Nov. 18, 1969 P. HEDGEWICK ETAL 3,478,911

SAFETY CAP AND CONTAINER

Filed Dec. 22, 1967

FIG. 1

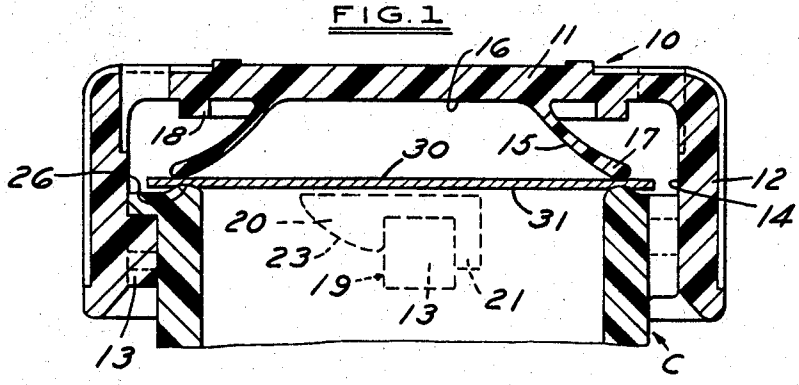


FIG. 2

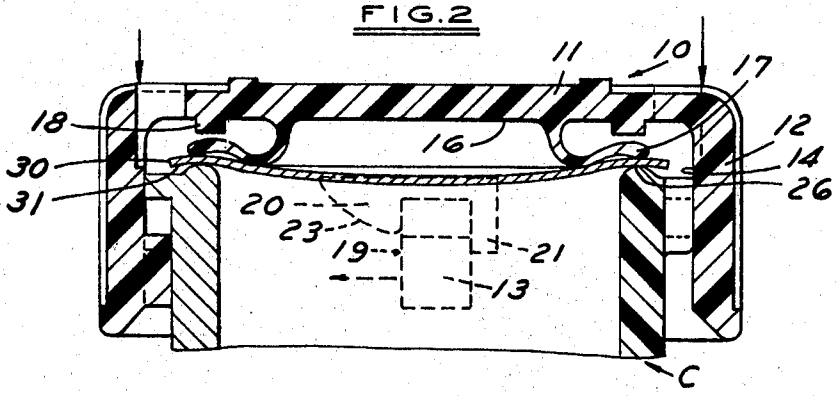


FIG. 4

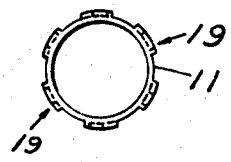


FIG. 3

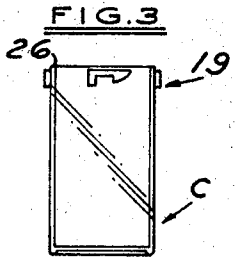


FIG. 5

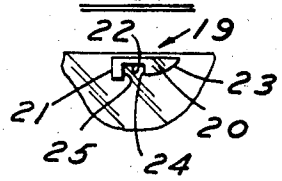


FIG. 6

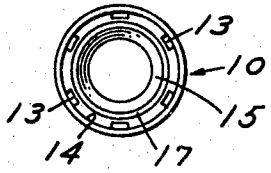
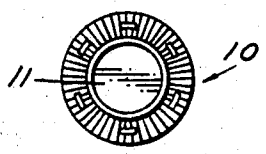


FIG. 7



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SAFETY CAP AND CONTAINER

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U.S. Cl. 215—9 4 Claims

ABSTRACT OF THE DISCLOSURE

The container disclosed herein comprises a cylindrical plastic body which is molded in one piece and has circumferentially spaced radially extending projections on the upper end thereof that have notches therein. The cap comprises a one-piece plastic body having a base and a peripheral flange with circumferentially spaced lugs extending radially inwardly for engagement with the notches. An annular integral flexible web is provided on the inner surface of the base and extends downwardly and outwardly. An annular integral rib on the inner surface of the base overlies the annular flexible web and serves as a stop to prevent overflexing of the web. A liner having a deformable outer surface is interposed between the annular flexible web and the lugs for engagement with the upper end of the container. The base of the cap includes circumferential openings which facilitate its manufacture as a one-piece plastic cap but do not interfere with the sealing action of the annular web. The cap is applied to the container by a rotating movement. The cap can only be removed from the container by applying an axial force on the periphery of the cap and thereafter rotating the cap.

Background of the invention

This invention relates to safety caps and containers.

In the patent to Hedgewick 3,344,942, issued Oct. 3, 1967, there is disclosed and claimed an ovel cap and container structure which cannot be readily opened by children, which is relatively simple and inexpensive and wherein the cap and container can each be molded in one piece.

Among the objects of the present invention are to provide a cap and container construction which is similar to that shown in the Hedgewick patent 3,344,942 but in addition produces a moisture and vapor-tight seal.

Summary

Basically, the container comprises a cylindrical plastic body which can be molded in a one-piece mold and has circumferentially spaced radially extending projections on the upper end thereof that have notches therein. The cap embodying the invention comprises a one-piece plastic body having a base and a peripheral flange with circumferentially spaced lugs extending radially inwardly for engagement with the notches. An annular integral flexible web is provided on the inner surface of the base and extends downwardly and outwardly. An annular integral rib on the inner surface of the base overlies the annular flexible web and serves as a stop to prevent overflexing of the web. A liner having a deformable outer surface is interposed between the annular flexible web and the lugs for engagement with the upper end of the container. The base of the cap includes circumferential openings which facilitate its manufacture as a one-piece plastic cap but do not interfere with the sealing action of the annular web. The cap is applied to the container by a rotating movement. The cap can only be removed from the container by applying an axial force on the periphery of the cap and thereafter rotating the cap.

In the drawings:

FIG. 1 is a fragmentary vertical sectional view of a cap and container embodying the invention.

FIG. 2 is a view similar to FIG. 1 showing the relative positions of the cap and container as the cap is being removed from the container.

FIG. 3 is a side elevational view of the container.

FIG. 4 is a plan view of the container.

FIG. 5 is a fragmentary side elevational view of a portion of the upper end of the container.

FIG. 6 is a bottom plan view of the cap.

FIG. 7 is a top plan view of the cap.

Referring to FIGS. 1–7, the invention comprises a cap **10** that is adapted to be applied to the upper end of a container C, each of which is molded by injecting plastic into a cavity.

As shown in FIGS. 1, 6 and 7, the cap **10** includes a base **11** and a peripheral flange **12** extending axially of the axis of the cap. A plurality of radially inwardly extending lugs or locking elements **13** are provided on the inner surface **14** of the flange **12** adjacent the lower end thereof. An integral flexible resilient annular web **15** extends generally axially and radially outwardly from the inner surface **16** of the base **11** and is formed with an enlarged rib **17** on the free end thereof that is adapted to engage the upper end of the container C. The web **15** has a lesser cross section intermediate its ends so that it will flex intermediate its ends upon application of an axial force. An integral annular rib **18** extends axially from the inner surface **16** of the base **11** in generally overlying relation to the free end of the web **15**.

The container C is generally cylindrical at least at the upper end or mouth portion and preferably throughout so that it can be made in a single cavity one-piece mold. The container C is formed at its upper end with a plurality of outwardly extending radial projections or locking elements **19**. As shown in FIG. 5, each radial projection **19** is formed with a first portion **20** and a circumferentially spaced second portion **21** to define a notch **22**. The lower surface **23** of the first portion **20** is tapered gradually downwardly and circumferentially to blend in a smooth curve with the side wall **24** of the notch **22**. The second portion **21** extends axially a greater distance from the upper end of the container to define the side **25** of the notch **22**. The upper end of the container **11** is formed with an upwardly extending rib **26**.

As further shown in FIGS. 6 and 7, the cap **10** is formed with a plurality of axially extending openings in the base **11** which overlie the lugs **13** and result from the apparatus for manufacture of the cap.

As shown in FIG. 1, a liner or sealing member **30** is interposed between the free edge of the annular web and the lugs. The liner **30** has a deformable surface **31** which conforms with the rib **26** on the upper end of the container as presently described.

In order to assemble the cap **10** on the container C, the cap is applied to the upper end of the container with the liner **30** engaging rib **26**. The cap is then rotated to bring the lugs **13** into engagement with the tapered surfaces **23** of the projections **19**. Further rotation of the cap causes the lugs to follow the surfaces **23** producing a flexing of the web **15** intermediate its free edge and its base until the lugs engage the notches **22**. In this position, the cap **10** is locked on the container C by the spring force of the web **15** and the bead **17** of the web **15** is in sealing engagement with the upper surface **26** of the container C as shown in FIG. 1. The base **11** of the cap **10** is of such a thickness that it will flex if a force is applied at the center of the base **11**. The area of juncture of the base of the web **15** and the base **11** of the cap substantially overlies the upper end of the container.

The cap cannot be removed by a simple rotation so that children are deterred, if not prevented, from removing the cap. In order to remove the cap, an axial force must be provided on the periphery of the cap in the direction of the arrow as shown in FIG. 2 to cause a flexing of the web **15** and permit the lugs **13** to move axially and thereby clear the portion **20** of the projections. After this axial force is applied, the cap can be turned in the direction of the arrow shown in FIG. 2 to permit its removal. Because of the flexible nature of the base **11** of the cap, the axial force must be provided on the periphery of the cap and not at the center of the cap. This force is most conveniently applied by pressing the container against the palm of the hand. In both applying and removing the cap, the rib **18** prevents overflexing of the web **15** beyond the elastic limit which might cause a loss of resiliency or spring action of the web. In applying the cap, the greater axial extent of the portion **21** prevents turning the cap beyond the notch **22**. In removing the cap, the greater axial extent of the portion **21** prevents rotating the cap in the wrong direction for removal.

During application and removal of the cap, the annular flexible web **15** flexes intermediate its ends downwardly as shown in FIG. 2. During this flexing action, the intermediate portion engages the liner **30** along an annular area spaced inwardly from the periphery of the liner and applies a force on the inner surface of the liner that forces the liner downwardly in an axial direction and radially outwardly into conformity with the rib **26** on the upper end of the container. Since during the engagement and disengagement of the cap there is also a rotary movement, this tends to smooth out deformable surface **31** of the liner **30** facilitating the moisture and vapor seal that is formed between the liner and the rib of the container.

The cap **10** is made of a suitable plastic material which provides the desired flexibility of the integral web **15**. A preferred material comprises polypropylene although other materials such as polyethylene can be used. The container C is also preferably made of a plastic. A preferred plastic material comprises a high impact styrene.

Satisfactory results have been achieved by utilizing a liner having a thickness of 0.025" and comprising a cardboard base having a thickness of 0.02", a paperbacked aluminum foil coated with vinyl adhered to the cardboard and having a thickness of 0.00035" and a layer of wax over the vinyl-coated foil having a thickness of 0.00015".

We claim:

1. The combination comprising: a plastic container having a plurality of circumferentially spaced projections extending radially outwardly from the upper end thereof; an annular rib on the upper end of said container, each said projection having a downwardly facing notch therein; and a one-piece plastic cap having a base and a peripheral flange; a plurality of radially inwardly extending lugs on the inner surface of said flange, said lugs being adapted to engage the notches on the projections of the container; an integral annular web on the inner surface of the base extending downwardly therefrom; a liner interposed between the free edge of said annular web and the lugs on the flange of the cap and yieldingly urged by said web toward said lugs, said liner engaging the annular rib on the upper end of the container, the shape of said annular web being such that the free edge of the annular web substantially overlies the upper end of the container in all flexed positions of said annular web, said liner having a deformable outer surface engaging the annular rib on the upper end of the container; said annular flexible web extending downwardly and outwardly and adapted to flex intermediate its ends, said intermediate portion of said annular web being operable upon axial movement of said cap relative to said container during engagement and disengagement of the lugs on the cap with the projections on the container to apply a force on the inner surface of the liner tending to urge the liner against the annular rib on the container in a direction axially and partly radially outwardly and thereby cause the deformable surface of the liner to conform to the rib on the upper end of the container during each axial movement of the web of the cap and the container.

2. A safety package for medicines and the like comprising: a container having a mouth portion with an annular rim; a one-piece cap having a base with an integral peripheral flange projecting axially therefrom for receiving the mouth portion of said container; interengageable locking elements on the inner wall of the flange of the cap and the outer wall of the mouth of the container, the cap locking elements projecting inwardly from the inner wall of the flange and being engageable with and disengageable from the container locking elements by combined axial and rotative motion of the cap relative to the container; a resilient flexible member on said cap having an inner annular end joined integrally to said base and extending axially therefrom and terminating in an outer annular free end; and a generally flat sealing member carried by said cap, said sealing member being received in the flange of the cap between the cap locking elements and the outer annular free end of the resilient flexible member and urged by the resilient flexible member into engagement with the rim of the container when the locking elements are engaged such that the sealing member is resiliently clamped between the outer annular free end of the resilient flexible member and the rim of the container; the diameter of the outer annular free end of the resilient flexible member being greater than the diameter of the inner annular end thereof; and the intermediate portion of the resilient flexible member being flexed inwardly when the locking elements are engaged, said flexed intermediate portion engaging the portion of the sealing member surrounded by the outer annular free end to apply an axial and radially outward force thereon.

3. A safety package for medicines and the like comprising: a container having a mouth portion with an annular rim; a one-piece plastic cap having a base with an integral peripheral flange projecting axially therefrom for receiving the mouth portion of said container; interengageable locking elements on the inner wall of the flange of the cap and the outer wall of the mouth of the container, the cap locking elements projecting inwardly from the inner wall of the flange and being engageable with and disengageable from the container locking elements by axial motion of the cap relative to the container followed by rotative motion of the cap relative to the container; a hollow web of annular cross-section joined integrally to said base and surrounded by said flange and having an inner annular end joined to said base and extending axially therefrom and terminating in an outer annular free end; said web being constructed to have sufficient resistance to distortion to react between the cap and container when the cap locking elements are engaged with the container locking elements and bias the cap against axial motion relative to said container to resiliently resist disengagement of the cap and container locking elements; a generally flat disc member carried by said cap, said disc member being received in the flange of the cap between the cap locking elements and said hollow web with its periphery overlying said cap locking elements and the annular rim of the cap, at least a portion of said web engaging said disc radially inwardly of said annular rim when the cap and container locking elements are engaged to resiliently deform said disc.

4. A safety package for medicines and the like comprising: a container having a mouth portion with an annular rim; a one-piece plastic cap having a base with an integral peripheral flange projecting axially therefrom for receiving the mouth portion of said container; interengageable locking elements on the inner wall of the flange of the cap and the outer wall of the mouth of the container, the cap locking elements projecting inwardly from the inner wall of the flange and being engageable with and disengageable from the container locking elements by axial motion of the cap relative to the container followed by rotative motion of the cap relative to the container; a

hollow web of annular cross-section joined integrally to said base and surrounded by said flange and having an inner annular end joined to said base and extending axially therefrom and terminating in an outer annular free end; said web being constructed to have sufficient resistance to distortion to react between the cap and container when the cap locking elements are engaged with the container locking elements and bias the cap against axial motion relative to said container to resiliently resist disengagement of the cap and container locking elements; a generally flat disc member carried by said cap, said disc member being received in the flange of the cap between the cap locking elements and the outer annular free end of said hollow web with its periphery overlying said cap locking elements and the annular rim of the cap and resiliently urged by the hollow web into engagement with the annular rim of the container when the locking elements are engaged, said web engaging said disc member

radially inwardly of said annular rim to resiliently flex the disc member axially away from the base of the cap when the cap and container locking elements are engaged.

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U.S. Cl. X.R.

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