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54 Apparatus for flushing a cistern.

57 A syphon is provided for a domestic lavatory cistern comprising an inverted vessel e.g. a bell 24 positioned over a downpipe 22. At the lower end of the bell there are valve means 26 which are fixed in relation to the downpipe. By depressing the bell, a syphonic action is initiated which flushes the cistern.

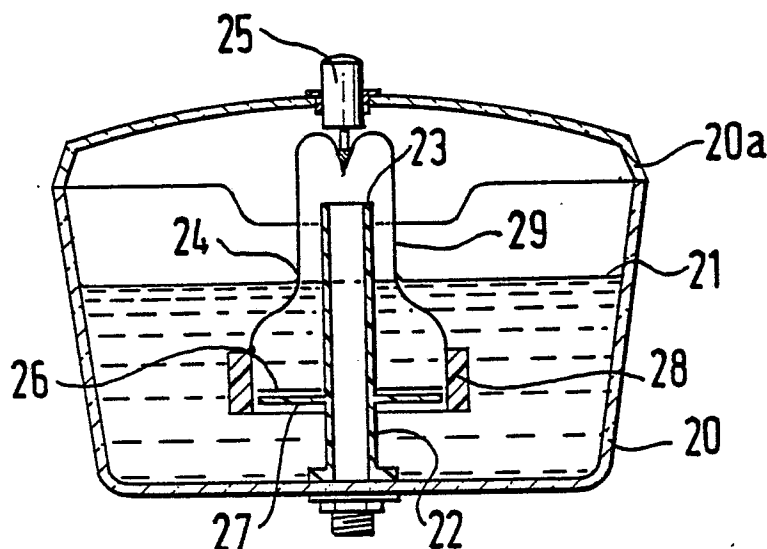


Fig. 2a.

EP 0 302 150 A1

APPARATUS FOR FLUSHING A CISTERN

This invention relates to apparatus for flushing a cistern, in particular a syphon for flushing a lavatory cistern, and to a cistern including said apparatus.

Apparatus employing a syphon is known for flushing domestic lavatory cisterns and commonly comprises a diaphragm inside a cylinder which is connected by an inverted U-bend to a downpipe. The diaphragm is lifted by means of a lever, so as to lift water into the U-bend and down the downpipe, thereby initiating syphoning of the water in the cistern.

According to one aspect of the present invention, apparatus for flushing a cistern is provided comprising a downpipe, a movable vessel having an upper region and a lower region, which vessel is in communication with the downpipe in the said upper region, the upper region having a smaller horizontal cross-sectional area than the lower region and the lower region having an open end, and valve means fixed in relation to the downpipe, closing the lower end of the vessel so as to allow upward flow of water only, the vessel being movable between an upper position in readiness for flushing and a lower position, movement of the vessel from the upper position towards the lower position causing, in use, water to flow into the downpipe to initiate syphoning of water through the valve means.

According to a further aspect of the present invention, apparatus for flushing a cistern is provided comprising a downpipe having a free end extending upwardly in use, an inverted vessel positioned over the free end of the downpipe, having a smaller horizontal cross-sectional area at its upper, closed end than at its lower, open end and valve means, fixed in relation to the downpipe, closing the lower end of the vessel so as to allow upward flow of water only, the vessel being movable between an upper position in readiness for flushing and a lower position, movement of the vessel from the upper position towards the lower position causing, in use, water to flow into the downpipe to initiate syphoning of water through the valve means, into the upper end of the vessel and down the downpipe.

The valve may comprise a diaphragm on top of support means and the vessel may be bell-shaped with a cylindrical lower end.

A float may be attached to the outside of the vessel, near its lower end, and means may be provided for deflecting water from the vessel into the end of the downpipe, which means preferably comprise a generally cone-shaped projection inside the vessel, at its closed end, protruding into the

downpipe when the vessel is in its lower position. One or more locators may be provided in the inside of the vessel, extending toward the downpipe, for preventing lateral movement therebetween.

According to the invention, there is further provided a cistern including flushing apparatus according to the invention.

The downpipe preferably extends through the base of the cistern, and water level regulating means are preferably provided for controlling filling of the cistern with water up to a level at which the vessel has a cross-sectional area less than its cross-sectional area, at the level of the valve means, when in its lower position.

The cistern may have a lid and means, preferably a button, may be provided, for example, in the lid and connected to the vessel, to move it from its upper position to its lower position.

A typical conventional domestic lavatory cistern is illustrated in Figure 1. Figure 1a shows a syphon in its rest position and Figure 1b shows how, when a handle 10 is depressed, a valve comprising a diaphragm 11 and a support grid 12 is lifted so as to force water up an inverted U-bend 13 and down a downpipe 14. The water falling down the downpipe initiates a syphonic action which syphons water in the cistern 15 past the diaphragm 11, and down the downpipe until the position of Figure 1c is reached, whereupon air enters the syphon and syphoning ceases. A float operated water supply valve (not shown) refills the cistern.

By way of example a preferred embodiment of a flushing apparatus according to the invention will now be described with reference to Figures 2, 3 and 4 of the accompanying drawings, wherein:

Figure 2 illustrates schematically, in cross-section, apparatus according to the present invention at three stages in operation;

Figure 3 shows the working parts of the apparatus of Figure 2 in more detailed cross-section; and

Figure 4 shows the outline in plan view of part of some of the major components of the syphon shown in Figure 3.

Referring to Figure 2a, a cistern 20 having a lid 20a is shown filled with water to a maximum water level 21. The cistern is filled by means of a ball-cock water supply valve (not shown) as is well known in the art, or other suitable means. A central downpipe 22 extends through the base of the cistern 20 down to the lavatory bowl (not shown). It will be appreciated that it is not essential for the downpipe to extend through the base of the cistern. The upper end of the downpipe 20 terminates at a

level 23 above the maximum water level 21. The free upper end of the downpipe 22 is covered by a movable vessel in the shape of a bell 24 which is connected to a push-button 25 projecting through the lid 20a. Between the downpipe 22 and the bell 24 there is an annular, flexible diaphragm 26 supported on top of an annular grid 27. The diaphragm and grid are fixed to the downpipe 22. Surrounding the base of the bell 24 is an annular float 28. Figure 2a shows the syphon in its charged, rest position.

The operation of the syphon is illustrated by Figures 2b and 2c and is as follows. The operator pushes down the button 25 which pushes down the bell 24 to the position shown in Figure 2b. In the course of this action, diaphragm 26 rests on grid 27 so as to close the mouth of the bell 24 to the flow of the water therein. The bell and diaphragm act as a cylinder and piston and, due to the changing cross-section of the bell, the water therein is forced to rise up inside narrow portion 29 of the bell 24, above the level of the water outside. When the level of the water reaches the top 23 of the downpipe 22, it falls down inside the pipe and initiates a syphoning of the water in the cistern. Once the syphonic action begins, the diaphragm 26 lifts off the grid 27, due to the upward flow of water, and the bulk of the water in the cistern is free to syphon down the pipe 22. The bell remains in the depressed position under the action of the flowing water, and syphoning continues until the water level reaches the bottom of the bell 24 (Figure 2c) whereupon air leaks into the bell and the bell fills with air. Meanwhile, as soon as the water falls below the maximum water level 21, the water supply valve (not shown) begins refilling the cistern and this continues when the syphoning has stopped. The cistern therefore refills and the bell 24 floats, due to the annular float 28, resetting push-button 25 to its original position, ready to flush again once the cistern is sufficiently full.

Figure 3 shows further features of the apparatus described and in that Figure, the lower position of the bell 24 is shown in broken lines, as is the position of the diaphragm during syphoning. It can be seen that a cone 30 is provided inside the bell, at the top, and that the cone is able to pass down inside the downpipe 22 when the bell is pushed down. The cone assists in initiating the syphonic action by deflecting flow of water advantageously into the downpipe 22.

Locators 31 are also shown, integral to the bell 24 and extending from the inside of the narrow part thereof, to the outside of the downpipe 22 for locating the bell laterally relative to the downpipe. The grid 27 serves this function of the wider part of the bell.

Figure 4 illustrates among other things, the grid

27 in broken lines, the grid 27 including ribs 32 extending between inner and outer rings 33, 34.

The apparatus described has the advantage over conventional syphons, of allowing a more compact cistern, in particular in width as viewed in Figure 2. Furthermore, the bell can readily be lifted out of the cistern to provide easy access to the diaphragm for servicing.

It will be appreciated that the movable vessel need not be positioned over the downpipe but may be removed therefrom, provided a conduit is provided between the vessel and the downpipe to allow syphoning to occur but to allow relative movement therebetween, e.g. a flexible or telescopic tube.

It will further be appreciated that the foregoing description is by way of example only, and that modifications may be made within the scope of the invention.

Claims

1. Apparatus for flushing a cistern, comprising a downpipe, a movable vessel having an upper region and a lower region, which vessel is in communication with the downpipe in the said upper region, the upper region having a smaller horizontal cross-sectional area than the lower region and the lower region having an open end, and valve means fixed in relation to the downpipe, closing the lower end of the vessel so as to allow upward flow of water only, the vessel being movable between an upper position in readiness for flushing and a lower position, movement of the vessel from the upper position towards the lower position causing, in use, water to flow into the downpipe to initiate syphoning of water through the valve means.

2. Apparatus for flushing a cistern, comprising a downpipe having a free end extending upwardly, in use, an inverted vessel positioned over the free end of the downpipe, having a smaller horizontal cross-sectional area at its upper, closed end than at its lower, open end and valve means, fixed in relation to the downpipe, closing the lower end of the vessel so as to allow upward flow of water only, the vessel being movable between an upper position in readiness for flushing and a lower position, movement of the vessel from the upper position towards the lower position causing, in use, water to flow into the downpipe to initiate syphoning of water through the valve means.

3. Apparatus according to Claim 1 or 2 wherein the valve comprises a diaphragm on top of support means.

4. Apparatus according to Claim 1, 2 or 3 wherein the vessel is bell-shaped with a cylindrical lower end.

5. Apparatus according to any one of Claims 1 to 4 further comprising a float attached to the outside of the vessel, near its lower end.

6. Apparatus according to any one of Claims 1 to 5 wherein the downpipe has an upwardly extending free end and means are provided for deflecting water from the vessel into the end of the downpipe. 5

7. Apparatus according to Claim 6 wherein the means for deflecting water comprises a generally cone-shaped projection inside the vessel, at its closed end, protruding into the downpipe when the vessel is in its lower position. 10

8. Apparatus according to Claim 2 or any one of Claims 3 to 7 when dependent on Claim 2 wherein one or more locators are provided on the inside of the vessel, extending towards the downpipe for preventing lateral movement therebetween. 15

9. A cistern comprising flushing apparatus as claimed in any preceding Claim. 20

10. A cistern as claimed in Claim 9, wherein the downpipe extends through the base of the cistern.

11. A cistern as claimed in Claim 9 or Claim 10 comprising water level regulating means arranged to fill the cistern with water up to a level at which the vessel has a cross-sectional area less than its cross-sectional area at the level of the valve means, when in its lower position. 25

12. A cistern according to any one of Claims 9 to 11 comprising means operable externally of the cistern for moving the vessel from its upper position to its lower position. 30

13. A cistern according to Claim 12 wherein the means for moving the vessel comprise a button connected to the vessel. 35

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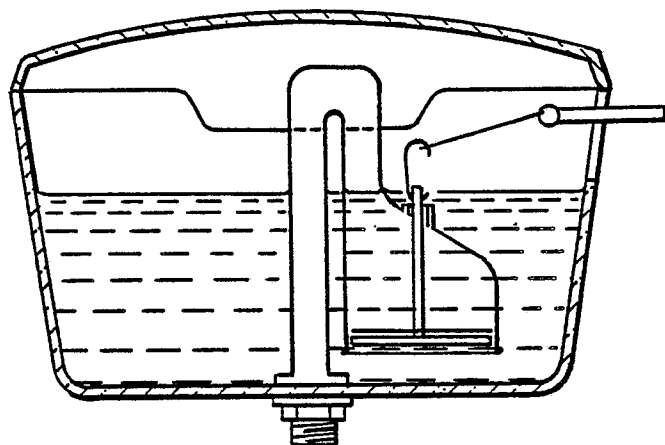


Fig.1a.

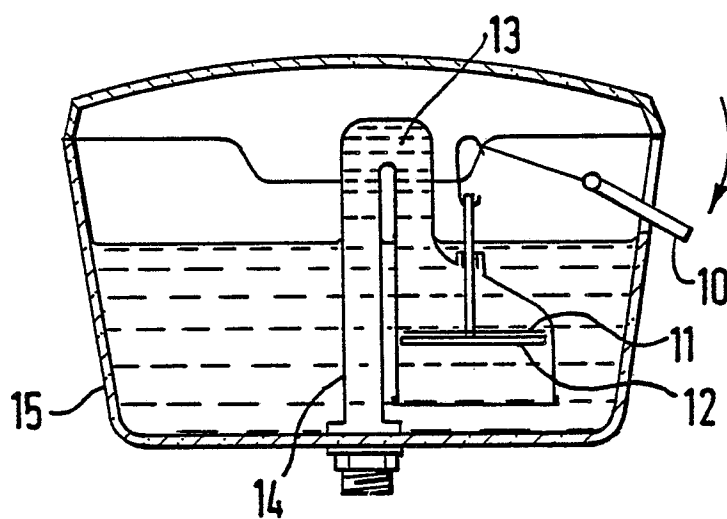


Fig.1b.

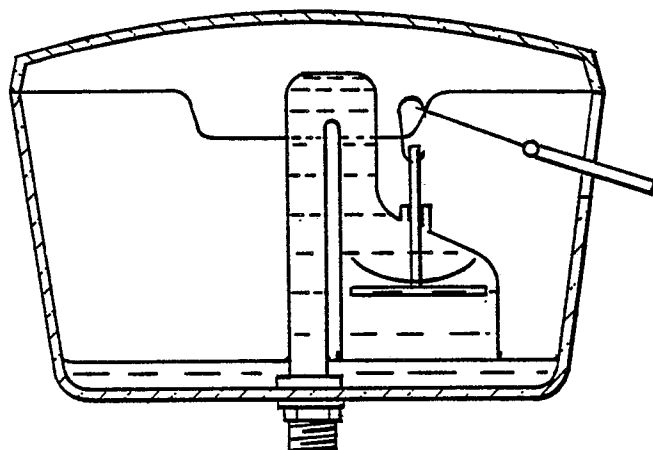


Fig.1c.

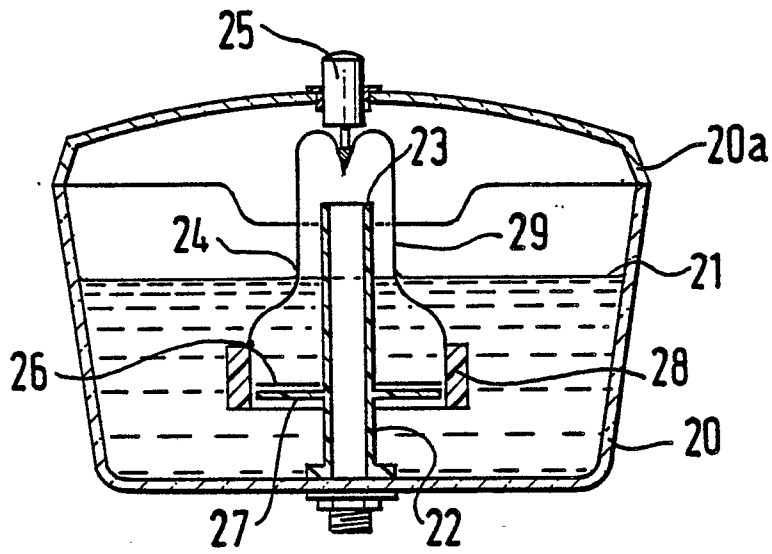


Fig. 2a.

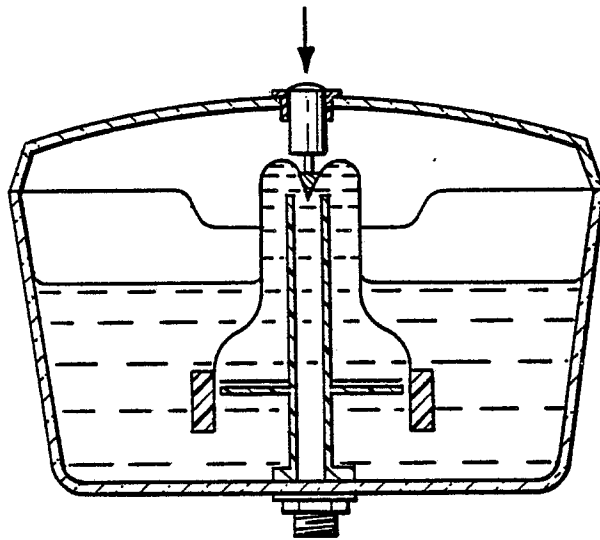


Fig. 2b.

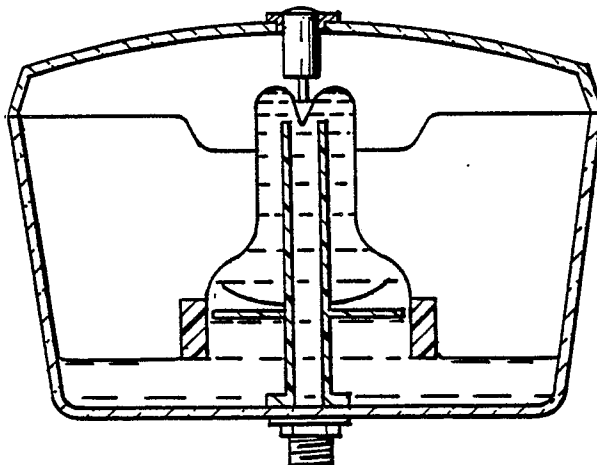


Fig. 2c.

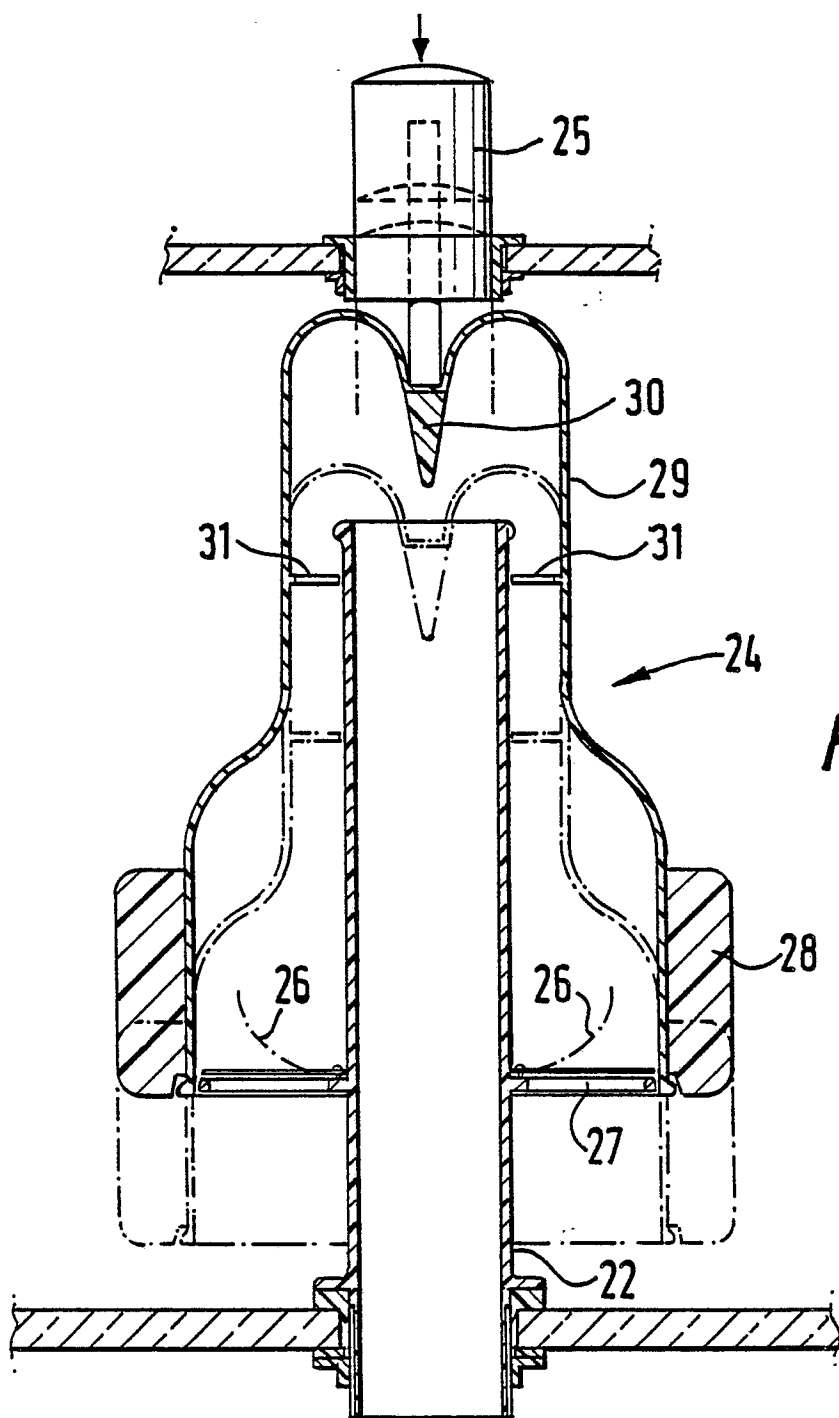


Fig. 3.

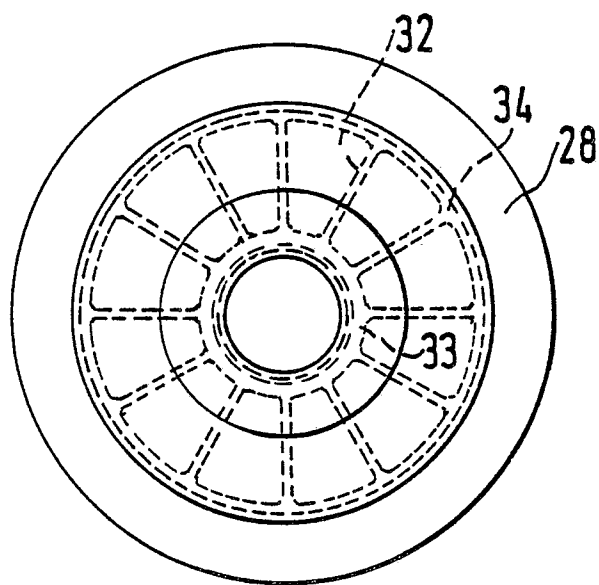


Fig. 4.



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. 4)
X	GB-A- 126 288 (SOCIETE FRANCAISE DE CHALEUR ET LUMIERE) * Whole document *	1,2,4,9 ,10,12	E 03 D 1/05
Y	---	3,5,6,8 ,13	
Y	DE-C- 66 552 (JÄNICKE) * Whole document *	3	
Y	---	5	
Y	GB-A- 385 760 (LOVE) * Pages 2,3; figures 1,2 *	6,7	
Y	---	8	
Y	CH-A- 255 353 (PHILIPS) * Figure 6 *	13	
Y	---		
Y	FR-A-1 003 305 (CLUZEL) * Page 1, column 2, lines 18-20; figure 1 *		
Y	---		
Y	FR-A-2 119 638 (BARNES) * Page 4, lines 13-27; figure 1 *		

The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 22-03-1988	Examiner HANNAART J.P.
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