July 3, 1962 H. RITZENHOFF 3,042,243

SEALING CAP FOR BOTTLES, JARS, CANISTERS AND SIMILAR CONTAINERS

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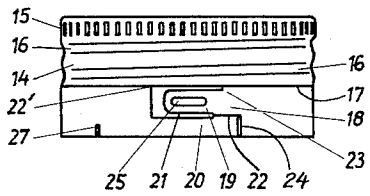



Fig. 1

Fig. 2

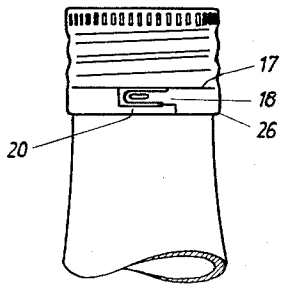



Fig. 3

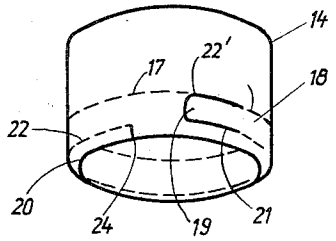



Fig. 4

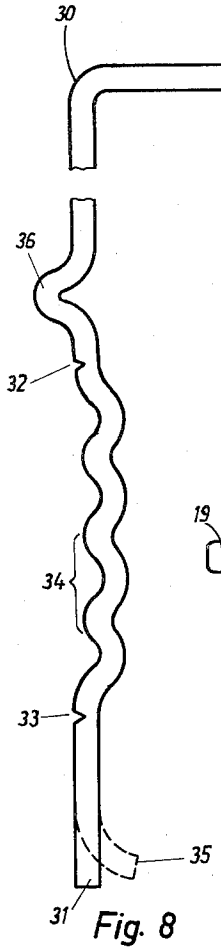



Fig. 8

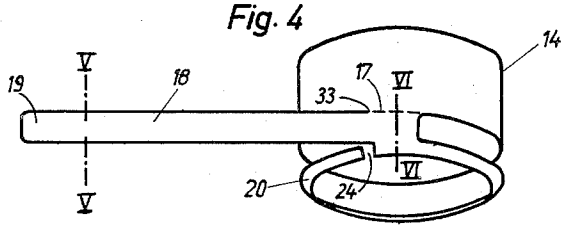




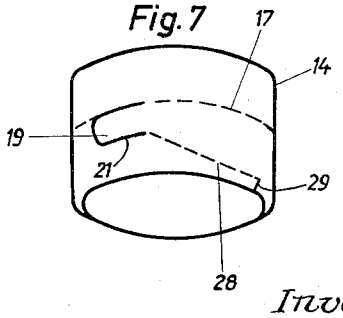


Fig. 5



Fig. 6

Fig. 7




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# SEALING CAP FOR BOTTLES, JARS, CANISTERS AND SIMILAR CONTAINERS

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The present invention relates to sealing caps of metal, preferably of aluminum or aluminum alloys, particularly to caps provided with a screw-thread.

A sealing band is provided on a sealing cap and maintains the cap firmly on the opening of the bottle or the like, until this sealing band is removed, which happens when the bottle, jar, canister or similar container is opened for the first time. Since this sealing band is firmly connected to the cap until the container is opened for the first time, it is impossible to open the container without separating the connection between cap and sealing band. The purpose of this arrangement is to make visible whether the container is still in its unopened state or had already been opened. This distinguishability is important in order to assure the buyer of the merchandise in the container that the contents of the container has not been adulterated and that no refilling with a non-original article after a removal of the first charge has been made.

In order to make possible that in cases, in which the contents of the container is not completely used up immediately after opening, this container may be closed again, the sealing caps are provided with a screw-thread, engaging with a corresponding spiral line at the top of the bottle or the like. Commonly, this spiral line is situated on a reinforced top adjoining the neck of the bottle, the lower edge or collar of this top standing out with respect to the bottleneck and serving as an anchor for the sealing band. At its lower rim the sealing band of the cap is flanged inwardly around the said edge or collar so that a removal of the sealing is prevented. In order to open the container the sealing band must be separated from the cap and the cap then be screwed off.

This invention provides a sealing band flanged-in around a collar and having a slit extending through a short part of the sealing band connected to a weakened line which is spaced from the lower end of the sealing band and meets with a transverse slit extending up from the lower edge of the sealing band. In forming the flanged-in edge of the sealing band in this construction the flanging-in can be achieved by the application of a rolling pressure to the lower rim of the sealing band without wrinkling the cap. The following description sets forth a variety of constructions which embody this novel advance over previous sealing caps. These embodiments have varying advantages and each modification embodying the invention to some extent fulfills one or more of the following objects.

One object of the invention is the provision of a seamless sealing cap, made of one single part in which the disadvantages of the known seals are avoided.

One particular object of the invention is the provision of a sealing cap which may be opened securely and easily, i.e. without the application of a particular strong force and without tools and which leaves no parts on the bottle or the like.

Another object of the invention is the provision of a sealing cap having no sharp edges at its lower rim after the opening of the seal so that injuries are avoided during its further use and of which no parts must be specially removed after the opening of the seal.

A still further object of this invention is a sealing cap provided with a removable band which has a high resistance to premature or accidental removal but is susceptible to easy removal under a properly applied force.



It is still another object of this invention to provide a removable sealing band on a sealing cap which has slight resistance to tearing along a predetermined weakened line but does not produce faulty or unintentional tears along the torn off removable strip.

It is still a further object of this invention to provide a sealing cap which has circumferential strength in the section remaining after removal of the sealing band and is otherwise reinforced.

As another object of this invention it is intended to provide a weakened line attached to a transverse slit on closures of very small diameters.

A further object of this invention is the provision of a sealing cap with a vertical slit in connection with a weakening line together with means for pulling on a removable portion of the sealing cap in which the combination of parts is arranged for simple production.

These and other objects of this invention will become more apparent upon consideration of the following descriptions taken together with the accompanying drawings in which FIGURE 1 is a front elevation of a sealing cap according to this invention carrying a removable sealing band.

FIGURE 2 is a front elevation of the sealing cap of FIGURE 1 applied to a container.

FIGURE 3 is a perspective view from below of the modification of the sealing cap of this invention.

FIGURE 4 is a perspective view from below of the modified sealing cap of FIGURE 3 with the removable sealing band partly torn off.

FIGURE 5 is a section of the partly removed portion of the sealing cap of FIGURE 4 taken at line V—V of FIGURE 4.

FIGURE 6 is a sectional view of the side wall of the sealing cap of FIGURE 4 taken at line VI—VI of FIGURE 4.

FIGURE 7 is a perspective view from below of a further modification of the sealing cap according to this invention.

FIGURE 8 is a longitudinal section of a modified side wall of a sealing cap of this invention.

Referring to the embodiment illustrated in FIGURES 1 and 2, FIGURE 1 shows a sealing cap **14** in the shape given to it before its application to the bottle or the like. The portion of the cap above line **17**, i.e. the sealing cap proper shows the usual construction, the whole cap being formed of one single seamless piece of aluminum sheet, having a thickness of about 0.22 to 0.25 mm. An upper rim **15** is provided with small impressions in order to facilitate the handling of the cap during the opening or sealing operation. In the interior of rim **15** lies a thin cork-plate or cardboard plate (not shown in the drawing) to the lower side of which is fastened a foil of wax paper, metal, resin or the like. Threaded impressions **16** are fitted to corresponding projecting parts on the bottle or the like, for the sealing of which the cap is intended.

Impressions **16** may also be omitted if the device employed for the attachment and fastening of the seal to the bottle is adapted to effect also a forcing-in of the threaded impressions **16** in addition to the flanging-in of the lower edge of the cap.

A tear-off line **17** made by indentation weakens the metal of the cap along its entire circumference without cutting it completely. Merely in that part of the circumference, which lies between points **22'** and **23**, the metal is completely cut along the line **22'—23**.

The cap **14** is made up of two main parts. One is the part above the tear-off line **17** remaining after the part below is removed at the initial opening of the container. The other is the sealing band below the tear-off line, which part is removed at the initial opening of the container. Immediately adjacent to the tear-off or weaken-

ing line 17 but not extending over the entire breadth of the sealing band is a tongue 19 punched out of the part of the sealing cap below tear-off line 17. This tongue 19 preferably extends from right to left in order to enable a person to open the seal by using his right hand. Tongue 19 may be provided with impressions 25 which facilitate taking a hold on the tongue.

A tear-off band 18 extends circumferentially of the cap 14 in the sealing band and below the tear-off line 17. The tear-off band 18 is a separable strip. The tear-off band 18 is the tongue 19 and that part between the tear-off line 17 and a weakening line 22. Since tongue 19 does not extend over the entire breadth of the sealing band, a narrow strip 20 is left below tongue 19, the breadth of this strip amounting as a rule to about ¼ to ⅓ of the breadth of the tear-off band 18. Opposite the tip of tongue 19 and approaching the base of tongue 19 this narrow strip 20 is limited by a cutting line 21. The weakening line 22 is a continuation of this line 21 and also defines the strip 20. The weakening line 22 is made by a mere pressing action and extends a small distance beyond the base of tongue 19 which is determined by the point 23 on the upper side of tongue 19. A cut 24 then runs from the end of the weakening line 22 normal to the lower edge of a sealing band 18 provided below the tear-off line 17.

As will be explained in greater detail below, the cutting line 24 may be situated at other points around the lower rim of the cap 14.

In the manner described here there is provided a cut over the entire breadth of the sealing band merely interrupted by weakening line 22. This cut across the sealing band extends from the lower rim of the sealing band perpendicularly to this rim, in the form of the cutting line 24 to the base of tongue 19; this line is continued by weakening line 22 and that line again by cutting line 21 along the length of tongue 19 on the lower side thereof and finally by a cut opposite the tip of the tongue normal to the circumference of the cap in the direction towards the tear-off line 17, which is reached by the cut at the point 22'. At point 22' the cut meets the cutting line 22'—23, limiting the upper side of tongue 19.

With reference to FIGURE 1, it may be mentioned that here cutting lines 21 and 24, as well as the cutting line between the tip of the tongue and point 23 at its base, have been shown as narrow gaps in order to illustrate those cutting lines more clearly and to differentiate them from weakening lines 17 and 22. In reality, the said cutting lines do not result in such openings in the form of gaps, but consist only of a plain cut through the entire thickness of the metal.

The lower rim of the sealing band at the narrow band 20, serves for the formation of a flanged-in edge, by means of which the sealing cap may be fastened to a bottle or the like. In FIGURE 2 the seal of the invention is shown in the form obtained after the fastening thereof to a bottle or the like. The parts situated above tear-off line 17 are the same as in FIGURE 1 and, consequently, need not be discussed here again. By means of the bending-in of the lower rim of tear-off band 18 about a collar at the bottleneck, a fastening of the cap to the bottle is created at 26 which prevents the cap to be pulled off the bottle. By forming this constriction 26 the circumference of the lower rim of tear-off band 18 is decreased a little so that owing to the action of the flange-in rolls, employed for the formation of the constriction 26 and moving from right to left around the bottleneck, both lower corners of the two sheet metal portions at cutting line 24 overlap each other a small distance. Since cutting line 24 was formed by cutting with a shear-like tool so that the end of the narrow band 20 lies a small distance under the part of the tear-off band 18 opposite to it at the cutting line 24, the lower corner of the narrow band 20 moves at the location of the cutting line under the other end of tear-off band 18 during the formation of the constriction. In this way narrow band 20 is fixed and insurance provided that the seal cannot be opened without the removal of the tear-off strip 18. For opening the seal, the thumbnail of the right hand is inserted below the tip of tongue 19, which may easily be raised, then tongue 19 is seized by the thumb and index finger and by moving it to the right is pulled off the sealing cap.



It is apparent from the above description that during this pulling-off movement narrow strip 20 is freed by the tongue when weakening line 22 is torn and tearing line 17 begins to separate at 23 and that the entire tear-off band 18 is removed from cap 14 during the continuation of the pulling-off movement.

Depending on the thickness of the sheet metal employed for the manufacture of the seal and depending on the extent of the flanging-in at 26, the tear-off band 18 may simply be pulled off tangentially to its circumference, which is possible with thinner sheet metals and with lesser inward extension of the bending-in at 26; or, in case of a stronger sheet metal and with a greater inward extension of the bending-in, the tear-off band 18 may be pulled off to the right in an obliquely downward direction, after it has started to separate at 23. In the first case, in order to avoid any substantial resistance caused by buckles in tear-off band 18 formed by the tangential tearing-off, one or a few small incisions having approximately the breadth of the bent-in portions, i.e. being shorter than the breadth of narrow band 20, can be provided over the entire length of the circumference of the sealing band, as is shown in FIGURE 1 at 27. Such incisions at 27 may be a simple cut or may have the form of a triangular notch.

In operation on the opening of the sealing cap no parts of the seal are left on the bottle or at the cap 14 after opening. On the other hand the tear-off line 17 produces a completely smooth lower rim on the remaining part of the cap 14, comprising no sharp edges which might result in injuries.

This sealing cap has various advantages. For example, it is easily attachable to a container at the time that the container is filled. After this easy attachment of the sealing cap to the container, the cap remains securely attached to the container, such as a bottle, until the moment of first use. This attachment is secure against surreptitious or illicit removal of the cap with an undetected repositioning. Thus, the cap provides means for preventing undetected adulteration of the contents. A further advantage of the sealing cap relates to the subsequent use of the container after the first removal of the cap. The sealing band is completely removed, leaving for further use the upper portion of the cap in which the threaded impressions 16 are formed. This upper portion of the cap remaining after the removal of the sealing band has the appearance and the function of a conventional cap with no protruding or sharp edges. In fact, the remaining part of the cap can be the same as any suitable closure.

Finally, the sealing cap with the removable sealing band is a particularly adaptable attachment to a container by flanging the lower rim of the tear-off band around a suitable protuberance on the container such as a collar at the bottleneck. The lower rim can be flanged-in by a rolling action without wrinkling the cap.

The embodiment illustrated in FIGURES 1 and 2 as described above presents essential features of the sealing cap. Further development of these features provides embodiments of the invention having additional advantages. The present invention relates to this further development as illustrated in FIGURES 3 through 8 inclusive. The tearing-off of the tear-off band 18 may be initiated in a preferred manner by a positioning of the cut which runs vertically into the tear-off band from the lower edge of the sealing band. Upon positioning of this cut at a distance from the root of the tongue, the initiation of the tearing action is improved. Sealing cap

14, shown in FIGURE 3, may be made up of the parts of the closure of FIGURES 1 and 2. As in the embodiment shown in FIGURES 1 and 2, the tear-off line 17 is a weakening line in the metal of the cap which girdles the cap around its entire circumference and delineates the tear-off band 18. The tear-off band 18 carries the tongue 19. At the base of the tongue 19, the tear-off line 17 extends around the cap 14 and the weakening line 22 extends around the cap 14. The tear-off line 17 extends from the upper end of the base of the tongue 19. The narrow strip 20 is below the tongue 19 and the weakening line 22 is the upper edge of the narrow strip 20. The cut 24 is shown in the embodiment of FIGURES 3 and 4 and corresponds to the cut 24 of FIGURES 1 and 2. Cut 24 extends vertically up from the lower rim of the cap. The cut 24 may also run in an oblique direction and if cut in an oblique direction is preferably in the direction of the tear. The cut 24 is spaced away from the base of the tongue 19 along the weakening line 22. As shown in FIGURES 3 and 4 the cut 24 is positioned in the cap 14 along the weakening line 22 so that the weakening line 22 extends almost completely around the cap 14. Thus the cut 24 is positioned a relatively short distance from the tip of tongue 19 but at a point on weakening line 22 where the weakening line has nearly encircled the cap 14.

The narrow strip 20 of the embodiments of FIGURES 3 and 4 runs around substantially all of the cap 14 as formed by the elongation of the weakening line 22. FIGURE 4 shows the cap 14 with the tongue 19 completely torn away from the cap 14. Thus the narrow strip 20 is shown as formed by the removal of tongue 19 along the weakening line 22. In FIGURE 4 the tear-off band 18 is vertically removed from the remainder of the cap 14 by the separation of the tongue 19 from the upper part of the sealing cap 14 along the tear-off line 17. The tear-off band 18 in FIGURE 4 is attached to the upper part of the cap 14 along the portion of the tear-off line 17 not yet severed.

In FIGURE 5 it shows a vertical section through the tongue 19 after it is stripped from the cap 14. Tongue 19 is a flat strip of metal. FIGURE 6 is a vertical section taken through that portion of the sealing band portion not traversed by the weakening line 22. FIGURE 6 shows a straight section equivalent in width to the tongue 19 and a flanged-in section equivalent in width to the narrow strip 20. This demonstrates the flanging-in of the lower rim of the cap 14 and the formation of the narrow strip 20 portion of the cap 14 when the cap is initially fastened to its container.

The spacing between the cut 24 of FIGURES 3 and 4 and the base of the tongue 19 along the weakening line 22 simultaneously results in the weakening line being accordingly elongated. This gives the cap 14 greater facility and safety in the tearing-off operation. The tear-off band 18 is formed as an elongation of the tongue 19 when the tongue 19 is stripped along the tear-off line 17 and the weakening line 22. The narrow strip 20 makes up the rest of the sealing band which is separated from the remainder of the cap 14. The sharp edged flanging of the lower narrow strip 20 on the container provides an angular cross-section. This angular structure between the narrow strip 20 and the tear-off band 18 provides the narrow strip 20 with a strength. This strength tends to retain the narrow strip 20 on the container while the tear-off band 18 is removed by the tearing action applied to the tongue 19 as applied along the tear-off line 17 and the weakening line 22. By spacing the cut 24 along the weakening line 22 away from the base of the tongue 19, the initial tearing action on the tear-off band 18 is exerted only on the straight walled portion of the sealing band. This is the arrangement of FIGURES 3 and 4. As only the straight walled section of the sealing cap is being torn off, there is a relatively slight tear resistance against the removal of tear-off band 18. The further the cut 24 is spaced from the base of tongue 19 along the weakening line 22 the greater will be the distance through which the tear-off band 18 will be stripped away along the straight wall section of the sealing band. The greater this distance of the removal of the tear-off band 18, the easier will be the removal of the sealing band from the remainder of cap 14. As shown in FIGURE 4 when the removal of the tear-off band 18 reaches the cut 24, only a relatively small section of the sealing band is still circumferentially attached to the remainder of the sealing cap 14.

It has been found that the removal of a tear-off band of considerable length in the stripping off of the sealing band from the remainder of the cap greatly facilitates and improves the removal of the sealing band. The resistance to the removal of the separable sealing band is greatly diminished and this reduction is in proportion to the increase of the amount of tear-off band which is removed from the sealing cap. Stated otherwise, the greater distance of the cut 24 from the base of tongue 19 along the weakening line 22, the greater the proportion of tear-off band 18 removal from the sealing cap 14 and the easier will be the over-all removal.

In the embodiments of the invention described in connection with FIGURES 1–4, the weakening line 22 forming the lower limit of the tear-off band 18 has been shown as running parallel to the lower rim of the cap 14. This has been found to be a satisfactory and workable construction. However, it will be understood that this weakening line 22 between the base of the tongue 19 and the vertical cut or slit 24 need not necessarily run parallel to the lower edge of the cap 14. In FIGURE 7 the sealing cap 14 of this invention is shown in a modified form. In this modified form a weakening line 28 is shown running obliquely from the base of the tongue 19 to a lower cut 29. It has been found satisfactory to extend the weakening line 28 from the cut 29 as long as weakening line 28 forms an angle of at least 90° with the cutting line 21 which forms the lower edge of the tongue 19. Thus it would be possible to place the cut 29 directly beneath the base of the tongue 19 and extend a short weakening line 28 vertically from the cut 29 to the base of the tongue 19 where it would form a 90° angle with cutting line 21. It is preferred, however, to extend the weakening line 28 oblique at an angle of greater than 90° from the base of the tongue 19 to the cut 29.

In the operation of the cap of this invention as in removal it has been found that upon tearing-off the tongue 19 the tearing-off movement will sever the cap 14 along the weakening line 28, provided that the weakening line 28 runs about the surface of the collar and the tearing-off reach the lower cut 29 at the lower side of the surface of the collar. It has also been found that the lower surface of the collar is the point at which the resistance to severance is unexpectedly high. The embodiment of FIGURE 7 is particularly adaptable to closures of small diameters such as on small or narrow necked bottles. The lack of sufficient room for a horizontal course of the weakening line, such as weakening line 22, is technically inexpedient on such small bottles. The oblique weakening line 28 of FIGURE 7 modification accommodates itself to this problem and is particularly advantageous.

Another embodiment of this invention is illustrated in FIGURE 8. In this embodiment the purposes and advantages of the present invention are achieved through the increase of the strip resistance by stamping grooves into the tear-off strip. These grooves run parallel to the lower rim of the sealing cap and are stamped preferably in an inwardly direction and are not to enlarge the outside diameter of the cap housing. In addition, and for further reinforcement, the entire sealing band is slightly inwardly bent as it has been found that the tear-off strip removes with the greatest reliability in the desired track if the weakened lines simultaneously constitute the highest elevation of the cap.

In FIGURE 8 there is shown a longitudinal cross-sec-

tion of the embossing of a side wall of a cap 30 according to the invention. A bottom edge 31 of the cap wall is shown in full lines. Weakening lines 32 and 33 are provided. It will be understood that the weakening lines 32 and 33 extend from cutting edges in the cap 30, not shown, which cutting edges form the tongue, not shown. Wavelike embossed grooves 34 are parallel to the weakening lines 32 and 33. The position of the bottom edge of the cap 30 after it is mounted on a container neck for example, is shown by the dotted line positioning at the bottom edge of the cap at 35. For example, the bottom edge of the cap is bent to the position 35 around a bead or collar on a bottleneck and the lower edge is flanged inwardly. An outwardly directed bead 36 is embossed on the cap. After the separation of the tear-off strip or band from the cap, and the removal of the sealing band, the bead 36 will protect the hand of the later user in the screwing on and off the remainder of the cap 30 in its continued use.

By means of the cap shown in FIGURE 8, various advantages are provided to this invention. The tear-off strip or band which is formed as an extension of the tongue is shaped in such a manner between grooves that faulty tearing-off is avoided. The inward bend of the sealing band portion of the cap also guards against faulty tearing-off. At the same time the outside diameter of the cap is not increased.

A preferably colored protective layer, e.g. in the form of a polyvinyl chloride film may be applied onto the tongue to exclude the possibility of the fingers being hurt on touching the tongue and in order to make the tongue stand out to the eye.

This application is a continuation-in-part of my copending U.S. application Serial No. 662,369 filed May 29, 1957, now U.S. Patent No. 2,994,449 issued August 1, 1961, for Sealing Cap for Bottles, Jars, Canisters and Similar Containers.

The above-described embodiments contain principles which are new in the construction of sealing caps. It will be understood that the described embodiments are set forth for the purpose of illustration and that modifications may be made within the scope of this invention. The features of this invention which are believed to be new are expressly set forth in the accompanying claims.

What is claimed is:

1. A sealing cap for bottles, jars, containers, and the like comprising a cap having a permanent portion and a removable sealing band, said sealing band being integral with and attached to the lower edge of said permanent portion, a weakening line girdling said cap at the lower edge of said permanent portion at which weakening line the removable sealing band is attached, a tongue formed in said sealing band of narrower width than said sealing band and defined at its upper edge by an upper cut extending circumferentially along said upper weakening line and at its lower edge by a lower circumferential cut, a lower weakening line in said sealing band extending circumferentially from said lower cut and a transverse slit extending into said sealing band from the lower edge, and meeting with said lower weakening line, a narrow strip formed in said sealing band formed between said tongue and said lower weakening line and the lower edge of the sealing band and extending to said transverse slit adjacent to said tongue and the lower weakening line and a separable portion of said sealing band lying between said upper and lower weakening lines and adjoining said tongue whereby said tongue and said separable portion are removed integrally separated from said narrow strip by pulling on said tongue.

2. In combination the cap as claimed in claim 1 and a container closed by said cap, an inwardly extending surface on said container, said container and a flanged-in portion of said sealing band at the lower edge of the sealing cap at said inwardly extending surface, said flanged-in portion including the narrow strip.

3. A sealing cap as claimed in claim 1 in which said lower weakening line and said transverse slit form an angle of 90° or more with said lower cut.

4. A sealing cap as claimed in claim 1 having the transverse slit circumferentially removed from the base of the tongue by a considerable portion of the circumference of said cap and a lower weakening line which circumscribes a considerable portion of the circumference of the sealing band.

5. A sealing cap claimed in claim 1 having grooves in the separable portion, said grooves parallel to the lower edge of the permanent portion.

6. A sealing cap as claimed in claim 1 wherein the sealing band is bent inwardly of the cap between the upper and the lower weakening line.

7. A sealing cap as claimed in claim 1 having an outward bead formed circumferentially of the permanent portion immediately adjacent to the upper weakening line.

8. A sealing cap as claimed in claim 1 having a colored film forming a protective layer on the tongue.

9. The sealing cap of claim 1 wherein said sealing band is provided with an additional number of transverse slits extending from the lower edge of said sealing band a partial distance toward the upper edge of said sealing band, said additional transverse slits being spaced from each other along the length of said sealing band.




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