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(71) Applicant : **DUX ENGINEERS LIMITED**
6-8 Laery Street
Lower Hutt, Wellington (NZ)

(72) Inventor : **Christie, Ross Ernest**
65 Queens Grove
Lower Hutt, Wellington (NZ)

(74) Representative : **Maury, Richard Philip**
Marks & Clerk 57-60 Lincoln's Inn Fields
London WC2A 3LS (GB)

(54) **A flushing mechanism and method of reducing the flushing volume of a cistern.**

(57) A method of reducing the volume flushed from a toilet cistern (1) during a full flush. A forcing means (8, 21) is provided part way along a tube (4, 23) connected to a valve means (2,3) of a toilet cistern (1). As the water level in the cistern (1) lowers about the forcing means (8, 21) it applies downward force which closes the valve means (2,3) at a predetermined water level (12). In this way the maximum volume of water flushed from a cistern may be varied for any cistern (1) without reducing the maximum head of pressure available.

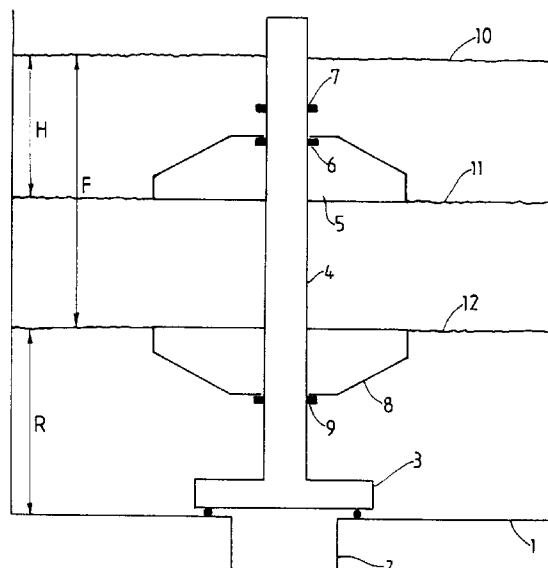


FIG.1

This invention relates to flushing mechanism including a forcing means which closes an outlet valve when the water level reaches a predetermined lower level.

As pressure to conserve water mounts, authorities around the world are regulating to decrease the maximum volume of water which may be flushed from a toilet cistern during a full flush. To date, lower flushing volumes have been obtained simply by filling a toilet cistern to a lower level, so that the volume discharged is less than that previously discharged. This, however, has the drawback that there is a lesser head of water to flush the exiting water into a toilet bowl.

It is an object of the present invention to provide a flushing mechanism which overcomes or at least minimises the problems of the prior art, or at least provides the public with a useful choice.

Further objects of the invention will become apparent from the following description.

According to one aspect of the present invention there is provided a flushing mechanism for reducing the volume of fluid flushed from a toilet cistern during a full flush, said mechanism including a valve means which may be opened by raising a float of the valve means and closed by applying downward force to said float, characterized in that said mechanism is provided with forcing means positioned so that, in use, when the water level in the cistern lowers to a predetermined level the valve means is closed by the downward force applied by the forcing means to the float, closing the valve means prior to the level at which the valve means would close without the forcing means. According to the invention there is also provided a method of decreasing the volume of fluid flushed from a toilet cistern during a full flush, said cistern including valve means which may be opened by raising a float of the valve means and closed by applying downward force to said float, said method characterised by providing a forcing means which applies downward force to the float as the water level in the cistern lowers about the forcing means. In one embodiment the forcing means consists of a container which collects water therein and produces downward force on the outlet valve as the water level lowers.

According to another embodiment the forcing means is a bell which, due to the force of suction between the bell and the water surface, closes the valve as the water level lowers.

Further aspects of this invention, which should be considered in all its novel aspects, will become apparent from the following description, given by way of example of possible embodiments thereof, in which reference is made to the accompanying drawings in which:

Figure 1: shows the flushing mechanism according to one possible embodiment.

Figure 2: shows the cup which forms the forcing means in the embodiment shown in Figure 1.

Figure 3: shows another flushing mechanism in which the forcing means is a bell

Figure 4: shows the bell of the mechanism shown in Figure 3. Although the present invention may be incorporated into a flushing mechanism of any standard toilet cistern, operation will be described in relation to a dual flushing mechanism. The descriptions of dual flushing mechanisms in New Zealand Patent Specification No. 223066 (corresponding to Australian specification Serial No. 625514) and New Zealand Patent Specification No. 233623/234333 (corresponding to Australian application No. 76442/91) are hereby incorporated by way of reference.

Referring now to Figure 1, a dual flushing mechanism of the type described in New Zealand Patent Specification No. 234333 is shown. A toilet cistern 1 has an outlet 2 which cooperates with a float 3 to form a valve means. Connected to float 3 is a tube 4, which when lifted opens the valve means formed by float 3 and outlet 2. A bell 5 is provided on tube 4 and is retained between rings 6 and 7. A forcing means 8 is also provided, which is supported by ring 9 secured to tube 4. Ring 9 can be positioned anywhere along tube 4 depending upon the desired flushing volume. The forcing means 8 is preferably formed of a material less dense than water, such as polypropylene, so that the forcing means does not apply downward force to float 3 when under water.

The full water level in the cistern is indicated by numeral 10. If float 3 is lifted, by raising tube 4, the valve means formed by float 3 and outlet 2 is opened. Water flowing out of the cistern under float 3 keeps the float raised until sufficient downward force is applied to tube 3 to overcome this upward force. For a half flush bell 5 is not tilted and remains in the position shown in figure 1. An air-tight seal is formed between ring 6 and the top of bell 5. As the water level lowers about the bell a partial vacuum coupling is created between the bell and the falling water surface. Bell 5 thus forces down tube 4 and float 3 as the water level lowers, to close the valve means at the water level indicated by numeral 11.

For a full flush, bell 5 is tipped to create an air gap between the aperture in the top surface of bell 5 and the tube 4. Accordingly, as the water level in the cistern falls, following the raising of float 3, no partial vacuum coupling is formed between valve 5 and the lowering water level. Accordingly, the water level continues to fall below bell 5 until it reaches the level indicated by numeral 12. At this point water held within forcing means 8 increasingly acts down upon float 3 as the water contained therein is raised above the lowering water level. This continues until the downward weight exceeds the resistance of float 3 to closure. The float 3 then closes on outlet 2.

Where the words "full flush" are used in this specification reference is made to the maximum volume of fluid flushed by a dual flushing mechanism or the vol-

ume of water flushed by a single flush mechanism.

For a half flush the volume of water discharged is indicated by the letter H. For a full flush the volume of water discharged is indicated by the letter F. The residual volume of water always remaining in the cistern is indicated by the letter R.

Accordingly, the volume of water displaced for a half and full flush can be set by altering the heights of rings 6 and 9. An important feature is that the volume of water flushed for a half and full flush is independent of the capacity of the cistern.

For the embodiment shown in Figure 1, forcing means 8 is a container mounted upon tube 4 which applies downward force on float 3 as the water level drops below the level of the water contained in container 8. It is to be appreciated that any shape of container may be used. A container of truncated conical form is however preferred.

As the forcing means 8 always ensures closure is effected at lower water level 12, a higher head of water can be achieved for low volume flushing cisterns. In the prior art, the level the cistern is filled to is adjusted so that the cistern contains the required volume for a full flush. This means that a lower static head is available when a lower flush volume of water is used for a full flush. Accordingly to the present invention however, the maximum head of pressure available in a cistern can be used for reduced volume flushing.

Figures 3 and 4 show a preferred embodiment in which the forcing means 21 is a bell, rather than a cup as shown in Figure 1. The mechanism shown in Figure 3 operates in the same way as the mechanism shown in Figure 1, except that the forcing means 21 forces tube 23 down due to the partial vacuum coupling formed between water surface 24 and bell 21, rather than by a weight of water supported above the water level (as in Figure 1).

A ring 22 is secured to tube 23. Tube 23 passes through aperture 25 in bell 21. The top edge of the bell adjacent aperture 25 sits on ring 22. As the water level in the cistern drops below ring 22, water is left between ring 22 and the top surface of bell 21 adjacent the ring 22. The water between bell 21 and ring 22, ensures that an air tight seal is formed therebetween. When the water level 24 is close to the bottom of bell 21 a partial vacuum or coupling is formed between the water surface 24 and bell 21. As the water level 24 lowers, bell 21 is drawn downwardly by the partial vacuum coupling and applies downward force to tube 23 via ring 22. This embodiment has the advantage that the water level at which the valve closes can be accurately controlled.

The forcing means will be positioned to reduce the volume of water released from a cistern by a desired amount. Typically the forcing means is positioned so that half or less of the maximum volume of the cistern is always retained. It is to be appreciated

that bell 21 or cup 8 may be formed integrally with tube 23 or 4. Alternatively, bell 21 or cup 8 may be secured directly to tube 23 or 4 by adhesive etc to form an airtight seal therebetween.

Where in the foregoing description reference has been made to intergers or components having known equivalents then such equivalents are herein incorporated as if individually set forth. For example it is to be appreciated that the forcing means could apply downward force to the float via a sleeve etc without requiring the forcing means to be secured to the tube.

Although this invention has been described by way of example and with reference to a possible embodiment thereof it is to be appreciated that improvements and/or modifications may be made thereto without departing from the scope of the invention defined in the appended claims.

Claims

1. A flushing mechanism for reducing the volume of fluid flushed from a toilet cistern during a full flush, said mechanism including a valve means (2,3) which may be opened by raising a float (3) of the valve means and closed by applying downward force to said float, characterized in that said mechanism is provided with forcing means (8,21) positioned so that, in use, when the water level in the cistern lowers to a predetermined level the valve means is closed by the downward force applied by the forcing means to the float, closing the valve means prior to the level at which the valve means would close without the forcing means.
2. A mechanism as claimed in claim 1 characterised in that the valve means is opened and closed by raising and applying downward force respectively to a tube (4,23) secured to the float.
3. A mechanism as claimed in claim 2 characterised in that the forcing means is a bell (21) provided part way along said tube.
4. A mechanism as claimed in claim 2 characterised in that the flushing mechanism is a dual flushing mechanism.
5. A mechanism as claimed in claim 4 characterised in that the dual flushing mechanism includes a bell supported by a ring (9,22) on the tube which may be tilted to provide an air gap between the tube and an aperture in the top of the bell.
6. A method of decreasing the volume of fluid flushed from a toilet cistern during a full flush, said cist-

tern including valve means (2,3) which may be opened by raising a float (3) of the valve means and closed by applying down ward force to said float, said method characterised by providing a forcing means which applies downward force to the float as the water level in the cistern lowers about the forcing means. 5

7. A method as claimed in claim 6 characterised in that the valve means is opened and closed by raising and applying downward force respectively to a tube (4,23) secured to the float. 10

8. A method as claimed in claim 7 characterised in that the forcing means is a bell (21) provided part way along said tube. 15

9. A method as claimed in claim 8 characterised in that the flushing mechanism of the toilet cistern is a dual flushing mechanism. 20

10. A method as claimed in claim 9 characterised in that the dual flushing mechanism includes a bell (21) supported on a ring (22) secured to the tube, which when tipped opens an air gap between the tube and an aperture in the top of the bell. 25

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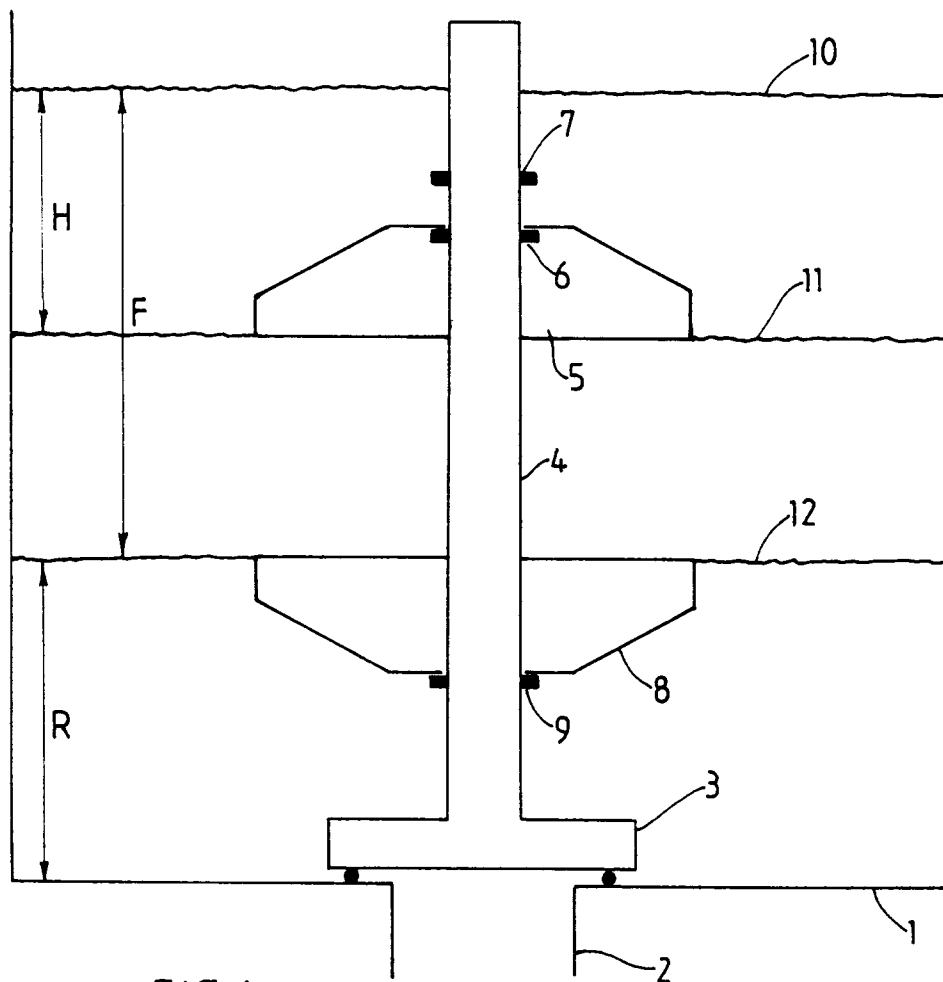


FIG.1

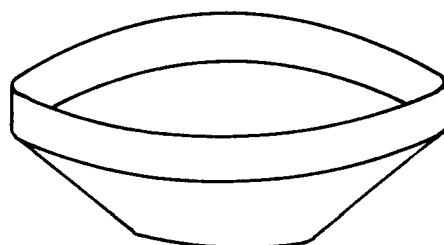


FIG. 2

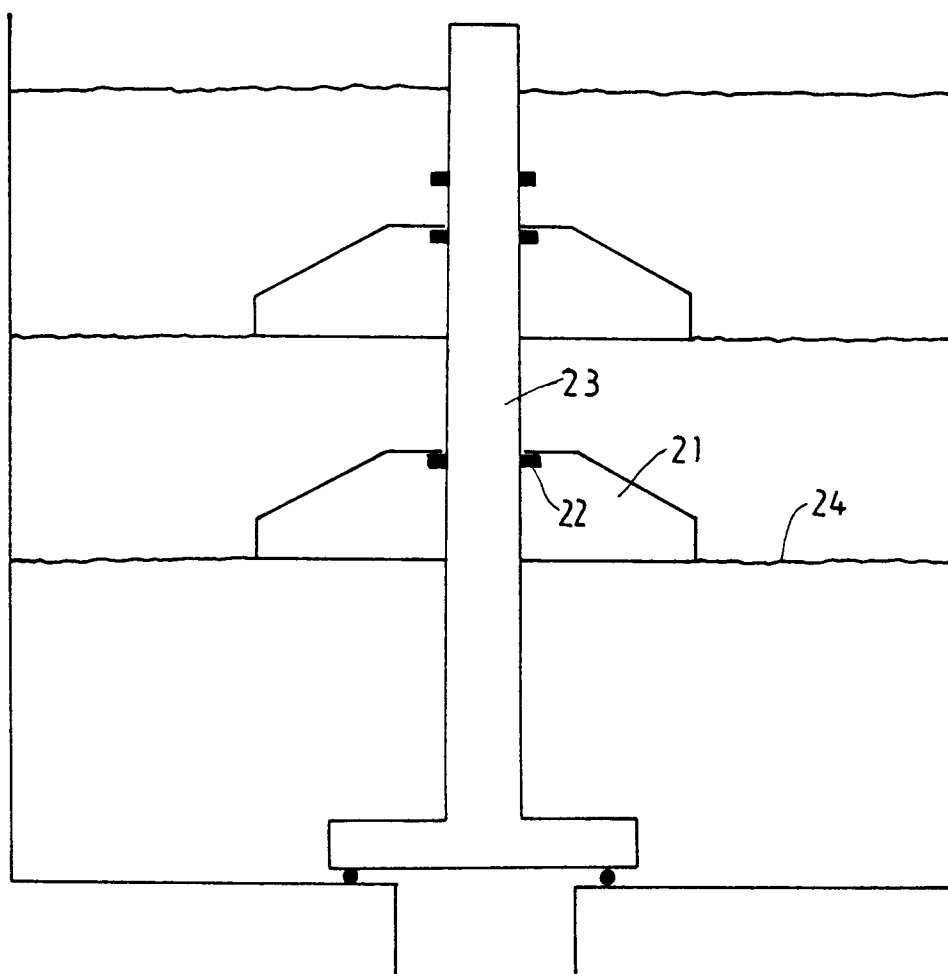


FIG. 3

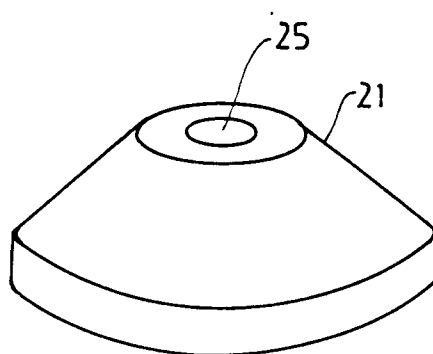


FIG. 4



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 92 30 8876

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	US-A-4 135 263 (J. ANDERSON)	1,2,4,6,7,9	E03D1/14
A	* column 3, line 63 - column 5, line 2; figures *	5,10	
X	US-A-3 380 077 (O. ARMSTRONG)	1,2,6,7	
A	* column 3, line 49 - column 4, line 15; figures *	5,10	
A	US-A-4 032 997 (C. PHRIPP)	1,3,6,8	
A	US-A-3 156 930 (C. MOULTON)	-	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			E03D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 04 JANUARY 1993	Examiner KRIEKOUKIS S.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		I : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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