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## (54) Cup with a valve for drinking juice

(57) A drinking vessel (20) with a cup (28) having a hollow inner body and an open end (60), a removable cap (22) for sealingly closing the open end (60), an outer surface with a spout and an air vent, and an inner surface with a tubular outlet passage and a tubular inlet passage. The cup (28) further contains a one-piece flow control valve (30) made of an elastomeric material. The flow control valve (30) contains an inlet valve and an outlet valve joined together by a connector bar. The outlet valve of parabolic configuration has a reinforcing ring and a partition wall, held in place by two jutting out walls that are part of the connector bar. The inlet valve has a tubular edge sitting on two wing-like projections holding a membrane with a slit. The tubular edge is integral with the connector bar and the two wing-like projections, with outlet and inlet valves fitting into the outlet and inlet passages, respectively.

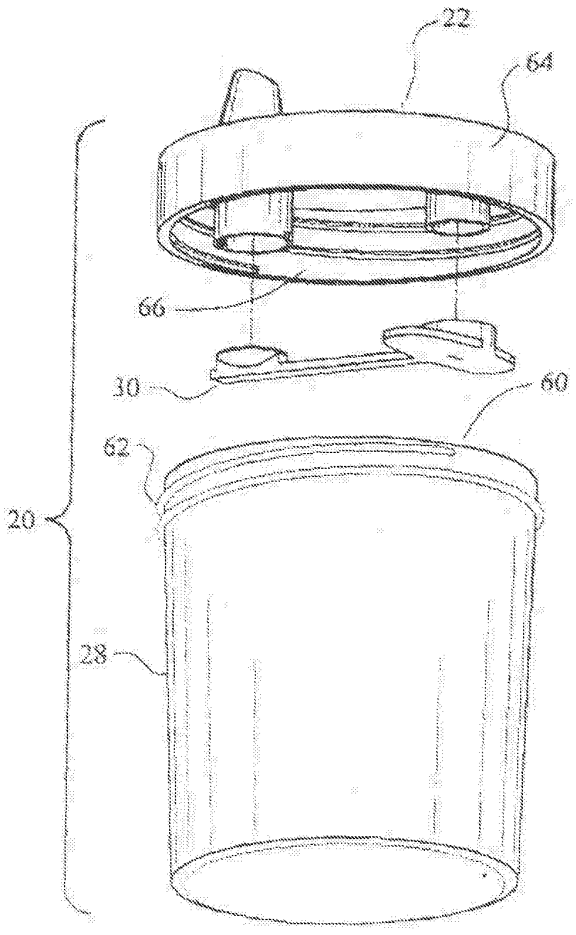



FIG. 2

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## Description

**[0001]** This invention relates to closed drinking vessels, preferably in the shape of a cup with a screw-on lid having a fluid dispensing valve that prevents fluids from flowing out unless properly used.

**[0002]** Drinking cups for young children have been in the market for many years, and are well known in the art. A variety of cups with valves are currently available commercially, providing a solution to the problem of children spilling their drink by dropping the cup, turning it upside down or shaking it. These valves work only by allowing the liquid to flow out when the cup is squeezed or when a person drinks by sucking from the spout. The cups may have one or two valves, one for allowing the liquids to flow out of the cup, and another one for allowing air to flow in. As liquid is sucked from the vessel creating a low-pressure condition within the vessel, this low-pressure condition draws external air through the second passageway to maintain a pressure equilibrium.

**[0003]** However, due to their design, the current valves don't work properly when used for drinking juices having pulp, blended fruit or other liquids with suspended particles in them. The suspended particles in the liquid affect the correct working of the valve by partially or totally blocking the mechanism, and therefore, not allowing the liquids to flow out.

**[0004]** Another disadvantage of the prior art is that they are difficult to clean or take a long time to do so. Valves such as those proposed in U.S. Pat. numbers 5,079,013, 6,250,503 and 6,321,931 contain enclosed parts or angles difficult to reach which make the cleaning process much more complicated. In addition the number of parts involved makes such valves difficult to manufacture, requiring a lot of manipulation to be assembled.

**[0005]** Several types of one-piece valves made of elastomeric materials, such as silicone rubber have been proposed, for example U.S. Pat. numbers 5,542,670, 6,050,445 and 6,102,245, these valves are much easier to clean and simpler to manufacture. The shortcoming of these valves is that they control the liquid flow by means of a small slit in the elastomeric membrane, therefore acting as a filter that is finally blocked by the small-suspended solids such as fruit pulp or pieces of blended fruit.

**[0006]** Accordingly, there is still a need in the art for a cup for drinking with a valve that will allow the user to drink liquids with suspended particles without the valve getting blocked that can be easily cleaned and is inexpensively manufactured.

**[0007]** It is an object of the present invention to provide a drinking vessel with an improved valve mechanism that will not get blocked when used for drinking juices containing pulp, blended fruit or other liquids with suspended particles.

**[0008]** It is a further object of the present invention to provide a valve mechanism that prevents liquids from flowing out of the cup unless the user sucks upon the spout, creating a lower external pressure than the pressure inside the drinking vessel.

**[0009]** It is a further object of the present invention to provide a fluid dispensing valve, a cup and a cap that are easy to clean and simple to assemble.

**[0010]** The present invention relates to a drinking container with a valve preferably in the shape of a cup having a hollow inner body for containing liquid with an open end, a cap which encloses the open end and a one piece valve made of an elastomeric material, preferably but not limited to silicone rubber.

**[0011]** The outer surface of the cap has a drinking spout and an air vent. The inner surface of the cap has a tubular outlet passage extending below the spout and a tubular inlet passage extending below the air vent.

**[0012]** The valve has two different means to attach itself to the tubular passages. The tubular passage below the spout is sealed by the valve and will only open and allow the liquid to flow out when a person sucks from the spout creating a low-pressure condition. Where the air vent is located, the valve has a small slit for drawing external air in order to maintain pressure equilibrium.

**[0013]** Other objects, features, advantages, and benefits of the present invention will become apparent from the following detailed specification.

- FIG.1 is a top perspective view of the drinking vessel;
- FIG.2 is an exploded perspective view of the drinking vessel showing the cup, cap and valve assembly;
- FIG.3 is a perspective view showing the inner part of the cap;
- FIG.4 is a top plan view of the drinking vessel cap;
- FIG.5 is a cross-sectional view of valve assembly taken along line 5-5 applied to FIG.4 in another embodiment of the cap;
- FIG.6 is a top perspective view of the valve; and
- FIG.7 is a bottom perspective view of the valve of FIG.6.

**[0014]** A preferred embodiment of the present invention is shown in FIG.1 and FIG.2, the drawings show a drinking vessel 20 comprising a cup 28, a cap 22 and a flow control valve 30.

**[0015]** The cup 28 has a hollow inner body for containing liquids with an open upper end 60 and an external thread 62 formed circumferentially therearound.

**[0016]** The cap 22 (see FIGS.3, 4 and 5) has an outer surface 36, and an inner surface 38. On the outer surface 36, the cap 22 has a spout 24 with an aperture 68 and an air vent 26. On the inner surface 38, the cap 22 has a tubular outlet passage 32 with two recesses 40, which are connected to the spout 24, and a tubular inlet passage 34, which is connected to the air vent 26.

**[0017]** The cap 22 has a cylindrical neck 64 with internal threads 66 formed circumferentially therearound. The internal thread 66 engages the external thread 62 for screwing the cap 22 on to the cups upper end 60, thereby sealingly closing the drinking vessel, except for the ap-

erture 68 on the spout 24 and the air vent 26.

**[0018]** The flow control valve 30 (see FIGS.5 to 7) is made of a single piece of elastomeric material, preferably silicone rubber, but other elastomers such as natural rubber or PVC (Polyvinyl Chloride) are also preferred. An outlet valve 42 and an inlet valve 44, interconnected by a connector bar 46, form the flow control valve 30.

**[0019]** The outlet valve 42 has a paraboloid configuration comprising a reinforcing ring 69 with a narrow partition wall 71 transversal to the axis of the connector bar 46. The outlet valve 42 being held in place by two jutting out walls 56 that are part of the connector bar 46. The two jutting out walls 56 provide more rigidity to the outlet valve 42, but allows for two flexible side parts 48, which act as flexible membranes. The reinforcing ring 69 and the partition wall 71 are provided to avoid deformation of the two flexible side parts 48; therefore allowing for a longer period of use.

**[0020]** The inlet valve 44 has a tubular edge 50 sitting on two wing-like projections 70 holding the membrane 54 with a slit 52 in the middle. The tubular edge 50 is integral with the connector bar 46 and the two wing-like projections 70.

**[0021]** These wing-like projections 70 are provided for safety reasons (i.e., for an infant not to swallow it) and not for functional ones.

**[0022]** The outlet valve 42 fits into the tubular outlet passage 32 that is connected to the spout 24, and is held in place by pressure as the connector bar 46 fits into the pair of recesses 40.

**[0023]** The inlet valve 44 fits by friction around the tubular inlet passage 34 by means of the tubular edge 50.

**[0024]** Once the fluid control valve 30 is attached to the tubular outlet passage 32 and the tubular inlet passage 34, as previously described, the liquid inside the cup 28 will only flow out if a person inverts the cups 28 position, therefore moving the liquid towards the cap, and sucks at the spout 24 creating a lower external pressure than the pressure inside the drinking vessel 20. This difference in pressure bends the two flexible side parts 48 of the outlet valve 42 towards the spout 24, therefore allowing the liquid to flow through the tubular outlet passage 32 and finally flow out of the drinking vessel 20 though the aperture 68. As the liquid flows out, it creates a low-pressure condition in the drinking vessel 20, this difference in pressure forces air in through the slit 52 of the inlet valve 44.

**[0025]** When the person stops sucking at the spout 24, the two flexible side parts 48 return to their original position stopping the liquid from flowing out. Due to the type of material used in the manufacture of the flow control valve 30, as soon as the suction force that keeps the flexible side parts 48 opened or bent ceases, the pressure of the two flexible sides 48 contacting the inner wall of the outlet passage 32 closes the outlet passage 32. The slit 52 also closes, and acts as a non-return valve, so that the liquid inside the vessel 20 is thereby prevented from flowing out through the air vent 26.

**[0026]** While preferred embodiments of the present invention have been illustrated and described, other embodiments could be manufactured with the outlet valve and outlet passage having an oval shape; the outlet valve having one flexible side acting as a membrane, etc. Thus, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the scope of the invention as defined in the appended claims.

## Claims

1. A drinking vessel comprising:

   a cup having a hollow inner body and an open end;
   a removable cap for sealingly closing said open end, comprising an outer surface with a spout and an air vent, and an inner surface with a tubular outlet passage and a tubular inlet passage;
   a one piece flow control valve, made of an elastomeric material, comprising an inlet valve and an outlet valve joined together by a connector bar, said outlet valve of parabolic configuration having a reinforcing ring and a partition wall, held in place by two jutting out walls that are part of said connector bar, said inlet valve having a tubular edge sitting on two wing-like projections holding a membrane with a slit, said tubular edge being integral with the connector bar and the two wing-like projections, said outlet and inlet valves fitting into said outlet and inlet passages, respectively.

2. The drinking vessel of claim 1, wherein said tubular outlet passage protrudes from under said spout and having a pair of recesses at its open end.

3. The drinking vessel of claim 1 or 2, wherein said outlet valve fits by pressure into the tubular outlet passage as the connector bar fits into said pair of recesses, and said inlet valve fits by friction around the tubular inlet passage by means of the tubular edge.

4. The drinking vessel of any of the previous claims wherein said outlet valve comprises a pair of flexible side parts that act as flexible membranes.

5. The drinking vessel of any of the previous claims wherein said slit of said membrane of the inlet valve being in the middle.

6. The drinking vessel of any of the previous claims wherein said partition wall of the outlet valve is transversal to the axis of said connector bar.

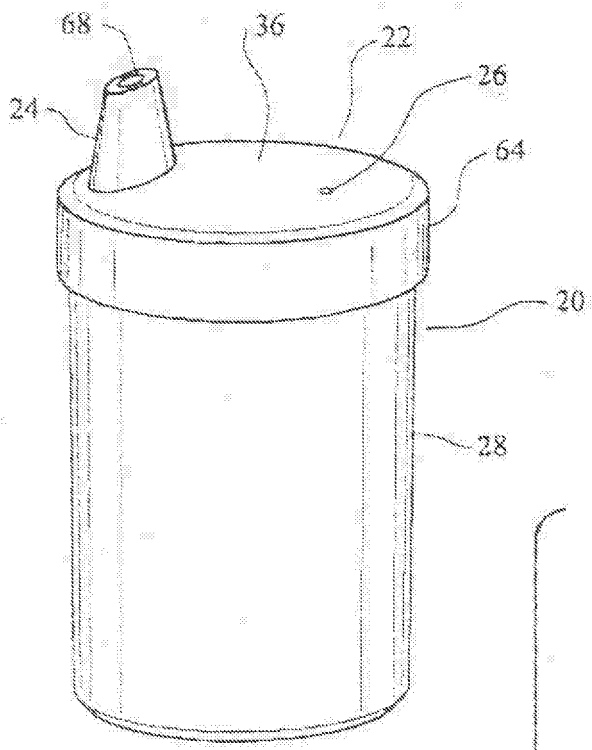



FIG. 1

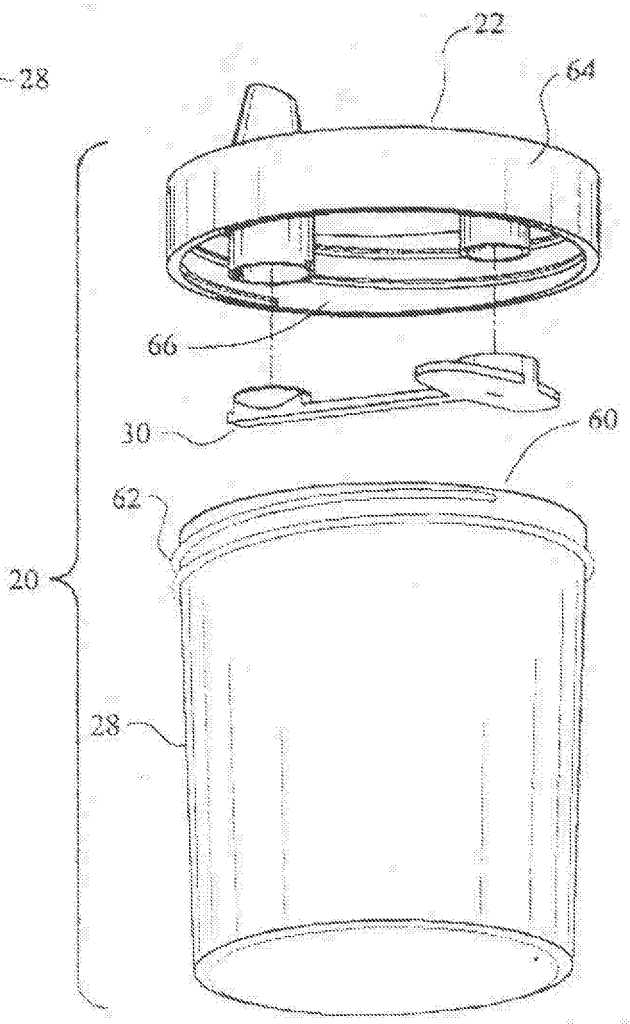



FIG. 2

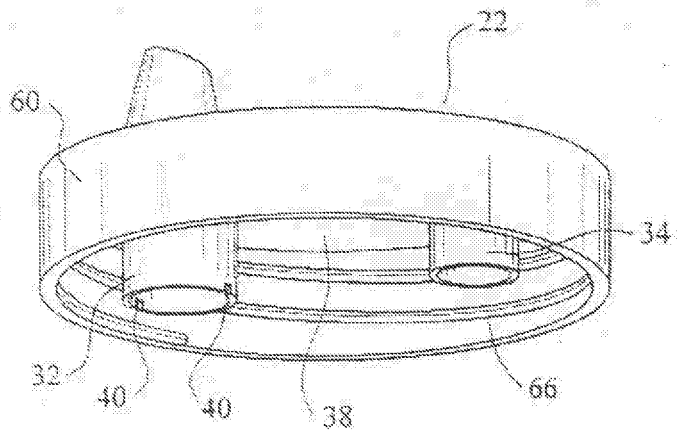



FIG. 3

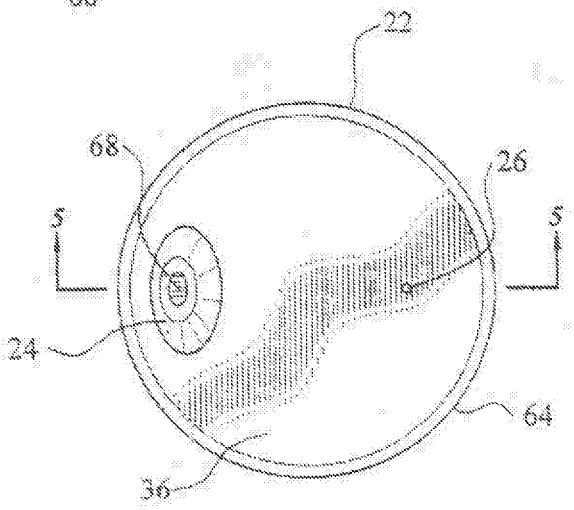



FIG. 4

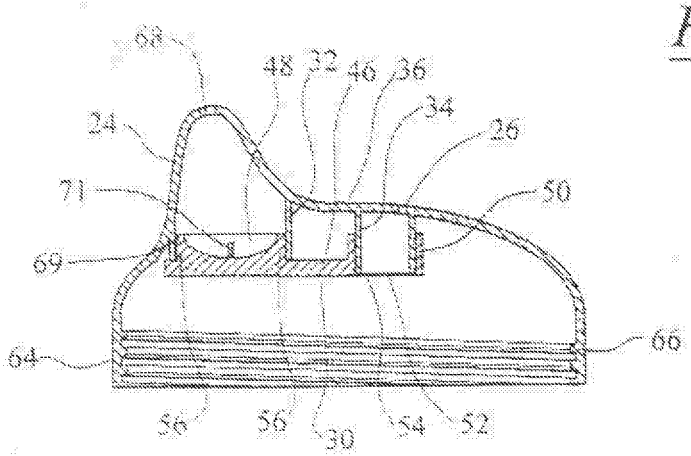



FIG. 5

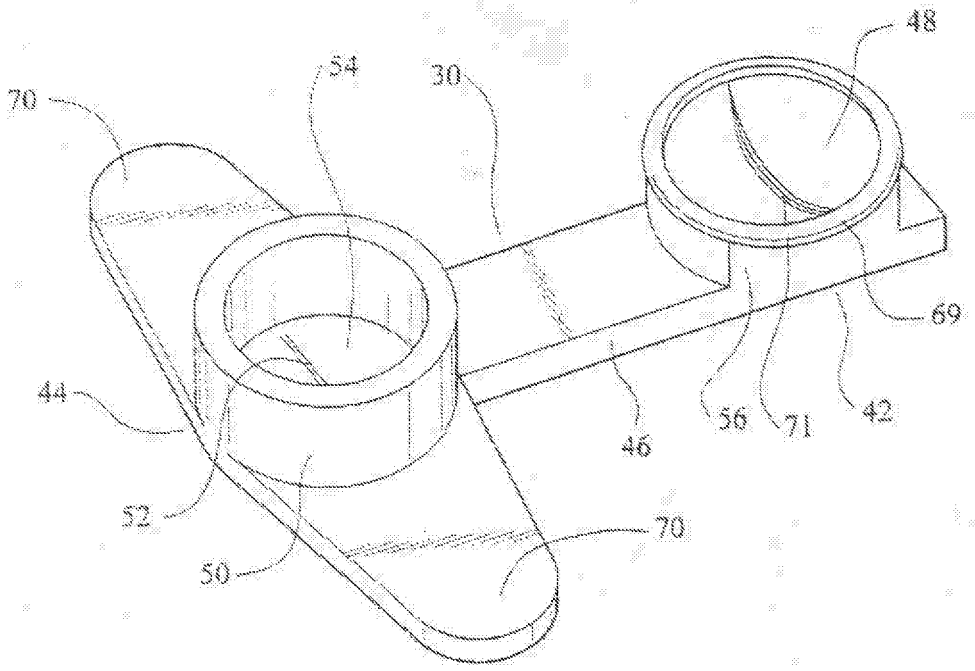



FIG. 6

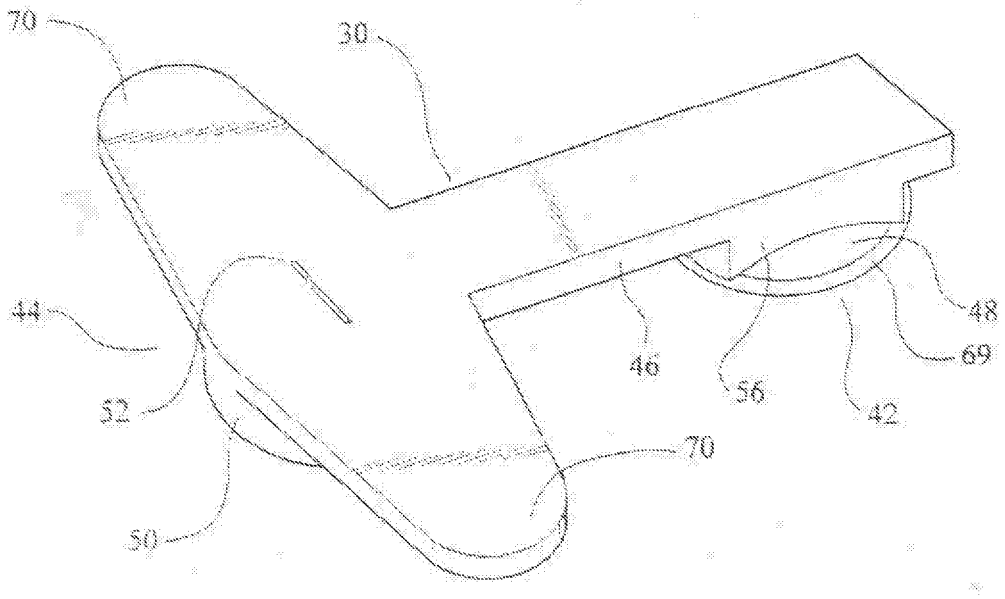



FIG. 7

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Application Number
EP 05 10 7240

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The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| The Hague | 10 November 2005 | Vistisen, L |

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