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(54) Title: A WATER REGULATING DEVICE AND A METHOD OF REGULATING A FLOW OF WATER IN A CISTERN OF A TOILET

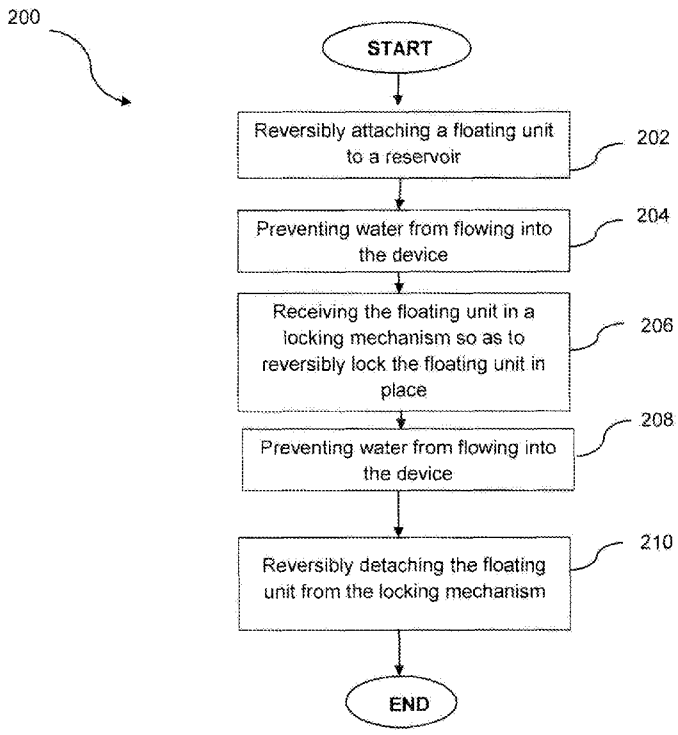

Figure 2

(57) Abstract: According to a first aspect of the invention, there is provided a water regulating device, for use in a cistern of a toilet, said device including: a reservoir; a floating unit reversibly attached to said reservoir, said floating unit being displaceable between a dormant condition in which said floating unit is received in a detachable locking mechanism so as to reversibly lock said floating unit in place thereby preventing an inflow of water into said device and an in-use condition in which said floating unit is reversibly detached from said locking mechanism and water is allowed to flow into said system.

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A WATER REGULATING DEVICE AND A METHOD OF REGULATING A FLOW OF WATER IN A CISTERN OF A TOILET

FIELD OF THE INVENTION:

The invention is directed to a water regulating device and a method of regulating the flow of water.

BACKGROUND TO THE INVENTION:

A typical flush toilet is a vitreous, ceramic bowl containing water plus plumbing made to be rapidly filled with more water. The water in the toilet bowl is connected to a hollow drain pipe shaped like an upside-down U connecting the drain. One side of the U channel is arranged as a hollow siphon tube longer than the water in the bowl is high. The siphon tube connects to the drain. The bottom of the upside-down U-shaped drain pipe limits the height of the water in the bowl before it flows down the drain. The water in the bowl acts as a barrier to sewer gas entering and as a receptacle for waste. Sewer gas is vented through a vent pipe attached to the sewer line.

When a toilet is flushed, the water should flow into a septic tank or into a sewage system with a sewage treatment plant. However, this is often not the case at a global level.

The amount of water used by conventional flush toilets usually make up a significant portion of personal daily water usage. However, modern low flush toilet designs allow the use of much less water per flush. Dual flush toilets allow the user to select between a flush for urine or feces saving

a significant amount of water over conventional units. The flush handle on these toilets is pushed up for one kind of flush and down for the other.

In some places users are encouraged not to flush after urination. Flush toilets, if plumbed for it, may also use greywater (water previously used for washing dishes, laundry and bathing) for flushing rather than potable water (drinking water). Some modern toilets pressurize the water in the tank which initiates flushing action with less water usage.

The modern water closet or toilet utilizes a cistern to reserve and hold the correct amount of water required to flush the toilet bowl. In earlier toilets, the cistern was located high above the toilet bowl and connected to it by a long pipe. It was necessary to pull a hanging chain connected to a release valve located inside the cistern in order to flush the toilet. Modern toilets may be close coupled, with the cistern mounted directly on the toilet bowl and no intermediate pipe. In this arrangement, the flush mechanism (lever or push button) is usually mounted on the cistern. Concealed cistern toilets, where the cistern is built into the wall behind the toilet, are also available. A flushing trough is a type of cistern used to serve more than one water closet pan at one time.

It will be appreciated that the flushing mechanism in a conventional flushing toilet provides a large flow of water into the bowl. As such, the mechanism usually incorporates a water regulating or tank fill valve so as to control the amount of water syphoned into the cistern of the toilet.

Tank-fill valve:

Tank fill valves are found in all tank-style toilets. The valves are of two main designs: the side-float design and the concentric-float design.

The side-float design uses a float on the end of a lever to control the fill valve. The float is usually shaped like a ball, so the mechanism is called a ball-valve or a ballcock. The float is located to one side of the main valve tower at the end of a rod or arm. As the side-float rises, so does the side-float-arm. The arm connects to the fill valve that blocks the water flow into the toilet tank, and thus maintains a constant level in the tank. As a typical example, a ballcock or float valve is often used to regulate the filling of a tank or cistern. In terms of the conventional functioning of this device, when the fluid level drops, the float descends, levering the valve opening and allowing more fluid to enter. Once the float reached the 'full' position, the arm presses the valve shut again.

Another type of tank fill valve is the concentric float valve. The concentric float valve opens when the fluid level is low, allowing more fluid to enter. When the fluid level returns to the full level, the valve is shut.

The newer concentric-float fill valve consists of a tower which is encircled by a plastic float assembly. Operation is otherwise the same as a side-float fill valve, even though the float position is somewhat different. By virtue of its more compact layout, interference between the float and other obstacles (tank insulation, flush valve, and so on) is greatly reduced, thus increasing reliability. The concentric-float fill valve is also designed to signal to users automatically when there is a leak in the tank, by making much more noise when a leak is present than the older style side-float fill valve, which tends to be nearly silent when a slow leak is present.

Tank style with flapper-flush valve:

In tanks using a flapper-flush valve, the outlet at the bottom of the tank is covered by a buoyant (plastic or rubber) cover, or flapper, which is held in place against a fitting (the flush valve seat) by water pressure. To flush the toilet, the user pushes a lever, which lifts the flush valve from the valve seat. The valve then floats clear of the seat, allowing the tank to empty quickly into the bowl. As the water level drops, the floating flush valve descends back to the bottom of the tank and covers the outlet pipe again. This system is common in homes in the US and in continental Europe. Recently this flush system has also become available in the UK due to a change in regulations.

Tank style with siphon flash-valve:

This flush valve system is sometimes referred to as a valveless system, since no traditional type of valve is required. Some would argue, however, that any system of regulating the flow of a fluid is still technically a valve. In the siphon-flush-valve system, the user pushes a lever or button, forcing the water up into the tank siphon passageway which then empties the water in the tank into the bowl. The advantage of a siphon over the flush valve is that it has no sealing washers that can wear out and cause leaks, so it is favoured in places where there is a need to conserve water.

These valves can sometimes be more difficult to operate than a "flapper"-based flush valve because the lever requires more torque than a flapper-flush-valve system. This additional torque required at the tank lever is due to the fact that a user must forcefully lift a certain amount of water up into the siphon passageway in order to initiate the siphon action in the tank.

Tank style with high-pressure or pressure-assist valve:

This system uses water main pressure to pre-pressurize a plastic tank located inside what otherwise appears to be the more typical ceramic flush tank. A flush cycle begins each time a user flushes the bowl. After a user flushes and the water in the pre-pressurized tank has finished emptying into the bowl, the outlet valve in the plastic tank shuts. Then the high pressure water from the main refills the plastic tank. Inside the tank is an air-filled balloon-like rubber diaphragm. As the higher-pressure mains water enters the tank, the rubber diaphragm is also pressurized and shrinks accordingly.

During flushing, the compressed air inside the diaphragm pushes the water into the bowl at a flow rate which is significantly higher than a tank style gravity-flow toilet. This system requires slightly less water than a gravity-flow toilet- or alternatively can be more effective for a similar amount of water. Pressure-assist toilets are sometimes found in both private (single, multiple, and lodging) bathrooms as well as light commercial installations (such as offices). They seldom clog, but the pressurized tanks require replacement about once every 10 years. They also tend to be noisier - a possible concern for residential settings. The inner bowl stays cleaner (in appearance) than gravity counterparts because of the larger water surface area and the toilet's forceful flush.

Tankless style with high-pressure (flush-ometer) valve:

Flusho-meter toilet flush valves are still often installed in commercial restrooms, and are frequently used for both toilets and urinals. Since they have no tank, they have zero recharge time, and can be used immediately by the next user of the toilet. They can be easily identified by their distinctive chrome pipe-work, and by the absence of a toilet tank or cistern, wherever they are employed.

Some flushometer models require the user to either depress a lever or press a button, which in turn opens a flush valve allowing mains-pressure water to flow directly into the toilet bowl or urinal. Other flushometer models are electronically triggered, using an infrared sensor to initiate the flushing process. Typically, on electronically triggered models, an override button is provided in case the user wishes to manually trigger flushing earlier. Some electronically triggered models also incorporate a true mechanical manual override which can be used in the event of the failure of the electronic system. In retrofit installations, a self-contained battery-powered or hard-wired unit can be added to an existing manual flushometer to flush automatically when a user departs.

Once a flushometer valve has been flushed, and after a preset interval, the flushometer mechanism closes the valve and stops the flow. The flushometer system requires no storage tank, but requires a high volume of water in a very short time.

It will be appreciated that each of the existing mechanisms of regulating the flow of water has significant drawbacks including the use of washers and the like which leads to the leakage of water.

OBJECT OF THE INVENTION:

It is an object of the invention to provide a system and a water regulating device and a method of regulating a flow of water in a cistern of a toilet, which provides the advantages and addresses some of the issues and deficiencies described above.

SUMMARY OF THE INVENTION:

According to a first aspect of the invention, there is provided a water regulating device, for use in a cistern of a toilet, said device including:

a reservoir;

a floating unit reversibly attached to said reservoir, said floating unit being displaceable between a dormant condition in which said floating unit is received in a detachable locking mechanism so as to reversibly lock said floating unit in place thereby preventing an inflow of water into said device and an in-use condition in which said floating unit is reversibly detached from said locking mechanism and water is allowed to flow into said system.

In an embodiment of the invention, said floating unit is operable to enable said floating unit to rise with a rise in the water level, when said device is in an in-use condition.

In an embodiment of the invention, said floating unit is reversibly attached to a reservoir that provides a latent elevation mechanism so as to enable said floating unit to be operatively elevated above a water level in said reservoir therefore ensuring that the floating unit is reversibly locked in place to seal the system and prevent further inflow of water into the system, when the device is in a dormant condition.

According to a second aspect of the invention, there is provided a method of regulating a flow of water in a cistern tank of a toilet, said method comprising the following steps:

reversibly attaching a floating unit to a reservoir;

displacing said floating unit between a dormant condition in which said floating unit is received in a detachable locking mechanism so as to reversibly lock said floating unit in place thereby preventing an inflow of water into said device and an in-use condition in which said floating unit is reversibly detached from said locking mechanism and water is allowed to flow into said system.

BRIEF DESCRIPTION OF THE DRAWINGS:

These and other features of this invention will become apparent from the following description of one example described with reference to the accompanying drawings in which:

Figure 1 shows a water regulating device, in accordance with an example embodiment of the invention; and

Figure 2 shows a method of regulating a flow of water in a cistern tank of a toilet, in accordance with an embodiment of the invention.

DETAILED DESCRIPTION OF THE DRAWINGS:

In Figure 1, a water regulating device, in accordance with embodiments of the invention, is generally described with reference to numeral 100.

The device 100 comprises a reservoir 102, a floating unit 104 and a detachable locking mechanism 106.

The floating unit is reversibly attached to the reservoir 102. The floating unit 104 is displaceable between a dormant condition in which said floating unit 104 is received in the detachable locking mechanism 106 so as to reversibly lock the floating unit 104 in place thereby preventing an inflow of water into said device 100 and an in-use condition in which the floating unit 104 is reversibly detached from the locking mechanism 106 and water is allowed to flow into the system 100.

In Figure 2, a method of regulating a flow of water in a cistern tank of a toilet, in accordance with embodiments of the invention, is generally described with reference to numeral 200.

The method includes, at block 202, reversibly attaching a floating unit to a reservoir.

At block 204, water is prevented from flowing into the device. In particular, at block 206, the floating unit is received in a detachable locking mechanism so as to reversibly lock the floating unit in place.

At block 208, water is allowed to flow into the device. In particular, at block 210, the floating unit is reversibly detached from the locking mechanism.

CLAIMS:

1. A water regulating device, for use in a cistern of a toilet, said device including:

a reservoir;

a floating unit reversibly attached to said reservoir, said floating unit being displaceable between a dormant condition in which said floating unit is received in a detachable locking mechanism so as to reversibly lock said floating unit in place thereby preventing an inflow of water into said device and an in-use condition in which said floating unit is reversibly detached from said locking mechanism and water is allowed to flow into said system.

2. A water regulating device, as claimed in claim 1, wherein said floating unit is operable to enable said floating unit to rise with a rise in the water level, when said device is in an in-use condition.

3. A water regulating device, as claimed in any of the preceding claims, wherein said floating unit is reversibly attached to a reservoir that provides a latent elevation mechanism so as to enable said floating unit to be operatively elevated above a water level in said reservoir therefore ensuring that the floating unit is reversibly locked in place to seal the system and prevent further inflow of water into the system, when the device is in a dormant condition.

4. A method of regulating a flow of water in a cistern tank of a toilet, said method comprising the following steps:

reversibly attaching a floating unit to a reservoir;

displacing said floating unit between a dormant condition in which said floating unit is received in a detachable locking mechanism so as to reversibly lock said floating unit in place thereby preventing an inflow of water into said device and an in-use condition in which said floating unit is reversibly detached from said locking mechanism and water is allowed to flow into said system.

5. A water regulating device, as hereinbefore described, with reference to and as illustrated in any of the accompanying diagrammatic drawings.

6. A method of regulating a flow of water in a cistern tank of a toiler, as hereinbefore described, with reference to and as illustrated in any of the accompanying diagrammatic drawings.

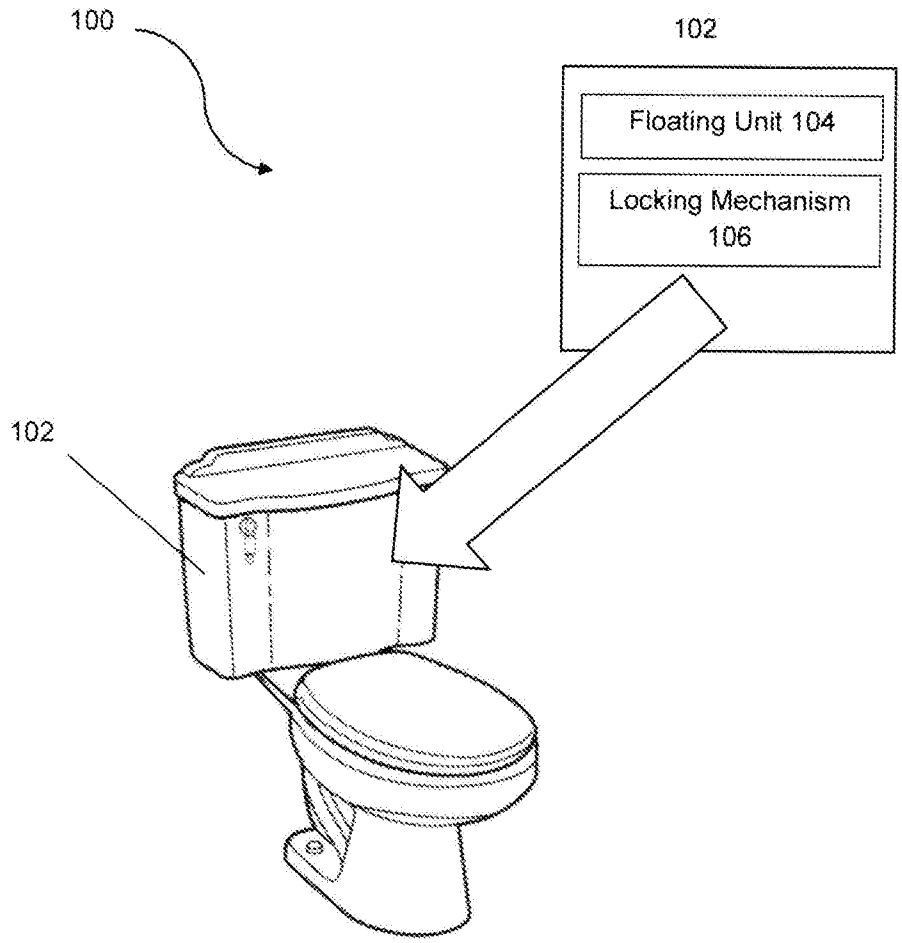

Figure 1

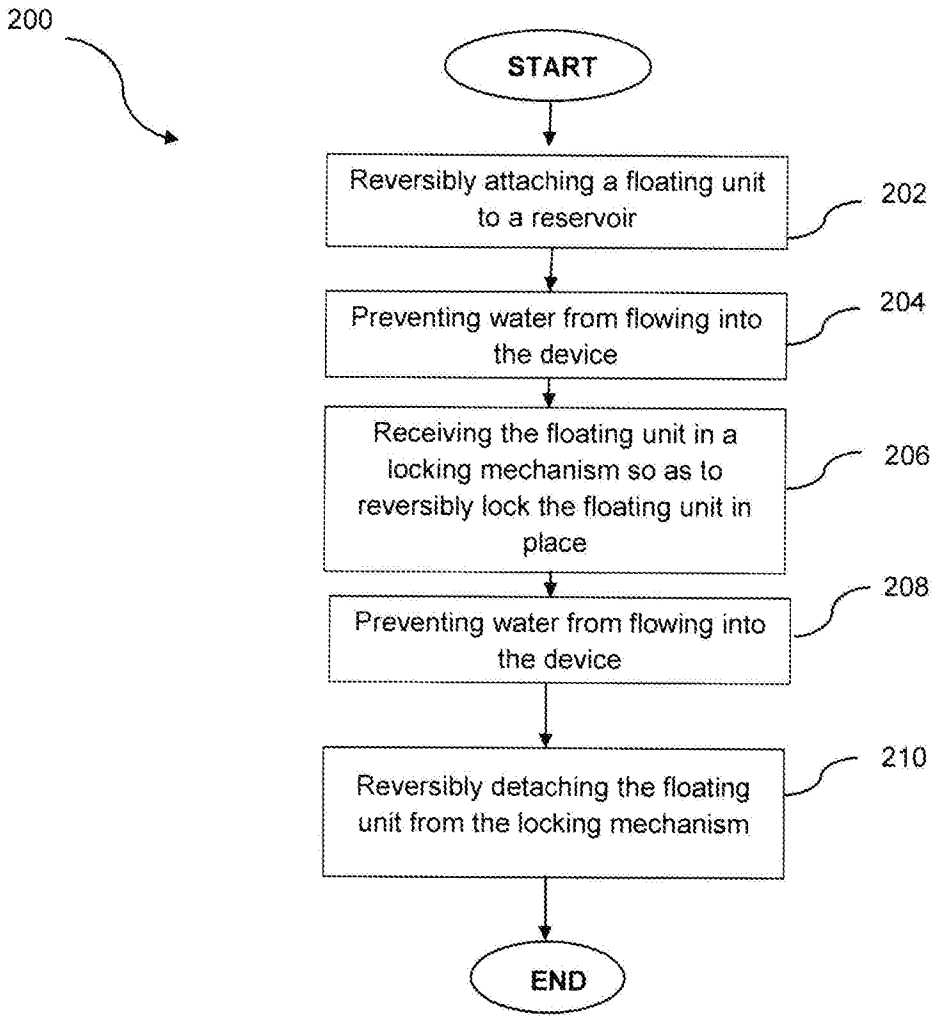
200
START
Reversibly attaching a floating unit to a reservoir
202
Preventing water from flowing into the device
204
Receiving the floating unit in a locking mechanism so as to reversibly lock the floating unit in place
206
Preventing water from flowing into the device
208
Reversibly detaching the floating unit from the locking mechanism
210
END

Figure 2