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2,761,593

VALVE FOR PRESSURIZED CONTAINERS

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Fig. 1.

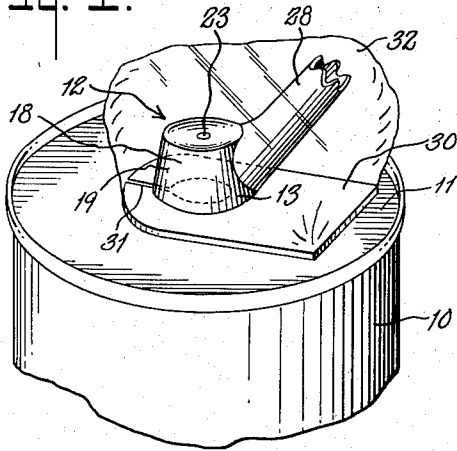


Fig. 2.

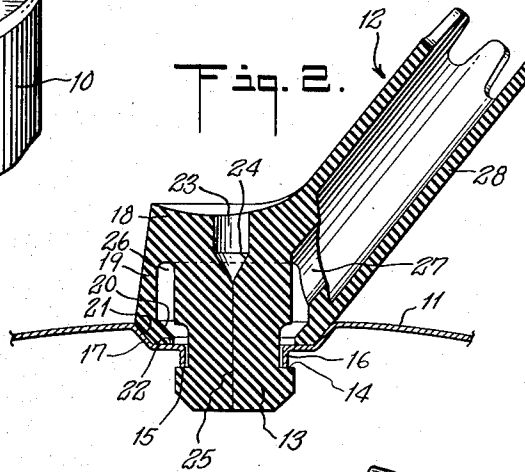


Fig. 3.

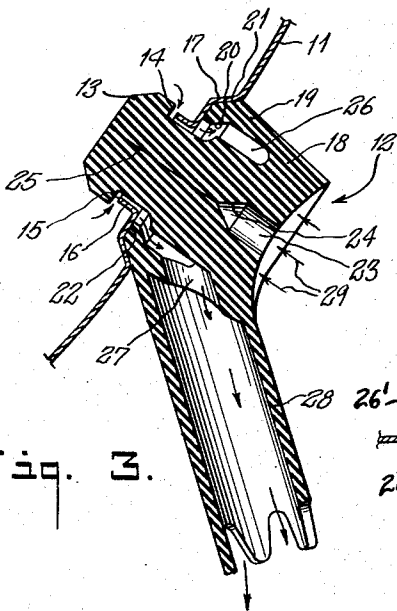
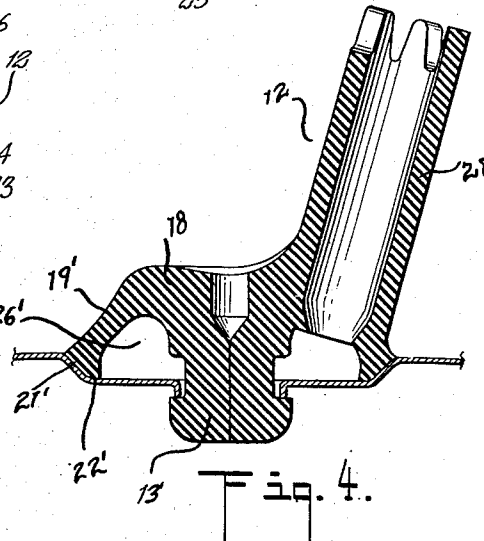


Fig. 4.



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VALVE FOR PRESSURIZED CONTAINERS

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10 Claims. (Cl. 222—394)

The present invention relates to valve mechanisms adapted to control the discharge of the contents from a container under pressure and embodies more specifically an improved form of valve mechanism that, with the container, may be disposed of after the use of the contents within the container.

For a considerable time there has existed a need for a cheap but effective valve mechanism by means of which the contents of containers may be discharged controllably and wherein the cost is such that the valve may be disposed of, together with the container, after it has served to discharge the contents of the container. Where the contents of a container is relatively expensive, the circumstances permit of the use of a single service valve mechanism that is proportionately expensive, but where the contents of the container is relatively inexpensive, it has not been economically feasible to use these existing valve mechanisms in a single service container.

Reusable valve mechanisms for use in connection with single service containers have been provided but, in certain services, there is an objection to dispensing products in single service containers where the user must have available an appropriate valve and discharge mechanism for using the contents of the container.

In accordance with the present invention, a valve mechanism is provided by means of which the contents of a container under pressure may be dispensed controllably and wherein the valve structure is of such nature as to be capable of being manufactured at a cost sufficiently low to permit the valve to be disposed of, along with the container when the container contents has been discharged.

In this connection the valve mechanism is such as to provide an effective seal for the container and also to provide a means by which the container may be charged with a suitable gas under pressure.

The foregoing and other objects of the invention are attained by means of the mechanism shown and described in the accompanying drawings, wherein

Figure 1 is a partial view in perspective showing a portion of a container having mounted thereon the discharge valve mechanism of the present invention;

Figure 2 is a partial view in cross-section, taken on a plane passing through and including the axis of the valve mechanism;

Figure 3 is a view similar to Figure 2, showing the manner in which the contents of the container is discharged through the valve mechanism of the present invention; and

Figure 4 is a view similar to Figure 2, showing a modified form of the invention.

Referring to the above drawings, a container is illustrated at 10, having a top 11 within which a valve mechanism indicated generally at 12 is mounted.

As will be seen from Figures 2 and 3, the valve mechanism includes a body portion 13 formed with a lower annular shoulder 14 which is adapted to engage the

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adjacent edge 15 of an aperture formed in the container by an inwardly turned flange 16 formed in the container top 11. The container top 11 is recessed at 17 to facilitate sealing of a portion of the valve mechanism, presently to be described, to the adjacent surface of the container top 11.

The valve body 13 is formed with an enlarged head 18 upon which a downwardly extending skirt 19 is formed, the skirt being flanged inwardly at 20 and being formed with an annular inclined surface 21 and an adjacent annular surface 22 which lies normally in a plane substantially perpendicular to the axis of the body 13.

At least a portion of the valve body is formed of an elastic material, such as rubber, and is provided with a central recess 23 in the head thereof having a conical lower extremity 24. In charging the container with a gas, a hollow charging needle may be inserted into the recess 23 and caused to pierce the valve body 13 as indicated by the line 25 and the desired quantity of gas charged into the container. When the charging needle is removed, the valve body is self-sealing and prevents the escape of the fluid.

Between the skirt 19 and the valve body 13 an annular discharge chamber 26 is formed, a discharge outlet 27 being provided to permit the contents of the chamber 26 to discharge into an outlet tube or nozzle 28.

It is to be observed that the space, in an axial direction, between the lower shoulder 14 and the annular surface 22 of the skirt 19 is less than the length of the flange 16. As a result, when the device is inserted in the container aperture, the upper and lower portions of the valve body are subjected to compressive stresses which pre-load the body and insure effective sealing of the holes that are formed therein as a result of punctures that may be formed by devices that are utilized to charge the containers. These stresses also facilitate the prevention of leakage between the container surfaces and the surfaces of the valve body in contact therewith. The sealing of the hole formed by the piercing needle and indicated at 25 is especially accomplished at the lower portion of the valve body and adjacent the lower surface thereof where the radially inward compressive stresses above described combine with the stresses set up by the pressure within the container to cause the material of the valve body to maintain the aperture or apertures closed against escape of the contents of the container. In this fashion, certain of the sealing forces are proportional to the pressure within the container.

In operation, pressure is applied to the valve head 18 as indicated by the arrows 29 in Figure 3, and the valve body is moved axially inwardly. This permits the contents of the container to be discharged as indicated by the arrows in Figure 3, the contents flowing between the peripheral flange 16 and the valve 13 and into the annular chamber 26, from which the contents flows through the outlet 27 and into the discharge nozzle 28, all as indicated by the arrows in Figure 3.

In order that accidental discharge of the contents during shipment and storage may be avoided, a plate or shield 30 is provided having a slot 31 and adapted to fit beneath the bottom of the skirt 19 and about the body 13 to prevent pressure from moving the valve body inwardly. A suitable transparent plastic 32, such as cellophane, can be secured about the valve mechanism and to the edges of the plate 30 to seal the mechanism until it is in the hands of the ultimate user.

In the form of the invention shown in Figure 4, a modified form of valve mechanism is illustrated, this form being such as to facilitate the molding of the device in the manufacture thereof. It will be observed that the enlarged head 18 is provided with a skirt 19' that extends

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downwardly and outwardly, being formed with a surface 21' corresponding to the surface 20 in the form of the valve illustrated in Figure 2, and also a corresponding inwardly extending surface 22' that serves a function similar to that described in connection with the annular surface 22.

The valve body proper is illustrated at 13' and is generally shaped similarly to that of the valve body 13 shown in the device of Figure 2.

The chamber 26' is somewhat differently shaped from the annular chamber 26 in Figure 2, but it will be apparent that the mechanism of Figure 4 functions identically to the manner in which the mechanism of Figure 2 functions. In the drawings, the spacing of the valve body from the flange 16 is shown somewhat exaggerated in order that the operation of the mechanism may be readily understood.

From the foregoing, it will be seen that the valve mechanism serves effectively as a seal for the container (which may be a can or other suitable type) and yet is of simple construction so that it may be disposable, together with the container, after the container contents has been discharged. It is an integral part of the container, and it does not require assembly with the container after the container is purchased and before its use. The operation of the mechanism is simple and sure, and is readily controlled so that the operation of discharging the contents of the container may be accomplished without any difficulty whatsoever. In addition to the foregoing, the structure of the valve is such that it may be readily cleaned by directing a cleaning fluid into the outlet and alternately squeezing and releasing the annular discharge chamber 26 so that it is caused to circulate therein and be drained therefrom.

While the invention has been described with specific reference to the accompanying drawings, it is not to be limited save as defined in the appended claims.

We claim:

1. A closure and valve mechanism for a container, comprising a resilient body portion adapted to be received within an aperture in a container for movement therein and dimensioned to permit passage of fluid through the aperture around the body, a shoulder on the body and adapted normally to be movably seated against one side of a wall of the container adjacent the aperture in fluid sealing relationship, a skirt formed on the body adjacent the other side of the wall and spaced from the shoulder to form an annular chamber on said other side of the container wall, said skirt being formed with a continuous surface engaging the other side of the container in fluid sealing relationship, the spacing of the continuous surface of the skirt and the shoulder being such that the body portion is maintained in tension to effect the sealing relationship between the shoulder and the one wall of the container and between the continuous surface and the other wall of the container and an outlet for the chamber.

2. A closure and valve mechanism for a container, comprising a body portion formed of yielding non-metallic material adapted to be received for axial movement within an aperture in a container to permit the passage of fluid through the aperture, a shoulder formed on the body and adapted normally to be seated against a reentrant inside portion of the container adjacent the aperture in fluid sealing relationship, a yielding skirt formed on the body and adapted to be spaced from the shoulder and forming an annular discharge chamber about the body, said skirt being formed with a surface adapted to engage the outside of the container adjacent the edge of the aperture therein to seal the skirt to the container, the relative spacing of said surface and said shoulder being such that when the valve is installed in a container the body is maintained under tension to cause the surface of the skirt to press tightly against the outside of the container and to cause the shoulder to press tightly against the reentrant inside portion of the con-

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tainer and a discharge nozzle communicating through the skirt with the chamber.

3. A closure and valve mechanism for a container as set forth in claim 2 including an inwardly projecting flange on the bottom of the skirt adapted to engage the outside of the container adjacent the edge of the aperture therein to seal the skirt to the container.

4. A closure and valve mechanism for a container as set forth in claim 2 including an inwardly projecting flange on the bottom of the skirt, said flange having annular surfaces at angles to each other and to the axis of the body adapted to engage the outside of the container adjacent the edge of the aperture therein to seal the skirt to the container.

5. A closure and valve mechanism for a container as set forth in claim 1, said body portion being formed with a normally closed aperture through which fluid may be introduced into the container.

6. In combination, a container having an aperture in one wall thereof, and a closure and valve mechanism co-operating therewith comprising a resilient body portion adapted to be received within the aperture for axial movement therein, said body and aperture being relatively dimensioned to permit the passage of fluid through the aperture around the body, a shoulder formed on the body and adapted normally to be movably seated against the one side of the wall of the container to block the passage of fluid from the container through the aperture, an annular surface on the body to engage the other side of the wall of the container outwardly of the aperture and defining together with the portion of the container wall circumscribed thereby, a fluid chamber located on said other side of the container wall, said annular surface and the container wall engaged thereby and said shoulder and the container wall engaged thereby being relatively dimensioned to place the body in tension to cause the shoulder normally to seat tightly against the container wall, and a discharge means communicating with the chamber.

7. In the combination as set forth in claim 6, the container wall being formed with an inwardly projecting portion defining the aperture and presenting a narrow edge to be engaged by said shoulder in sealing relationship, and an annular recessed portion in the wall spaced from the aperture, said annular surface on the body adapted to engage the annular recessed portion of the container.

8. In the combination as set forth in claim 6, the container wall being formed with an annular inwardly sloping recessed portion in the wall spaced from the aperture, said annular surface of the body being formed with an inwardly sloping surface adapted to engage the annular recessed portion of the container outwardly of the aperture in sealing relationship.

9. In the combination as set forth in claim 6, said body portion being pierced to form an aperture forming a second means of communication into the container for the passage of fluid, the tension maintained on the body by the shoulder and annular surface serving to seal the body aperture to prevent the passage of fluid therethrough.

10. A container having an aperture in one wall thereof, an axially inwardly projecting wall portion defining the aperture, and an annular inwardly sloping recessed wall portion concentric to and spaced outwardly of the aperture, including in combination, a valve assembly mounted in the aperture including a body portion passing through the aperture and having a diameter less than the aperture to permit the passage of fluid therebetween, a shoulder portion formed on the inner end of the body to engage the inwardly projecting wall to block the passage of fluid, and an annular flexible skirt portion at the outer end of the body formed with an annular surface for engaging the sloping recessed wall portion of the container, the spacing of the shoulder and the annular surface relative to the container wall maintaining the body in tension to cause the shoulder normally to be pressed against the inwardly projecting wall portion in fluid seal-

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ing relationship, the flexible skirt portion defining, together with the portion of the container wall circumscribed thereby, a fluid chamber in communication with the aperture, and discharge means communicating with the chamber exteriorly of the container to pass fluid from the chamber.

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