(54) BEVERAGE CAN END WITH A STRAW OPENING END

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(57) ABSTRACT
The present invention relates to a metallic beverage end closure which is adapted to receive a drinking straw through a puncturable membrane in one embodiment, and which utilizes a hinged closure mechanism in another embodiment to provide access to a beverage stored in a container inter-connected thereto.
BEVERAGE CAN END WITH A STRAW OPENING END

[0001] This application claims priority of U.S. Provisional Application Serial No. 60/368,762 which was filed on Mar. 29, 2002, and which is incorporated herein in its entirety by reference.

FIELD OF THE INVENTION

[0002] The present invention relates to beverage containers, and more specifically a metallic beverage container end closure with a substantially impermeable membrane which may be penetrated by a drinking straw.

BACKGROUND OF THE INVENTION

[0003] In recent years, beverage containers which are designed to receive a drinking straw have become increasingly popular. The straw is especially beneficial for small children to prevent spilling, and for the physically handicapped or disabled which have difficulty drinking from a standard glass, cup, or larger opening beverage can end. One such product described in U.S. Pat. No. 5,253,779 to Lee combines a compressible straw disposed within the can body. Upon opening, the straw projects itself through a v-shaped panel for a user's benefit. Unfortunately, these types of products are undesirable since the flavor of the beverage may become compromised from scalping as the straw is suspended for indefinite periods of time in the beverage. Additionally, it is possible for the straw to become obstructed and thus difficult to retrieve. Further, the opening disclosed in the '779 is too large to make the container substantially spill-proof when the container is knocked over, thus substantially defeating its purpose.

[0004] Other types of closures such as described in U.S. Pat. No. 6,030,582 to Levy provide a puncturable closure which are substantially self scaling upon removal of a pipette or other laboratory instrument. These devices are not suitable for use with pressurized beverage containers that contain internal pressure or provide sufficient venting for us with a drinking straw, and are further not designed to be puncturable with the tip of a traditional drinking straw.

[0005] Two of the more common types of beverage containers which are adapted to receive a drinking straw include cardboard juice cartons and metallic cans having a foil pull tab. With respect to the cardboard juice cartons, a foil tab or other impermeable material is positioned over a hole and pierced with a sharpened end of the straw to provide entry into the beverage container. With regard to the metal cans, a foil pull tab is typically used which is removably interconnected to an upper surface of the metal juice can and positioned over an opening in the beverage can end.

[0006] Both of the aforementioned foil opening mechanisms have inherent problems. With regard to the cardboard juice cartons, the nature of the squeezable cardboard makes the beverage container conducive to spilling and prone to damage during shipping and bulk storage. Additionally, when the foil is punctured with the sharpened straw, they often spill as a result of a small child or adult inadvertently squeezing the juice carton. Thus, the goal of preventing spilling is oftentimes exasperated by the collapsible nature of the cardboard storage carton. Additionally, the foil is often difficult to pierce with a plastic drinking straw, especially for the physically disabled or small children. Thus, the goal of making a user friendly, spill-proof drink container is not realized.

[0007] Further, the foil and associated cardboard containers are significantly less durable than a typical metallic beverage can end, and are thus not suitable for high pressure applications, hot-fillable pasteurized liquids, and other applications which require a high degree of durability. Finally, flavor scalping may be an inherent problem as the enclosed beverages are in contact with the foil, which may have a tendency to alter the taste of the beverage contained therein.

[0008] With regard to metallic beverage cans which utilize a liquid impervious foil pull-tab, numerous additional problems exist. For example, small children and the physically disabled cannot remove the pull tab from the upper surface of the beverage can end due to the adhesive materials required to hold the foil on the upper surface of the can end. Thus it may be impossible for these individuals to remove the pull tab, let alone insert the straw into the small hole. Additionally, these types of foil pull tabs require an adhesives bonding agent to interconnect the foil pull tab to the upper surface of the beverage can end which is both expensive and further likely to contaminate the taste of the beverage through scalping. Further, the leading edge of the small opening which is adapted to receive the straw and the associated pull tab is typically very sharp, and presents the risk of injury by the user.

[0009] Finally, with the foil pull tab and the puncture type foil mechanisms used for drinking straws, there is an inherent venting problem since there is no significant size differential between the external diameter of the drinking straw and the opening to receive the straw. Thus, the beverage becomes difficult to withdraw from the beverage can. Thus, there is a significant need for a safe, durable, pressurized metallic beverage can end which may be penetratated with a traditional drinking straw, is user friendly for the physically disabled, elderly and small children, and which is substantially spill proof.

SUMMARY OF THE INVENTION

[0010] It is thus one object of the present invention to provide an easy opening beverage can which is adapted to receive a drinking straw and which can be used by small children, the physically disabled, and the elderly to dispense a liquid from a beverage can. It is a further aspect of the present invention to provide a can opening mechanism which is familiar to a user and which does not contaminate or alter the taste of the beverage.

[0011] It is a further aspect of the present invention to locate the small opening in the beverage can end in a position which makes the beverage can end substantially spill proof. Thus, in one embodiment of the present invention the small opening is positioned substantially in the middle of the central panel of the beverage can end, thus inhibiting spillage when a drinking straw is inserted therein and the beverage container is tipped over.

[0012] It is another aspect of the present invention to create a durable beverage can end which can be used under pressure (75-100 psi) for storing certain types of carbonated liquids such as beer or soft drinks. Further, a metallic
beverage can end is provided which is capable of holding hot-fill liquids such as pasteurized milk at the time the beverage is introduced into the can and which is durable enough to withstand shipping and mishandling during transportation and bulk storage.

[0013] It is another aspect of the present invention to provide a metallic beverage can end which can be manufactured with the use of existing production equipment in a beverage can end manufacturing facility. Thus, significant time and money are saved since the conventional production lines in a beverage plant do not need to be significantly modified to create a small opening beverage can end which a selectively weakened fracturable zone for selective penetration by a straw.

[0014] It is a further aspect of the present invention to provide a can end which is adapted for receiving a straw and which does not have a pull tab with any significant sharp edges to substantially decrease the likelihood of any type of finger injury to the user pulling the pull tab. Thus, in one aspect of the present invention a score line is provided to define the selectively weakened fracturable zone and which may incorporate a raised reinforcing bead which substantially encircles the small opening and shrouds the opening to prevent inadvertent contact with a user’s fingers.

[0015] It is a further object of the present invention to provide a beverage can end which is adapted to receive a straw and which may be selectively closed and rescaled to prevent spillage and product contamination. Thus, in one embodiment of the present invention a hinged closure mechanism is provided which closes when the straw is removed from the opening in the end closure. In this embodiment, a hinged plug is sized to effectively seal the opening when a straw is removed, and can be repeatedly opened and closed without compromising the hinged closure mechanism.

[0016] It is yet another aspect of the present invention to provide a puncturable membrane which has a vent area positioned substantially adjacent an inserted drinking straw. This vent area allows a small child or the physically disabled to efficiently withdraw a beverage from the container without creating a vacuum in the container. Thus, in one aspect of the present invention, a metallic beverage can end closure which is adapted for receiving a drinking straw is provided, comprising:

[0017] a substantially circular end wall;
[0018] a central panel interconnected to said substantially circular end wall, and further comprising an aperture extending therethrough having a first diameter;
[0019] a puncturable membrane sealingly engaged to and positioned within said aperture in said central panel, wherein when a downward force is applied to said puncturable membrane with a first end of the drinking straw, said puncturable membrane is opened to receive the drinking straw.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] FIG. 1 is a top plan view of a beverage can end with a puncturable membrane positioned substantially in a middle portion therein;

[0021] FIG. 1A is a top plan view of the embodiment shown in FIG. 1 but with the puncturable membrane opened to receive a drinking straw;
[0022] FIG. 2 is a top plan view of the beverage can end of FIG. 1 and showing the puncturable membrane in greater detail;
[0023] FIG. 3 is a cross sectional front elevation view of FIG. 2 taken at line AA;
[0024] FIG. 4 is a top plan view of an alternative embodiment of the present invention;
[0025] FIG. 5 is a cross-sectional front elevation view of the embodiment shown in FIG. 4 taken at line AA;
[0026] FIG. 6 is an alternative embodiment of the present invention;
[0027] FIG. 7 is a cross-sectional front elevation view of the invention shown in FIG. 6, and identifying when a positive or negative pressure is present within the beverage container and the flexure associated with the puncturable membrane;
[0028] FIG. 8 is a cross-sectional, front elevation view of the embodiment shown in FIG. 9 taken at line AA;
[0029] FIG. 9 is a top plan view of a straw penetrating the puncturable membrane;
[0030] FIG. 10 is a top plan view of an alternative embodiment of the present invention;
[0031] FIG. 11 is a cross-sectional, front elevation view of the embodiment shown in FIG. 10 taken at line AA;
[0032] FIG. 12 is a top plan view of an alternative embodiment of the present invention;
[0033] FIG. 13 is a cross-sectional, front elevation view of the embodiment shown in FIG. 12, taken at line AA;
[0034] FIG. 14 is a top plan view of an alternative embodiment of the present invention;
[0035] FIG. 15 is a cross-sectional, front elevation view of the embodiment shown in FIG. 14 at line AA;
[0036] FIG. 16 is a top plan view of an alternative embodiment of the present invention;
[0037] FIG. 17 is a cross-sectional, front elevation view of the embodiment of FIG. 16 taken at line AA shown just prior to penetration by a drinking straw;
[0038] FIG. 18 is a detailed front elevation view of the embodiment shown in FIG. 17;
[0039] FIG. 18A is a detailed, exploded view of the non-hinged corner portion of the plug shown in FIG. 18; and
[0040] FIG. 19 is a cross-sectional, front elevation view of the invention shown in FIG. 18 after penetration by the drinking straw.

DETAILED DESCRIPTION

[0041] Referring now to the drawings, FIG. 1 represents a metallic beverage can end 2 and a puncturable membrane 12 associated with the present invention. As shown in FIG. 1, the beverage can end 2 typically comprises a circular end wall 4 which is interconnected on an interior portion to a
central panel 6 and which is adapted for interconnection to a neck portion of a beverage container by means of double scanning or other methods commonly known in the art. The puncturable membrane 12 as shown in FIG. 1 is positioned in substantially a central portion of the central panel 6, but alternatively may be positioned proximate to the circular end wall or in any other portion of the central panel 6 as preferred by the manufacturer or filler. FIG. 1A is a depiction of the beverage can end 2 of FIG. 1, but further showing the puncturable membrane 12 in an open position.

[0042] Referring now to FIGS. 2 and 3, FIG. 2 is a top plan view of one embodiment of the puncturable membrane 12, while FIG. 3 is a cross-sectional front elevation view of the embodiment shown in FIG. 2 taken at line AA. As seen in FIGS. 2 and 3, the puncturable membrane 12 is generally comprised of an upper ring 18 and a lower ring 16 which are operably interconnected to the central panel 6 of the beverage can end 2 proximate to a central panel aperture 8. A central portion of the lower ring 16 may additionally include one or more score lines 14 which are used to allow shearing and penetration of the puncturable membrane 12 with a typical drinking straw 20 (not shown). As shown in FIG. 3, the puncturable membrane 12 in this embodiment of the present invention is concave with respect to the beverage can end closure, although the puncturable membrane 12 may additionally be flat, convex, or any other geometric configuration. Further, the puncturable membrane 12 may be formed in the shape and color of an object such as an orange, apple, etc. to identify the beverage in the container. Preferably, the puncturable membrane 12 is comprised of a resilient plastic, rubber, polymer or other material such as a multi-layer laminate which is capable of retaining internal pressures of between about 80 and 105 psi and has good gas barrier properties, yet can be punctured with a tip of a typical drinking straw. The puncturable membrane may also have the capability to function with a vacuum product such as a hot fluid juice beverage. Further, the material is preferably comprised of a material which will not scalp into the beverage to effect the taste or color after extended periods of storage.

[0043] To attach the puncturable membrane 12 to the central panel aperture 8, in one embodiment of the present invention any adhesive or a sealant material 38 such as a heat seal coating or hot melt adhesive or spin welding to an appropriate coated surface may be used to sufficiently interconnect the puncturable membrane 12 to the central panel 6. Alternatively, the puncturable membrane 12 may be inter-connected to the central panel aperture 8 purely by means of friction, and which does not require any type of adhesive or bonding for interconnection to the central panel 6.

[0044] Referring now to FIGS. 4 and 5, an alternative embodiment of the present invention is provided herein. More specifically, FIG. 4 is a top plan view of the puncturable membrane 12, while FIG. 5 is a cross-sectional front elevation view of the embodiment shown in FIG. 4 taken along lines AA. As further seen in these drawings, the puncturable membrane 12 has a central portion comprised of an upper cap 22 which extends in a substantially linear direction proximate to the central panel 6. The upper cap 22 may additionally include one or more score lines 14 which are used for selective penetration into the puncturable membrane 12 with a drinking straw 20.

[0045] Referring now to FIGS. 6 and 7, a top plan view and a cross-sectional front elevation view of an alternative embodiment is provided herein. More specifically, the affects of a positive internal pressure and a negative internal pressure which creates a vacuum are shown in FIG. 7 and depicts the flexure of the upper cap 22 as pressure is applied either internally or externally to the beverage can end 2. This particular feature is important as a tamper proof indicator for the consumer. More specifically, when beverage products or pasteurized goods are stored in the container, a vacuum may be created showing a negative pressure and would provide an indicator to a consumer that the beverage container has not been contaminated. Likewise, a positive pressure maybe used to indicate a positive pressure in the container and could be used to indicate that the beverage container has not been penetrated or inadvertently contaminated.

[0046] FIG. 8 is a front cross-sectional elevation view of one embodiment of the present invention and which identifies a beverage can body 28 which is double seamed to the circular end wall 4 of a beverage can end 2, and as shown in FIG. 9, penetrates a drinking straw 20 through the central panel 6. FIG. 9 is a cross-sectional, top perspective view of the embodiment shown in FIG. 8, and which further identifies the drinking straw 20 penetrating the puncturable membrane 12 and further identifying a vent area 10 which permits easy withdrawal of the beverage in the beverage can body 28.

[0047] FIG. 10 is a top plan view of an alternative embodiment of the present invention while FIG. 11 is a front cross-sectional elevation view of the invention shown in FIG. 10 taken at line AA. This drawing further identifies the positioning of the puncturable membrane 12 in the central panel 6 and the orientation of one or more score lines 14 which are positioned in the puncturable membrane 12 to allow the penetration of a drinking straw 20. In this embodiment, the puncturable membrane 12 has a substantially convex shape with respect to the central panel 6, and thus has an upwardly projecting profile. FIG. 11 further depicts that the puncturable membrane 12 may be positioned below the upper cap 22.

[0048] Referring now to FIG. 12 and FIG. 13, FIG. 12 is a top plan view of another embodiment of the present invention, while FIG. 13 is a front elevation view of the puncturable membrane 12 shown therein. In this embodiment of the present invention, the puncturable membrane 12 comprises a lower ring portion 16 which fits below the central panel (6) (not shown) of the beverage can end 2, and which has an upper cap portion 22 positioned above the central panel 6 to retain the puncturable membrane 12 in a sealed position on a central panel aperture 8 of the beverage can end closure 2. As shown in this embodiment, the lower ring 16 has an outer diameter which is less than the outer diameter of the upper cap 22, although the diameter of the upper cap 22 and the lower ring 16 are greater than the central panel aperture 8, (not shown).

[0049] Referring now to FIGS. 14 and 15, a top plan view and a front elevation view of an alternative embodiment of the present invention is provided herein. More specifically, FIG. 15 identifies that the puncturable membrane of the present invention has a lower ring 16 with an exterior diameter which is greater than the external diameter of the
upper cap 22. Additional detail is provided with regard to the dimensions of the puncturable membrane 12 and the score profile 14, as well as the radius of curvature of the puncturable membrane 12 and the lower ring portion 16 below the cap which engages the central panel 6.

[0050] Referring now to FIGS. 16 and 17, another embodiment of the present invention is provided which depicts a puncturable membrane 12 having an upper cap 22 with an exterior diameter larger than the exterior diameter of the lower ring 16. More specifically, FIG. 16 is a top plan view while FIG. 17 is a cross-sectional front elevation view of the embodiment shown in FIG. 16 taken along line AA. FIG. 17 further identifies the positioning of a drinking straw 20 prior to penetrating the puncturable membrane 12 along the score lines 14. Further, the lower ring 16 has an external diameter just slightly larger than the central panel aperture 8, while the upper cap 22 has an external diameter which is larger than the external diameter of the lower ring 16. The application of an adhesive or other material to interconnect the central panel 6 to a lower surface of the upper cap 22 is also shown, as well as an internal sidewall 24 which effectively interconnects the lower ring 16 to the upper cap 22.

[0051] Referring now to FIGS. 18-19, and alternative embodiment of the present invention is provided herein. More specifically, FIG. 18 is a cross-sectional, front elevation view of a beverage end closure 2 with a puncturable membrane 12 and a sealing plug 34 sealingly interconnected to the central panel 6.

[0052] More specifically, the upper cap 22 is interconnected to a central panel 6 with a sealing material 38 such as an adhesive, spin welding, thermal welding, ultrasonic welding or other means commonly known in the art. As shown, the upper cap 22 extends beyond the diameter of the central panel aperture 8 to provide a sufficient seal and prevent leaking.

[0053] A sealing plug 34 is provided on a lower portion of the upper cap 22, and is hingedly connected at the hinge area 30. On an opposing side to the hinge area 30, a tapered lip 32 is provided which engages a back taper 36 of the lower ring 16, which sealingly engages the lower ring 16 portion to the sealing plug 34.

[0054] During use, when a drinking straw 20 is pushed downwardly onto the sealing cap 42, a puncturable membrane 12 begins to tear along one or more score lines 14. Once the score lines are torn, the downward force from the drinking straw begins acting on an upper portion of the sealing plug 34, which allows rotation at the hinge area 30. Initially, a minimum amount of finger pressure is believed to be required to disengage the tapered lip 32 of the sealing plug 34 from the back taper 36 of the sealing cap lower ring 16. Additional detail of the fit showing the tapered lip 32 and back taper 36 may be seen in FIG. 18A.

[0055] Once the tapered lip 32 is disengaged from the sealing cap back taper 36, the sealing plug 34 is free to rotate about the hinge area 30 to allow complete penetration of the drinking straw 20 as shown in FIG. 19. When the drinking straw 20 is withdrawn from the beverage can body 28, the sealing plug 34 preferably rotates back to the original position shown in FIG. 18, and thus substantially prevents spillage when a beverage product is still present in the beverage can body 28.

[0056] For clarity purposes, the following list of components identified in the drawings is provided herein:

<table>
<thead>
<tr>
<th>#</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Beverage can end closure</td>
</tr>
<tr>
<td>4</td>
<td>Circular end wall</td>
</tr>
<tr>
<td>6</td>
<td>Central panel</td>
</tr>
<tr>
<td>8</td>
<td>Central panel aperture</td>
</tr>
<tr>
<td>10</td>
<td>Vent area</td>
</tr>
<tr>
<td>12</td>
<td>Puncturable membrane</td>
</tr>
<tr>
<td>14</td>
<td>Score line</td>
</tr>
<tr>
<td>16</td>
<td>Lower ring</td>
</tr>
<tr>
<td>18</td>
<td>Upper ring</td>
</tr>
<tr>
<td>20</td>
<td>Drinking straw</td>
</tr>
<tr>
<td>22</td>
<td>Upper cap</td>
</tr>
<tr>
<td>24</td>
<td>Internal side wall</td>
</tr>
<tr>
<td>26</td>
<td>Lower cap</td>
</tr>
<tr>
<td>28</td>
<td>Beverage can body</td>
</tr>
<tr>
<td>30</td>
<td>Hinge area</td>
</tr>
<tr>
<td>32</td>
<td>Tapered lip</td>
</tr>
<tr>
<td>34</td>
<td>Sealing plug</td>
</tr>
<tr>
<td>36</td>
<td>Back taper</td>
</tr>
<tr>
<td>38</td>
<td>Sealing material</td>
</tr>
<tr>
<td>40</td>
<td>Transitional area</td>
</tr>
<tr>
<td>42</td>
<td>Sealing cap</td>
</tr>
</tbody>
</table>

[0057] The foregoing description of the present invention has been presented for purposes of illustration and description. Furthermore, the description is not intended to limit the invention to the form disclosed herein. Consequently, variations and modifications commencing here with the above teachings and the skill or knowledge of the relevant art are within the scope of the present invention. The embodiments described herein above are further intended to explain best modes known for practicing the invention and to enable others skilled in the art to utilize the invention in such, or other, embodiments or various modifications required by the particular applications or uses of present invention. It is intended that the dependent claims be construed to include all possible embodiments to the extent permitted by the prior art.

What is claimed is:

1. A metallic container end closure with a puncturable membrane adapted for receiving and venting a drinking straw comprising:
   - a substantially circular end wall adapted for interconnection to a container;
   - a central panel integrally interconnected to said substantially circular end wall, and further comprising an aperture extending therethrough having a first diameter;
   - a puncturable membrane sealingly engaged to said central panel and operably positioned within said aperture in said central panel, wherein when a downward force is applied to said puncturable membrane with a first end of the drinking straw, said puncturable membrane is opened to receive said drinking straw.

2. The metallic container end closure of claim 1, further comprising a vent area positioned proximate to said drinking straw to facilitate the removal of a beverage from the container.
3. The metallic container end closure of claim 1, wherein said vent area has a cross-sectional area of at least about 0.05 square inches.
4. The metallic container end closure of claim 1, wherein said puncturable membrane is comprised of a plastic material.
5. The metallic container end closure of claim 1, wherein said puncturable membrane is comprised of at least one of a multi-layer laminate, a polymer and a foil having gas barrier properties.
6. The metallic container end closure of claim 1, wherein said puncturable membrane is comprised of a rubber material.
7. The metallic container end closure of claim 1, wherein said aperture in said central panel has a diameter no greater than about 0.375 inches.
8. The metallic container end closure of claim 1, wherein said puncturable membrane has a lower ring positioned below said central panel and an upper cap positioned above said central panel, said lower ring and said upper cap operably interconnected and having an exterior diameter greater than said first diameter of said aperture.
9. The metallic container end closure of claim 1, wherein said puncturable membrane is comprised of:
   a) a lower ring having an upper surface, a lower surface, an exterior circumference and an interior circumference, said exterior circumference having a diameter greater than said first diameter of said aperture;
   b) an upper cap having an upper surface, a lower surface, and an exterior circumference greater than said first diameter of said aperture, said lower surface of said cap integrally interconnected to said upper surface of said lower ring proximate to said interior circumference to create a junction, said junction operably positioned adjacent to said aperture in said central panel to form a sealing engagement; and
   c) at least one score line positioned in said upper surface of said upper cap which shears when a predetermined force is applied thereto.
10. The metallic container end closure of claim 9, wherein said upper cap has an arcuate shape.
11. The metallic container end closure of claim 1, wherein said puncturable membrane shears to allow penetration of a drinking straw when a force of at least about 0.5 lbs. is applied to said score line and not to exceed 10 lbs.
12. The metallic container end closure of claim 1, wherein said aperture is positioned substantially in a middle portion of said central panel.
13. The metallic container end closure of claim 1, wherein the puncturable membrane can withstand an internal pressure of at least about 80 psi
14. The metallic container end closure of claim 1, further comprising at least one score line operably positioned on said puncturable membrane to facilitate breaking the seal of said puncturable membrane.
15. The metallic container end closure of claim 1, further comprising a hinged plug positioned in a lower portion of said puncturable membrane, said hinged plug capable of substantially resealing said aperture in said central panel.
16. The metallic container end closure of claim 1, wherein said puncturable membrane deflects inwardly or outwardly to identify whether there is a positive or a negative pressure within said container.
17. The metallic container end closure of claim 1, wherein said puncturable membrane has at least two distinct thicknesses to facilitate puncturing with the straw.
18. A metallic container end closure with a hinged plug membrane adapted for receiving and venting a drinking straw; comprising:
   a) a substantially circular end wall adapted for interconnection to a container;
   b) a central panel integrally interconnected to said substantially circular end wall, and further comprising an aperture extending therethrough having a first diameter;
   c) a substantially impermeable membrane scalingly engaged to said central panel proximate to said aperture, said impermeable membrane comprising an upper portion hingedly interconnected to a lower portion, wherein when a downward force is applied to said substantially impermeable membrane with a first end of the drinking straw, said lower portion of said substantially impermeable membrane swings open to allow the drinking straw to enter the container.
19. The metallic end closure of claim 18, wherein said lower portion of said substantially impermeable membrane re-engages an upper portion of said substantially impermeable membrane when said drinking straw is withdrawn from said container.
20. The metallic end closure of claim 19, wherein said lower portion and said upper portion of said substantially impermeable membrane form a substantially sealing engagement after withdrawal of said drinking straw.
21. The metallic end closure of claim 1, wherein said substantially impermeable membrane is comprised of at least one of an elastomer, a plastic, a rubber, a polymer and combinations thereof.

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