

PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Composite Container

- We, OWENS-ILLINOIS, INC. a Corporation of the State of Ohio, United States of America, of Toledo, Ohio, United States of America, (Assignee of RICHARD ALLEN HEATON), do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—
- 10 This invention relates to a container of composite construction. More particularly, the invention relates to a container having a bulbously-shaped glass body for containing the packaged product and a base member of non-frangible material for protecting the glass body and maintaining it in an upright position.
- 15 In a preferred construction of such a container, the base member provides a surface which is well adapted to receive printing or other decorative matter, thereby eliminating the need for placing such printing matter on the glass, either directly or by way of a separately-adhered paper or foil label, with the well-known problems and disadvantages attendant thereto. Additionally, the container bodies may be formed in large quantities at high speed by a process similar to the ribbon process used in the forming of light bulbs and wherein the wall of each bulb is of a more uniform and substantially reduced thickness in relationship to the wall portions of a conventional hot-iron mold blow glass bottle or jar. Such a high-speed forming process will result in manufacturing costs which compare favorably to the costs of conventional container forming processes and the features of a thin wall of more uniform thickness and of a bulbular configuration provide containers of improved thermal shock resistance, even when such bodies are formed from a glass composition of a relatively high coefficient of thermal expansion. Obviously, improved thermal shock resistance helps to minimize breakage when such containers are immersed in a hot liquid for washing or sterilization, filled with a product at elevated temperature, or rapidly cooled from an elevated processing temperature. Another important feature of a container of reduced and more uniform wall thickness is that the resulting reduction in weight of glass used in a container of a given size, in relationship to the weight of a conventional glass container, makes it economically feasible, where desired, to form the body from a glass composition of higher quality, and hence cost, than the customary soda-lime glasses used in the forming of conventional glass bottles and jars. This makes it possible to obtain even better thermal shock resistance, if desired, and/or makes it possible to use various known additives in the glass composition for the purpose of improving the strength, appearance, light transmission, chemical attack resistance or other properties of the glass.
- 20 According to the present invention, a composite construction container for bottling liquids under condition of elevated pressures and/or temperatures comprises a single-walled glass body as hereinafter defined having a mouth opening which, when the body is disposed in an upright position, is at the upper extremity thereof, the body having a seamless, relatively thin wall of substantially uniform thickness and distribution which is substantially continuously convexly arcuate in an axial section along a bottom portion of substantial extent to produce a body which is highly unstable when unsupported in an upright position; and a generally cup-shaped base member of a yieldable material substantially less frangible than that of the body secured to the continuously convexly curved arcuate portion of the body bottom portion, the base of the cup-shaped member having a level portion to support the glass body with stability in an upright position.

[Price 5s. 0d.]

In this specification and in the claiming clauses hereof the expression "single-walled glass body" means a body defined by one wall rather than the spaced double or multiple wall vessels which are sometimes employed in, for example, vacuum flasks.

The invention will now be further described by way of examples with reference to the accompanying drawings, in which:—

Fig. 1 is a perspective view of an embodiment of a wide-mouth composite container constructed in accordance with the present invention;

Fig. 2 is a perspective view of certain of the elements of the container of Fig. 1 in disassembled relationship;

Fig. 3 is a perspective view of an embodiment of a narrow-mouth composite container constructed in accordance with the present invention;

Fig. 4 is an enlarged fragmentary sectional view taken along the line 4—4 of Fig. 3;

Fig. 5 is a perspective view of certain of the elements of the container of Fig. 3 in disassembled relationship;

Figs. 6 and 7 are elevational views, partly in section, of additional wide-mouth and narrow-mouth composite containers constructed in accordance with the present invention, respectively;

Fig. 8 is a sectional view taken along the line 8—8 of Fig. 7; and

Fig. 9 is a fragmentary sectional view of yet another embodiment of a composite container constructed in accordance with the present invention.

In accordance with the present invention there is provided a composite container comprising a single-walled glass body which terminates in an open mouth at its upper end and which has a bulbously-shaped bottom portion that causes the body to be unstable in its upright position. The container further comprises a cup-shaped bottom or base member formed of a material substantially less frangible than the glass of the body which member is secured to and snugly engages the lower portion of the glass body to support it in its upright position and to protect it from impact with objects and articles of many types including adjacent containers of the same type, for example, in a shipping carton filled with such containers or in a filling line. In the composite container of Figs. 1 and 2, the glass body thereof is designated by numeral 11 and the base member by numeral 12. Additionally, such a container, after introduction of the packaged product into the body thereof through a mouth or aperture 11a in an upper minor portion 11b thereof, is preferably sealingly closed by a closure of any suitable construction. In the container of Figs. 1 and 2, the closure is designated by numeral 13 and is shown as a convenience-type metallic closure having a downwardly

extending and upwardly deflectable tab 13a that is attached to a medial portion 13b of the top panel which is separated from the remaining portions of the top panel by weakened and readily rupturable lines 13c and 13d.

Body 11 of the container of the present invention may be formed of a wide variety of known glass compositions including the relatively inexpensive soda-lime glass compositions used in forming conventional glass bottles and jars and other glass containers. Body 11 differs from prior art glass containers, however, in that the wall thereof is substantially thinner than the wall even of a lightweight glass container such as the popular non-returnable beer bottle, and the distribution of glass in the wall is considerably more uniform. For example, it is highly desirable and entirely feasible if the average wall thickness of the body of a container in accordance with the present invention be in the range of 0.035—0.050 inch when such body is formed of a soda-lime glass composition. Bodies such as envelope 11 with reduced and more uniform wall thickness in relationship to prior art glass containers may be economically formed at high speed by the ribbon forming process used in the forming of electric lamp bulbs, as generally disclosed in U.S. Patent Specification 1,790,397, and in Handbook of Glass Manufacture, page 356, by F. V. Tooley, (1953). This forming process is a paste mold process in which the glass heat content is removed through a steam layer, hence at a lower rate than in a hot-iron mold process. This lower heat transfer rate reduces the formation of stresses in the formed article. The reduced and more uniform wall thickness further imparts improved thermal shock resistance to the body relative to a prior-art glass container, even when the body is formed of a glass of comparable coefficient of thermal expansion.

The lower and major portion of the body 11, designated by reference character 11c, is constructed with an outline approximating that of a major section of a sphere, a configuration readily obtained in the ribbon forming process heretofore mentioned. The improved structural properties afforded to the container by such a configuration make it extremely well suited for the packaging of products which normally exhibit high pressure during shipment and storage, such as beer or other malt beverage products, carbonated beverages, or aerosols. If, for reasons of design or otherwise, it is desirable to depart from a true spherical configuration in forming portion 11c, it is, nonetheless, quite structurally important that a lower and major portion of body 11 be of a substantially circular configuration in horizontal section at every elevation of such portion and that such portion be substantially continuously con-

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5 vexly arcuate in all axial sections (vertical planes passing through the central vertical axis of the body), of the body. It is to be noted that the use of a small flattened surface portion (not shown) in the lower portion 11c of the body for example one of a diameter materially less than one-half of the major diameter of the body, may be of benefit in providing a locating or registration point for post-forming operations and a body with such a flattened surface portion is to be considered to be within the scope of the terms "substantially circular" or "substantially continuously convexly arcuate" as such terms have been hereinbefore used. In any event, the flattened surface portion will be of insufficient extent to provide satisfactory stability to the container in its upright position and the radius of the wall approaching such flattened surface will, desirably, be of gradually increasing length to avoid abrupt changes in radius of curvature.

10 Base member 12 of the container of the present invention securely engages a lower portion of body 11 thereof to support the body with stability in its upright position and to protect such engaged portion from impact damage. To this end, base member 12 must, of course, have a level lowermost extent (e.g., a flat base) and it must be constructed of a material substantially less frangible (more resistant to shock breakage) than glass. It is also desirable for the material to be capable of appreciable deformation under impact load to minimize the transmission of impact forces through the base member to the glass body. The popular thermoplastic materials, such as low and medium density polyethylene, incorporate these desirable properties to a large degree and are relatively inexpensive and readily formable by well-known production or molding techniques. The use of other materials in the formation of base member 12 including other thermoplastic materials, paper, molded pulp, plastisol formed in place, foamed plastics, and thermosetting plastics, as well as composites of any of such materials is also contemplated. The use of various metallic materials, such as tin-plate and aluminum, can also be satisfactory if suitable cushioning techniques are employed.

15 If body 11 of the container of the present invention is to be positively protected from such surface abuse, such as impact damage caused by contact with adjacent containers in a shipping carton or in a filling line, it is important to provide base member 12 with a side wall portion 12a which extends upwardly at least to the major diameter of body 11. Such a construction feature is additionally advantageous in that the cylindrical outer surface of portion 12a which may thereby be provided is well adapted for the placement of descriptive, advertising or other

decorative material, as shown generally at 14 in Figs. 1 and 2, thereby eliminating the need for the placement of such decorative material on the glass surface of body 11. This is particularly advantageous when the base member is formed of pigmented polyethylene (or other plastic), for example, because it makes it possible to do such decoration with fast curing organic inks which results in a more opaque decoration than the decoration obtained on a glass surface when popular printing inks are used. Furthermore, when the wall of base member 12 extends upwardly to the major diameter of body 11, assembly of the base member and the body may be facilitated by forming base member 12 of a heat shrinkable plastic material and by heating it after the body has been placed therein; additionally or alternatively, such assembly may be accomplished by the use of an adhesive suitable to bond glass to the material of the base member, e.g., an epoxy resin adhesive, or by a simple shrink-fit of base member over body.

20 In the embodiment of the invention illustrated in Figs. 3-5, there is provided a single-walled glass body 21 which is generally the same as body 11 of the embodiment of Figs. 1 and 2 except that the upper minor portion 21b thereof is narrower to define a narrow-mouth 21a therefor. Base member 22 of the embodiment of Figs. 3-5 can be considered to be identical to base member 12 of the embodiment of Figs. 1 and 2.

25 In Figs. 3 and 4, mouth 21a of body 21 is shown as being closed by a closure 23 which is similar to closure 13 in that it incorporates an upwardly deflectable tab 23a attached to a removable medial portion 23b, as defined by weakened lines 23c and 23d, of the top panel of the closure. As is shown in Fig. 4, attachment of closure 23 to open mouth of body 21 may be facilitated by providing a liner cap 25 of resilient material, such as polyethylene, which has a downwardly and inwardly extending flange 25a, to snugly engage the upper portion of the rim of body 21 and over which closure 23 is placed. Such a liner cap may also be used in other embodiments of the present invention if desired.

30 As shown in Fig. 5, it is also contemplated that narrow-mouth embodiments of containers in accordance with the present invention may also, when desired, be provided with other well-known convenience-type closures such as manually removable closure 123 which has a stiff outwardly extending removal tab 123a similar to that in use in some prior art crown closure constructions.

35 Fig. 6 illustrates an embodiment of a container in accordance with the present invention in which the single-walled body 31 thereof is provided with a hemispherical

bottom portion 31a, a feature common to other body configurations, and a cylindrical portion 31b immediately thereabove. Because of its departure from the optimum configuration of a sphere by virtue of the incorporation of cylindrical portion 31b, body 31 is not as well suited for the packaging of pressurized products, such as carbonated soft drinks and malt beverage products, as are other of the illustrated body configurations. For example, Fig. 7 illustrates an embodiment wherein body 41 has about as close an approximation to the configuration of a sphere as can be provided consistent with the provisions of a suitable neck portion 41a.

A number of design features can be provided in the construction of a base member or fitment for use in the practice of the present invention which improve the stability of the base member to absorb impact. For example, in the embodiment of Fig. 6, fitment 32 has a bottom spherical surface portion 32a which contacts an adjacent surface portion of body 31 in surface-to-surface contact and a cylindrical surface portion 32b spaced from portion 32a which likewise contacts a portion of body 31 in surface-to-surface contact. Thus, fitment 32 between portions 32a and 32b is free to deflect under impact to absorb loads which otherwise would be transmitted to body 31. In some cases, further impact absorbing properties can be imparted to the base member or fitment of the present invention by constructing the fitment to contact the adjacent body only in point or line contact. Thus, the upstanding wall 42a of base member 42 of the embodiment of Figs. 7 and 8 is of corrugated construction to minimize the area of contact of body 41 therewith and the bottom of base member 52 of the embodiment of Fig. 9 is shaped with an upstanding annular protuberance 52a to contact the lower portion of associated body 51 in the pattern of a thin circumferentially extending ring.

The best mode known to us to carry out this invention has been described above in terms sufficiently full, clear, concise and exact as to enable any person skilled in the art to make and use the same. It is to be understood, however, that it is within our contemplation that certain modifications of the above-described mode of practicing the invention can be made by a skilled artisan without departing from the scope of the invention and it is, therefore, desired to limit the invention only in accordance with the appended claims.

WHAT WE CLAIM IS:—

1. A composite construction container for bottling liquids under conditions of elevated pressures and/or temperatures comprising a single-walled glass body (as hereinbefore defined) having a mouth opening which, when

the body is disposed in an upright position, is at the upper extremity thereof, the body having a seamless, relatively thin wall of substantially uniform thickness and distribution which is substantially continuously convexly arcuate in an axial section along a bottom portion of substantial extent to produce a body which is highly unstable when unsupported in an upright position; and a generally cup-shaped base member of yieldable material substantially less frangible than that of the body secured to the continuously convexly curved arcuate portion of the body bottom portion, the base of the cup-shaped member having a level portion to support the glass body with stability in an upright position.

2. A composite construction container for liquids as claimed in claim 1 comprising closure means for sealingly closing said mouth opening.

3. A composite construction container for liquids as claimed in claim 1 or 2 wherein a lower major portion of the body has the outline of a section of a sphere.

4. A composite construction container for liquids as claimed in claim 1, 2 or 3 wherein a major portion of the body immediately above said bottom portion is cylindrically-shaped.

5. A composite construction container for liquids as claimed in any one of claims 1 to 4 wherein the bottom portion of the body is hemispherically-shaped.

6. A composite construction container for liquids as claimed in any one of claims 1 to 5 wherein the cup-shaped base member has an upstanding wall portion extending at least to the major diameter of the glass body and serving to protect the body from side contact with articles adjacent thereto when the body is in an upright position.

7. A composite construction container for liquids as claimed in any one of claims 1 to 6 wherein the cup-shaped base member has a substantially-cylindrical outer surface.

8. A composite construction container for liquids as claimed in any one of claims 1 to 7 wherein the cup-shaped base member has a surface adjacent the glass body which is shaped to contact the latter at spaced-apart locations of the body and to be spaced therefrom at locations other than said spaced-apart locations.

9. A composite construction container for liquids as claimed in claim 8 wherein one of said spaced-apart locations is a circumferentially extending area of substantial depth immediately adjacent the upper extremity of the cup-shaped base member.

10. A composite construction container for liquids as claimed in claim 8 or 9 wherein one of said spaced-apart locations is one of substantial area at the lowermost extremity of the body.

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bottom portion 31a, a feature common to other body configurations, and a cylindrical portion 31b immediately thereabove. Because of its departure from the optimum configuration of a sphere by virtue of the incorporation of cylindrical portion 31b, body 31 is not as well suited for the packaging of pressurized products, such as carbonated soft drinks and malt beverage products, as are other of the illustrated body configurations. For example, Fig. 7 illustrates an embodiment wherein body 41 has about as close an approximation to the configuration of a sphere as can be provided consistent with the provisions of a suitable neck portion 41a.

A number of design features can be provided in the construction of a base member or fitment for use in the practice of the present invention which improve the stability of the base member to absorb impact. For example, in the embodiment of Fig. 6, fitment 32 has a bottom spherical surface portion 32a which contacts an adjacent surface portion of body 31 in surface-to-surface contact and a cylindrical surface portion 32b spaced from portion 32a which likewise contacts a portion of body 31 in surface-to-surface contact. Thus, fitment 32 between portions 32a and 32b is free to deflect under impact to absorb loads which otherwise would be transmitted to body 31. In some cases, further impact absorbing properties can be imparted to the base member or fitment of the present invention by constructing the fitment to contact the adjacent body only in point or line contact. Thus, the upstanding wall 42a of base member 42 of the embodiment of Figs. 7 and 8 is of corrugated construction to minimize the area of contact of body 41 therewith and the bottom of base member 52 of the embodiment of Fig. 9 is shaped with an upstanding annular protuberance 52a to contact the lower portion of associated body 51 in the pattern of a thin circumferentially extending ring.

The best mode known to us to carry out this invention has been described above in terms sufficiently full, clear, concise and exact as to enable any person skilled in the art to make and use the same. It is to be understood, however, that it is within our contemplation that certain modifications of the above-described mode of practicing the invention can be made by a skilled artisan without departing from the scope of the invention and it is, therefore, desired to limit the invention only in accordance with the appended claims.

WHAT WE CLAIM IS:—

1. A composite construction container for bottling liquids under conditions of elevated pressures and/or temperatures comprising a single-walled glass body (as hereinbefore defined) having a mouth opening which, when

the body is disposed in an upright position, is at the upper extremity thereof, the body having a seamless, relatively thin wall of substantially uniform thickness and distribution which is substantially continuously convexly arcuate in an axial section along a bottom portion of substantial extent to produce a body which is highly unstable when unsupported in an upright position; and a generally cup-shaped base member of yieldable material substantially less frangible than that of the body secured to the continuously convexly curved arcuate portion of the body bottom portion, the base of the cup-shaped member having a level portion to support the glass body with stability in an upright position.

2. A composite construction container for liquids as claimed in claim 1 comprising closure means for sealingly closing said mouth opening.

3. A composite construction container for liquids as claimed in claim 1 or 2 wherein a lower major portion of the body has the outline of a section of a sphere.

4. A composite construction container for liquids as claimed in claim 1, 2 or 3 wherein a major portion of the body immediately above said bottom portion is cylindrically-shaped.

5. A composite construction container for liquids as claimed in any one of claims 1 to 4 wherein the bottom portion of the body is hemispherically-shaped.

6. A composite construction container for liquids as claimed in any one of claims 1 to 5 wherein the cup-shaped base member has an upstanding wall portion extending at least to the major diameter of the glass body and serving to protect the body from side contact with articles adjacent thereto when the body is in an upright position.

7. A composite construction container for liquids as claimed in any one of claims 1 to 6 wherein the cup-shaped base member has a substantially-cylindrical outer surface.

8. A composite construction container for liquids as claimed in any one of claims 1 to 7 wherein the cup-shaped base member has a surface adjacent the glass body which is shaped to contact the latter at spaced-apart locations of the body and to be spaced therefrom at locations other than said spaced-apart locations.

9. A composite construction container for liquids as claimed in claim 8 wherein one of said spaced-apart locations is a circumferentially extending area of substantial depth immediately adjacent the upper extremity of the cup-shaped base member.

10. A composite construction container for liquids as claimed in claim 8 or 9 wherein one of said spaced-apart locations is one of substantial area at the lowermost extremity of the body.



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11. A composite construction container for liquids as claimed in claim 8 or 9 wherein one of said spaced-apart locations is a thin circumferentially extending ring located proximate to the lowermost extremity of the body.
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12. A composite construction container for liquids as claimed in claim 8 wherein the cup-shaped base member is provided with an upstanding wall which contacts the glass body at spaced-apart locations extending in a circumferential series.
- 10
13. A composite construction container for liquids as claimed in any one of claims 1 to 12 wherein the glass in the body consists essentially of soda-lime glass.
- 15
14. A composite construction container for liquids as claimed in any one of claims 1 to 13 wherein the average thickness of the wall of the glass body is 0.035 to 0.050 inch.
- 20
15. A composite construction container for liquids as claimed in claim 2 or any claim appendant thereto further comprising a pressurized liquid packaged in the body, said closure means acting to retain the product under pressure in the container.
- 25
16. A composite construction container for liquids as claimed in any one of claims 1 to 15 wherein the cup-shaped base member is formed of a heat-softenable plastics material.
- 30
17. A composite construction container for liquids as claimed in any one of claims 1 to 16 wherein the cup-shaped base member is provided with a substantially cylindrical outer surface and wherein such outer surface is provided with decorative or informative material.
- 35
18. Composite construction container for liquids substantially as herein described with reference to and as illustrated in the accompanying drawings.
- 40

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