

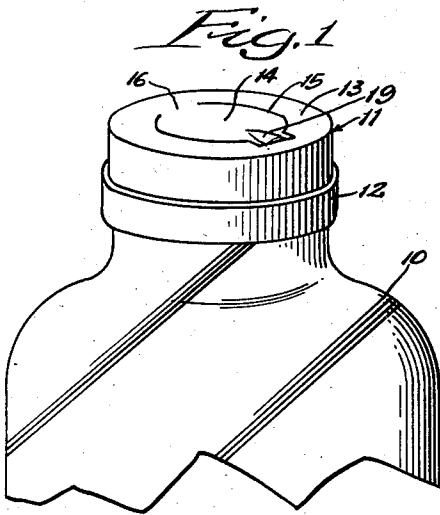
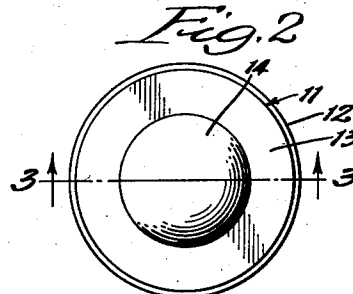
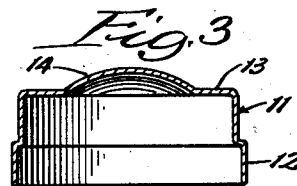
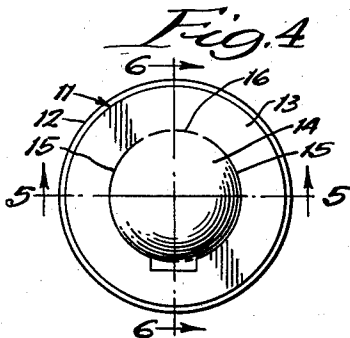
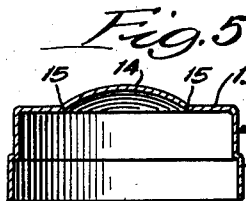
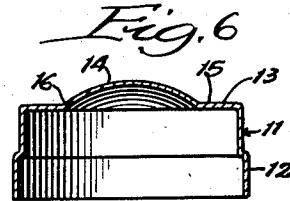
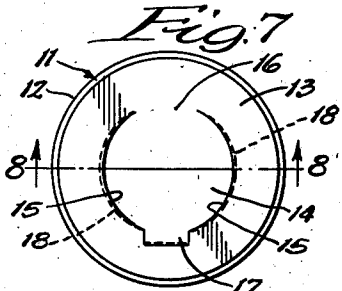
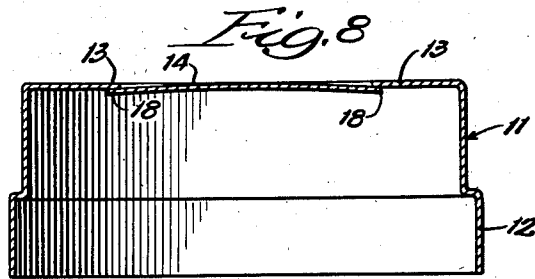
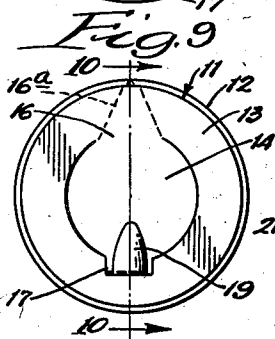
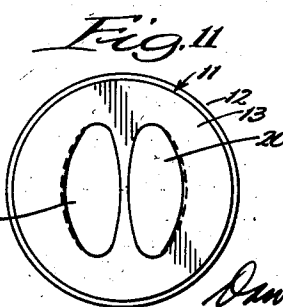
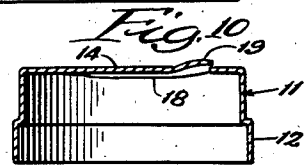
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2,789,718

ONE-PIECE TEAR-CAP OR CLOSURE

Filed Sept. 28, 1953



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1

2,789,718

ONE-PIECE TEAR-CAP OR CLOSURE

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1 Claim. (Cl. 215—46)

This invention relates to a one-piece tear-cap or closure and method of forming same. The invention is particularly useful in connection with containers for pharmaceutical solutions, providing protection for the closure plug thereof and permitting ready access to the plug or easy removal of the cap when this is desired. Other uses will be obvious.

In the packaging of parenteral solutions, it has been common to provide a closure of several parts, including an inner flanged seal extending about a rubber closure plug having a resilient closure disc thereon, a metal disc over the resilient disc, and a final outer cap enclosing the metal disc and the inner flanged seal. With such structures, it was possible to tear the outer seal and expose the inner metal disc and resilient disc for removal and leaving the inner flanged seal to retain the rubber plug. There has long been a need for a seal of such character which would accomplish the same or better functions while at the same time forming the seal in one piece.

An object of the invention is to provide a seal of the character described in which a single seal member is utilized for providing the metal disc and the outer seal, etc. A further object is to provide a cap seal or closure of unitary structure having the novel advantages described. Yet another object is to provide a seal structure in which one part thereof is caused to be expanded and then gripped below another part, while at the same time permitting the seal to be removed from the container. A still further object is to provide a new method and means for forming a seal or closure for a container while utilizing a single piece of metal, etc., and while also permitting the tearing or removing of the seal. A still further object is to provide a novel method for forming a closure or cap structure while utilizing a single piece of metal or other material and while also providing one part below another in the assembled relation and permitting a tearing of the cap. Other specific objects and advantages will appear as the specification proceeds.

The invention is shown, in an illustrative embodiment, by the accompanying drawing, in which—

Figure 1 is a perspective view of a container equipped with a cap or closure embodying my invention; Fig. 2, a top plan view of the cap as produced in an early step; Fig. 3, a sectional view of the structure shown in Fig. 2, the section being taken as indicated at line 3—3 of Fig. 2; Fig. 4, a top plan view of the cap structure shown in Fig. 2 but showing a second partial severing step; Fig. 5, a sectional detail view, the section being taken as indicated at line 5—5 of Fig. 4; Fig. 6, a sectional view of the structure shown in Fig. 4, the section being taken as indicated at line 6—6 of Fig. 4; Fig. 7, a top plan view of the cap showing the structure after a pressing or expanding operation; Fig. 8, a sectional view of the structure shown in Fig. 7 on a much enlarged scale, the section being taken as indicated at line 8—8 of Fig. 7; Fig. 9, a top plan view of the cap structure, illustrating

2

a further step; Fig. 10, a sectional view of the structure shown in Fig. 9, the section being taken as indicated at line 10—10 of Fig. 9; and Fig. 11, a top plan view of a cap illustrating a modified form of the invention.

In the illustration given, 10 designates a bottle or container equipped at its top with a closure or cap 11 embodying my invention. The cap 11 is provided with a skirt portion 12 which may be spun around a bead or thread on the bottle or container for anchoring the cap firmly about the container. If desired, the skirt portion 12 may be flared or stepped outwardly, as shown more clearly in Fig. 3.

As an initial step of the process, I prefer to press the top portion of the cap wall 13 upwardly to form a dome-shaped portion 14. This operation results in expanding or increasing the portion of the metal now forming the dome 14.

In a second step of the process, I sever the cap along the line 15 and all the way around the dome 14 except at the rear portion 16 thereof, which is left unsevered. Further, I sever a tab portion 17 at the side opposite the unsevered portion 16.

A third step of the process is illustrated in Figs. 7 and 8. In this operation, the dome portion 14 is pressed downwardly against a flat surface so as to expand the dome portion and bring the peripheral portion 18 thereof under the inner edges of the top wall 13. It will be observed that at the portion 16, the top wall 13 and the portion 16 merge together and lie in a single plane. Forwardly of the portion 16, the side walls or peripheral portions 18 of the portion 14 underlie the edges of the top wall 13 and are thus locked thereby.

I prefer to form a longitudinal rib 19 in the tab or lip 17 and extending into the portion 14 so as to reinforce the lip and the forward portion of the severed disc 14. The rib 19 thus serves not only to reinforce the tab 17, but also to raise the same so that it may be readily grasped, as shown more clearly in Fig. 10.

The present invention may be used very effectively in connection with a container of the type shown in Campbell Patent 2,236,491, and it will be noted that the present single cap structure serves the function of the multiple cap parts shown in this patent. The disc 14, after being converted from the dome portion first described, lies underneath the outer seal portion 13 and is confined thereby tightly against the rubber disc resting upon the rubber closure of the type shown in said Campbell patent.

In the operation of the method and structure as described, I proceed with a closed cap 11 which may be preformed to the shape shown, or may be drawn from a single strip of metal such as aluminum, steel, alloys, etc. Plastic materials may also be utilized. I prefer to use aluminum or aluminum alloys. In the first step, the dome 14 is formed by pressing or drawing the metal upwardly, or downwardly, as illustrated in Figs. 2 and 3. In step 2, the severing occurs along the line 15. Finally the dome is pressed or flattened, as shown in Figs. 7 and 8, to bring the peripheral portion 18 below the top wall 13. By then embossing or forming the rib in the draw-tab 17, I strengthen the draw-tab and the central part of the disc portion 14 so as, in the tab-drawing operation, the side flaps of the disc 14 bend as the disc 14 is raised to free the edges 18 from the top wall 13. By tearing the unscored portion 16 rearwardly, the metal is removed in the form of a V, as indicated more clearly by the numeral 16a, the tear extending into the skirt 12 but terminating before it reaches the bottom of the skirt. The disc 14 with the V portion torn from the metal, is then removed, leaving the remainder of the closure intact and holding the plug of the bottle in place. The V tear exposes the plug and the rubber sealing disc

thereon, so that the rubber sealing disc may also be removed.

In the foregoing specific illustration, I have shown a partial severing of the dome-shaped portion. It will be understood that, if desired, the entire dome-shaped portion may be severed and then pressed into a position below the flange portion 14. I prefer the structure illustrated, however, because the tab 17, when pulled, is not only effective in removing the disc 14, but also in effecting a tearing of the wall 13 and at least a portion of the cap 11, leaving a V-shaped opening through which access may be had to the rubber plug and to any resilient seal positioned over the plug.

If desired, the disc 14 may be severed all the way around, so that when the tab 17 is pulled, the edge portions 18 lying below the top panel 13 may be removed by simply drawing upon the tab 17. I prefer, however, to leave the unsevered area 16, because this results in the drawing of the V-shaped portion shown by the dotted lines 16a in Fig. 9 when the tab 17 is drawn, and the V-shaped opening is desirable because it exposes the top of the closure plug and the flexible sealing disc thereon. The sealing disc may be removed through the V slot to provide direct access to the closure plug and to the openings which usually extend through the plug.

While I have shown in Figs. 1 to 10, inclusive, a single dimple or dome which is circular in shape, it will be understood that the expanded dome may be of any shape and instead of one dome, there may be two or more, the irregular shape of the dome being effective in giving greater expansion sidewise than endwise. In Fig. 11, the cap 11 is provided with a pair of elongated dimples or domes 20 and 21. The two domes are elongated and are slightly spaced apart. It will be observed that when this structure is flattened, there will be greater expansion in a sidewise direction than in the endwise direction. Thus, by providing domes or dimples of vari-

ous odd or multiple shapes, it is possible to correct the direction and extent of expansion in the subsequent flattening step.

It will be obvious that the structure may be used in many environments and in connection with various types of containers and closures therefor, and the showing herein is merely illustrative of one mode of the cap or closure.

While, in the foregoing specification, I have set forth a specific structure in considerable detail and method steps also in considerable detail, for the purpose of illustrating the invention, it will be understood that such details of structure and method may be varied widely by those skilled in the art without departing from the spirit of my invention.

I claim:

A unitary cap structure having a cylindrical side portion and a top wall, said top wall being severed along lines of severance to provide on one side a raised tab and on the other side an unsevered portion diametrically aligned with said tab, said lines of severance providing a disc integral with said tab and said disc having enlarged peripheral edges extending under said top wall.

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