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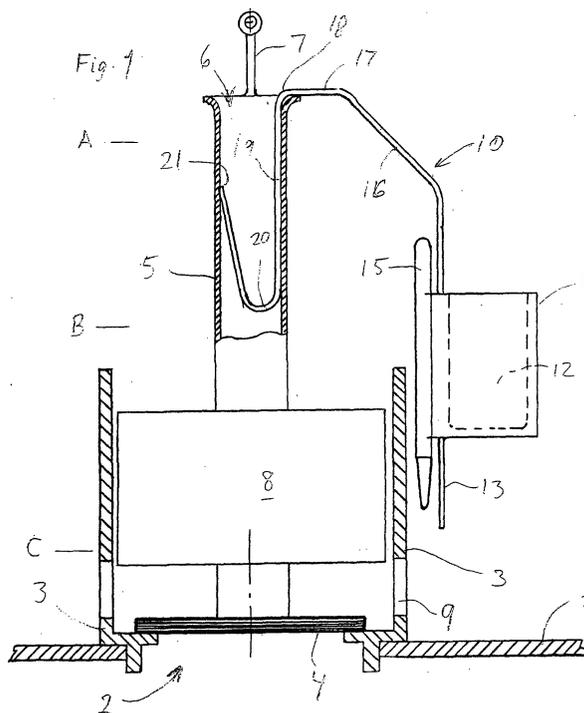
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(54) **Toilet cistern water saving device**

(57) A water saving device for use in toilet cisterns with bottom valve and float on the overflow pipe (5) consists of a metal bracket (10), the upper end of which may be put down into the upper opening (6) of the pipe and the lower end of which having a vessel (11) filled with water. The device may thus readily be retrofitted on existing cisterns.

Without the water saving device, the cistern is emptied from an upper level (A) to a lower (C). When using the device, the vessel (11) will act as weight pressing the valve body (4) down under normal level, whereby the valve closes earlier whereas the water level is at an intermediate level (B), thus reducing water consumption.



## Description

### Background of the Invention

**[0001]** The present invention concerns a water saving device adapted for use in a toilet cistern provided with a bottom valve having a valve body, which is disposed at the bottom of a central overflow stand pipe having an upwardly facing top opening, and to which pipe is secured an upwardly projecting operating rod, the device including a balancing means connected with the pipe for adjusting the closing position of the valve body in dependence on the water level in the cistern.

**[0002]** Such a water saving device is known from DK patent application no. 0315/94. The balancing means used is an element functioning by floating on the water surface. Due to its weight, however, the balancing means forces the otherwise floating valve body down so that the valve is closed while there is still an amount of water between the valve body and the balancing means. This construction, however, presupposes that different elements can be inserted above the overflow pipe, something which is not possible with many cisterns with this type of flush mechanism.

**[0003]** US patent 4,120,056 discloses a flush regulator for a toilet cistern with two cup-shaped, upwardly facing vessels acting as balancing means and connected with clamping means to a stem forming the pull connection between external handle or knob and a bottom valve body. However, the overflow stand pipe in this cistern is provided in parallel with stem and valve body as a separate, fixed element. This water saving device is, however, not configured to be used in cisterns with a combined stand pipe and valve body moving as one part. Even if modified to such cisterns, it would interfere with structure, e.g. housing, disposed in the vicinity of the valve body.

### Explanation of the Invention

**[0004]** The peculiar features of the water saving device according to the invention is that balancing means is provided in the shape of at least one open vessel with its opening facing upwards in the position of use, the device including a fastening means in the form of a bracket adapted for engaging the overflow pipe at its top opening with a V-shaped section provided at one end of the bracket, where one leg of the V-shaped section is extended and bent so as to project downward in the position of use, the vessel being attached to the downward projecting leg for suspending the vessel from the top of the overflow pipe.

**[0005]** The water saving device may readily be retrofitted on existing cisterns of the kind mentioned in the introduction. The vessel may thus hang in the bracket from the upper opening of the overflow pipe and down along the side of the pipe. Due to the bracket, the vessel is kept spaced apart from the overflow pipe and struc-

tural features surrounding bottom valve and overflow pipe and may thus be moved freely up and down. Furthermore, the V-shaped end of the bracket implies that it may be safely mounted at the top of overflow pipes, despite tapering inner diameter or varying inner diameters on different overflow pipes, as the V-shape provides for resilient wedge action at the inner side of the pipe. Furthermore, the device is simple in structure and may be produced with low cost.

**[0006]** In the mounted state, the vessel is filled with water and acts as weight on the overflow pipe, thereby urging the valve body towards the closing position. When a user flushes by pulling an operating knob connected with the overflow pipe, the vessel is lifted together with pipe and valve body, and when the user releases again, the vessel will weigh down the bottom valve until the vessel is submerged or so far below water level in the cistern that equilibrium is attained in relation to a buoyancy already provided in the valve body or provided as a float on the overflow pipe. Depending on how far the vessel is above the float, the valve body will thus be pressed a further distance down under the sinking water level in the cistern and then reach the bottom hole and thereby the closing position for the bottom valve before the water level has reached the bottom. A lesser amount of water than by normal flushing is thus flushed, also called a "small flush". If the user wants to perform flushing of the toilet with the full amount of water in the cistern, he can just keep the operating knob up until the cistern has been completely emptied. The invention thus provides possibility of two different kinds of flushings, one with a full discharge of the cistern volume and one with a reduced volume, with simple measures.

**[0007]** By the invention there is also the possibility that several devices may be provided in the same cistern, e.g. if the buoyancy requires particularly large balancing weight in order to achieve sufficient suppression of the valve body. The weight may thus be multiplied by adding more devices according to the invention, or fitting more vessels in one device, the bracket carrying several vessels.

**[0008]** In cases where a structure is provided around the overflow pipe, and which may interfere with the movements of the vessel, it is preferred that the vessel is provided with at least one oblong member at the side to face the overflow pipe in the position of use, as the members extend above and below the vessel. Then the members serve as slides or guides for the vessel at the outside of the structure.

**[0009]** In order to adjust the device according to the invention to different cisterns and/or to different amounts of water by "small flush", the vessel may be fastened at different positions along the bracket. The fastening may be effected by means of a friction connection with a screw, with a combination of a sharp-edged squeezing member on the vessel and notches on the bracket, or with other known means.

**[0010]** In a simple embodiment, the bracket is a solid

steel member and the vessel is an injection moulded plastic member.

### The Drawing

[0011] A preferred embodiment of the invention will now be described with reference to the drawing, where:

Fig. 1 shows a detail of a toilet cistern with a bottom valve, provided with a water saving device according to the invention, and

Fig. 2 shows a balancing means shaped as a vessel in the water saving device, as seen from above.

### Description of Embodiments

[0012] A toilet flush cistern with a bottom 1 has in a known way a bottom valve with a bottom hole or discharge opening 2 provided with a valve housing 3, Fig. 1 depicting the opening 2 closed with a valve body 4 which may be a rubber disc. The body 4 is disposed at the bottom of a pipe 5 constituting the overflow stand pipe of the cistern. The pipe 5 has a top opening 6 and is attached to an upwardly projecting rod 7 having an operating knob for the user outside the cistern. A float 8 is mounted around the overflow pipe close to the body 4; the float 8 has so great buoyancy that it may bring the pipe 5 and the body 4 afloat in that the body 4 is positioned a relatively small distance below the water surface. The valve housing 3 guides the movable parts 4, 5 in vertical direction. The reference number 9 indicates a passage for water in the housing 3.

[0013] The water saving device according to the invention is here made in two parts, a bracket 10 of round steel wire and a vessel 11 which may be moulded in plastic.

[0014] The vessel 11 may function as a weight when its interior 12 is filled with water. The vessel 11 is attached to a lower, straight end 13 of the bracket 10 in a through-going aperture 14 in the vessel 11, which is thus fastened by friction between bracket 10 and aperture 14. The vessel 11 may then be set in different positions along the lower part 13 of the bracket. Furthermore, the vessel 11 is provided with two vertical oblong members 15 at its side closest to the valve housing 3, the members 15 serving as guides in relation to the housing 3 and preventing that the vessel 11 with its lower edge accidentally hits the upper edge of the housing 3 when the vessel 11 is moving down after the the water saving device having been lifted up with the pull rod 7.

[0015] The bracket 10 extend along an intermediate section 16 above the vessel 11 to an upper section 17 where there is a bend 18 downward so that the other end 19 of the bracket can project down through the opening 6 and into the pipe 5. In order to stabilise and secure the device in the pipe 5, the bracket end 19 is provided with a V-shaped bend 20, forming two legs

which can be wedged by bearing against the inner side of the pipe 5; this detail provides for applying the device to different diameters of the pipe 5. The outermost edge 21 of the end of the bracket 19 can be made sharp for engaging the pipe wall, thereby further contributing to retention of the bracket 10 in the pipe 5.

[0016] In the filled condition, the water level in the cistern is at level with the line A on Fig. 1. When effecting "large flush", the rod 7 is held in its top position during the whole flushing when the water saving device according to the invention is fitted, thus flushing without utilising the water saving device, the cistern is emptied to the level C before the valve closes the hole 2. When applying a "small flush", utilising the water saving device according to the invention, the rod 7 is released immediately, and the water filled vessel 11 will press the valve body 4 a distance below the water level, while the body 4 is sinking under the flushing. During flushing, the body 4 is thus displaced some distance downwards in relation to the position it would have assumed if the vessel 11 was not present and filled with water. Thereby, the bottom valve 4 is forced to reach and to close the hole 2 earlier in the flushing process, the water level only reaching the level indicated by B on Fig. 1 when the opening 2 is closed. The flushed amount of water is then reduced to that which can be between levels A and B. By adjusting the vessel 11 up and down on the straight end 13 of the bracket 10, the relative position of the valve body may be adjusted, causing adjusting of level B and thereby adjusting the amount of water by "small flush".

[0017] Other embodiments are possible within the scope of the invention. E.g. the bracket may be made as a flat rod instead of from round wire. The vessel may be made of different materials, including wood and light-alloy metal.

### Claims

1. A water saving device adapted for use in a toilet flush cistern provided with a bottom valve having a valve body, which is disposed at the bottom of a central overflow stand pipe having an upwardly facing top opening, and to which pipe is secured an upwardly projecting operating rod, the device including a balancing means connected with the pipe for adjusting the closing position of the valve body in dependence on the water level in the cistern, **characterised in that** the balancing means is provided in the shape of at least one open vessel with its opening facing upwards in the position of use, the device including a fastening means in the form of a bracket adapted for engaging the overflow pipe at its top opening with a V-shaped section provided at one end of the bracket, where one leg of the V-shaped section is extended and bent so as to project downward in the position of use, the vessel being attached to the downward projecting leg for

suspending the vessel from the top of the overflow pipe.

2. A water saving device according to claim 1, wherein the vessel is provided with at least one oblong member at the side to face the overflow pipe in the position of use. 5
3. A water saving device according to claim 1 or 2, wherein vessel is attached to bracket by means of friction fit. 10
4. A water saving device according to any preceding claim, wherein the bracket is made of steel and the vessel of plastic. 15

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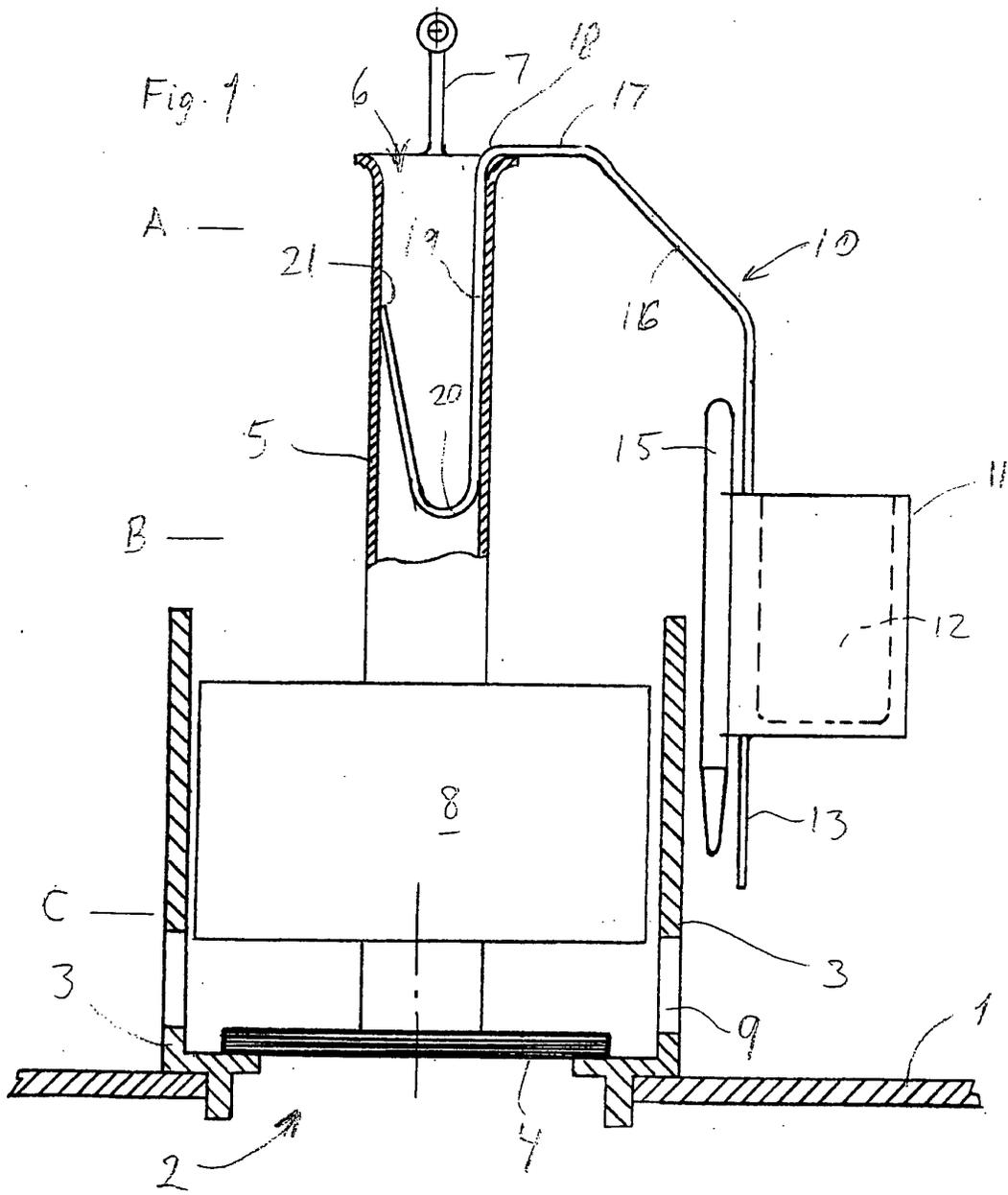
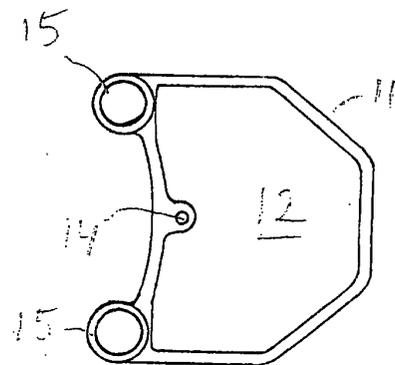


FIG. 2





European Patent  
Office

EUROPEAN SEARCH REPORT

Application Number  
EP 02 01 9210

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Place of search		Date of completion of the search	Examiner
MUNICH		20 November 2002	Flygare, E
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		T : 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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**ANNEX TO THE EUROPEAN SEARCH REPORT  
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