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TOILET TANK FLUSH VALVE

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TOILET TANK FLUSH VALVE

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Fig. 3

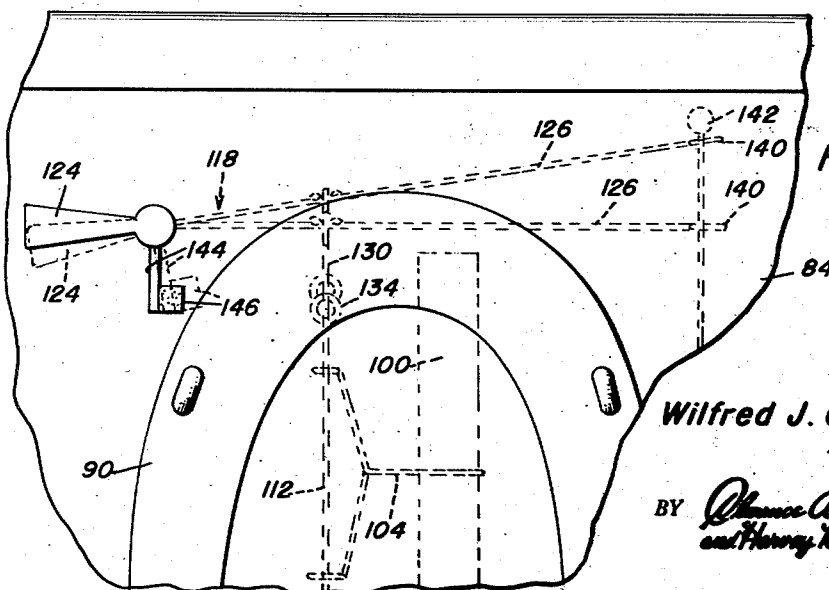
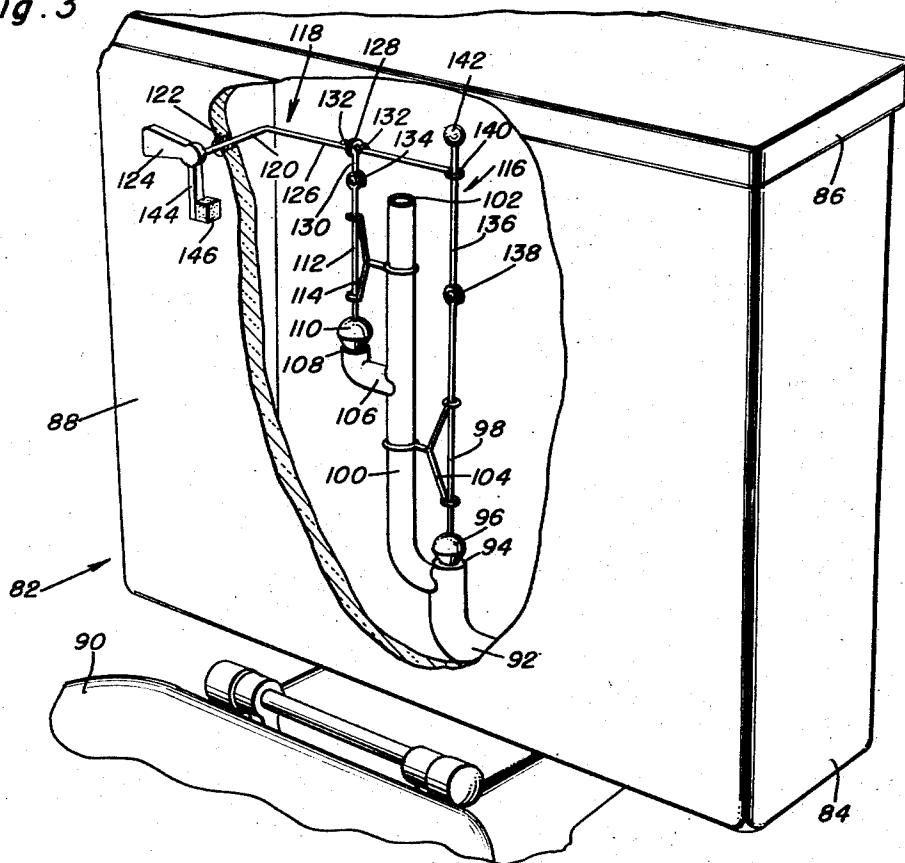


Fig. 4

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TOILET TANK FLUSH VALVE

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This invention relates in general to new and useful improvements in toilet flush tank construction, and more specifically to improved toilet flush tank valve assembly.

In order that there may be supplied sufficient water for all requirements, a flush tank of a toilet carries a relatively large amount of water. Further, each time the toilet is flushed all this water passes down through the toilet bowl and is lost. This not only places a severe drain on the water supply, but in the instances where septic tanks are used, this results in an overloading of the septic tank. When the toilet is used as a urinal, very little water is required to flush the toilet. It is, therefore, the primary object of this invention to provide an improved flush tank valve assembly which includes means whereby various quantities of water may be released from the flush tank into a toilet bowl depending upon the flushing requirements of the toilet so as to conserve water and to prevent overloading of a sewage system.

An object of this invention is to provide an improved flush tank valve assembly, the valve assembly including intake openings disposed at various levels within the flush tank and being provided with separate valve members, there being provided a suitable control mechanism whereby the uppermost valve member will first open and may be opened independently of the lower valve member so that only an upper portion of the water in the flush tank may be supplied to the toilet bowl for flushing purposes.

Another object of this invention is to provide an improved valve assembly for toilet flush tanks, the valve assembly including an outlet pipe, a normal inlet opening for the outlet pipe, an overflow pipe extending upwardly from the outlet pipe, there being carried by the overflow pipe intermediate the ends thereof an inlet fitting whereby water within a flush tank may be taken off at an intermediate level, and there being provided a separate valve member for controlling the flow of water from the flush tank, the valve members being interconnected by linkage which is of such a nature whereby the uppermost valve member is first opened and then if the linkage is further operated the lower valve member will open in order to provide two separate flushing cycles.

A further object of this invention is to provide an improved flush tank valve assembly which may be used automatically to curtail the use of water in a toilet flushing operation when the toilet is used as a urinal, the valve assembly including upper and lower intakes for an outlet pipe and there being provided separate valve members for the intakes, the valve members being connected together by linkage which sequentially opens the valve members with the uppermost valve member being opened first, the linkage being of such a nature whereby opening operation thereof is limited to the upper valve member when a toilet seat is in an upstanding or raised position.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accom-

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panying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

Figure 1 is a fragmentary perspective view of a toilet flush tank and an upper portion of a toilet seat when in upstanding position, and a portion of the toilet seat and the flush tank being broken away in order to illustrate the details of the valve mechanism of the flush tank, the valve mechanism being shown in a partially inoperative position by dotted lines;

Figure 2 is an enlarged fragmentary sectional view taken substantially upon the plane indicated by the section line 2—2 of Figure 1 and shows how a portion of the linkage of the valve mechanism or valve assembly is rendered inoperative by the toilet seat being in an upstanding position;

Figure 3 is a fragmentary perspective view of a toilet with a portion of the flush tank thereof being broken away, and there being illustrated the details of a modified form of valve assembly for flush tanks;

Figure 4 is an enlarged fragmentary elevational view of the upper part of flush tank of Figure 3 and shows the seat of the toilet in an upstanding position with the seat functioning as a stop for the linkage of the valve assembly, the linkage of the valve assembly being shown in two positions; and

Fig. 5 is a fragmentary perspective view of a toilet with the portions of the flush tank thereof being broken away and showing the details of still a further modified form of valve assembly, portions of the valve assembly being shown in an inoperative position by dotted lines.

Referring now to Figures 1 and 2 in particular, it will be seen that there is illustrated portions of a toilet which is referred to in general by the reference numeral 10. The toilet 10 includes a flush tank 12 having a cover 14. The toilet 10 also includes a seat 16.

Mounted within the flush tank 12 for the purpose of delivering water to the toilet bowl (not shown) is an outlet pipe 18. The outlet pipe 18 has an upper inlet opening 20. The inlet opening 20 is normally closed by a first valve member 22. Connected to the valve member 22 for moving it to an open position is a lift rod 24. The lift rod 24 is guided for vertical movement only by means of a guide 26.

Secured to the outlet pipe 18 and supported thereby in communication therewith is an overflow pipe 28. The overflow pipe 28 extends vertically within the flush tank 12 and serves as a support for the guide 26. The overflow pipe 28 has an open upper end 30 which receives an overflow from the flush tank 12 in the event it should be overflowed.

Carried by the overflow pipe 28 intermediate the ends thereof is an L-shaped inlet fitting 32 having an upper inlet 34. The inlet 34 is normally closed by a second valve member 36 which may be identical with the valve member 22. Connected to the valve member 36 for the purpose of moving it to an open position is a lift rod 38. The lift rod 38 is restrained for vertical movement only by means of a guide 40 secured to the upper portion of the overflow pipe 28.

In order that the valve members 36 and 22 may be sequentially opened in that order, there is carried by the flush tank 12 operating linkage referred to in general by the reference numeral 42. The operating linkage 42 includes a crank 44 having one arm 46 journaled in a front wall 48 of the flush tank 12 by means of a bushing 50 disclosed therein. The forward end of the arm 46 is provided with an operating handle 52. The crank 44 also includes a generally horizontally disposed lift arm 54 which is disposed at right angles to the arm 46.

The upper end of the lift rod 38 is provided with an eye 56 through which the lift arm 54 passes. The lift arm 54 is positioned relative to the eye 56 by means of a

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pair of projections 58 which are disposed in spaced relation on opposite sides of the eye 56.

The extreme end of the lift arm 54 is in the form of a horizontally disposed eye 60. Interlocked with the eye 60 is a vertical eye 62, the eyes 60 and 62 providing a hinge. The eye 62 is part of a link 64 which is normally vertically disposed and which is provided at its lower end with an eye 66 receiving an offset end 68 of the upper part of lift rod 24.

During the normal operation of the valve assembly of the flush tank 12, both of the valve members 22 and 36 will be moved to open positions so that the entire supply of water in the flush tank 12 will pass out through the outlet pipe 18 in a normal flushing operation. However, at times, particularly when the toilet has been used as a urinal, it is desired that only the valve member 36 be moved to an open position. It is therefore desirable to provide suitable means for disengaging the links 64 from the lift rod 24 so as to render the valve member 22 inoperative.

Referring now to Figure 2 in particular, it will be seen that the front wall 48 of the flush tank 12 is provided with a tubular housing 70 in which is mounted a push button 72, the push button 72 extending out through the forward end of the housing 70. Connected to the rear end of the push button 72 is a rod 74 which is restrained for horizontal movement only by means of a guide 76 mounted on the overflow pipe 28. The rod 74 is normally urged to a forwardmost position by means of a spring 78 disposed within the housing 70. The rear end of the rod 74 is in the form of an eye 70 receiving an intermediate portion of the link 64.

The push button 72 is so positioned whereby when the toilet seat 16 is in an upstanding or raised position, it will engage the push button 72 and compress the spring 78 so as to move the rod 74 rearwardly or to the right, as viewed in Figure 2. This will result in the disengagement of the eye 66 from the offset end 68. When this happens, the valve member 22 will be rendered inoperative and only a small portion of the water of the flush tank 12 will be used in flushing the toilet. However, when the seat 16 is in the lowered position, the entire valve assembly will function in a normal manner and both the valve members 22 and 36 will be moved to open positions when the handle 52 is operated.

Referring now to Figures 3 and 4 in particular, it will be seen that there is illustrated a toilet which is referred to in general by the reference numeral 82. The toilet 82 includes a flush tank 84 having a cover 86. The flush tank 84 also includes a front wall 88. The toilet 82 further includes a toilet seat 90 among other components.

Mounted within the flush tank 84 for the purpose of supplying water to a toilet bowl (not shown) is an outlet pipe 92 having an intake opening 94. The intake opening 94 is normally closed by a flush valve member 96. The valve member 96 has connected thereto a lift rod 98.

Connected to the upper part of the outlet pipe 92 and communicated therewith is an upstanding overflow pipe 100. The overflow pipe 100 has an upper entrance opening 102. Carried by the overflow pipe 100 intermediate the ends thereof is a guide 104 to restrain the lift rod 98 against vertical movement only so as to maintain the valve member 96 aligned with the intake opening 94 at all times.

Carried by the overflow pipe 100 intermediate the ends thereof is an inlet fitting 106. The inlet fitting 106 is L-shaped in outline and includes an upper entrance 108. Normally closing the entrance 108 is a second valve member 110 having a lift rod 112. The lift rod 112 is restrained against movement other than vertical by means of a guide 114 carried by the upper part of the overflow pipe 100.

In order that the lift rods 98 and 112 may be operated

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to move the valve members 96 and 110 to open positions, there is provided a suitable linkage which is referred to in general by the reference numeral 116. The linkage 116 includes a crank which is referred to in general by reference numeral 118. The crank 118 includes a first arm 120 which extends through the front wall 88 of the flush tank 84 and is journaled in a suitable bushing 122 carried by the front wall 88. Secured to the forward end of the arm 120 is a handle 124 for oscillating the crank 118.

The crank 118 also includes a lift arm 126. The lift arm 126 has an intermediate portion thereof passing through an eye 128 of a link 130. The eye 128 is positioned relative to the lift arm 126 by means of a pair of spaced projections 132 on the lift arm 126. The link 130 is connected to the upper end of the lift rod 112 by means of a hinge 134.

The linkage 116 also includes a link 136. The lower end of the link 136 is connected to the upper end of the lift rod 98 by means of a hinge 138. The upper end of the link 136 passes through an eye 140 at the extreme end of the lift arm 126. The link 136 extends a considerable distance above the eye 140 and terminates in a ball 142.

In order to control the action of the linkage 116, there is secured to the handle 128 a depending stop arm 144 which is provided at its lower end with a cushion 146.

The normal operation of the valve assembly of the flush tank 84, when the handle 124 is pivoted to rotate the crank 118, the lift arm 126 moves upwardly and first unseats the valve member 110. Then as the lift arm 126 moves upwardly further, the eye 140 will engage the ball 142 and cause the valve member 96 to unseat. This is a normal flushing sequence for the toilet 82.

When the seat 90 is in a raised position, such as that illustrated in Figure 4, then the cushion 146 of the stop arm 144 will engage the seat 90 and limit the pivoting of the crank 118 so that the lift arm 126 thereof will move upwardly sufficiently to unseat the valve member 110, but will not move up sufficiently so that the eye 140 will engage the ball 142. Thus when the seat 90 is in its raised position, the handle 124 may be moved only sufficiently to unseat the valve member 110 thus limiting the amount of water used during the flushing operation.

Referring now to Figure 5 in particular, it will be seen that there is illustrated in modified form a toilet which is referred to in general by reference numeral 150. The toilet 150 includes a toilet bowl 152 which supports a flush tank 154. The flush tank 154 includes a removable cover 156 and a front wall 158 among other components. The toilet 150 includes a connecting portion 160 on the upper rear part of the bowl 152, which connecting portion supports a seat 162 for pivotal movement from a lowered operative position to an upstanding out of the way position.

The flush tank 154 is communicative with the bowl 152 for flush purposes by an outlet pipe 164. The inlet pipe 164 includes an intake opening 166 which is normally closed by a first valve member 168. In order that the valve member 168 may be moved to an open position, there is connected thereto a vertically extending rod 170.

Connected to the outlet pipe 164 and communicated therewith is an upstanding overflow pipe 172 having an upper entrance opening 174. Supported by overflow pipe 172 intermediate the ends thereof is a guide 176. The guide 176 receives an intermediate portion of the lift rod 170 and restrains it against movement other than vertical so as to retain the valve member 168 in alignment with the intake opening 166 at all times.

Carried by an upper portion of the overflow pipe 172 is a generally L-shaped inlet fitting 178. The inlet fitting 178 has an upper entrance opening 180 which is normally closed by a valve member 182. The valve member 182 has connected thereto a vertical lift rod 184 which is guided for vertical movement only by means of a guide

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186 secured to the upper part of the overflow pipe 172.

In order to move the valve members 168 and 182 to open positions, there is provided suitable linkage which is referred to in general by the reference numeral 188. The linkage 188 includes a crank 190. The crank 190 has a first arm 192 which passes through the front wall 158 of flush tank 154 and is journaled in a bushing 194 carried thereby. The forward end of the arm 192 is provided with an operating handle 196.

The crank 190 also includes a lift arm 198 which is disposed in general alignment with upper ends of the lift rods 170 and 184. The lift rod 184 is provided at its upper end with a transversely elongated eye 200. Received in the eye 200 is an intermediate portion of the lift arm 198. The upper end of the lift rod 170 is in the form of an offset end 202 which normally overlies an end portion of the lift rod 98.

In order that the lift rod 198 may be selectively disengaged with the end 202 of lift rod 170 to render the valve member 168 temporarily inoperative, the lift rod 198 is hingedly connected to the arm 192 as at 204. This may be in the form of an axial hinge or may be merely a resilient connection between the arms 192 and 198. In either event, it is desirable that relative movement between the arms 192 and 198 be limited to movement of the lift arm 198 in a horizontal plane only.

In order that the lift rod 198 may automatically be disengaged from the upper end 202 of the lift rod 170 when the seat 162 is in an upstanding position, there is provided a crank 206. The crank 206 includes a shaft portion 208 which is suitably journaled in a guide 210 carried by the support portion 160 of the toilet bowl 152. The crank 206 is provided at its forward end with an offset portion 212 and an arm 214. The arm 214 is received in an extended eye 216 of a rod 218 secured to the seat 162.

The opposite end of the shaft 208 is provided with an offset arm 220 which is provided with an extended eye 222. Disposed in the eye 222 is an offset end 224 of a vertical shaft 226. The vertical shaft 226 extends down through the flush tank 154 and is supported for rotary movement by means of a lower guide 228 secured to the outlet pipe 164 and an upper guide 230 secured to the overflow pipe 172.

The upper end of the shaft 226 is in the form of a crank 232 which includes an arm 234 disposed in an eye 236. The eye 236 is disposed intermediate the ends of the lift arm 198 and is extended longitudinally of the lift arm 198.

In the normal operation of the valve assembly and the flush tank 154, when the handle 196 is operated, the lift arm 198 will lift the lift arms 170 and 184 to move the valve members 168 and 182 to open positions. However, when the seat 162 is moved to an upstanding position, the rod 218 will cause rotation of crank 206 which in turn will cause rotation of the shaft 226 to swing the lift arm 198 to its dotted line position. At this time the lift arm 198 will move out of engagement with the end 202 of the lift arm 170 and then when the lift arm 198 is swung upwardly by rotating the handle 196, only the lift arm 184 will be moved upwardly. Thus only the valve member 182 will be unseated and the quantity of water delivered to the toilet bowl 152 during the flushing operation will be restricted.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A toilet flush tank valve assembly comprising an

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outlet pipe, an inlet opening in said outlet pipe, an overflow pipe communicated with said outlet pipe, an inlet fitting on said overflow pipe intermediate ends thereof, a first valve member normally closing said inlet opening, a second valve member normally closing said inlet fitting, linkage for moving said second valve member and said first valve member to open positions, a single handle for operating said linkage, and means operable by a upstanding toilet seat to render said linkage inoperative to move said first valve member to said open position.

2. A toilet flush tank valve assembly comprising an outlet pipe, an inlet opening in said outlet pipe, an overflow pipe communicated with said outlet pipe, an inlet fitting on said overflow pipe intermediate ends thereof, a first valve member normally closing said inlet opening, a second valve member normally closing said inlet fitting, linkage for moving said second valve member and said first valve member to open positions, a single handle for operating said linkage, said linkage including lift rods for said first and second valve members, and means operable by an upstanding toilet seat to disengage said lift rod of said first valve member from the remainder of said linkage to prevent movement of said first valve member to said open position when said linkage is operated.

3. A toilet flush tank valve assembly comprising an outlet pipe, an inlet opening in said outlet pipe, an overflow pipe communicated with said outlet pipe, an inlet fitting on said overflow pipe intermediate ends thereof, a first valve member normally closing said inlet opening, a second valve member normally closing said inlet fitting, linkage for moving said second valve member and said first valve member to open positions, a single handle for operating said linkage, and means operable by an upstanding toilet seat to render said linkage inoperative to move said first valve member to said open position, said means including a stop element connected to said handle.

4. A toilet flush tank valve assembly comprising an outlet pipe, an inlet opening in said outlet pipe, an overflow pipe communicated with said outlet pipe, an inlet fitting on said overflow pipe intermediate ends thereof, a first valve member normally closing said inlet opening, a second valve member normally closing said inlet fitting, linkage for moving said second valve member and said first valve member to open positions, a single handle for operating said linkage, said linkage including lift rods for said first and second valve members, and means operable by an upstanding toilet seat to disengage said lift rod of said first valve member from the remainder of said linkage to prevent movement of said first valve member to said open position when said linkage is operated, said linkage including a depending link releasably connected to said first valve member lift rod, said means including a rod for swinging said depending link out of engagement with said first valve member lift rod.

5. A toilet flush tank valve assembly comprising an outlet pipe, an inlet opening in said outlet pipe, an overflow pipe communicated with said outlet pipe, an inlet fitting on said overflow pipe intermediate ends thereof, a first valve member normally closing said inlet opening, a second valve member normally closing said inlet fitting, linkage for moving said second valve member and said first valve member to open positions, a single handle for operating said linkage, said linkage including lift rods for said first and second valve members, and means operable by an upstanding toilet seat to disengage said lift rod of said first valve member from the remainder of said linkage to prevent movement of said first valve member to said open position when said linkage is operated, said linkage including a lift arm normally engaged with said first valve member lift rod, said means including a rod for swinging said lift arm out of engagement with said first valve member lift rod.

6. A toilet flush tank valve assembly comprising an

outlet pipe, an inlet opening in said outlet pipe, an overflow pipe communicated with said outlet pipe, an inlet fitting on said overflow pipe intermediate ends thereof, a first valve member normally closing said inlet opening, a second valve member normally closing said inlet fitting, linkage for moving said second valve member and said first valve member to open positions, a single handle for operating said linkage, said linkage including lift rods for said first and second valve members, and means operable by an upstanding toilet seat to disengage said lift rod of said first valve member from the remainder of said linkage to prevent movement of said first valve member to said open position when said linkage is operated, said linkage including a depending link releasably connected to said first valve member lift rod, said means including a rod for swinging said depending link out of engagement with said first valve member lift rod, said rod including a plunger engageable by an upstanding toilet seat.

7. A toilet flush tank valve assembly comprising an outlet pipe, an inlet opening in said outlet pipe, an overflow pipe communicated with said outlet pipe, an inlet

fitting on said overflow pipe intermediate ends thereof, a first valve member normally closing said inlet opening, a second valve member normally closing said inlet fitting, linkage for moving said second valve member and said first valve member to open positions, a single handle for operating said linkage, said linkage including lift rods for said first and second valve members, and means operable by an upstanding toilet seat to disengage said lift rod of said first valve member from the remainder of said linkage to prevent movement of said first valve member to said open position when said linkage is operated, said linkage including a lift arm normally engaged with said first valve member lift rod, said means including a rod for swinging said lift arm out of engagement with said first valve member lift rod, said rod being part of second linkage, said second linkage including means for permanent attachment to a toilet seat.

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