

May 22, 1945.

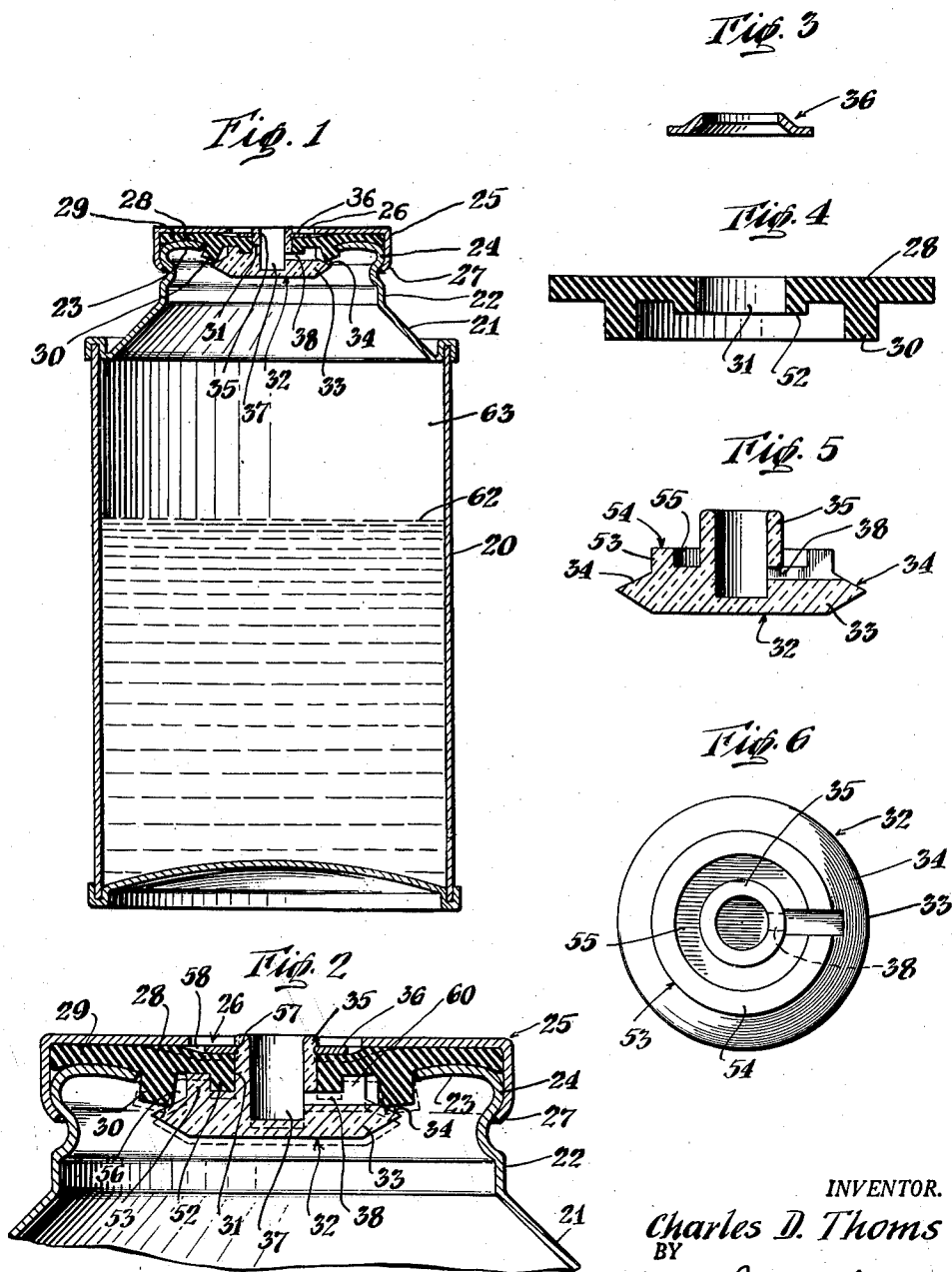
C. D. THOMS

2,376,404

VALVED CONTAINER

Filed Feb. 28, 1942

2 Sheets-Sheet 1



INVENTOR.

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BY

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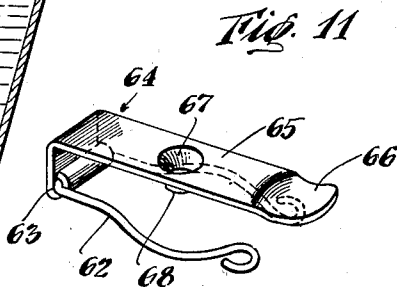
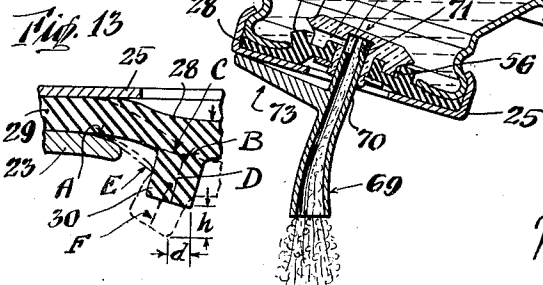
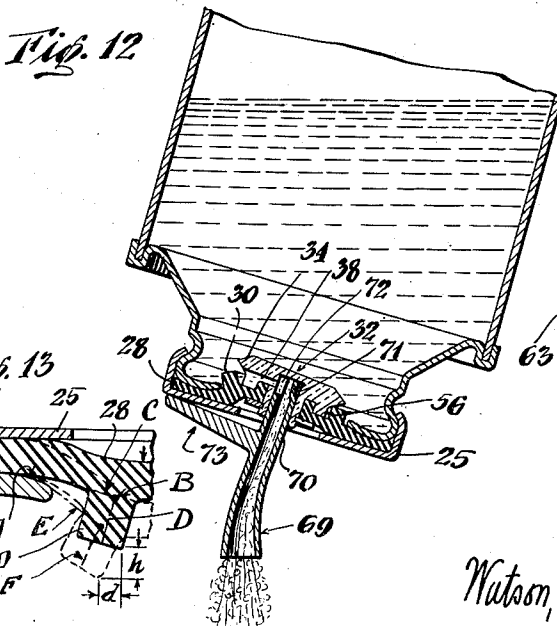
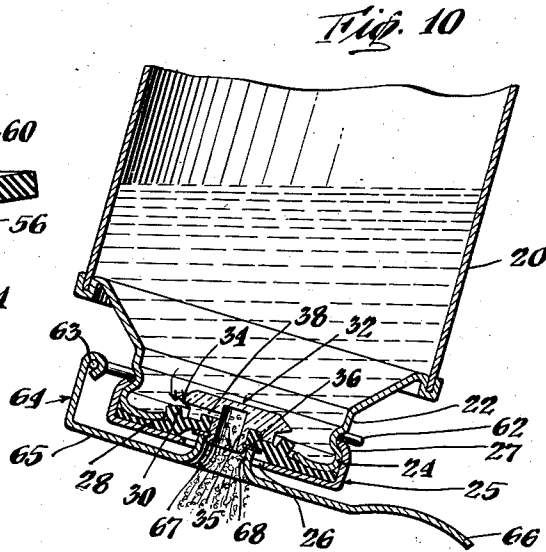
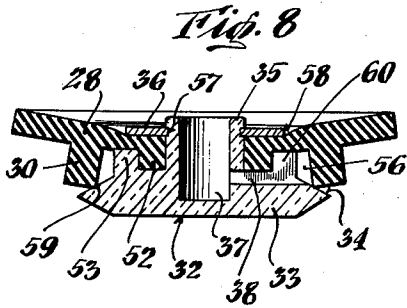
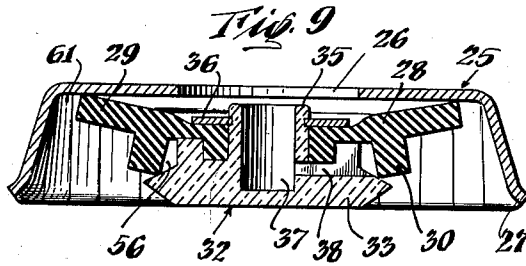
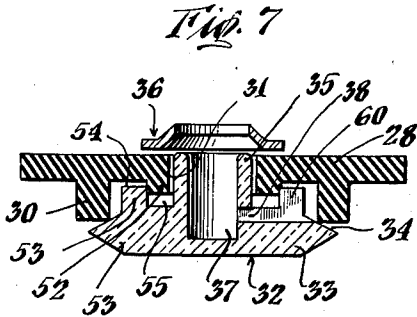
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VALVED CONTAINER

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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VALVED CONTAINER

Charles D. Thoms, New York, N. Y.

Application February 28, 1942, Serial No. 432,772

4 Claims. (Cl. 222—400)

The present invention relates to valved containers adapted for packaging or commercial handling and distribution of products such as fluids under pressure, and the present application is a continuation-in-part of my copending application Serial No. 368,440, filed December 4, 1940.

A general object of the invention is the provision of efficient valved containers characterized by readily mounted substantially non-leaking valved closures inclusive of economically manufactured simple valve structure of unique construction assuring effective packaging with ease and dispensation at will of all or any desired part of fluids under unusually high pressures, such as gas-charged foamable liquids under pressures upwards of 85 pounds per square inch.

A more specific object of the invention is the provision of such valved containers inclusive of a conventional type of container characterized by a hollow neck terminating in a relatively small mouth circumscribed by a lip preferably provided with a bead for anchorage of conventional crown caps; and a cap such as an apertured crown cap securely fitted thereto and efficiently housing a valve structure characterized by a washer-like gasket member of resilient material effectively gasketing the cap and having an aperture and a depending circumambient flange for fluid-sealing engagement with a valve seat member mounted to or supported on the gasket member whereby pressure of container contents will cause the gasket to be held forcibly in snug engagement against the cap for efficient gasketing and the valve seat member to be jammed against the free projecting end of the circumambient flange portion for effective fluid-sealing, the external diameter of the flange portion at its free projecting end, i. e. adjacent the outer edge portion of its free end, being appreciably less than the internal diameter of the hollow neck opposite thereto to permit easy and efficient cracking of the valve by an unique expansive and axial separating action of the flange portion relative to the seat member with a minimum of axially and/or angularly inward movement of the latter.

A further object is to provide such valved container with a simple but effective operating lever having a discharge aperture and a projection adjacent thereto adapted to be swung through the aperture in the cap into engagement with valve structure for inward movement thereof to open or crack the valve.

Other objects of the invention will in part be obvious and will in part appear hereinafter.

The invention accordingly comprises the fea-

tures of construction, combination of elements and arrangement of parts, which will be exemplified in the construction hereinafter set forth and the scope of the invention will be indicated in the claims.

For a fuller understanding of the nature and objects of the invention, reference should be had to the following detailed description taken in connection with the accompanying drawings, in which:

Fig. 1 is a sectional view with parts broken away of a valve-equipped container of the present invention charged with fluid under pressure;

Fig. 2 is an enlarged sectional view of the valve-equipped top portion of the container shown in Fig. 1;

Fig. 3 is a diametrical sectional view of the anchorage plate or washer for the valve seat member of the valve structure of the present invention;

Fig. 4 is a diametrical sectional view of the gasket member of the valve structure of the present invention;

Fig. 5 is a diametrical sectional view of the valve seat member of the valve structure of the present invention;

Fig. 6 is a top plan view of the valve seat member shown in Fig. 5;

Fig. 7 is a diametrical sectional view of the anchorage plate, gasket member and valve seat member shown in Figs. 3, 4, 5 and 6, arranged in their relative positions during assembly prior to final parts-securing operations;

Fig. 8 is a diametrical sectional view of parts shown in Fig. 7 showing them in their relative positions subsequent to the final parts-securing operations;

Fig. 9 is a sectional elevational view showing the relative positions of the valve structure of Fig. 8 and the crown cap to be associated therewith in the formation of a container closure;

Fig. 10 is a sectional view with parts broken away of a charged container of the present invention equipped with valve operating means showing the same in use during dispensing operations;

Fig. 11 is a perspective view of the valve operating means shown in Fig. 10;

Fig. 12 is a view similar to Fig. 10 showing a modified form of valve operating means in use; and

Fig. 13 is a detailed diagrammatic diametrical view of portions of the valve structure and associated parts showing in exaggerated style for pur-

poses of clarity operative movement of gasket parts.

The present invention will be readily understood by reference to the drawings in which like numerals refer to like parts throughout. As shown in Fig. 1 a container 20 of conventional form, provided, if desired, with a frustro-conical top 21 merging with a hollow neck 22 terminating in a relatively small mouth circumscribed by a lip 23 and preferably beaded at 24, is fitted with a valved cap structure which may comprise a crown cap 25, apertured such as at 26, attached to the container or secured on the neck thereof in any suitable manner such as by the well known procedure of crimping portions of edges 27 thereof beneath the bead 24.

This crown cap structure houses a valve structure which preferably comprises a washer-like gasket member of resilient material such as rubber or the like having an apertured base portion 28 extending substantially transversely of the cap 25 across the mouth of the container with a marginal zone 29 thereof clamped in a substantially fluid-tight manner between the lip 23 and the cap 25. The washer-like gasket member also includes a depending flange 30 made integral at the root thereof with the base portion 28 and this flange extends circumambient of the central aperture 31 through the base portion. A valve seat member 32 cooperates with the gasket member to provide a two-way valve structure and the valve seat member preferably comprises an enlarger head 33 having an upwardly facing conical seat 34, and a stem 35 to which is anchored a plate or washer 36 between which and the head 33 the base portion 28 of the gasket member is clamped in a substantially fluid-tight manner. The stem 35 is preferably hollow for a portion of its axial dimension to provide an outlet passage 37. An aperture in the wall of the stem 35 affords communication between the passage 37 and a lateral way or passage 38 which may be provided in the top of the valve member 32 by a notch or trough as shown.

As will be more readily understood from the showing in Fig. 2, the base portion 28 of the gasket member is adapted to fit or be housed snugly within the crown cap 25 when the latter is secured to the container neck 22 thereby providing for proper positioning or centering of the valve structure relative to the aperture 26 in the cap 25 and the circumambient flange portion 30 depends downwardly from the base portion 28 preferably immediately adjacent the edge of the lip 23 for cooperative positioning or centering action and further to assure the provision of fixed abutment means relative to which the flexible central portion of the gasket member may be flexed or moved during valve opening action. The central aperture 31 through the base portion 28 is defined in part preferably by an annular depending flange 52 to serve as anchorage means and to provide an annular space laterally thereof within the flange portion 30.

The valve seat member 32 may be made of any suitable relatively rigid material such as a moldable synthetic resin frequently termed a "plastic," or metal. The head 33 is preferably provided with a circumambient shoulder flange 53 having a seating face 54 and located laterally from the stem 35 to provide an anchorage space 55 for reception of the anchorage flange 52 of the gasket member. The head 33, inclusive of the seat 34 and shoulder flange 53, cooperates with the base portion 28 of the gasket member and the flange

portion 30 thereof to provide a circumambient free space or chamber 56. The valve seat member 32 is secured to or suitably mounted upon the gasket member by stem 35 which is adapted to fit snugly in the central aperture 31 when the parts are securely clamped together. The plate 36 is preferably formed from a coned washer as shown in Fig. 3 which, when forced down over the stem to expand the gasket anchorage flange 52 in the anchorage recess 55 to completely fill the same, will be sprung into the flat position shown in Fig. 2 with the inner edge thereof biting into the stem 35 at 57 additionally to clamp the base portion 28 between it and the head 33 in seating engagement on the shoulder flange 53. As a result the valve seat member 33 is securely anchored to the gasket member and a substantially fluid-tight mount therebetween is provided which is enhanced by the interfitting anchorage flanges 52 and 53. Attaching the sprung washer 36 to the stem 35 in this manner also forces an annular depression 58 in the gasket member which may result in a positioning of the top of the washer 36 substantially flush with the upper surface of portions of the gasket member adjacent thereto as will be readily understood from Fig. 8. This may also result in a slight upward cupping of the base portion 28 of the gasket member attended by an outward flaring of the flange portion 30 of the gasket member with a circumambient edge thereof brought into engagement with the seat 34 at 59.

At the time of formation of the valve seat member 32 the passage 38 may be provided by forming a notch or trough 60 therein which communicates with a hole which may be drilled through the wall of the hollow stem 35 to connect with the passage 37 thereby providing communication between the chamber 56 and the outlet passage. With this chamber closed by circumambient contact between the inside edge of the flange portion 30 and the conical seat 34 at 59, and with internal pressure in the container forcing the described valve structure outwardly so that the base portion 28 of the gasket member is forcibly held snugly in engagement against the nether of the cap 25 and the valve seat 34 is jammed against the edge of the resilient flange portion 30, a substantially fluid-tight seal is assured.

It will be noted from Fig. 7 that the diameter of the aperture 31 through the base portion 28 of the gasket member is preferably of greater dimension than the outside diameter of the stem 35 to provide for flow of resilient material when placed under compression in the assembly of the valve parts so that the anchorage recess 55 will be completely filled by the anchorage flange 52 and the outer surface of the stem 35 will be snugly engaged by the base portion 28 without undue distortion of the gasket member. Further it will be noted from Fig. 9 that the outside diameter of the gasket member is preferably of a dimension less than the inner diameter of the crown cap 25 before mounting on the container neck to provide an annular space 61 therebetween so that as the marginal zone 29 of the base portion 28 of the gasket member is clamped between the container lip 23 and the cap 25 suitable provision is made for lateral flow of resilient material so that the base portion 28 will in the assembled structure extend substantially entirely across the housing crown cap 25 with a proper centering of the valve structure in the latter.

As will be noted from Fig. 1 wherein the valve parts are shown in valve opened position, Fig. 2

wherein the valve parts are shown in full lines in closed position and dotted lines in opened position, and the fragmentary diagrammatic showing in Fig. 13, pressure applied by gas or mechanical means against the outer surface of the gasket base portion 28, the washer 36 and outside exposed portions of the valve seat member 32 will cause the latter to move inwardly with inward flexure of the central portion of the gasket member. This will cause the resilient gasket member to be cupped inwardly thereby increasing the distance between the contact zone of the seat 34 and the gasket flange portion 30 resulting in cracking of the valve. This cracking or opening action of the valve is inherent by an action of the gasket member radially inwardly of the lip 23 which may be in any radius similar to a lever action or pivotal movement about a point such as A in Fig. 13 with the center line of the lever between the pivot point A and the flange portion root point B represented by the broken line C, and with the center line of a radial element of the flange portion 30 being represented by the broken line D. It will thus be noted that as the central portion of the gasket member is flexed downwardly the lever element on line C will be swung about point A to a position such as that represented by the broken line at E and due to the fact that the flange portion 30 is made integral with the base portion 28 and is of appreciable dimension at its root there will be a tendency to maintain the angular relationship between the lines C and D when moved to their positions at E and F. This is permitted by the resiliency of the material from which the gasket member is formed. It will be understood that this angular relationship is not precisely maintained throughout such movement of portions of the gasket member since as it will be understood there is some tendency for the circumambient construction of the flange portion 30 to resist such swinging. As a result the flange portion 30 may assume a slight curvilinear shape, such as that represented at G in dotted lines in Fig. 13 but it will be noted that the seating edge of the flange portion 30 in moving an axial distance h will travel radially outwardly through a lateral distance such as d . As a result only slight axial or angular movement of the movable valve parts is necessary to accomplish a wide open position of the valve seating parts which makes for positive and efficient operation. The importance of this feature will be further apparent from the following description of the valve opening operation for dispensing container contents.

In Figs. 10 and 11 one type of simple manually operable valve opening means is shown as preferably comprising a clip member 62 of spring wire adapted to be snapped in engaging position upon the neck 22 of the container preferably below the bead 24 and the turned edge 27 of the crown cap 25. The clip 62 suitably pivotally supports at 63 one end of a lever member 64 having a transversely extending portion 65 terminating in a force-applying end 66 preferably shaped for convenient engagement by the thumb of the user. The portion 65 is suitably apertured at 67 to provide a discharge hole and in the preferred form this is accomplished by punching so that a valve operating projection 68 in the shape of an annular flange will be formed to be projected through the aperture 26 in the cap 25 to engage the valve structure such as the washer 36 fixed to the stem 35 whereby the base portion 28 of the resilient gasket member may be flexed inwardly

to crack the valve, that is separate the annular flange portion 30 from the seat 34 on the valve seat member 32 either wholly when the valve structure is flexed substantially axially inwardly or in part at some circumferential location if moved angularly inwardly. The former operation is illustrated in Fig. 10 and the latter operation is more fully illustrated in Fig. 12.

Obviously other valve operating devices may be used for efficient dispensing operation or, if desired, the valve structure may be flexed inwardly without utilization of specially designed manually operable means. For example, a suitable spout member such as that illustrated in Fig. 12 may comprise a nozzle 69 having a shank portion 70 insertable in the passage 37 in the stem 35 with a reduced end portion 71 thereof seated against the bottom of the passage 37 with a notch 72 in a reduced portion 71 providing communication between the interior of the nozzle and the passage 38. The nozzle 69 may also be provided with a lateral projection or member 73. The user may insert such nozzle structure in the valve equipped closure of the container and invert the latter. Thereafter pressure may be applied to the lateral member 73 by the thumb or finger which will cause the valve to be cracked by separation of some circumferential portion of the flange portion 30 from the seat 34 immediately beneath the lateral member 73. This brings the gas-charged contents into communication with the annular chamber 56 which is in turn in communication with the nozzle through the passage 38.

Upon such valve opening movement the contents of the container, being under considerable pressure, instantly rushes through between the separated portions of the flange portion 30 and the seat 34, the passage 38, and the outlet passage provided by the stem 35 and/or the nozzle 69, and upon reaching the atmosphere or the reduced pressure side of the valve structure the gas dissolved in the liquid composition causes it to issue in the form of an expanded foam-like product. Obviously when the valve is cracked at only one circumferential location, such as that illustrated in Fig. 12, this need not be accomplished immediately adjacent the passage 38 since the latter is always in communication with the annular chamber 56 and accordingly a dispensing passage will be provided when the valve is cracked in any circumferential location.

It will thus be seen that the objects set forth above are efficiently attained and since certain changes may be made in the above construction and different embodiments of the invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A valved container comprising, in combination, a container of the type having a hollow neck terminating in a relatively small mouth circumscribed by a lip, an apertured cap secured on the neck, a washer-like gasket member of resilient material having an aperture and extending sub-

stantially transversely of the mouth with a marginal zone thereof clamped in a substantially fluid-tight manner between the container lip and said cap and said gasket member also having a depending flange portion circumambient of the aperture projecting into the hollow neck, the external diameter of said depending flange portion at its free projecting end being appreciably less than the internal diameter of said hollow neck to permit free lateral expansion of said flange during valving action, a valve seat member having a head for circumambient fluid-sealing engagement with said flange portion and a stem extending through the gasket aperture, and means engaging said members to hold said head in substantially fluid-sealing engageable position with respect to said flange portion, said combined valve seat member and gasket member assembly being provided with a passage extending from the fluid-sealing engagement zone to the exterior of said cap.

2. A valved container comprising, in combination, a container of the type having a hollow neck terminating in a relatively small mouth circumscribed by a lip, an apertured cap secured on the neck, a washer-like gasket member of resilient material having an aperture and extending substantially transversely of the mouth with a marginal zone thereof clamped in a substantially fluid-tight manner between the container lip and said cap and said gasket member also having a depending flange portion circumambient of the aperture projecting into the hollow neck, the external diameter of said depending flange portion at its free projecting end being appreciably less than the internal diameter of said hollow neck to permit free lateral expansion of said flange during valving action, a valve seat member having a head for circumambient fluid-sealing engagement with said flange portion and a stem extending through the gasket aperture, and means engaging said gasket and said stem to hold said head in substantially fluid-sealing engageable position with respect to said flange portion; said valve seat member and said gasket member including its flange portion cooperating to provide a chamber, said combined valve seat member and gasket member assembly being provided with passageways including one in said stem for communication between the chamber and the exterior of said cap whereby ingress and egress of fluid to and from said container is had upon inward flexure of said gasket member.

3. A valved container comprising, in combination, a container of the type having a hollow neck terminating in a relatively small mouth circumscribed by a lip, an apertured cap secured on the neck, a washer-like gasket member of resilient material having an aperture and ex-

tending substantially transversely of the mouth with a marginal zone thereof clamped in a substantially fluid-tight manner between the container lip and said cap and said gasket member also having a depending flange portion circumambient of the aperture projecting into the hollow neck, the external diameter of said depending flange portion at its free projecting end being appreciably less than the internal diameter of said hollow neck to permit free lateral expansion of said flange during valving action, a valve seat member having a head providing an upwardly facing conical seat for circumambient fluid-sealing engagement with said flange portion and a hollow stem extending through the gasket aperture to provide an outlet passage, and a plate of less lateral dimension than the cap aperture fixed to said stem with said gasket member clamped between it and said head in a substantially fluid-tight manner; said valve seat member and said gasket member including its flange portion cooperating to provide a chamber, and said combined valve seat member and said gasket member assembly being provided with passageways including a hole extending through the wall of said stem for cooperative communication between the outlet passage and the chamber.

4. A valved container comprising, in combination, a container of the type having a hollow neck terminating in a relatively small mouth circumscribed by a lip, an apertured cap secured on the neck, a washer-like gasket member of resilient material having an aperture and extending substantially transversely of the mouth with a marginal zone thereof clamped in a substantially fluid-tight manner between the container lip and said cap and said gasket member also having a depending flange portion circumambient of the aperture projecting into the hollow neck, the external diameter of said depending flange portion at its free projecting end being appreciably less than the internal diameter of said hollow neck to permit free lateral expansion of said flange during valving action, a valve seat member having a head for circumambient fluid-sealing engagement with said flange portion and a stem extending through the gasket aperture, means engaging said members to hold said head in substantially fluid-sealing engageable position with respect to said flange portion, said combined valve seat member and gasket member assembly being provided with a passage extending from the fluid-sealing engagement zone to the exterior of said cap, and a lever member pivotally mounted on the container and having a discharge hole and a projection adjacent thereto adapted to be swung through the aperture to operate said valve means at will.

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