Sept. 13, 1955 R. F. GRAY 2,717,728

CLOSURE CAP FOR A CONTAINER

Filed Nov. 17, 1951

Fig. 1.

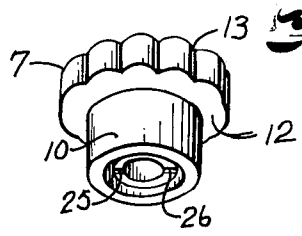
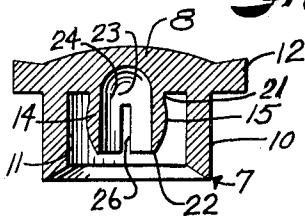


Fig. 2.



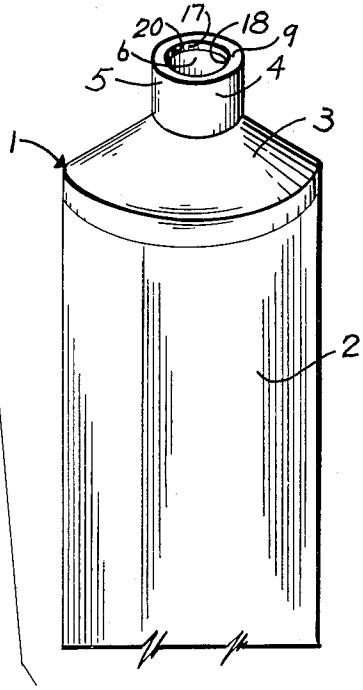


Fig. 3.

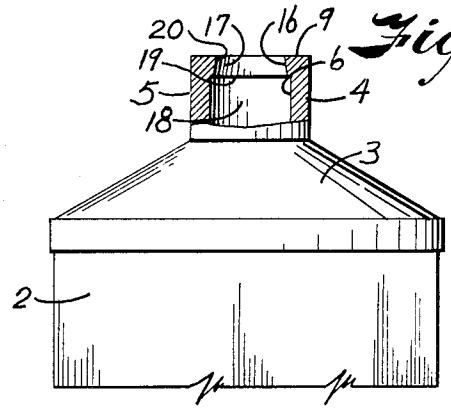
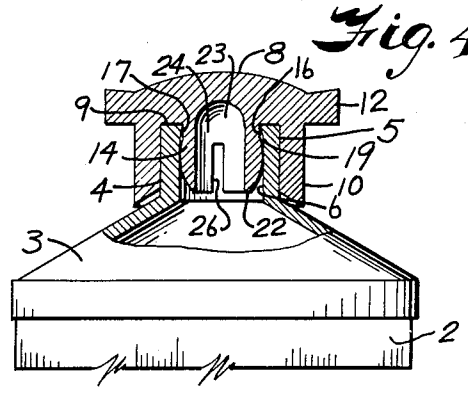


Fig. 4.



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CLOSURE CAP FOR A CONTAINER

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2 Claims. (Cl. 222—546)

This invention relates to closures for containers and particularly to those formed of resilient plastic material such as polyethylene. Containers of this character are satisfactory because they are of light weight, shatter proof and are adapted to expel the contents by squeezing upon the walls thereof. However, to manufacture such containers at a minimum cost, they must be produced in large quantities by high production molding machines, and it has been difficult to provide for secure retention of the closure cap.

Consequently, the closures for such containers are simply caps having a tight fit on the neck of the container. This is satisfactory under most conditions, but when the containers are shipped by the manufacturer of a product, or when the containers are packed in the luggage of travelers, accidental pressure on the container often results is displacement of the caps and spilling of the contents.

Therefore, the principal objects of the present invention are to provide a container with a neck and closure cap which is easily manufactured in simple, high production molds; to provide a closure that is easily applied and removed; and to provide a closure cap which automatically grips the neck of the container responsive to pressure on the content of a container when the cap is in closing position.

In accomplishing these and other objects of the present invention hereinafter pointed out, I have provided improved structure, the preferred form of which is illustrated in the accompanying drawings wherein:

Fig. 1 is a perspective view of the upper portion of a container having a neck and closure cap constructed in accordance with the present invention, the cap being shown removed from the neck of the container.

Fig. 2 is an enlarged section through the cap.

Fig. 3 is a side elevational view of the upper portion of the container showing the neck in section to better illustrate the internal annular flange which cooperates with the fastener on the cap.

Fig. 4 is an elevation through the upper portion of the container showing the cap in closing position, the neck and cap being in section.

Referring more in detail to the drawings:

While the invention is applicable to various forms of containers, the invention is especially desirable for collapsible tubes and resilient containers, particularly those formed of plastic material.

In the present illustrations and description, the invention is applied to a collapsible tube **1** having a relatively thin wall and a tubular body **2** that is formed of plastic material such as polyethylene. The upper end of the tubular body **2** has a head **3** and a neck **4**. The neck **4** has a substantially cylindrical wall portion **5** and an axial outlet opening **6** through which material within the container is discharged under pressure applied to the wall of the body **2**. The opening in the neck is closed by a cap **7** having a cover portion **8** adapted to extend over the opening **6** and seat upon the end face **9** of the neck.

The cap also includes a substantially cylindrical skirt portion **10** having an inner face **11** for closely engaging the outer face of the wall **5**. The cover portion may extend beyond the skirt portion **10** to provide a circumferential flange **12** having deformations **13** for ornamental purposes and to facilitate grip of the fingers in removing and applying the cap.

The structure thus far described is substantially conventional, the cap under ordinary conditions being retained by the frictional contact of the cylindrical surface **11** on the surface of the neck **4**. However, such contact is not sufficient to retain the cap when pressure is accidentally applied to the body of the container. To avoid this difficulty, the cap includes a fastener **14** which is formed as an annular flange depending from the cover portion **8** to engage within the opening **6** of the container neck. The fastener or cap flange **14** has a somewhat spherical exterior **15**, the major diameter of which substantially conforms with the inner diameter of the neck below the inwardly extending flange **16**.

The flange **16** provides an outlet orifice **17** of a smaller diameter than the inner cylindrical face **18** of the neck and forms therewith an annular shoulder **19**. The orifice **17** preferably tapers slightly toward the outer end of the neck, as shown at **20**, Fig. 3. The rounding portion **15** of the fastener **14** curves inwardly toward the cover portion **8** and terminates in a neck **21** substantially conforming to the smaller diameter of the orifice **17**. The oppositely rounding portion of the fastener terminates in an annular edge **22** which is of slightly smaller diameter than the orifice **17** so as to facilitate passage of the fastener into the orifice when the skirt portion **10** is moved onto the neck **4**.

In order to utilize pressure within the container to effect gripping contact of the fastener against the inner cylindrical surface of the neck and to expand the neck portion **21** into gripping contact with the tapered wall of the orifice, the fastener is provided with an axial recess **23** which extends into the body of the cover portion to provide a pressure chamber **24**. The recess is of a size so that the wall of the fastener portion of the cap is therefore relatively thin and permits ready application of the cap. In the presence of pressure within the container, the pressure acts against the wall of the fastener and presses it against the cylindrical surface of the neck, with the rounding portion of the fastener engaging the shoulder **19** as shown in Fig. 4.

To further facilitate freedom of application of the cap, the wall of the fastener may be provided with diametrically opposed slots **25** and **26** which terminate short of the neck portion **21** so that the neck portion **21** cooperates with the inner face of the cap and the end face **9** of the neck to form a seal.

To further facilitate application of the cap, the end face of the skirt **10** is preferably tapered inwardly from the outer toward the inner surface of the skirt. Therefore, when the cap is placed over the neck of the container, the taper guides the cap in position over the neck and brings the fastener into the orifice **17**. Pressure on the cover portion of the cap slides the cap into position with the rounded or bulging portion of the fastener flexing inwardly to permit passing thereof through the orifice **17**. As soon as the rounded portion of the fastener passes the shoulder **19**, the inherent resiliency of the material causes the rounded portions to move outwardly and to effect engagement with the shoulder **19**.

When pressure is applied with the cap in place, the pressure acts within the recess **23** and forces the wall of the fastener outwardly to frictionally engage the inner cylindrical surface of the neck and enhance engagement with the shoulder **19** so that the cap is re-

tained under substantially all pressures that may be accidentally applied on the container.

The cap is readily removed by merely drawing the cap away from the neck, the skirt portion sliding along the outer cylindrical face of the neck. During this movement, the rounding portion 15 of the fastener readily passes the inwardly extending flange. This release is enhanced by the camming action of the tapered wall of the orifice and by the relatively thin cross section of the neck portion of the fastener.

From the foregoing it is obvious that I have provided a container, neck and cap readily constructed of a resilient plastic material by use of simple molds in a high production molding machine. It is also obvious that the cap is readily applied to the neck of the container and when applied, any accidental pressure within the container acts to retain the cap in closing relation with the orifice 17 rather than effect its displacement.

It is also obvious that the cap is readily removed from the container when the pressure is removed from the walls of the container.

What I claim and desire to secure by Letters Patent is:

1. A bottle of resilient plastic material having a cylindrical tubular neck thereon, a tapered neck flange encircling the inside of the neck and positioned at the upper end thereof, the portion of the neck flange having the greatest thickness being above the portion of least thickness, a cap including a cover portion fitting over the end of the neck, a cylindrical skirt depending from the cover to enclose the outside of the neck, a cylindrical cap flange depending from said cover and positioned concentrically within said skirt, the upper portion of the cap flange being indented on its outer side to receive the neck flange, said cap flange forming a hollow chamber extending upwardly to a level at least

coinciding with that of the lower edge of the cover between the inner side of the skirt and the outer side of the cap flange, a slot in said cap flange, said slot extending upwardly from the lower edge of said cap flange to a level below said indentation in said cap flange.

2. A bottle of resilient plastic material having a cylindrical tubular neck thereon, a tapered neck flange encircling the inside of the neck and positioned at the upper end thereof, the portion of the neck flange having the greatest thickness being above the portion of least thickness, a cap including a cover portion fitting over the end of the neck, a cylindrical skirt depending from the cover to enclose the outside of the neck, the lower edge of said skirt having its outer portion of greater length than the inner portion, a cylindrical cap flange depending from said cover and positioned concentrically within said skirt, the outer side of said cap flange formed in a convex arc whereby the upper and lower portions thereof are of lesser thickness than the central portion, said cap flange forming a hollow chamber extending upwardly to a level at least coinciding with that of the lower edge of the cover between the inner side of the skirt and the outer side of the cap flange, a slot in said cap flange, said slot extending upwardly from the lower edge of said cap flange to a level below said neck flange.

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