

DISPOSABLE DRINKING CONTAINER AND NIPPLE

Technical Field

This invention relates to a disposable, single use drinking container and a nipple dispensing portion therefor. The drinking container is particularly suitable for use by infants or the elderly who have difficulty taking liquid from a container having a conventional drink dispensing opening. The invention also relates to a method of manufacturing a drinking container and a method of preparation thereof.

Background of the Invention

Single use, disposable drinking containers are popular, at least in part, because of their convenience. Furthermore, single use containers can offer assured cleanliness and hygiene in view of the use of proven sterilisation techniques and impervious seals applied at the time of manufacture and/or packaging. One type of single use drinking container that has become popular is derived from sports drink bottles having a nozzle that is operable by the mouth or fingers of the user to seal and unseal the bottle. Sports persons such as cyclists commonly used previous forms of these bottles, but the bottle was sold without contents and it was necessary to fill the bottle from a source of drinking liquid before use. The convenience of the pre-filled, single use, disposable form of the sports drink bottle resulted in a large increase in commercial, non-carbonated soft-drink sales, particularly those drinks directed to replenishment of minerals or nutrients during or following sporting activity.

Infants, and sometimes the infirm elderly, often require or desire drinking from a special container having a nipple or teat for dispensing the liquid into the child's mouth. The most common form of infant drinking container is a simple re-useable nursing bottle with a cap having a nipple or teat made from rubber or plastic fitted thereto. In order to provide a child with a drink it is necessary to open a separate container of drinking fluid, fill the nursing bottle and replace the cap having the nipple or teat. Between uses the bottle must be washed, and preferably sterilised. It thus becomes problematic for a child carer to provide an infant with a

- 2 -

drink from a nursing bottle, especially when away from the home and laden with other children's paraphernalia.

Various forms of pre-filled, disposable drink containers for infants have been proposed in the past. For example, United States Patent No. 5,273,171 (Maricoma, et al) discloses a pre-filled, disposable nursing container for holding and dispensing a nursing liquid by way of a nipple. The nursing container is in the form of a rectangular box having a nipple at the top attached to the box by way of a nipple attachment piece. The nipple attachment piece has a sharp protrusion which is actuatable to pierce an access port on top of the box, allowing liquid from the box to flow to the nipple. The nursing container makes use of a friction fit, removable cap for covering the nipple at the time of sale, and when not in use.

Another example of a disposable nursing bottle is described in United States Patent No. 5,112,628 (Conrad), which in use more clearly resembles a conventional non-disposable baby bottle. The emphasis of the bottle feeder described in Conrad is on the sealed and tamper evident cap assembly which encloses a nipple, making it particularly suitable for single use applications. In its initial configuration, the cap assembly is sealed to the top of the bottle in an orientation such that the nipple is inverted. For use, the cap assembly is removed from the bottle and the nipple unsealed from therewithin. A portion of the cap assembly having the nipple is then reversed in orientation and reattached to the bottle top, placing the bottle feeder in a condition for use.

Several other forms of disposable baby bottles are known also, and some examples can be found described in United States Patents 4,678,092, 4,830,205 and 4,706,827.

Summary of the Invention

In accordance with the present invention, there is provided a disposable container comprising a container body for housing a liquid and having a mouth at the top with an opening therein through which liquid can pass; and a cap assembly attached to the top of the container body, the cap assembly comprising a flexible nipple in fluid communication with the container body

- 3 -

through the opening in the top, a cap rim attached to the mouth and sealed with the nipple therearound, the cap rim having an aperture through which the nipple can project, in use, and a removable sealing portion which, in a first configuration of the container, is hygienically sealed around said aperture of the cap rim so as to prevent ingress and egress of liquid or gas to and from the container, wherein the nipple, in the first configuration of the container, is contained beneath said sealing portion; and wherein the seal portion is removable from the cap rim to place the container in a second configuration such that the flexible nipple can be extended through the cap rim aperture to protrude from the top of the container in condition for use.

In one embodiment of the invention, the container is in the form of a small bottle or the like constructed from a plastics material. For example, the container may be in the form of a relatively thin walled plastic bottle constructed from PET recyclable plastic, polycarbonate plastic or similar, which can be fabricated by moulding. The bottle preferably has a base at the bottom thereof to enable the bottle to stand on a flat surface, and the mouth at the top to which the cap assembly attaches.

The cap rim may also be constructed from a plastics material. The cap rim preferably is formed with a downwardly extending peripheral flange and an inward annular portion defining said aperture, which is centrally located and aligned with the mouth of the container body. The flange is adapted to attach the cap assembly to the bottle. The cap rim may be secured to the bottle mouth using interfitting circumferential ridges and/or grooves formed on the cap rim flange and container body mouth, in known fashion. Alternatively, the cap rim and container body mouth may be formed, for example, to form a screw fit to one another, or the cap rim flange may be heat welded or similarly affixed to the container body.

The flexible nipple preferably has an outwardly extending peripheral flange that abuts around the underside of the annular portion of the cap rim, so that the nipple is centrally located with respect to the aperture. In the preferred form of the cap assembly, a portion of the nipple can be inverted so that the nipple is partially "collapsed" in the first configuration of the container wherein the nipple is held at least partially below the annular portion of the cap. In this configuration, with the cap rim sealed to the bottle mouth and the seal portion of the cap

- 4 -

assembly in place over the aperture, the nipple is sealed within the a space bounded by the bottle, cap rim and seal portion, the same space which holds the drinking liquid of the container. When the seal portion is removed, the end of the nipple may be drawn out through the aperture, un-inverting the nipple portion such that the nipple fully extends through the aperture in the cap rim, placing the nipple in a drinking configuration. In the drinking configuration the nipple end is accessible to an infant to draw liquid therethrough from the container body.

Preferably, the nipple can be re-inverted from the drinking configuration back to the collapsed configuration for storage if the contents of the container are not finished at once. A protective over-cap may be supplied with the container to fit over the cap assembly to shield the nipple during such storage and/or to protect the seal portion before removal, if necessary or desired.

In one embodiment, the seal portion is integrally formed with the cap rim, having a frangible seal formed around its outer edge that is moulded to an inner edge of the cap rim which defines the central aperture. In this embodiment the seal portion has an upstanding projection from the cap rim when in place, so that a user can apply a transverse force thereto sufficient to break the frangible seal and remove the seal portion from the cap rim. The seal portion may be formed with a hollow interior to the upstanding projection adapted to receive the tip of the nipple.

In another embodiment the seal portion comprises a flexible plastic or laminate disk or the like which is fusion welded or adhesively attached to the annular portion of the cap rim to seal the aperture. The seal portion may then be formed with a loose tab, which can be grasped by the user in order to peel the seal portion from the cap rim to expose the nipple in the aperture.

The nipple may be drawn out from the collapsed configuration to the drinking configuration by gripping the end of the nipple and pulling it through the aperture. Alternatively, where the container body is constructed from a flexible material, the nipple may be un-inverted by gently squeezing on the walls of the container body. By squeezing the container body the internal pressure of the container is temporarily increased because the only outlet of the container is through the nipple which typically has only a very small opening. Thus, the increased pressure

- 5 -

forces the nipple to expand through the aperture in the cap annulus and extend to the drinking configuration.

The nipple is preferably constructed from a relatively soft, inert, flexible and mouldable material, such as silicone rubber or the like. In one form of the invention, the nipple has a peripheral flange which, with the cap assembly attached to the container body mouth, is pressed between surfaces of the cap annulus and container body mouth which may both secure the nipple to the container and provide a liquid-tight seal between the cap assembly and container body.

The invention also provides a method of manufacturing a disposable drinking container, comprising: forming a container body suitable for carrying a liquid and having a mouth at the top with an opening therein through which liquid can pass from the container body; substantially filling the container body with a drinking liquid; forming a cap assembly comprising a cap rim adapted to seal onto the container body mouth, a flexible nipple fitted within the cap rim and having a suckling end aligned with an access port of the cap rim, and removable sealing portion attached over the access port of the cap rim to seal the access port; and fitting the cap assembly to the container body with the cap rim sealed around the container body mouth so that the nipple is held to the container body mouth and sealed thereto beneath the cap rim and removable sealing portion.

In one embodiment of the invention, the container body comprises a bottle made from a plastics material such as PET or the like. This allows, for example, the formation of the container body to be carried out by a suitable moulding process, such as "blow moulding". The cap rim may also be moulded from plastic, although it may be desirable to use a different type of plastics material for the cap than for the container body, as is practised in the art. The nipple should be constructed from a relatively soft and flexible material to make it suitable for suckling by an infant and moulded silicone rubber or similar has been found to be appropriate for that purpose.

It is preferred that the container body and cap assembly be in a sterile condition at the time the

- 6 -

cap assembly is fitted to the container body to prevent any inadvertent contamination of the drinking liquid. To that end, it may be desirable in some situations for the filling and capping procedures to be carried out under relatively sterile conditions and/or for any air space remaining in the container body after introduction of the drinking liquid to be filled with an inert gas such as nitrogen gas prior to fitting the cap assembly. Such precautions are generally known in the field of pre-filled drinking and eating container manufacturing.

In one form of the invention, the sealing portion is formed integrally with the cap rim and has an upstanding projection which, when the cap assembly is fitted to the container body, projects away from the container body mouth. In this case, the sealing portion preferably attaches around the inner periphery of the access port by a thin annular wall section such that lateral finger pressure on the upstanding portion is sufficient for frangible unsealing and removal of the sealing portion from the cap rim. This form of construction is particularly advantageous because the manufacturing formation of the drinking container involves assembly of only three components, the container body, the nipple, and the integral cap rim and sealing portion. Furthermore, sterile sealing between the cap rim and sealing portion is not dependent upon any bonding process since the two are integrally formed and attached by the thin walled section.

In this form of the invention, the upstanding projection of the sealing portion is preferably hollow and adapted to receive the suckling end of the nipple therewithin. The suckling end of the nipple preferably fits within the interior of the projection with an inner surface of the projection abutting against the end of the nipple which has a suckling aperture therein so as to seal the aperture against leakage.

In another form of the invention the sealing portion is constructed in the form of a flexible flat disk made from a liquid and gas impervious material such as a suitable plastic, foil or laminate of foil and plastic. In that case, the sealing portion may be attached to an outer surface of the cap rim, over the access port, using a frangible adhesive or heat-sealing technique which enables the disk to be peeled away from the cap rim and removed for use.

The manufacturing procedure may also include a step of fitting a protective over-cap to the cap

- 7 -

assembly. The protective over-cap preferably fits over the sealing portion and at least a portion of the cap rim, and is removable from the cap assembly to expose the sealing portion, and replaceable after removal of the seal for shielding the nipple during storage of the container after opening. The protective overcap also serves to protect the sealing portion before unsealing and removal thereof, to prevent inadvertent removal of the sealing portion or premature breaching of the seal which it provides. An additional sealing band or cover may also be provided around or over the over-cap when it is fitted to the cap assembly, if desired, to prevent removal of the over-cap before use or to provide a visual indication of unauthorised over-cap removal or tampering.

The invention also provides a cap for a disposable container having a container body with a mouth having an opening therein through which liquid can pass from the container body, comprising a cap rim adapted to seal onto the container body mouth and having a central access port, a flexible nipple arranged within the cap rim and having a suckling end with an aperture therein and aligned with the access port, and removable seal attached and sealed around the access port of the cap rim, the nipple suckling end being contained within and/or abutting against an inner portion of the seal.

In one form of the invention, the removable seal is integrally formed with the cap rim and has an upstanding projecting portion. The marginal portion between the seal and the cap rim comprises a thin-walled annular section that is frangible upon a lateral force being applied to the upstanding projection. The projecting portion is preferably hollow and adapted to receive the suckling end of the nipple therewithin. A base portion of the nipple is partially inverted to allow the suckling portion to be accommodated within the projecting portion of the seal, which preferably does not project from the cap rim as far as the nipple itself does when in a position for use.

In another form of the invention, the nipple is also in a collapsed configuration such that a base portion thereof is inverted as compared to a drinking configuration of the nipple. In this form of the invention, a flange of the nipple arranged around the periphery of the base portion is attached to the cap annulus and, in the collapsed configuration, the inverted base portion of the

- 8 -

nipple protrudes from the flange away from the removable seal to its integral attachment with an end portion of the nipple. The suckling end of the nipple, which is the portion adapted for suckling by an infant, extends back toward the seal from its connection to the base portion. In this case the seal may be a flexible flat disk of a liquid and gas impervious material such as a suitable plastic, foil or laminate of plastic, foil and/or cardboard or the like.

In one embodiment, the nipple has a flange portion that is arranged around the cap rim where the cap rim fits around the mouth of the container. Preferably the nipple flange is arranged to be sandwiched or pressed between the cap rim and container mouth so as to seal the attachment of the cap rim and the container mouth.

The cap rim may comprise a flat disk having a central aperture therein forming the access port, and an integrally formed, peripheral, downwardly extending flange for attaching the cap to the container. The flange may be provided with a circumferential ridge or groove formed on the inner side thereof and adapted to interfit with a ridge or groove formed on an outer surface of the container mouth.

The invention further provides a single use, disposable drinking container comprising a flexible plastic bottle or jar containing a drinking liquid and having a mouth opening sealed by a cap assembly, the cap assembly comprising a cap having a central aperture, a nipple arranged within the cap and having a suckling portion aligned with the aperture in the cap, and a sealing portion removably sealed over the cap aperture, the cap assembly being coupled to the bottle or jar with a flange of the nipple sandwiched between the cap and a rim of the mouth opening wherein the nipple is contained in the mouth opening and beneath the sealing portion, the sealing portion being, in use, removable from the cap so as to expose the nipple in the aperture enabling the suckling portion to be drawn through the aperture for use.

The invention further provides a nipple for a disposable infant nursing container, comprising an attaching portion in the form of a generally annular flange for attaching the nipple to a liquid container, a suckling portion having an aperture therein for delivering liquid from the container, when attached thereto, to an infant by way of the nipple, and a connecting portion intermediate

the suckling portion and the attaching portion, wherein the nipple is provided with a circumferential groove at the boundary of the suckling and connecting portions to facilitate two stable configurations of the nipple, being a storage configuration and a drinking configuration, and wherein the connecting portion is inverted in the storage configuration as compared to the drinking configuration.

The nipple is preferably moulded from a relatively soft and flexible material, such as silicone rubber or the like.

The suckling and connecting portions of the nipple are preferably of approximately equal extent, such that the circumferential groove is approximately mid-way along the nipple in the drinking configuration. In the storage configuration, the groove facilitates circumferential folding or bending of the nipple at approximately the mid-point thereof.

A further circumferential groove may be formed on the nipple at or near the boundary between the connecting portion and the attaching portion of the nipple. This additional groove may facilitate circumferential bending or folding and unfolding of the nipple thereat when the nipple is moved between the storage and drinking configurations and the attaching portion is affixed to a nursing container.

In a preferred construction the connecting portion of the nipple has a smooth curvature, from a substantially horizontal plane at its connection to the flange, to a substantially vertical plane at its connection to the suckling portion. This facilitates easy movement of the nipple between the storage and drinking configurations.

Strengthening surface formations, preferably on the inner surface of the suckling portion, may also be provided on the nipple in order to reduce any tendency of diametrically opposed surfaces of the nipple to fold upon one another to obstruct fluid flow through the nipple. The strengthening formations may comprise, for example, one or more circumferential ridges and/or one or more longitudinal ridges arranged on the inner surface of the suckling portion.

Brief Description of the Drawings

The invention is described in greater detail hereinafter, by way of example only, with reference to embodiments thereof illustrated in the accompanying drawings, in which:

Figure 1 is an isometric view of a drinking container in a sealed configuration with protective over-cap in place;

Figure 2 is an isometric view of the drinking container in a sealed configuration with over-cap and seal removed;

Figure 3 is an isometric view of the drinking container in a drinking configuration with a nipple thereof exposed for use;

Figure 4 is an exploded view of the drinking container and cap assembly with protective over-cap;

Figure 5 is a side cross-sectional view of the drinking container in a sealed configuration, including protective over-cap;

Figure 6 is a side cross-sectional view of the drinking container with seal in place and nipple collapsed;

Figure 7 is a side cross-sectional view of the drinking container with seal removed, illustrating extraction of the nipple;

Figure 8 is a side cross-sectional view of the drinking container with nipple extracted;

Figure 9 is a side view of a nipple in extracted condition;

Figure 10 is a side cross-sectional view of the nipple of Figure 9;

Figure 11 is a side view of the nipple in collapsed condition;

Figure 12 is a side cross-sectional view of the nipple of Figure 11;

Figure 13 is a side cross-sectional view of a particular form of nipple;

Figure 14 is a side cross-sectional view of a drinking container top with nipple attached;

Figure 15 is a perspective view of the upper portion of a second drinking container fitted with a second form of top;

Figure 16 is a perspective view of the upper portion of the drinking container of Figure 15 illustrating removal of the sealing portion;

Figures 17 and 18 are perspective views illustrating the second form of drinking container top with sealing portion removed and nipple extended for use;

Figure 19 is a central cross-sectional view through the second form of drinking container top attached to a drinking container;

Figure 20 is a cross-sectional view of a preferred nipple construction in extracted configuration; and

Figure 21 is a cross-sectional view of the preferred nipple in a fully retracted configuration.

Detailed Description of the Preferred Embodiments

A drinking container 10 according to an embodiment of the present invention is shown in various configurations and views in Figure 1 to 8. The container 10 comprises a container body 12 which is of generally cylindrical form and has a flat base 14 at the bottom end thereof and a mouth 16 having a round opening at the top end (best seen in Figure 4). In a preferred form of the invention the container body 12 comprises a bottle constructed from a plastics material, such as recyclable PET plastics or the like, as is known for the construction of drinking bottles. The preferred form of the bottle is relatively small, for example having a liquid storage capacity of about 100 to 250 millilitres, particularly because embodiments of the invention are adapted for use by infants.

Referring particularly to Figures 1 to 4, the container 10 also comprises a cap assembly 20 which fits on the mouth 16 of the container body so as to, in use, seal the mouth opening 18. The cap assembly includes a cap rim 22, which has a flat annular portion 24 with a central circular aperture 25 and a downwardly extending flange portion 26. For ease of reference, the flange portion 26 is referred to as downwardly extending because, when the cap assembly is fitted to the container body and the container is set on its base 14, the flange extends downward from the annular portion 24 with respect to the upwardly facing outer surface thereof. The inner circumference of the flange portion 26 is constructed to be marginally larger than the outer circumference of the container mouth 16, so that the cap rim 22 can be fit over the container mouth 16 where the underside (downward facing) surface of the annular portion is adjacent the lip edge of the mouth. In use, the cap rim 22 is firmly secured to the container body 12 at the mouth 16. The cap rim and container body may be connected to each other in

- 12 -

any convenient way, such as by adhesive, heat-sealing, or interference fit by interlocking or interfitting circumferential ridges and/or grooves formed on the cap rim and container mouth.

A flexible nipple 50 is attached to the cap rim 22 so that the nipple end is centrally located with respect to the aperture 25. The nipple 50 in its extended or drinking configuration is generally conical in shape (see Figure 9, for example), and has an attaching portion at the base thereof. The attaching portion, in the illustrated form of the nipple, is a flat annular flange 52 which extends outwardly around the base of the nipple. With the nipple 50 fitted to the cap rim 22, the flange 52 lies against the underneath surface of the annular portion 24. The flange 52 may be attached to the cap rim 22 by an adhesive or the like, or may form a loose friction fit in the cap rim and rely on opposed pressures from surfaces of the cap rim and container mouth to secure the nipple to the container when the cap assembly is attached, as discussed in greater detail hereinbelow.

The flexible nipple preferably has two stable configurations, one in which the nipple is generally conical in shape and extends in one direction from the base thereof as shown in Figure 9 and 10, for example (herein referred to as the extended, extracted or drinking configuration or condition). The other configuration is the collapsed or storage configuration or condition, in which the nipple is folded in upon itself about a circumferential folding or bending area which is located approximately mid-way along the extent of the nipple when in the extended configuration. The nipple 50 is illustrated in its collapsed configuration in Figure 11 and 12, for example. Whilst in the collapsed configuration a connecting portion 54 of the nipple which extends between the attaching portion 52 and a suckling portion 56 (see Figure 9 or 10, for example) is inverted so that the connecting portion 54 extends downwardly from the attaching portion and the suckling portion 56 extends upwardly from its union with the connecting portion. This results in the collapsed configuration of the nipple 50 illustrated in Figure 11 or 12. With the nipple 50 in the collapsed configuration and the attaching portion 52 thereof attached to the cap rim 22, the nipple extends downwardly from the cap rim at least substantially below the upper surface of the annular portion 24, which is illustrated in Figures 2, 4 and 14.

- 13 -

The cap assembly 20 also includes a seal 28 (Figure 4) which is in the form of a flexible disk of material. The seal 28 is preferably made from a liquid and gas impervious material, such as a suitable foil, plastic or laminate of plastic and foil. Seals of this type are well known in the field of pre-filled drink and food containers. The seal 28 is removably affixed to the upper surface of the cap rim 22 so that it extends across the aperture 25. The seal 28 together with the sealed attachment between the cap rim 22 and container body 12 ensure that the contents of the container 10 remain sealed until use of the container.

With cap rim 22 attached to the container body 12 and the seal 28 in place, the nipple in the collapsed configuration is concealed beneath the seal 28 and enclosed within the space defined by the container body 12, the cap rim 22 and seal 28. This is the same space in which the container 10 holds the liquid to be carried thereby. Removal of the seal 28 exposes the collapsed nipple bounded by the aperture 25 in the cap rim 22 (Figure 2). The nipple 50 may then be extracted through the aperture 25 to place the nipple in the drinking or extended configuration where the nipple 50 extends outwardly through the aperture for use (Figure 3). With the nipple 50 in the extended condition as shown in Figure 3, an infant may place the suckling portion in his or her mouth and invert the container so receive liquid from the container through the opening in the end of the nipple.

The cap assembly may additionally include a protective over-cap 30 as seen particularly in Figure 4. The protective over-cap 30 is adapted to fit over the seal 28 when attached to the cap rim, to prevent accidental breakage or removal of the seal 28, and to reduce the possibility of tampering with the container and its contents. To further improve the tamper resistance of the container, a sealing band (not shown in the drawings) may be placed around the edge of the over-cap and adjacent portion of the container body 12, as is known in the art. Such a sealing band is designed so that the over-cap cannot be removed from the container without damage to the sealing band, which provides a visual indication of removal or tampering with the over-cap. With the over-cap in place (Figure 1), the seal 28 is concealed.

The over-cap 30 of the preferred embodiment is marginally larger than the cap rim 22 which it fits over, and may be formed with small projecting ridges circumferentially spaced around an

- 14 -

inner side surface thereof to bear against a lower edge of the cap rim, so as to removably hold the over-cap in place when fitted over the cap rim. Simple snap-fit caps of this type are well known in the field of disposable drink and food containers.

The over-cap preferably fits over the cap rim relatively closely to avoid wasted space taken thereby. The over-cap may be replaced on the container after initial use thereof, but because of the close fit between the over-cap and cap rim in the preferred form of the invention, the nipple should be replaced in the storage configuration before replacing the over-cap. This is done by pressing the suckling portion 56 of the nipple down into the aperture 25 so that the nipple then remains at least substantially beneath the level of the annular portion 24. This enables the over-cap to be replaced over the cap rim without interfering with the nipple, even though the over-cap fits closely over the aperture from which the nipple 50 extends when in use. It may be desirable for the over-cap to be constructed with a locating structure such as a low annular wall or circular indentation around the centre of the inside surface of the over-cap. Such a locating structure would be sized so that the end of the nipple in the extended condition would rest therein when the over-cap is replaced, so that the nipple could be more easily manipulated from the extended to the collapsed condition by pressure from the over-cap during replacement thereof.

A particular advantage of the cap and nipple according to embodiments of the invention, when applied to pre-filled, disposable drinking containers is the ease of use. A pre-filled, disposable drinking container 10 may be purchased, for example, at a supermarket or the like in the condition shown in Figure 1 or in cross-sectional view in Figure 5. The container 10 already contains a suitable drinking liquid 13 (see Figure 5) such as apple juice, and is sterilised and sealed against contamination at the time of manufacture, most particularly by the seal 28 which conceals the nipple 50. In order to use the drinking container, a child carer needs to merely remove the protective over-cap 30 and peel away the seal 28. The nipple 50 is then exposed within the aperture 25, and for use must be extended from the storage configuration to the drinking configuration. This is easily done without having to remove the nipple, and thus the drinking container is prepared for use with a minimum of fuss.

The procedure for use of a pre-filled disposable drinking container 10 is illustrated in the sequence of drawings comprising Figures 5 to 8. Figure 5 shows the container 10 in a sealed condition, which is the condition in which a consumer would typically purchase the pre-filled container. Any sealing band which may be provided around the edge of the protective over-cap 30 is not shown in the drawings. The protective over-cap 30, as discussed above, is preferably a snap-fit over the cap rim 22, and is thus easily removed by user such as a child carer or the like. The container 10 without the protective over-cap is shown in side cross-sectional view in Figure 6. The seal 28 is then removed from the container 10 which exposes the nipple 50 there beneath for access by the user. In order to use the drinking container 10 it is then necessary for the user to extract the nipple 50 from the storage configuration which it is shown at in Figures 5 and 6. There are several ways in which the nipple 50 may be extracted from the storage configuration to the drinking configuration, and one is illustrated in Figure 7. In particular, the end of the nipple may be grasped between the fingers of the user and gently pulled upwardly in order to draw the nipple out through the aperture 25.

The nipple may be extracted by increasing the internal pressure of the container 10 with respect to the atmospheric pressure, so as to force the nipple 50 from the container into the extended configuration. Where the container 10 is constructed from a flexible material, gently squeezing or pressing on the outside of the container body 12 may generate this increase in internal pressure.

In an alternative, the nipple 50 may be constructed with a spring bias toward the extended condition. In that case the nipple 50 may be constructed to spring out from the collapsed configuration to the drinking configuration automatically upon removal of the seal 28. This is particularly advantageous for ease of first use of the drinking container, but creates problems if it is desired to return the nipple to the storage configuration. Thus, if the nipple is constructed in that way, it may be advantageous to provide an over-cap which can fit over the nipple when in the extended condition for protection of the nipple after unsealing thereof, if desired. The nipple can be provided with the necessary spring bias by the nature of the material from which it is constructed, although it may be found that the wall thickness of the nipple is required to be thicker in that instance as compared to the above discussed nipple construction which is stable

- 16 -

in both the extended and storage configurations. The additional wall thickness of the material from which the nipple is constructed can be used to provide an increase in the resilience of the nipple and its ability to return to its extended configuration shape.

The container 10 is shown in side cross-sectional view with the nipple 50 in extended configuration in Figure 8.

Referring particularly to Figures 9, 10, 11 and 12, a nipple 50 is shown in side and cross-sectional views in both extended and collapsed configurations. The nipple 50 is preferably constructed from a relatively soft, inert, non-toxic and mouldable material which is suitable for infants to place in their mouths. Silicone rubber is one suitable material, and other materials, such as plastics and/or rubbers, will be readily apparent to those skilled in the art. The nipple 50 is preferably formed by moulding, and the type of moulding technique employed may depend upon the material from which the nipple is to be constructed. The nipple is preferably moulded in the shape of the extended configuration (Figures 9 and 10), and then manipulated into the storage configuration (Figures 11 and 12) during manufacture of the cap assembly 20.

The nipple, in the embodiment illustrated in Figure 9 to 12, comprises an attachment portion 52, a suckling portion 56 having a small drinking hole in the end thereof, and a connecting portion 54 intermediate the attaching and suckling portions. The attaching portion 52 comprises a flat annular flange which is utilised to secure the nipple to the cap rim 22 and/or container body 12. The connecting portion 54 as shown in Figures 9 and 10, comprises a frustoconical shape which tapers from the inner circumference of the annular attaching portion 52 and the base of the suckling portion 56 which has a smaller diameter. The suckling portion 56 is generally conical in shape, extending from its union with the connecting portion to an end which contains the drinking hole (the drinking hole is not labelled in the drawings). The suckling portion of the nipple may of course be constructed in any desirable shape and may, for example, be formed substantially cylindrically with a bulb at the end thereof, or otherwise in accordance with established appropriate shapes for infant drinking nipples.

The preferred nipple has two stable configurations, namely the extended configuration and the

- 17 -

collapsed configuration as illustrated in side cross-section in Figures 10 and 12, respectively. The primary difference between the two configurations is in the arrangement of the connecting portion 54, which is inverted in collapsed configuration. Where the connecting portion of the nipple is referred to as being inverted, this means that the surface thereof which normally faces outwardly, in the inverted condition, faces inwardly, and vice versa. In the present instance, this also means that the connecting portion 54 extends in the opposite direction also, for example extending downwardly whilst inverted, as opposed to upwardly when not inverted. With the nipple in the storage configuration (Figures 11 and 12), the connecting portion 54 extends downwardly from the attaching portion 52, and the suckling portion 56 extends upwardly from its union with the connecting portion at least substantially back to the plane of the attaching portion. On the other hand, with the nipple in the drinking configuration (Figures 9 and 10), the connecting portion 54 extends upwardly from the attaching portion 52, and the suckling portion 56 extends further upward from the end thereof.

Because the nipple, in the storage configuration, lies at least substantially below the plane of the attaching portion which in use is attached underneath the annular portion 24 of the cap rim, the seal 28 can be applied to the upper surface of the cap rim without interfering with the nipple during manufacture.

Figure 13 is a side cross-sectional view of a particular form of nipple 50'. The nipple 50' is moulded with formations which facilitate the two stable configurations of the nipple as discussed above. In particular, the nipple 50' is provided with a circumferential groove 60' therearound at the junction of the connecting and suckling portions 54', 56'. The groove 60' facilitates folding or bending thereat, which makes the nipple more stable in the collapsed configuration. A similar groove formation 62' may be provided at the junction of the connecting and attaching portions 54', 52', for the same reasons. The formation of the grooves 60', 62' may be accompanied by the formation of corresponding ridges on the nipple if the groove formations would otherwise result in an unacceptable thinning or weakening of the nipple wall material.

Again referring to Figure 13, the nipple 50' may be provided with one or more surface

- 18 -

formations, preferably on the inner surface thereof. For example, one or more strengthening formations may be provided on the nipple suckling portion 56', for the purpose of reducing any tendency of diametrically opposed surfaces of the nipple to fold in on one another during suction thereon. For example, one or more circumferential strengthening ridges 64' may be provided on the inner surface of the nipple suckling portion 56'. In the alternative, or in addition, one or more strengthening ridges extending longitudinally of the nipple may be provided for the same purpose.

The container body 12 of the disposable, pre-filled drinking container 10 is preferably constructed from a plastics material, such as recyclable PET or other plastics material suitable for drink containers as are known in the art. Other materials for construction of the container body 12 may alternatively be employed, such as glass, metal or laminated cardboard, but plastic is preferred for various reasons including its light weight and the ability to easily seal containers made from plastics. Manufacturing of the container body preferably entails moulding in a known manner, the details of which may depend upon the material of construction. The technique of blow-moulding, for example, may be employed.

The cap rim is preferably also constructed from plastic, although other suitable materials may be readily apparent to those skilled in the art. The cap rim may be constructed from a different type of plastic than the container body, and may be formed from, for example, a suitable density of polyethylene or polypropylene. Of course the manufacturing technique utilised for forming the cap rim may also vary depending upon the material used, and injection moulding may be found appropriate for suitable materials.

As mentioned, the nipple is preferably moulded in the extended configuration, and may be manipulated into the collapsed configuration either before or after being coupled with the cap rim. In the preferred manufacturing procedure, the cap assembly including at least the cap rim, nipple and seal is manufactured as a unit, before being fitted to the pre-filled container body. For example, the cap rim and nipple are separately moulded and the seal is cut from sheet material. The nipple is then fitted within the cap rim by insertion from the underneath thereof. Simultaneously, the nipple may be manipulated into the collapsed configuration by applying

- 19 -

opposed compressive forces to the attaching portion and end of the suckling portion along axis of extent of the nipple. Alternatively, the nipple may be manipulated into the collapsed configuration during or immediately after removal from the mould. The nipple may be secured to the cap rim by friction fit, or may employ some extraneous adhesive, as appropriate. The seal is then applied to the upper surface of the annular portion of the cap rim, using an adhesive, heat-seal, or any other suitable sealing method which is apparent to those skilled in the art. This completes the formation of the cap assembly, and the over-cap, if required, may be fitted thereover either before or after fitting of the cap assembly to the container body. If a sealing band or cover is also desired, it should preferably be applied after the cap assembly is fitted to the container, since the sealing band or cover should also fit over a portion of the container body to provide the abovementioned visual indication of cap removal or tampering.

The container body is formed and then filled with a drinking liquid. The cap assembly is then fitted and sealed thereto, sealing the container liquid contents and nipple therein. The cap-rim may be attached to the mouth of the container body in any appropriate manner which is apparent to those skilled in the art, such as by use of adhesives or heat sealing. However, in the preferred form of the invention, the attaching portion of the nipple itself is utilised for sealing of the cap assembly to the container body. As shown particularly in Figure 14, the flange 52 of the nipple may be arranged to interpose between the inner surface of the cap rim and the edge of the container body mouth so that when the cap assembly is fitted to the container body the nipple flange provides a seal therebetween. This is particularly advantageous where the nipple is constructed from a relatively soft material such as silicone rubber which allows some compression and provides excellent sealing characteristics.

Whilst the seal may be provided by the nipple flange, it is still necessary that the cap rim be secured to the container body, and it is preferred that this is achieved using interfitting ridges and/or grooves formed around the outer circumference of the container body mouth and the inner circumference of the cap rim flange. For example, the construction illustrated in Figure 14 shows a circumferential ridge 70 formed on the outer surface of the container body mouth, interengaged with a corresponding circumferential groove 72 and ridge 74 formed on the inner surface of the cap rim flange 24. The tolerances of fit between the cap rim and container body

- 20 -

mouth are such that, when the corresponding ridges and/or grooves are securely interengaged, a pressure is applied to the nipple flange between the mouth edge and cap rim so as to provide a good seal.

As an alternative, the inner surface of the cap rim and the outer surface of the container body mouth may be formed with helical screw threads so that they can be threadedly interengaged, and screwed on to one another until sealed. This form of attachment is not preferred in the present instance because it is neither necessary nor desirable that the cap rim be removable from the container body as is allowed by a screw threaded attachment.

Figures 15 to 19 illustrate another form of drinking container 100 according to an embodiment of the present invention. The drinking container 100 is generally similar to the container 10 described above, although with a modified construction of the cap assembly. The different form of the cap assembly is seen clearly in Figure 19 which is a central side cross-sectional view of the cap assembly 110 of the container 100. In this form of the drinking container cap assembly, the cap rim 112 and sealing portion 120 are in fact formed integrally, which avoids any possible difficulties with attaching a seal to the surface of the cap rim.

Figure 17 is an upper perspective view of the cap assembly 110 of the modified form of the container 100. The cap assembly 110 comprises a cap rim 112 which is substantially the same as the cap rim 22 described hereinabove, with a flat annular upper surface 114 and a downwardly extending flange portion 116 by which the cap rim is secured to the mouth of the container body. However, at the time of manufacture, the cap rim 112 is not formed with a central aperture, as in the case of the cap rim 22, but rather with a centrally located and integrally moulded, removable sealing portion 120. The sealing portion 120 projects upwardly from the centre of the cap rim, above the flat annular surface 114, and is attached to the inner edge of the annular portion by way of a frangible marginal wall section 115 (indicated with the aid of a dashed line in Figure 15).

As can be seen in the cross-sectional view of the cap rim and sealing portion shown in Figure 19, the sealing portion 120 is hollow in construction and shaped much like the suckling end of

the nipple itself. The inner surface of the end of the sealing portion is preferably shaped to conform quite closely to the shape of the external surface of the end of the nipple. This allows the end of the nipple to be accommodated within the hollow interior of the sealing portion whilst the container is in the sealed condition, which has several advantages. For example, with the inner surface of the sealing portion closely surrounding the end of the nipple which contains the drinking aperture, the possibility of leakage of liquid from the container body through the aperture and into the space within the cap assembly is minimised. Liquid cannot freely flow through the nipple drinking aperture as the aperture is too small to permit that and in any event abuts against the sealing portion surface. The drinking aperture may in fact be in the form of a small slit or the like which does not allow liquid to pass therethrough in the absence of a pressure differential or deformation of the nipple at the aperture. Since the sealing portion is moulded from the same plastic material as the cap rim, it is relatively rigid so as to substantially prevent deformation of the nipple. Furthermore, a relative increase in pressure in the container body, such as may occur if the container is squeezed or dropped, causes the nipple end with the aperture to be pressed more firmly against the inner surface of the sealing portion end, further relieving the likelihood of liquid leakage. A ridge may additionally be formed around the inner surface of the sealing portion towards the end thereof, so as to marginally impinge around the outer surface of the nipple towards the end to seal the nipple end from the space which exists between the nipple outside and cap inside surfaces.

It is preferred that the sealing portion 120 not project from the cap rim to the full extent of the nipple 130, as the greater the extent of the sealing portion projection the greater the possibility that the seal between the sealing portion and the cap rim may be broken inadvertently. Accordingly it is preferred that the sealing portion only project a fraction of the length of the nipple extent, such as about half of the nipple length. For example, if the longitudinal length of the nipple is of the order of 3 to 4 centimetres then the extent of the sealing portion projection may be of the order of 1.5 to 2 centimetres. This then requires that the nipple be partially collapsed or inverted beneath the cap rim as shown in Figure 19, although not to the same extent as in the case of the flat seal described hereinabove.

In this form of the drinking container (100), as mentioned, the sealing portion 120 is formed

- 22 -

integrally with the cap rim 112, so that the cap rim and sealing portion are manufactured together, making both manufacture and assembly of the drinking container easier. The cap rim and sealing portion are moulded with an annular thinned wall frangible section (115) therebetween where the sealing portion 120 breaks away from the cap rim 112, in use. As seen in the Figures, for example, the sealing portion curves upwards (indicated at 122 in Figure 16) from the flat surface 114 of the cap rim to a generally vertically extending section (124) which then curves over in a hemispherical end section (126), the inner diameter of which closely matches the outer diameter of the end of the nipple (see Figure 19). With the close fit of the nipple end within the end of the sealing portion interior the possibility of leakage of liquid from the container body through the aperture in the nipple end is greatly reduced. Because the outer circumference of the hemispherical nipple end portion is closely matched to the inner circumference of the hemispherical sealing portion, if a relative increase in internal pressure occurs within the container body this tends to press the flexible nipple more tightly against the sealing portion inner surface to prevent leakage from the end thereof.

The annular thinned wall section (115) between the cap rim and the sealing portion may only be of the order of a millimetre or so in width, and is preferably one millimetre or less in thickness. The actual wall thickness may vary depending upon the material from which the cap rim and sealing portion are moulded, and also upon the desired force which is required to be applied in order to cause the sealing portion to frangibly break away from the cap rim. For example the wall thickness at the marginal frangible portion can be made slightly thicker if greater strength is required over ease of opening, or vice versa for the opposite.

In the preferred form of the invention the sealing portion is provided with laterally extending flat tab portions 128 which project from opposing sides of the exterior of the sealing portion. These tab portions are provided to facilitate the application of a transverse force by the user to the sealing portion in order to break the sealing portion 120 away from the cap rim 112. For example, the user may grasp the bottle with two hands and press on the tabs 128 on each side of the sealing portion with the thumbs in order to break off the sealing portion without difficulty.

Since the sealing portion 120 in this form of the invention projects somewhat from the cap rim

and the nipple end is disposed therewithin with the container sealed, it is apparent that the nipple is not fully "collapsed" when the sealing portion is in place. However, since the sealing portion preferably does not project to the full extent of the nipple, the nipple is nevertheless partially collapsed inside the cap assembly when sealed. When the sealing portion is removed, the sealing portion is pressed from the side and tilted to break the frangible seal, as illustrated in Figure 16. The end of the nipple remains inside the sealing portion during this operation until the sealing portion is completely removed from the cap rim (Figures 17 and 18). Upon complete removal the nipple suckling portion is drawn fully out to its extended configuration by the frictional forces resulting from the relatively close fit between it and the interior of the sealing portion, which is increased by any compression applied at the time to the sides of the sealing portion upon such removal. It is nevertheless preferable that the nipple be capable of complete retraction into the "collapsed" configuration which may be useful particularly if the entire contents of the bottle are not consumed at once and it is desired to store the bottle with a reduced likelihood of contamination of the nipple. With the nipple in the collapsed configuration, even if no cover is utilised, the likelihood of any contamination is greatly reduced because the nipple does not project above the surface 114 of the cap rim and so the possibility of contact with any unhygienic surface or object is lessened.

As discussed above, however, an overcap (not illustrated) may also be supplied with the pre-filled drink container, and this may be placed over the cap rim for storage of the unfinished bottle to further shield the nipple from contamination. The overcap is equally applicable to both preferred forms of the invention described in detail above. In the case of the second described form of the invention the overcap, being disposed over the sealing portion during transport and sale, may aid in avoiding inadvertent breakage of the sealing portion, for example. Alternatively, in this second form of the invention the mass packaging of the bottles may be arranged so as to protect the projecting sealing portion during shipping and the like. For example, cardboard packages, pallets or the like adapted for shipping and/or storage of the bottles may be constructed with recessed portions into which the sealing portions project and are relatively protected from breakage.

In another alternative, the sealing portion 120 itself may be constructed to enable it to be

- 24 -

replaced into the opening formed in the cap rim upon removal of the sealing portion. For example, the sealing portion 120 can be formed with one or more circumferential rims (not shown in the drawings) located marginally above the frangible wall section at which it connects to the cap rim, adapted to hold the sealing portion in cap rim opening to shield the retracted nipple. A circumferential rim of slightly larger diameter than that of the cap rim opening would allow the base of the sealing portion to be pressed back into the opening without passing through too far. The sealing portion would then be held in the opening by interference fit between the edge of the opening and the edge of the sealing portion, and prevented from over-insertion by the circumferential rim. If the edge of the sealing portion does not provide sufficient interference fit with the edge of the cap rim opening once the two have been separated, an additional appropriately sized circumferential rim positioned slightly below the and closely spaced with the rim provided to prevent over-insertion. The spacing between the two rims, in that instance, may correspond to the thickness of the material of the cap rim at the edge of the opening. Alternatively, circumferential rims formed on the sealing portion 120 may not be desired, and instead lugs or the like may be formed of the tabs 128 adjacent the base of the sealing portion, for the purpose of holding the sealing portion in the cap rim opening for reclosure of the bottle after unsealing. In any event, it is preferred that the nipple be recessed into the container in its collapsed configuration before replacement of the sealing portion.

The process of unsealing and opening the drinking container 100 for use is illustrated in the sequence of Figures 15, 16 and 17. Figure 15 shows the bottle in the sealed condition with the sealing portion 120 integrally formed with the cap rim 112. In order to use the bottle, the sealing portion 120 must be removed, and this is done by first applying a lateral force to the projection of the sealing portion. For example, whilst grasping the bottle with the hands a force can be applied to the tabs 128 with the thumbs. This causes the frangible thinned wall section 115 to rupture, thus breaking the seal formed by the cap. The sealing portion 120 is then levered away from the cap rim 112, as shown in Figure 16. As the sealing portion is levered away from the cap rim the nipple 130 having its end fitted within the sealing portion, is drawn out through the aperture left by the sealing portion. With the sealing portion totally removed, the nipple 130 extends fully from the bottle, ready for use, as seen in Figures 17 and 18.

Figure 20 is a cross-sectional view of a preferred form of the nipple 130. As can be seen in the drawing, the nipple base has a substantially flat annular peripheral flange portion 132 from which extends the outstanding suckling portion 134 of the nipple. The nipple preferably is constructed with a circumferential groove 136 at about half-way along the extent of the nipple between the flanged base and the nipple end 138. This circumferential groove may comprise a thinned wall section with the groove formed thereby toward the interior of the nipple, as shown. The groove or thinned wall facilitates the stability of the nipple in the "collapsed" configuration. Furthermore, the connecting portion 140 of the nipple intermediate the base and suckling portions is preferably constructed so as to curve smoothly from the flanged base to the transversely extending projecting suckling portion, and the cross-sectional curvature may be arcuate so that the nipple may be easily moved between the extended and collapsed configurations. With the connecting portion 140 of the nipple constructed to be substantially parallel to the plane of the flange portion 132 where the two portions meet, it is not difficult to press the nipple downwardly from the extended to the collapsed configuration since no significant bending is required at any region of the nipple other than at the groove or thinned wall section mentioned above. It has been found most suitable for the connecting portion of the nipple to curve smoothly from the inner diameter of the base flange to the extent of the mid-point groove. Figure 21 illustrates the nipple 130 in cross-section in its collapsed configuration.

Because the nipple 130 is intended to be used only once, the wall thickness of the nipple construction need not be as thick as re-useable nipples, which enables a saving of material used in the moulding process. For example, the wall of most of the nipple 130 may be of the order of 0.5 to 1.5 millimetres in thickness, with thicker material (e.g. 2 millimetres) at the base flange 132. Additionally, the hemispherical end section at which the liquid aperture (not shown) is provided may also be constructed with a slightly thicker wall material. As shown in the drawings, the nipple end portion may be slightly enlarged in diameter as compared to the tubular shaft thereof, for ease of use by an infant.

In view of the advantageous sealing characteristics of the drinking containers herein described, drinking containers constructed in accordance with the present invention are particularly well suited for pre-filled single use applications in which the bottle contents are inserted and then the

- 26 -

cap assembly with nipple applied to hygienically seal the contents in the container. It may of course be desirable to sterilise the bottle and cap assembly before insertion of the contents and assembly, but this may be done in any convenient manner as known to those skilled in the art. Of course care should also be taken with regard to hygiene during assembly, such as by application of a sterilising steam jet or the like to the interior of the cap assembly immediately before sealing to the container body.

Depending upon the contents and the filling technique, a pre-filled single use drinking bottle according to an embodiment of the invention may be supplied for mass consumption by provision at supermarkets and the like. Of course drinking liquids for infants are currently available in this way but, as mentioned above, typically these require transferral to a drinking container such as a re-useable baby bottle with its inherent drawbacks and disadvantages both in terms of hygiene and convenience. Furthermore, the present invention is easily applicable to medical uses such as the delivery of orally taken pharmaceuticals for vaccination or treatment of infants, or merely for feeding of infants in post-natal wards of hospitals where sterile contents are particularly important and usage of bottled products is high. Furthermore, the invention may find useful application in delivery of pharmaceuticals or feeding of infants in remote, perhaps famine stricken parts of the world where sterilisation of bottles and contents on site is not possible or difficult. The pre-filled single use drinking bottles also address another difficulty which can arise in the supply of drinking nutrients to famine stricken children which is the wrongful mixing and dilution of formulas and the like in circumstances where the drinking fluid can be tampered with or must be mixed before use.

It will be immediately apparent to those skilled in the art that the shape of the container and in particular the container body is unimportant to the principles of the invention, and whilst a bottle/jar shape has been described and illustrated herein, many other container shapes, constructed from many different materials, may alternatively be employed. Furthermore, whilst the embodiments described herein all utilise a "cap rim" or securing ring to attach the nipple to container, those skilled in the art will recognise that various aspects of the invention can be practised without the nipple being attached in that way. Indeed, it is possible that the nipple may be directly coupled to the container body or even integral therewith if appropriate

known manufacturing techniques and/or materials are employed.

Throughout this specification, unless the context requires otherwise, the word "comprise", or variations such as "comprises" or "comprising", will be understood to imply the inclusion of a stated integer or group of integers but not the exclusion of any other integer or group of integers.

The foregoing detailed description of the present invention has been presented by way of example only, and is not intended to be considered limiting to the invention which is defined in the claims appended hereto.

**Claims:**

1. A disposable container comprising a container body for holding a liquid and having a mouth at the top with an opening therein through which liquid can pass; and a cap assembly attached to the top of the container body, the cap assembly comprising a flexible nipple in fluid communication with the container body through the opening in the top, a cap rim attached to the mouth and sealed with the nipple therearound, the cap rim having an aperture through which the nipple can project, in use, and a removable sealing portion which, in a first configuration of the container, is hygienically sealed around said aperture of the cap rim so as to prevent ingress and egress of liquid or gas to and from the container, wherein the nipple, in the first configuration of the container, is contained beneath said sealing portion; and wherein the sealing portion is removable from the cap rim to place the container in a second configuration such that the flexible nipple can be extended through the cap rim aperture to protrude from the top of the container in condition for use.
2. A disposable container as claimed in claim 1, wherein the nipple has first and second stable configurations, such that in the first stable configuration the nipple is partially inverted and in the second stable configuration the nipple is fully extended.
3. A disposable container as claimed in claim 2, wherein the nipple is constructed with a peripheral flange at its base which is held to the bottle mouth by the cap rim, and wherein the nipple in the first stable configuration is recessed into the container mouth so as to not substantially protrude through the cap rim aperture.
4. A disposable container as claimed in claim 1, wherein the cap rim includes a downwardly extending flange which fits over the container mouth and is secured thereto by way of inter-engaging formations on the inner surface of the cap rim flange and the outer surface of the container mouth.
5. A disposable container as claimed in claim 1, wherein the cap rim includes an annular

- 29 -

portion which defines said aperture, and wherein the sealing portion is integrally constructed with the cap rim and joined thereto with a frangible section to allow the sealing portion to be broken away from the cap rim to form said aperture.

6. A disposable container as claimed in claim 5, wherein the sealing portion has a projection which extends from the cap rim to enable a lateral force to be applied thereto with respect to the cap rim to cause the sealing portion to break away from the cap rim.

7. A disposable container as claimed in claim 6, wherein the sealing portion projection has a hollow interior which is adapted to accommodate a suckling end of the nipple therewithin when the sealing portion is attached to the cap rim, and wherein removal of the sealing portion from the cap rim facilitates drawing out of the nipple suckling end from the cap rim for use.

8. A disposable container as claimed in claim 2, wherein the sealing portion comprises a flexible disk which is fusion welded or adhesively attached to the cap rim forming a seal over the aperture, and wherein the flexible disk is formed with a loose tab which can be grasped by the user in order to peel the sealing portion from the cap rim to expose the nipple in the aperture.

9. A disposable container as claimed in claim 8, wherein the nipple is arranged in said first stable configuration with the sealing portion attached over the cap rim aperture, and wherein the nipple can be extended through the aperture upon removal of the sealing portion into said second stable configuration.



10. A disposable infant drinking container comprising:
- a container body for holding a drinking liquid, the container body having an open mouth;
 - a nipple having a suckling portion for dispensing the drinking liquid through the container body mouth to an infant; and
 - a cap having an integrally formed cap rim and sealing portion;
- wherein the nipple is constructed to cover the open mouth of the container body, and is



held in place over the open mouth by the cap rim which is attached to the container body around the mouth, wherein the cap rim and integrally formed sealing portion cover the suckling portion of the nipple from exposure to external contaminants and, together with the nipple, form a hygienic seal over the open mouth of the container body to prevent ingress and egress of liquid and gaseous fluids into and out of the container; and wherein the sealing portion of the cap can be broken away from the cap rim by a user to expose the suckling portion of the nipple for use.

11. A disposable drinking container as claimed in claim 10, wherein the cap rim is annular and has the sealing portion projecting centrally therefrom, the sealing portion and cap rim being attached by way of a frangible joining section constructed to rupture and allow the sealing portion to be broken away from the cap rim upon a lateral force being applied between the cap rim and sealing portion.

12. A disposable drinking container as claimed in claim 11, wherein the projecting sealing portion has a hollow interior which has an end of the nipple suckling portion fitted therewithin.

13. A disposable drinking container as claimed in claim 10 or 11, wherein the cap is moulded in single piece from plastic material.

14. A disposable drinking container as claimed in claim 10 or 11, wherein the cap rim is attached to the container body so as to not be removable by the user.

15. A disposable drinking container as claimed in claim 11, wherein the frangible joining section comprises a ring of reduced wall thickness.

16. A disposable drinking container as claimed in claim 10, 11 or 12, wherein the nipple is constructed with a base having a peripheral flange, the suckling portion projecting centrally from the base, and wherein the peripheral flange is held between the a rim of the container body defining the open mouth and said cap rim to thereby secure the nipple to the container body and facilitate said hygienic seal between the container body and cap.



17. A disposable drinking container as claimed in claim 16, wherein the peripheral flange of the nipple is substantially flat and the suckling portion projects substantially at right angle centrally therefrom with the base curving smoothly from the flange to the projecting suckling portion.
18. A disposable drinking container as claimed in claim 17, wherein the nipple is further constructed with a bending region between the curved base and suckling portion which facilitates partial and stable inversion of the nipple base by displacement of an end of the nipple suckling portion toward the plane of the flange to place the nipple in a collapsed configuration.
19. A disposable drinking container as claimed in claim 18, wherein the bending region comprises a circumferential groove or ring of reduced wall thickness around the interior of the nipple.
20. A disposable drinking container as claimed in claim 18, wherein the end of the nipple suckling portion, in the collapsed configuration, is positioned near the plane of an upper surface of the cap rim.
21. A disposable drinking container as claimed in claim 10 or 11, wherein separation of the sealing portion from the cap rim creates a central round aperture in the cap rim through which the suckling portion of the nipple projects.
22. A disposable drinking container as claimed in claim 21, wherein the sealing portion is replaceable in the central round aperture to shield the nipple from contaminants.
23. A disposable drinking container as claimed in claim 22, wherein the sealing portion is constructed with peripheral formations which interfit with the edge of the cap rim to hold the sealing portion in place when replaced in the central aperture.
24. A closure for a drinking container comprising a cap rim with a substantially flat annular



upper panel having an attaching portion extending from the outer edge thereof, the attaching portion being adapted to fit and be affixed over the mouth of a drinking container, and a sealing portion extending upwardly from the centre of the upper panel, the sealing portion being attached and sealed around the inner edge of the annular upper panel by way of a frangible connecting section which allows the sealing portion to be broken away from the attaching portion on application of a transverse force on the sealing portion with respect to the attaching portion by the fingers of a user, the closure further comprising a flexible nipple adapted for suckling by an infant, wherein the sealing portion and nipple are constructed such that an end of the nipple fits within a hollow interior of the sealing portion to extend through an aperture formed in the attaching portion when the sealing portion is removed.

25. A closure as claimed in claim 24, wherein the nipple has a base with an annular peripheral flange which fits within the attaching portion, a suckling portion of the nipple having said nipple end thereon extending from the base, and wherein the interior of the hollow sealing portion fits closely about the nipple end to reduce likelihood of liquid leakage from a suckling aperture in the nipple end, in use.

26. A closure as claimed in claim 24, wherein the attaching portion and sealing portion are moulded from a plastic material in a single piece, the connecting section comprising a ring of reduced thickness plastic material.

27. A closure as claimed in claim 25, wherein the sealing portion projects from the attaching portion for a fraction of the extent of the nipple suckling portion from the base, such that the nipple is partially collapsed within the closure when the nipple end is fitted within the sealing portion and the base flange within the attaching portion.

28. A closure as claimed in claim 24, wherein the sealing portion has a peripheral rim at its attachment to the connecting section, and wherein the sealing portion is constructed with at least one formation adjacent the peripheral rim for interfitting with at least one area of the inner edge of the attaching portion so that the sealing portion may be replaced and secured to the attaching portion after unsealing and removal thereof.

- 33 -



29. A closure as claimed in claim 24, wherein the sealing portion is constructed with at least one flat tab portion to facilitate application of the transverse force to the sealing portion by the fingers of the user.

30. A closure as claimed in claim 28, wherein the sealing portion is constructed with at least one flat tab portion to facilitate application of the transverse force to the sealing portion by the fingers of the user, and wherein said at least one formation is arranged at a junction of the at least one flat tab portion with the peripheral rim.

31. A method of forming a disposable infant drinking container, comprising moulding a container body having an open mouth, moulding a flexible suckling nipple adapted to fit over the opening of the container body mouth, moulding a single piece cap having an integrally formed but removable central sealing portion, attaching the cap around the container body mouth so as to hold the nipple over the opening and seal the drinking container, wherein the removable sealing portion can be broken away from the remainder of the cap to unseal the container and expose the nipple.

32. A method as claimed in claim 31, including filling the container with a drinking liquid before attaching said cap.

33. A method as claimed in claim 31 or 32, including the step of sterilizing the interior of said container before sealing thereof.

34. A method as claimed in claim 31, wherein the cap is attached to the container body so as to not be readily removable by a user of the container, except for said sealing portion.

35. A method as claimed in claim 31, including a step of fitting an end of the nipple into a hollow interior of the sealing portion of the cap before attaching the cap to the container body.

36. A single use, disposable drinking container comprising a flexible plastic bottle or



jar containing a drinking liquid and sealed by a cap assembly, the cap assembly comprising a cap having an aperture with a nipple thereon and a removable seal which is attached over the aperture when the container is in a sealed condition, the nipple being collapsed into the container when in the sealed condition but being extractable to an extended configuration to protrude from the bottle or jar upon removal of the seal from over the aperture.

37. A drinking container as claimed in claim 36, wherein the nipple comprises a flange portion for attaching the nipple to the container, a suckling portion having a liquid delivery opening therein and being adapted for suckling by an infant, and a base portion intermediate the flange portion and suckling portion, and wherein the base portion of the nipple, in the sealed condition of the container, is inverted as compared to the extended configuration of the nipple when the nipple protrudes from the bottle or jar after removal of the seal.

38. A drinking container as claimed in claim 37, wherein the nipple is stable in shape in both the extended configuration and in a collapsed configuration with the base portion thereof inverted, and wherein the nipple is extractable from the collapsed configuration to the extended configuration by grasping the suckling portion thereof between fingertips and drawing away from the bottle or jar, or by squeezing of the bottle or jar.

39. A single use, disposable drinking container comprising a flexible plastic bottle or jar containing a drinking liquid, the bottle or jar having an opening with a rim which is sealed by a cap assembly, the cap assembly comprising a cap having a central aperture, a nipple fitted into the cap and a flexible removable seal which is attached to the cap over the aperture when the container is in a sealed condition, the nipple having a peripheral flange portion which is pressed between the rim of the bottle or jar and an inner surface of the cap with the cap affixed to the bottle or jar, the nipple being collapsed into the container when in the sealed condition but being extractable to an extended configuration to protrude from the bottle or jar upon removal of the seal from over the aperture.



40. A drinking container as claimed in claim 39, wherein the nipple has a suckling portion extending from the flange portion having a liquid delivery opening therein and being adapted for suckling by an infant, and a base portion intermediate the flange portion and suckling portion, and wherein the base portion of the nipple, in the sealed condition of the container, is inverted as compared to the extended configuration of the nipple when the nipple protrudes from the bottle or jar after removal of the seal.

41. A drinking container as claimed in claim 40, wherein the nipple is stable in shape in both the extended configuration and in a collapsed configuration with the base portion thereof inverted, and wherein the drinking container is placed in a condition for use from the sealed condition by peeling away the seal from the cap and extracting the nipple from the collapsed configuration to the extended configuration by grasping the suckling portion thereof between fingertips and drawing away from the bottle or jar, or by squeezing of the bottle or jar.

42. A closure for a drinking container comprising a lid having a rim portion adapted to be attached over the mouth of a drinking container and an integrally formed central portion which is sealed to said rim portion so that, with said rim portion attached over the drinking container mouth, the interior of the drinking container is sealed from the exterior thereof, said central portion being formed with a hollow interior, and a flexible nipple having a peripheral flange which is attachable to the rim portion of the lid and a teat end which is adapted to closely interfit with the hollow interior of the central portion, wherein the central portion is in use frangibly removable from the rim portion to expose said teat end.