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VALVE MOUNTING AND OPERATING MEANS
FOR TOILETS

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2 Claims. (Cl. 4-41)

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This invention relates to the valve mechanisms of toilet flushing tanks.

One object of the invention is to provide an improved hydraulically actuated means to open the flush valve at each flushing operation.

Although it is not broadly new to provide a means for opening the flushing valve, which is actuated by water pressure, yet the mechanism which has hitherto been used for that purpose is much more complicated than it should be. Therefore it is an object of the present invention greatly to simplify such a mechanism so as to render it less expensive to manufacture, more positive in operation and less apt to get out of order.

Another object is to provide an improved float operated valve mechanism to shut off the inflow of water to the tank after each flushing operation, this means being combined with the aforesaid flush valve opening means in such a way as to produce for a plurality of valves, a mounting and operating means that can be quickly and easily installed into toilet flushing tanks now in use.

Other objects, advantages and features of invention will hereinafter appear.

Referring to the accompanying drawing, illustrating a preferred embodiment of the invention,

Fig. 1 is a view showing the structure provided by this invention partly in side elevation and partly in vertical midsection, the toilet tank containing the same being shown in vertical section.

Fig. 2 is a transverse section on approximately the plane indicated by line 2-2 of Fig. 1.

Fig. 3 is a sectional detail on line 3-3 of Fig. 2, the scale being enlarged.

Referring in detail to the drawing, a toilet flushing tank 5 is shown upwardly to one end portion of which extends a supply pipe 6, and upwardly against the opposite end portion of which extends the water discharge flushing pipe 7, which leads to the toilet bowl (not shown).

By this invention an upstanding cylindrical housing 8 is provided having a thickened basal portion 9 which terminates in a diametrically reduced, exteriorly threaded part 10 onto which is screwed a clamping nut 11 which cooperates with a gasket 12 and an annular shoulder 13 of said part 8 to form a fluid tight joint between the aforesaid flushing pipe 7 and tank bottom 14.

A frusto-conical valve seat 16 is formed in the upper part of the aforesaid basal part 9 and with this seat cooperates a buoyant valve 17 at times opened by means of an operating stem 18 connected therewith and extending upwardly there-

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from. A plurality of spacious, circumferentially spaced apart, water outlet slots 19 are provided in the aforesaid housing 8, said slots extending down into the thickened, valve seat forming, basal part 9 of said housing.

It will be seen that the lower portion of the buoyant valve 17 is tapered to conform to the taper of the valve seat 16, and that, viewing said valve in its seated position, its taper extends downwardly to the top of the seat from a point thereabove, the housing slots 19 extending down to the top of said seat. Therefore, as soon as the valve is lifted slightly from the seat, water flows through said slots past the unseated valve. The valve 17 is of greatest diameter at about its midheight where it slidably engages the intact portions of the housing between said slots 19.

The upper end of said tubular housing 8 carries an axial tubular extension 21 within the lower part of which is fitted a centrally apertured guide disk 22 for the aforesaid valve stem 18. Said extension 21 is provided with a spacious top opening 23 to admit nuts 24 and 25 after they have been screwed onto the upper end of the valve stem 18. Said nuts 24 and 25 serve as an abutment means against which said disk 22 acts to apply upward traction to the stem 18. Under said guide disk 22 is a small chamber 26 with a passage 27 in its bottom within which the stem 18 slidably fits. Small circular outlet openings 21a may also be provided in said extension 21.

A lateral passage 29 leads into said small chamber 26 and with said passage 29 communicates one end of a pipe 30, the opposite end of said pipe at times being supplied with water under pressure, through a valve casing 31 which receives water under pressure through a pipe 32 that communicates with the aforesaid supply pipe 6 through a pipe section 33. The pipes 6 and 33 are connected by a fitting 34 and the pipes 32 and 33 are connected by an elbow 35. The front wall of the tank 5 is designated 5a, a fragment thereof being shown in Fig. 1 in an underlying relation to the valve stem head 43'. The tank has a conventional cover 5b.

The valve structure 31, preferably constructed as shown in detail in Fig. 3, comprises a casing 40 having a central chamber 41 with an inlet passage 32a with which the pipe 32 communicates, and an outlet passage 30a with which the pipe 30 is connected. Through said chamber 41 passes a slidable valve stem 42 carrying a frusto-conical valve proper 43 which controls liquid flow from passage 32a to chamber 41. Said valve

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proper is normally held closed by a spring 44 one end portion of which occupies a recessed cap 45. The projecting end portion of the stem 42 is provided with an operating head 43'. The valve casing 31 is provided with a threaded nipple 47 which projects through a hole in the tank wall and has screwed onto it a securing nut 48. At the inner end of said nipple vents 49 allow surplus water to flow back into the tank.

One end of a refilling pipe 50 communicates with the aforesaid supply pipes 6 and 33 through the elbow 35, the opposite end of said refilling pipe communicating with an automatically operated valve structure 51 which includes a body portion 52 and a depending cylinder or sleeve 53 having a bottom wall 54 provided with a spacious, circular central aperture 55.

Said valve structure 51 is carried by an elongated, horizontal bracket plate 56 having at one end a head 57 whereby it is secured to the said casing part 53 by screws 58, and at its opposite end having an expanded part 59 secured to the aforesaid cylindrical valve casing 8 by screws 61.

The aforesaid pipe 50 at all times conducts water under pressure to an angular passage 62 in the aforesaid casing body 52, said passage 62 having an expanded lower end portion 63 into the lower side of which leads the smaller end of a frusto-conical needle valve seat 64 controlled by a needle valve 65. When the water flows downwardly through said needle valve seat it passes out of the valve casing through a horizontal passage 66 into which is tapped the upper end portion of the discharge section 67 of the refill pipe structure, this section being of an inverted L shape. The body portion 52 of the casing of the valve structure now being described is circular in transverse section and has fitted around it the upper end portion of the aforesaid cylindrical part 53, the latter having a circular hole in its side to receive a threaded fitting 68 which is screwed into the outer part of said passage 66, thus providing a means for holding in place the applied cylindrical part 53, as well as for attaching the aforesaid pipe section 67.

Describing now the means for automatically operating the needle valve 65, said valve fits slidably within a bore which leads from the passage 66 to the lower side or end of the valve casing body 52, the lower end of said needle valve seating loosely upon an upwardly directed swell 69 provided upon the upper side of a horizontal operating arm 70. With said arm 70 cooperates a subjacent horizontal lever 71. One end of said arm 70 is swingably secured to the cylindrical casing section 53 by means of an angular clip 72, and the opposite end of said arm 70 is loosely connected to the aforesaid lever 71 by means of a link 73. That end portion of said lever to which said link is connected, at a point in a spaced relation to the link, is swingably connected by means of a pivot screw 74, to the main bracket 56, which has already been mentioned. The opposite end portion of said lever 71 carries a horizontal disk 75 with which cooperates a large, buoyant ball 76, so as at times to raise the latter end portion of said lever. When this occurs the lever, link and arm structure which has been described forces the needle valve 65 upwardly into a firm contact with its seat, causing a positive shutting off of the water supply to the tank whenever that is required.

A slot 51x in the cylindrical member 53 accommodates the arm 70 and lever 71.

When the operator opens the valve 31 by press-

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ing upon the head 43' of the valve stem 42, water pressure is admitted to the chamber 26 (see upper, right hand portion of Fig. 1) and lifts the disk 22, which, in turn, raises the nut-carrying valve stem 18 to the dotted line position, thus opening the buoyant valve 17 and producing a flushing operation. When the operator releases pressure against the head 43', allowing the spring loaded valve 31 to close, said disk 22 will gravitate back to its normal position, owing to its loose fit around said stem 18 and within the cylindrical casing extension 21, thus unobstructing the descent of the buoyant valve 17 to closed position after the tank has emptied.

The device is shown provided with an upstanding overflow pipe 80 having a deflected lower end portion inserted into a passage 81 provided for it in the housing base 9.

It will be seen that both the cylindrical housing 8 and the valve casing 51 and related parts are supported by a single basal mounting member, the part 9 having the downwardly directed extension 10 clamped within the flushing outlet. Quick, easy and satisfactory installation of the device is thus provided for.

The refilling of the tank causes the buoyant valve 76 to rise, as indicated by the broken arcuate line thereabove in Fig. 1. Said buoyant valve then presses upwardly against the disk 75 and swings upwardly the end of lever 71 which carries said disk. When this occurs said lever, through link 73 swings upwardly arm 70, thus exerting a powerful leverage upon the needle valve 65, while moving said needle valve up into a tightly closed relation to its conical seat 64, cutting off inflow of water through the pipe 50 until the next flushing operation.

I claim:

1. In a device of the kind described, an elongated housing having a tubular axial extension and attached to the bottom of a toilet tank in an upstanding overlying relation to the flushing outlet, said housing having a vertically slotted bottom portion, a buoyant flushing valve positioned to open and close said outlet, the lower portion of said housing guiding the closing movement of said valve to its seat, a manually controlled hydraulically operated piston means in said extension connected with said valve to open it for flushing operations, an elongated bracket attached to and extending horizontally away from said housing, a valve casing carried by the outer end portion of said bracket, a needle valve within said casing arranged for vertical movement to control inflow of water into the tank to refill the latter after flushing operations, a horizontally extending vertically swingable arm having one of its ends pivotally attached to said casing, that end of said arm forming the short end portion of a lever which multiplies force to close said needle valve, an operating lever for said arm in a parallel subjacent relation thereto and linked to that end of said arm which is opposite to its attached end, one end of said lever being in a pivotally attached relation to the part of the aforesaid bracket that is attached to the aforesaid housing, the opposite end of said lever projecting into said valve casing, and a buoyant body loosely contained within said casing subjacent to the latter end of said lever, said buoyant body, as the tank is refilled, acting upon said lever to close said needle valve.

2. In a device of the kind described, an elongated housing having a tubular axial extension vertically slotted in its bottom portion and at-

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tached to the bottom of a toilet tank in an up-
standing overlying relation to the flushing valve,
a buoyant flushing valve positioned to open and
close said outlet, the lower portion of said housing
guiding the closing movement of said valve to its
seat, a manually controlled hydraulically oper-
ated piston means in said extension connected
with said valve to open it for flushing operations,
an elongated bracket attached to and extending
horizontally away from said housing, a valve 10
casing carried by the outer end portion of said
bracket, a needle valve within said casing ar-
ranged for vertical movement to control inflow of
water into the tank to refill the latter after flush-
ing operations, a supply pipe supplying inflow of 15
water to said tank and also supplying the hy-
draulic pressure that operates the aforesaid pis-
ton means, a plurality of linked together force
multiplying levers mounted on said bracket and
including a vertically swingable lever end portion 20
projecting into said valve casing, and a valve

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buoyant body loosely contained within said valve
casing subjacent to said lever end portion, said
buoyant body, as the tank is refilled, acting upon
said lever end portion to close said needle valve.

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