception in such a pouring spout and is provided with an annular flange which overlies the mouth of the spout and functions both as a sealing flange or gasket for engagement with the closure cap and as a positioning means for the valve.

A valve element within said valve is normally spring projected outwardly, but is retractible within the casing to permit sealing engagement of the flange with the cap. However, upon removal of the cap, which may function as a shipping seal for the container, said valve is automatically projected outwardly to seal the container against spillage of its contents or against ingress of air which might evaporate and/or coagulate the container contents.

The valve of the invention is of simplified construction, including a valve assembly movable through the valve casing, and with valve elements having guide fingers or means projecting into the valve casing and guiding them for alternate movement into sealing or closing relation with the opposite ends of the valve casing. An important and novel feature of the valve consists in utilizing the valve actuating spring to arrest the movement of one of said valve elements when same is positioned in proper sealing relation within the casing and, more particularly to so arrest the movement of the valve assembly before the guide fingers of the other valve element are withdrawn from the casing.

In accordance with a further feature of the invention, the assembly of such a valve is simplified and facilitated by forming same of a minimum number of parts, namely a pair of valve elements respectively formed with complementary valve stem sections or segments, whereby said segments may be assembled through opposite ends of the valve casing, the valve spring being positioned on one of said segments, and the segments then being rigidly interconnected in telescoping relation.

Further features and advantages will be apparent from the following detailed description, considered in conjunction with the accompanying drawings, in which:

Figure 1 is a side elevation, partly in section, of the upper end portion of a container having the invention applied thereto;

Figure 2 is an enlarged diametrical cross section through the container of Figure 1, showing the manner in which the valve of the invention cooperates with the sealing cap to confine the contents of the container against escape, the container being partially inverted;

Figure 3 is a view generally similar to Figure 2, but with the sealing cap removed and the valve in a different

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operative position, the container being in an upright position;

Figures 4 and 5, respectively, are cross-sectional views on the lines 4-4 and 5-5 of Figure 3; and

Figure 6 is a perspective view, partly in section, of the valve casing or cylinder.

Referring now in detail to the accompanying drawings, the reference character 10 designates a conventional can or container such as is employed for dispensing liquid detergents and the like. Formed centrally in the domed top 11 of the container 10 is a dispensing aperture in which is secured, by conventional methods, a metal pouring spout 12. Adjacent its open upper end, spout 12 is formed with an annular radially inwardly projecting beading or rib 13. As conventionally used prior to our invention, the said beading 13 was for the purpose of substantially "drip-proofing" spout 12, and the annular upper edge of the spout was adapted for sealing contact with the resilient liner disc 14 of a cap 15 which was threaded on the spout 12 as at 16.

Our invention, the preferred embodiment of which is adapted for use in combination with such a spout 12, comprises an open ended tubular valve casing 17, preferably of cylindrical form adapted to be press fitted in the upwardly opening spout 12. The cylinder or casing 17 is preferably of somewhat resilient plastic material, and may be provided with radial external projections 27 adapted to be pressed through the smallest diameter portion of beading 13, and thereafter to expand beneath the beading and prevent withdrawal of the casing 17 as shown in Figures 2 and 3. An outwardly extending lip or flange 18 at the upper end of the casing 17 overlies the upper edge or mouth of the spout 12 to limit the inward movement of the casing. This flange 18 additionally functions as a sealing flange for sealing engagement with the resilient liner disc 14 of cap 15.

Obviously, where the valve casing 17 is made of a substantially resilient material such as polyethylene, the resilient liner disc 14 may be eliminated and the flange 18 may function as a resilient gasket in direct engagement with the lower face of the cap 15.

Axially reciprocable through the cylindrical casing 17 is a valve assembly which comprises the spaced valve discs or elements 19 and 20 interconnected by a valve stem 21, which is preferably integral with one such disc 19 and is received and press fitted or cemented within a socket 22 formed on the other disc 20. Since the valve stem 21 maintains the discs 19 and 20 spaced apart a distance greater than the length of the cylinder 17, it will be seen that these discs are capable only of alternate movement into sealing relation with the adjacent ends of cylinder 17.

In order to avoid any interference with the sealing engagement between the cap liner 14 and flange 18, the outer valve element 19 is of a diameter slightly less than the internal diameter of the cylinder 17, and is permitted to move into the upper or outer end of said cylinder into substantially sealing or plugging relation therewith, under the downward pressure exerted by the cap 15 as the latter is secured on spout 12. Although in practice the disc 19 may fit rather loosely into the cylinder 17 so as not to prevent all leakage, this will be immaterial in view of the coaction between the sealing flange 18 and cap 15.

The valve disc 20 on the other hand is preferably of a larger diameter than the interior of cylinder 17 and is arranged for movement into flush sealing engagement with the adjacent end edge of cylinder 17.

The entire valve assembly is resiliently biased outwardly by a coil spring 23 disposed under compression about the stem 21, between the valve disc 19 and an axially directed abutment, such as may be conjointly defined by the co-terminous outer ends of a series of spaced axially extend-

ing reinforcing ribs 24 within cylinder 17. This is best shown in Figure 3.

Thus it will be seen that immediately upon removal of the cap 15, spring 23 will automatically urge the disc 20 into seating engagement with its adjacent end of cylinder 17, as in Figure 3, thereby preventing accidental spillage or evaporation and consequent coagulation of the container contents.

Inner valve disc 20 is formed with an annular series of guide fingers or means 26 which are slidably received in the cylinder 17, between the ribs 24 thereof, and the outer disc 19 is similarly formed with a series of guide fingers 25 slidably received in its adjacent end of cylinder 17. These fingers 25 and 26 jointly support the valve assembly for axial movement in cylinder 17 so that their respective valve discs 20 and 19 will be accurately guided into sealing relation with the cylinder.

It will be noted that the spring 23 is of substantially frusto-conical conformation, with the largest diameter coil 23' at its base, abutting against the ends of ribs 24 and preferably contiguous to the inner wall of cylinder 17, in the path of movement of the fingers 25. Thus by engagement with the free ends of fingers 25, the larger coil 23' of spring 23 arrests the inward movement of the valve assembly before the guide fingers 26 of inner valve disc 20 are withdrawn from the cylinder 17. The remaining coils of spring 23 (other than coil 23') are of relatively smaller diameter and are disposed radially inwardly of the fingers 25 to avoid interference therewith. Thus, the smaller diameter end of spring 23 projects between the valve stem 21 and the relatively radially spaced fingers 25 into thrusting engagement with valve disc 19. Obviously, outward movement of the valve assembly is arrested by seating of the disc 20 against the end of cylinder 17 to prevent withdrawal of guide fingers 25 from the cylinder.

In the use of this invention, the cap 15 is first unscrewed and removed from the spout 12, whereupon the spring 23 automatically opens the outer valve disc 19 and seats disc 20 in air tight relation against the adjoining end of cylinder 17 (Figure 3). Thereafter, to dispense a measured amount of the container contents, the container is grasped and inverted, as in Figure 2, whereupon the outer disc 19 is pressed inwardly to the full extent permitted. Thus the disc 19 closes the outer end of cylinder 17 and inner disc 20 is unseated to permit liquid to flow into and fill measuring cylinder 17, displacing the air therein upwardly into the container. Subsequent release of pressure on the disc 19 while the container is still inverted permits the spring 23 to again seat the disc 20 and prevent entry of additional fluid into cylinder 17, while permitting the measured quantity of liquid therein to discharge through the outer end of the cylinder.

In this application there is shown and described only the preferred embodiment of the invention. However, it is realized that the invention is capable of other embodiments, and that its several details may be modified in various ways, all without departing from the inventive concept. Accordingly, the drawings and description are to be construed merely illustrative in nature, and not exclusive.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In combination with a generally cylindrical pouring spout having a sealing cap threaded thereon, an open ended measuring cylinder snugly coaxially received in said spout and having a radial external sealing flange overlying the upper end of said spout for vertically positioning said cylinder in the spout and for sealing engagement with said sealing cap, a valve assembly axially reciprocable through said cylinder including an upper valve disc normally projecting above the upper end of said cylinder and of smaller diameter than said cylinder for reception therein responsive to sealing pressure of said cap, said valve assembly including a lower valve disc adapted to seat

against the lower end of said cylinder, a valve stem extending through said cylinder and interconnecting said discs for alternate seating relation with their respective ends of the cylinder, and means in the cylinder resiliently urging said valve assembly in a direction to seat said lower disc, whereby said lower disc will automatically seat responsive to removal of said sealing cap.

2. In combination with a generally cylindrical pouring spout having a sealing cap removably threaded thereon, an open ended measuring cylinder snugly coaxially received in said spout and having a radial external sealing flange overlying the upper end of said spout, a valve assembly extending through and normally projecting axially from the upper end of said spout, a valve disc carried at the lower end of said assembly for movement into seating relation with the lower end of said cylinder, the pressure of said sealing cap against said valve assembly maintaining said disc unseated while the cap is in seating relation with said flange, and resilient means coacting between said cylinder and the valve assembly for automatically seating said disc upon removal of said sealing cap.

3. In combination with a generally cylindrical pouring spout having a sealing cap removably threaded thereon, an open ended measuring cylinder snugly coaxially received in said spout, a valve assembly extending through and normally projecting axially from the upper end of said spout, a valve disc carried at the lower end of said assembly for movement into seating relation with the lower end of said cylinder, the pressure of said sealing cap against said valve assembly maintaining said disc unseated while the cap is in seating relation with said flange, and resilient means coacting between said cylinder and the valve assembly for automatically seating said disc upon removal of said sealing cap.

4. A liquid dispensing and measuring valve comprising an open ended measuring cylinder adapted for snug reception in the dispensing outlet of a liquid container, to thus have an inner end and outer end, a valve assembly movable axially through said cylinder comprising inner and outer valve discs, a stem of greater length than the cylinder extending therethrough and interconnecting said discs for alternate seating relation with their respective ends of the cylinder, each said disc having a plurality of annularly arranged guide fingers slidably received in said cylinder and guiding it for movement in axial registry with the cylinder, means defining an axially directed abutment in the cylinder, a coil spring having a large diameter coil at one end seated axially against said abutment in contiguous relation to the inner wall of the cylinder, the remaining coils of said spring being of relatively smaller diameter and said spring being compressed between the said abutment and said valve assembly to urge the latter outwardly of the cylinder, said fingers of the outer disc being disposed for abutting engagement with said large diameter coil to limit the inward movement of said valve assembly.

5. The combination of claim 4 in which said stem is spaced radially inwardly from the guide fingers of the outer disc, and the smaller diameter coils of said spring project between said fingers and the valve stem into thrusting engagement with the outer disc.

6. The combination of claim 4 in which said cylinder is formed interiorly with a plurality of axially extending ribs terminating in a common radial plane short of its outer end, the outer ends of said ribs jointly defining the said axially directed abutment.

7. The combination of claim 6 in which said guide fingers of the inner disc are received and guided between said ribs.

8. A liquid dispensing valve according to claim 4 in which said valve stem is formed of telescopically interconnected sections to facilitate assembly thereof with the said spring and said cylinder.

9. A liquid dispensing and measuring valve compris-

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ing a tubular valve casing, a valve assembly movable through said casing comprising spaced valve elements, a valve stem extending through the casing and interconnecting said valve elements for alternate movement into seating relation with opposite ends of said casing, each said element having guide means slidably received in the casing and guiding said element for movement in registry with the ends of said casing, an abutment directed toward one end of the casing, a coil spring under compression between said abutment and the valve assembly, the end of said coil engaging said abutment being defined by a coil of larger diameter than the remaining coils of said spring, said larger diameter coil being disposed in the path of movement of one said guide means to arrest the movement of the valve assembly before the other said guide means is withdrawn from the valve casing.

10. A valve comprising a tubular casing, a valve element having guide means slidably received in said casing

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and guiding said element for movement into seating relation within one end of the casing, a coil spring under compression between said valve element and said abutment, said spring having a relatively large diameter coil engaging said abutment and the remaining coils of said spring being of relatively smaller diameter, said large diameter coil being disposed in the path of movement of said guide means to limit the movement of said valve element in one direction.

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