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G. L. ROY

3,521,796

SLIDING PLUNGER DISPENSING CLOSURE

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Fig. 1

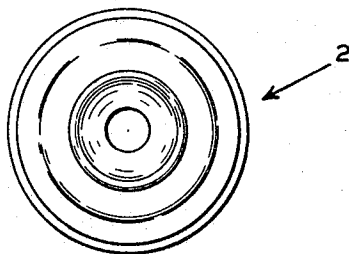


Fig. 2

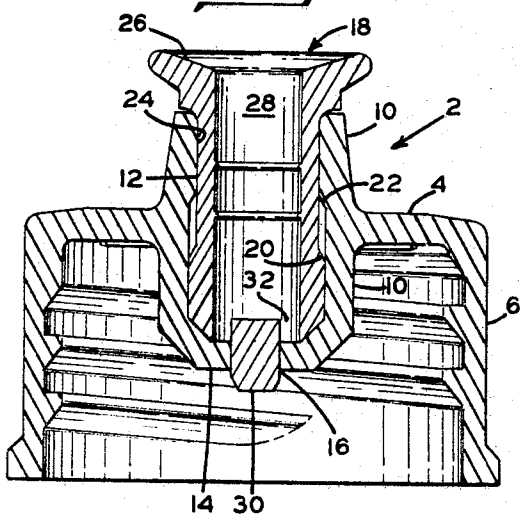


Fig. 3

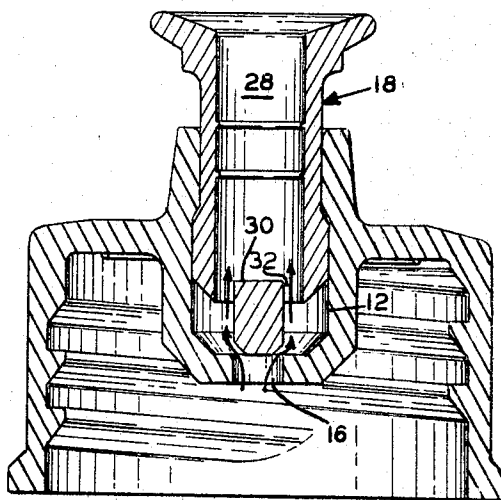
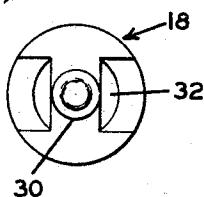


Fig. 4



INVENTOR
GERALD L. ROY

BY

Clifford B. Price

ATTORNEY

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SLIDING PLUNGER DISPENSING CLOSURE
Gerald L. Roy, Lancaster, Pa., assignor to Armstrong
Cork Company, Lancaster, Pa., a corporation of Penn-
sylvania

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1 Claim

ABSTRACT OF THE DISCLOSURE

A closure for a container embodying a dispensing plunger. The plunger located in the center of a closure is movable between an upward position and a downward position. When the plunger is in the downward position, the exit port is sealed. When the plunger is in its upward position, the exit port of the plunger is open and liquid may be dispensed.

BACKGROUND OF THE INVENTION

Field of the invention

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

Description of the prior art

Pat. No. 3,294,294 discloses one form of dispensing closure utilizing a reciprocating plunger which operates as a control valve. A post-like structure suspended in a support ring of the closure acts as the sealing means for the reciprocating plunger. The liquid being dispensed must pass around the supports for the post as it passes through the closure. The supports for the post must be sufficiently strong to hold the post in position, particularly when the plunger is pushed to its downward position and engages the post. The providing of supports sufficiently strong to hold the post in position unduly restricts the size of the passageway for the liquid being dispensed. The making of a larger passageway results in a weakening of the supports for the post. It is extremely difficult to secure just the proper balance of open passageway versus support to provide a closure capable of meeting a large number of various applications.

Pat. No. 1,643,285 discloses a reciprocating plunger dispensing closure being composed of several components. This closure requires that the inside dimension of the neck of the container be held to a critical dimension so that liquid will not escape around the periphery of the closure. Also it is difficult to determine when the closure is in its fully downward position so that the exit port for the liquid is closed.

The problems of the prior art are solved by the invention herein since the exit port feeds directly to the center of the reciprocating plunger and there is no need to balance size with structural strength. Further, when the reciprocating plunger herein moves into its sealing position, there is an audible click which clearly indicates the sealing of the exit port.

SUMMARY OF THE INVENTION

The invention contemplates a dispensing closure for a container capable of holding a liquid. The closure comprises an elastomeric plastic top wall having an upwardly and downwardly extending projection defining a passage extending therethrough. A plunger is reciprocally mounted within the passage. The lower end of the passage has a wall thereacross with an aperture therethrough. The plunger has a projection on its lower end, which pro-

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jection passes through the aperture in the wall at the lower end of the passage. The projection is slightly larger than the size of the aperture so that the projection is frictionally engaged by the walls of the aperture to provide a tight fit. Moving of the plunger to its upper position removes the projection from the aperture so that liquid may pass through the aperture. The plunger is provided with a passageway through its middle, the upper end of the passageway opening to the outside region of the closure and the lower end of the passageway having openings adjacent the projection. Once liquid can pass through the aperture in the lower wall of the dispensing cap, it is then free to pass through the passageway of the plunger to the outside of the container. Sliding the plunger to its lower position has the projection passing through the aperture sealing the aperture and providing an audible sound indicating that the aperture is sealed liquid tight.

BRIEF DESCRIPTION OF THE DRAWING

- FIG. 1 is a plan view of a cap embodying the invention;
- FIG. 2 is a vertical cross section of the closure with the plunger in its lower position;
- FIG. 3 is a vertical cross-sectional view of the closure with the plunger in its upward position; and
- FIG. 4 is a plan view of the projection end of the plunger.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1, there is shown a top view of the detergent cap 2. As shown in FIG. 2, the cap has a top wall 4 and a skirt portion 6. Threads on the internal portion of the skirt are used to fasten the closure cap assembly 2 to a liquid container. A projection 10 extends above and below the closure cap 4. In the center of the projection 10 is a passage 12 which is open at its upper end and partially closed at its lower end by a wall 14 which contains an aperture 16.

Reciprocally mounted within the passage 12 is a plunger assembly 18. Shoulder 20 on the plunger and shoulder 22 on the projection 10 limit the upward movement of the plunger assembly 18. The frictional fit between the outside wall of the plunger assembly 18 and the inside wall 24 of the projection 10 frictionally holds the plunger in its upward or downward position. The upper end of the plunger has a concave-shape enlargement 26. Passing through the plunger is a passageway 28. At the lower end of the plunger is a projection 30 with an outside diameter slightly larger than the diameter of the aperture 16 thereby insuring that insertion of the projection 30 into the aperture 16 provides a liquid-tight seal and prevents movement of the plunger upwardly without a substantial degree of force. This frictional fit between projection 30 and aperture 16 provides a secondary safety means to hold the plunger in the closed position should the frictional fit between plunger 18 and wall 24 be defective. Apertures 32 placed on either side of the projection 30 provide the lower opening for the passageway 28.

As shown in FIG. 2, the plunger is in its downward position and the projection 30 seals the aperture 16 to prevent escape of the liquid out through the passageway 28. As seen in FIG. 3 when the plunger is moved to its upper position, the projection 30 moves out of the aperture 16 and thereby allows passage of liquid through aperture 16, past projection 30, through apertures 32, up passageway 28 and outwardly of the liquid-containing bottle.

Pushing of the plunger to its downward position requires insertion of the projection 30 into the aperture 16 to seal the container. By having the diameter of the projection slightly larger than that of the aperture 16, a fric-

tional engagement will securely lock the plunger in its downward position. The forcing of the plunger through the aperture 16 provides a definite audible click which functions as an audible indicator to the user that the container is now sealed.

What is claimed is:

1. A dispensing closure for a container capable of holding a liquid, said closure comprising an elastomeric plastic top wall having a tubular projection extending both upwardly and downwardly from the top wall, a passage extending through said projection and top wall, a lower wall extending across the lower end of the passage in the projection and having an aperture therethrough, a tubular plunger reciprocally mounted within the passage and having a length equal approximately to the length of the projection, said plunger having a passageway there-through and being movable between a lower position in which the lower end of the plunger abuts the upper side of said lower wall and the upper end portion of the plunger extends only a short distance above said projection and an upper position in which the lower end of the plunger is spaced above the lower wall, a central downwardly extending projection on the lower end of the plunger having an external diameter slightly larger than the diameter of the aperture so that the projection is frictionally engaged within the aperture to provide a liquid-tight sealing of the aperture when the plunger is in said lower position, said central projection being withdrawn from the aperture to permit liquid to pass through the aperture when said plunger is in said upper position and the upper end portion of said plunger being enlarged and projecting radially and outwardly beyond the upper end of said projection when the plunger is in said lower

position for easy grasping by the user, openings on either side of the central projection communicating with the passageway through the plunger so that liquid passing through the aperture can pass through the openings adjacent the projection and up the passageway for discharge outwardly of the container, the closure top wall and the tubular projection being an integral one-piece molded plastic structure, the internal diameter of the passage of the tubular projection extending above the top wall being slightly less than the external diameter of the plunger at that point to provide a frictional engagement between the projection and the plunger so that the plunger may be held in its upward position by the frictional engagement and said lower end of said plunger and said upper side of said lower wall being complementary conical surfaces which, upon movement of the plunger into said lower position engage each other with an audible click to indicate to the user that the container is in a liquid-tight state.

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ROBERT B. REEVES, Primary Examiner

F. R. HANDREN, Assistant Examiner

U.S. Cl. X.R.

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