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(54) **Valve assembly**

(57) Valve assembly for discharging a cistern, the valve assembly comprising a valve member, and actuating means for opening and closing the valve member, the actuating means comprising a float element for delaying closure of the valve element.

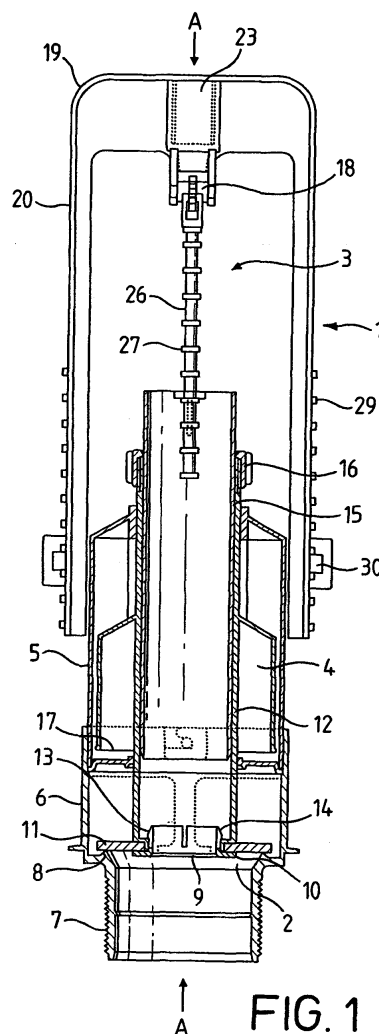


FIG. 1

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Description

[0001] The invention relates to a valve assembly, more especially to a valve assembly for discharging a cistern such as a lavatory cistern.

[0002] Water is conventionally discharged from lavatory cisterns by a siphon installed inside the cistern. However, United Kingdom water regulations have been changed so that they now allow water to be directly discharged from a lavatory cistern.

[0003] It is an object of the invention to provide a valve assembly which will allow water to be directly discharged from a cistern.

[0004] Accordingly, the present invention provides a valve assembly for discharging a cistern, the valve assembly comprising a valve member and actuating means for opening and closing the valve member, the actuating means comprising a float element for delaying closure of the valve member.

[0005] The valve member allows water to be directly discharged from the cistern. It is important that the valve member should be open for long enough to allow a sufficient volume of water to be discharged from the cistern into the pan of the lavatory, and the actuating means for opening and closing the valve member therefore comprises a float element for delaying closure of the valve member.

[0006] The float element may be mounted on an elongate member, the elongate member being connected at one end to the valve member and at the other end to the first arm of a lever, whereby depressing the second arm of the lever raises the elongate member and so raises the valve member.

[0007] The float element may be annular, and the elongate member may extend through the centre of the float element.

[0008] The float element may have an opening in its base, whereby air is trapped in the float element.

[0009] The lever may be mounted on an element of adjustable length, and the means for connecting the elongate member with the first lever arm may be of adjustable length, whereby the valve assembly may be used with cisterns of different heights.

[0010] The means for adjusting the length of the element for mounting the lever and/or the connecting means may comprise a number of spaced projections and means for engaging a selected projection.

[0011] The second lever arm may be depressed by means of a push button.

[0012] The push button may comprise a recess and/or a counterbore to increase movement thereof.

[0013] The push button may comprise a stem for depressing the second lever arm, and the valve assembly may comprise a recess for receiving the stem, the recess comprising a stepped portion for guiding the stem.

[0014] The element for mounting the lever may be flexible. This means that differences in alignment between the base of the valve assembly and the push but-

ton, caused by manufacturing tolerances in ceramic cisterns, can be accommodated.

[0015] The second lever arm may have a curved profile to facilitate movement thereof.

[0016] The elongate member may act as an overflow element.

[0017] The length of the elongate member may be adjustable.

[0018] The elongate member may be telescopically mounted.

[0019] The valve assembly may be made of any suitable material. For example, the valve assembly may be made of plastics material.

[0020] Three embodiments of the invention are now described by way of example with reference to the accompanying drawings.

Figure 1 is a side cross-sectional view of a first embodiment of a valve assembly according to the invention;

Figure 2 is a side cross-sectional view of the valve assembly of Figure 1 taken along line A-A;

Figure 3 is a perspective view of a second embodiment of the valve assembly according to the invention;

Figure 4 is the opposing perspective view of the valve assembly of Figure 3;

Figure 5 is a side cross-sectional view of a third embodiment of a valve assembly according to the invention;

Figure 6 is a perspective view of part of a fourth embodiment of a valve assembly according to the invention; and

Figure 7 is a side cross-sectional view of another part of the valve assembly of Figure 6.

[0021] Referring to the drawings, there is shown a valve assembly 1 for discharging water from a cistern, the valve assembly comprising a valve member 2 and actuating means 3 for opening and closing the valve member 2, the actuating means 3 comprising a float element 4 for delaying closure of the valve member 2.

[0022] The valve assembly 1 shown in Figures 1 and 2 is made of plastics material, and comprises a cylindrical housing 5 having at its lower end a valve base 6 with an integral screw fitting 7, which allows the valve assembly 1 to be connected to a pipe external to the base of a cistern for discharging water into the pan of a lavatory. The connector 6 includes on its inner surface a projecting rim 8, which acts as a valve seat for the valve member 2.

[0023] The valve member 2 comprises a retainer 9

having at its base a circular flange 10, which supports an annular seal 11, which is seated on the projecting rim 8.

[0024] A first tube 12 is supported on the seal 11 by means of a flange 13 at the base of the first tube 12. The retainer 9 is not connected to the seal 11, but is instead supported by the flange 13 by means of a projecting rim 14 on the retainer 9.

[0025] The first tube 12 is telescopically mounted around a second tube 15. The two tubes 12, 15 are held in a selected position by means of a compression nut 16 and a sealing washer. The first tube 12 extends through the centre of an annular float element 4, which has an opening 17 at its lower end, whereby air is trapped in the float element 4.

[0026] A lever 18 is pivotally mounted on a yoke 19, the two prongs 20 of which are mounted on either side of the housing 5. The lever 18 comprises a first arm 21 and a second arm 22.

[0027] The yoke 19 includes a depression 23 for receiving a push button 24 for depressing the second lever arm 22. The first lever arm 21 is connected to a projecting arm 25 on the second tube 15 by means of a connecting member 26. The connecting member 26 includes a number of spaced projections 27, and the arm 25 includes means (two teeth) 28 for engaging a selected projection 27, whereby the length of the connecting member 26 may be adjusted. The length of the yoke 19 may similarly be adjusted by means of a number of spaced projections 29 and means 30 for engaging a selected projection 29, the means 30 comprising a U-shaped clip 31, each prong of which may be inserted between two loops 32 mounted on either side of the housing 5.

[0028] The valve assembly 1 is connected to a pipe external to the base of a cistern by means of screw fitting 7. The cistern is then filled with water. The water enters the valve assembly 1 through windows 33 in the housing 5, but is prevented from entering the float element 4 by the air trapped therein. Water is discharged from the cistern by depressing the push button 24, which in turn depresses the second lever arm 22, and so raises the first lever arm 21. Raising first lever arm 21 raises connecting member 26, tubes 12, 15 and finally both the retainer 9 and the seal 11 of the valve member 2, thereby allowing water to be discharged through the pipe at the base of the cistern.

[0029] When the push button 24 is released, the second lever arm 22 returns to its original position, as do the first lever arm 21, connecting member 26, tubes 12, 15 and both the retainer 9 and the seal 11 of the valve member 2. However, the return of those elements is delayed by the float element 4, which floats until the level of the water in the cistern is no longer sufficient to support the combined weight of the elements, thereby ensuring that the valve member 2 is open for long enough to allow a sufficient volume of water to be discharged from the cistern into the pan of the lavatory.

[0030] If the water level in the cistern reaches above the level of the second tube 15, water will flow down the tubes 12, 15. Thus, the tubes 12, 15 act as an overflow device.

[0031] The second tube 15 is telescopically mounted in the first tube 12, and the level at which the cistern overflows can therefore be adjusted, to suit various water levels in a variety of cisterns.

[0032] The length of the valve assembly 1 can be adjusted by means of the projections 27, 29 and means 28, 30 for engaging a selected projection 27, 29 on the yoke 19 and connecting member 26. This means that the valve assembly 1 may be used with cisterns of different heights.

[0033] The yoke 19 is flexible. This allows for differences in alignment between the push button 24 and the base of the valve 6, caused by manufacturing tolerances in ceramic cisterns, to be accommodated.

[0034] The valve assembly shown in Figures 3 and 4 is identical to that shown in Figures 1 and 2 except that the dimensions of the depression 23 for receiving push button 24 have been altered. The same references have been used as in Figures 1 and 2.

[0035] The valve assembly 34 shown in Figure 5 is similar to those shown in Figures 1 to 4, but includes the following modifications: -

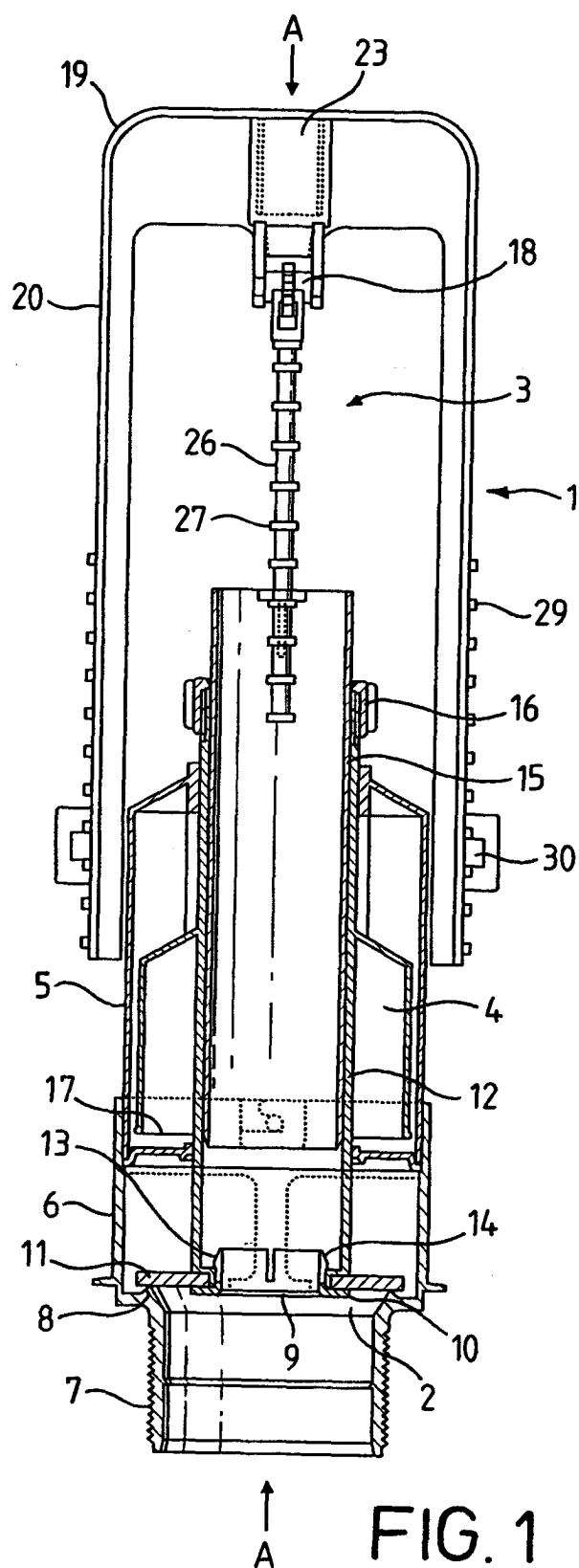
1. The second lever arm 40 has a circular profile to facilitate movement when actuated by the push button 44.
2. The depression 41 in the yoke 42 has a stepped lower portion 43 to give more guidance to the push button 44 to ease movement and prevent jamming.

[0036] The valve assembly 45 shown in Figures 6 and 7 is also similar to those shown in Figures 1 to 4, but includes a stop 46 to prevent the push-rod 47 of the push button 48 from overriding the second lever arm 48 and so causing jamming.

Claims

1. Valve assembly for discharging a cistern, the valve assembly comprising a valve member, and actuating means for opening and closing the valve member, the actuating means comprising a float element for delaying closure of the valve element.
2. Valve assembly according to Claim 1, wherein the float element is mounted on an elongate member, the elongate member being connected at one end to the valve member and at the other end to the first arm of a lever, whereby depressing the second arm of the lever raises the elongate member and so raises the valve member.

3. Valve assembly according to Claim 2, wherein the float element is annular, and the elongate member extends through the centre of the float element.
4. Valve assembly according to Claim 3, wherein the float element has an opening in its base, whereby air is trapped in the float element. 5
5. Valve assembly according to any preceding claim, wherein the lever is mounted on an element of adjustable length, and the means for connecting the elongate member with the first lever arm is of adjustable length, whereby the valve assembly may be used with cisterns of different heights. 10
15
6. Valve assembly according to Claim 5, wherein the means for adjusting the length of the element for mounting the lever and /or the connecting means comprises a number of spaced projections and means for engaging a selected projection. 20
7. Valve assembly according to any of Claims 2 to 6, wherein the second lever arm is depressed by means of a push button. 25
8. Valve assembly according to Claim 7, wherein the push button comprises a recess and/or a counter-bore to increase movement thereof.
9. Valve assembly according to Claims 7 or 8, wherein the push button comprises a stem for depressing the second lever arm, and the valve assembly comprises a recess for receiving the stem, the recess comprising a stepped portion for guiding the stem. 30
35
10. Valve assembly according to any of Claims 7 to 9, wherein the element for mounting the lever is flexible.
11. Valve assembly according to any of Claims 2 to 10, wherein the second lever arm has a curved profile to facilitate movement thereof. 40
12. Valve assembly according to any of Claims 2 to 11, wherein the elongate member acts as an overflow element. 45
13. Valve assembly according to Claim 12, wherein the length of the elongate member is adjustable. 50
14. Valve assembly according to Claim 13, wherein the elongate member is telescopically mounted.
15. A cistern comprising a valve assembly according to any of Claims 1 to 14. 55



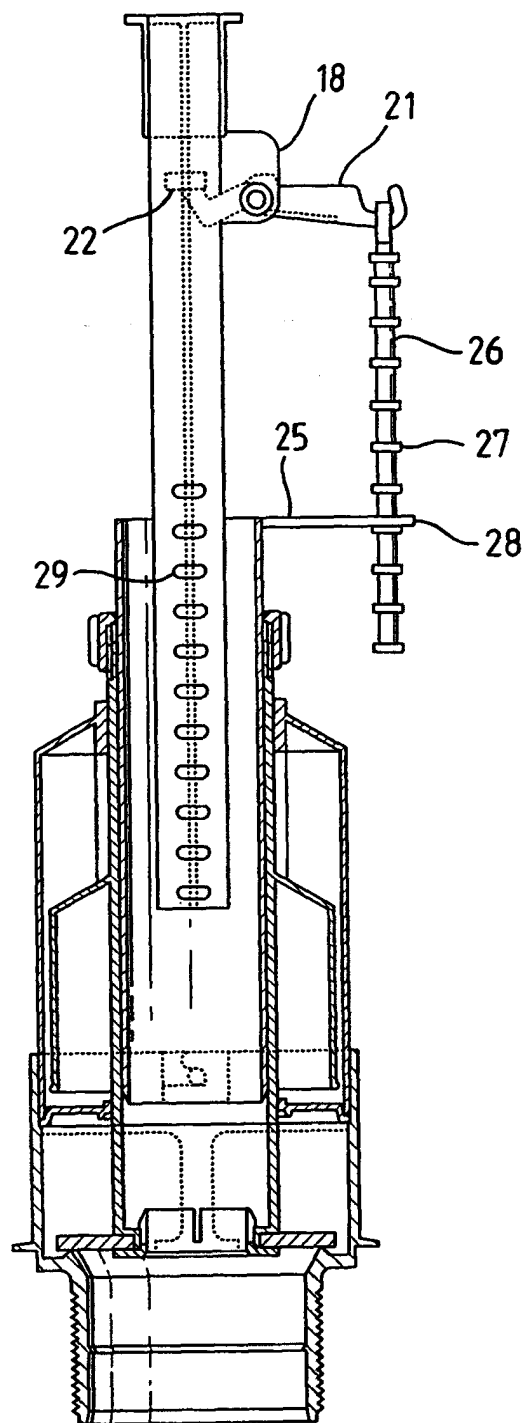
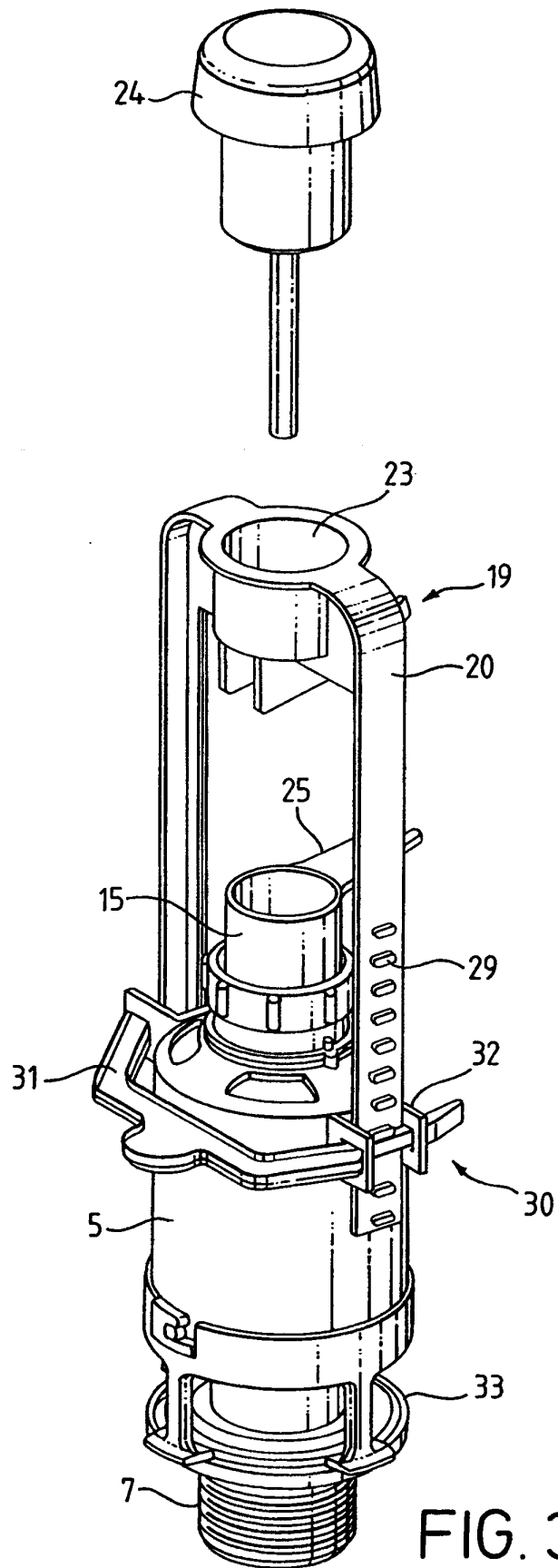
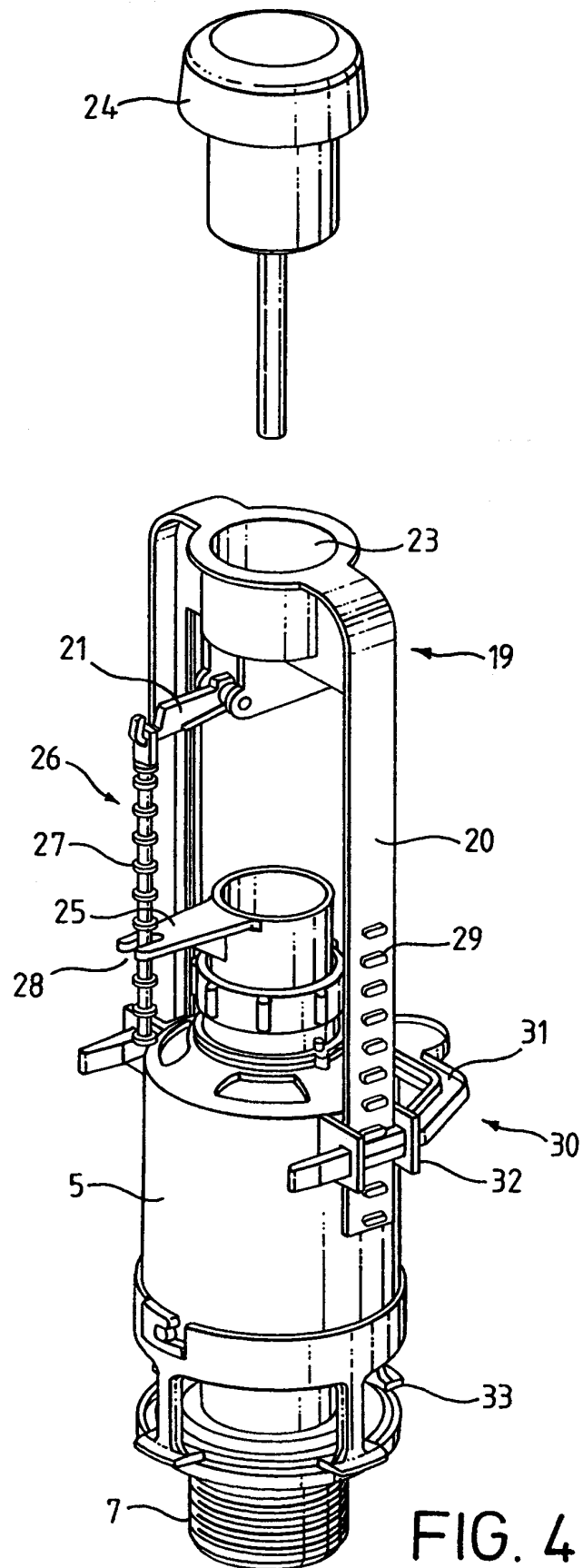


FIG. 2





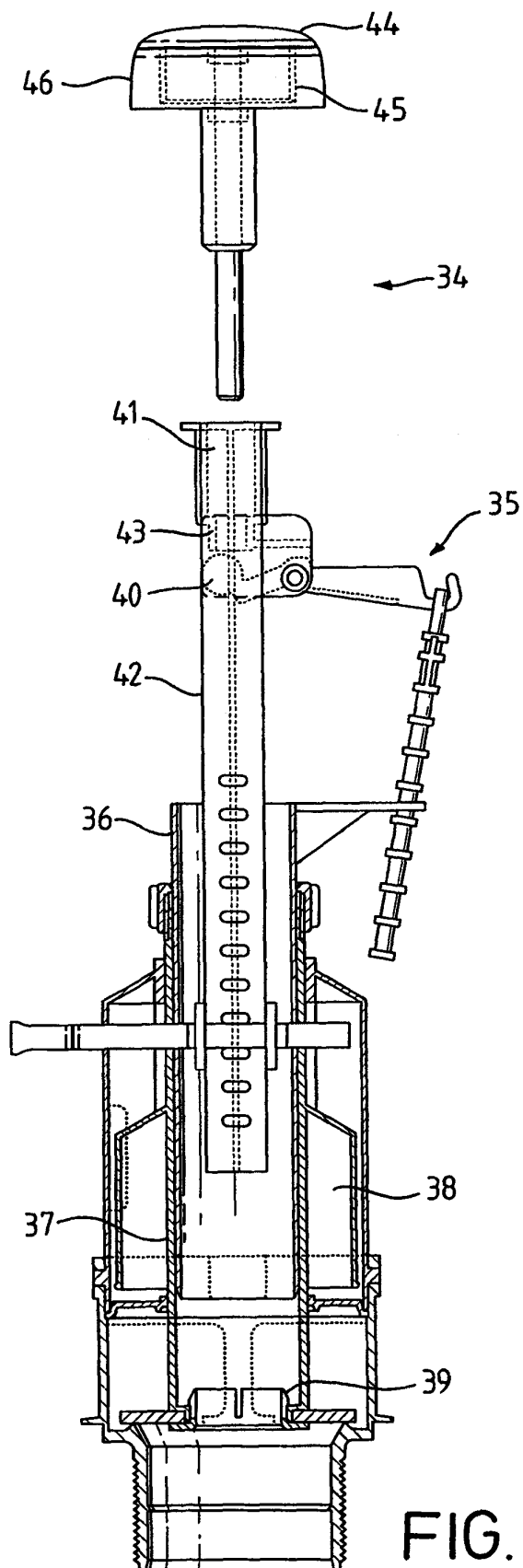


FIG. 5

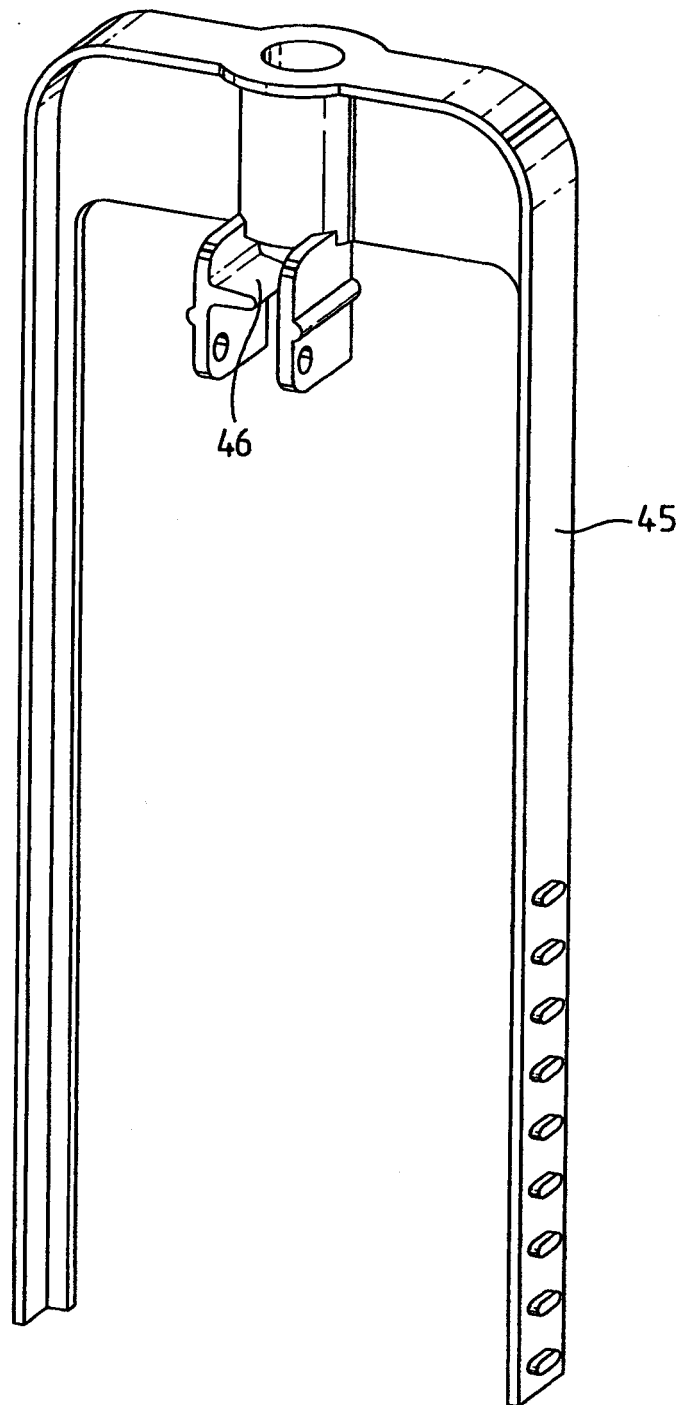


FIG. 6

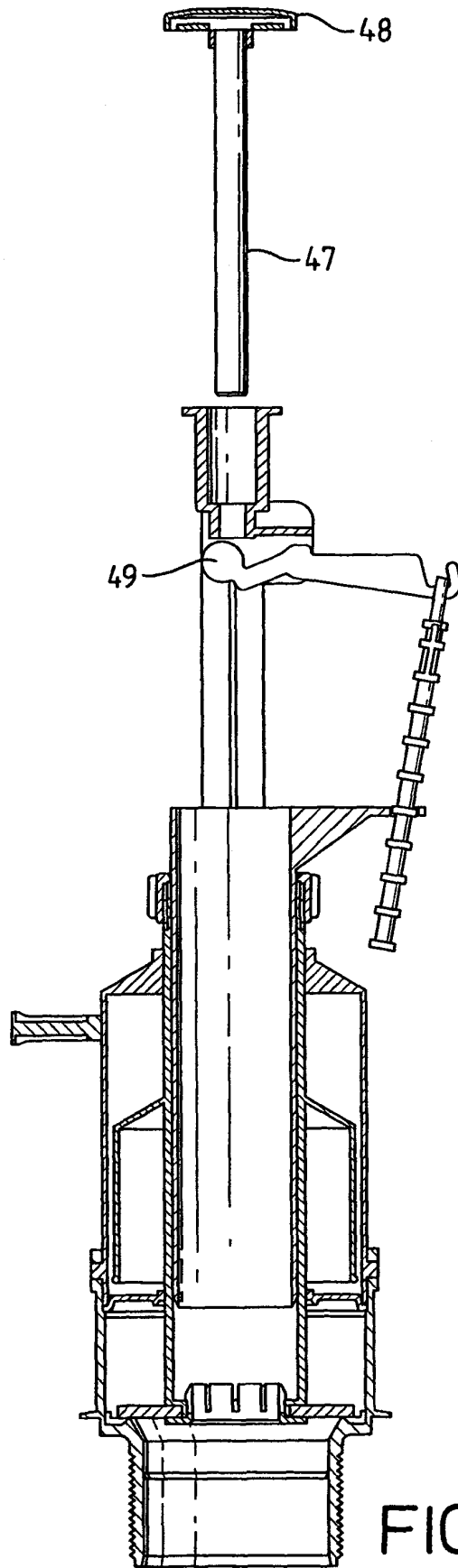


FIG. 7