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A. D. PAULL ET AL
HINGED CLOSURE

2,889,087

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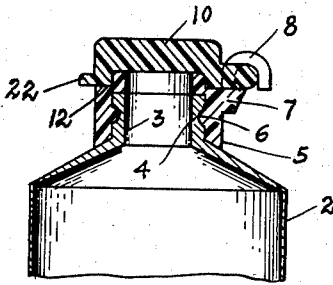


Fig. 1.

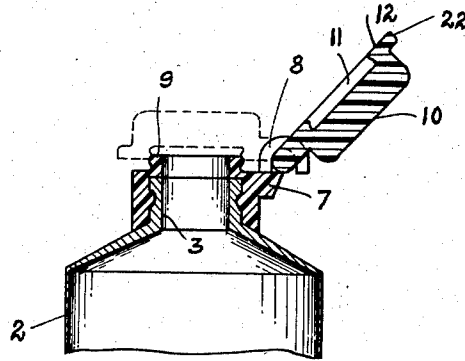


Fig. 2.

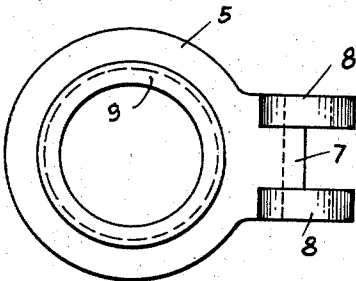


Fig. 3.

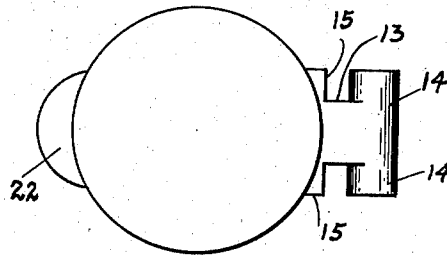


Fig. 5.

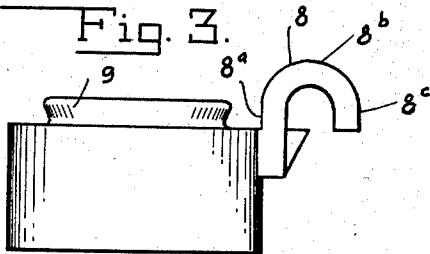


Fig. 4.

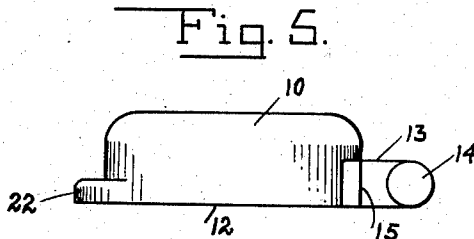


Fig. 6.

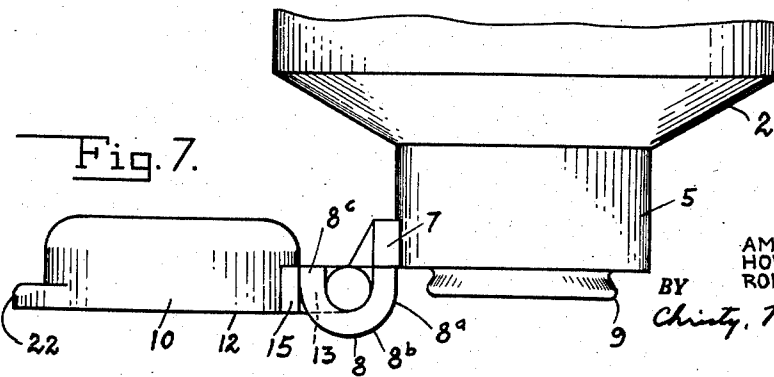


Fig. 7.

INVENTOR.
AMBROSE D. PAULL.
HOWARD A. KELLY.
RONALD A. MUDGE.

BY

Christy, Parmelee

Strickland
ATTORNEYS.

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HINGED CLOSURE

Ambrose D. Paull, Wheeling, Howard A. Kelly, Triadelphia, and Ronald A. Mudge, Wheeling, W. Va., assignors to Wheeling Stamping Company, Wheeling, W. Va., a corporation of West Virginia

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3 Claims. (Cl. 222-498)

This invention is for a hinged closure for use primarily on collapsible tubes, but applicable also to other types of containers, and is for a closure made entirely of plastic.

Many attempts have been made to provide a so-called "captive cap" for expendable containers, such as collapsible tubes. The market requires tube caps to be formed of plastic, but the nature of plastic is such that the provision of a satisfactory hinge has presented a difficult problem. Such a cap must first form a tight seal and not be likely to open when the tube is being filled or transported, and it must remain secure whenever it is closed until the contents of the receptacle are consumed. It must be compact and pleasing in appearance. It must open to a position where it will not be in the way when the contents of the tube are being discharged. It must be of a form such that it can be molded in molds of a practical design, and it must be cheap. The labor required to assemble it must be such that large numbers can be rapidly assembled so that the labor cost per unit is within a commercially practical range.

The most successful attempts in this direction have been in the form of a collar and cap member integrally connected by a hinge strap, the piece being molded from polyethylene so that the strap itself serves as a hinge, but a serious draw-back with such a construction is that when the cap is open, it springs back to a closed or partly closed position, and hence is in the way.

The primary object of the present invention is to provide a closure having separately formed cap and collar elements with a pivoting hinge connection provided by parts integrally molded on the cap and collar elements, and which are so designed that advantage can be taken of the inherent resilience of the plastic in interfitting the parts in assembled relation, enabling the operation to be effected easily and rapidly. Further important objects of our invention are to provide a closure which is cheap, practical, secure and of good appearance, and with the cap movable to a fully open position in which it will remain until manually closed.

Our invention may be more fully understood by reference to the accompanying drawings, in which:

Fig. 1 is a vertical section through a tube and closure assembly embodying our invention with the cap closed;

Fig. 2 is a similar view with the cap open;

Fig. 3 is a plan view on a larger scale of the collar element;

Fig. 4 is a side elevation of the collar element, also on a larger scale;

Figs. 5 and 6 are views of the cap element corresponding to Figs. 3 and 4 respectively; and

Fig. 7 is a view showing the closure turned upside down and open to illustrate how the closure remains open against gravity.

In the drawings, 2 designates a container, such as a collapsible tube having an integral neck 3, here shown as having an annular groove 4 around its exterior intermediate the top and bottom of the neck.

A sleeve element 5, formed of a slightly resilient plas-

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tic such as polyethylene or the like, is designed to be tightly fitted over the neck with an internal bead 6 that engages in the groove 4 and prevents accidental removal of the collar and gives added assurance against leakage or loss of volatile ingredients during the shelf-life of the container. At one point on the periphery of the collar, which point is hereinafter for convenience referred to as the "back" or "back edge," there is a lateral extension or lug 7. This lug has two loop elements 8 extending upwardly from the top thereof at each side, the loops in effect being extensions of the two ends of the lug, so that the loops are firmly attached to the cap. Each loop (see Fig. 3) has a straight bottom portion 8a, a semi-circular top portion 8b, and straight outer extensions 8c. The loops may be open or closed, open loops being shown in substantially the form of an inverted U.

The top of the collar or sleeve element 5 has an upwardly-extending externally undercut rim or bead 9 thereon of less diameter than the diameter of the sleeve.

The cap or closure element 10 is also preferably formed of a resilient plastic such as polyethylene, and it has an interior cavity 11 and a flat face 12. The cap may, however, be formed of urea, phenol or other plastics. The cavity 10 has a contour matched to the contour of the rim or bead 9, with the side walls of the cavity being undercut, so that the cap may be pressed against the top of the sleeve and, because of the inherent resilience of the materials, the cap will snap over the rim, with the flat face of the cap engaging the flat top of the collar, the top of the bead 9 seating against the bottom of the cavity 11, as shown in Fig. 1, and with the undercut side faces of the cavity and bead interlocked to form a tight closure.

At one point on the periphery of the cap, designated for convenience the "forward edge," is a protruding lip 22 by which pressure may be applied to the cap to disengage or lift it from the closed position.

Diametrically opposite the lip, at the rear edge of the cap, is a laterally-extending projection 13 of a width to just fit between the loops 8, and extending transversely from each side of the projection are oppositely-extending pintle elements 14, which are spaced from the wall of the cap. The wall of the cap is provided with slightly protruding abutments or flat surfaces 15 which confront but are spaced from the pintle elements, the space being equal to the thickness of the loops 8.

In assembling the cap and sleeve, the loops 8 are sprung upwardly, or laterally if they are closed, and the pintle elements are entered under the loops, the loops being engaged between the pintle elements and the confronting flat surfaces 15 on the cap. When the cap is in the position shown in full lines in Fig. 2, the pintle elements are concentric with the semi-circular portions 8b of the loop, and the flat surfaces 15 are tangent to this curve, and the cap swings easily. When the cap is moved to the full open position of Fig. 7, the flat portion 8c of the loop is confined between the pintle and the flat surfaces 15, exerting a yieldable pressure and increased friction on the loops because the flat surfaces are parallel, whereas the cap moves in an arc, tending thereby to keep the cap in this position, and its own weight is insufficient to cause the cap to overcome this binding engagement between the cap and loops, even when the container 2 is inverted. With slight pressure from one's finger, the cap will, however, be released and easily swung to a closed position. When it reaches the dotted line position shown in Fig. 2 it is centered over the end of the tube and the loops, because of their contour, resist closing of the cap, tending to spring it up. However it may be readily pushed into closed position, but when pressure is placed on the lip 22 to open the cap, the cap, when disengaged, will spring to a slightly open position,

From this position it is readily moved to the full open position.

The two parts of the closure, the cap and collar, can be separately and economically molded. Because of the resilience of the plastic, an operator can rapidly assemble the two parts while at the same time inspecting them, and the collars are then forced onto the necks of the tubes. Alternatively, the collars can be mounted on the tubes and then the pintles of the caps engaged with the loops and the caps pressed closed, making the tube ready for filling.

The cap is convenient to use because of the fact that it is easily operated, but when open, is held in the full open position against gravity, even when the container is inverted, and hence does not interfere with the discharge of the contents of the tube.

We claim:

1. A container with a closure wherein the container has a top with a cap engaging bead and a lateral offset with a pair of upwardly and outwardly-turned loops, the closure having a cavity for releasably interlocking with the bead, an extension on the closure at one edge thereof received between the loops and having oppositely projecting pintle elements thereon, and means on the closure having binding engagement with the loops when the cap is fully open to releasably retain the cap in open position.

2. A hinged closure for a container wherein the container has a top with a cap engaging bead and the cap has an undercut cavity for releasably interlocking with said bead, said top having thereon a lateral offset, a pair of resilient loops extending upwardly from and turned backwardly toward said offset, and said closure having an extension at one edge thereof received between said loops, a pair of oppositely facing pintle elements formed on said extension and received within the compass of said loops, and abutment means provided on the closure

at each side of the extension for releasably binding the loops between the abutment and the pintle elements when the cap is fully open to retain the cap in open position.

3. A collapsible tube having a plastic collar secured thereto, the collar having a bead over which a cap may be snapped and having a lateral extension with two parallel hinge elements extending upwardly from the face of the extension and being outwardly looped above the level of the bead with the extreme outer ends of the loop extending straight down tangential to the curve of the loop portion, a plastic cap having a skirt designed to releasably snap over the bead on the collar and having a lateral extension that extends between the parallel elements, said extensions of the cap having transverse pintle elements thereon which are received in the loops, the loops and pintle elements cooperating to provide a hinge for the cap in the plane of the bead, the cap having a flat surface confronting the pintle elements with the upwardly extending hinge elements on the collar being parallel with said flat surfaces when the cap is closed and being confined at all times between said flat surface and the pintle elements, and with said flat surfaces on the collar being parallel with straight downwardly extending ends of the hinge elements when the cap is turned 180° about the axes of the pintle elements.

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