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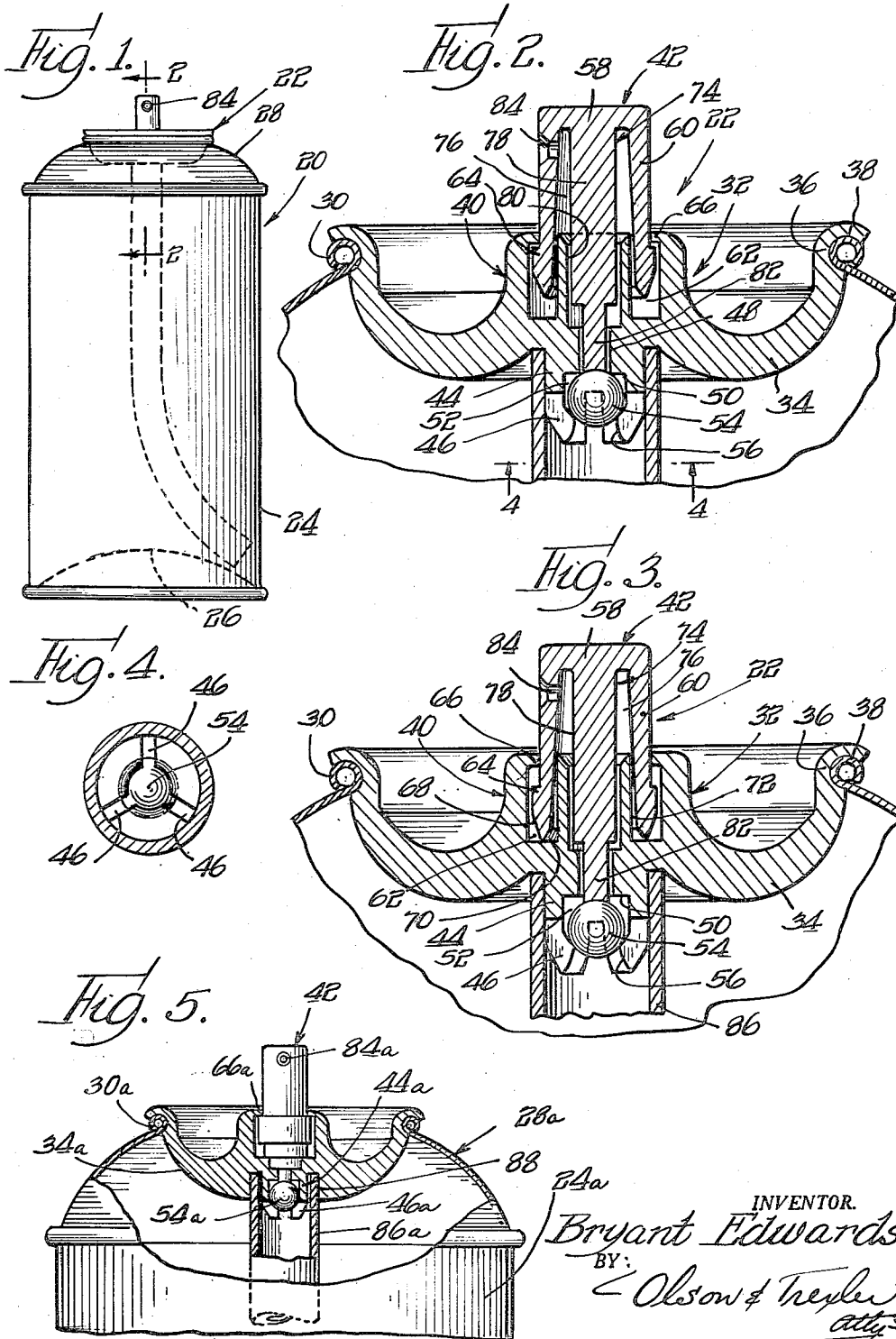
B. EDWARDS

2,854,176

DISPENSING VALVE ASSEMBLY

Filed Oct. 19, 1955

2 Sheets-Sheet 1



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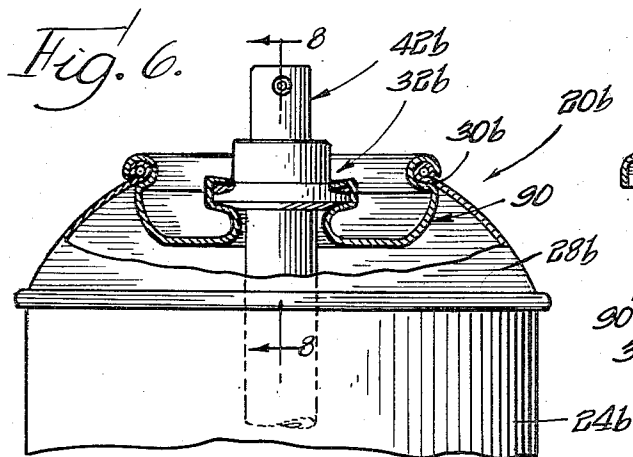
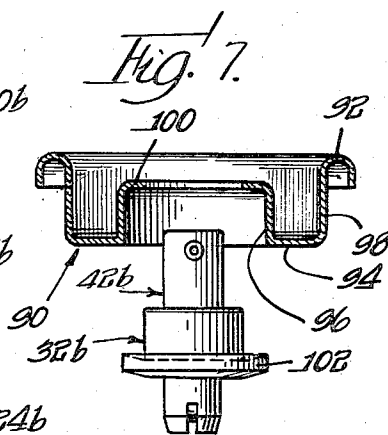
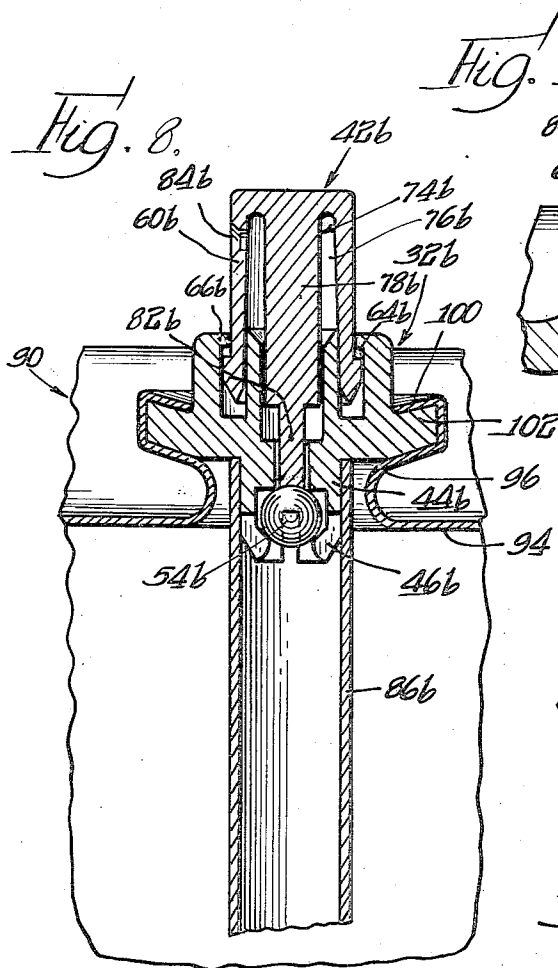
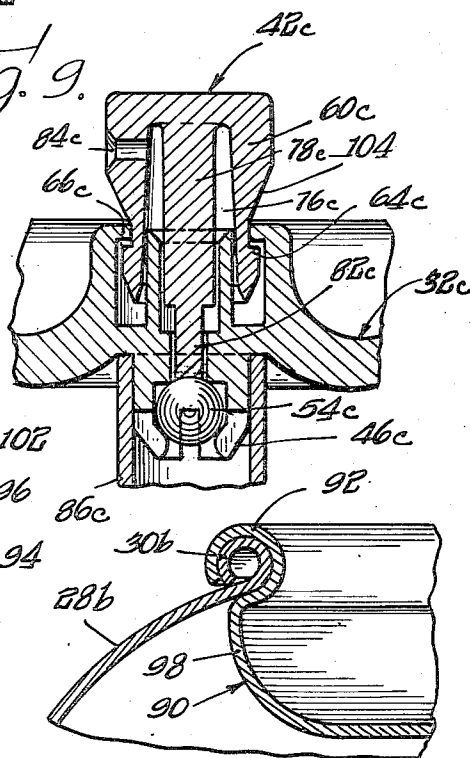
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DISPENSING VALVE ASSEMBLY

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2 Sheets-Sheet 2



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1

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DISPENSING VALVE ASSEMBLY

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14 Claims. (Cl. 222—394)

The present invention relates to a novel dispensing device, and more particularly to a novel dispensing valve assembly for use in connection with a pressurized dispensing container.

Many different products are presently packaged in pressurized dispensing containers which include dispensing valve assemblies of various construction. Such heretofore known dispensing valve assemblies are relatively complicated and usually include as many as seven separate elements so that a considerable amount of time, labor and equipment is required for producing and assembling the valve elements. It is, therefore, an important object of the present invention to provide a novel simplified dispensing valve structure which may be manufactured and assembled more economically than heretofore proposed dispensing valves.

A more specific object of the present invention is to provide a novel valve assembly having a reduced number of separate elements which may be easily and economically produced as by molding so that manufacturing and assembling costs may be substantially reduced.

Another object of the present invention is to provide a novel dispensing valve of the above described type which can be applied to containers to be filled and processed by machinery presently in use.

Still another object of the present invention is to provide a novel dispensing valve of the above described type which is constructed so that all of its elements may be formed from non-metallic materials whereby the valve may be used on containers of caustic products as well as other products.

Another more specific object of the present invention is to provide a novel dispensing valve structure of the above described type which includes a tube extending toward the bottom of a container and which is constructed so that the tube may be easily applied to and securely retained in assembled relationship with a body portion of the valve structure.

Other objects and advantages of the present invention will become apparent from the following description and the accompanying drawings wherein:

Fig. 1 is an elevational view of a dispensing container including the novel valve assembly of the present invention;

Fig. 2 is an enlarged fragmentary sectional view taken along line 2—2 in Fig. 1;

Fig. 3 is a fragmentary sectional view similar to Fig. 2 but showing the manner in which the dispensing valve is actuated to release the products from the container;

Fig. 4 is a fragmentary sectional view taken along line 4—4 in Fig. 2;

Fig. 5 is an elevational view partially broken away showing a slightly modified form of the present invention;

2

Fig. 6 is an elevational view partially broken away showing another modified form of the present invention;

Fig. 7 is an exploded view partially in cross section showing portions of the structure of Fig. 6 prior to assembly;

Fig. 8 is an enlarged fragmentary sectional view taken along line 8—8 in Fig. 6;

Fig. 9 is a fragmentary sectional view showing a modified form of the present invention; and

Fig. 10 is an enlarged fragmentary sectional view showing the manner in which the valve structure of Fig. 6 is secured to the container.

Referring now more specifically to the drawings wherein like parts are designated by the same numerals throughout the various figures, a dispensing container 20 incorporating a valve structure 22 formed in accordance with the present invention is shown in Fig. 1. The container 20 includes, in addition to the valve structure, a cylindrical body portion 24, a concave bottom 26, and a domed upper end 28. The upper end 28 is provided with a central aperture for receiving the valve structure, which aperture is defined by a rigidifying bead 30.

The valve structure 22 comprises a main body member 32 which is preferably formed from plastic material. The body member 32 is provided with an annular section 34 having a generally concavo-convex radial cross section. A peripheral portion 36 of the body member is formed with an annular groove 38 which substantially receives the bead 30 in the manner shown. It should be noted that when the container is filled with a material under pressure, the pressure tends to flex the annular section 34 of the body member outwardly and thereby aggressively presses the peripheral section 36 against the bead 30 so as securely to seal the container.

The body member 32 is provided with an upwardly extending centrally located enlargement 40 which is formed for receiving and retaining a combined valve actuating and dispensing nozzle member 42 which will be described in detail below, and a centrally located depending stem 44 which terminates in a plurality of flexible resilient fingers 46. A passageway 48 is provided through the stem 44 and is defined at its lower end by a valve seat 50 which opens into an enlarged chamber 52. A ball valve member 54 is disposed in the chamber 52 for engagement with the valve seat normally to preclude the passage of the product within the container through the passageway 48. It is to be noted that the lower ends of the fingers 46 are disposed in converging relationship to retain the ball 54 within the chamber. In addition, the fingers 46 are formed so as to function as spring means resiliently biasing the ball 54 against the valve seat. The ball is assembled within the chamber 52 by spreading the resilient fingers 46, and in order to facilitate this assembly, the ends of the fingers are provided with outwardly flaring cam surfaces 56 against which the ball may be pressed to spread the fingers sufficiently to permit the ball to be snapped into position.

The ball 54 is preferably formed from material which is substantially harder than the relatively soft and resilient material of the body member 32, which body member may be formed from a suitable plastic material such as polyethylene. For example, the ball may be formed from metal, but in certain instances, it may be desired to form the ball from glass or a ceramic material especially if a caustic product is to be packaged within the container.

The actuating and nozzle member 42 is formed in

3

one piece from any suitable material and is preferably formed from a plastic material. This member comprises an upper solid end portion 58 from which a generally cylindrical portion 60 depends. The lower end of the cylindrical portion 60 is adapted to extend within an annular recess 62 formed in the central enlarged portion of the body member. Generally radially extending annular shoulder means 64 is provided on the cylindrical portion 60 for cooperating with an annular flange 66 of the body member which partially traverses the recess 62 so as to retain the member 42 in assembled relationship with the body member. The lower end of the cylindrical portion 60 terminates in converging cam surfaces 68 and 70. These cam surfaces facilitate entry of the lower end portion of the cylindrical wall 60 in the narrow annular space between the flange 66 and the inner wall 72 of the recess 62 during initial assembly of the member 42 with the body member. In addition, these cam surfaces during assembly of the member 42 serve to spread the flange 66 and the inner wall 72 so as to permit the shoulder 64 to pass beneath the flange.

The member 42 is provided with an axially extending stem 74 which is located so that an annular space 76 is formed between the stem and the cylindrical portion 60. The stem has a relatively large diameter section 78 which extends loosely into an enlarged central passageway 80 formed in the body member, and a stem section 82 of reduced diameter extends from the section 78 loosely through the passageway 48 for engagement with the ball 54. It will be appreciated that the large diameter section 78 of the stem provides the relatively long stem with the desired strength and rigidity.

The elements of the valve structure thus far described normally assume the positions shown in Fig. 2 so that the valve is closed. In order to open the ball valve 54 for dispensing the product from the container, the member 32 is depressed by an operator as shown in Fig. 3 so that the stem 74 shifts the ball 54 from the valve seat. This permits the product to flow between the fingers 46, along the ball and through the passageways 48 and 80 and into the space 76. A nozzle-like aperture 84 having a reduced diameter portion and a flaring mouth is provided in the cylindrical wall 60 for permitting the product to pass from the space 76 into the atmosphere. It should be noted that the inner surface of the cylindrical wall portion 60 is tapered so that the thickness of the wall increases toward its upper end. As a result, the wall portion 60 is wedged between the flange 66 and the surface 72 of the body member when the member 42 is depressed as shown in Fig. 3 so as to prevent the product from entering the recess 62. When the operator releases the pressure on the member 42, the resilient fingers 46 which have been flexed downwardly as shown in Fig. 3 return to their normal positions and thereby resiliently press the valve ball 54 against the valve seat and at the same time, cause the member 42 to be raised to its original position.

Preferably, as tube 86 is provided which extends from the body member 32 to a point adjacent the bottom of the container as shown in Fig. 1. As will be understood, this tube permits the product to be dispensed from the container while the container is held in an upright position since the gas under pressure will force the product upwardly through the tube. However, it will be appreciated that the tube 86 could be eliminated and the contents of the container could be dispensed by holding the container in an inverted position. In the embodiment shown in Figs. 1 through 4, the tube 86 is connected with the body member 32 in a secure yet simple manner. More specifically, the upper end of the tube 86 is applied over the stem portion 44 of the body member with a force fit which is sufficiently tight to prevent the tube from becoming disassembled. It should be noted that with this structure there is no tendency for the tube to become loose when the member 42 is depressed and

4

the valve is open since the finger portions 46 will spread and even more securely retain the tube.

Fig. 5 shows a slightly modified form of the present invention which is similar to the above described structure as indicated by the application of identical reference with the suffix "a" added to corresponding elements. This embodiment differs from the above described structure in that the body member 32 is provided with a cylindrical wall 88 surrounding the stem portion 44a, and the diameter of the tube 86a is relatively increased so as to avoid substantial contact with the stem portion 44a and to fit snugly within the wall 88.

In Figs. 6, 7, 8 and 10 there is shown another modified form of the present invention which is similar to the above described structure as indicated by the application of identical reference numerals with the suffix "b" added to corresponding elements. In this embodiment, the body member 32b is modified for assembly with a sheet material cap member 90 which, in turn, is adapted to be secured to the bead 30b of the container top. As shown in Fig. 7, the cap member 90 which may be from sheet metal is initially formed so as to include a peripheral inverted U-shaped section 92, and intermediate annular portion 94 having a generally U-shaped cross section including upstanding walls 96 and 98, and a central inwardly extending annular flange 100. The body member 32b is provided with a peripheral flange 102 having opposite sides thereof flowing upwardly and outwardly as shown best in Fig. 8. The body member 32b is assembled with the cap member by shifting it from the position shown in Fig. 7 up through the central aperture in the cap member flange 100 until the body member flange 102 engages the cap member flange. Then the flange 100 and the wall 96 of the cap member are crimped around the flange 102 of the body member as shown in Figs. 6 and 8 by suitable tool means, not shown. The upwardly flaring shape of the body member flange and the complementary shape of the flange retaining sections of the cap member serve to strengthen and rigidify the assembly. Upon application of the cap member of the container top, the section 92 and the wall 98 are deformed or crimped by suitable tool means, not shown, so that the cap member is securely interconnected with the bead 30b of the container top.

Fig. 9 shows another modified form of the present invention which is similar to the structure shown in Figs. 1 through 4 as indicated by the application of identical reference numerals with the suffix "c" added to corresponding elements. This embodiment differs only in that the cylindrical wall portion 60c of the actuating and nozzle member 42c is provided with an outwardly flaring cam surface 104 spaced above the annular shoulder 64c sufficiently normally to be located above the flange 66c. It will be appreciated that when the member 42c is depressed, the resilient flange 66c and the portion of the body member from which the flange extends will be flexed outwardly. As a result, the flange 66c resiliently presses against the cam surface 104 so that when the member 42c is released by the operator it is cammed upwardly toward its normal position. This action complements the resilient forces provided by the fingers 46c and insures proper closing of the valve. In addition, the pressure which must be applied by an operator to force the cam surface 104 past the flange 66c gives the operator a feeling of doing work so that the valve assembly has a "feel" which has been found to be beneficial in promoting proper operation of the device.

From the above description it is seen that the present invention has provided a novel valve structure which has a reduced number of simple parts that may be easily manufactured and assembled so as to promote the provision of a more economical dispensing container. It should also be appreciated that the valve assembly may be easily applied to a container using procedures now

5

employed, and in this connection, it should be noted that the valve body may first be applied to the container whereupon the container may be filled by injecting the product and gas through the passageway 48 and the member 42 may be applied by machinery presently in use. It is further seen that the present invention has provided a novel valve assembly which may be manufactured economically from completely non-metallic materials so that the assembly is especially adapted for use with containers of caustic products.

While the preferred embodiments of the present invention have been shown and described herein, it is obvious that many structural details may be changed without departing from the spirit and scope of the appended claims.

The invention is claimed as follows:

1. A dispensing valve assembly comprising one-piece body means adapted to be mounted on a container and having an axially extending passageway completely therethrough surrounded by a valve seat, a valve member cooperable with said valve seat for closing said passageway, annularly disposed resilient means integral with an inner end of said body means and disposed behind and yieldably retaining said valve member for engagement with said valve seat, said resilient means being expandable during initial assembly of the valve member for enabling passage of the valve therethrough and into engagement with the valve seat, and a one-piece dispensing member axially slidably interconnected with an outer end portion of said body means and separate from said valve member, said dispensing member including an element extending through said passageway for engaging and shifting said valve member from said valve seat when the dispensing member is shifted axially inwardly relative to said body member, and means providing a discharge passageway through said dispensing member and communicating with said first mentioned passageway.

2. A dispensing valve assembly comprising a one-piece body member adapted to be mounted on a container and having an axially extending passageway therethrough surrounded by a valve seat, a valve member cooperable with said valve seat for closing said passageway, a plurality of annularly spaced generally axially extending resilient flexure spring means integral with an inner end of said body member and disposed behind and yieldably retaining said valve member for engagement with the valve seat, said flexure spring means being expandable during initial assembly of the valve member for enabling the valve member to be forced thereby and into engagement with the valve seat, and a one-piece dispensing member separate from said valve member and axially slidably interconnected with said body member, said dispensing member including an element extending through said passageway for engaging and shifting said valve member from said valve seat when the dispensing member is depressed axially, and means providing a discharge passageway through said dispensing member and communicating with said first mentioned passageway.

3. A dispensing valve assembly comprising a one-piece plastic body member adapted to be mounted on a container having an axially extending passageway therethrough surrounded by a valve seat, a valve member cooperable with said valve seat for closing said passageway, annularly arranged resilient means integral with an inner end of said body member and extending behind and yieldably retaining said valve member for engagement with said valve seat, said resilient means being expandable during initial assembly of the valve member for permitting the valve member to be forced therethrough and into engagement with the valve seat, and a one-piece dispensing member axially slidable with respect to the valve member and including a cylindrical section telescopically associated with a body member section surrounding said passageway, interengageable shoulder means on said sections for preventing axial separation of the dispensing

6

member from the body member, one of said shoulder means being yieldable to permit assembly of said sections, and said dispensing member including an element within said cylindrical section and extending through said passageway for engaging and shifting the valve member when the dispensing member is actuated, and means providing a discharge passageway through said dispensing member and communicating with said first mentioned passageway.

4. A dispensing valve assembly comprising a plastic body member adapted to be mounted on a container and having an axially extending passageway therethrough surrounded by a valve seat, a valve member cooperable with said valve seat, means on said body member yieldably retaining said valve member for engagement with the valve seat, and a dispensing member axially shiftable with respect to said body member including a cylindrical section telescopically extending around a body member section surrounding said passageway, one of said sections having a tapering surface for increasingly aggressively engaging the other of said sections when the dispensing member is depressed axially to prevent the contents of the container being dispensed from passing between said sections, said dispensing member including an element within said cylindrical section and extending through said passageway for engaging and shifting the valve member from the valve seat when the dispensing member is depressed, and means providing a discharge passageway through said dispensing member and communicating with said first mentioned passageway.

5. A dispensing valve assembly comprising a body member adapted to be mounted on a container and having a passageway therethrough surrounded by a valve seat, a valve member cooperable with said valve seat, means on said body member yieldably retaining said valve member for engagement with said valve seat, and a dispensing member axially shiftable relative to said body member and including a cylindrical section telescopically extending around a body member section surrounding said passageway, one of said sections being radially yieldable and one of said sections having a flaring cam surface engageable with the other of said sections so that when the dispensing member is depressed axially and then released the dispensing member is cammed outwardly, said dispensing member including an element within said cylindrical section and extending through said passageway for engaging and shifting said valve member from the valve seat when the dispensing member is depressed, and said dispensing member including discharge passageway means therethrough communicating with said first mentioned passageway.

6. A dispensing valve assembly comprising a plastic body member adapted to be mounted on a container and having a passageway therethrough surrounded by a valve seat, a valve member cooperable with said valve seat, resilient means on said body member yieldably retaining said valve member for engagement with the valve seat, and a dispensing member including a cylindrical section telescopically and axially slidably associated with a yieldable body member section surrounding said passageway, said cylindrical section having a generally axially extending and radially flaring cam surface increasingly aggressively engageable with said yieldable section when the dispensing member is depressed so that the dispensing member upon being released is cammed outwardly, said dispensing member including an element extending through said passageway for engaging and shifting said valve member from the valve seat when the dispensing member is depressed, and discharge passageway means through said dispensing member and communicating with said first mentioned passageway.

7. A dispensing valve assembly comprising a one-piece plastic body member adapted to be mounted on a container and having a passageway therethrough surrounded

7

by a valve seat, a valve member cooperable with said valve seat, resilient means on said body member yieldably retaining said valve member for engagement with the valve seat, means providing an annular recess having an open upper end surrounding said passageway, said body member including an annular flange extending from a wall of said recess, and a one-piece dispensing member including a cylindrical section having an end portion thereof slidably disposed within said recess, shoulder means on said cylindrical section engageable with said annular flange for preventing axial separation of the dispensing member from said body member, said dispensing member including an element extending through said passageway for engaging and shifting the valve member from the valve seat when said dispensing member is depressed, and discharge passageway means through said dispensing member and communicating with said first mentioned passageway.

8. A dispensing valve assembly comprising a one-piece plastic body member including a central section having a passageway therethrough surrounded by a valve seat, said body member including a relatively thin annular flange section extending laterally from said central section and comprising a peripheral portion having annular radially outwardly facing groove means therein for receiving an edge of a container and an annular portion extending axially and radially inwardly from said peripheral portion so that when the body member is applied to a pressurized container the pressure forces said peripheral portion into aggressive sealing engagement with said container edge, a valve member cooperable with said valve seat, resilient means integral with said body member yieldably retaining said valve member for engagement with the valve seat, and a dispensing member slidably interconnected with said body member, said dispensing member including an element extending through said passageway for engaging and shifting said valve member from the valve seat when the dispensing member is actuated, and means providing a discharge passageway through said dispensing member and communicating with said first mentioned passageway.

9. A dispensing valve assembly comprising a plastic body member having an axially extending passageway therethrough surrounded by a valve seat, said body member including a peripheral upwardly inclined flange having axially inner and outer upwardly inclined end surfaces, an annular sheet material member including an inner marginal section sealed with respect to said flange and conforming to and engaging the axially inner and outer and peripheral surfaces of said flange and a peripheral portion adapted to be connected to a container, a valve member cooperable with said valve seat, resilient means integral with said body member yieldably retaining said valve member for engagement with the valve seat, and a dispensing member axially slidably interconnected with said body member, said dispensing member including an element extending through said passageway for engaging and shifting the valve member when the dispensing member is depressed, and means providing a discharge passageway through said dispensing member and communicating with said first mentioned passageway.

10. A dispensing valve assembly comprising body means adapted to be mounted on a container and having an axially extending passageway therethrough surrounded by a downwardly facing valve seat, a valve member cooperable with said valve seat, annularly arranged resilient means and extending beneath and integral with said body means yieldably retaining said valve member for engagement with the valve seat, an elongated tube having an upper end portion having a cylindrical surface disposed for communicating with said valve seat and secured to a lower end section of said body means having a cylindrical surface by means of a force fit between said cylindrical surfaces, said tube being adapted to extend toward a container bottom, and a dispensing member

8

axially slidably interconnected with said body means, said dispensing member including a discharge passageway communicating with said first mentioned passageway and an element extending through said first mentioned passageway for engaging and shifting the valve member from said valve seat when the dispensing member is actuated.

11. A dispensing valve assembly comprising a one-piece plastic body member adapted to be mounted on a container and having an axially extending passageway therethrough surrounded by a downwardly facing valve seat, a valve member cooperable with said valve seat, said body member including a hollow depending stem portion having integral resilient means projecting beneath and yieldably retaining said valve member for engagement with said valve seat, a tube for extending toward a bottom of a container, said tube having an upper end portion telescoped over said stem portion with a force fit, and a dispensing member axially slidably interconnected with said body member, said dispensing member including discharge passageway means therethrough communicating with said first mentioned passageway and an element extending through said first mentioned passageway for engaging and shifting the valve member from said valve seat when the dispensing member is actuated.

12. A dispensing valve assembly comprising a one-piece plastic body member adapted to be mounted on a container and having a passageway extending axially therethrough and surrounded by a downwardly facing valve seat, a valve member cooperable with said valve seat, resilient means integral with said body member yieldably retaining said valve member for engagement with the valve seat, said body member including a cylindrical surface at its inner side and generally concentric with said valve seat and surrounding said resilient means in radially spaced relationship thereto, a tube adapted to extend toward a bottom of a container and having its upper end disposed within said cylindrical surface with a force fit and communicating with said valve seat, and a one-piece dispensing member axially slidably interconnected with said body member, said dispensing member including discharge passageway means therethrough communicating with said first mentioned passageway and an element extending through said first mentioned passageway for engaging and shifting said valve member from the valve seat when said dispensing member is actuated.

13. A dispensing valve assembly comprising a one-piece plastic body member adapted to be mounted on a container, and having a passageway therethrough surrounded by a downwardly facing valve seat, a valve member disposed for cooperation with said valve seat, said body member including a plurality of annularly arranged resilient integral finger means yieldably retaining said valve member for engagement with the valve seat, and a one piece dispensing member axially slidably interconnected with said body member, said dispensing member including means providing a discharge passageway therethrough communicating with said first mentioned passageway and an element extending through said first mentioned passageway for engaging and shifting said valve member from said valve seat when the dispensing member is depressed.

14. A dispensing valve assembly comprising a one-piece plastic body member adapted to be mounted on a container and having a generally centrally located axially extending passageway completely therethrough surrounded by a downwardly facing valve seat, a ball-like valve member disposed for cooperation with said valve seat, a plurality of annularly arranged resilient finger means integral with said body member projecting beneath and yieldably biasing said valve member against said valve seat, and a one-piece plastic dispensing member including a cylindrical section slidably telescopically associated with a body member section surrounding said passageway, interengageable shoulder means on said sec-

tions for preventing axial separation of the dispensing member from the body member, one of said shoulder means being yieldable to permit assembly of said sections, one of said sections including a tapering surface increasingly aggressively engaging the other of said sections when the dispensing member is axially depressed to prevent the contents of a container being dispensed from passing between said sections, said dispensing member including means providing a discharge passageway therethrough communicating with said first mentioned passageway, and an elongated element extending through said first mentioned passageway for engaging and shifting said valve

5

10

member from said valve seat when said dispensing member is depressed.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 2,854,176

September 30, 1958

Bryant Edwards

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 3, line 58, for "as tube" read -- a tube --; column 4, line 41, for "member of" read -- member to --; column 7, line 67, strike out "and extending beneath and" and insert the same after "means" in line 68, same column.

Signed and sealed this 17th day of February 1959.

(SEAL)
Attest:

KARL H. AXLINE
Attesting Officer

ROBERT C. WATSON
Commissioner of Patents