

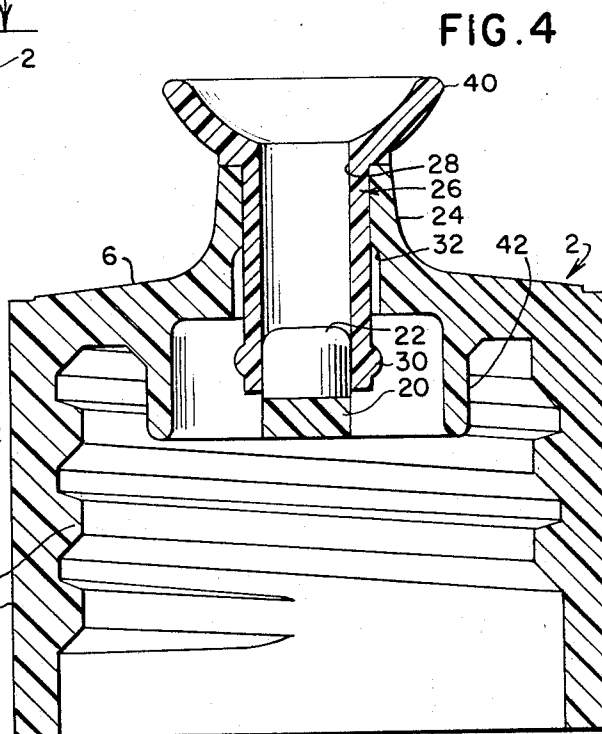
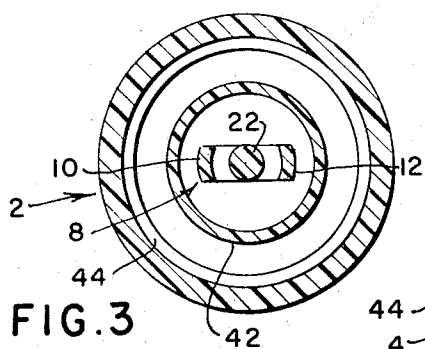
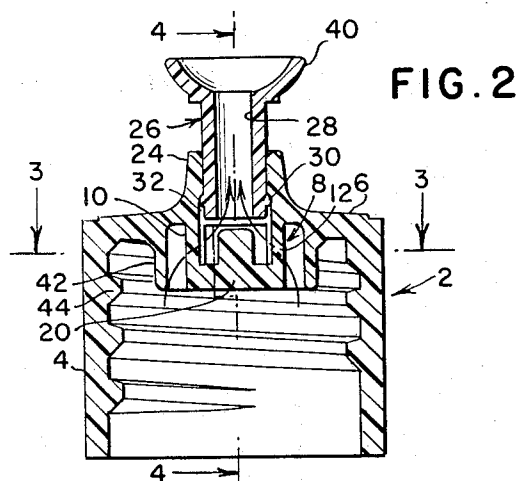
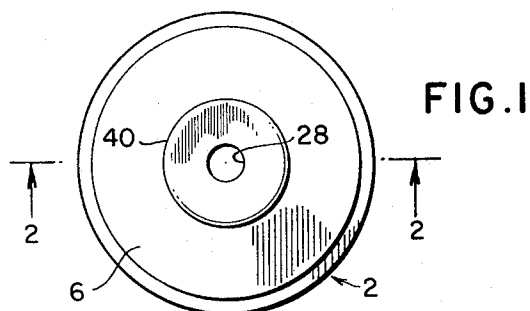
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DISPENSING CLOSURE WITH SLIDE

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DISPENSING CLOSURE WITH SLIDE

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This invention relates to a cap capable of being attached to a container for dispensing liquid. More particularly, this invention relates to a push-pull cap which does not impede the flow of liquid from a container.

Broadly, this invention contemplates a dispensing closure for a container capable of holding a liquid and comprising an elastomeric plastic top wall having an upwardly extending projection defining a passage extending through said extension and top wall, a stirrup having two diametrically positioned narrow arms connected at one end to the top wall adjacent the inner end of said passage and at the other end to a cross piece, a plug on said cross piece axially aligned with and extending toward said passage, an elastomeric plastic slider slidably mounted in said passage in fluid-tight relation thereto, said slider having therethrough a discharge channel adapted to mate with and be closed by said plug when said slider is positioned thereon, an enlargement on said slider at the outer end thereof to facilitate moving it outwardly off said plug and cooperative means in said passage and on the slider to limit normal outward movement of the slider after the inner end thereof is slid clear of said plug.

In the drawing, FIGURE 1 is a plan view of a cap embodying an invention;

FIGURE 2 is a vertical cross-sectional view along the line 2-2 of FIGURE 1;

FIGURE 3 is a plan-sectional view taken along the line 3-3 of FIGURE 2; and

FIGURE 4 is a cross-sectional view taken along the line 4-4 of FIGURE 2.

The cap comprises a side wall 4 and a top wall 6. Depending from the top wall is a stirrup, generally indicated as 8. This stirrup 8 has two diametrically positioned narrow arms 10 and 12, which are attached to the top wall 6. A cross piece 20 is connected to the end of each arm remote from the top wall 6. A plug 22 is intermediate to, and attached to, the cross piece 20 and extends upward toward the top wall 6.

The top wall 6 includes an upwardly extending projection or sleeve 24 which defines a passage through the top wall 6 and sleeve 24. The passage is axially aligned with the plug 22. An elastomeric plastic slider 26 having a discharge channel 28 therethrough is slidably disposed within the passage of the sleeve 24 in a fluid-tight manner. The discharge channel 28 of the slider 26 is axially aligned with and is capable of receiving in a fluid-tight manner the plug 22, so that when the slider is pushed down, the plug 22 will project, in a fluid-tight manner, into the discharge channel 28 of the slider 26 and will thus seal off said channel 28 from a container.

The slider 26 includes a rim 30 which cooperates with the shoulder 32 of the sleeve 24 to serve as a cooperative stopping means to limit the normal outward movement of the slider 26 after the slider 26 is clear of the plug 22.

The end of the slider 26 opposite the plug has a concave enlargement 40 which serves to limit the amount of drippage from the container after product has been discharged therefrom and after the container is returned to an upright position.

In order to assure a fluid-tight fit between the slider 26 and the plug 22, as well as the slider 26 and the sleeve 24, the clearance between said slider 26 and said sleeve

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24, as well as said slider 26 and said plug 22, at the point of contact of each with the slider is from about 0.003 to about 0.006 inch.

The cap includes a ring 42 which depends from the top wall 6 and surrounds the stirrup 8. This ring 42 is flexible and is capable of being deformed to effect a seal between the cap and a container when the cap is attached thereto.

The clearance between the ring 42 and any part of the stirrup 8 is at least 0.002 inch so that when the cap is attached to the container the ring 42 will deform to provide said seal without contacting the stirrup 8. In this manner, there is no possibility that the ring 42 will put pressure on the stirrup 8 and deform it thereby disturbing the alignment of the plug 22 with the discharge channel 28.

In order to provide the stirrup 8 with the desired strength and flexibility, the narrow arms 10 and 12 have a wall thickness of at least 0.09 inch and the cross piece 20 has a wall thickness of at least 0.14 inch.

The cap 2 may be attached to a container in any suitable manner and preferably by providing threads 44 on the inside surface of the side wall to mate with external threads on the bottleneck (not shown) of a container.

The cap may be molded in any suitable manner, such as by injection molding. It is preferable that the cap be manufactured from polyethylene having a density of from about 0.920 to about 0.940 because it has been found that polyethylene having a density within such a range provides a cap with the necessary flexibility and allows for the necessary slidability. However, the cap may also be molded from other materials which have a suitable flexibility and allow the necessary slidability.

When it is desired to dispense product from the container to which the cap is attached, the concave enlargement 40 is grasped and pulled up until the rim 30 of the slider 26 contacts the shoulder 32 of the sleeve 24. In this manner, the slider 26 is disengaged from the plug 22, as shown in FIGURE 2, without removing the slider 26 from the cap 27. The bottle is then tilted so that liquid may freely flow through the discharge channel 28 and be dispensed at the outer, concave-shaped enlargement 40 of the slider 26. After the desired amount of liquid has been dispensed, the container is returned to an upright position and the slider 26 is pushed down, thereby causing the plug 22 to enter the discharge channel 28 of the slider 26 (FIGURE 4) in a fluid-tight manner and prevent undesired discharge of contents of the container regardless of the angle at which the bottle is held.

It has been found that the aforescribed cap is particularly advantageous in that the structure of the stirrup and surrounding area does not impede the flow of liquid from a container. This is particularly advantageous when such a cap is used in conjunction with a container which holds a fairly viscous liquid which is to be dispensed.

While this invention has been described in terms of a preferred embodiment, the invention is not to be construed as limited except as set forth in the following claims.

I claim:

1. A dispensing closure for a container capable of holding a liquid and comprising an elastomeric plastic top wall having an upwardly extending projection defining a passage extending through said extension and top wall, a stirrup having two diametrically positioned downwardly extending narrow arms connected at one end to the top wall adjacent to the inner end of said passage and at the other end to a cross piece, each of said narrow arms defining a segment of an annulus, the sum total of said segments being less than 180°, a plug on said cross piece axially aligned with and extending

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toward said passage, an elastomeric plastic slider slidably mounted in said passage in fluid-tight relation thereto, said slider having therethrough a discharge channel adapted to mate with and be closed at its inner end by said plug when said slider is positioned thereon, an enlargement on said slider at the outer end thereof to facilitate moving it outwardly off said plug, and cooperative means in said passage and on the slider to limit normal outward movement of the slider after the inner end thereof is slid clear of said plug.

2. A dispensing closure for a container capable of holding a liquid and having an externally threaded neck comprising a molded elastomeric plastic cap having a cylindrical wall and a top wall, internal threads in said cylindrical wall adapted to fit the external threads on the container neck, said top wall having an upwardly extending central projection defining a passage extending through said projection and top wall, a stirrup having two diametrically positioned downwardly extending narrow arms connected at one end to the top wall adjacent to the inner end of said passage and at the other end to a cross piece, each of said narrow arms defining a segment of an annulus, the sum total of said segments being less than 180°, a plug on said cross piece axially aligned with and extending toward said passage, an elastomeric plastic slider slidably mounted in said passage in fluid-tight relation thereto, said slider having therethrough a discharge channel adapted to mate with and be closed at its inner end by said plug when said slider is positioned thereon, an enlargement on said slider at the outer end thereof to facilitate moving it outwardly off said plug and cooperative means in said passage and on the slider to limit normal outward movement of the slider after the inner end thereof is slid clear of said plug.

3. A dispensing closure for a container capable of holding a liquid and having an externally threaded neck portion comprising a molded elastomeric plastic cap having a cylindrical wall, a top wall connected to said cylindrical wall and internal threads in said cylindrical wall adapted to fit the external threads on a container neck, said top wall having an upwardly extending sleeve, the inner wall of said sleeve defining a passage extending through said sleeve and top wall, an elastomeric plastic slider disposed in said passage and having a discharge channel therethrough, said top wall having a flexible annular sealing ring depending therefrom and adapted to seal said neck portion, a stirrup having two diametrically positioned narrow arms connected at one end to the top wall and at the other end to a cross piece, each of said narrow arms defining a segment of an annulus, the sum total of said segments constituting a minor portion thereof, a plug on said cross piece axially aligned with and extending toward said passage, said plug being concentric to said arms, said plug being adapted to mate with said slider in fluid-tight relationship and cooperative means in said passage and on said slider to limit normal outward movement of said slider when said slider is free of said plug, whereby when said slider is lowered upon said plug, said plug is in fluid-tight relation with said plastic slider and the dispensing of fluid contents from said container is prevented.

4. A dispensing closure for a container capable of holding a liquid and having an externally threaded neck portion comprising a molded elastomeric plastic cap having a cylindrical wall, a top wall connected to said cylindrical wall and internal threads in said cylindrical wall adapted to fit the external threads on a container neck, said top wall having an upwardly extending sleeve, the inner wall of said sleeve defining a passage extending through said sleeve and top wall, an elastomeric plastic slider disposed in said passage and having a discharge channel therethrough, said slider having a concave enlargement at its outer end to limit the amount of drip-
page from the container after product is discharged

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therefrom and the container is returned to an upright position, said slider having a rim adjacent its inner end and on its outer wall, said sleeve having a shoulder on its inner wall, said shoulder and rim cooperatively limiting normal outward movement of said slider to prevent displacement of said slider from said cap, said top wall having a flexible annular sealing ring depending therefrom, a stirrup having two diametrically positioned narrow arms connected at one end to the top wall and at the other end to a cross piece, each of said narrow arms defining a segment of an annulus, the sum total of said segments constituting a minor portion thereof, a plug on said cross piece axially aligned with and extending toward said passage, said plug being concentric to said arms, said plug being adapted to mate with said slider in fluid-tight relationship whereby when said slider is lowered upon said plug, said plug is in fluid-tight relationship with said plastic slider and the dispensing of fluid contents from said container is prevented.

5. A dispensing closure for a container capable of holding a liquid and having an externally threaded neck portion comprising a molded elastomeric plastic cap having a cylindrical wall, a top wall connected to said cylindrical wall and internal threads in said cylindrical wall adapted to fit the external threads on a container neck, said top wall having an upwardly extending sleeve, the inner wall of said sleeve defining a passage extending through said sleeve and top wall, an elastomeric plastic slider disposed in said passage and having a discharge channel therethrough, said slider having a concave enlargement at its outer end to limit the amount of drip-
page from the container after product is discharged therefrom and the container is returned to an upright position, said slider having a rim adjacent its inner end and on its outer wall, said sleeve having a shoulder on its inner wall, said shoulder and rim cooperatively limiting normal outward movement of said slider to prevent displacement of said slider from said cap, said top wall having a flexible annular sealing ring depending therefrom, a stirrup having two diametrically positioned narrow arms of at least 0.09-inch wall thickness connected at one end to the top wall and at the other end to a cross piece of at least 0.14-inch wall thickness, each of said narrow arms defining a segment of an annulus, the sum total of said segments constituting a minor portion thereof, a plug on said cross piece axially aligned with and extending toward said passage, said plug being concentric to said arms, the difference between the lesser diameter of said plug and the diameter of said inner wall of said slider being from about 0.003 inch to about 0.006 inch, whereby when said slider is lowered upon said plug, said plug is in fluid-tight relation with said plastic slider and the dispensing of fluid contents from said container is prevented.

6. A dispensing closure for a container capable of holding a liquid and having an externally threaded neck portion comprising a molded elastomeric plastic cap having a cylindrical wall, a top wall connected to said cylindrical wall and internal threads on said cylindrical wall adapted to fit the external threads on a container neck, said top wall having an upwardly extending sleeve, the inner wall of said sleeve defining a passage extending through said sleeve and top wall, an elastomeric plastic slider disposed in said passage and having a discharge channel therethrough, said slider having a concave enlargement at its outer end to limit the amount of drip-
page from the container after product is discharged therefrom and the container is returned to an upright position, said slider having a rim adjacent its inner end and on its outer wall, said sleeve having a shoulder on its inner wall, said shoulder and rim cooperatively limiting normal outward movement of said slider to prevent displacement of said slider from said cap, said top wall having a flexible annular sealing ring depending therefrom, a stirrup spaced from said sealing ring by

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a distance of at least 0.002 inch on all sides thereof and having two diametrically positioned narrow arms of at least 0.09-inch wall thickness connected at one end to the top wall and at the other end to a cross piece of at least 0.14-inch wall thickness, each of said narrow arms defining a segment of an annulus, the sum total of said segments constituting a minor portion thereof, a plug on said cross piece axially aligned with and extending toward said passage, said plug being concentric to said arms, the difference between the lesser diameter of said plug and the diameter of said inner wall of said slider being from about 0.003 each to about 0.006 inch, whereby when said slider is lowered upon said plug, said plug is in fluid-tight relation with said plastic slider and the dispensing of fluid contents from said container is prevented.

7. A dispensing closure for a container capable of holding a liquid and having an externally threaded neck portion comprising a molded elastomeric plastic cap having a cylindrical wall, a top wall connected to said cylindrical wall and internal threads on said cylindrical wall adapted to fit the external threads on a container neck, said top wall having an upwardly extending sleeve, the inner wall of said sleeve defining a passage extending through said sleeve and top wall, an elastomeric plastic slider disposed in said passage and having a discharge channel therethrough, the outer wall of said slider being spaced from the inner wall of said sleeve by a distance of from about 0.003 inch to about 0.006 inch to assure a fluid-tight slidable fit of said slider in said passage, said slider having a concave enlargement at its outer end to limit the amount of drippage from the container after product is discharged therefrom and the container is returned to an upright position, said slider having a rim adjacent its inner end and on its outer wall, said sleeve having a shoulder on its inner wall, said shoulder and rim cooperatively limiting normal outward

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movement of said slider to prevent displacement of said slider from said cap, said top wall having a flexible annular sealing ring depending therefrom, a stirrup spaced from said sealing ring by a distance of at least 0.002 inch on all sides thereof and having two diametrically positioned narrow arms of at least 0.09-inch wall thickness connected at one end to the top wall adjacent to the inner end of said passage and at the other end to a cross piece of at least 0.14-inch wall thickness, each of said narrow arms defining a segment of an annulus, the sum total of said segments constituting a minor portion thereof, a plug on said cross piece axially aligned with and extending toward said passage, said plug being concentric to said arms, the difference between the diameter of said plug and the diameter of said inner wall of said slider being from about 0.003 inch to about 0.006 inch, whereby when said slider is lowered upon said plug, said plug is in fluid-tight relation with said plastic slider and the dispensing of fluid contents from said container is prevented.

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