May 23, 1967 J. V. CROYLE 3,321,114

POP-UP DIAPHRAGM CLOSURE

Filed March 4, 1966

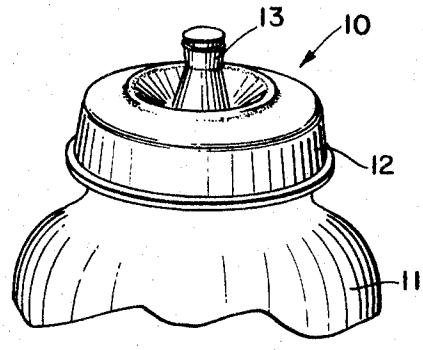

FIG. 1

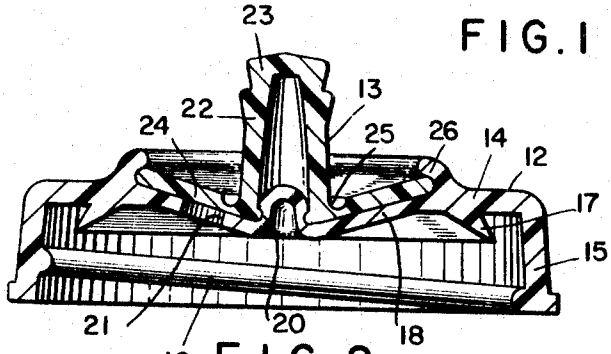

FIG. 2

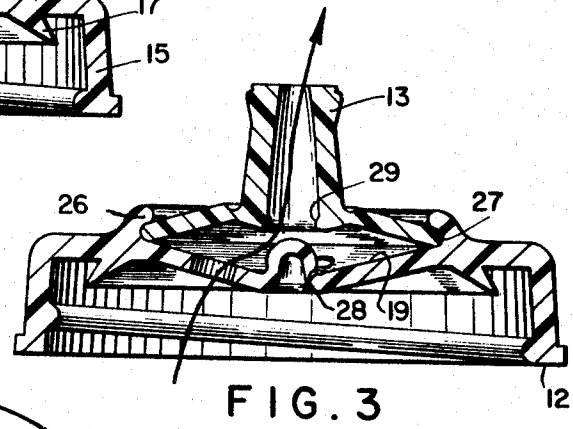

FIG. 3

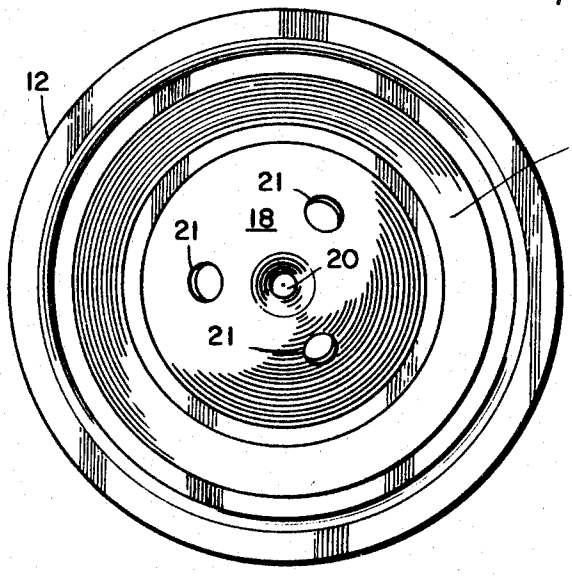

FIG. 4

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POP-UP DIAPHRAGM CLOSURE

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ABSTRACT OF THE DISCLOSURE

A fluid dispensing container closure of two-piece interconnected construction wherein the first piece is on the downstream side of the container and has openings therethrough adapted to be closed by the second piece. The second piece acts as a valve and is longitudinally movable in relationship to the first piece by means of a buckle hinge effect.

This invention relates to dispensing containers and more particularly to two-piece dispensing closures therefor. Two-piece dispensing closures of this general type are known and, accordingly, this invention is more particularly directed to improvements thereover.

It is desirable that dispensing closures for fluent substances such as free-flowing solids and liquids including detergents and the like be easily manipulated from an open dispensing position to a closed sealing position and that such actuating movement be obvious and simple to the user. It is also highly desirable that the closures be inexpensive as such are used primarily in conjunction with throw-away containers and, accordingly, their construction should be straightforward and simple. The assembly of the component parts preferably should also be readily capable of assembly through uncomplicated mechanical procedures.

It is also highly desirable that dispensing closures of the subject nature be self-cleaning in operation, that is, that possible product accumulations which would retard the dispensing operation of the device and present an unclean appearance are retarded or removed by the construction or operation of the device.

It is therefore the primary object of this invention to provide a closure of the subject type which accomplishes the above elicited desirable features and which, further, does not incorporate the many shortcomings of prior art devices.

It is also an object of the invention to provide a two-piece dispensing closure of novel construction and operation which is readily molded from plastic materials, e.g., by the injection molding process, and which is readily mechanically assemblable to operating condition.

With the above comments and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description, the appended claims and the several views illustrated in the accompanying drawing wherein like numerals refer to like parts.

In the drawing:

FIGURE 1 is a perspective view of a closure embodying the present invention illustratively shown in sealing position with an illustratively represented container of conventional design;

FIGURE 2 is a sectional view on an enlarged scale taken along the line 2—2 of FIGURE 1 and shows the interrelationship of the component parts of the closure in its closed sealing position;

FIGURE 3 is a sectional view similar to FIGURE 2 of the drawing but showing the closure in open dispensing position; and

FIGURE 4 is a bottom plan view of the closure shown in FIGURES 2 and 3.

Referring to the drawing in greater detail, the component parts of the subject dispensing closure are best shown in FIGURE 1 wherein the closure 10 is shown attached by conventional means such as screw threads or the like and in sealing engagement with a conventional bottle 11. The closure 10 is comprised of a fixed part 12 and a movable part 13.

The fixed part 12 is provided with a generally planar top wall closure portion 14 from which a circumferential flange or skirt 15 downwardly depends. The skirt 15 may be provided suitably with means such as threads 16 by which the fixed part 12 of the closure 10 may be attached to a bottle 11 or the like. Furthermore, conventional sealing means such as the resilient circular fin 17 illustrated may be utilized to provide a fluid seal between the neck of the container 11 and the closure itself.

It may be further seen from reference to FIGURES 2 through 4 that the fixed part 12 is further provided, preferably centrally thereof, with a valve seat 18, the upper surface 19 of which has been adapted for sealing receipt of the movable part 13. The valve seat 18 is further provided with a movable part positioning means 20 in the shape of an upwardly extending dome and a valve opening 21.

The movable part 13 is comprised of a dispensing opening or spout 22 which may be initially provided with a snip-off cap 23 at one end thereof so as to assure non-dispensing of product during the initial shipment of the full containers. The fixed part is further provided with a closure flange 24 integral with and radially extending from the spout 22 and connected thereto by means of a buckle type hinge means 25. Such buckle type hinge means 25 has been shown as a circular area of reduced wall thickness and, accordingly, it should be borne in mind that other buckle or snap type hinge means such as an inherently more flexible section at the interconnection of the spout 22 with the closure flange 24 may be utilized or that the reduced thickness hinges of less than full radius might also be utilized.

The operational construction of the closure 10 is completed through the provision of positioning means 26 for the peripheral portions 27 of the closure flange 24 by which such may be held in laterally fixed position relative to the fixed part 12 so as to permit the upward and downward flexure of the movable part 13 by means of the buckle hinge so as to provide for the opening and closing of the closure in a manner which will be more clearly hereinafter brought out. The attachment means 26 illustratively comprises an upwardly and inwardly directed bead portion which may or may not be continuous and, accordingly, could be of a slide lock type wherein projections positioned into engagement with corresponding holding portions of an outer member aid in eliminating lateral relative motion.

In operation the fixed part 12 and the movable part 13 are separately molded and assembled together by positioning the movable part in alignment with the fixed part and then snapping the peripheral portions 27 of the closure flange 24 beneath the attachment bead means 26 provided on the upper portion of the closure wall 14. Upon receipt of a container, the contents thereof may be readily dispensed through the closure of the present invention by applying an upward force upon the spout 22 so as to position the closure flange 24 thereof away from the valve seat 18 of the fixed part 12. This alternate dispensing position, as illustrated in FIGURE 3, will be maintained by means of the buckle hinge 25 and its positioning effect and, accordingly, it is readily discernible that the contents may be dispensed through the valve 21, into the space provided between the valve seat 18 and

he closure flange 24 longitudinally outwardly through he spout 22. Naturally any snip-off cap 23 that may iave been provided should be removed prior to dispens-ng. The boss 20 serves as a positioning means by which the relationship of the movable part to the fixed part is maintained and further additionally may provide a secondary sealing contact area between the movable part 13 and the fixed part 12 when laterally dimensioned slightly larger than the lower portions of the base opening of spout 22 in which such boss is received. The boss 20 may be further provided with an undercut 28 for receipt of an extension 29 from the spout walls as shown in FIGURE 3 and in this manner provides for locking said parts 12 and 13 in sealing closed position. The undercut and bead may alternatively be provided on respective opposite components.

The valve seat 18 is also, as shown, centrally depressed and, accordingly, the closure flange 24 passes through the horizontal plane formed by the peripheral portions 27 thereof from its stable upper open dispensing position shown in FIGURE 3 to its stable lower closed sealing position shown in FIGURE 2. Such positions of stability are brought about by positioning the closure flange, which is usually disc form in shape, into alternate conical presentation aided and to an extent increased by the provision of the hinge means 25.

Several valve openings 21 may be provided as operatively herein illustrated as three in number, and it should be further understood that the final dispensing of the contents need not be carried out through a conventional spout construction 22 as illustrated and that any dispensing opening offset from the valve openings 21 may be provided within the scope of the present invention so long as the longitudinal movement of the movable part 13 is effected for presenting the dispensing closure in an initial closed sealing position and in an opened dispensing position and that such is held in the latter position by means of the action of the valve closure hereinbefore described and illustrated.

It is thus believed that the present invention provides a two-piece dispensing closure which has wider utility and at the same time is simple and inexpensive to make and assemble.

While there is above disclosed but one major embodiment of the two-piece closure of the present invention, it is possible to produce still other embodiments without departing from the inventive concept as hereinafter set forth in the claims.

I claim:

1. A two-piece fluid dispensing closure for a container comprising: a fixed part having means for fluid sealing attachment to said container and a movable part operable with said fixed part to open dispensing and closed sealing positions therewith, said fixed part having a valve seat, attachment means adjacent to said valve seat for positioning said movable part in operable association therewith, said valve seat being in communication with the interior of said container and having a valve opening, said movable part having a closure flange positioned above said valve opening and a dispensing opening offset from said valve opening, said closure flange snappable between a first stable position of sealing contact with said valve seat in said closed sealing position and a second stable position in spaced relation to said valve seat in said open dispensing position, and wherein peripheral portions of said closure flange contact said fixed part attachment means and are held thereby in fixed lateral relation with said valve seat and wherein buckle type hinge means are employed, said buckle hinge means permitting longitudinal movement stress upon said movable part in all positions thereof except said stable closed sealing and open dispensing positions, said hinge means comprises a substantially continuous grooved portion within said closure flange adjacent to and surrounding said dispensing opening.

2. The closure construction of claim 1 wherein said valve seat is centrally depressed and wherein said movable part moves through a horizontal plane defined by said closure flange peripheral contacting portions from its stable upper open dispensing position to its stable lower sealing position.

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WALTER SOBIN, *Primary Examiner.*