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(54) TETHERED PLASTIC SCREW STOPPER

(57) The present invention relates to tethered plastic stopper having a closure shell and a tamper band that separably connected to the closure shell by a plurality of bridges that connect a bottom edge of the closure shell to a top edge of the tamper band. Each bridge is configured to be stretched and broken when the closure shell is moved from a first orientation prior to opening to a second orientation after opening. The stopper further includes a strip and a hinge. The strip is intended to connect to the closure shell at a junction point and has an extremity located at an end of the top weakness line positioned above a first set of bridges located along the bottom weakness line. The hinge is intended to link the strip and the tamper band. The hinge is positioned beneath a set of bridges located along the top weakness line.

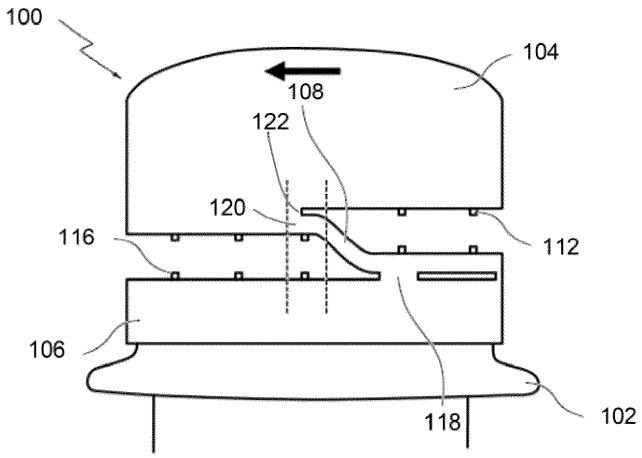

Fig. 2

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Description

TECHNICAL FIELD

[0001] This invention relates to a tethered plastic screw stopper.

BACKGROUND

[0002] In the field of liquid packaging, it is very common to seal the aperture of a container with a stopper, often made from a plastic material. Such container is usually a plastic or glass bottle, but other materials may be used as well.

[0003] The stopper has a tubular shape closed at its top edge by a top wall. The stopper comprises a roof attached to a tamper shell through bridges. Bridges are distributed around the circumference of the roof and the tamper shall. The bridges may be made when molding the stopper or after through undergoing a cutting step during the manufacturing process.

[0004] Usually the bottle neck includes outer fixation feature, such as thread(s) for screw type stopper or annular fixation rings for snap type stopper, to secure the stopper on the bottle neck.

[0005] For screw type stoppers, the tamper shell comprises inner thread(s) arranged inside side walls. The bottle neck fixation feature may include outer thread(s). Such combination of outer and inner thread(s) allows the stopper to be screwed on a bottle neck to seal it and unscrewed for bottle opening. A snap type stopper may include an inner annular area and the bottle neck fixation feature may include outer fixation ring, in order to slot in force the stopper on the bottle neck. A snap type stopper may include a tamper shell with a movable sealing roof from a closed position to a partial opening position, and reversely. The roof may be separated upon opening or may be connected to the tamper shell.

[0006] In a bottle sealing position of the stopper, the tamper shell may be secured around the bottle neck through inner shell retaining features or through the retaining features diameter being smaller than a diameter of a tamper shell of the bottle neck.

[0007] The roof may be removable. During bottle opening, the bridges form a weakness line and may be torn apart from the roof, separating it from the bottle. The weakness line may be torn when user unscrews the tamper shell of the stopper or when user lifts the roof by tilting.

[0008] There is a recycling risk with separable roof as consumers may not always screw or snap back the roof onto the bottle neck once empty. The stopper may be thrown away as litter or put into the trash bin, or worse make its way into a landfill, which is not good in view of the environmental considerations.

[0009] One solution includes linking the roof to the tamper shell secured on the bottle neck, so the roof stays attached to the bottle after bottle opening. Such an attached stopper may be called a "tethered stopper."

[0010] U.S. Patent No. 9,010,555 teaches a plastic screw stopper including a peripheral strip between a tamper shell and a roof. Such peripheral strip is linked to the tamper shell through a bottom weakness line and to the roof through a top weakness line. The bottom weakness line and top weakness line are parallel and extend across the periphery of the stopper in order to incorporate one or two hinges in close proximity to each other. When unscrewing the stopper the bottom weakness line and top weakness line tear apart, but the two hinges hold the roof on the tamper shell. The roof becomes unmovable and as capable of toggling around the hinges beside of the stopper secured on the bottle neck.

[0011] U.S. 8,490,805 teaches a plastic screw stopper comprises a helicoidal strip between a tamper shell and a roof. Such helicoidal strip is obtained by cutting the tamper shell around the stopper. The outer wall of the tamper shell is placed against a blade and the stopper is moved in rotation relative to the blade according to an angular stroke greater than an entire turn or more than 360°. During rotation, the stopper is being moved in an axial movement relative to the blade. The cut line forms a helicoidal weakness line which remains attached at one end to the tamper shell and at its opposite end to the roof after opening. US20110297682 teaches a stopper with strips that are connected with a plurality of top and bottom bridges at different position along the strip. EP2331418 teaches a stopper with strips that have no top nor bottom bridge.

[0012] Other known art prior art systems include a tethered stopper comprising a spiral strip. The spiral strip is made during the stopper molding so there is no cutting or slitting operations. Other known prior art systems include tethered stoppers comprising two strips linking the closure shell to the tamper band secured on the bottle.

SUMMARY

[0013] This invention is a tethered plastic screw stopper where its closure shell remains attached to its tamper band after the bottle is opened by use of a strip made into the plastic material of the stopper between the tamper band and the closure shell using a bottom weakness line and a top weakness line. Each strip remains connected to the tamper band secured on the bottle neck by a least a bottom hinge managed into the bottom weakness line. The opposite ends of each strip are directly linked to the closure shell through a junction point.

[0014] The stopper further comprises a specific top weakness line where the junction point of the strip with the closure shell is located over a bottom bridge located at the nearest from the bottom hinge(s), so called "nearest bottom bridge" on a side of the screwing direction of the closure shell.

[0015] Thus, the invention systematically allows the nearest bottom bridge to be broken due to the junction point location where the closure shell and the strip ends

are upwardly moved the farthest from the tamper band during closure shell unscrewing motion. A force is applied on the closest bridge due to the specific position of the junction point of the end of the strip.

DETAILED DESCRIPTION OF THE DRAWINGS

[0016] The figures are not necessarily to scale and some features may be exaggerated or minimized, such as to show details of particular components. Emphasis is placed on illustrating the principles of the invention. In the figures, like reference numerals designate corresponding parts throughout the different views.

Figure 1 is a diagrammatic lateral view of a tethered stopper in a closed position on a bottle.

Figure 2 is a diagrammatic lateral view similar to Figure 1 during the opening of the stopper.

Figure 3 is a diagrammatic horizontal cross section view along the bottom weakness line a tethered stopper.

Figure 4 is a diagrammatic horizontal cross section view along the top weakness line of the tethered stopper.

DETAILED DESCRIPTION

[0017] As required, detailed embodiments of the present disclosure are disclosed herein. The disclosed embodiments are merely examples that may be embodied in various and alternative forms, and combinations thereof. As used herein, for example, exemplary, and similar terms, refer expansively to embodiments that serve as an illustration, specimen, model or pattern.

[0018] In some instances, well-known components, systems, materials or methods have not been described in detail in order to avoid obscuring the present disclosure. Therefore, specific structural and functional details disclosed herein are not to be interpreted as limiting, but merely as a basis for the claims and as a representative basis for teaching one skilled in the art to variously employ the present disclosure.

[0019] Phrasing such as 'configured to' perform a function, including in the claims, can include any or all of being sized, shaped, positioned in the arrangement, and comprising material to perform the function.

[0020] Terms indicating quantity, such as 'first' or 'second' are used for exemplary and explanation purposes and are not intended to dictate the specific ordering of a component with respect to other components. Terms indicating position such as 'top' or 'bottom' and 'left' or right' are used for exemplary and explanation purposes with respect to other components.

[0021] Various embodiments of the present disclosure are disclosed herein. The described embodiments are merely exemplary illustrations of implementations set for a clear understanding of the principles of the disclosure. Variations, modifications, and combinations may be made to the described embodiments without departing from the scope of the claims. All such variations, modifications, and combinations are included herein by the scope of this disclosure and the claims.

[0022] This invention relates to a tethered plastic screw stopper 100 for closing a bottle neck 102. The stopper 100 is integrally made of one plastic piece by a molding fabrication step. Other parts or elements of the stopper 100 can be further created into the entire plastic piece through a cutting or slitting step.

[0023] The stopper 100 is a screw type and comprises inner fixation features, such as thread(s), designed to cooperate with outer complementary fixation features made on the bottle neck 102.

[0024] In some embodiments, as illustrated in Figures 1 through 4, the screwing direction of the stopper 100 is typically clockwise and extends from right to left. The screwing orientation is represented as a directional arrow in Figures 1 through 4. The unscrewing direction of the stopper 100 oppositely extends relative to the screw direction, so counterclockwise from left to right. In other embodiments, the screwing direction can be designed counterclockwise.

[0025] The stopper 100 comprises a closure shell 104 and underneath a tamper band 106. The tamper band 106 and the closure shell 104 are separably linked together by way of a strip 108.

[0026] In some embodiments, the stopper 100 includes one strip 108. In other embodiments, the stopper 100 includes two or more strips 108. For example, the stopper 100 includes two strips 108 positioned on opposite sides of the stopper 100. The two strips 108 can be positioned in a symmetrical or asymmetrical layout.

[0027] The strip 108 is separably connected to the closure shell 104 through a plurality of top bridges 112 that form a top weakness line 110. Similarly, the strip 108 is separably connected to the tamper band 106 through a plurality of bottom bridges 116 that form a bottom weakness line 114.

[0028] The bottom weakness line 114 comprises at least one hinge 118 configured to connect the strip 108 and the tamper band 106. In some embodiments, the bottom weakness line 114 comprises two hinges 118 where each hinge 118 connects a respective strip 108 to the tamper band 106. The two hinges 118 can be spaced through a hole or a less thick material managed into the tamper band 106 between the two hinges 118.

[0029] The top bridges 112 and bottom bridges 116 are each configured to be stretched and ultimately broken when unscrewing the closure shell 104. The top and bottom bridges 112, 116 are regularly or irregularly positioned around the perimeter of the top and bottom weakness lines 110, 114 respectively. However, at the location of the hinge(s) 118, the top and bottom bridges 112, 116 are not present.

[0030] Each strip 108 comprises an extremity at an end of the top weakness line 110, linking the strip 108 with the closure shell 104 at a junction point 120. For example,

in the embodiment having two strips 108, there is a junction point 120 at each end of the top weakness line 110, linking the extremity of each strip 108 to the closure shell 104.

[0031] The top weakness line 110 is configured in order to form an end 122 of the strip 108 positioned above a bottom bridge 116 located at the nearest to the hinge 118 on the left side of the hinge considering a clockwise screwing direction of the closure shell 104. When facing the stopper looking at the hinge(s) 118, if the screw direction is clockwise, then the junction point of the left strip relative to the hinge 118 is located over the nearest left bottom bridge 116 (denoted with parallel vertical lines in Figure 2).

[0032] The end of the top weakness line located on the left of the hinge 118 for a clockwise screwing stopper is angularly located between - 40° to 40° relative to the vertical axis of the bottom bridge 116 located at the nearest from the hinge 118. In some embodiments, the hinge 118 is more particularly located between - 20° to 20° relative to the vertical axis of the bottom bridge 116 located at the nearest from the hinge 118. For example, when looking at the hinge 118, the junction point 120 of the left strip 108 is angularly situated approximately 20° relative to the left nearest bottom bridge 116. Such angular variation is shown in the drawings illustrated in dotted lines on Figures 3 and 4.

[0033] In some embodiments, the top weakness line 110 is asymmetric relative to the bottom weakness line 114 which is symmetric relative to a vertical plane crossing the diameter of the stopper 100. So when molding or further slitting the stopper 100, the top weakness line 110 is angularly switched or turned offset in relation with the position of the hinge(s) 118 of the bottom weakness line 114. Thus, one strip 108 (e.g., the left strip) in a clockwise screwing configuration, is shorter than the opposite strip 108 (e.g., the right strip). In other embodiments, such as show in Figure 3, the bottom weakness line 114 is symmetric relative to a vertical plane crossing the diameter of the stopper 100 where the plane being shown by a fine continuous line.

[0034] While various embodiments of the invention have been described, it will be apparent to those of ordinary skill in the art that many more embodiments and implementations are possible that are within the scope of this invention.

Claims

1. A tethered plastic screw stopper, comprising:

a closure shell;
a tamper band separably connected to the closure shell by a plurality of bridges that connect a bottom edge of the closure shell to a top edge of the tamper band, each of the bridges configured to be stretched and broken when the closure shell is moved from a first orientation prior to opening to a second orientation after opening;
a strip made into the plastic material of the stopper between the tamper band and the closure shell using a bottom weakness line, formed by a plurality of bottom bridges, and a top weakness line, formed by a plurality of top bridges, top and bottom bridges being regularly or irregularly positioned around the perimeter of the top and bottom weakness lines, respectively, wherein
the strip is connected to the closure shell at a junction point, the strip comprising an extremity at an end of the top weakness line positioned above a first set of bridges located along the bottom weakness line; and a hinge linking the strip and the tamper band, the hinge being positioned beneath a set of bridges located along the top weakness line, and
the end of the top weakness line is located on the left of the hinge and is angularly positioned within 40° of the vertical axis of the bottom bridge located at the nearest from the hinge considering a clockwise screwing motion configuration.

2. The tethered plastic screw stopper according to claim 1, wherein the end of the top weakness line is located on the left of the hinge and is angularly positioned within 20° of the vertical axis of the bottom bridge located at the nearest from the hinge considering a clockwise screwing motion configuration.

3. The tethered plastic screw stopper according to claim 1, wherein:

the strip is a first strip,
the screw stopper further comprises a second strip having an extremity at an end of the top weakness line, linking the strip with the closure shell at a second junction point,
the second strip is separably connected to the closure shell through a top weakness line and to the tamper band through a bottom weakness line and the second strip is positioned opposite the first strip about a diameter of the tamper band.

4. The tethered plastic stopper according to claim 3, wherein the two strips are positioned on opposite sides of the stopper, in a symmetrical layout

5. The tethered plastic stopper according to claim 3, wherein, when looking at the hinge, the junction point of the left strip is angularly situated approximately 20° relative to the bottom bridge located at the nearest from the bottom hinge

6. The tethered plastic stopper according to any of the preceding claims, wherein, the bottom weakness

line comprises two hinges, where each hinge connects a respective strip to the tamper band, and, at the location of the hinges, the top and bottom bridges are not present.

7. The tethered plastic stopper according to any of the preceding claims, wherein the strip or each of the two strips comprises an extremity at an end of the top weakness line, linking the strip with the closure shell at a junction point.

8. The tethered plastic stopper according to any of the preceding claims, wherein the stopper is a screw type and comprises inner fixation features, such as thread(s), designed to cooperate with outer complementary fixation features made on the bottle neck.

9. The tethered plastic stopper according to any of the preceding claims, wherein the strip, or each of the two strips, is separably connected to the closure shell through a plurality of top bridges that form the top weakness line, and, similarly, is separably connected to the tamper band through a plurality of bottom bridges that form the bottom weakness line.

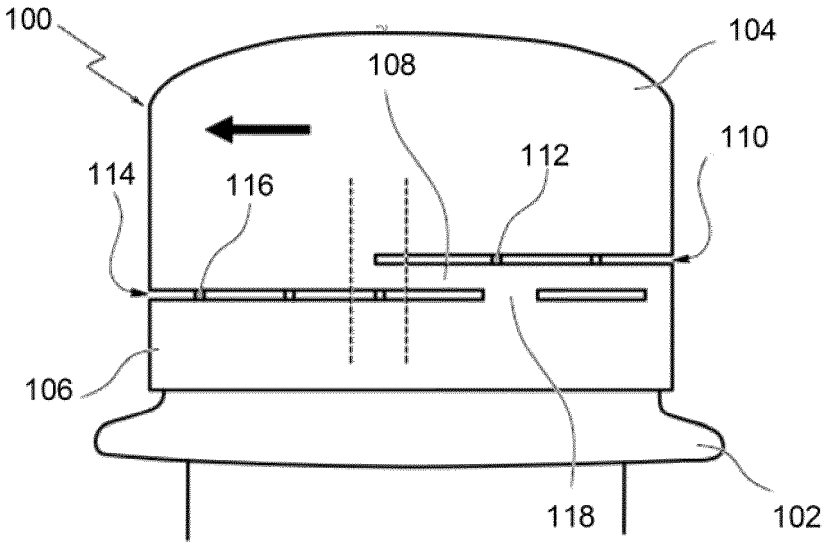
100
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Fig. 1

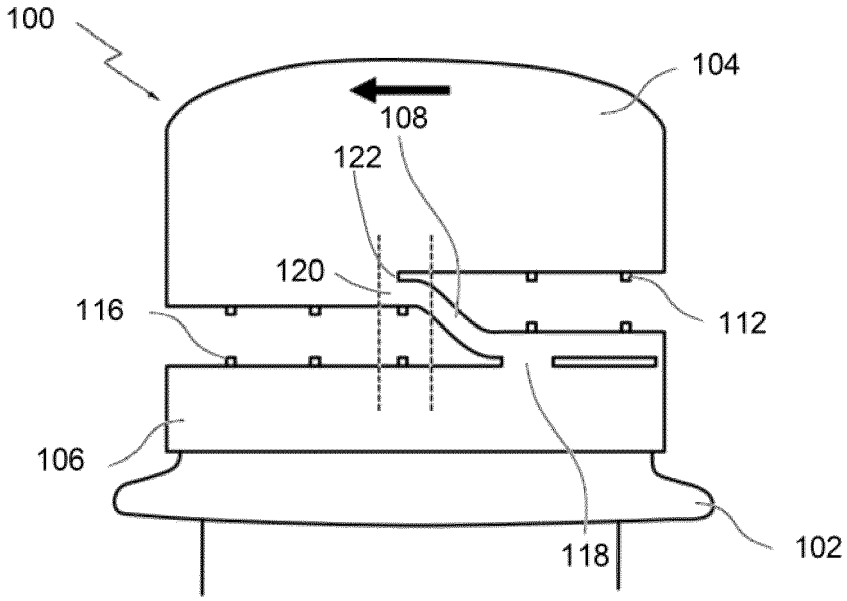
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Fig. 2

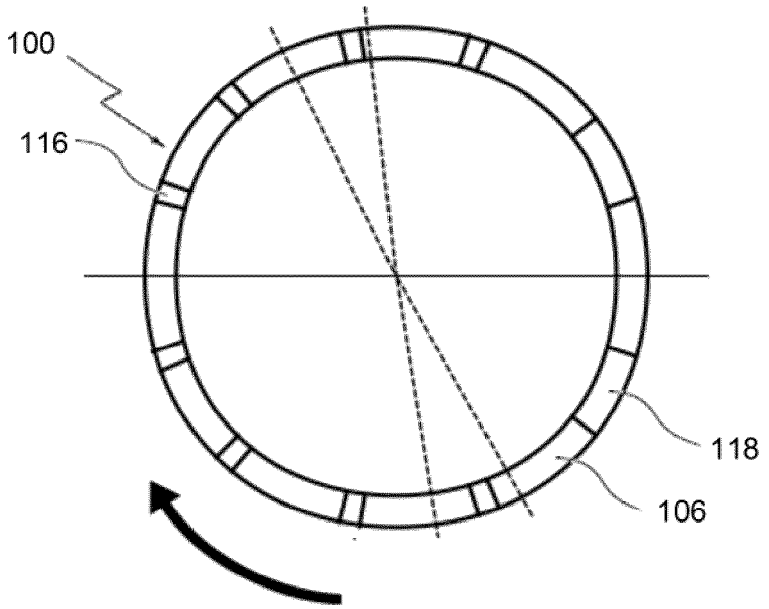

Fig. 3

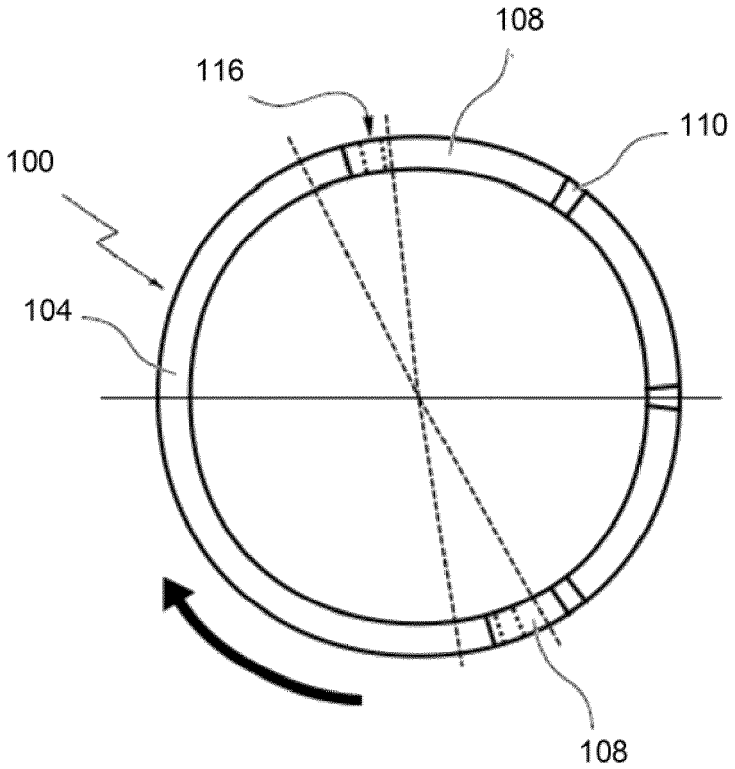

Fig. 4

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 9010555 B **[0010]**
- US 8490805 B **[0011]**
- US 20110297682 A **[0011]**
- EP 2331418 A **[0011]**