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FLUSH APPARATUS

The present invention relates to a flush apparatus and in particular to a dual flush apparatus for use in a cistern. Selective volume flush apparatus used in cisterns are known to the art wherein it is possible to selectively flush a small quantity or a large quantity of water from the cistern tank. Prior art models include a large number of component parts which result in increased cost of production. In particular, prior art models involve the use of at least two floats and valves and a plurality of lever mechanisms to activate the valve bodies.

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It is an object of the present invention to provide a selective volume flush apparatus in which a single flush valve seal is provided to selectively discharge pre-determined quantities of water.

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It is another object of the present invention to provide a selective volume flush apparatus in which a single valve seal is independently operated by two separate and independent activating lever mechanisms.

20 It is still another object of the invention to provide a selective volume flush apparatus in which the amount of water discharged can be pre-adjusted by adjusting the activating lever mechanisms.

Object and advantages of the invention are set forth in part herein, and in part will be obvious here from, or may be learned by practice with the invention, the same being realized and attained by means of the instrumentalities and combinations pointed out in the appended claims.

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According to one aspect of the present invention there is disclosed a selective volume liquid flush apparatus for use in a cistern having a floor and a drain, a first and second lifting means, said apparatus comprising a container body having at least one aperture on its floor and positioned at a pre-determined height from
10 the cistern floor; a valve seal configured to sealingly engage said drain; a float moveable in the container body, said float connected to the valve seal at its lower side and to the first and second lifting means on its upper side; at least one plug body whose cross-sectional area across its vertical axis being smaller than the cross-sectional area of the aperture on the floor of the container, being
15 removingly introduceable into the said aperture and being disposed below the float; and wherein the float valve seal and the plug body are connected together to move in unison.

The invention consists in the novel parts, constructions, arrangements,
20 combinations, steps and improvements herein shown and described

Fig 1 is a side perspective view of the apparatus of the preferred embodiments.

Fig 2 is a side exploded view of the apparatus shown in Figure 1 with details of lifting mechanisms omitted.

5 Fig 3 is a schematic sectional view of the apparatus at a rest position before discharge of liquid from cistern tank.

Fig 4 is a schematic sectional view of the apparatus at the start of the half volume discharge wherein the plugs are just below and outside the apertures.

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Fig 5 is a schematic sectional view of the apparatus at the start of the full volume discharge wherein the plugs are introduced into the container through the apertures.

Fig 6 is a sectional view along lines X-X Fig 5

15 Fig 7 is a side view of the lifting means and the screw for adjustment of volume of "half" flush

Fig 8 is a schematic sectional view of another embodiment apparatus of the invention.

20 According to one aspect of the present invention there is disclosed a selective volume flush apparatus for use in cistern mechanisms, said apparatus comprising a container body having at least one aperture on its floor and the container body positioned at a predetermined height from the cistern floor; a valve seal configured

25 to sealingly engage outlet port of the cistern; a float moveable in

the container body, said float connected to the valve seal at its lower side and to the first and second lifting means on its upper side; at least one plug body whose cross-sectional area across its vertical axis being smaller than the cross-sectional area of the

5 aperture on the floor of the container, being removably introduceable into the said aperture and being disposed below the float and wherein the float, valve seal and the plug body are connected together to move in unison.

10 In still another aspect of the invention, the float, the valve seal are connected to a shaft cum overflow discharge conduit, which shaft extends through the container.

On applying a single stroke of pressure on the first lifting means, a first pre-
15 selected volume of water (say, half volume of contents of cistern tank) is discharged. On applying a single stroke of pressure on the second lifting means, entire cistern tank is emptied. The mechanism of the single stroke on the second lifting means whereby the entire cistern tank is emptied, can be adopted for a full flush system.

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Referring to Fig 1 - 8 of the accompanying drawings there is illustrated a preferred embodiment of a selective volume flush apparatus indicated generally by reference numeral (10).

As here embodied apparatus (10) includes a valve (12), a container (14) to contain a float (26), a valve seal (16), a first lifting means (18), a second lifting means (20) and a discharge outlet port (22).

- 5 The container (14) to contain the float includes a floor portion with two apertures (24a, 24b). The volumetric size of the float (26) is smaller than the volumetric size of the container (14). The float (26) is secured around a hollow tubular shaft (28) which functions as an overflow conduct. The terminal end of the shaft
- 10 (28) is secured to a valve seal (16). The lower open end of the shaft (28) is configured to discharge overflow water into the mouth of the outlet port (22). A pair of tubular plugs (30a, 30b) is provided on the upper side of the valve seal (16) and are positioned to pass through the apertures (24a, 24b) in the
- 15 container.

- The float (26) is connected to the first and second lifting means (18, 20). The first lifting means (18) will now be described with reference to Fig 7. The application of downward force on knob (32) against spring bias (34) results in one end of the
- 20 lever arm (36) pushed down thereby lifting the shaft (28). The lever arm (36) is suitably fulcrummed either onto the body of a cistern tank or some other fixed extension secured to the cistern tank. The lever arm (36) preferably includes a hook (38). The functions of the hook (42) will be clear later in the description.

The second lifting means (20) is similar and corresponds to first lifting means (18), except the lever arm does not include any hook portion.

- 5 The operating mechanism of the preferred embodiment and other ancillary features will be described now.

In a rest position, the valve seal (16) will be in a sealing position, over the mouth of the outlet port (22). The cistern tank will be filled
10 with water to the desired full flush volume levels. In the rest position, the container will be filled with water. When the half flush knob (32a) is subjected to a single stroke of downward force, the first lifting means (18) lifts the float (26) upwards to a position where the plugs (30a, 30b) are raised to a level just outside
15 and below the apertures (24a, 24b). As the outlet port (22) is now open, water from the cistern tank flows onto the outlet port. As the water level falls the float (26) and the valve seal (16) descend. When the predetermine volume of water is discharged the valve seal (16) sealingly engages upon the mouth of the outlet port (22), thus stopping any further discharge of water from the cistern tank. It will be
20 appreciately that the volume of water that is discharged from a cistern tank is a function of the height to which the float is raised from the mouth of the outlet port in a container of a given size. If the float is raised higher, a larger volume of water is discharged, as it takes

a longer time for the float to descend and correspondingly a longer time for the valve seal (16) to sealingly engage on the mouth of the outlet port.

- 5 The volume of water that is discharge from the cistern tank is also a factor of the rate of discharge (R_y) of water from the container through the outlet ports. If the cross-sectional area of the outlet ports (22) is reduced from a first size X_1 to a smaller cross-sectional area of size X_2 , than for R given volume of water in the
- 10 container (of a given size), the rate of discharge R_2 corresponding to cross-sectional area X_2 will be larger than rate of discharge R_1 corresponding to cross-sectional area X_1 ie $X_2 < X_1$ than $R_2 > R_1$. Thus where desirable, the container (14) can be of smaller height but of larger cross-sectional area so as to be accommodated is cistern tank where height is
- 15 small but whose length is bigger.

- To reduce the volume of water that is discharged during the "half" flush, the maximum height to which the float is raised by the first lifting means can be adjusted. Preferably an adjustable screw assembly (38) is provided adjacent to
- 20 the knob (32). By extending the screw (38) downwards, the maximum height to which the shaft (28) is lifted is reduced, thereby reducing the volume of water that is discharged. Conversely by withdrawing the screw (38) upwards the height to which the shaft can be lifted is increased, resulting in a larger volume of water that is discharged.

The hook (42) secured or integral to the first lever arm (36) ensures that the maximum height to which the float will be raised in the container when the "half flush" activation knob is depressed, is fixed. The hook acts as restraining member to prevent the shaft member (28) and thereby the float from being raised beyond a pre-determined maximum height when the "half flush" knob is depressed.

To effect full flush the knob (32b) of the second lifting means (20) is depressed by applying a downward stroke of force. The lifting means lifts the float (26) upwards to a position where the plugs (30a, 30b) are introduced into the two corresponding apertures (24a, 24b). The external dimensions of the plugs are smaller than the size of the aperture opening. The relationship between the size of the aperture opening and the external dimensions of the plug will be explained below. In the preferred embodiment the plugs are cylindrical and of a pre-determined height/length. As the outlet port (22) is now open, water from the cistern tank flows onto the outlet port. As the water level falls, the float body (26) and the valve seal descends. The rate of descent of the float (26) in the container (14) depends on the rate at which water in the container is discharged through the apertures (24a, 24b). When the water level in the cistern tank falls below the floor (25) level of the container, the float descends at a lower rate than the descent of the water level in the

cistern tank. The flow of water from the container (14) into the general body of the cistern is determined by the difference in cross-sectional area between the apertures (24a, 24b) and the plugs (30a, 30b). The dimensions of the apertures and the plugs are dimensioned such that float descend to the floor level while
5 simultaneously the valve seal sealingly engages upon the mouth of the open port when the water in the cistern tank is fully discharged. It will be appreciated that the larger the difference in cross sectional areas, the greater will be the rate of descend of the float, and consequently the quicker will the valve seal engage upon the mouth of the open port, resulting in lesser volume of water being
10 discharged (on the assumption the diameter of the outlet port remains constant).

It will also be appreciated that the longer the length of the plugs (30a, 30b) the longer it will take for the water in the container (14) to be discharged.

15 The various dimensional parameters, such as the size of cross-sectional differences of the apertures and the plugs, the distance of the float (26) from the valve seals (16), the size of the cross-sectional area of the mouth of the open port; distance of the base of the float from the floor (25) of the container; are subject to different permutation and combinations to yield a wide variety of
20 selective volume flush systems.

Although in the preferred embodiment the shaft (28) is configured to function as a overflow conduit, it can be easily envisaged that separate and/or independent overflow conduit can be provided and associated with the embodiment without departing from the scope of

5 this invention (see Fig. 9). In this embodiment the float is secured to an elongate member extending from the lifting means to the valve seal, and through the container. The plug can be either be connected to the elongate member, or to the top of the valve seal or extend from the bottom of the float.

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The container (14) is fixed in position within the cistern tank either by securing to the ceiling of the tank or to the floor of the cistern tank. The container and the lifting means and the valve can all be assembled as a composite unit, for easy fitting into the cistern tank. The float (26) would include connecting features to
15 the plugs (30a, 30b), thus displacing the plugs from registration with the apertures. In one example, a pair of guide members can be connected from the float to the plug, such guide members being introduced through the apertures.

But where the plugs are independently secured to the shaft member or the top of a
20 valve seal, then the float body (26) is free to rotate about its vertical axis. If preferred guide pins or member can be provided on the plug bodies to ensure registration of the plug bodies with the out ports (24a, 24b).

The shaft (28) can be conveniently telescopically engaged in another larger shaft (40) which is secured to the container, the lower end of which is secured to the floor of the container, while the upper end terminating above the upper rim of the container. This arrangement ensures no water from the container is discharged at
5 other than through the outlet port apertures (24a, 24b).

The manner of constructions of the valve seal (16) and the outlet port (22) can be done as per conventional methods. The activation knobs (32a, 32b) can be placed adjacent to each other or can be placed spaced apart, the option being dictated by
10 aesthetic factors.

The control of the water level inside the cistern is accomplished by known conventional methods.

15 To the extents not already indicated, it also will be understood by those ordinarily skilled on the art, that the specific embodiment herein described and illustrated may be further modified to incorporate features as described therein. The invention in its broader aspects therefore is not limited to the specific embodiments therein shown and described but departures may be made therefrom
20 within the scope of the accompanying claims, without departing from the principles of the invention and without sacrificing its chief advantages.



THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A selective volume liquid flush apparatus for use in a cistern having a floor and a drain (22), a first and second lifting means, said apparatus comprising:

a container body (14) having at least one aperture (24) on its floor and positioned at a pre-determined height from the cistern floor;

a valve seal (16) configured to sealingly engage said drain; (22),

a float (26) moveable in the container body (14) said, float (26) connected to the valve seal (16) at its lower side and to the first and second lifting means on its upper side at least one plug (30) whose cross-sectional area across its vertical axis being smaller than the cross-sectional area of the aperture (24) on the floor of the container (14), being removably introduceable into the said aperture and being disposed below the float; and wherein the float (26) valve seal (16) and the plug body (30) are connected together to move in unison

2. A selective volume liquid flush apparatus as claimed in claim 1, wherein when a knob (32a) of the first lifting means is depressed, the float (14), the valve seal (16) and the plug (30) are raised upwards, the said plug (30) being raised to a position where it is nearer to but below the aperture (24).



3. A selective volume liquid flush apparatus as claimed in claim 1 wherein said second lifting means comprises a knob (32b) which, when depressed, the float (26), the valve seal (16) and the plug (30) are raised upwards, the said plug
5 being raised to a position where it is introduced into the aperture (24) in the floor of the container (14).

4. A selective volume liquid flush apparatus as claimed in claim 1 wherein the plug (30) consists of a tubular body.

10 5. A selective volume liquid flush apparatus as claimed in claims 1 and 4 wherein the plug (30) is secured to the upper side of the valve seal (10).

15 6. A selective volume liquid flush apparatus as claimed in claim 1 wherein the float body (14) and the valve seal (16) are secured to a shaft conduit (28).

20 7. A selective volume liquid flush apparatus as claimed in claims 1 and 4 wherein the plug is secured to the shaft conduit (28).

25 8. A selective volume liquid flush apparatus as claimed in claim 1 wherein the container (14) includes a cylinder (40), through which the shaft is extended, and the one end of the cylinder (40) is sealingly engaged on the base of the floor of the container (14), and the other end extends to at least the same height as the container.



9. A selective volume liquid flush apparatus as claimed in claim 1 wherein the apparatus includes a means to vary the volume of liquid discharged.

5 10. A selective volume liquid flush apparatus as claimed in claim 9 wherein the means to vary the volume of liquid discharged includes as adjustable screw member (42) acting upon a lever arm (36) of the first lifting means and wherein by moving the screw member downwards,
10 the volume of liquid discharged is reduced and by moving the screw member upwards, the volume of liquid discharged is increased.

11. A selective volume liquid flush apparatus as claimed in claim 10 wherein the adjustable screw member (42) is activatable from the top of
15 the cistern tank.

12. A selective volume liquid flush apparatus as claimed in claim 1 wherein the float body (26), is secured to an elongate member (44) extending from the lifting means through the container to connect the
20 valve means (16).

13. A selective volume liquid flush apparatus as claimed in claim 1 and 12 wherein the plug (30) is secured to the elongate member (44).



14. A selective volume liquid flush apparatus as claimed in claim 1 wherein the plug (30) is connected to the float by a elongate member (46), which elongate member extends through the aperture (24).

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15. A selective volume liquid apparatus as claimed in claim 1 wherein the volume of liquid discharged from a cistern tank is determined by the rate of discharge of liquid through apertures (24) contained at the floor of a container.