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Pearce

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(54) **VENTING CAP**

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(22) Filed: **Jan. 24, 2005**

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Filed: **Mar. 29, 1999**

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B65D 53/04 (2006.01)

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(58) **Field of Classification Search** 220/366.1, 220/367.7, 374, 360; 215/307, 260
See application file for complete search history.

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(57) **ABSTRACT**

A bottle cap is provided that allows for venting of gases generated in a bottle. A single or multiple ridges are formed on the inner surface of the cap top such that the ridges sit on the bottle mouth rim when the cap is threaded onto the bottle. A single or multiple slots may be formed across each of the ridges. Alternatively, a single or multiple grooves may be formed on the inner surface of the cap top. The ridge(s) or groove(s) may also be formed on a disc fitted over the inner surface of the cap top. When the cap is threaded on to the bottle, gases generated in the bottle can escape through the slot(s) formed across the ridge(s) or through the groove (s) formed on the inner surface of the cap top. A liner having an opening formed through its thickness may be placed in the cap. The liner opening allows the passage of gases from the bottle to the slot(s) or groove(s) formed on the cap top or disc.

5 Claims, 7 Drawing Sheets

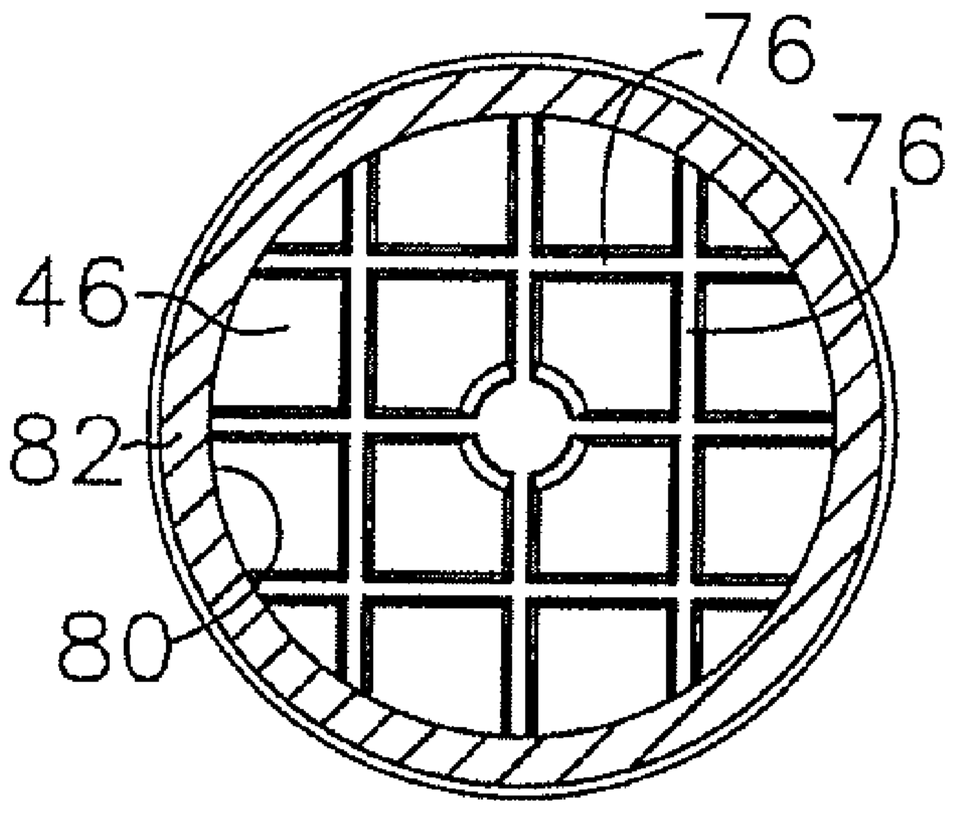

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FIG. 1
PRIOR ART

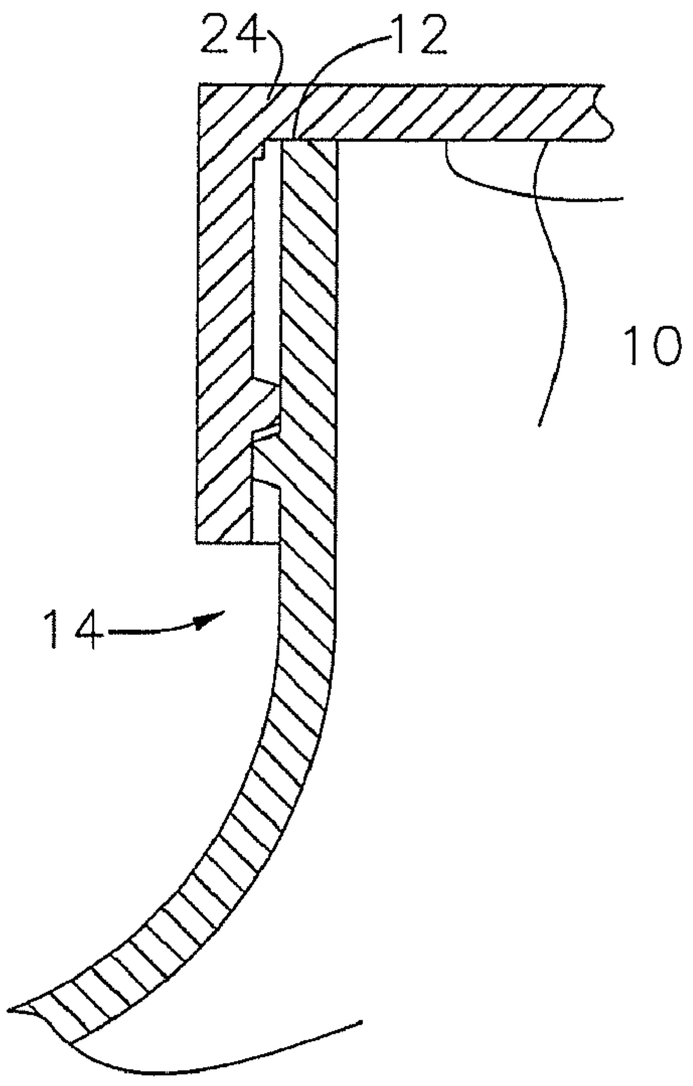


FIG. 3B

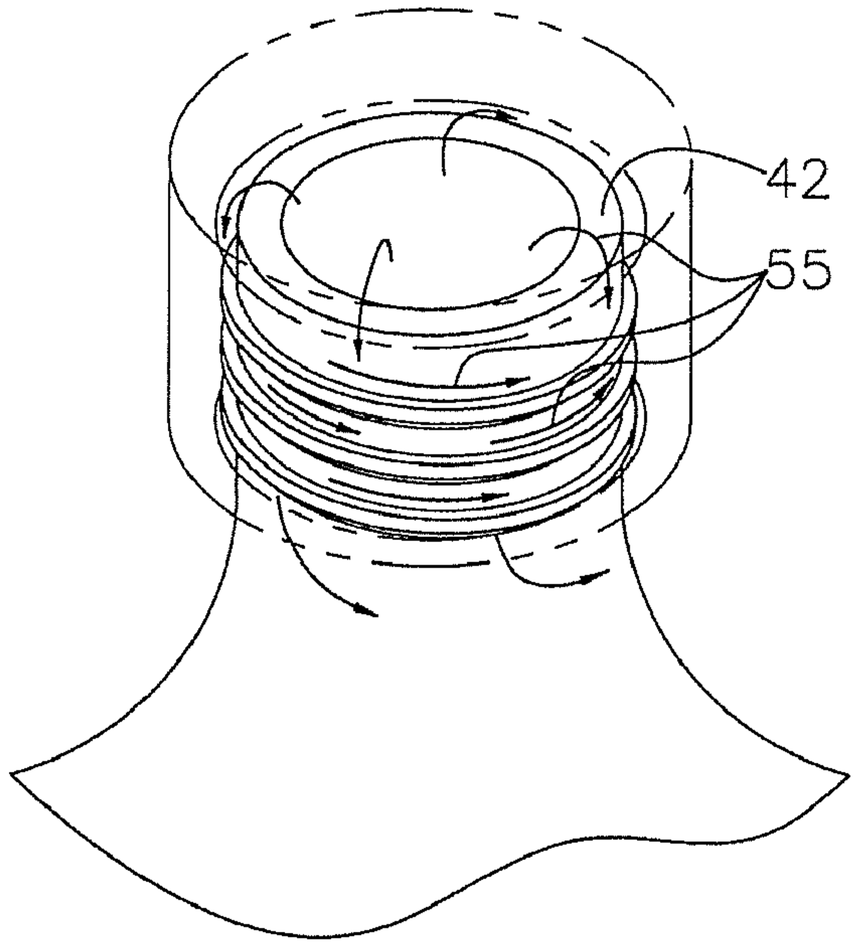


FIG. 2

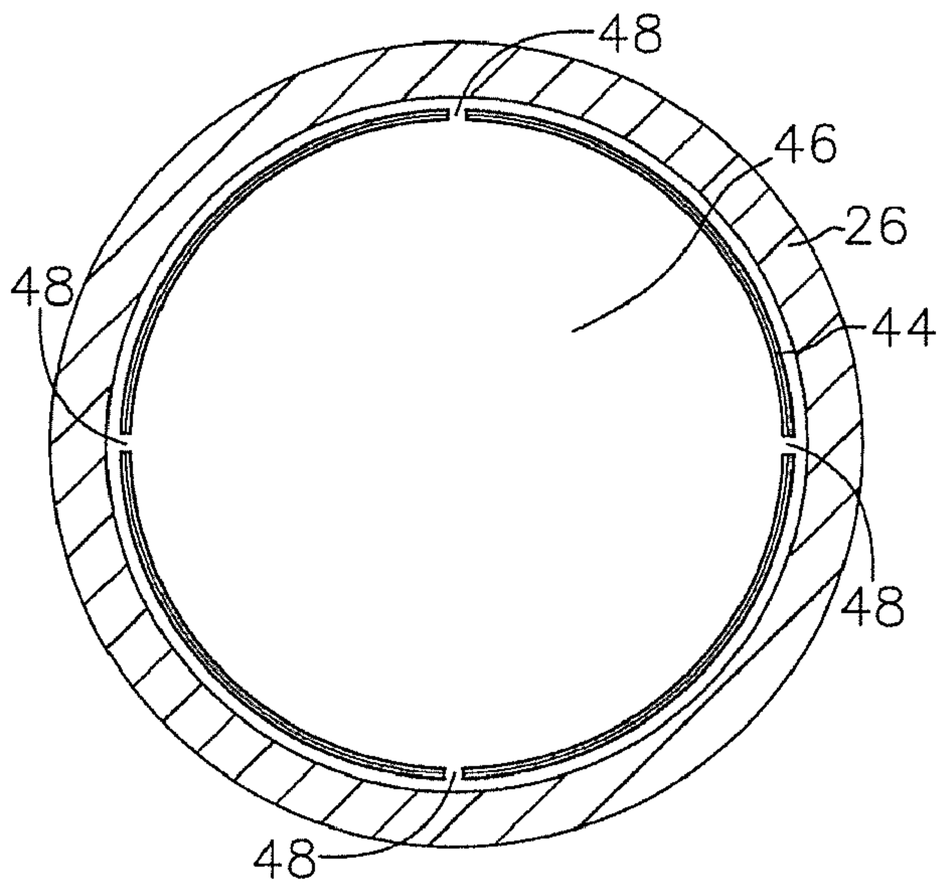


FIG. 3A

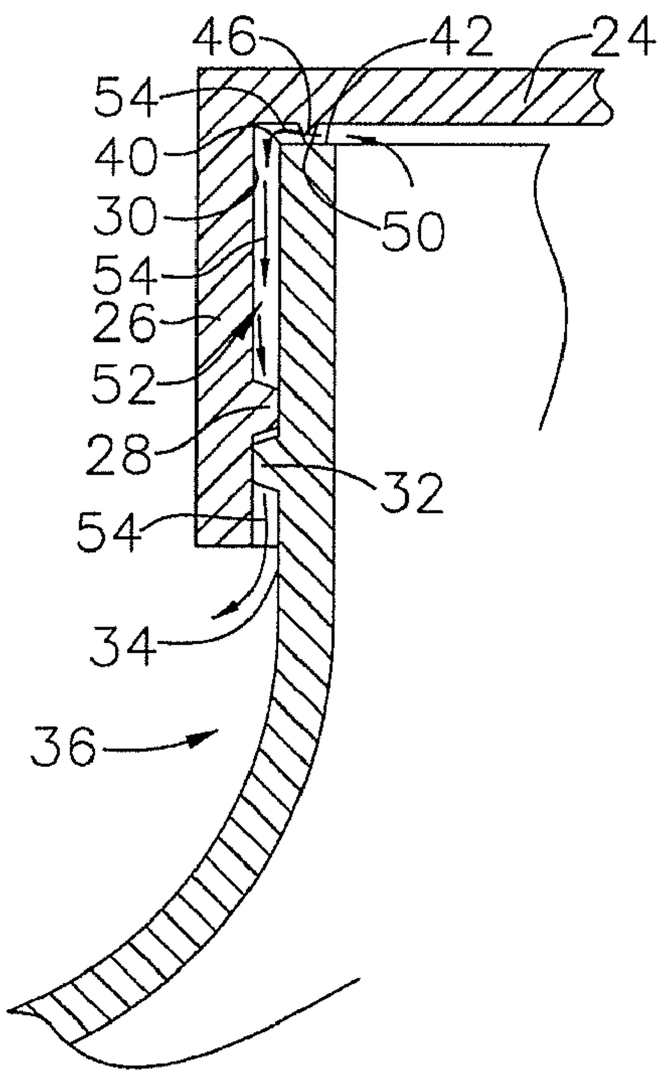


FIG. 4

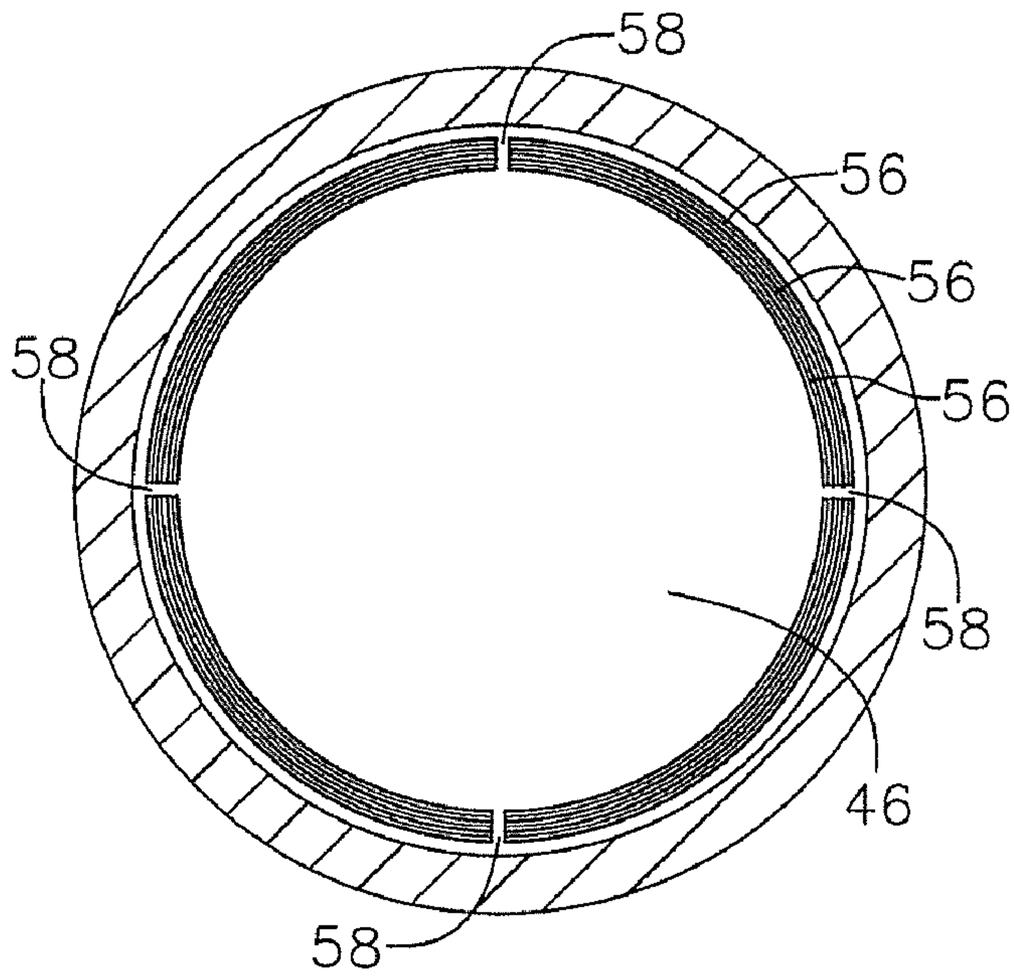


FIG. 5

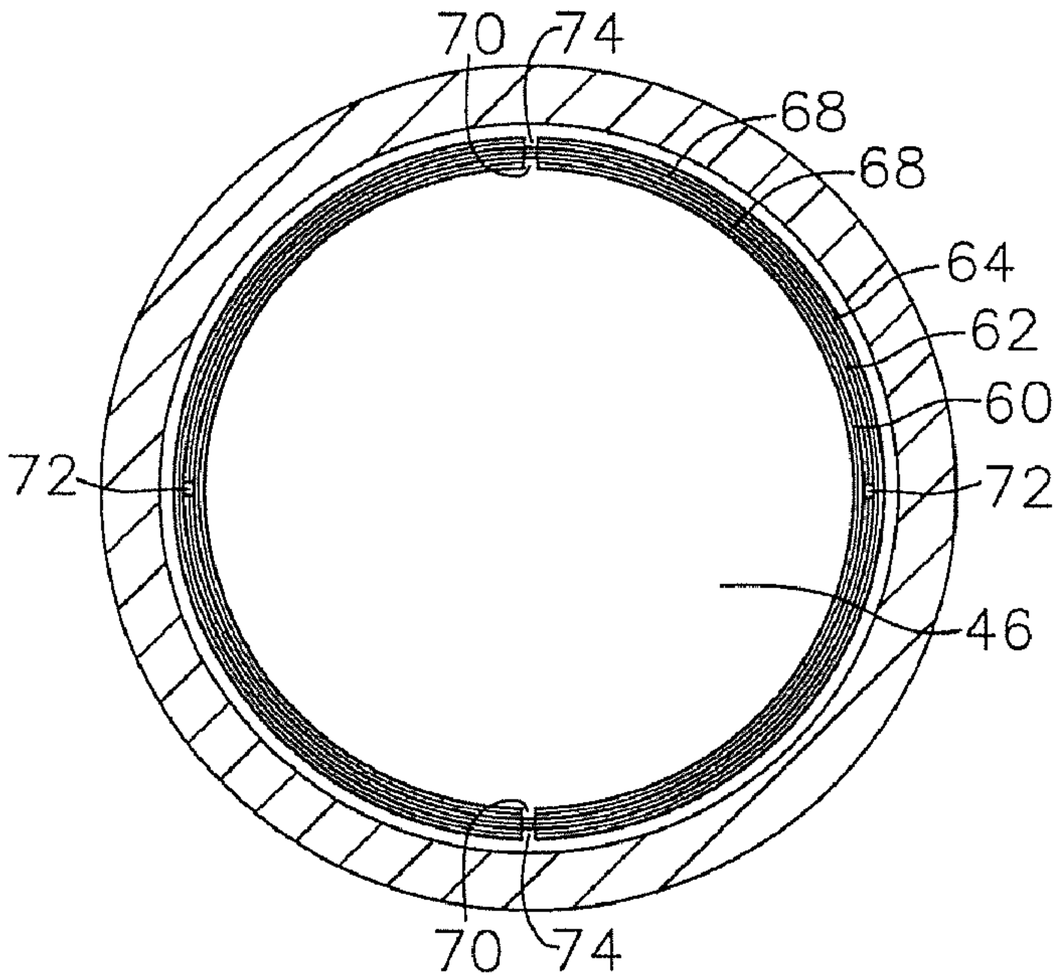


FIG. 6

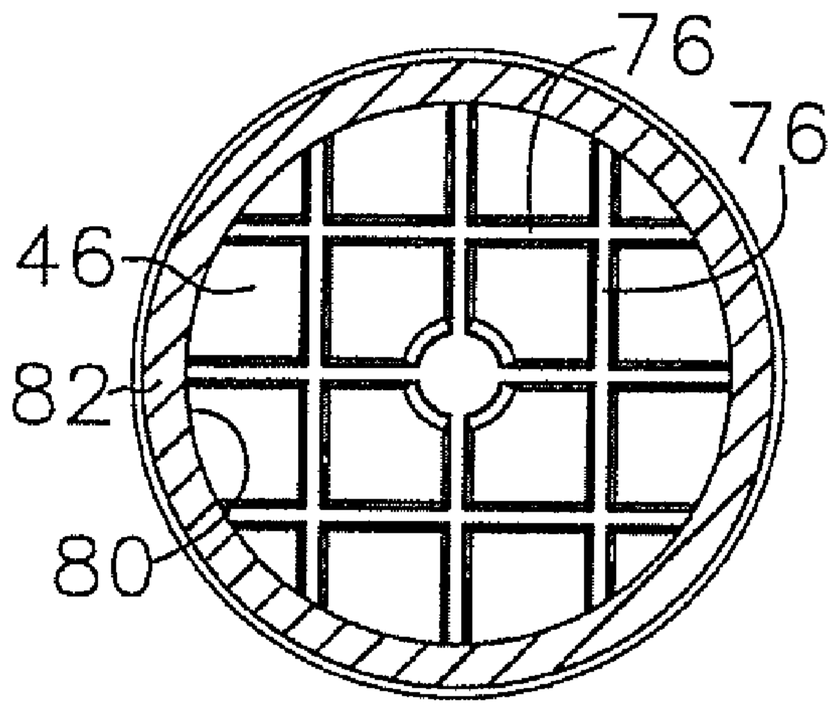


FIG. 7

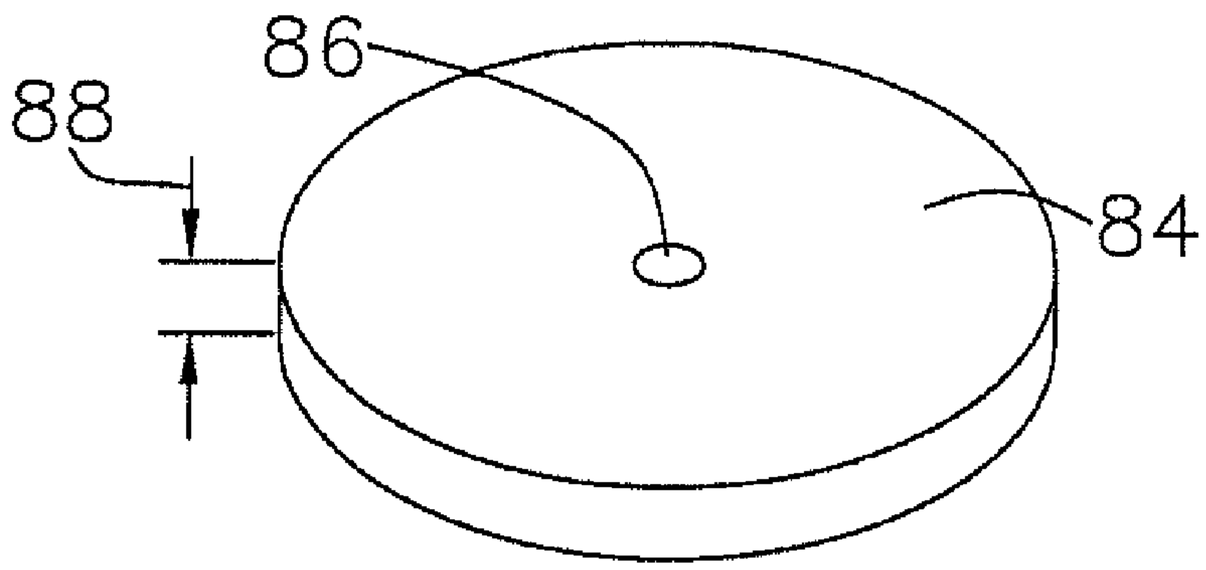


FIG. 8

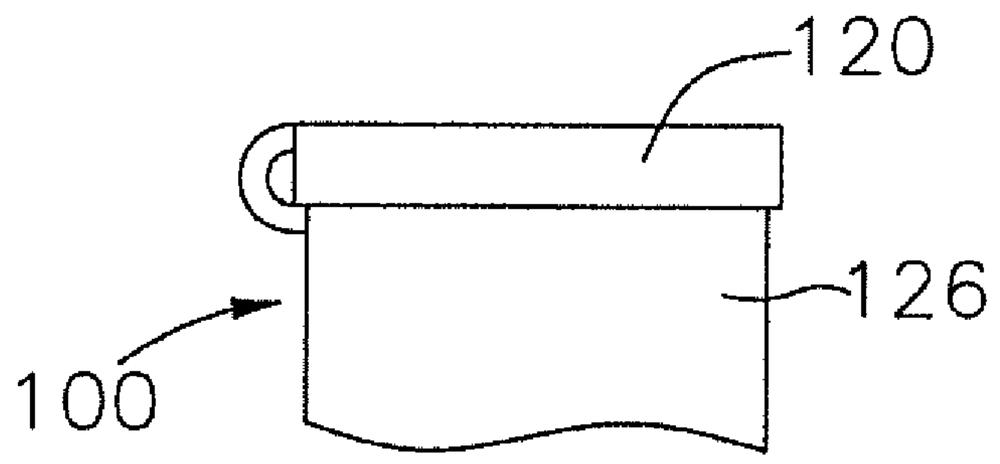


FIG. 9

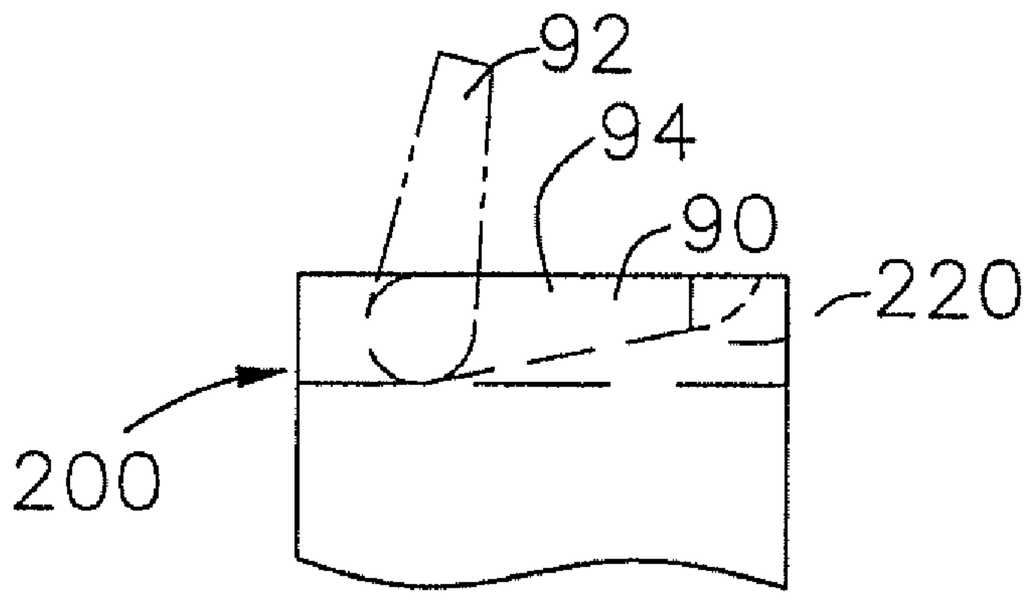


FIG. 10

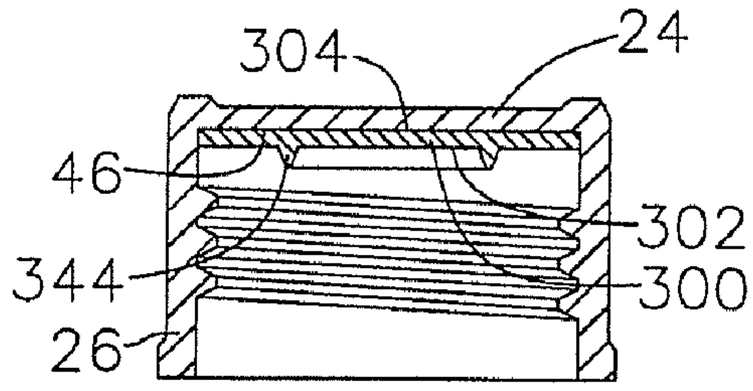


FIG. 11

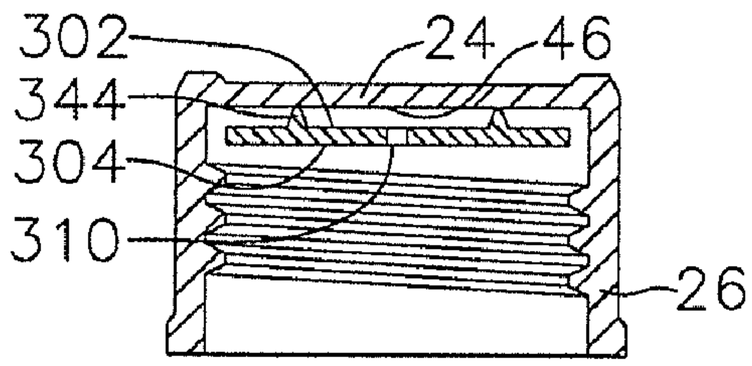


FIG. 12

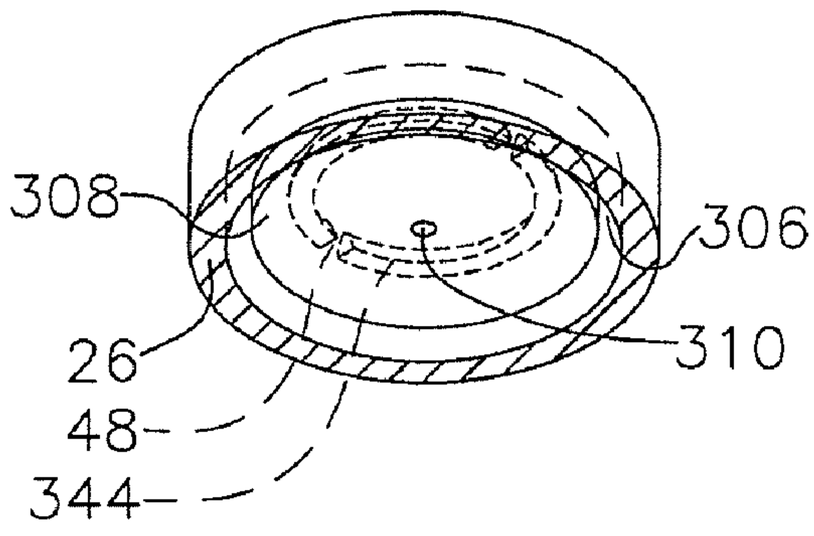


FIG. 13

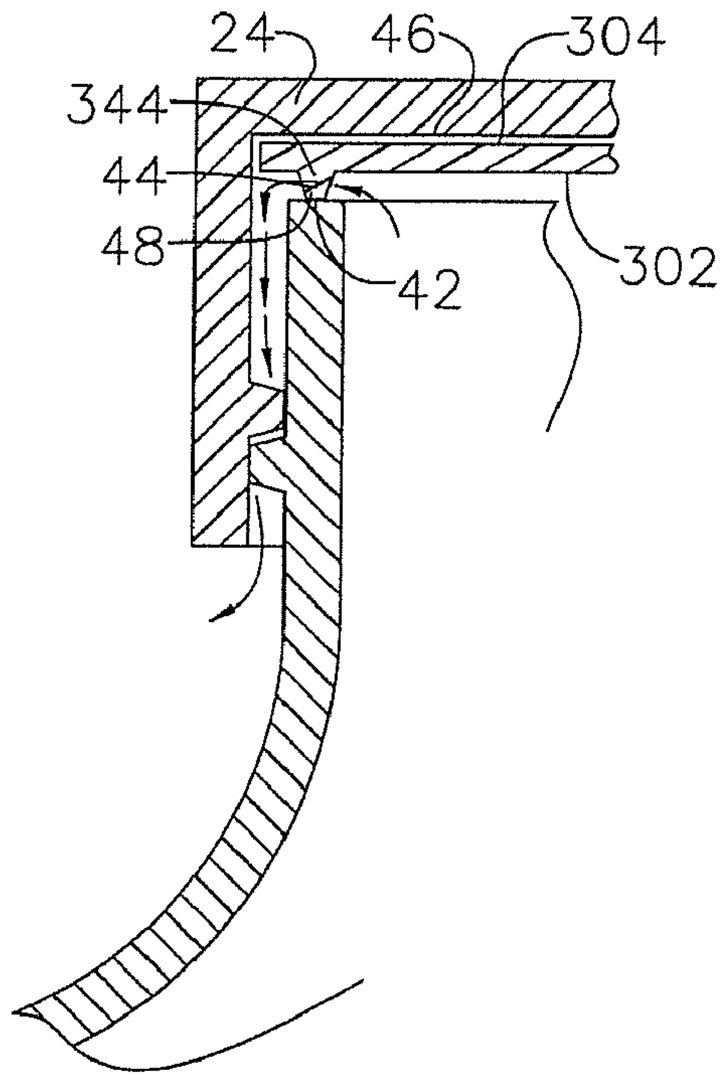
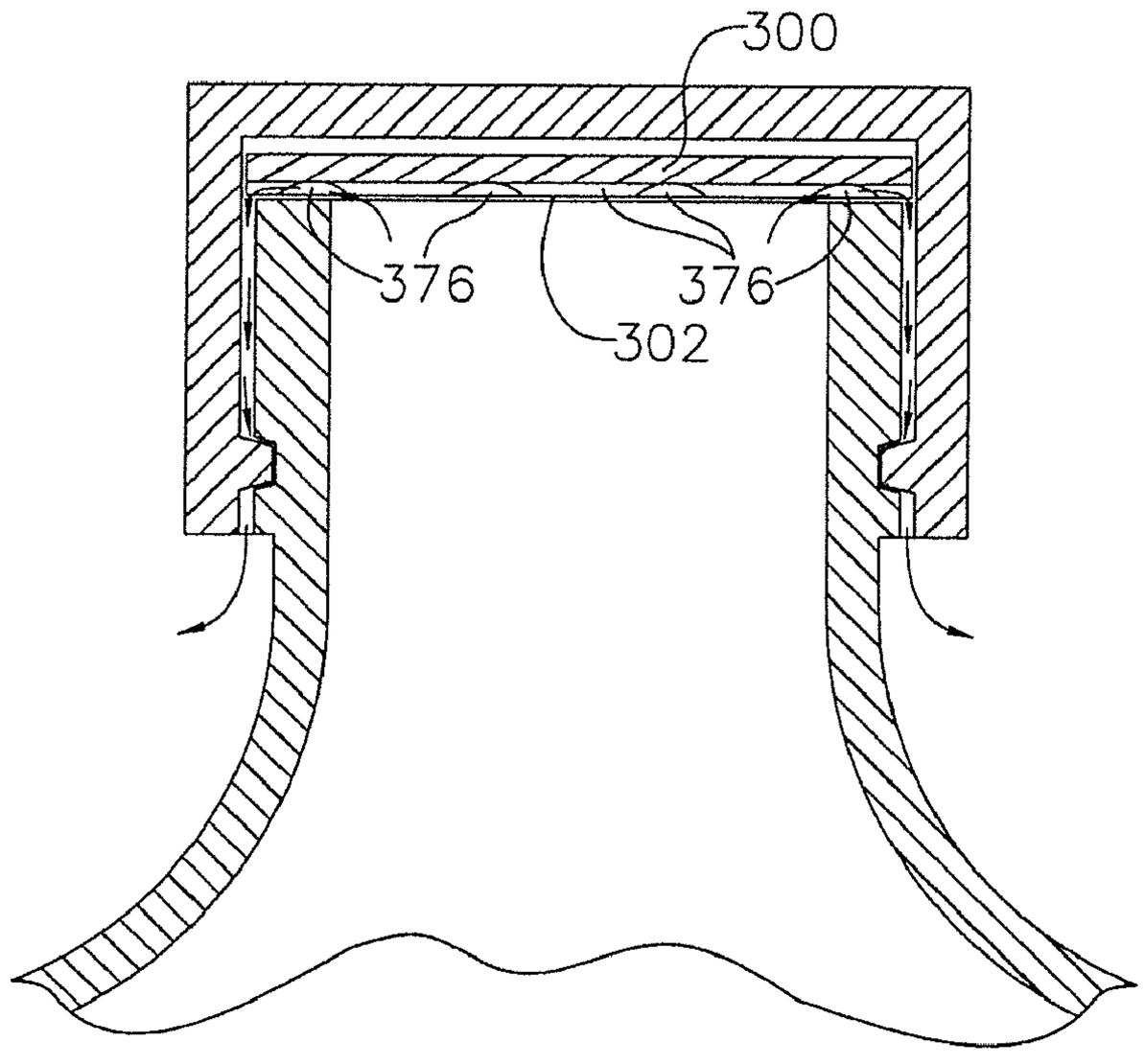


FIG. 14



VENTING CAP

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

NOTICE

More than one reissue application has been filed for the reissue of U.S. Pat. No. 6,202,870. The reissue applications are Reissue application Ser. No. 09/995,483 which was filed on Nov. 28, 2001 and this application which is a divisional of Reissue application Ser. No. 09/995,483.

CROSS-REFERENCE TO RELATED APPLICATIONS

This is a divisional application of Reissue application Ser. No. 09/995,483, filed on Nov. 28, 2001, which is a reissue of application Ser. No. 09/277,918 filed Mar. 29, 1999, now U.S. Pat. No. 6,202,870.

BACKGROUND OF THE INVENTION

This invention relates to bottle caps which when screwed on a bottle allow for the venting of gases generated in the bottle.

Shampoos, cold creams and other cosmetics are typically prepared under heat and are poured into plastic containers such as bottles usually while still hot. The plastic bottles containing the hot cosmetic material are capped, trapping the hot gases generated by the hot cosmetics. When capped, a lower or inner surface **10** of the cap top seats against the mouth **12** of the bottle **14** forming a seal (FIG. **1**). Consequently, if capped immediately after filling, the gases generated by the hot cosmetics generate a pressure within the bottle. The hot pressurized gases cause the plastic bottle to form flat spots. This condition is commonly referred to as "bottle paneling." Moreover, the increase in pressure within the bottle may cause the bottles to explode creating a hazardous condition. One way to avoid pressure build-up and paneling is to fill the bottles while the cosmetics are cold. When cold, the cosmetics are thick and viscous, thus, having reduced fluidity. Consequently, the filling process is slowed requiring a longer time to fill the bottles.

A typical way of avoiding pressure build-up and paneling is to fill the bottles with the hot cosmetics and wait for a period of time, typically in the order of 24 hours, before capping the bottles. This approach also slows down the filling process adding to production costs.

Another common way of preventing bottle paneling, incorporates a grooved liner fitted into the bottle cap. The liner typically has a surface that has grooves forming a cross-hatched pattern as well as holes penetrating its thickness. The bottom surface of the liner is covered with a gas permeable layer. When fitted into the cap, the grooved surface of the liner is mated to the lower surface of the cap top. When the cap is screwed onto the bottle, the holes provide a path for gas generated within the bottle to travel to the grooves which provide a path to the inner circumference of the cap from where the gas can escape through the space created between the cap rim and the bottle neck to the exterior of the bottle.

Thus, there is a need for a fail safe bottle cap that would allow for venting of gases generated in a bottle so as to allow for the capping of bottles immediately after being filled with hot liquids.

SUMMARY OF THE INVENTION

A bottle cap is provided which when screwed on to a bottle provides a path for gases generated in the bottle to escape from the bottle through a spiraling space formed in the threaded region between the inner surface of the bottle cap rim and the outer surface of the bottle neck.

The bottle cap includes one or a plurality of concentric preferably circular ridges formed on the inner surface of the cap top. Each of these ridges is designed to sit on the rim of the bottle mouth when the cap is threaded onto the bottle neck. A slot or multiple slots are formed in each ridge. The slots between adjacent ridges may be staggered or may be aligned.

In an alternate embodiment, grooves are formed on the inner surface of the cap top. When the bottle cap is threaded onto the bottle neck, the grooves extend from a location on the inner surface of the cap top within the mouth of the bottle neck to a location extending to the outer edge of the mouth rim or beyond the mouth rim of the bottle neck.

With every embodiment, when the cap is threaded onto the bottle, gases generated within the bottle can escape across the rim of the mouth of the bottle neck through the slots or through the grooves and through the threaded region between the inner surface of the cap rim and the outer surface of the bottle neck to the exterior of the bottle.

In an alternate embodiment, the ridges or grooves are formed on a disc which is fitted in the cap over the cap top inner surface. The disc may be glued on the cap inner surface.

A liner may also be used with the caps of the present invention. This liner is typically fitted over the inner surface of the cap top. An opening is formed in the liner to allow for gases generated in the bottle to penetrate the opening and escape through the slots or grooves formed on the cap top or disc.

DESCRIPTION OF THE DRAWINGS

FIG. **1** is a partial cross-sectional view of a typical cap threaded onto a bottle neck.

FIG. **2** is a partial cross-sectional bottom view of a cap of the present invention depicting a ridge formed on the inner surface of the cap top having slots formed therethrough.

FIG. **3**A is a partial cross-section of a cap of the present invention threaded on to a bottle neck.

FIG. **3**B is a perspective view depicting the flow of gases through the threaded space formed between the bottle neck outer surface and the cap inner surface.

FIG. **4** is a partial cross-sectional bottom view of a cap of the present invention having multiple slotted concentric ridges formed on the inner surface of the cap top.

FIG. **5** is a partial cross-sectional bottom view of a cap of the present invention having multiple concentric ridges formed on the inner surface of the cap top having staggered slots formed therethrough.

FIG. **6** is a partial cross-sectional bottom view of a cap of the present invention having grooves formed on the inner surface of the cap top.

FIG. **7** is a perspective view of a liner for used with any of the caps of the present invention.

FIG. **8** is a side view of a cap having a flip top.

FIG. **9** is a side view of a cap having a moveable spout.

FIG. **10** is a cross-sectional view of cap fitted with a disc according one embodiment of the present invention.

FIG. **11** is a cross-sectional view of cap fitted with a disc according to an alternate embodiment of the present invention.

FIG. **12** is a top view of the cap with disc of the embodiment show in FIG. **11**.

FIG. **13** is a partial cross sectional view of a cap threaded onto a bottle neck and incorporating a disk having a ridge and a slot there through.

FIG. **14** is a partial cross sectional view of a cap threaded on a bottle neck and sandwiching there between a disk having a plurality of grooves which extend beyond the rim of the bottle neck.

DETAILED DESCRIPTION OF THE INVENTION

A cap typically consists of a disc shaped top portion **24** from which extends an annular wall or rim **26** (FIG. **2**). Threads **28** are formed on the inner surface **30** of the annular wall **26** for threading on threads **32** formed on the outer surface **34** of a bottle neck **36** (FIG. **3**). The end of the bottle neck has a mouth **40** defined by a rim **42**.

In a first embodiment, the cap of the present invention includes a circular ridge **44** formed on the inner surface **46** of the cap top portion (FIG. **2**). The circular ridge diameter is smaller than the outer diameter of bottle rim, but greater than the inner diameter of the bottle rim defining the mouth. In this regard, when the cap is threaded onto the bottle neck, the ridge **44** sits on the bottle neck rim **42** (FIG. **3**A).

One or more slots **48** are formed radially across the ridge. If more than one slot is formed, preferably the slots are equidistantly spaced along the ridge circumference. Preferably, four slots are formed spaced at 90° intervals around the ridge.

When the cap is threaded onto the bottle, the ridge sits on the rim **42** of the bottle neck. A seal **50** is formed between the ridge and the bottle mouth. The slots, however, provide a path for gas to escape from the bottle through the slots and out through the threaded spiraling space **52** between the inner surface of the cap annular wall and the outer surface of the bottle neck as shown by arrows **54** (FIG. **3**A) or arrows **55** (FIG. **3**B).

In an alternate embodiment, instead of a single ridge, multiple concentric spaced apart ridges **56** are formed (FIG. **4**). Again, preferably each ridge should have a diameter that is smaller than the outer diameter of mouth of the bottle to be capped but greater than the inner diameter of the mouth of the bottle to be capped so that they can all mate with the bottle mouth rim **42** when the cap is threaded on to the bottle. At least a single slot **58** is formed radially across each of the ridges. If more than one slot is formed, preferably the slots would be equidistantly spaced around the concentric ridges. The concentric ridges provide multiple ridge surfaces for sealing with the bottle mouth rim, whereas each slot provides a path for venting to the outside.

In another embodiment, multiple concentric spaced apart ridges **60**, **62**, **64** are formed on the inner surface **46** of the cap top portion (FIG. **5**). These ridges form grooves **68** between them. Again, these circular ridges have diameters such that they will sit on the rim **42** defining the mouth of the bottle neck when the cap is torqued onto the bottle. Staggered radial slots **70**, **72**, **74** are formed across the ridges. Preferably each slot is formed across a single ridge. At least one slot **70**, but preferably two, are formed on the innermost ridge **60**. When more than one slot is formed on a ridge, the slots should preferably be equidistantly spaced around the ridge. Similarly, one, or preferably two, slots **72** are formed on the ridge **62** immediately adjacent the innermost ridge **60**. The slot or slots **72** should not be aligned with the slots **70** formed on the innermost ridge. If two slots **72** are formed, preferably, they are each located at a 180° from each other and spaced 90° away from slots **70** formed on the innermost ridge **60**. One, or preferably two slots **74** are then formed on the next adjacent ridge **64**. Preferably, these slots are aligned with the slots **70** formed on the inner most ridge **60**. This pattern is preferably repeated until slots are formed on all the ridges formed on the cap top portion inner surface. Alternatively, the location of the slots on each ridge may be arbitrary or may be in any other preselected pattern. Moreover, each slot may span more than one ridge and/or the number of slots penetrating each ridge may be different from ridge to ridge.

When the cap is torqued onto the bottle neck, the ridges are seated on the rim **42** of the bottle neck forming a seal. The slots provide a path for gas to escape. Gas will first escape through the slots **70** formed on the innermost ridge **60** and travel in the groove **68** formed between the innermost ridge **60** and its adjacent ridge **62** until it reaches the slots **72** formed on the adjacent ridge **62** and then escapes through those slots. The gas then follows the various slot and groove paths until it exits through the threaded space **52** between the cap annular wall inner surface and the bottle neck outer surface.

In a further embodiment, grooves **76** may be formed on the inner surface **78** of the cap top portion inner surface **46** (FIG. **6**). These grooves should preferably span to the edge **80** of the inner surface, i.e., the location where the inner surface of the cap top portion intersects the annular wall **82** of the cap, or span to at least a location at/or beyond the outer edge of the bottle neck rim **42** when the cap is torqued onto the bottle neck. Preferably, multiple chord-wise grooves are formed across the inner surface **46** of the cap top portion. The grooves may be parallel to each other and may also cris-cross each other. In the embodiment shown in FIG. **6**, the grooves cris-cross each other forming squares. *Moreover, the grooves 76 shown in FIG. 6 are linear and extend transversely from each other.* When the cap is torqued onto the bottle neck, the inner surface **46** of the cap top will seat against the rim **42** of the bottle neck. The inner surface **46** of the cap top portion will form a seal with the rim **42** of the bottle neck. The grooves **76**, however, will provide a path for gasses formed in the bottle to escape across the rim of the bottle neck and through the threaded space **52** between the cap annular wall inner surface and the bottle neck.

The caps of the above described embodiments while allowing gas to vent would also allow some of the liquid to vent if the bottle were turned upside down and squeezed. When squeezed, the liquid material will travel through the slots formed on the ridges and in the later embodiment through the grooves **68**. The liquid material would eventually gel in the slots and/or grooves sealing the slots and grooves. Thus, once the gas generated in the bottle has vented, the slots and/or grooves can be sealed by squeezing some of the liquid material through the slots or grooves as described above, thereby, preventing the escape of any further liquid from the capped bottle.

With all of these embodiments, the grooves, ridges and slots may be machined into the cap which is typically made of a hard plastic material. Alternatively, the grooves, ridges and slots may also be formed by a molding process. The cap with grooves, or ridges and slots may be formed by a single molding process. Alternative the grooves, or ridges and slots may be formed by a combination of molding and machining processes.

Because the grooves or ridges are made from the same hard plastic material as the cap, they are not susceptible to collapsing when under compression, as for example, when compressed against the rim **42** of the bottle mouth under normal cap torquing conditions.

With any of the aforementioned caps, a liner **84** may be used if necessary (FIG. **7**). Typically, the liner will sit against the ridges or the grooved inner surface of the cap top portion. To allow for venting through the liner, at least a hole **[80]** *86* should be formed through the liner thickness **88**. The hole should preferably have a diameter between about 0.010 to 0.015 inch. The liner thickness should preferably be between about 0.015 and 0.020 inch.

Moreover, any of the aforementioned embodiments may be incorporated in non-conventional caps, such as caps having a flip top or a moveable spout. With flip caps **100**, the top **120** of the cap is hingedly connected to the annular wall or rim **126** of the cap (FIG. **8**). In this regard, the top can be flipped open to allow for the pouring out of the contents of the bottle. With spout caps **200**, a spout **90** is incorporated on the cap top portion **220** of the cap **200** (FIG. **9**). The spout can be rotated from a closed position **90** to an open position **92**. When in an open position, a path is provided allowing for the pouring out of the contents of the bottle. With either type of cap, the ridges or grooves are also formed on the inner surface of the cap top portion as described herein.

Furthermore, the ridges or grooves may be formed, preferably by a molding or a machining process, on a disc **300** made from a hard or semi-hard material such as plastic (FIGS. **10**,**11**,**12**,**13** and **14**). The disc is sized such that it can fit and sit against the inner surface **46** of the cap top portion **24** and such that the ridges **344** (FIGS. **11**,**12** and **14**) or grooves **376** (FIG. **14**) can mate with the bottle neck rim **42** which defines the bottle mouth **40** as described above. In this regard the disc may be used with conventional caps to provide the necessary venting so as to prevent bottle paneling. Moreover, since the disc is made from a hard or semi-hard material, the risk of collapsing of the ridges of grooves which may prevent the venting of gases is decreased. The thickness of the disc should preferably be in the order of 0.030 inch. The disc may be glued to the inner surface of the cap top portion using an adhesive compatible with the contents of the bottle.

The ridges **[44]** *344* or grooves **376** are formed on one surface **302** of the disc, with the opposite surface **304** being flat (FIGS. **10**, **11**, **12** and **14**). In one embodiment, the disc can be mated to the cap with its flat surface **304** against the cap top portion **24** inner surface **46** (FIGS. **10** and **13**). In another embodiment, the disc is mated to the cap with its ridged or grooved surface **302** against the inner surface **46** of the cap top portion (FIG. **11**). With this embodiment, the flat surface side of the disc mates with the bottle mouth when the cap is torqued onto the bottle. Moreover, with this embodiment, the diameter of the disc should be smaller **[**then**]** *than* the inner diameter of the cap annular wall **26** such that a gap **306** is defined between the annular wall **26** and the disc edge **308**. An opening **310** is formed through the thickness of the disc to allow the gases generated in the bottle to travel from the bottle through the opening and to the grooved or ridged surface **302** of the disc. From there the gas travels in the grooves or through the slots in the ridges and through the gap and through to the threaded space **52** (FIG. **3**) between the cap annular wall inner surface and the bottle neck outer surface.

With this latter embodiment, i.e., the embodiment where the ridged surface is mated to the inner surface of the cap top portion, the ridges act as a spacer to separate the disc from the inner surface of the cap top portion. Moreover, with this embodiment, to prevent the bending of the disc when the cap is threaded onto the bottle, the disc should be positioned such that a ridge is located over the bottle neck rim **42**.

What is claimed is:

[1. A bottle cap for capping a bottle having a mouth having a rim, the cap comprising:
- a top portion having an inner surface;
- an annular wall extending from the top portion;
- a plurality of concentric circular ridges formed on the top portion inner surface for registering with the rim; and
- at least a slot formed across each of said plurality of ridges.**]**

[2. A bottle cap as recited in claim **1** comprising, wherein at least one slot is formed across all the ridges.**]**

[3. A bottle cap as recited in claim **1** wherein a slot in each ridge is aligned with a slot in a consecutive ridge for defining a single slot across said consecutive ridges.**]**

[4. A bottle cap as recited in claim **1** wherein the slot formed across one ridge is circumferentially spaced apart from a slot formed across an adjacent ridge.**]**

[5. A bottle cap as recited in claim **1** further comprising a liner fitted over the top portion inner surface, the liner having an opening formed through the liner thickness.**]**

[6. A bottle cap as recited in claim **1** wherein the top portion is hingedly coupled to the annular wall.**]**

[7. A bottle cap as recited in claim **1** further comprising a moveable spout extending from the top portion.**]**

[8. A bottle cap comprising:
- a top portion having an inner surface;
- an annular wall extending from the top portion; and
- a groove formed on the inner surface of the top portion said groove extending chordwise from a first point adjacent the annular wall to a second point adjacent the annular wall.**]**

[9. A bottle cap as recited in claim **8** comprising a plurality of grooves formed on the inner surface of the top portion.**]**

[10. A bottle cap comprising:
- a top portion having an inner surface;
- an annular wall extending from the top portion;
- a first set of parallel spaced apart grooves formed on the inner surface of the top portion; and
- a second set of parallel spaced apart grooves formed on the inner surface of the top portion, wherein grooves of the first set intersect grooves of the second set.**]**

[11. A bottle cap comprising:
- a top portion having an inner surface;
- an annular wall extending from the top portion;
- a plurality of grooves formed on the inner surface of the top portion; and
- a liner fitted over the top portion inner surface, the liner having an opening formed through its thickness.**]**

[12. A bottle cap as recited in claim **8** wherein the top portion is hingedly coupled to the annular wall.**]**

[13. A bottle cap as recited in claim **8** further comprising a moveable spout extending from the top portion.**]**

[14. A vented bottle cap system comprising:
- a bottle having a neck having a rim defining a mouth and threads formed on the neck outer surface;
- a cap having a top portion having an inner surface and an annular wall extending from the top portion, the annular wall having threads formed on its inner surface for threading onto the threads formed on the bottle neck, wherein when the cap is threaded onto the bottle neck a gas path is formed between the outer surface of the bottle neck and the inner surface of the annular wall;
- a plurality of concentric circular ridges formed on the inner surface of the top portion; and
- a slot formed across each of said plurality of ridges, wherein when the cap is threaded onto the bottle neck,

the ridges sit on the bottle neck rim and the slots define a pathway for gas generated in the bottle to escape across the bottle neck rim and through the pathway.]

[**15**. A vented bottle cap system as recited in claim **14** wherein a slot in each ridge is radially aligned with a slot in an adjacent ridge.]

[**16**. A vented bottle cap system as recited in claim **14** wherein a slot in each ridge is circumferentially spaced apart from a slot in an adjacent ridge.]

[**17**. A vented bottle cap system as recited in claim **14** further comprising a liner fitted in the cap and having a hole through its thickness, wherein when the cap is threaded onto the bottle neck, the liner sits on the bottle neck rim and wherein gases generated in the bottle escape through the hole, through the slot and through the pathway.]

[**18**. A vented bottle cap system comprising:

a bottle having a neck having a rim defining a mouth and threads formed on the neck outer surface;

a cap having a top portion having an inner surface and an annular wall extending from the top portion, the annular wall having threads formed on its inner surface for threading onto the threads formed on the bottle neck, wherein when the cap is threaded onto the bottle neck a gas path is formed between outer surface of the bottle neck and the inner surface of the annular wall; and

a groove formed on the inner surface of the top portion wherein when the cap is threaded onto the bottle neck, the groove extends outwardly beyond two locations of the rim of the bottle neck providing a pathway for gas generated in the bottle to escape across the bottle neck mouth and through the gas path.]

[**19**. A vented bottle cap system as recited in claim **18** comprising a plurality of grooves formed on the inner surface of the top portion, wherein each groove extends radially beyond the rim of the bottle neck when the cap is threaded onto the bottle neck.]

[**20**. A vented bottle cap system as recited in claim **19** comprising a first set of parallel grooves and a second set of parallel grooves formed on the inner surface of the top portion, wherein grooves of the first set intersect grooves of the second set.]

[**21**. A vented bottle cap system as recited in claim **18** further comprising a liner fitted in the cap and having a hole through its thickness, wherein when the cap is threaded onto the bottle neck, the liner sits on the bottle neck rim and wherein gases generated in the bottle escape through the hole, through the groove and through the gas path.]

[**22**. A method for venting gases generated in a bottle having a rim defining a mouth and containing a liquid, the method comprising the steps of:

providing a cap having a top portion, a plurality of circular ridges formed on an inner surface of the top portion and a slot formed across each of said plurality of ridges; and

torquing the cap on the bottle causing the plurality of ridges to sit on the rim, wherein the plurality of slots provide a pathway for the venting of gases.]

[**23**. A method as recited in claim **22** further comprising the steps of:

forcing liquid in the slot; and

solidifying the liquid to block the pathway through at least one of said slots.]

[**24**. A method for venting gases generated in a bottle having a rim defining a mouth and containing a liquid the method comprising the steps:

providing a cap having a top portion and a groove formed on an inner surface of the top portion; and

torquing the cap on the bottle causing the inner surface of the top portion to sit on the rim, wherein the groove extends outwardly beyond two locations of the rim and provides a pathway for the venting of gases.]

[**25**. A method as recited in claim **24** further comprising the steps of:

forcing liquid in the groove; and

solidifying the liquid to block the pathway through the groove.]

[**26**. A vented bottle cap system comprising:

a bottle having a neck having a rim defining a mouth and threads formed on the neck outer surface;

a cap having a top portion having an inner surface and an annular wall extending from the top portion, the annular wall having threads formed on its inner surface for threading onto the threads formed on the bottle neck, wherein when the cap is threaded onto the bottle neck a gas path is formed between outer surface of the bottle neck and the inner surface of the annular wall;

a disc made of a material being at least semi hard fitted over the top portion inner surface, the disc having a first surface opposite a second surface, wherein the first surface faces the top portion inner surface;

a circular ridge formed on the second surface of the disc; and

a slot formed across the ridge, wherein when the cap is threaded onto the bottle neck, the ridge sits on the bottle neck rim and the slot forms a pathway for gas generated in the bottle to escape across the bottle neck rim and through the gas path.]

[**27**. A vented bottle cap system as recited in claim **26** comprising:

a plurality of concentric ridges formed in the second surface of the disc, wherein when the cap is threaded onto the bottle neck, the plurality of ridges contact the bottle neck rim; and

at least a slot in each ridge.]

[**28**. A vented bottle cap system as recited in claim **27** wherein at least a slot in each ridge is radially aligned with a slot in an adjacent ridge.]

[**29**. A vented bottle cap system as recited in claim **26** further comprising a liner fitted in the cap over the disc and having a hole through its thickness, wherein when the cap is threaded onto the bottle neck, the liner is sandwiched between the ridge and the rim and wherein gases generated in the bottle escape through the hole, through the slot and through the gas path.]

[**30**. A vented bottle cap system as recited in claim **26** wherein the disc is made from plastic.]

[**31**. A vented bottle cap system comprising:

a bottle having a neck having a rim defining a mouth and having threads formed on the bottle neck outer surface;

a cap having a top portion having an inner surface and an annular wall extending from the top portion, the annular wall having threads formed on its inner surface for threading onto the threads formed on the bottle neck outer surface, wherein when the cap is threaded onto the bottle neck a gas path is formed between outer surface of the bottle neck and the inner surface of the annular wall;

a disc made of a material being at least semi hard fitted over the top portion inner surface, the disc having a first surface opposite a second surface, wherein the first surface faces the top portion inner surface; and

a first set of parallel grooves and a second set of parallel grooves formed on the second surface of the disc, wherein grooves of the first set intersect grooves of the second set,

wherein when the cap is threaded onto the bottle neck, the grooves extend radially beyond the rim of the bottle neck providing pathways for gas generated in the bottle to escape across the bottle neck mouth.]

[**32**. A vented bottle cap system comprising:

a bottle having a neck having a rim defining a mouth and threads formed on the neck outer surface;

a cap having a top portion having an inner surface and an annular wall extending from the top portion, the annular wall having threads formed on its inner surface for threading onto the threads formed on the bottle neck outer surface, wherein when the cap is threaded onto the bottle neck a gas path is formed between the outer surface of the bottle neck and the inner surface of the annular wall;

a disc made from a material being at least semi hard fitted over the top portion inner surface, the disc having a circumferential edge and a first surface opposite a second surface, wherein the first surface faces the top portion inner surface;

a gap between the annular wall and the circumferential edge;

an opening formed through the thickness of the disc, the opening located within the bottle mouth when the cap is threaded onto the bottle neck;

a circular ridge formed on the first surface of the disc; and

a slot formed across the ridge, wherein when the cap is threaded onto the bottle neck, the ridge is located over the bottle neck rim and the opening and slot form a pathway for gas generated in the bottle to escape across the bottle neck and through the gas path.]

[**33**. A bottle cap liner disc for use with a cap for capping a bottle having a rim defining a bottle mouth and having an inner and an outer diameter, the disc allowing for the venting of gases generated in a bottle when the cap is threaded on the bottle, the disc comprising:

a first surface opposite a second surface and a thickness therebetween;

an opening formed through the thickness;

a circular ridge formed on the first surface of the disc; and

a slot formed across the ridge.]

[**34**. A bottle cap liner disc for use with a cap for capping a bottle having a rim defining a bottle mouth and having an inner and an outer diameter, the disc allowing for the venting of gases generated in a bottle when the cap is threaded on the bottle, the disc comprising:

a first surface opposite a second surface; and

a plurality of concentric circular ridges formed on the first surface of the disc; and

a slot formed across each of said plurality of ridges.]

[**35**. An insert having an annular section for use with a cap for capping a bottle having a rim defining a bottle mouth and having an inner and an outer diameter, the insert allowing for the venting of gases generated in a bottle when the cap is threaded on the bottle, the disc defining a central opening and comprising:

a first surface opposite a second surface;

a circular ridge formed on the first surface of the annular section; and

a slot formed across the ridge.]

[**36**. An insert as recited in claim **35** comprising a plurality of concentric circular ridges and a slot formed across each of said plurality of ridges.]

[**37**. A vented bottle cap system comprising:

a bottle having a neck having a rim defining a mouth and threads formed on the neck outer surface;

a cap having a top portion having an inner surface and an annular wall extending from the top portion, the annular wall having threads formed on its inner surface for threading onto the threads formed on the bottle neck, wherein when the cap is threaded onto the bottle neck a gas path is formed between outer surface of the bottle neck and the inner surface of the annular wall;

a venting member having an annular section having a central opening and made of a material being at least semi hard, the annular section having a first surface opposite a second surface and sandwiched between the cap inner surface and the rim wherein the first surface faces the cap top portion inner surface;

a circular ridge formed on the first surface of the annular section; and

a slot formed across the ridge, wherein when the cap is threaded onto the bottle neck, the slot forms a pathway for gas generated in the bottle to escape through the opening and across the bottle neck rim and through the gas path.]

[**38**. A vented bottle cap system as recited in claim **37** comprising:

a plurality of concentric ridges formed in the first surface of the annular section; and

at least a slot in each ridge.]

[**39**. A vented bottle cap system as recited in claim **38** wherein at least a slot in each ridge is radially aligned with a slot in an adjacent ridge.]

[**40**. A vented bottle cap system as recited in claim **37** therein the insert is made from plastic.]

41. A vented bottle cap system comprising:

a bottle having a neck having a rim defining a mouth;

a cap having a top portion comprising an inner surface and an annular wall having an inner surface and extending from the top portion, wherein when the cap is capping the bottle neck, a first gas path is formed between an outer surface of the bottle neck and the inner surface of the annular wall; and

a second gas path defined across the inner surface of the cap top portion in communication with the first gas path, said second gas path comprising a plurality of linear slots, each of said linear slots extending transversely from another of said linear slots defining a continuous groove on said inner surface, wherein gas in the bottle escapes via the second gas path to the first gas path.

42. A system as recited in claim 41 wherein a projection projects from the inner surface of the cap top portion for seating over the rim, and wherein the second gas path is formed across the projection.

43. A system as recited in claim 41 wherein said cap top portion inner surface is a surface of an insert inserted against the cap top portion.

44. A vented bottle cap system comprising:

a bottle having a neck having a rim defining a mouth;

a cap having a top portion having an inner surface and an annular wall having an inner surface and extending from the top portion;

an annular insert, said annular insert located between the cap top portion inner surface and the rim, wherein when the cap is capping the bottle neck, a first gas path is formed between an outer surface of the bottle neck and the annular wall; and

a second gas path defined on the annular insert in communication with the first gas path, said second gas path comprising a plurality of linear slots, each of said linear slots extending transversely from another of said linear slots defining a continuous groove on said annular insert, wherein gas in the bottle escapes via the second gas path to the first gas path.

45. A system as recited in claim 44 wherein a projection projects from the annular insert for seating over the rim, and wherein the second gas path is formed across the projection.

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