Aug. 23, 1955 S. M. KASS 2,715,910

FLOAT CONTROL VALVE

Filed March 25, 1950

Fig. 1.

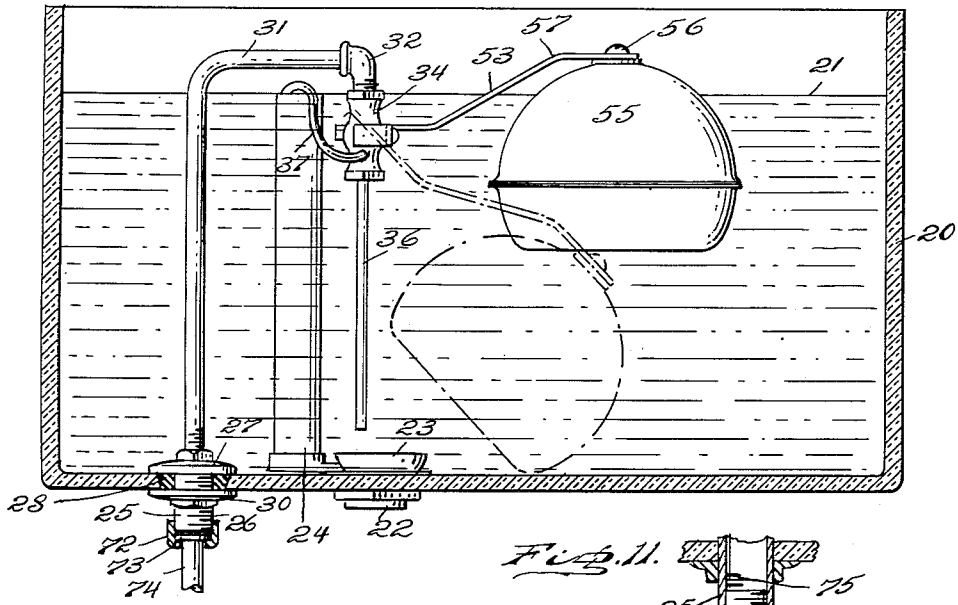


Fig. 11.

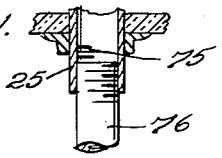


Fig. 2.

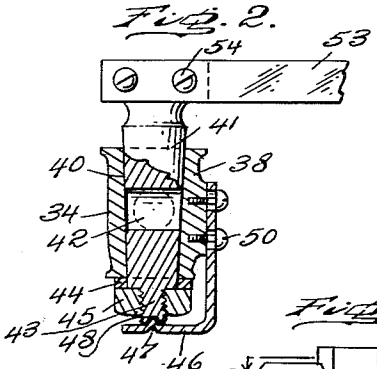


Fig. 3.

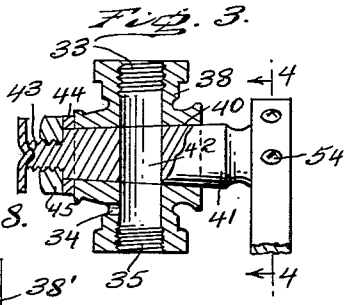


Fig. 4.

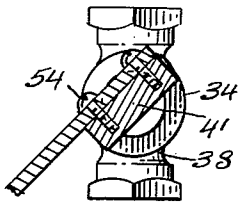


Fig. 8.

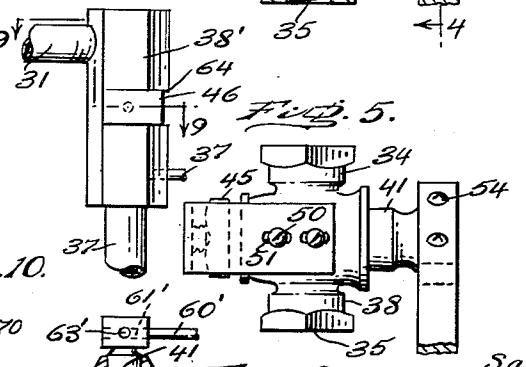
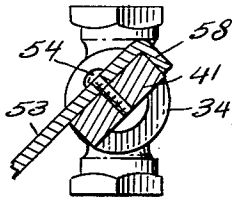


Fig. 5.

Fig. 6.



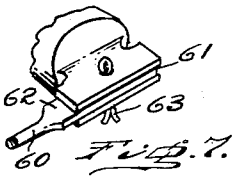


Fig. 7.

Fig. 10.

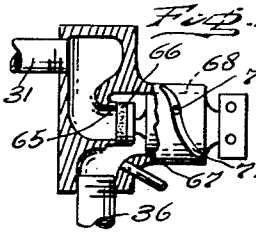


Fig. 9.

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FLOAT CONTROL VALVE

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2 Claims. (Cl. 137—447)

The present invention relates to float valves particularly of the type used as inlet valves in flush tanks of toilets.

A purpose of the invention is to avoid difficulty through leaking and sticking flush tank inlet valves, reducing the wear on the valve and increasing the service life.

A further purpose is to obtain more positive cutoff action by a flush tank inlet valve.

A further purpose is to prevent the tendency of a plug type rotary valve to bind by urging the valve axially away from its seat while limiting the extent of axial motion in the direction of urging, preferably employing a leaf spring on the small end of the valve plug to urge the valve away from the binding position.

A further purpose is to permit relief of all upward pull on the float arm by overtravel.

A further purpose is to provide an inlet pipe connection either from an external machine thread or an internal pipe thread on the shank.

Further purposes appear in the specification and in the claims.

In the drawings I have chosen to illustrate a few only of the numerous embodiments in which my invention may appear, selecting the forms shown from the standpoints of convenience in illustration, satisfactory operation and clear demonstration of the principles involved.

Figure 1 is a central vertical longitudinal section through a flush tank embodying the valve of the invention.

Figure 2 is an enlarged fragmentary plan view partly in central horizontal section showing the valve of the invention.

Figure 3 is a central vertical section of the valve of Figure 2 shifted to open position.

Figure 4 is a section on the line 4—4 of Figure 3.

Figure 5 is a right end elevation of the valve of Figure 2.

Figure 6 is a view corresponding to Figure 5 showing a variation.

Figure 7 is a fragmentary perspective showing a different manner of mounting the float arm to the valve.

Figure 8 is a side elevation showing a variant construction of the valve.

Figure 9 is a section on the line 9—9 of Figure 8.

Figure 10 is a vertical section of a further variant, partly in elevation, and with the float engaging end shifted into the plane of the paper.

Figure 11 is a central vertical section showing a variant form of connection of the inlet water to the valve assembly.

In the drawings like numerals refer to like parts.

Describing in illustration but not in limitation and referring to the drawings:

A great deal of difficulty has been encountered in flush tank inlet valves through the tendency to leak and to stick or bind. Flush tank inlet valves have also suffered from the failure to provide for overtravel of the float in rising. The present invention is concerned particularly with the development of a flush tank inlet valve which will give longer service life without these difficulties.

The valve of the invention is also more readily connected to the inlet pipe, as provision is made for a pipe threaded connection as well as a packing or flange and nut connection.

Figure 1 illustrates a flush tank **20** having water filled to the level **21**. For placement purposes, outlet pipe **22** is shown with outlet valve seat **23** and stand pipe **24** in accordance with usual practice. The ball valve and its guide and lifting mechanism are eliminated to avoid masking the inlet assembly.

The inlet assembly includes a shank **25** having an external machine thread **26**, and sealed into the bottom of the flush tank by a flange **27** holding a gasket **28** pressed into position by a packing nut **30** on the thread **26**. A goose neck inlet pipe **31** extends upwardly from the shank and is connected as by a street-ell **32** with the upper inlet port **33** of inlet valve **34**.

Discharge from the inlet valve is by bottom discharge port **35** making suitably threaded connection with discharge pipe **36** in the tank.

The usual bleeder pipe **37** connects from the discharge side of the valve to the top of the overflow pipe.

The valve comprises a valve body **38** in which the inlet and outlet ports are provided suitably in opposed relation as best seen in Figure 3. The body has an interior rotary tapered valve engaging surface **40** as commonly used in plug valves.

A rotary tapered plug valve **41** is provided in the body and having a valve opening **42** which communicates between the inlet and outlet ports in the open position corresponding to the dot-and-dash lines in Figure 1.

The plug valve has from its smaller end an exteriorly threaded extension **43**. A washer **44** surrounds the small end of the plug valve and rests against the end of the body and a nut **45** on the threaded extension **43** engages the washer and holds the plug valve from moving too far out of the body.

To prevent binding of the plug valve, it is spring urged axially away from the binding position. This is accomplished by leaf spring **46** suitably of any resilient sheet metal, which has an axial projection **47** engaging an axial recess **48** in the end of threaded extension **43**. The leaf spring is secured as to the side of the body by screws **50** and to make the tension of the spring adjustable slotted holes **51** are provided in the spring for the screws as shown in Figure 5.

At the left end the plug valve mounts float arm **53** by screws **54**. A float **55** suitably of hollow metallic character as well known is secured on the outer end of the float arm as by screw **56**. The float arm may if desired be bent as shown at **57** to provide the proper angular relation between the height of the water and the closed position of the valve. One advantage of the present device is that the valve can overtravel.

While two screws **54** are shown in the form of Figures 2 to 5 inclusive to mount the float arm on the plug valve, this can be accomplished if desired by bending over the end of the float arm beyond the plug valve at **58** as shown in Figure 6 and employing only one screw **54**.

If desired the float arm may be a rod **60** as shown in Figure 7 rather than a strip. In this case the end of the plug valve may desirably be slotted at **61** to receive a flattened end portion **62** on the float arm, desirably holding the float arm and valve together by a cotter pin **63**.

Instead of using the street-ell **32** to make the downward bend, the valve body may be formed as at **38'** in Figures 8 and 9 so that the inlet pipe **31** threads directly into the side of the valve body near the upper portion. In this case the spring **46** desirably acts in a slot **64**. In this case the threaded extension is pointed at **48'** and engages a recess **47'** in the spring. The float arm **60'**

in this case is carried through an opening **61'** in the end of the valve and held in place by set screw **63'**.

In some cases it may be desirable to employ a valve of the type which moves along the axis in opening and closing. A valve of this character is shown in Figure 10 having a valve seat **65** engaged by a valve **66** which has a guiding shank **67** moving in a cylinder **68** of the valve body. The valve carries a cam pin **70** on the circumference of the shank which is guided to move the valve in and out toward the seat by a cam track or thread **71** as it turns.

The conventional manner of connecting the inlet to the inlet valve assembly is by an external nut engaging a flanged or packed pipe as shown in Figure 1. In this case a packing or locking nut **72** engages the machine threads **26** on the shank drawing up flange or packing **73** against the end of the shank. The flange is carried on the end of inlet pipe **74** from the water system.

In some cases it is preferable to avoid the danger of leakage from the flanged or packed fitting and use a direct threaded connection. For this purpose shank **25** has an internal pipe thread **75** in addition to the external machine thread already described. Thus the plumber can if he desires thread a pipe **76** directly into the internal thread **75**, avoiding the use of the packing or locking nut **72** and the flanged or packed connection.

In operation, the plug valve is adjusted before assembly so that it is appreciable play but not sufficient play to leak. The play should be just sufficient so that it can be felt by a discriminating touch. This adjustment is accomplished by adjusting nut **45**. Spring **46** is then adjusted by loosening and tightening screws **50** until sufficient pressure is applied on the plug valve to keep it away from its seat, but not sufficient pressure to impose unnecessary frictional drag. When it is stated that the valve is kept away from its seat, it will be appreciated that minute distances are involved, suitably of the order of 0.0001 to 0.0005 inch.

The assembly is then made in the usual manner, and the float arm is bent until cutoff is obtained at the correct height. Bleeder tube **37** is placed in the stand pipe.

The connection from the inlet water system may be made in the conventional manner as shown in Figure 1 or by using the internal thread on the shank as shown in Figure 11.

It will be evident that the device of the invention works very accurately to permit cutoff at the correct point without allowing leakage.

In view of my invention and disclosure, variations and modifications to meet individual whim or particular need will doubtless become evident to others skilled in the art to obtain all or part of the benefits of my invention without copying the structure shown, and I, therefore, claim all such insofar as they fall within the reasonable spirit and scope of my claims.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. A flush tank inlet valve comprising a rotary valve body having inlet and outlet ports, and having a tapering valve receiving rotary surface, a tapering rotary valve within the body engaging the tapering surface, a float, a float arm extending transversely to the axis of the valve and interconnecting the float and the valve, a screw take-up on the small tapered end of the valve adapted to exert pressure against the body and limit motion of the valve out of the tapered surface and a spring acting from the body against the valve in the axial direction tending to urge the valve out of the tapering surface as far as permitted by the screw take-up.

2. A flush tank inlet valve comprising a valve body having a tapered rotary valve receiving surface provided with inlet and outlet ports, a tapered rotary plug valve in the tapered surface of the body having a passage which in one position interconnects the ports of the body and in another position closes the connection, a threaded extension on the small end of the valve, a nut on the threaded extension and adapted to limit motion of the valve away from the body, a leaf spring secured to the body and exerting pressure on the end of the threaded extension in the direction to separate the valve and the body, a float arm secured to the valve and extending transversely to the axis and a float on the float arm.

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