

Nov. 25, 1958

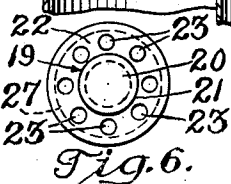
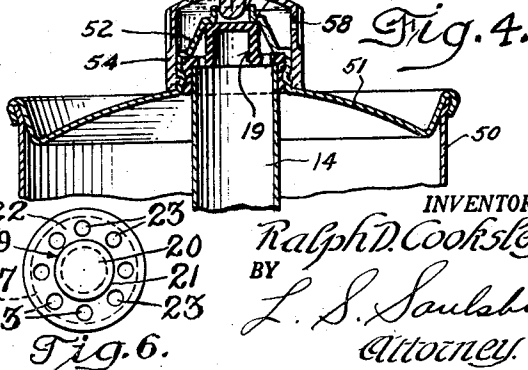
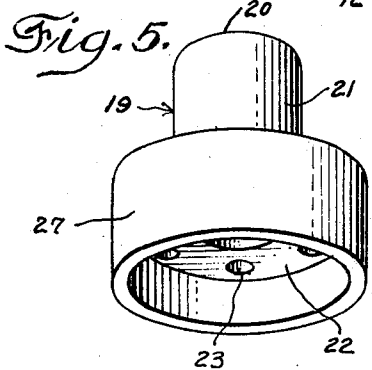
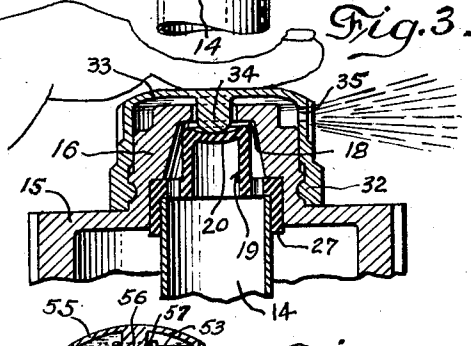
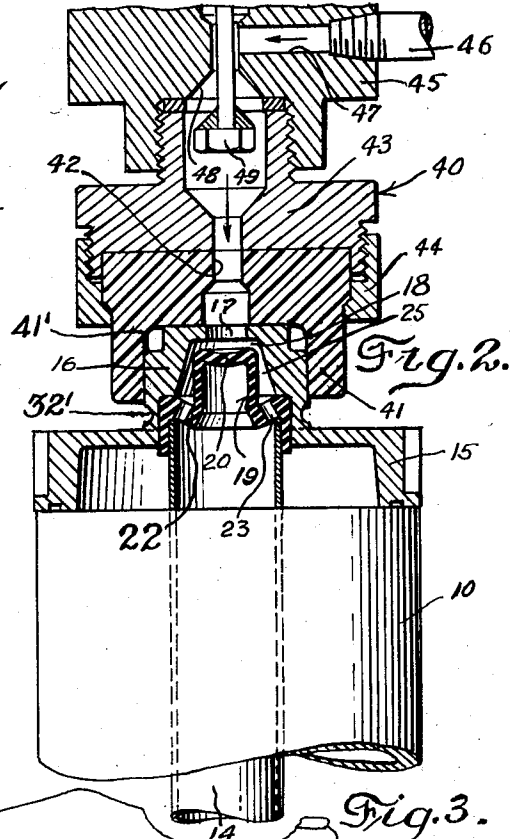
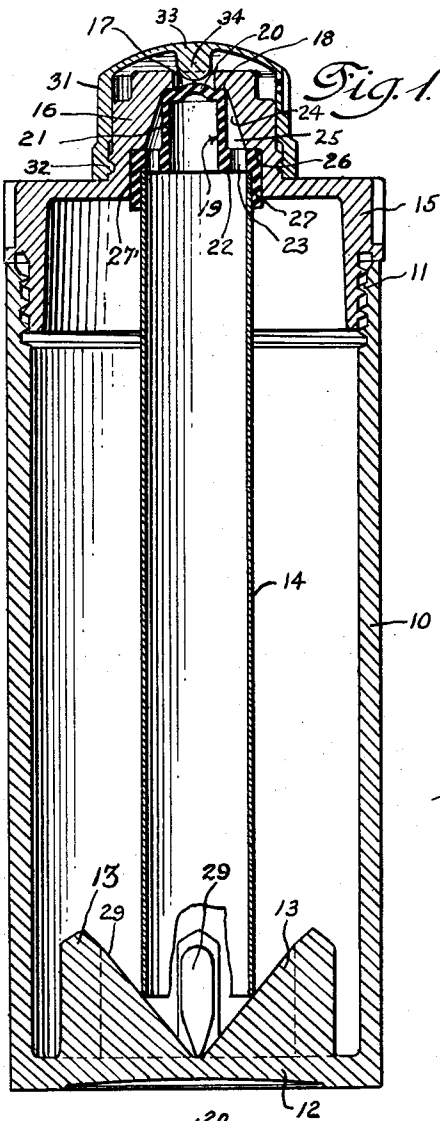
R. D. COOKSLEY

2,861,723

TWO WAY RESILIENT VALVE FOR PRESSURIZED CONTAINERS

Filed April 29, 1954

2 Sheets-Sheet 1



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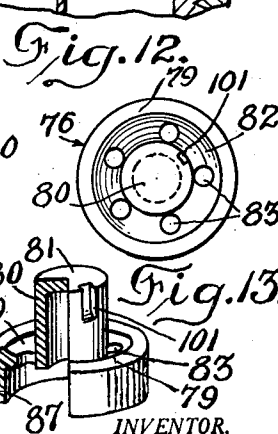
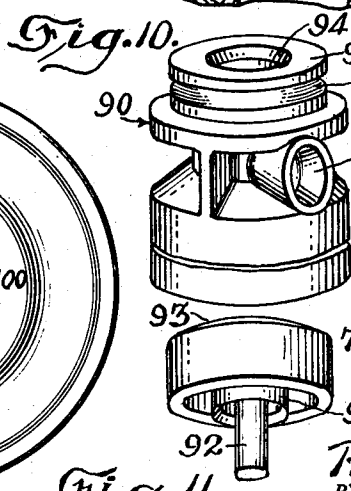
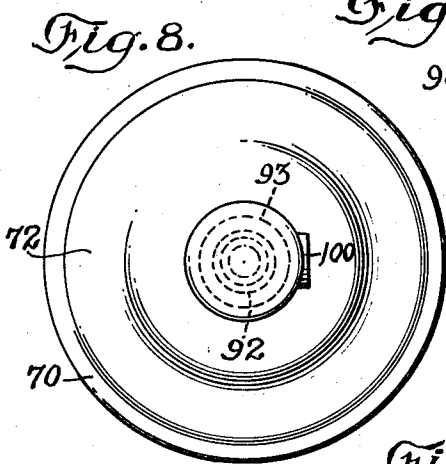
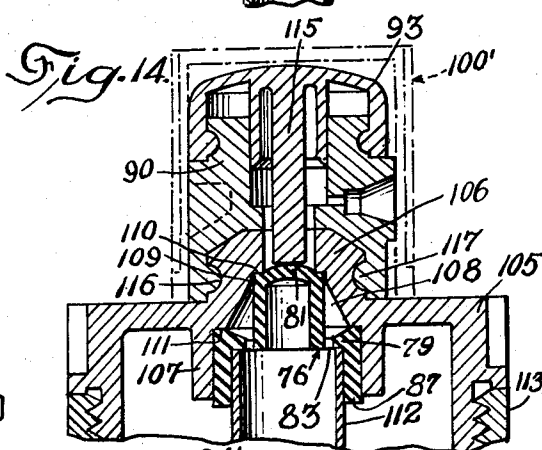
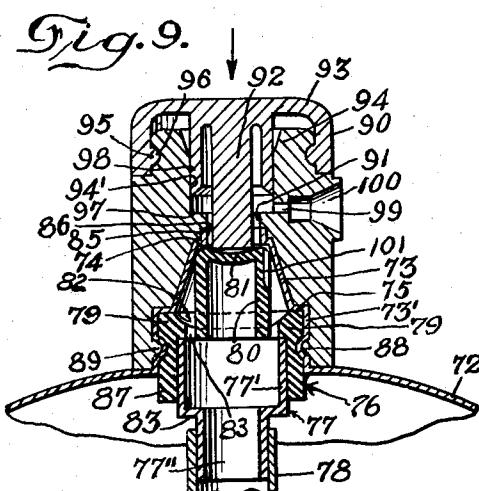
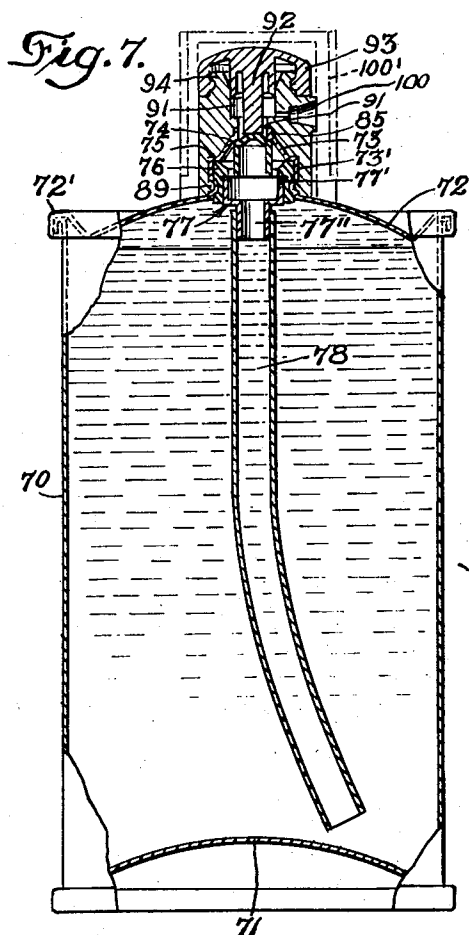
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TWO WAY RESILIENT VALVE FOR PRESSURIZED CONTAINERS

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2 Sheets-Sheet 2



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2,861,723

TWO WAY RESILIENT VALVE FOR PRESSURIZED CONTAINERS

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Application April 29, 1954, Serial No. 426,427

8 Claims. (Cl. 222—394)

This invention relates to a two-way resilient control valve and more particularly to such a valve adapted especially for use in pressurized containers.

It is the principal object of this invention to provide in a pressurized container of metal or plastic a two-way resilient valve that has no spring and no metal parts to corrode and impair the operation of the container.

It is another object of the present invention to provide in a pressurized container and dispenser of a type adapted to contain fluid under pressure and manually operable to dispense the fluid therefrom, an inexpensive two-way springless valve that is wide open under pressure when the container is being filled in one direction with the pressurizing gas and product, and which is depressible manually to meter the contents out of the container in the other direction in the form of spray or foam.

It is another object of the invention to provide a pressurized container wherein the valve may be readily and simply assembled by hand and without machine in the pressurized container top that may be either made of metal or of plastic, whereby to cut the cost of assembly and manufacture of pressurized or aerosol containers to a minimum.

It is another object of the invention to provide a simple, inexpensive valve for pressurized containers which is engineered to work in two different distinct ways, one way being to automatically open to the full extent of the fixed orifice of the container to permit the loading of the container with the greatest efficiency and minimum of time, and the other way being to enable the user to meter and dispense the contents in the other direction at his discretion.

It is still another object of the invention to provide a pressurized container that is so designed as to utilize pressure in the container itself to expand the rubber valve into the loading hole in such a way as to preclude what is commonly known as "leakers" and to seal off the loading hole so that it is impossible to have a leaky valve as long as there is pressure in the container.

It is another object of the invention to provide a pressurized container wherein the complete assembly has a minimum of essential parts and the valve is made in such a way that it can be either set over the upper end of a rigid plastic syphon tube, or be held in place within the valve opening by a plastic adaptor which can be snapped into place by hand and to which a flexible syphon tube can be readily attached, if desired, thereby making for a very rapid assembly job without tools or machine.

It is another object of the invention to place the rubber valve in a straight and then conical chamber and to have molded into the exterior of the valve itself for a small distance greater than the straight portion of the chamber, a small channel which will meter the contents of the container, when the valve is depressed and before the valve itself has been displaced from the straight portion of the chamber.

Other objects of the invention are to provide in a pres-

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surized container a valve which is of simple construction, inexpensive to manufacture, cuts present costs to less than half, molded of flexible material, light in weight, sanitary, durable, compact, has no leakage, cheap enough so that it can be thrown away, convenient to use and efficient in operation.

For other objects and a better understanding of the invention, reference may be had to the following detailed description taken in connection with the accompanying drawing, in which:

Figure 1 is a vertical sectional view of a pressurized container having the two-way springless valve of the present invention assembled therein, the valve being in its closed position and the container being under the pressure of its contents;

Fig. 2 is an enlarged fragmentary and vertical sectional view of the container top and of a filling head disposed upon the container and the valve element assuming its shape when the container is being filled with the pressurizing gases and the product under pressure from the filling head;

Fig. 3 is a fragmentary vertical sectional view of the container and of the valve with the overcap in place and being depressed so that its projection forces open the valve to meter and dispense the contents;

Fig. 4 is a fragmentary vertical sectional view of the valve of the present invention as applied to a metal can top with the valve being undepressed and in its closed position;

Fig. 5 is an enlarged perspective view of the rubber valve element itself;

Fig. 6 is a top plan view of the valve element showing the plural circumferentially spaced holes in its flange;

Fig. 7 is a vertical sectional view of a pressurized metal container with a valve in place, the valve being of modified form and with a modified overcap structure and an adaptor for fixing the valve element and a flexible syphon tube in the container top, the contents being retained in the container and the valve element bulged or ballooned into the loading hole, under the pressure of the contents;

Fig. 8 is a top plan view of the metal container top and of the overcap parts connected thereto;

Fig. 9 is an enlarged vertical fragmentary sectional view of the top structure of the can similar to Fig. 7 with the valve element depressed from the seat in order to meter and dispense the contents of the container;

Fig. 10 is a perspective view of the lower one of the cap parts that fits immediately over the central projection of the container top;

Fig. 11 is a perspective view of the top cap part having the projection that operates the valve element;

Fig. 12 is a top plan view of the valve element;

Fig. 13 is a perspective view of the valve element used in the form of the invention shown in Fig. 7 with a portion broken away to show the internal shape of the valve element;

Fig. 14 is a fragmentary sectional vertical view utilizing the valve element as shown in Figs. 12 and 13 and the cap parts shown in Figs. 10 and 11 but with the valve element and the cap parts being assembled upon a plastic container top having the straight and conical shaped valve opening.

Referring now particularly to the Figures 1 to 6, 10 represents a plastic container having an internally threaded upper end portion 11 and a bottom 12 with upstanding centering projections 13 adapted to receive and support a rigid syphon tube 14.

Fitted into the upper end 11 of the container body 10 is a container top 15 having a central upwardly extending filling and dispensing projection 16 with a combined loading and dispensing hole 17 in its upper end.

Surrounding the lower end of the hole 17 is an annular seat 18 against which a two-way rubber valve element 19 is caused to be retained by the pressure of the fluid contents of the container body. The upper end of the valve element 19 has a seat engaging portion 20 that is bulged upwardly or ballooned into the loading opening 17 so that a tight sealing engagement of the upper end 20 is effected with the annular seat 18.

Below the upper end portion 20 of the valve element is a depending cylindrical portion 21, on the lower end of which is an annular radially-outwardly extending flange portion 22 having a plurality of circumferentially-spaced escape holes 23. The total cross-sectional area of these holes is greater than the area of the loading and discharge hole 17, thereby eliminating any back pressure from within the container when depressing the valve to either fill or dispense its contents.

Within the hollow projection 16 and depending from the annular seat 18 is a conical wall surface 24 providing an annular space 25 between the surface 24 and the cylindrical portion 21 of the valve element into which the contents may pass from the holes 23 but in which the contents are held by the seating of the portion 20 upon the annular seat 18. At the lower end of the conical surface 24 is an annular seat 26 against which the annular flange portion 22 is retained and depending from the annular portion 22 is a skirt or large cylindrical portion 27 adapted to receive the upper end of the syphon tube 14. The tube 14 is made of rigid material and is tight fitted into this portion 17 of the valve element and forces the portion into tight engagement with a cylindrical wall surface lying below the seat 26.

The lower end of the syphon tube rests in inclined surfaces 29 of the nested upstanding centering projections 13 in the bottom of the container. In this manner the tube is held elevated so that there is no chance for the lower end thereof to be locked off from the fluid and with the tube being rigid the valve is positively held and supported thereby in the valve opening against downward displacement therefrom. Thus, the tube 14 becomes an integral part of the container. The assembly is simple. The valve element is placed on the tube by hand and both are then assembled into the container top 15 and the container top threaded onto container body 10.

Upon the hollow projection 16 there is tightly fitted an overcap 31 having an internal bead 32 at its lower end cooperating with an annular groove 32' located adjacent the root of the projection 16 whereby to hold the overcap 31 in tight fitting engagement upon the projection 16.

The overcap 31 has a flexible top portion 33 with a depending central projection 34 that registers with the loading and dispensing opening 17 and upon the top portion 33 being depressed in the manner illustrated in Fig. 3, the projection 34 pushes downwardly the top portion 20 of the valve element 19 to depress it away from the valve seat 18 so the fluid contents will be metered past the valve seat 18. At this time, the cylindrical portion 21 will tend to be expanded toward the surface 24 by the internal pressure to assist in the metering action. The top portion 20 can be depressed to a greater or lesser extent depending upon the amount of flow desired. The top portion 20, instead of having a convex formation, as shown in Fig. 1, will at this time be given a downwardly concaved formation, as shown in Fig. 3. The contents will pass through the opening 17 and around the upper end of the hollow projection 16 and into the overcap 31 and discharged through a small side hole 35 in the form of a spray, as shown in Fig. 3. Immediately upon release of the top portion 33 of the cap 31 by the finger, the projection 34 will be elevated. The portion 20 of the valve element will again engage the annular seat 18 to seal off the container. The top portion will then return

to its normal convex shape in the loading opening, as shown in Fig. 1.

When the container is to be filled, a filling head structure, as indicated generally at 40, is placed over the hollow projection 16 in the manner shown in Fig. 2. This filling head has a soft sealing member 41 that has a bottom opening 41' therein for receiving the projection 16. This member 41 has a central opening 42 leading from the bottom opening 41' for directing fluid to the loading hole 17 in the top of the projection 16. The soft member 41 is retained upon a metal body 43 by a threaded retaining ring 44. An upper head member 45 has a supply pipe 46 for directing pressurizing gases or a product to a passage 47 and downwardly through a central conical seat 48 with which a valve 49 cooperates to seal off the gas or product at the completion of the filling operation. The valve element 49 is normally urged toward a closed position by a spring in the filling head, not shown. The gas or product moves downwardly under pressure and causes the portion 20 to be dropped from the seat 18. The flange portion 22 will be deflected downwardly, as shown in Fig. 2, at this time, and the fluid will pass the annular seat 18 and move downwardly through the space 25 and valve holes 23 into the container 10. The top portion of the valve 19 will be lowered automatically to a position where the rear of the space surrounding the periphery will be equal to the area of the loading hole. In this manner, the gas and product are placed in the container under pressure. When the container has been filled and the valve element 49 of the filling head 40 is released, the valve 19 is closed against its seat 18 under the pressure of the contents of the container.

The valve element 19 is formed of soft resilient material, such as rubber, natural or synthetic, or plastic, and has sufficient resiliency to return to its normal shape upon release of any force therefrom tending to distort its initial shape.

In Fig. 4, there is shown the present valve element 19 applied to a metal can top. The metal can is indicated generally at 50 and has a can top 51 secured at its periphery to the cylindrical wall of the can. This can top 51 has an upwardly extending central projection or nipple 52 into which the valve element 19 is fitted. This projection 52 has a seat 53 against which the top portion 20 of the valve element 19 engages to retain the contents within the can. The valve element 19 is of the same shape and construction and supports and retains in its lower end the syphon tube 14 that depends into the bottom of the container.

An overcap 54 has depressible portion 55 with a projection 56 that depends through a loading and dispensing hole 57 in the projection 52 to engage the top portion 20 of the valve element 19. With the container under pressure, the top portion 20 of the valve element will be elevated, in the manner shown in Fig. 1. The overcap 54 has a side spray opening 58 through which the contents of the container are discharged in the manner illustrated in Fig. 3. The container is filled in the same manner as above described and with the filling head 40. The valve element 19, as can be seen particularly in Fig. 6, has a plurality of holes about its flange, the total area of which is greater than the area of the loading and dispensing hole 17.

Referring now particularly to Figs. 7 to 13, 70 represents a metal container having an upwardly-convex bottom 71 and an upwardly-convex metal top 72. The metal top 72 has a central upwardly depressed valve-containing portion or nipple 73 with an annular valve seat 74 and a shoulder 75 against which rubber valve element 76 is retained by a plastic adaptor 77 having retaining annular flange 77' to grip the rubber valve 76 and from which a reduced diameter end 77'' of which a syphon tube 78 may be suspended. The syphon tube 78 and the valve element 76 are assembled by hand into the central

projection or nipple 73 of the container top and the container top is secured at its periphery as indicated at 72' to the upper end of the container body.

The valve element 76 is shaped generally like the valve element 19 described above in connection with the first form of the invention but has a dished or weakened flange 79. Extending upwardly from the flange 79 is a cylindrical portion 80 with top 81 thereon. The flange is weakened adjacent to the outer surface of the cylindrical portion 80 by an annular top recess 82 from which circumferentially spaced perforations 83 extend to allow communication of the contents of the container through the valve flange. The outer periphery of the flange 79 is held tightly seated against seat 75 by the adaptor 77 as above explained. The projection 73 is tapered from the seat 75 to the seat 74. The seat 74 is on the upper end of the tapered projection 73 and extends radially inwardly. An annular top flange 85 extends upwardly into the loading hole 86. The top 81 of the cylindrical portion 80 of the valve element 76 normally lies against the seat 74 under the pressure of the contents within the cylindrical portion 80 and prevents the escape of the contents from the container.

Depending from the flange 79 of the valve element is a skirt portion 87 into which the adaptor 77 fits to secure the valve element 76 in the projection 73 so that the skirt portion is compressed over an inwardly projected annular retaining rib projection 88 and the flange 79 firmly against its seat 75. This same annular projection 88 forms a groove 89 on the exterior of the central projection 73' in order that a tight grip can be had of a lower molded cap part 90 that is fitted over the projection 73. This lower cap part has a central opening 91 that lies over the loading hole 86 of the projection 73 and about the flange 85 and through which the contents are dispensed when the top portion 81 of the valve element 80 is depressed by central projection 92 of an upper cap part 93 that is tightly fitted over upon a reduced diameter upper portion 94 of the lower cap part 90. The upper cap part has an internal annular rib projection 95 that fits into an annular groove 96 of the upper portion 94 of the lower cap part 90.

Above the central opening 91 of the lower cap part 90 and in the upper portion thereof is a concentric large cylindrical opening 94' that has a bottom shoulder 97. The upper cap part 93 has a depending skirt portion 98 that has tight sealing engagement with the wall of the cylindrical opening 94' to prevent leakage of the contents into the top cap part 93. The cap parts are molded from semi-rigid plastic and the pressure of the contents acting with the rib 95 of the skirt portion 98 will expand the same and provide an effective sealing engagement of the skirt 98 with the wall of the opening 94'.

At the level of the shoulder 97 is a small outlet spray hole 99 through which the contents may pass under pressure when the valve 76 is depressed, in a manner as shown in Fig. 9, and that delivers the contents to a flared discharge opening 100 to provide a spray pattern.

In order to provide a better metering action as the top portion 81 of the valve 76 is depressed by the projection 92 of the upper cap part 93, the top portion 81 and the side of the cylindrical portion 80 of the valve element are slightly recessed or notched as indicated at 101, leaving sufficient unnotched area of top portion 81 to effect the sealing action, to provide a quick removal of the top portion 81 from the valve seat 74 and to thereby minimize the amount of pressure required to unseat the top portion 81 of the valve element and to meter a small amount of the contents through the recess. When the valve element is depressed as shown in Fig. 9, the valve element will remain symmetrical and the flange will be slightly centrally depressed so that the contents upon rising through flange openings 79 will enter the tapered portion 84 of the projection and will pass the seat 74, loading hole 86, opening 91, large opening 94', spray hole 99 and discharge from flared opening 100. A fanciful cover cap

100' may be fitted over the cap assembly to protect the same and prevent the operation of the container when the same is shipped or displayed on the store counter.

In Fig. 14, there is shown a modified valve and top arrangement applied to a plastic top 105. This plastic top 105 has an upwardly extending central button projection 106 and a concentric depending skirt portion 107 that provide a valve chamber 108. This valve chamber 108 differs in shape from the chambers of the other forms by the provision of a straight short cylindrical wall surface 109 in which the top portion 81 of the valve element is guided when moved to and from the valve seat 110. The side recess 101 in the valve element 76 is longer than the height of the wall surface 109 so the recess is always in communication with the tapered part of the chamber. The flange 79 engages a lower seat 111 when the valve element is fitted into place and retained thereagainst by rigid syphon tube 112, similar to the tube 14 that will engage with the bottom of the container. The container top 105 is secured by threaded engagement to body 113 of the container after the assembly of the tube 112 and valve element 76 has been made within the valve opening 108.

Upon the button projection 106 there is fitted the lower cap part 90, Fig. 10, and the upper cap part 93 having the projection 92 that engages top portion 81 of the valve element 76 to depress the same. The button projection 106 has a retaining groove 116 for receiving annular rib projection 117 of the lower cap part 90. The pressure within the container causes the top portion 81 to bulge into the loading hole and to make a tight leakproof engagement with the seat thereunder.

It should now be apparent that there has been provided a simple valve arrangement consisting of a two-way springless valve and the syphon tube can be easily and quickly assembled by hand into the container. It should be further apparent that the valve opens to provide adequate space about the same to accommodate a full flow of the gas and product during the filling operation and that the same valve when used for dispensing gives a restricted and metered flow of the contents.

It should be further apparent that above all there has been provided a two-way rubber or plastic valve element that has no spring or metal parts, that is inexpensive to manufacture and that permits easy filling of the container by a filling head.

While various changes may be made in the detail construction, it shall be understood that such changes shall be within the spirit and scope of the present invention as defined by the appended claims.

What is claimed is:

1. A pressurized container and dispenser comprising a container body having a hollow projection with an annular seat and a central loading and dispensing hole, a valve element comprising a cylindrical portion extending into the hollow projection, a top sealing portion having its periphery engaging with the annular seat of the projection, a perforated annular flange portion extending radially outwardly from the bottom of the cylindrical portion, said hollow projection having a second annular seat surrounding the hole and parallel to the first mentioned seat and said annular flange portion of the valve element engaging with the second mentioned seat, means for retaining said valve element within the hollow projection and against downward displacement, said valve element being formed of flexible material and adapted to be flexed from its seat in the hollow projection and normally held thereagainst by the pressure of the contents within the container, and means for depressing the top portion of the valve element to discharge the contents.

2. A pressurized container and dispenser as defined in claim 1, and said depressing means having a flexible cap tightly fitted upon the hollow projection and a depending central projection extending downwardly from said cap into the loading and dispensing hole and engageable upon

the cap being depressed to move the valve element to its open position.

3. A pressurized container and dispenser as defined in claim 1, and said hollow projection having a straight short guide wall surface surrounded by the first annular seat and an annular tapered wall surface depending from the first annular seat to the second annular seat.

4. A pressurized container and dispenser comprising a body portion having an internally threaded upper end, a top threaded upon the upper end of the container body portion, said cap having an upwardly extending hollow projection with a loading and dispensing hole therein, said hollow projection having an annular seat adjacent to said hole and extending radially outwardly thereof, said hollow projection having an annular tapered side wall surface depending from said seat and a second seat adjacent the lower end of the surface and extending radially outwardly thereof, a valve element of flexible material having a top portion engaging the annular seat, a cylindrical portion depending therefrom, an annular deflectible flange portion extending laterally from the cylindrical portion and engaging the second seat of the hollow projection, a skirt portion depending from the outer periphery of the flange portion, said flange portion being provided with a plurality of perforations and communicating with an annular top recess lying between the cylindrical portion of the valve element and the tapered side wall surface of the hollow projection and syphon tube means tightly fitted in the depending skirt portion of the valve element and urging the skirt portion of the valve element into tight fitting engagement with the wall of the hollow projection.

5. A pressurized container and dispenser as defined in claim 4, and said top portion of the valve element being deflected upwardly into the top opening of the projection and against the annular seat when the container is filled with contents under pressure, and an overcap having a flexible top portion with a central projection adapted to extend into the loading and dispensing hole in the hollow projection and engage with the top portion of the valve element upon being depressed and to move the top portion of the valve element from its seat and permit the discharge of the contents into the overcap, said overcap having a spray discharge opening therein.

6. In a valve assembly, a body having a loading and dispensing hole therein, an annular seat adjacent the lower end of said hole, an annular space depending from said seat, said body having a valve chamber lying below said annular space and seat, said valve chamber having at the upper end a second annular seat of larger diameter than the diameter of the first mentioned seat and concentric therewith, a two-way flexible valve element disposed in said chamber, said valve element having a top portion normally engaging the first mentioned seat and deflected into the loading and dispensing hole when acted upon by pressure from the underside thereof, a hollow cylindrical portion depending from the top portion a distance equal to the length of the distance between the two seats, an external flange on the lower end of the cylindrical portion engaging with the second seat, said valve chamber being of larger diameter than the cylindrical portion of the valve element thereby providing an annular space therearound, and said flange having an opening therethrough communicating between the underside of the flange and the annular space surrounding the valve element and means on the body for depressing the top portion of the valve element.

7. In a valve assembly, a body having a loading and dispensing hole therein, an annular seat adjacent the lower end of said hole, an annular space depending from said seat, said body having a valve chamber lying below said annular space and seat, said valve chamber having at the upper end a second annular seat of larger diameter than the diameter of the first-mentioned seat and concentric therewith, a two-way flexible valve element disposed in said chamber, said valve element having a top portion normally engaging the first-mentioned seat and deflected into the loading and dispensing hole when acted upon by pressure from the underside thereof, a hollow cylindrical portion depending from the top portion a distance equal to the length of the distance between the two seats, an external flange on the lower end of the cylindrical portion engaging with the second seat, said valve chamber being of larger diameter than the cylindrical portion of the valve element thereby providing an annular space therearound, and said flange having an opening therethrough communicating between the underside of the flange and the annular space surrounding the valve element, means on the body for depressing the top portion of the valve element, and said valve chamber having an annular wall surface lying below the second seat and concentric therewith, said valve element having a skirt portion depending from the outer periphery of the flange and engaging the annular wall surface of the chamber and means tightly fitted into the skirt portion and forcing the skirt portion against the annular wall surface to retain the valve element within the valve chamber.

8. A pressurized container and dispenser comprising a container body having a hollow projection with an annular seat and a central loading and dispensing hole, a valve element comprising a cylindrical portion extending into the hollow projection, a top sealing portion having its periphery engaging with the annular seat of the projection, a perforated annular flange portion extending radially outwardly from the bottom of the cylindrical portion, said hollow projection having a second annular seat surrounding the hole and parallel to the first-mentioned seat and said annular flange portion of the valve element engaging with the second-mentioned seat, means for retaining said valve element within the hollow projection and against downward displacement, said valve element being formed of flexible material and adapted to be flexed from its seat in the hollow projection and normally held thereagainst by the pressure of the contents within the container, means for depressing the top portion of the valve element to discharge the contents, and a rigid syphon tube extending from the flange portion of said valve element toward the bottom of the container body, and open centering means on the bottom of the container body surrounding the lower open end of the tube, whereby the tube serves to assist in the retention of the valve element within the projection and an intake end held from becoming locked from the contents of the container.

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