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(54) **LANCE THROUGH STRAW OPENING END**

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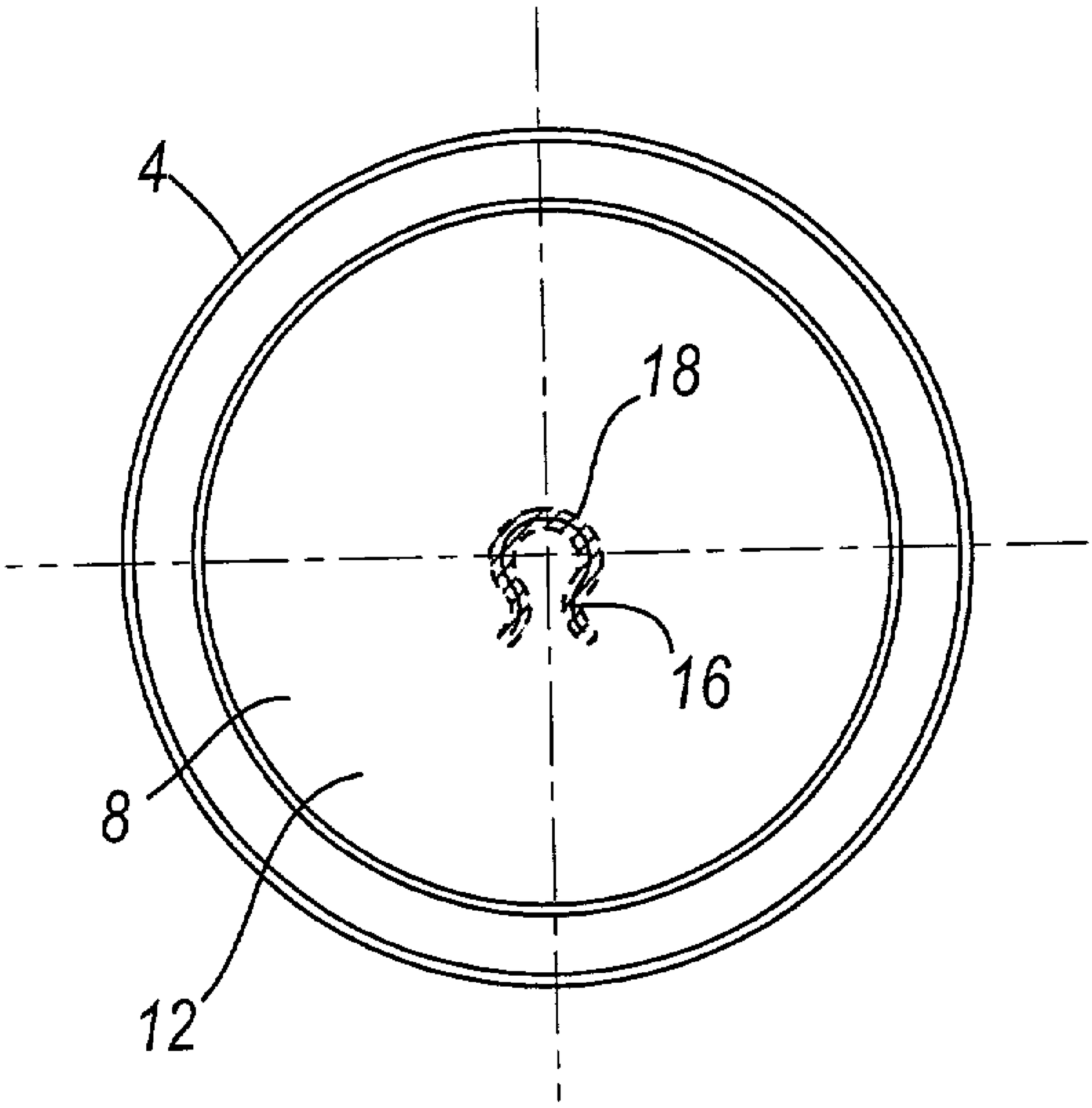
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(57) **ABSTRACT**

The present invention relates to a metallic beverage can end and more specifically to a substantially spillproof end which is adapted for penetration and opening by a drinking straw.



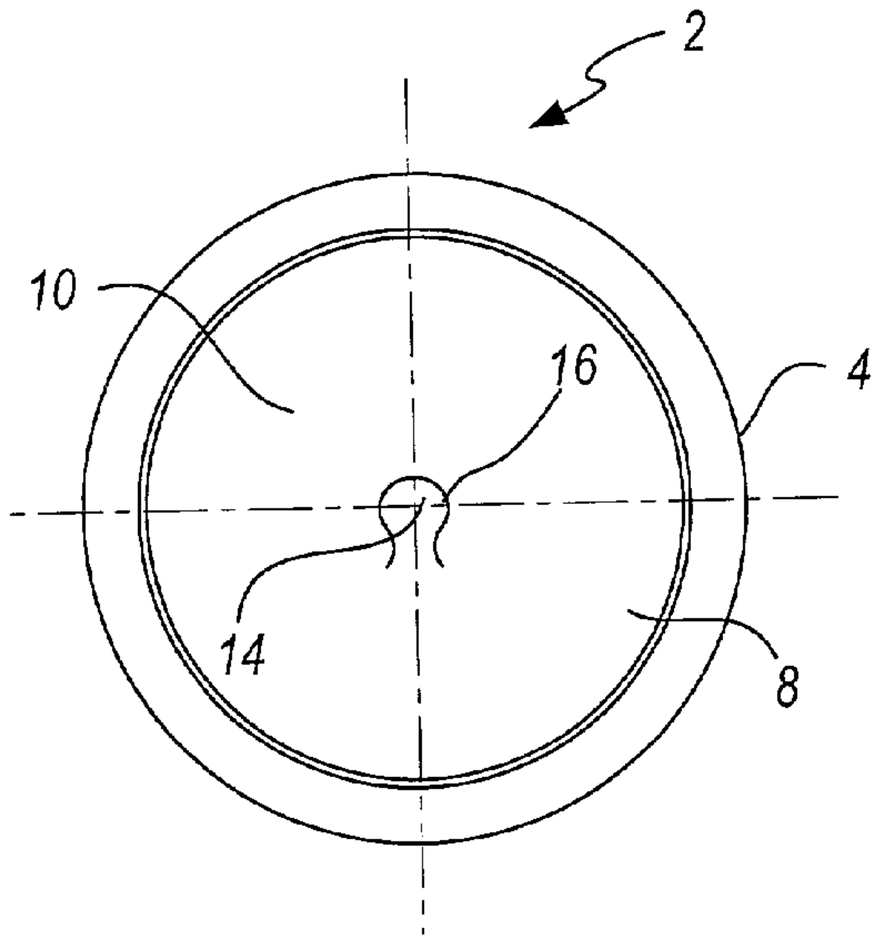


FIG. 1

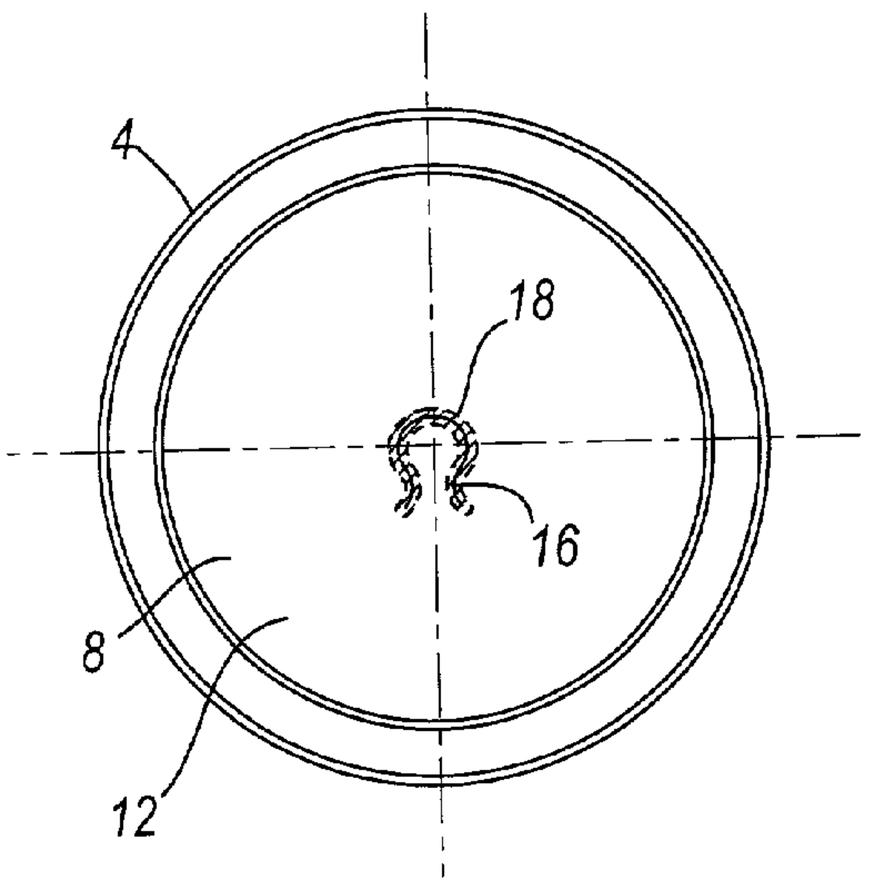


FIG. 2

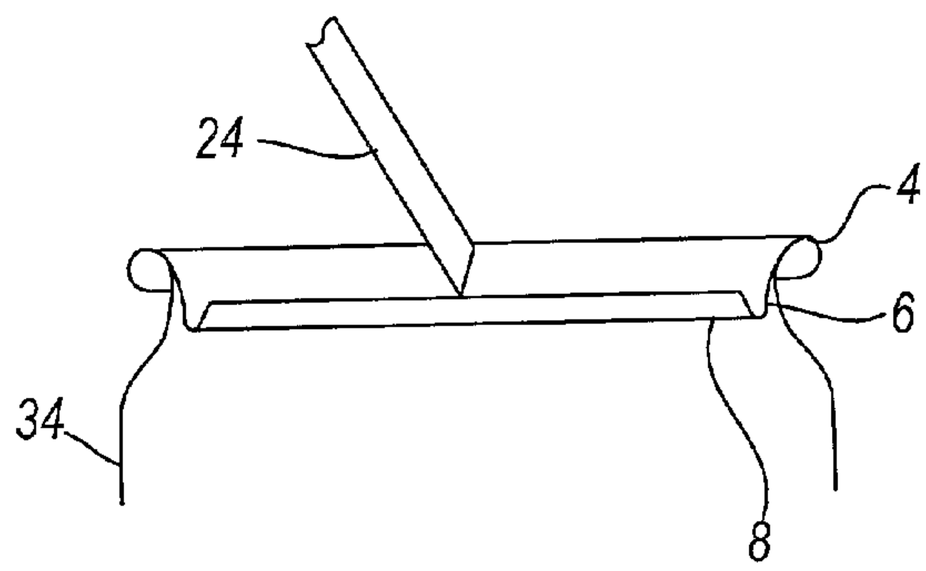


FIG. 3

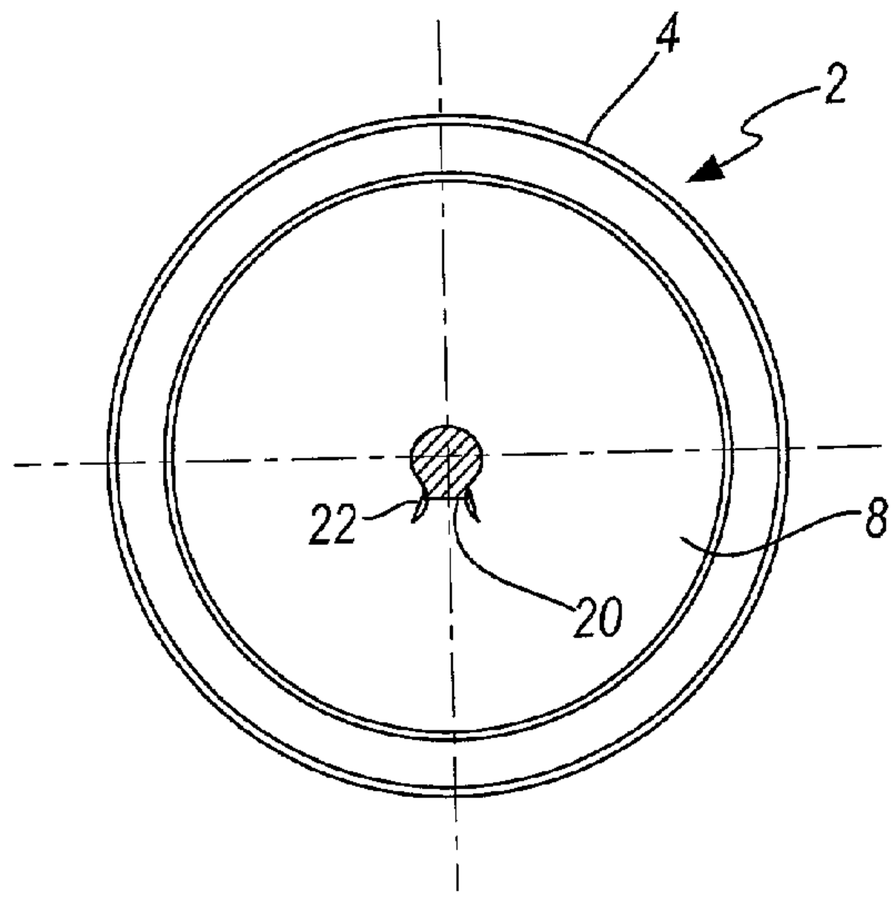


FIG. 4

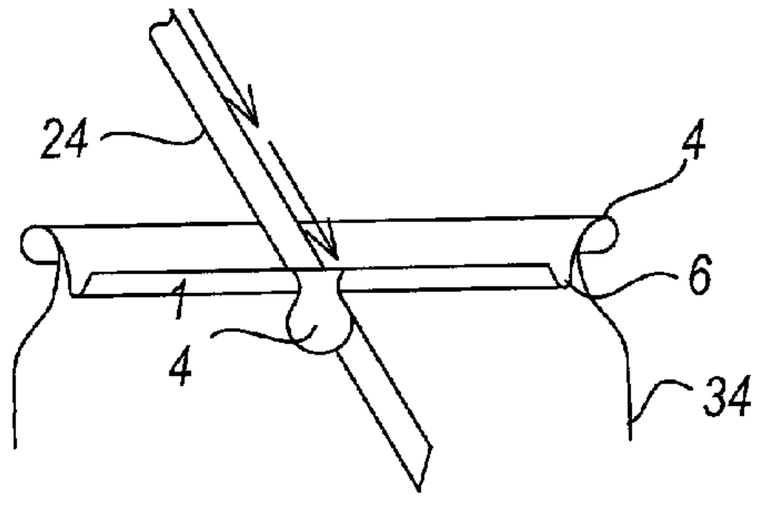


FIG. 5

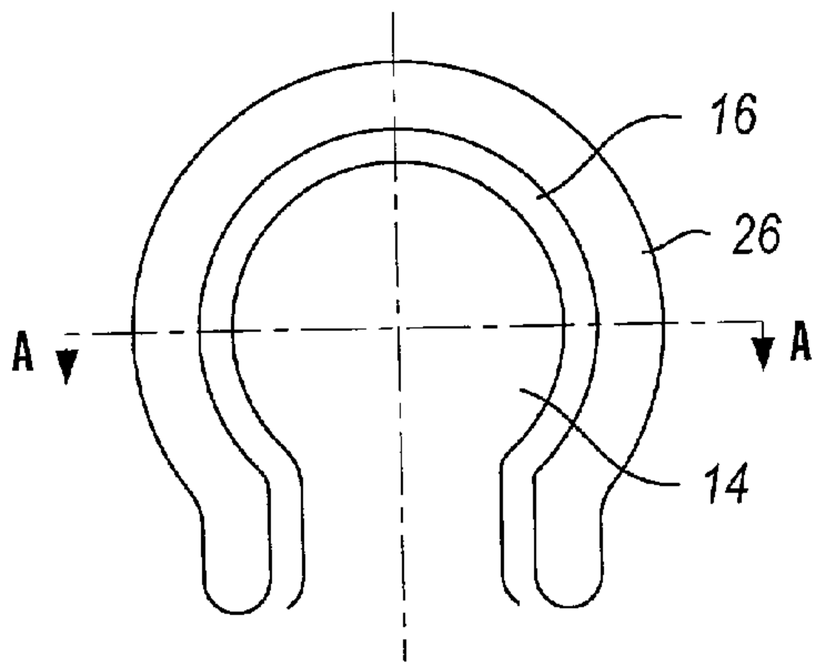


FIG. 6

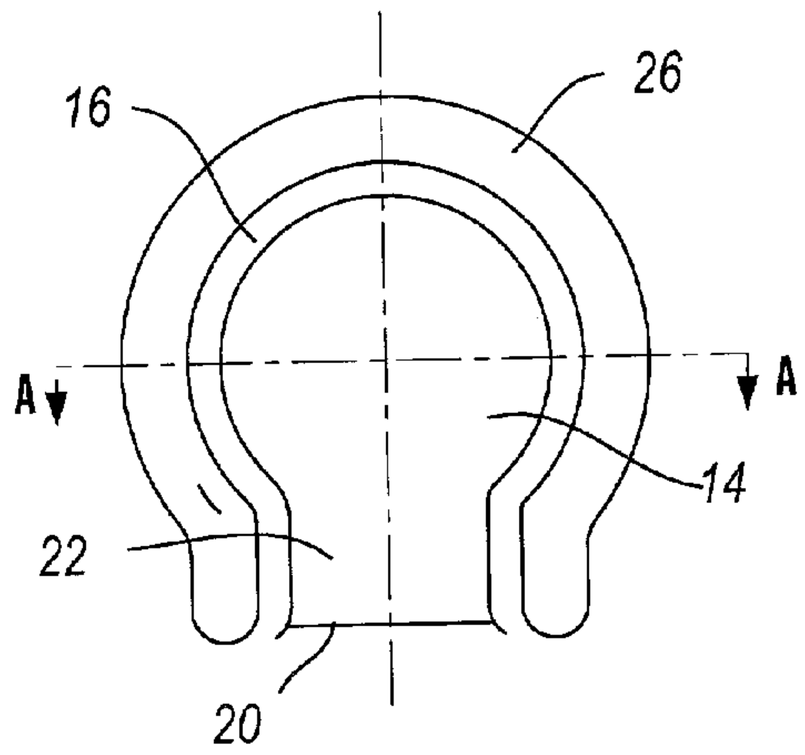


FIG. 8

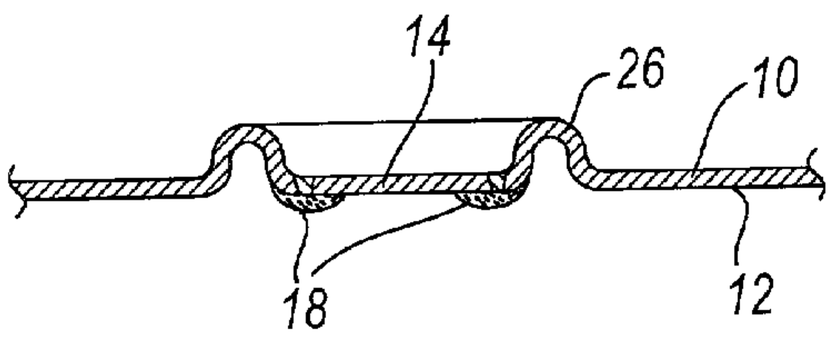


FIG. 7

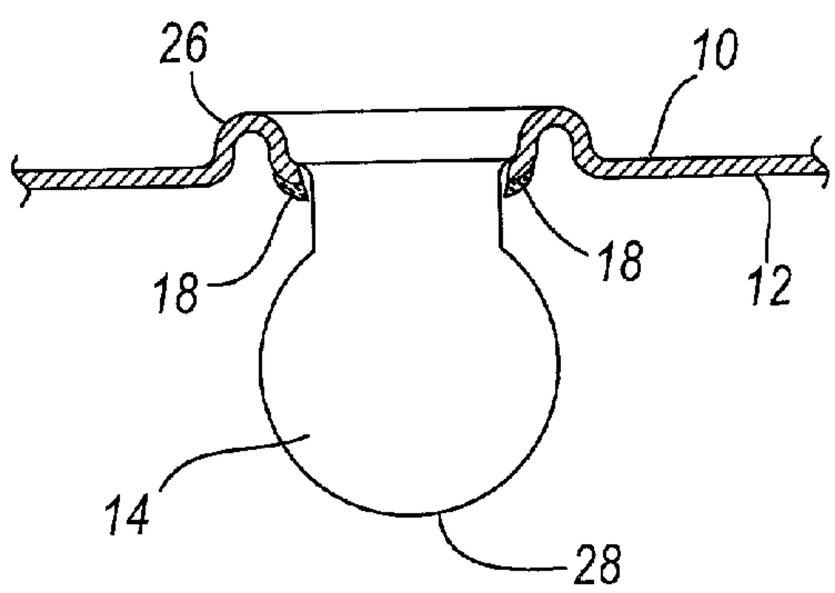


FIG. 9

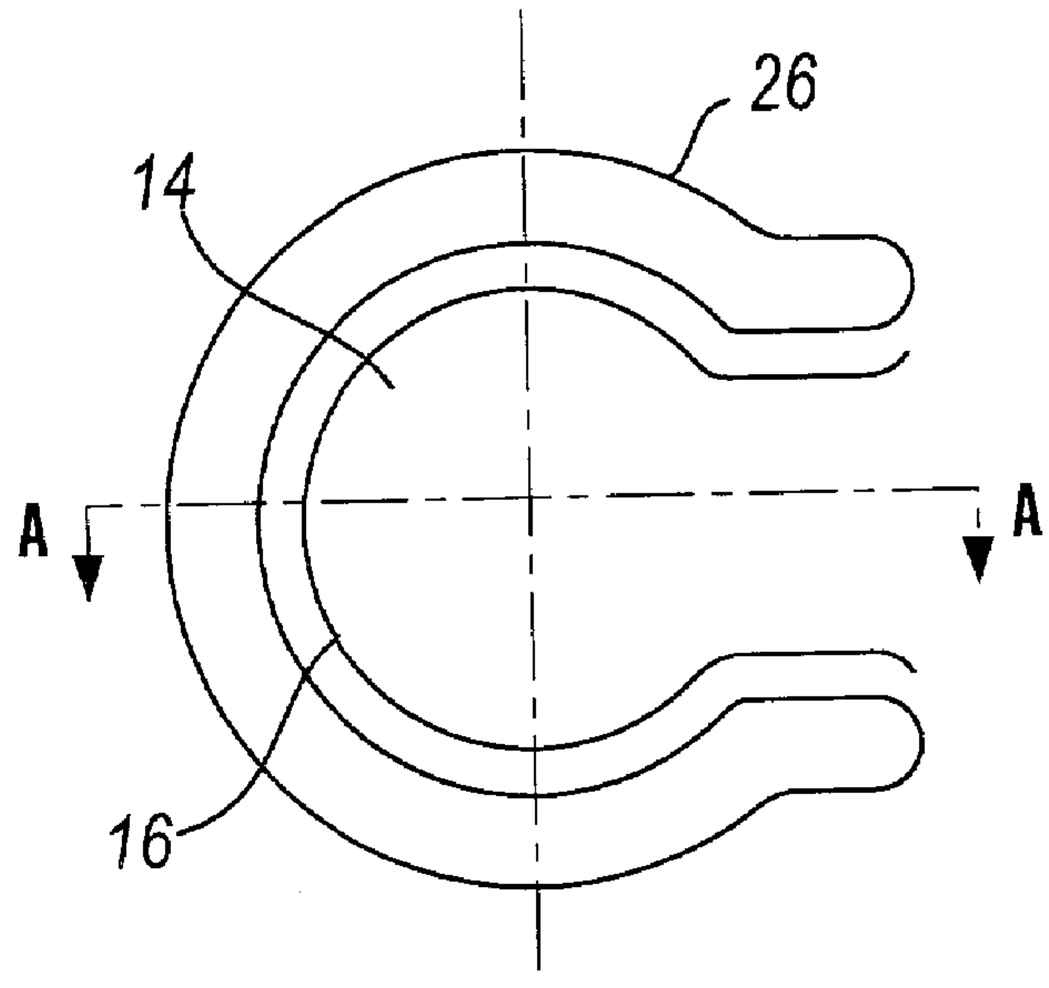


FIG. 10

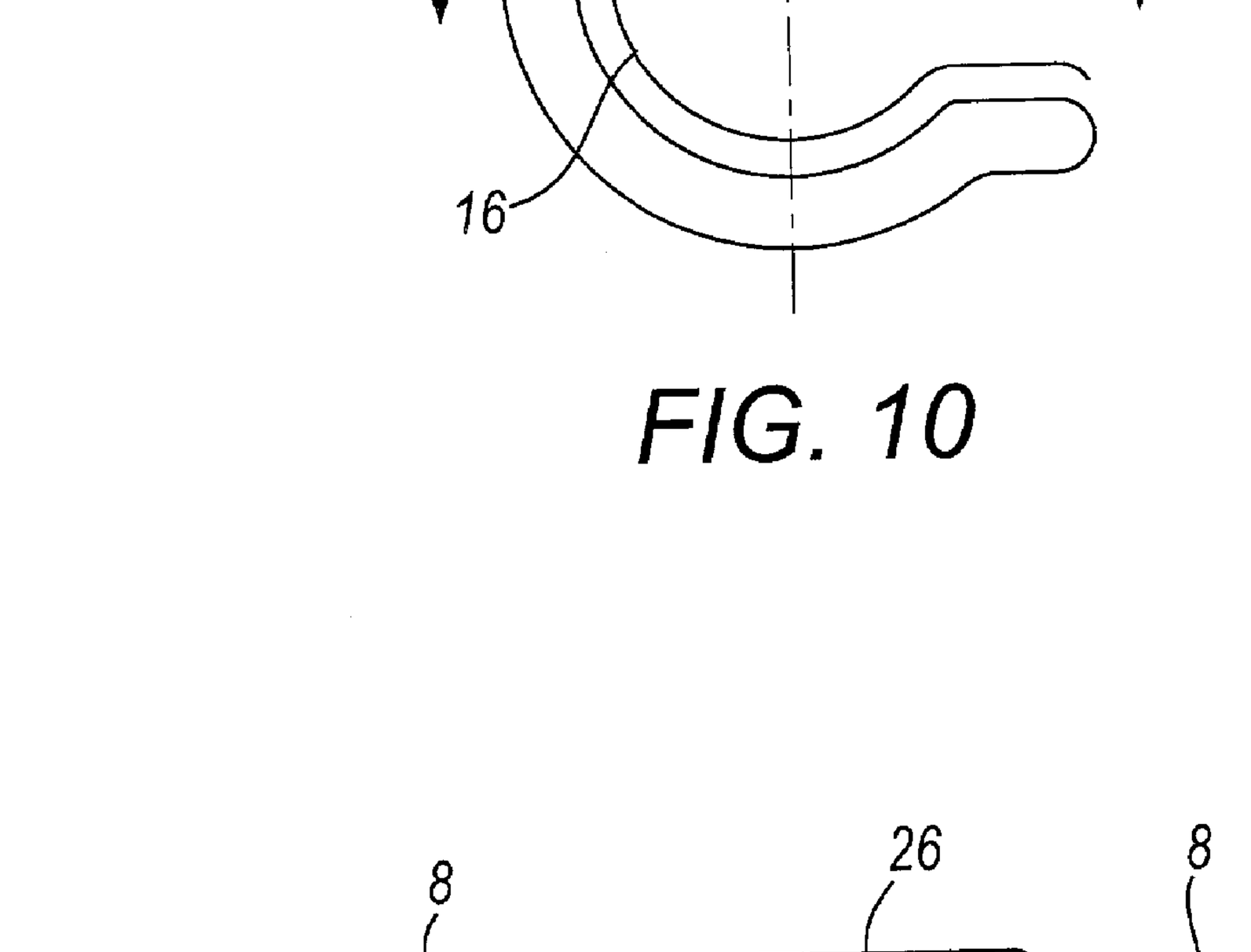


FIG. 11

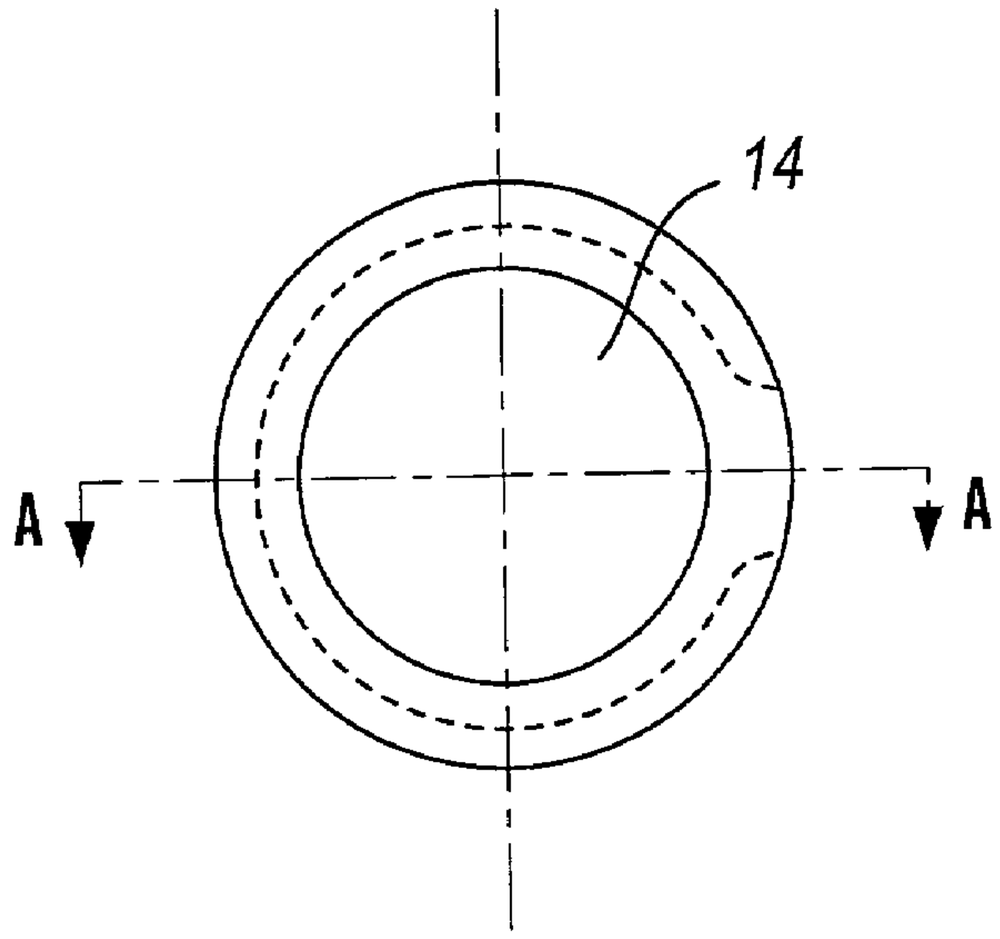


FIG. 12

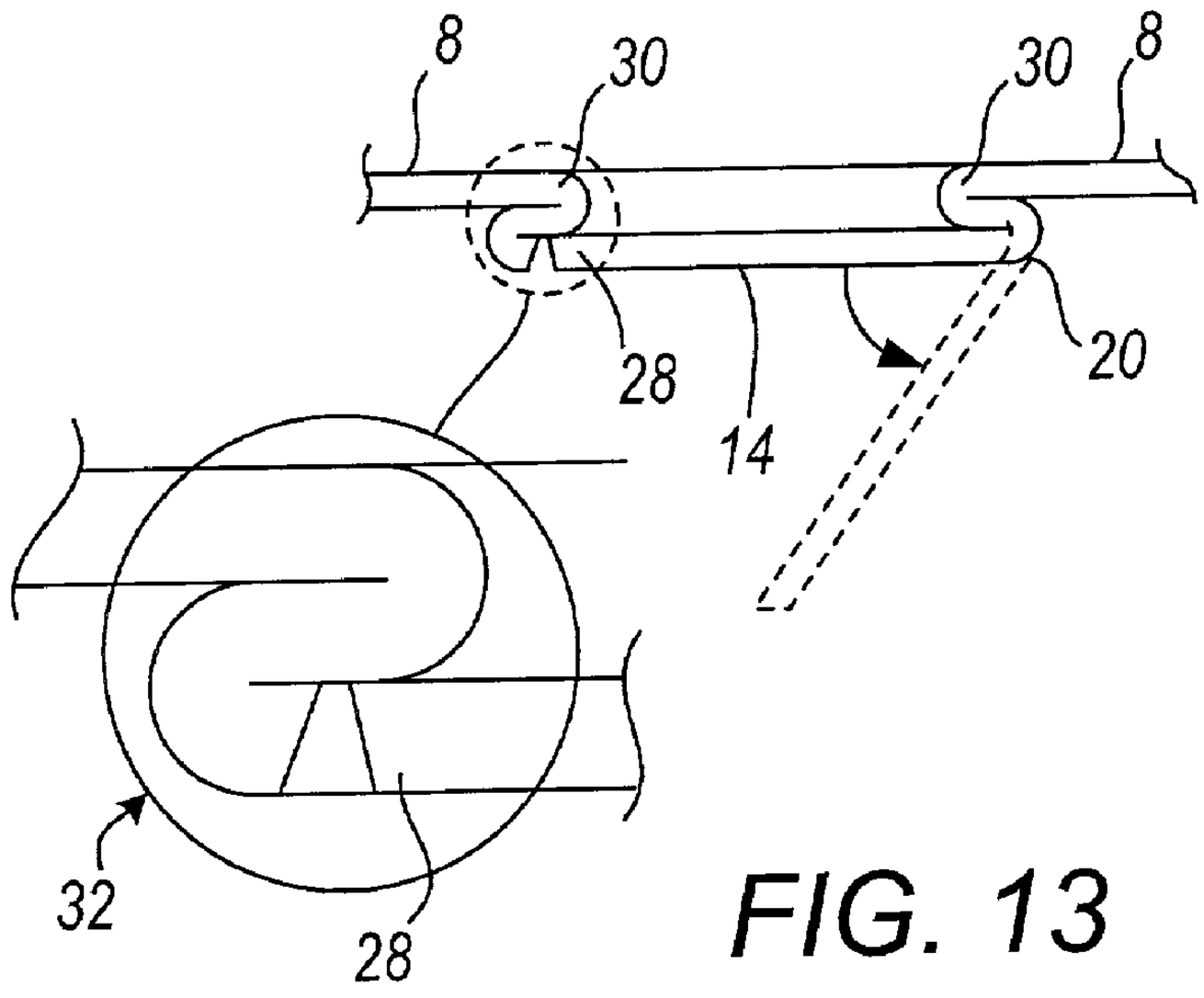


FIG. 13

LANCE THROUGH STRAW OPENING END

FIELD OF THE INVENTION

[0001] The present invention relates to beverage containers, and more specifically a metallic beverage can end which may be penetrated by a conventional drinking straw.

BACKGROUND OF THE INVENTION

[0002] 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 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.

[0003] Another type of beverage can opening is described in U.S. Pat. No. 4,126,244 to Elser, which describes a push tab with an easy opening wall section. However, this type of container still requires substantial finger pressure to open and is not feasible for penetration by a straw or use by small children or the physically disabled.

[0004] Two of the more common types of beverage containers which are adapted to receive a 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.

[0005] 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. Thus, the goal of making a user friendly, spill-proof drink container is not realized. Further, the durability of the foil and associated cardboard container is significantly less than a typical metallic beverage can end, and is 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 has a tendency to alter the taste of the beverage contained therein.

[0006] 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 adhesive 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.

[0007] 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 size of the 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 metallic beverage can end which may be penetrated 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

[0008] 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.

[0009] 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.

[0010] It is another object 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.

[0011] 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.

[0012] It is a further aspect of the present invention to provide a beverage 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 tabs. 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.

[0013] Thus, in one aspect of the present invention, a metallic beverage can end adapted for receiving a drinking straw is provided, and which comprises:

[0014] a substantially circular end wall adapted for interconnection to a beverage can body;

[0015] a central panel integrally interconnected to said circular end wall and comprising an outer surface and an inner surface;

[0016] a selectively weakened fracturable zone positioned within said central panel which is defined by a score line and penetrable by the drinking straw; and

[0017] a sealant material selectively applied to at least a portion of said central panel and said selectively weakened fracturable zone, wherein said central panel and said selectively weakened fracturable zone are sealingly engaged until a downward force is applied to said selectively weakened fracturable zone by the drinking straw.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] **FIG. 1** is a top plan view of one embodiment of the present invention in identifying a score line position in a central panel which is adapted for penetration by a drinking straw;

[0019] **FIG. 2** is a bottom plan view of the embodiment shown in **FIG. 1** and further identifying a sealant material positioned proximate to the score line;

[0020] **FIG. 3** is a front elevation view of the embodiment shown in **FIG. 1** and further depicting a drinking straw prior to penetration of the beverage can end;

[0021] **FIG. 4** is a top plan view of the beverage can end shown after the hinge gate is rotated downwardly;

[0022] **FIG. 5** is a front elevation view of the drawing shown in **FIG. 4** and further identifying a drinking straw penetrating the beverage can end;

[0023] **FIG. 6** is a top plan view of one embodiment of the closed hinge gate and surrounding reinforcing bead;

[0024] **FIG. 7** is a cross-sectional front elevation view of the embodiment shown in **FIG. 6**;

[0025] **FIG. 8** is a top plan view of the embodiment shown in **FIG. 6** in an open position;

[0026] **FIG. 9** is a front elevation view of the embodiment shown in **FIG. 8**;

[0027] **FIG. 10** is a top plan view of an alternative embodiment of the present invention;

[0028] **FIG. 11** is a cross-sectional, front elevation view of the embodiment shown in **FIG. 10**, and providing additional detail regarding the overlap between the central panel and the hinged gate;

[0029] **FIG. 12** is a top plan view of an alternative embodiment of the present invention; and

[0030] **FIG. 13** is a cross-sectional front elevation view of the embodiment shown in **FIG. 12** and providing additional detail of a folded edge in the central panel and associated overlap with the hinged gate.

DETAILED DESCRIPTION

[0031] Referring now to the drawings, FIGS. **1-13** depict numerous embodiments of the present invention which is generally used in conjunction with a metallic beverage can end **2**. The beverage can end **2** is generally comprised of a circular end wall **4** which is interconnected to a central panel **8** and is adapted for interconnection to a beverage can by means of double seaming or other methods commonly known in the art.

[0032] The central panel **8** of the present invention generally includes a central panel upper surface **10** and a central panel lower surface **12**, and further includes a selectively weakened fracturable zone which is otherwise referred to herein as a hinged gate **14**. The hinged gate **14** is generally defined by a score line **16** and a hinge point **20** to allow downward rotation of the hinged gate **14**. In some embodiments a vent area **22** is provided which permits sufficient venting to allow the withdrawal of a beverage from the beverage can body through a typical drinking straw without creating a vacuum. The hinged gate **14** further comprises a hinged gate leading edge **28** as described below, while the central panel **8** may include a folded edge **30** positioned along the aperture created in the central panel to eliminate a sharpened edge and possible injury to a user.

[0033] Referring now to **FIGS. 1 and 2**, a top and a bottom plan view are respectively provided of one embodiment of the present invention. More specifically, the circular end wall **4** is shown interconnected to a central panel **8** which has a hinged gate **14** defined by a score line **16** positioned in a central portion of the central panel **8**. In one embodiment of the present invention the score line may be substantially circular, substantially oval, or any other type of geometric configuration which may be preferred by the beverage can end maker or filler. For example, the outline of an apple, orange, or other fruit maybe depicted to identify the beverage product contained in the beverage container. Further, the hinged gate **14** is preferably sized to have a diameter which is greater than the diameter of the opening drinking straw **24** to assure that the hinged gate **14** cannot be ingested if it inadvertently breaks free from the hinge point **20** and becomes suspended in the beverage in the beverage can body **34**.

[0034] The hinged gate **14** is further defined by a hinge point **20** which defines a point of rotation when pressure is applied to an upper surface with a finger or a drinking straw. As further identified in **FIG. 2**, in a bottom plan view of the present invention a sealant material **18** is provided which interconnects the central panel lower surface **12** to the score

line **16**, and thus prevents the score line **16** from being sheared due to internal pressure in the beverage container, and/or external forces applied to the beverage can end **2**. As appreciated by one skilled in the art, the sealant material **18** may additionally be applied to the central panel upper surface **10**, or both.

[**0035**] In one embodiment of the present invention, the sealant material **18** comprises at least one of a plastic, a polymer, a rubber, or an organic resin and may further include a material known as a "PVC plastisol", which is manufactured by D. S. Chemie of Bremen, Germany and Alltrista Corporation of Muncie, Ind. Preferably, when the sealant material **18** is applied to the central panel lower surface **12**, the material is "non-scalping" and hence does not alter the taste or color of the beverage contained in the beverage can body.

[**0036**] Referring now to **FIG. 3, a** front elevation view of the invention shown in **FIGS. 1 and 2** is provided herein and shows the positioning of a typical drinking straw **24** prior to insertion through the central panel. Although in the embodiment shown in **FIG. 3** the hinged gate **14** is centrally located in the central panel **8**, the hinged gate **14** may be positioned in close proximity to the circular end wall **4** or any location in the central panel **8**. The central positioning of the hinged gate **14** is generally preferred since after insertion of the drinking straw **24**, very little spillage occurs if the beverage container is inadvertently tipped over by a small child or other user, and is thus substantially spillproof.

[**0037**] Referring now to **FIG. 4, a** top plan view of the present invention is shown herein after the hinged gate **14** rotated downward to an open position. **FIG. 5** is a front elevation view of the embodiment shown in **FIG. 4**, and further depicting a drinking straw **24**. **FIG. 4** also identifies a vent area **22** which may be created when the hinged gate **14** is rotated downward and which is generally positioned adjacent the hinge point **20**. As shown, once the drinking straw **24** penetrates through the hinged gate **14**, the hinged gate **14** is oriented downwardly and folded along a hinge point **20**. To allow penetration of the drinking straw through the hinged gate, a force of preferably at least about 0.5 pounds must be applied by the drinking straw to the hinged gate **14**. Further, the beverage can end **2** of the present invention must be capable of retaining a pressurized beverage at pressures up to 100 psi, yet can be opened with a typical drinking straw **24** by children or the physically disabled.

[**0038**] Referring now to **FIG. 6** and **FIG. 7, a** top plan view and a cross-sectional front elevation view of another embodiment of the present invention is provided herein, and which shows additional detail of the hinged gate **14** and an associated reinforcing bead **26**. The reinforcing bead **26** is used to provide structural support proximate to the score line **16** and which helps orient the drinking straw **24** to the upper surface of the hinged gate **14** for penetration. As shown in the closed position, the sealant material **18** generally overlaps between the hinged gate **14** and the central panel lower surface **12**. When pressure is applied to an upper surface of the hinged gate **14**, the sealant material **18** is sheared along the score line, thus allowing rotation of the hinged gate **14** around the hinge point **20**.

[**0039**] Referring now to **FIGS. 8 and 9**, the embodiment shown in **FIGS. 6 and 7** are shown in an open position. More specifically, **FIG. 8** is a top plan view of the invention shown in **FIG. 6**, while **FIG. 9** is a cross-sectional front elevation view of the embodiment shown in **FIG. 8**. As shown in these drawings, a vent area **22** may be positioned adjacent the hinge point **20**, and which allows for withdraw of the beverage from the beverage can body without creating a vacuum. Furthermore, the shearing of the sealant material **18** is shown in **FIG. 9**, and the positioning of the reinforcing bead **26** with respect to the hinged gate **14**.

[**0040**] Referring now to **FIGS. 10 and 11**, an alternative embodiment of the present invention is provided herein. More specifically, **FIG. 10** is a top plan view of a beverage can end **2** of the present invention which identifies the hinged gate **14** in a closed position. **FIG. 11** is a cross-sectional front elevation view of the embodiment shown in **FIG. 2**, and which further identifies the positioning of the hinged gate **14** prior to and immediately after opening (dotted lines). In this particular embodiment, a hinged gate leading edge **28** is oriented below the central panel **8** to provide additional resistance to internal pressure. An expanded view of this hinged gate overlap is shown in the circular area provided therein. Thus, the hinged gate **14** is substantially prevented from opening upwardly, while external downward pressure from the drinking straw is sufficient to fracture the sealant material **18** and to allow rotation of the hinged gate **14**.

[**0041**] Referring now to **FIGS. 12 and 13**, a further embodiment of the present invention is provided herein, and which shows an aperture folded edge **30** which is designed to substantially eliminate sharp edges and the possibility of an injury to a user's fingers during opening. More specifically, **FIG. 12** is a top plan view, while **FIG. 13** is a front elevation view of the embodiment shown in **FIG. 12**. Although the hinged gate **14** in this particular embodiment is substantially round, as appreciated by one skilled in the art the geometric shape may be arcuate as shown in **FIG. 10** or any other possible geometric configuration. As further shown in **FIG. 13**, in this particular embodiment the aperture has folded edges **30** and additionally has the hinged gate leading edge **28** positioned below the aperture folded edge **30** to prevent upward rotation of the hinged gate **14**. Thus the hinged gate **14** may be pushed downward for rotation and opening, but is designed to withstand significant pressures approaching 100 psi from carbonated beverages stored in the beverage can body.

[**0042**] To assist in the understanding of the present invention, the following component list is provided herein which identifies the numbering and components associated with the present invention:

#	Component
2	Beverage can end
4	Circular end wall
6	Countersink
8	Central panel
10	Central panel upper surface
12	Central panel lower surface
14	Hinged gate
16	Score line
18	Sealant material
20	Hinge point

-continued

#	Component
22	Vent area
24	Drinking straw
26	Reinforcing bead
28	Hinged gate leading edge
30	Aperture folded edges
32	Hinged gate overlap
34	Beverage can body

[0043] 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 commenced here with the above teachings and the skill or knowledge of the relevant art are within the scope in the present invention. The embodiments described herein above are further extended 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 beverage can end adapted for receiving a drinking straw, comprising:

a substantially circular end wall adapted for interconnection to a beverage can body;

a central panel integrally interconnected to said circular end wall and comprising an outer surface and an inner surface;

a selectively weakened fracturable zone positioned within said central panel which is defined by a score line and penetrable by the drinking straw; and

a sealant material selectively applied to at least a portion of said central panel and said selectively weakened fracturable zone, wherein said central panel and said selectively weakened fracturable zone are sealingly engaged until a downward force is applied to said selectively weakened fracturable zone by the drinking straw.

2. The metallic beverage can end of claim 1, wherein said sealant material comprises at least one of a plastic, a polymer, a rubber and an organic resin coating.

3. The metallic beverage can end of claim 1, wherein said sealant material is selectively applied to an inner surface of said central panel and said selectively weakened fracturable zone.

4. The metallic beverage can end of claim 2, wherein said sealant is a PVC plastisol.

5. The metallic beverage can end of claim 1, wherein said selectively weakened fracturable zone has a semi-circular shape.

6. The metallic beverage can end of claim 4, wherein said selectively weakened fracturable zone further comprises a vent area positioned proximate to a hinge point after penetration by the drinking straw.

7. The metallic beverage can end of claim 4, wherein said selectively weakened fracturable zone has a diameter no greater than about 0.375 inches.

8. The metallic beverage can end of claim 1, wherein said selectively weakened fracturable zone is positioned substantially within a mid-section of said central panel.

9. The metallic beverage can end of claim 1, wherein said central panel is comprised of a metallic material having a thickness no greater than about 0.016 inches.

10. The metallic beverage can end of claim 1, further comprising a reinforcing bead which substantially surrounds said selectively weakened fracturable zone.

11. The metallic beverage can end of claim 1, further comprising a countersink positioned between said substantially circular end wall and said central panel.

12. The beverage can end of claim 11, further comprising a chuck wall positioned between said countersink and said circular end wall.

13. The beverage can end of claim 1, wherein at least a leading edge of said selectively weakened fracturable zone is positioned below a portion of said central panel, wherein said selectively weakened fracturable zone is resistant to traveling upwardly based on an interval pressure in said beverage can body.

14. A metallic beverage can end adapted for receiving a drinking straw, comprising:

a circular end wall adapted for interconnection to a metallic can body and which is capable of withstanding an internal pressure of at least about 90 psi;

a chuck wall interconnected to said circular end wall and extending downwardly therefrom;

a central panel interconnected to said chuck wall;

a score line positioned in said central panel which defines a hinged gate for receiving the drinking straw; and

a sealant material applied to at least a portion of said central panel and said hinged gate, wherein when a force of at least about 0.5 pounds is applied to said hinged gate, the drinking straw penetrates through said central panel.

15. The metallic beverage can end of claim 14, wherein said score line is non-sealing prior to the application of said sealant material.

16. The metallic beverage can end of claim 14, wherein an aperture cleated in said central panel upon penetration of the straw has curled edges, wherein there are substantially no sharpened edges positioned substantially adjacent to said aperture.

17. The metallic beverage can end of claim 14, wherein a leading edge of said hinged gate is positioned below said central panel proximate to said score line.

18. The metallic beverage can end of claim 14, wherein said sealant material is at least one of a plastic, a rubber, an organic material and is positioned on an interior surface of said central panel and said hinged gate.

19. The metallic beverage can end of claim 14, wherein said hinged gate has an external shape greater than an opening defined by said score line, wherein said hinged gate is prevented from passing through said opening or said drinking straw if it becomes disengaged from said central panel.

20. A method for opening a metallic beverage can end with a drinking straw, comprising the steps of:

providing a metallic beverage can end adapted for interconnection to a beverage can body, comprising:

a) a substantially circular end wall;

b) a central panel integrally interconnected to said substantially circular end wall and comprising an outer surface and an inner surface;

d) a hinged gate positioned within said central panel which is defined by a score line;

e) a sealant material applied to at least a portion of said central panel and said hinged gate to provide a sealing engagement; and

applying a force to an upper surface of said hinged gate, wherein the drinking straw penetrates said central panel for communication with a liquid contained in the beverage can body.

21. The method of claim 20, wherein said sealant material comprises at least one of a plastisol, a plastic, a rubber and an organic resin coating.

22. The method of claim 20, wherein said applying a force step requires at least about 0.5 lbs.

23. The method of claim 20, wherein subsequent to said applying a force step a vent area is defined proximate to a hinge area of said hinged gate, wherein the liquid contained in the beverage can body may be more readily withdrawn.

24. The method of claim 20, wherein said hinged gate has a cross-sectional area no greater than about 0.375 inches.

25. The method of claim 20, wherein said metallic beverage can end is capable of withstanding an internal pressure upon interconnection with the beverage can body of at least about 90 psi.

26. The method of claim 20, wherein said metallic beverage can end is comprised of an aluminum material having a thickness no greater than about 0.016 inches.

27. The method of claim 20, wherein said applying a force step comprises pushing a first end of the drinking straw against an upper surface of said hinged gate.

28. The method of claim 20, further comprising a countersink operably positioned between said substantially circular end wall and said central panel.

29. The method of claim 20, wherein a leading edge of said hinged gate is positioned at least partially below said central panel.

30. The method of claim 20, wherein an aperture defined by said score line in said central panel has a curled edge.

* * * * *