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Ballin

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[54] **OPENER FOR DISPOSABLE CLOSURE**

[76] Inventor: **Gene Ballin,** 159 Main St., Hempstead, N.Y. 11550

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[21] Appl. No.: **248,635**

[52] **U.S. Cl.** ..... **215/46 A,** 215/11 C
[51] **Int. Cl.** **B65d 41/32**
[58] **Field of Search** ..... 215/11 R, 11 C, 46 A; 30/1.5, 5.5, 300, 315; 81/3.48, 3.1 B, 3.1 C, 3.1 D; 222/83, 81

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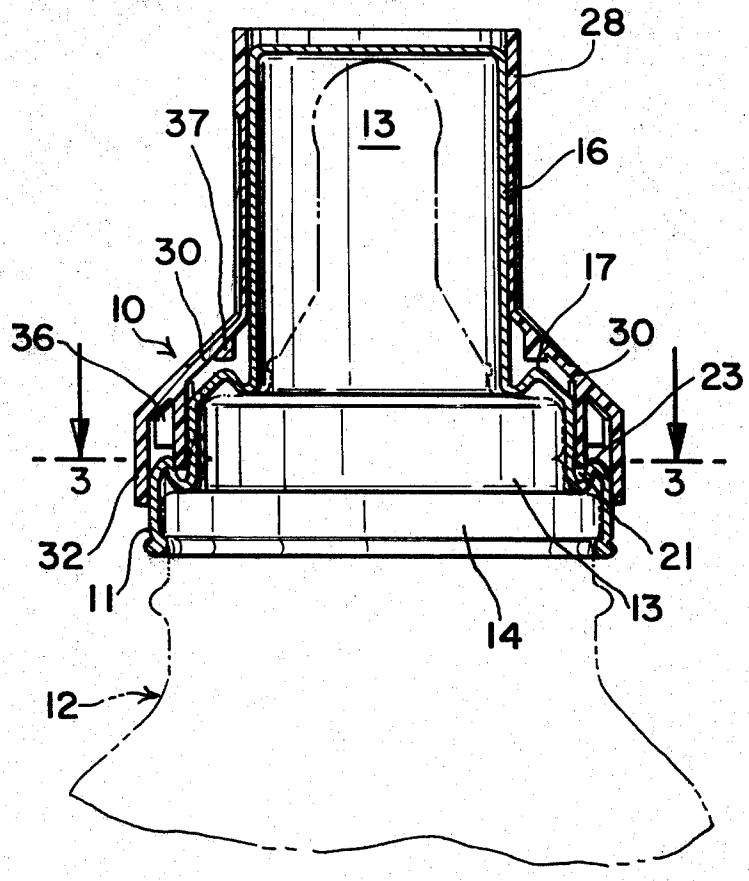
Primary Examiner—Donald F. Norton
Attorney—Howard C. Miskin

[57] **ABSTRACT**

A device for opening a closure cap along a score line around the base of an annular channel without piercing the cap includes a collar which rotatably and slidably engages the cap and includes a peripheral wall provided with circumferentially spaced depending arcuate teeth of greater thickness than the channel and stop elements which limit the downward movement of the device on the cap. The device is pressed downwardly and rotated so that the teeth wedge between and spread the channel walls to sever the closure along the full length of the score line, the piercing of the channel by the teeth being prevented by the stop elements.

11 Claims, 10 Drawing Figures



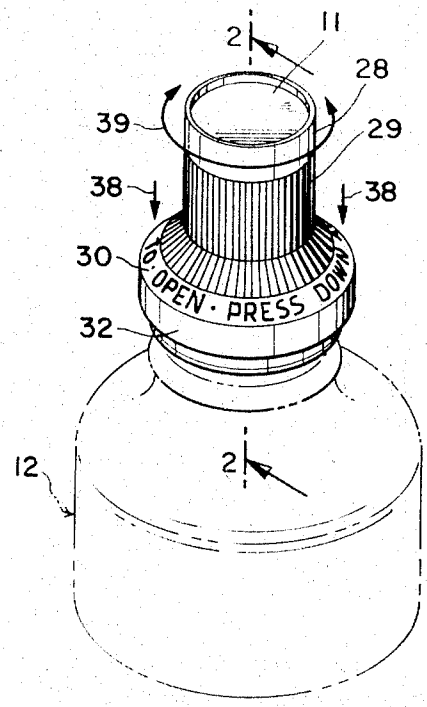


Fig. 1.

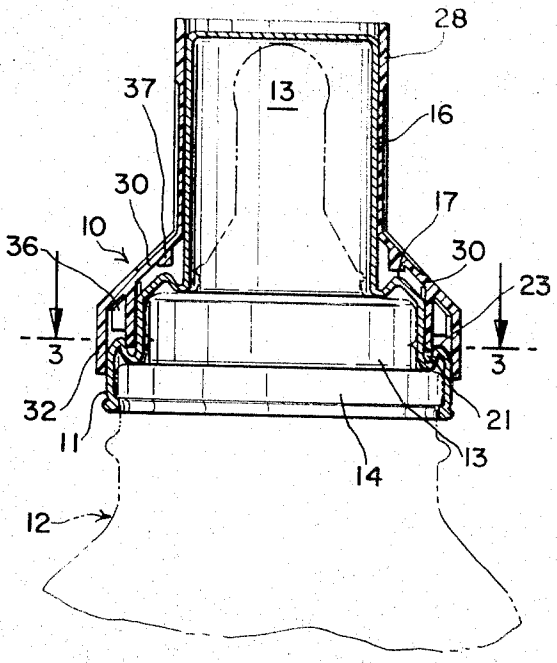


Fig. 2.

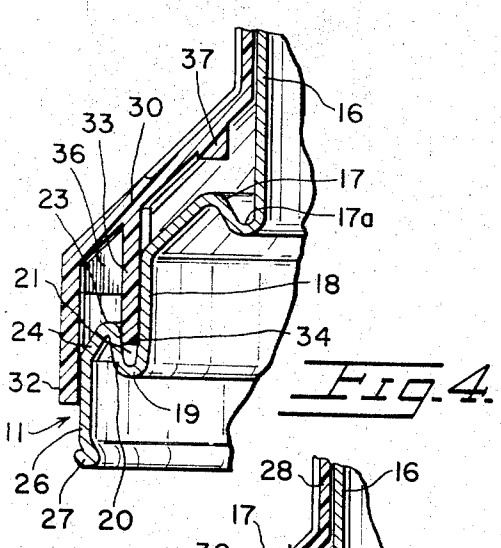


Fig. 4.

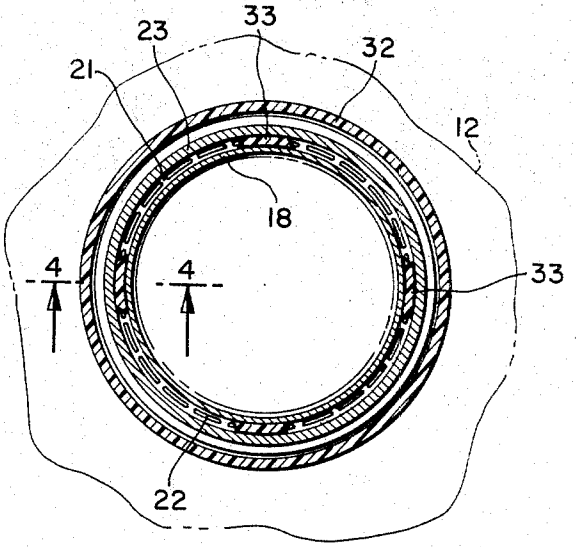


Fig. 3.

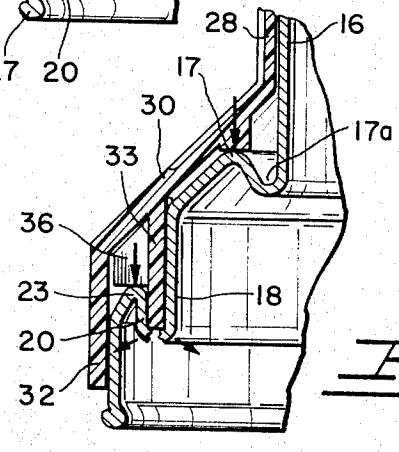


Fig. 5.

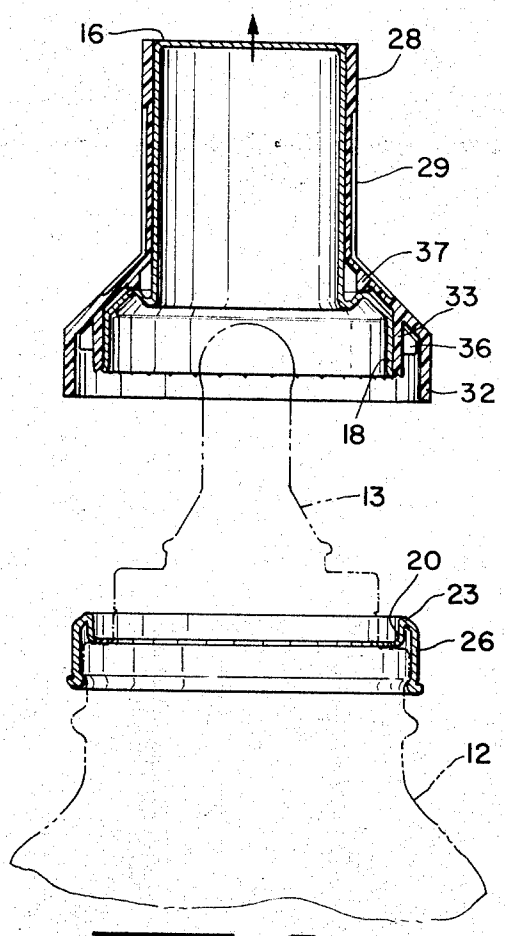


Fig. 6.

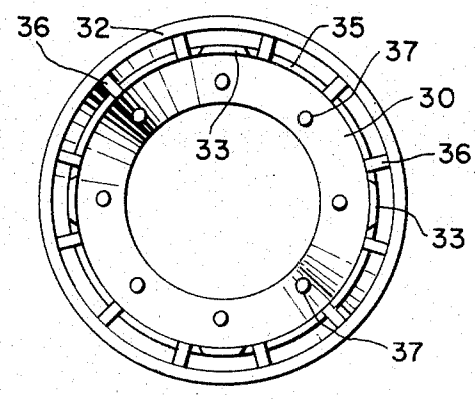


Fig. 7.

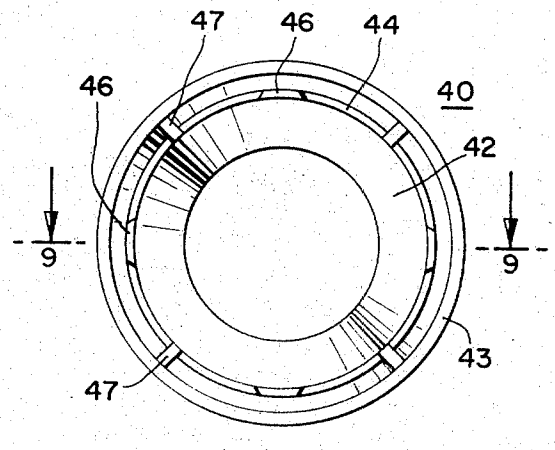


Fig. 8.

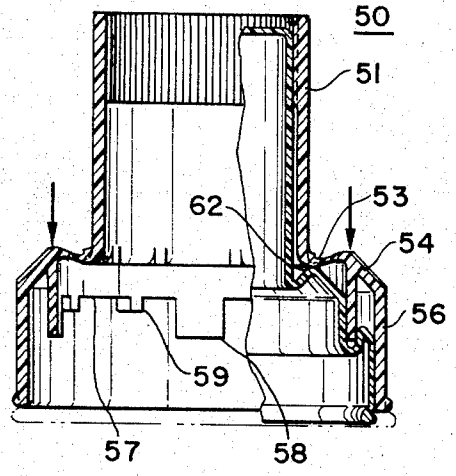


Fig. 10.

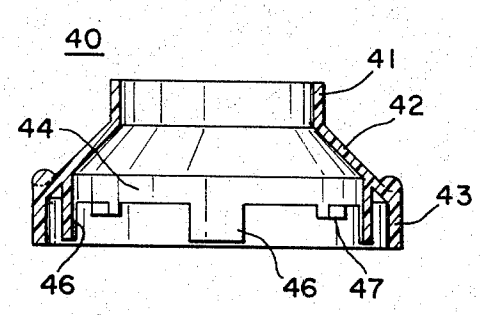


Fig. 9.

OPENER FOR DISPOSABLE CLOSURE

BACKGROUND OF THE INVENTION

The present invention relates generally to improvements in receptacle opening devices and it relates particularly to an improved opener for a metal receptacle cover having an annular line of weakness.

A receptacle employed in the dispensing of a nursing formula in a sterilized condition and ready to use without any further handling is a disposable baby bottle which contains the prepared formula and a pierced nipple and which is hermetically sealed by a thin metal cap which fully covers and encloses the nipple to maintain the nipple as well as the contents of the bottle in a sterile tamperproof condition. The sealing closure cap generally includes an upper cylindrical portion which surrounds the upper part of the nipple, a lower sleeve which encircles the lower nipple band and tightly engages the lower border thereof. An intermediate section joins the closure upper and lower closure portions and includes a depending peripheral channel proximate the lower portion having a base provided with a score line or line of weakness. While the above closure top is highly satisfactory in that it maintains the nipple and formula in a sterile tamperproof condition, it possesses an important drawback in that the breaking of the seal along the full line of weakness to provide access to the nipple is an awkward and inconvenient procedure frequently bothersome and difficult for the operator, usually the mother, to perform, as well as the danger of gashing the hand during the opening operation on the sharp edges. The line of weakness must not be too open or weak since it could raise a question on continued sterility. Also, it must resist inadvertent breaking of the seal.

SUMMARY OF THE INVENTION

It is therefore a principal object of the present invention to provide an improved opening device for receptacle closures.

Another object of the present invention is to provide an improved device for rupturing the line of weakness extending along the base of an annular channel in a nipple enclosing nursing bottle enclosure cap without injuring the nipple.

A further object of the present invention is to provide a device for rupturing the seal of a nipple enclosing nursing bottle closure cap which encloses it and permits the use of a lighter gauge metal in fabricating the cap.

Still another object of the present invention is to allow separation of the metal cover from the metal base without exposing the nipple to air or non-sterile atmosphere until the bottle is ready to be used.

A yet further object of the present invention is to eliminate the breaking of the seal by bending so as to avoid the hazards of the person preparing the bottle for use being cut on the sharp edges of the broken seal.

Still a further object of the present invention is to provide an opening device of the above nature characterized by its low cost, ease and convenience of use, reliability and attractive appearance.

The above and other objects of the present invention will become apparent from a reading of the following description taken in conjunction with the accompanying drawings which illustrate preferred embodiments thereof.

In a sense the present invention contemplates the provision of an opening device for a closure member provided with a frangible seal along an annular channel having upwardly directed side webs comprising a body member having a bore and a tooth depending from the body member and spaced from the center of the bore a distance equal to the radius of the annular channel and having a thickness greater than the face to face distance between the side webs, the body member having a downwardly facing stop section adapted to engage a face of the closure member to prevent the vertical movement of the tooth between the webs so as not to pierce the bottom of the channel, but instead to spread the webs and rupture the seal in the area of the tooth.

A preferred form of the improved opening device includes a collar which is adapted to rotatably and slidably engage the cylindrical cap section of the closure and a bottom wall which may be conical and extends outwardly from the collar. A plurality of circumferentially spaced teeth depend from the lower wall and are of arcuate transverse cross section and two coaxial sets of circumferentially spaced fingers also depend from the lower wall and are adapted to register with corresponding annular ridges on the closure to limit the downward movement of the teeth to a point not below the channel base. A skirt wall depends from the periphery of the lower wall and is adapted to rotatably engage a corresponding skirt wall of the closure. The collar may be open or closed at its top and in accordance with another embodiment of the present invention the lower wall is joined to the collar by a flexible section which permits the collar to be supported on the closure member and the skirt and teeth to be partially depressed to rupture the line of weakness.

The improved device is reliable, inexpensive, easy and convenient to use and of great versatility. It further protects the cap during shipment and allows the use of very thin gauge metal in the closure.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of an opening device embodying the present invention illustrated as applied to a baby bottle closure;

FIG. 2 is a sectional view taken along line 2 — 2 in FIG. 1;

FIG. 3 is a sectional view taken along line 3 — 3 in FIG. 2;

FIG. 4 is a sectional view taken along line 4 — 4 in FIG. 3;

FIG. 5 is a view similar to FIG. 4 illustrating the opening device in a depressed seal rupturing position;

FIG. 6 is a view similar to FIG. 3 illustrating the completion of the closure opening and separating operation;

FIG. 7 is a bottom plan view of the opening device;

FIG. 8 is a bottom plan view of another embodiment of the present invention;

FIG. 9 is a sectional view taken along line 9 — 9 in FIG. 8; and

FIG. 10 is a view similar to FIG. 9 of still another embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings, particularly FIGS. 1 to 7 thereof which illustrate a preferred embodiment of the present invention, the reference numeral 10 gener-

ally designates the improved opener as applied to the rupturing of the circular line of weakness of the hermetically sealing closure 11 of a nursing bottle 12. The nursing bottle 12 and closure 11 are of known construction, the bottle 12 including a rubber nipple member 13 punctured in the usual manner and closing the opening to bottle 12, being provided with a depending skirt wall 14 which tightly engages the upper peripheral border of the opening or throat of bottle 12.

The closure 11 is likewise of known construction and is advantageously formed of a metal such as aluminum as an integral unit and includes an upper cylindrical cap portion 16 enclosing the upper portion of nipple 13, the bottom periphery of cap portion 16 engaging an intermediate annular shoulder on the nipple 13. Joined to and spaced radially outwardly from the bottom edge of cap portion 16 is an annular ridge 17 which delineates an annular channel 17*a* with the bottom border of cap portion 16 and terminates in a depending annular skirt wall 18 which engages a corresponding face of nipple 13. Coaxial with and spaced radially outwardly of the skirt wall 18 and connected to the bottom edge thereof by an upwardly concave cross web or base 19 is an upwardly slightly outwardly inclined wall 20, which is somewhat less than half the height of wall 18 and defines therewith a channel 21. The base 19 is medially scored or indented along the full circumference thereof to form an easily rupturable imperate line of weakness 22, as seen best in FIG. 3. Extending downwardly and outwardly from the top edge of wall 20 and connected thereto by an annular elbow 23 is a wall which terminates in a depending skirt wall 26 encircling the nipple bottom wall 14 and provided with a bottom beaded edge 27 hermetically engaging nipple skirt wall 14.

The opener 10 is formed as an integral unit by injection molding or the like from any suitable stiff synthetic thermoplastic polymeric resin and includes an upper collar 28 provided with external vertical ribs 29 and when assembled with or applied to the closure 11 slidably and rotatably engages the cap section 16. In the raised, normally engaged position of collar 28, its bottom edge is spaced above ridge 17 and the top of upper collar 28 advantageously extends above the top of cap 16 to prevent any deforming force exerted against cap 16 during shipment or storage. Depending from collar 28 is a conical wall 30 which terminates in a depending skirt wall 32 which slidably and rotatably engages the face of closure wall 26 to a point above the bead 27.

Depending from conical wall 30 into engagement with the upper part of channel 21 are one or a plurality of circumferentially spaced teeth 33 of arcuate transverse cross sections and of uniform thicknesses somewhat greater than the inside width of channel 21. The bottoms of the teeth 33 are flat and uniform as at 34 and, as shown in FIG. 7, the upper parts of the teeth are connected by a shallow cylindrical wall 35 depending from wall 30.

In order to limit the amount of depression of the opener 10 on the closure 11, there are provided circumferentially spaced radial arms 36 depending from conical wall 30 and extending inwardly from the skirt wall 32 to the outer surface of teeth 33, a plurality of arms 36 being disposed between successive teeth 33. The distance between the level of the underfaces of arms 36 and the tips of teeth 33 is approximately equal to or slightly less than that between elbow 23 and the underface of channel base 19. Also depending from the conical wall 30 in vertical medial alignment with ridge 17 are a plurality of circumferentially spaced arms 37, the distance between the level of the underfaces of arms 37 and the top of ridge 17 being about equal to that between the level of the underfaces of arms 36 and elbow 23.

Considering now the operation of opener 10, in its normal rest condition on the closure 11, as shown in FIGS. 1 to 4, the teeth 33 are wedged in the upper parts of channels 21 with the arms 36 and 37 being spaced above elbow 23 and ridge 17 respectively. To break the seal defined by line of weakness 22 and separate the upper portion of closure 11 to expose the nipple 13, the opener 10 is merely depressed following the direction of arrows 38 in FIG. 1, as shown in FIG. 5 until the arms 36 and 37 engage elbow 23 and ridge 17 respectively, in which position channel 21 and skirt 18 are spread in the areas of the individual teeth 33 to rupture the base 19 along the line of weakness 22 in the areas of the teeth. The depressed opener 10 is rotated as illustrated in the direction of arrows 39 of FIG. 1 to effect the rupture of successive areas of base 19 until it is severed along the full length thereof. The opener 10 is then raised, as shown in FIG. 6, to separate the severed portion 16 from the lower portion of nipple 13 as delineated by the line of weakness 22 and expose the nipple 13. The severed portion of the cap closure remains within the opener 10 by friction, which could be obtained by external ribs within collar 28.

In FIGS. 8 and 9 of the drawings there is illustrated another form of opener 40 embodying the present invention which is likewise formed as an integral unit and includes a shallow collar 41 for slidably and rotatably engaging the closure cylindrical cap portion. Extending downwardly and outwardly from the bottom edge of collar 41 is a conical wall 42 which terminates in a depending skirt wall 43 whose inside diameter is slightly greater than the outside diameter of the closure bottom skirt wall. An intermediate shallow cylindrical wall 44 coaxially depends interiorly from wall 42 and is spaced from wall 43 a distance about equal to that between the bottom skirt wall of the closure and the line of weakness.

A plurality of circumferentially spaced teeth 46 of arcuate transverse cross section depend from and are coplanar with cylindrical wall 44. Medially located between each pair of successive teeth 46 is a stop defining arm 47 which extends between walls 43 and 44 and below the level of wall 44, the distance between the level of the underfaces of arms 47 and the bottoms of teeth 46 corresponding to that between the level of the underfaces of arms 36 and the bottoms of teeth 33 as set forth above. The operation of the opener 40 is similar to that of the opener 10 as previously described.

Another embodiment of the present invention is illustrated in FIG. 10 of the drawing and differs from the earlier described embodiment, primarily in the association of the upper and lower sections of the opener. Specifically, the opener 50 includes an upper cylindrical collar or cap having a peripheral wall 51 and a top, either open or closed, the cap rotatably and slidably engaging the closure upper cap portion and the top edge being positioned on the top wall or ridge 62 of the closure cap portion. A flexible outwardly directed thin sectional peripheral flange 53 is integrally formed with the bottom edge of wall 51 and is connected at its outer periphery by a relatively rigid shallow conical wall 54

to a depending cylindrical skirt wall **56.** Depending from proximate the upper inner edge of conical wall **54** is a shallow cylindrical wall **57** having formed an coplanar therewith circumferentially spaced downwardly directed vertical teeth **58** of arcuate transverse cross section. A pair of circumferentially spaced stop defining arms **59** is positioned between each pair of successive teeth **58** and extends between walls **56** and **57.** The relationships between wall **56,** teeth **58** and stops **59** as related to the cooperating closure are similar to those between wall **43,** teeth **46** and stops **47** and between wall **32,** teeth **33** and stops **36** of the earlier described embodiments.

The operation of the opener **50** is similar to that of opener **40,** the downward and rotational force being applied to walls **54** and **56** attendant to the opening operation. Any downward pressure on the cap portion **51** of opener **50** is absorbed by ridge **62** of the closure and is not transmitted to sufficiently depress the teeth **58** to rupture the closure line of weakness. As a consequence, accidental opening of the closure seal due to pressure on the opener cap portion is prevented.

While a plurality of teeth **33, 46** and **58** have been illustrated a single tooth can be used. However, it has been found that four teeth 90° apart produce a complete severance of the closure with only slightly more than 90° rotation of the opener.

The embodiment shown in FIG. **10** resists the load applied to the containers during shipping without breaking the seal and possibly affecting sterility.

If desired, the top edge portion of the upper cap could be spaced from the upper edge of ridge **62** and if a downward force were exerted on cap portion **51,** the flexing of flange **53** could resist the teeth **58** from opening the seal.

While there have been described and illustrated preferred embodiments of the present invention, it is apparent that numerous alterations, omissions and additions may be made without departing from the spirit thereof.

What I claim is:

1. An opening device for a closure member provided with a rupturable seal along an annular channel having upwardly directed side webs comprising a body member having a bore and a tooth depending from said body member and spaced from the center of said bore a distance equal to the radius of said annular channel and having a thickness greater than the face-to-face distance between said side webs, said body member having a downwardly facing stop section adapted to engage a face of said closure member to prevent the vertical movement of said tooth below the level of the bottom of said channel, the depression of said body member wedging said tooth between said webs to spread said webs and rupture said seal in the area of said tooth.

2. The device of claim **1** wherein said closure member includes a circular cap section extending above said channel and said body member comprises a collar adapted to rotatably and slidably engage said cap section.

3. The device of claim **2** wherein said body member includes a lower wall integrally formed with and extending outwardly from the bottom edge of said collar and a plurality of circumferentially spaced teeth integrally formed with and depending from said lower wall.

4. The device of claim **3** wherein said tooth is of arcuate transverse cross section.

5. The device of claim **2** wherein said lower wall is of conical configuration.

6. The device of claim **3** wherein said closure member includes an upwardly directed annular ridge coaxial with and of greater diameter than said cap and said stop section depends from said lower wall, the distance between the levels of the underface of said tooth and stop section being approximately equal to that between the top of said ridge and the bottom of said channel.

7. The device of claim **6** wherein said stop section comprises a plurality of circumferentially spaced depending fingers.

8. The device of claim **7** wherein said fingers are circumferentially and radially spaced from said teeth.

9. The device of claim **3** including a coaxial skirt wall depending from and integrally formed with said lower wall and spaced outwardly of said teeth.

10. The device of claim **3** wherein a peripheral section of said lower wall proximate said collar is flexible.

11. The device of claim **10** wherein said bottom edge of said collar rests on said closure member and said flexible section is intermediate of said bottom edge of said collar and said teeth depending from said wall, whereby said lower wall can be flexed to depress said teeth.

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