Abstract Title: Non-spill drink container

The invention employs a cup (1) having a spill protection cover (2), defining an outlet (2A) and a venting means (2B). Both outlet (2A) and venting means (2B) are of a size and positioned such that, when the cup (1) is tipped to a drinking position, liquid can flow out freely but will be prevented by surface tension when the cup is tipped beyond a drinking position. The cover (2) is received on the lower edge of a rim (3) which conceals the cover (2) and enables the user to drink from the cup (1) in a conventional manner. The venting means may be provided by on or more holes which may be flared.
NON-SPILL DRINK CONTAINER

This invention relates to a non-spill drinks container for use in circumstances where a normal open-ended receptacle would result in a risk of spillage. Such risk of spillage could arise because of the circumstances of use, e.g. if the user is engaged in a physical activity or is located in a moving vehicle; or it could be because the user, being very young, old or handicapped, cannot be relied upon to hold the container steadily during use.

There have been many proposals in the past for the design of non-spill containers. Some, for example as described in patent specification US 5284261, rely on the application of suction from the user’s mouth to draw the liquid through a hole that is too small to allow spillage when not in use. Others use spring loaded valves, operated by suction, to prevent spillage e.g. as described in patent specification US5079013. Others have valves operated by hand pressure e.g. as described in US3739938. A variation of this latter technique is described in patent specifications US3727808 and US3730399 where manual deformation of the container, temporarily creates an opening to allow pouring of the liquid.

With these known proposals, the drinking process is considerably different to that employed when drinking normally; and this difference may be an inconvenience or an embarrassment. Also, the components in these known devices are relatively complex and therefore difficult to clean.

This invention provides a drink container comprising an outlet positioned to allow liquid to pour out when the container is tipped from an upright position to a drinking position, and venting means for allowing air to enter the container during such pouring, characterised in that:

the venting means is located at a position so that it becomes covered with liquid when the container is tipped beyond the drinking position;
and is of a size so that the liquid is prevented by surface tension from escaping through it; and

the outlet is of a size that liquid is prevented from escaping through it when the venting means is covered but is large enough that liquid is free to escape when the venting means is open.

Thus, by employing the invention, it is possible to drink normally from a container by tipping it in a controlled fashion to its drinking position, but if the container is tipped excessively, or dropped when full of liquid, the vent will become closed by the action of the liquid, thereby preventing spillage from the outlet.

The outlet can be just a simple hole or slot sufficiently large to allow the liquid to pour through it without the application of suction from the user's lips as is needed in many prior devices. The venting means similarly can be a small hole or a number of holes. In one preferred design the venting means comprises a hole flared towards the outside of the container so that any liquid, held by surface tension in the hole, can easily be removed by blowing on the hole.

The outlet can be just a simple hole or slot sufficiently large to allow the liquid to pour through it without the application of suction from the user's lips as is needed in many prior devices. However, the inventor has realised that, because the surface tension effect, that prevents liquid from flowing through the outlet when the vent is covered, is not dependent upon the number of holes, but rather the size of the hole, it is possible to replace the single outlet hole or slot with a group of holes thereby achieving improved flow rates of liquid out of the container together with reducing the tendency for spillage. It is thought that this idea has independent inventive merit and thus there is provided a drink container comprising an outlet positioned to allow liquid to pour out when the container is tipped from an upright position to a drinking position, and venting means for allowing air to enter the container during such pouring, characterised in that the venting means is located at a position so that it becomes covered with liquid when the container is tipped beyond the drinking
position; and is of a size so that the liquid is prevented by surface tension from escaping through it and that the outlet comprises a plurality of holes of a size so that, when the venting means is covered, liquid is prevented by surface tension from escaping through the outlet.

5 It has been particularly effective to form the outlet and the venting means in a cover member held between a main body of the container and a separate rim attached to the main body eg by a short screw thread. In this way it becomes possible to dispense a small quantity of liquid from the outlet into a region defined by the rim member, from which it can then be sipped by the user. An added advantage of this arrangement is that the parts that define the outlet and the vent can be hidden from view so that the overall appearance of the container can be made similar to a conventional drinking vessel and of attractive distinctive styling.

The technique of forming the outlet and vent in a separate cover member like this is considered to have independent inventive merit and, accordingly, a third aspect of this invention provides a drink container comprising a main body for holding the drink and an anti-spill cover member defining a restricted opening to allow the liquid to pour out; characterised by a rim designed to attach onto the main body with the cover member being held between the main body and the rim; the rim defining a repository for a small amount of the liquid after being poured from the opening.

20 It is thought that the features of the rim and disc that make the cup so effective may also be incorporated into the form of a lid adapted to fit onto a preformed cup. Thus, according to a fourth aspect of the invention there is provided an anti-spill lid for a drinks container characterised by an outlet positioned to allow liquid to pour out when the container is tipped from an upright position to a drinking position, and venting means for allowing air to enter the container during such pouring and further characterised in that the venting means is located at a position so that it becomes covered with liquid when the container is tipped beyond the drinking position; and is of a size so that the liquid is prevented by surface tension from escaping through it,
and defining a rim defining a repository for a small amount of the liquid after being poured from the opening

One embodiment of the invention will now be described by way of example with reference to the accompanying drawings in which: -

Fig 1 is an exploded perspective view from one side of a non-spill drinking mug constructed in accordance with the invention and shown in an upright position;

Fig 2 is a perspective view of the same mug but as seen from above so as to show outlet and vent holes;

Fig 3 is an axial cross-section through the mug of Figs 1 and 2, showing it tilted to a drinking position;

Fig 4 is similar to Fig 3 but shows the mug after tilting beyond a position for normal drinking; and

Fig 5 is a plan view of the mug illustrating an alternative arrangement of outlet and venting holes.

Referring first to Figs 1 and 2, the illustrated non-spill drinking vessel is made from just three components each moulded from synthetic plastics material. A main body 1 is transparent so that the user can see how much liquid it contains and has a short quarter-turn thread on the outside surface of its upper lip. A spill-prevention cover disc 2 is received in a rebate formed on the lower edge of a rim member 3. The latter has an internal screw thread co-operating with the thread on the main body 1 so as to clamp the cover 2 in watertight relationship with the parts 1 and 3. The rim 3 is moulded integrally with a handle 3A.
The disc 2 is formed with an outlet slot 2A and an array of vents 2B. Each of these vents is flared towards the outside as can be seen in Figs 3. Slot 2 is of a size that freely allows the escape of liquid out of the container when the vent is clear, but is small enough that the surface tension effect of the liquid is strong enough to prevent liquid from escaping when the vent 2B is covered.

Fig 3 shows the mug tipped during use. The liquid contents of the mug pours out of the slot 2A so as to occupy a space enclosed by the rim 3 from where it can be drunk in a conventional manner. Air simultaneously passes into the mug through the vents 2B to avoid reduced pressure that would otherwise inhibit the outflow of liquid.

If the mug is tipped excessively as shown in Fig 4 or is dropped, the liquid inside the mug covers the vents 2B, preventing the ingress of air and therefore preventing spillage of liquid. When the mug is returned to a position as shown in Fig 3, some of the liquid is retained, by the action of surface tension, at the narrow inner end of each vent holes 2B. The user then blows into the relatively wide outer ends of the vent holes 2B and, because of their tapered shape this easily clears the blockage caused by the retained liquid.

If the mug is dropped when it contains only a small quantity of liquid, insufficient to cover the vents, some of the liquid will splash onto and block the vents 2B thereby preventing escape of liquid from the slot 2A until the blockage is cleared by blowing as previously described. The mug may also be designed so that, when dropped, it is unlikely to come to rest in a position with the aperture 2A at the bottom.

Because the illustrated device has no drinking spout or valve mechanism, it is simple to manufacture and easy to assemble/dismantle and clean. It can also allow the user to appear to be drinking from a conventional mug. Drinking from the open edge of the mug teaches a child to drink correctly in terms of breathing etc. and can accelerate progress towards normal drinking from a cup. The principle of operation is effective for teaching correct use of the mug because excessive tilting, such as would for a normal mug cause spillage, simply cuts off the supply of drink from the user.
Furthermore, it is believed that there may be some orthodontic advantage to drinking in this way.

Referring now to Figure 5, there is illustrated a plan view of a disc with an alternative arrangement of venting and outlet holes. The outlet is formed from a group or array of holes 4A, whilst the vent is formed by a single hole 4B. The holes 4A, although smaller than the slot 2A, are still large enough to allow liquid to flow through freely when the vent 4B is clear. As the surface tension effect is not dependent upon the number of holes but rather their size, it is possible by using a plurality of holes, to create a vent having a larger total area than would be possible using a single hole or slot without losing the surface tension effect which maintains the liquid within the cup when the vent is blocked. Additionally, the flow rate of liquid out of the cup can be easily controlled by adjusting the number of outlet holes 4A.

It is envisaged that the disc 2 and/or the rim 3 may be combined into a single moulded component or lid for a drinking container. The lid, formed from synthetic plastics material may be adapted so as to clip/affix onto a rim of a drinking cup such as those commonly used for containing take-away coffee, soft drinks etcetera.

Many modifications are possible without departing from the scope of the invention as defined by the accompanying claims. For example, if desired, suitable locating means may be included to ensure the correct relative rotational positions of parts 2 and 3 for left or right-handed users. Alternatively, the components 2 and 3 could be combined as a single moulded component designed specifically either for a right or left handed user or if used solely for the purpose as a not spill lid, may not comprise a handle at all. In another variation, instead of vents positioned as shown at 2B, a single vent could be positioned at the centre of the disc 2, though this would not be effective in preventing spillage when the mug contained just a small amount of liquid, equally in the embodiment shown in Fig 5, the vent 4B may be positioned closer to the outlet as shown at 2A.
CLAIMS

1. A drink container comprising an outlet positioned to allow liquid to pour out when the container is tipped from an upright position to a drinking position, and venting means for allowing air to enter the container during such pouring, characterised in that:

   the venting means is located at a position so that it becomes covered with liquid when the container is tipped beyond the drinking position; and is of a size so that the liquid is prevented by surface tension from escaping through it; and

   the outlet is of a size that liquid is prevented from escaping through it when the venting means is covered but is large enough that liquid is free to escape when the venting means is open.

2. A drink container according to claim 1 characterised in that the container comprising a main body for holding the drink and an anti-spill cover member defining the outlet and the venting means; characterised by a rim designed to attach onto the main body so that the cover member is held between the main body and the rim; the rim defining a repository for a small amount of the liquid after being poured from the outlet.

3. A drink container according to claim 2 characterised by a handle formed integrally with the rim.

4. A drink container according to any preceding claim characterised in that the venting means is formed by more than one venting hole.

5. A drink container according to any preceding claim characterised in that the outlet is comprises of a plurality of holes of a size so that, when the venting means is covered, liquid is prevented by surface tension from escaping through the outlet.
6. A drink container according to any preceding claim characterised in that the venting means includes at least one hole that is flared towards the outside of the container.

7. A drink container comprising a main body for holding the drink and an anti-spill cover member defining a restricted opening to allow the liquid to pour out; characterised by a rim designed to attach onto the main body with the cover member being held between the main body and the rim; the rim defining a repository for a small amount of the liquid after being poured from the opening.

8. A drink container according to claim 7 characterised in that venting means is formed in the anti-spill cover member, this venting means being sufficiently large to allow entry of air but too small to allow escape of liquid.

9. A drink container according to claim 7 or 8 characterised by a handle formed integrally with the rim.

10. A drink container according to any one of claims 7 to 9 characterised in that the venting means includes an array of vent holes.

11. A drink container according to any one of claims 7 to 10 characterised in that the or each vent is flared towards the outside of the container.

12. An anti-spill lid for a drinks container characterised in comprising an outlet positioned to allow liquid to pour out when the container is tipped from an upright position to a drinking position, and venting means for allowing air to enter the container during such pouring, characterised in that the venting means is located at a position so that it becomes covered with liquid when the container is tipped beyond the drinking position; and is of a size so that the liquid is prevented by surface tension from escaping through it, and defining a
rim defining a repository for a small amount of the liquid after being poured from the opening.

13. An anti-spill lid according to Claim 12 characterised in that the outlet comprises of a polarity of holes of a size so that, when the venting means is covered, liquid is prevented by surface tension from escaping through the outlet.

14. An anti-spill lid according to Claim 14 characterised in that the venting means is formed by more than one venting hole.

15. A drink container comprising an outlet positioned to allow liquid to pour out when the container is tipped from an upright position to a drinking position, and venting means for allowing air to enter the container during such pouring, characterised in that the venting means is located at a position so that it becomes covered with liquid when the container is tipped beyond the drinking position; and is of a size so that the liquid is prevented by surface tension from escaping through it and that the outlet comprises a plurality of holes of a size so that, when the venting means is covered, liquid is prevented by surface tension from escaping through the outlet.

16. A drink container comprising an outlet positioned to allow liquid to pour out when the container is tipped from an upright position to a drinking position, and venting means for allowing air to enter the container during such pouring, characterised in that the venting means is located at a position so that it becomes covered with liquid when the container is tipped beyond the drinking position; and is of a size so that the liquid is prevented by surface tension from escaping through it.
Application No: GB0614524.7
Claims searched: 1-6, 15, 16
Examiner: Mr Darren Williams
Date of search: 19 February 2007

**Patents Act 1977: Search Report under Section 17**

**Documents considered to be relevant:**

<table>
<thead>
<tr>
<th>Category</th>
<th>Relevant to claims</th>
<th>Identity of document and passage or figure of particular relevance</th>
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<tr>
<td>X,Y</td>
<td>X; 1, 4-6, Y; 1, 4-6</td>
<td>US 2004/0245258 A (CONNORS) see whole document</td>
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<td>Y</td>
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<td>US 5624053 A (FREEK) see whole document</td>
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Search of GB, EP, WO & US patent documents classified in the following areas of the UKC

- B8T Worldwide search of patent documents classified in the following areas of the IPC
- A47G; B65D
- OPTICS, EPODOC, WPI

The following online and other databases have been used in the preparation of this search report.