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(54) **Two-stage flush device for a toilet tank**

(57) A two-stage flush device for a toilet tank is provided with a side press rod (4) for operating to open a valve (26) of a low level outlet tube (25) for flushing a large volume of water, a longitudinal press rod or pull rod (5) for operating to open a valve (29) of a high level outlet tube (28) for flushing a small volume of water. The side press rod (4) and the longitudinal press rod (5) are combined together and supported in a position sleeve (1) fixed in a hole of a side wall of a toilet tank. This device further includes a water volume control device, which has a high level outlet tube (62) for flushing a small volume of water and a low level outlet tube (61) for a large volume of water. The side press rod (4) is connected with the low level outlet tube (61) for operating to open a valve (65) of the low level outlet tube (61), and the longitudinal press or pull rod (5) is connected with that of the high level outlet tube (62).

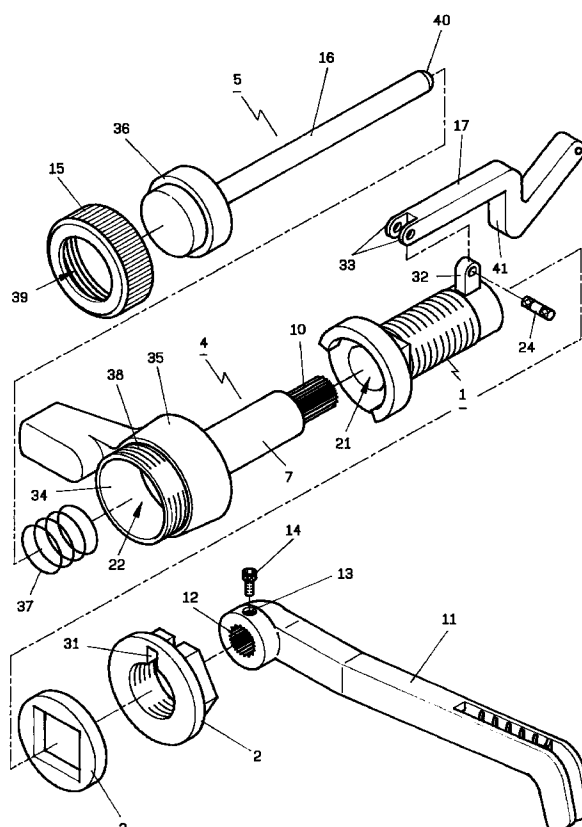


Fig 5

EP 0 768 435 A1

Description

This invention concerns a two-stage flush device for a toilet tank, and relates particularly, but not exclusively, to a flush device having a press button and a push or pull button for respectively flushing a small volume of water and a large volume of water.

A conventional two-stage flush device for a toilet tank shown in Fig. 1 has a single water volume control outlet tube with a valve for flushing two different volumes of water by two press buttons A and B for opening the valve C by different degrees. A second conventional two-stage flush device for a toilet tank shown in Fig. 2 has an auxiliary button E and a main button F, and the auxiliary button E can be pushed only or both the buttons E and F are pushed at the same time for flushing different volumes of water.

The two kinds of conventional two-stage flush devices have only one outlet tube for different volumes of water to flush out, but the main and the auxiliary button are to be pressed in the same direction. The chances are that a user may carelessly, easily or wrongly press the two buttons at the same time to flush a large volume of water, losing the water saving function they are designed for.

A third conventional two-stage flush device shown in Fig. 3 has two outlet tubes H and I respectively having a high level and a low level, but if the opening time for the valve cap of each outlet tube H or I should not be controlled, it would be of no use. It has an auxiliary press rod J and a main press rod K for operating respectively a high and a low level outlet valve for flushing different volumes of water. It could be that both press rods J and K will be carelessly or mistakenly pressed at the same time, as in the first and the second conventional devices described above.

A fourth conventional two-stage flush device shown in Fig. 4 has two different buttons L and M, nevertheless, these two buttons need two holes N and O for fixing them. Most toilet tanks in use now only have one hole for fixing pressing levers or rods, and consequently, a new water tank has to be used or an old one has to be transformed for the fourth conventional device.

Viewed from one aspect the present invention provides a two-stage flush device for a toilet tank, comprising a sleeve for mounting in an opening of a toilet tank, said sleeve having a central longitudinal opening there-through, a side operated valve actuating means having a shaft portion extending through said central longitudinal opening in said sleeve and connecting with a first connecting means for operating a valve of one of a high level and a low level outlet for said tank, said side operated valve actuating means being rotationally operable at a side thereof to rotate said shaft portion about its axis, and a central valve actuating means extending from a front of the device through a central longitudinal opening in said shaft portion to operate a valve of the other of said high level and low level outlets via a second connecting means.

The side operated valve actuating means preferably comprises a hollow shaft portion having a longitudinal opening for the central valve actuating means to pass through, a means for manually rotating the shaft portion about its axis such as by a button or lever protruding radially from one side thereof, and a radially extending actuating arm at the inner end of the shaft portion which rotates with said shaft portion to pull on a connecting member such as a chain or other flexible or inflexible elongate connecting means to open a valve of one of the outlets to the tank. The actuating arm may conveniently be connected to the inner end of the shaft by engagement of a toothed aperture therein with a toothed end portion to said shaft.

The central valve actuating means is preferably operable by longitudinally displacing an operating member extending through said longitudinal opening in said shaft portion of the side operated valve actuating means. In one embodiment the operating member is a pull rod which pulls on a connecting member to open a valve, and in another embodiment the operating member is a push rod which pushes a pivotally mounted actuating arm to open an outlet valve. The operating member is preferably resiliently biased into a position in which the outlet valve which it operates is closed. The central valve actuating means may also be pivotally mounted within the shaft portion of the side operated valve actuating means, so as to be operated by pressing down on a lever exposed at the front of the shaft portion to pull on a connecting means connected to the lever beyond the fulcrum to open an outlet valve.

Thus, in at least preferred embodiments one of the tank outlets, preferably the lower one, is operated by rotating a first valve actuating means by turning or pressing on the side thereof, and a second outlet, preferably a higher one, is operated in a different direction such as by longitudinally pulling or pushing, or pressing to tilt a central lever, at the front of the device.

Several features of preferred embodiments of the present invention are listed as follows.

1. An operating device for flushing water consists of a side press button for operating a low level outlet tube and a push button for operating a high level outlet tube;
2. The push button can be replaced by a pull button to have the same function; and
3. Although the operating device has two separate components for operating two-stage flush, they have different-directions for operating, preventing them from being mistakenly operated.

In one embodiment a two-stage flush device for a toilet tank comprises at least a high level outlet tube and a low level outlet tube which are respectively provided with a valve connected with a lower end of a chain, the other end of which is connected with either a front press rod or a side press rod; and a position sleeve having a center through hole for a connecting shaft portion of

said side press rod to extend therethrough, said position sleeve being fixable in a hole in a wall of a water tank; said side press rod having a connecting shaft portion extending through said center through hole of said position sleeve, said connecting shaft portion being provided with a center through hole and a shaft hole arranged transversely to said center through hole, a press button being fixed at a front end of said connecting shaft portion, an actuating arm being connected at a front end firmly with a rear end of said connecting shaft portion, said center hole of said connecting shaft portion being protruded through by a connecting rod portion of said front press rod; said front press rod having a shaft hole for insertion of a shaft protruding through said shaft hole of said connecting shaft portion so that said connecting rod portion of said front press rod may function as a lever with said shaft as a fulcrum; said connecting rod portion of said front press rod having its front end fixed with a press button; said side press rod operating said low level outlet tube and said front press rod operating said high level outlet tube for flushing separately a large and a small volume of water.

Another embodiment comprises: a position sleeve having a center through hole and being fixable in a hole in a side wall of a toilet tank by means of a nut and a washer; a side press rod and a longitudinal push rod provided to operate respectively a low and a high level outlet tube; said side press rod having a connecting shaft portion extending through said center through hole of said position sleeve and provided with a center through hole and a side press button at a front end, said side press button having a male thread and a cavity for receiving a push button of said push rod and a spring for urging said push button of said push rod therein; said male thread engaging a cover cap after said longitudinal press rod is placed to extend through said center through hole of said connecting shaft portion, said press rod being able to be pressed inward; said connecting shaft portion having straight teeth around its end to combine with an actuating arm; said actuating arm having an inner end provided with a toothed hole and a shaft hole for a screw to secure said connecting shaft portion of said side press rod with said actuating arm, and an outer end connectable with a valve of a low level outlet tube via a chain; said longitudinal push rod having a push rod portion and a push button fixed with an outer end of said rod portion, a spring provided to push back said push button after the push button has been pushed inward, said push rod portion extending out of said connecting shaft portion of said side press rod and urging a vertical side wall of a second actuating arm, said second actuating arm being connected pivotally with a shaft base of said position sleeve and having an outer end connectable with a valve of a high level outlet tube via a first chain, said side press rod operating to open said low level outlet tube, and said longitudinal push rod operating to open said high level outlet tube.

Preferably in such a two-stage flush device for a toilet tank said position sleeve has a shaft base to be com-

bined pivotally with a forked end of said second arm by means of a shaft so that said second actuating arm may swing with said shaft as a fulcrum. Preferably said nut engaged with the outside of said position sleeve has a notch corresponding to said shaft base and fitting with said shaft base, enabling said nut to engage with said position sleeve without being blocked by said shaft base.

In another embodiment a two-stage flush device for a toilet comprises: a position sleeve having a center through hole and being fixable in a hole in a side wall of a toilet tank by means of a nut and a washer; a side press rod and a longitudinal pull rod respectively being operable to open a high level outlet tube and a low level outlet tube, said side press rod having at least a connecting shaft portion extending through said center through hole of said position sleeve and having a center through hole, a press button fixed at a front end, a male thread and an inner cavity for receiving a recovery spring therein; a cover cap engaging with said male thread of said side press button after said longitudinal pull rod is placed extending through said center through hole of said connecting shaft portion so as to enable said pull rod to be pulled and returned back; said connecting shaft portion having straight teeth at an inner end to engage with an inner end of an actuating arm; said actuating arm having a toothed hole in the inner end engaging said toothed end of said connecting shaft portion and secured by a screw engaging a threaded hole in said inner end, said actuating arm having its outer end connected with a valve of said low level outlet tube via a chain; said longitudinal pull rod having a knob and a pull rod portion, said knob being fixed at a front end of said pull rod portion, said rod portion extending through said center through hole of said connecting shaft portion of said side press rod and having a lateral shaft hole for a shaft to be inserted therethrough to act as a stop and urge a spring located between said shaft and a front wall of a cover cap engaging said male thread of said side press button, said spring always resiliently urging said knob to protrude out of said cover cap, said knob being pulled outward together with the rod portion in operation to open the said valve of said high level outlet tube.

Viewed from another aspect the present invention provides a two-stage flush device for a toilet tank comprising a water volume control device consisting of a high level outlet tube, a low level outlet tube, and an overflow tube, said high level outlet tube having a valve, said low level outlet tube having a valve, and characterized by said high level outlet tube being provided with an inner tube and an outer tube, either said inner tube or said outer tube being movable to extend and shrink said high level outlet tube in order to alter the height of said high level outlet tube and accordingly alter the volume of water flushed through said high level outlet tube.

Embodiments of the invention will now be described, by way of example only, with reference to the accompanying drawings, wherein:

Figure 1 is a perspective view of a first conventional two-stage flush device for a toilet tank;

Figure 2 is a side cross-sectional view of a second conventional two-stage flush device for a toilet tank;

Figure 3 is a side view of a third conventional two-stage flush device for a toilet tank;

Figure 4 is a side view of a fourth conventional two-stage flush device for a toilet tank;

Figure 5 is an exploded perspective view of a first embodiment of a two-stage flush device for a toilet tank in the present invention;

Figure 6 is a perspective view of the first embodiment of a two-stage flush device for a toilet tank in the present invention;

Figure 7 is a cross-sectional view of the first embodiment of a two-stage flush device for a toilet tank in the present invention;

Figure 8 is a perspective view of the first embodiment of a two-stage flush device for a toilet tank in the present invention showing it combined with a water volume control device;

Figure 9 is an exploded perspective view of a second embodiment of a two-stage flush device for a toilet tank in the present invention;

Figure 10 is a cross-sectional view of the second embodiment of a two-stage flush device for a toilet tank in the present invention.

Figure 11 is a perspective view of the second embodiment of a two-stage flush device for a toilet tank in the present invention;

Figure 12 is a side view of the second embodiment of a two-stage flush device for a toilet tank in the present invention, showing it assembled in a toilet tank;

Figure 13 is an exploded perspective view of a third embodiment of a two-stage flush device for a toilet tank in the present invention;

Figure 14 is a perspective view of the third embodiment of a two-stage flush device for a toilet tank in the present invention;

Figure 15 is a operational view of a side press rod in the third embodiment of a two-stage flush device for a toilet tank in the present invention;

Figure 16 is a cross-sectional view of the third embodiment of a two-stage flush device for a toilet tank in the present invention, showing action of a front press rod;

Figure 17 is a perspective view of the third embodiment of a two-stage flush device for a toilet tank in the present invention;

Figure 18 is a perspective view of a first embodiment of a water volume control device in the two-stage flush device for a toilet tank in the present invention;

Figure 19 is a cross-sectional view of the first embodiment of a water volume control device in the two-stage flush device for a toilet tank in the present invention;

Figure 20 is a magnified view of the part A in Fig.

19;

Figure 21 is a cross-sectional view of a second embodiment of a water volume control device in the two-stage flush device for a toilet tank in the present invention;

Figure 22 is a cross-sectional view of a third embodiment of a water volume control device in the two-stage flush device for a toilet tank in the present invention;

Figure 23 is a magnified view of the part marked A in Fig. 22;

Figure 24 is a magnified view of the part marked B in Fig. 22;

Figure 25 is a cross-sectional view of a fourth embodiment of a water volume control device in the two-stage flush device for a toilet tank in the present invention;

Figure 26 is a magnified view of the part marked A in Fig. 25;

Figure 27 is a perspective view of a fifth embodiment of a water volume control device in the two-stage flush device for a toilet tank in the present invention;

Figure 28 is a cross-sectional view of the fifth embodiment of a water volume control device in the two-stage flush device for a toilet tank in the present invention;

Figure 29 is a magnified view of the part marked A in Fig. 28;

Figure 30 is a perspective view of a sixth embodiment of a water volume control device in the two-stage flush device for a toilet tank in the present invention;

Figure 31 is a cross-sectional view of the sixth embodiment of a water volume control device in the two-stage flush device for a toilet tank in the present invention;

Figure 32 is a magnified view of the part marked A in Fig. 31;

Figure 33 is an exploded perspective view of a seventh embodiment of a water volume control device for the two-stage flush device for a toilet tank in the present invention;

Figure 34 is a magnified view of the part marked A in Fig. 33;

Figure 35 is a magnified view of the part marked B in Fig. 33;

Figure 36 is a cross-sectional view of the seventh embodiment of a water volume control device in the two-stage flush device for a toilet tank in the present invention;

Figure 37 is a magnified view of the part marked A in Fig. 36; and,

Figure 38 is a perspective view of the two-stage flush device combined with the water volume control device in the two-stage flush device for a toilet tank in the present invention.

A two-stage flush device for a toilet tank in a first

illustrated embodiment of the present invention, as shown in Figs. 5-8, includes a position sleeve 1 having a center through hole 21 for receiving a connecting shaft portion 7 of a rotationally operated "side press rod" 4 therein, fixed firmly in a hole of a toilet tank by means of a nut 2 and a washer 3 as shown in Fig. 12. The position sleeve 1 further has a shaft base 32 standing on an outer surface of an inner end, and the nut 2 has a notch 31 to fit with the shaft base 32 so as to be located surrounding the outer surface of the position sleeve 1 after assembly with the sleeve 1. The shaft base 32 has a shaft hole for a shaft 24 to fit therein, which shaft 24 also fits through holes in one end of a first actuating arm 17 so that the arm 17 may be combined with the position sleeve 1. The first actuating rod 17 has the other end connected with a first connecting means, in this case a chain 30 of a high water outlet tube.

The two-stage flush device further includes a side press rod 4 having a connecting shaft portion 7, straight male teeth 10 cut in an outer surface of an inner end for engaging with a toothed hole 12 in an end of a second actuating arm 11, and a threaded lateral hole 13 bored in the end of the second actuating arm 11 for a screw 14 to secure the second actuating arm 11 with the side press rod 4. The side press rod 4 further has a center through hole 22 for a push rod portion 16 of a push rod 5 to extend through, a male thread 38 around a left end (as seen in Fig. 5) thereof having a larger diameter than the right end, the male thread 38 being for a cover nut 15 to screwedly engage with after the push rod 5 is inserted through the press rod 4, with a push button 36 of the push rod 5 protruding forward out of a hole in the cover nut 15. A spring 37 is provided to be placed around the rod portion 16 between an inner surface of the button 36 and an annular bottom in the center hole 22 so that after being pushed inward the push rod 5 may be pushed back by the spring 37 to an original position wherein the button 36 protrudes from the cover nut 15. The rod portion 16 has its rear end 40 urging on a vertical wall surface 41 of the first actuating arm 17 after the push rod portion 16 extends through the center through hole 22 of the side press rod 4. Therefore, when the push button 36 of the push rod 4 is pressed inward, the first actuating arm 17 may be forced to swing upward by a pushing movement of the push rod portion 16. Then the first actuating arm 17 pulls up the first chain 30, which lifts the valve 29 of the high level tube 28 to allow water in the toilet tank to flow out in a small pre-set volume. If the button 35 of the side press rod 4 is pressed, the second actuating arm 11 is swung upward to pull a second chain 27 up, with the valve 26 of the outlet tube 25 being lifted up allowing a larger pre-set volume of water to flow out.

A second embodiment of a two-stage flush device for a toilet tank as shown in Figs. 9-11, has a position sleeve 1 the same as that in the first embodiment, but a different operating method, wherein a rotationally operated side press rod 4 and a pull rod 5 are used. The side

press rod 4 has the same structure as that of the first embodiment but the pull rod 5 is different, having a structure in which it is operated by pulling outward. A cover nut 15' with a female thread has a front center hole 39' of a smaller diameter than that of the cover nut 15 in the first embodiment, with a front side wall 39A for an outer end of a spring 37 to urge thereon. The pull rod 5 has an elongate rod portion 51 extending through the center through hole 22 of the side press rod 4, a shaft hole 52 laterally provided near the front end for a shaft 53 to fit therein and therethrough to provide a stop for the rear end of the spring 37, and a round button or knob 54 fixedly attached to a front end of the rod portion 51. Then if the button 54 is pulled outward together with the rod portion 51, then the inner end of the rod portion 51 connected with a first chain 30 will pull up the chain 30 and the valve 29 of the outlet tube together, which allows a small volume of water in the toilet tank to flow out of the tube 28. And if the side press rod 4 is pressed down, a large volume of water will flow out of the valve 26 as shown in the same way as the first embodiment.

The second embodiment has a two-stage flush function with a different operating method wherein the side press rod 4 is functioned by pressing, but the pull rod 5 is operated by pulling. Therefore, wrong operation can be prevented to attain the object of water economization.

A third embodiment of a two-stage flush device shown in Fig. 13 at least has a position sleeve 1 provided with a center through hole 21 for receiving a connecting shaft portion 7 of a side press rod 4, and fixed in a hole of a toilet tank by means of a nut 2 and a washer 3 in the same way as the first and the second embodiment.

The third embodiment further includes a rotationally operable side press rod 4 having at least a connecting shaft portion 7, which has straight teeth 10 around an inner end, a center through hole 22 for a connecting rod portion 16 of a front press rod 5 to extend therein, and a side press button 8 for pressing to rotate the side press rod 4, and a lateral shaft hole 23 bored in an intermediate portion of the connecting shaft portion 7 for a small shaft 24 to fit through and also through a shaft hole 17 of the connecting rod portion 16 of the front press rod 5 so that the connecting rod portion 16 may function as a lever with the shaft 24 as a fulcrum. The third embodiment further has a connecting rod 11 with the same structure as the first embodiment, provided with a shaft hole 12 at one end, and a threaded hole 13 for a screw to engage and secure the second actuating arm 11 with the end of the connecting shaft portion 7 of the side press rod 4. The other end of the second actuating arm 11 is connected with the second chain 27 of the valve 26 for flushing a large volume of water by pressing the side press rod 4.

The third embodiment further has a front press rod 5, which is provided with connecting rod portion 16 extending through the center through hole 22 of the side press rod 4 and having a shaft hole 17 in an intermedi-

ate point for the shaft 24 to fit through to function as a fulcrum relative to the rod portion 16, and with a plate-shaped end 19 with two threaded holes for screws 20 to secure a front button 18 with the plate end 19. Then if the front button 18 is pressed down, the rod portion 16 functions as a lever, forcing its end to lift the chain 30 connected with the valve 29 of the outlet tube 28 for flushing a small volume of water.

Though the front press rod 5 and the side press rod 4 are in some degree connected with each other, and the side press rod 4 also moves the front press rod 5, the water volume flushed out by the side press rod 4 is a large volume and the water flushed out by the front press rod 5 is a small volume, therefore the water volume flushed out in total is not affected. On the other hand, the front press rod 5 cannot move the side press rod at all in operating.

Preferred embodiments of water volume control device 60 for the flush device in the present invention, will be described in many kinds of structures below. They generally have a low level outlet tube 61 and a high level outlet tube 62, a common outlet tube 63, and an overflow tube 64 located between the two outlet tubes 61 and 62. Each outlet tube 61;62 has a valve 65;66, and two extension 67 of the valve 66 have outer ends fixed on an outer surface of the lower end of the overflow tube 64, and extensions 68 of the outlet tube 66 are pivotally connected with a shrinkable tube forming the outlet tube 62 or a side of an inner tube and can be changed in their position according to the level to which the height of the outlet tube 62 is adjusted. Each valve is bound with a pull chain 69 or 70 which is to be pulled up by the operating structure for flushing out a small or a large volume of water for use.

In the following embodiments, the high water level outlet tube 62 is structured to be able to adjust the water volume to be flushed out thereof.

A first embodiment of a water volume control device includes a high level outlet tube 62 formed of an inner tube 71 and an outer tube 72 combined together, as shown in Figs. 18-20. The inner tube 71 has a plurality of rings 73 around proper locations of an outer surface, preventing water leaking through contact surfaces of the inner and the outer tube 71,72 by a blocking or sealing function. Then the outer tube 72 can be adjusted in its location relative to the inner tube 71, altering the level or volume of water to be flushed out with numerous stages or in a continuously variable manner between a maximum and a minimum volume.

A second embodiment of a water volume control device shown in Fig. 21 has a stationary inner tube 74 provided with a male thread 76 and a movable outer tube 75 provided with a female thread 77 to engage with the male thread 76 so as to adjust the level or volume of water to be flushed out in a continuously variable manner or in numerous stages.

A third embodiment of a water volume control device, as shown in Figs. 22-24, includes a high level outlet tube 62 formed of an stationary inner tube 78 hav-

ing a plurality of semicircular or hemispherical recesses 80 spaced apart equidistantly in a vertical line on an outer surface, a position groove 81 on an opposite side to the recesses 80, and a movable outer tube 79 having a locking pin 82 fitted in a position hole 83 in the wall thereof and a spring 84 fitted around a lower end of the locking pin inside of the position hole 83 and a position annular projection 85 engaging with the position groove 81 of the inner tube 78 so that the outer tube 79 may be lifted or lowered in a definite vertical position for adjusting its height, i.e. the level of water to be flushed out. And the position pin 82 is used to lock the outer tube 79 at an adjusted position, by being moved to engage one of the recesses 78.

A fourth embodiment of a water volume control device, as shown in Figs. 25 and 26, has the same structure as the third one except a locking ball 82A being used instead of the locking pin 82 of the third embodiment and confined in a ball room 82B and being urged by a spring 82C and a cap 82D covered on the spring 82C to always compress the spring 82C to push the locking ball 82A. Then the locking ball 82A has the same function as the locking pin 82 in the third embodiment.

Thus, according to third and fourth embodiments the height of said high level outlet tube is controlled by engagement of a spring biased locking member associated with the outer tube in one of a plurality of recesses associated with the inner tube. In the third embodiment the spring biased locking member is a locking pin, and in the fourth embodiment the locking member is a locking ball confined in a ball chamber in the outer tube and being secured by a cap with a spring located therebetween.

A fifth embodiment of a water volume control device, as shown in Figs. 27-29, has the same structure as the third embodiment except it has a movable inner tube 86 and a stationary outer tube 87. The inner tube 86 includes a plurality of upwardly sloping teeth 88 continuously arranged in a vertical position on an outer surface, and the outer tube 87 includes a flexible leaf or grip 90 extending down from a lower end and an engaging tooth 89 provided on an inner surface of the movable grip 90 and able to engage with any of the teeth 88 of the inner tube so that the outer tube 87 may be lifted or lowered relative to the stationary inner tube and locked at an adjusted position, to alter the height of the outer tube, i.e. the water level to be flushed out.

Figs. 30-32 show a sixth embodiment of a water volume control device, which has an extensible inner tube 91, an outer stationary tube 92 provided with a male thread 93, a constrict ring 94 with a female thread and a washer 95 engaging and fitting around a male thread 93, and a cover cap 96 with a female thread to engage with the male thread 93 of the outer tube so that the over cap 96 can tighten and loosen the ring 94 and the inner tube by screwing and then the inner tube 91 can be secured tightly at an adjusted position so as to adjust the water volume to be flushed out.

The seventh embodiment of a water volume control device shown in Figs. 33-37 has a stationary inner tube 97 provided with a plurality of grooves 99 spaced apart equidistantly and connected with a vertical slot 100 at a right side, a movable outer tube 98 provided with a locking projection 101 on an inner surface. Then when the outer tube 98 is moved up and down relative to the inner tube 97, the locking projection 101 can engage with any of the grooves 99 of the inner tube 97 by rotating a little the outer tube so that the height of the outer tube 98 can be altered and locked at that position.

It should be noted that at least preferred embodiments of the water volume control device have a washer 102 for preventing water leak, and a direction orienting slot for allowing either the inner or the outer tube to extend or shrink in a definite direction so that the valve of either the high or the lower level base does not change its location and direction, permitting the valve to open or close normally to let flushing operate smoothly according to a preset small or large volume. In preferred embodiments the valve of the high level outlet tube is provided with two opposing projections pivotally fixed with the outer or inner tube at an outer surface.

Thus, in at least preferred embodiments there is provided a device which offers several embodiments of two-stage flush device for a toilet tank having two kinds of pressing or pulling directions for a side press rod and a longitudinal pull or push rod and able to be fixed in a single hole of the wall of a conventional toilet tank; and there is provided a two-stage flush device for a toilet tank which includes a side press rod for operating a high level outlet tube to flush a small volume of water, and a longitudinal push or pull rod for operating a low level outlet base to flush a large volume of water, both the side press rod and the longitudinal rod being fitted in a center through hole of a locking sleeve fixed in a hole of the wall of a conventional toilet tank by means of a nut and a washer, extending out of the tank wall for operation.

While preferred embodiments of the invention have been described above, it will be recognized and understood that various modifications may be made therein and the appended claims are intended to cover all such modifications which may fall within the spirit and scope of the invention.

Claims

1. A two-stage flush device for a toilet tank, comprising a sleeve (1) for mounting in an opening of a toilet tank, said sleeve (1) having a central longitudinal opening (21) therethrough, a side operated valve actuating means (4) having a shaft portion (7) extending through said central longitudinal opening (21) in said sleeve (1) and connecting with a first connecting means (27) for operating a valve (26) of one of a high level and a low level outlet (25,28) for said tank, said side operated valve actuating means (4) being rotationally operable at a side thereof to rotate said shaft portion (7) about its axis, and a

central valve actuating means (5) extending from a front of the device through a central longitudinal opening (22) in said shaft portion (7) to operate a valve (29) of the other of said high level and low level outlets (28) via a second connecting means (30).

2. A two-stage flush device for a toilet tank as claimed in claim 1, wherein first connecting means (27) includes a substantially radially extending connecting arm (11) mounted to the rear of said shaft portion (7) with said central valve actuating means (5) extending therethrough.

3. A two-stage flush device for a toilet tank as claimed in claim 1 or 2, wherein said side operated valve actuating means (4) and said central valve actuating means (5) are operable in different directions.

4. A two-stage flush device for a toilet tank as claimed in claim 3, wherein said central valve actuating means (5) is operable by longitudinally displacing a rod portion (16,51) thereof within said central longitudinal opening (22) in said shaft portion (7) of said side operated valve actuating means (4).

5. A two-stage flush device for a toilet tank as claimed in claim 4, wherein said rod portion (16) is longitudinally displaceable by pushing said central valve actuating means (5) against a resilient bias, said rod portion (16) being engageable with a connecting arm (17) pivotally mounted on said sleeve (1) to thereby operate a said outlet valve (29).

6. A two-stage flush device for a toilet tank as claimed in claim 4, wherein said rod portion (51) is operable by pulling on said central valve actuating means (5) against a resilient bias, and hence on said first connecting means (27).

7. A two-stage flush device for a toilet tank as claimed in claim 1, 2 or 3, wherein said central valve actuating means (5) is operable by pressing on a lever (16) which is pivotally mounted in said shaft portion (7) of said side operated valve actuating means (4) and which extends through said shaft portion (7) to the front thereof.

8. A two-stage flush device for a toilet tank comprising a water volume control device consisting of a high level outlet tube (62), a low level outlet tube (61), and an overflow tube (60), said high level outlet tube (62) having a valve (66), said low level outlet tube (61) having a valve (65), and characterized by said high level outlet tube (62) being provided with an inner tube (71;74;78;86;91;97) and an outer tube (72;75;79;87;92;98), either said inner tube (71;74;78;86;91;97) or said outer tube (72;75;79;87;92;98) being movable to extend and

shrink said high level outlet tube (62) in order to alter the height of said high level outlet tube (62) and accordingly alter the volume of water flushed through said high level outlet tube (62).

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9. The two-stage flush device for a toilet tank as claimed in claim 8, wherein said high level outlet tube (62) includes an inner tube (71) provided with a plurality of rings (73), and said outer tube (72) can be extended and shrunk by means of said rings (73) forming resistance against an inner surface thereof. 10
10. The two-stage flush device for a toilet tank as claimed in claim 8, wherein said inner tube (74) is provided with a male thread (76), and said outer tube (75) is provided with a female thread (77) to engage with said male thread (76), with said inner tube (74) being capable of being extended and shrunk. 15 20
11. The two-stage flush device for a toilet tank as claimed in claim 8, wherein said inner tube (78) is provided with a plurality of recesses (80) spaced apart equidistantly in a vertical line in an outer surface, and said outer tube (79) is provided with a locking member (82; 82A) associated therewith urged by a spring (84; 82C), said locking member (82; 82A) selectably engaging with any of said recesses (80) of said inner tube (78) so that said outer tube (79) can be extended and shrunk. 25 30
12. The two-stage flush device for a toilet tank as claimed in claim 8, wherein said inner tube (86) is provided with a continuous series of sloped teeth (88) on an inner surface, and said outer tube (87) is provided with a locking tooth (89) supported on a grip (90), said locking tooth (89) selectably engaging with any of said sloped teeth (88) of said inner tube (86) to enable said outer tube (87) to be secured at an adjusted position. 35 40
13. The two-stage flush device for a toilet tank as claimed in claim 8, wherein said outer tube (92) is provided with a male thread (93), a constrict ring (94), a washer (95) and a cover cap (96) being provided to fit around an upper end of said outer tube (92), said cover cap (96) having a female thread engaging said male thread (93) of said outer tube (92) so that said inner tube (91) may be extended out and in said outer tube (92) and secured at an adjusted position by means of said cover cap (96) engaging tightly with or disengaging from said outer tube (92). 45 50 55
14. The two-stage flush device for a toilet tank as claimed in claim 8, wherein said inner tube (97) is provided with a plurality of grooves (99) connected with a vertical slot (100) at one side, and said outer

tube (98) is provided with a locking projection (101) movable along in said slot (100) of said inner tube (97) and engageable with any of said grooves (99) to secure said outer tube (98) at an adjusted position.

15. The two-stage flush device for a toilet tank as claimed in claim 8, wherein said inner tube (78;97) is provided with a direction orienting slot (81;100) for a position projection (85;101) of said outer tube (79;98) to fit in and slide along in said slot (81;100), enabling said outer tube (79;98) to move in a definite direction.

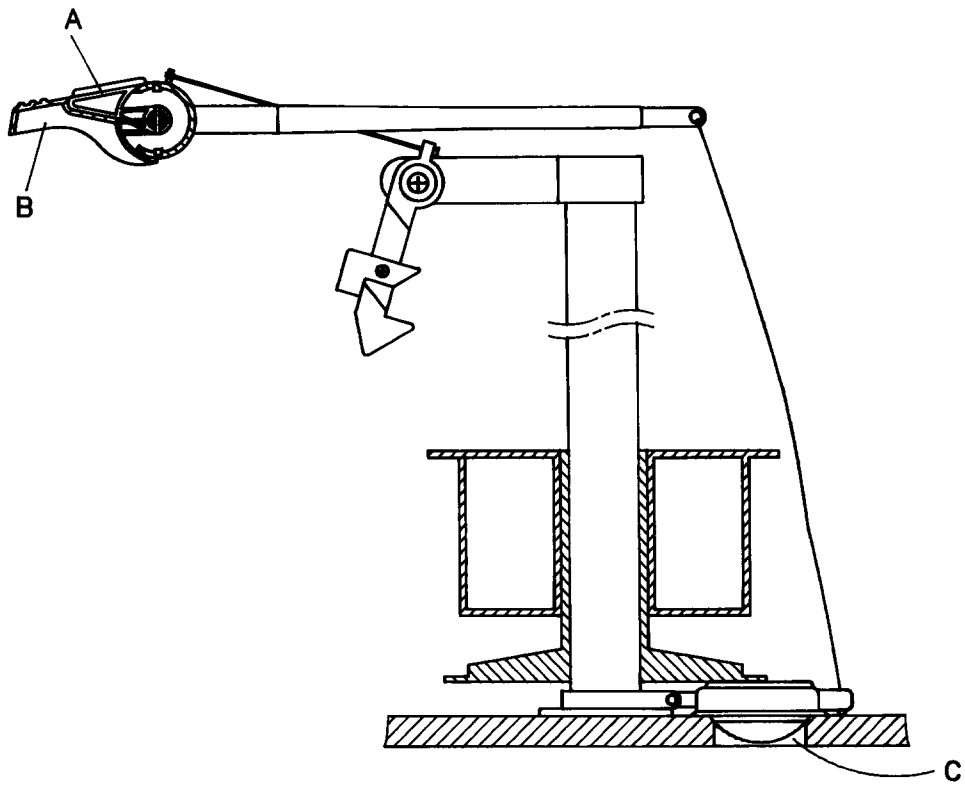


Fig 1 (PRIOR ART)

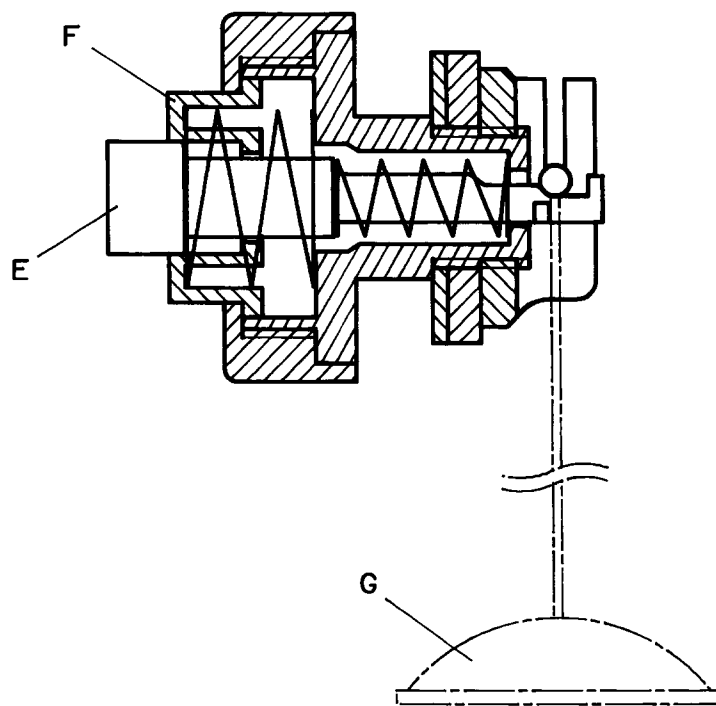


Fig 2 (PRIOR ART)

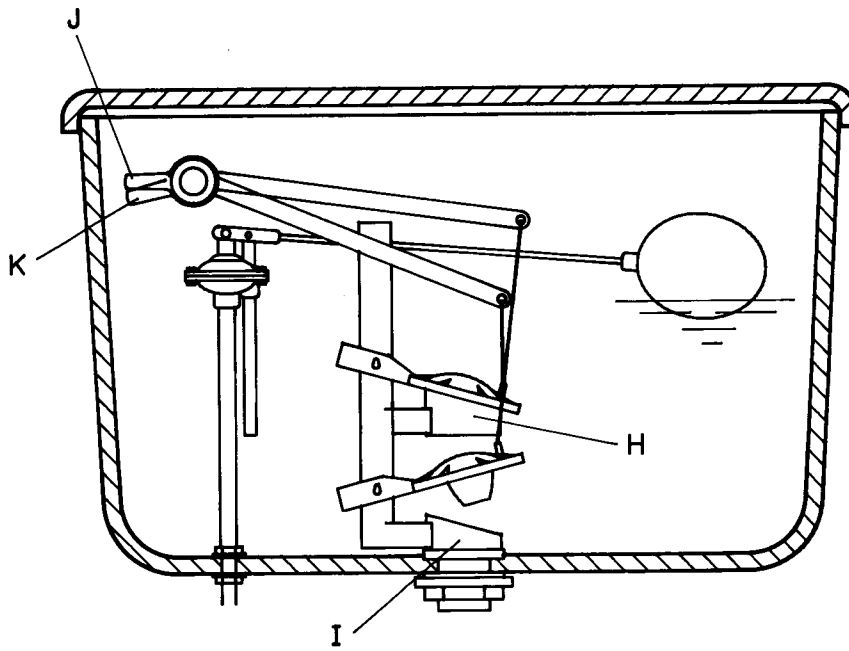


Fig 3 (PRIOR ART)

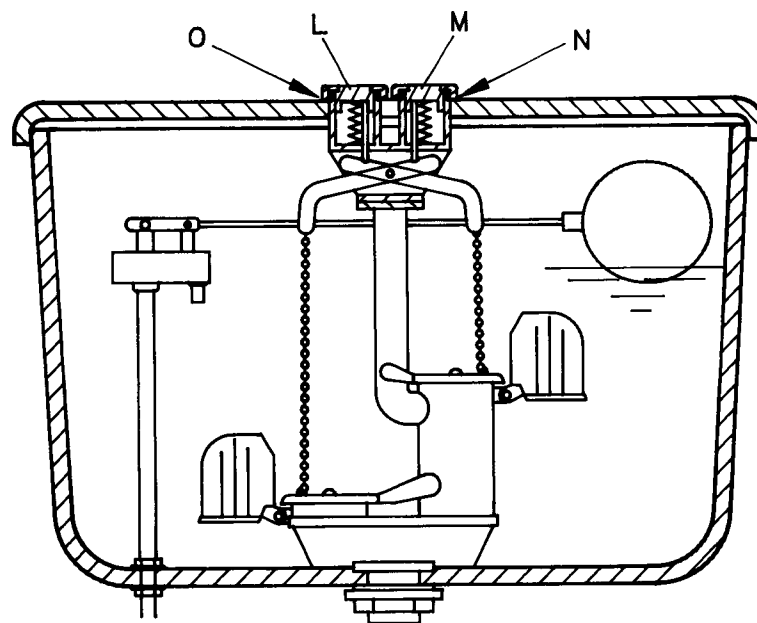


Fig 4 (PRIOR ART)

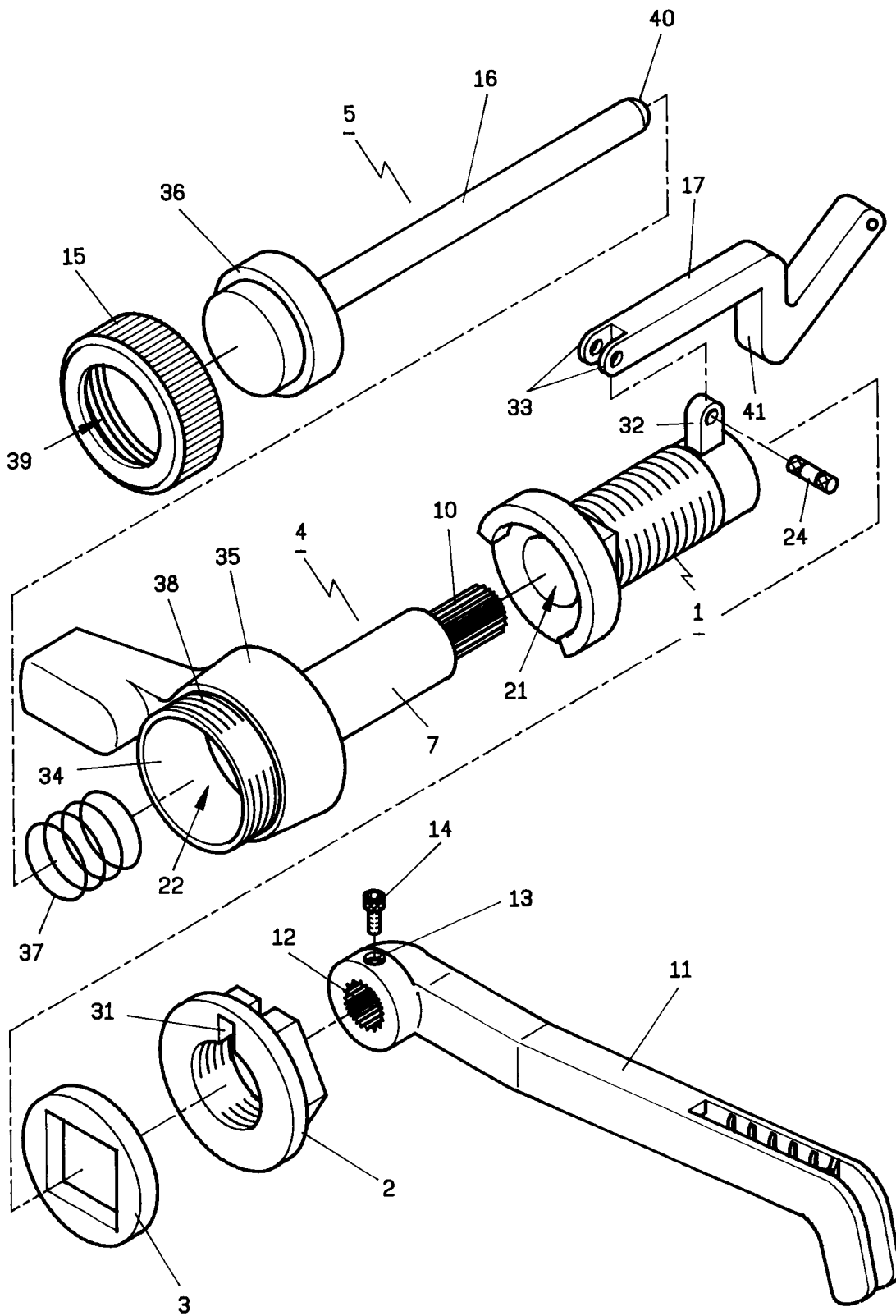


Fig 5

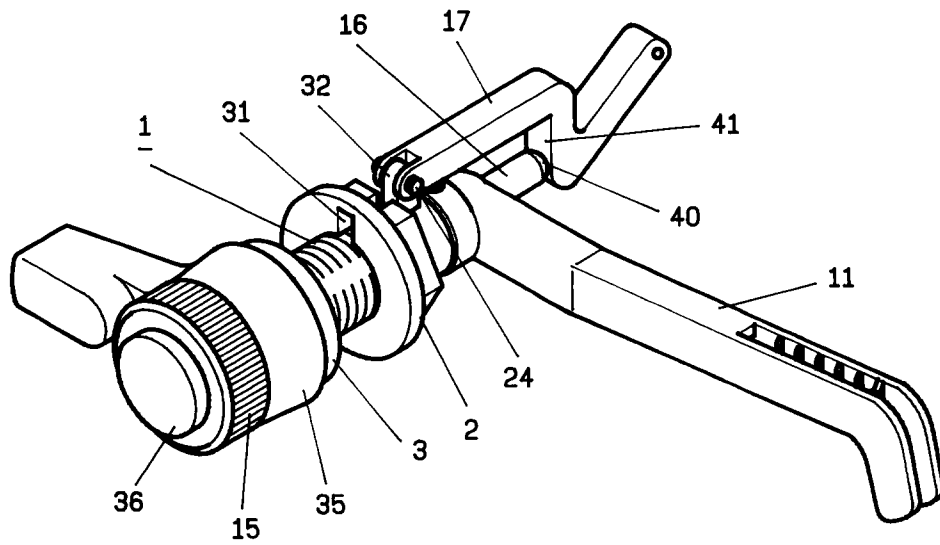


Fig 6

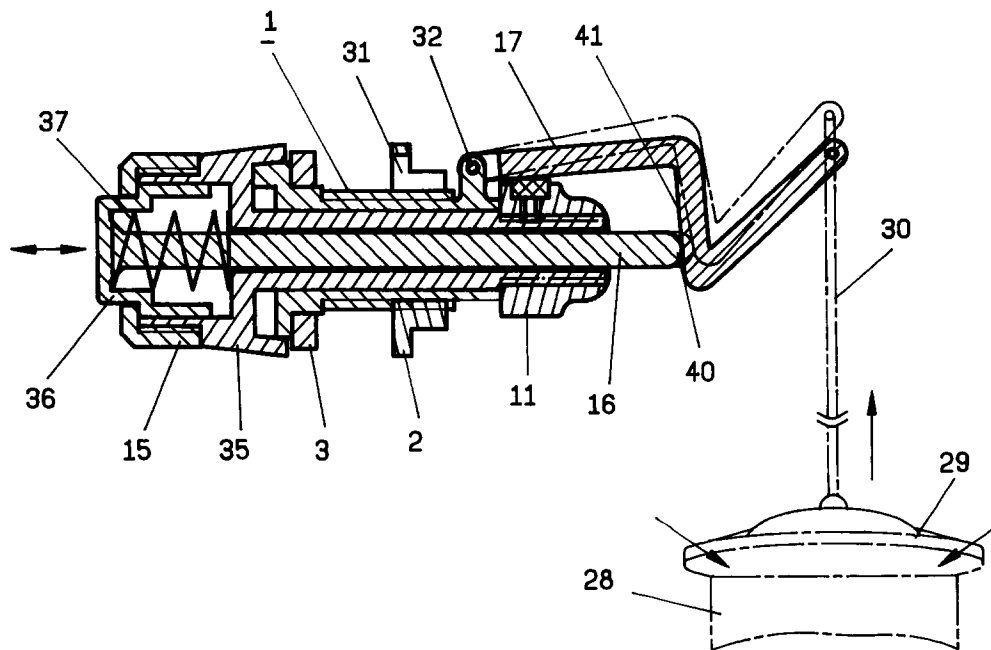


Fig 7

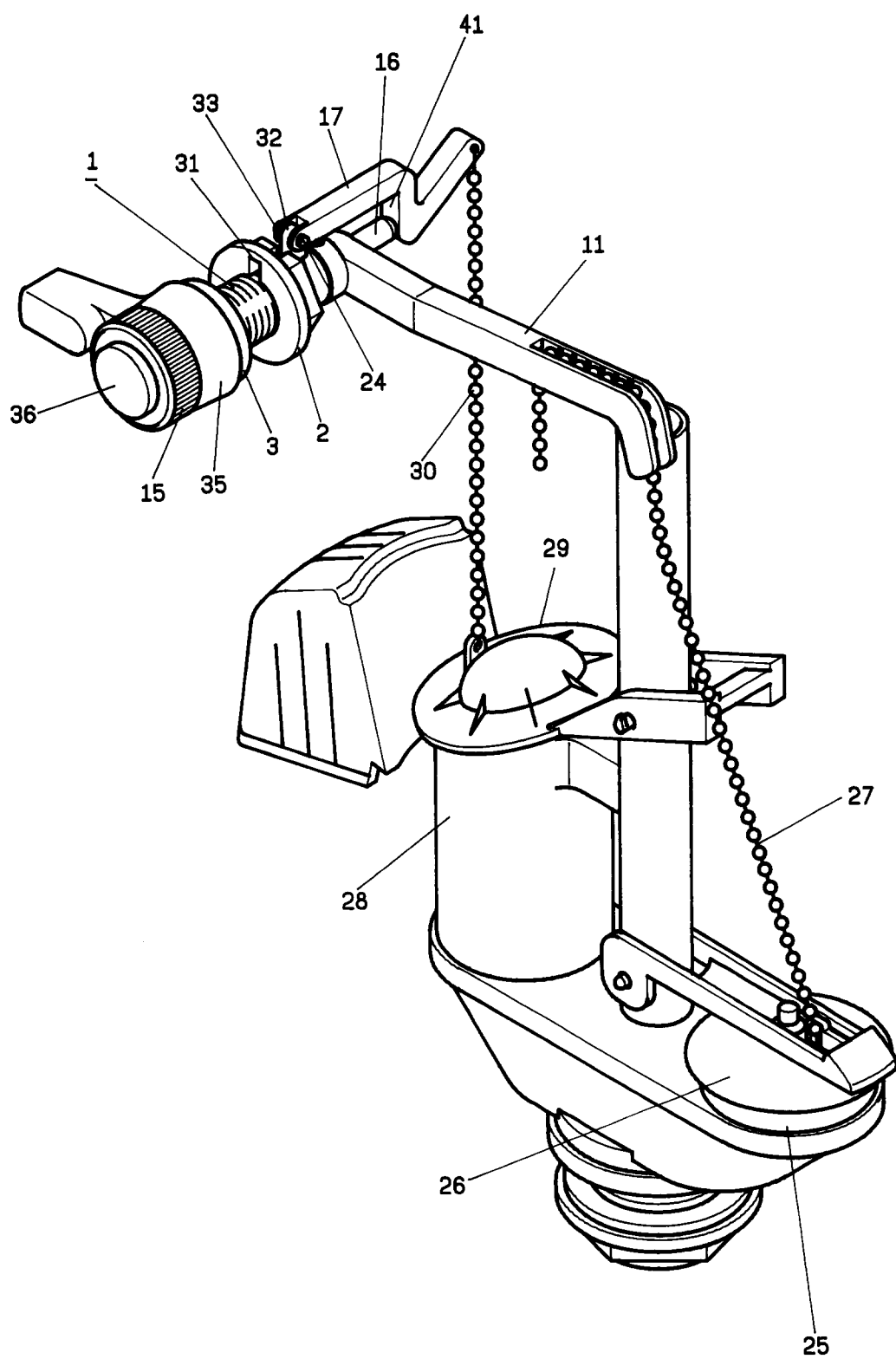


Fig 8

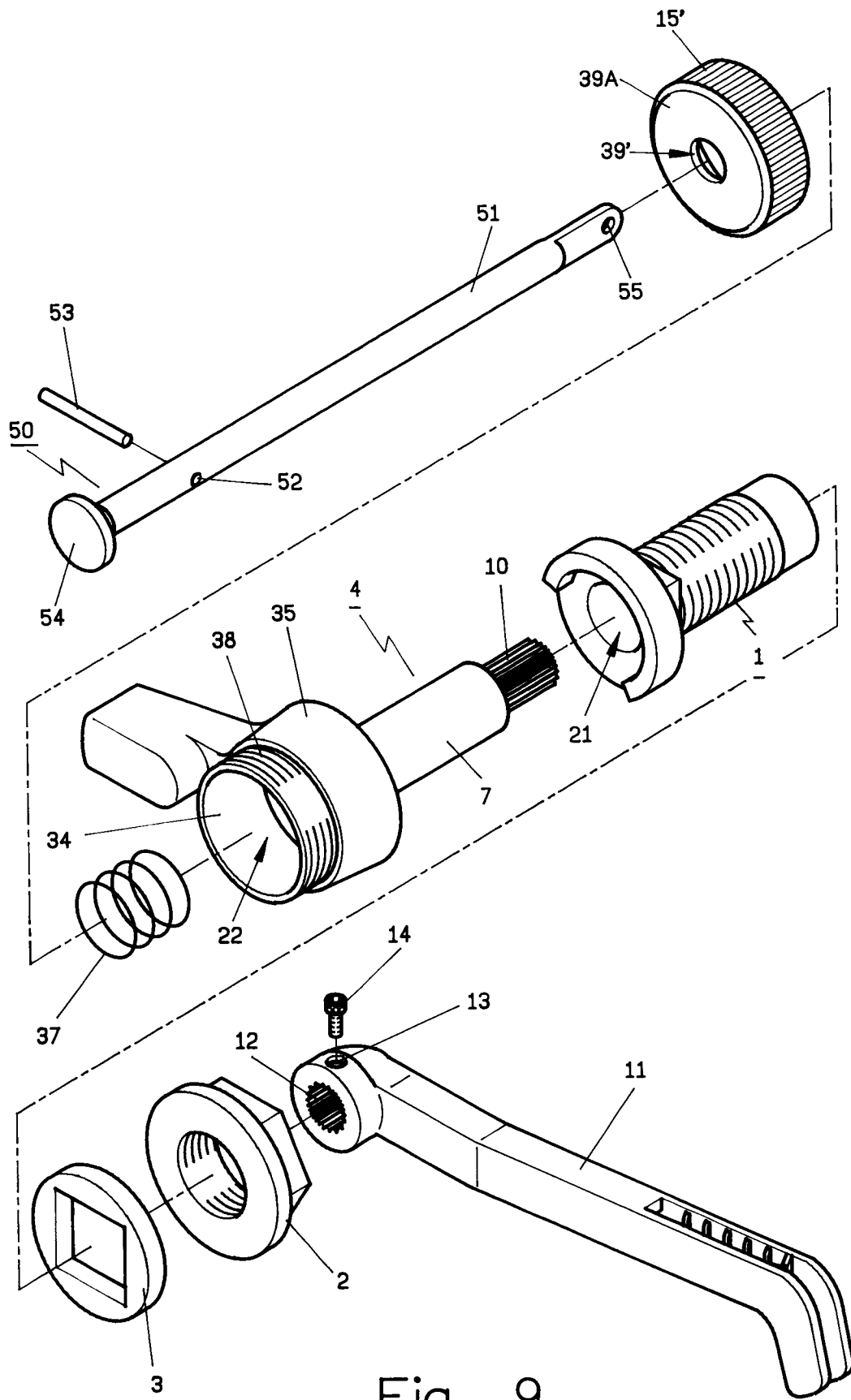


Fig 9

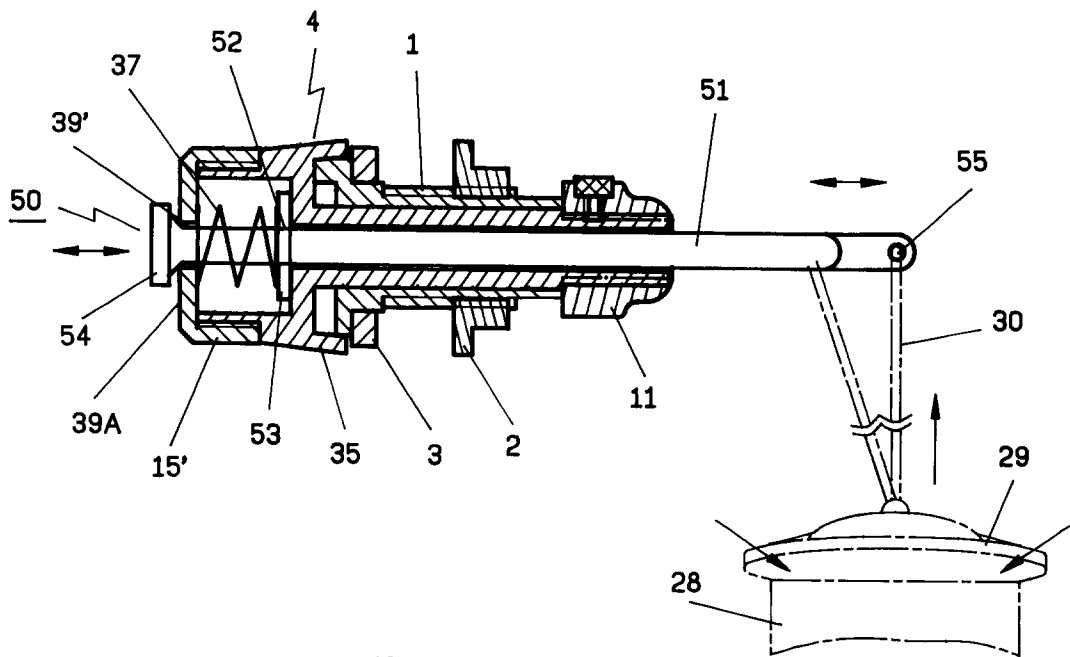


Fig 10

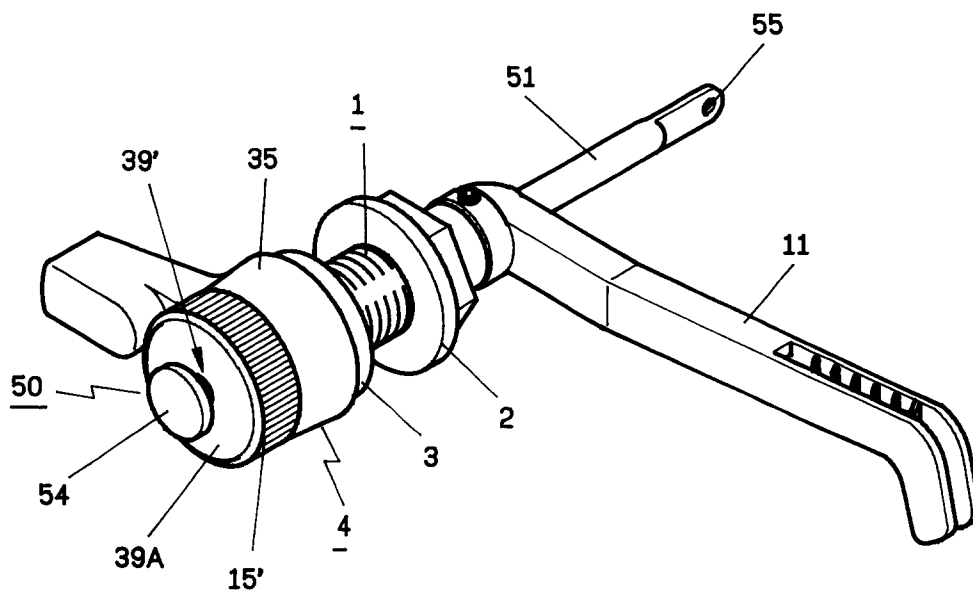


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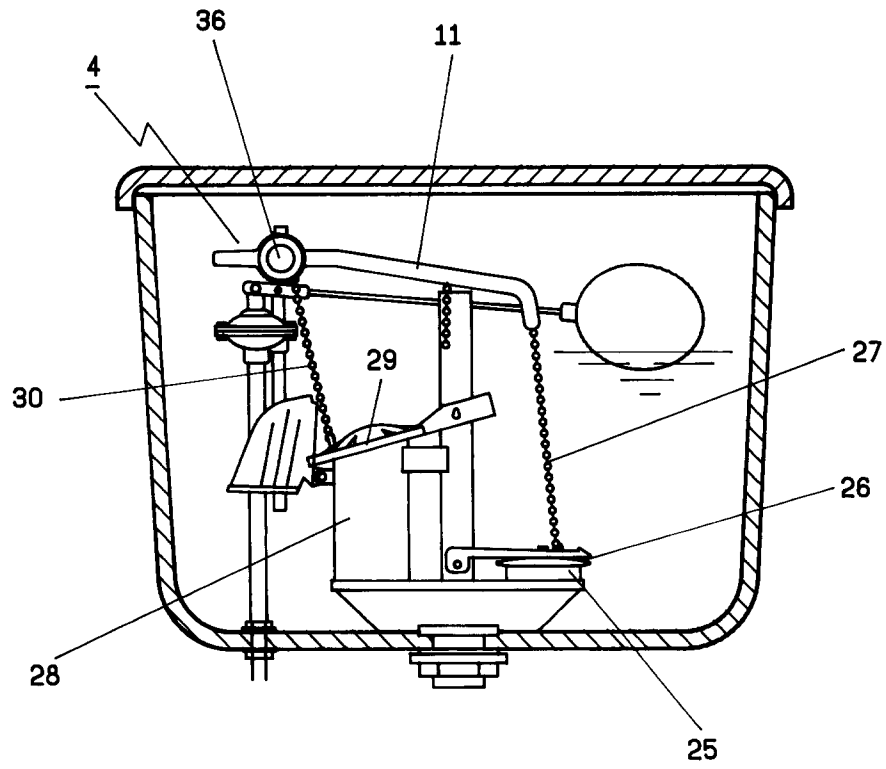


Fig 12

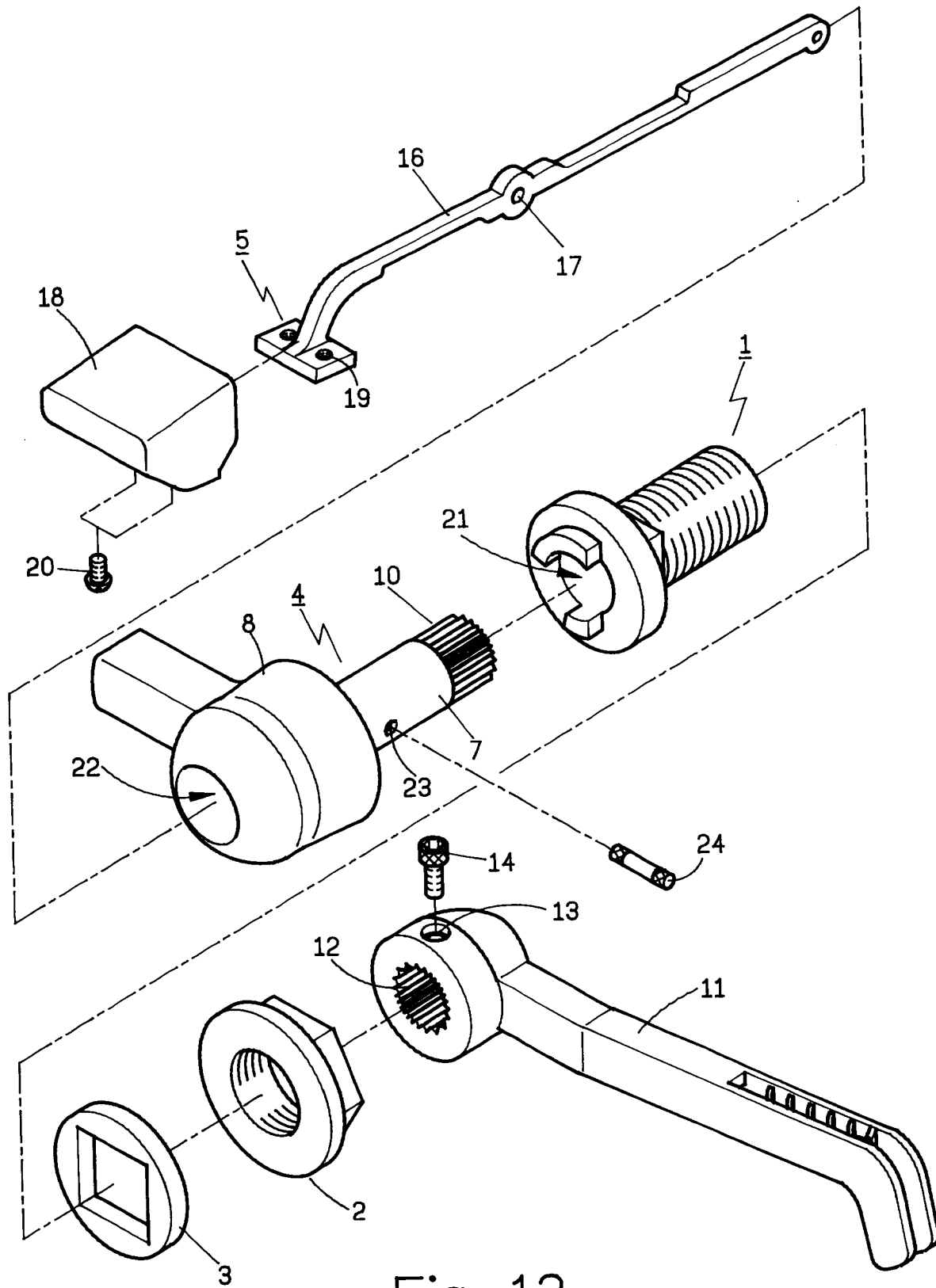


Fig 13

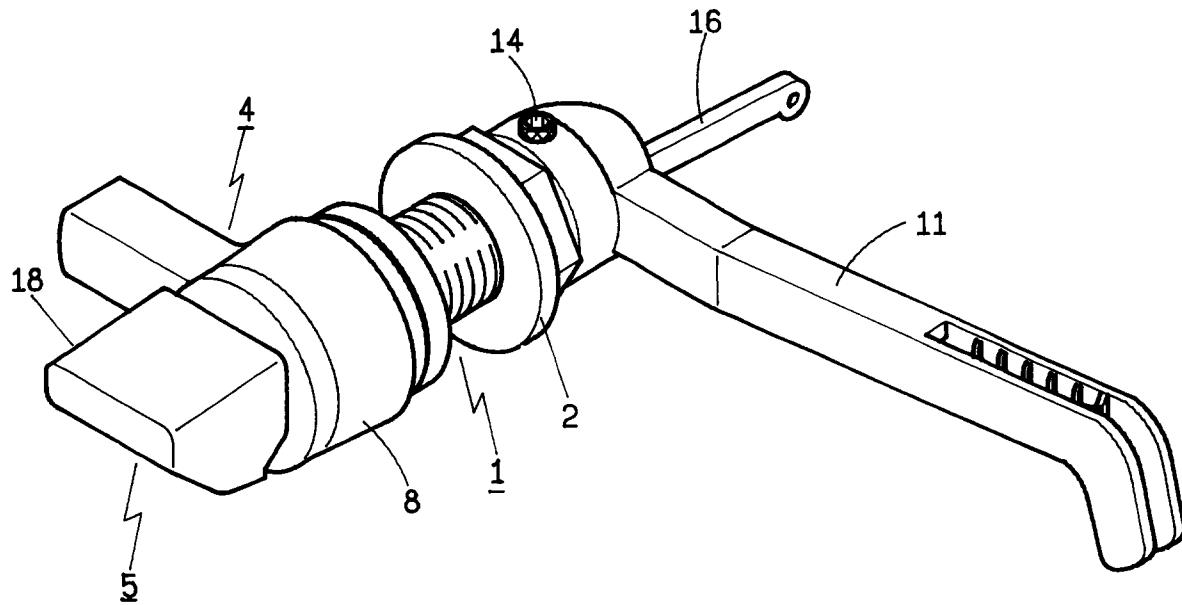


Fig 14

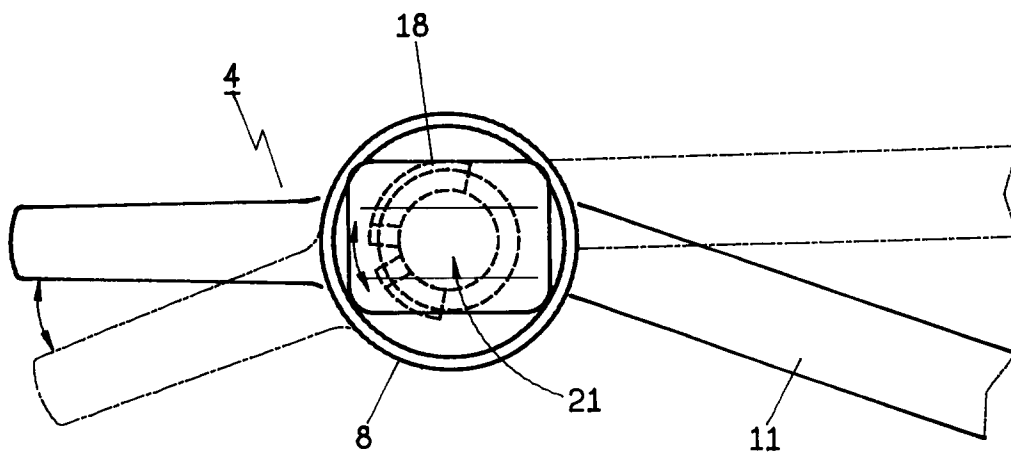


Fig 15

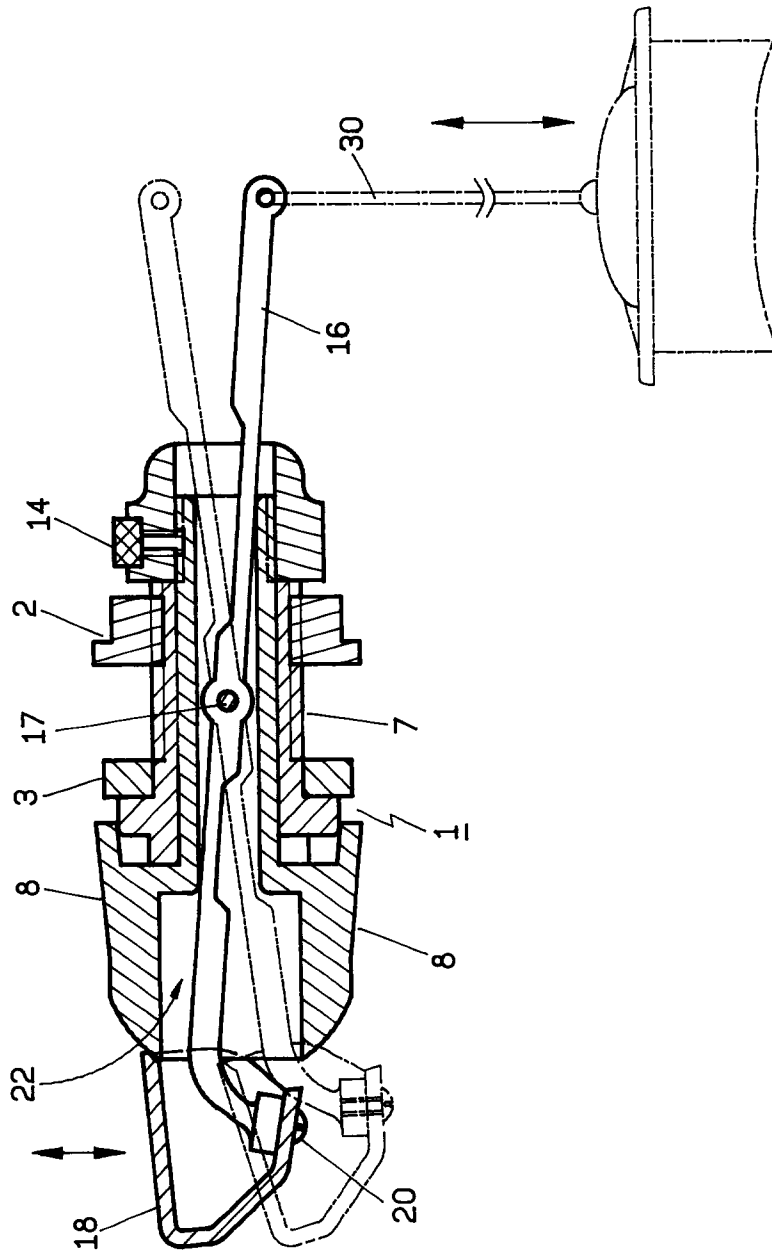


Fig 16

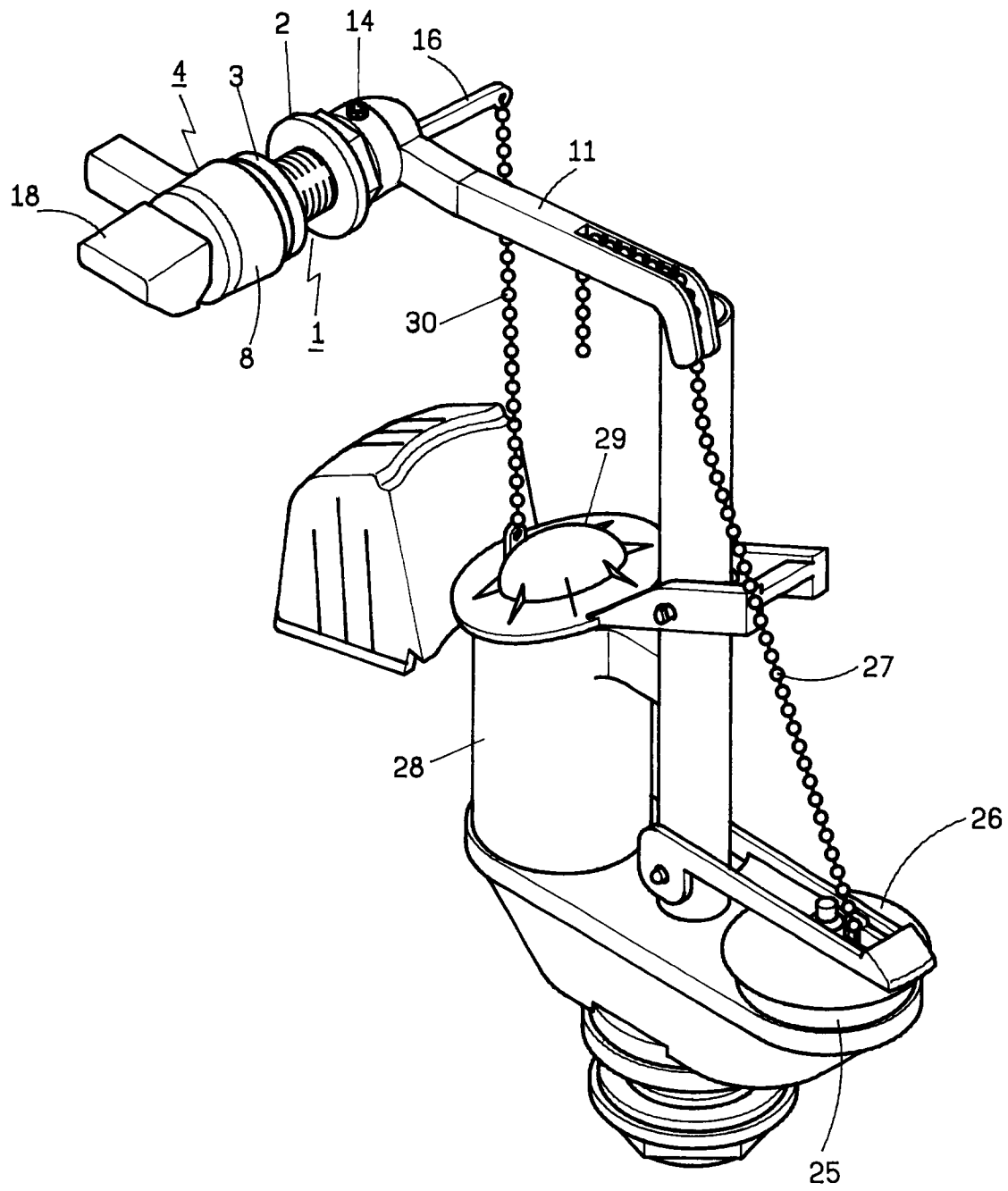


Fig 17

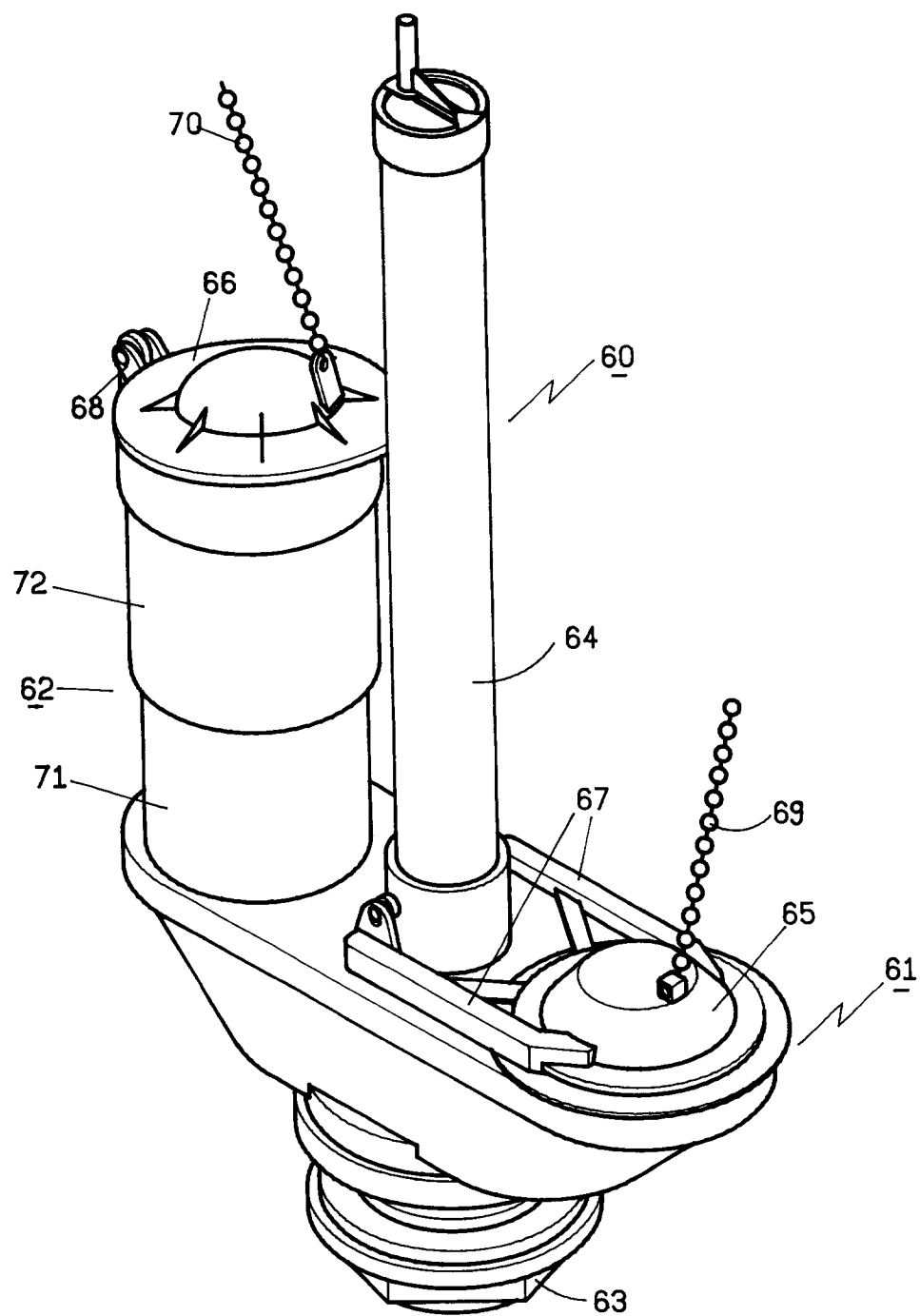


Fig 18

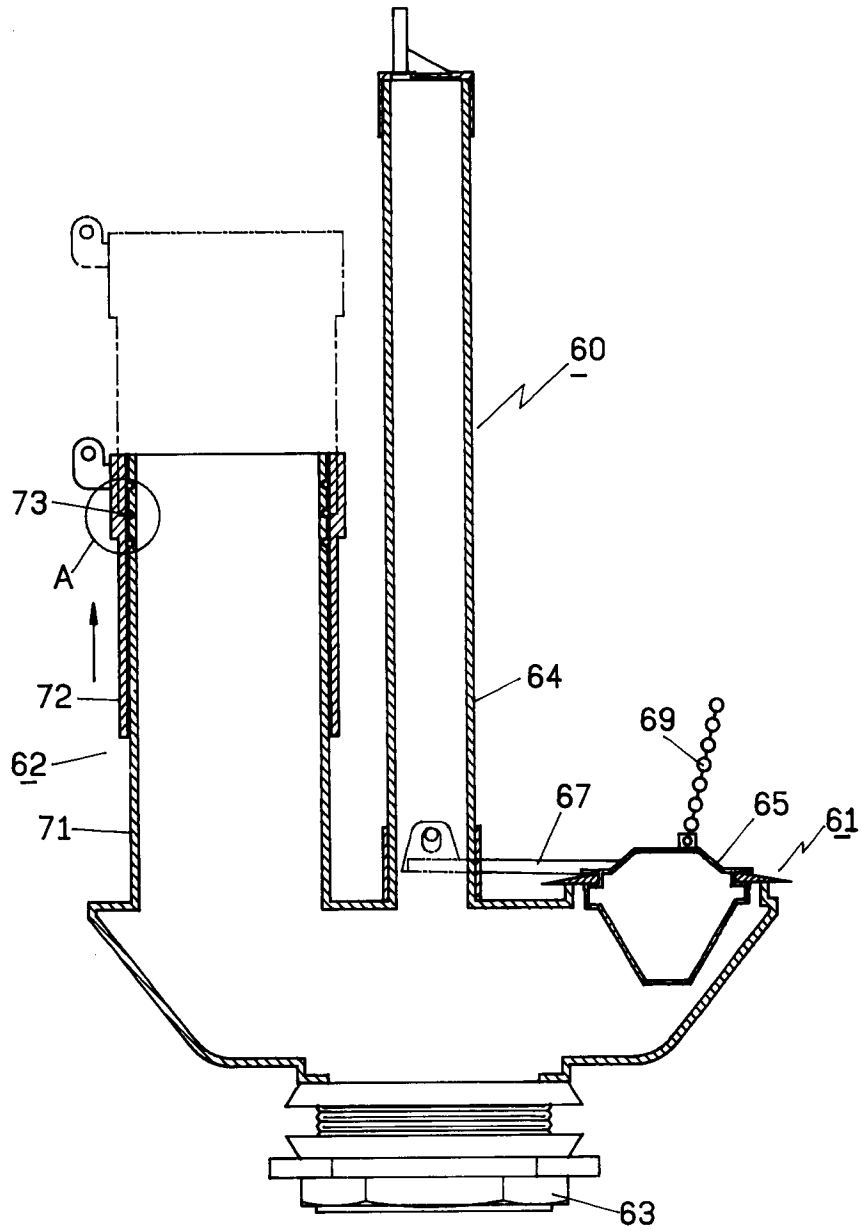


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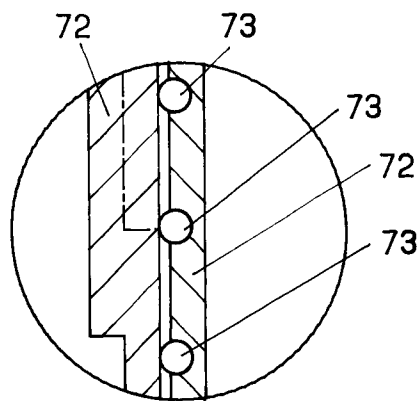


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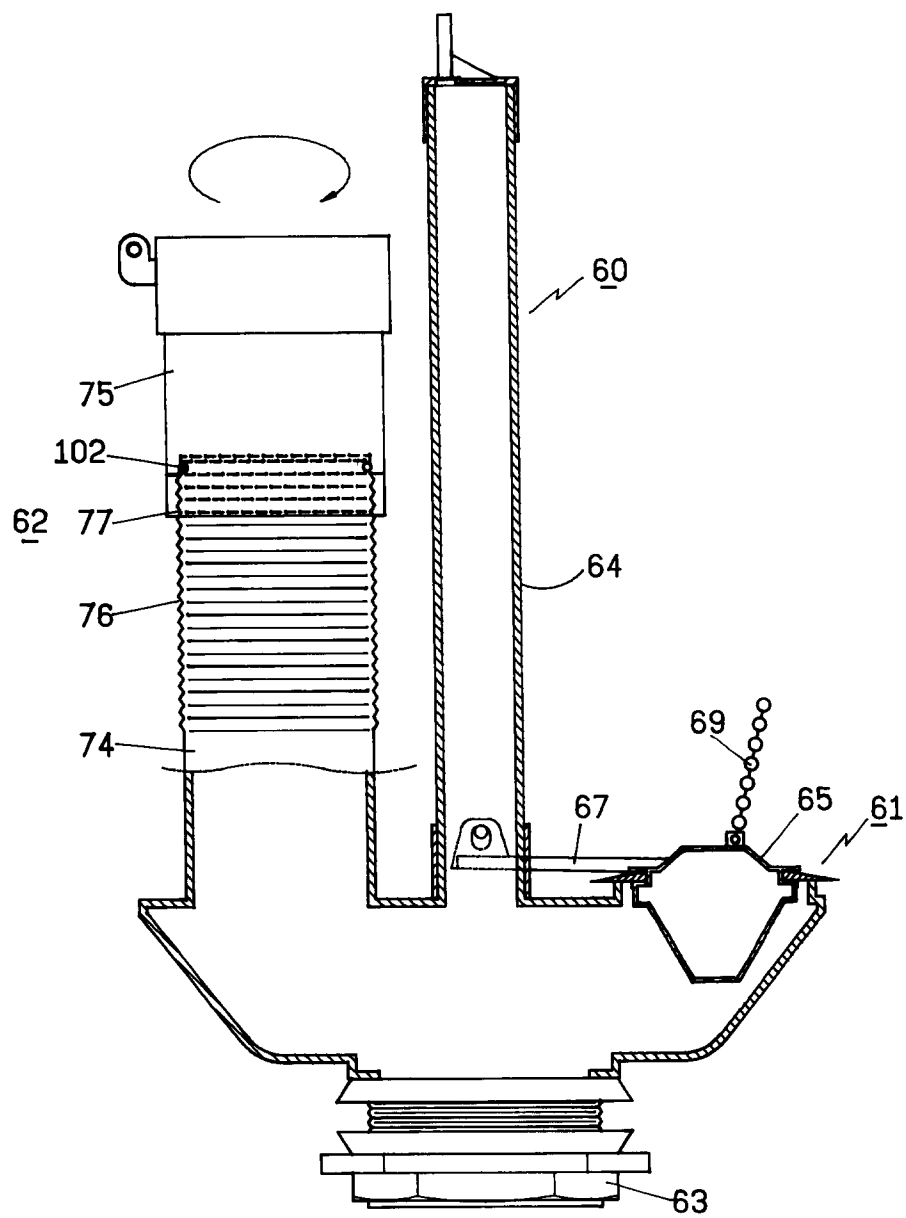


Fig 21

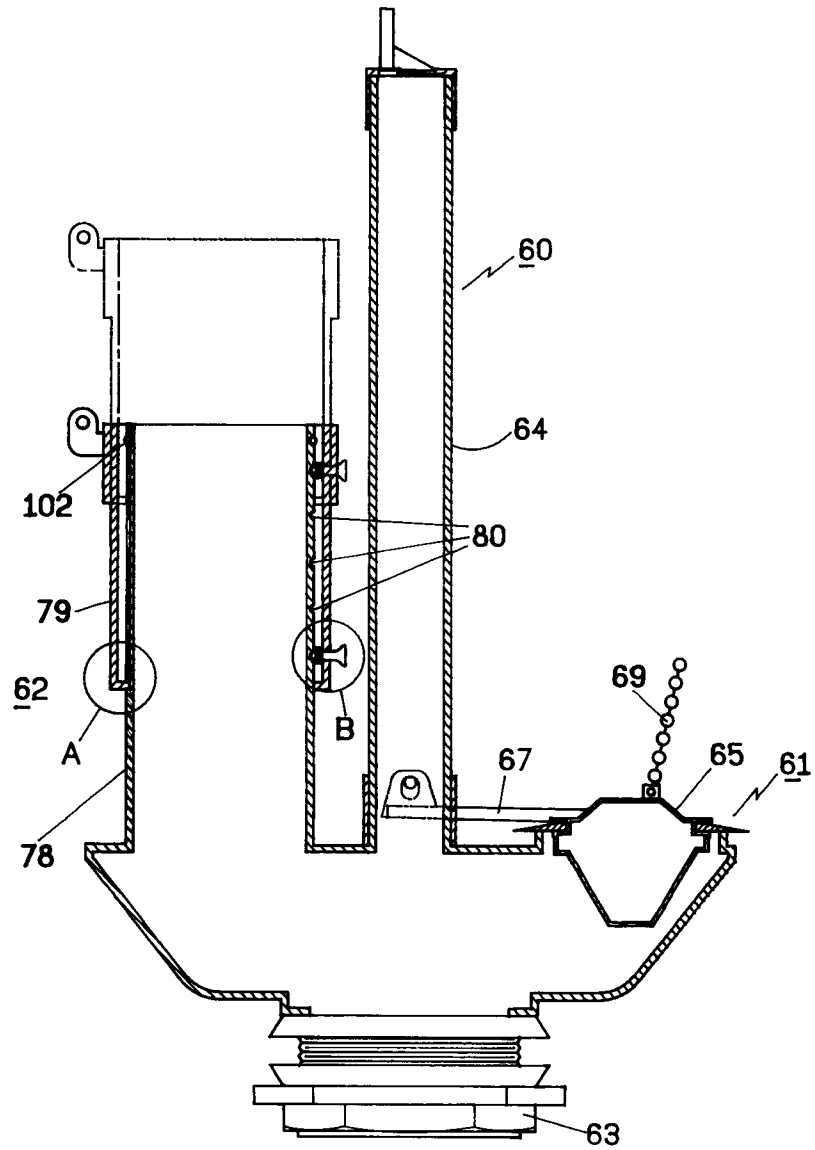


Fig 22

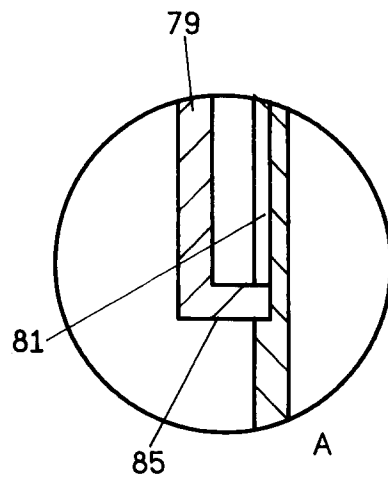


Fig 23

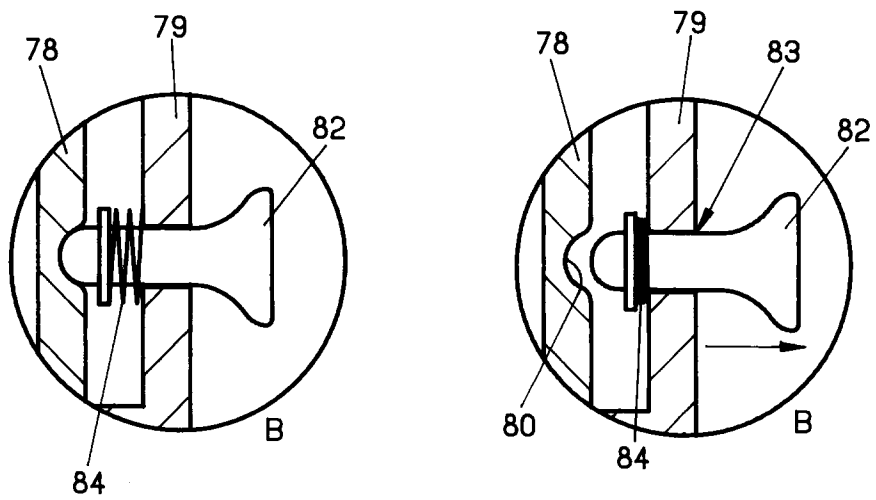


Fig 24

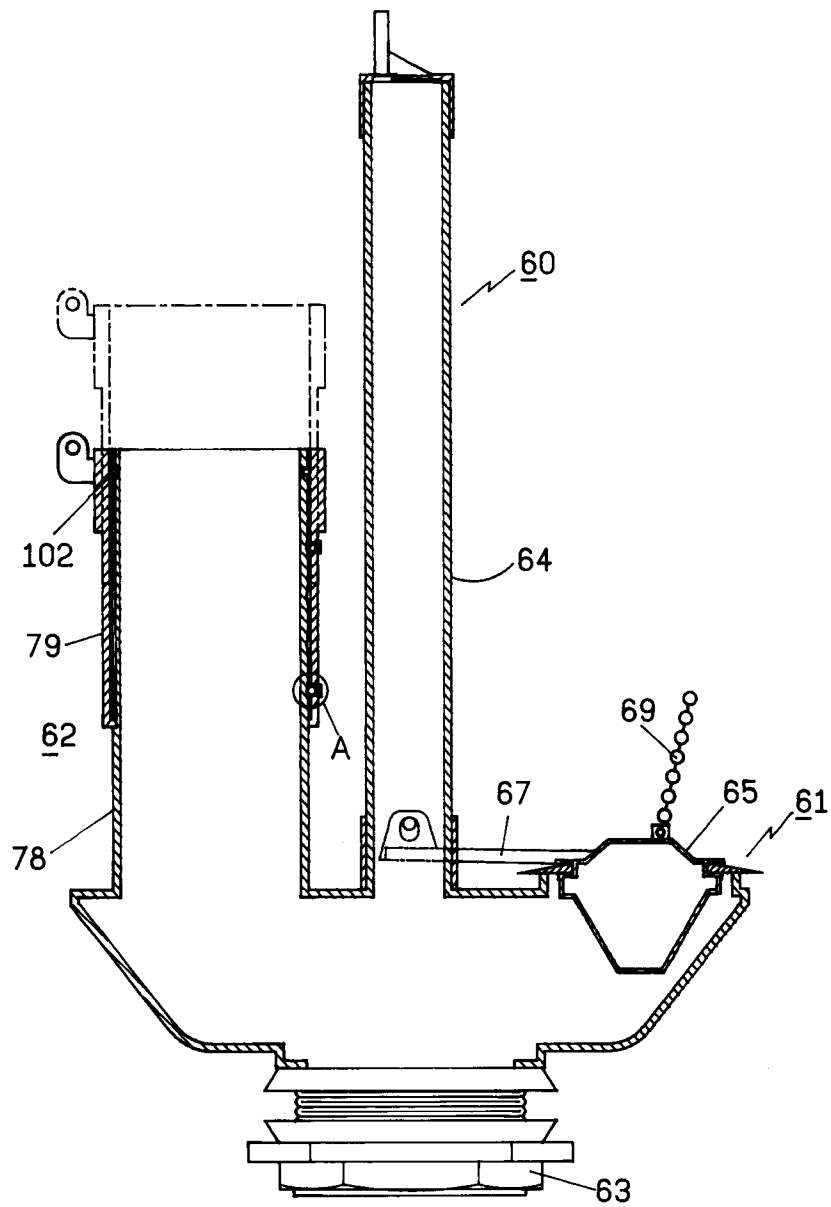


Fig 25

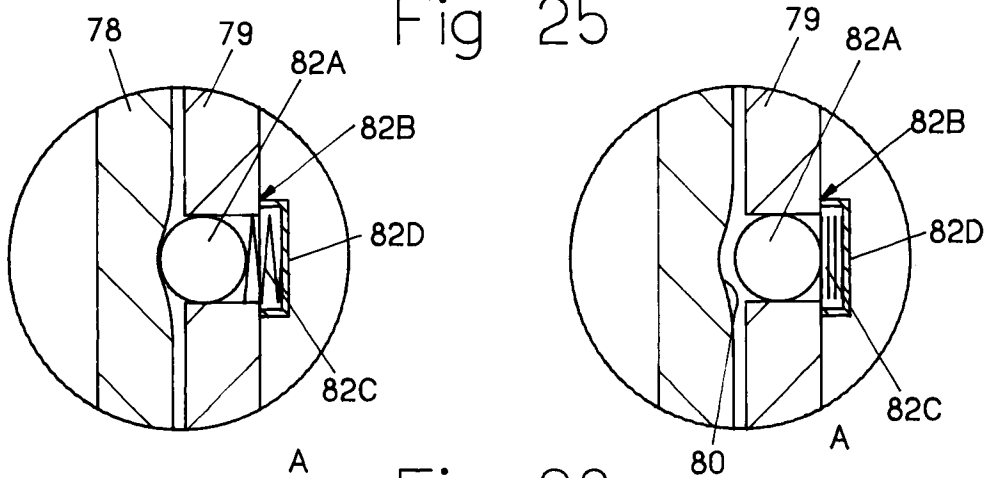


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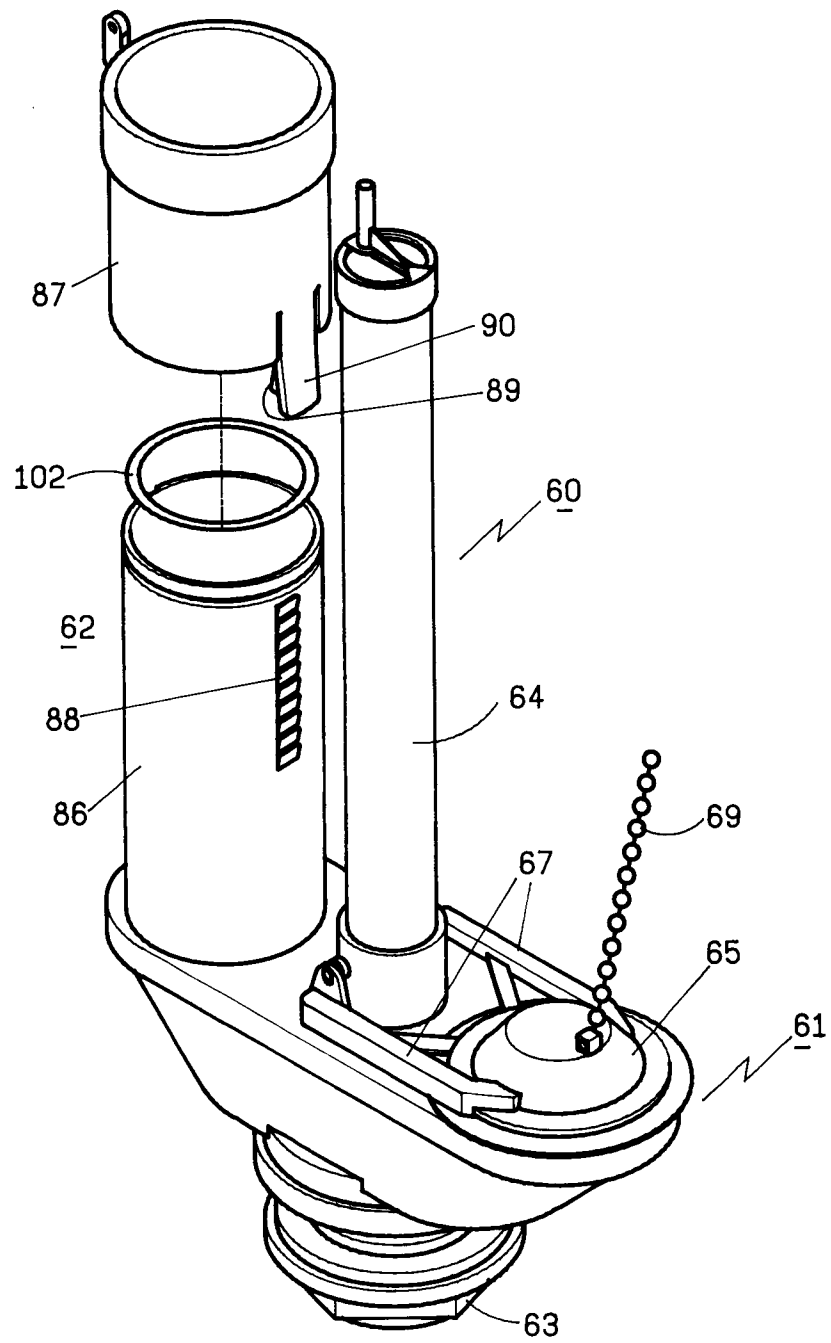


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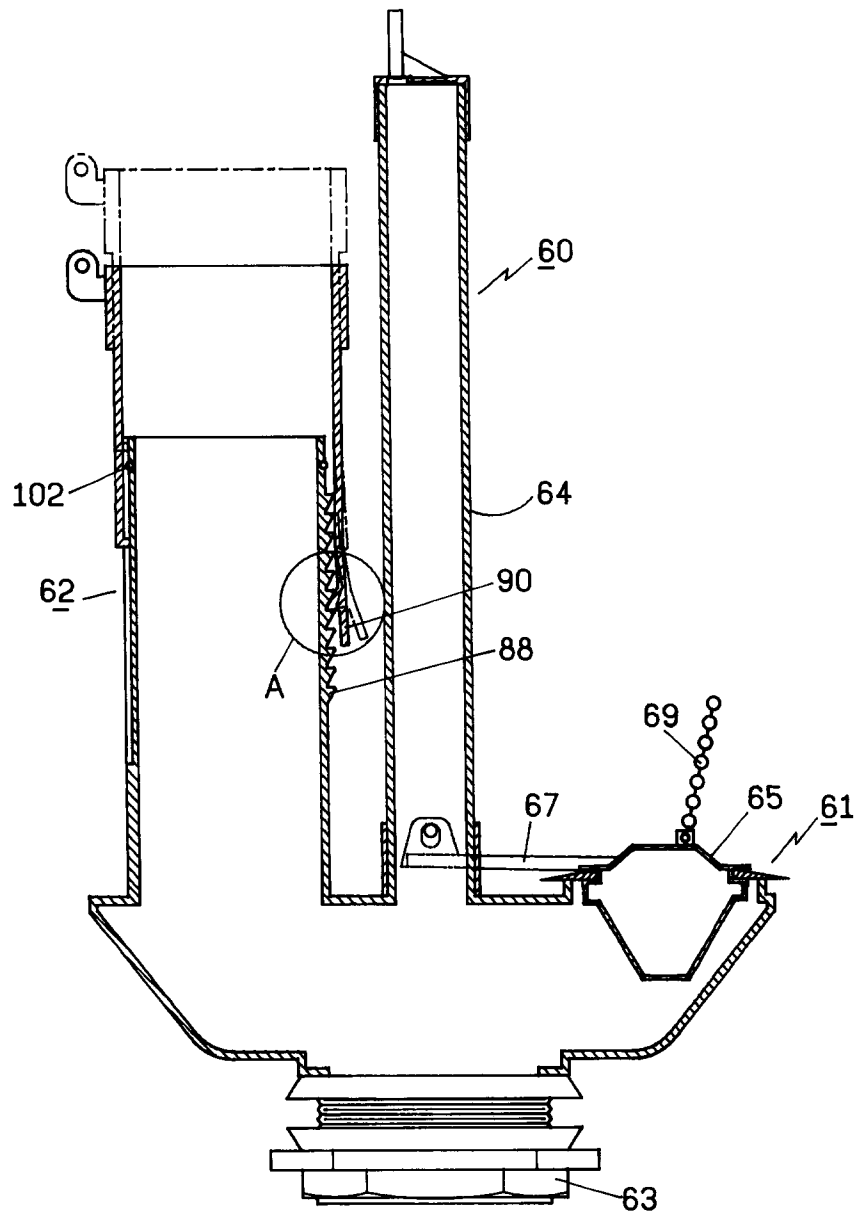


Fig 28

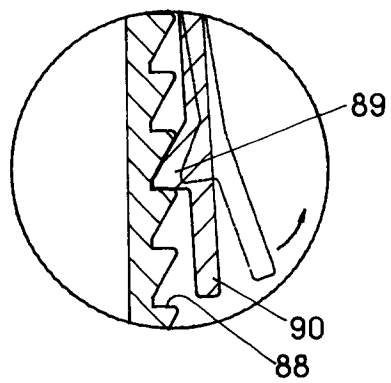


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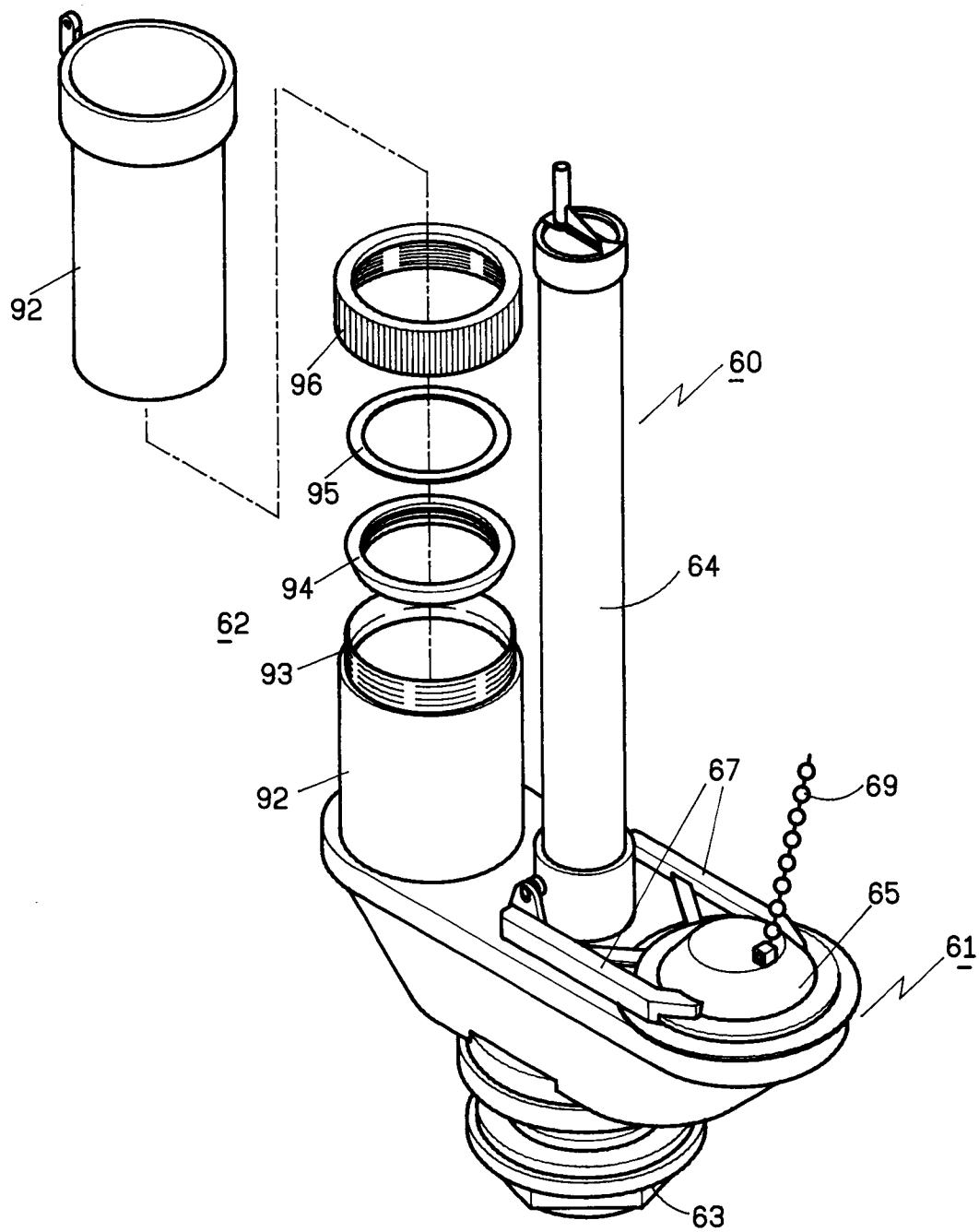


Fig 30

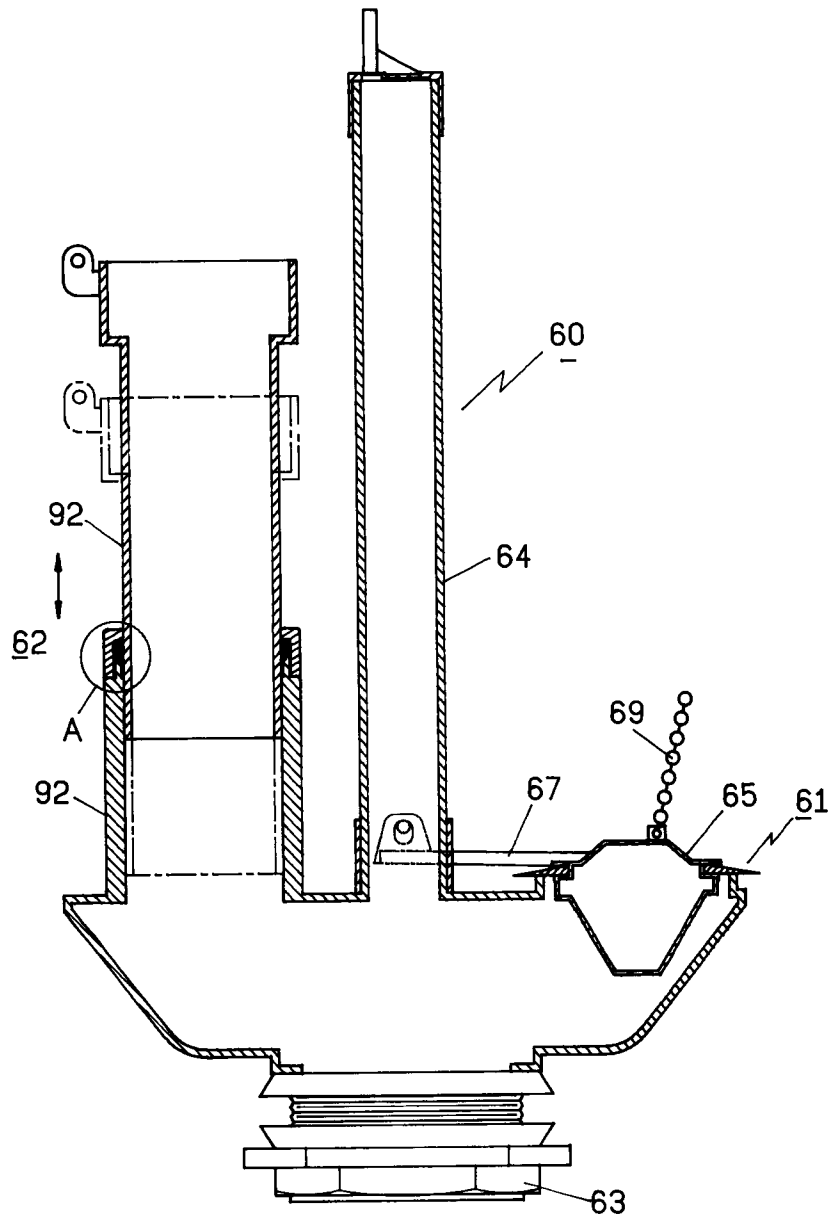


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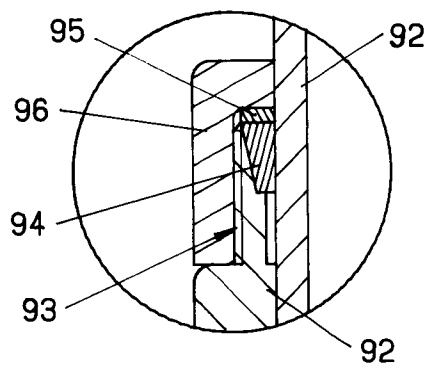


Fig 32

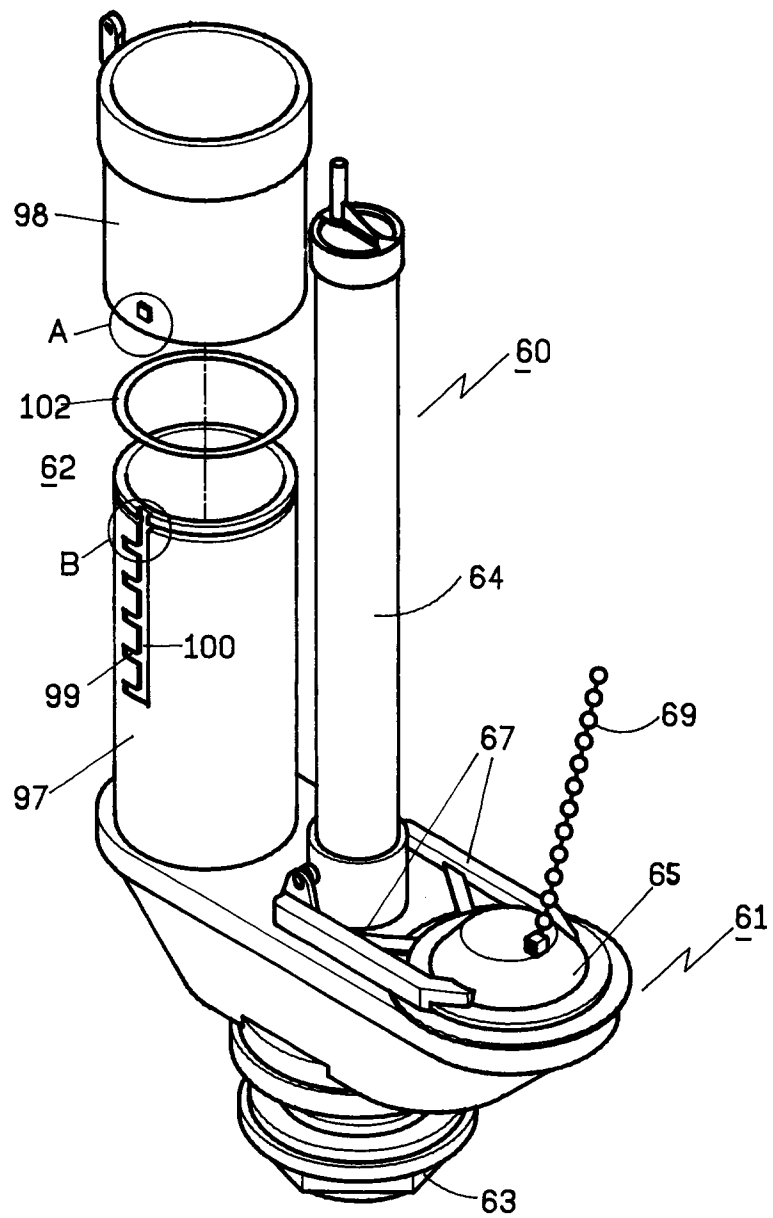


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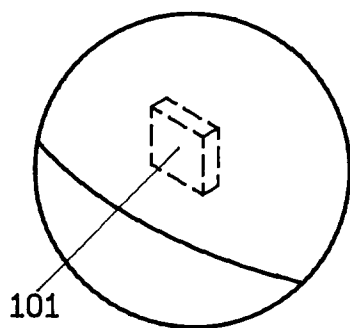


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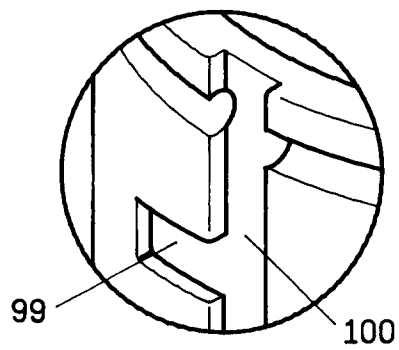


Fig 35

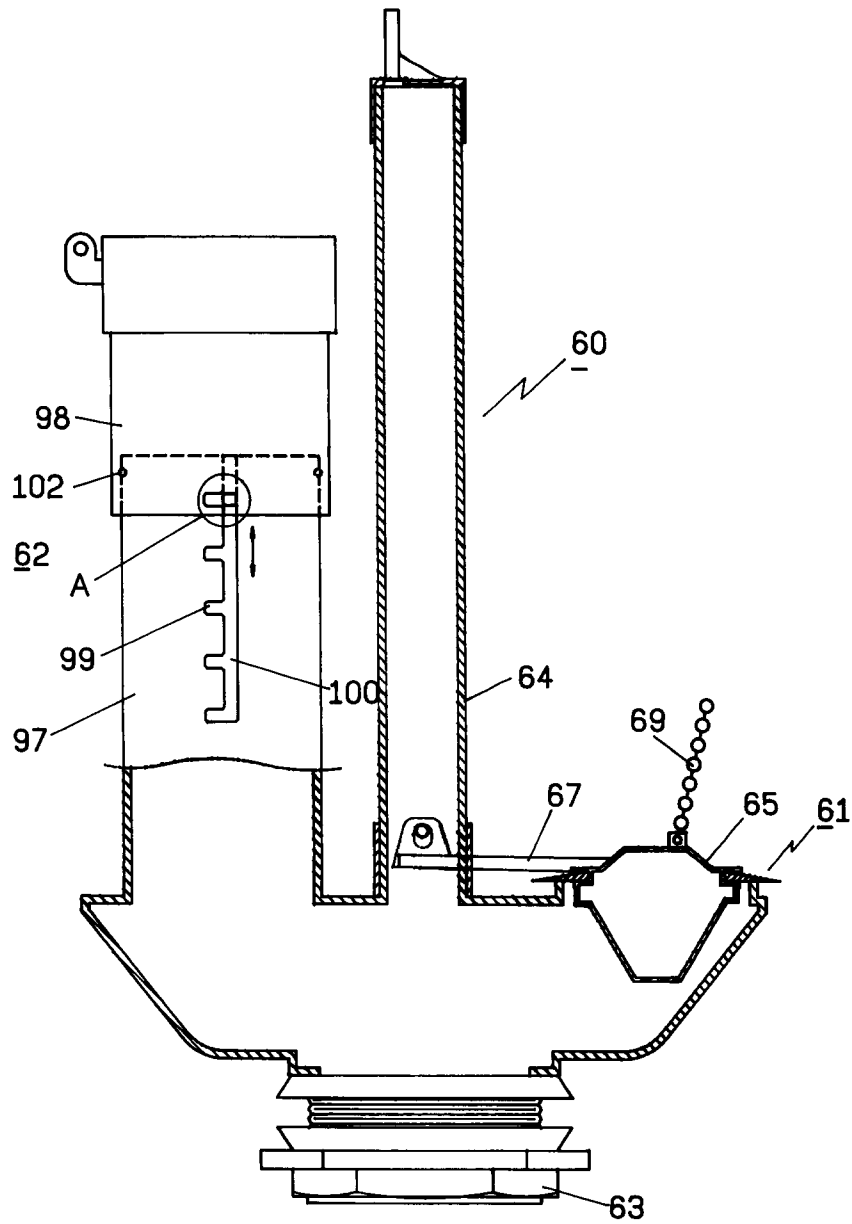


Fig 36

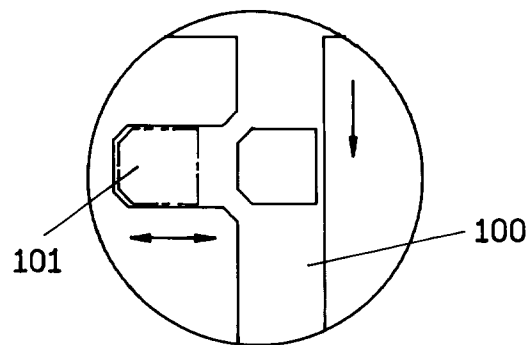


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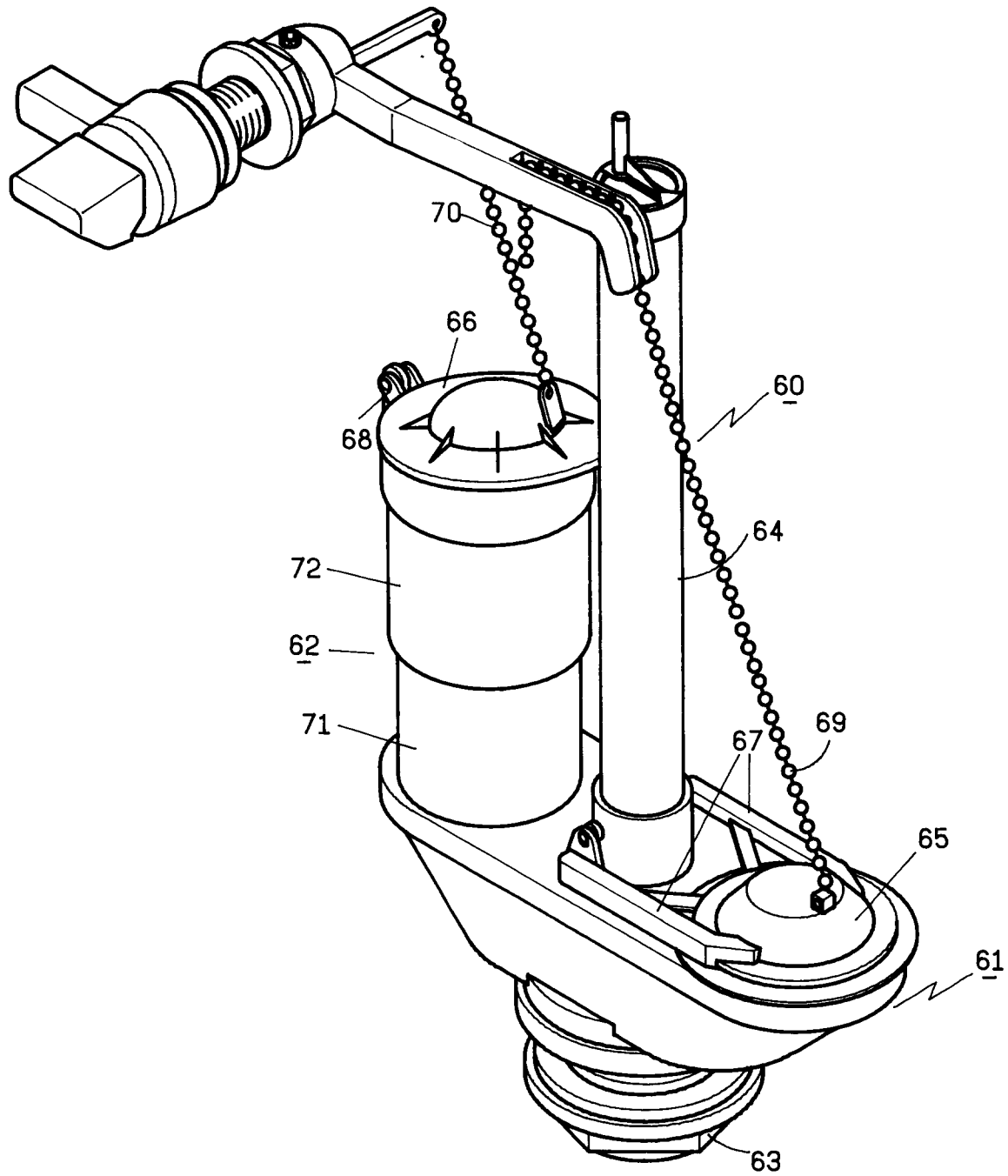


Fig 38



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 95 30 7326

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.6)
X	US-A-3 894 299 (CLEARY) * column 1, line 62 - column 2, line 66; figures 1,3 *	1,2	E03D1/14
Y	---	3	
Y	US-A-3 744 064 (PRESTON) * column 4, line 37 - column 4, line 41; figures 1,5 *	3	
A	---		
A	US-A-3 758 893 (SMOLINSKI) * column 2, line 42 - column 4, line 29; figures 1-6 *	3,5	
A	---		
A	US-A-4 141 092 (JONES) -----		
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 22 March 1996	Examiner Hannaart, J
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			

EPO FORM 1503 03.82 (P04C01)



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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- ☐ All claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for all claims.
- ☐ Only part of the claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claims:
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirement of unity of invention and relates to several inventions or groups of inventions,

namely:

See sheet -B-

- ☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- ☒ None of the further search fees has been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims: 1 - 7



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Office

EP 95 30 7326 -B-

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirement of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims 1-7 : Actuating means for a two-stage flush device
2. Claims 8-15: Volume control device for a two stage flush device