

Flowable Material Dispensing Apparatus

Field of the Invention

The present invention relates to an apparatus and method for dispensing flowable materials. In particular, the present invention has been developed for the dispensing of sanitary liquids into sanitation systems in bathroom and toilet environments. It will be appreciated that the invention is not limited to this particular field of use, and that it can be applied to other applications requiring the slow release of liquids.

Background of the Invention

It is often desirable to introduce a sanitary liquid into the water flow path of a sanitation system such as a flush toilet or urinal. The sanitary liquid may be a disinfectant, detergent, pipe cleaning agent, deodorant or other such sanitary additive.

Known liquid dispensing apparatus direct a volume of water from the toilet cistern or urinal inlet pipe into a container holding a concentrated volume of the sanitary additive. The water and sanitary additive are permitted to mix, and the water subsequently directed into the toilet or urinal bowl contains a diluted volume of the sanitary liquid. A disadvantage of such devices is that the concentrated volume of sanitary additive in the container becomes increasingly diluted during use. This reduces the devices ability to deliver a consistent, regulated amount of the sanitary additive to the toilet bowl or urinal.

WO98/27288 in the name of Calfarme (Singapore) Pte Ltd discloses a dispenser for flowable materials that utilises a twin container arrangement. A duct from a toilet or urinal is connected to a first container containing a volume of sanitary liquid, and the first container is connected to a second container. When water and/or air pressure from the toilet or urinal passes through the duct, the change in pressure breaks the hydrostatic seal of the first container and allows a small volume of concentrated sanitary liquid to flow into the second container. When the water or air pressure ceases the hydrostatic surface tension again seals the first container, and the small volume of concentrate that previously escaped from the first container is allowed to flow through the duct and subsequently into the toilet bowl or urinal. A disadvantage of this system is that the design requires two separate containers, which is costly from a manufacturing perspective. In addition, the device does not provide a consistent volume of concentrated fluid for each flush of the toilet or urinal.

Summary

It is an object of the present invention to substantially overcome or at least ameliorate one or more of the disadvantages of the prior art, or at least to provide a useful alternative.

5 Accordingly, in a first aspect, the present invention provides a bracket assembly for a flowable material dispensing apparatus, the bracket comprising:

a first end having a mounting portion attachable to a container of the dispensing apparatus, and

a second end operatively engagable with a wall or rim of a sanitation system
10 flush tank,

wherein the bracket is selectively adjustable to vary the length between the first and second ends, such that an outlet of the container is operatively located between high and low water levels of the flush tank during a flushing operation thereof.

In a second aspect, the invention provides a flowable material dispensing
15 apparatus comprising:

a first container for holding the flowable material, the first container having an inlet opening adapted to receive a flow condition, and an outlet opening, the inlet and outlet openings being adapted to operatively face downwards,

a second container in fluid communication with the first container, the second
20 container having at least one inlet passage in fluid communication with a sanitation system, and an outlet passage in fluid communication with the sanitation system, wherein the inlet passage includes a flow restriction adapted to selectively limit the flow condition,

wherein the second container is formed by a removable cap member interferingly
25 attachable to the first container such that an outer surface of the first container is separated from an inner surface of the second container by a narrow space therebetween,

wherein the flow condition from the sanitation system passes through the inlet
passage into the second container and breaks a hydrostatic seal of the first container outlet opening, permitting outflow of a volume of flowable material into the second container,
30 and

wherein when the flow condition ceases the hydrostatic seal re-forms, substantially sealing the first container, and the volume of flowable material in the second container flows through the outlet passage into the sanitation system.

In a third aspect, the invention provides a flowable material dispensing apparatus
35 comprising:

a first flowable material storage container, having an outlet aperture on an underside thereof, the outlet aperture operatively facing downwardly and adapted to receive a flow condition,

a second container in fluid communication with the first container, the second container attachable to a conduit in fluid communication with a sanitation system,

wherein the second container is a removable cap member interferingly attachable to the first container such that an outer surface of the first container is separated from an inner surface of the second container by an internal cavity,

wherein the flow condition from the sanitation system passes through the conduit into the second container and breaks a hydrostatic seal of the first container outlet aperture, permitting outflow of a volume of flowable material into the second container, and

wherein when the flow condition ceases, the hydrostatic seal re-forms sealing the first container outlet aperture, and the volume of flowable material in the second container flows through the conduit into the sanitation system.

In a fourth aspect, the present invention provides A flowable material dispensing apparatus comprising:

a flowable material storage container, having an outlet aperture on an underside thereof, said outlet aperture operatively facing downwardly and adapted to receive a flow condition,

a conduit attached to the outlet aperture of the container, the conduit being in fluid communication with a sanitation system,

wherein the flow condition from the sanitation system passes through the conduit and breaks a hydrostatic seal of the container outlet aperture, permitting outflow of a volume of flowable material from the container, and

wherein when the flow condition ceases, the hydrostatic seal re-forms sealing the container outlet aperture, and the expelled volume of flowable material flows through the conduit into the sanitation system.

Preferably the second end of the bracket has a hook adapted to engage with a rim of the flush tank.

The first end of the bracket preferably includes an arm with a substantially U shaped opening adapted to receive a neck region of the container.

One of the first and second ends preferably has a plurality of rib members and the other of the first and second ends preferably has one or more oppositely facing rib

members, such that the ribs on the first and second ends interferingly mesh and provide a plurality of adjustable positions of the bracket.

Preferably the inlet passage and outlet passage are formed from a single conduit, and fluid flow is permitted in either direction through the conduit.

5 The conduit is preferably attached to an underside surface of the cap member.

The inlet and outlet openings of the first container are preferably formed by a single opening.

The first and second containers are preferably located in a generally enclosed housing unit, the housing unit having a pivotally openable cover member.

10 The conduit preferably passes through an aperture in the housing unit.

Preferably the flow condition is an air current, a liquid current, or a current consisting of a mixture of air and liquid.

A portion of the conduit located between the cap member and the housing unit is preferably formed from a resilient material permitting the first container and the cap member to be removed from the housing unit whilst still connected to the conduit.

The cap member is removably attached to the first container directly beneath the inlet opening, and the conduit is attached to an opposing side of the cap member, such that the conduit and inlet opening are coaxial and separated by the narrow space.

20 The cap member preferably has a flowable material receiving well formed in its base.

The well is preferably arcuate in profile.

the first container and the cap member are preferably connected in substantially air tight engagement.

Brief Description of the Drawings

25 A preferred embodiment of the invention will now be described, by way of example only, with reference to the accompanying drawings in which:

Figure 1a is a partially sectioned side view of a flowable material dispensing device according to a first embodiment of the invention.

Figure 1b is a bottom view of the dispensing device shown in Figure 1a.

30 Figure 2 is a sectional view of a second embodiment of the flowable material dispensing device according to the present invention.

Figure 3 is a sectional view of the flowable material dispensing device of Figure 2 with the housing unit included.

Figure 4 is a perspective view of the flowable material dispensing device of the second embodiment with the housing unit open.

Figure 5 shows a conventional urinal and the connection method with the second embodiment of the present invention.

5 Figure 6 is a sectional view of a third embodiment of the flowable material dispensing device according to the present invention.

Detailed Description of the Preferred Embodiments

Figure 1a shows a first embodiment of a flowable material dispensing apparatus, generally indicated by the reference numeral 10. The apparatus 10 includes a container
10 12 with an interior storage volume for accommodating a sanitary liquid 14. The container 12 has a neck portion 16 which extends downwardly from the underside of the container 12. The neck portion 16 is externally threaded, and has an internal opening sufficiently wide to permit the container 12 to be refilled with sanitary liquid 14 as required.

A cover member 18 is provided with a small central aperture 20, and is placed
15 within the opening of neck portion 16 to substantially seal the container 12. A cap 22 with an internal thread is fitted to the complementary thread on the exterior of the neck portion 16. By fastening the cap 22, a liquid tight seal is achieved between the container 12 and the cover member 18, such that the only escape route for the liquid 14 is through the aperture 20 in the cover 18. A rubber seal washer 19 may be included between the
20 cover 18 and the cap 22, the washer also having a central aperture adjacent to aperture 20. In an embodiment not shown in the drawings, the cover 18 and cap 22 may be integrally formed from a single component.

A bracket assembly 24 is attached to the container 12 and supports the container 12 with the neck portion 16 facing downwardly. The bracket assembly 24 includes two
25 elongated members 28a, 28b. The member 28a is L shaped in profile (as illustrated in Figure 1a) and has U shaped lower arms 28c (best seen in figure 1b) that are adapted to support the container 12 around opposing sides of the neck 16. The member 28b includes a hook 26 that latches onto the rim of a cistern/flush tank (not shown) of a toilet system and operates to suspend the apparatus 10 within the cistern/flush tank.

30 The first member 28a has a number of transverse ribs 30 that extend substantially along the length of it's upright portion. The second bracket member 28b has a single raised transverse rib 32 that engages with the multiple ribs 30 of the first bracket member 28a. The two bracket members 28a, 28b are interferingly slidable relative to each other to adjust the length of the bracket assembly 24. Accordingly, the suspended height of the

container 12 is adjustable with respect to the rim of the cistern/flush tank, and therefore relative to the water level in the cistern/flush tank.

The engagement between the opposing ribs 30, 32 on the first and second bracket members 28a, 28b ensures that the bracket assembly 24 maintains its desired length after each adjustment. The bracket assembly 24 may alternatively utilise another adjustment means such as a pin and socket arrangement. Alternatively, the bracket may be made at a fixed length to correspond to a particular make or style of toilet cistern, or urinal flush tank.

The operation of the dispensing apparatus 10 will now be described. In use, the apparatus 10 is placed inside the cistern of a toilet, or urinal flush tank. The length of the bracket 24 is adjusted to ensure that the central aperture 20 is located vertically between the high and low water levels inside the cistern that are encountered during flushing and refilling of the cistern.

After the cistern/flush tank has been flushed, the aperture 20 is above the surface level of the water, and the aperture 20 is exposed to the air (atmospheric pressure) in the cistern, thereby creating a flow condition. As the water fills in the cistern/flush tank, the contact between the water in the cistern and the aperture 20 breaks the film of surface tension at the aperture 20, and the sanitary liquid 14 begins to flow out of the container 12 through aperture 20 into the cistern due to the hydrostatic pressure acting on the aperture 20. The flow of sanitary liquid 14 from the container 12 reduces the internal pressure within the container 12 until the internal pressure acting on the aperture 20 equalises with the external pressure acting on the aperture 20. At this point the flow of liquid out of the container 12 ceases.

When the toilet or urinal is flushed, the water in the cistern with the dispersed quantity of sanitary liquid 14 are expelled into the toilet bowl or urinal. At this point, the aperture 20 is again exposed to air in the cistern, and a small quantity of air is drawn into the container 12 through the aperture 20. The drawing of this additional air ceases when the pressure of the air in the top of the container 12 equals the atmospheric air pressure. A film of the sanitary liquid 14 then occludes the opening 20, preventing the transfer of any further fluids in or out of the container 12. The water in the cistern subsequently refills after the completion of the flushing operation, and the process begins again.

The volume of sanitary liquid 14 expelled from the aperture 20 can be varied by altering the area of the aperture 20.

Figures 2 to 4 show an embodiment of a flowable material dispensing apparatus, generally indicated by the reference numeral 40. The apparatus 40 includes a container

42 with an interior storage volume for accommodating a sanitary liquid 14. The container 42 has a neck portion 44 which extends downwardly from the underside of the container 42. The neck portion 44 has an internal opening which is sufficiently wide to permit the container 42 to be refilled with sanitary liquid 14 as required.

5 A cover member 46 is provided with a small central aperture 48, and is placed in the opening of the neck portion 44 to substantially seal the container 42, such that the only path for fluid to enter or exit the container 42 is through the aperture 48.

A cap 50 as best seen in Figure 2 is fitted around the neck portion 44, such that a cavity 52 is formed between the cap 50 and the cover member 46. The cap 50 attaches to
10 the neck portion 44 with an interference, airtight fit. The cap 50 has a curved base 51 that defines a well formed by the internal surface of the cap 50, and which represents a lower portion of the cavity 52. The lowest portion of the well is located directly beneath the aperture 48 of cover member 46. The cap 50 also includes an aperture 54 located in the lowest region of the well. The apertures 48 and 54 of the cap 50 and the cover 46 are
15 substantially co-axial.

One end of a duct 56 is attached to the external surface of the cap 50, such that the duct 56 joins the cap adjacent to the aperture 54, at the bottom of the well, and there is a fluid flow path from the duct 56 into the cavity 52, through aperture 54.

The duct 56 may be formed from flexible rubber, an elastomer or another
20 suitable material. As seen in Figures 3 and 4, the duct 56 is fitted at its other end to a housing unit 58a. The housing unit 58a is a receptacle that can be mounted to a wall or other such surface in a bathroom environment. The housing unit 58a has a door 58b shown in Figure 4 which pivotally opens to provide access to the container 42 for refilling of the sanitary liquid 14 and maintenance purposes. A lock may be fitted to ensure the
25 door 58b is not opened by unauthorised persons.

As shown in Figure 3 the housing unit 58a has a main duct 60 which is directly connected to a mains flow pipe 66 of the toilet cistern or urinal. An elbow connector 62 attaches the main duct 60 to the housing unit 58a. The connector 62 includes a flow restriction device such as a slidable plastic or steel sphere 64, or other such adjustable
30 control valve. The flow restriction device selectively restricts and substantially prevents water from flowing into the duct 56, whilst at the same time substantially impeding the exiting of the sanitary liquid 14 from the duct 56.

The operation of the device 40 will now be described. The container 42 is filled with a sanitary liquid 14 such as a disinfectant or deodorant, and the container 42 is
35 mounted inside the housing unit 58a. When the toilet or urinal is flushed, a flow

condition is created as fluid is diverted through the main duct 60 towards the housing unit 58a. The fluid may be a burst of air, water from the toilet cistern, or a combination of water and air.

5 The fluid flow condition subsequently passes through the connector 62 and enters into the flexible duct 56. As the flow condition passes through the connector, the flow restricting sphere reduces the magnitude of the flow condition. The fluid passes through the flexible duct 56 and through the aperture 54 in the cap 50 into cavity 52.

The fluid then breaks the hydrostatic seal of liquid surface tension acting in the aperture 48 of the cover 46. A volume of sanitary liquid is then permitted to escape
10 through aperture 48. The excreted sanitary liquid collects in the well of the cap 50.

Once the flow condition from the toilet or urinal has ceased, the sanitary liquid drains from the well through aperture 54 in the cap 50. The sanitary liquid 14 mixes with the fluid and subsequently drains back into the toilet or urinal system through the main duct 60. When the fluid inflow from the toilet has ceased, the aperture 48 in the cover 46
15 is again exposed to air, such that the film of surface tension is permitted to reform. The surface tension prevents the out flow of any further sanitary liquid 14 from the container 42 until a further fluid inflow from the toilet or urinal occurs.

Figure 5 illustrates an example of the connection between the liquid dispensing device 40 and a convention urinal that enables the flow condition to be created. Water
20 from the mains pipe 66 flows into the urinal during a flushing operation. A portion of the water from the mains pipe is diverted along the main duct 60 in the direction of the arrow. Air may also be directed along main duct 60. The air and/or water subsequently interact with the flowable material dispensing device 40 as described above.

In the embodiment shown in figure 6, the sanitary liquid 14 inside the container
25 12 is directly in contact with aperture 54 of the cap 50.

Embodiments of the invention may also be connected to other types of sanitation systems such as wash basins and the like.

An advantage of the second embodiment is that the cap 50 provides a predefined volume for containment of the sanitary liquid 14. In the event that the fluid flow
30 condition through the main duct 60 is larger than normal, the cap 50 prevents the excretion of an excessive amount of the sanitary liquid 14. This ensures that the sanitary liquid 14 is not consumed excessively quickly.

A further advantage of the second embodiment is that the flexible duct 56 permits the container 42 to be extracted from the housing unit 58 whilst the duct 56 is still
35 attached to the cap 50. The container 42 can be oriented upside down before the cap 50 is

removed. This prevent the sanitary liquid 14 from being spilled during refilling and maintenance.

Although the invention has been described with reference to specific examples, it will be appreciated by those skilled in the art that the invention may be embodied in many
5 other forms.

The claims defining the invention are as follows;

1. A bracket assembly for a flowable material dispensing apparatus, said bracket comprising:

5 a first end having a mounting portion attachable to a container of the dispensing apparatus, and

a second end operatively engagable with a wall or rim of a sanitation system flush tank,

wherein the bracket is selectively adjustable to vary the length between the first and second ends, such that an outlet of the container is operatively located between high and low water levels of the flush tank during a flushing operation thereof.

2. The bracket assembly of claim 1, wherein the second end has a hook adapted to engage with a rim of the flush tank.

3. The bracket assembly of claim 1 or 2, wherein the first end includes an arm with a substantially U shaped opening adapted to receive a neck region of the container.

4. The bracket assembly of claim 1, 2 or 3, wherein one of said first and second ends has a plurality of rib members and the other of said first and second ends has one or more oppositely facing rib members, such that the ribs on the first and second ends interferingly mesh to provide a plurality of adjustable positions of the bracket.

5. A flowable material dispensing apparatus comprising:

20 a first container for holding the flowable material, the first container having an inlet opening adapted to receive a flow condition, and an outlet opening, said inlet and outlet openings being adapted to operatively face downwards,

25 a second container in fluid communication with the first container, said second container having at least one inlet passage in fluid communication with a sanitation system, and an outlet passage in fluid communication with the sanitation system, wherein the inlet passage includes a flow restriction adapted to selectively limit the flow condition,

30 wherein the second container is formed by a removable cap member interferingly attachable to the first container such that an outer surface of the first container is separated from an inner surface of the second container by a narrow space therebetween,

wherein the flow condition from the sanitation system passes through the inlet passage into the second container and breaks a hydrostatic seal of the first container outlet opening, permitting outflow of a volume of flowable material into the second container, and

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wherein when the flow condition ceases the hydrostatic seal re-forms, substantially sealing the first container, and the volume of flowable material in the second container flows through the outlet passage into the sanitation system.

6. The apparatus of claim 5, wherein the inlet passage and outlet passage
5 are formed from a single conduit, and fluid flow is permitted in either direction through the conduit.

7. The apparatus of claim 6, wherein the conduit is attached to an underside surface of the cap member.

8. The apparatus of claim 5 or 6, wherein the inlet and outlet openings of
10 the first container are formed by a single opening.

9. The apparatus of claims 6 or 7, wherein the first and second containers are located in a generally enclosed housing unit, the housing unit having a pivotally openable cover member.

10. The apparatus of claim 9, wherein the conduit passes through an
15 aperture in the housing unit.

11. The apparatus of any one of claims 5 to 10, wherein the flow condition is an air current, a liquid current, or a current consisting of a mixture of air and liquid.

12. The apparatus of claim 10, wherein a portion of the conduit located between said cap member and the housing unit is formed from a resilient material
20 permitting the first container and the cap member to be removed from the housing unit whilst still connected to the conduit.

13. The apparatus of any one of claims 6 to 11, wherein the cap member is removably attached to the first container directly beneath the inlet opening, and the conduit is attached to an opposing side of the cap member, such that the conduit and inlet
25 opening are coaxial and separated by the narrow space.

14. The apparatus of any one of claims 5 to 12, wherein said cap member has a flowable material receiving well formed in its base.

15. The apparatus of claim 13, wherein the well is arcuate in profile.

16. The apparatus of any one of claims 5 to 14, wherein the first container
30 and the cap member are connected in substantially air tight engagement.

17. A flowable material dispensing apparatus comprising:

a first flowable material storage container, having an outlet aperture on an underside thereof, said outlet aperture operatively facing downwardly and adapted to receive a flow condition,

a second container in fluid communication with the first container, said second container attachable to a conduit in fluid communication with a sanitation system,

wherein the second container is a removable cap member interferingly attachable to the first container such that an outer surface of the first container is separated from an inner surface of the second container by an internal cavity,

wherein the flow condition from the sanitation system passes through the conduit into the second container and breaks a hydrostatic seal of the first container outlet aperture, permitting outflow of a volume of flowable material into the second container, and

wherein when the flow condition ceases, the hydrostatic seal re-forms sealing the first container outlet aperture, and the volume of flowable material in the second container flows through the conduit into the sanitation system.

18. A flowable material dispensing apparatus comprising:

a flowable material storage container, having an outlet aperture on an underside thereof, said outlet aperture operatively facing downwardly and adapted to receive a flow condition,

a conduit attached to the outlet aperture of the container, the conduit being in fluid communication with a sanitation system,

wherein the flow condition from the sanitation system passes through the conduit and breaks a hydrostatic seal of the container outlet aperture, permitting outflow of a volume of flowable material from the container, and

wherein when the flow condition ceases, the hydrostatic seal re-forms sealing the container outlet aperture, and the expelled volume of flowable material flows through the conduit into the sanitation system.