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### No-Spill Cup

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#### Abstract

The present invention is a no-spill cup apparatus having a magnetic closure element that acts to open and close a liquid flow channel. The no-spill cup design permits the liquid flow channel to be opened or closed by grasping the handle or by pressing a button on the exterior of the cup. The magnetic closure follows a helical channel that permits a magnetic ring to engage and disengage from a ferrous ring disposed within a channel of the upper lid, sealing the liquid within the body of the cup when the pull lever or button is not engaged. The cup may also provide an ability to control the liquid flow speed to keep the liquid flow within an easy range for drinking.

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## Background/Summary

CLAIM TO PRIORITY [0001] This application claims under 35 U.S.C. § 120, the benefit of the Application 63/553,905, filed Feb. 15, 2024, titled “No Spill Cup” which is hereby incorporated by reference in its entirety.

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### BACKGROUND

[0003] The field of this invention relates generally to the field of drink containers, and more particularly toward a novel cup device that has a spill proof closure element.

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## Description

### BRIEF DESCRIPTION OF THE DRAWINGS

[0004] Certain illustrative embodiments illustrating organization and method of operation, together with objects and advantages may be best understood by reference to the detailed description that follows taken in conjunction with the accompanying drawings in which:

[0005] FIG. 1 is a perspective view of a no-spill cup apparatus suitable for use by both children and adults in accordance with the principles of the present disclosure;

[0006] FIG. 2A is a side view of the no-spill cup apparatus in accordance with the principles of the present disclosure;

[0007] FIG. 2B is a back side view of the no-spill cup apparatus in accordance with the principles of the present disclosure;

[0008] FIG. 2C is a top down view of the lid of the no-spill cup apparatus in accordance with the principles of the present disclosure;

[0009] FIG. 3 is a cutaway side view of the no-spill cup apparatus internal closure mechanism in accordance with the principles of the present disclosure;

[0010] FIG. 4A is a sideview of the open position of the no-spill cup apparatus permitting an individual to access any liquid within the body of the apparatus in accordance with the principles of the present disclosure;

[0011] FIG. 4B is a sideview of the closed position of the no-spill cup apparatus retaining any liquid within the body of the apparatus to protect against spills in accordance with the principles of the present disclosure;

[0012] FIG. 5 is a top view of the components of the auto-close mechanism of the no-spill cup apparatus in accordance with the principles of the present disclosure;

[0013] FIG. 6A is a perspective view of the seal plug separate from the body of the no-spill cup and open position of the no-spill cup apparatus in accordance with the principles of the present disclosure;

[0014] FIG. 6B is a perspective view of the seal plug separate from the body of the no-spill cup and closed position of the no-spill cup apparatus in accordance with the principles of the present disclosure;

[0015] FIG. 7 is a view of the liquid flow pathway when the no-spill cup apparatus is in an open position in accordance with the principles of the present disclosure;

[0016] FIG. 8 is an alternative embodiment of the no-spill cup apparatus with a button shaped opening component in accordance with the principles of the present disclosure;

[0017] FIG. **9** is an exploded view of the components of an alternative embodiment of the no-spill cup apparatus with a button shaped opening component in accordance with the principles of the present disclosure;

[0018] FIG. **10** is an alternative embodiment of the no-spill cup apparatus with a trigger-shaped opening component separate from the cup handle in accordance with the principles of the present disclosure;

#### DETAILED DESCRIPTION

[0019] While this invention is susceptible of embodiment in many different forms, there is shown in the drawings and will herein be described in detail specific embodiments, with the understanding that the present disclosure of such embodiments is to be considered as an example of the principles and not intended to limit the invention to the specific embodiments shown and described. In the description below, like reference numerals are used to describe the same, similar or corresponding parts in the several views of the drawings.

[0020] The terms “a” or “an”, as used herein, are defined as one or more than one. The term “plurality”, as used herein, is defined as two or more than two. The term “another”, as used herein, is defined as at least a second or more. The terms “including” and/or “having”, as used herein, are defined as comprising (i.e., open language). The term “coupled”, as used herein, is defined as connected, although not necessarily directly, and not necessarily mechanically.

[0021] Reference throughout this document to “one embodiment”, “certain embodiments”, “an embodiment” or similar terms means that a particular feature, structure, or characteristic described in connection with the embodiment is included in at least one embodiment of the present invention. Thus, the appearances of such phrases or in various places throughout this specification are not necessarily all referring to the same embodiment. Furthermore, the particular features, structures, or characteristics may be combined in any suitable manner in one or more embodiments without limitation.

[0022] The preferred embodiment of the instant invention provides for a no-spill drinking apparatus in accordance with the principles of the present disclosure. Alternate embodiments are also disclosed. Reference is made in detail to the exemplary embodiments of the present disclosure, which are illustrated in the accompanying figures.

[0023] In an embodiment, the no-spill cup may be used to bridge the gap between sippy-cups and open-mouth “big kid” or adult cups. The no-spill cup may be used to teach younger children to drink from a cup while reducing accidental spills. The no-spill cup operates in a similar manner as an open-mouth cup with the liquid flows freely with no sucking required when the silicone seal recessed inside the mouth of the no-spill cup is open. When the pull lever is engaged the no-spill cup is in an open condition and liquid may flow freely from any portion of the circular top of the no-spill cup.

[0024] In this embodiment the user may pull the locking lever, tilting the locking pull lever into the handle of the no-spill cup. This position of the locking lever the silicone seal retaining the liquid inside the body of the no-spill cup drops down into an open position and creates a pathway for liquid to flow around the silicone seal and out of the cup. The locking lever is spring loaded such that when the user releases the locking lever the silicone seal lifts up into a sealed position, closing the flow pathway and retaining the liquid within the body of the no-spill cup. The silicone seal remains in the closed position, retaining the liquid against spills, until the locking lever is once again pulled into the handle of the no-spill cup.

[0025] In an embodiment, the no-spill cup may have a seal plug with an upper and lower flange. Each of the upper and lower flanges may have an integrated flat ferrous ring. Both flanges of the seal plug contain the flat ferrous ring and inside the internal channel of the upper lid of the no-spill cup are magnets positioned in a ring formation. The magnets travel on a helical track. When the pull lever is engaged the magnetic ring is rotated and travels up the helical track to the top of the internal channel of the upper lid. When the magnet ring is positioned near the bottom of the internal

ring channel of the upper lid, the magnets attract the flat ferrous ring of the bottom flange of the seal plug. When the magnet ring is rotated up to the top of the internal ring channel of the upper lid, the magnets have a stronger magnetic pull on the ferrous ring of the top flange of the seal plug. This switching of the magnetic ring from bottom to top and vice versa of the internal ring channel is the operation that engages or disengages the seal capability of the seal plug.

[0026] In an embodiment the design of the no-spill cup permits a user to drink from any side of the no-spill cup. An additional design element of the no-spill cup features channels that may act to slow the flow of liquid from the body of the cup by tilting the cup in a narrow or steep angle as referenced from a horizontal position of the body of the no-spill cup, permitting the user to better control the volume of the liquid flow when the no-spill cup silicone seal is in an open position.

[0027] The no-spill cup also features a silicone base to prevent sliding or slipping when the no-spill cup is placed on a surface. Additionally, the body of the cup is manufactured from a transparent material, permitting the user or another associated with the user to easily see the liquid and liquid level within the body of the cup.

[0028] The no-spill cup disassembles into three sections to permit easy cleaning of the cup between uses.

[0029] In an embodiment, the instant innovation comprises a no-spill cup apparatus with an vertically oriented body having a cylindrical shape with a sealed bottom and open upper portion. The body of the no-spill cup may have an upper lid having the same diameter as the open upper portion of said body, where the upper lid connects to the upper portion of said body to form a liquid tight seal and the upper lid having an internal ring channel disposed about the circumference of the upper lid. The upper lid may have a concave upper portion and a central opening at the base of the concave portion with a seal plug disposed within the central opening of the upper lid, the seal plug having an upper flange having a diameter larger than the central opening and smaller than the base of the concave portion of the upper lid. The seal plug may extend below the bottom portion of the upper lid and into the open body of the no-spill cup, the bottom portion of the seal plug having a lower flange with a diameter larger than the central opening of the seal plug and smaller than the diameter of the upper portion of the body.

[0030] The no-spill cup having a handle connecting at the upper portion to the exterior of said upper lid, and connecting to a flange extension at the bottom exterior of the body of the no-spill cup, where the handle has a locking pull lever and the locking pull lever has a physical connection to the seal plug. The lower flange of the seal plug may have a flat ferrous ring disposed on the top surface of said lower flange, and the internal ring channel may have a magnetic ring disposed within the interior of the internal ring channel.

[0031] In an embodiment, when the locking pull lever changes position through the action of a user, the flat ferrous ring is connected to, or released from, magnetic connection with said magnetic ring, this action by a user opening or closing a channel for flow of liquid from the body of the no-spill cup through the connection to, or release from, the magnetic connection with said magnetic ring.

[0032] Turning now to FIG. 1, this figures presents a perspective view of the no-spill cup consistent with the principles of the present disclosure. The body of the cup **100** that contains a liquid placed with in the cup and may be constructed of any transparent material such as plastic, acrylic, or other such materials. An upper lid **102** is detachably connected to the upper portion of the body of the cup **100** when the cup is placed in a vertical orientation. A seal plug **104** is disposed in the center of the upper lid **102** and forms a movable seal that permits the no-spill cup to retain liquid within the body of the cup **100** or permit the flow of liquid from the body of the cup **100**. A handle **106** with a circular upper portion forming an integrated connection with the upper lid **102** and a lower curved portion that connects to a flange **108** on the body of the cup **100** forms a curved handle suitable for the insertion of a human hand to grasp and hold the cup securely while drinking. A locking pull lever **109** is disposed within the interior section of the handle **106** such that the pull

lever **108** extends horizontally from the interior section of the handle **106** when the no-spill cup is closed against liquid flow. The locking pull lever **109** may be pulled to move the locking pull lever **109** into a recess in the handle **106** when a user grasps the locking pull lever **109**, thus moving the seal plug **104** and permitting the flow of liquid from the body of the no-spill cup **100**.

[0033] Turning to FIG. 2A, this figure presents a side view of the no-spill cup apparatus in accordance with the principles of the present disclosure.

[0034] Turning to FIG. 2B, this figure presents a back side view of the no-spill cup apparatus in accordance with the principles of the present disclosure.

[0035] Turning to FIG. 2C, this figure presents a top-down view of the lid of the no-spill cup apparatus in accordance with the principles of the present disclosure.

[0036] Turning to FIG. 3, this figure presents a cutaway side view of the no-spill cup apparatus internal closure mechanism in accordance with the principles of the present disclosure. The seal plug **104** is attached to a flat ferrous ring **300** and may move vertically along a series of helical shaped channels to engage the flat ferrous ring **300** with a magnetic ring **302** moving along the helical shaped channels and disposed within an internal ring channel **304** structure of the upper lid **102**. The handle **106** having a locking pull lever portion **109**, having a bottom trigger portion **110** and a top trigger portion **111**. The bottom trigger portion of the locking pull lever **110** may be engaged by a person gripping and moving a bottom trigger of the locking pull lever **110** into the recess of the handle **106**. This action rotates the flat ferrous ring **300** vertically downward utilizing the magnetic ring **302** connected to a plurality of helical channels (not shown) until the flat ferrous ring **300** no longer engages the magnetic ring **302** through magnetic attraction. This action relaxes a thin flexible web **308** to permit the ferrous ring **300** to move downward in a vertical direction to disconnect from the magnetic ring **302**, opening a liquid flow channel around the 360-degree circumference of the seal plug to provide access to the liquid within the body of the no-spill cup. This action permitting a user access to the liquid released from the body of the no-spill cup **100**, and engaging a spring **306** that locks the bottom trigger of the locking pull lever **110** into an engaged position in the recess of the handle until the user releases the locking pull lever from the handle recess by gripping the top trigger portion of the pull lever **111**.

[0037] When the user grips the top trigger portion of the locking pull lever **111**, the locking pull lever is rotated out of the recess of the handle and moves the flat ferrous ring **300** vertically upward utilizing the magnetic ring **302** connected to the plurality of helical channels (not shown) until the flat ferrous ring **300** engages the magnetic ring **302** through magnetic attraction. This action compresses a thin flexible web **308** to permit the ferrous ring **300** to move upward in a vertical direction to connect to the magnetic ring **302** and seal the channel against a liquid flow around the 360-degree circumference of the seal plug **104**.

[0038] Turning to FIG. 4A, this figure presents a sideview of the open position of the no-spill cup apparatus permitting an individual to access any liquid within the body of the apparatus in accordance with the principles of the present disclosure. The locking pull lever **109** in this figure is shown in a position that has moved the locking pull lever **109** into the recess of the handle (not shown). This action by a user moves the flat ferrous ring **300**, which is physically attached to the bottom of the seal plug (not shown), vertically in a downward direction along the path provided by a plurality of helical-shaped channels **400**. In this position, the seal plug (not shown) has been moved vertically to open a 360-degree channel around the circumference of the seal plug to permit the movement of liquid from the body of the no-spill cup to the exterior of the no-spill cup.

[0039] Turning to FIG. 4B, this figure presents a sideview of the closed position of the no-spill cup apparatus permitting an individual to access any liquid within the body of the apparatus in accordance with the principles of the present disclosure. The locking pull lever **109** in this figure is shown in a position that has moved the locking pull lever **109** out of the recess of the handle (not shown). This action by a user moves the flat ferrous ring **300**, which is physically attached to the bottom of the seal plug (not shown), vertically in an upward direction along the path provided by a

plurality of helical-shaped channels **400**. In this position, the seal plug (not shown) has been moved vertically to close a 360-degree channel around the circumference of the seal plug to permit the retention of liquid within the body of the no-spill cup to prevent any spillage of liquid.

[0040] Turning to FIG. **5**, this figure presents a top view of the components of the auto-close mechanism of the no-spill cup apparatus in accordance with the principles of the present disclosure. The pull cable **500** provides a small spring force created by the one or more cam followers **501** connected to the pull cable **500** and applying a force to the spring pin **504**. The lock pin **502** holds the spring pin **504** in place when the locking feature is active to engage the lock in an open operation position. When an impact, such as force applied by a user or the no-spill cup being dropped, occurs the lock pin **502** moves vertically downward to press against the pull cable **500**. The spring force applied to the spring pin **504** by the pull cable **500** and the movement of the lock pin **502** against the pull cable **500** results in the movement of the spring pin **504** past the lock pin **502** and results in the disengagement of the locking feature.

[0041] Turning now to FIG. **6A**, this figure presents perspective view of the seal plug separate from the body of the no-spill cup and open position of the no-spill cup apparatus in accordance with the principles of the present disclosure. The seal plug **104** is displayed separated from the body of the no-spill cup **100**. The seal plug **104** may be rotated to align the retainer structures **600** with the sides of the upper lid **102** to remove the seal plug **104** easily to clean the seal plug and the body of the no-spill cup. When installed in the open position, the seal plug **104**, liquid may flow from the body of the no-spill cup, bypassing the seal plug **104**.

[0042] Turning now to FIG. **6B**, this figure presents perspective view of the seal plug separate from the body of the no-spill cup and closed position of the no-spill cup apparatus in accordance with the principles of the present disclosure. The seal plug **104** is displayed separated from the body of the no-spill cup **100**. The seal plug **104** may be rotated to align the retainer structures **600** with the sides of the upper lid **102** to insert the seal plug **104** easily after cleaning the seal plug and the body of the no-spill cup. When installed in the closed position, the seal plug **104**, liquid stops the flow of liquid from the body of the no-spill cup **104**.

[0043] Turning now to FIG. **7**, this figure presents a view of the liquid flow pathway **700** when the no-spill cup apparatus is in an open position and when the no-spill cup is placed in a horizontal orientation in accordance with the principles of the present disclosure.

[0044] Turning now to FIG. **8**, this figure presents an alternative embodiment of the no-spill cup apparatus with a button shaped activation component **800** in accordance with the principles of the present disclosure.

[0045] Turning now to FIG. **9**, this figure presents an exploded view of the components of an alternative embodiment of the no-spill cup apparatus with a button shaped opening component in accordance with the principles of the present disclosure. This figure presents the body of the no-spill cup **100** separated from the seal plug **104**. In this embodiment, the upper lid **102** has the button shaped activation component **800** integrated into the upper lid **102** as a single component. When cleaning is required, these three components may be separated as separable elements and cleaned individually. When the three components are realigned and reassembled, the no-spill cup **100** is once again ready for use.

[0046] Turning now to FIG. **10**, this figure presents an alternative embodiment of the no-spill cup apparatus with a trigger shaped activation component **1000** in accordance with the principles of the present disclosure.

[0047] While certain illustrative embodiments have been described, it is evident that many alternatives, modifications, permutations and variations will become apparent to those skilled in the art in light of the foregoing description.

## Claims

- 1.** A no-spill cup apparatus comprising: a body having a cylindrical shape with a sealed bottom and open upper portion; an upper lid having the same diameter as the open upper portion of said body, where the upper lid connects to the upper portion of said body to form a liquid tight seal; the upper lid having an internal ring channel disposed about the circumference of the upper lid; the upper lid having a concave upper portion and a central opening at the base of the concave portion; a seal plug disposed within the central opening of said upper lid, the seal plug having an upper flange having a diameter larger than the central opening and smaller than the base of the concave portion of the upper lid; said seal plug extending below the bottom portion of the upper lid and into the open body of the no-spill cup, the bottom portion of the seal plug having a lower flange with a diameter larger than the central opening of the seal plug and smaller than the diameter of the upper portion of the body; a handle connecting at the upper portion to the exterior of said upper lid, and connecting to a flange extension at the bottom exterior of the body of the no-spill cup; the handle having a locking pull lever; the locking pull lever having a physical connection to said seal plug; the lower flange of said seal plug having a flat ferrous ring disposed on the top surface of said lower flange; said internal ring channel having a magnetic ring disposed within the interior of the internal ring channel; when said locking pull lever changes position through the action of a user, the flat ferrous ring is connected to, or released from, magnetic connection with said magnetic ring, said action opening or closing a channel for flow of liquid from the body of the no-spill cup through the connection to, or release from, the magnetic connection with said magnetic ring.
  - 2.** The no-spill cup apparatus of claim 1, further comprising a series of helical channels disposed around the diameter of the upper lid and having a physical connection with said seal plug.
  - 3.** The no-spill cup apparatus of claim 1, further comprising a flexible web portion forming the bottom portion of the seal plug and connected to said lower flange of the seal plug.
  - 4.** The no-spill cup apparatus of claim 2, where the lower flange moves vertically, upward and downward, through said series of helical shaped channels to rotate the flat ferrous ring into position to create a magnetic connection with the magnetic ring.
  - 5.** The no-spill cup apparatus of claim 3, where the flexible web portion compresses and relaxes when the bottom flange moves vertically to permit the bottom flange to open or close a liquid flow channel.
  - 6.** The no-spill cup apparatus of claim 1, where the locking pull lever is opened and closed through the action of a spring disposed at the center of the locking pull lever, permitting a user to lock the liquid flow channel into an open or closed state.
  - 7.** The no-spill cup apparatus of claim 1, further comprising a locking lever and a first and second pin to create an auto-close capability, where the first pin holds the locking lever in an open position until a force acts upon the second pin to push the second pin past the first pin position and move the locking lever into a closed position to close a liquid flow channel.
  - 8.** The no-spill cup apparatus of claim 1, where said upper lid, said seal plug, and said body of the cup are separable to permit ease of cleaning.
  - 9.** The no-spill apparatus of claim 1, where the locking pull lever further comprises a button shape having an open and a locked position.
  - 10.** The no-spill apparatus of claim 1, where the locking pull lever comprises a two-position lever that does not insert into a channel in the handle.
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