

Liquid Dispenser

Technical Field

The present invention generally relates to a liquid dispenser.

Background

Liquid dispensers, such as water coolers, are becoming increasingly popular consumer product items. This demand has been driven by consumer's concerns relating to treated scheme waters. These scheme waters are sometimes heavily chlorinated, which can affect the taste of the water. Furthermore, the chlorine in the water under certain conditions can produce by-products such as trihalomethanes (THM's) or haloforms, which are potentially harmful to human health.

In certain developing countries, the scheme water supplied to hotels, offices and homes is not suitable for drinking and hence, water coolers are a necessary consumer item.

One known water cooler comprises a front panel having a recess which comprises a dispensing spout that is located within the recess above a base support. In use, a glass or cup is placed on the base support to allow water to be dispensed directly thereon. While the provision of the recess is desirable because it provides an over-all sleek design because the dispensing spout is located within the recess, it is not possible to dispense water directly from the dispensing spout into a receptacle that will not fit into the recess (ie such as a large bottle).

Accordingly, a disadvantage with known water coolers of the type described above is that it is not possible to directly fill receptacles that are too large to fit into the water cooler recess.

There is a need to provide a liquid dispenser that overcomes, or at least ameliorates, the disadvantage described above.

Summary

According to a first aspect, there is provided a liquid dispenser comprising:

- a housing having a front wall;

- a liquid conduit provided in said housing for liquid communication with a chamber capable of holding liquid; and

- a nozzle coupled to said front wall for dispensing liquid therefrom when in liquid communication with said liquid conduit, said nozzle being moveable relative to said front wall.

In use, water flows from the chamber, through the liquid conduit and out through the nozzle. In use, a user is able to move the nozzle relative to the front wall while water is dispensed from the nozzle.

According to a second aspect, there is provided a liquid dispenser comprising:

- a housing having a front wall;

- a liquid conduit provided in said housing for liquid communication with a chamber capable of holding liquid; and

- an nozzle pivotally coupled to said front wall for dispensing liquid therefrom when in liquid communication with said liquid conduit, said nozzle having a longitudinal axis, said pivotal coupling to said front wall allowing movement of said longitudinal axis along an arc extending between a first position at a first offset angle relative to said front wall and a second position at a second offset angle relative to said front wall.

According to a third aspect, there is provided a water dispenser comprising:

- a housing having a front wall;

- a liquid conduit mounted to said housing for liquid communication with a chamber capable of holding liquid;

- a recess provided in the front wall having a receptacle support for supporting a receptacle in use, a top plate disposed above said receptacle support and at least one side wall disposed between said receptacle support and said top plate;

- an nozzle pivotally coupled to said front wall for dispensing water therefrom when in water communication with said liquid conduit, said nozzle having a longitudinal axis, wherein said pivotal coupling to said front wall allows movement of said longitudinal axis of said nozzle along an arc extending between a first position at a first offset angle relative to said front wall and a second position at a second offset angle relative to said front wall, and wherein when said longitudinal axis is moved to said second position, water emitted from said nozzle does not contact said receptacle support.

According to a fourth aspect, there is provided a cartridge for use in a water dispenser of the type comprising a housing having a front wall; a liquid conduit mounted to said housing for liquid communication with a chamber capable of holding liquid; and a recess provided in the front wall having a receptacle support for supporting a receptacle in use; said cartridge comprising:

- a body having a pair of side walls;

- a nozzle extending through said body between said side walls, said nozzle having a longitudinal axis and being for water communication with said liquid conduit;

a pair of engagement arms respectively provided on said pair of side walls for pivotal coupling to said front wall,

wherein in use, said pivotal coupling allows movement of said longitudinal axis along an arc extending between a first position at a first offset angle relative to said front wall and a second position at a second offset angle relative to said front wall.

Definitions

The following words and terms used herein shall have the meanings indicated:

Unless specified otherwise, the terms "comprising" and "comprise", and grammatical variants thereof, are intended to represent "open" or "inclusive" language such that they include recited elements but also permit inclusion of additional, unrecited elements.

The terms "coupling", "coupled", "couple" and grammatical variations thereof, refer to the connection of two objects together either by being connected directly to each other or by being indirectly connected to each other, such as for example, by being connected by a third object between the two objects.

As used herein, the term "about", in the context of concentrations of components of the formulations, typically means $\pm 5\%$ of the stated value, more typically $\pm 4\%$ of the stated value, more typically $\pm 3\%$ of the stated value, more typically, $\pm 2\%$ of the stated value, even more typically $\pm 1\%$ of the stated value, and even more typically $\pm 0.5\%$ of the stated value.

Throughout this disclosure, certain embodiments may be disclosed in a range format. It should be understood that the description in range format is merely for

convenience and brevity and should not be construed as an inflexible limitation on the scope of the disclosed ranges. Accordingly, the description of a range should be considered to have specifically disclosed all the possible sub-ranges as well as individual numerical values within that range. For example, description of a range such as from 1 to 6 should be considered to have specifically disclosed sub-ranges such as from 1 to 3, from 1 to 4, from 1 to 5, from 2 to 4, from 2 to 6, from 3 to 6 etc., as well as individual numbers within that range, for example, 1, 2, 3, 4, 5, and 6. This applies regardless of the breadth of the range.

Detailed Disclosure of Embodiments

Exemplary, non-limiting embodiments of a liquid dispenser will now be disclosed.

In one embodiment, the liquid dispenser is a water dispenser and may dispense hot and/or cold water. The water dispenser comprises a housing having a front wall, and preferably, a pair of side walls, a rear wall, a top wall and a bottom wall. The liquid water dispenser also comprises a liquid conduit that is mounted to the housing. In use, the liquid conduit is in liquid communication with a chamber containing water therein. Preferably the chamber is located within the housing and may be removable to allow it to be filled with water.

The water dispenser also comprises a nozzle for dispensing liquid when it is in liquid communication with the liquid conduit. The nozzle has a longitudinal axis and is pivotally coupled to the front wall of the housing. In use, the longitudinal axis is moveable along an arc extending between a first position at a first offset angle relative to the front wall of the housing and a second

position at a second offset angle relative to the front wall of the housing.

The angle of the arc through which the longitudinal axis is moveable may be selected from the group consisting of: about 5° to about 35°, about 5° to about 30°, about 5° to about 25°, about 5° to about 20°, about 5° to about 15°, about 5° to about 10°, about 10° to about 35°, about 15° to about 35° and about 20° to about 35°. In one embodiment, the angle of the arc through which the longitudinal axis is moveable may be about 30°.

In one embodiment, the first offset angle is about 0° so that the longitudinal axis of the adjustable dispenser spout is substantially parallel with the front wall of the housing. However, in other embodiments, the first offset angle may be selected from the group consisting of about 0° to about 15°, about 5° to about 15°, about 10° to about 15°, about 0° to about 10° and about 0° to about 5°.

In one embodiment, the second offset angle is about 30°. However, in other embodiments, the first offset angle may be selected from the group consisting of about 25° to about 45°, about 30° to about 45°, about 35° to about 45°, about 40° to about 45°, about 30° to about 40° and about 30° to about 45°.

The dispenser may comprise a cartridge which is pivotally coupled to the front wall of the housing. The nozzle may extend through the body of the cartridge. The cartridge body may comprise a pair of side walls, a rear wall connected at each edge to the respective edges of said pair side walls and a front wall connected at each edge to the respective edges of said pair side walls. The cartridge may comprise two side arms that extend from each of the respective side walls. The cartridge side arms may be capable of engaging with corresponding engagement arms provided in the housing adjacent to each of the side

walls. The cartridge side arms may be located adjacent to a corner of the side walls to allow the cartridge body to pivot about the engagement arms while the side arms reside therein.

The two engagement arms may be respectively provided on two inner mounting walls provided within the housing. The two mounting walls may be respectively disposed adjacent to said cartridge side walls.

The cartridge side walls may comprise an abutment member for abutment of the respective mounting walls. Advantageously, the abutment of the respective mounting walls by the abutment member on each side wall aligns the cartridge between the two mounting walls. Advantageously, the two abutment members provide a resistance force as they abut the mounting walls when the cartridge is moved along the arc extending between the first position and the second position. More advantageously, the abutment members prevent movement of the cartridge when a force is not applied to the cartridge, thereby holding the cartridge in a desired position along the arc.

In one embodiment, the abutment members comprise an elastic material. The elastic material may be a plastic material that has been adhered to the side walls of the cartridge.

The cartridge may also comprise a pair of locating guides respectively provided on each of the two side walls of the cartridge. The locating guides are able to reside in corresponding locking holes provided in the mounting walls. The locating guides advantageously position and guide the cartridge as it is moved along the arc extending between the first position and the second position.

The cartridge may be made of plastic material. Advantageously, the cartridge may be made in an injection molding process. The cartridge may be hollow inside,

advantageously making the cartridge light weight. The cartridge may further comprise a strengthening rib on the side walls to increase the strength of the side wall.

The liquid dispenser may further comprise a flexible tube extending from said liquid conduit mounted to said housing to said nozzle.

Advantageously, the flexible tube allows liquid to flow from the liquid conduit to said cartridge conduit when the cartridge has been moved between the first position and the second position.

In one embodiment, the front wall of the housing comprises a dispenser recess. The dispenser recess may comprise a receptacle support for supporting a receptacle, such as a cup, in use. The cartridge may be mounted to a top plate directly above the receptacle support. The dispenser recess may comprise at least one side wall extending between the receptacle support and the top plate.

In one embodiment, the longitudinal axis of the nozzle is substantially parallel relative to the front wall, when the cartridge is in the first position. Advantageously, in the second position, the longitudinal axis of the nozzle is at an offset angle from said front wall such that, in use, water emitted from said conduit is able to flow past said receptacle support.

Brief Description Of Drawings

The accompanying drawings illustrate a disclosed embodiment and serve to explain the principles of the disclosed embodiment. It is to be understood, however, that the drawings are designed for purposes of illustration only, and not as a definition of the limits of the invention.

Fig. 1 is a perspective view of a disclosed embodiment of a water dispenser in which the nozzle is in the first position;

Fig. 2 is a perspective view of the water dispenser of Fig. 1 in which the nozzle is in the second position;

Fig. 3 is a cross-sectional side view of the water dispenser of Fig. 2 in which the nozzle is in the second position;

Fig. 4 is a cross-sectional side view along the line A-A of the water dispenser of Fig. 1 in which the nozzle is in the first position;

Fig. 5 is a more detailed cross-sectional side view of the water dispenser of Fig. 4;

Fig. 6 is a more detailed cross-sectional side view of the water dispenser of Fig. 3;

Fig. 6A is a cross-sectional front view of the water dispenser of Fig. 5 along the line B-B;

Fig. 7 is cross-sectional top view showing the main equipment of the water dispenser along the line C-C of Fig. 1;

Fig. 8 is cross-sectional top view showing the cartridge housing the nozzle of the water dispenser along the line D-D of Fig. 1;

Fig. 9 is side perspective view of the cartridge housing the nozzle of the water dispenser of Fig. 1; and

Fig. 10 shows a side perspective view of the opposite side of the cartridge housing shown in Fig. 9.

Detailed Description

Referring to Figs. 1-8, there is shown a water dispenser 10. The water dispenser 10 comprises a housing defined by a front wall (12) connected to two oppositely facing side walls (14,16) that are joined by a rear wall 18. The housing also comprises a base plate 22 and a top cover 20.

The water dispenser 10 also comprises an adjustable nozzle 48 located in a cartridge 46 that is pivotally coupled to the front wall 12 as will be described further below. The nozzle 48 dispenses water from the water dispenser 10 in use. The nozzle 48 has a longitudinal axis 48a and is pivotally coupled to the front wall 12 as will be described further below, to allow movement of the longitudinal axis 48a along an arc extending between a first position as shown in Fig. 1 in which the longitudinal axis 48a is at an offset angle of 0° relative to the front wall 12 (or parallel to the front wall 12) and a second position as shown in Fig. 2 in which the longitudinal axis 48a is at an offset angle of 30° relative to the front wall 12.

Referring to Fig. 7, the main operating components of the water dispenser 10 will now be described. The water dispenser 10 has a water chamber in the form of water tank 24 for storing water in use. A float 26 connected to a float valve 28 which is connected to a water supply source (not shown) is provided in the water tank 24. The float 26 and float valve 28 ensure that water is automatically supplied to the water tank 24 from the water source.

The water dispenser 10 also comprises a pump 30 for pumping water from the tank 24 as it is dispensed from the water dispenser 10, as will be described in further detail below.

The water dispenser 10 also comprises an ultraviolet (UV) light 32, which is in liquid communication with the water tank 24. The UV light 32 kills or inhibits microorganisms residing in the water, thereby acting to purify the water before it is dispensed from the water dispenser.

The water dispenser 10 also incorporates a controller (not shown) for controlling operation of the water dispenser 10. The water dispenser 10 operates in the same way as the potable water recovery and dispensing apparatus disclosed in WO 03/073029, the disclosure of which is incorporated herein in its entirety for reference. It will be appreciated however that other embodiments may operate in different ways to the water dispenser disclosed in WO 03/073029. For example, other embodiments may not dispense water but a beverage such as coffee or a carbonated soda drink. Further other embodiments may not source water by condensing water from air but may be from a scheme water source.

Referring again to Fig. 1, the front wall 12 has an upper front wall portion 12a and a lower front wall portion 12b. The lower front wall portion 12b comprises a recess 36 for receiving a receptacle, such as a cup, in use. The recess 36 is defined between a base support 38, a top cover 44 and a circular-shaped side wall 42 extending between the base support 38 and the top cover 44. The base support 38 has a plurality of a drainage holes extending therethrough which allow water to drain below the base support 38 into a removable drainage chamber 40.

The nozzle 48 of the cartridge 46 is in liquid communication with the water tank 24 to enable water to be dispensed from the nozzle 48 when the water dispenser is in use.

Referring to Fig. 4, there is shown a cross-sectional side view of the water dispenser 10. The water dispenser 10 comprises a water conduit 34 that is in fluid communication with the water tank 24. Referring again to Fig. 7, a solenoid valve 52 is provided in water conduit 34 to allow the flow of water when the pump 30 is switched on and to stop the flow of water when the pump 30 is switched off.

A flexible tube 54 extends between the conduit 34 and the nozzle 48 for passage of water from the water tank 24 to the nozzle 48 from where it is dispelled.

Referring now to Fig. 9 and Fig. 10, there are shown perspective side views of the cartridge 46. The cartridge 46 comprises the nozzle 48 extending through its body from an inlet nozzle end 48a located on a top cover 64 of the cartridge 46 to an outlet nozzle end 48b located on a bottom cover 64 of the cartridge 46. The cartridge 46 has a pair of opposing side walls (56,58) between which are connected front wall 60 and rear wall 62.

Each of the side walls (56,58) have respective side arms in the form of pivot arms (68,70). Referring to Fig. 8, the pivot arms (68,70) respectively engage with corresponding engagement arms in the form of cradle arms (72,74) that are respectively provided in mounting walls (76,78) which are connected to the lower front wall portion 12b. The pivot arms (68,70) are located adjacent to a corner of the side walls (56,58) to allow the cartridge 46 to pivot about the cradle arms (72,74).

Referring again to Figs. 9 and 10, the cartridge side walls (56,58) each have an abutment member in the form of plastic springs (80,82) for abutment of the respective mounting walls (76,78).

The cartridge side walls (56,58) each have a pair of locating guides in the form of locating members (84,86). The locating members (84,86) are dimensioned to reside in corresponding locating holes (not shown) respectively provided in the mounting walls (76,78).

In use, a user who wishes to dispense water from the water dispenser can press button 88 located on lower front wall portion 12b, which activates the pump 30. The water is pumped from the water tank 24 and the solenoid valve 52 is opened to allow water to flow through the conduit 34. As water flows through the conduit 34, water flows into the flexible tube 54 and then out from the outlet 48b of the nozzle 48.

In use, the user has the choice to adjust the position of the cartridge 46 and thereby adjust the position of the nozzle 48. The cartridge 46 is moved when a user grips either the nozzle 48 and/or the cartridge 46 and moves the nozzle 48 away from, or toward, the front wall 12.

Referring to Fig. 5, the nozzle is in the first position as the longitudinal axis 48a is parallel to the front wall 12. As a user moves the cartridge 46 in a direction away from the front wall 12, the pivot arms (68,70) respectively pivot about the cradle arms (72,74). As the cartridge 46 moves, the springs (80,82) respectively abut against the mounting walls (76,78). The abutment of the mounting walls (76,78) by the springs (80,82) aligns the cartridge 12 between the two mounting walls (76,78). The springs (80,82) also provide a resistance force as they abut the mounting walls (76,78) to provide a smooth movement of the cartridge 46 and to prevent further movement of the cartridge 46 should the user stop applying a moving force.

While the cartridge 46 moves, the locating members (84,86), engage with the locating holes (not shown) provided along the mounting walls (76,78) to effect locking engagement of the cartridge, and thereby hold the nozzle in a fixed position. The user applies more force to move the locating members (84,86) out of the locating holes and thereby further move the cartridge 46.

The user is able to move the cartridge 46 to the second position as shown in Fig. 6 in which the longitudinal axis 48a is at an offset angle of 30° relative to the front wall 12, as can be seen by the angle "a" as shown between longitudinal axis 48a and dashed line 48b. Accordingly, moving from the first position shown in Fig. 5. to the second position as shown in Fig. 6, the longitudinal axis 48a moves along an arc as represented by dashed line "b" in Fig. 6.

In use, a user that wishes to fill a receptacle that will not fit in recess 36 (ie such as a large bottle), is able to move the nozzle 48 to the second position shown in Fig. 6. This changes the angle at which water is dispelled from the nozzle 46 and enables the user to fill the receptacle.

Referring to Fig. 6A, there is shown a cross-sectional view of the dispenser 10 through the line B-B of Fig. 5 showing the solenoid valve 52 in conduit 34. The conduit 34 also comprises a T-coupling 55 and stem elbow coupling 53 for connection to the water tank 24.

The cartridge 46 is made of Acrylonitrile Butadiene Styrene (ABS) plastic material that is the same material as the front wall. The cartridge 46 is hollow inside and is therefore relatively light weight, thereby reducing material cost and the overall weight of the water dispenser 10. The cartridge 46 is made in an injection molding process and is therefore relatively easy to

manufacture. The skilled addressee is able to understand how to manufacture the cartridge 46 using known techniques in the art that are disclosed in known references such as *Injection Molding Handbook* by Tim A. Osswald, published by Hanser Gardner Publications (October 1, 2001) and *Successful Injection Molding: Process, Design, and Simulation* by John P. Beaumont, published by Hanser Gardner Publications; 1st edition (July 15, 2002). Furthermore, suitable materials for manufacturing the cartridge 46, front wall 12, side walls (14,16), rear wall (18), base plate 22 and top cover 20 are known in the art in such references as *Modern Plastics Handbook* by Charles A. Harper, published by McGraw-Hill Professional; 1 edition (March 24, 2000).

Advantageously, because the nozzle 48 is adjustable between the first position (Fig. 5) and the second position (Fig. 6), the water dispenser 10 can be used to fill receptacles that wont fit into the recess 36. This provides the water dispenser 10 with enhanced features over known dispensers. Furthermore, the cartridge allows designers and manufacturers of water dispensers to utilise less space in the recess 36 while still allowing receptacles that wont fit into the recess to be filled with water.

Advantageously, the cartridge 46 is easy to manufacture. Furthermore, if the cartridge 46 is damaged or malfunctions, it is able to be replaced with a replacement cartridge 46 without having to replace the whole water dispenser.

It will be apparent that various other modifications and adaptations of the invention will be apparent to the person skilled in the art after reading the foregoing disclosure without departing from the spirit and scope of the invention and it is intended that all such

modifications and adaptations come within the scope of the appended claims.

Claims

1. A liquid dispenser comprising:
a housing having a front wall;
a liquid conduit provided in said housing for liquid communication with a chamber capable of holding liquid;
and
a nozzle having a longitudinal axis and coupled to said front wall for dispensing liquid therefrom when in liquid communication with said liquid conduit, said nozzle being moveable relative to said front wall.
2. A liquid dispenser as claimed in claim 1, wherein said nozzle is pivotally coupled to said front wall.
3. A liquid dispenser as claimed in claim 2, wherein said pivotal coupling to said front wall allows movement of said longitudinal axis along an arc extending between a first position at a first offset angle relative to said front wall and a second position at a second offset angle relative to said front wall.
4. A liquid dispenser as claimed in claim 3, wherein the angle of the arc through which the longitudinal axis is moveable is about 5° to about 35°.
5. A liquid dispenser as claimed in claim 3, wherein the first offset angle is about 0°.
6. A liquid dispenser as claimed in claim 3, wherein the second offset angle is about 25° to about 45°.

7. A liquid dispenser as claimed in claim 1, wherein the nozzle extends through the body of a cartridge pivotally coupled to the front wall of the housing.

8. A liquid dispenser as claimed in claim 7, wherein the cartridge comprises:

two side arms respectively extending from two side walls for pivotal coupling to said housing.

9. A liquid dispenser as claimed in claim 8, wherein said housing comprises a pair of mounting walls respectively having engaging arms for respective engagement with said two side arms.

10. A liquid dispenser as claimed in claim 9, wherein said cartridge side walls are mounted between, and adjacent to, said pair of mounting walls.

11. A liquid dispenser as claimed in claim 9, wherein said side walls each comprise an abutment member for abutting the respective pair of mounting walls.

12. A liquid dispenser as claimed in claim 9, wherein said side walls each comprise a locating guide for locking engagement with corresponding locking holes provided in the mounting walls.

13. A liquid dispenser as claimed in claim 1, comprising:

a flexible tube extending from said liquid conduit mounted to said housing to said nozzle.

14. A liquid dispenser as claimed in claim 1, comprising:

a recess provided in the front wall having a receptacle support for supporting a receptacle and wherein said nozzle is mounted above said receptacle support.

15. A cartridge for use in a water dispenser of the type comprising a housing having a front wall; a liquid conduit mounted to said housing for liquid communication with a chamber capable of holding liquid; and a recess provided in the front wall having a receptacle support for supporting a receptacle in use; said cartridge comprising:

a body having a pair of side walls;

a nozzle extending through said body between said side walls, said nozzle having a longitudinal axis and being for water communication with said liquid conduit; and

a pair of engagement arms respectively provided on said pair of side walls for pivotal coupling to said front wall,

wherein in use, said pivotal coupling allows movement of said longitudinal axis along an arc extending between a first position at a first offset angle relative to said front wall and a second position at a second offset angle relative to said front wall.

16. A liquid dispenser comprising:

a housing having a front wall;

a liquid conduit provided in said housing for liquid communication with a chamber capable of holding liquid; and

an nozzle pivotally coupled to said front wall for dispensing liquid therefrom when in liquid communication with said liquid conduit, said nozzle having a longitudinal axis, said pivotal coupling to said front wall allowing movement of said longitudinal axis along an arc extending between a first position at a first offset angle relative to said front wall and a second position at a second offset angle relative to said front wall.

17. A water dispenser comprising:

a housing having a front wall;

a liquid conduit mounted to said housing for liquid communication with a chamber capable of holding liquid;

a recess provided in the front wall having a receptacle support for supporting a receptacle in use, a top plate disposed above said receptacle support and at least one side wall disposed between said receptacle support and said top plate;

an nozzle pivotally coupled to said front wall for dispensing water therefrom when in water communication with said liquid conduit, said nozzle having a longitudinal axis, wherein said pivotal coupling to said front wall allows movement of said longitudinal axis of said nozzle along an arc extending between a first position at a first offset angle relative to said front wall and a second position at a second offset angle relative to said front wall, and wherein when said longitudinal axis is moved to said second position, water emitted from said nozzle does not contact said receptacle support.