

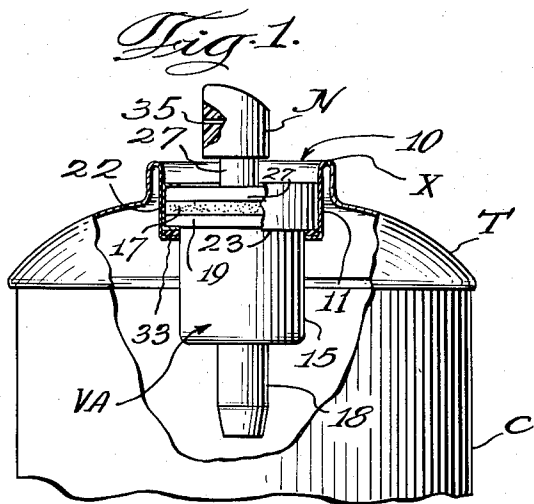
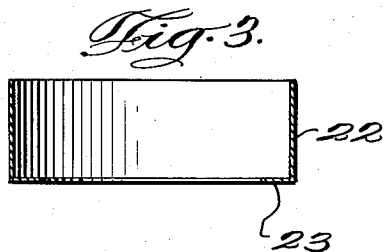
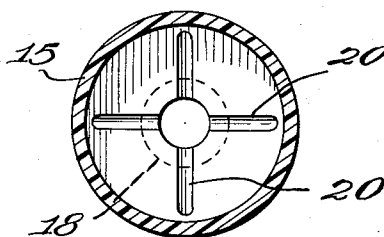
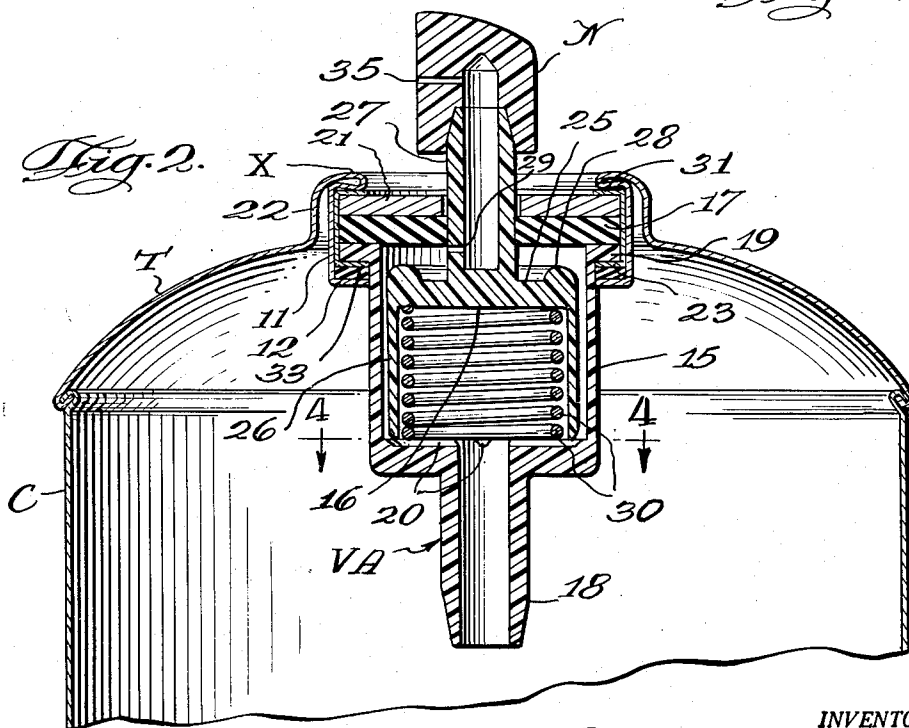
Dec. 17, 1963

H. C. KAPPEL
DISPENSER VALVE

3,114,483

Filed Nov. 25, 1960

2 Sheets-Sheet 1



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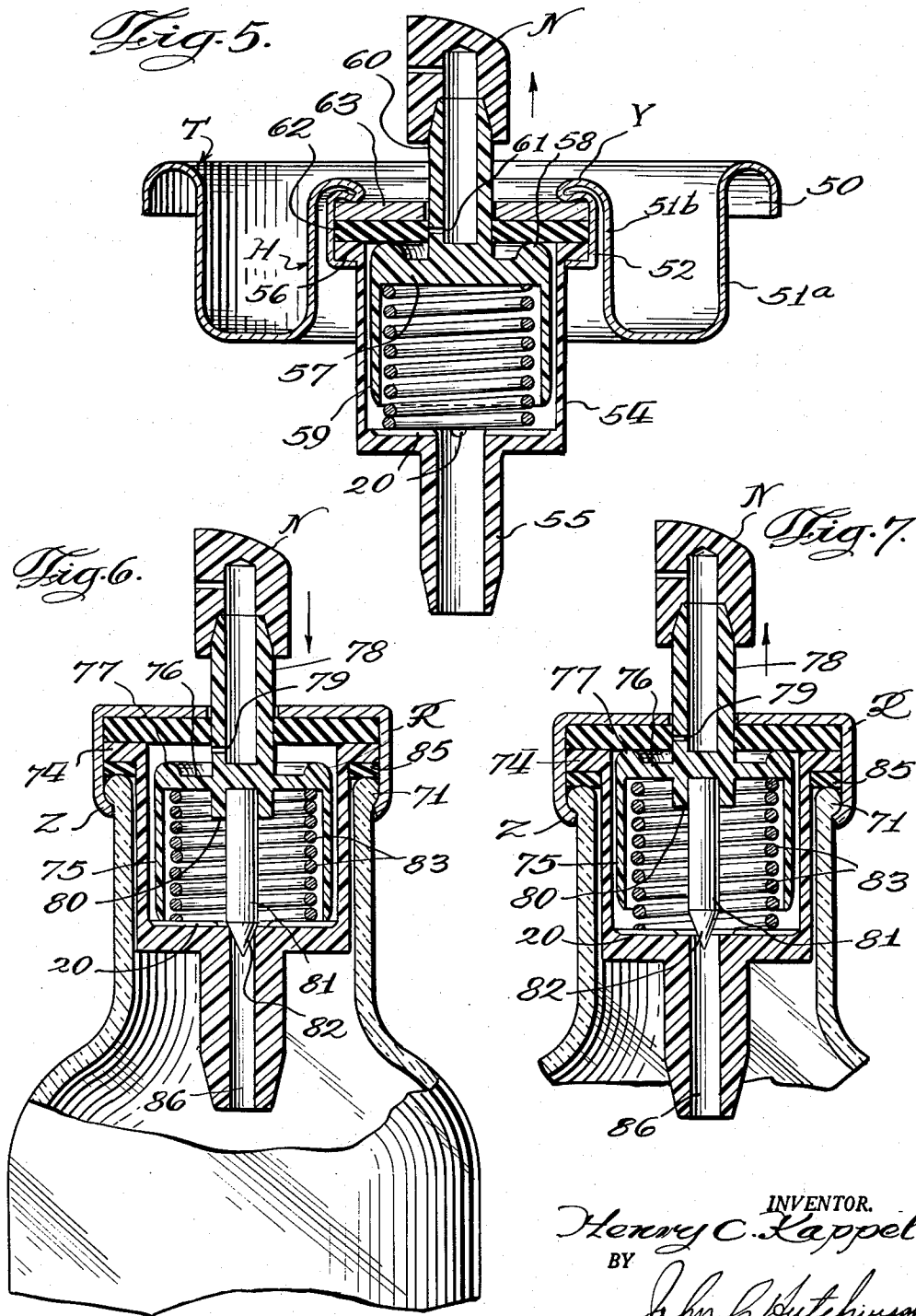
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DISPENSER VALVE

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This invention is concerned with dispensers of the aerosol type and, more particularly with improved valve assemblies for such dispensers.

As is apparent from a review of the numerous patents issued, many types of valves have been developed for use with aerosol dispensers, whereby the contents of the dispenser under the influence of a confined gas may be discharged as a spray or mist. Some valves are designed for the purpose of obtaining special dispensing action. In other instances, valves are designed with the objective of improving manufacturing and assembly operations and correspondingly reducing costs. The latter feature is of special interest in connection with the valve design disclosed and claimed in my now abandoned application S.N. 60,727 filed October 25, 1960 and entitled Valve Assembly.

The present invention has as one of its objects an improved valve design for an aerosol-type dispenser which enables a more rapid assembly of the valve and dispenser.

Another object is to provide a basic valve assembly which may be used with various types of dispensers, thereby permitting a greater degree of standardization in dispenser manufacture and assembly.

A further object is the provision of a valve whose component parts are designed in such manner that they are particularly adaptable for mass production.

These and other objects will be more readily apparent from the following specification and drawings.

FIGURE 1 is a partial elevation, partly broken away, illustrating one type of valve assembly contemplated by the present invention in position within the top of a dispenser prior to deforming a part of the top to form a permanent assembly.

FIGURE 2 is an enlarged partial elevation, in cross section, of the dispenser of FIGURE 1 showing in detail the valve components.

FIGURE 3 is an elevation, partly in cross section, of a retainer which may be used with the valve assembly.

FIGURE 4 is a view taken along line 4-4 of FIGURE 2 and shows the design of the bottom of the valve assembly housing.

FIGURE 5 is a cross sectional elevation of a modified valve assembly and container top.

FIGURE 6 is an elevation, partly in cross section, of a further modified valve assembly and dispenser.

FIGURE 7 illustrates the closed position of the valve of the modified valve assembly shown in FIGURE 6.

The valve assembly disclosed and claimed in my aforementioned copending application includes a valve housing which is formed simultaneously with and as an integral part of the dispenser top. The valve housing opens upwardly as viewed from the top of the dispenser thereby enabling the component parts of the valve assembly to be inserted from the top resulting in a more rapid assembly operation. A somewhat similar concept is included in the present invention in that the valve assembly components are installed into an upwardly opening housing. However, the valve housing of this invention is an independent component separate from the dispenser top.

The basic components of the valve assembly contemplated by the present invention comprise a valve housing, a reciprocally operable valve, a sealing gasket dis-

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posed across the open top of the housing and a spring disposed within the housing normally urging the valve into a closed position against the gasket. Additional components are included with the above as are required by the particular type of dispenser with which the valve is used and by the special assembly operations that may be involved with a particular type of dispenser. In one embodiment the valve assembly may be suspended from the dispenser top independent of the sides while in another embodiment the valve assembly may be supported at its periphery between the upper edge of the container portion of a dispenser and top of the dispenser.

For a more detailed description, reference will be made to the drawings and initially to FIGURES 1, 2, 3 and 4. The dispenser illustrated is in these figures composed of three principle components, namely a container C, a top T and a valve assembly indicated generally by the letters VA. The top T may be secured to the upper edge of the container C by any appropriate means to form a unitary assembly. One method which may be used consists of overlapping and permanently crimping opposing edges of the top and container in the manner shown in FIGURE 2.

Although not shown, an alternate modification consists of forming the container and top as an integral unit from a single blank or billet of metal or other material by draw molding or similar technique. If such a technique is employed, the bottom of the container would normally be open to permit access of forming tools, dies, etc., and then would be subsequently closed by application of a bottom plate suitably attached to the lower edges of the container. Unitary containers of the foregoing type are disclosed and claimed in my copending application S.N. 60,727, filed October 25, 1960, entitled "Valve Assembly."

Top T is provided with a centrally located circular opening 10 formed by deformation of a part of the top T into a vertically extending circular wall 11. As indicated, the circular wall 11 preferably extends above and below the general plane of the top. Additionally, the bottom edge of the wall 11 is deformed so as to provide an inwardly extending flange 12, upon which is supported the valve assembly, as further described hereinafter.

The valve assembly VA includes a valve housing 15, a valve 16, and a gasket 17. As shown, the housing 15 is somewhat cup-shaped, being open at the top and substantially closed at the bottom except for a tubular extension 18 depending from the bottom thereof and adapted to receive an eduction tube, not shown. The upper edge of the housing is provided with an outwardly extending lateral flange 19. As perhaps best indicated by FIGURE 4, the bottom of the valve housing 15 may be provided with one or more depressions 20 to permit passage of the dispenser contents around the valve skirt in its lower most position.

The valve housing 15 is designed in such a manner that it readily lends itself to a relatively simple molding operation. Thus, the housing may be molded from a variety of plastic materials normally impervious to gases and non-reactive toward the particular contents of a dispenser with which the valve housing may be used.

Valve 16 is preferably formed as an integral unit and may be molded from a suitable plastic in the same manner as the valve housing. The valve 16 is composed of a base 25 having a downwardly extending peripheral skirt 26 and an upwardly extending tubular valve stem 27. Formed as an integral part of the valve body is a continuous projection 28 disposed on the upper surface of the base 25.

Projection 28 is adapted to be forced against the underside of gasket 17 when the valve is in its uppermost or

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closed position to form a seal. Also provided is a lateral port 29 extending through the wall of the valve stem 27, adapted to provide communication between the bore of the tubular stem and the valve housing chamber when the valve is in the open position. Spring 30 disposed within the confines of skirt 26 is adapted to normally urge the valve upwardly in a closed position.

In the particular embodiment of the valve assembly shown in FIGURES 1 and 2 there are associated with the aforementioned components a washer 21, usually metal, and a retainer 22 adapted to hold the components comprising the valve assembly in permanent relationship. The retainer is normally formed with a lower flange 23. In assembling the components of valve assembly, the valve housing is initially inserted through the retainer with the underside of the housing flange 19 resting on the upper side of retainer flange 23. Spring 30 and valve 16 are then inserted in the housing 15 with the spring disposed within and surrounded by the skirt 26 and the valve stem 27 projecting upwardly above the housing. Gasket 17, provided with a small opening for valve stem 27, is next placed in position on the upper side of flange 19. The gasket is normally formed of an impervious and chemically resistant material such as neoprene or buna N, and extends between the inner wall of retainer 22 and the outer surface of valve stem 27 to provide a tight seal for the chamber of housing 15.

After gasket 17 has been placed in position, the washer 21 is then installed over the valve stem and onto the top of the gasket. The final assembly operation to fix the components of the valve assembly into a permanent unit consists of inwardly deforming the upper edge of the retainer 22, to form, in effect, an upper flange 31. As illustrated in FIGURE 2, retainer 22 may thus be employed to permanently hold as a unitary sub-assembly the valve housing, valve, spring, gasket and washer.

The aforementioned sub-assembly as a complete unit may be inserted directly into the opening 10 of a dispenser top T and supported by the aforementioned flange 12. Preferably, before inserting the sub-assembly into the opening, a sealing gasket is initially placed in position on the flange 12. After the gasket and sub-assembly have been installed the upper portion of the wall 11, indicated by the letter X may then be deformed inwardly until it contacts the top of the retainer 22, thereby permanently uniting the valve assembly with the dispenser top T. FIGURE 1 illustrates the valve assembly in position within the opening 10 of the top T prior to deformation of the portion X, whereas FIGURE 2 shows the complete assembly after deformation of the portion X of the wall 11 to form the complete assembly. The valve assembly is thus retained between flange 12 and the deformed portion X of the top, which in effect, constitutes a second vertically spaced flange.

The final step in making the dispenser, other than filling, consists of installing an appropriate spray nozzle N, normally by means of a press fit, onto the top of the valve stem 27.

FIGURE 2 illustrates the valve in an open or discharge position attained by exerting downward pressure on nozzle N and against the opposing force of spring 30. In the open position port 29 of the valve stem is moved downward past the lower edge of gasket 17, thereby permitting communication between the chamber of the valve housing 15 and the bore of the valve stem 27. Correspondingly, when the valve is opened projection 28 on the upper surface of valve base 25 is forced downward and out of contact with the underside of gasket 17. The contents of the dispenser under the influence of an inert gas normally present, is forced upwardly from the container through tubular projection 18 into the chamber of the valve housing, around the valve skirt and then into the tubular valve stem by means of port 29. Discharge from the valve stem is accomplished by means of orifice 35 in nozzle N.

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Closure of the valve is obtained by release of pressure on nozzle N, whereupon projection 28 is forced against the underside of the gasket 17 and the valve stem 27 moved upwardly until port 29 has passed by the underside of gasket 17 and is actually closed off by the latter.

FIGURES 5, 6 and 7 disclose similar valve assemblies to the foregoing which are adapted for use with somewhat analogous dispensers having slightly modified designs.

In FIGURE 5 there is shown a modified design of a top T for a dispenser. A downwardly opening concave flange 50 extends around the periphery of the top T and is adapted to receive the upper edge of a container, not shown, to complete the dispenser. As illustrated by FIGURE 5, top T is deformed by stamping, etc., so as to provide a centrally located raised portion H surrounded by an annular recess. The annular recess is formed between outer wall 51a and inner wall 51b which are deformed portions of the top.

Inner wall 51b extends upwardly a distance which may be generally equivalent to the height of outer wall 51a and is then turned upon itself 180° forming a third wall 52 extending downwardly a short distance and terminating in an inwardly extending flange. Walls 51b and 52, as indicated in FIGURE 5, define an opening in the top by which is analogous to the opening 10 provided by the somewhat similar design of the top T of FIGURE 1 and the associated wall 11 and flange 12.

The valve assembly of FIGURE 5 may comprise a unitary sub-assembly, as described in connection with FIGURES 1 and 2. Alternately, if expedient, an assembly shown may be used wherein the retainer 22 is not employed. In this alternate embodiment, the basic components of the valve assembly are initially assembled within the central opening of the top T of FIGURE 5 in substantially the same manner as described when using the separate retainer. The valve assembly shown includes a similar valve housing 54 provided with a tubular extension 55 depending from the bottom thereof and a lateral flange 56 extending around its upper edge. Likewise, a valve similar to that disclosed in the embodiments shown in FIGURES 1 and 2 may be employed consisting of a base 57 provided with a continuous projection 58 on its upper surface, a downwardly extending peripheral skirt 59 and an upwardly extending tubular valve stem 60. A port 61 extends through the wall of the valve stem to provide communication with the valve housing chamber when the valve is open. Also provided is the usual spring to normally urge the valve in a closed position, a gasket 62 and washer 63.

In assembling the modified dispenser top and valve assembly of FIGURE 5, the valve housing, valve, spring, gasket and washer are initially disposed within the centrally located opening of top T, the assembly resting on and being supported by the inwardly extending flange at the bottom of wall 52. After these components are in position, that portion of the top T indicated by the letter Y is deformed inwardly onto the washer 63, thereby forming a permanent assembly. Nozzle N may then be placed on the top of the valve stem 60. In this embodiment wall 52 and its associated lower flange and upper deformation serve to hold the valve assembly components together in the desired position, thereby eliminating the need for the retainer 22, previously described.

Operation of the valve of the design of FIGURE 5 to discharge the contents of the dispenser is the same as that described previously in connection with FIGURES 1 and 2. In FIGURE 5 the valve is shown in its normally closed position.

FIGURES 6 and 7 illustrate a further modification wherein a valve assembly similar to that described hereinabove is employed with a special type of container to form a complete dispenser. As shown in these latter figures, the top of the container tapers inwardly forming a relatively narrow neck, a design characteristic of many glass bottles. The top of the neck surrounding the

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opening of the container is enlarged forming an outwardly projecting peripheral lip or flange 71. A valve housing is employed having the same design as that of the embodiments of the prior figures, the lateral flange of the housing being identified by the numeral 74.

Included within the housing is a reciprocally operable valve having a downwardly extending skirt 75 around the periphery of base 76. A continuous projection 77 is provided, adapted to form a closure with the underside of the gasket in the same manner as described in the previous embodiments. Extending upwardly from the base 76 is the hollow valve stem 78 provided with a lateral port 79 and the customary nozzle N. Disposed within the skirt is spring 83 normally urging the valve in a closed position.

The valve of FIGURES 6 and 7 incorporates an additional feature permitting discharge of a fixed quantity of the dispenser contents. This is accomplished by means of a supplemental valve which serves to close the opening between the dispenser container and the valve housing chamber. Thus, as shown in FIGURES 6 and 7, the underside of base 76 is provided with a short centrally located downwardly extending tubular stem 80. The bore of the stem 80 is designed so as to retain, by a press fit or otherwise, a valve 81. This valve is provided with a tapered end 82 adapted to be automatically inserted into the top of bore 86 of the downwardly extending tubular projection of the valve housing to which the eduction tube is normally attached, when pressure on nozzle N forces the main valve to its furthest downward position.

While the main valve and supplemental valve are illustrated as being two separate parts which are assembled to form a unitary body, it will be appreciated that the supplemental valve 81 may be formed simultaneously with and as an integral part of the main valve. A design of this type may be especially advantageous when the valve is molded from a plastic material.

By means of the supplemental valve which comprises a unitary part of and thus is controlled by operation of the main valve, metered quantities of fluidized agent can be discharged from the dispenser. Thus, upon initially opening the main valve by downward pressure on nozzle N, the dispenser contents will be discharged. Discharge will normally continue until further downward pressure forces supplemental valve 81 to close bore 86 preventing further discharge. On release of pressure on the nozzle a small metered amount may be likewise released through the nozzle orifice.

Returning to further description of the modifications of FIGURES 6 and 7, it can be seen that, in assembling the component parts of the dispenser, the valve housing is initially disposed within the opening of the neck of the container and supported by the flange 74 resting on lip 71. In order to obtain a seal, a gasket 85 is preferably disposed between the underside of the flange 74 and the top edge of the container opening. A gasket for the top of the valve housing is also provided in the same manner and for the same purpose as described in connection with the previous embodiments, the gasket being adapted to rest on the top of flange 74, as shown, and form a tight fit with valve stem 78.

All components of the valve assembly and associated gasket 85 are permanently held in position by retainer R usually formed of metal. This retainer, as shown, constitutes a top for the dispenser and extends over the top of the gasket, down and around the peripheral edges of the valve assembly projecting above the mouth of the container and is deformed, as at Z, to extend under lip 71. Retainer R will normally be placed in position over the stem 78 and deformed, as at Z, prior to installing nozzle N.

FIGURE 6 illustrates the valve in its furthest down-

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ward position wherein supplemental valve 81 has closed off the bore 86 of the tubular extension to which the eduction tube may be connected and which provides communication between the chamber of the valve housing and the dispenser container. FIGURE 7 illustrates the valve in the normally closed position resulting from the influence of spring 83.

As previously indicated, the valve assembly contemplated by this invention is so constructed and designed that it is readily adaptable for use with a wide variety of dispenser with little if any modifications. Accordingly, the present valve assembly offers appreciable advantages in standardizing dispenser assembly operations and correspondingly a reduction in costs.

Having described the invention and certain exemplary embodiments thereof, the same is only intended to be limited by the scope of the following claims.

I claim:

1. In a dispensing top for an aerosol container having an open upper end,

an annular member having an outer marginal portion adapted for mounting upon and sealed connection with the upper end of the container, an intermediate portion extending inwardly from said outer marginal portion, and an inner deformed portion including a reverse bend presenting an upper, inwardly extending flange defining the upper extremity of an opening in the member, a downwardly extending wall section, and an inward bend at the bottom of said wall section presenting a lower flange spaced vertically below said upper flange and defining the lower extremity of said opening in the member;

a separate cup-shaped valve housing having an outwardly extending annular, upper lip flange, a side wall extending downwardly from the last-mentioned flange and an apertured bottom;

an annular resilient gasket;

means mounting said housing in the opening of said member with said gasket superimposed upon said lip flange of the housing and said gasket and lip flange clamped in sealing relationship between said upper flange and said lower flange of said member; and valve means mounted in said housing.

2. In a dispensing top as set forth in claim 1, wherein said housing mounting means includes a washer element disposed between the upper flange of the member and said gasket in engagement with the upper face of the latter, said valve means including a valve member having a base and tubular stem rigid to and extending upwardly from said base, said stem extending through and being shiftable relative to the annular gasket and having a side wall provided with a port therein, said base being provided with an annular projection thereon in surrounding space relationship to the inner peripheral edge of said gasket, and means biasing said base in a direction to force said projection into annular line contact with the lower face of said gasket.

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