

Sept. 22, 1964

S. E. EDELSTONE ETAL

3,149,746

SELF-LOCKING CONTAINER CAP

Filed Oct. 24, 1960

2 Sheets-Sheet 1

Fig. 1

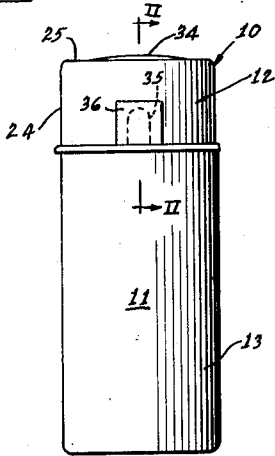


Fig. 2

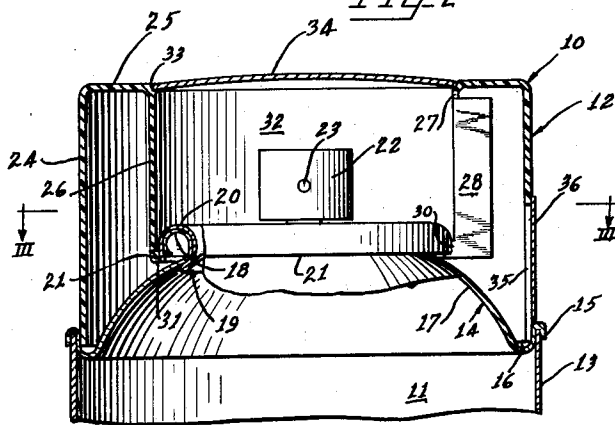


Fig. 3

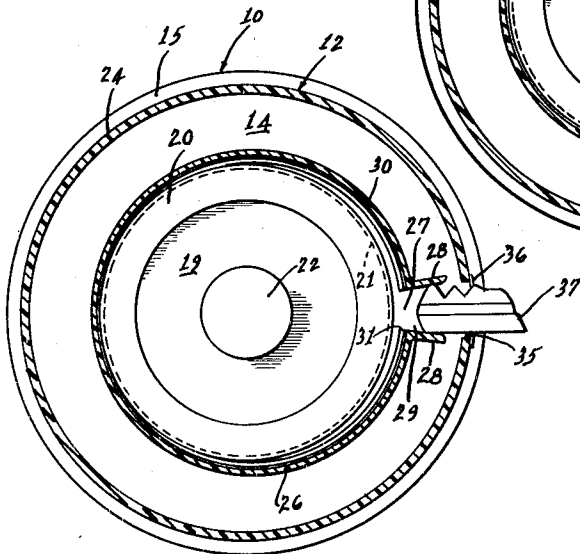


Fig. 4

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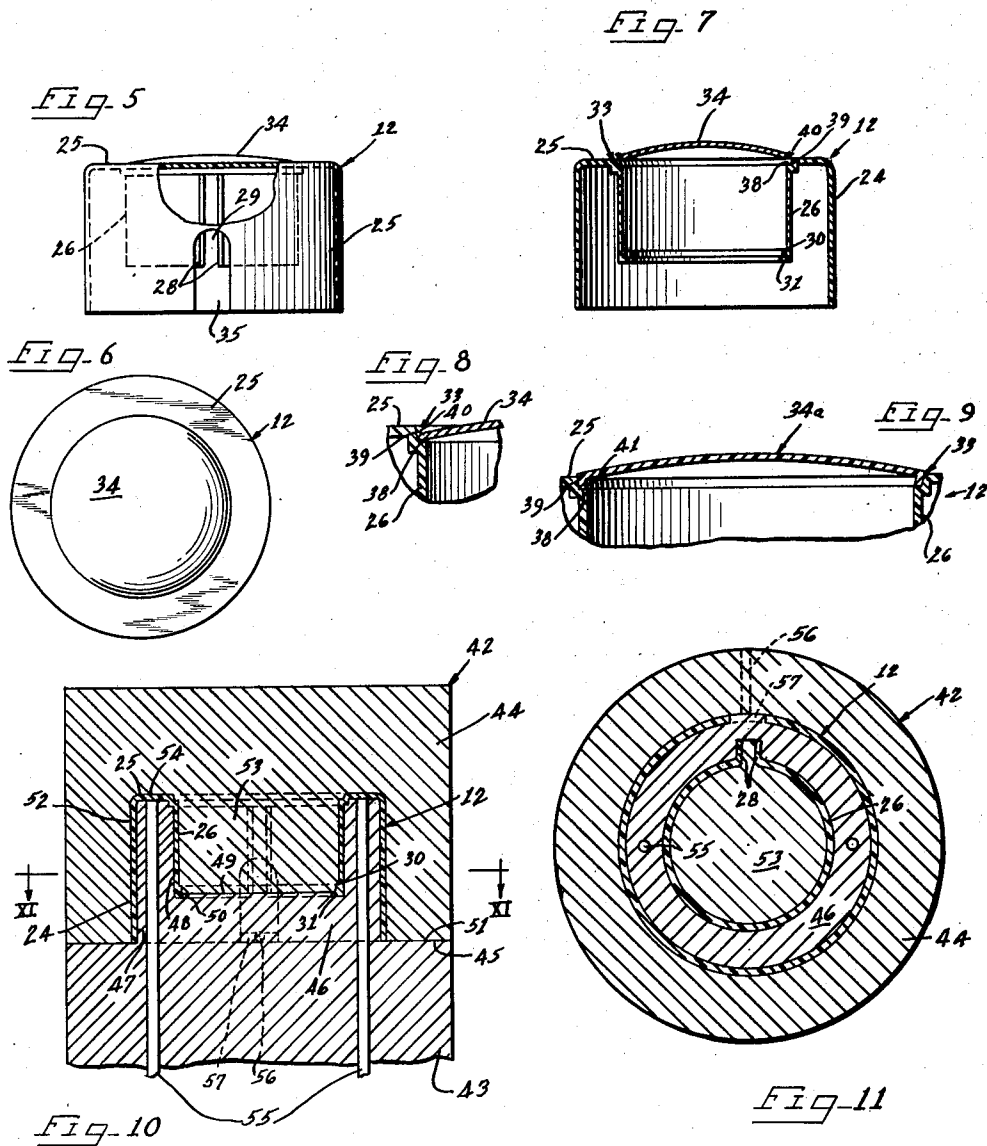
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SELF-LOCKING CONTAINER CAP

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This invention relates to snap-on container caps that can be unlocked and removed from a container with a key or probe device inserted through an access hole in the outer wall of the cap which is normally sealed by a puncturable closure. Specifically the invention relates to a molded plastic container cap with a locking flange equipped inner integral split cylinder or sleeve and having a disc member closing the outer end of the sleeve or cylinder to form a thimble or inner cap.

According to this invention a plastic snap-on locking cap is formed in conventional dies with an outer cylindrical side wall having an access window therein, an inner cylindrical sleeve with an intumed locking flange around the bottom edge thereof, a gap along the length thereof, a pair of outturned lips or abutment flanges adjacent the gap in alignment with the window to receive therebetween a probe inserted through the window for expanding the locking flange, a centrally apertured and counterbored top or end wall joining the sleeve and side wall and a disk closing the aperture seated in the counterbore to cooperate with the sleeve and form a closed top thimble or inner cup-shaped cap. The disk closure feature makes possible the simple molding of the cap with the integral locking flange. The caps of this invention are thus inexpensive, easily made, and perform the multiple function of closing and locking a container.

The container caps of this invention are specially suitable for use on spray dispensing aerosol cans of the conventional type having a domed end surrounded by a well receiving the outer side wall of the cap, a valve cup providing a locking shoulder at the top of the dome for receiving thereunder the locking flange of the cap thimble and a spray dispensing valve head projecting from the valve cup and enclosed in the disk topped thimble chamber of the cap. However, it should be clearly understood that the container caps of this invention are suitable for use on many other types of containers or packages and the scope of this invention is therefore not limited to the hereinafter described preferred embodiment.

It is then an object of this invention to provide a snap-on self-locking container cap with an inner open end cylinder or sleeve closed by a disk secured in the outer end wall of the cap.

Another object of this invention is to provide a molded plastic container cap with a cylindrical outer wall having an access window, a split inner cylindrical sleeve with an intumed locking flange, outturned lips along the split portion of the sleeve in alignment with the window, and a disk locked in the end wall of the cap to close the sleeve chamber.

A still further object of this invention is to provide a molded plastic self-locking container cap of generally U-shaped cross-section easily molded in conventional dies and having a centrally apertured end wall closed by a disk locked in a counterbore thereof.

Another object of the invention is to provide a one-piece molded plastic container cap with an inner cylindrical sleeve or locking cylinder having the outer end thereof closed by a disk frictionally engaged in a counterbore.

A still further object of this invention is to provide a molded plastic locking cap with a centrally apertured or annular end wall having a counterbore or well receiving

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in locked relation a closure member forming a domed top for the cap.

Other and further objects of this invention will be apparent to those skilled in this art from the following detailed description of the annexed sheets of drawings which, by way of preferred examples only, illustrate several embodiments of the invention.

On the drawings:

FIGURE 1 is an elevational view of an aerosol can closed by a self-locking snap-on container cap of this invention and illustrating the sealed access hole or window in the side wall of the cap.

FIGURE 2 is an enlarged fragmentary vertical cross-sectional view along the line II-II of FIG. 1.

FIGURE 3 is a fragmentary horizontal cross-sectional view along the line III-III of FIG. 2.

FIGURE 4 is a view similar to FIG. 3 but illustrating the manner in which the inner sleeve or locking cylinder is spread by a key to an unlocked position.

FIGURE 5 is a side elevational view of the locking cap with a portion broken away to show underlying structure including the closure disk for the cap.

FIGURE 6 is a top plan view of the cap of FIG. 5.

FIGURE 7 is a vertical cross-sectional view of the cap illustrating the manner in which a metal type closure disk is snapped into the counterbore of the cap.

FIGURE 8 is a fragmentary vertical cross-sectional view illustrating the manner in which the metal closure disk of FIG. 7 bites into the counterbore to be securely locked to the plastic cap.

FIGURE 9 is a fragmentary vertical cross-sectional view of an alternate form of cap according to this invention receiving a skirted plastic disk in the cap counterbore.

FIGURE 10 is a fragmentary vertical cross-sectional view illustrating the formation of the molded plastic part of the cap in conventional injection molding dies.

FIGURE 11 is a horizontal cross-sectional view along the line XI-XI of FIG. 10.

As shown on the drawings:

In FIGS. 1 to 4 the aerosol can and cap assembly 10 includes a spray dispensing aerosol can 11 and a molded plastic container cap 12 of this invention.

As best shown in FIG. 2, the can 11 has a cylindrical body 13 with a domed end head 14 that is crimped to the top of the can body and provides an outturned rim 15 and an annular well 16 surrounded by the rim. The dome of the end head 14 has a fragmental spherical main body portion 17 which rises from the well 16 to a small diameter top which opens at a level above the top of the can body 13. The open top of the dome body 17 has an outturned beaded rim 18. A valve cup 19 is inserted in the open top of the dome and is crimped around the bead 18 to provide a peripheral rim 20 terminating in a skirt with a bottom edge 21 that forms a downwardly facing annular shoulder surrounding the top of the dome.

The valve cup 19 carries a spray valve assembly with a projecting head 22 that can be depressed to release the contents of the can through an orifice 23 in the head.

The cap 12 has a cylindrical side wall 24 sized to snugly fit in the well 16 in frictional engagement with the crimped portion 15. The cap 12 has an integral flat annular top wall 25 extending radially inward from the top end of the cylindrical wall 24 to a depending inner cylindrical sleeve or wall 26 in spaced concentric relation from the outer wall 24. The cylindrical sleeve has a vertical slot 27 extending substantially along the entire length thereof and bounded on each side by outturned lips or flanges 28 integral with the sleeve and providing therebetween a gap 29 adapted to receive a probe or other spreading implement such as a key as will be hereinafter more fully described.

The sleeve 26 terminates inside of the outer wall 24

at a level sufficiently above the bottom of the wall 24 so as to extend beyond the shoulder 21 of the valve cup rim 20 but spaced above the dome body 17 when the wall 24 is bottomed in the well 16 as best shown in FIG. 2.

The internal dimension of the sleeve 26 is sufficiently large to rather freely embrace the outer skirt of the rim 20 and a slightly thickened terminal edge end portion provides an internal bead 30 for embracing the skirt of the rim 20. An intumed locking flange 31 projects inwardly from the bottom end of this bead 30 around the entire periphery of the sleeve 26 to snap under the shoulder 21 when the cap is applied to the can. This flange 31 will abut the shoulder 21 preventing unauthorized removal of the cap from the can.

The thickened portion 30 immediately above the intumed flange 31 provides a stiffening or reinforcing internal bead that will rather freely embrace the skirt of the rim 20 when the cap 12 is locked on the can 13. This reinforcing or stiffening bead makes possible the use of a very thin wall for the sleeve 26.

The sleeve 26 thus provides an open ended chamber 32 terminating at one end at the flange 31 and at the other end in a counterbore 33. The chamber 32 of the cap 12 thus has an open top end which must be closed off to prevent access to the valve head 22 when the cap is locked on the can. For this purpose a closure disk 34 is locked in the counterbore 33 as will be more fully hereinafter described. This closure disk 34 is preferably crowned as shown and rises above the end wall 25 to give a very pleasing appearance to the cap. The closure disk 34 is spaced considerably above the valve head 22 when the cap is locked on the can.

The side wall 24 of the cap 12 has a slot 35 extending from the bottom thereof in alignment with the lips 38 to a level considerably above the bottom of the lips. This slot 35 provides an access window which is closed by a puncturable seal 36 adhesively secured to the side wall 24. This seal can be composed of paper, metalfoil, or the like and is easily punctured by a probe device such as conventional lock key 37 shown in FIG. 4. Insertion of such probe device through the access window into the gap 29 between the lips 28 effects a spreading apart of the lips to open up the slot 27 and thereby expand the sleeve 26 sufficiently so that the locking flange 31 can be disengaged from the shoulder 21 of the rim skirt. In this manner the cap 12 is easily unlocked from the can 13.

As best shown in FIG. 5, the lips 28 are easily accessible through the slot or window 35 and the gap 29 between these lips can readily receive therebetween the key or other probe device. As also shown in FIG. 5 the slot in the sleeve 26 extends from the bottom to the top of the thimble.

As best shown in FIGS. 7 and 8, the counterbore 33 between the end wall 25 and the sleeve 26 of the cap 12 provides a flat shoulder 38 on which the closure disk 34 is bottomed. In addition this counterbore 33 provides a cylindrical side wall 39 with a slight outward taper from the shoulder 38 to the end wall 25. This side wall 39 has a diameter sized for accepting the disk 34 in tight frictional gripping relation and the lead or taper of the side wall is such that the initial free crown of the disk 34 will be slightly increased or sprung to accommodate a slight reduction in the diameter of the disk as the disk approaches the shoulder 38.

In FIGS. 7 and 8 the closure disk 34 takes the form of a stamped metal disk having a conventional bur lip 40 projecting therefrom and forming a sharp peripheral edge. This bur lip is conventionally formed in stamping sheet metal and is caused by shear of the metal in the stamping dies. The sharp bur lip 40 is formed in the direction of the crown of the disk so that when the disk is press fitted into the counterbore 33 and is contracted by the taper of the side wall 39, the bur will dip into the side wall 39 when the disk is bottomed on the shoulder

38. This provides a permanent uniting together of the metal disk 34 and the plastic cap 12. It will be understood that the disk 34 in effect is snapped into the counterbore 33 and is permanently locked in this counterbore.

As shown in FIG. 6, the closure disk 34 in cooperation with the flat end wall 25 of the cap 12 provides a very pleasing and decorative top for the cap.

In the modification shown in FIG. 9, the counterbore 33 of the cap 12 receives a crowned closure disk 34a with a depending rim or skirt 41. This closure disk can conveniently be molded from plastic material of the same or different composition used for the body of the cap 12 and the skirt 41 is press fit into the counterbore to be somewhat contracted by the tapered side wall 39 to form a tight frictional connection for permanently uniting the cap and closure disk. If desired, cement can be used to unite the skirt with the bottom and side wall of the counterbore 33.

As shown in FIGS. 10 and 11, the plastic cap 12 is conveniently formed in conventional injection die molds 42. Any plastic molding composition capable of being molded by an injection process can be used to form the cap 12. Suitable plastic materials are selected from a wide variety of polystyrene resins, acrylic resins, and the like. In addition, phenol-formaldehyde resin compositions, hardened vulcanized natural and synthetic rubbers, and the like, are useful even though some of these materials do not lend themselves to injection molding techniques.

As shown in FIGS. 10 and 11, the molding apparatus includes a bottom die 43 and a top die 44. The bottom die 43 has a flat shoulder 45 from which a cylindrical integral portion 46 projects to define the mold shape for the interior of the cap 12. This projection 46 has a cylindrical outer wall 47 forming the inner face of the side wall 24 for the cap, a cylindrical inner wall 48 forming the outer face of the sleeve 26, a flat wall 49 with an annular groove 50 therearound to form the locking flange 31 and the bottom edge of the sleeve 26.

The top die 44 has a flat end wall 51 mating with the wall 45, a cylindrical bore 52 extending from this flat wall 51 to form the outer face of the side wall 24 of the cap, a central cylindrical stud 53 in the bore 52 to form the inner face of the sleeve 26, the bead 30, and the top edge of the flange 31 and to seat on the wall 49. The top die 44 also has an end wall 54 cooperating with the end wall of the part 46 to form the end 25 of the cap and of course suitable stepped portions are provided to form the counterbore of the cap.

Ejection pins 55 are slidably mounted through the dies 43 and 44 to eject the finished cap 12. To facilitate removal of the cap from the dies the mold cavity defining walls can be made with suitable draft angles and the sleeve 26 can thus be slightly tapered inwardly from top to bottom while the outer side wall 24 can thus be slightly tapered outwardly from top to bottom. The outward flare or taper of the outer side wall enhances the firm bottoming of the wall in the well 16 while the inward flare or taper of the sleeve 26 enhances firm engagement of the locking flange 31 under shoulder 21 under widely varying tolerances.

As shown in FIG. 11, the top die 44 has an injection aperture 56 which is gated at 57 to supply the plastic molding compound to the mold cavity. As also shown in FIG. 11, the portion 46 of the bottom die 43 and the stud portion 53 of the top die 44 cooperate to form the slot in the sleeve 26 and the lips 28 of this sleeve.

When the dies are mated together as shown in FIG. 10, the molding cavity receives the molding compound and the complete cap 12 is formed in one operation. The molded cap is removed by separating the dies and by raising the ejection pins 55 to force the cap off of the die part 46.

From the above description it will be understood that this invention now provides a self-locking container cap

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which can be molded in one piece to provide an integral locking sleeve, the outer end of which is easily closed by a closure disk or the like member to form with the sleeve a thimble or inner cup-shaped cap.

It will be understood that modifications and variations may be effected without departing from the scope of the novel concepts of the present invention.

We claim as our invention:

1. In combination with a container having an end wall with an upstanding rim portion providing a shoulder and a well portion outwardly from said shoulder, a cap for said container having an annular top wall, an integral side wall depending from the outer periphery of said top wall and bottomed in said well portion at one end and an open end sleeve depending from the inner periphery of said annular top wall and integral therewith receiving said rim portion, said sleeve having an intumed flange underlying said shoulder to lock the cap on the container, said annular top wall having a counterbore around the inner periphery thereof providing a shoulder, a closure disk secured in said counterbore and bottomed on said shoulder closing the outer end of the sleeve and cooperating with the sleeve to form a thimble chamber, said side wall of the cap having an access opening therethrough, and said sleeve having an expansion gap aligned with said access opening and adapted to receive a probe to expand the sleeve sufficiently for unseating the intumed flange from the shoulder of the container to accommodate removal of the cap from the container.

2. In a combination with a container having an end wall with an upstanding rim providing a downwardly facing shoulder and a surrounding cap receiving well, a one-piece molded plastic cap having an annular top wall, an outer side wall depending from the outer periphery of said top wall and seated in said well at one end thereof and an inner cylindrical open end sleeve depending from the inner periphery of said top wall and axially split along the length thereof, said sleeve having the end thereof remote from said top wall embracing said rim, said remote end of the sleeve having an intumed flange extending under said shoulder to secure the cap to the container, said side wall of the cap having an access hole therethrough aligned with the split portion of the sleeve to accommodate a probe implement for expanding the sleeve to unseat the flange from the shoulder, and a closure disk spanning the outer open end of the sleeve and secured to said annular top wall at the inner periphery thereof to cooperate with the sleeve for forming an inner cup-shaped cap inside of the side wall.

3. A snap-on self-locking container cap which comprises a one-piece molded plastic member having an annular top wall, a cylindrical outer side wall depending from the outer periphery of said top wall, a split cylindrical sleeve depending from the inner periphery of said top wall inside of said outer wall and in spaced relation therefrom, an intumed locking flange on the end of said sleeve remote from said top wall, an access window in said outer wall aligned with the split portion of the sleeve to accommodate passage of a probe for spreading the sleeve for expanding the locking flange to an unlocking position, said top wall having a counterbore in the inner periphery thereof, and a closure disk secured around its periphery in said counterbore to span the outer end of the sleeve and close the top of the cap.

4. A snap-on self-locking container cap which comprises a one-piece molded plastic cup-shaped member having an annular end wall, a side wall depending from the outer periphery of said end wall, an internal open ended split sleeve depending from the inner periphery of said end wall in spaced relation inside of said side wall, intumed locking means on the end of said sleeve remote from said end wall adapted to be snapped around a container rim and locked under a shoulder provided by the rim, a closure plate spanning the outer open end of the sleeve and secured around its periphery to the inner pe-

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ripheral portion of said end wall for cooperating with the sleeve to form therewith an inner cup-shaped cap, and said outer side wall of the cap having an access window therethrough aligned with the split portion of the sleeve for accommodating insertion of a probe to expand the sleeve to an unlocking position.

5. A cap for a container comprising a one-piece molded plastic cup-shaped member having a flat annular top wall, an outer cylindrical side wall depending from the outer periphery of the top wall, an inner cylindrical sleeve depending from the inner periphery of the top wall in spaced relation inside of said side wall, said side wall having a slot extending upwardly from the bottom edge thereof, said sleeve having a gap along the length thereof aligned with said slot, said top wall having a counterbore around the inner periphery thereof, and a closure disk seated around its periphery in said counterbore and secured to the plastic of the top wall for closing the outer end of the sleeve and for cooperating with the annular top wall to form a complete top for the cap.

6. A plastic container cap which comprises a cup-shaped one-piece member having an annular end wall with a cylindrical outer side wall depending from the outer periphery thereof and a cylindrical inner sleeve depending from the inner periphery thereof,

said inner sleeve having an intumed locking flange and being split along the length thereof to accommodate spreading of the flange to unlock the cap,

said outer side wall having an access window aligned with the split portion of the sleeve to accommodate passage of a probe for spreading the sleeve and locking flange to an unlocking position,

said annular end wall having a counterbore around the inner periphery thereof providing a shoulder and a side wall diverging from said shoulder to the outer surface of said annular wall,

a crowned closure disk seated around its periphery in said counterbore against said shoulder,

and said disk having a sharp peripheral edge extending into said diverging side wall of the counterbore to secure the disk in the counterbore.

7. A cap adapted for a container having an end wall with an upstanding rim providing a downwardly facing shoulder and a surrounding cap receiving well which comprises, a member having an annular top wall, an outer side wall depending from the outer periphery of said top wall adapted to seat in the cap receiving well of a container at one end thereof and an inner cylindrical open end sleeve depending from the inner periphery of said top wall and axially split along the length thereof, said sleeve having the end thereof remote from said top wall adapted to embrace the upstanding rim of a container, said remote end of the sleeve having an intumed flange adapted to extend under the downwardly facing shoulder provided by the upstanding rim of a container to secure the cap to the container, said side wall of the cap having an access hole therethrough aligned with the split portion of the sleeve to accommodate a probe implement for expanding the sleeve to unseat the flange from the shoulder of a container, and a closure disk spanning the outer open end of the sleeve and secured to said annular top wall at the inner periphery thereof to cooperate with the sleeve for forming an inner cup-shaped cap inside of the side wall.

8. A snap-on self-locking container cap which comprises a member having an annular top wall, a side wall depending from the outer periphery of said top wall, a split sleeve depending from the inner periphery of said top wall inside of said outer wall and in spaced relation therefrom, an intumed locking flange on the end of said sleeve remote from said top wall, an access window in said outer wall aligned with the split portion of the sleeve to accommodate passage of a probe for spreading the sleeve for expanding the locking flange to an unlocking position,

and a closure disk spanning the outer end of the sleeve
secured to said top wall for closing the top of the cap.

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