

[72] Inventor **Jay G. Livingstone**
 715 W. Market St., Akron, Ohio 44303
 [21] Appl. No. **823,742**
 [22] Filed **May 12, 1969**
 [45] Patented **Mar. 9, 1971**
 Continuation-in-part of Ser. No.
 701,524, Jan. 8, 1968, Patent No.
 3,494,496, and a continuation-in-part of
 797,922, Feb. 10, 1969, abandoned.

3,255,907	6/1966	Eddy	215/40
3,360,149	12/1967	Roth	215/40
3,254,785	6/1966	Lovell	215/41

FOREIGN PATENTS

202,476	3/1959	Austria	215/(Fin)
1,079,700	8/1967	Great Britain	215/40
477,152	1/1953	Italy	215/41(578)
667,287	9/1964	Italy	215/(Fin)

Primary Examiner—Donald F. Norton
 Attorney—Gordon C. Mack

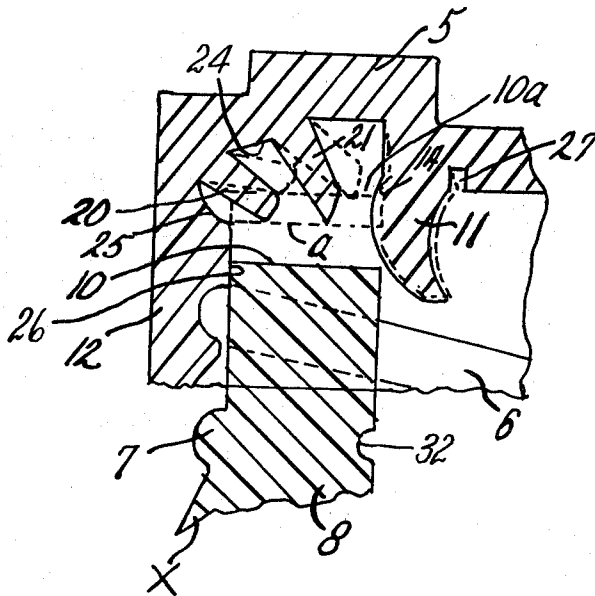
- [54] **CLOSURE CAP**
 4 Claims, 10 Drawing Figs.
- [52] U.S. Cl. **215/40,**
 215/41
- [51] Int. Cl. **B65d 41/28,**
 B65d 41/16
- [50] Field of Search 215/40, 41,
 (Fins); 220/60; 150/.5

References Cited

UNITED STATES PATENTS

2,904,204	9/1959	Naphtal et al.	215/41
3,053,406	9/1962	Wandell	215/41
3,074,579	1/1963	Miller	215/41
3,203,571	8/1965	Plunkett	215/40
3,232,470	2/1966	Gibson	215/(Fin)

ABSTRACT: A flexible cap is designed to make a tight seal with a bottle or the like. The cap may be either a snap-on or a screw-on cap. There are two annular tonguelets which extend down from the top of the cap, and preferably there is also an annular tongue. The tongue and tonguelets are concentric. The tonguelets are brought into pressure contact with the top surface of the wall of the bottle when the cap is in place on the bottle, and the tongue makes pressure contact with the inner top edge and/or the inner surface of the wall of the bottle. The tonguelets meet the top of the wall at an angle and when they are in pressure contact with this wall they are flexed. When both tonguelets are inclined inward, the outer tonguelet makes a greater angle with the skirt of the cap than the inner tonguelet so that when the tonguelets are flexed inward against the top of a bottle there is more room for the outer tonguelet to flex inward than if both tonguelets were parallel.



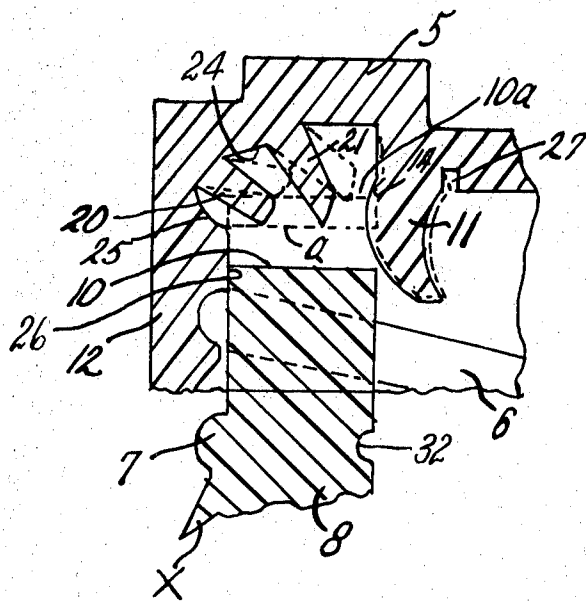


FIG. 1

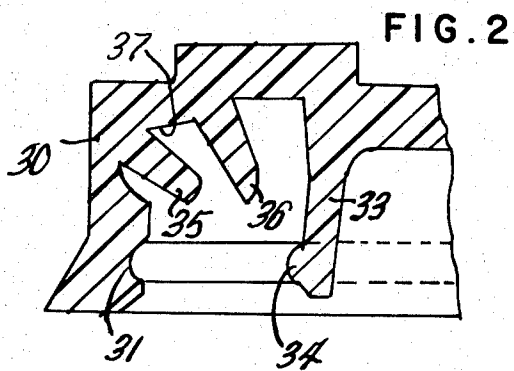
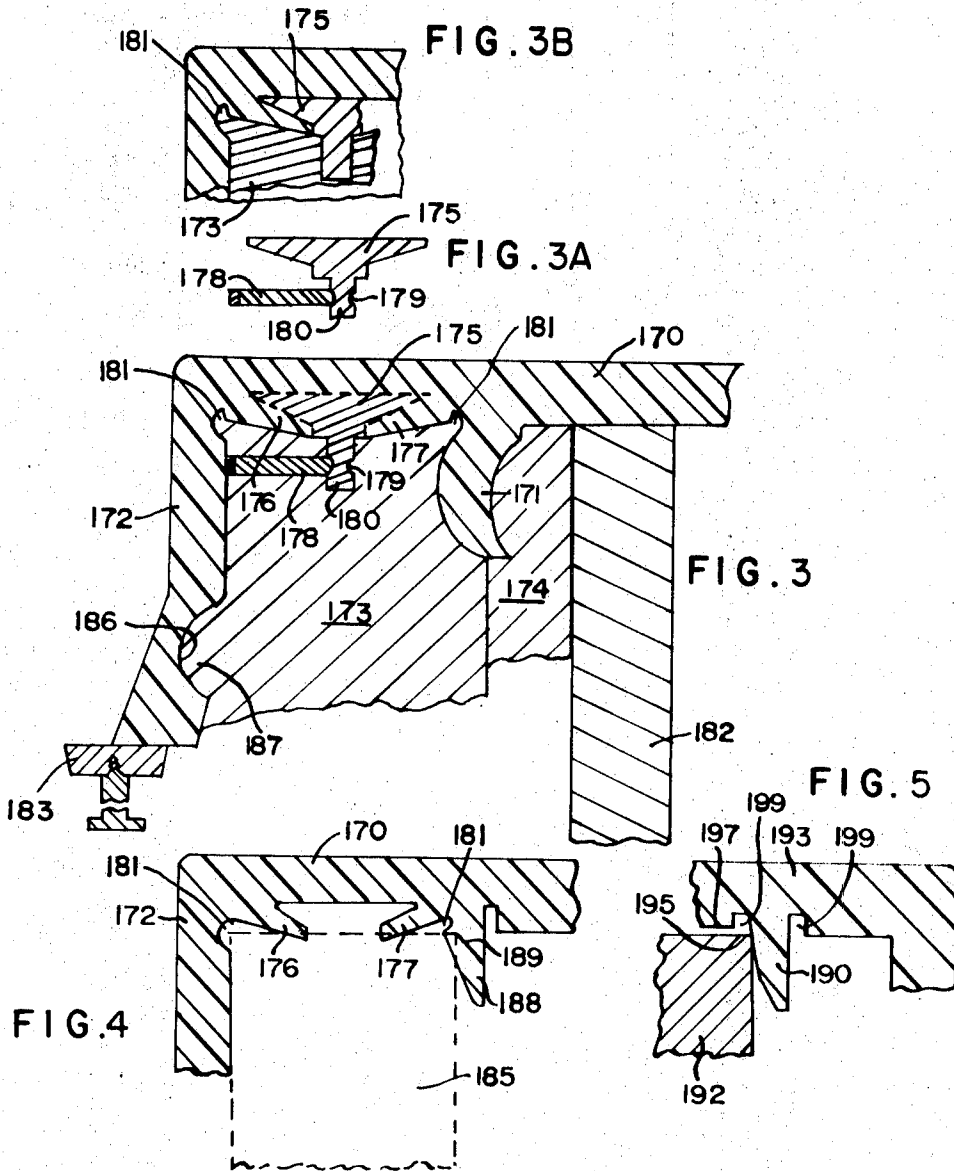
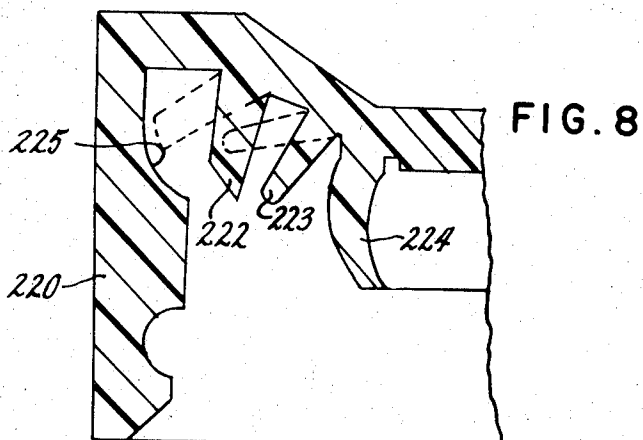
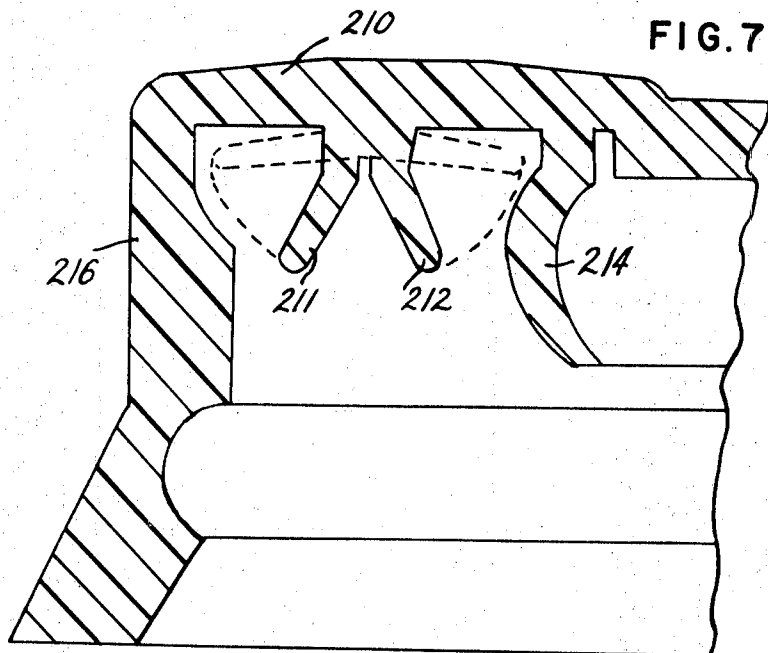
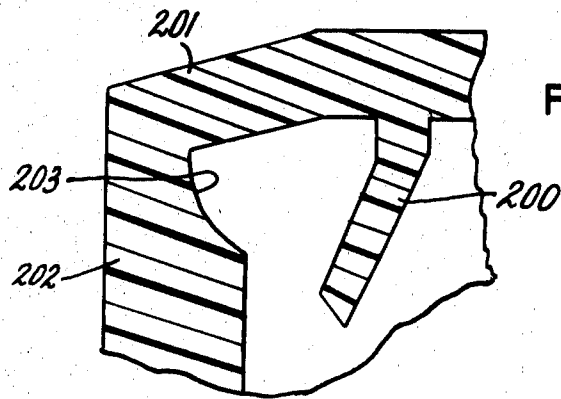


FIG. 2

INVENTOR
Jay J. Harrington
by *London C. Mack*
ATTORNEY



INVENTOR
J. G. LIVINGSTONE



INVENTOR
JAY G. LIVINGSTONE
BY *Robert C. Wood*
ATTORNEY

CLOSURE CAP

This application is a continuation-in-part of my applications Ser. No. 701,524 filed Jan. 8, 1968, now U.S. Pat. No. 3,494,496 and Ser. No. 797,922 filed Feb. 10, 1969, now abandoned.

This invention relates to a flexible cap or other fitment for a container such as a bottle.

In the preferred form of the invention the cap is provided with a downwardly extending annular tongue and two annular tonguelets, all of which are concentric. It is not essential that the cap be provided with a tongue in addition to the two tonguelets. The tonguelets may be substantially parallel or may be directed toward or away from one another. The word "tongue" herein refers to a flexible downward extension from the top of the cap which seals against the inner surface of the wall of the container—either at the top inner edge or against the wall below the edge, and the word "tonguelet" is used more particularly to refer to a downward extension (usually smaller) from the cap which is pressed against the top of the wall of the container, although "tonguelets" is applied to such downward extensions from caps which are pressed against the top of the wall of the container, even though there be no tongue. Both tonguelets may incline inward or outward or they may be directed toward or away from one another. The tonguelets are directed away from the vertical so that they flex on contact with the container, and they flex independently of one another.

The cap may be of the snap-on type or of the type which screws on to threads on the bottle or other container.

The skirt of the cap may be indented adjacent the bottom surface of one or more tonguelets to give the tonguelets greater effective flexing length. If one or more tonguelets are slanted outward and extend beyond the outer edge of the top of the container when flexed, the inner surface of the skirt is advantageously indented to provide room for the ends of one or more tonguelets when flexed by contact with the upper edge of the container.

In a particular form of the invention, the outer surface of the tongue is provided with a bead or groove which interlocks with a groove or bead on the inner surface of the wall of the container. If the cap is of the snap-on type this interlocking means on the tongue and inner wall of the container interlock when the cap is snapped on to the container.

If there are two tonguelets in a cap designed to contact the top surface of a bottle or the like, their lower ends must be very close together. If these tonguelets are parallel to one another, precautions are taken to insure their independent movement. For instance, if both tonguelets are directed inward, when the outer tonguelet is flexed, unless precautions are taken, its inner surface will contact the outer surface of the inner tonguelet, and the inner tonguelet will tend to be flexed inwardly by the outer tonguelet, thus lessening the pressure between the bottom end of this inner tonguelet and the top of the wall of the bottle. By having the tonguelets extend downwardly at different angles, as contemplated herein, whether they incline inward or outward, with the upper tonguelet making a larger angle with the top of the wall of the container than the lower tonguelet, such interference is greatly reduced or entirely eliminated.

When two tonguelets incline inward, the skirt of the cap can be indented at the base of one or both tonguelets to give them greater length and more room in which to flex than if there were no indentation. If the tonguelets incline outward, flexing space may be provided by indenting the skirt of the cap, as described in detail below.

Alternatively, the two tonguelets may be directed toward one another. They should be spaced far enough apart to prevent the tonguelets from contacting one another when they are flexed in use. This is advantageously done by providing more space between the tops of the tonguelets than between their bottoms. The top surfaces of two such tonguelets can be tapered or cut back so that they come to a point to prevent them from fouling each other as they are flexed upward, and thus gives them additional room in which to flex.

According to a different arrangement, the two tonguelets may be directed away from one another provided the top of the container wall is wide enough to accommodate them, or the skirt of the cap may be indented to accommodate them. The tonguelets may make sealing contact with the container only at the inner and outer edges of the container wall.

The invention is further described in connection with the accompanying drawings which are illustrative only, as the invention is applicable to different types of caps and containers.

In the drawings:

FIG. 1 is a view in section of one type of cap as it is being placed onto a bottle;

FIG. 2 is a section through a cap of different design;

FIG. 3 is a section through a cover with means for forming the same;

FIGS. 3-A and 3-B show details of the core, etc. shown in FIG. 3;

FIG. 4 is a section through a modification of the cover of FIG. 3 with the neck of the container shown in dotted lines;

FIG. 5 is a detail of a modification of the cover shown in FIG. 4, with the neck of the container shown in full lines;

FIG. 6 is a section through a portion of a cap provided with an outwardly extending tonguelet;

FIG. 7 is a section through a cap with two tonguelets directed away from each other; and

FIG. 8 is a view of a cap with a tongue and two outwardly directed tonguelets.

The cap 5 of FIG. 1 is provided with threads 6 so that it can be threaded onto threads 7 on the neck of the bottle 8. It might equally well be a screw-on cap. As the cap is fastened onto the bottle the top surface 10 of the neck rises between the tongue 11 and the skirt 12 from the position shown in FIG. 1 substantially to the dotted line 10a. The tongue 11 makes pressure contact with the inner surface of the neck 8 and is deflected inward as indicated in dotted lines. If the outward bulge of the tongue is somewhat lower than illustrated in FIG. 1, so that the bottle neck rises above it when the cap is in sealing position, the outer surface of the tongue will not be indented as shown at 14, but a portion of the outer surface of the tongue will be flattened.

The tonguelets 20 and 21 are inclined inward toward the tongue 11. Before contacting the neck of the bottle they extend to about the same level. This is indicated by the line a. As the cap is seated on the bottle, these tonguelets are flexed inward by the top of the bottle as it rises to the line 10a or higher, and they independently make tight seals with the top surface of the bottle neck. Two such seals are much better than one because the top surface of a bottle is usually not flat, but is wavy (particularly at the seam where the two mold parts used in forming the bottle, come together), and a single seal made by a single tongue, is not as tight as two seals.

The top surface of the bottle neck is not very wide. In order to have two tonguelets make individual seals with the top surface of the neck, these tonguelets must be quite close together. If they were parallel to one another, when flexed inward due to pressure against the top surface of the bottle neck, the upper tonguelet would be apt to contact the upper surface of the lower tonguelet and exert downward pressure against it which would lessen the pressure exerted between the bottom edge of the upper tonguelet and the top surface of the bottle. This is avoided by arranging the upper tonguelet at a greater angle to the top edge of the container than the lower tonguelet. If both tonguelets incline from the skirt, it is helpful to have the tonguelets as far apart, as at 24 where they join the skirt. With this arrangement, as the tonguelets are flexed against the bottle top, the lower tonguelet is flexed inward sufficiently to be moved to a position in which it is either out of contact with the upper tonguelet when it is flexed, or there is so little pressure between the two that it has no material effect on the pressure exerted by the lower tonguelet against the top surface of the bottle.

The inward flexing of the upper tonguelet is enhanced by having the skirt dished outward at 25, just below the outer ton-

gullet. Thus the outer tonguelet flexes from a point which is out beyond the vertical inner wall 26 of the skirt of the cap.

The flexibility of the tongue 11 is similarly improved by providing an indentation 27 in the top inside of the tongue, adjacent the joiner of the tongue with the top of the cap which in effect lengthens the tongue.

Instead of providing a spiral bead on the outer surface of the bottle neck, the bottle neck may be grooved spirally to be engaged by a spiral bead on the inner surface of the skirt.

The invention is not limited to a cap which is threaded on to a container, and FIG. 2 shows a cap 30 of the snap-on type which there is an annular groove 31 which snaps over an annular bead on the bottle neck. The bottle is not shown. As shown in FIG. 1, when a bead is provided on the outer surface of the neck of a bottle made of organic plastic or even glass or metal, there is usually an indentation 32 on the inner surface of the neck opposite the bead. Conversely, if the bead were on the inner surface of the bottle neck a groove would usually be formed on the outer surface. The bead 7 in FIG. 1 is much larger than the groove because the neck illustrates a bottle which has been blown inwardly into a form, and the indentation 32 occurs opposite the bulge 7.

The tongue 33 of FIG. 2 is provided with a bead 34 designed to be engaged in sealing contact with a groove of substantially the same size in the inner surface of the bottle neck when the bead on the outer surface of a bottle is engaged in the snap-on groove 31' of the skirt. For this reason the bead 34 is at the same level as the groove 31. It is to be understood that the groove 31 might be replaced by a bead which would be snapped into a groove in the neck of the bottle and the bead 34 might be replaced by a groove which would snap over the bead on the inner surface of the bottle, in sealing contact with it.

The inclination of the tongue 33 and its shape may be varied very materially. A tongue with a bead such as bead 34 (or a groove for interlocking with the inner surface of a bead on the neck of a bottle) is novel and such a tongue may be provided in many different types of caps. Such caps may be provided with a single tonguelet or may comprise no tonguelet at all. The shape of the tongue is quite immaterial. It may be substantially vertical or it might be slanted, or the bead 34 might be on an outward bulge of a tongue similar to the bulge of the tongue 11 of FIG. 1.

The tongue may readily be designed to make sealing contact with the inner edge of the bottle neck, and this may be in addition to making sealing contact with the inner surface of the bottle neck.

The tonguelets 35 and 36 are of much the same design as those shown in FIG. 1. They extend away from the skirt at different angles. They may vary in thickness, depending upon the width of the top edge of the container. Their lower ends may be rounded or may be provided with a relatively sharp edge for contact with the top surface of a bottle neck. They advantageously vary in length, as illustrated. As tonguelet 35 is flexed upward it does not contact tonguelet 36 because there is more space between the upper portions of the tonguelets at 37 than between their lower portions. The top surfaces of the tonguelets may taper sharply to a point and/or may be cut back on their opposed surfaces in order to give additional space for flexing without contacting.

The cap may be indented at the base of any tongue or tonguelet to facilitate flexing. The indentation is preferably provided on the side of the tongue or tonguelet where the cap is placed under tension when the tongue or tonguelet is flexed, but it may be on the side which is compressed, or it may be on both sides.

The two tonguelets form a better seal than a single tonguelet. If the bottle includes a tongue, this provides a further seal with the bottle neck. The interlocking threads or the snap-on interlock provide a further seal. Thus the improved cap provides means for very efficient sealing with a bottle neck or the like. It may even maintain a different pressure within the bottle or other container, than prevails outside of it.

FIG. 3 shows a cover 170 with parts of the mold used in forming it. Thus, the inside of the cover 170 and between the flange 171 and the skirt 172 are the two cores 173 and 174. In addition to these there is the third core 175 which fits up in between the two tonguelets 176 and 177. This spaces the ends of the tonguelets so that they do not touch one another when flexed up. The pin 178 fits between the groove 179 in the lower extension 180 of this core and the outside surface of the core 173. The purpose of this pin is to hold the core 180 in position. This core is shown separately from the rest of the mold and the cover in FIG. 3-A. The ejector pin 178 is to separate the cover from the cores. The ejector 183 cooperates with the ejection pin 178. The detailed FIG. 3-B shows how the two cores 180 and 173 fit into one another.

FIG. 4 shows a somewhat smaller similar cover but with a tongue 188 which is somewhat different in shape from the tongue 171. The tonguelets 176 and 177 are flexed against the top of the neck 185 of the bottle or other container when applied thereto. Tonguelets 176 and 177 are directed toward one another and their inner edges make sealing contact with the top edge of neck 185. The cap is not shaped to make a tight fit with the outer edge of the top of the neck, but space at 181 is provided to permit tonguelets 176 and 177 also 171 to flex without any great distortion of the cap. The inside diameters of bottle necks vary, and also the distance between the top of the bottle neck and the top of the snap-on interlock at 186 and 187 will vary. Thus the tonguelets are deflected more or less, depending upon the height of the neck, and they form two seals with the top of the neck. The tongue 188 is flexed inwardly by the neck as it is inserted between the tongue and the skirt 172, and sealing contact is made between this tongue 188 and the top inner corner 189 of the neck. Indentations 181 in the cover immediately below the base of each tongue, permit the tongues to be flexed more easily and minimize the distortion of the cover when the tongues are flexed. The tonguelets need not be the same length; either one may be longer than the other depending upon where they are located and the angle they make with the top of the container.

Although in the earlier views the outer surface of the flange on contact with the inner surface of the neck of a container was distorted, in FIG. 5 a tongue 190 is shown which may be of any suitable shape, and it is noted that this tongue is deflected inwardly without any great distortion as the neck 192 of the bottle fits up into the cover 193. The sealing contact is between the corner 195 at the upper inner edge of the neck and the tongue 190. The distance the neck fits up into the cover will vary, depending upon the height of the neck above the bead or threads, and it may contact the wall 197 of the cover which, in that event will serve as a tonguelet to form a seal, but such contact is not necessary and the height of the neck will vary, so whether contact is made, and the pressure applied at contact is unpredictable. The openings 199 at the sides of the tongue 190 where it joins the rest of the cover are indented to facilitate inward flexing of the tongue 190 with minimum distortion of the balance of the cover.

FIG. 6 shows a single tonguelet 200 which is adapted to contact the top edge of the wall of a container when the cap 201 is placed on the container. The skirt 202 of the cap is cut away at 203 to accommodate the end of the tonguelet 200 if the cap fits down so far on the container as to cause the end of the tonguelet to extend beyond the outer edge of the container wall.

FIG. 7 shows a cap 210 provided with two annular tonguelets 211 and 212 and an annular tongue 214. When the cap is placed over the top of the container, the skirt 216 fits against the outer surface of the top portion of the wall of the container. The tonguelets 211 and 212 are directed away from one another. As the cap is pressed down over the container the tongue 214 makes sealing contact with the inner surface of the wall at its upper inside edge. On contact with the top of the wall the two tonguelets flare apart (as shown in dotted lines) and seal against it in two areas. The area of contact between the tonguelets and the top of the wall will depend upon the flexibility of the tonguelets.

The cap 220 shown in FIG. 8 resembles that shown in FIG. 1, but the tonguelets 222 and 223 are directed outwardly. They are adapted to make seals with the top edge of a container when they make pressure contact with it. The tongue 224 also makes sealing contact with the container. Note that the upper inner surface of the skirt is cut away to make the indentation 225 to accommodate the end of the outer tonguelet when the tonguelets are flexed outward by contact with a container.

The closure cap may be provided with a cylindrical upward extension of small diameter, the top of which is to be snipped off when the contents of the container are to be used. Such a structure is not uncommon in plastic closure caps for bottles containing liquids to be used from time to time in small amount. A closure for this extension may be provided for use after the top has been snipped away. This closure may be a cap attached to the main closure cap (such as closure cap 5 of FIG. 1 provided with such an upward extension of small diameter, usually tapering) by suitable strap means, as is known in the art. Thus the principle of the invention is applicable to containers and closure caps of different designs.

Thus the closures more specifically disclosed herein can be modified to form fitments suitable for a variety of purposes, other than mere closure means, and such fitments may be provided with tongues and/or tonguelets as disclosed herein. The containers to which the closures or other fitments are applied need not comprise necks, although the fitments are designed more particularly for use on the necks of bottles, which necks may be longer or shorter, and the skirts of the fitments may extend down over the outsides of the containers for greater or lesser distances while still providing adequate sealing means, even to retain pressure within the containers.

I claim:

1. A flexible closure cap for a container which comprises a skirt to contact with the surface of the wall of the container

and an annular tonguelet which depends from the top of the cap and is inclined outwardly, the end of which tonguelet when the tonguelet is flexed upwardly is adapted to extend beyond the outer surface of the container wall, and the inner surface of said skirt is indented near its top to accommodate the end of the tonguelet when so flexed.

2. The combination of a container with an opening at the top and a closure cap of flexible material with a skirt which fits over the opening, means on the inner surface of the skirt engaged with means on the outer surface of the wall of the container near the top thereof, and upper and lower angular concentric tonguelets angling down from the top of the cap in substantially the same direction, to substantially the same level, into pressure contact with the top surface of the wall of the container, there being more space between the tonguelets at their tops than at their bottoms, said tonguelets being spaced from each other at their bottoms and the lower tonguelet making a smaller angle with the top surface of the wall of the container than the upper tonguelet whereby when the tonguelets are flexed by contact with the top surface of the wall of the container there is more room for the lower tonguelet to flex than if the tonguelets were parallel.

3. The combination of claim 2 in which the tonguelets angle inwardly.

4. A closure cap for a container, which cap is composed of flexible material and comprises a skirt adapted to fit over the open top of the container, an annular tongue which depends from the cap inside of the skirt and is adapted to extend into the top of the container and make sealing contact with the container, and a tonguelet which extends down from the cap between the skirt and the tongue, adjacent the tongue, there being an annular indentation that spaces the bases of the tongue and tonguelet and narrows the base of the tongue and tonguelet and gives them greater flexibility.

40

45

50

55

60

65

70

75