

A FLUSHING CISTERN

This invention relates to a flushing cistern for a water closet or toilet.

The cleansing action of water delivered to a toilet by a flushing cistern is dependent upon the pressure and volume of the water. High volume requires a large cistern whereas high pressure requires either a substantial head of water or electric pump delivery. Such expedients require additional space or expense or both.

It is an object of the present invention to obviate or mitigate the aforesaid disadvantages.

According to the present invention there is provided a flushing cistern comprising an outlet chamber swept by a piston carrying a closure element of an outlet valve of the chamber, the piston being biased into the valve closing position and including a non-return valve permitting water flow in the direction of the outlet, whereby a flushing action causes the piston to be retracted from the outlet valve so opening the valve and energising the biasing means, and subsequent return movement of the piston pressurises the outflow of residual water downstream thereof.

A specific embodiment of the present invention will be now described by way of example with reference to the drawings in which:-

Fig. 1 is a part cross-sectioned view of a toilet cistern.

Fig. 2 is a plan view of the toilet cistern with the cover removed.

Fig. 3 shows an upper valve plate of the embodiment of Fig. 1.

Fig. 4 shows an upper plate of the embodiment of Fig. 1.

Referring to Fig. 1 a main cistern body 1 is divided into an upper chamber 2 and a lower chamber 3 separated by a plate 4. The upper chamber 2 contains a flush actuator 5 which operates a non-return valve 6 which is moveable within the lower chamber 3. Water enters the cistern through inlet 7 in the upper chamber 2 and leaves the cistern through outlet 8 (in the lower chamber 3) to the toilet bowl (not shown). Inlet 7 is controlled by a ballcock valve 9 as is well known.

Upper chamber 2, closed by cover 10, is rectangular in cross-section and is approximately twice the width of lower chamber 3 which

is circular in cross-section. The plate 4 is adapted to seat in the aperture connecting the two chambers 2,3. The plate 4 is shown in detail in Fig. 4. The plate 4 has a central circular portion 11 having a central hole 12 therethrough and has four radially extending arms 13 the ends of which are adapted to locate over the top of the lower chamber 3. The end of each radial arm 13 has a through hole 4 for fixing the plate 4 to the cistern body 1. The side of the plate 4 which faces the lower chamber 3 has a shallow annular wall 5 projecting at right angles to the plate 4. The wall 4 houses one end of a spring 6. The other end of spring 16 locates in a similar annular wall 17 in an upper valve plate 18 shown in detail in Fig. 3.

The upper valve plate 18 is circular and comprises a central circular hub portion 19, an outer rim 20 and eight radial spokes 21 which connect the hub 19 to the rim 20. The rim 20 has an additional outer annular wall 22 concentric with the aforementioned wall 17. The centre of the hub portion 19 defines a circular hole 23. The upper valve plate 18 rests against a lower valve plate 24 which is a thin flat disc of substantially the same diameter as the upper valve plate 18. The lower valve plate 24 has a similar central through hole aligned with that through the upper valve plate 18. The two valve plates 18,24, movable up and down within the lower chamber 3, are biased towards outlet 8 by spring 16.

A rubber stopper valve 25, frustoconical in cross-section, is fixed to the upper valve plate 18 (as described below). The valve 25 is disposed centrally in the lower chamber 3 below the lower valve plate 24 so as to locate sealably over the outlet 8. The outlet 8 has a tapered edge 26 designed to receive the stopper valve 25.

Referring to Fig. 2, the flush actuating lever 5 is connected to spindle 27 which is supported in bearings 28 located opposite each other in the upper chamber 2 walls. Fixed to the midpoint of spindle 27 is a pulley 29. As is shown in Fig. 1, the pulley 29 is connected to the non-returnable valve 6 by line 30 which wraps around the circumference of the pulley and passes from the pulley 29 through the hole 10 in plate 4 to a rod 31 fitted to the upper valve plate 18. Rod 31 is fixed into the holes in the valve plates 18,24 by means of two nuts 32,33 disposed either side of the upper valve plate 18. The stopper valve 25 is fixed to the end of rod 31 below the lower valve

plate 24 by nut 34.

The flush actuating lever 5 is pulled by means of chain 35 connected thereto. The spindle 27 and pulley 29 rotate clockwise (in the disposition of Fig. 1) and line 30 wraps around pulley 29 moving the upper valve plate 18 and stopper valve 25 against spring 16 towards the top of the lower chamber 3.

Upper valve plate 18 is not directly connected to lower valve plate 24. Initially, when the upper valve plate 18 is raised, the lower valve plate 24 remains stationary and the two plates are thus separated allowing a fluid communication channel to open. Water can pass from the upper chamber 3, through the apertures defined between the radial spokes 21 of the upper valve plate 18, through the central hole in the lower valve plate 24 into the volume below the lower valve plate 24. The stopper valve 25 is now unseated and water is able to pass through outlet 8.

Further raising of the upper valve plate 18 and the stopper valve 25 results in the stopper valve 25 abutting the lower valve plate 24 and the latter being carried up the lower chamber 3 supported on the stopper valve 25 whilst still being separate from the upper valve plate 18. Water has thus been allowed to pass from upper chamber 2 through to outlet 8.

When the lever 5 is released the spring 16 biases the upper valve plate 18 against lower valve plate 24 and water is prevented from passing through the non-return valve 6. The non-return valve 6 is now biased by spring 16 against the volume of water remaining in the lower chamber 3 and thus forces the water through outlet 8 at a relatively high velocity until the volume of water recedes to allow stopper 25 to seat over the outlet 8.

When lever 5 is pulled through approximately a 30° rotation and is released quickly a short flush is effected, as the non-return valve 6 does not travel the full length of the lower chamber 3. If lever 5 is pulled through approximately 90° and slowly released the non-return valve 6 is lifted substantially to the top of the lower chamber 3 and a long flush is effected.

Pressurizing the water through the outlet in such a way as described above eliminates the need for a pump or for a large head or volume of water. A saving of water of more than 50% can be made.

For a short flush the discharged water is between one and two litres,
for a long flush between three and four litres.

CLAIMS

1. A flushing cistern comprising an outlet chamber swept by a piston carrying a closure element of an outlet valve of the chamber, the piston being biased into the valve closing position and including a non-return valve permitting water flow in the direction of the outlet, whereby a flushing action causes the piston to be retracted from the outlet valve so opening the valve and energising the biasing means, and subsequent return movement of the piston pressurises the outflow of residual water downstream thereof.
2. A flushing cistern as claimed in claim 1, wherein the non-return valve comprises two plates separable on retraction of the piston to allow water flow through apertures in the plates, the return movement of the piston causing the plates to move together so closing the apertures and preventing water flow through the valve.
3. A flushing cistern as claimed in claim 1 or 2, wherein the flushing action is actuated by a flush actuating lever connected to a rotatable pulley, the pulley being connected to the piston such that operation of the flush actuating lever causes the pulley to rotate, thus retracting the piston by lifting.
4. A flushing cistern as claimed in any preceding claim, wherein the piston is biased into the valve closing position by a spring.



5. A flushing cistern as claimed in any preceding claim, wherein the closure element of the outlet valve is a rubber stopper valve.
 6. A flushing cistern substantially as hereinbefore described, with reference to the accompanying drawings.
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