United States Patent

[11] 3,586,068

[72] Inventor **John B. Nicholson**
Country Club Hills, Ill.

[21] Appl. No. **833,399**
[22] Filed **June 16, 1969**
[45] Patented **June 22, 1971**
[73] Assignee **Continental Can Company, Inc.**
New York, N.Y.

[54] **ONE-PIECE VALVE**
13 Claims, 7 Drawing Figs.

[52] **U.S. Cl.** **141/20,** 141/326, 222/494, 222/495, 222/501, 251/349
[51] **Int. Cl.** **B65b 31/00**
[50] **Field of Search** 251/342, 349, 353, 354; 222/494, 495, 501; 141/3, 20, 326

[56] **References Cited**

UNITED STATES PATENTS

3,282,474	11/1966	Gorman	251/353 X
3,340,561	9/1967	Schwartzman	222/501
3,348,742	10/1967	Assauit	251/354
3,434,695	3/1969	Green	251/349

Primary Examiner—Houston S. Bell, Jr.
Attorneys—Fred P. Kostka, Joseph E. Kerwin and William A. Dittmann

ABSTRACT: A one-piece valve having a tubular body to one of which there is integrally attached a closure member which is compressed within the bore of the tubular body to seal the same when subjected to pressure forces acting on the end of the valve.

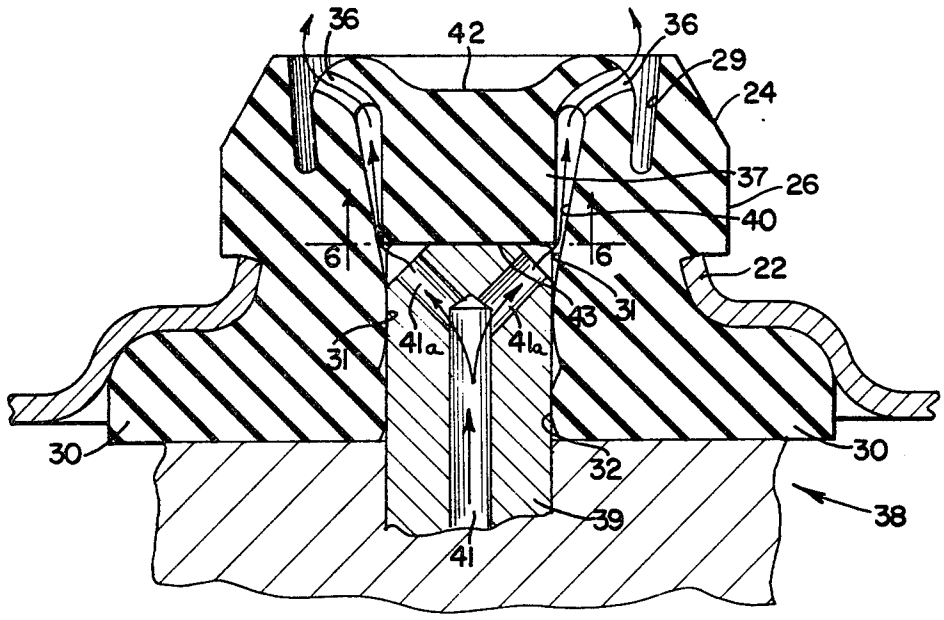
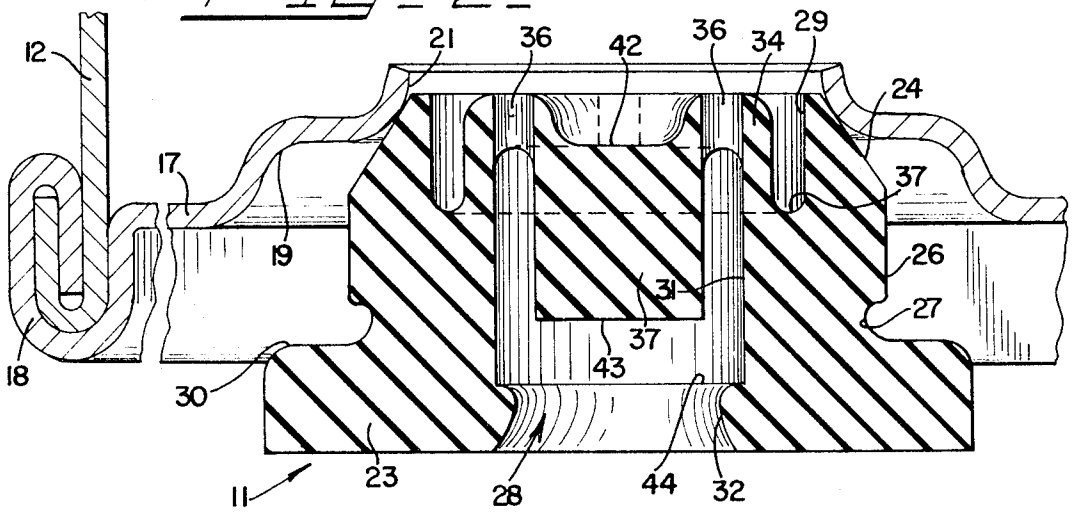


FIG - 2 -



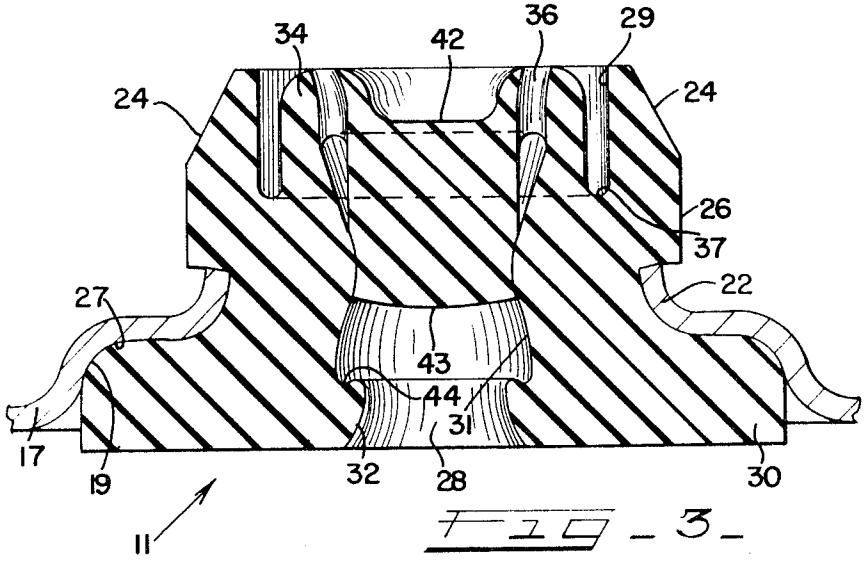


FIG - 3 -

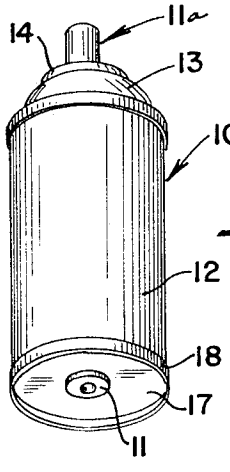


FIG - 1 -

INVENTOR
JOHN B. NICHOLSON
BY - Fred P. Kostka
ATT'Y.

FIG - 4 -

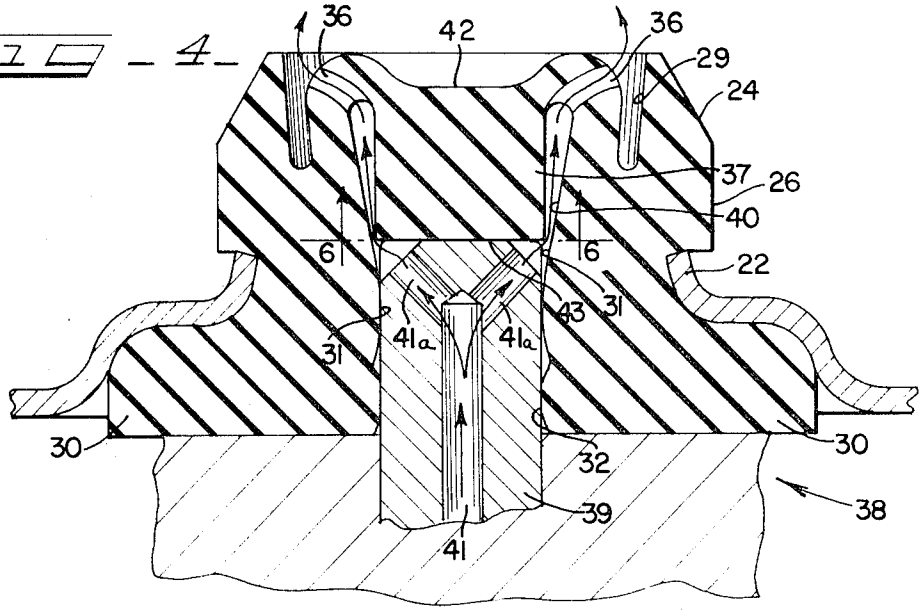


FIG - 5 -

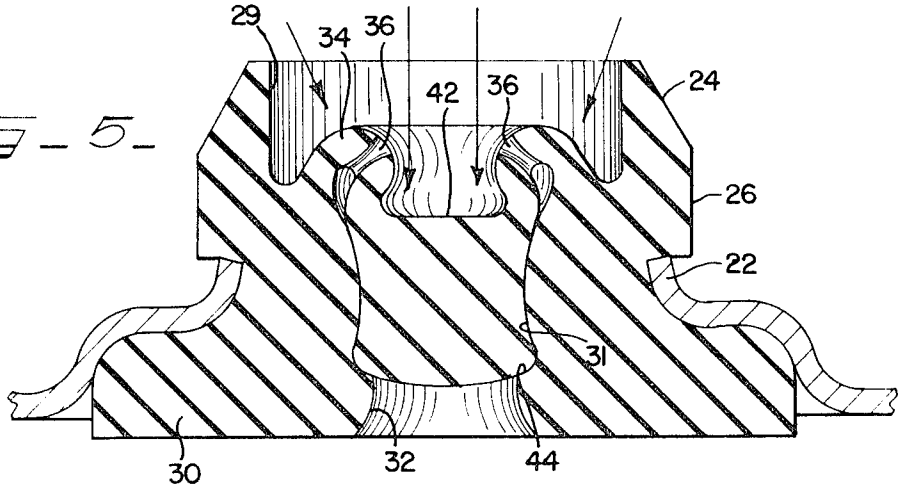
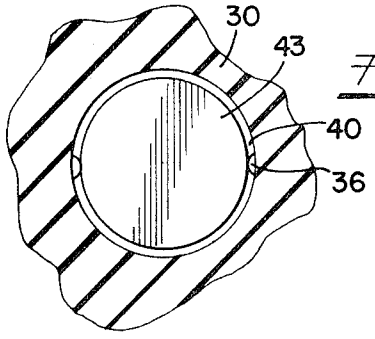


FIG - 6 -



INVENTOR
JOHN B. NICHOLSON
BY Fred P. Kostka
ATT'Y.

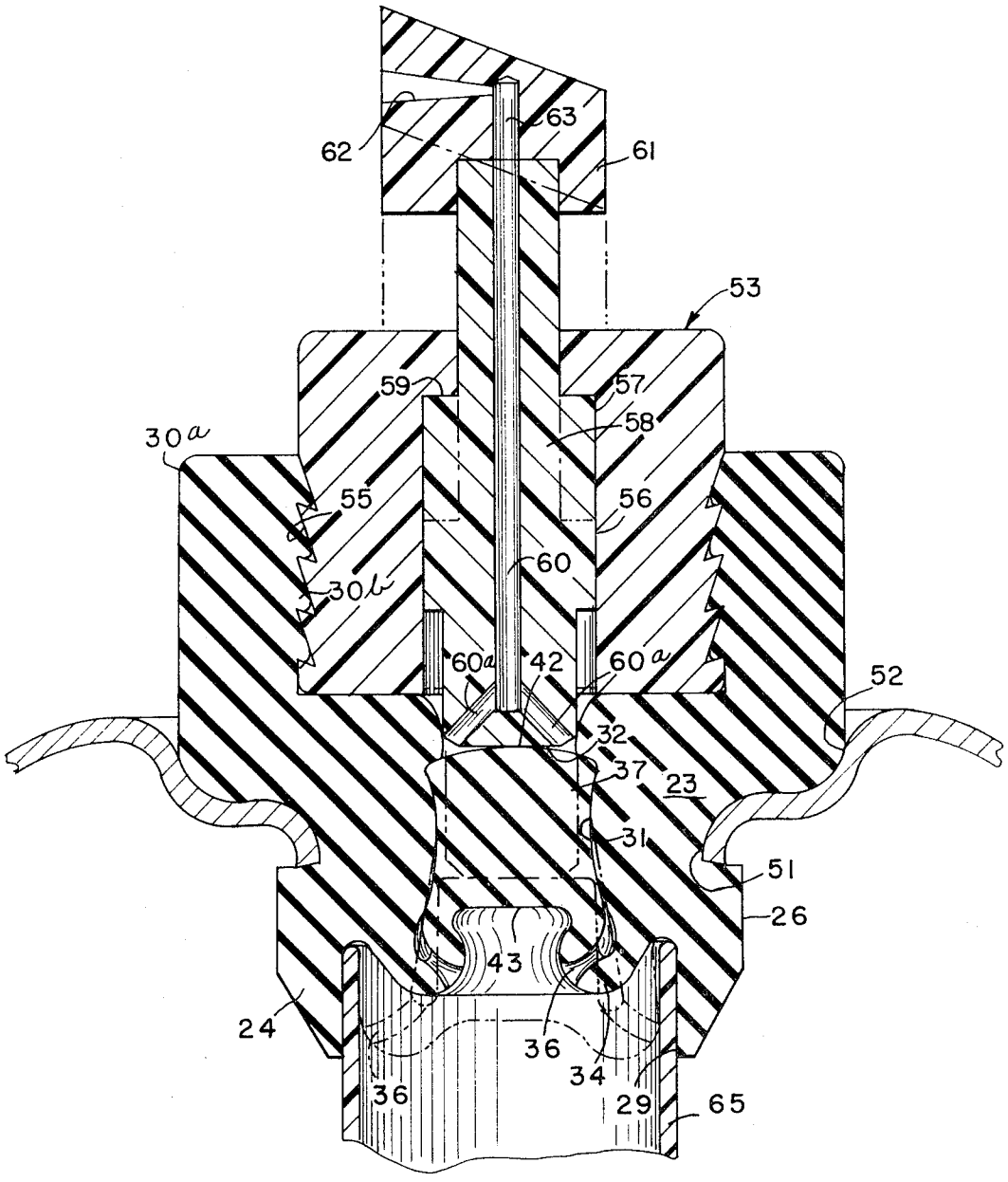


FIG-7-

INVENTOR
JOHN B. NICHOLSON
BY Fred P. Böttcher
ATT'Y.

ONE-PIECE VALVE

The present invention relates to valves and more particularly to a valve adapted for use in pressurized containers for either charging the container or dispensing the contents therefrom.

It is a principle object of the present invention to provide a fluid pressure responsive valve made as a single unitary piece and having fluid passage means formed therein and an integral plug which is compressible within the fluid pressure means to seal the passages when fluid pressure forces are imposed on the valve and to be released from compression to open the passages when a force opposing the fluid pressure forces is applied on the plug.

It is another object of the present invention to provide a simple one piece valve which is made from a resilient compressible material and having fluid passage means and an integral closure which is operative to close the passage when the valve is compressed

It is still another object taken in conjunction with the immediately foregoing object in which the valve is constructed and arranged so that the integral closure effectively seals the fluid passage means upon application of a fluidized pressure force on said valve.

It is another object to provide a one-piece valve capable of being applied to a pressurized container to serve as either a charging valve to charge the container with a pressurized fluid or as a dispensing valve for dispensing the contents from the container.

It is still a further object of the invention to provide a pressurized container having an opening in which there is inserted a one-piece valve made from a flexible and compressible material and having a fluid passage means and an integral closure member which is compressed within the fluid passage to seal the latter when the container is charged with a fluid under pressure.

The foregoing objects are generally accomplished by a one-piece valve made from a flexible and compressible material and includes a substantially tubular body having a closure member flexibly attached adjacent one end thereof extending into the bore of the tubular body and compressed therein to seal the bore when the end is subjected to pressures greater than atmospheric within the container.

More particularly, the one-piece valve is insertable into an opening of a container so as to compress the tubular body intermediate the ends thereof and into engagement with the closure member in the fluid passage means. The valve is inserted into the container so that the fluid under pressure within the container acts on the flexibly connected end of the closure member to compress the plug into the bore and thereby seal the fluid within the container. The valve is opened by a force applied on the end of the closure member opposite to that on which the fluid pressure forces are applied thereby to release the closure member from compression within the bore and provide a passage through the tubular body.

Further objects and features will hereinafter appear.

In The Drawing:

FIG. 1 is a perspective view of a pressurized container having a dispensing valve and a charging valve embodying the structure of the present invention;

FIG. 2 is an enlarged fragmentary sectional view taken along the bottom of the container and illustrating the valve of the present invention prior to being inserted into a charging opening;

FIG. 3 is a fragmentary view of the valve inserted in the charging opening;

FIG. 4 is an illustration of the valve during the charging operation for charging fluid under pressure into the container;

FIG. 5 is a cross-sectional view similar to FIGS. 2 to 4 inclusive but showing the sealed position of the valve after the charging operation is completed;

FIG. 6 is a cross-sectional view taken generally along the lines 6–6 of FIG. 4;

FIG. 7 is a cross-sectional view taken generally along the lines 7–7 of FIG. 1 and in particular showing the valve of the present invention applied as a dispensing valve.

Referring now to the drawing, there is shown a container or can **10** of the type generally used for dispensing aerosol products. The aerosol container **10** embodies generally a charging valve **11** and a dispensing valve **11***a* both incorporating the structure of the present invention. The aerosol container **10** includes a generally cylindrical metal body **12** enclosed at the upper end by an upper domed shaped closure **13**. The closure **13** is secured to the body **12** by means of a conventional double seam. Attached to the dome closure **13** as by clinching in the standard manner is a closure disc **14** on which the dispensing valve **11***a* is mounted.

Attached to the bottom or under side of the container body **12** is an end closure plate **17** also secured to the body by means of a double seam **18**. The end closure plate **17** includes an axial recess **19** in which there is formed an opening **21** bounded by an upwardly projecting flange **22**. Seatable within the opening **21** is the charging valve **11** of the present invention as illustrated in FIGS. **1** to **6**. The charging valve **11** serves to charge the container with a fluid under pressure to provide the propellant force for dispensing the product from the aerosol container **10**. In this connection, it should be mentioned that the propellant fluid may be incorporated into the product to be dispensed therewith as is common practice in aerosol containers, or the propellant may be maintained separate from the product to be dispensed as in a container having a product bag or the like on which the propellant acts. The latter type containers are generally known as dual compartment aerosol containers.

The charging valve **11** comprises a tubular body **23** of generally cylindrical cross section. The valve **11** is made from a flexible and resilient material such as natural or synthetic rubber or plastic such as polyurethane and the like and is inserted into the charging opening or orifice **21** on the underside of the container **10**.

As shown, the tubular body **23** is formed at one end with an upper truncated dome section **24** for facilitating the insertion of the valve into the opening **21**. Contiguous with the truncated dome section **24** is a cylindrical section **26** which is of larger diameter than the orifice **21**. An annular groove **27** is formed at the lower end of the cylindrical section **26** and accommodates the upstanding flange **22** bounding the opening **21** therein. Extending from the lower end of the annular groove **27** is an enlarged horizontal flange **30**, which is accommodated within the axial recess **19** in the end closure **17** to prevent lateral movement of the valve **11** when inserted within the opening **21**.

The bore **28** of the tubular body is formed with a large bore section **29**, an intermediate bore section **31** and a small bore section **32**. The large bore section **29** and intermediate bore section **31** define a shoulder **33** at the juncture thereof. Integral with the shoulder **33** and extending into the large bore section **29** is an annular flexible web **34**. Formed in the web **34** is a plurality of ports or openings **36** which provide communication between the upper bore section **29** and the intermediate bore section **31**.

Extending from an integral with the web **34** is a downwardly projecting closure member or plug **37** which is of lesser diameter than the intermediate bore section **31** and small bore section **32** as shown in FIG. **1**. However, upon insertion of the valve **11** into the orifice **21** the resilient tubular **16** is compressed thereby to constrict the intermediate bore section **31** as shown in FIG. **3**. In this position, the lower end of the plug **37** remains spaced above a shoulder **37** formed at the juncture of the intermediate bore section **31** and small bore section **32** which is also constricted. Thus the plug **37** closes the valve **11** so that fluid is unable to pass between the bore sections **31** and **32** and the large bore section **29** via the ports **36** in the web **34**.

To open the valve **11** to charge fluid into the container body **11**, a charging head assembly **38** is placed into engagement with the outer surface of the end closure **17** of the container as

shown in FIG. 4. The charging head assembly 38 may include a reciprocal spindle 39 which upon elevation is operative to engage and force the plug 37 upwardly out of the constricted portion of the intermediate bore section 31 so that the sidewall of the plug 37 is spaced from the wall of the intermediate bore section 31 to provide an annular passage 40. In this position of the plug 37, fluid is free to flow through the annular passage 40 and via the web ports 36 into the container body 11.

The propellant or pressurized fluid is charged into the container body 11 from a suitable source of fluid (not shown) via spindle bore 41. As shown in FIG. 4, the charged fluid flows in the direction of the arrows through the bore 41 and outwardly through inclined passages 41*a* into the intermediate bore section 31 and through the annular passage 40 into the container body 11 via the ports 36.

When the container body 11 is fully charged, the spindle 39 is retracted and the container end 17 is displaced out of engagement with the charging head assembly 38. At the same time, the pressure forces of the pressurized fluid within the container body 11 act on the upper end or face 42 of the plug 37 force the latter downwardly into the constricted portion of the intermediate bore section 31. In this connection, it is to be noted that the plug 37 is compressed within the intermediate and small bore section 31 and 32 and the lower end or face 44 of the plug 34 is tightly seated against a shoulder 43 defined at the juncture of the intermediate and small bore sections 31 and 32. In this manner, the plug 37 is snuggly seated along the horizontal shoulder 44 and also along the constricted vertical wall of the intermediate bore sections 31 and 32 so that an effective seal is thereby formed at the opening 21.

Referring now to FIG. 6, the valve 11*a* is shown applied to the upper closure disc for use as a dispensing valve. The valve 11*a* may be similar in all respects to the valve 11 with the exception that a tubular extension 30*a depends upwardly from the flange 30. The tubular extension 30a* is formed with a bore having a serrated wall 30*b*.

The valve 11*a* is mounted in an end closure opening 51 so that the flange 30 is received within an axial recess 52. The opening 51 is of smaller diameter than the cylindrical section 26 of the tubular valve body 23 so that the intermediate bore section 31 is constricted. Normally, the valve 11*a* is in the closed and sealed position shown in FIG. 7 in full lines and held therein by means of the pressure forces exerted by the pressurized fluid or propellant within the container body 11 acting on the face 43.

For opening the valve 11*a* and thereby to dispense the contents from the container, there is provided an actuating assembly 53. The actuating assembly 53 includes a tubular sleeve 54 having an outer serrated wall 55 which coacts with the serrated bore wall 30*b* to fasten the sleeve therein. The tubular sleeve 54 includes a bore 56 having a shoulder 57. Vertically slidable within the bore 56 is an actuating stem 58 having a shoulder 59 which abuts the bore shoulder 57 in the closed position of the valve 11*a*.

A longitudinal fluid passage 60 having inclined intake passages 60*a* at the lower end extends through the stem 58. An actuating button 61 having a product discharge orifice 62 and an axial passage 63 communicating with the fluid passage 60 is attached to the projecting end of the stem 58 as by means of a force fit. Normally, the actuating stem 58 assumes the position shown in full lines in FIG. 7. However, upon the application of a downwardly force as by fingers of the user on the button 61, the shaft 58 displaces the plug 37 downwardly to the phantom line position. In this position, the walls of the plug 37 are out of engagement with the walls of the small and intermediate bore sections 31 and 32 so that the contents of the container are free to flow through the annular space 40 and the web ports 36 and thereby into the passage 60 via the inclined passages 60*a*. The contents are then discharged from the actuating button 61 through the axial passage 63 and orifice 62.

Upon release of the button, the pressure forces in the container acting on the plug face 43 are operative to reseat the latter in the bore section 31 and return the actuating assembly components to the full line position.

Under some circumstances, a dip tube may be required to efficiently dispense the products from the container. As shown in FIG. 7, the large bore section 29 provides a convenient location for attaching a dip tube 65. The dip tube 65 may be secured within the large bore section 29 with a force fit. The presence of the dip tube 65 does not alter the function of the valve as described heretofore because the fluid pressure forces act on the plug face 43 in the same manner to retain the valve closed until an opposing force is applied on the opposing face 42.

What I claim is:

1. A valve comprising a one-piece body made from a flexible and compressible material, fluid passage means extending through said body and including an axial bore extending upwardly into said body from one end thereof, a closure member integrally connected adjacent to the other end of said body and extending into said bore for substantially axial movement between a position permitting fluid flow through said bore and a position for sealing said bore upon compression of said closure member therein.

2. A valve comprising a one-piece body made from a flexible and compressible material, an axial bore extending upwardly into said body from one end thereof, an annular flexible web adjacent to the other end of said bore and having a plug depending therefrom, port means in said annular web communicating with said bore, said plug extending into said bore substantially axial for movement between a position seatable within said bore upon compression of said plug therein to seal said bore from said ports and to a position permitting fluid passage through said valve body through said bore and said ports when said plug is released from compression within said bore.

3, A valve for a container charged with a fluid under pressure greater than atmosphere and having an opening into which said valve is insertable, said valve comprising a one-piece body made from a flexible and compressible material, fluid passage means extending through said body including an axial bore extending upwardly into said body from one end thereof, a closure member integrally connected adjacent to the other end of said body and substantially axially extending into said bore and being movable to seal said valve under the internal pressure forces in said container acting on one end of said closure member and being longitudinally displaceable relative to said bore to permit flow through said fluid passage means when an external force greater than said internal pressure force is applied to the other end of said closure member.

4. A valve for a container charged with a fluid under pressure greater than atmosphere and having an opening into which said valve is insertable, said valve comprising a one-piece body made from a flexible and compressible material, said body having a cross-sectional area grater than said container opening so as to be compressed therein, fluid passage means extending through said body including an axial bore extending into said body from one end thereof, a closure member integrally connected adjacent to the other end of said body and substantially axially extending into said bore and being movable to seal said bore when compressed therein and to permit fluid flow through said fluid passages when released from compression.

5. A charging valve for charging and sealing a pressurized container having an opening into which said valve is insertable, said charging valve comprising a one-piece body made from a flexible and compressible material, fluid passage means extending through said body including an axial bore extending through said body, a plug integrally connected adjacent to one end of said body and substantially axially extending into one end of said bore to permit charging of pressurized fluid into said container through the other end of said bore and said fluid passage means and being compressible within said bore to seal the pressurized fluid within the container by the pressure forces exerted therein by said pressurized fluid charged into said container.

6. The charging valve as defined in claim 5 wherein an annular web connects said plug adjacent to said upper end of said body.

7. The charging valve as defined in claim 6 wherein a circular recess is formed in the upper end of said body and said web is foldably disposed in said recess.

8. A valve and a container charged with a fluid under pressure greater than atmosphere and having an opening into which said valve is insertable, said valve comprising a one-piece tubular body made from a flexible and compressible material, fluid passage means extending through said body including an axial bore of said tubular body, a closure member integrally connected adjacent to one end of said body for substantially axial movement so as to be compressible into said bore to seal said valve under the internal pressure forces in said container acting on one end of said closure member and being longitudinally displaceable relative to said bore out of compression engagement therewith to permit fluid flow through said fluid passage means when an external force greater than said internal pressure force is applied to the other end of said closure member.

9. The invention as defined in claim 8 wherein an opening is formed in the upper end of a container and said valve is inserted in said opening, for use as a dispensing valve and wherein a dip tube is connected to said valve body at said other end of said body.

10. The invention as defined in claim 9 wherein said dip tube is seated in said bore at the other end of said bore.

11. The invention as defined in claim 8 wherein an annular flange defining a bore extension extends from said other end of said valve body, and a dispensing valve actuating assembly is seated in said bore extension.

12. The invention as defined in claim 11 wherein said actuating assembly includes a tubular sleeve seated in said bore extension, and wherein a stem is slidably mounted in said sleeve and engages said closure member for exerting a force opposing said pressurized fluid force in said container and acting on said closure member.

13. A valve comprising a one-piece tubular body made from a flexible and compressible material, fluid passage means extending through said body and including an axial bore constrictable along the length thereof, and a closure member integrally connected adjacent to one end of said body extending substantially axially into said bore and being compressible therein for sealing said bore.