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(54) ANTI-STICKING PREFORMS FOR BLOW MOLDED ARTICLES

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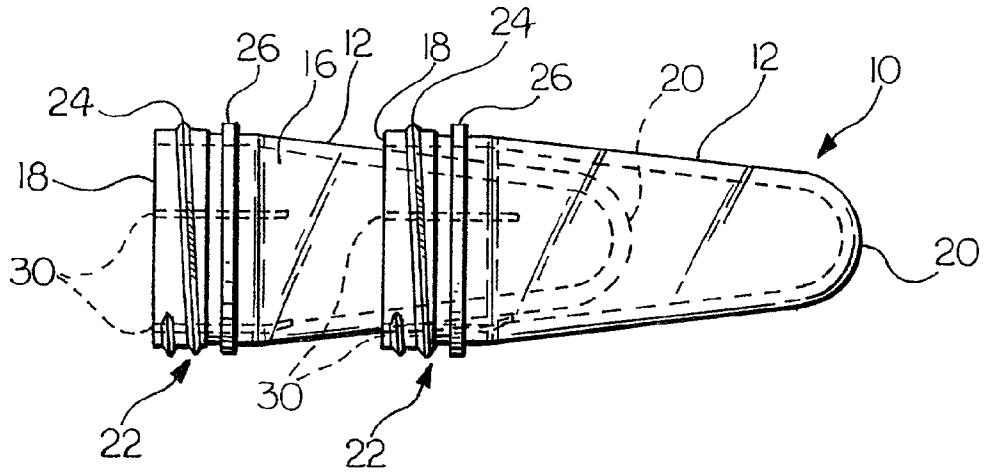
(57) **ABSTRACT**

A preform for a blow molded container provided a tubular body having inner and an outer surface having a first end open to the inner surface and a second closed end opposite to the first end. The relative dimensions of the ends being such that the closed end is receivable in the open end of a similar preform to nest therein. The open end is provided with a passageway to provide communication with the outside atmosphere to prevent formation of a vacuum and thereby enable disassembly of the nesting preforms.



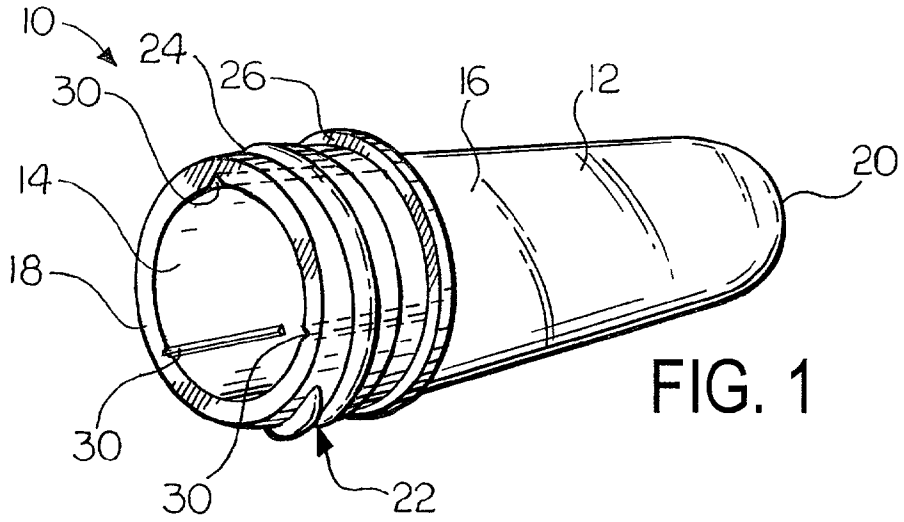


FIG. 1

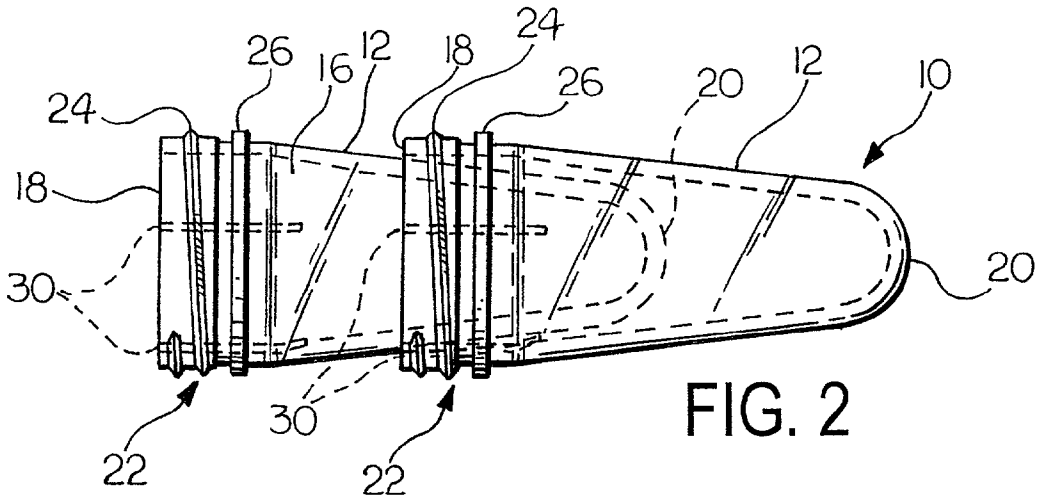


FIG. 2

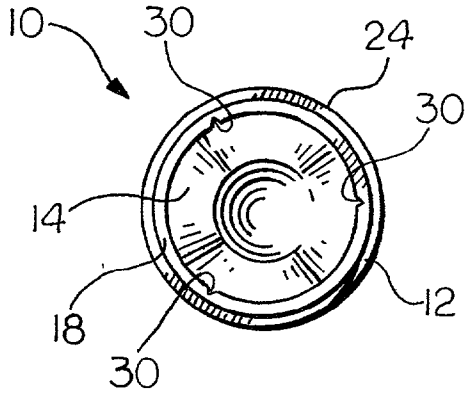


FIG. 3

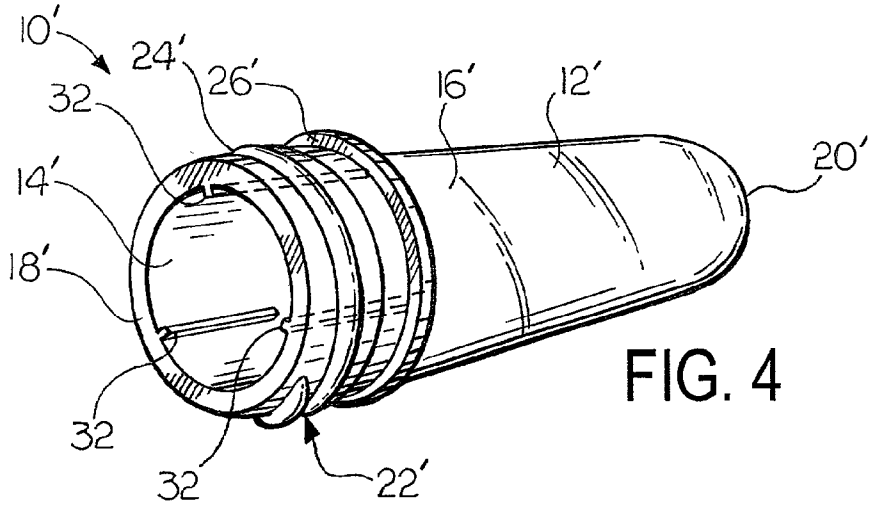


FIG. 4

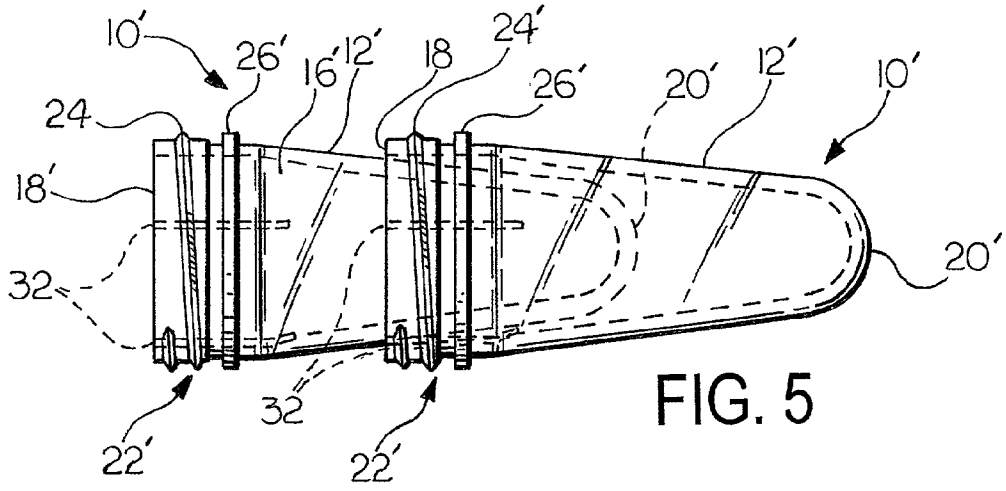


FIG. 5

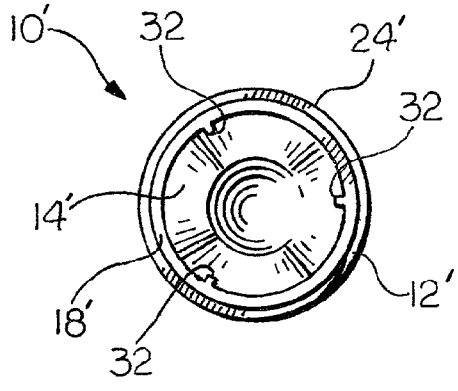


FIG. 6

ANTI-STICKING PREFORMS FOR BLOW MOLDED ARTICLES

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] Polyethylene terephthalate is a polyester resin useful in preparing blow molded containers to contain a wide variety of liquids. It is desirable that the bottles have excellent strength and a high degree of clarity. Typically, such bottles are filled with liquid at a location remote from the location at which the containers are molded. The molded containers are commonly formed by the reheat-stretch-and-blow procedure. Tubular preforms closed at one end and open at the opposite end are injection molded of a suitable grade and formulation of PET.

[0003] The molded containers must be packaged and shipped to the location at which they are filled with liquid. The preforms are typically removed from the injection mold and allowed to cool to ambient temperature and are later introduced to a blow molding system when the preforms are first heated to a temperature within the glass-transition range of the material, then mechanically stretched in the longitudinal direction, and finally blow molded to the final container configuration and dimensions. The mechanical stretching and blow molding impart biaxial molecular orientation to the material of the container body, thereby enhancing the tensile strength of the body wall while reducing its thickness. The finished containers are of a great variety of sizes and configurations. The problems of designing a container from a PET material for a particular purpose presents an extremely wide variety of considerations including not only capacity and aesthetic appeal, but economy of material and, importantly, whether the container is to be filled with contents under pressure, as is the case with carbonated beverages, or under vacuum, as is the case with hot filled products.

[0004] Once the configuration of the container has been determined, a preform must be designed. Due to the necessity of conserving material and notwithstanding the ensurance that the material forming the container will be distributed properly in the finished container to ensure that it will exhibit resistance to deformation and rupture under all conditions of expected use, preform design has become an exact science.

[0005] When the PET containers are intended for use in packaging carbonated beverages subject to internal pressures of three to four atmospheres, a preform configuration has evolved in which the outer diameter of the closed end is smaller than the internal diameter of the open end, whereby one preforming, by way of its open end, receive the closed end of an adjacent preform. The procedure is referred as nesting. In certain instances when the nesting of two or more preforms occurs, two preforms may be locked together by a vacuum created in the enclosed zone between the outer surface of the inner preform and the contacting inner surface of the outer preform. This condition is an impediment to safety and efficient handling of preforms. Heretofore, it is necessary to detect and individually separate nested preforms before damage could occur to the preforms or the equipment in which they were being processed.

[0006] 2. Description of the Prior Art

[0007] To eliminate the above problem of nesting, the prior art, as illustrated in the U.S. Pat. No. 5,366,774 to H. M. Pinot et al. discloses a preform which in a well-known manner comprises a generally tubular body formed of synthetic resinous material about a central axis. The body is provided with an inner surface and an outer surface surrounding the central axis, a first end open to the inner surface, and a second end opposite to the first end. A narrow body portion is axially spaced from the second end. The outer surface of the narrow portion has a radial dimension slightly smaller than the radial dimension of the inner surface of the wide portion.

[0008] The anti-nesting feature includes an interference means formed on the inner surface at the wide portion to prevent the narrow portion of a similar preform from nesting within the wide portion of an adjacent preform.

[0009] The interference means comprise at least one projection protruding radially inwardly from the inner surface at the wide portion, such as in axially extending rib.

[0010] The interference means in the preferred embodiment includes, not one, but a plurality of inwardly protruding projections, such as ribs, spaced circumferentially about the inner surface. Each of the projections protrudes radially inwardly from the inner surface.

[0011] These inwardly extending ribs militate against the entry of the narrow portion of a similar preform from nesting within the wide portion of the neck finish of the preform. The configuration of the neck finish, once established, is not altered in the blow molding procedure and is carried over intact to the finished blown container. The inwardly extending ribs have no function in the finished container and are considered surpluses.

[0012] Another prior art structure designed to prevent nesting of adjacent preforms is illustrated and described in U.S. Pat. No. 5,756,172 to Frank E. Semersky. The patent discloses a preform having a generally tubular body formed about a central axis and having inner and outer surfaces surrounding the axis, a first end open to the inner surface, a second end opposite to the first end, a wide portion of the tubular body adjacent to the first end, a narrow portion of the tubular body axially spaced from the second end, the outer surface at the narrow portion being a radial dimension smaller than the radial dimension of the inner surface at the wide portion, at least one outwardly extending protrusion located along the outer surface at the narrow portion and protruding radially outward from the outer surface of the narrow portion a radial distance greater than the distance between the radial dimension of the outer surface of the narrow portion and the radial dimension of the inner surface of the wide portion to prevent a narrow portion of a similar preform from nesting within the wide portion.

[0013] The protrusions, being disposed in that portion of the preform which undergoes substantial stretching, tend to disappear and blend invisibly into the finished blow molded container.

[0014] It is an object of the present invention to produce a preform construction which militates against the locking of two preforms together, yet permits the nesting of the preforms.

[0015] Another object of the invention is to produce a preform of a design permitting the nesting of two or more adjacent preforms wherein the surface area contact between two nested preforms is minimized to prevent the creation of a vacuum in the closed area of the nested preforms.

[0016] The above as well as other objects of the invention may be achieved by a preform for a blow molded container comprising a generally tubular body formed about a central axis and having inner and outer surfaces surrounding the axis; a first end open to the inner surface, a second end opposite to and spaced from the first end; a wide portion of the tubular body adjacent the first end; a narrow portion of the tubular body spaced from the second end; the outer surface of the narrow portion having a radial dimension smaller than the radial dimension of the inner surface at the wide portion, wherein the improvement comprises:

[0017] at least one interruption in the inner surface at the wide portion and extending axially from the first open end toward the second end and protruding radially outwardly from the inner surface a sufficient amount to provide a passageway between the outer surface of the narrow portion of a similar preform and the inner surface of the wide portion to prevent a similar preform from sticking within the wide portion by vacuum.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] The above objects and advantages of the invention will become readily apparent to those skilled in the art from reading the following detailed description of the invention when considered in the light of the accompanying drawings, in which:

[0019] **FIG. 1** is a perspective view of a preform constructed in accordance with the present invention;

[0020] **FIG. 2** is a side view of the preform constructed in accordance with the invention, as illustrated in **FIG. 1**, in a nested relation;

[0021] **FIG. 3** is an end view of the preform illustrated in **FIG. 2** taken from the left hand side thereof;

[0022] **FIG. 4** is a perspective view of an alternative preform constructed in accordance with the present invention;

[0023] **FIG. 5** is a side view of two preforms constructed in accordance with the invention, as illustrated in **FIG. 4** in a nested relation; and

[0024] **FIG. 6** is an end view of the preform illustrated in **FIG. 5** taken from the left hand side thereof.

DESCRIPTION OF THE PREFERRED EMBODIMENT

[0025] Referring to the drawings, and particular to **FIGS. 1, 2**, and **3**, there is shown a preform generally indicated by reference numeral **10** for forming a blow molded container intended for the packaging of contents under pressure such as carbonated beverages. The preform **10** has preferably been injection molded of polyethylene terephthalate and is ready to be reheated, stretched, and blow molded into final container configurations by the well-known blow molding procedure.

[0026] The preform **10** comprises a generally tubular body **12** having a central longitudinally extending axis and having an inner surface **14** and an outer surface **16** surrounding the central axis. A first end **18** of the preform **10** is open to the inner surface **14**. A second end **20** opposite to and spaced from the first or open end **18**, is closed in a generally hemispherical configuration.

[0027] A neck finish, generally represented at **22**, is provided adjacent the open end. The neck finish **22** includes male threads **24** adapted to mate with female threads formed in a conventional closure to be applied when the finished container formed by being blow molded from the preform **10** has been filled and the closure received over the open end **18** of the preform. The neck finish **22** also includes a circumferential flange **26** which is used in the handling of the preform and the resulting container on processing and filling lines. The flange **26** is also useful to the consumer in pouring from the container, since it assists in affording a firm grip on the neck thereof. The configuration of the neck finish **22** and the flange **26** once established in the injection mold, are not altered in the blow molding procedure, whereby they are structurally carried over intact to the blown container.

[0028] The remainder of the body **12** of the preform **10** in the embodiment illustrated in **FIGS. 1, 2**, and **3** includes three passageways **30** which extend longitudinal in a spaced apart parallel relation on the inner surface **14**. The passageways **30** commence at the first end **18** and typically terminate on the inner surface **14** at a point beyond the flange **26**. These passageways **30** are in the form of interruptions in the smooth inner surface **14** and will allow the preforms **10** to nest and will prevent the creation of a vacuum in the otherwise closed zone generally defined by the inner surface **14** of one preform **10** and the outer surface **16** of the nested preform **10** as illustrated in **FIG. 2**.

[0029] It will be understood that the vacuum which the present invention eliminates is caused by the nesting of warm preforms. When the temperature of particularly the outermost preform decreases, the outer preform tends to commence shrinking causing the tubular body to decrease in dimensional configuration and cause the inner surface to contact the outer surface of the inner nested preform thereby establishing a zone defined by the outer surface of the inner preform and the inner surface of the outer preform and the line of contact between the preforms. The pressure of the atmosphere within the defined zone decreases as the temperature decreases. The resulting vacuum condition causes the nesting preforms to stick together and thereby interfere with the handling thereof.

[0030] Since the embodiment of the invention illustrated in **FIGS. 1, 2**, and **3** provides a continuous communication between the outside atmosphere and the closed zone between the two nested preforms preventing the sticking together of the nested bodies and allowing easy disassembly thereof.

[0031] Another embodiment of the invention is illustrated in **FIGS. 4, 5**, and **6** wherein structural features which are the same as those illustrated in the embodiment illustrated in **FIGS. 1, 2**, and **3** utilize similar reference numerals with a prime (') designation.

[0032] Referring to **FIGS. 4, 5**, and **6**, there is a preform generally indicated by reference numeral **10'** for forming a

blow molded container intended for the packaging of contents under pressure such as carbonated beverages. The preform **10'** has preferably been injection molded of polyethylene therephthalate and is ready to be reheated, stretched, and blow molded into final container configurations by the well known blow molding procedure.

[**0033**] The preform **10'** comprises a generally tubular body **12'** having a central longitudinally exterior axis and having an inner surface **14'** and an outer surface **16'** surrounding the central axis. A first end **18'** of the preform **10'** is open to the inner surface **14'**. A second end **20'**, opposite to and spaced from the first or open end **18'**, is closed in a generally hemispherical configuration.

[**0034**] A neck finish, generally represented at **22'**, is provided adjacent the open end. The neck finish **22'** includes male threads **24'** adapted to mate with female threads formed in a conventional closure to be applied when the completed container formed by being blow molded from the preform **10'** has been filled and the closure received over the open end **18'** of the preform. The neck finish **22'** also includes a circumferential flange **26'** which is used in the handling of the preform and the resulting container on processing and filling lines. The flange **26'** is also useful to the consumer in pouring from the container, since it assists in affording a firm grip on the neck thereof. The configuration of the neck finish **221** and the flange **26'** once established in the injection mold, are not altered in the blow molding procedure, whereby they are structurally carried over intact to the blown container.

[**0035**] The remainder of the body **12'** of the preform **10'** in the embodiment illustrated in **FIGS. 4, 5**, and **6** include three rib members **32** which extend longitudinally in spaced relation and extend radially inwardly from the inner surface **14'**. The rib members **32** produce passageways which commence at the first end **18'** and typically terminate on the inner surface **14'** at a point beyond the flange **26'**. These passageways are in the form of interruptions in the smooth inner surface **14'** of one preform **10'** and the outer surface **16'** of the nested preform **10'** as illustrated in **FIG. 5**.

[**0036**] In each embodiment of the invention it will be appreciated that the invention effectively minimizes the surface area contact between two nested preforms; and eliminates the creation of a vacuum in the zone between the nested preforms. Also, the invention reduces the force required to separate nested preforms due to the reduction in the surface area contact during nesting.

[**0037**] In accordance with the provisions of the patent statutes, the present invention has been described in what is considered to represent its preferred embodiment. However, it should be understood that the invention can be practiced otherwise than as specifically illustrated and described without departing from its spirit or scope.

What is claimed is:

1. A preform for a blow molded container comprising:

a generally tubular body formed about a central axis and having inner and outer surfaces surrounding the axis;

a first end open to the inner surface;

a second closed end opposite to and spaced from the first end;

a wide portion of the tubular body adjacent the first end;

a narrow portion of the tubular body spaced from the second end;

the outer surface of the narrow portion having a radial dimension smaller than the radial dimension of the inner surface at the wide portion, wherein the improvement comprises:

at least one interruption in the inner surface at the wide portion and extending axially from the first open end toward the second end and protruding radially outwardly from the inner surface a sufficient amount to provide an air passageway between the outer surface of the narrow portion of a similar preform and the inner surface of the wide portion to prevent a similar preform from sticking within the wide portion by vacuum.

2. A preform as defined in claim 1, wherein said interruption is in the form of a groove.

3. A preform as defined in claim 2 wherein said groove is formed to extend axially of said tubular body

4. A preform as defined in claim 3 wherein said grooves is formed in the inner surface of said tubular body.

5. A preform as defined in claim 1 wherein said interruption is in the number of more than one.

6. A preform as defined in claim 1 wherein said interruption is in the number of three.

7. A preform as defined in claim 1 wherein said interruption is in the form of a rib.

8. A preform as defined in claim 7 wherein said rib is formed to extend axially of said tubular body.

9. A preform as defined in claim 8 wherein said rib is formed in the inner surface of said tubular body.

* * * * *