A stackable blow-molded container having a bottom wall that includes a parting line ridge projecting downwardly from a lower surface of the bottom wall, and a cap comprising a top panel having a plurality of upwardly extending projections formed on the upper surface of the top panel. The projections are circumferentially spaced apart about the upper surface of the top panel so as to define a plurality of substantially straight channels between the projections, the channels being angularly spaced apart, each channel being configured to receive the parting line ridge on the bottom wall of another one of the containers stacked atop the cap. The projections have sufficient height (i.e., equal to or greater than the height of the parting line ridge) such that they are able to contact the bottom wall atop the cap and form a stable base therefor.
STACKABLE BLOW-MOLDED CONTAINER AND CAP THEREFOR

BACKGROUND OF THE INVENTION

[0001] This invention relates to containers, and more particularly relates to bottles, jars, and the like, having caps or lids, and being designed to stack one upon another.

[0002] Containers for food products and beverages are often formed as blow-molded plastic bottles or jars. In a blow-molding operation, a mold is provided in two complementary mold halves that fit together and define a mold cavity between them. A parison or preform of heated and softened thermoplastic material is enclosed between the mold halves when they are brought together to close the mold cavity. The parison or preform is inflated to expand and fill the mold cavity, the resulting blow-molded article is partially cooled and the mold is opened by moving the mold halves apart, and the article is removed or ejected from the mold.

[0003] Articles formed by the blow-molding process generally have some amount of “flashing” at the location of the mold parting line, where the two mold halves come together, simply because it is generally not possible in practice to seal the mold halves together perfectly enough to prevent some of the softened thermoplastic material from finding its way between the mold halves. The result is a ridge or flashing that extends along the outer surface of the blow-molded article. The flashing typically is removed from the blow-molded article by a trimming or deflashing apparatus.

[0004] The bottom wall of many blow-molded containers is not flat, but often includes a domed or pushed-up central portion. As a result, there is some amount of the flashing that is recessed upwardly of the outer rim of the bottom wall, and this portion of the flashing typically is not removed by deflashing devices. This material, referred to herein as a parting line ridge, can interfere with the stacking of the blow-molded article on top of a cap of another such article. The cap typically is smaller in diameter than the bottom wall of the article, such that the cap fits into the domed central portion of the bottom wall having the parting line ridge. Stacking thus is compromised because the parting line ridge contacts the cap and does not form a stable base for the stacked article.

BRIEF SUMMARY OF THE INVENTION

[0005] The present invention addresses the above needs and achieves other advantages, by providing a stackable blow-molded container having a bottom wall that includes a substantially straight parting line ridge projecting downwardly from a lower surface of the bottom wall and passing substantially through a center of the bottom wall, and a cap comprising a top panel having an upper surface and a lower surface and having an outer periphery, a skirt depending from the outer periphery of the top panel for engaging a neck of the container body to secure the cap thereto, and a plurality of upwardly extending projections formed on the upper surface of the top panel. The projections are circumferentially spaced apart about the upper surface of the top panel so as to define a plurality of substantially straight channels between the projections, the channels being angularly spaced apart, each channel passing substantially through a center of the top panel and being configured to receive the parting line ridge on the bottom wall of another one of the containers stacked atop the cap. The projections have sufficient height (i.e., equal to or greater than the height of the parting line ridge) such that they are able to contact the bottom wall atop the cap and form a stable base therefor.

[0006] The projections preferably define a sufficiently great number of channels such that only a small rotation of a container atop the cap of another container will cause the parting line ridge to fall into a channel of the cap if the ridge initially was not rotationally aligned with a channel. Thus, advantageously there are at least five channels circumferentially spaced or “clocked” uniformly or substantially uniformly about the circumference of the cap; more preferably there are at least 10 channels, and still more preferably there are at least 15 channels. As an example, five channels are formed by providing 10 projections spaced uniformly about the circumference of the cap, 10 channels are formed by providing 20 projections, and 15 channels are formed by providing 30 projections.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S)

[0007] Having thus described the invention in general terms, reference will now be made to the accompanying drawings, which are not necessarily drawn to scale, and wherein:

[0008] FIG. 1 is a perspective view of a cap in accordance with one embodiment of the invention;

[0009] FIG. 2 is a top elevation of the cap;

[0010] FIG. 3 is a fragmentary front elevation of a container to which a cap in accordance with one embodiment of the invention is attached, and showing the bottom of another container stacked atop the cap;

[0011] FIG. 4 is a magnified view of the interface between the cap and the bottom of the stacked container; and

[0012] FIG. 5 is a cross-sectional view of a blow-molding apparatus for making a blow-molded container that is useful in the practice of the invention.

DETAILED DESCRIPTION OF THE INVENTION

[0013] The present inventions now will be described more fully hereinafter with reference to the accompanying drawings, in which some but not all embodiments of the inventions are shown. Indeed, these inventions may be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will satisfy applicable legal requirements. Like numbers refer to like elements throughout.

[0014] With initial reference to FIG. 5, the problem to which the present invention is directed is the stacking of blow-molded containers, such as bottles, jars, and the like. It is sometimes desirable to be able to stack a container atop another identical container, such that the bottom wall of one container rests atop the cap of another container. A blow-molded container is formed by using a mold 10 that is formed in two halves 10a, 10b. The mold halves come together at a plane 12 that is parallel to the longitudinal axis of the container, this plane is often referred to as the parting
line. To form a blow-molded container, a tubular parison of softened and flowable thermoplastic material is enclosed in the mold and is inflated so that it expands against the inner surface of the mold, as shown in FIG. 5. A blow-molded article or container 14 generally comprises a bottom wall 14a and a tubular side wall 14b that extends upwardly from an outer periphery of the bottom wall. The top end of the container comprises a neck 14c (FIG. 3) that defines an opening into the container and is configured for attachment of a cap as further described below.

[0015] Because it typically is not possible or practical to completely seal the interface between the mold halves 10a, 10b at the parting line 12, some amount of thermoplastic material infiltrates between the mold halves and forms a parting line ridge 16 that extends along the outer surface of the blow-molded container, including the bottom wall 14a. The parting line ridge typically lies in a plane passing through the central longitudinal axis of the container, and thus the parting line ridge passes substantially through the center of the bottom wall 14a. While the parting line ridge can be removed from the side wall using commonly available deflashing devices, it generally is not possible to completely remove the parting line ridge from the bottom wall when the bottom wall 14a includes a domed or pushed-up central region 18 as shown, because the outer rim 19 of the bottom wall surrounding the domed central region prevents the deflashing device from reaching the parting line ridge. As a result, the domed central portion will not stably stack atop a cap of another container because the parting line ridge contacts the cap and prevents a larger area of the bottom wall from contacting the cap; the parting line ridge thus acts as a fulcrum about which the container can pivot relative to the underlying cap.

[0016] The present invention addresses this problem not by attempting to modify the mold to eliminate the parting line ridge (which would be difficult and relatively expensive), but instead by redesigning the cap to allow a larger area of the cap to contact the bottom wall of a container in a stable fashion. With reference to FIGS. 1-4, a cap 20 in accordance with one embodiment of the invention is shown. The cap includes a top panel 22 having an upper surface 24 and having an outer periphery 26. A skirt 28 depends from the outer periphery of the top panel. The skirt is structured and arranged for engaging the neck 14c of a container body to secure the cap thereto. As examples, the skirt can include an internal screw thread (not shown) for engaging an external screw thread (not shown) on the container neck, or the neck and cap can be configured so that the cap attaches to the container neck with a snap fit.

[0017] The upper surface 24 of the top panel preferably is substantially planar, except for the presence of a plurality of projections 30 that project upward from the upper surface. The projections are circumferentially spaced apart about the upper surface of the top panel so as to define a plurality of substantially straight channels 32 between the projections, with the channels being angularly spaced apart from one another. Advantageously, each channel passes substantially through a center of the top panel and is configured to receive the parting line ridge 16 (shown in phantom lines and received in two alternative channels in FIG. 2) on the bottom wall of another one of the containers stacked atop the cap.

[0018] With particular reference to FIGS. 3 and 4, the projections 30 have sufficient height (i.e., at least as great as the height of the parting line ridge 16) such that the projections contact the bottom wall 14a atop the cap and form a stable base therefor. Generally, to constitute a stable support base, the projections must be at least three in number (e.g., three projections spaced 120° apart about a circle centered at the center of the top panel 22), but preferably the number of projections is substantially greater than three. When the projections are spaced apart about a circle centered at the center of the top panel, the number of channels N is related to the number of projections P according to the formula N=P/2. The channels advantageously are uniformly spaced from one to the next by an angular spacing of 180°/N. The number of channels N advantageously is at least five, more preferably is at least 10, and most preferably is at least 15 so that if the parting line ridge on a container being stacked atop the cap initially is not aligned with a channel, only a small rotation of the container is necessary to align the ridge with a channel.

[0019] For example, in the illustrated embodiment, the cap has 30 (thirty) projections 30 spaced uniformly about a circle centered at the center of the top panel 22, thereby defining 15 channels 32 that are spaced apart by 12°. Each projection has a radial extent that is substantially smaller than a radius of the top panel of the cap. Each projection is in a straight line with the center of the top panel and with another one of the projections on an opposite side of the center of the top panel. However, it will be recognized that other configurations of projections can be used in accordance with the invention for forming channels for receiving the parting line ridge 16 and forming a stable base for contacting the bottom wall of an overlying container.

[0020] Many modifications and other embodiments of the inventions set forth herein will come to mind to one skilled in the art to which these inventions pertain having the benefit of the teachings presented in the foregoing descriptions and the associated drawings. Therefore, it is to be understood that the inventions are not to be limited to the specific embodiments disclosed and that modifications and other embodiments are intended to be included within the scope of the appended claims. Although specific terms are employed herein, they are used in a generic and descriptive sense only and not for purposes of limitation.

What is claimed is:

1. A stackable blow-molded container, comprising:
   a blow-molded container body having a bottom wall, a tubular side wall extending upwardly from an outer edge of the bottom wall, and a neck formed on an upper end of the side wall, the neck defining an opening of the container body, the bottom wall having a substantially straight parting line ridge projecting downwardly from a lower surface of the bottom wall and passing substantially through a center of the bottom wall; and
   a cap comprising:
   a top panel having an upper surface and a lower surface and having an outer periphery;
   a skirt depending from the outer periphery of the top panel, the skirt being structured and arranged for engaging the neck of the container body to secure the cap thereto; and
a plurality of upwardly extending projections formed on the upper surface of the top panel, the projections being circumferentially spaced apart about the upper surface of the top panel so as to define a plurality of substantially straight channels between the projections, the channels being angularly spaced apart, each channel passing substantially through a center of the top panel and being configured to receive the parting line ridge on the bottom wall of another one of the containers stacked atop the cap, wherein the projections have sufficient height such that the projections contact the bottom wall atop the cap and form a stable base therefor.

2. The stackable blow-molded container of claim 1, wherein the projections define N channels having a substantially uniform angular spacing from one channel to the next of about 180°/N.

3. The stackable blow-molded container of claim 2, wherein N is at least 5.

4. The stackable blow-molded container of claim 2, wherein N is at least 10.

5. The stackable blow-molded container of claim 2, wherein N is at least 15.

6. The stackable blow-molded container of claim 1, wherein the upper surface of the top panel of the cap is planar except for the projections.

7. The stackable blow-molded container of claim 6, wherein each projection has a radial extent that is substantially smaller than a radius of the top panel of the cap.

8. The stackable blow-molded container of claim 1, wherein each projection is in a straight line with the center of the top panel and with another one of the projections on an opposite side of the center of the top panel.

9. The stackable blow-molded container of claim 1, wherein the cap is a screw-on cap.

10. The stackable blow-molded container of claim 1, wherein the projections are spaced radially inwardly from the periphery of the top panel of the cap.

11. A cup for a stackable blow-molded container body having a bottom wall that includes a substantially straight parting line ridge projecting downwardly from a lower surface of the bottom wall and passing substantially through a center of the bottom wall, the cap comprising:

a top panel having an upper surface and a lower surface and having an outer periphery;

a skirt depending from the outer periphery of the top panel, the skirt being structured and arranged for engaging a neck of the container body to secure the cap thereto; and

a plurality of upwardly extending projections formed on the upper surface of the top panel, the projections being circumferentially spaced apart about the upper surface of the top panel so as to define a plurality of substantially straight channels between the projections, the channels being angularly spaced apart, each channel passing substantially through a center of the top panel and being configured to receive the parting line ridge on the bottom wall of another one of the containers stacked atop the cap, wherein the projections have sufficient height such that the projections contact the bottom wall atop the cap and form a stable base therefor.

12. The cap of claim 11, wherein the projections define N channels having a substantially uniform angular spacing from one channel to the next of about 180°/N.

13. The cap of claim 12, wherein N is at least 5.

14. The cap of claim 12, wherein N is at least 10.

15. The cap of claim 12, wherein N is at least 15.

16. The cap of claim 11, wherein the upper surface of the top panel of the cap is planar except for the projections.

17. The cap of claim 16, wherein each projection has a radial extent that is substantially smaller than a radius of the top panel of the cap.

18. The cap of claim 11, wherein each projection is in a straight line with the center of the top panel and with another one of the projections on an opposite side of the center of the top panel.

19. The cap of claim 11, wherein the cap is a screw-on cap.

20. The cap of claim 11, wherein the projections are spaced radially inwardly from the periphery of the top panel of the cap.

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