June 29, 1965 T. J. FINLAYSON 3,191,622

DISPENSING VALVE

Filed May 2, 1963

Fig. 1.

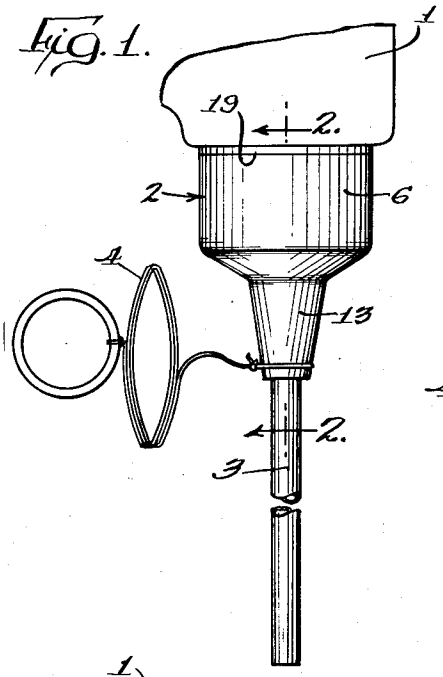
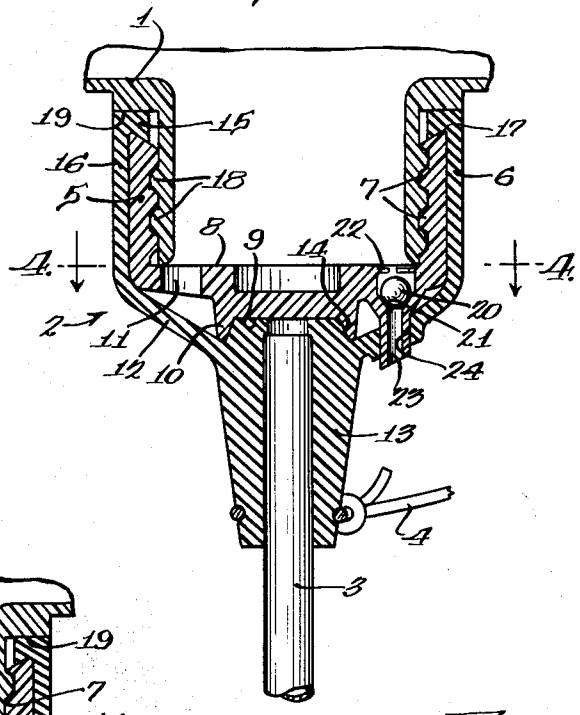


Fig. 2.



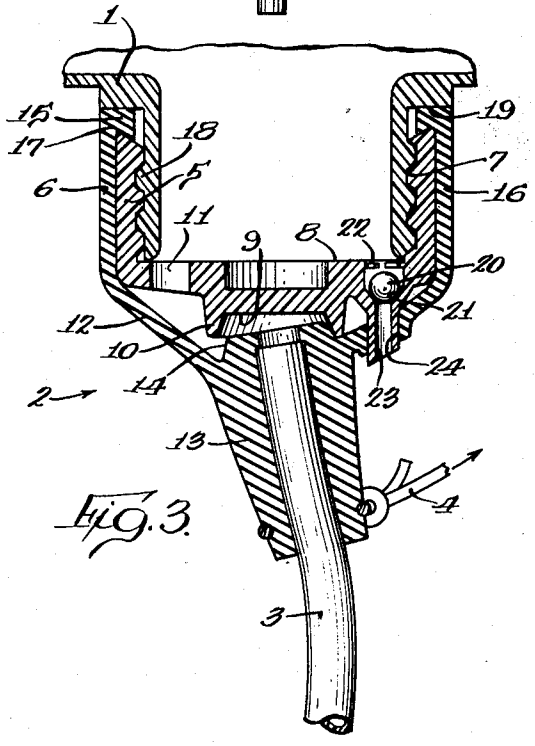
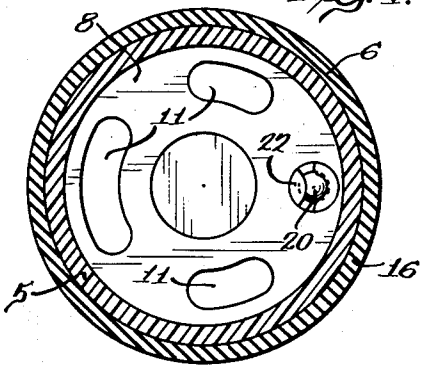


Fig. 3.

Fig. 4.



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DISPENSING VALVE

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This invention relates to an improved dispensing valve, and more particularly to an improved dispensing valve for gravity flow liquid containers.

It is an object of this invention to provide an improved dispensing valve which is low cost, has a minimum number of parts, and is easy to assemble and operate.

In the invention the improved dispensing valve comprises essentially two generally cup-shaped members which are nested one within the other. The inner and outer nested members have a discharge passage and conduit, respectively, which are offset with respect to each other. The inner member is rigid whereas the outer member is elastic, as by being constructed from rubber or a rubberlike material. When the two members are nested the outer elastic member is stressed or tensioned so that they are snugly engaged to provide a seal between the discharge passage and conduit. However, the seal can be broken by distorting the outer elastic member. When the distorting force is removed the stored energy in the stressed or tensioned outer member automatically re-establishes the seal.

The invention will be better understood by considering the following description taken in connection with the accompanying drawings, and its scope will be pointed out in the appended claims.

In the drawings, FIG. 1 is an elevation view of the dispensing valve;

FIG. 2 is an enlarged sectional view taken along the section line 2—2 of FIG. 1 with the valve being shown in closed position;

FIG. 3 is a view similar to FIG. 2 but with the valve shown in open position; and

FIG. 4 is a sectional view taken along the section line 4—4 of FIG. 2.

Referring now first to FIG. 1 of the drawings, illustrated therein is a partly broken away container 1 which is adapted to hold a liquid therein. The lower portion of the container comprises its discharge end, and discharge of liquid from the container is controlled by a discharge valve indicated generally by reference numeral 2. The liquid discharged from within the container is carried away by a discharge conducting tube 3. As will be more clear hereinafter, the discharge valve 2 is automatically operable to closed position. However, the discharge valve 2 is manually opened by pulling on a cord or the like 4.

Referring now also to FIGS. 2 to 4, the discharge valve 2 comprises essentially two generally cup-shaped members 5 and 6. The inner member 5 is nested within the outer member 6. The inner member 5 is constructed from rigid plastic material by molding or the like. Integrally formed on the inner member 5 are internal threads 7. The undeside of the bottom 8 of member 5 has a raised and recessed valve seat portion 9 integrally formed thereon. The valve seat 9 is aligned with the axis of the inner cup-shaped member 5. The valve seat 9 is recessed by virtue of an integrally formed peripherally extending rim or bead 10. Disposed in the bottom 8 adjacent to the valve seat 9 are a plurality of discharge passages 11. Passages 11 are offset with respect to the axes of members 5 and 6.

The outer cup-shaped member 6 is constructed from elastic material such as rubber or a rubberlike material. Integrally formed on the underside of the bottom 12 of member 6 is an axially aligned depending discharge conduit 13. Integrally formed on the top surface of bottom 12 about the inner end of discharge conduit 13 is a raised and apertured movable valve element 14. The valve element 14 is seated in the valve seat 9 to seal off the discharge passages 11 and discharge conduit 13 from with respect to each other. This is accomplished by forming an integral internal flange 15 on the upper edge of the outer cup-shaped member 6. The outer member 6 can be readily positioned on the inner member 5 by turning its side walls 16 inside out and then bottoming the inner member 5 against the outer member 6 and then turning back the side walls 16 on the side walls of the inner member 5 until the flange 15 engages the upper edge 17 of the inner member 5. When the flange 15 is engaged with the upper edge 17, the side walls 16 are in a stretched condition. That is to say, they are stressed or tensioned. This stretched, stressed or tensioned condition of the outer element 6 causes the valve element 14 to be biased against the valve seat 9 and retained in seated position. In other words, the energy stored in the side walls 16 automatically seats the valve element 14 in the valve seat 9 to seal off the discharge conduit 13 from the discharge passages 11.

In order to place the discharge conduit 13 and discharge passages 11 in communication with each other, it is necessary to break the seal therebetween. As illustrated in FIG. 3, this is accomplished by moving or deflecting the discharge conduit 13 so as to distort the bottom 12 of the outer member 6 in order to unseat the the valve element 14 from the valve seat 9. The means for manually accomplishing this comprises the cord 4 which is fastened to the lower end of the discharge conduit 13. When the cord 4 is pulled, the bottom 12 of member 6 is distorted to unseat the valve element 14. When the distorting force on cord 4 is released, the energy stored in the distorted bottom 12 automatically re-establishes the seal.

The internal threads 7 on the inner member 5 are adapted to engage threads 18 formed at the outlet end of container 1 so as to connect the discharge valve 2 to the container 1. The threads 7 perform the additional function of sealing the discharge valve 2 to the container 1. This is accomplished by turning the discharge valve on the threads 18 until the flange 15 is clamped between the upper edge 17 and a surface 19 on the outlet end of container 1.

The container 1 and its connected discharge valve 2 are intended to be mounted on the handle of a not shown floor conditioner for purposes of depositing cleaning detergent, wax or other liquids on surfaces such as floors, rugs and the like. It will be appreciated by those skilled in the art that assuming the container 1 is closed a vacuum will be formed therein after some discharge of liquid whereby thereafter the discharge of liquid by gravity flow will cease. A vacuum relief opening may be provided in the upper end of container 1 to break the vacuum. However, for purposes of refilling the container 1 and minimizing likelihood of accidental spillage of its contents, it is preferable for the container to have only the single illustrated bottom opening and be otherwise closed. Accordingly, in the invention the vacuum pressure relief means is built into the discharge valve 2. This is accomplished by a one way ball-type check valve comprising a movable ball-shaped valve element 20, a valve seat 21, and a ball retainer 22. The valve seat 21 and retainer 22 are integrally formed in the bottom 8 of inner cup-shaped member 5. Also integrally formed on the bottom 8 is a short pipe or the like which extends from the valve seat 21 through the bottom 12 of the outer member 6 to the atmosphere. An aperture 24 is formed

in the bottom 12 to permit passage of the pipe 23 therethrough. The aperture 24 is undersize with respect to the pipe 23 so as to snugly embrace the latter in sealed relationship. For successful operation of the vacuum pressure relief valve the tube 3 should be connected to the conduit 13. The total pressure at the end of tube 3 provided by the head of liquid in tube 3 and container 1 as well as the pressure inside container 1 is balanced by the pressure of the atmosphere. However, when the tube has a length of about a foot or so the pressure at the vacuum pressure relief valve is slightly less than atmospheric pressure so that the atmosphere can open the vacuum pressure relief valve to relieve the vacuum inside the container.

It will now be appreciated that the invention comprises essentially two parts, namely the nested inner and outer cup-shaped members 5 and 6 which are easy to assemble and operate. Therefore, the invention provides a discharge valve which is very low cost and has a minimum number of parts.

While there has been shown and described a particular embodiment of the invention, it will be obvious to those skilled in the art that changes and modifications may be made without departing from the invention, and that it is intended by the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. A dispensing valve for the outlet end of a liquid container, said valve comprising essentially two cup-shaped members nested one within the other, the inner member being constructed from rigid material and the outer member being constructed from elastic material, a discharge passage formed on the bottom of the inner member, a discharge conduit formed on the bottom of said outer member, said discharge passage and conduit being offset with respect to each other, an internal flange formed on the edge of said outer member, said flange being engaged with the edge of said inner member to stress the side walls of said outer member to retain the bottoms of said inner and outer members engaged to establish a seal between said discharge passage and conduit, means for distorting the bottom of said outer member to break said seal, and means formed on said inner member for engaging said dispensing valve with the outlet end of a liquid container and simultaneously sealingly clamping said flange between the edge of said outer member and the outlet end of a liquid container.

2. A dispensing valve for the externally threaded outlet end of a liquid container, said valve comprising essentially two cup-shaped members nested one within the other, the inner member comprising an internally threaded molded rigid plastic member, the other member comprising a rubber member having elastic side walls, an integrally formed depending discharge conduit on the bottom of said rubber member, an integrally formed raised and apertured movable valve element on the bottom of said rubber member at the inner end of said discharge conduit, a raised and recessed valve seat integrally formed on the bottom of said plastic member for seating said movable valve element, a plurality of discharge openings formed in the bottom of said plastic member adjacent said valve seat, an integral internal flange formed on the edge of the rubber member, said flange being engaged with the edge of the plastic member to tension said side walls to retain said movable valve element seated on said valve seat, and manually operable means connected to said discharge conduit for deflecting the same for distorting the bottom of said rubber member to unseat said movable valve element to establish communication between said discharge openings and discharge conduit.

3. In a dispensing valve as in claim 2, a pressure relief valve for said container, said pressure relief valve comprising a one way check valve in the bottom of said plastic member, said one way check valve comprising a movable ball-shaped valve element, and a valve seat and retainer integrally formed in the bottom of said plastic member for said ball-shaped valve element, an aperture formed in the bottom of said rubber member, and an integrally formed pressure relief pipe on the bottom of said plastic member, said pipe extending from the valve seat of said check valve through said aperture to the atmosphere.

4. In a dispensing valve as in claim 3, wherein said manually operable means for deflecting said discharge conduit comprises a cord fastened to said discharge conduit, a removable discharge conducting tube connected to said discharge conduit, and the internal threads on said plastic member being adapted to connect said dispensing valve to the externally threaded outlet end of a liquid container and simultaneously sealingly clamp said internal flange between the edge of said plastic member and the outlet end of a liquid container.

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