

PATENT SPECIFICATION

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(54) SANITARY APPARATUS

(71) We, CALMIC LIMITED, of Crewe Hall, Crewe, Cheshire, a company incorporated in England, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to an apparatus for deodorising the atmosphere and is primarily concerned with an apparatus whereby the air in a particular locality is automatically given a charge of a volatile deodorant or disinfectant from time to time, for example, as with each flushing operation of a water supply cistern.

A deodorising apparatus in which air displaced by water from the flushing of a cistern is caused to pass through or by a pad soaked in deodorant liquid is known (see, for example, U.K. patent specification No. 1,069,213). In such an apparatus, the air displaced picks up deodorant vapour from the pad and then passes into the atmosphere. However, pads have some disadvantages in that they have to be changed periodically, they increase the initial cost of the apparatus, they can collect solid particles, thus becoming contaminated, and expensive deodorant liquid is wasted. It would, therefore, be advantageous to provide a deodorising apparatus in which pads were not required. Some suggestions have been made for providing a deodorising apparatus not requiring pads. Thus, in U.K. patent specification No. 782,872, it is stated that the air displaced may be caused to bubble through the deodorant liquid. However, a difficulty here is that there is often a suck-back effect at the end of the flush and deodorant liquid is sucked back along the air pipe and lost. This difficulty is overcome in U.K. patent specification No. 782,872 by providing a non-return valve. This, however, increases the cost and complexity of the

[Price 25p]

apparatus and increases maintenance problems. Indeed, the invention of specification No. 782,872 has not been adopted commercially, as far as is known.

It is believed that a deodorising apparatus in which air is bubbled directly into deodorant liquid provides a more uniform dispersion of deodorant than is obtained in a deodorising apparatus incorporating a pad. Moreover, the former apparatus has a smaller surface area of deodorant liquid compared with the latter apparatus thus reducing losses by evaporation, and ensuring more effective use of deodorant liquid.

It has now been found, however, that a deodorising apparatus can be provided which enables air displaced by water from a flushing cistern to be bubbled directly into deodorant liquid and at the same time overcomes the above-mentioned problem of suck-back in a manner which is automatically effective and is very simple, requiring no valves or complicated devices.

Thus, according to the present invention there is provided a deodorising apparatus in which a flow of air generated by movement of water at some stage in a flushing cycle is directed into a first vessel capable of receiving a liquid and from thence passes upwardly through the shorter leg of a syphon duct, whose mouth is disposed within the first vessel, then downwardly through the longer leg of the syphon duct, whose outlet is disposed within a second vessel, and then passes from the longer leg of the syphon duct into a deodorant liquid contained in the second vessel from which it emerges to deodorize the surrounding atmosphere, the mouth of the shorter leg of the syphon duct being near to the base of said first vessel and being above the outlet of the longer leg.

A deodorising apparatus of the present invention comprises a chamber into which flush water is allowed to rise to displace

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air therefrom either during the filling of a flushing cistern or during a flush therefrom, a first vessel capable of receiving a liquid, said vessel being in pneumatic communication
 5 with said chamber to receive air discharged therefrom, a second vessel for receiving a deodorant liquid, and a syphon duct whose shorter leg extends upwardly from a point within said first vessel and adjacent the base
 10 thereof and whose longer leg extends downwardly towards the base of said second vessel to a point therewithin, said vessels being pneumatically isolated from one another except for the connection afforded there-
 15 between by said syphon tube.

The deodorising apparatus of the present invention may be used in conjunction with both "high-flush" cisterns and "low-flush" cisterns. Thus, when used a "high-flush"
 20 cistern, the chamber may be connected to the flush pipe of the cistern so that water passing down the flush pipe enters the chamber to displace air therefrom. In a "low-flush" cistern, however, insufficient pressure is
 25 developed in the flush pipe during the flush. The chamber is therefore positioned in the cistern with an open end near the bottom of the cistern, the open end being above the minimum water level, so that when the
 30 cistern is being filled with water, air is displaced upwardly from the chamber. It will be observed, therefore, that when the deodorising apparatus is used with a "high-flush" cistern, the deodorising draught of air is
 35 produced during the actual flushing of the cistern, whereas when used with a "low-flush" cistern, the deodorising draught is produced during the filling of the cistern.

After the air has ceased to pass through
 40 the syphon duct in the operation of the present invention, there is often a suck-back effect which sucks deodorant liquid into the syphon duct. The deodorant liquid would thus be wasted but for the provision of the
 45 first vessel, in which the sucked-back liquid is collected. When the suck-back ceases, the liquid in the first vessel flows back along the syphon tube, by syphon action, into the second vessel. Thus, loss of expensive de-
 50 odorant liquid is simply and automatically minimised or avoided. Moreover, in some cases, the agitation caused by the movement of the liquid back into the second vessel causes further deodorant vapour to be re-
 55 leased.

In a preferred form, the deodorizing apparatus of the present invention comprises two chambers each with a vessel therein for receiving liquid, one of which chambers is
 60 connectable to a flushing system so as to give rise to an increase of pressure in said one chamber at some stage of a flushing cycle and to a subsequent return to normal pressure therein, and the other of which
 65 chambers has an air discharge opening, and

a syphon duct whose shorter leg extends upwardly from a point within the vessel of said one chamber and adjacent the base of that vessel and whose longer leg extends
 70 downwardly towards the base of the vessel of said other chamber to a point within the latter vessel so that the lower end of the longer leg lies below the lower end of the shorter leg, said chambers being pneumatically
 75 isolated from one another except for the connection therebetween afforded by said syphon duct. Thus, as stated above, the displacement of air giving rise to an increase in pressure takes place during the flush when
 80 the deodorizing apparatus is used in conjunction with a "high-flush" cistern and whilst the cistern is filling when used in conjunction with a "low-flush" cistern.

In the operation of the preferred form of the deodorizing apparatus, when used
 85 in conjunction with a "high-flush" cistern, water rises in the said one chamber during a flush to drive air from the said one chamber through said syphon duct to adjacent the base of the vessel in said other cham-
 90 ber, through deodorant liquid in the last-mentioned vessel and thence through said air discharge opening into the atmosphere. Deodorant liquid is sucked back through the
 95 syphon duct from the vessel in said other chamber to the vessel in said one chamber while the water drains from said one chamber, is subsequently syphoned back into the vessel in said other chamber.

Conveniently, the preferred form of the
 100 deodorising apparatus, when used in conjunction with a "high-flush" cistern, is provided with a float in said one chamber, said float being connected to a valve, positioned
 105 to control the flow of water into said one chamber. Thus, when sufficient water has entered said one chamber, the float activates the valve so preventing further flow of water into said one chamber.

In the operation of the preferred form
 110 of the deodorizing apparatus, when used in conjunction with a "low-flush" cistern, air pressure rises in said one chamber at some stage of a flushing cycle and the air is driven
 115 from the said one chamber through said syphon duct to adjacent the base of the vessel in said other chamber, through deodorant liquid in the last-mentioned vessel and thence through said air discharge opening
 120 into the atmosphere. Deodorant liquid is syphoned back in the same way as in the apparatus used in conjunction with a "high-flush" cistern, in cases where the liquid is sucked-back. A convenient means for causing
 125 air pressure to rise in said one chamber is provided by a further chamber having an open bottom, positioned in the cistern and connected by a conduit to said one chamber. Thus, when the cistern fills, air is displaced
 130 from the further chamber and thence into

said one chamber.

In the preferred form of deodorizing apparatus according to the present invention said chambers can be incorporated in a single container with said air discharge opening in its upper part and with the syphon tube passing through a partition which seals one chamber from the other, passing below the vessel in said other chamber and above the vessel in said one chamber. Conveniently, said partition can comprise the vessel of said other chamber.

Examples of deodorant liquids which can be used in the apparatus of the present invention are:

1. a mixture of isoeugenol, eugenol, geraniol and aromatic chemicals;
2. a mixture of citrus oil, lemongrass oil and aromatic chemicals;
3. a mixture of essential oils of lavender and orange together with aromatic chemicals; and
4. a mixture of essential oils and their derivatives isolates containing 30% isopropyl alcohol.

It will, however, be readily appreciated that the liquids used in the apparatus of the present invention need not necessarily be restricted to deodorant liquids. Thus, any volatile liquid, the vapour of which it is desired to disperse into the air, could be used, for example, perfumes, insecticides, aromatics and the like.

The invention will now be further described by way of example with reference to the somewhat diagrammatic drawings which accompany the provisional specification and which illustrate two forms of deodorizing apparatus according to the present invention and in which:—

Fig. 1 is a front view of a high-flush arrangement;

Fig. 2 is a section on the line A-A of Fig. 1;

Fig. 3 is a section on the line B-B of Fig. 1;

Fig. 4 is a front view of a low-flush arrangement; and

Fig. 5 is a section on the line B-B of Fig. 4, a section on the line A-A of Fig. 4 being the same as Fig. 2.

Referring first of all to Figs. 1, 2 and 3, the outer container 1 comprises a shell having a back-wall 2, a front-wall 3 and a base 9, and a grille 4 sealed to the back-wall 2 and front-wall 3. The grille 4 is secured in position by a screw 5 which engages in a threaded pillar 6 held by a second screw 7 to the inner face of the back-wall 2.

A pipe connection 10 is secured to the base 9 of the outer container 1. A pipe 11 of the pipe connection 10 leads to a flush pipe. The pipe connection 10 includes a valve housing 12. A valve 15 in the valve housing 12 has a valve stem 16 connected

at its upper end to a float 17, comprising a sealed hollow container which may be of metal or plastics material. The outer container 1 has two chambers 23 and 24 which are separated by an internal diaphragm 18, which is held in position by the screw 5 and sealed by an epoxy resin gasket (not shown). The diaphragm 18 is conveniently constructed from an acetal copolymer such as "Kematal" (Registered Trade Mark). Each chamber 23 and 24 is provided with a vessel 19 and 22 for receiving liquid. The second vessel 19 is actually part of the diaphragm 18 and the first vessel 22 is firmly affixed to the back-wall 2 of the outer container 1.

The other chamber 24 is connectable to a flushing system via the valve housing 12, the pipe connection 10 and the pipe 11. A syphon duct in the form of a copper U-tube 20 passes through the diaphragm 18 and is held in position by means of a neoprene grommet 21. The shorter leg 25 of the U-tube 20 extends upwardly from adjacent the base of the first vessel 22 of the chamber 24 and longer leg 26 of the U-tube 20 extends downwardly towards the base of the second vessel 19 of the chamber 23. The lower end of the longer leg 26 lies below the lower end of the shorter leg 25. The chambers 23 and 24 are pneumatically isolated from one another except for the connection therebetween afforded by the U-tube 20.

In operation of the deodorizing apparatus depicted in Figs. 1, 2 and 3, a flush of water passes down the flush pipe to which the pipe 11 is connected. Water enters the chamber 24 and rises therein. The float 17 and the valve 15 are arranged to restrict the rise of water in the chamber 24. The movement of water causes a flow of air to be generated. The air passes into the first vessel 22, upwardly through the shorter leg 25 of the U-tube 20, downwardly through the longer leg 26 of the U-tube 20 into deodorant liquid contained in the second vessel 19. The air thus picks up deodorant and passes through the grille 4 into the atmosphere.

At the end of the flush, water drains from the chamber 24 and a fresh supply of air is drawn in. There is often a suck-back at the end of the flush and deodorant liquid tends to be drawn from the vessel 19 along the U-tube 20 and into the vessel 22. When the suck-back ceases, the deodorant liquid which has been collected in the vessel 22 passes along the U-tube 20 and back into the vessel 19 by syphon action.

Referring now to Figs. 4 and 5, certain parts are identical with those in Figs. 1, 2 and 3 and these have been given the same reference numerals. Moreover the section according to Fig. 2 also applies to the embodiment of Figs. 4 and 5.

The embodiment of Figs. 4 and 5 differs from that of Figs. 1 to 3 in that the valve

15 and the float 17 are omitted and in place of the pipe 11, a pipe 27 is secured to the base 9 of the outer container. This pipe 27 leads to a container 28 to which it is connected. The container 28 is open-bottomed and is positioned within a cistern 29.

In operation of the deodorizing apparatus depicted in Figs. 4 and 5, water rises in the cistern 29 after a flush has occurred. The rising of the water level forces air from the container 28 and along the pipe 27. The air passes into the chamber 24 and thence into the first vessel 22, upwardly through the shorter leg 25 of the U-tube 20, downwardly through the longer leg 26 of the U-tube 20 into deodorant liquid contained in the second vessel 19. The air thus picks up deodorant and passes through the grille 4 into the atmosphere.

When the cistern 29 is flushed again, there is often a suck-back as water leaves the container 28. Deodorant liquid thus tends to be drawn from the vessel 19 along the U-tube and into the vessel 22. When the suck-back ceases, the deodorant liquid which has been collected in the vessel 22 passes along the U-tube 20 and back into the vessel 19 by syphonic action.

In the embodiment of Figs. 1, 2 and 3 a disinfecting device can be provided in the chamber 24. Such disinfecting device can comprise an inverted inner container within the chamber 24 with its lower end spaced above the base 9 and closed by a layer, wad or plug of reticulate or foraminous material as described more fully in the above-mentioned British patent specification No. 1,069,213. A viscous, slowly mobile disinfectant composition inside the inverted container rests on the upper face of the layer, wad or plug. The chamber 24 does not drain completely at the end of the flush and some disinfectant composition diffuses through the layer, wad or plug during the interval between flushes to form with the residual liquid retained in the bottom of the container 24 a concentrated disinfectant solution. This concentrated solution is diluted by flushing water fed through the pipe 11 during a flush and the diluted disinfectant solution discharges itself from the container 1 into the convenience at the end of a flush.

In the embodiment of Figs. 4 and 5 a disinfecting device can be attached to the open-bottomed container 28 disposed in the cistern 29. In this case such disinfecting device can comprise an inverted inner container disposed within a separate outer container in its lower end closed by a layer, wad or plug as described more fully in British patent specification No. 1,070,188. As before, residual water in the outer container forms a concentrated disinfectant solution with disinfectant composition which diffuses out of the inverted inner container. When the cistern

fills, water flows into the outer container to dilute the disinfectant solution. Towards the end of a flush the diluted solution flows into the cistern through an inverted U-tube under syphonic action.

WHAT WE CLAIM IS:—

1. A deodorizing apparatus in which a flow of air generated by movement of water at some stage in a flushing cycle of a urinal, water-closet basin or the like convenience is directed into a first vessel capable of receiving a liquid and from thence passes upwardly through the shorter leg of a syphon duct, whose mouth is disposed within the first vessel, then downwardly through the longer leg of the syphon duct, whose outlet is disposed within a second vessel, and then passes from the longer leg of the syphon duct into a deodorant liquid contained in the second vessel from which it emerges to deodorize the surrounding atmosphere, the mouth of the shorter leg of the syphon duct being near to the base of said first vessel and being above the outlet of the longer leg.

2. A deodorizing apparatus for a flushed convenience comprising a chamber into which flush water is allowed to rise to displace air therefrom either during the filling of a flushing cistern or during a flush therefrom, a first vessel capable of receiving a liquid, said first vessel being in pneumatic communication with said chamber to receive air discharge therefrom, a second vessel for receiving a deodorant liquid, and a syphon tube whose shorter leg extends upwardly from a point within said first vessel and adjacent the base thereof and whose longer leg extends downwardly towards the base of said second vessel to a point therewithin, said vessels being pneumatically isolated from one another except for the connection afforded therebetween by said syphon tube.

3. Apparatus as claimed in claim 2 in which a float valve is provided to limit the rise of water in said chamber.

4. Apparatus as claimed in claim 2 in which said chamber is formed in an open-bottomed container adapted to be disposed inside a cistern of the flushing system.

5. A deodorizing apparatus comprising two chambers each with a vessel therein for receiving liquid, one of which chambers is connectable to a flushing system so as to give rise to an increase of pressure in said one chamber at some stage of a flushing cycle and to a subsequent return to normal pressure therein, and the other of which chambers has an air discharge opening, and a syphon duct whose shorter leg extends upwardly from a point within the vessel of said one chamber and adjacent the base of that vessel and whose longer leg extends downwardly towards the base of the vessel of said other chamber to a point within the latter vessel so that the lower end of the



15 and the float 17 are omitted and in place of the pipe 11, a pipe 27 is secured to the base 9 of the outer container. This pipe 27 leads to a container 28 to which it is connected. The container 28 is open-bottomed and is positioned within a cistern 29.

In operation of the deodorizing apparatus depicted in Figs. 4 and 5, water rises in the cistern 29 after a flush has occurred. The rising of the water level forces air from the container 28 and along the pipe 27. The air passes into the chamber 24 and thence into the first vessel 22, upwardly through the shorter leg 25 of the U-tube 20, downwardly through the longer leg 26 of the U-tube 20 into deodorant liquid contained in the second vessel 19. The air thus picks up deodorant and passes through the grille 4 into the atmosphere.

When the cistern 29 is flushed again, there is often a suck-back as water leaves the container 28. Deodorant liquid thus tends to be drawn from the vessel 19 along the U-tube and into the vessel 22. When the suck-back ceases, the deodorant liquid which has been collected in the vessel 22 passes along the U-tube 20 and back into the vessel 19 by syphon action.

In the embodiment of Figs. 1, 2 and 3 a disinfecting device can be provided in the chamber 24. Such disinfecting device can comprise an inverted inner container within the chamber 24 with its lower end spaced above the base 9 and closed by a layer, wad or plug of reticulate or foraminous material as described more fully in the above-mentioned British patent specification No. 1,069,213. A viscous, slowly mobile disinfectant composition inside the inverted container rests on the upper face of the layer, wad or plug. The chamber 24 does not drain completely at the end of the flush and some disinfectant composition diffuses through the layer, wad or plug during the interval between flushes to form with the residual liquid retained in the bottom of the container 24 a concentrated disinfectant solution. This concentrated solution is diluted by flushing water fed through the pipe 11 during a flush and the diluted disinfectant solution discharges itself from the container 1 into the convenience at the end of a flush.

In the embodiment of Figs. 4 and 5 a disinfecting device can be attached to the open-bottomed container 28 disposed in the cistern 29. In this case such disinfecting device can comprise an inverted inner container disposed within a separate outer container in its lower end closed by a layer, wad or plug as described more fully in British patent specification No. 1,070,188. As before, residual water in the outer container forms a concentrated disinfectant solution with disinfectant composition which diffuses out of the inverted inner container. When the cistern

fills, water flows into the outer container to dilute the disinfectant solution. Towards the end of a flush the diluted solution flows into the cistern through an inverted U-tube under syphonic action.

WHAT WE CLAIM IS:—

1. A deodorizing apparatus in which a flow of air generated by movement of water at some stage in a flushing cycle of a urinal, water-closet basin or the like convenience is directed into a first vessel capable of receiving a liquid and from thence passes upwardly through the shorter leg of a syphon duct, whose mouth is disposed within the first vessel, then downwardly through the longer leg of the syphon duct, whose outlet is disposed within a second vessel, and then passes from the longer leg of the syphon duct into a deodorant liquid contained in the second vessel from which it emerges to deodorize the surrounding atmosphere, the mouth of the shorter leg of the syphon duct being near to the base of said first vessel and being above the outlet of the longer leg.

2. A deodorizing apparatus for a flushed convenience comprising a chamber into which flush water is allowed to rise to displace air therefrom either during the filling of a flushing cistern or during a flush therefrom, a first vessel capable of receiving a liquid, said first vessel being in pneumatic communication with said chamber to receive air discharge therefrom, a second vessel for receiving a deodorant liquid, and a syphon tube whose shorter leg extends upwardly from a point within said first vessel and adjacent the base thereof and whose longer leg extends downwardly towards the base of said second vessel to a point therewithin, said vessels being pneumatically isolated from one another except for the connection afforded therebetween by said syphon tube.

3. Apparatus as claimed in claim 2 in which a float valve is provided to limit the rise of water in said chamber.

4. Apparatus as claimed in claim 2 in which said chamber is formed in an open-bottomed container adapted to be disposed inside a cistern of the flushing system.

5. A deodorizing apparatus comprising two chambers each with a vessel therein for receiving liquid, one of which chambers is connectable to a flushing system so as to give rise to an increase of pressure in said one chamber at some stage of a flushing cycle and to a subsequent return to normal pressure therein, and the other of which chambers has an air discharge opening, and a syphon duct whose shorter leg extends upwardly from a point within the vessel of said one chamber and adjacent the base of that vessel and whose longer leg extends downwardly towards the base of the vessel of said other chamber to a point within the latter vessel so that the lower end of the



longer leg lies below the lower end of the shorter leg, said chambers being pneumatically isolated from one another except for the connection therebetween afforded by said syphon duct.

6. A deodorizing apparatus comprising two chambers each with a vessel therein for receiving liquid, one of which chambers is connectable at its lower end to a flushing system to enable water to be fed thereto during a flush and to drain therefrom back to the flushing system at the end of a flush and the other of which chambers has an air discharge opening, and a syphon duct whose shorter leg extends upwardly from a point within the vessel of said one chamber and adjacent the base of that vessel and whose longer leg extends downwardly towards the base of the vessel of said other chamber to a point within the latter vessel so that the lower end of the longer leg lies below the lower end of the shorter leg, said chambers being pneumatically isolated except for the connection afforded therebetween by said syphon duct to enable water rising in said one chamber during a flush to drive air from said one chamber through said syphon duct to adjacent the base of the vessel in said other chamber, through deodorant liquid in the last-mentioned vessel and thence through said air discharge opening and to enable deodorant liquid sucked back through the syphon duct from the vessel in said other chamber to the vessel in said one chamber while the water drains from said one chamber to be subsequently syphoned back into the vessel in said other chamber.

7. A deodorizing apparatus comprising two chambers each with a vessel therein for receiving a liquid, one of which chambers is connectable to a flushing system to give rise to an increase of air pressure in said one chamber at some stage of a flushing cycle and the other of which chambers has an air discharge opening, and a syphon duct whose shorter leg extends upwardly from a point within the vessel of said one chamber and adjacent the base of that vessel and whose longer leg extends downwardly towards the base of the vessel of said other chamber to a point within the latter vessel so that the lower end of the longer leg lies below the lower end of the shorter leg, said chambers being pneumatically isolated except for the connection afforded therebetween by said syphon duct to enable air discharged from said one chamber as a result of an increase of pressure therein to pass through said syphon duct to the base of the vessel in said other chamber, through deodorant liquid in the last-mentioned vessel and thence through said discharge opening and to enable deodorant liquid sucked back through the

syphon duct from said vessel in said other chamber to the vessel in said one chamber when the pressure in said one chamber returns to normal to be subsequently syphoned back into the vessel in said other chamber.

8. Apparatus as claimed in claim 5 or 6 in which the lower end of said one chamber is connected to a float valve to a pipe connectable to the flushing system to limit the rise of water in said one chamber.

9. Apparatus as claimed in claim 5 or 7 in which said one chamber is connected by a pipe to an open-bottomed container adapted to be disposed inside a cistern of the flushing system.

10. Apparatus as claimed in any of claims 5 to 9 in which said chambers are incorporated in a single container with said air discharge opening in its upper part and with the syphon tube passing through a partition which seals one chamber from the other, passing below the vessel in said other chamber and above the vessel in said one chamber.

11. Apparatus as claimed in claim 10 in which said partition comprises the vessel of said other chamber.

12. Apparatus as claimed in claim 2 or 3 in which said chamber contains a disinfecting device adapted to discharge a diluted disinfectant solution into the flushing system.

13. Apparatus as claimed in claim 4 in which said open-bottomed container is attached to a disinfecting device adapted to discharge a diluted disinfectant solution into the cistern.

14. Apparatus as claimed in claim 5, 6 or 8 or in claim 10 or 11 when dependent from claim 5, 6 or 8 in which said one chamber contains a disinfecting device adapted to discharge a diluted disinfectant solution into the flushing system.

15. Apparatus as claimed in claim 9 or in claim 10 or 11 when dependent from claim 9 in which said open-bottomed container is attached to a disinfecting device adapted to discharge a diluted disinfectant solution into the cistern.

16. A deodorizing apparatus constructed and adapted to operate substantially as herein described with reference to and as illustrated in Figs. 1, 2 and 3 of the drawings accompanying the provisional specification.

17. A deodorizing apparatus constructed and adapted to operate substantially as herein described with reference to and as illustrated in Figs. 4 and 5 of the drawings accompanying the provisional specification.

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