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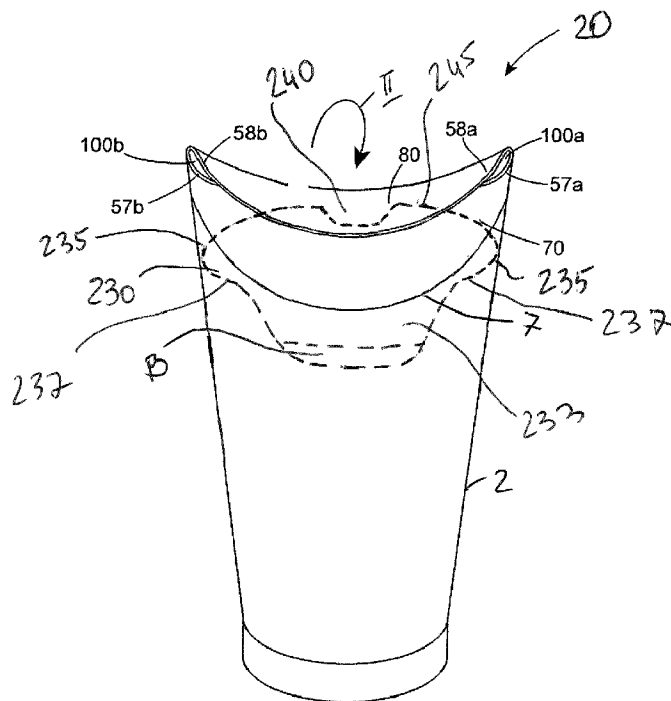


Fig. 15

(57) **Abrégé/Abstract:**

A container (10, 20, 30) comprising a wall 2 having an outer side, an inner side, a closed base (4) at one end and a generally curved rim (5) at an opposite end, the container further comprising a pair of substantially arcuate crease lines (7, 8) formed in the

(57) **Abrégé(suite)/Abstract(continued):**

wall of the container at opposite sides of the wall below the rim; each crease line has first and second ends (7a, 7b, 8a, 8b) coinciding with the rim; each crease line and the portion of the rim between the first and second ends of the crease line define a flap (70, 80) having an outer face (70a, 80a) and an inner face (70b, 80b); each crease line acts as a hinge allowing each flap to toggle between an open upright position and a closed lowered position; a closure arrangement to restrict at least one flap opening (100a, 100b) defined at or adjacent the positions where the ends of each crease line coincide with the rim of the container when the flaps are in the closed lowered position; the closure arrangement comprises a closure leaf (130, 230, 330) attached to the inner side of the container wall so as to be movable by and with a movement of the first one of the flaps at least a portion of the closure leaf extends underneath and downwardly spaced from said flap opening when the flaps are in the closed lowered position; and the closure leaf is resiliently bendable and has a portion (133, 233, 333) extending below the crease line of the first flap.

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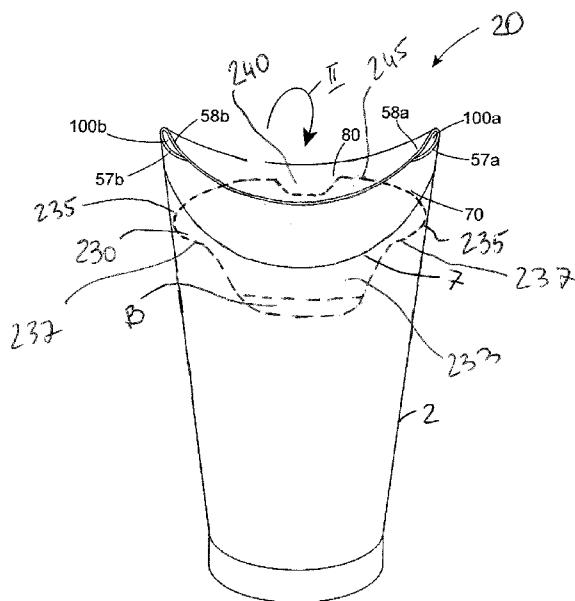


Fig. 15

(57) Abstract: A container (10, 20, 30) comprising a wall 2 having an outer side, an inner side, a closed base (4) at one end and a generally curved rim (5) at an opposite end, the container further comprising a pair of substantially arcuate crease lines (7, 8) formed in the wall of the container at opposite sides of the wall below the rim; each crease line has first and second ends (7a, 7b, 8a, 8b) coinciding with the rim; each crease line and the portion of the rim between the first and second ends of the crease line define a flap (70, 80) having an outer face (70a, 80a) and an inner face (70b, 80b); each crease line acts as a hinge allowing each flap to toggle between an open upright position and a closed lowered position; a closure arrangement to restrict at least one flap opening (100a, 100b) defined at or adjacent the positions where the ends of each crease line coincide with the rim of the container when the flaps are in the closed lowered position; the closure arrangement comprises a closure leaf (130, 230, 330) attached to the inner side of the container wall so as to be movable by and with a movement of the first one of the flaps at least a portion of the closure leaf extends underneath and downwardly spaced from said flap opening when the flaps are in the closed lowered position; and the closure leaf is resiliently bendable and has a portion (133, 233, 333) extending below the crease line of the first flap.

A CONTAINER WITH AN IMPROVED CLOSURE ARRANGEMENT RESTRICTING SPILLAGE

Field of the Invention

5 The present invention relates to containers for cold and hot beverages or food, and in particular to containers, which may be disposable or reusable, made from flexible resilient material, such as paperboard or plastics.

Background to the Invention

10 Known containers, whether disposable or reusable, such as, for example, those used in fast food outlets or in vending machines usually comprise a body in the form of an inverted truncated cone having a closed base and an open top. To prevent spilling of the contents of the container, a lid is usually placed over the opening of the container. Such lids are typically moulded from a plastics material. Such lids may also be formed from paper. A
15 supply of matching lids needs to be maintained available for a user near the supply of containers at the vending location. Obviously, a lid has to be compatible with the opening of the container so as to fit securely over the rim of the container and to prevent spillage. There are a number of disadvantages associated with the use of such lids. Whilst having the same general configuration of a truncated cone, such containers come in different sizes
20 and, therefore, for each container size, a different lid is normally required. Maintaining a stock of matching lids for every container size involves additional expense, requires additional storage space and managerial resources. Furthermore, it is often difficult to place even a matching lid over the container opening in a single attempt and typically some manipulation is required before the lid is finally properly put in place. Moreover, if the lid is
25 pressed a little too hard against the rim of the container, the container can tumble and cause the contents inevitably to escape the container. Since most lids are provided with a spout/opening, there still remains a relatively high risk of spillage through the spout, e.g. when a person who is carrying the container walks or manipulates other objects, such as keys, mobile phone, etc. Due to the incessant popularity of fast food services, enormous
30 amounts of containers and lids are being used and discarded all over the world on a daily basis. Whilst many containers are made from paperboard, which are renewable and recyclable, lids are often made from plastics which are far less environmentally friendly.

One known type of known container which seeks to provide an arrangement for closing a
35 container in the form of a cup is disclosed in W02011/063835. This known frusto-conical cup is made from a flexible resilient material, having a circular rim defining the top opening of the cup. A pair of arcuate crease lines are formed at the opposing sides of the wall of

the cup below the rim defining a pair of flaps for closing the top opening of the cup by folding the flaps along the crease lines. Due to the resilience of the cup material, each flap can toggle between two stable positions on application of an initial external force on the flap, namely an open upright position in which the flap is convex and forms part of the wall of the cup, and a closed slanted position in which the flap changes its shape to concave. In the closed mode, the rim of one flap impinges against the inner face of the second flap. The flaps remain relatively rigid in the closed mode due to static opposing forces acting between the flaps. When the rim of one flap impinges against the inner face of the second flap there are gaps or flap openings between the flaps adjacent the ends of the crease lines, and these gaps provide openings through which the cup contents can be consumed, e.g. by tilting the cup or through a drinking straw. However, the cup contents can also splash or spill through the openings if the cup is shaken or otherwise subjected to impact.

A closure arrangement to reduce or restrict splashing and spillage of the cup contents through the flap openings is described in WO2017/207466. This closure arrangement provides a closure leaf attached to the inner side of one of the flaps so that the closure leaf is movable with that flap. When the flaps of the cup are closed, the closure leaf is positioned underneath the flap opening thereby restricting spillages. When the flaps of the cup are in the upright position, the closure leaf is also upright to allow multiple cups to be stacked efficiently. Whilst providing an efficient barrier to reduce splashes and spillages and facilitating stacking, there are a number of drawbacks associated with this arrangement. The first drawback is that in cups of larger volumes and/or with a wider top opening diameter, the seal created by the countervailing pressure between the first closure flap and the second closure flap when the cup is in the closed position (i.e. by static opposing forces acting between the flaps), becomes weaker as the diameter of the cup becomes wider. Furthermore, the stiffness of the cup wall near the rim diminishes to the extent that the cup wall may become easily deformable when the cup is ordinarily gripped by a user. Also, when the cup is used for hot beverages or food, the material of the cup often becomes softer so that the cup wall can be easily deformed at the top when ordinarily gripped and the seal created by the countervailing pressure (static opposing forces acting between the flaps) is further weakened. This increasing weakness in the seal is accentuated by a user gripping or squeezing the cup. The combined effects of a wider cup diameter, hot contents and gripping by a user undermine the structural strength of the cup and the seal that is generated by the countervailing pressure between the first closure flap and the second closure flap (static opposing forces acting between the flaps) when the cup is in the closed position. The increased deformability results in a greater risk of spillages in larger cups designed to hold a larger volume of contents. While the countervailing

pressure generated between the closure flaps, combined with the existing closure leaf, helps to maintain a satisfactory degree of rigidity in smaller cups, it does so to a lesser extent in larger cups. One partial solution to the above issues would be to make the cup from a thicker and/or stiffer material. However, this would lead to the increase of material usage per cup, and the resulting increases in manufacturing cost and disposal burden. A second drawback is that when the cup is in the closed position lateral ends of the closure leaf (which is shaped approximately similarly to the shape of the closure flap) are prone to sagging out of the planar position, thereby reducing the structural strength that a more planar and rigid closure leaf would provide to the cup. A third drawback with the current design, in instances where the closure leaf extends or protrudes above the rim of the container when the container is in the open position, is that (1) the protruding portion of the closure leaf is more easily prone to be damaged as it is more exposed, (2) the protruding portion of the closure leaf makes the containers more difficult to stack and also more difficult to load into cup dispensing units, (3) the protruding portion of the closure leaf increases the overall height of the container causing it to not fit under some beverage dispensing machines, (4) the protruding portion impairs the user experience by impeding access to the body of the cup for adding sugar, stirring or the option of drinking from the cup while leaving the closure flaps in the open position, and (5) the protruding portion of the closure leaf makes stacking and handling of the container more difficult during the container manufacturing process.

In view of the above, it is an object of the present invention to alleviate and mitigate the above disadvantages and provide an improved closure arrangement for a container, whether disposable or reusable to further minimise the risk of spillage or leakage of the container contents.

Summary of the Invention

Accordingly, in a first aspect the present invention provides a container comprising a wall having an outer side, an inner side, a closed base at one end and a generally curved rim at an opposite end, the rim defining a top opening of the container, the container further comprising:

a pair of substantially arcuate crease lines formed in the wall of the container at opposite sides of the wall below the rim; wherein each crease line has first and second ends coinciding with the rim; wherein each crease line and the portion of the rim between the first and second ends of the crease line define a flap having an outer face and an inner face; wherein each crease line is configured to act as a hinge allowing each flap to toggle between two positions upon application of an initial external force on the flap, the two

positions being an open upright position in which the flap is convex and forms part of the wall of the container, and a closed lowered position in which the flap changes its shape to concave;

wherein the container further comprises a closure arrangement operable to restrict
5 at least one flap opening defined at or adjacent the positions where the ends of each crease line coincide with the rim of the container when the flaps are in the closed lowered position, wherein the closure arrangement comprises at least one closure leaf attached to the inner side of the container wall;

wherein the closure leaf is attached to the inner side of the container wall so as to
10 be movable by and with a movement of the first one of the flaps;

wherein at least a portion of the closure leaf extends underneath and downwardly spaced from said flap opening when the flaps are in the closed lowered position;

characterised in that the closure leaf is resiliently bendable and has a portion extending below the crease line of the first flap.

For ease of reference, the portion extending below the crease line of the first flap
15 will hereinafter be referred to as a "leg portion". However, it will be appreciated that the term "leg portion" is not in any way limited to any particular size or shape or configuration. Indeed, while the "leg portion" can be provided, for example, in the form of an extension to a main portion of the closure leaf, the leg portion may also be a region or a portion of the
20 closure leaf indistinguishable by any visual features from the whole of the closure leaf.

Preferably, the closure leaf is resiliently bendable upon application of an external force to the closure leaf. Preferably, the closure leaf is capable of returning into its original unbent, i.e. relaxed, state upon withdrawal of the external force due to the inherent resilience of the material of the closure leaf.

In a first variation, the closure leaf is attached to the inner side of the container wall
25 at a location below the crease line of the first flap. Preferably, the closure leaf is attached to the inner side of the container wall at a location below the crease line of the first flap by the leg portion.

In a second variation, the closure leaf is attached to the inner side of the container
30 wall above the crease line of the first flap, i.e. to the first flap and above the leg portion. Preferably, the closure leaf is attached to the first flap at a location spaced from the position where the ends of the crease lines coincide with the rim at the flap opening being restricted.

Preferably, the leg portion extends below the crease line of the first flap when the first flap is in the open upright position and when the first flap is in the closed lowered
35 position.

Preferably, in the open upright position of the first flap, the closure leaf, including the leg portion is relaxed.

Preferably, in the closed lowered position of the first flap, at least a portion of the closure leaf extends underneath the first flap and across the top opening of the container and the closure leaf assumes a resiliently bent state as the leg portion becomes biased against the inner side of the container wall below the crease line of the first flap. Thus, when the first flap is in the closed lowered position, the leg portion causes the closure leaf to apply pressure on the inner side of the container wall, effectively causing the closure leaf to act as a spring on the container wall, applying pressure from the inside and imparting an extra degree of rigidity on the upper portion of the container by resisting displacement and rendering the container less prone to deformation when the container is gripped or squeezed by a user. This effectively reduces the risk of spills or leakage.

Preferably, in the bent state of the closure leaf, lateral bent edges of the closure leaf abut or impinge on the inner side of the container wall at locations downwardly spaced from the positions where the ends of each crease line coincide with the rim of the container. The spring-like pressure generated by bending the closure leaf and anchoring the leg portion against the wall of the container helps to maintain the bent region of the closure leaf in a straight line in the direction between the lateral edges downwardly spaced from the flap openings and prevents peripheral portions of the closure leaf from sagging. This imparts rigidity onto the container by pressing against the inner side of the container wall when the flap is closed. The lateral bent edges of the closure leaf impart additional stiffness on the upper portion of the container by resisting displacement when the container is gripped or squeezed by a user. In this regard, the distance between the opposite lateral bent edges of the closure leaf in the direction parallel to the line of bending of the closure leaf is preferably sufficient to allow the lateral edges of the closure leaf to abut or impinge on the inner side of the container wall when the closure leaf is in a bent state thereby imparting increased rigidity onto the upper portion of the container. The spring-like pressure generated by bending the closure leaf also enhances a positive contact between the rim of the first flap and the inner side of the second flap when the flaps are closed, by pressing the first flap upward, thus improving a seal which may form between the flaps. Each of the above described first and second variations of the closure leaf are capable of imparting sufficient and effective rigidity onto the upper portion of the container, while the rigidity provided by the first variation, i.e. in which the closure leaf is attached to the container wall below the crease line, has been found to be somewhat greater and more reliable than the rigidity provided by the closure leaf of the second variation, i.e. the one in which the closure leaf is attached to the container wall above the crease line.

Thus, the closure leaf of the invention when in the closed position helps the upper portion of the container to keep its shape relatively rigid and helps to maintain the structural strength of the container and thereby prevents the upper portion of the container from being

deformed when the container is ordinarily gripped. Thus, the present invention allows thinner or less dense material, e.g. thinner paper, plastic or other material, to be used to make the container or eliminates the necessity to use thicker or denser material for containers of larger volume. The invention also helps to maintain the shape of the top part of the container when the container is heated by hot contents. The invention also helps to improve the strength of the seal which may be formed between the closure flaps when the flaps are in the closed position.

A further advantage of the present invention is that it allows a lighter material to be used than would otherwise be required in the manufacture of containers of a larger size.

An additional advantage of the above described first variation of the closure leaf lies in that, because the closure leaf is attached to the inner side of the container wall below the crease line, the closure leaf does not need to protrude out beyond the rim of the container when the first flap is in the open upright position in order to be able to extend fully or substantially fully across the top opening of the container and to restrict the flap openings efficiently when the first and second flaps are in the closed lowered position. The closure leaf may have a top edge which is substantially level with the rim of the container or even below the rim when the closure flap is in the open upright position. When the first flap is moved down, the first flap will slide over the closure leaf as it bends the closure leaf down because the closure leaf is not attached to the first flap, but instead is attached to the inner side of the container wall below the crease lines delineating the first flap. This relative sliding of the first flap over the closure leaf allows the top edge of the closure leaf to protrude beyond the rim of the first flap when the closure leaf and the first flap are in the closed lowered position. This allows the closure leaf to extend substantially fully across the top opening of the container when the first flap is closed but not necessarily when the first flap is open. The absence in the closure leaf of a protrusion beyond the rim of the container when the first flap is in the open upright position facilitates manufacture, storage and stacking of multiple containers, filling of containers and improves user experience. In contrast, in the closure leaf of the second variation, in order to be able to extend fully or substantially fully across the top opening of the container, the top edge of the closure leaf needs to protrude out beyond the rim of the container when the first flap is in the open upright position. This is because the closure leaf is attached to the first flap and the first flap therefore does not slide over the closure leaf when the first flap is lowered into the closed position.

Upon return of the first flap into the open upright position, the closure leaf relaxes and returns into its original unbent state due to the inherent resilience of the closure leaf. Preferably, the inherent resilience of the closure leaf allows the closure leaf to return into the unbent state without the requirement for an external force to be applied to the closure

leaf. Preferably, the bending of the closure leaf is achieved through the resiliently deformable elastic properties of the material of the closure leaf.

Preferably, the closure leaf is positioned upright and, preferably, concentrically with the first flap when the first flap is in the open upright position. In one arrangement, the closure leaf is superimposed on the first flap. When the first flap is being closed, the closure leaf is moved down by and together with the first flap so that the closure leaf is positioned substantially across the top opening of the container when the first flap is in the closed lowered position and the closure leaf becomes resiliently bent and the leg portion becomes biased against the inner side of the container wall below the crease line of the first flap in the closed lowered position of the first flap.

When the flaps are in the closed lowered position, the flap opening(s) is/are restricted by the closure leaf in that spills are prevented or reduced when the container is generally upright and is shaken or otherwise subjected to impact. However, the flap opening is preferably not sealed off completely by the closure leaf and passage of the container contents is still possible through the flap opening when the container is tilted, enabling drinking or pouring from the container. For this purpose, the closure leaf may be shaped appropriately, e.g. smaller than the top opening of the container and/or with suitable one or more cut-outs, notches, holes or similar arrangements for allowing contents moving out from the container to bypass the closure leaf and exit the container through the flap opening. In some arrangements however, e.g. in food containers, the closure leaf may be sized and shaped to close off the top opening of the container fully. When the first flap is moved into the open upright position, the closure leaf is also pivoted together with the first flap away from the position in which the closure leaf restricts the flap opening and assumes the upright orientation together with the first flap. This allows multiple containers to be stacked into each other in a space efficient manner. Also, the top opening of the container is unobstructed during pouring, filling or emptying. When it is necessary to close the container by the flaps, the closure leaf is moved into the position in which the closure leaf restricts the flap opening in one motion simultaneously with the first flap. No separate action is necessary to move the closure leaf into the position in which the closure leaf restricts the flap opening. Furthermore, it is ensured with a high level of accuracy that the closure leaf is positioned correctly underneath the flap opening.

Preferably, in the second variation described above, a portion of the closure leaf proximal to the flap opening(s) is unattached to the first flap and the closure leaf is attached to the first flap by a portion distal from the flap opening.

In one arrangement, when the flaps are in the closed lowered position, the closure leaf extends tangentially in relation to the first flap, such that a portion of the closure leaf

proximal to the flap opening is spaced apart from the first flap and the portion of the closure leaf distal from the flap opening is in contact with the first flap.

The closure leaf is preferably made from a suitable elastic resiliently deformable material, such as, for example, a suitable type of paperboard or plastics. The closure leaf
5 may be substantially planar, convex or concave when the flaps are in the closed lowered position and may bend to conform to the arcuate shape of the first flap and the inner side of the container wall when the flaps are in the open upright position.

Preferably, in the second variation described above, the closure leaf is attached to the first flap at a location spaced from the portion of the rim and the crease line which
10 define the first flap. Preferably, the closure leaf is attached to the first flap at a location intermediate opposite ends of the portion of the rim and the crease line which define the first flap. The closure leaf may be attached to the first flap at a central location on the first flap.

As described above, the closure leaf may impinge against the inner side of the
15 container wall underneath and downwardly spaced from the flap opening when the first flap is in the closed lowered position. The portion of the closure leaf which impinges against the inner side of the container wall may have an edge portion shaped to conform to the inner side of the container wall to further ensure that the contents of the container do not spill from the flap opening. Accordingly, splashing is minimised and the rate of spillage if the
20 container is knocked over is reduced. The present invention thus improves the spill-resistant properties of the container, whilst, if required for drinking or pouring, permitting the container to allow the passage of the container contents when tilted for drinking and pouring.

The closure leaf may be of any suitable shape as required or desired, and may be
25 adapted to have a shape specifically suited to the shape of the container and the function that is to be performed. For example, the closure leaf may be substantially round, oval, polygonal or irregular shaped as needed. Furthermore, the closure leaf may be formed with suitable one or more cut-outs, notches, holes or similar arrangements for allowing contents moving out from the container to bypass the closure leaf and exit the container
30 through the flap opening. The closure leaf may be shaped to restrict only one flap opening of the container. The closure leaf may be shaped to restrict a pair of opposite flap openings of the container. If needed, the closure leaf may be shaped to close the top opening of the container fully when the flap which moves the closure leaf is closed. One, two or more closure leaves may be provided, to restrict the top opening of the container or
35 the flap openings as required.

The closure leaf may be made of the same material as the container, or may alternatively be made of a heavier gauge or a lighter gauge and/or an alternative material

for additional strength or functionality.

In use, in order to close the container, the first flap, i.e. the one to which the closure leaf is either attached directly or attached in a position downwardly spaced from the first flap, is closed first and the other flap is closed second.

5 Each crease line may be configured such that the open upright position in which the flap is convex and forms part of the wall of the container, and the closed lowered position in which the flap changes its shape to concave are stable positions; wherein the resilience of the flap material causes the flap to complete the toggle and prevents the flap from stopping in a position intermediate the open upright and the closed lowered positions. The length of
10 each crease line and the shortest distance between a point of the crease line axially most remote from the rim of the flap and the rim may be selected such that when the flaps are moved to the closed lowered position, each flap assumes a slanted orientation in relation to the base of the container, wherein the rim of a first flap impinges against the inner face of the second flap and wherein the two flaps form a double slope roof across the top opening
15 of the container.

In one arrangement, when the flaps are closed a spill-tight seal may be formed between the rim of the first flap and an inner face of the second flap.

When one of the flaps, e.g. the first flap, is allowed to move fully into the closed lowered position, the second flap may be prevented from moving fully into the closed
20 lowered position by the rim of the first flap. The rim of the first flap may be prevented from being deformed by the second flap due to the resilience of the material of the container, so that the second flap remains statically forced against the rim of the first flap towards the closed lowered position due to the resilience of the container material. The counteracting forces between the rim of the first flap and the inner face of the second flap may be
25 sufficient to push the respective rim and the inner face together into a positive contact, which in some instances may help to form a seal between the flaps. The closure leaf of the present invention helps to increase both the structural strength of the container and the seal that is generated by the countervailing pressure between the first closure flap and the second closure flap (i.e. by static opposing forces acting between the flaps) when the
30 container is in the closed position. The spring-like characteristics generated by the closure leaf of the invention when in the closed position also helps to maintain and increase the strength of the seal created by the countervailing pressures between the closure flaps.

The flap openings remaining at or adjacent the location where opposite ends of the crease lines coincide with the rim of the container serve as drinking apertures, but, in
35 absence of a closure arrangement, spillage of the container contents can also occur through these flap openings. It will be appreciated that only one flap opening may be formed when the flaps are in the closed lowered position. The provision of a closure leaf,

according to the invention, is operable to restrict or protect the flap openings formed at the rim of the container when the flaps are moved into the closed lowered position, and so provides a means to prevent or improve against splashing of the container contents through the flap openings and reduce the rate of spillage if the container is knocked over. The present invention thus improves the spill-resistant properties for the container, whilst, if required for drinking or pouring, permitting the container to allow the passage of the container contents when tilted for drinking and pouring. The closure leaf of the present invention also permits stacking of multiple containers, unobstructed pouring of contents into the container and provides for correct positioning of the closure leaf underneath the flap opening in one movement simultaneously with the downward movement of the first flap.

The closure leaf may be connected to the inner side of the container wall by an adhesive, by an ultrasonic weld and/or with the use of heat sealing.

The closure leaf may be integrally formed with the container.

In the first variation described above, the closure leaf may be provided as an insert for removably inserting the closure leaf into the container. The closure leaf may include an insert portion, the insert portion being adapted to be inserted into the container and attached to the inner side of the container wall. The insert portion may be shaped to conform to the shape of the inner side of the container wall, wherein upon insertion into the container, the insert portion snugly engages the inner side of the container wall and is retained in position due to cooperation with the container wall. The retention of the insert portion in snug engagement with the inner side of the container wall may be achieved in a number of ways apparent to a skilled person. For example, the insert portion may be provided in the form of a leaf spring which needs to be compressed to be inserted into the container and expands upon being located inside the container so as to engage inner side of the container wall. The insert portion may be provided as a ring or a portion of a ring. If the container wall is tapered, the insert portion may be provided as a ring or a portion of a ring having a taper matching that of a specific section of the container wall, so that upon insertion of the insert portion into the container, the insert portion is retained in the specific section of the container by the tapered wall of the container. The provision of the container as an insert simplifies the manufacturing process of the container of the invention and dispenses with the need to use adhesives or other fastening means in order to attach the closure leaf to the inner side of the container wall. The insert portion is preferably provided at the leg portion of the closure leaf.

Preferred materials for the container are flexible resilient materials such as paperboard or plastics, the paperboard being a more preferred material due to its ability to be recycled.

Preferably, the container is a cup. Alternatively, the container is a jug, a carton or a

vessel for drinking or for carrying or storing a liquid, semi-solid or solid contents.

In a second aspect, the present invention provides a container comprising a wall having an outer side, an inner side, a closed base at one end and a generally curved rim of at an opposite end, the rim defining a top opening of the container, the container further comprising:

at least one substantially arcuate crease line formed in the wall of the container below the rim; wherein the crease line has first and second ends coinciding with the rim; wherein the crease line and the portion of the rim between the first and second ends of the crease line define a flap having an outer face and an inner face; wherein the crease line is configured to act as a hinge allowing the flap to toggle between two positions upon application of an initial external force on the flap, the two positions being an open upright position in which the flap is convex and forms part of the wall of the container, and a closed lowered position in which the flap changes its shape to concave;

wherein the container further comprises a closure arrangement operable to restrict at least one flap opening defined between the portion of rim defining the flap and the inner side of the container wall when the flap is in the closed lowered position;

wherein the closure arrangement comprises at least one closure leaf on the inner side of the container wall;

wherein the closure leaf is attached to the inner side of the container wall so as to be movable by and with the first flap; and

wherein the closure leaf extends across the flap opening in plan view when the first flap is in the closed lowered position;

characterised in that the closure leaf is resiliently bendable and has a portion extending below the crease line of the flap.

The closure leaf is substantially as described in connection with the first aspect of the invention.

The closure leaf may extend underneath the flap opening in side view when the flap is in the closed lowered position.

Such an arrangement may be particularly useful in a food container for holding viscous or solid foods (e.g. soup or finger food). The closure leaf in this arrangement prevents the contents from spilling, whereas the flap does not come into contact with the contents and remains clean on the inside and the outside when the flap is lifted into the open position. Any food particles will remain on the closure leaf and not on the flap. Accordingly, the container wall remains un-stained and the user receives a pleasant experience from using the container.

In a third aspect, the invention provides a container comprising a wall having an outer side, an inner side, a closed base at one end and a generally curved rim at an opposite end, the rim defining a top opening of the container, the container further comprising:

a pair of substantially arcuate crease lines formed in the wall of the container at opposite sides of the wall below the rim; wherein each crease line has first and second ends coinciding with the rim; wherein each crease line and the portion of the rim between the first and second ends of the crease line define a flap having an outer face and an inner face; wherein each crease line is configured to act as a hinge allowing each flap to toggle between two positions upon application of an initial external force on the flap, the two positions being an open upright position in which the flap is convex and forms part of the wall of the container, and a closed lowered position in which the flap changes its shape to concave;

wherein the container further comprises a closure arrangement operable to restrict at least one flap opening defined at or adjacent the positions where the ends of each crease line coincide with the rim of the container when the flaps are in the closed lowered position, wherein the closure arrangement comprises at least one closure leaf attached to the inner side of the container wall;

wherein at least a portion of the closure leaf extends underneath and downwardly spaced from said flap opening when the flaps are in the closed lowered position;

characterised in that the closure leaf has a portion, which can be referred to as a "leg" portion for brevity, extending below the crease line of the first flap; and

wherein the closure leaf is provided as an insert for removably inserting the closure leaf into the container.

The closure leaf is substantially as described in connection with the first aspect of the invention, however, it need not necessarily be resiliently bendable and not necessarily movable by and with a movement of the first one of the flaps.

The insert portion of the closure leaf is preferably attached to the inner side of the container wall below the crease lines.

It will be appreciated that features of the first aspect of the invention can be incorporated into the second and third aspects *mutatis mutandis*. The features of the second and third aspects can be combined as appropriate.

It will be appreciated that the terms "inner", "inwardly", "outer", "outwardly", "axially", "longitudinally" or similar are used in relation to a central longitudinal axis of the container. Accordingly, the terms "convex" and "concave" are to be understood as, respectively, "bent outwardly and inwardly in relation to the central axis". It will also be appreciated that the terms "up", "upper", "upright", "down", "lower", "downward", "lowered" and "slanted" are used in relation to the base of the container. Also, the terms "container" and "cup" are

interchangeable.

Detailed Description of the Invention

The invention will now be described with reference to the accompanying drawings which show, by way of example only, embodiments of a container according to the invention. In the drawings:

Figs. 1 to 7 are various views of a container formed as a cup according to the prior art;

Fig. 8 is a perspective schematic view of a container formed as a cup showing a closure arrangement according to a variation of the first aspect of the invention;

Fig. 9 is a plan view of the cup of Fig. 8;

Fig. 10 is a perspective view of a fully closed cup of Fig. 8 and Fig. 9;

Fig. 11 is a plan view of Fig. 10;

Fig. 12 is a cross-section of the cup of Fig. 11 made along the lines X – X in Figure 11;

Fig. 13 is a perspective schematic view of a container formed as a cup showing a closure arrangement according to another variation of the first aspect of the invention;

Fig. 14 is a plan view of the cup of Fig. 13;

Fig. 15 is a perspective view of a fully closed cup of Fig. 13 and Fig. 14;

Fig. 16 is a plan view of Fig. 15;

Fig. 17 is a cross-section of the cup of Fig. 16 made along the lines Y – Y in Figure 16;

Fig. 18 is a perspective partially cutaway view of a fully closed cup of Fig. 13 to Fig. 17;

Figs. 19 and 20 are respectively a perspective and a plan view of a variation of the cup of Figs. 13 to 18;

Fig. 21 is a schematic plan view of a container formed as a cup showing a closure arrangement according to a variation of the second aspect of the invention;

Fig. 22 is perspective view of a partially closed cup of Fig. 21;

Fig. 23 is a schematic plan view of a container formed as a cup showing a closure arrangement according to another variation of the second aspect of the invention; and

Fig. 24 is perspective view of a partially closed cup of Fig. 23.

Since the present invention is defined in the appended claims, the embodiments described below should not be construed as limiting the claimed invention. For example only, in the following description the features of the present invention will be described as they relate to a container embodied as a cup. However, it will be understood that other

embodiments for a container are also envisaged, such as a jug, a carton, and a vessel for drinking or for carrying or storing a liquid, a semi-solid or solid contents, and that therefore reference in the following description to a container formed as a cup only should in no way be seen as limiting.

5 Referring initially to Figs. 1 to 7, a cup in accordance with the prior art is indicated generally by reference numeral 1. The cup 1 is made from a flexible resilient material, such as paperboard or a plastics material.

The cup 1 has a wall 2 having a shape of a truncated cone having a central axis 3, a closed base 4 of an optionally smaller diameter at one end and a generally circular rim 5 of
10 optionally larger diameter at an opposite end. It will be appreciated that the invention is not limited to a circular cross-section of the cup wall. Indeed, a generally curved, e.g. oval or other shape cross-section of the cup is within the scope of the present invention. It is also within the scope of the present invention to have a protruding spout or drinking opening. The rim 5 defines a top opening 6 of the cup 1. The rim 5 and base 4 may also be of the
15 same diameter. The base may be of any shape, including, but not limited thereto, circular, oval, square, rectangular or other complex or irregular shape.

A pair of substantially arcuate crease lines 7, 8 is formed in the wall 2 of the cup 1 at opposite sides of the wall 2 below the rim 5. Each crease line 7, 8 has first and second ends 7a, 8a and 7b, 8b, respectively. The ends of the crease lines 7a, 8a, 7b, 8b coincide
20 with the rim 5. Also, each end 7a, 7b of a first crease line 7 substantially coincides with a corresponding end 8a, 8b of the second crease line 8 on the rim 5 of the cup, although it will be understood that in order to provide a container having a drinking or pouring spout or funnel, the ends 7a, 7b, 8a, 8b of the crease lines 7,8 may not coincide with each other at the rim 5 so as to create a sufficiently wide opening at the rim 5, as shown in Fig. 7 by gaps
25 5a, 5b, thereby creating a drinking or pouring funnel or opening 100a, 100b.

Each crease line 7, 8 and the respective portion 57, 58 of the rim 5 between the respective first and second ends 7a, 7b; 8a, 8b of the crease line 7, 8 define a flap 70, 80, respectively. Each flap 70, 80 has an outer face 70a, 80a and an inner face 70b, 80b, respectively.

30 Each crease line 7, 8 is configured using a suitable method (e.g. by bending, scoring or differential forming, such as in the case of plastic cups, the material of the wall 2) to act as a hinge to allow each flap 70, 80 to toggle between two stable positions upon application of an initial external force on the flap 70, 80. One of the two stable positions is an open upright position in which the flap 70, 80 is convex and forms part of the wall 2 of the cup, for example, as shown in Fig. 1. The second of the two stable positions is a
35 closed lowered position in which the flap 70, 80 changes its shape to concave, for example, as shown in Fig. 4 and 5. In the presently described embodiment, a flap 70, 80 is

prevented from remaining in a position intermediate the open upright and the closed lowered positions due to the resilience of its material and because in an intermediate position the flap 70, 80 becomes distorted, e.g. corrugated, because the length of the flap 70, 80 in the circumferential directions is greater than the length of a plane defined by the respective crease line 7, 8. When pushed into an intermediate position by an external force and upon subsequent removal of the external force, the flap 70, 80 assumes either the concave shape in the closed lowered position or the convex shape in the open upright position under the influence of the inherent resilience of the cup material. The resilience of the cup material causes the flap 70, 80 to complete the toggle without the need for the continued application of the external force and prevents the flap 70, 80 from stopping in a position intermediate the open upright and the closed lowered positions. It will be appreciated that in other embodiments, the two positions need not be stable.

The length of each crease line 7, 8 and the distance between points P1 and P2, as shown in Fig. 1, respectively, of the crease line 7, 8 axially most remote from the rim portions 57, 58 of the flap 70, 80 and the rim 5 are such that when the flaps 70, 80 are closed, each flap 70, 80 assumes a lowered, curved and/or angled orientation in relation to the base 4 of the cup 1. Furthermore, a first flap, e.g. flap 70, is allowed to move fully into the closed lowered position as shown in Fig. 4. The second flap, i.e. flap 80, is prevented from moving fully into the closed lowered position by the rim portion 57 of the first flap which impinges against the inner face 80b of the second flap 80 substantially along the full length of the rim portion 57 of the first flap 70. The rim portion 57 of the first flap 70 is prevented from being deformed by the second flap 80 due to the resilience of the material of the first flap 70 (i.e. the material of the cup 1), while the second flap 80 remains statically forced against the rim portion 57 of the first flap 70 towards the fully closed lowered position due to the resilience of the material of the second flap 80 (i.e. the material of the cup 1), as shown in Fig. 5. Due to the continuous forced contact between the rim portion 57 of the first flap 70 and the inner face 80b of the second flap 80, a spill-tight seal may be formed along the length of the rim portion 57 of the first flap 70. As shown in Figs. 5 to 7, the two flaps 70, 80 form a double-slope roof across the top opening 6 of the cup 1. It will be appreciated that in other embodiments, the flaps may not be required to impinge against each other or to form a double-slope roof or a seal.

When the flaps 70, 80 are closed, there are noticeable gaps or flap openings 100a, 100b located near the ends 57a, 57b, 58a, 58b of the rim portions 57, 58 where the ends of the crease lines 7a, 8a and 7b, 8b coincide with the cup rim 5, and these openings provide an outlet through which spillage of the contents of the cup 1 may occur. The present invention now provides an improved closure arrangement to restrict or protect the flap openings 100a, 100b to thereby prevent or improve against splashing of the container

contents when the container is in a generally upright position and reduce the rate of spillage if the container is knocked over. The present invention thus improves the splash-resistant and spill-resistant properties for the container, whilst, if required for drinking or pouring, permitting the container to allow the passage of container contents when tilted for drinking and pouring. It will be understood that the ends of the crease lines 7a, 8a and 7b, 8b may not coincide with the rim 5 in order to create a sufficiently wide opening at the rim 5 for the formation of a drinking and/or pouring spout or funnel.

Referring now to Figs. 8 to 18, two variations of a cup in accordance with a first aspect of the invention, indicated generally by reference numerals 10, 20, respectively, will be described. The cup 10, 20 includes most of the features of the prior art cup 1 and for brevity parts of the cup 10, 20 which are common with the prior art cup 1 have been indicated using common reference numerals. Also, like parts of the cup 10, 20 have been indicated using like reference numerals. In the cup 10, 20, the closure arrangement comprises at least one closure leaf 130, 230 for restricting each of the opposite gaps or flap openings 100a, 100b formed when the flaps 70, 80 are folded. Although the closure leaf 130, 230 is shown in the drawings to restrict both flap openings 100a, 100b, it will be understood that the cup 10 may require the closure leaf 130, 230 to restrict only one flap opening where a single flap opening is to be sealed or where only one flap opening is provided in the cup 10, 20. For example, and depending on the specific application of the invention, it may be desirable to allow the container contents to have an unimpeded flow through one of the two flap openings, and to restrict flow through the other of the two flap openings, in which case the inclusion of a closure leaf 130, 230 to restrict only one of the flap openings would be required. Reference to the closure leaf 130, 230 as restricting one flap opening or restricting two opposite flap openings should therefore in no way be seen as limiting. Thus, depending on the specific requirements, the closure leaf 130, 230 may be shaped to restrict only one flap opening of the cup 10, 20. The closure leaf 130, 230 also may be shaped to restrict both flap openings 70, 80 of the cup 10, 20. Furthermore, a pair of (or multiple) closure leaves 130, 230 may be provided on the same flap, to restrict respective opposite flap openings 70, 80.

In the presently described embodiment, in use, the closure leaf 130, 230 is shaped to restrict the openings 100a, 100b from within the cup 10, 20 to reduce splashing of the container contents.

The closure leaf 130 in Figures 8 to 12 is attached on the inner side of the cup wall 2 to a first one of the flaps 70, 80, for example, the flap 70, at a location A spaced from the position where the ends 7a, 8a, 7b, 8b of the crease lines 7, 8 coincide with the rim 5 at the flap opening 100a, 100b and the closure leaf 130 is movable with the first flap 70. In the presently described arrangement, the closure leaf 130 is attached to the first flap 70 at a

central location on the first flap 70 spaced from the portion of the rim 5 and the crease line 7 which define the first flap 70.

The closure leaf 230 in Figures 13 to 18 is attached to the inner side of the cup wall 2 at a location B below the crease line 7 of the first flap 70.

5 The closure leaf 130, 230 is attached to the inner side of the container wall 2 so as to be movable by and with the first flap 70.

In use, in order to close the cup 10, 20, the first flap 70 is closed first and the other flap 80 is closed second, as indicated by respective arrows I and II in Figures 8, 10, 13 and 15.

10 The closure leaf 130, 230 is resiliently bendable and has a portion 133, 233 extending below the crease line 7 of the first flap 70. For ease of reference, the portion 133, 233 extending below the crease line of the first flap 70 will hereinafter be referred to as a "leg portion". However, it will be appreciated that the term "leg portion" is not in any way limited to any particular size or shape or configuration. Indeed, while the leg portion 133, 233 can be provided, for example, in the form of an extension to a main portion of the closure leaf 130, 230, the leg portion 133, 233 may also be a region or a portion of the closure leaf 130, 230 indistinguishable by any visual features from the whole of the closure leaf 130, 230. The closure leaf 130, 230 is resiliently bendable upon application of an external force to the closure leaf 130, 230 and is capable of returning into its original unbent, i.e. relaxed, state upon withdrawal of the external force due to the inherent resilience of the material of the closure leaf 130, 230. The leg portion 133, 233 extends below the crease line 7 of the first flap 70 when the first flap 70 is in the open upright position and when the first flap 70 is in the closed lowered position.

20 The closure leaf 230 is attached to the inner side of the cup wall 2 at a location below the crease line 7 of the first flap 70 by the leg portion 233.

25 In the open upright position of the first flap 70, the closure leaf 130, 230 is relaxed (Figures 8, 9, 13 and 14). In the closed lowered position of the first flap 70, at least a portion of the closure leaf 130, 230 extends broadly horizontally and underneath the first flap 70 and across the top opening of the cup 10, 20 and the closure leaf 130, 230 assumes a resiliently bent state as the leg portion 133, 233 is biased against the inner side of the cup wall 2 below the crease line 7 of the first flap 70 in the closed lowered position of the first flap 70 (Figures 10 to 12 and 15 to 18). The bending of the closure leaf 130, 230 is achieved through the resiliently deformable elastic properties of the material of the closure leaf 130, 230

30 Accordingly, when the first flap 70 is in the closed lowered position, the leg portion 133, 233 causes the closure leaf 130, 230 to apply pressure on the inner side of the cup wall 2, effectively acting as a spring on the cup wall 2, applying pressure from the inside.

This spring-like pressure caused by the closure leaf helps the upper portion of the cup 10, 20 to keep its shape relatively rigid and prevents the upper portion of the cup 10, 20 from being deformed when the cup 10, 20 is ordinarily gripped. Thus, the present invention allows thinner or less dense material, e.g. thinner paper or plastic or other material, to be used to make the cup or eliminates the necessity to use thicker or denser material for cups of larger volume. A further advantage of the present invention is that it allows a lighter material to be used than would otherwise be required in the manufacture of cups of a larger size. The invention also helps to maintain the shape and structural strength of the top part of the cup 10, 20 when the cup 10, 20 is heated by hot contents as well as improves the strength of the seal which may be formed between the flaps 70, 80 when the flaps 70, 80 are closed.

The spring-like pressure generated by bending the closure leaf 130, 230 imparts an extra degree of stiffness on the upper portion of the cup 10, 20 by resisting displacement and rendering the cup 10, 20 less prone to deformation when the cup 10, 20 is gripped or squeezed by a user. This effectively reduces the risk of spills or leakage.

In the bent state of the closure leaf 130, 230, lateral bent edges 137, 237 of the closure leaf 130, 230 abut or impinge on the inner side of the cup wall 2 at locations downwardly spaced from the positions where the ends 7a, 7b, 8a, 8b of each crease line 7, 8 coincide with the rim 5 of the cup 10, 20. The spring-like pressure generated by bending the closure leaf helps to maintain the bent region of the closure leaf 130, 230 in a straight line in the direction between the lateral bent edges 137, 237 and prevents peripheral portions of the closure leaf 130, 230 from sagging. This reduction in sagging of the peripheral portions of the closure leaf imparts rigidity onto the cup 10, 20 and also enhances a positive contact between the rim 57 of the first flap 70 and the inner side of the second flap 80 when the flaps 70, 80 are closed thus improving a seal which may form between the flaps 70, 80. By pressing against the inner side of the cup wall 2 below the flap opening 100a, 100b when the flap 70 is closed, the more rigid lateral bent edges 137, 237 of the closure leaf 130, 230 impart a further additional stiffness on the upper portion of the cup 10, 20 by resisting displacement when the cup 10, 20 is gripped or squeezed by a user. In this regard, the distance between the opposite lateral bent edges 137, 237 of the closure leaf 130, 230 in the direction parallel to the line of bending of the closure leaf 130, 230 is preferably sufficient to allow the bent edges 137, 237 of the closure leaf 130, 230 to abut or impinge on the inner side of the cup wall 2 when the closure leaf 130, 230 is in a bent state thereby imparting stiffness onto the upper portion of the cup 10, 20. Each of the closure leaf 130 and 230 is capable of imparting sufficient and effective stiffness onto the upper portion of the cup 10, 20. However, the stiffness provided by the closure leaf 230

has been found to be somewhat greater and more reliable than the stiffness provided by the closure leaf 130.

An additional advantage of the closure leaf 230 of Figures 13 to 18 lies in that, because the closure leaf 230 is attached to the inner side of the cup wall 2 below the crease line 7 at, or in-or-about, the location B, the closure leaf 230 does not need to protrude out beyond the rim 5 of the cup 20 when the flap 70 is in the open upright position in order to be able to extend fully or substantially fully across the top opening of the cup 20 and to restrict the flap opening 100a, 100b efficiently when the flap 70 is in the closed lowered position. The closure leaf 230 may have a top edge 245 which is substantially level with the rim 5 of the cup 20 or even below the rim 5 when the flap 70 is in the open upright position. When the flap 70 is moved down / closed, the flap 70 will slide over the closure leaf 230 as it bends the closure leaf 230 down because the closure leaf 230 is not attached to the flap 70, but instead is attached to the inner side of the cup wall 2 below the flap 70 at, or in-or-about, location B. This relative sliding of the flap 70 over the closure leaf 230 allows the top edge 245 of the closure leaf 230 to protrude beyond the rim 5 of the flap 70 when the closure leaf 230 and the flap 70 are in the closed lowered position (Figures 15 to 18). This allows the closure leaf 230 to extend substantially fully across the top opening of the cup 20 when the flap 70 is closed but not when the flap 70 is open. The absence in the closure leaf 230 of a protrusion beyond the rim 5 of the cup 20 when the flap 70 is in the open upright position facilitates manufacture, storage and stacking of multiple cup 20, makes filling of cups easier and improves user experience. In contrast, in the closure leaf 130 of the cup 10, in order to be able to extend fully or substantially fully across the top opening of the cup 10, a top edge 145 of the closure leaf 130 needs to protrude out beyond the rim 5 of the cup 10 when the flap 70 is in the open upright position. This is because the closure leaf 130 is attached to the flap 70 at the location A and the flap 70 therefore does not slide over the closure leaf 130 when the flap 70 is lowered into the closed position.

Upon return of the first flap 70 into the open upright position, the closure leaf 130, 230 relaxes and returns into its original unbent state due to the inherent resilience of the closure leaf 130, 230. The inherent resilience of the closure leaf 130, 230 allows the closure leaf 130, 230 to return into the unbent state without the requirement for an external force to be applied to the closure leaf 130, 230.

In the presently described arrangement, the closure leaf 130, 230 is substantially superimposed on the first flap 70. Also, in the presently described arrangement, when the flaps 70, 80 are in the open upright position, as shown in Figures 8, 9 and 13, 14, the closure leaf 130, 230 is positioned upright and concentrically with the first flap 70. When the flaps 70, 80 are in the closed lowered position, as shown in Figures 10 to 12 and 15 to 18, the closure leaf 130, 230 extends underneath the flap opening 100a, 100b downwardly

spaced from the flap opening 100a, 100b. When the first flap 70 is moved down into the closed position, the closure leaf 130, 230 is moved down by and together with the first flap 70 so that the closure leaf 130, 230 is positioned substantially across the top opening of the cup 10, 20 when the first flap 70 is in the closed lowered position and the closure leaf 130, 230 becomes resiliently bent and the leg portion 133, 233 becomes biased against the inner side of the cup wall 2 below the crease line 7 of the first flap 70 in the closed lowered position of the first flap 70.

When the flaps 70, 80 are in the closed lowered position, the flap opening 100a, 100b is restricted by the closure leaf 130, 230 in that spills are prevented or minimised when the cup 10, 20 is generally upright and is shaken or otherwise subjected to impact. However, the flap opening 100a, 100b is not sealed off completely by the closure leaf 130, 230 as the closure leaf 130, 230 does not completely block the top opening 6 of the cup 10, 20 and passage of the cup contents is still possible through the flap opening 100a, 100b when the cup 10, 20 is tilted, enabling drinking or pouring from the cup 10, 20. In the presently described arrangement, the closure leaf 130, 230 provides a cut-out 140, 240 to permit passage of cup contents and also to allow the flap 70 and the closure leaf 130, 230 to be held together to move them into the open upright position. In other arrangements, however, e.g. in food containers, the closure leaf 130, 230 may be shaped to close off the top opening 6 of the container fully. When the flap 70 is moved into the open upright position, the closure leaf 130, 230 is also pivoted together with the flap 70 away from the position in which the closure leaf 130, 230 restricts the flap opening 100a, 100b and assumes the upright orientation together with the flap 70. This allows multiple cups 10, 20 to be stacked into each other for efficient storage. Also, the top opening 6 of the cup 10, 20 is unobstructed during filling. When it is necessary to close the cup 10, 20 by the flaps 70, 80, the closure leaf 130, 230 is moved into the position in which the closure leaf 130, 230 restricts the flap opening 100a, 100b in one motion simultaneously with the first flap 70. No separate action is necessary to move the closure leaf 130, 230 into the position in which the closure leaf 130, 230 restricts the flap opening 100a, 100b. Furthermore, it is ensured that the closure leaf 130, 230 will be positioned correctly underneath the flap opening 100a, 100b.

In the variation of Figures 8 to 12, a portion of the closure leaf 130 proximal to the flap opening 100a, 100b is unattached to the first flap 70 and the closure leaf 130 is attached to the first flap 70 at the location A by a portion distal from the flap opening 100a, 100b.

As shown in Figures 10 and 15 when the flaps 70, 80 are in the closed lowered position, the closure leaf 130, 230 extends tangentially in relation to the first flap 70, such that a portion of the closure leaf 130, 230 proximal to the flap opening 100a, 100b is spaced

apart from the first flap 70 and the portion of the closure leaf 130, 230 distal from the flap opening 100a, 100b is in contact with the first flap 70. Since the closure leaf 130, 230 is made from an elastic resiliently deformable material, such as, for example, a suitable type of paperboard or plastics, the closure leaf 130, 230 may be substantially planar, or slightly
5 convex or concave, when the flaps 70, 80 are in the closed lowered position and may bend to conform to the arcuate shape of the first flap 70 and the inner side of the container wall 2 when the flaps 70, 80 are in the open upright position.

In one arrangement, when the flaps 70, 80 are in the closed lowered position, a spill-tight seal may be formed between the rim 5 of the first flap 70 and the inner face of the
10 second flap 80.

The closure leaf 130, 230 may impinge against the inner side of the cup wall 2 at a location underneath and downwardly spaced from the flap opening 100a, 100b when the flaps 70, 80 are in the closed lowered position. Preferably, the portion of the closure leaf 130, 230 which impinges against the inner side of the cup wall 2 has an edge portion 135,
15 235 shaped to conform to and engage the inner side of the cup wall 2 to provide additional structural strength to the cup 10, 20 and to further ensure that the contents of the cup 10, 20 do not splash out of the flap opening 100a, 100b. Accordingly, splashing is minimised and the rate of spillage if the cup 10, 20 is knocked over is reduced. The present invention thus may improve the spill-resistant properties for the cup 10, 20 by strengthening the seal
20 which may be formed between the flaps 70, 80 in the closed position of the flaps 70, 80, whilst, if required for drinking or pouring, permitting the cup 10, 20 to allow the passage of the cup contents when tilted for drinking and pouring. This also imparts extra rigidity and overall structural strength on the cup 10, 20 in that the cup 10, 20 is less prone to deformation when it is gripped by a user's hand.

The closure leaf 130, 230 of the present invention also permits stacking of multiple
25 cups 10, 20, unobstructed pouring of contents into the cup 10, 20 and provides for correct positioning of the closure leaf 130, 230 underneath the flap opening 100a, 100b in one movement, simultaneously with the downward movement of the first flap 70.

It will be understood that the closure leaf 130, 230 may be of any suitable shape as
30 required or desired, and may be adapted to have a shape specifically suited to the shape of the cup 10, 20 and the function that is to be performed. For example, the closure leaf 130, 230 may be substantially round, oval, polygonal or irregular shaped as needed. Furthermore, the closure leaf 130, 230 may incorporate one or more suitable cut-outs, notches, holes or similar arrangements for allowing contents moving out from the cup 10,
35 20 to bypass the closure leaf 130, 230 and exit the cup 10, 20 through the flap opening 100a, 100b. If needed, the closure leaf 130, 230 may be shaped to close the top opening 6 of the container fully when the flap 70 is closed. The leg portion 133, 233 can be of any

suitable shape. Indeed, the leg portion 133, 233 may be simply a region or a portion of the closure leaf 130, 230. The attachment location A, B as shown in the drawings is indicative and may vary in its position.

The closure leaf 130, 230 may be made of the same material as the cup 10, 20, or may alternatively be made of a heavier or lighter gauge and/or alternative material for additional strength or functionality.

Figs. 19 and 20 show a cup 30 which is a variation of the cup 20 of Figs. 13 to 18. In the cup 30, the closure leaf 330 is substantially the same as the closure leaf 230 of Figs. 13 to 18, but instead of being affixed to the inner side of the cup wall 2 at a location B, the closure leaf 330 is provided as an insert for removably inserting the closure leaf 330 into the cup 30. The closure leaf 330 is secured to the inner side of the cup wall 2 by an insert portion 400. The insert portion 400 is adapted to be inserted into the cup 30 and attached to the inner side of the cup wall 2. The insert portion 400 is shaped to conform to the shape of the inner side of the cup wall 2. Upon insertion into the cup 30, the insert portion 400 snugly engages the inner side of the cup wall 2 and is retained in position. The retention of the insert portion 400 in snug engagement with the inner side of the cup wall 2 may be achieved in a number of ways apparent to a skilled person. For example, the insert portion 400 may be provided in the form of a leaf spring (not shown) which needs to be compressed to be inserted into the cup 30 and expands upon being located inside the cup 30 so as to engage inner side of the cup wall 2. The insert portion 400 may be provided as a ring or a portion of a ring. In Figs. 19, 20, the cup wall 2 is tapered and the insert portion 400 is provided as a ring having a taper matching that of a specific section of the cup wall 2. Upon insertion of the insert portion 400 into the cup 30, the insert portion 400 is retained in the specific section of the cup 30 by the tapered wall 2 of the cup. In Figs. 19, 20, the insert portion 400 is provided at the leg portion 333 of the closure leaf 330. In another variation (not shown), the closure leaf 330 need not necessarily be resiliently bendable and not necessarily movable by and with a movement of the first flap 70.

Referring now to Figs. 21 to 24, two variations of a cup in accordance with a second aspect of the invention, indicated generally by reference numerals 110, 210, respectively, will be described. The cup 110, 210 includes some of the features of the cup 10, 20 and for brevity parts of the cup 110, 220 which are common with the cup 10, 20 have been indicated using common reference numerals. In the container 110, 220, only one flap 70 is defined by one crease line 7 and the portion of the rim 5 between the first and second ends 7a, 7b of the crease line. A flap opening 200 is defined between the portion of rim 5 defining the flap 70 and the inner side of the container wall 2 when the flap 70 is folded down. The closure arrangement of this aspect of the invention comprises at least one closure leaf 138, 238 on the inner side of the container wall 2 for restricting the flap opening

200. The closure leaf 138 of the cup 110 is the same as the closure leaf 130 of the cup 10 of Figures 8 to 15. The closure leaf 238 of the cup 210 is the same as the closure leaf 230 of the cup 20 of Figures 13 to 18. The closure leaf 138 is attached to the flap 70 at a location spaced from the position where the ends 7a, 7b of the crease line 7 coincide with the rim 5. The closure leaf 238 is attached to the inner side of the cup wall 2 below the crease line 7. The closure leaf 138, 238 is movable by and with the flap 70 and extends across the flap opening 200, in plan view, and underneath the flap opening 200 as viewed from a side, when the flap 70 is in the closed lowered position. A free outer edge portion 139, 239 of the closure leaf 138, 238 may impinge against and/or conform to the shape of the inner side of the container wall 2 when the flap 70 is in the closed lowered position.

Such an arrangement may be particularly useful in a food container for holding viscous or solid foods (e.g. soup, noodles or finger food). The closure leaf 138, 238 in this arrangement prevents the contents from spilling, whereas the flap 70 does not come into contact with the contents and remains clean on the inside and the outside when the flap 70 is lifted and the container is opened. Any food particles will remain on the closure leaf 138, 238 and not on the flap 70. Accordingly, the cup wall 2 remains un-stained and the user receives a pleasant experience from using the cup 110, 210.

The closure leaf 138, 238 has a leg portion 142, 242 substantially as described in connection with the embodiments of Figures 8 to 12 and Figures 13 to 18 and functions in substantially the same manner as the leg portion 133, 233 of the closure leaf 130, 230 of those embodiments. The closure leaf 238 of the cup 210 may be provided as an insert and have an insert portion 400 of Figures 19, 20 instead of being affixed to the inner side of the cup wall 2 at a location B.

In other modifications, the cup 110, 210 may include two or multiple flaps, as in the cup 10, 20. Other features of the cup 10, 20 can be incorporated into the cup 110, 210 *mutatis mutandis*. The closure leaf 138, 238 may be provided as an insert described above in relation to cup 30.

It will be appreciated by those skilled in the art that variations and modifications can be made without departing from the scope of the invention as defined in the appended claims.

CLAIMS:

1. A container comprising a wall having an outer side, an inner side, a closed base at one end and a generally curved rim at an opposite end, the rim defining a top opening of the container,
5 the container further comprising:

a pair of substantially arcuate crease lines formed in the wall of the container at opposite sides of the wall below the rim; wherein each crease line has first and second ends coinciding with the rim; wherein each crease line and the portion of the rim between the first and second ends of the crease line define a flap having an outer face and an inner face; wherein each
10 crease line is configured to act as a hinge allowing each flap to toggle between two positions upon application of an initial external force on the flap, the two positions being an open upright position in which the flap is convex and forms part of the wall of the container, and a closed lowered position in which the flap changes its shape to concave;

wherein the container further comprises a closure arrangement operable to restrict at
15 least one flap opening defined at or adjacent the positions where the ends of each crease line coincide with the rim of the container when the flaps are in the closed lowered position, wherein the closure arrangement comprises at least one closure leaf attached to the inner side of the container wall;

wherein the closure leaf is attached to the inner side of the container wall so as to be
20 movable by and with a movement of the first one of the flaps;

wherein at least a portion of the closure leaf extends underneath and downwardly spaced from said flap opening when the flaps are in the closed lowered position;

characterised in that the closure leaf is resiliently bendable and has a portion, hereinafter referred to as a "leg" portion, extending below the crease line of the first flap.

2. A container of claim 1, wherein the closure leaf is resiliently bendable upon application of an external force to the closure leaf and

the closure leaf is capable of returning into its original unbent, i.e. relaxed, state upon withdrawal of the external force due to the inherent resilience of the material of the closure leaf.

3. A container of claim 1 or claim 2, wherein the closure leaf is attached to the inner side of the container wall at a location below the crease line of the first flap.

4. A container of claim 3, wherein the closure leaf is attached to the inner side of the container wall at a location below the crease line of the first flap by the leg portion.

5. A container of claim 1 or claim 2, wherein the closure leaf is attached to the inner side of the container wall above the crease line of the first flap, i.e. to the first flap and above the leg portion.

5 6. A container of claim 5, wherein the closure leaf is attached to the first flap at a location spaced from the position where the ends of the crease lines coincide with the rim at the flap opening being restricted.

10 7. A container of any preceding claim, wherein the leg portion extends below the crease line of the first flap when the first flap is in the open upright position and when the first flap is in the closed lowered position.

15 8. A container of any preceding claim, wherein in the open upright position of the first flap, the closure leaf, including the leg portion is relaxed.

20 9. A container of claim 8, wherein in the closed lowered position of the first flap, at least a portion of the closure leaf extends underneath the first flap and across the top opening of the container and the closure leaf assumes a resiliently bent state as the leg portion becomes biased against the inner side of the container wall below the crease line of the first flap.

25 10. A container of claim 9, wherein in the bent state of the closure leaf, lateral bent edges of the closure leaf abut or impinge on the inner side of the container wall at locations downwardly spaced from the positions where the ends of each crease line coincide with the rim of the container.

30 11. A container of any preceding claim, wherein the closure leaf is positioned upright and concentrically with the first flap when the first flap is in the open upright position.

35 12. A container of any preceding claim, wherein the closure leaf is superimposed on the first flap, wherein when the first flap is being closed, the closure leaf is moved down by and together with the first flap so that the closure leaf is positioned substantially across the top opening of the container when the first flap is in the closed lowered position and the closure leaf becomes resiliently bent and the leg portion becomes biased against the inner side of the container wall below the crease line of the first flap in the closed lowered position of the first flap.

13. A container of any preceding claim, wherein when the flaps are in the closed lowered position, the closure leaf extends tangentially in relation to the first flap, such that a portion of

the closure leaf proximal to the flap opening is spaced apart from the first flap and the portion of the closure leaf distal from the flap opening is in contact with the first flap.

14. A container of claim 10, wherein the portion of the closure leaf which impinges against the inner side of the container wall has an edge portion shaped to conform to the inner side of the container.

15. A container of any preceding claim, wherein each crease line is configured such that the open upright position in which the flap is convex and forms part of the wall of the container, and the closed lowered position in which the flap changes its shape to concave are stable positions; wherein the resilience of the flap material causes the flap to complete the toggle and prevents the flap from stopping in a position intermediate the open upright and the closed lowered positions;

wherein the length of each crease line and the shortest distance between a point of the crease line axially most remote from the rim of the flap and the rim is selected such that when the flaps are moved to the closed lowered position, each flap assumes a slanted orientation in relation to the base of the container, wherein the rim of a first flap impinges against the inner face of the second flap and wherein the two flaps form a double slope roof across the top opening of the container and a spill-tight seal is formed between the rim of the first flap and an inner face of the second flap.

16. A container of claim 15, wherein when the first flap is allowed to move fully into the closed lowered position, the second flap is prevented from moving fully into the closed lowered position by the rim of the first flap; wherein the rim of the first flap is prevented from being deformed by the second flap due to the resilience of the material of the container, so that the second flap remains statically forced against the rim of the first flap towards the closed lowered position due to the resilience of the container material; wherein the counteracting forces between the rim of the first flap and the inner face of the second flap are sufficient to push the respective rim and the inner face together into a positive contact, thereby forming a seal between the flaps.

17. A container of claim 3 or claim 4, wherein the closure leaf is provided as an insert for removably inserting the closure leaf into the container.

18. A container of claim 17, wherein the closure leaf has an insert portion, the insert portion being adapted to be inserted into the container and attached to the inner side of the container wall;

wherein the insert portion is shaped to conform to the shape of the inner side of the container wall, wherein upon insertion into the container, the insert portion snugly engages the inner side of the container wall and is retained in position due to cooperation with the container wall.

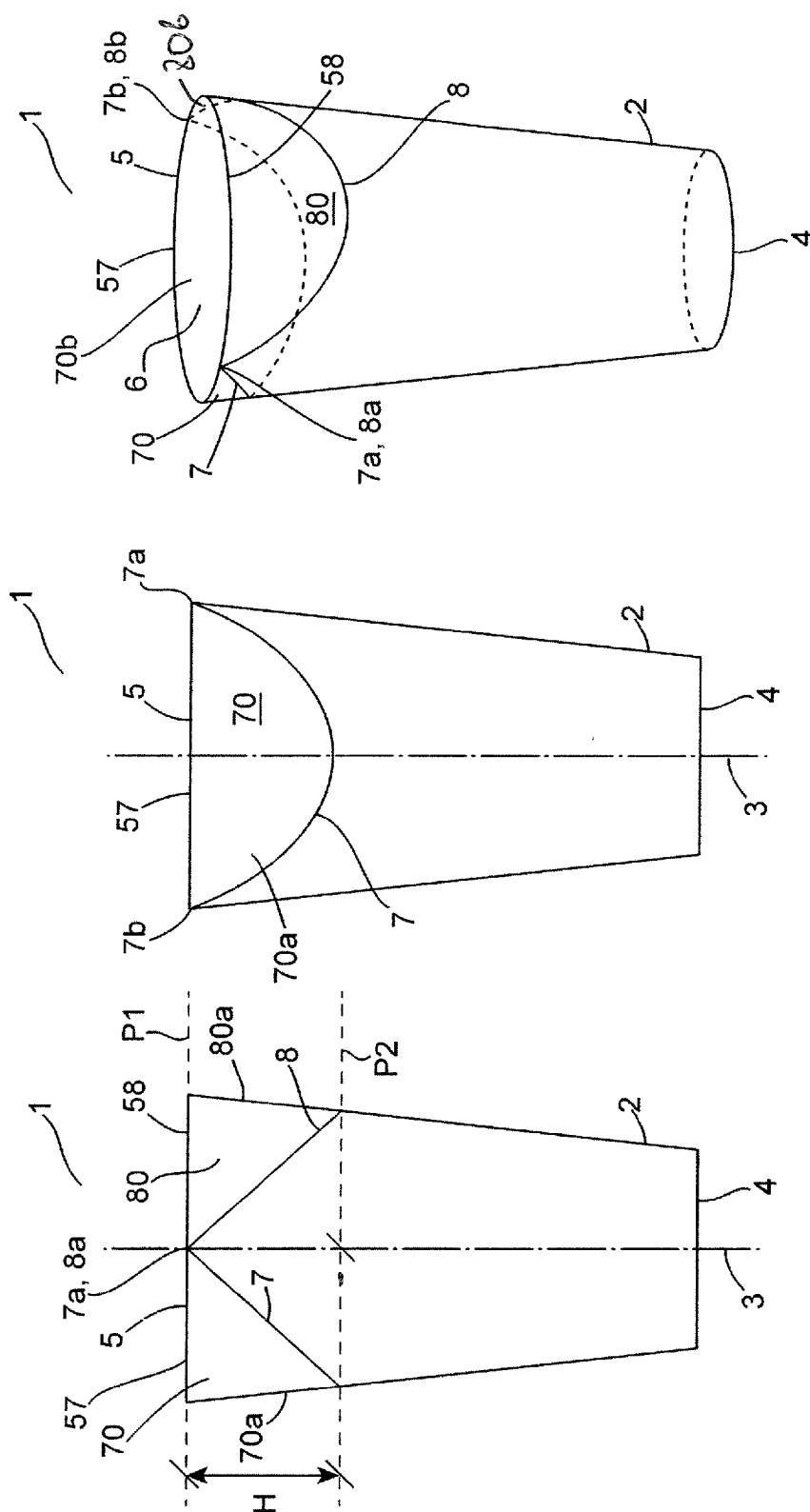


Fig. 1
(PRIOR ART)

Fig. 2
(PRIOR ART)

Fig. 3
(PRIOR ART)

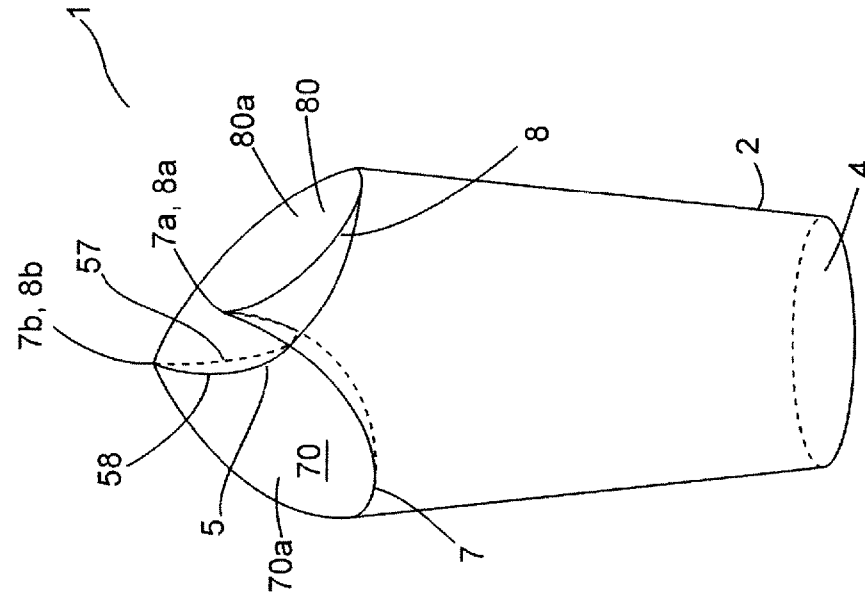


Fig. 5
(PRIOR ART)

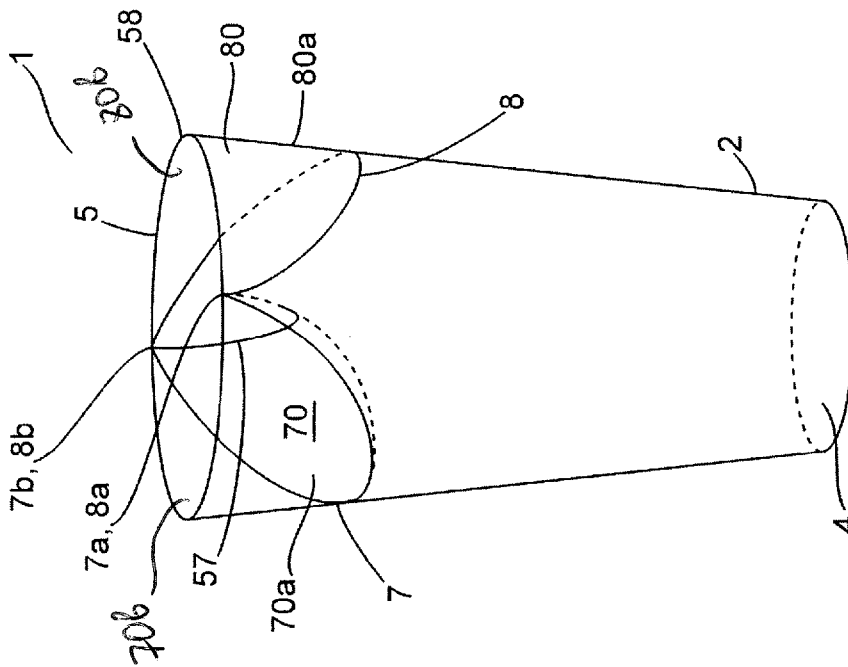


Fig. 4
(PRIOR ART)

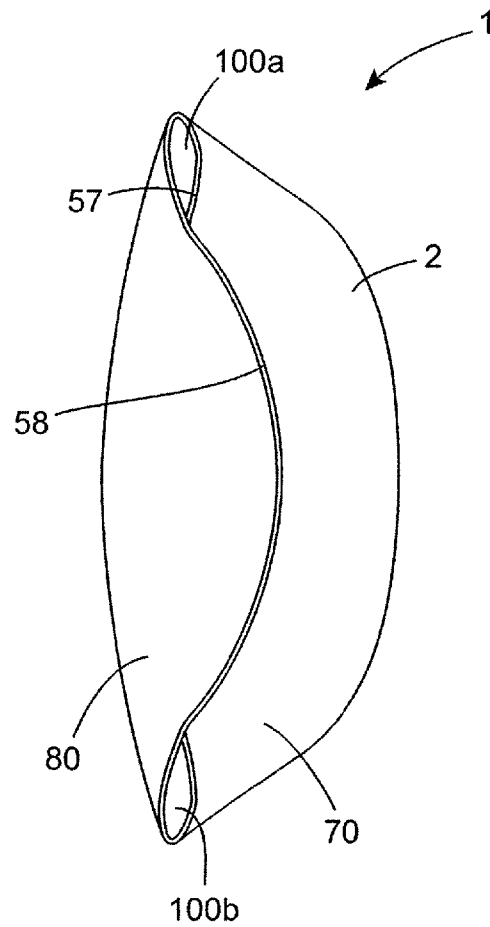


Fig. 6
(PRIOR ART)

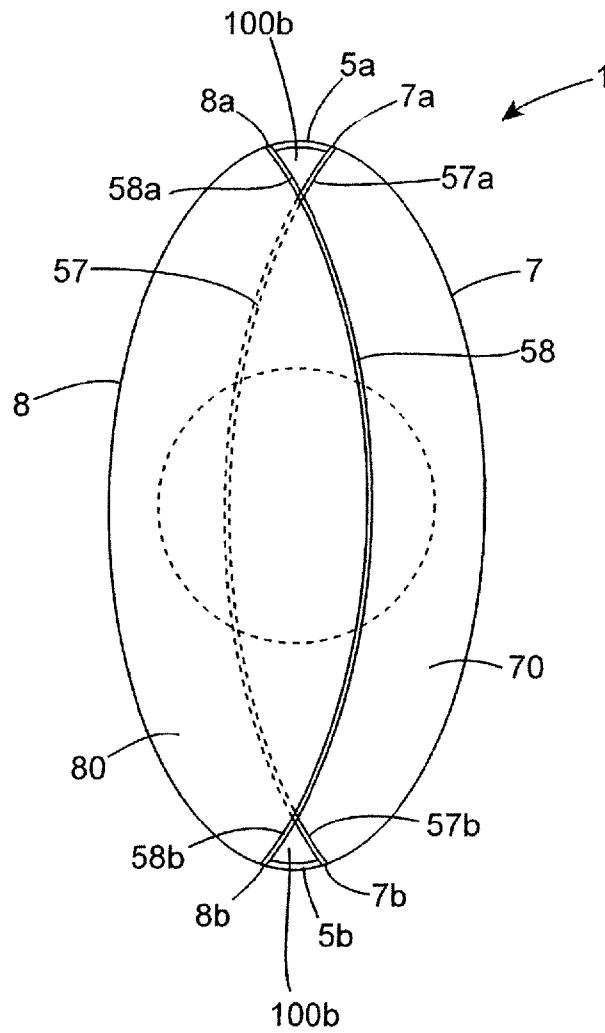


Fig. 7

(PRIOR ART)

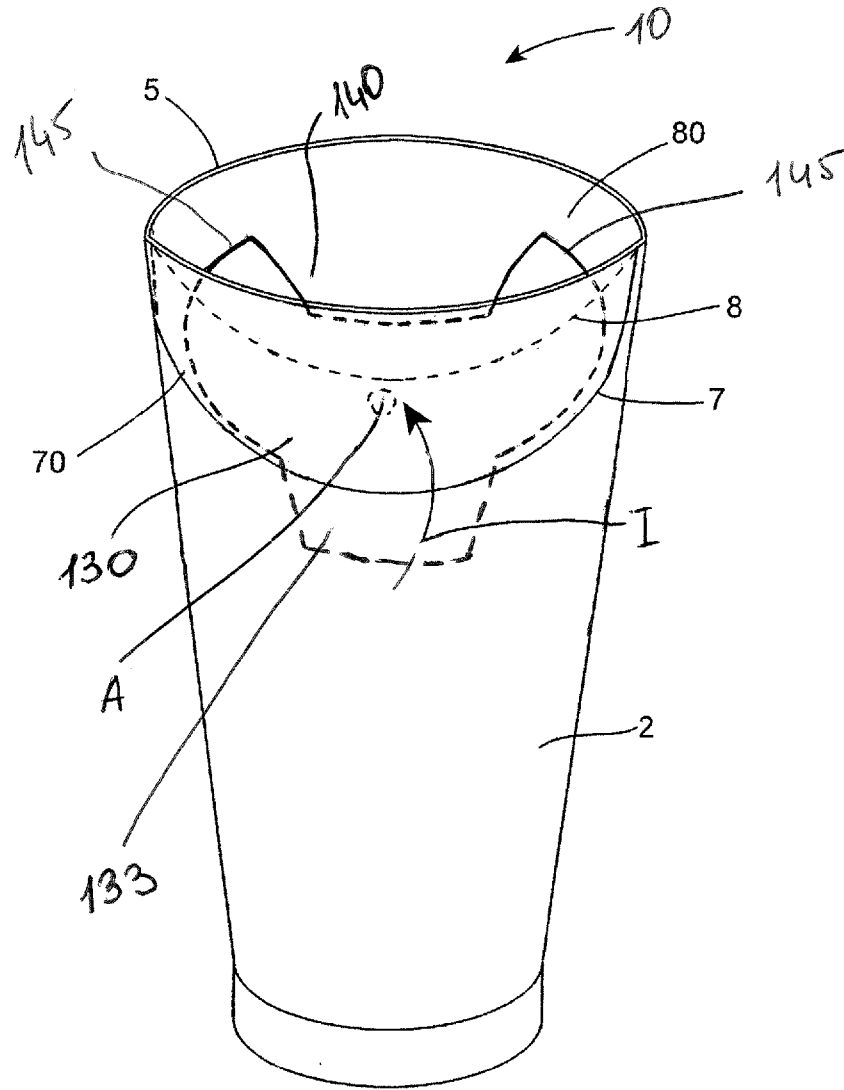


Fig. 8

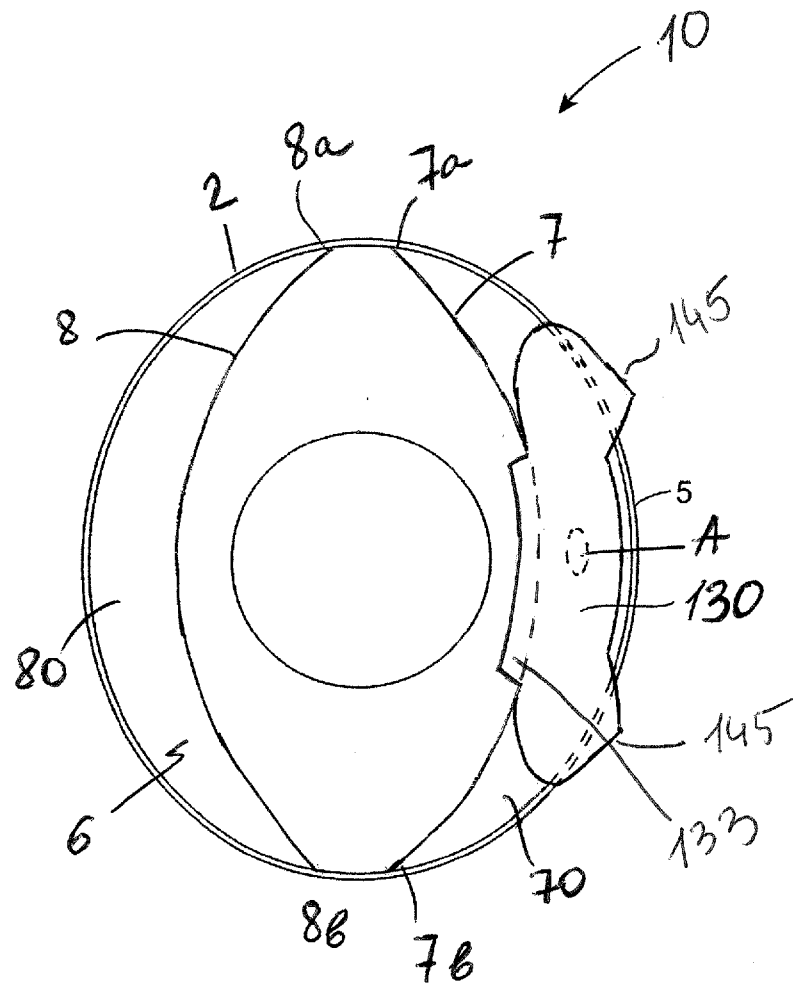


Fig. 9

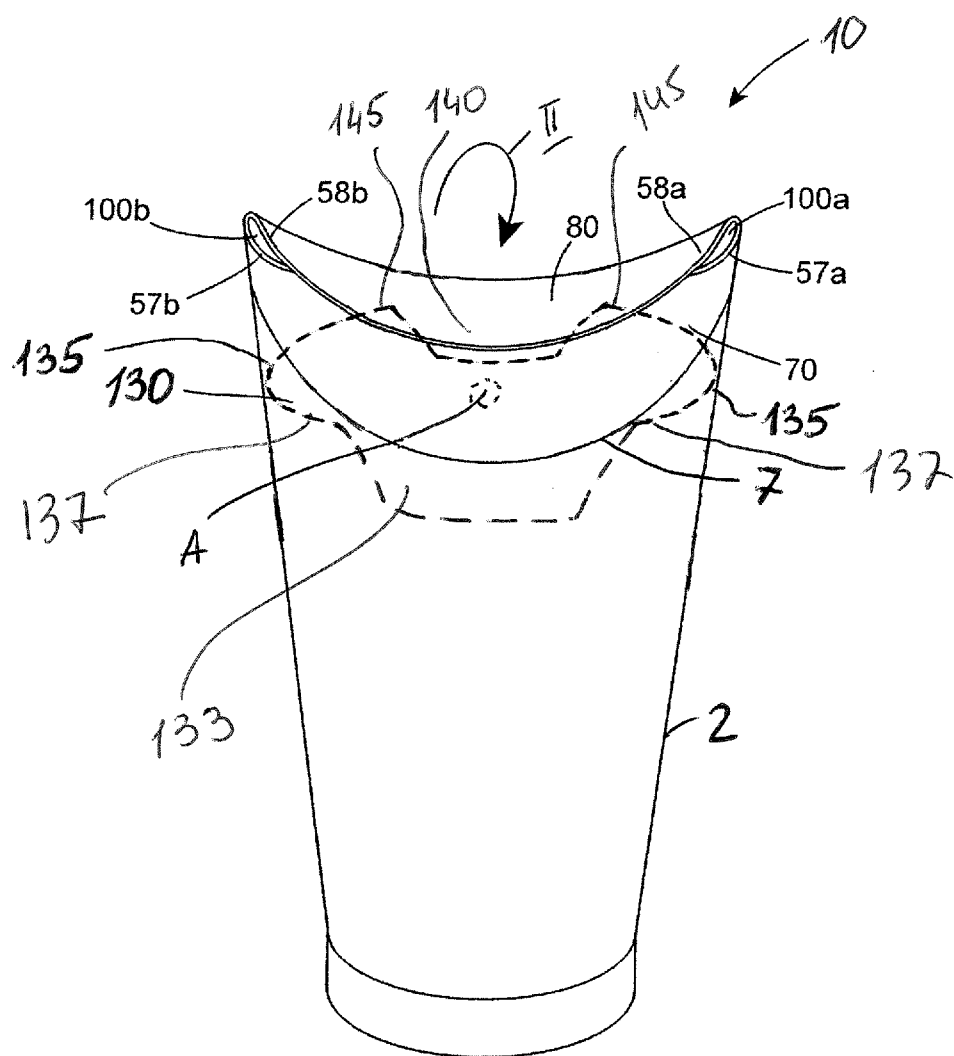


Fig. 10

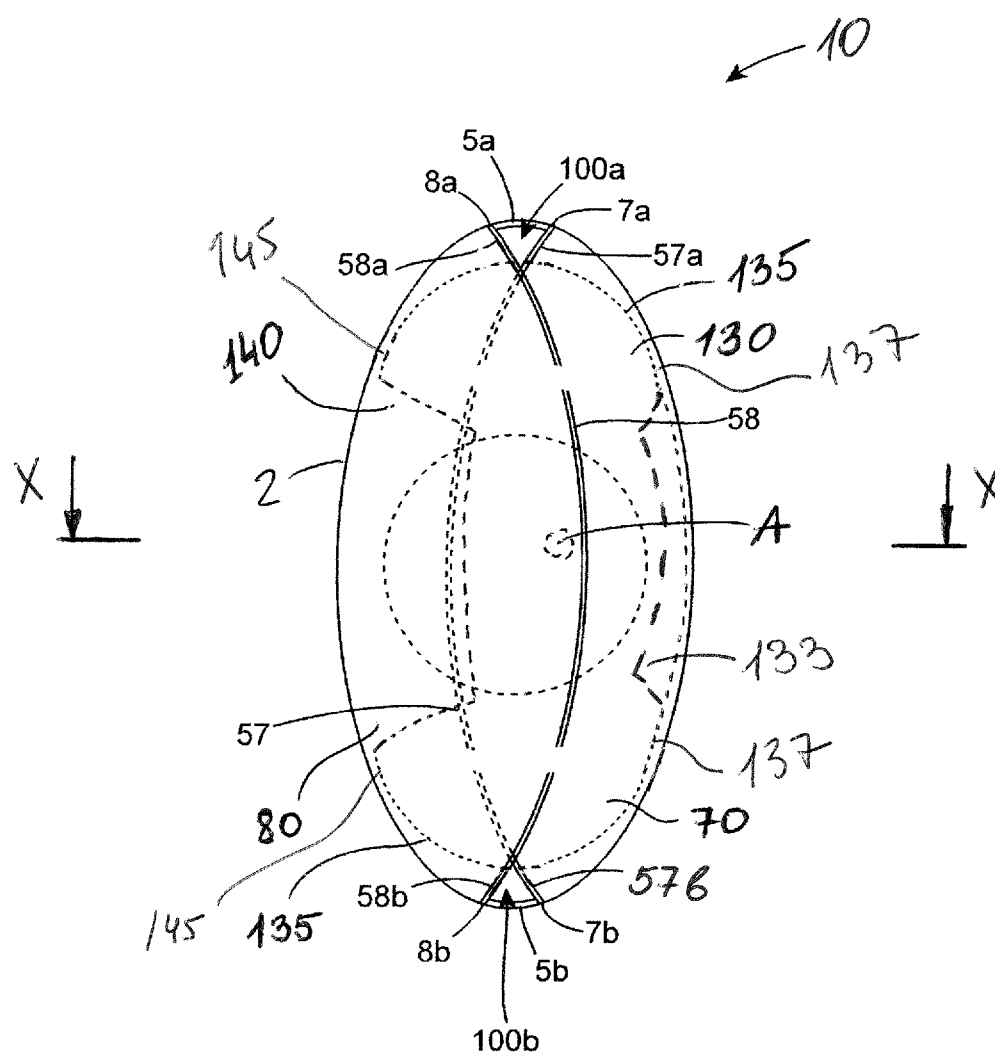


Fig. 11

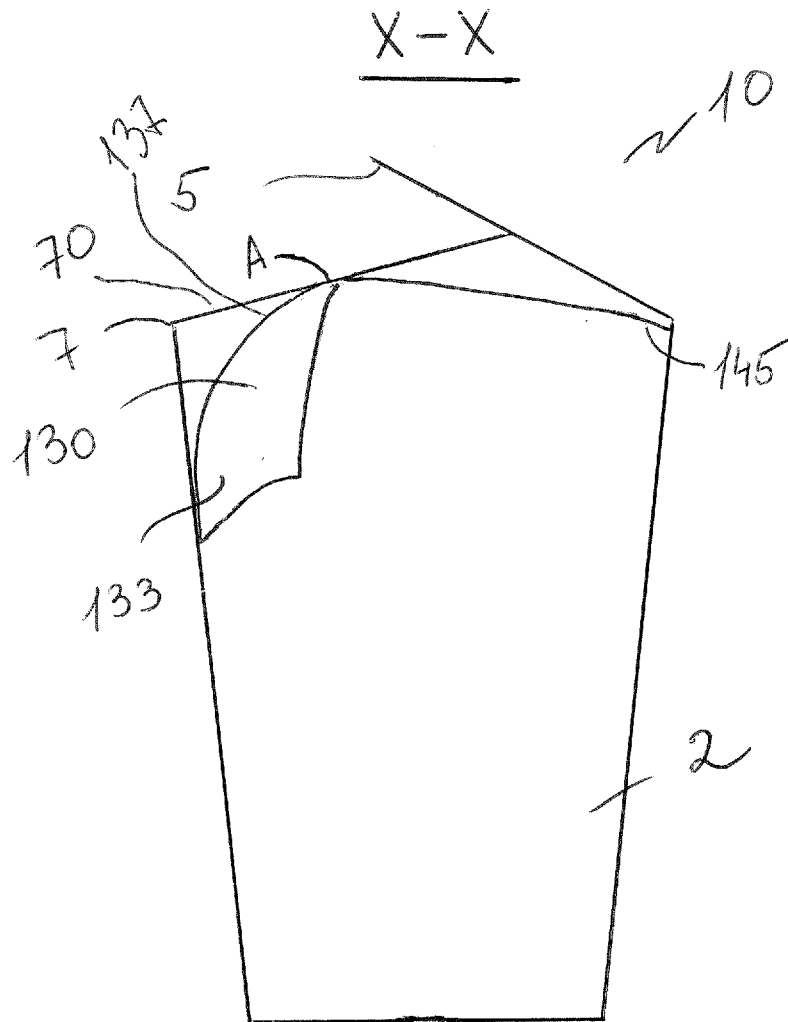


Fig. 12

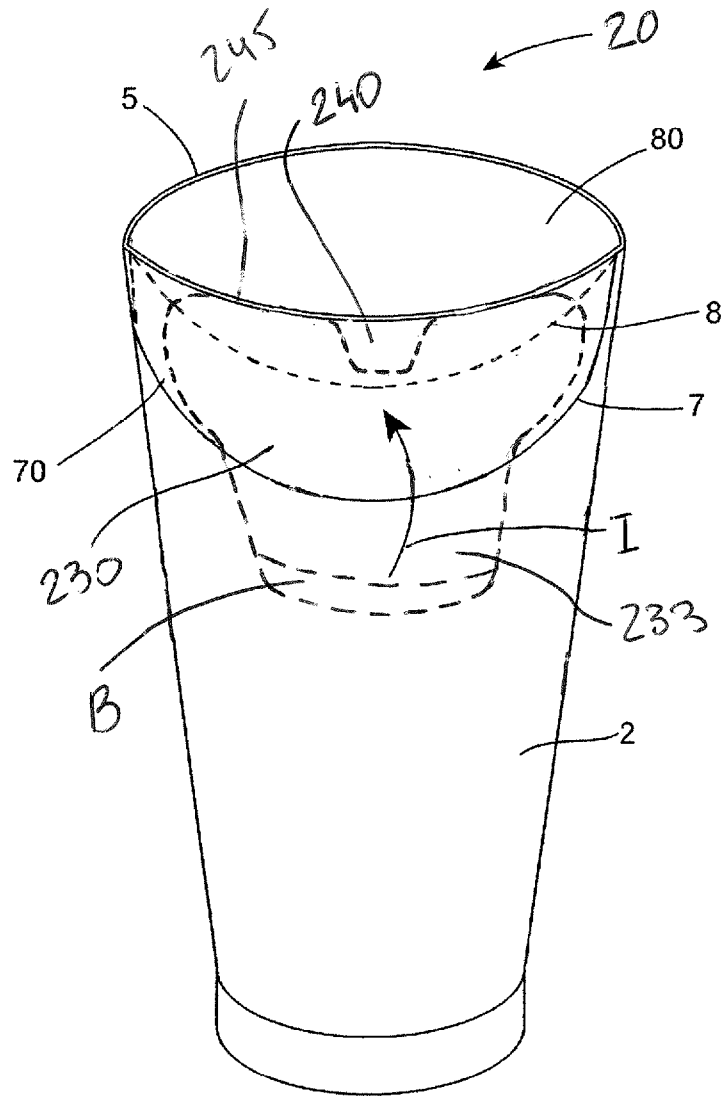


Fig. 13

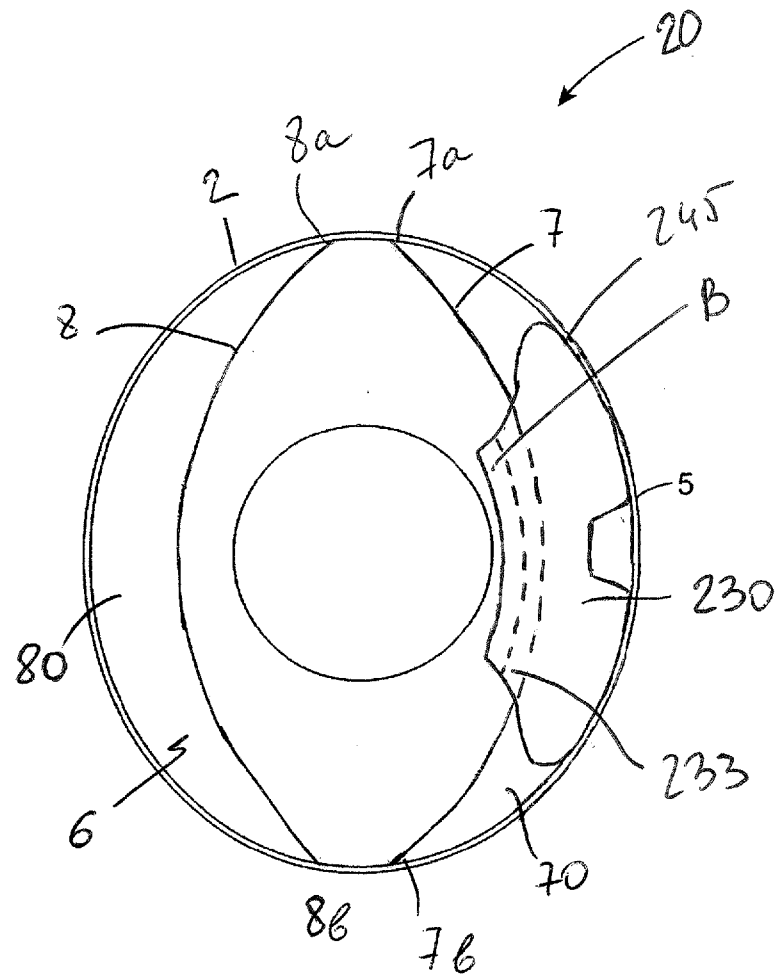


Fig. 14

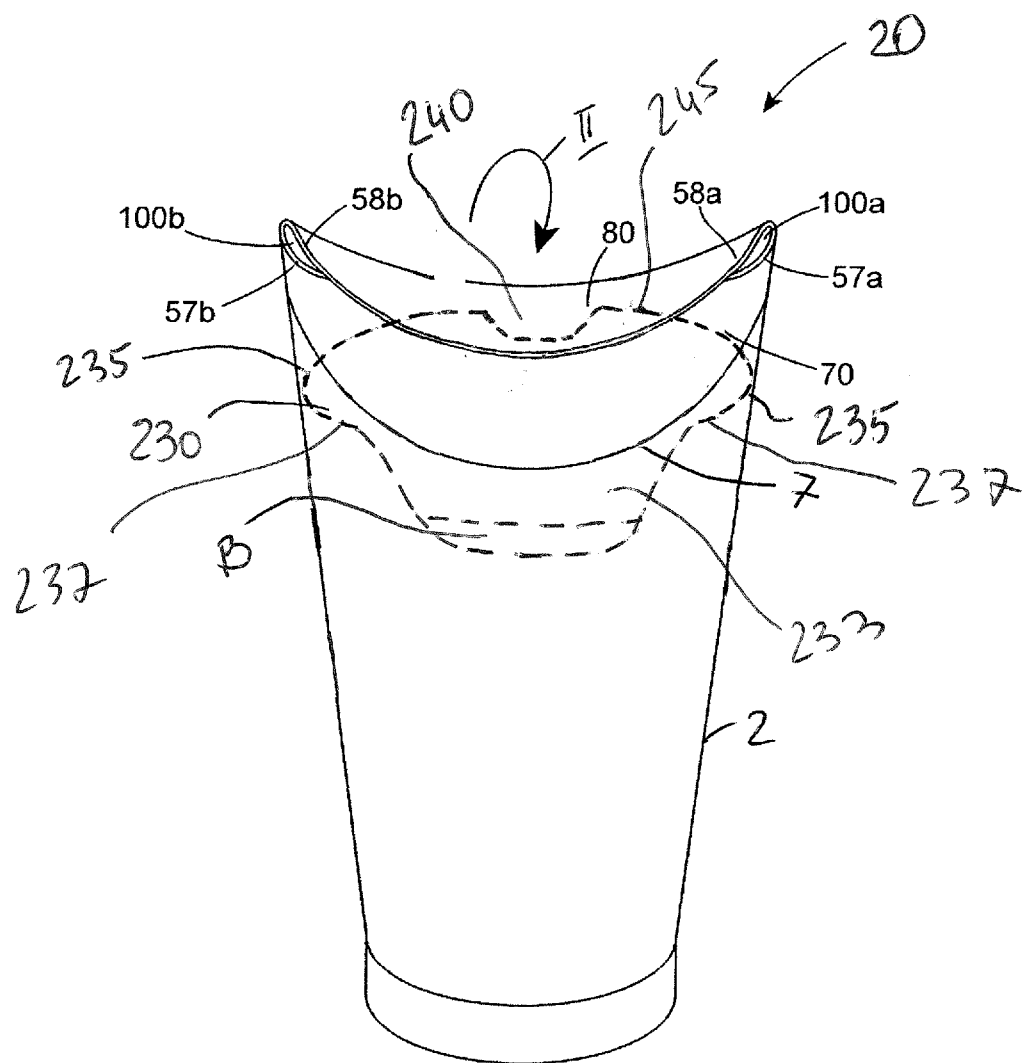


Fig. 15

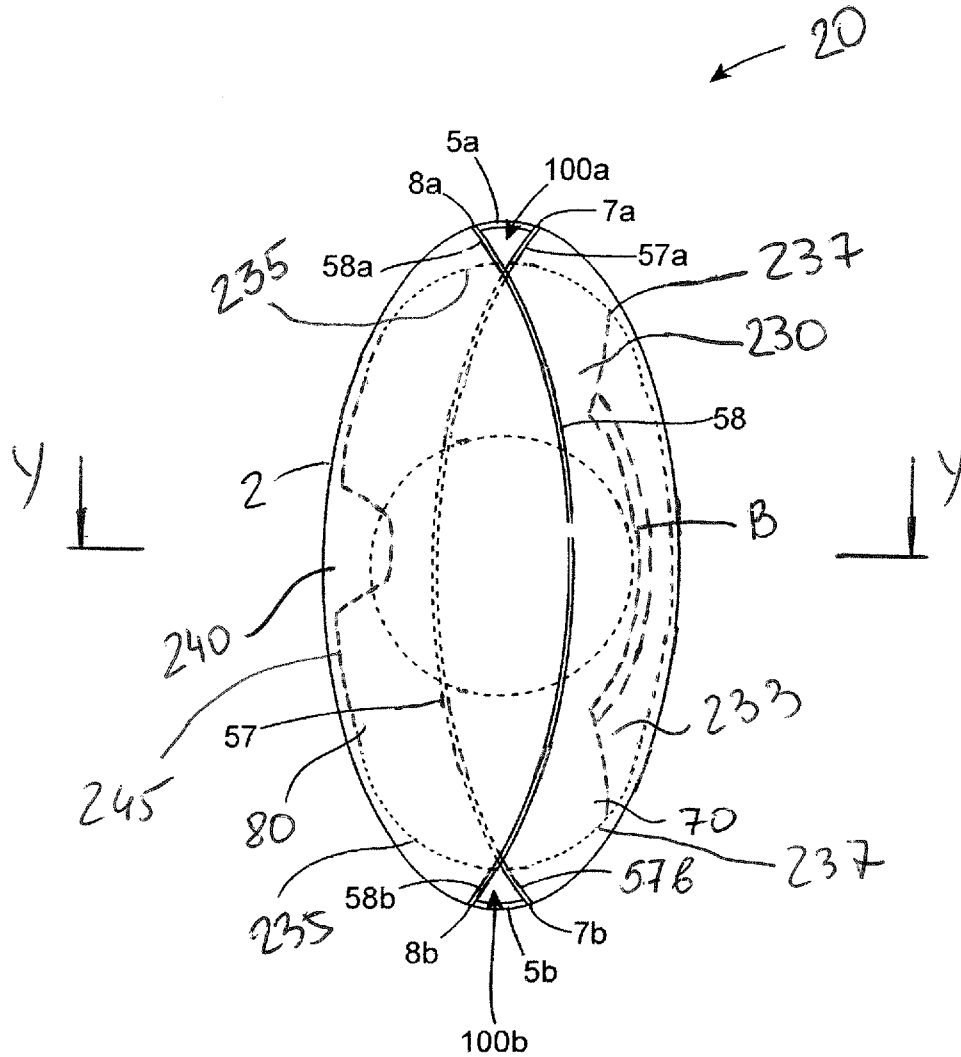


Fig. 16

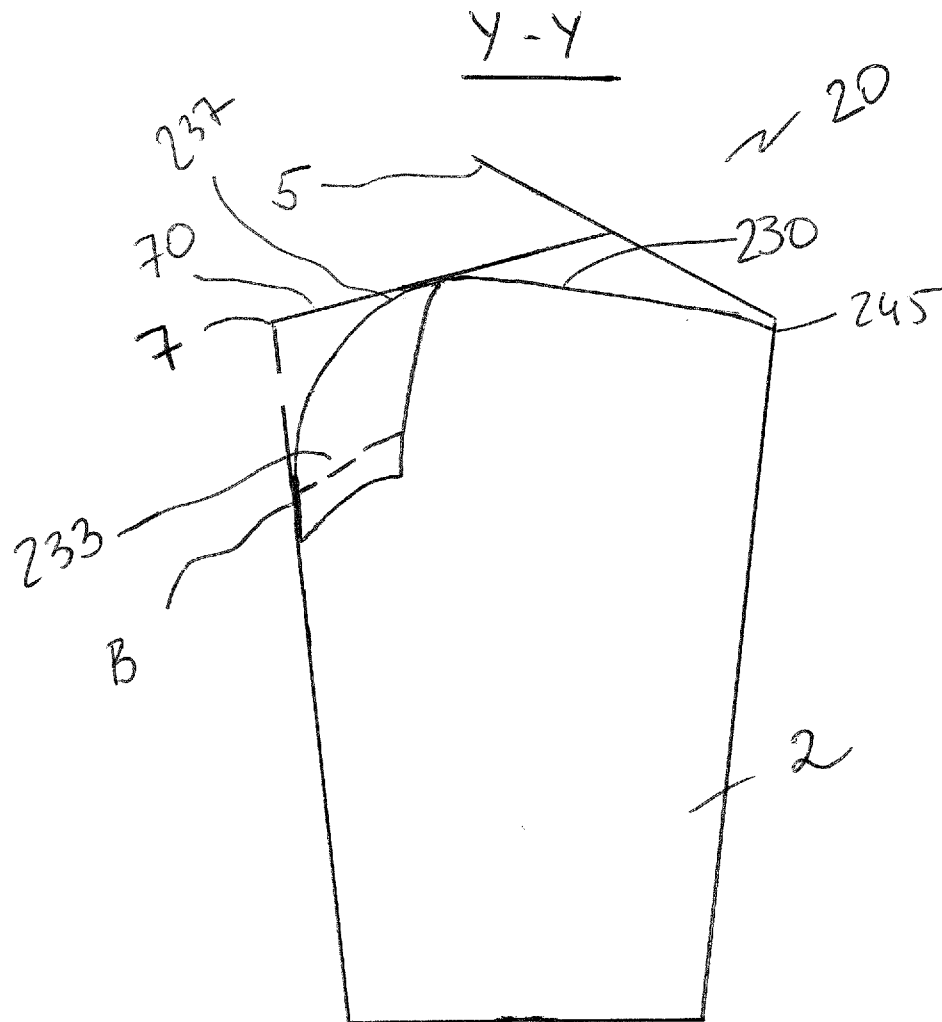


Fig. 17

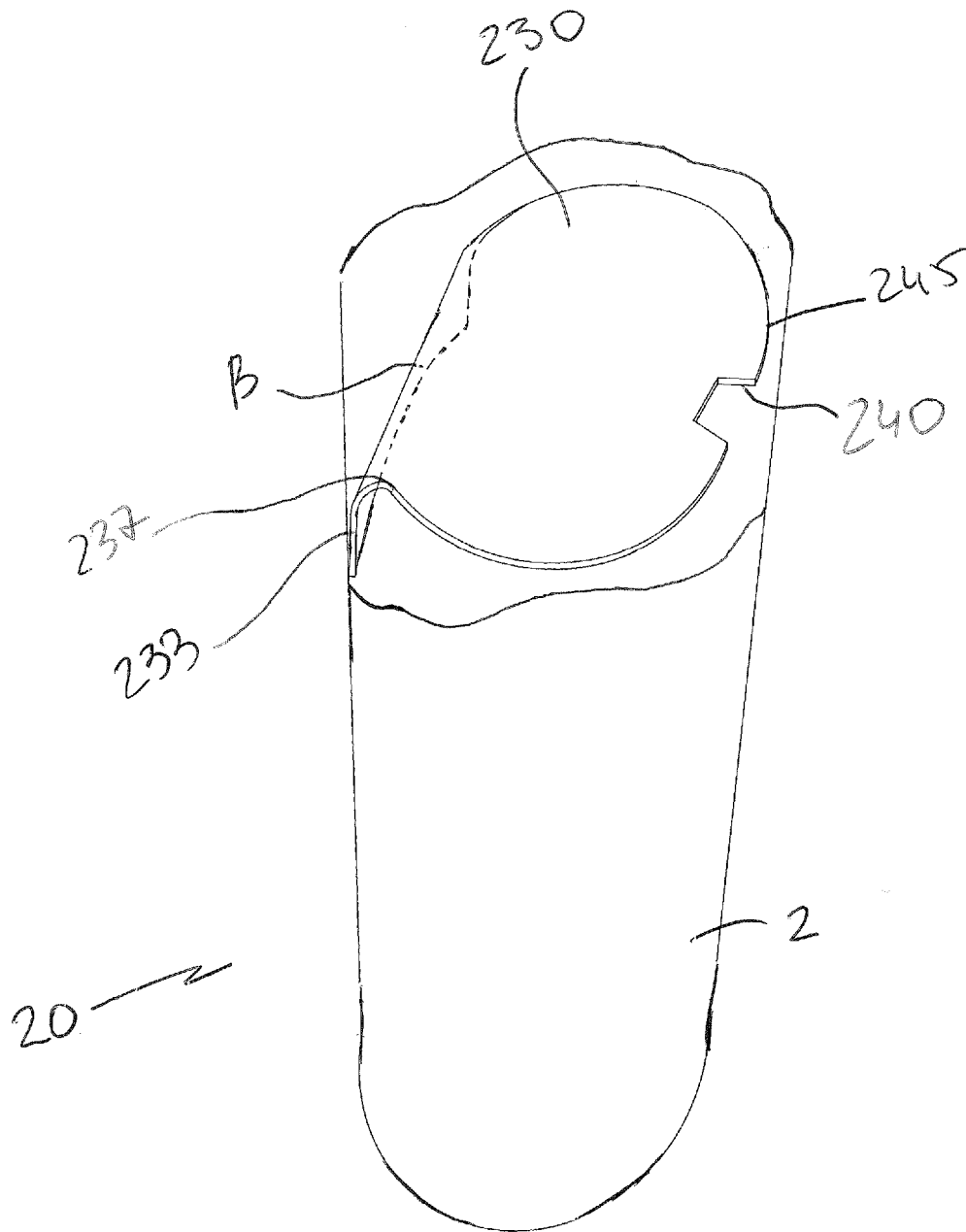


Fig. 18

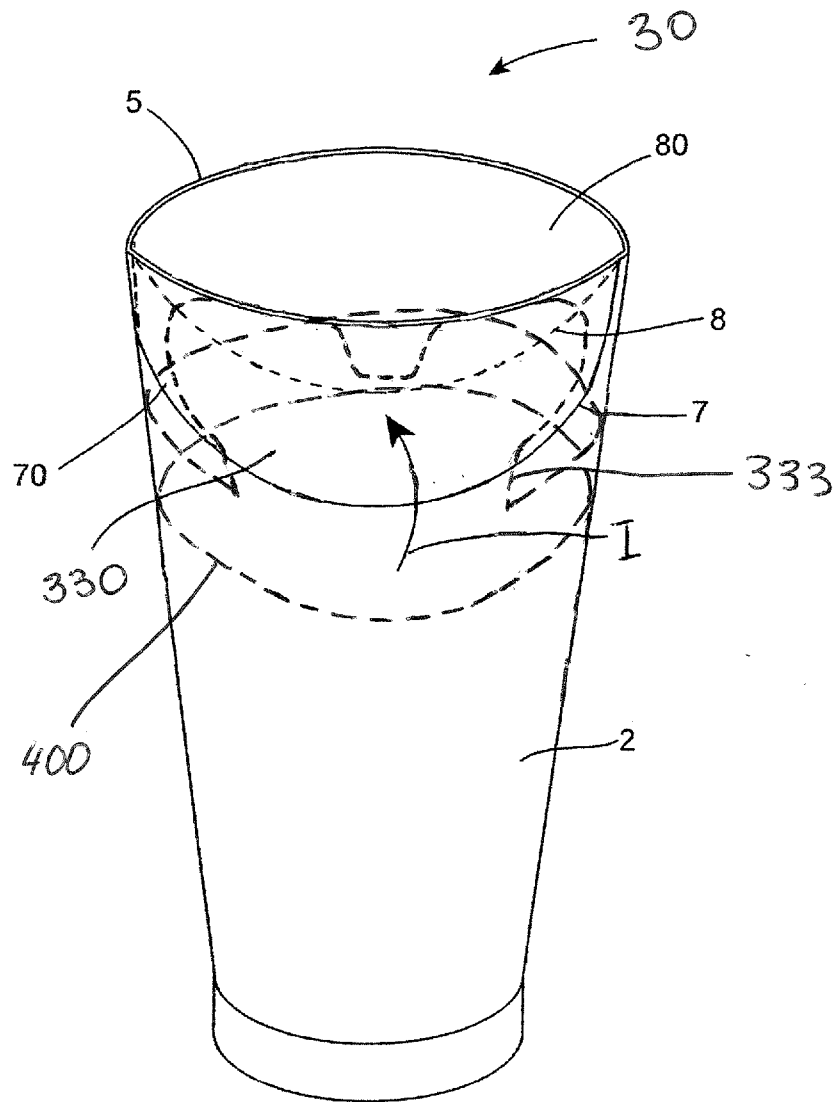


Fig. 19

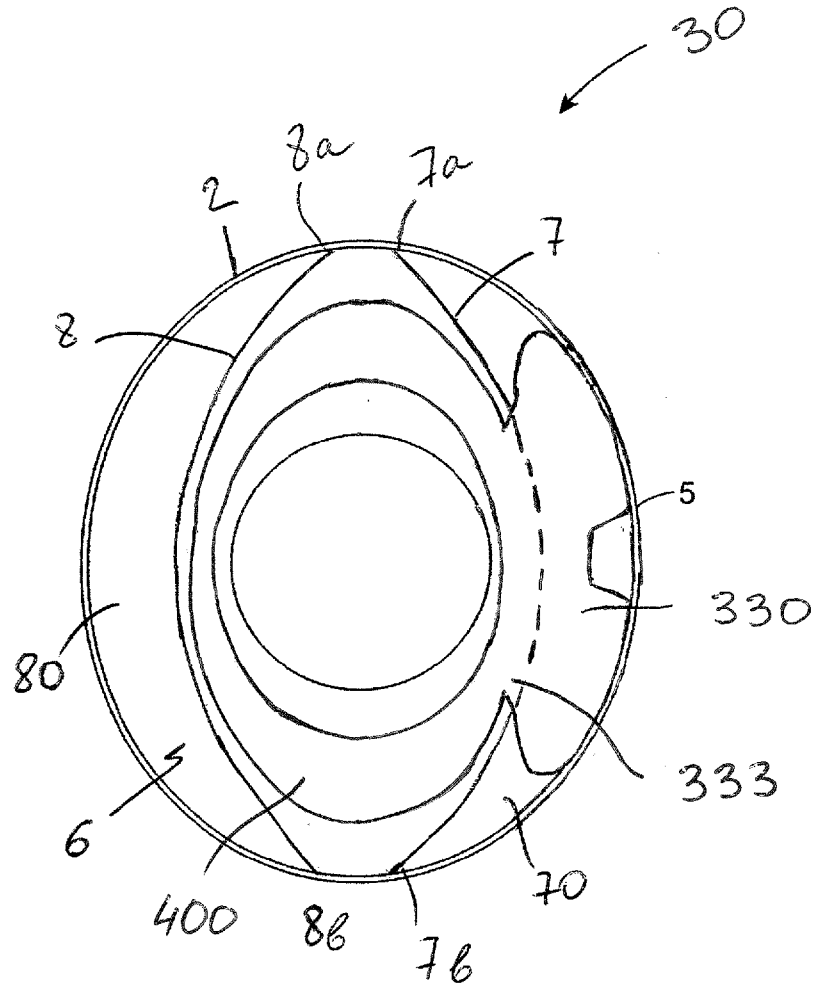


Fig. 20

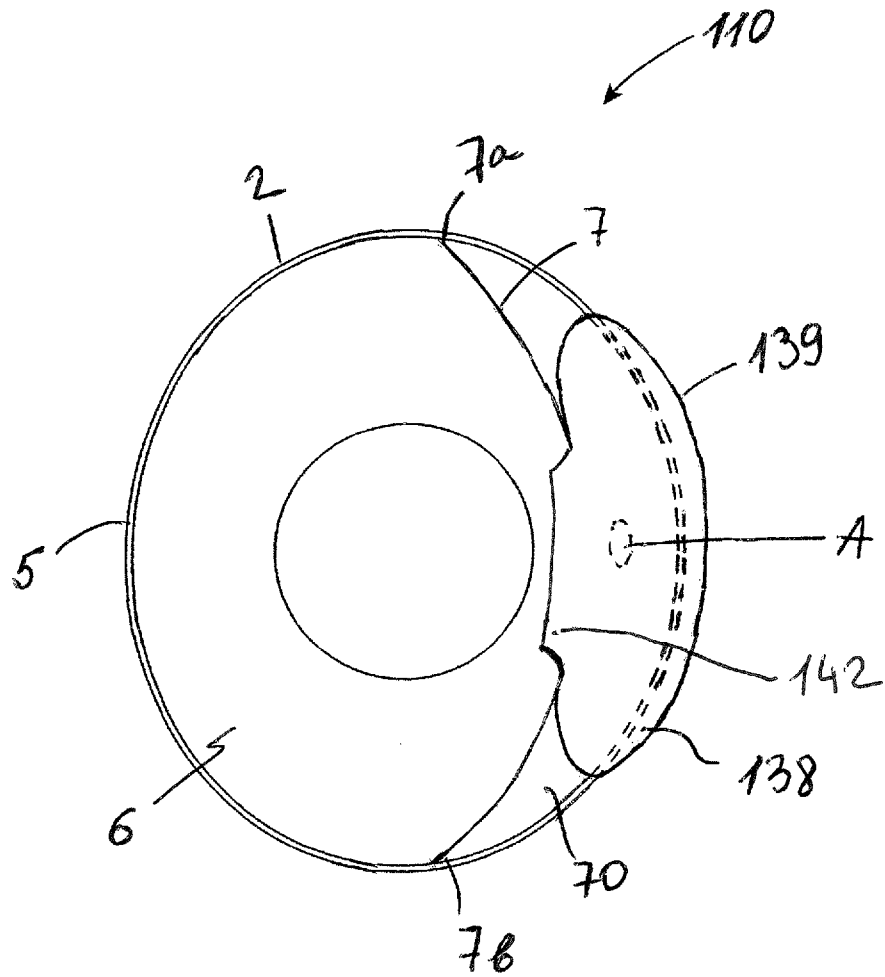


Fig. 21

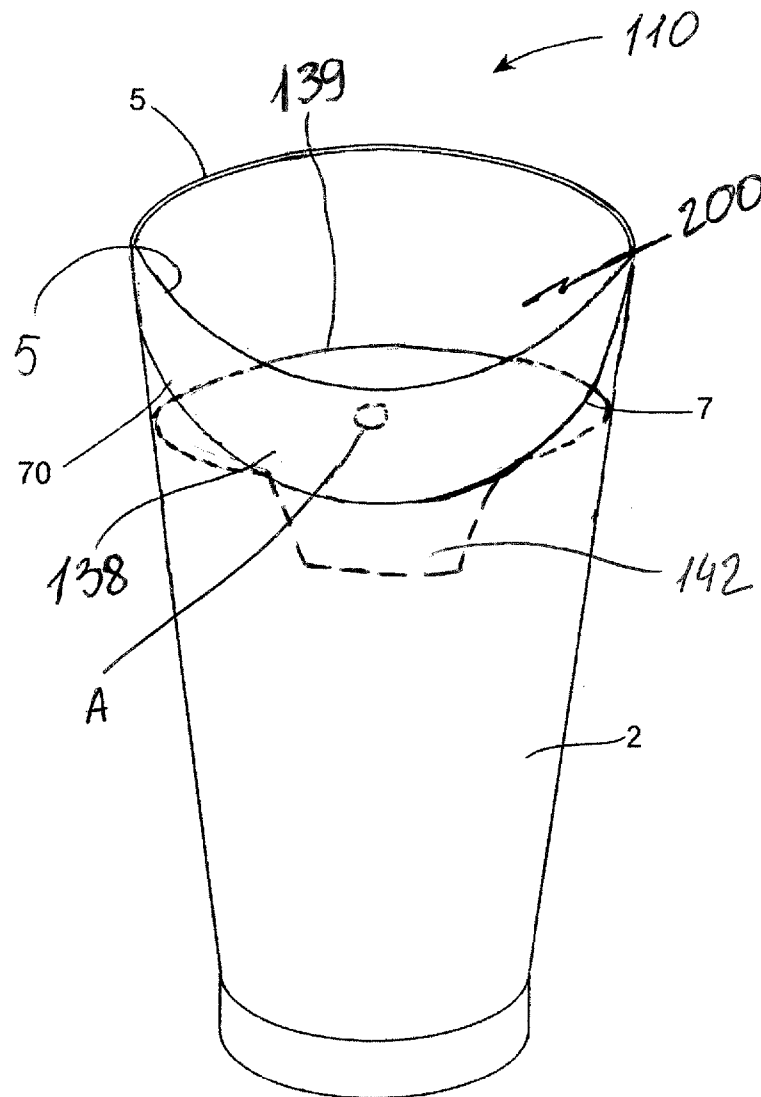


Fig. 22

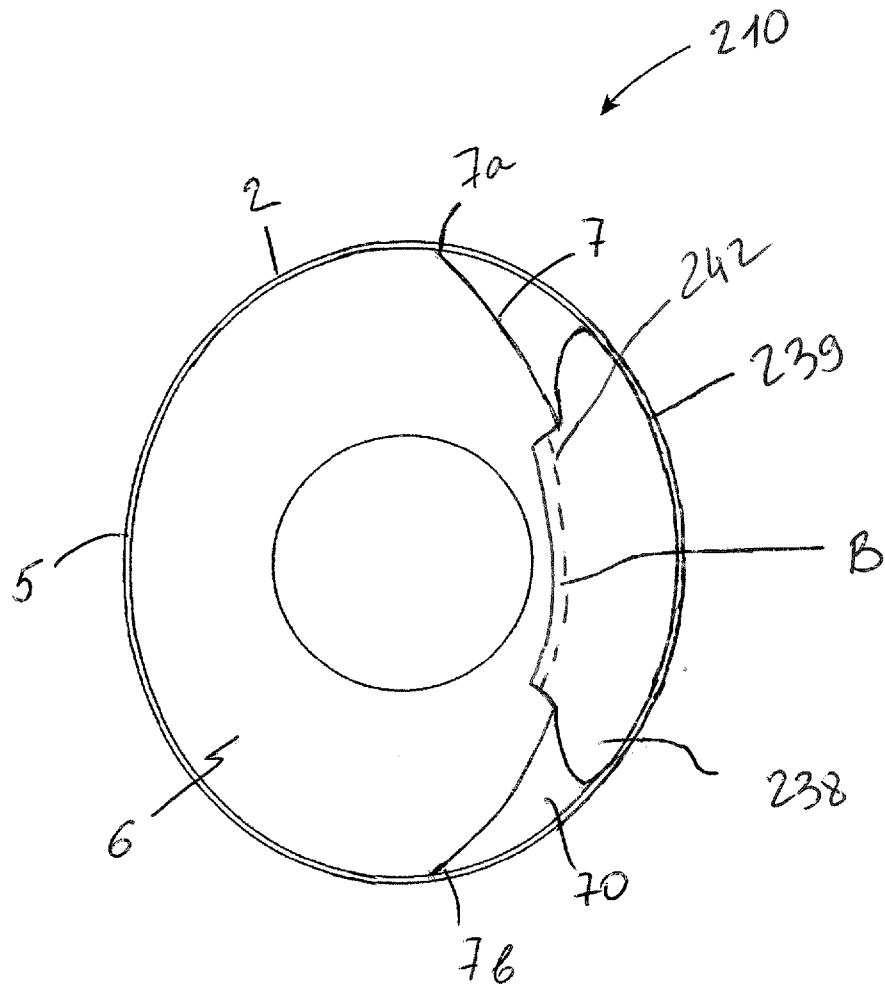


Fig. 23

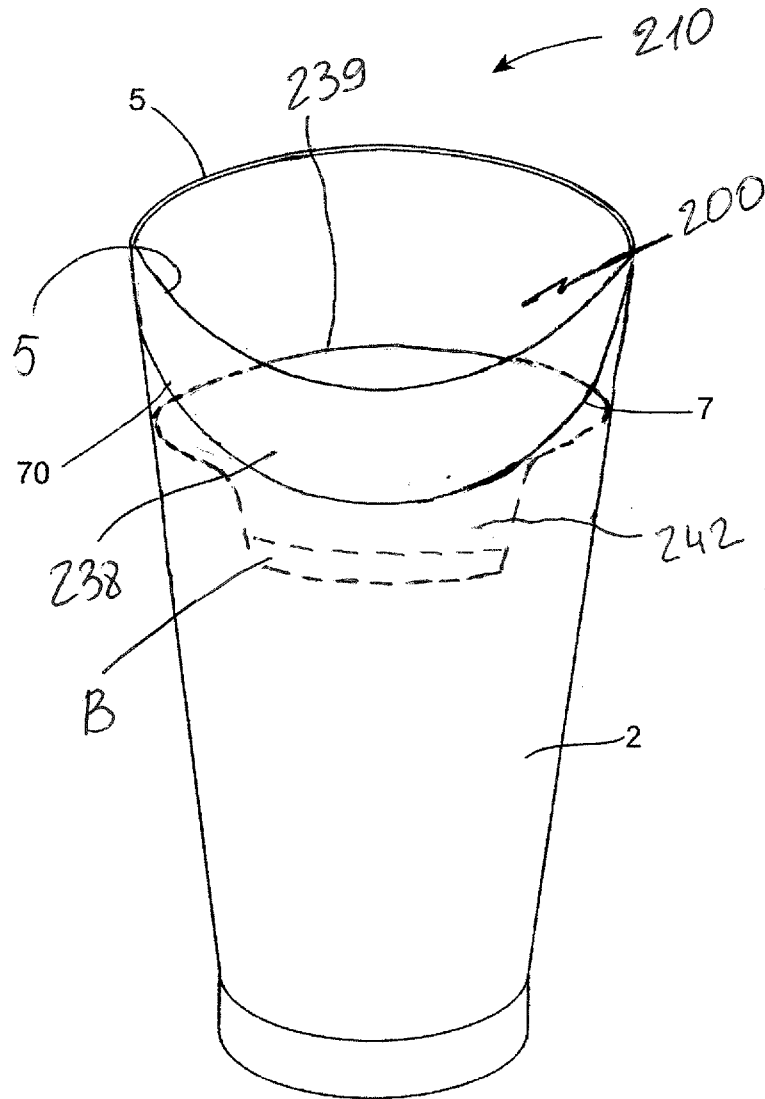


Fig. 24

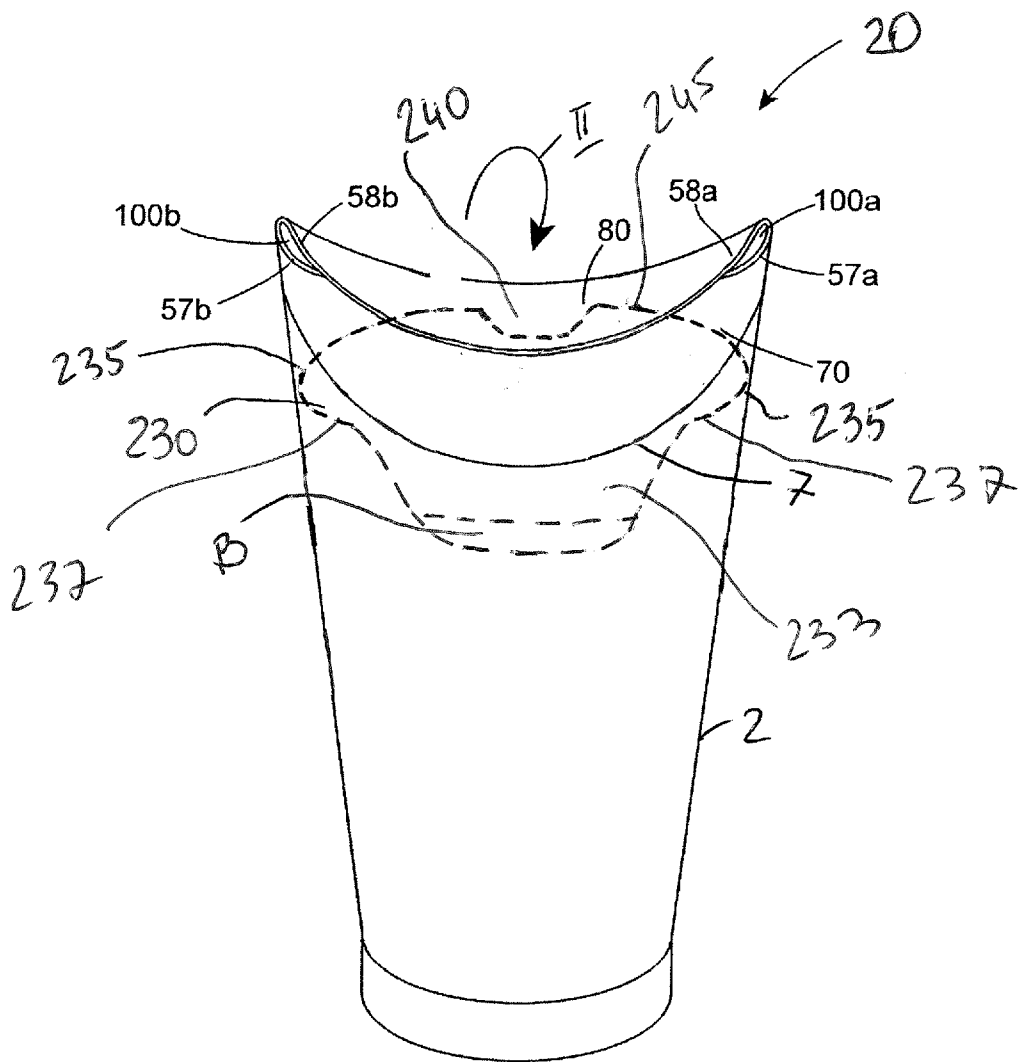


Fig. 15