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(71) Applicant *(for all designated States except US)*: **THE COCA-COLA COMPANY** [US/US]; One Coca-Cola Plaza NW, Atlanta, GA 60313 (US).

(72) Inventors; and
(75) Inventors/Applicants *(for US only)*: **ADAMS, John, E.** [US/US]; 3265 Wood Branch Drive, Alpharetta, GA 30004 (US). **TOSINI, Giancarlo** [IT/IT]; Strada Montanara No. 107, 43100 Parma (IT).

(74) Agents: **HACKETT, Ingrid** et al.; The Coca-Cola Company, One Coca-Cola Plaza NW, Atlanta, GA 30313 (US).

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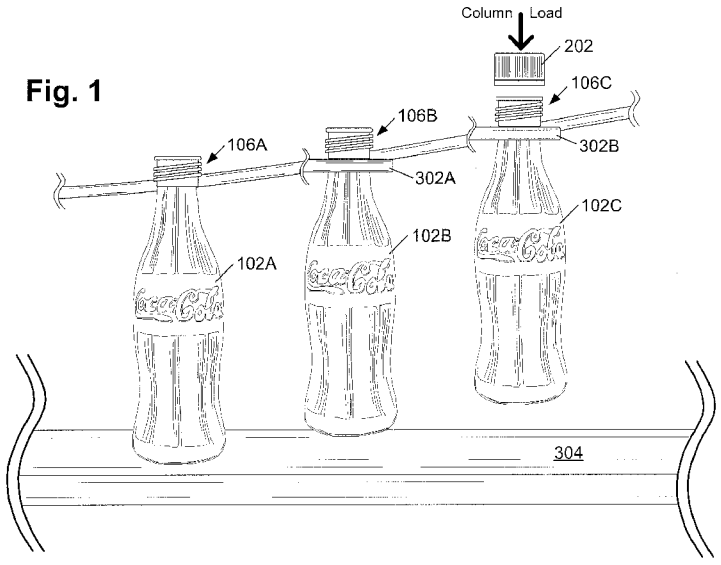
(54) **Title**: METHOD OF ISOLATING COLUMN LOADING AND MITIGATING DEFORMATION OF SHAPED METAL VESSELS

Fig. 1



(57) **Abstract**: The present invention relates to a method of isolating column loading and mitigating deformation of shaped metal vessels, the method comprising forming a cylindrical metal tube into a shaped metal vessel, the shaped metal vessel comprising a sealed end, an open end, and an integral carry ring proximate the open end. Column load is isolated between the open end and the carry ring by supporting the shaped metal vessel by the carry ring. The shaped metal vessel is sealed with a closure, wherein deformation of the shaped metal vessel between the sealed end and the carry ring due to column load is minimized during application of the closure.

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METHOD OF ISOLATING COLUMN LOADING AND MITIGATING DEFORMATION OF SHAPED METAL VESSELS

TECHNICAL FIELD OF THE INVENTION

[0001] This invention relates to a method of isolating column loading and mitigating deformation of shaped metal vessels, the method comprising forming a cylindrical metal tube into a shaped metal vessel, the shaped metal vessel comprising a sealed end, an open end, and an integral carry ring proximate the open end. Column load is isolated between the open end and the carry ring by supporting the shaped metal vessel by the carry ring. The shaped metal vessel is sealed with a closure, wherein deformation of the shaped metal vessel between the sealed end and the carry ring due to column load is minimized during application of the closure.

BACKGROUND OF THE INVENTION

[0002] Before our invention product packaging, often formed from sheet metal or metal slugs had to be designed with wall thicknesses sufficient to avoid deformation or crushing when high column loads were applied to the top of the product packaging. Such high column loads can typically occur while the packaging closure is being applied thus sealing the product packaging on a filling line. In this regard, often loading forces in excess of 175 pounds (lbs) can be applied to the top of the product packaging to apply and seal the packaging with a closure.

[0003] A shortcoming is that in designing packaging with thinner walls to support column loads more material is used in the product packaging, which raises the cost of the packaging.

[0004] Another shortcoming is that product packaging with thicker walls can be more difficult to shape and as such can limit the types and or kinds of possible functional and ornamental product packaging design options.

[0005] There is a long felt need for a system and method to enable the high column load during filling and closure application to be isolated to the top portion of the product packaging and to avoid packaging deformation or crushing during the fill and or application of the closure to seal the beverage. In addition, there is a long felt need for a low cost metal package well suited for food and beverage applications, as well as a need for other types and kinds of packages that have thin and or weaker side wall constructions. In addition, there is a need to overcome the shortcomings mentioned above as well as to overcome other shortcomings. All of which gives rise to the present invention.

SUMMARY OF THE INVENTION

[0006] The shortcomings of the prior art are overcome and additional advantages are provided through the provision of a method of isolating column loading and mitigating deformation of shaped metal vessels, the method comprising forming a cylindrical metal tube into a shaped metal vessel, the shaped metal vessel comprising a sealed end, an open end, and an integral carry ring proximate the open end. Column load is isolated between the open end and the carry ring by supporting the shaped metal vessel by the carry ring. The shaped metal vessel is sealed with a closure, wherein deformation of the shaped metal

vessel between the sealed end and the carry ring due to column load is minimized during application of the closure.

[0007] Additional shortcomings of the prior art are overcome and additional advantages are provided through the provision of a method of isolating column loading and mitigating deformation of shaped metal vessels, the method comprising forming a cylindrical metal tube into a shaped metal vessel, the shaped metal vessel comprising a sealed end, and an open end. An outsert is applied around the open end of the shaped metal vessel, the outsert comprising a carry ring. Column load is isolated between the open end and the carry ring by supporting the shaped metal vessel by the carry ring. The shaped metal vessel is sealed with a closure, wherein deformation of the shaped metal vessel between the sealed end and the carry ring due to column load is minimized during application of the closure.

[0008] Additional shortcomings of the prior art are overcome and additional advantages are provided through the provision of a method of isolating column loading and mitigating deformation of shaped metal vessels, the method comprising forming a cylindrical metal tube into a shaped metal vessel, the shaped metal vessel comprising a sealed end, an and open end. A carry ring is pinched or adhered around the open end of the shaped metal vessel. The column load is isolated between the open end and the carry ring by supporting the shaped metal vessel by the carry ring. The shaped metal vessel is sealed with a closure, wherein deformation of the shaped metal vessel between the sealed end and the carry ring due to column load is minimized during fill and application of the closure.

[0009] System and computer program products corresponding to the above-summarized methods are also described and claimed herein.

[0010] Additional features and advantages are realized through the techniques of the present invention. Other embodiments and aspects of the invention are described in detail herein and are considered a part of the claimed invention. For a better understanding of the invention with advantages and features, refer to the description and to the drawings.

BRIEF DESCRIPTION OF THE FIGURES

[0011] The subject matter which is regarded as the invention is particularly pointed out and distinctly claimed in the claims at the conclusion of the specification. The foregoing and other objects, features, and advantages of the invention are apparent from the following detailed description taken in conjunction with the accompanying drawings in which:

[0012] FIG. 1 illustrates one example of a system and method of isolating column loading and mitigating deformation of shaped vessels during fill and or closure application;

[0013] FIG. 2A-2C illustrates one example of product packaging comprising a column load-bearing outsert with a carry ring;

[0014] FIG. 3A-3B illustrates one example of product packaging comprising a column load-bearing outsert;

[0015] FIG. 4A-4B illustrates one example of product packaging comprising an integral thread and integral carry ring;

[0016] FIG. 5A-5B illustrates one example of product packaging comprising an inward extending integral carry ring;

[0017] FIG. 6A-6D illustrates one example of product packaging comprising symmetrical and asymmetrical carry rings pinched or adhered into product packaging;

[0018] FIG. 7A-7B illustrates one example of product packaging comprising a integral outwardly extending carry ring;

[0019] FIG. 8 illustrates one example of column load-bearing outsert;

[0020] FIG. 9 illustrates one example of product packaging comprising an outsert and application of a threaded screw cap closure. The product package supporting column load through use of carry ring support;

[0021] FIG. 10A-10B illustrates one example of product packaging comprising a crown finish closure. The product package supporting column load through use of carry ring support;

[0022] FIG. 11 illustrates one example of a shaped vessel;

[0023] FIG. 12-14 illustrates one example of a method of isolating column loading and mitigating deformation of shaped vessels during fill and or closure application;

[0024] FIG. 15 illustrates one example of a method of forming a carry ring in product packaging isolating column loading and mitigating deformation of shaped vessels during fill and or closure application; and

[0025] FIG. 16 illustrates examples of exemplary embodiments of methods of isolating column loading and mitigating deformation of shaped vessels during fill and or closure application.

[0026] The detailed description explains the preferred embodiments of the invention, together with advantages and features, by way of example with reference to the drawings.

DETAILED DESCRIPTION OF THE INVENTION

[0027] A. Shaped Metal Vessel

[0028] A shaped metal vessel is used in the present invention. Details of such shaped metal vessels can be found in the co-pending patent application entitled "SHAPED METAL VESSEL", inventor John E. Adams et al., which was filed concurrently with the present application and is incorporated herein by reference in its entirety.

[0029] Turning now to the drawings in greater detail, it will be seen that in Figure 1 there is illustrated one example of a system and method of isolating column loading and mitigating deformation of shaped vessels during fill and or closure application. In an exemplary embodiment, a plurality of shaped vessels 102A-C comprising outsert 106A-C can be formed by way of a plurality of cylindrical tubes and conveyed on a carrier 304. A carry ring can then be formed and or added to shaped vessel 102A-C. A carry ring support 302A-B can be used to support the shaped vessel during fill and or application of a closure 202. In this regard, a column load can be isolated between the carry ring and the open end of the shaped vessel 102C during shaped vessel 102 filling and or when the closure 202 is being applied.

[0030] For purposes of disclosure, column load also referred to as axially loading is defined as a load or force along or parallel to a concentric with a primary axis. In this regard, the primary axis is from the top open end to the bottom sealed end of the shaped vessel 102. In an exemplary embodiment, such a column load is typically present during fill and or when the closure is being applied to the shaped vessel 102 and when the shaped

vessels are stacked on top of each other, such as when forming pallets of stacked product, store displays, storage of finished product, and or is present in other situations, as may be required and or desired in a particular embodiment.

[0031] In addition, for purposes of disclosure, a cylindrical tube is defined as the space enclosed by a cylindrical surface. As example, a soda or vessel can be referred to as a cylindrical tube. Furthermore, shaped vessel 102 can be referred to as a shaped metal vessel.

[0032] An advantage of isolating the column to the area between the carry ring and the open end of the shaped vessel 102A-C is that such column loading does not get applied to the area of the shaped vessel below the carry ring. As such, isolating the column load to the area between the carry ring and the open end of the shaped vessel effectuates the ability to manufacture a thinner walled shaped vessel, from metal or other materials, that might otherwise deform and or crush under high column loading. An economic advantage is that thinner walled vessels have less material and are less costly to manufacture. This is particularly true regarding metal vessels. A marketing and fabrication advantage is that the thinner walled vessels can be easier to shape and form, which effectuates the ability to create highly shaped vessels by numerous molding methods including blow molding, pressure ram, embossed, rolled, hydro formed, pneumatic formed, stamped halves, and or other methods, as may be required and or desired in a particular embodiment.

[0033] Referring to Figure 2A-2C there is illustrated one example of product packaging also referred to as shaped vessel 102 or shaped metal vessel 102 comprising a column load-bearing outsert 106 having a carry ring 108. Figure 2A illustrates a shaped vessel 102 with outsert 106 placed around the open end 124 of the vessel. Figure 2B

illustrates a thin wall cross section 110 view of the shaped vessel 102 with the outsert 106 being positioned under a rolled edge 104. For purposes of disclosure a shaped, polished, or other edge description can be referred to as a rolled edge.

[0034] Figure 2C illustrates a cross section view of the shaped vessel 102 with the outsert 106 being positioned under a rolled edge 104. The rolled edge 104 interlocking with the outsert 106 to prevent outsert 106 slippage around the vessel neck during threaded closure application and removal.

[0035] Referring to Figure 2B, in an exemplary embodiment, outsert 106 can be manufactured from polymers, metal, or glass and or other materials, as may be required and or desired ion a particular embodiment. Furthermore, the outsert 106 can be used with a closure such as a crown finish type, a threaded finish type, a rolled-on pilfer proof (ROPP) type, a plastic closure, snap-on closure finish, and or other types and kinds of closures, as may be required and or desired in a particular embodiment. Crown finishes can be metal, plastic, and or other materials, as may be required and or desired. Plastic closures can be threaded, twist-off, and or other types of closure, as may be required and or desired in a particular embodiment. In an exemplary embodiment, a carry ring length 'Q' can be in the range of 1mm to 10mm, with a preferred length of less than 5mm.

[0036] Referring to Figure 2C, in an exemplary embodiment, outsert 106 can be manufactured from polymers, metal, or glass and or other materials, as may be required and or desired ion a particular embodiment. Furthermore, the outsert can be used with a closure such as a crown finish type, a threaded finish type, a rolled-on pilfer proof (ROPP) type, a plastic closure, snap-on closure finish, and or other types and kinds of closures, as may be required and or desired in a particular embodiment. Crown finishes can be metal,

plastic, and or other materials, as may be required and or desired. Plastic closures can be threaded, twist-off, and or other types of closure, as may be required and or desired in a particular embodiment. The step at the top of the outsert allows the vessel material to be rolled over the outsert upper edge which grips the outsert and aids in securing the outsert from rotation and slippage when the closure is applied and or removed from the vessel.

[0037] Referring to Figure 3A-3B there is illustrated one example of product packaging also referred to as shaped vessel 102 comprising a column load-bearing outsert 106. The outsert 106 further comprising optional threads 122 for engaging and securing a removable closure 202 (closure 202 not shown in this Figure). In an exemplary embodiment, the optional threads can be a plurality of threads spirally affixed to the outer surface of the outsert to engage and secure a separate vessel closure to the shaped metal vessel body. The vessel 102 further comprising a rolled edge 104. Figure 3A illustrates a shaped vessel 102 with outsert 106 placed around the open end of the vessel. Figure 3B illustrates a cross section view of the shaped vessel 102 with the outsert 106 being positioned under a rolled edge 104.

[0038] Figure 3B also illustrates how a shaped vessel 102 thin wall cross section 110 can be a rolled edge 104 or otherwise shape edge 104 at the top of the open end 124 of the vessel 102. In this regard, the rolled edge 104 secures the outsert 106 from slipping off the shaped vessel 102, open end 124, as well as provides a smooth edge to effectuate good consumer experience when pouring and drinking from the shaped vessel 102.

[0039] Referring to Figures 4A-4B there is illustrated one example of product packaging also referred to as shaped vessel 102 comprising an integral thread and integral carry ring. Referring to Figure 4A, in an exemplary embodiment, threads 122, rolled edge

104, and carry ring 114 can be formed integral to the vessel 102. An advantage of this embodiment is that no additional outsert or separate carry ring such as carry ring 114A-B shown in Figure s 6A-6B. This can lead to faster manufacturing line speeds, less complicated assembly, and lower cost vessels 102. Closures such as a crown finish type, a threaded finish type, a rolled-on pilfer proof (ROPP) type, a plastic closure, snap-on closure finish, and or other types and kinds of closures, as may be required and or desired in a particular embodiment. Crown finishes can be metal, plastic, and or other materials, as may be required and or desired. Plastic closures can be threaded, twist-off, and or other types of closure, as may be required and or desired in a particular embodiment.

[0040] Figure 4B also illustrates how a shaped vessel 102 thin wall cross section 110 can be a rolled edge 104 or otherwise shape edge 104 at the top of the open end 124 of the vessel 102. Threads 122 and a carry ring 114 are integral to the vessel wall 110 eliminating in this embodiment the need for an outsert.

[0041] Referring to Figure 5A-5B there is illustrated one example of product packaging also referred to as shaped vessel 102 comprising an inward extending integral carry ring 120. Figure 5B illustrates a cross sectional view of the open end 124 of the shaped vessel 102, illustrating the side wall 110, formed edge 104, and the formed carry ring 120. In an exemplary embodiment, a carry ring 120 can be formed in the side wall of the shaped vessel 102. An advantage of the present invention is that by forming the carry ring in the side wall of the shaped vessel no separate carry ring or outsert is required.

[0042] Referring to Figure 5A, in an exemplary embodiment, a length of outsert 106 'B' can be in the range of 5mm to 30mm, with a preferred length of less than 20mm. An opening 'H' length can be in the range of 13mm to 50mm. A rolled edge 'I' length can be

in the range of 0.25mm to 5mm, with a preferred length of less than 3mm. An opening diameter 'K' can be in the range of 10mm to 47mm, with a preferred diameter of less than 32mm. A carry ring of length 'J' can be in the range of 1mm to 8mm, with a preferred length of less than 5mm.

[0043] Referring to Figures 6A-6D there is illustrated one example of product packaging also referred to as shaped vessel 102 comprising symmetrical 114B or asymmetrical 114A carry ring pinched or adhered to the product packaging 102. Figure 6A-6B illustrates a shaped vessel 102 with outsert 106 placed around the open end of the vessel. Figure 6A illustrates an asymmetrical carry ring 114A having a shaped outer circumference edge other than the continuous circular circumference outer edge such as shown in Figure 6B carry ring 114B. The inner circumference is sized to fit around the open end of the shaped vessel 102. In an exemplary embodiment, the shaped outer edge can be any shape, as may be required and or desired in a particular embodiment.

[0044] Figure 6B illustrates a symmetrical carry ring 114B. Symmetrical refers to the outer circumference edge of carry ring 114B being continuous circular in shape. The inner circumference is sized to fit around the open end of the shaped vessel 102.

[0045] Figure 6C illustrates a shaped vessel 102 with a carry ring 114 pinched or adhered between a formed upper edge 118A and a formed lower edge 118B being positioned proximate the rolled edge 104. The upper edge 118A and lower edge 188B are integral to the tapered body of the shaped metal vessel body.

[0046] Figure 6D illustrates a shaped vessel 102 with a carry ring 114 pinched or adhered between a lower ledge integrally formed in the tapered body portion of the vessel 102 a carry ring 114 resting on top of the integral lower ledge and formed integral upper

edge 118B pinches and or adheres the carry ring 114 in place between the formed lower ledge and the upper edge 118. The upper edge 118A and lower ledge are integral to the tapered body of the shaped metal vessel body. For purposes of disclosure the lower ledge can be referred to as the lower edge.

[0047] Referring to Figures 6C-6D, in an exemplary embodiment, a length of the open end 'B' can be in the range of 5mm to 30mm, with a preferred length of less than 20mm. An opening 'H' length can be in the range of 13mm to 50mm. A rolled edge 'I' length can be in the range of 0.25mm to 5mm, with a preferred length of less than 3mm. An opening diameter 'K' can be in the range of 10mm to 47mm, with a preferred diameter of less than 32mm. A carry ring being pinched or adhered between the lower edge and the upper edge, the lower edge, the upper edger, and the carry ring combination of length 'J' can be in the range of 1mm to 8mm, with a preferred length of less than 5mm.

[0048] Referring to Figure 7A-7B there is illustrated one example of product packaging also referred to as shaped vessel 102 comprising an integral outwardly extending carry ring. Figure 7A illustrated the shaped vessel 102 comprising the integral outwardly extending carry ring 120. Figure 7B illustrates a cross sectional view of the open end 124 of the shaped vessel 102, illustrating the side wall 110, formed edge 104, and the formed carry ring 120. In an exemplary embodiment, a carry ring 120 can be integrally formed in the side wall of the shaped vessel 102.

[0049] Referring to Figure 8 there is illustrated one example of a column load-bearing outsert 106. In an exemplary embodiment, the outsert 106 is positioned around the open end of a shaped vessel 102, optional threads 122 for engaging and securing a removable closure 202 (closure 202 not shown in this Figure), and designed to provide a carry ring or

carry ring edge to support column load during the application of a closure onto the open end of the shaped vessel. The optional threads can be a plurality of threads spirally affixed to the outer surface of the outsert to engage and secure a separate vessel closure to the shaped body. Such an outsert can be manufactured from plastic, metal, or other material, as may be required and or desired in a particular embodiment.

[0050] For purposes of disclosure column load also referred to as axially loading is defined as a load or force along or parallel to a concentric with a primary axis. In this regard, the primary axis is from the top open end to the bottom sealed end of the shaped vessel 102. In an exemplary embodiment, such a column load is typically present during fill and or when the closure is being applied to the shaped vessel 102 and when the shaped vessels are stacked on top of each other, such as when forming pallets of stacked product, store displays, storage of finished product, and or in present in other situations, as may be required and or desired in a particular embodiment.

[0051] Referring to Figure 9 there is illustrated one example of product packaging also referred to as a shaped vessel 102 comprising an outsert 106 and application of a threaded screw cap closure 202. The product package 102 supporting column loads through use of carry ring support 302. In an exemplary embodiment, a carry ring support 302 can be associated with a system for conveying the shaped vessel 102 to the closure application location or station. A capping system can apply the closure 202 creating a column load in the range of 600 pounds (lbs) to 800 lbs for crown type closures, 300 lbs to 500 lbs for ROPP type closures, 30 lbs to 80 lbs for plastic threaded or twist off closures in general varying in accordance with the type and or kind of closure utilized.

[0052] Referring to Figure 10A-10B there is illustrated one example of product packaging also referred to as a shaped vessel 102 comprising a crown finish closure 202. Figure 10A illustrates a shaped vessel 102 comprising a rolled edge 104 being supported by a carry ring support 302. Figure 10B illustrates a cross section of the carry support 302 shaped to fit the shaped vessel 102 comprising carry ring 120.

[0053] Referring to Figure 11 there is illustrated one example of a shaped vessel 102. Shaped vessel 102 can be characterized with certain preferred embodiment dimensional ratios. Such shaped vessel 102 can also utilize straight walls, as may be required and or desired in a particular embodiment. In this regard, a length of the outsert 106 'B' can be in the range of 5mm to 30mm, with a preferred length of less than 20mm. An opening 'H' length can be in the range of 13mm to 50mm. A rolled edge 'I' length can be in the range of 0.25mm to 5mm, with a preferred length of less than 3mm. An opening diameter 'K' can be in the range of 10mm to 47mm, with a preferred diameter of less than 27mm.

[0054] In a plurality of exemplary embodiments the size of the shaped vessel can vary to accommodate shaped vessels that are small, medium, and large, as may be required and or desired in a particular embodiment. As example and not a limitation such dimensional aspect for a typical 500 milliliter (ml) vessel can be as follows. The total length of the shaped vessel 120 'A' can be in the range of 230mm to 280mm, with a preferred length in the range of 251mm. A tapered body minimum diameter 'L' can be in the range of 20mm to 30mm, with a preferred diameter in the range of 25mm. A mid body maximum diameter 'M' can be in the range of 50mm to 80mm with a preferred diameter in the range of 68mm. A low body minimum diameter 'N' can be in the range of 45mm to 70mm, with a preferred diameter in the range of 59mm. A base maximum diameter 'O' can be in the range of 50mm to 75mm, with a preferred diameter of in the range of 69mm. A tapered

body 'C' length can be in the range of 80mm to 100, with a preferred length in the range of 80mm. A mid body 'D' length can be in the range of 20mm to 50mm, with a preferred length in the range of 30mm. A low body 'E' length can be in the range of 100mm to 120mm, with a preferred length in the range of 106mm. A base 'F' length can be in the range of 18mm to 30mm, with a preferred length in the range of 22mm. A shaped vessel 102 length 'G' can be in the range of 50mm to 75mm, with a preferred length of less than 69mm. In an exemplary embodiment where the shaped vessel 102 is fabricated from metal the thickness of the metal can be in the range of 0.0030 inch to 0.0250 inch.

[0055] B. Method of Making the Shaped Metal Vessel

[0056] Referring to Figure 12 there is illustrated one example of a method of isolating column loading and mitigating deformation of shaped vessels 102 during closure 202 applications. In an exemplary embodiment, a cylindrical tube fabricated from metal, or other material can be molded and or formed into a shaped vessel 102. A carry ring can then be formed in the shaped vessel 102 proximate the open end of the shaped vessel 102. The contour vessel 102 can then supported by the carry ring to isolate the column load associated with the application of a closure 202 to the region between the open end and the carry ring. In this regard, isolating the column load to the open end of the shaped vessel 102 minimizes deformation of the shaped vessel 102 resultant from column loading during application of the closure 202. The shaped vessel 102 can then be sealed with the application of a closure 202. The method begins in block 1002.

[0057] In block 1002 a cylindrical tube is formed or otherwise shaped into a shaped vessel 102. In an exemplary embodiment, a cylindrical tube can be formed by injection molding, cupping, drawn and ironing (D&I), draw or re-draw (DRD) of sheet metal,

impact extrusion of metal slugs, and or by other methods, as may be required and or desired in a particular embodiment. The cylindrical tube can be formed into a shaped vessel 102 by way of one or more or the following methods blow molding, pressure ram, embossing or de-embossing, die forming, trimming, shaping, hydro forming, pneumatic forming, rolled, necking or contouring, stamped halves, and or by other methods, as may be required and or desired in a particular embodiment.

[0058] In contrast to polyethylene terephthalate (PET) vessel forming, wherein the carry ring can be part of the injection molded preform and thus present prior to the step of molding, the method of the present invention forms the carry ring either as a separate step after the vessel is formed or during the forming of the vessel. This is considered an advantage in the present invention and is due in part to the fact that no preform exists and often the starting material is sheet metal or metal slug and as such molding or forming of the vessel is required prior to being able to add and or form a carry ring.

[0059] For purposes of disclosure embossed is defined as an embellishment such as indicia having a raised pattern on a surface. De-embossed is defined as an embellishment such as indicia having a sunken pattern on a surface. In the present invention such a surface can be the surface of the shaped vessel 102, the closure 202, and or other surfaces, as may be required and or desired in a particular embodiment.

[0060] Though advantageously the vessel 102 can create an iconic shaped vessel, the trade off can be a very thin walled vessel that can no longer support a column load that is generated while applying the closure to the vessel. In other embodiments, the cost of the shaped vessel 102 may be directly proportional to the amount of material such as aluminum or other material used to form the vessel. As an example and not a limitation,

the more metal needed to make the vessel the higher the cost of the vessel. As such, it may be highly desirable to minimize vessel cost by making the shaped vessel with wall thicknesses as thin as possible to save material costs. In an exemplary embodiment, such shaped vessels 102 fabricated form metal or metal alloy can be shaped with wall thicknesses in the range of 0.0030 inch to 0.0250 inch.

[0061] In an exemplary embodiment, the shaped vessel 102 has a sealed end and an open end. In this regard, product can be put into the shaped vessel 102 and with a closure 202 seal the product into the shaped vessel 102. The method continues in block 1004.

[0062] In block 1004 a carry ring is formed proximate the open end of the shaped vessel 102. In this regard, a carry ring can be used to support the shaped vessel during fill and or application of the closure 202. Such application of a closure 202 can introduce a column load in the range of generally 30 lbs to 800 lbs depending on the type, kind, and manner that the closure is applied. In this regard, without supporting the shaped vessel 102 by the carry ring, such a column load could be sufficient to deform and or crush the thin walled shaped vessel 102.

[0063] In an exemplary embodiment, a carry ring can be formed into the wall of the shaped vessel and illustrated in Figures 7A-7B and or formed by other methods, as may be required and or desired in a particular embodiment. The method then continues in block 1006.

[0064] In block 1006 the column load is isolated between the carry ring and the open end of the vessel by supporting the shaped vessel with a carry ring support 302. As such, resultant from the shaped vessel 102 being supported by the carry ring support 302, the shaped vessel below the carry ring does not receive sufficient column load during

application of the closure 202 to cause deformation and or crushing of the thin walled body portion of the shaped vessel 102. The method continues in block 1008.

[0065] In block 1008 the shaped vessel 102 is sealed with a closure 202. In an exemplary embodiment, for example and not a limitation, the shaped vessel can be filled with a product such as a refreshing COCA-COLA product prior to the shaped vessel being sealed. During such shaped vessel 102 sealing, depending on the closure type, for example a threaded closure, a crown type finish, metal or plastic closure, and or other types and kinds of closures, as may be required and or desired in a particular embodiment. Column load can range generally from 30 lbs to 800 lbs depending on the type, kind, and manner that the closure is applied.

[0066] An advantage with the present invention is that with the use of a carry ring, significantly higher column load forces can be used in the application of putting the closure onto the shaped vessel 102. In this regard, other types and kinds of closure 202 that currently cannot be used to seal vessels due to high column load damaging the vessel, can be used with the present invention due in part to the fact that the column load can be isolated between the carry ring, by way of the carry ring support 302 and the open end of the shaped vessel 102. The method is then exited.

[0067] Referring to Figure 13 there is illustrated one example of a method of isolating column loading and mitigating deformation of shaped vessels 102 during closure 202 applications. In an exemplary embodiment, a cylindrical tube fabricated from metal, or other material can be molding into a shaped vessel 102. An outsert can be applied around the open end of the shaped vessel 102. The outsert comprising a carry ring. The contour vessel 102 is then supported by the carry ring to isolate the column load associated with

the application of a closure 202 to the region between the open end and the carry ring. In this regard, isolating the column load to the open end of the shaped vessel 102 minimizes deformation of the shaped vessel 102 resultant from column loading during application of the closure 202. The shaped vessel 102 can then be sealed with the application of a closure 202. The method begins in block 2002.

[0068] In block 2002 the shaped vessel is formed with the methods detailed in block 1002 or by other methods, as may be required and or desired in a particular embodiment. The method continues in block 2004.

[0069] In block 2004 an outsert is applied around the open end of the shaped vessel 102. The outsert comprising a carry ring. Such a carry ring can be formed into the outsert as a pronounced ledge such as ledge 108 illustrated in Figure 2A-2B or other ledge, as may be required and or desired in a particular embodiment. In another exemplary embodiment, a carry ring edge can be exposed such as carry ring 114 illustrated in Figure 3B or other carry ring edge, as may be required and or desired in a particular embodiment. The method continues in block 2006.

[0070] In block 2006 the column load is isolated between the carry ring and the open end of the shaped vessel 102 with the methods detailed in block 1006 or by other methods, as may be required and or desired in a particular embodiment. The method continues in block 2008.

[0071] In block 2008 the shaped vessel 102 can be sealed with a closure 202 with the methods detailed in block 1008 or by other methods, as may be required and or desired in a particular embodiment. The method is then exited.

[0072] Referring to Figure 14 there is illustrated one example of a method of isolating column loading and mitigating deformation of shaped vessels 102 during closure 202 applications. In an exemplary embodiment, a cylindrical tube fabricated from metal, or other material can be molding into a shaped vessel 102. A carry ring can added to the shaped vessel 102 and pinched or adhered to the shaped vessel 102 to secure the carry ring in place proximate the open end of the shaped vessel 102. The contour vessel 102 is then supported by the carry ring to isolate the column load associated with the application of a closure 202 to the region between the open end and the carry ring. In this regard, isolating the column load to the open end of the shaped vessel 102 minimizes deformation of the shaped vessel 102 resultant from column loading during application of the closure 202. The shaped vessel 102 can then be sealed with the application of a closure 202. The method begins in block 3002.

[0073] In block 3002 the shaped vessel is formed with the methods detailed in block 1002 or by other methods, as may be required and or desired in a particular embodiment. The method continues in block 3004.

[0074] In block 3004 a carry ring can be pinched or adhered to the shaped vessel 102 to create and or retain the carry ring around the neck area proximate the open end of the shaped vessel 102. Such a carry ring can be partially formed in the material of the shaped vessel 102 and or have added to the vessel assemble additional material such as a separate carry ring and or other materials, as may be required and or desired in a particular embodiment. The method continues in block 3006.

[0075] In block 3006 the column load is isolated between the carry ring and the open end of the shaped vessel 102 with the methods detailed in block 1006 or by other methods,

as may be required and or desired in a particular embodiment. The method continues in block 3008.

[0076] In block 3008 the shaped vessel 102 can be sealed with a closure 202 with the methods detailed in block 1008 or by other methods, as may be required and or desired in a particular embodiment. The method is then exited.

[0077] Referring to Figure 15 there is illustrated one example of a method of forming a carry ring in product packaging isolating column loading and mitigating deformation of shaped vessels during closure application. In an exemplary embodiment, a cylindrical tube fabricated from metal, or other material can be formed into a shaped vessel 102. A lower edge 118B can be formed in the side wall of the shaped vessel 102 proximate the open end of the vessel. A carry ring can added to the shaped vessel 102. The carry ring 114, 114A-B can be asymmetrical 114A or symmetrical 114B as illustrated in Figure 6A-6C. An upper edge 118A is then formed in the vessel wall above the lower edge and carry ring to secure by pinching or adhesion the added carry ring in place. The contour vessel 102 is then supported by the carry ring to isolate the column load associated with the application of a closure 202 to the region between the open end and the carry ring. In this regard, isolating the column load to the open end of the shaped vessel 102 minimizes deformation of the shaped vessel 102 resultant from column loading during application of the closure 202. The shaped vessel 102 can then be sealed with the application of a closure 202. The method begins in block 4002.

[0078] In block 4002 the shaped vessel is formed with the methods detailed in block 1002 or by other methods, as may be required and or desired in a particular embodiment. The method continues in block 4004.

[0079] In block 4004 a lower edge can be formed on the shaped vessel 102 side walls. Such a lower edge can be formed by way of necking, blow molding, pressure ram, embossed, rolled, hydro formed, pneumatic formed, stamped halves, or other shaping type operations, as may be required and or desired in a particular embodiment. The method continues in block 4006.

[0080] In block 4006 a carry ring 114 is placed around the open end of the shaped vessel 102. The carry ring rests on the lower edge which keeps the ring from sliding down the neck of the contour vessel. The method continues in block 4008.

[0081] In block 4008 an upper edge is formed on the shaped vessel 102 side walls above the lower edge and the carry ring. The method continues in block 4010.

[0082] In block 4010 the carry ring is pinched or adhered between the lower and upper edge proximate the open end of the shaped vessel 102. In an exemplary embodiment, the column load is isolated between the carry ring and the open end of the shaped vessel 102 with the methods detailed in block 1006 or by other methods, as may be required and or desired in a particular embodiment. Figures 6A-6D illustrates the carry ring 114, 114A-B and the pinched or adhered position between the upper edge 118A and the lower edge 118B. The method is then exited.

[0083] Referring to Figure 16 there is illustrated examples of exemplary embodiments of methods of isolating column loading and mitigating deformation of shaped vessels during closure application. Such exemplary embodiments can be selectively utilized with the methods of the present invention.

[0084] In block 5002 an outsert can be applied around the open end of the shaped vessel 102. Such application can be by press fitting, adhering, roll formed, and or by other methods, as may be required and or desired in a particular embodiment.

[0085] In block 5004 the shaped vessel can be filled with a product. In an exemplary embodiment, such a product can be filled through the open end of the shaped vessel 102. Such products can include food, beverage, and or other products, as may be required and or desired in a particular embodiment.

[0086] In block 5006 the cylindrical tube can be heated to increase the workability of the vessel material prior to and or during the step of molding. In an exemplary embodiment, a metal cylindrical tube can be heated to soften the metal prior to and or during molding. Furthermore, such molding methods can include blow molding, pressure ram, embossed, rolled, hydro formed, pneumatic formed, stamped halves, and or other types and kinds of molding, as may be required and or desired in a particular embodiment.

[0087] In block 5008 the shaped vessel can be decorated. Such decoration can be brand name indicia, product indicia, nutrition content indicia, and or other indicia and or decoration, as may be required and or desired in a particular embodiment. In an exemplary embodiment, such indicia and or decoration can be applied to the shaped vessel by way of printing, screening, ink jet, application on a pre printed label, and or by other methods, as may be required and or desired in a particular embodiment.

[0088] In block 5010 the cylindrical tube is formed from a sheet metal or metal slug. In an exemplary embodiment, sheet metal can be formed into a cylindrical tube by way of cupping, drawn and ironing (D&I), impact extrusion of metal slugs formed, and or by way

of other types and kinds of methods, as may be required and or desired in a particular embodiment.

[0089] In block 5012 the formed shaped vessel 102 can be heat treated to strengthen the vessel walls or improve the metal for future forming operations. In an exemplary embodiment, such heating methods can include annealing, tempering, re-crystallizing, and or other methods, as may be required and or desired in a particular embodiment.

[0090] In block 5014 the shaped vessel can be trimmed. In an exemplary the open end of the shaped vessel can be trimmed to create a uniform even open end edge. As an example and not a limitation, trimming of the open end edge can be effectuated prior to rolling the edge such as illustrated in Figures 2A-2C and 3A-B, 4A-4B, 5A-5B, 6C-6D, and 7A-7B shown as rolled edge 104.

[0091] In block 5016 the shaped vessel can have the interior of the vessel coated to prevent the contents of the vessel such as a food, beverage, or other packaging contents, as may be required and or desired in a particular embodiment from coming in contact with the metal side walls of the vessel. In this regard, such metal vessel can leach into the packaging contents and or the packaging contents can adversely interact with the metal that forms the vessel. In an exemplary embodiment a coating such as epoxies, acrylics, polyesters, polymer laminates, and others can be used to insure separation of the metal vessel surface from the vessel contents such as a food or a beverage. Such a coating can be applied to the sheet metal prior to forming the cylindrical tube, to the cylindrical tube prior to shaping into a shaped vessel, and or to the shape vessel after shaping, as may be required and of desired in a particular embodiment..

[0092] In block 5018 the shaped vessel can be cleaned to remove any process films, oils, dirt and or debris, contamination, sterilization, and or cleaned for other purposes, as may be required and or desired in a particular embodiment.

[0093] In block 5020 final shaping can be provided after initial shaping processes are performed. In this regard, after the vessel has been initially shaped, other non-shaping steps can be performed such as decoration, trimming, cleaning, and other non-shaping steps, as may be required and or desired in a particular embodiment. After such non-shaping steps additional shaping steps can be performed.

[0094] The capabilities of the present invention can be implemented in software, firmware, hardware or some combination thereof.

[0095] As one example, one or more aspects of the present invention can be included in an article of manufacture (e.g., one or more computer program products) having, for instance, computer usable media. The media has embodied therein, for instance, computer readable program code means for providing and facilitating the capabilities of the present invention. The article of manufacture can be included as a part of a computer system or sold separately.

[0096] Additionally, at least one program storage device readable by a machine, tangibly embodying at least one program of instructions executable by the machine to perform the capabilities of the present invention can be provided.

[0097] The flow diagrams depicted herein are just examples. There may be many variations to these diagrams or the steps (or operations) described therein without departing from the spirit of the invention. For instance, the steps may be performed in a

differing order, or steps may be added, deleted or modified. All of these variations are considered a part of the claimed invention.

[0098] While the preferred embodiment to the invention has been described, it will be understood that those skilled in the art, both now and in the future, may make various improvements and enhancements which fall within the scope of the claims which follow. These claims should be construed to maintain the proper protection for the invention first described.

CLAIMS

What is claimed is:

1. A method of isolating column loading and mitigating deformation of shaped metal vessels, the method comprising:

forming a cylindrical metal tube into a shaped metal vessel, the shaped metal vessel comprising a sealed end, an open end, an integral carry ring proximate the open end, and thin side walls;

isolating column load between the open end and the carry ring by supporting the shaped metal vessel by the carry ring; and

sealing the shaped metal vessel with a closure, wherein deformation of the shaped metal vessel between the sealed end and the carry ring due to column load is minimized during application of the closure.

2. The method in accordance with claim 1, further comprising: filling the shaped metal vessel with a product.

3. The method in accordance with claim 1, further comprising: heating the cylindrical metal tube to increase workability during forming.

4. The method in accordance with claim 1, further comprising: decorating the shaped metal vessel.

5. The method in accordance with claim 1, further comprising: forming the cylindrical metal tube from a sheet of metal or metal slug.

6. The method in accordance with claim 1, further comprising: forming flutes on the surface of the shaped metal vessel.

7. The method in accordance with claim 1, further comprising: embossing or de-embossing indicia on the surface of the shaped metal vessel.

8. The method in accordance with claim 1, wherein forming the cylindrical metal tube is by way of blow molding, pressure ram, stamped halves, die necking, hydro forming, or pneumatic forming.

9. The method in accordance with claim 1, wherein the closure is selected from the group consisting of a crown finish, a threaded finish, snap-on closure finish, or a rolled-on pilfer-proof (ROPP) finish.

10. A method of isolating column loading and mitigating deformation of shaped metal vessels, the method comprising:

forming a cylindrical metal tube into a shaped metal vessel, the shaped metal vessel comprising a sealed end, and an open end;

applying an outsert around the open end of the shaped metal vessel, the outsert comprising a carry ring;

isolating column load between the open end and the carry ring by supporting the shaped metal vessel by the carry ring; and

sealing the shaped metal vessel with a closure, wherein deformation of the shaped metal vessel between the sealed end and the carry ring due to column load is minimized during application of the closure.

11. The method in accordance with claim 10, further comprising: forming the cylindrical metal tube from a sheet of metal or metal slugs.

12. The method in accordance with claim 10, further comprising: heating the cylindrical metal tube to increase workability during step of forming.

13. The method in accordance with claim 10, further comprising: decorating the shaped metal vessel.

14. The method in accordance with claim 10, wherein the closure is selected from the group consisting of a crown finish, a threaded finish, snap-on closure finish, or a rolled-on pilfer-proof (ROPP) finish.

15. A method of isolating column loading and mitigating deformation of shaped metal vessels, the method comprising:

forming a cylindrical metal tube into a shaped metal vessel, the shaped metal vessel comprising a sealed end, an and open end;

pinching or adhering a carry ring around the open end of the shaped metal vessel;

isolating column load between the open end and the carry ring by supporting the shaped metal vessel by the carry ring; and

sealing the shaped metal vessel with a closure, wherein deformation of the shaped metal vessel between the sealed end and the carry ring due to column load is minimized during fill and application of the closure.

16. The method in accordance with claim 15, wherein pinching or adhering further comprising:

forming a lower edge integral to the shaped metal vessel proximate the open end;

placing a carry ring around the open end and resting on the lower edge; and

forming an upper edge integral to the shaped metal vessel above the lower edge and the carry ring, the carry ring is pinched or adhered between the lower edge and the upper edge.

17. The method in accordance with claim 16, wherein the carry ring is asymmetrical in shape.

18. The method in accordance with claim 16, wherein the lower edge or the upper edge is integrally formed around less than the entire the circumference of the open end.

19. The method in accordance with claim 15, further comprising: forming the cylindrical metal tube from a sheet of metal or metal slugs.

20. The method in accordance with claim 15, wherein forming the cylindrical metal tube into the shaped metal vessel is by way of blow molding, pressure ram, embossed, rolled, hydro formed, pneumatic formed, or stamped halves.

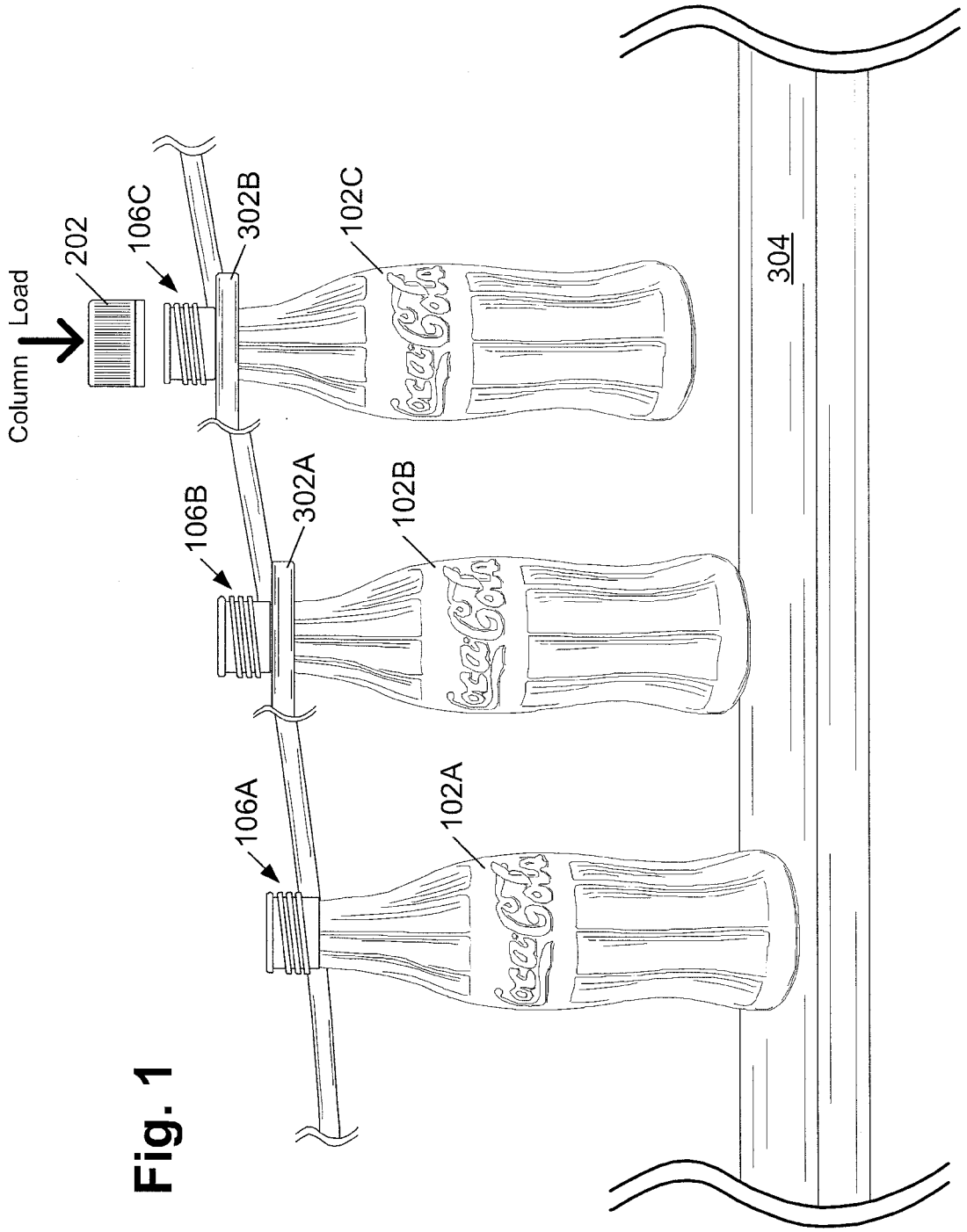


Fig. 1

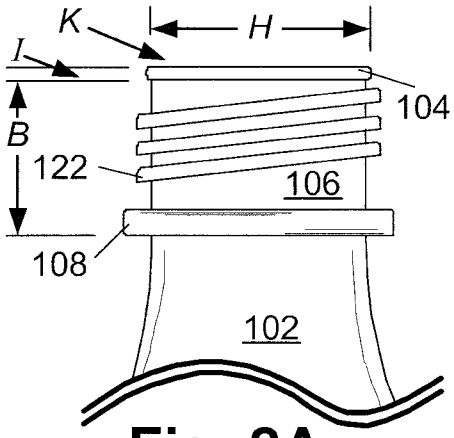


Fig. 2A

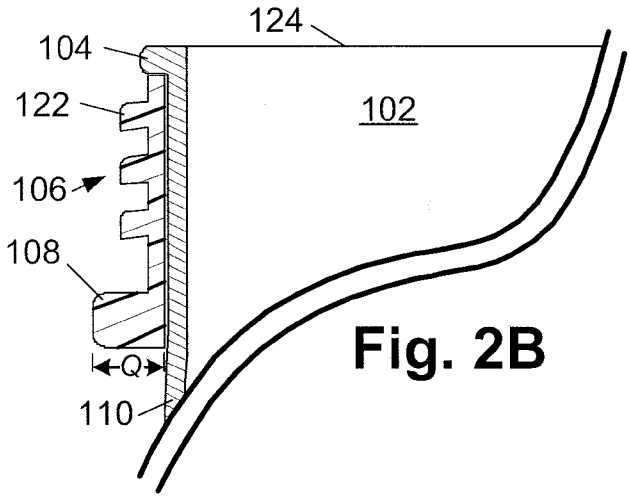


Fig. 2B

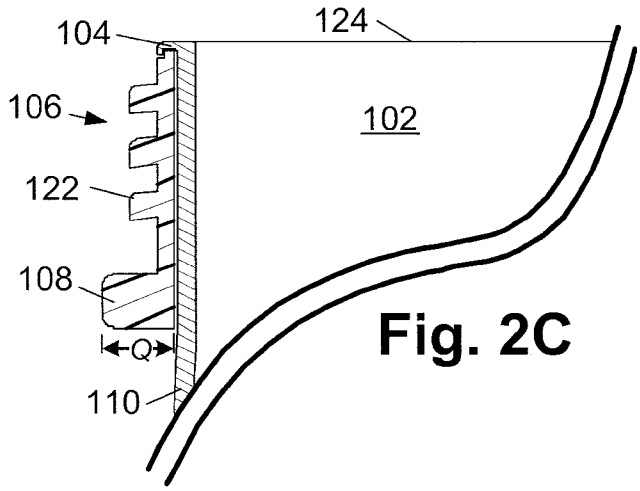


Fig. 2C

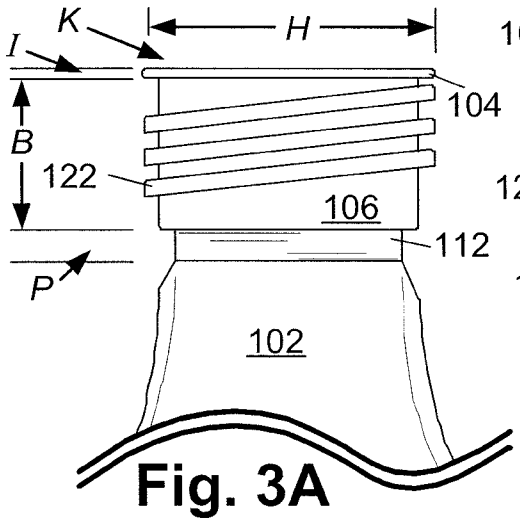


Fig. 3A

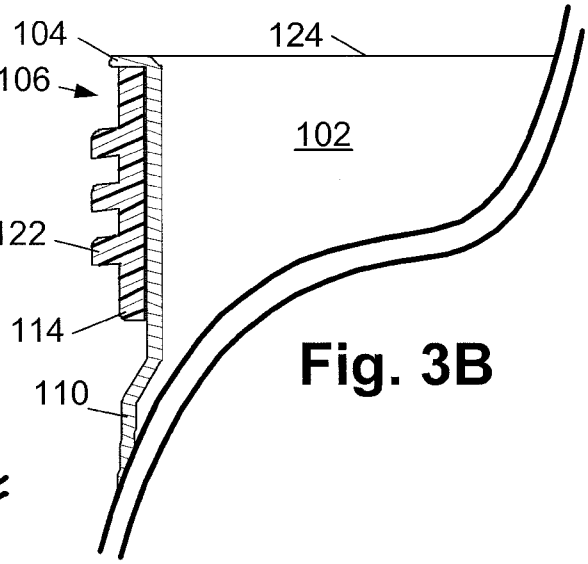


Fig. 3B

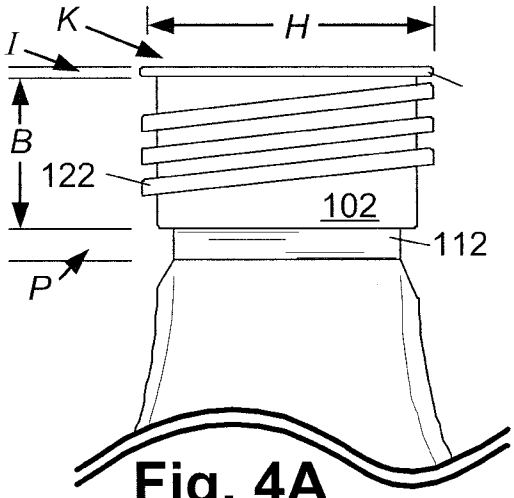


Fig. 4A

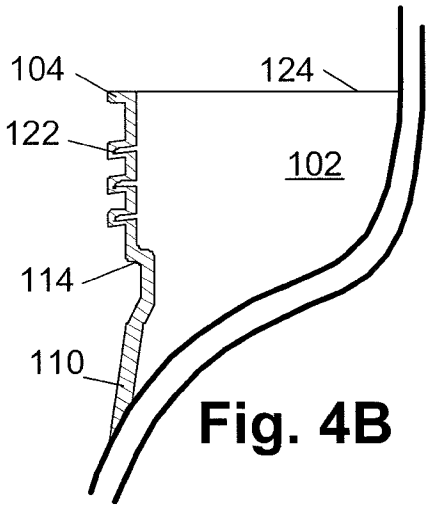


Fig. 4B

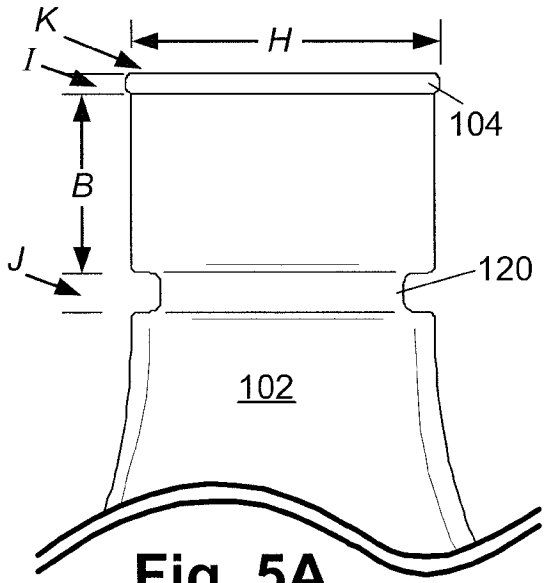


Fig. 5A

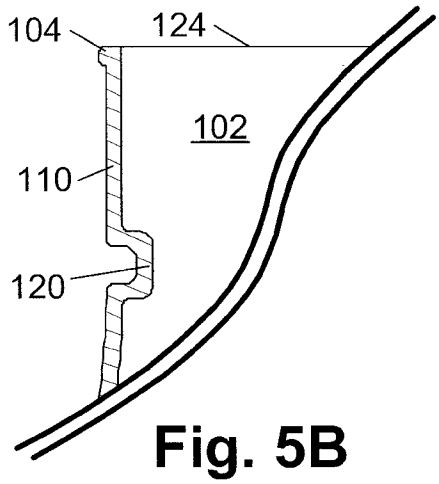


Fig. 5B

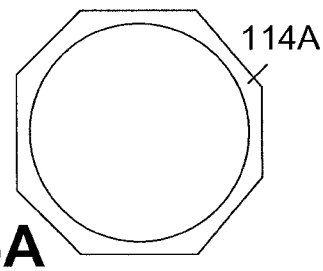


Fig. 6A

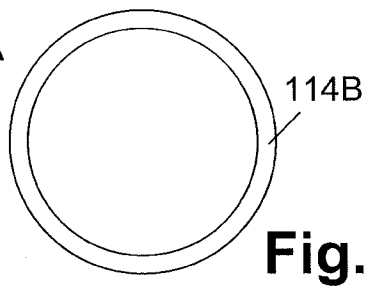


Fig. 6B

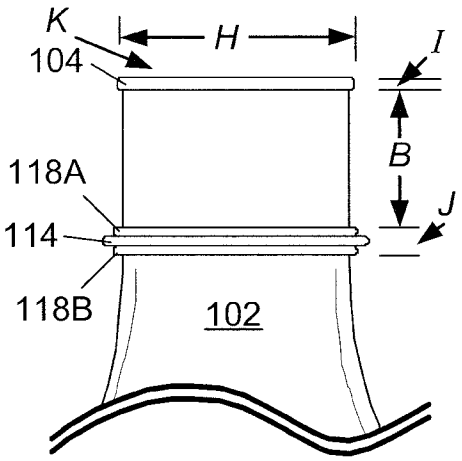


Fig. 6C

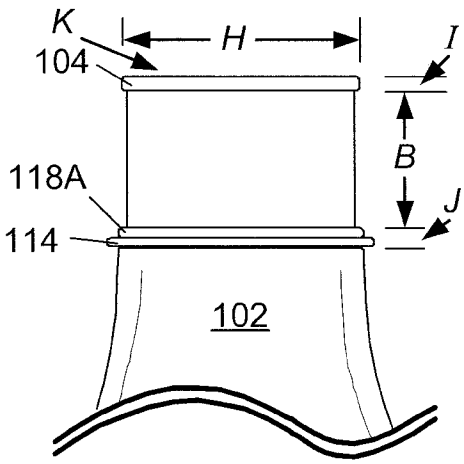


Fig. 6D

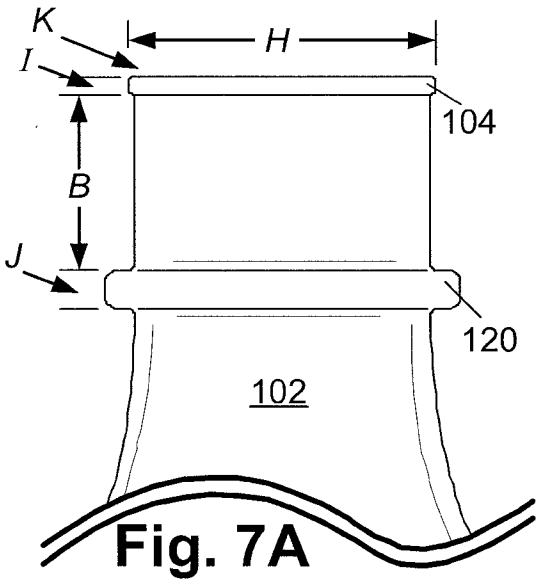


Fig. 7A

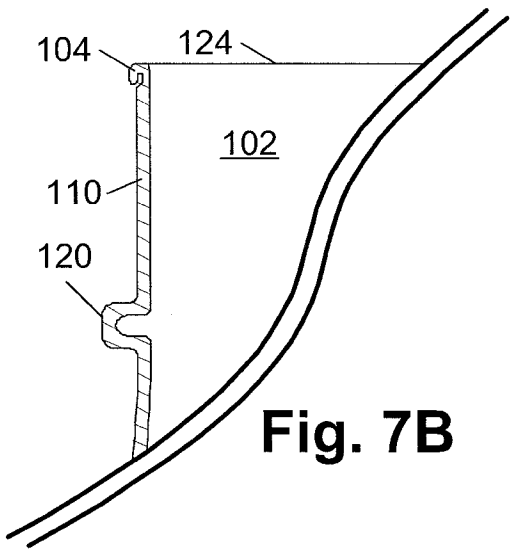


Fig. 7B

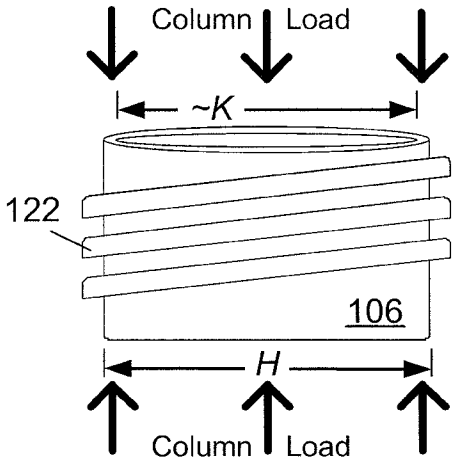


Fig. 8

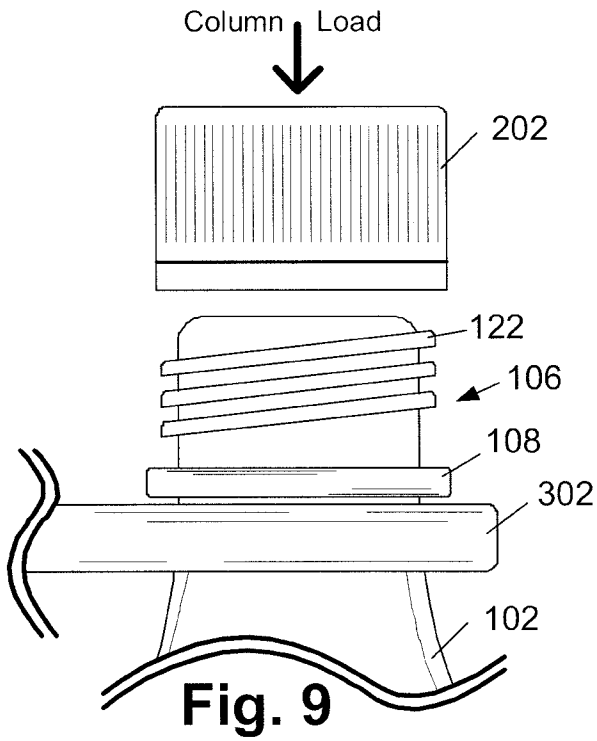


Fig. 9

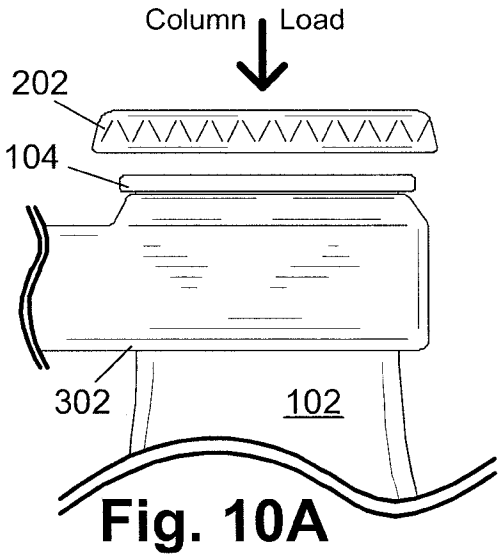


Fig. 10A

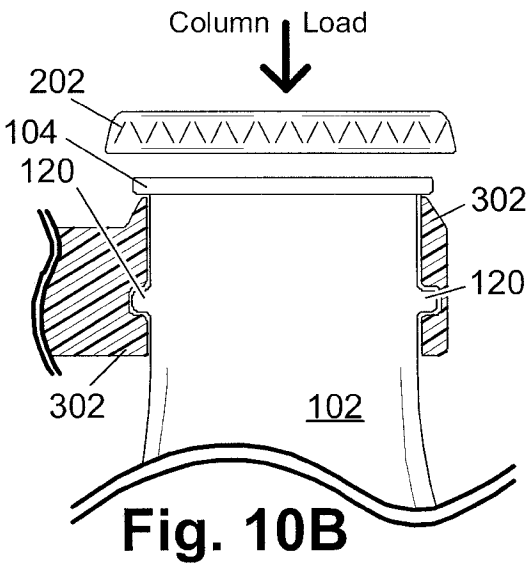
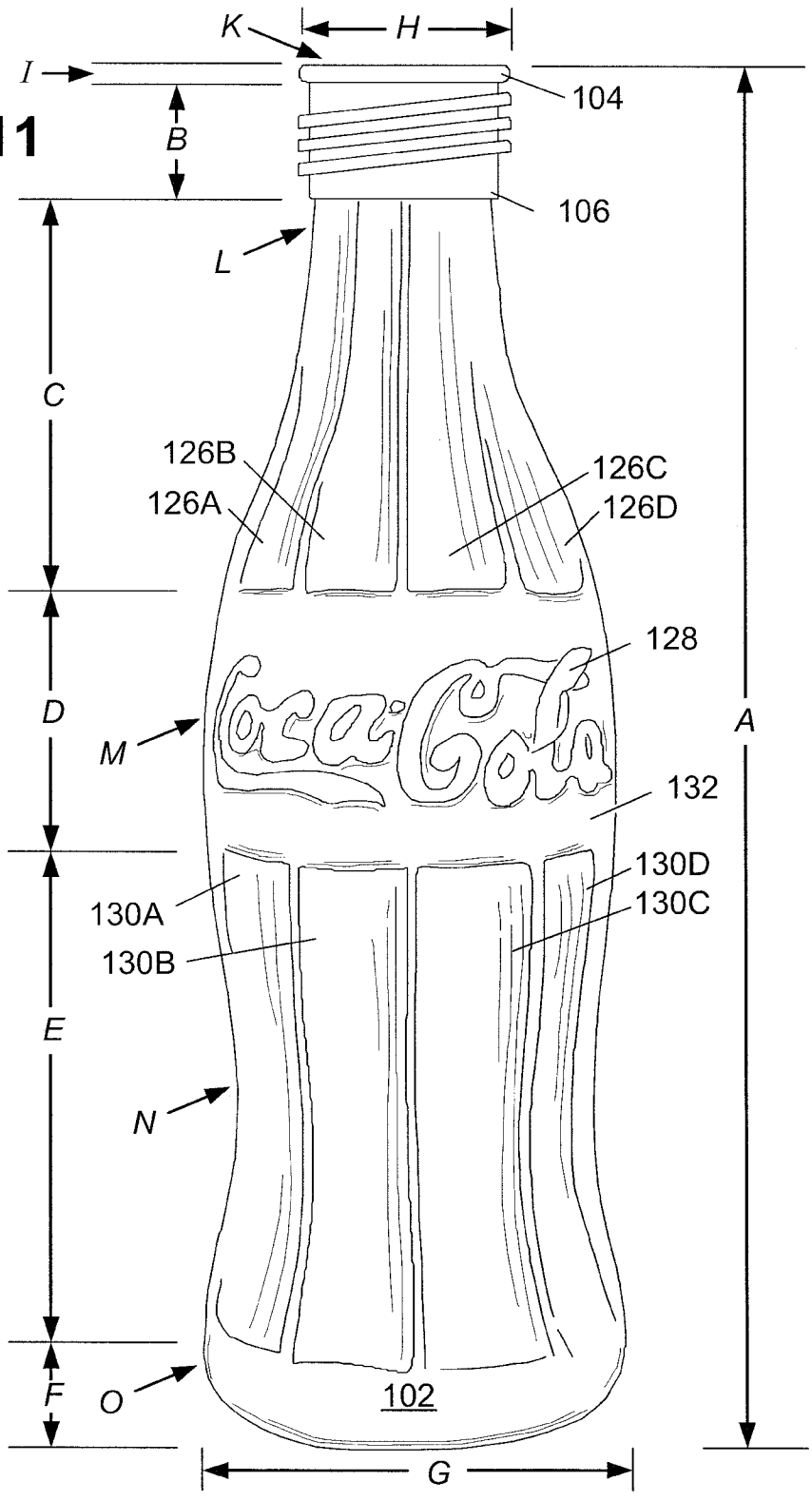


Fig. 10B

Fig. 11


K
H
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B
104
106
L
C
126B
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E
N
F
O
102
G

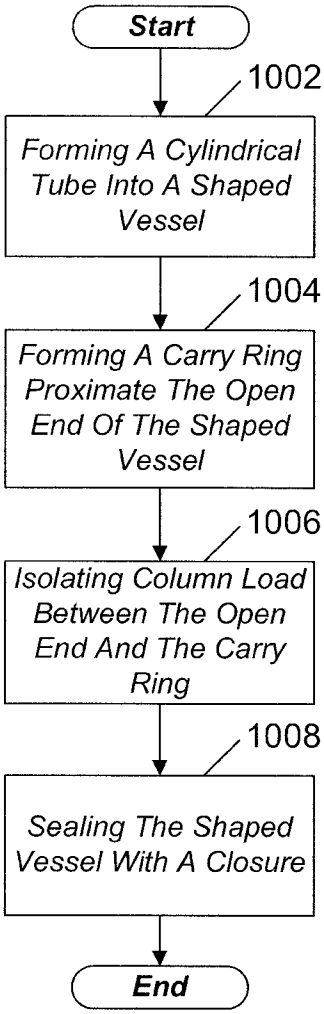

Fig. 12

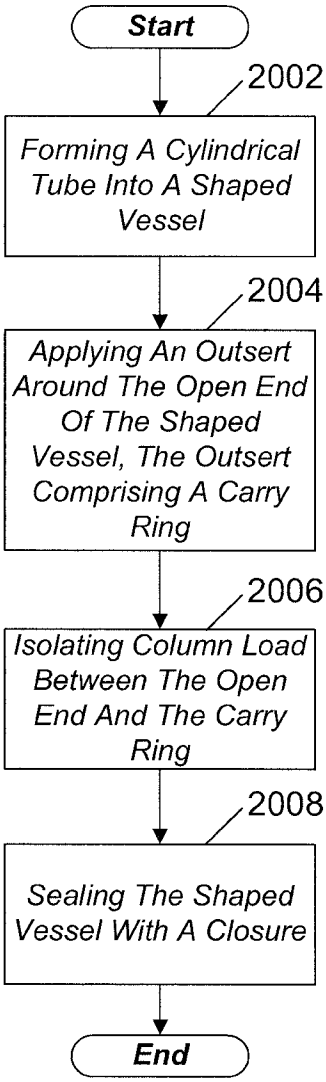

Fig. 13

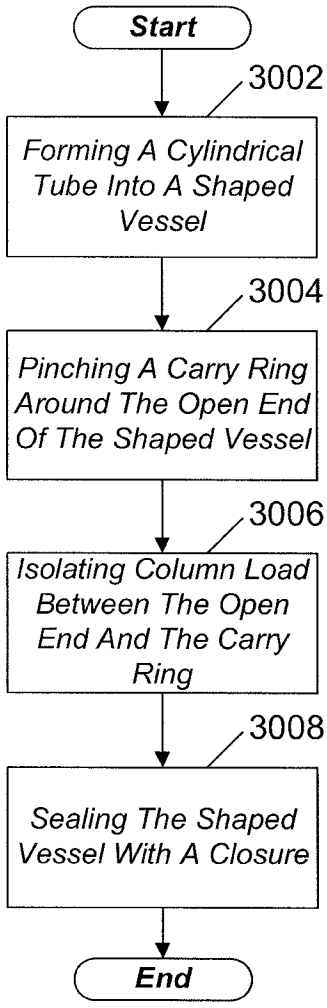

Fig. 14

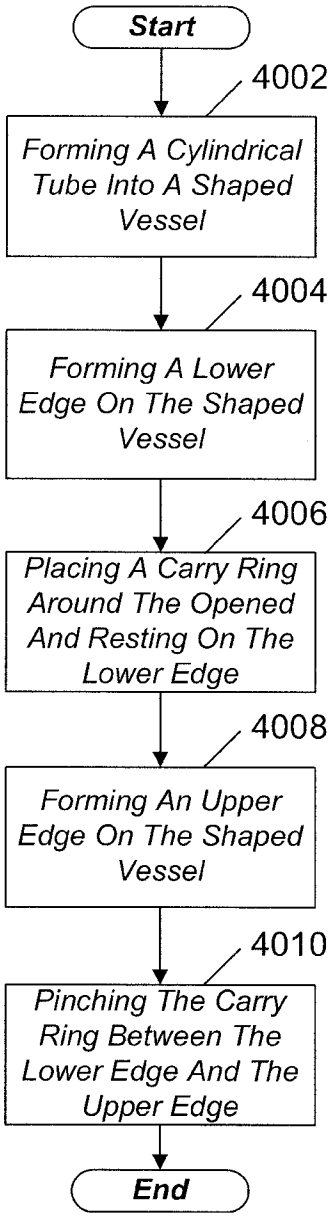
Start
4002
Forming A Cylindrical Tube Into A Shaped Vessel
4004
Forming A Lower Edge On The Shaped Vessel
4006
Placing A Carry Ring Around The Opened And Resting On The Lower Edge
4008
Forming An Upper Edge On The Shaped Vessel
4010
Pinching The Carry Ring Between The Lower Edge And The Upper Edge
End

Fig. 15

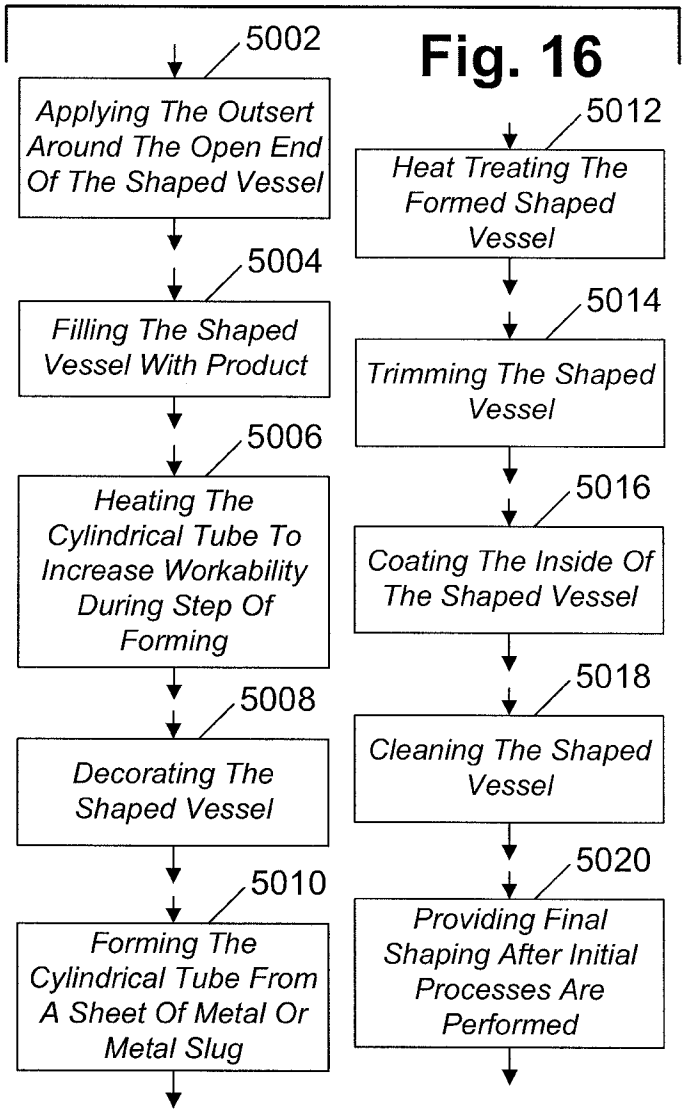
5002
Applying The Outsert Around The Open End Of The Shaped Vessel
5004
Filling The Shaped Vessel With Product
5006
Heating The Cylindrical Tube To Increase Workability During Step Of Forming
5008
Decorating The Shaped Vessel
5010
Forming The Cylindrical Tube From A Sheet Of Metal Or Metal Slug
5012
Heat Treating The Formed Shaped Vessel
5014
Trimming The Shaped Vessel
5016
Coating The Inside Of The Shaped Vessel
5018
Cleaning The Shaped Vessel
5020
Providing Final Shaping After Initial Processes Are Performed

Fig. 16

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2010/055052

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - B65B 21/00 (2010.01)
USPC - 141/1
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC(8) - B65B 21/00, 21/04; B65C 9/00, 9/06 (2010.01)
USPC - 141/1, 369, 372, 378

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
USPTO EAST System (US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT), MicroPatent

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 6,772,799 B1 (PRUITT) 10 August 2004 (10.08.2004) entire document	1-20
Y	US 6,748,983 B2 (BAUSCH) 15 June 2004 (15.06.2004) entire document	1-20
Y	US 2006/0159797 A1 (LEE et al) 20 July 2006 (20.07.2006) entire document	5, 10-20
Y	US 6,620,473 B2 (NISHIZAWA et al) 16 September 2003 (16.09.2003) entire document	7

☐ Further documents are listed in the continuation of Box C. ☐

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Date of the actual completion of the international search	Date of mailing of the international search report
19 December 2010	11 JAN 2011
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Authorized officer: Blaine R. Copenheaver PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

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