Jan. 8, 1924. 1,479,947

C. H. WAY

AUTOMATIC TOILET FLUSH

Filed Aug. 29, 1919

Fig. 1.

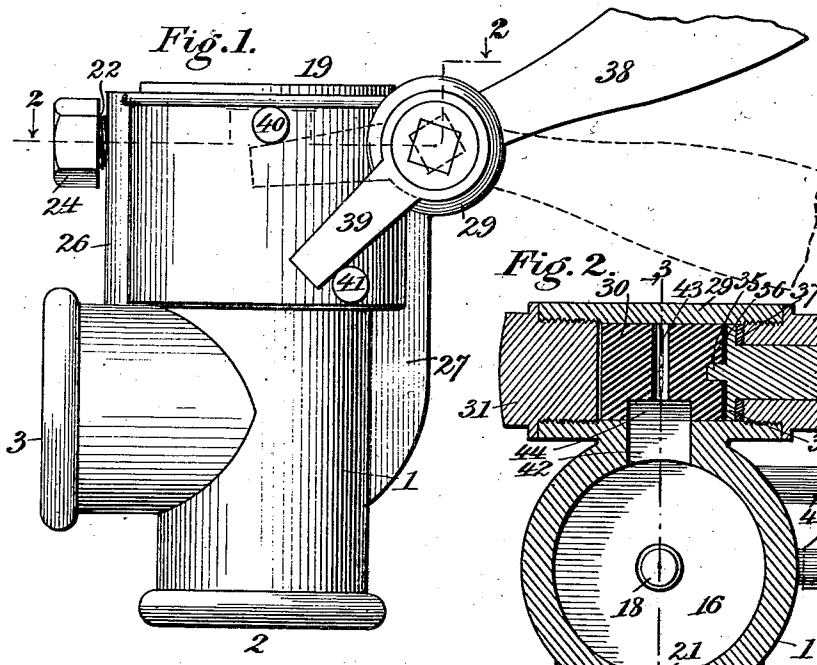


Fig. 2.

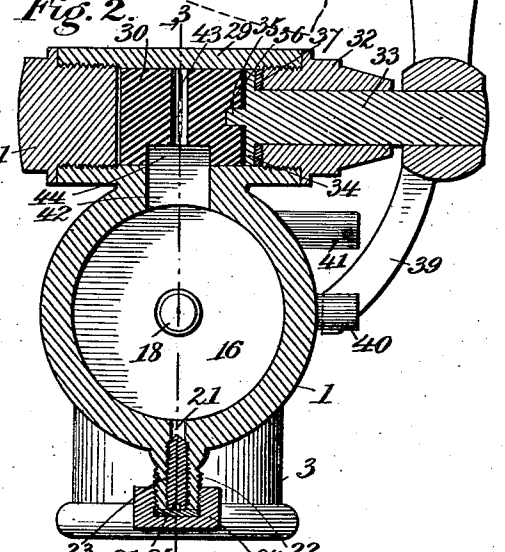
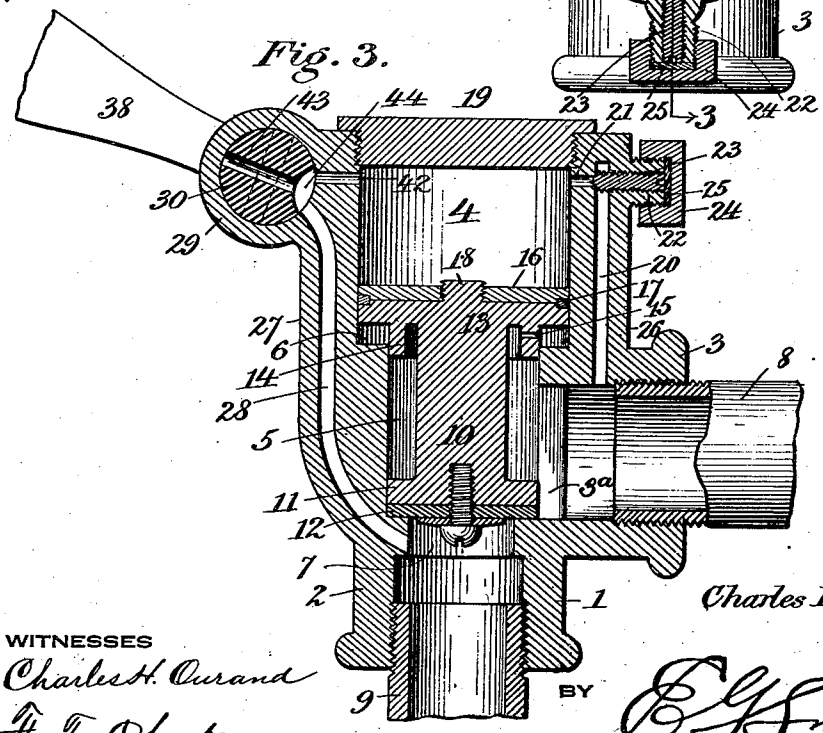


Fig. 3.



WITNESSES

Charles H. Ourand

F. T. Chapman

Charles H. Way
INVENTOR

BY E. G. Siggers

ATTORNEY

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UNITED STATES PATENT OFFICE.

CHARLES H. WAY, OF LANSING, MICHIGAN.

AUTOMATIC TOILET FLUSH.

Application filed August 29, 1919. Serial No. 320,643.

To all whom it may concern:

Be it known that I, CHARLES H. WAY, a citizen of the United States, residing at Lansing, in the county of Ingham and State of Michigan, have invented a new and useful Automatic Toilet Flush, of which the following is a specification.

This invention has reference to automatic toilet flushes whereby a stream of water may be started and will continue for a definite period of time and then automatically cut off, thereby saving the necessity of a flush tank.

In accordance with the invention, a service pipe is connected to the bowl to be flushed through a valve structure containing a reciprocable plunger acting as an automatic cut-off between the service pipe and the bowl. The valve structure contains a valve member which may be of the rockable type, and delivering to one side of the reciprocable valve member is a duct capable of restriction as to the amount of flow allowed through it. Leading from the same side of the reciprocable valve member is another duct and a manipulatable valve permitting the escape of liquid from the side of the reciprocable valve member fed from the service pipe, this manipulatable valve being of a character to slowly close and thereby stop the valve structure from further operation.

The invention will be best understood from a consideration of the following detailed description taken in connection with the accompanying drawing forming part of this specification, with the understanding, however, that the invention is not confined to any strict conformity with the showing of the drawing, but may be changed and modified so long as such changes and modifications mark no material departure from the salient features of the invention as expressed in the appended claim.

In the drawing:—

Figure 1 is an elevation of the flush valve when set for flushing.

Figure 2 is a section on the line 2—2 of Figure 1.

Figure 3 is a section on the line 3—3 of Figure 2.

Referring to the drawing there is shown a casing 1 which may be in the form of a casting with interiorly threaded necks 2, 3, which, in the particular showing of the drawing, are arranged at right angles to each other with the neck 2 in the longitudinal axis of the body member 1. Formed in the body member 1 is a chamber 4 extending longitudinally thereof and about midway the length of this chamber it is contracted into a smaller chamber 5, the division between the two chambers being defined by an internal shoulder 6. That end of the chamber 5 remote from the chamber 4 communicates with the neck 2 through a port 7 and the neck 3 communicates directly with the chamber 5. The neck 3 is entered by a service pipe 8 and the neck 2 is entered by another pipe 9 which may be considered as leading to the bowl to be flushed. Within the chamber 5 and extending into the chamber 4 is a plunger 10 having a head 11 at one end carrying a leather or other packing disk 12 adapted to seat on that end of the chamber 5 opening through the port 7 into the neck 2. The other end of the plunger 10 is expanded into a head 13 of sufficient extent to fit snugly yet freely in the chamber 4 and when the disk 12 is seated on the corresponding end wall of the chamber 5 the head 13 is spaced or elevated a short distance from the shoulder 6. The head 13 is provided with an annular flange 14 fitting snugly in the mouth of the chamber 5 remote from the neck 2 and when the plunger 10 is seated with the end provided with the disk 12 closed against the corresponding end of the chamber 5, the head 13 is close to but spaced from the shoulder 6. Through the flange 14 there is provided a small passage 15 placing that portion of the chamber 4 between the head 13 and the shoulder 6 into communication with the chamber 5 so that there will be no pockets of water or air produced. To render the head 13 fluid-tight, it is provided with a cover plate 16, which cover plate and head have matching grooves housing a packing ring 17, the head 13 having a short axial threaded stem 18 onto which the plate 16 is screwed.

The end of the chamber 4 remote from the chamber 5 is closed by a plug 19 which may be in the form of a screw plug. Extending through the side wall of the chamber 4 is a duct 20 leading from the interior of the neck 3 to a point near the plug 9 where the duct has a branch 21 opening into the chamber 4. On the exterior of the casing 1 is an exteriorly threaded nipple 22 also interiorly threaded to receive a pointed screw 23 traversing the duct 20 and movable toward the branch 21 so that the effective capacity

of the duct 20 and branch 21 may be regulated as desired. Applied to the nipple 22 is a screw cap 24 with a packing washer 25 whereby the nipple may be closed against leakage and the screw 23 protected against tampering or accidental misadjustment.

The duct 20 may be formed in a flange or enlargement 26 along the side of the casing 1. On the other side of the casing 1 is another flange or enlargement 27 through which there is produced another duct 28 leading from the port 7 to an enlargement 29 on the exterior of the casing 1 at a point close to the plug 19. Within the enlargement 29, which is located about tangentially with relation to the chamber 4, there is lodged a valve member 30 preferably, though not necessarily, of hard rubber, and made to fit the bore of the enlargement snugly yet freely. One end of the enlargement 29, which is somewhat elongated, is closed by a plug 31, which may be a screw plug, and the other end of the enlargement is closed by a sleeve 32 screwed into the enlargement 29. Extending through the sleeve 32 is a valve shaft or spindle 33 terminating within the enlargement in a head 34 from which projects a tongue 35 engaging in a groove 36 in the corresponding end of the valve member 30. A packing washer 37 is interposed between the head 34 and the corresponding end of the sleeve 32. The shaft or spindle 33 projects beyond the sleeve 32 and there carries a manipulating handle 38 projecting radially therefrom, while on the side of the spindle 33 remote from the handle 38 is an arm 39 movable between two spaced lugs or stops 40, 41 respectively. Leading from the chamber 4 through the wall of the casing 1 into the bore of the enlargement 29 is a duct 42 entering the bore of the enlargement adjacent to the duct 28. Extending diametrically through the valve member 30 is a duct 43 opening at one end into a cavity 44 formed in the valve member 30 and wide enough circumferentially to maintain engagement with the duct 42 throughout the range of movement of the valve member 30 as limited by the stops 40 and 41.

It may be assumed that the normal position of the handle 38 is that with the outer or free end of the handle lowermost, in which case the arm 39 is in contact with the stop 40, and the weight of the handle may be so arranged that on being raised it will normally though sluggishly gravitate to the lowered position where it is held by the stop 40. Before the handle is raised the outlet duct 28 is closed with the duct 42 still open into the cavity 44. It may also be assumed that the plunger 10 is in the lowered or closed position. Now, on raising the handle, water will flow from the service pipe 8 through the ducts 20 and 21 into the chamber 4 filling the latter, and through the duct 42 into the cavity 44 and by way of the duct 43 against the walls of the enlargement 29, thus forcing the head 34 of the valve stem 33 against the packing 37 and compressing the packing to prevent leakage. In this way the parts are held in non-leakable position, avoiding the use of packing glands which are very frequently troublesome. The water in the chamber 4 pressing upon the head of the plunger 10 and water in the chamber 5 pressing upon the head 11 serves to hold the packing disk 12 in firm seating engagement with the end of the chamber 5 through which water may flow into the flush pipe 9.

If, now, the handle 38 be raised to the position shown in Figure 1 where further movement is stopped by the engagement of the arm 39 with the lug 41, the duct 42 is put into communication with the duct 28 by way of the cavity 44, then bridging the two ducts. Now, the pressure of water in the service pipe is exerted upon the under surface of the head 13 through the passage 15 and as the area of the head 13 exposed to the water pressure is greater than the area of the head 11 and as water in the chamber 4 has free outlet to the ducts 42 and 28, the superior upward pressure of the water against the head 13 causes the plunger 10 to rise, thus opening the port 7 and allowing the direct flow of the service water to pass into the flush pipe 9. This continues with the plunger 10 rising until after the handle 28 has had time to gravitate to the lower position or is forcibly moved to the lower position by hand, whereupon the accumulation of water at service pressure in the chamber 4 through the ducts 20 and 21 forces the plunger to again seat, but this seating is not rapid because of the throttling of the flow of service water through the duct 21 by the screw 23. Ultimately, however, the plunger is seated and the water is cut off. The speed of closing is readily regulated by the throttle 23 and is entirely automatic. All that is necessary in order to produce a flush is to raise the handle 38, after which it may be released with the flushing continuing for a short but sufficient time and then automatically being cut off.

The structure has the advantage of small size and great simplicity and therefore cheapness of manufacture, with practically no parts to get out of order, so that the structure is far less expensive than a flush tank and is readily installed and will give efficient service for a long time.

That portion of the chamber 4 which is divided off by the flange 14 forms a pocket when the flange 14 enters the chamber 5, and it then communicates with the chamber 5 by way of the small port 15 forming a bleeding port. The result is that when the plunger 10 on its lowering movement approaches the

closed position, the water trapped between the flange 14 and the side walls of the chamber 4 acts as a retarder, not only preventing any water hammering, but so slows the closing movement of the plunger by the restriction of the escape of trapped water into the chamber 5 by reason of the smallness of the port 15, wherefore the plunger can only seat slowly. The diameter of the stem of the plunger 10 is nearly the same as the opening 7, consequently the plunger is nearly balanced and the closing movement of the plunger depends wholly upon the action of the fluid in the chamber 4. Extending across the neck 3 where entering the chamber 5, there is a bar 3^a providing a guide for the valve end of the plunger as it approaches its seat.

What is claimed is:—

1. A flushing structure for toilets comprising a casing having a connection for a service pipe and a connection for a flush pipe, a reciprocable plunger in the casing having a normal tendency to move by gravity into position for closing communication between the service and flush pipes, a duct leading from the service pipe to the interior of the casing on that side of the plunger remote from the flush pipe, a rockable valve interposed and working in an enlargement of the casing and provided with a spanning cavity, a duct leading from said cavity to the flush pipe, a diametric passage extending through the valve from the cavity to the opposite side of the valve, and a short duct leading from the same side of the plunger to said cavity, whereby water at service pressure will pass through the short duct and through the said diametric passage to and against the walls of the valve body.

2. A flushing apparatus comprising a casing with a connection for a service pipe and a connection for a flush pipe, means for closing communication between the service and flush pipes, a duct leading from the service pipe to the interior of the casing on that side of the plunger remote from the flush pipe, an enlargement of the casing forming a chamber, a rockable valve mounted in said enlargement, a duct leading from said enlargement to the flush pipe, a short duct leading from the casing to said enlargement, a plug at one end of the enlargement, a sleeve at the other end, a spindle connected to the valve and mounted in the sleeve, a head at the inner end of the spindle, a handle for the outer end of the spindle, a packing between the sleeve and the head, a duct extending diametrically through the valve, and a cavity formed on the valve at one end of the last-mentioned duct and having sufficient width to make connection between the two first-mentioned ducts or to close communication with the duct leading to the flush pipe.

3. A flush structure for closets, comprising a casing provided with an upper cylindrical chamber, and a lower chamber of less diameter than the upper chamber, a shoulder between the two chambers, the lower chamber being in communication with a connection for a service pipe and a connection for a flush pipe, a reciprocable plunger in the casing having an enlarged head operating in the upper chamber and a head of smaller diameter operating in the lower chamber adapted to normally close communication between the service and flush pipes, a duct connecting the service pipe with the upper chamber, another duct leading from the upper chamber to the flush pipe, a valve for closing and opening the last-named duct and provided with manipulating means exterior to the casing, an annular flange depending from the under side of the enlarged head with its outer cylindrical wall of a diameter to neatly fit the wall of the lower chamber and forming with the underside of said head and the said annular shoulder a pocket for trapping fluid, said annular flange being spaced from the wall of the plunger.

4. A flush structure for closets, comprising a casing, provided with an upper chamber, and a lower chamber of less diameter than the upper chamber, a shoulder between the two chambers, the lower chamber being in communication with a connection for a service pipe and a connection for a flush pipe, a reciprocatory plunger in the casing having an enlarged head operating in the upper chamber and a head of smaller diameter operating in the lower chamber, adapted to be normally positioned on said valve seat for closing communication between the service and flush pipes, the upper head forming with the shoulder a pocket for trapping fluid, a restricted passage in the head causing communication between the pocket and the lower chamber, a duct connected to the service pipe and to the upper chamber, another duct leading from the upper chamber to the flush pipe, a valve for closing and opening the last-named duct and provided with manipulating means exterior to the casing, the underside of the upper head through the restricted passage having a greater surface exposed to the pressure of water in the lower chamber from the service pipe than the upper side of the lower head whereby when communication is established between the upper chamber and the flush pipe the plunger will be moved to raise the lower head from its respective seat by the difference in pressure on the head.

5. A flush structure for closets, comprising a casing provided with an upper cylindrical chamber, and a lower chamber of less diameter than the upper chamber, a shoul-

der between the two chambers, the lower chamber being in communication with a connection for a service pipe and a connection for a flush pipe, a reciprocatory plunger in the casing having an enlarged head operating in the upper chamber and a head of smaller diameter operating in the lower chamber adapted to normally close communication between the service and flush pipes, a duct connected to the service pipe and to the upper chamber above the enlarged head of the plunger, another duct leading from the upper chamber above the enlarged head of the plunger to the flush pipe, a valve for closing and opening the last-named duct and provided with manipulating means exterior to the casing, an annular flange depending from the underside of the enlarged head with its outer cylindrical wall of a diameter to neatly fit the wall of the lower chamber and forming with the underside of said head and the annular shoulder a pocket for trapping fluid, a restricted radial duct in the flange connecting said pocket with the lower chamber whereby the speed of descent of the plunger is retarded when the above-named valve is opened, and whereby a greater surface of the upper head is exposed to the pressure of the fluid from the service pipe than the lower head.

6. A flush structure for closets, comprising a casing provided with an upper cylindrical chamber, and a lower chamber of less diameter than the upper chamber, a shoulder between the two chambers, the lower chamber being in communication with a connection for a service pipe and a connection for a flush pipe, a reciprocatory plunger in the casing having an enlarged head operating in the upper chamber and a head of smaller diameter operating in the lower chamber adapted to normally close communication between the service and flush pipes, a duct connected to the service pipe and to the upper chamber above the enlarged head of the plunger, another duct leading from the upper chamber above the enlarged head of the plunger to the flush pipe, a valve for closing and opening the last-named duct and provided with manipulating means exterior to the casing, an annular flange depending from the underside of the enlarged head with its outer cylindrical wall of a diameter to neatly fit the wall of the lower chamber and forming with the underside of said head and the annular shoulder a pocket for trapping fluid, a restricted radial duct in the flange connecting said pocket with the lower chamber whereby the speed of descent of the plunger is retarded when the above-named valve is opened, and whereby a greater surface of the upper head is exposed to the pressure of the fluid from the service pipe than the lower head, the plunger being formed on a smaller diameter than the lower chamber for spacing the outer wall of the plunger from the inner wall of the lower chamber with the annular flange spaced from the wall of the plunger.

In testimony, that I claim the foregoing as my own, I have hereto affixed my signature.

CHARLES H. WAY.

Witnesses:
HERBERT A. SHEFFER,
GEO. H. PRATT.