March 3, 1964 R. J. MUSEL ETAL 3,123,259

DISPENSING CLOSURE FOR A CONTAINER

Filed Aug. 28, 1961

FIG. 1

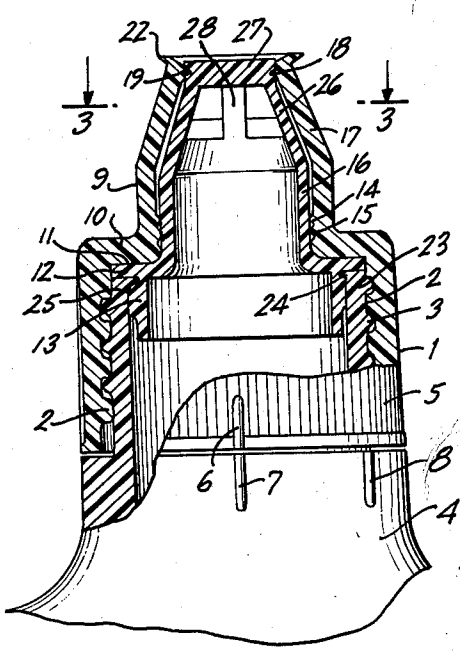


FIG. 3

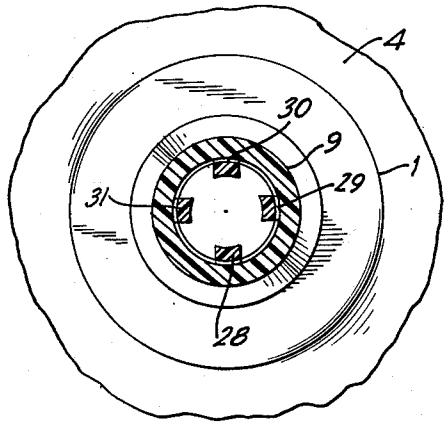


FIG. 5

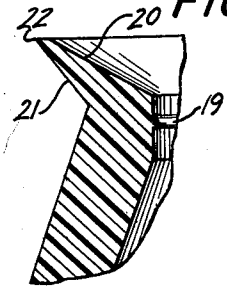


FIG. 2

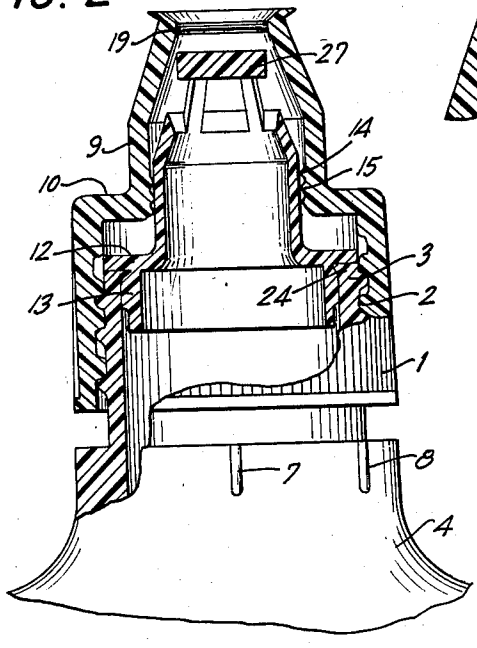
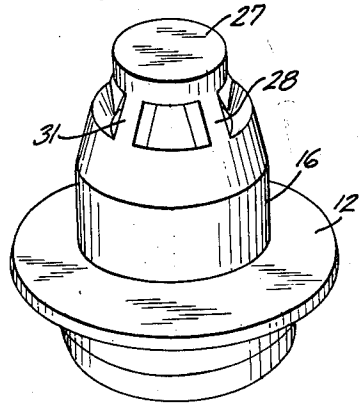


FIG. 4



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United States Patent Office 3,123,259 Patented Mar. 3, 1964

3,123,259

DISPENSING CLOSURE FOR A CONTAINER

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Filed Aug. 28, 1961, Ser. No. 134,210
4 Claims. (Cl. 222—521)

This invention relates to a dispensing closure for bottles containing liquids and is particularly useful as a closure for bottles of chemical reagents which need to be dispensed either dropwise or in a steady stream of predetermined rate of flow. The dispensing closure is also characterized by a special pouring lip which prevents the liquid from running down the outside of the closure after the dispensing operation has stopped and the bottle returned to a vertical position.

It is often desirable, particularly in chemical laboratories, to dispense corrosive acids and other liquids from bottles in extremely small amounts as drops, as well as in a steady stream, as when removing a relatively large amount of liquid from the bottle. When the operation is completed, the bottle is closed and returned to the shelf, but ordinarily a drop or so of liquid remains on the pouring lip of the bottle and slowly works its way down the outside of the bottle so that the bottle becomes coated with a thin film of the chemical reagent. When handling highly corrosive fluids such as hydrofluoric acid, this condition can be obnoxious and even hazardous. The present invention is directed to a bottle closure which has several important advantages over closures presently in use. The closure can be opened and the contents of the bottle removed without removing the cap. There is no chance of dropping the cap or having it pick up foreign matter and the contents of the bottle become contaminated. Liquids may be dispensed from the bottle at a measured rate varying from single drops to a steady flow. Drops of liquid do not cling to the pouring edge when the pouring is stopped. Any liquid that remains at the edge runs back into the container and does not seep down the outside of the bottle when the bottle is returned to the shelf. Other advantages of the invention will be apparent.

In order that the nature of the invention may be better understood, reference is made to the accompanying figures in which:

FIGURE 1 is a vertical cross section showing the essential features of the internal construction of the closure when in closed position;

FIGURE 2 is also a vertical cross section of the closure when partly opened;

FIGURE 3 is a plan view partly in section taken along lines 3—3 of FIGURE 1;

FIGURE 4 is a perspective of the fixed interior member of the closure assembly slightly enlarged; and

FIGURE 5 is a cross sectional view, also enlarged, of a portion of the pouring lip of the closure.

Referring again to FIGURE 1, it will be seen that the closure consists of a rotatable body portion 1 the lower cylindrical section of which having internal threads 2 engaing grooves formed by the external threads 3 of the neck 23 of bottle 4 which is shown only in part. The said body portion 1, which may also be called a cap, may be knurled on the outer lower surface as shown 5 and advantageously have raised portions 6 on its lower periphery to serve as indexing means. The neck of the bottle may also have similar indexing means 7 and 8 so that when the bottle is closed, indexing means 6 is in line with indexing means 7, for instance. Ordinarily there will only be one indexing means on the screw cap and several on the neck of the bottle which may be numbered consecutively if desired.

Above the threaded portion of the rotatable cap, the cross sectional diameter is reduced to a cylinder 9 joined by a shoulder 10 which provides a flat surface 11 which makes contact with a flange 12 of insert 13 when the cap is screwed down in closed position, thus holding the insert firmly in place and increasing the effectiveness of the seal. This intermediate section of the cap is of uniform internal diameter as shown and may be provided with small internally projecting beads 14, 15 which press against the outer cylindrical wall 16 of the insert and insure a liquid impermeable seal between the cylindrical section 9 of the cap and the outer cylindrical surface of the insert. The upper portion 17 of the cap is tapered inwardly in a frusto-conical shape as shown. The uppermost section 18 of the cap is cylindrical for a short distance and is also provided with one or more projecting beads 19 as shown to provide a tight seal between the cap and the insert when the cap is screwed down. These beads are shown to better advantage in FIGURE 5. Also as shown in FIGURE 5, the uppermost portion of the cap slopes sharply upwardly and outwardly on its upper side 20 and somewhat less sharply inwardly and downwardly on its lower side 21 to provide a sharp edge 22 which acts as a pouring lip and prevents the last large drop of liquid poured from the bottle from clinging to the edge and running down the sides of the cap.

The insert 13 fits into the neck 23 of the bottle as shown. An inwardly projecting bead 24 may be provided in the neck of the bottle, as shown, and the insert 13 may have a complementary groove, formed by a slight enlargement 25 of the insert, into which bead 24 fits so as to anchor the insert more firmly in place. The outer surface of the intermediate cylindrical portion 16 of the insert should be relatively smooth and straight-walled so that the sealing beads 14 and 15 will remain in contact therewith over the entire length of the cylinder as the cap is raised or lowered by turning the cap. The upper portion 26 of the insert is also of frusto-conical shape having the same taper as that of the rotatable cap as shown. A short section at the very top 27 again assumes a cylindrical form which is of substantially the same diameter as the circular opening at the top of the cap so that when the cap is screwed down onto the sealing flange 12 the solid circular section completely fills the opening thus effecting closure of the bottle.

Although the dispensing closure of the present invention may be made of any suitable material, the plastic composition known as polyethylene is particularly suitable as a material for constructing the closure as it is pliable and resilient and may be deformed slightly so that minor irregularities in the structure may be compensated for and the sealing beads 14, 15, 19 are thus more effective in performing their function. Any other similarly resilient material which is compatible with and resistant to the liquid to be placed in the bottle may also be used as a material for constructing the dispensing closure of the present invention.

In the frusto-conical section of the insert, openings are formed by ribs 28, 29, 30 and 31, shown to best advantage in FIGURE 3, which, as stated, is a cross section of this conical portion of the dispenser taken along lines 3—3 of FIGURE 1. These ribs may also be seen to good advantage in FIGURE 4 which is a perspective view of the insert.

As will be apparent from the foregoing description of the structure, screwing the outer cap down until shoulder 10 presses against flange 12 and the disc-like top member 27 completely fills the opening at the top as shown in FIGURE 1 closes the dispenser. To open the dispenser for pouring, the outer cap is turned until member 27 is removed from the circular opening in the outer cap as

shown in FIGURE 2. On tipping the bottle, liquid contents flow through the openings provided by ribs 28, 29, 30 and 31 into the space above and thence out through the opening and over the sharp edged pouring lip. If it is desired to dispense the liquid slowly or dropwise, the opening is made very small. For a larger stream, the cap is raised further.

As previously noted, the dispensing closure assembly is preferably made of polyethylene or similar resilient material which will yield slightly to pressure whereby a more effective seal is made at the several points where liquid might otherwise tend to leak through. An important advantage of the present invention is that the structure as described in readily molded with conventional machines at a high rate of speed and with low cost. The two piece construction of the dispensing closure is also an advantage because of its simplicity.

Although in FIGURE 1 of the drawing a space is shown between the insert and the outer sleeve, this has been done for purposes of clarity to better show the construction. Ordinarily, the two parts will fit very close together so that there is little space between the parts illustrated.

We claim:

1. A dispensing closure for a container having a cylindrical neck which comprises in combination an inner member having a lower cylindrical section adapted to be inserted into a round opening in the neck of the container, a substantially planar circular flange extending outwardly from the uppermost end of said cylindrical section and adapted to cover the endwall of the neck of the container into which it may be inserted an intermediate cylindrical section of smaller diameter than the lower cylindrical section above said flange, a frusto-conical section extending from the upper end of said intermediate cylindrical section with openings therein to permit flow of liquid through said frusto-conical section terminating in a circular disc-like structure with a side wall parallel to the axis of said inner member, an outer member having at the lower end a cylindrical section with screw threads in the internal wall thereof adapted to fit screw threads on the outer neck of the container, a substantially planar shoulder extending inwardly from the upper end of the lower cylindrical section to an intermediate cylindrical section, the internal diameter of said intermediate cylindrical section being substantially the same as the external diameter of the intermediate cylindrical section of said inner member, a frusto-conical section having a circular opening at the top, the walls of said opening being substantially parallel to the axis and of substantially the same internal diameter as the disc-like planar end section of the inner member so that the solid end section of the inner member may fit into said circular opening at the upper end of the frusto-conical section of the outer member and effectively close said opening, the upper most interior face of said outer frusto-conical sleeve extending upwardly and outwardly from the upper part of said circular opening at an angle to the axis of said member, the upper most exterior face of the said sleeve member extending outwardly and upwardly at a lesser angle to the axis of the said member than said interior face and forming a sharp pouring edge, and said outer frusto-conical sleeve has small sealing beads extending inwardly from the intermediate cylindrical section and sealing beads extending inwardly from the uppermost cylindrical section.

2. A dispensing closure in accordance with claim 1 in which the inner and outer members are of a resilient material.

3. A dispensing closure in accordance with claim 1 in which the lowermost cylindrical section of the inner member has an annular groove adapted to engage a bead inside the neck of a container.

4. In combination, a dispensing closure as described in claim 1 and a bottle, said bottle having on the outside of the neck thereof a plurality of indexing means and the dispensing closure having on the outer periphery of the lower cylindrical section of the outer member an indexing means whereby as the outer member is turned the outer sleeve will rise and the indexing means thereon will pass from opposite one indexing means on the neck of the bottle to another.

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