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(54) **CUP ASSEMBLY**

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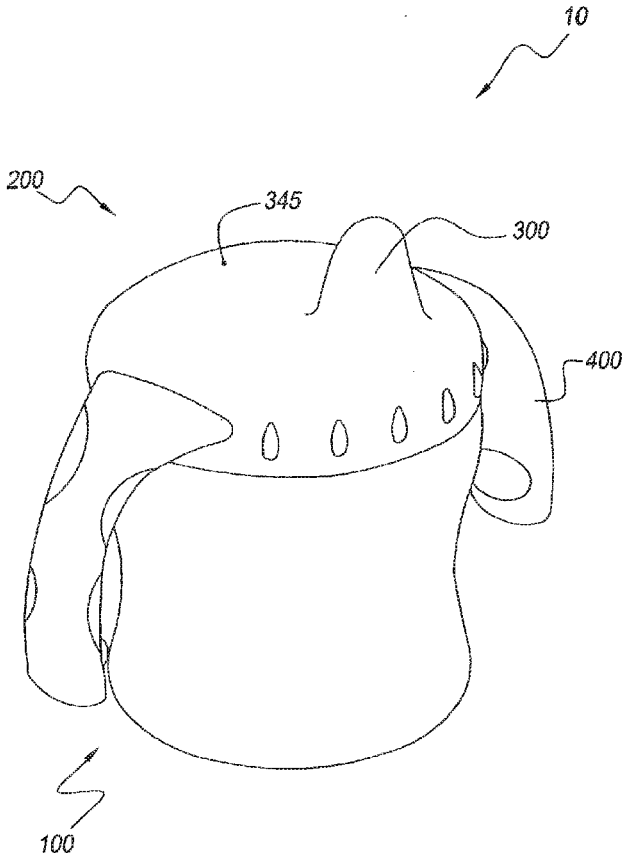
(57) **ABSTRACT**

A cup is provided having a lid with a spout defined by walls tapered towards a distal end of the spout. The lid has handles extending therefrom that are preferably formed of a first and second material having different Shore A hardnesses to define a rigid portion and a gripping portion.



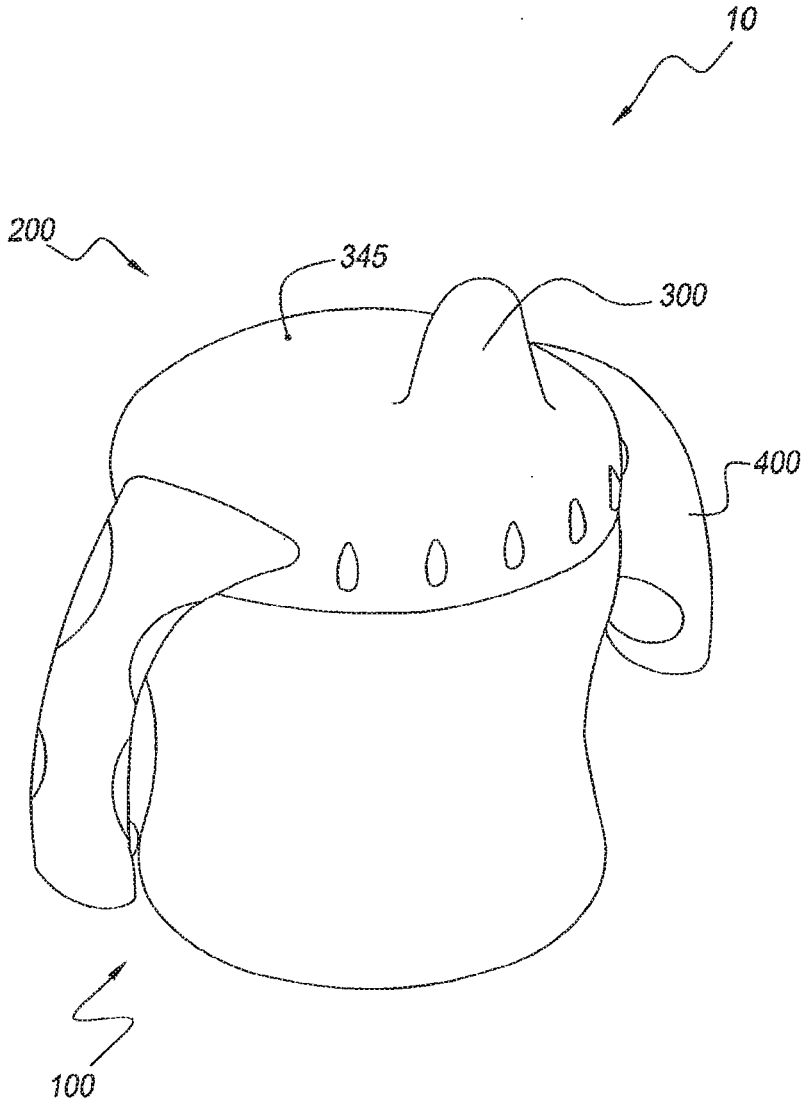
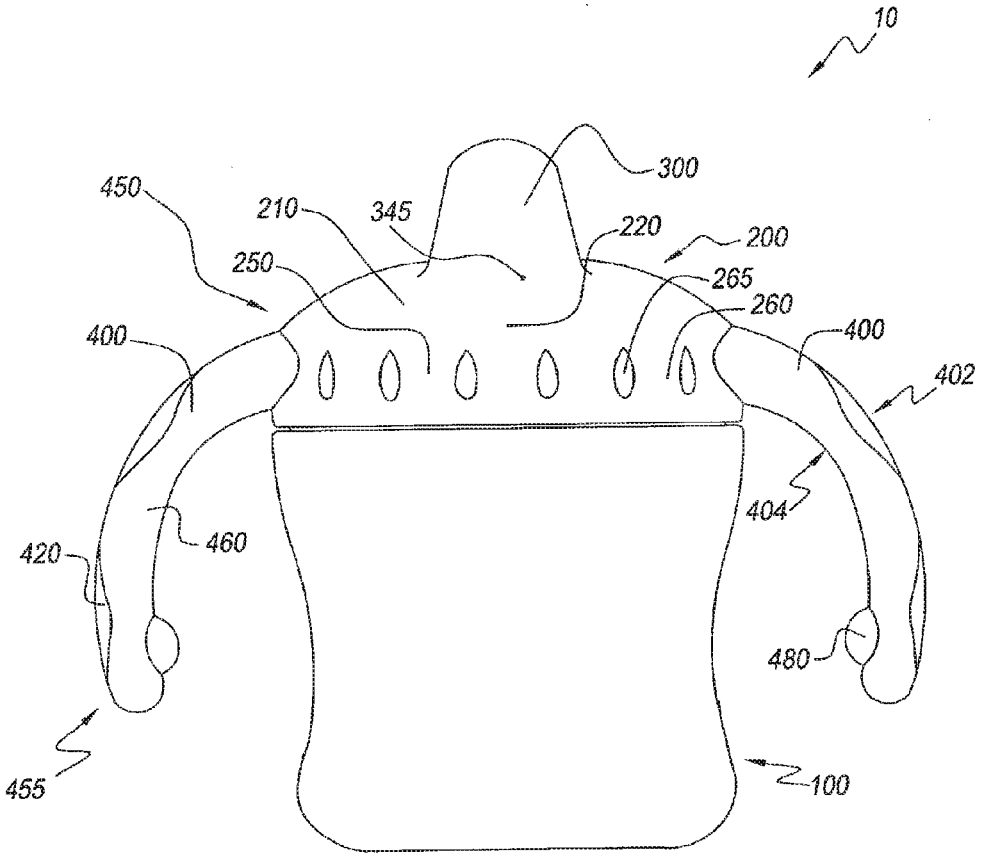


Fig. 1


10
300
450
210
345
220
200
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265
260
400
400
402
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460
420
480
455
100

Fig. 2

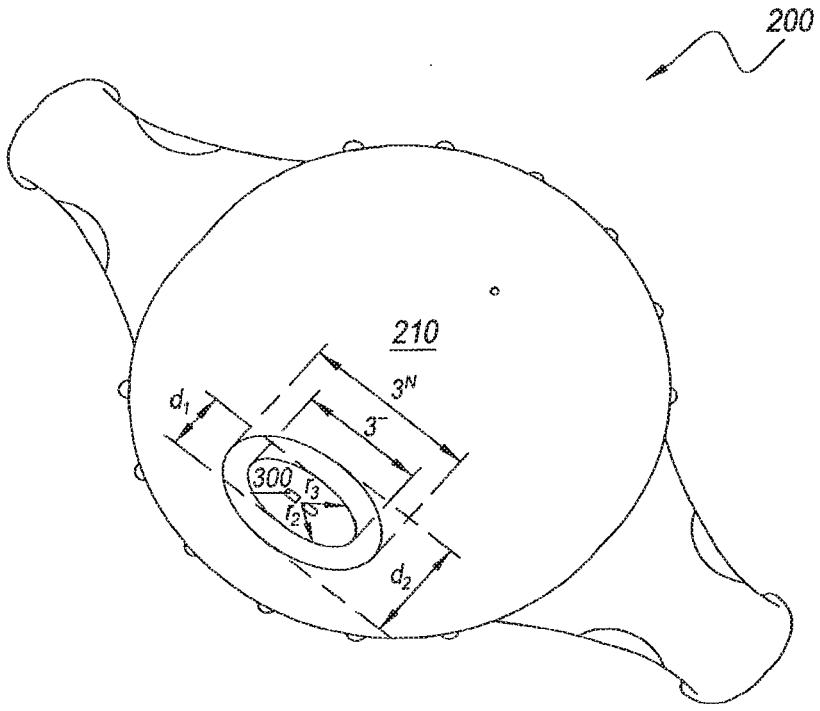

Fig. 3

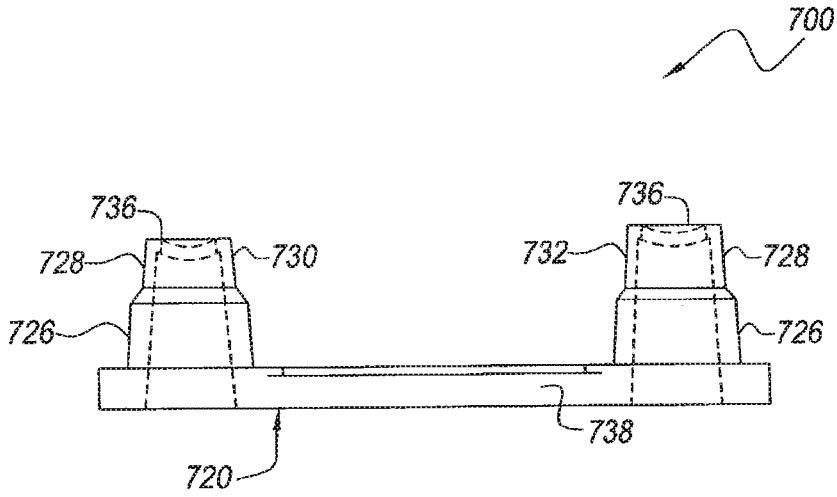

Fig. 4

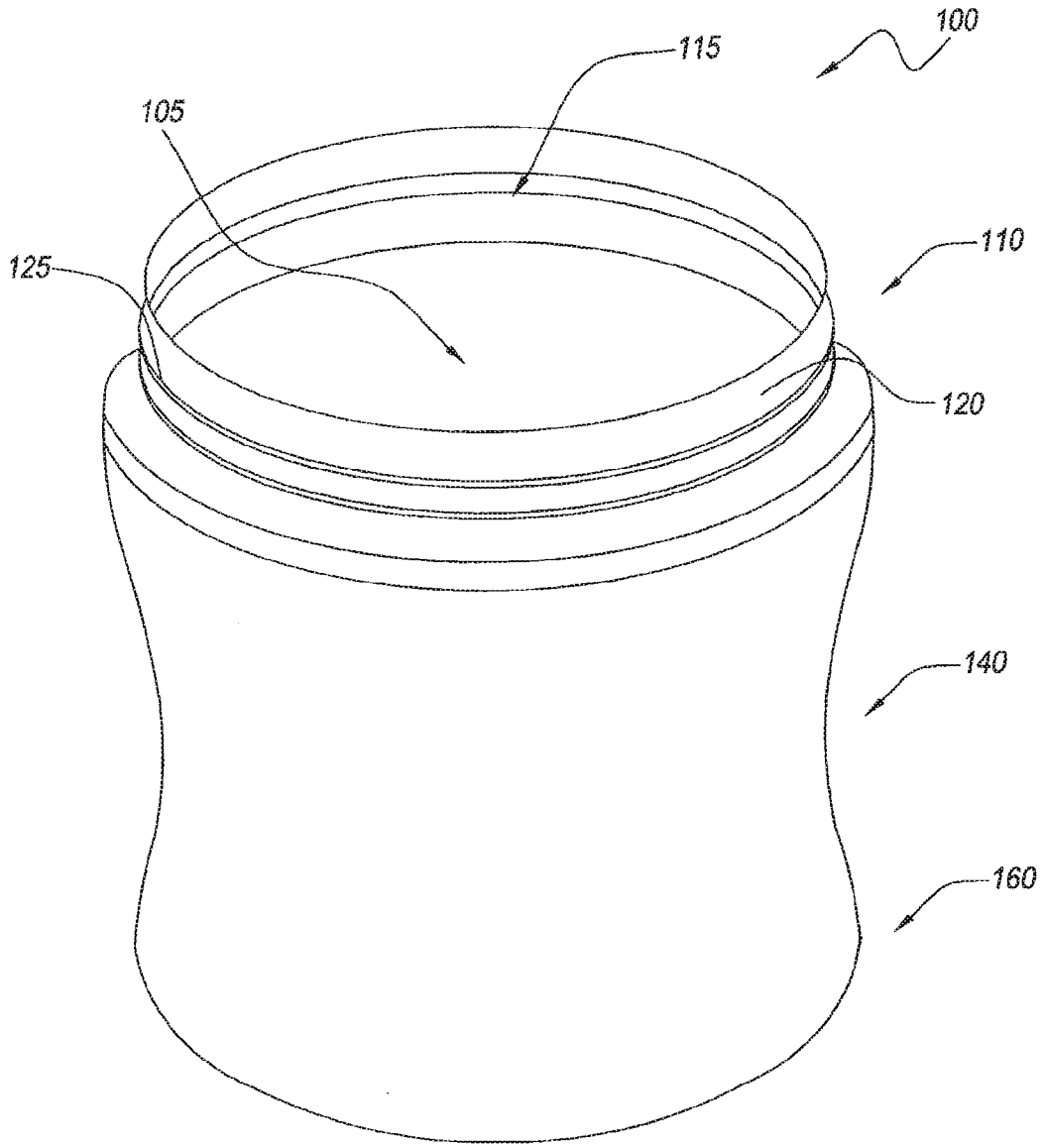

Fig. 5

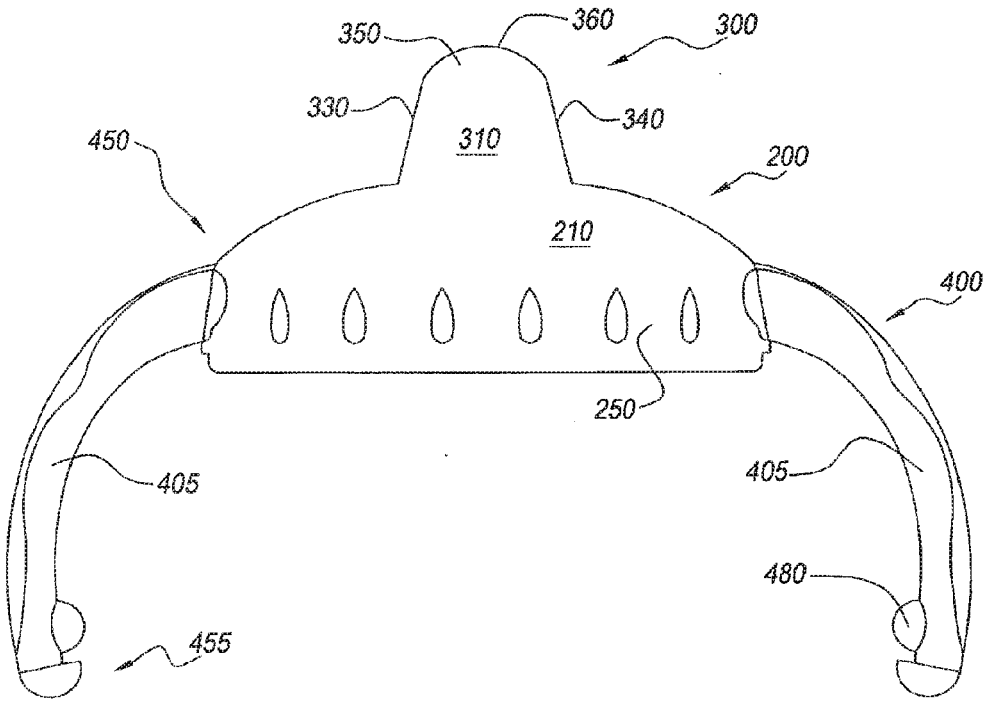

Fig. 6

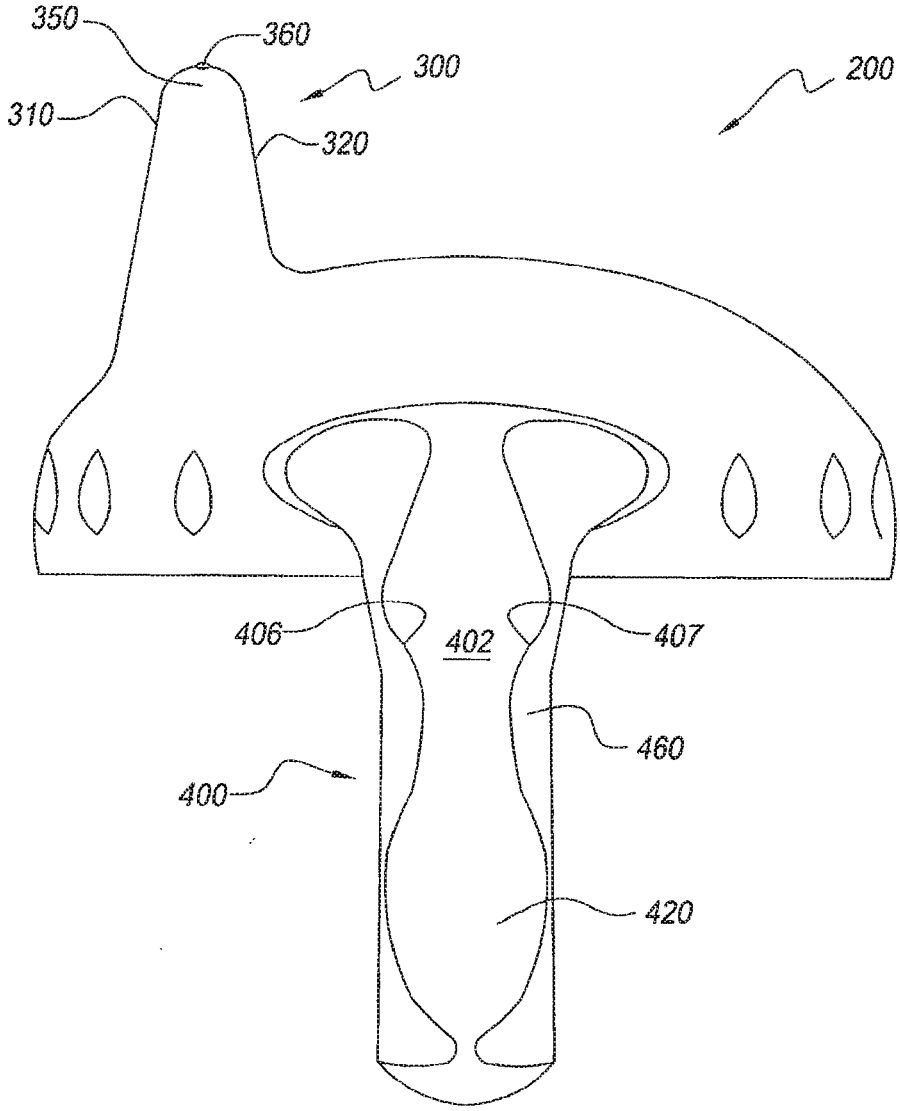

Fig. 7

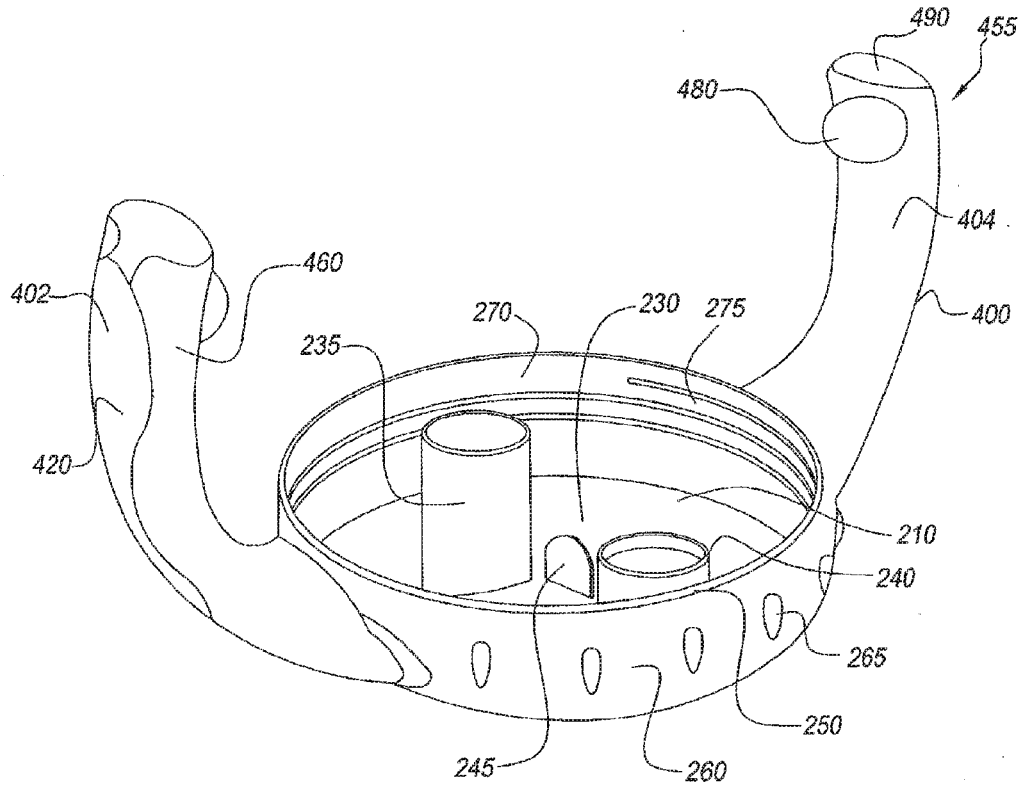
490
455
480
404
460
402
270
230
275
400
235
420
210
240
265
250
245
260

Fig. 8

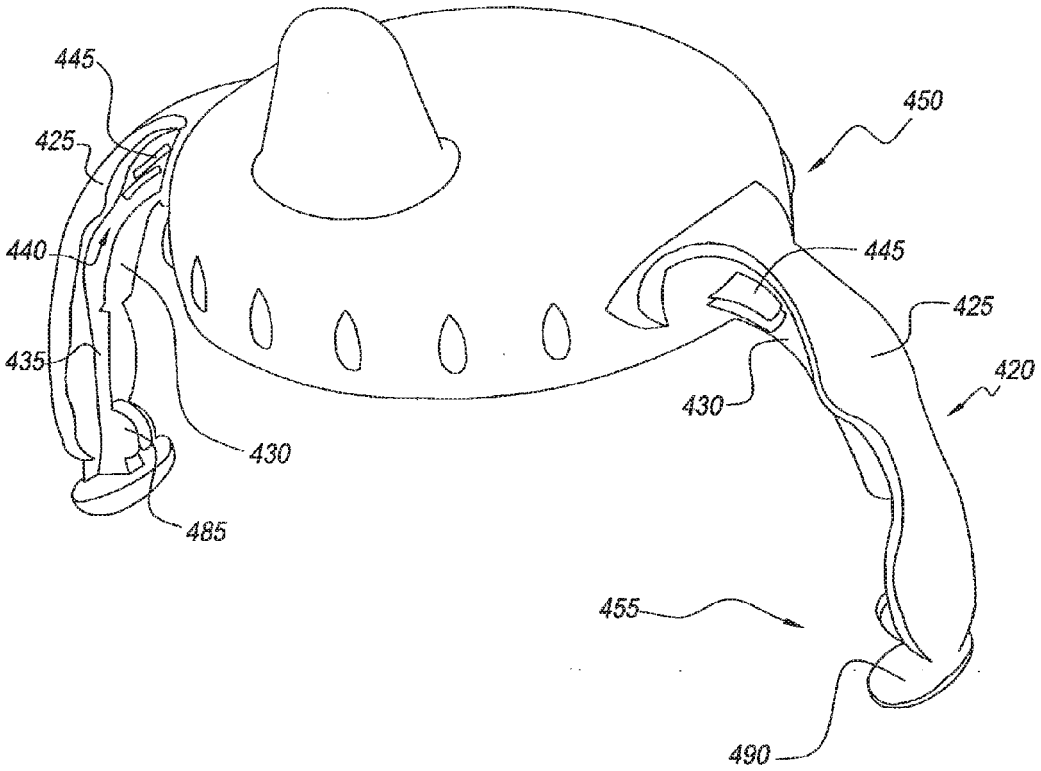

Fig. 9

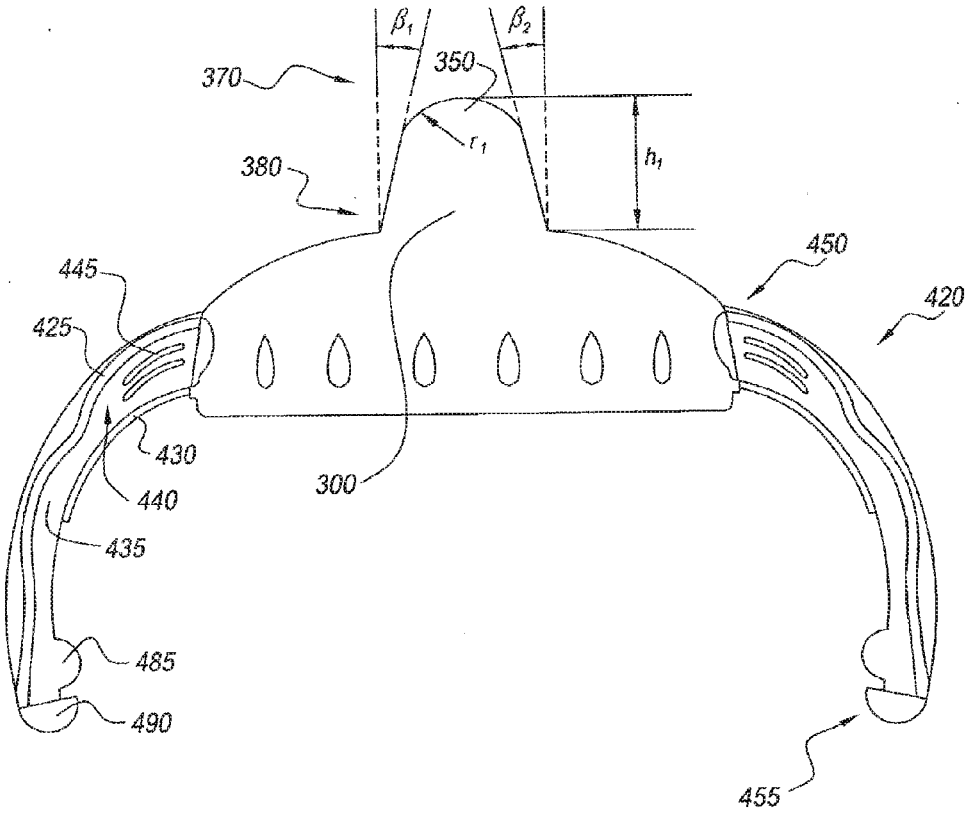
β_1
β_2
370
350
r_1
h_1
380
450
445
420
425
430
440
300
435
485
490
455

Fig. 10

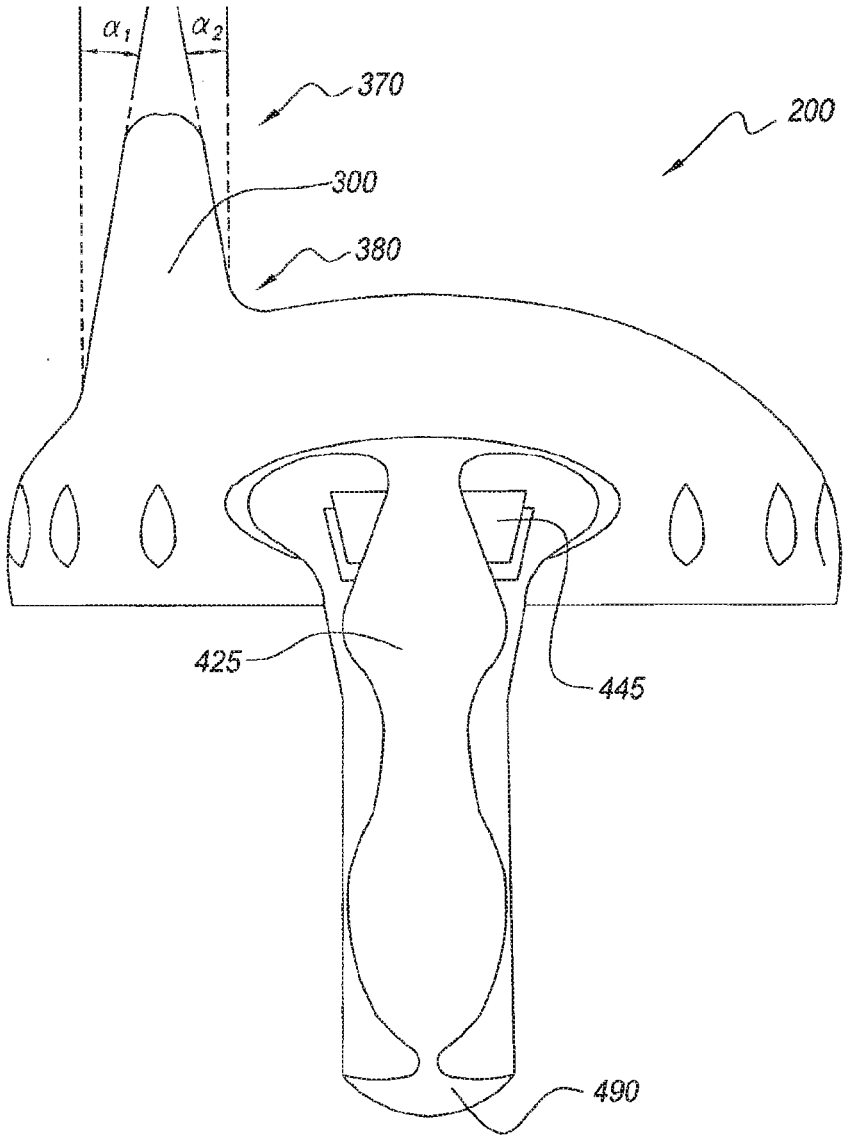

Fig. 11

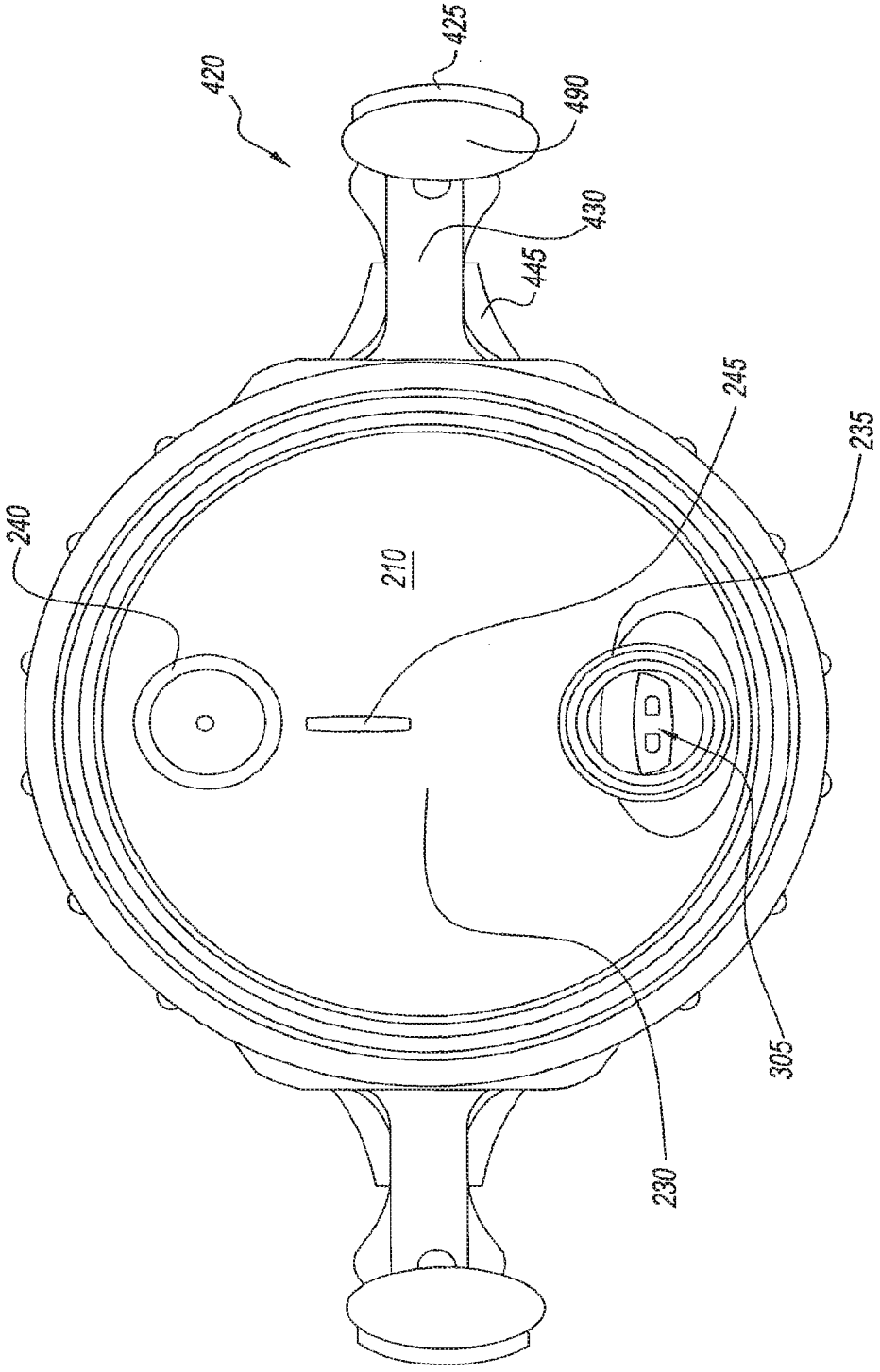

Fig. 12

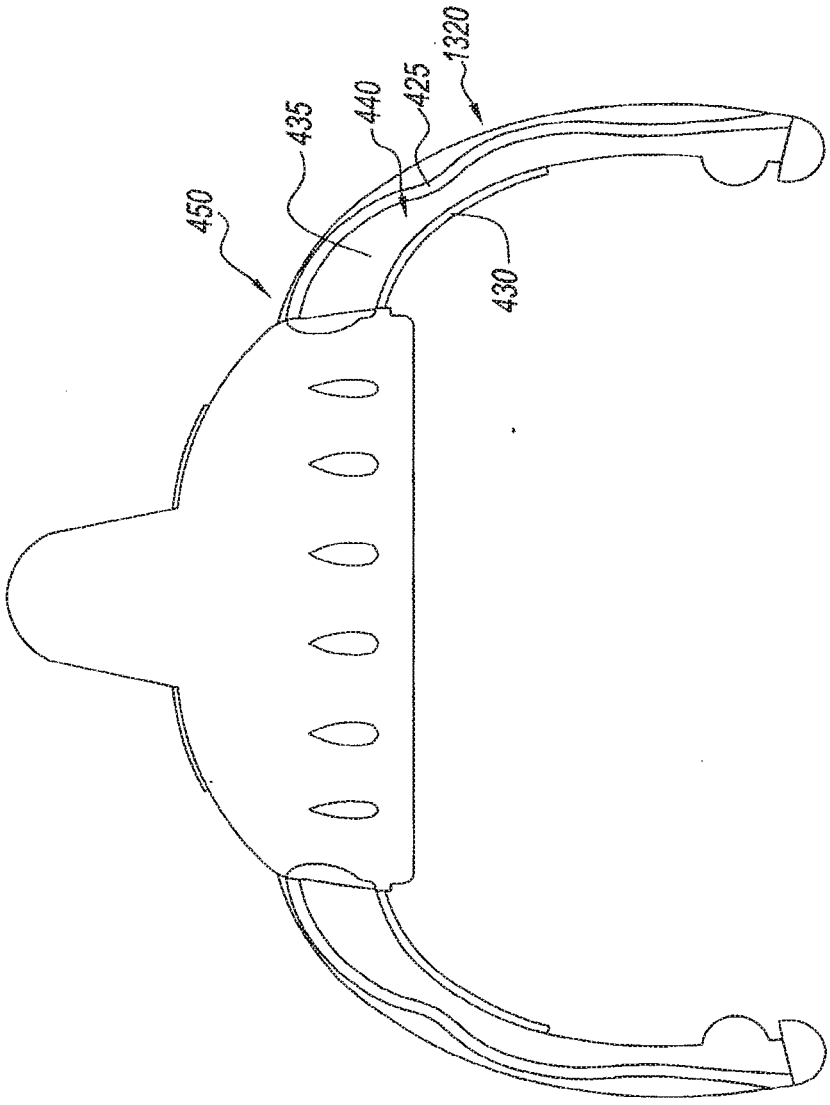

Fig. 13

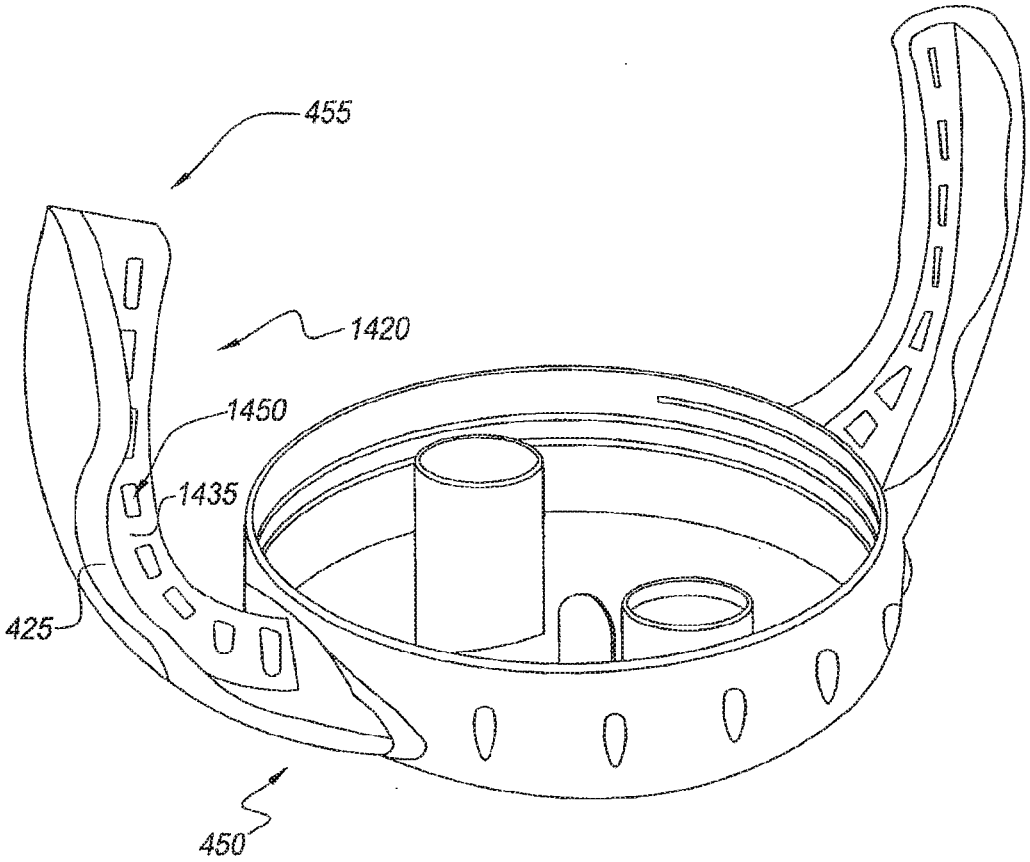

Fig. 14

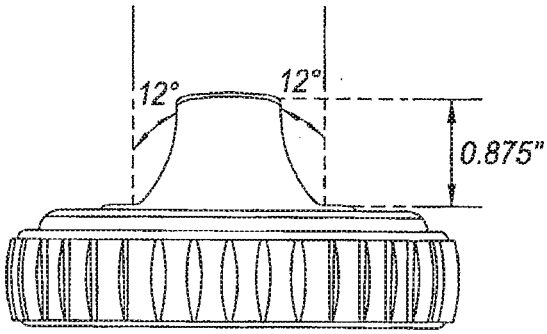

Fig. 15
(Prior Art)

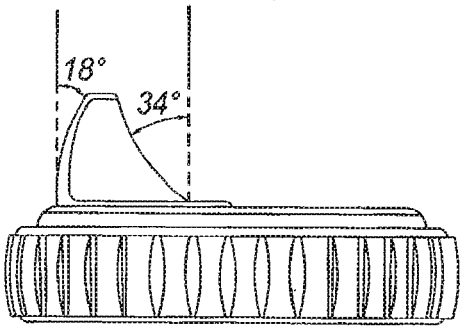

Fig. 16
(Prior Art)

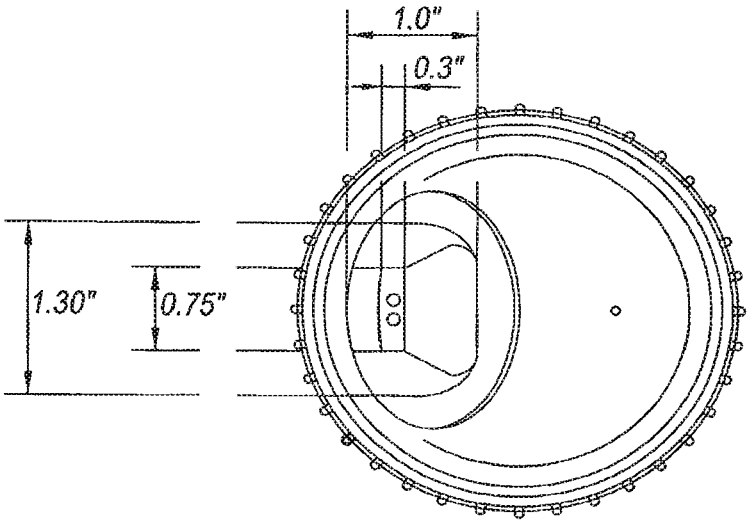

Fig. 17
(Prior Art)

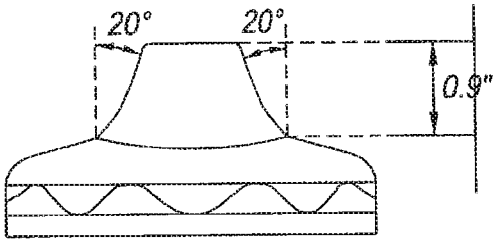

Fig. 18
(Prior Art)

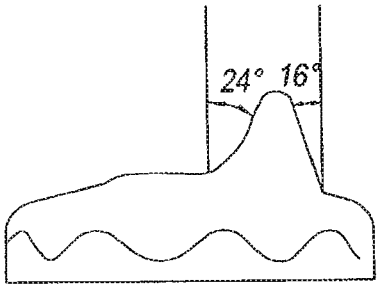

Fig. 19
(Prior Art)

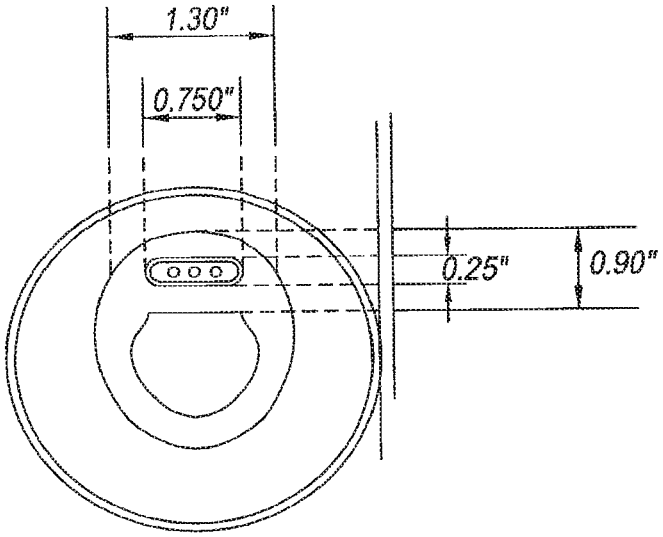

Fig. 20
(Prior Art)

CUP ASSEMBLY

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a continuation of prior application Ser. No. 13/569,025, filed Aug. 7, 2012, which is a continuation of prior application Ser. No. 12/456,298, filed Jun. 15, 2009, which is a continuation of prior application Ser. No. 10/404,919, filed. Apr. 1, 2003, which is a continuation-in-part of prior U.S. Design application Ser. No. 29/168,356, filed Oct. 1, 2002, and a continuation-in-part of prior U.S. application Ser. No. 09/908,099, filed Jul. 18, 2001, which is a continuation-in-part of prior U.S. patent application Ser. No. 09/645,975 filed on Feb. 4, 2000 and issued as U.S. Pat. No. 6,422,415, which is a continuation of prior U.S. patent application Ser. No. 09/019,765 filed on Feb. 6, 1998 and issued as U.S. Pat. No. 6,050,445. The disclosures of application Ser. No. 12/456,298, filed Jun. 15, 2009, application Ser. No. 10/404,918, filed Apr. 1, 2003, U.S. Design application Ser. No. 29/168,356, filed Oct. 1, 2002, U.S. application Ser. No. 09/908,099, filed Jul. 18, 2001, U.S. patent application Ser. No. 09/645,975 filed on Feb. 4, 2000 and issued as U.S. Pat. No. 6,422,415, and U.S. patent application Ser. No. 09/019,765 filed on Feb. 6, 1998 and issued as U.S. Pat. No. 6,050,445 are hereby incorporated by reference in their entirety.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] The present invention relates to cups. More particularly, the present invention relates to infant cup assemblies.

[0004] 2. Description of the Prior Art

[0005] Cups designed especially for use by infants or children are known. Such cups are intended to facilitate the gripping of the cup by the infant. Contemporary devices often employ gripping structures that are formed on the surface of the bottle.

[0006] A baby bottle with an outer surface that has been adapted to provide handles intended to allow infants and children to better grip the bottle, is disclosed in U.S. Pat. No. 5,215,203 to Malcolm. The bottle has at least two sets of handles that are formed integrally with the bottle by a plurality of recesses extending vertically along a substantial length of the bottle. The recesses have either side walls that converge towards each other as they extend towards a central longitudinal axis of the bottle or side walls that are parallel to each other. The lobe shaped handles resulting from the converging side walls and the rectangular shaped handles resulting from the parallel side walls, allow an infant or child to partially grasp or hold the handles. The bottles provide limited assistance to infants or children because they do not allow for a complete or nearly complete closure of the infants hands around the handles.

[0007] Other cups designed especially for use by infants or children include orifices that are intended to reduce spillage of fluid from the cup. Such cups have drinking orifices and separate air vents, which allow the user to drink from the orifice without creating excessive vacuum in the cup. However, drinking orifices and air vents are liable to leak liquid stored in the cup between feedings, or if dropped during use. Drinking orifices and the surrounding lid structure through which the orifices are disposed, have a lasting effect on the child's lip placement which can impact the child's ability to feed and swallow.

[0008] Certain cups have been developed that use valving mechanisms at the orifice and at the air vent. These valves respond to suction generated during feeding to open and allow liquid to pass through the orifice and to allow air to enter the air vent when a vacuum is developed in the interior of the cup. Patents disclosing such valves include U.S. Pat. No. 5,079,013 to Belanger, U.S. Pat. No. 6,422,415 to Manganiello, U.S. Pat. No. 6,050,445 to Manganiello and U.S. Pat. No. RE 37,016 to Morano, which are commonly assigned or licensed to the assignee of the present application. Applicant hereby incorporates the disclosure of these patents by reference.

[0009] Accordingly, there is a need for cups having handles, which facilitate gripping and grasping by infants, and motivate infants to use such handles. There is also a need for handles on cups having sufficient strength to withstand use by children. There is a further need for cups having lids and orifices that facilitate use by children, including promoting proper lip closure around the orifice.

SUMMARY OF THE INVENTION

[0010] It is an object of the present invention to provide a cup assembly that assists infants and children in holding the cup assembly.

[0011] It is another object of the present invention to provide such a cup assembly that promotes better hand-to-mouth coordination.

[0012] It is yet another object of the present invention to provide such a cup assembly that promotes independent cup drinking in the child.

[0013] It is still another object of the present invention to provide such a cup assembly that reduces or eliminates leakage and spillage.

[0014] It is a further object of the present invention to provide such a cup assembly that facilitates use of the spout.

[0015] It is another further object of the present invention to provide such a cup assembly that facilitates generation of a suction force and promotes improved flow-rate through the orifice.

[0016] It is yet a further object of the present invention to provide such a cup that promotes proper lip closure.

[0017] It is still a further object of the present invention to provide such a cup assembly that promotes better lip approximation.

[0018] These and other objects and advantages of the present invention are provided by a lid for a cup comprising a lid body removably securable to the cup; an orifice; and a handle having a rigid portion and a gripping portion. The rigid portion is formed from a first material, the gripping portion is formed from a second material, and the first material has a higher Shore A hardness than the second material. The lid body can have a spout with the orifice formed therethrough. The handle can have an upper surface and a lower surface with the gripping portion at least partially covering the upper surface and substantially covering the lower surface.

[0019] In another aspect of the invention, a cup assembly for an infant is provided comprising a cup defining an inner volume; a lid having an orifice in fluid communication with the inner volume and the lid being removably securable to the cup; and a handle having a rigid portion and a gripping

portion. The rigid portion is formed from a first material, the gripping portion is formed from a second material, and the first and second materials are integrally molded. The first material has a higher Shore A hardness than the second material.

[0020] In another aspect of the invention, a cup assembly for an infant is provided comprising a cup defining an inner volume; a lid having an orifice in fluid communication with the inner volume and the lid being removably securable to the cup; and a handle comprising a rigid portion and a gripping portion and having a proximal end and a distal end. The rigid portion is formed from a first material and the gripping portion is formed from a second material. The first material has a higher Shore A hardness than the second material. The proximal end is secured to the lid and the distal end is separated from the cup by a first distance when the lid is secured to the cup. The first distance is large enough to allow a hand of the infant to pass between the cup and the distal end of the handle.

[0021] In another aspect of the invention, a cup assembly is provided which comprises a cup defining an inner volume, and a lid having a spout, an orifice and a handle. The orifice is disposed through the spout. The handle has a rigid portion and a gripping portion. The rigid portion has a channel. The rigid portion is formed from at least a first material and the gripping portion is formed from at least a second material. The first material has a higher Shore A Hardness than the second material. A first portion of the second material is disposed in the channel and a second portion of the second material is disposed adjacent to the channel.

[0022] In another aspect of the invention, a method of making a handle for a cup assembly is provided. The method comprises molding a rigid portion of the handle from a first material, with the rigid portion having at least one channel formed therein. The method further comprises molding a gripping portion of the handle from a second material, with the gripping portion having at least a first portion disposed in the channel. The first material has a higher Shore A Hardness than the second material.

[0023] In another aspect of the invention, a method of making a lid is provided. The Method comprises molding a rigid portion of the lid from a first material, with the rigid portion having a lid body, a spout, and a handle. The handle has at least one channel formed therein. The method further comprises molding a gripping portion of the lid from a second material, with the gripping portion having at least a first portion disposed in the channel. The first material has a higher Shore A Hardness than the second material.

[0024] The rigid portion can have a channel formed therein, with at least a portion of the second material disposed in the channel. The channel can be first and second channels disposed at least partially along the rigid portion. The rigid portion can have first, second and third walls integrally formed with each other and defining the first and second channels. The first and second walls can be substantially orthogonal to the third wall. The handle can have an upper surface and a lower surface with the first wall of the rigid portion at least partially defining the upper surface, and with the gripping portion at least partially defining the lower surface.

[0025] The rigid portion can have a rib disposed along at least one of the first and second channels, and the rib can be substantially parallel with the first and second walls. The rib can be disposed in proximity to the proximal end of the handle. The first wall can have a wave-like shape, with the gripping portion having a corresponding wave-like shape adjacent to the first wall, and substantially defining the lower surface. The third wall can have a projection formed therein, and the second material can be molded over the projection to form a gripping abutment. The gripping abutment can be disposed in proximity to the distal end of the handle.

[0026] The first material can be a polypropylene and the second material can be a thermoplastic elastomer. The lid can have a spout and the orifice can be formed in the spout. The lid can have a vent hole formed therein. There can also be a flow control valve in fluid communication with the orifice, the vent hole and the inner volume, wherein the valve limits flow from the inner volume through the orifice. The handle can be a pair of handles extending from the lid and diametrically opposed along the lid. The spout can have an ellipsoidal cross-sectional area. The spout can have a distal end, and can be inwardly tapered toward the distal end. The spout can have a top wall, with the orifice being disposed through the top wall, and with the top wall having an upwardly arcuate or dome-like shape.

[0027] The molding of the gripping portion can include disposing a second portion of the second material adjacent to the channel. The molding of the rigid portion can include integrally forming a first wall, a second wall and a third wall, with the third wall connecting the first and second walls. The molding of the rigid portion can include forming a substantially planar bottom surface along the channel.

[0028] Other and further objects, advantages and features of the present invention will be understood by reference to the following.

BRIEF DESCRIPTION OF THE DRAWINGS

[0029] FIG. **1** is a front perspective view of a cup assembly of the present invention;

[0030] FIG. **2** is a rear view of the cup assembly of FIG. **1**;

[0031] FIG. **3** is a top view of the cup assembly of FIG. **1**;

[0032] FIG. **4** is a front view of the flow control valve for the cup assembly of FIG. **1**;

[0033] FIG. **5** is a top perspective view of the cup of FIG. **1**;

[0034] FIG. **6** is a front view of the lid of FIG. **1**;

[0035] FIG. **7** is a side view of the lid of FIG. **1**;

[0036] FIG. **8** is a bottom perspective view of the lid of FIG. **1**;

[0037] FIG. **9** is a front perspective view of the lid of FIG. **8** without a gripping portion;

[0038] FIG. **10** is a front view of the lid of FIG. **9** without the gripping portion;

[0039] FIG. **11** is a side view of the lid of FIG. **9** without the gripping portion;

[0040] FIG. **12** is a bottom view of the lid of FIG. **9** without the gripping portion;

[0041] FIG. **13** is a front view of an alternative embodiment of the lid of FIG. **8** without a gripping portion;

[0042] FIG. **14** is a bottom perspective view of another alternative embodiment of the lid of FIG. **8** without a gripping portion;

[0043] FIG. **15** is a front view of a prior art PLAYTEX® conventional lid;

[0044] FIG. **16** is a side view of the prior art PLAYTEX® conventional lid of FIG. **15**;

[0045] FIG. **17** is a top view of the prior art PLAYTEX® conventional lid of FIG. **15**;

[0046] FIG. **18** is a front view of a prior art GERBER® conventional lid;

[0047] FIG. **19** is a side view of the prior art GERBER® conventional lid of FIG. **18**; and

[0048] FIG. **20** is a top view of the prior art GERBER® conventional lid of FIG. **18**.

DESCRIPTION OF THE INVENTION

[0049] Referring to the drawings and, in particular, FIGS. **1** through **4**, there is shown a preferred embodiment of a cup assembly of the present invention, generally represented by reference numeral **10**. Cup assembly **10** has a cup or container **100**, a cap or lid **200**, a spout **300** extending from the lid, and a valve or flow control element **700** (FIG. **4**).

[0050] Referring to FIG. **5**, cup **100** has a substantially cylindrical shape defining an inner volume **105**. Cup **100** has a top portion **110** having an open end **115**, a middle portion **140** and a bottom portion **160**. Middle portion **140** can have a diameter that is smaller than the diameter of top portion **110** or bottom portion **160** to provide an hour-glass like shape. Alternative shapes can also be used for cup **100**, such as, for example, tapered.

[0051] Top portion **110** has an outer surface **120** with threads **125** formed thereon. The preferred embodiment has threads **125** for removably engaging lid **200** with cup **100**. However, alternative engagement structures or methods can also be used to engage lid **200** with cup **100**, such as, for example, a snap fit. Cup **100** is preferably transparent or semi-transparent, which provides for visual indication of the contents and amount within the cup, and also can encourage or promote use by a child through visual stimulation. Cup **100** can also be opaque.

[0052] Referring to FIGS. **1** through **8**, lid **200** has a center member or lid body **210**, an annular flange **250**, spout **300** (which will be described later in greater detail), an air vent **345** and handles **400**. Center member **210** has an upper surface **220** and a lower surface **230**. Preferably, center member **210** has a circular shape. More preferably, center member **210** has an upwardly convex or dome-like shape. However, alternative shapes can also be used for center member **210**, such as, for example, flat or concave. Annular flange **250** extends downwardly from the outer circumference of center member **210** to provide a sealing or mating surface between lid **200** and cup **100**.

[0053] Annular flange **250** has an outer surface **260** and an inner surface **270**. Outer surface **260** preferably has gripping structures **265** secured thereto. In the preferred embodiment, gripping structures **265** are a number or series of tear-drop shaped projections formed integrally with outer surface **260** of flange **250**. Preferably, gripping structures **265** are equidistantly spaced apart. Alternative shapes, designs and/or patterns for gripping structures **265** can also be used to facilitate removable engagement of lid **200** with cup **100**, such as, for example, bubbles or wave-like grooves or ridges. Inner surface **270** has threads **275** secured thereto. Threads **275** mate with threads **1.25** of cup **100** to removably engage the cup with the lid **200**. However, as described above, alternative engagement structures or methods can be used.

[0054] Lower surface **230** of center member **210** has a liquid mating surface **235** and a vent mating surface **240**. Mating surfaces **235**, **240**, are preferably adjacent to, or incorporated into, spout **300** and air vent **345**, so as to frictionally engage flow control valve **700** and place the valve in fluid communication with the spout and air vent. In the preferred embodiment, mating surfaces **235**, **240** are cylindrical channels integrally molded with center member **210** below spout **300** and below air vent **345**, respectively. Cylindrical channels **235**, **240** have a size and shape to mate with flow control valve **700**. Preferably, cylindrical channels **235**, **240** have an inner size and shape to engage with flow control valve **700**. Lower surface **230** can also have a valve securing member **245**, which engages with a corresponding structure on flow control valve **700** to orientate and/or assist in holding the valve in position. In the preferred embodiment, valve securing member **245** is a substantially planar, arcuate member extending orthogonally from lower surface **230** of lid **200**.

[0055] Flow control element or valve mechanism **700** has first valve portion or stack **730** and second valve portion or stack **732** connected together by substrate **738**. Each valve portion **730**, **732** has a lower portion **726**, an upper portion **728** and valve faces **736** bearing slits. Each valve portion **730**, **732** is configured to frictionally engage cylindrical channels **235**, **240**, respectively, and place flow control valve **700** in fluid communication with spout **300** and air vent **345**, respectively.

[0056] Flow control element **700** preferably has a concave shaped valve face **736** of valve portions **730** and **732**, and, in conjunction with the attendant curved shape of slits, provides superior fluid flow rate through the slit over existing valve configurations. U.S. Pat. No. 5,079,013 to Belanger, U.S. Pat. No. RE 37,016 to Marano, U.S. Pat. No. 6,050,445 to Manganiello and U.S. Pat. No. 6,422,415 to Manganiello depict examples of valves that are usable with the present invention. Additionally, alternative flow control mechanisms and valves can also be placed in fluid communication with spout **300** and/or air vent **345** to provide a resistance to flow or an inhibitor to spillage and shakeout, absent a sucking force, including a separate pair of stack valves that individually mate with cylindrical mating surfaces **235**, **240**.

[0057] Handles **400** are preferably a pair of handles that extend curvingly downward from annular flange **250** toward bottom portion **160** of cup **100**. Preferably, handles **400** extend substantially down in proximity to bottom portion **160** of cup **100**. Handles **400** are preferably diametrically opposed along annular flange **250**. Handles **400** have a proximal end **450** where the handle is connected to flange **250**, and a distal end **455**. Handles **400** have a length and width that allow an infant or child to fully grasp the handles and preferably allow closure of the entire hand around the handles. Handles **400** preferably extend at least half way down cup **100**. Handles **400** have a curvature and shape that provides for sufficient space between the handles and cup **100** for the hand of the infant or child when holding the handles. Preferably, handles **400** are separated from cup **100** at distal end **455** a sufficient distance to allow the infant or child's hand to pass between the distal end and the cup. The size, shape and positioning of handles **400** promote better hand-to-mouth coordination for the child or infant.

[0058] Handles **400** have a rigid portion **420**, a gripping portion **460** and a gripping abutment **480**. Gripping portion **460** is an area or portion of handle **400** that is more flexible, resilient and/or softer than rigid portion **420**, to facilitate grasping and holding of the handle by the infant or child. In

the preferred embodiment, gripping portion **460** is molded from a different material than rigid portion **420** to provide for the difference in flexibility, resiliency and softness. The different materials have different levels of hardness or Shore A Hardness. Preferably, rigid portion **420** and the remaining parts of lid **200**, i.e., center member **210**, annular flange **250** and spout **300**, are made of the same material and more preferably are integrally molded with each other.

[0059] Rigid portion **420** is preferably molded from a rigid material, such as, for example, a polypropylene. Preferably, gripping portion **460** is molded from a flexible, resilient and/or softer material, such as, for example, a thermoplastic elastomer (TPE). The TPE of gripping portion **460** preferably has a lower hardness or Shore A Hardness than the hardness or Shore A Hardness of rigid portion **420**. While the preferred embodiment has rigid portion **420** made of a first material and gripping portion **460** made of a second material, the present disclosure contemplates more than two materials, such as, for example, the rigid portion being a plurality of materials and/or the gripping portion being a plurality of materials.

[0060] Handle **400** has an upper or over-surface **402** and a lower or under-surface **404**. ripping portion **460** is preferably formed along under-surface **404** and substantially covers the under-surface. More preferably, gripping portion **460** substantially covers under-surface **404** and wraps around sides **405** of handles **400** to partially cover the over-surface **402**. In the preferred embodiment, gripping portion **460** partially wraps around over-surface **402** and has ends **406**, **407** with a wave-like shape, which facilitates grasping of the handles **400**. The wave-like shape of ends **406**, **407** further accommodates varying sizes of hands and varying positioning of hands on handles **400**. Gripping abutment **480** is formed along the under-surface **404** of handle **400** near distal end **455** and further facilitates grasping of the handle. Preferably, gripping abutment **480** is a circular or semi-spherical projection.

[0061] Gripping portion **460** provides an infant or child with a different texture or feel, as compared to rigid portion **420**. This provides textural stimulus for the use of handles **400**. Preferably, gripping portion **460** has a different color than the color of rigid portion **420** to provide a visual stimulus for the use of handles **400**. Other visual and textural stimuli can also be further provided on handles **400** to further motivate the child to utilize the handles, such as, for example, decorations or embossments. In the preferred embodiment, rigid portion **420** and gripping portion **460** are opaque. However, either or both of rigid portion **420** and gripping portion **460** can be transparent or semi-transparent. The transparency or semi-transparency of lid **100** provides for visual indication of the contents and amount within the cup, and also can encourage or promote use by a child through visual stimulation.

[0062] Referring to FIGS. **6** through **12**, preferably a first material is molded, and more preferably injection molded, to form rigid portion **420** of handles **400**, as well as center member **210**, annular flange **250** and spout **300** of lid **200**. To provide for a flow path for a second material which is more flexible, resilient and/or softer (with a lower hardness or Shore A Hardness) and to facilitate bonding of the first material of rigid portion **420** with the second material, the rigid portion preferably has an outer or first wall **425**, an inner or second wall **430** and a center or third wall **435**.

[0063] Outer wall **425** and inner wall **430** are substantially equidistantly spaced apart and connected by center wall **435**. Preferably, center wall **435** is substantially perpendicular or orthogonal to outer and inner walls **425**, **430** to define a generally U-shaped channel **440**. Channels **440** are preferably formed by outer, inner and center walls **425**, **430**, **435** along opposing sides of rigid portion **420**. The molding process for lid **200** and handles **400** is preferably a two-shot injection molding technique using a first material, such as polypropylene, for rigid portion **420**, and a second material, such as TPE, for gripping portion **460**.

[0064] Preferably, there is at least one rib **445** formed in channel **440**. More preferably, there are two ribs **445** in each channel **440**. Ribs **445** provide additional strength and. integrity to handles **400**. Ribs **445** are preferably formed in channels **440** in proximity to proximal end **450** of handles **400**. Preferably, ribs **445** are generally parallel to outer and inner walls **425**, **430** and have a shape or curvature that is similar to the shape or curvature of channel **440**. The shape, size and positioning of ribs **445** preferably reduce flow resistance and further facilitate flow of the second material into and along or through the channel **440**. Ribs **445** increase the surface contact area between the first and second materials, and improve the bonding between the first and second materials of rigid portion **420** and gripping portion **460**.

[0065] In the preferred embodiment, outer wall **425** of rigid portion **420** has a wave-like shape so that gripping portion **460** has a corresponding wave-like shape along handles **400**. To form gripping abutment **480**, a semi-circular projection **485** is formed in center wall **435** along distal end **455** of the rigid portion **420**. The second material is molded. over the projection **485** to form gripping abutment **480**. Rigid portion **420** has an end. wall **490** formed in distal end **455**, which provides further rigidity to handle **400**, improves the bonding between the rigid portion and the gripping portion **460**, and provides a terminus for the flow of the second material of the gripping portion. Preferably, end wall **490** is substantially perpendicular to outer and center walls **425**, **435**.

[0066] In the preferred embodiment, inner wall **430** extends only partially along handle **400**. However, alternatively, inner wall **430** can fully extend along handle **400**. Also, in the preferred embodiment, channels **440** are disposed on opposing sides of rigid portion **420** and run partially along the rigid portion. However, the present disclosure contemplates any number of channels **400**, which may be disposed in various orientations and positions along rigid portion **420**.

[0067] Referring to FIGS. **13** and **14**, alternative embodiments of lid **200** with rigid portions **1320**, **1420**, respectively, are shown. Features of FIGS. **13** and **14** similar to the features of the preferred embodiment of FIGS. **1** through **12**, have the same reference numerals. The rigid portion **1320** of FIG. **13** has channel **440** formed by outer, inner and center walls **425**, **430**, **435**. But the channels **440** do not have ribs disposed at proximal end **450**, compared to the preferred embodiment shown in FIGS. **9** through **12**.

[0068] The rigid portion **1420** of FIG. **14** has outer wall **425** formed orthogonally with a center wall **1435**. But rigid portion **1420** does not have an inner wall secured to center wall **1435** and does not form a channel along rigid portion **1420**, such as in the preferred embodiment. Rigid portion **1420** also does not have an end wall at distal end **455**, such as in the preferred embodiment. Rigid portion **1420** has a

number or series of apertures or holes **1450** formed through center wall **1435**. In contrast, the center wall **435** of rigid portion **420** of the preferred embodiment, does not have apertures, and provides a generally planar solid bottom surface of channel **440** along the flow path of the second material of gripping portion **460**. Apertures **1450** of rigid portion **1420** create orthogonal contact surfaces along center wall **1435** between the rigid portion and the gripping portion **460**, and the second material of the gripping portion flows through the apertures.

[0069] In the preferred embodiment, handles **400** are a pair of handles integrally formed on opposing sides of lid **200** with a space provided at distal ends **455** of the handles. However, it is contemplated by the present disclosure for alternative numbers and positions of handles **400** to be used. It is further contemplated by the present disclosure for handles **40**( )to be integrally formed with cup **100** at bottom portion **160** of the cup to provide a separation or space from the cup in proximity to lid **100** or for the handles to be integrally formed with the cup at both the top and bottom portions **110**, **160**. it is also contemplated by the present disclosure for handles **400** to be a separate structure that is secured to cup **100** and/or lid **200**, and/or removably secured, such as, for example, a handle ring having handles **400** extending therefrom. it is also contemplated by the present disclosure that gripping portion **460** is formed with, or secured to, rigid portion **420** in other ways, such as, for example, friction fit or adhesive.

[0070] During the molding process, an unexpected and significant result occurred with the use of ribs **445** disposed in channels **440**, as compared to rigid portions **1320**, and **1420** that did not have ribs. It was discovered that ribs **445** prevented sink marks from developing in gripping portion **460** when the second material was molded into and through channels **440**. In rigid portions **1320**, **1420**, sink marks developed in the area of proximal end **450**, which distorted the intended shape of gripping portion **460** and had a significant negative impact on the strength and integrity of handles **400**.

[0071] Additionally, during the molding process, an unexpected and significant result occurred with the use of channels **440** and the generally planar bottom surface (center wall **435**) along the flow path of the second material of gripping portion **460**, as compared to rigid portion **1420**, which has apertures **1450** formed through center wall **1435**, It was discovered that channels **440** and the generally planar solid bottom surface of center wall **435** significantly improved the flow of the second material through channels **440**, resulting in an improved bond between the rigid and gripping portions **420**, **460**, and further provided for a smoother outer surface of the gripping portion.

[0072] Referring to FIGS. **3** and **6** through **12**, spout **300** has a front wall **310**, a rear wall **320**, a first side wall **330**, a second side wall **340** and a top wall **350**. Top wall **350** has a number of holes **360** formed therethrough. Front wall **310**, rear wall **320**, first and second side walls **330**, **340** and top wall **350** are integrally molded, and define a spout volume **305** that is in fluid communication with inner volume **105** of cup **100** (through flow control valve **700**) and with holes **360**. In this embodiment, two holes **360** are shown but other numbers of holes can also be used.

[0073] Top wall **350** has an upwardly convex or arcuate shape and forms chamfered edges with front and rear walls **310**, **320** and first and second side walls **330**, **340**. Top wall **350** has a radius of curvature r_1. Preferably, radius of curvature r_1 is from about **0.25** inches to about 0.5 inches, more preferably from about 0.35 inches to about 0.40 inches, and most preferably about 0.38 inches.

[0074] Front wall **310** has an outwardly convex shape with a radius of curvature r_2. Rear wall **320** has an outwardly convex shape, in the opposite direction of front wall **310**, with a radius of curvature r_3. Preferably, radius of curvature r_2 is from about 3.0 inches to about 7.0 inches, more preferably from about 4.0 inches to about 6.0 inches, and most preferably about 5.0 inches. Preferably, radius of curvature r_3 is from about 3.0 inches to about 7.0 inches, more preferably from about 4.0 inches to about 6.0 inches, and most preferably about 5.0 inches. Preferably, radius of curvature r_2 and radius of curvature r_3 are equal. The periphery of front wall **310** and the periphery of rear wall **320** have arcuate shapes and are preferably aligned so that first sidewall **330** and second sidewall **340** are essentially chamfered edges of spout **300**. Preferably, front and rear walls **310**, **320** define an ellipsoidal cross-sectional shape for spout **300**.

[0075] Spout **300** has a distal end **370**, a proximal end **380** and a height h_1. Distal end **370** of spout **300** has a width w_1 and a depth d_1. Proximal end **380** of spout **300** has a width w_2 and a depth d_2. Preferably, height h_1 is from about 0.80 inches to about 1.80 inches, more preferably from about 1.0 inches to about 1.40 inches, and most preferably about 1.20 inches. Preferably, width w_1 is from about 0.50 inches to about 0.90 inches, more preferably from about 0.60 inches to about 0,70 inches, and most preferably about 0.69 inches. Preferably, width w2 is from about 0.80 inches to about 1.20 inches, more preferably from about 0.90 inches to about 1.10 inches, and most preferably about 0.97 inches. Preferably, depth d_1 is from about 0.10 inches to about 0.25 inches, more preferably from about 0.15 inches to about 0.22 inches, and most preferably about 0.20 inches. Preferably, depth d_2 is from about 0.25 inches to about 0.75 inches, more preferably from about 0.40 inches to about 0.60 inches, and most preferably about 0.56 inches.

[0076] Front and rear walls **310**, **320** are inwardly tapered toward distal end **370**. Preferably, front and rear walls **310**, **320** are inwardly tapered along a substantially straight line or constant slope. Front wall **310** has an angle of taper α_1. Rear wall **320** has an angle of taper α_2. Preferably, taper angle α_1 is from about 5° to about 15°, more preferably from about 10° to about 14°, and most preferably about 13.5°. Preferably, taper angle α_2 is from about 5° to about 15°, more preferably from about 10° to about 14°, and most preferably about 13.5°. Taper angle at and taper angle α_2 are preferably equal.

[0077] First and second side walls **330**, **340** are inwardly tapered toward distal end **370**. Preferably, first and second side walls **330**, **340** are inwardly tapered along a straight line or constant slope. First side wall **330** has an angle of taper β_1. Second side wall **340** has an angle of taper β_2. Preferably, taper angle β_1 is from about 5° to about 18°, more preferably from about 10° to about 15°, and most preferably about 12°. Preferably, taper angle β_2 is from about 5° to about 18°, more preferably from about 10° to about 15°, and most preferably about 12°. Taper angle β_1 and taper angle β_2 are preferably equal.

[0078] During consumer testing of cup assembly **10**, unexpected and significant results occurred from the use of spout **300**, as compared to the contemporary spout designs for the

PLAYTEX® and GERBER® spouts shown in FIGS. **15** through **20**. It was discovered that spout **300** performed significantly better with marked improvement in consumer preference and ease of use by infants, compared to both the PLAYTEX® and GERBER® spouts.

[0079] The testing included infants between the ages of six (6) months and eighteen (18) months who were provided separate cups having spout **300**, the PLAYTEX® spout and the GERBER® spout, for equal periods of times. Consumer preference was tested and the use of the cups and spouts was observed by the parent(s), including the ease with which the infants were able to use the cups and spouts, and the generation of preferred flow rates.

[0080] Spout **300** rated higher than the PLAYTEX® and GERBER® spouts at %80confidence for being easier for the infant to use. Spout **300** rated higher than the PLAYTEX® spout at %80confidence for preference of the flow-rate achieved by the infant. Cup assembly **10** rated higher than the PLAYTEX® spout at %95confidence for ease of drinking. These results are of statistical and practical significance.

[0081] The embodiment of spout **300** tested had a change in widths w_1, w_2 of 0.97 inches−0.69 inches=0.28 inches over a height h_1 of 1.20 inches, resulting in a rate of change of spout width of 0.23. In contrast, the PLAYTEX® spout had a change in widths of 1.30 inches−0.75 inches=0.55 inches over a height of 0.875 inches, resulting in a rate of change of spout width of 0.62. The GERBER® spout had a change in widths of 1.30 inches−0.75 inches=0.55 inches over a height of 0.90 inches, resulting in a rate of change of spout width of 0.61.

[0082] It was discovered based on the consumer data that the parameter of rate of change of spout width, and, in particular, a lower rate of change of widths w_1, w_2 from distal end **370** to proximal end **380** of 0.23, as compared to the rate of change for the PLAYTEX® and GERBER® spouts of 0.62 and 0.61, respectively, was a contributing cause in facilitating the use of spout **300** by the infant. In particular, the lower rate of change of widths w_1, w_2 of spout **300** promoted lip closure by the infant and facilitated generation of a suction force for achieving a preferred flow-rate.

[0083] Based on the consumer data, it was determined that the rate of change of spout widths w_1, w_2 should preferably be between about 0.10 to about 0.60, more preferably between about 0.20 to about 0.30, and most preferably be about 0.23.

[0084] Additionally, it was further discovered from the consumer data that the arcuate shape of top wall **350** with chamfered edges along the transition areas between the top wall and the front and rear walls **310**, **320** and first and second side walls **330**, **340**, further facilitated the movement of the infant's lips along spout **300**, for proper lip approximation resulting in further promotion of lip closure. In contrast, the PLAYTEX® and GERBER® spouts had substantially flat top walls with sharper edges along the transition areas between the top wall and the adjoining walls.

[0085] The embodiment of spout **300** tested had a change in depths d_1, d_2 of 0.56 inches−0.20 inches=0.36 inches over a height h_1 of 1.20 inches, resulting in a rate of change of spout depth of 0.30. In contrast, the PLAYTEX® spout had a change in depths of 1.00 inches−0.30 inches=0.70 inches over a height of 0.875 inches, resulting in a rate of change of spout depth of 0.80. The GERBER® spout had a change in depths of 0.90 inches−0.25 inches=0.65 inches over a height of 0,90 inches, resulting in a rate of change of spout depth of 0.72.

[0086] It was discovered from the consumer data that the parameter of rate of change of spout depth, and, in particular, a lower rate of change of depths d_1, d_2 from distal end **370** to proximal end **380** of 0.30, as compared to the rate of change for the PLAYTEX® and GERBER® spouts of 0.80 and 0.72, respectively, was a contributing cause in facilitating the use of spout **300** by an infant. In particular, the lower rate of change of depths d_1, d_2 of spout **300** promoted lip closure by the infant and facilitated generation of a suction force for achieving a preferred flow-rate.

[0087] Based on the consumer data, it was determined that the rate of change of spout depths d_1, d_2 should preferably be between about 0.10 to about 0.70, more preferably between about 0.25 to about 0.50, and most preferably be about 0.30.

[0088] Also, it was discovered from the above unexpected and significant results that the parameter of rate of change of spout cross-sectional area, and, in particular, a lower rate of change of cross-sectional area of spout **300**, promoted lip closure by the infant, which facilitated generation of a suction force for achieving a preferred flow-rate. The embodiment of spout **300** tested had an ellipsoidal cross-sectional shape. The area A_1 for an ellipse is equal to $\pi*a*b$, where a is the radius of the major axis and b is the radius of the minor axis.

[0089] Spout **300** has a cross-sectional area A_1 at distal end **370** of about $\pi*(w_1/2)*(d_1/2)$. Spout **300** has a cross-sectional area A_2 at proximal end **380** of about $\pi*(w_2/2)*(d_2/2)$. The rate of change of cross-sectional areas A_1, A_2 of spout **300** is $(\pi*(w_1/2)*(d_1/2)-\pi*(w_2/2)*(d_2/2))/h_1=0.27$. In contrast, the PLAYTEX® spout had spout cross-sectional areas of about 0.75 inches*0.30 inches=0.225 sq. inches at the distal end, and about 1.30 inches*1.00 inches=1.30 sq. inches at the proximal end. Over a height of 0.875 inches, the PLAYTEX® spout had a rate of change in spout cross-sectional area of about 1.229. The GERBER® spout had spout cross-sectional areas of about 0.750 inches*0.250 inches=0.1875 sq. inches at the distal end, and 1.300 inches*0.900 inches=1.170 sq. inches at the proximal end. Over a height of 0.900 inches, the GERBER® spout had a rate of change in spout cross-sectional area of about 1.092.

[0090] It was discovered from the consumer data that the lower rate of change of spout cross-sectional areas A_1, A_2 from distal end **370** to proximal end **380** of 0.27, as compared to the rate of change of spout cross-sectional areas for the PLAYTEX® and GERBER® spouts of 1.229 and 1.092 respectively, was a contributing cause in facilitating the use of spout **300** by an infant.

[0091] Based on the consumer data, it was determined that the rate of change of spout cross-sectional areas A_1, A_2 should preferably be between about 0.10 to about 1.0, more preferably between about 0.20 to about 0.50, and most preferably be about 0.27.

[0092] The embodiment of spout **300** tested had taper angles α_1, α_2 for front and rear walls **310**, **320** of about 13.5° each, compared to corresponding overall taper angles for the PLAYTEX® spout of about 18° and 34°, and for the GERBER® spout of about 16° and 24°. It was discovered based on the consumer data that the parameter of spout taper angles and, in particular, the smaller taper angles α_1, α_2 for front and rear walls **310**, **320**, was a contributing cause in

facilitating the use of spout **300** by an infant, promoting lip closure, and facilitating generation of a suction force for achieving the preferred flow-rate. The smaller taper angles α_1, α_2 for front and rear walls **310**, **320** further facilitated the movement of the infant's lips along spout **300** for proper lip approximation resulting in further promotion of lip closure. It was further discovered that the use of a constant slope for taper angles α_1, α_2 for front and rear walls **310**, **320**, also facilitated the use of spout **300** by an infant.

[0093] Based on the consumer data, it was determined that the taper angles α_1, α_2 should preferably be between about 5° to about 15°, more preferably between about 10° to about 14°, and most preferably be about 13.5°.

[0094] The embodiment of spout **300** tested had taper angles β_1, β_2 for first and second side walls **330**, **340** of about 12° each, compared to corresponding overall taper angles for the PLAYTEX® spout of about 12° and 12°, and for the GERBER® spout of about 20° and 20°. It was discovered from the consumer data that the parameter of side spout taper angles, and, in particular, smaller taper angles β_1, β_2 for first and second side walls **330**, **340** was a contributing cause in facilitating the use of spout **300** by an infant, promoting lip closure, facilitating generation of a suction force for achieving the preferred flow-rate, and further facilitating the movement of the infant's lips along spout **300** for proper lip approximation resulting in further promotion of lip closure. It was further discovered that the use of a constant slope for taper angles β_1, β_2 for first and second side walls **330**, **340**, also facilitated the use of spout **300** by an infant.

[0095] Based on the consumer data, it was determined that the taper angles β_1, β_2 should preferably be between about 5° to about 18°, more preferably between about 10° to about 15°, and most preferably be about 12°.

[0096] The embodiment of spout **300** tested had front and rear walls **310**, **320** that were outwardly convex to form an ellipsoidal cross-sectional shape, compared to the PLAYTEX® and GERBER® spouts which had rear walls that were concave. Additionally, front and rear walls **310**, **320** had radii of curvature r_2, r_3 of 5.0 inches. It was discovered from the consumer data that the parameters of the shape of the front and rear walls **310**, **320** and the radii of curvature r_2, r_3 of the front and rear walls, were contributing causes in facilitating the use of spout **300** by an infant, promoting lip closure, and facilitating generating a suction force for achieving the preferred flow-rate.

[0097] Based on the consumer data, it was determined that the radii of curvature r_2, r_3 should preferably be between about 3.0 to about 7,0, more preferably between about 4.0 to about 6.0, and most preferably be about 5.0 inches.

[0098] The shape of spout **300**, including top wall **350** being arcuate; front wall **310** being outwardly convex and inwardly tapered; rear wall **320** being inwardly tapered; and first and second side walls **330**, **340** being inwardly tapered at substantially equal angles providing symmetry to the spout, was determined to promote better lip approximation and lip closure for reducing liquid loss. The shape of spout **300** provides for better transitioning between bottle-feeding and cup drinking. Earlier promotion of lip closure in a child's life through the use of spout **300**, assists in developing the necessary lip closure for stripping boluses from a spoon and maintaining lip closure for chewing. It was discovered based on the consumer data that various combinations of the above-described parameters were contributing factors in facilitating the use of spout **300** by an infant, promoting lip closure, and facilitating generation of a suction force for achieving the preferred flow-rate.

[0099] The present invention having been thus described with particular reference to the preferred forms thereof, it will be obvious that various changes and modifications may be made therein without departing from the spirit and scope of the present invention as defined in the appended claims.

What is claimed is:

1. A cup assembly comprising:

a cup; and

a lid body having a lid wall with a top surface and a bottom surface opposite said top surface;

an annular flange having a flange wall extending downwardly from said lid wall that is connectable to said cup, said flange wall having an outer surface and an inner surface opposite said outer surface;

a spout extending from said top surface, said spout having a front wall, a rear wall, a first side wall connecting said front wall and said rear wall on a first side, a second side wall connecting said front wall and said rear wall on a second side opposite said first side, and a top wall, said top wall being connected to said front wall, said rear wall, said first side wall and said second side wall, said top wall forming edges with said front wall and said rear wall;

a vent; and

a flow control valve,

wherein said bottom surface includes a vent mating surface that is adjacent to or incorporated into said vent,

wherein said vent mating surface is configured to frictionally engage said flow control valve to place said valve in fluid communication with said spout and said vent,

wherein said bottom surface includes a valve securing member that engages said flow control valve to orientate and/or assist in holding said valve in position, said valve securing member extending orthogonally from said bottom surface.

2. The cup assembly of claim **1**, wherein said front wall and said rear wall are aligned so that said first sidewall and said second sidewall are chamfered edges.

3. The cup assembly of claim **1**, wherein said rear wall has an outwardly convex shape with a first radius of curvature and said front wall has an outwardly convex shape with a second radius of curvature.

4. The cup assembly of claim **3**, and wherein said first and second radii of curvature are between about 3.0 inches to about 7.0 inches.

5. The cup assembly of claim **1**, wherein said spout has a proximal end connected to said lid body and a distal end opposite said proximal end.

6. The cup assembly of claim **5**, wherein said spout has a height from said proximal end to said distal end, and wherein said height is from about 0.80 inches to about 1.80 inches.

7. The cup assembly of claim **5**, wherein said proximal end has a width from said first side wall to said second side wall and said distal end has a width from said first side wall to said second side wall, and wherein said width of said distal end is from about 0.50 inches to about 0.90 inches and said width of said proximal end is from about 0.80 inches to about 1.2 inches.

8. The cup assembly of claim **5**, wherein said proximal end has a depth from said front wall to said rear wall and said distal end has a depth from said front wall to said rear wall and said distal end has a depth from said front wall to said rear wall, and wherein said depth of said distal end is from about 0.10 inches to about 0.25 inches and said depth of said proximal end is from about 0.25 inches to about 0.75 inches.

9. The cup assembly of claim **1**, wherein said front wall and said rear wall are tapered.

10. The cup assembly of claim **9**, wherein said front wall and said rear wall are inwardly tapered.

11. The cup assembly of claim **10**, wherein said taper is along a substantially straight line or is a constant slope.

12. The cup assembly of claim **9**, wherein said spout has an angle of taper β_1 and an angle of taper β_2 that are substantially equal

13. The cup assembly of claim **9**, wherein said spout has an angle of taper or and an angle of taper α_2 that are substantially equal

14. The cup assembly of claim **1**, wherein said spout top wall has a plurality of holes therethrough.

15. The cup assembly of claim **1**, wherein said spout is made from a rigid material.

16. The cup assembly of claim **1**, wherein said spout is made from a flexible, resilient and/or soft material.

17. The cup assembly of claim **1**, wherein said spout has a generally elliptical cross-section.

18. The cup assembly of claim **1**, wherein said spout has a proximal end connected to said lid body and a distal end opposite said proximal end, wherein said proximal end has a first width from said first side wall to said second side wall and said distal end has a second width from said first side wall to said second side wall, and wherein said first width is greater than or equal to said second width.

19. The cup assembly of claim **1**, further comprising a handle, where the handle has a gripping portion.

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