



(11) **EP 3 666 676 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
17.06.2020 Bulletin 2020/25

(51) Int Cl.:
B65D 1/02 (2006.01) **B65D 51/16 (2006.01)**
B65D 8/00 (2006.01)

(21) Application number: **19220245.5**

(22) Date of filing: **12.11.2015**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

(72) Inventor: **HANAN, Jay C.**
Ontario, 91761 (CA)

(30) Priority: **13.11.2014 US 201462079431 P**
11.11.2015 US 201514938596

(74) Representative: **Dehns**
St. Bride's House
10 Salisbury Square
London EC4Y 8JD (GB)

(62) Document number(s) of the earlier application(s) in accordance with Art. 76 EPC:
15859648.6 / 3 218 271

Remarks:
This application was filed on 31-12-2019 as a divisional application to the application mentioned under INID code 62.

(71) Applicant: **Niagara Bottling, LLC**
Ontario, CA 91761 (US)

(54) **CONTAINER MOUTH FOR CARBONATED SOFT DRINK CONTAINER**

(57) An apparatus and method are provided for a finish configured to define an opening to an interior of a container and to substantially reduce foaming of contents when the container is opened, the finish comprising:

a cylindrical body (148) comprising a peripheral portion with a first edge (152) and a second edge (156) disposed at opposite ends, the first edge defining a first opening (160) and configured to receive a container cap (164), the second edge defining a second opening (168) and configured to receive a neck (136) of the container, wherein the first and second openings are in fluid communication;

one or more threads (176) on an exterior of the peripheral portion, the threads configured to rotatably engage with one or more threads (176) of the container cap (164); and

at least one notch (196) disposed at the first edge, peripheral to the first opening, the at least one notch comprising a cross-sectional shape suitably formed to substantially reduce foaming of the contents.

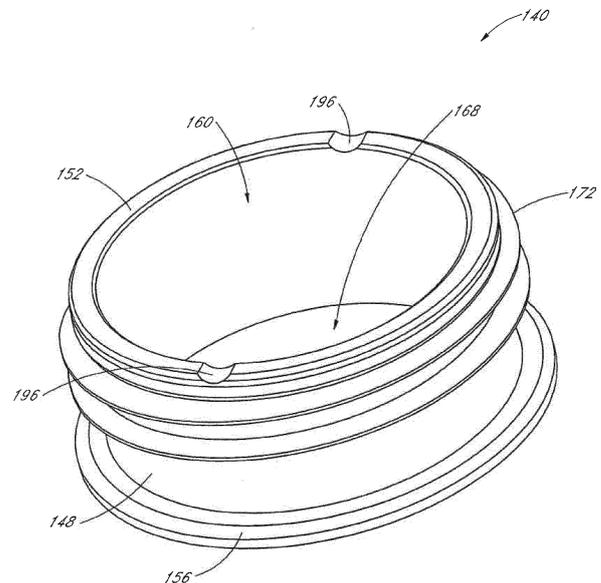


FIG. 2

EP 3 666 676 A1

Description**PRIORITY**

[0001] This application claims the benefit of and priority to U.S. Patent Application No. 14/938,596 filed on November 11, 2015 and U.S. Provisional Application, entitled "Carbonated Soft Drink Finish Modification," filed on November 13, 2014 and having application serial number 62/079,431.

FIELD

[0002] The field of the present invention generally relates to plastic containers. More particularly, the field of the invention relates to an apparatus and method for reducing foaming occurring with carbonated soft drink containers.

BACKGROUND

[0003] Plastic containers have been used as a replacement for glass or metal containers in the packaging of beverages for several decades. The most common plastic used in making beverage containers today is polyethylene terephthalate (PET). Containers made of PET are transparent, thin-walled, and have the ability to maintain their shape by withstanding the force exerted on the walls of the container by their contents. PET resins are also reasonably priced and easy to process. PET bottles are generally made by a process that includes blow-molding of plastic pre-forms which have been made by injection molding of the PET resin.

[0004] A drawback to plastic containers is that those that contain carbonated contents may allow foaming of the contents onto a consumer upon initially opening the container. In some cases, the foaming may be great enough to spill the contents of the container onto the lap of a consumer, or onto nearby furniture. Another drawback to plastic containers is that carbon-dioxide content within the containers must be limited so as to accommodate the foaming tendency of carbonated liquids. Limiting the carbon-dioxide content effectively decreases the shelf-life of the contents. What is needed, therefore, is an apparatus and method for decreasing the foaming tendency of bottled carbonated contents, such that the carbon-dioxide content may be increased, thereby increasing the shelf-life of the bottled carbonated contents.

SUMMARY

[0005] An apparatus and method are provided for a finish configured to define an opening to an interior of a container and to substantially reduce foaming of contents when the container is opened. The finish comprises a cylindrical body comprising a peripheral portion with a first edge and a second edge disposed at opposite ends. The first edge defines a first opening and is configured

to receive a container cap. Generally, the first edge is configured to receive a seal of the container cap. The second edge defines a second opening and is configured to receive a neck of the container. The first and second openings are in fluid communication. One or more threads on an exterior of the peripheral portion are configured to rotatably engage with one or more threads of the container cap. At least one notch is disposed at the first edge, peripheral to the first opening, and comprises a cross-sectional shape suitably formed to substantially reduce foaming of the contents. In one embodiment, the first edge comprises two notches, disposed on opposite sides of the first opening, wherein the cross-sectional shape of each of the notches comprises a half-circle configured to substantially reduce foaming of the contents.

[0006] In an exemplary embodiment, an apparatus comprises a finish configured to define an opening to an interior of a container and to substantially reduce foaming of contents when the container is opened. The finish comprises a cylindrical body comprising a peripheral portion with a first edge and a second edge disposed at opposite ends, the first edge defining a first opening and configured to receive a container cap, the second edge defining a second opening and configured to receive a neck of the container, wherein the first and second openings are in fluid communication; one or more threads on an exterior of the peripheral portion, the threads configured to rotatably engage with one or more threads of the container cap; and at least one notch disposed at the first edge, peripheral to the first opening, the at least one notch comprising a cross-sectional shape suitably formed to substantially reduce foaming of the contents.

[0007] In another exemplary embodiment, the first edge is configured to receive a seal of the container cap. In another exemplary embodiment, the first edge comprises two notches disposed on opposite sides of the first opening. In another exemplary embodiment, the cross-sectional shape is a half-circle. In another exemplary embodiment, the cross-sectional shape is a square. In another exemplary embodiment, the cross-sectional shape is triangular. In another exemplary embodiment, the cross-sectional shape is designed to produce an audible sound when pressurized gas exits through the at least one notch during twisting of the container cap.

[0008] In an exemplary embodiment, an apparatus comprises a container configured to substantially reduce foaming of contents when the container is opened. The container comprises a base which extends upward to a sidewall of the container; a shoulder connected between the sidewall and a bell, a diameter of the bell decreasing as the bell extends upward to a neck of the container; a finish connected to the neck, the finish configured to receive a container cap and defining an opening to the interior of the container; and at least one notch at the top of the finish configured to substantially reduce foaming of contents when the container is opened.

[0009] In another exemplary embodiment, the top of the finish is further configured to receive a seal of the

container cap. In another exemplary embodiment, the sidewall comprises a grip portion connected to the base and a label portion connected between the grip portion and the shoulder. In another exemplary embodiment, the grip portion comprises a plurality of circumferentially disposed grip portion ribs, and the label portion comprises a plurality of circumferentially disposed label portion ribs. In another exemplary embodiment, the grip portion and the label portion comprise a smooth continuous surface extending from the base to the shoulder. In another exemplary embodiment, the top of the finish comprises two notches disposed on opposite sides of the opening to the interior of the container. In another exemplary embodiment, at least one notch comprises a cross-sectional shape suitably formed to substantially reduce foaming of contents. In another exemplary embodiment, the cross-sectional shape is a half-circle. In another exemplary embodiment, the cross-sectional shape is a square. In another exemplary embodiment, the cross-sectional shape is triangular. In another exemplary embodiment, the cross-sectional shape is designed so as to produce an audible sound when the container cap is twisted.

[0010] In another exemplary embodiment, a method for a container to substantially reduce foaming of contents when the container is opened comprises extending a base upward to a sidewall of the container; connecting a shoulder between the sidewall and a bell; extending the bell from the shoulder to a neck of the container, such that a diameter of the bell decreases as the bell extends to a neck; connecting a finish to the neck, such that the finish defines an opening to the interior of the container; configuring the finish to receive a container cap; and forming at least one notch at the top of the finish so as to substantially reduce foaming of contents when the container is opened. In another exemplary embodiment, configuring the finish further comprises forming a cylindrical body comprising a peripheral portion with a first opening and second opening disposed at opposite ends, such that the first opening is configured to receive the container cap and the second opening is configured to receive the neck, and forming one or more threads on an exterior of the peripheral portion, the threads configured to rotatably engage with one or more threads of the container cap.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The drawings refer to embodiments of the present disclosure in which:

Figure 1 illustrates a lower perspective view of an exemplary embodiment of a container in accordance with the present disclosure;

Figure 2 illustrates an upper perspective view of an exemplary embodiment of a finish, according to the present disclosure;

Figure 3 illustrates a cross-sectional view of an ex-

emplary embodiment of a finish with a container cap installed, according to the present disclosure;

Figure 4A illustrates a cross-sectional view of an embodiment of a Carbonated Soft Drink container cap in accordance with the present disclosure;

Figure 4B illustrates a cross-sectional view of an embodiment of a Hot Fill container cap, according to the present disclosure; and

Figure 5 is a table illustrating observational data acquired during experimental testing of various embodiments of the present disclosure.

[0012] While the present disclosure is subject to various modifications and alternative forms, specific embodiments thereof have been shown by way of example in the drawings and will herein be described in detail. The invention should be understood to not be limited to the particular forms disclosed, but on the contrary, the intention is to cover all modifications, equivalents, and alternatives falling within the scope of the present invention as defined by the claims.

DETAILED DESCRIPTION

[0013] In the following description, numerous specific details are set forth in order to provide a thorough understanding of the present disclosure. It will be apparent, however, to one of ordinary skill in the art that the invention disclosed herein may be practiced without these specific details. In other instances, specific numeric references such as "first notch," may be made. However, the specific numeric reference should not be interpreted as a literal sequential order but rather interpreted that the "first notch" is different than a "second notch." Thus, the specific details set forth are merely exemplary. The specific details may be varied from and still be contemplated to be within the spirit and scope of the present disclosure. The term "coupled" is defined as meaning connected either directly to the component or indirectly to the component through another component. Further, as used herein, the terms "about," "approximately," or "substantially" for any numerical values or ranges indicate a suitable dimensional tolerance that allows the part or collection of components to function for its intended purpose as described herein.

[0014] In general, the present disclosure describes an apparatus and a method for a finish configured to define an opening to an interior of a container and to substantially reduce foaming of contents when the container is opened. The finish comprises a cylindrical body including a peripheral portion with a first edge and a second edge disposed at opposite ends. The first edge defines a first opening and is configured to receive a container cap. Generally, the first edge is configured to receive a seal of the container cap. The second edge defines a second

opening and is configured to receive a neck of the container. The first and second openings are in fluid communication. One or more threads on an exterior of the peripheral portion are configured to rotatably engage with one or more threads of the container cap. At least one notch is disposed at the first edge, peripheral to the first opening, and comprises a cross-sectional shape suitably formed to substantially reduce foaming of the contents. In one embodiment, the first edge comprises two notches, disposed on opposite sides of the first opening, wherein the cross-sectional shape of each of the notches comprises a half-circle configured to substantially reduce foaming of the contents.

[0015] Figure 1 illustrates a lower perspective view of an exemplary embodiment of a container 100 in accordance with the present disclosure. The container 100 comprises a base 104 that extends up to a grip portion 108. The grip portion 108 comprises a plurality of grip portion ribs 112 (i.e., sidewall ribs). As illustrated in Fig. 1, the plurality of grip portion ribs 112 generally may vary in depth, and may swirl or angulate around the grip portion 108. A label portion 116 is connected to the grip portion 108 and comprises one or more label panel ribs 120 (i.e., sidewall ribs). The label panel portion 116 transitions into a shoulder 124, which connects to a bell 128. In the embodiment illustrated in Fig. 1, the bell 128 comprises a plurality of scallops 132. In other embodiments, however, the bell 128 may include design features, or may be smooth and generally unornamented. The bell 128 connects to a neck 136, which connects to a finish 140. As shown in Fig. 1, the bell 128 comprises a diameter that generally decreases as the bell 128 extends upward from the shoulder 124 to the neck 136 and the finish 140. The finish 140 can be adapted to receive a closure to seal contents in the container 100, such as by way of non-limiting example, a container cap or bottle cap. The finish 140 generally defines an opening 144 that leads to an interior of the container 100 for containing a beverage, or other contents.

[0016] Figure 2 illustrates an upper perspective view of an exemplary embodiment of the finish 140 that is configured to substantially reduce foaming of contents, particularly carbonated contents, during opening of the container 100. The finish 140 comprises a cylindrical body 148 that includes a peripheral portion with a first edge 152 and a second edge 156 disposed at opposite ends. The first edge 152 defines a first opening 160 and is configured to receive a container cap 164, or bottle cap, as shown in Fig. 3. The second edge 156 defines a second opening 168 and is configured to receive the neck 136 of the container 100, as shown in Fig. 1. It will be appreciated that the first and second openings 152, 156 are in fluid communication so as to define the opening 144 into the interior of the container 100 once the finish 140 is installed thereon.

[0017] As illustrated in Fig 2, an exterior of the cylindrical body 148 comprises one or more threads 172 that are configured to rotatably engage with one or more

threads 176 of the container cap 164. An engagement of the threads 172 of the finish 140 with the threads 176 of the container cap 164 is best shown in Fig. 3. It should be borne in mind, however, that the bottle cap need not be limited to the container cap 164 and thus bottle caps other than the cap 164 may be coupled with the finish 140, without limitation. As such, Fig. 4A is a cross-sectional view of an exemplary embodiment of a Carbonated Soft Drink (CSD) container cap 180 which may be used to seal pressurized contents within the container 100. The CSD container cap 180 comprises a multiplicity of threads 176 suitable for rotatably engaging with the threads 172 of the finish 140. During tightening of the container cap 180, a seal 188 within the cap enters into the opening 144 and is placed into a pressed relationship with the first edge 152. Further, Fig. 4B is a cross-sectional view of an exemplary embodiment of a Hot Fill container cap 184. The container cap 184 is substantially similar to the container cap 180, with the exception that the container cap 184 comprises a seal 192 which is taller than the seal 188. Thus, during tightening of the container cap 184 onto the finish 140, the seal 192 enters more deeply into the opening 144 than the seal 188. It will be appreciated that the first edge 152 is configured to tightly receive the seals 188, 192 into the opening 144 so as to retain the contents within the container 100 without leaking.

[0018] In the embodiment illustrated in Fig. 2, the first edge 152 comprises two notches 196 disposed on opposite sides of the first opening 160. Each of the two notches 196 comprises a cross-sectional shape suitably formed so as to substantially reduce foaming of the contents when the container cap 164 is removed from the container 100. In the illustrated embodiment, the cross-sectional shape of the notches 196 is a half-circle. In other embodiments, one or both of the notches 196 may comprise cross-sectional shapes other than a half-circle, such as, by way of non-limiting example, various segments of circles, ellipsoids, ovals, rectangles, squares, triangles, V-shaped wedges, and any other cross-sectional shape which advantageously reduces foaming of contents when the container cap 164 is removed from the container 100. In some embodiments, the cross-sectional shape of the notches 196 may be specifically designed so as to produce an audible tone or sound as pressurized gas exits the container 100 through the notches 196 when the container cap 164 is twisted. Moreover, it is to be understood that although the finish 140 is described herein specifically in connection with the container cap 164, the finish 140 is not limited to being coupled solely with the container cap 164, but rather any container cap that is suitably configured to engage with the finish 140, such that contents are sealed within the container 100, including but not limited to the CSD container cap 180 and the Hot Fill container cap 184, may be coupled with the finish 140 without detracting from the spirit and scope of the present disclosure.

[0019] It will be appreciated that when the container

cap 164 is tightly engaged with the finish 140, as shown in Fig. 3, the seal within the cap, such as the seal 188, and the first edge 152 cooperate so as to prevent pressurized contents within the container 100 from leaking out of the container. When the container cap 164 is loosened, generally by twisting so as to loosen the engagement between the threads 172 and 176, the seal 188 is withdrawn from the first edge 152. In absence of the two notches 196, withdrawing the seal 188 from the first edge 152 causes an abrupt drop in pressure within the container 100 to the ambient atmospheric pressure. Such a drop in pressure may cause the contents within the container 100 to foam and potentially force the contents between the seal 188 and the first edge 152, and out of the container 100. In the embodiment illustrated in Fig. 2, however, as the seal 188 is withdrawn from the finish 140, the seal disengages from the two notches 196 before withdrawing from the rest of the first edge 152, thereby slowing down the pressure release occurring within the container 100. As will be appreciated, more slowly releasing pressure within the container 100 substantially reduces the likelihood that the contents will foam and push out of the container. Those skilled in the art will further appreciate that slowly reducing internal pressure within the container 100 permits the use of additional carbon-dioxide content within the container, thereby increasing the shelf-life of the contents.

[0020] As mentioned above, the cross-sectional shape of the notches 196 need not be limited to those illustrated in Fig. 2, but rather various other cross-sectional shapes may be utilized for the notches 196. Further, the number and positions of the notches 196 on the first edge 152 need not be limited to the number and positions illustrated in Fig. 2. Thus, in some embodiments, the first edge 152 may comprise more than two notches 196. In other embodiments, the first edge 152 may comprise one suitably configured notch 196. In some embodiments, multiple notches 196 may be uniformly distributed around the circumference of the first edge 152. In some embodiments, multiple notches 196 may be positioned around the circumference of the first edge 152 with a non-uniform spacing between the notches. Accordingly, Fig. 5 is a table 200 illustrating results observed during experimental testing performed in connection with applications of various embodiments of the present disclosure.

[0021] In some embodiments, suitably sized and shaped holes may be implemented in lieu of the notches 196. It is envisioned that the holes may be positioned just below the first edge 152 so as to be covered over by the seal 188 when the container cap 164 is tightly engaged with the container 100. It is further envisioned that the shape of the holes may be suitably designed to issue an audible sound when the container cap 164 is removed from the container 100 and pressure is relieved from the interior of the container. In some embodiments, the shape of each hole may be fashioned to resemble a flute, or a reed, which vibrates when the container cap 164 is removed from the container, thereby amplifying the au-

dible sound as pressure within the container 100 is relieved.

[0022] While the invention has been described in terms of particular variations and illustrative figures, those of ordinary skill in the art will recognize that the invention is not limited to the variations or figures described. In addition, where methods and steps described above indicate certain events occurring in certain order, those of ordinary skill in the art will recognize that the ordering of certain steps may be modified and that such modifications are in accordance with the variations of the invention. Additionally, certain of the steps may be performed concurrently in a parallel process when possible, as well as performed sequentially as described above. To the extent there are variations of the invention, which are within the scope of the claims, it is the intent that this patent will cover those variations as well. Therefore, the present disclosure is to be understood as not limited by the specific embodiments described herein, but only by scope of the appended claims.

Claims

1. A finish configured to define an opening to an interior of a container and to substantially reduce foaming of contents when the container is opened, the finish comprising:

a cylindrical body (148) comprising a peripheral portion with a first edge (152) and a second edge (156) disposed at opposite ends, the first edge defining a first opening (160) and configured to receive a container cap (164), the second edge defining a second opening (168) and configured to receive a neck (136) of the container, wherein the first and second openings are in fluid communication;
one or more threads (176) on an exterior of the peripheral portion, the threads configured to rotatably engage with one or more threads (176) of the container cap (164); and
at least one notch (196) disposed at the first edge, peripheral to the first opening, the at least one notch comprising a cross-sectional shape suitably formed to substantially reduce foaming of the contents.

2. The finish of claim 1, wherein the first edge is configured to receive a seal (192) of the container cap.

3. The finish of claim 1, wherein the first edge comprises two notches (196) disposed on opposite sides of the first opening.

4. The finish of claim 1, wherein the cross-sectional shape is a half-circle, or wherein the cross-sectional shape is a square, or wherein the cross-sectional

shape is triangular.

5. A container configured to substantially reduce foaming of contents when the container is opened, the container comprising:
- a base (104) which extends upward to a sidewall of the container (100);
 a shoulder (124) connected between the sidewall and a bell (128), a diameter of the bell decreasing as the bell extends upward to a neck (136) of the container;
 a finish (140) connected to the neck, the finish configured to receive a container cap (180) and defining an opening (144) to the interior of the container; and
 at least one notch (196) at the top of the finish configured to substantially reduce foaming of contents when the container is opened.
6. The container of claim 5, wherein the top of the finish is further configured to receive a seal (192) of the container cap.
7. The container of claim 5 or 6, wherein the sidewall comprises a grip portion (108) connected to the base and a label portion (116) connected between the grip portion and the shoulder.
8. The container of claim 7, wherein the grip portion comprises a plurality of circumferentially disposed grip portion ribs (112), and the label portion (116) comprises a plurality of circumferentially disposed label portion ribs (120).
9. The container of claim 7, wherein the grip portion and the label portion comprise a smooth continuous surface extending from the base to the shoulder.
10. The container of any of claims 5 to 9, wherein the top of the finish comprises two notches (196) disposed on opposite sides of the opening to the interior of the container.
11. The container of any of claims 5 to 10, wherein the at least one notch comprises a cross-sectional shape suitably formed to substantially reduce foaming of contents.
12. The container of claim 11, wherein the cross-sectional shape is a half-circle, or wherein the cross-sectional shape is a square, or wherein the cross-sectional shape is triangular.
13. A method for a container to substantially reduce foaming of contents when the container is opened, the method comprising:

extending a base upward to a sidewall of the container;
 connecting a shoulder between the sidewall and a bell;
 extending the bell from the shoulder to a neck of the container, such that a diameter of the bell decreases as the bell extends to a neck;
 connecting a finish to the neck, such that the finish defines an opening to the interior of the container;
 configuring the finish to receive a container cap; and
 forming at least one notch at the top of the finish so as to substantially reduce foaming of contents when the container is opened.

14. The method of claim 13, wherein configuring the finish further comprises forming a cylindrical body comprising a peripheral portion with a first opening and second opening disposed at opposite ends, such that the first opening is configured to receive the container cap and the second opening is configured to receive the neck, and forming one or more threads on an exterior of the peripheral portion, the threads configured to rotatably engage with one or more threads of the container cap.

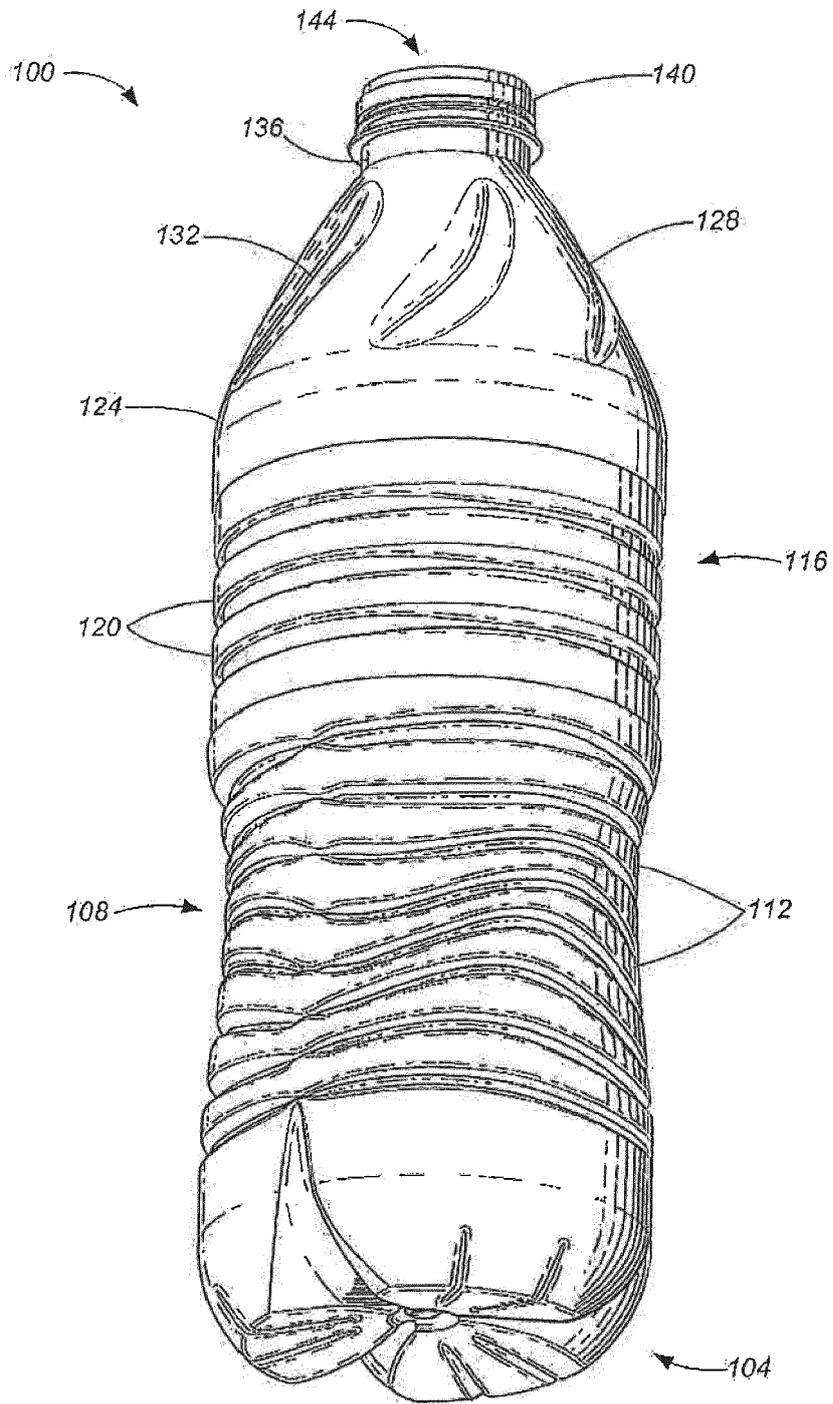


FIG. 1

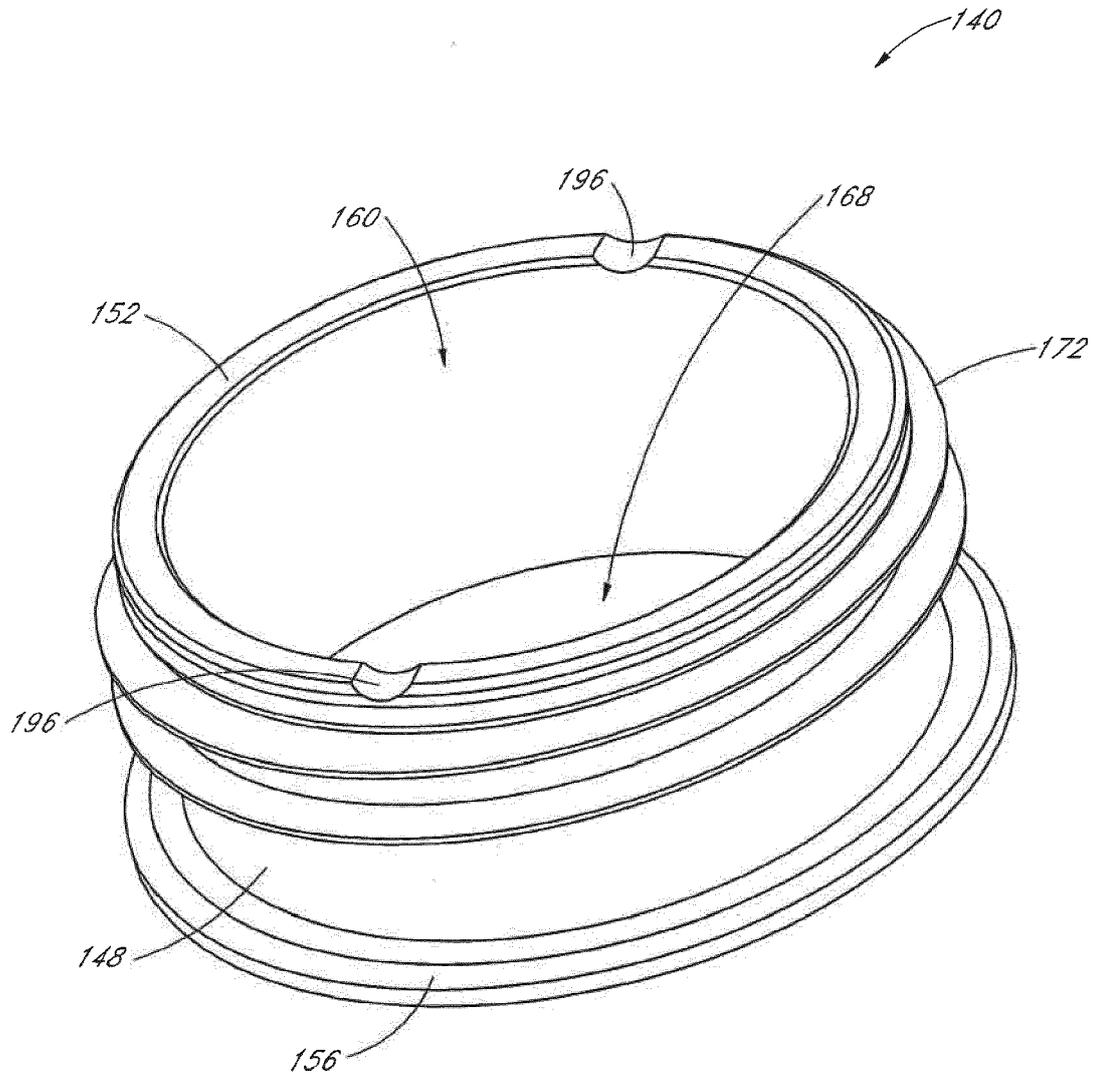


FIG. 2

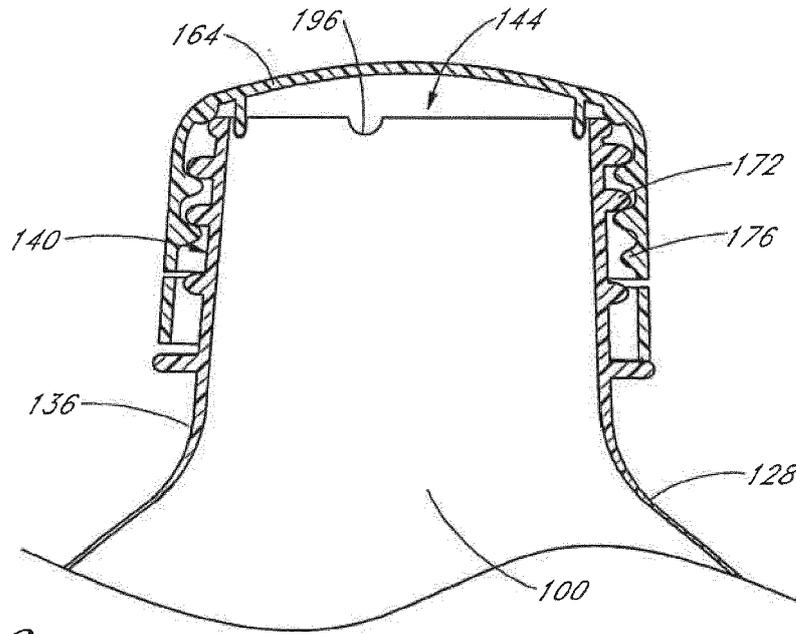


FIG. 3

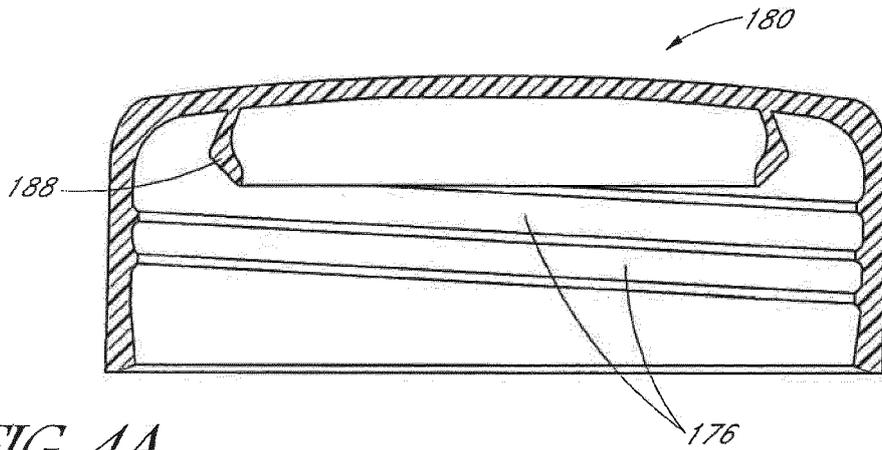


FIG. 4A

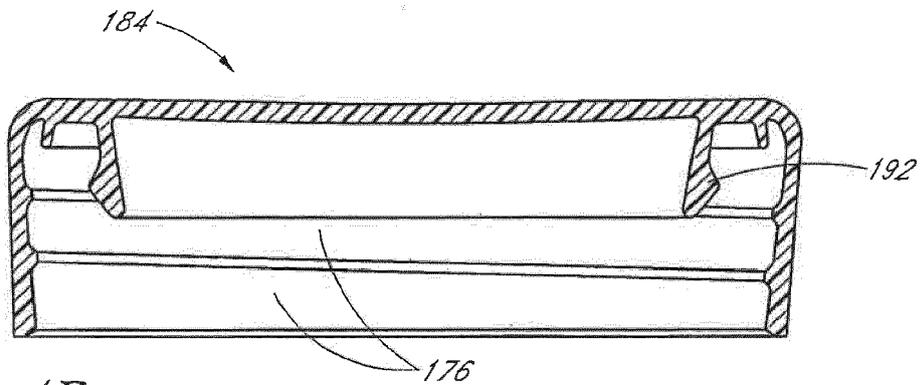
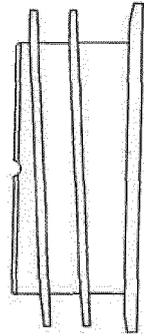


FIG. 4B

200

Modification		Title: Notch Half Circle	
Note:		Half Circle Notched into top edge of Bottle neck	
Trial:		Label:	Observation:
1	C1	Single Notch	No leak: Less fizzover than baseline: will retest to confirm
2	C1-1	Single Notch	Same as baseline
3	C1-2	Single Notch	Same as baseline Confirmed no positive results
4	C-2	Two Notches	Very little fizz over
5	C-2-1	Two Notches	Very little fizz over Similar results
6	C-2-2	Two Notches	Side by Side of Control; within 0.01 gram of alka noticeably less fizz
7	C-2-3	Two Notches	Repeated results of C-2-2

Image:



Circle Notch Shape							
	Bottle ID and Trial #	Depth (mm)	Width (mm)	Alkasetzer (g)	Time to open (min)	Observation (0-4) Vs Specified	Notes
2 Notches Evenly Spaced	TwC1-1	0.6	2.3	1.6	2.25	2;Baseline	
	TwC2-1	0.5	2	1.58	2.25	0;Baseline	
	TwC2-2	0.5	1	1.55	2.25	3;Baseline	
3 Notches Evenly Spaced	TwC3-1	0.7	2.5	1.56	2.25	3;Baseline	
	ThC1-1	0.7	2.5	1.65	2.25	3;Baseline	Viable, compare with 0.6 and 0.5 mm depth
4 Notches Evenly Spaced	ThC2-1	0.5	2	1.57	2.25	3;Baseline	
	FoC1-1	0.7	2.5	1.55	2.25	N/A	Leaky Bottle: Will try 0.6 mm and 0.5 depth
	FoC2-1	0.5	2	1.51	2.25	3;Baseline	

FIG. 5



EUROPEAN SEARCH REPORT

Application Number
EP 19 22 0245

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y A	US 2004/045967 A1 (BECKER GORDON P [US] ET AL) 11 March 2004 (2004-03-11) * paragraphs [0006], [0029]; figures 2,6 *	1-4,14 5	INV. B65D1/02 B65D51/16 B65D8/00
X	US 6 102 225 A (LYNN STEPHEN R [US]) 15 August 2000 (2000-08-15)	5-13	
Y	* column 3, line 37 - line 47; figure 1 * * column 1, line 6 - line 7 *	1-4,14	
A	US 3 181 720 A (CASSIE NORMAN M ET AL) 4 May 1965 (1965-05-04) * figures 1,5-10 *	4,12	
A	US 6 299 006 B1 (SAMONEK MICHAEL E [US]) 9 October 2001 (2001-10-09) * column 2, line 38 - line 63; figures 2-4 *	1-14	
A	US 2014/053513 A1 (DE CLEIR PIARAS VALDIS [US]) 27 February 2014 (2014-02-27) * column 2; figures 2,16 *	1-14	TECHNICAL FIELDS SEARCHED (IPC) B65D
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 4 March 2020	Examiner Sundell, 011i
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

1
EPO FORM 1503 03 82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

EP 19 22 0245

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

04-03-2020

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2004045967 A1	11-03-2004	AU 2003254676 A1	30-04-2004
		BR 0314244 A	26-07-2005
		CA 2498114 A1	25-03-2004
		EP 1549550 A1	06-07-2005
		JP 2005538001 A	15-12-2005
		US 2004045967 A1	11-03-2004
		US 2004256346 A1	23-12-2004
		US 2007257038 A1	08-11-2007
		WO 2004024574 A1	25-03-2004
US 6102225 A	15-08-2000	CN 1232768 A	27-10-1999
		US 6102225 A	15-08-2000
US 3181720 A	04-05-1965	NONE	
US 6299006 B1	09-10-2001	NONE	
US 2014053513 A1	27-02-2014	CA 2636650 A1	05-01-2009
		CN 101362537 A	11-02-2009
		EP 2011741 A1	07-01-2009
		JP 2009012862 A	22-01-2009
		KR 20090004736 A	12-01-2009
		US 2009008392 A1	08-01-2009
		US 2014053513 A1	27-02-2014
		ZA 200805875 B	29-04-2009

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 93859615 [0001]
- US 62079431 B [0001]