Dec. 14, 1954 O. L. ASHTON 2,696,934

CONTAINER VALVE MEANS

Filed April 18, 1950

Fig. 1.

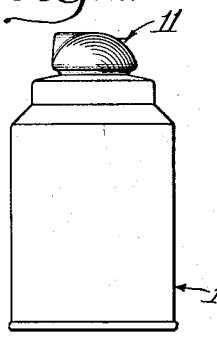


Fig. 2.

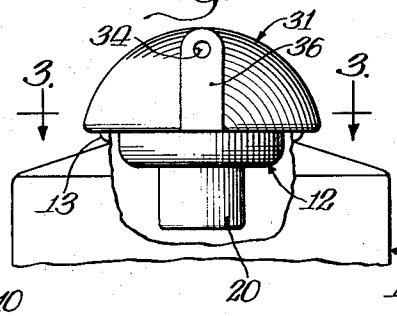


Fig. 3.

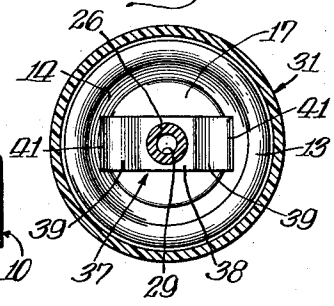


Fig. 4.

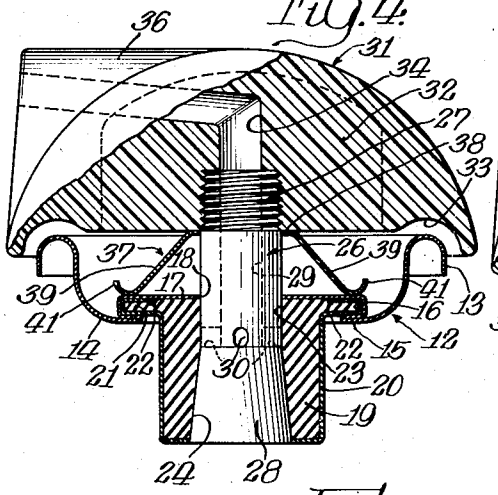


Fig. 5.

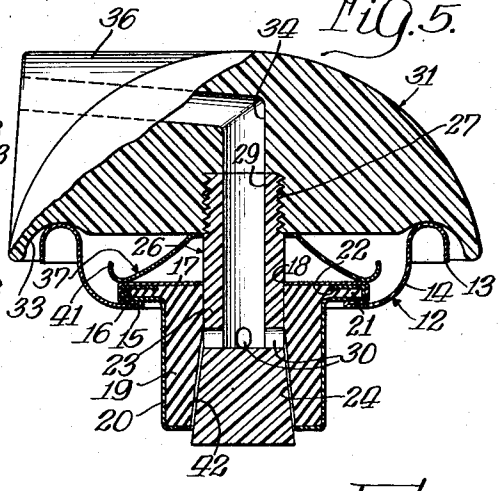


Fig. 6.

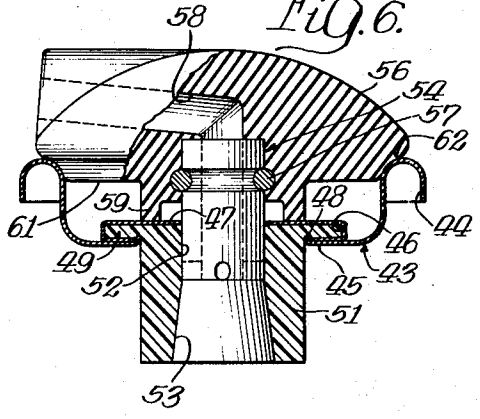
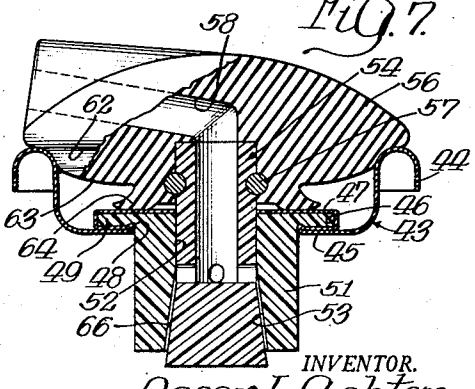


Fig. 7.



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United States Patent Office 2,696,934 Patented Dec. 14, 1954

2,696,934

CONTAINER VALVE MEANS

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Application April 18, 1950, Serial No. 156,587

12 Claims. (Cl. 222—394)

This invention relates to a novel valve means and more particularly to a valve means for use with pressurized containers or dispensers.

In recent years extensive use has been made of pressurized containers and dispensers for a wide variety of fluid materials such as insecticides, fungicides, moth-proofing compounds, disinfectants, deodorants, paints, lacquers, coating compositions, cosmetics, food products, and the like. Such containers are usually in the form of metal cans and are ordinarily provided with manually operable valve means for dispensing the contents of the can under pressure and in the form of a controlled spray. The fluid material to be dispensed is contained in the can in admixture with a pressure medium or propellant which is preferably a gas condensible at comparatively low pressures. Upon release of the contents of the can through the valve means, volatilization of the pressure medium produces atomization of the fluid material and causes discharge of the same as a fine spray.

Inasmuch as containers and dispensers of the foregoing type are intended primarily for household purposes and the like and are ordinarily discarded after use, it will be apparent that it is very important to provide an effective easily manipulated valve means which at the same time is simple in construction and inexpensive to manufacture.

Accordingly, the broad object of my invention is to provide a novel valve means for controlling the discharge of fluids under pressure.

A further object of the invention is to provide a novel valve means for a container of the class described which is simple in construction and inexpensive to manufacture.

Another object of the invention is to provide a novel valve means for a container of the class described which is characterized by positive action and which when manually actuated to open position automatically returns to tight closed position immediately upon release thereof.

An additional object of the invention is to provide a novel valve means for a container of the class described having resilient means for normally retaining the valve in closed position and having said resilient means located so that it does not come into contact with the contents of the container during discharge thereof.

Other objects and advantages of the invention will become apparent from the subsequent detailed description of the invention taken in connection with the accompanying drawing wherein:

Fig. 1 is a side elevational view of a container provided with valve means comprising the present invention;

Fig. 2 is a fragmentary front elevational view on an enlarged scale of the container shown in Fig. 1, a portion of the structure being broken away to show the valve means;

Fig. 3 is a horizontal sectional view taken substantially along the line 3—3 of Fig. 2;

Fig. 4 is a vertical sectional view on an enlarged scale of the valve means illustrated in Figs. 1 to 3, the valve means being shown in closed position;

Fig. 5 is a vertical sectional view similar to Fig. 4 but showing the valve means in open position;

Fig. 6 is a vertical sectional view of a valve means comprising a modified form of the invention, the valve means being shown in closed position; and

Fig. 7 is a vertical sectional view similar to Fig. 6 but showing the valve means in open position.

Broadly speaking, the valve means of the present invention comprises a valve body having means for securing the same in the opening of a container, a shiftable valve

member adapted to cooperate with the valve body, and a cap structure detachably secured to the valve member for manually actuating the latter. For insuring positive quick-acting closure of the valve, resilient means is provided which normally retains the valve member in closed position. Also, as will be seen hereinafter, the cap structure is preferably provided with integral fluid discharge means whereby the fluid contents of the container may be dispensed through the cooperating valve body and valve member and thence through the cap structure.

Referring now to Figs. 1 to 5 of the drawing, there is shown a container **10** provided with a valve means, indicated generally at **11**, which comprises one specific embodiment of my invention. The valve means **11** includes a closure member **12**, preferably of thin metal, which is formed at its outer edge with an annular downturned rim portion **13** adapted to fit over and to be firmly secured to the mouth of the container **10**. The inner portion of the closure **12** is dished downwardly, as at **14**, and the metal comprising the closure **12** is folded back upon itself, as indicated at **15**, and thence extends upwardly and inwardly to define an annular groove or recess **16** for receiving and retaining a valve body. The flat disk-like center portion, indicated at **17**, of the closure **12** is centrally apertured as at **18**.

Depending from the closure **12** and extending downwardly into the container **10** (Fig. 2) is a valve body in the form of a plug **19**, preferably of resilient material such as rubber, plastic, or the like, which is enclosed in a housing **20** which may be of thin metal similar to the closure **12**. The upper portion of the plug **19** is formed with an integral flange **21** and the housing **20** extending around the peripheral edge of the flange **21** is turned downwardly at its upper inner edge and is imbedded in the upper surface of the flange **21**, as indicated at **22**. For supporting the valve body **19** on the closure member **12**, the flange **21** and the corresponding portion of the housing **20** are received within the annular groove **16**, the entire valve body thereby being rigidly affixed to the closure **12** and retained between the folded portion **15** and the flat center portion **17**.

The plug **19** comprising the valve body is provided with a central bore **23** which is tapered outwardly, as at **24**, adjacent its lower end, and an elongated shiftable valve member, indicated generally at **26**, is movably disposed within this bore with the upper portion thereof being threaded externally, as at **27**, and extending upwardly beyond the valve body and the closure **12**. The valve member **26** may be formed from a suitable plastic material and is tapered at its lower end, as seen at **28**, in order to provide a closure having a tight fit within the tapered bore **24** of the plug **19** when the valve member is in elevated or closed position (Fig. 4). The upwardly extending portion of the valve member **26** is formed with a longitudinal central bore **29** terminating at the solid tapered portion **28**, and a plurality of radial apertures or bores **30** extend through the tubular wall of the valve member **26** into fluid communication with the bore **29** immediately adjacent the solid tapered portion **28**.

For actuating the valve member **26**, a depressible operating cap **31**, which may be of relatively rigid plastic or the like, is movably disposed above the closure **12**. In the form of the invention illustrated in Figs. 4 and 5 the cap **31** is shown as substantially hemispherical in shape and is provided with a bridge portion **32** extending diametrically therein, the threaded upper end **27** of the valve member **26** being threadedly secured in the bridge **32** for effecting shifting of the valve member **26** in response to movement of the cap **31**. The lower edge of the cap **31** has an outwardly and downwardly curved annular lip **33** at its under side adapted to overlie and coact with the rim **13** on the closure **12**, as hereinafter described. An integrally formed bore **34** extends upwardly in the bridge **32** and outwardly through a rib portion **36** on the exterior of the body of the cap **31**, the bore **34** being in communication with the bore **29** in the valve member **26**, as seen in Figs. 4 and 5.

For normally retaining the valve member **26** in closed position relative to the valve body **19**, a resilient member comprising in this case a leaf spring **37** is interposed between the cap **31** and the closure **12**. The leaf spring

37 has a flat apertured central portion 38 abutting the bridge 32 and the valve member 26 extends upwardly therethrough. Slanting downwardly at opposite ends of the central portion 38 are flexible leg portions 39 which are turned upwardly adjacent their outer ends, as at 41, for sliding engagement with the flat central portion 17 of the valve body housing 20.

In operation, it will be understood that the spring member 37 normally urges the cap 31 away from the valve body 19 and the closure 12 with the lip portion 33 in spaced relation above the rim 13 whereby to retain the tapered closure member 28 in tight-fitting closed position within the valve body 19 (Fig. 4). In order to open the valve means for releasing the fluid contents of the container, the cap 31 may be pressed downwardly against the action of the leaf spring 37 until the lip 33 of the cap engages the rim 13 of the closure 12. In this manner, the valve member 26 attached to the cap 31 is moved downwardly and a slight clearance, indicated at 42 (Fig. 5) is created between the tapered valve member 28 and the tapered aperture 24 in the valve body 19 whereby to permit the fluid under pressure to escape through the clearance space 42, the lateral bores 30, the internal bore 29, and thence through the bore 34 into the atmosphere. Immediately upon release of the downward pressure on the cap 31, it will be understood that the spring 37 will cause the valve member 26 to be returned to its closed position (Fig. 4) in a rapid and positive manner. The pressure within the container, exerted against the lower end of the valve member 26 also tends to close the valve.

In Figs. 6 and 7 I have illustrated a modified form of the invention which differs primarily from the previously described form in that the separate spring element 37 is omitted and the cap structure is formed from a distortable or flexible material which is adapted to effect resilient positive closure of the valve means.

In this embodiment of the invention, the closure, indicated at 43, is similar to the closure 12 in the previous form of the invention and comprises an annular depending rim 44 adapted to fit over the rim of the container mouth and a dished center portion with the thin sheet material comprising the closure being folded outwardly, as at 45, and thence extending upwardly and inwardly to define an annular groove 46 and a flat apertured central portion 47. The peripheral edge of the aperture defined by the folded portion 45 is turned upwardly to a slight extent, as at 48, to engage and retain a flange portion 49 of a resilient rubber or plastic plug 51 comprising the valve body and similar to the plug 19 in Figs. 4 and 5. The plug 51 is provided with a central bore having a straight portion 52 and a tapered lower portion 53 in which is shiftably disposed an elongated valve member 54 having the same general construction as the valve member 26 in Figs. 4 and 5.

A depressible cap 56 formed from rubber or a substantially flexible and resilient plastic material, such as Vinylite, is disposed above the closure 43, and the upper end of the valve member 54 is detachably secured within a cooperating bore in the cap 56 by means of a retainer ring 57 which is received in complementary annular grooved portions in the valve member 54 and the cap 56. The cap 56 is also provided with an integral outwardly extending bore 58 comprising a fluid discharge passageway in communication with the central bore of the valve member 54. A relatively thin integral skirt portion 59 depends centrally from the cap 56 and extends concentrically around the valve member 54 with its bottom edge in engagement with the flat portion 47 of the closure 43. In addition, the cap 56 is formed with a shoulder 61 (Fig. 6) having an upwardly curved peripheral portion 62 which conforms to and abuts the curved surface of the rim 44.

The flexible and resilient skirt portion 59, which bears against the center portion 47 of the closure 43, normally retains the valve member 54 in closed position as seen in Fig. 6. However, upon exerting downward pressure on the flexible cap 56 the shoulder 61 is distorted downwardly, as seen at 63 in Fig. 7, and the skirt portion 59 is flattened and spread outwardly, as at 64, whereby to permit the valve member 54 to be moved downwardly and thereby create a clearance 66 between the tapered portions of the valve member 54 and the valve body 51. In this position of the valve means, the fluid contents of the container may be discharged through the annular clearance 66 and the internal fluid passageways in the valve member 54 and thence through the discharge bore 58 in the cap 56. Upon release of downward pressure from the cap 56, the distorted shoulder 61 and the distorted skirt portion 64 automatically return to the positions shown in Fig. 6 and the valve member 54 is thereby restored to closed position.

Thus, it will be seen that the manually operable container valve means comprising my invention may be constructed from a plurality of inexpensive and easily fabricated parts utilizing rubber or plastic materials. In addition, resilient means is provided, e. g. either in the form of a separate spring member or an integral resilent portion of the cap structure, for normally retaining the valve in closed position and for returning the valve from open to closed position with a rapid positive action. It will also be seen that in each of the embodiments of the invention the resilient means, i. e. the spring 37 or the skirt 59, is located outside of and is completely separated from the flow path of the fluid being discharged from the container through the valve means. Accordingly, there is no possibility of the fluid contents of the container exerting an adverse effect on the resilient means during repeated use of the device.

Although the invention has been described herein in connection with certain specific structural embodiments, it will be understood that various modifications and equivalent constructions may be resorted to without departing from the scope of the invention as defined in the appended claims.

I claim:

1. Container valve means for controlling the discharge of a fluid under pressure, comprising a closure member having an outer rim portion adapted to be secured in the opening of a container and a downwardly dished inner portion providing a central depression adapted to extend into the container, said inner portion being folded radially outwardly and thence radially inwardly to define a flange-receiving annular groove within said depression, a valve body having an elongated lower portion extending below said closure member and an upper integral flange portion fitted within said groove for rigidly supporting the valve body on said closure member, a valve member shiftably disposed in said valve body, cap means movably disposed adjacent said closure member and operably attached to said valve member for shifting the latter, and resilient means disposed within said depression and coacting with said cap means and with said closure member for normally urging said cap means away from said valve body.

2. Container valve means for controlling the discharge of a fluid under pressure, comprising a closure member having a rim portion adapted to be secured in the opening of a container and a central depressed portion adapted to extend into the container, a valve body rigidly supported from the central depressed portion of said closure member and adapted to extend into the interior of the container, an elongated valve member shiftably disposed in said valve body for movement between seated and unseated positions and adapted to extend outwardly from the container beyond said valve body, an operating cap connected to said valve member at the outwardly extending portion thereof for actuating said valve member, and radially expansible resilient means operatively disposed within the central depressed portion of said closure member and coacting with said cap for normally urging the latter away from said valve body whereby said valve member is normally retained in seated position in said valve body, said central depressed portion of said closure member being of sufficient radial extent to accommodate said resilient means during radially outward expansion thereof in response to pressing movement of said cap toward said valve body for shifting said valve member to unseated position.

3. Container valve means for controlling the discharge of a fluid under pressure, comprising a closure member of thin metal having an outer rim portion adapted to be rigidly secured at the mouth of a container and a downwardly dished inner portion providing a central depression adapted to extend into the container, said inner portion being folded radially outwardly and thence radially inwardly to define within said depression a lower flange-receiving annular groove and an upper flat metal bearing surface having a central aperture therethrough, a valve body having a central bore and an integral flange portion disposed within said groove for rigidly supporting said valve body on said closure member, a shiftable valve member disposed

in said bore and extending outwardly through said aperture beyond said closure member, movable cap means operably affixed to the outwardly extending portion of said valve member, and radially expansible resilient means operatively disposed within said depression and coacting between said cap means and said bearing surface for normally urging said cap means away from said closure member whereby said valve member is normally retained in closed position within said valve body, said flat metal bearing surface providing a rigid operating surface for facilitating expansible movement of said resilient means relative thereto, and said depression being of sufficient radial extent to accommodate said resilient means during radially outward expansion thereof in response to pressing movement of said cap means toward said valve body for shifting said valve member to open position.

4. Container valve means for controlling the discharge of a fluid under pressure, comprising a closure member having an annular depending rim portion adapted to be rigidly secured to the mouth of a container, a valve body rigidly supported by said closure member, a valve member shiftably disposed in said valve body for movement between open and closed positions relative to said valve body, a depressible cap operably attached to said valve member for actuating the latter, and resilient means coacting with said cap for normally urging the latter away from said valve body whereby said valve member is normally retained in closed position, said cap being provided with an annular lip portion disposed in spaced relation from said rim portion when said valve member is in closed position and adapted to abut said rim portion when said cap is depressed whereby to limit the extent of movement of said cap.

5. Container valve means for controlling the discharge of a fluid under pressure, comprising a valve body, means for rigidly securing said valve body at the mouth of a container, an elongated valve member shiftably disposed in said valve body for longitudinal reciprocating movement between open and closed positions, a hollow movable cap member having a transversely extending bridge portion, said valve member being secured at one end in said bridge portion for actuating said valve member, and spring means disposed adjacent said valve body and coacting with said bridge portion for normally urging said cap member away from said valve body whereby said valve member is normally retained in closed position relative to said valve body, said valve member and the bridge portion of said cap member having communicating internal fluid passageways permitting the discharge of fluid from the container through said passageways without contacting said spring means.

6. Container valve means for controlling the discharge of a fluid under pressure, comprising a closure member adapted to be rigidly secured at the mouth of a container, a valve body rigidly supported by said closure member, a shiftable valve member movably disposed in said body for movement between open and closed positions, and an operating cap operably connected to said valve member for actuating the latter, said cap being provided with an integral resilient skirt portion in engagement with said closure member for normally retaining said valve member in closed position within said valve body, and said skirt portion being distortable under pressure exerted on said cap whereby to permit resilient movement of the latter toward said valve body whereby to shift said valve member to open position within said valve body.

7. Container valve means for controlling the discharge of a fluid under pressure, comprising a closure member having a central aperture and adapted to be rigidly secured at the mouth of a container, a valve body rigidly supported on said closure member, an elongated valve member shiftably disposed in said valve body and extending outwardly therefrom through said aperture, and

a cap member operably attached to the outwardly extending portion of said valve member for actuating the latter, said cap member being provided with a flexible resilient skirt extending annularly around said outwardly extending portion of said valve member and engaging said closure member, said valve member being normally retained in closed position within said valve body by the action of said skirt and said skirt being distortable under pressure exerted on said cap member whereby to permit resilient movement of the latter toward said valve body for shifting said valve member to open position.

8. Container valve means for controlling the discharge of a fluid under pressure, comprising a closure member having an annular rim portion adapted to be secured to the mouth of a container, a valve body supported on said closure member, a valve member shiftably disposed in said valve body for movement between open and closed positions, and an operating cap formed from a relatively flexible resilient material and operably affixed to said valve member for actuating the latter, said cap having a shoulder portion in engagement adjacent its outer peripheral edge with said rim portion and a deflectable skirt portion extending into engagement with said closure member adjacent said valve member, said valve member being normally retained in closed position within said valve body by the action of said skirt portion and said shoulder portion and said skirt portion being distortable under pressure exerted on said cap for permitting resilient movement of the latter toward said valve body whereby to shift said valve member to open position.

9. The device of claim 2 further characterized in that said valve member and said cap are provided with communicating fluid passageways therein to permit the discharge of fluid when said valve member is in unseated position.

10. The device of claim 2 further characterized in that said valve body and said valve member are provided with a tapered bore and a coacting tapered portion, respectively, and said valve member is also provided with a longitudinal internal bore extending from the outwardly extending end of the valve member and terminating short of the opposite end thereof with a plurality of laterally extending apertures communicating with said longitudinal bore adjacent said tapered portion, and said cap is provided with an internal fluid passageway communicating with said longitudinal bore in said valve member for discharging fluid therethrough without contacting said resilient means.

11. The device of claim 2 further characterized in that said resilient means comprises a leaf spring having flexible bent end portions and operatively disposed between said closure member and said cap.

12. The device of claim 2 further characterized in that said resilient means comprises a spring member having an apertured central portion with said valve member extending through the aperture therein and also having slanting end portions slidably engaging said closure member, the slanting end portions of said spring member being adapted to spread outwardly in response to pressure exerted on said cap for permitting said valve member to move to unseated position.

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