

996,346.

Patented June 27, 1911.

2 SHEETS—SHEET 1.

Fig. 1.

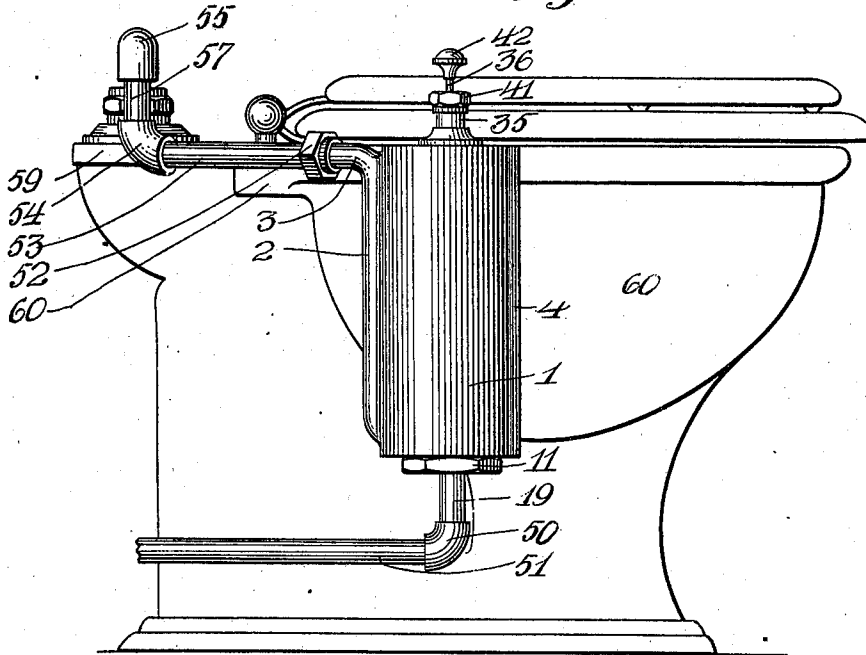
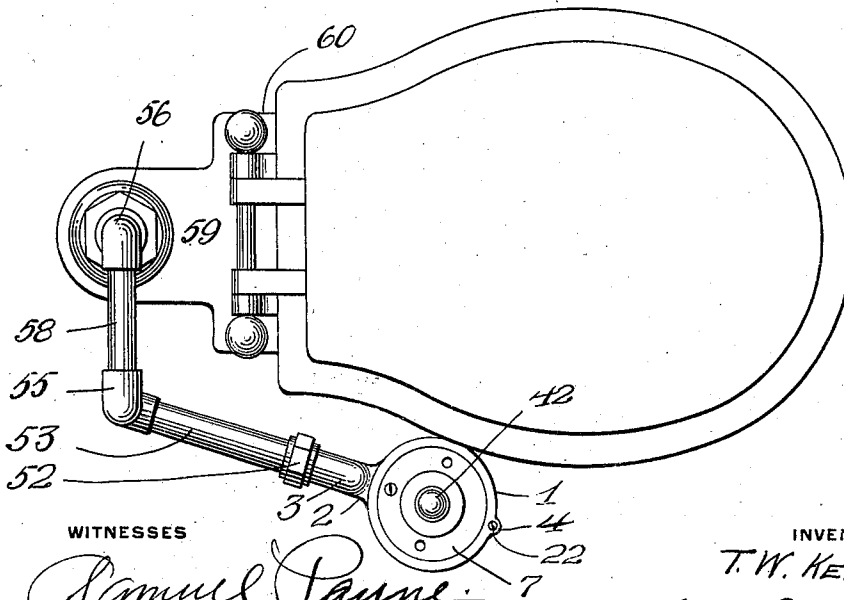


Fig. 2.



WITNESSES

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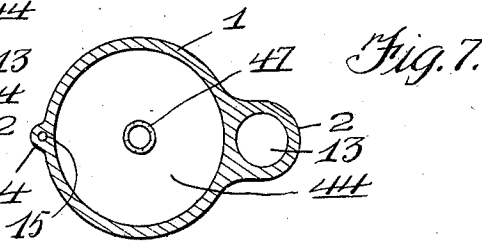
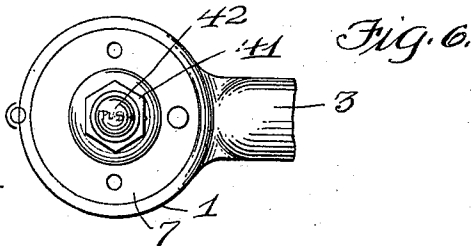
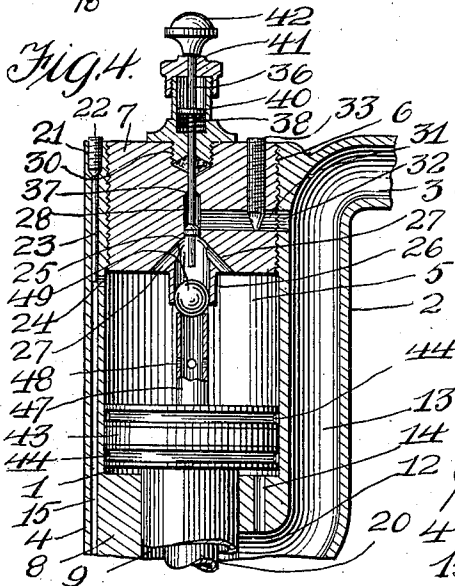
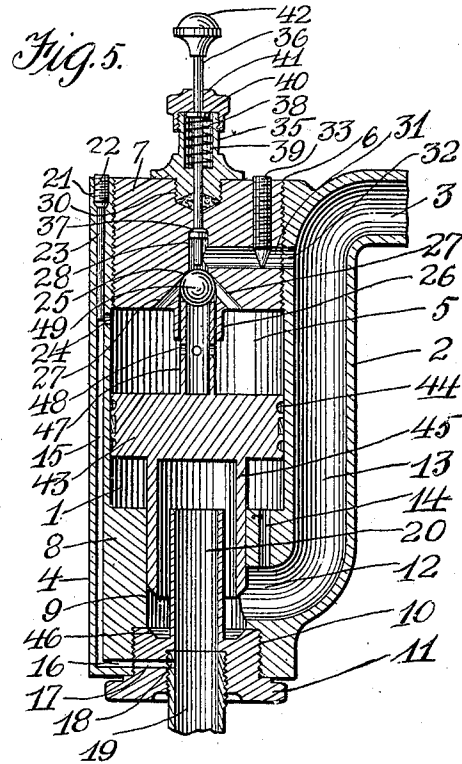
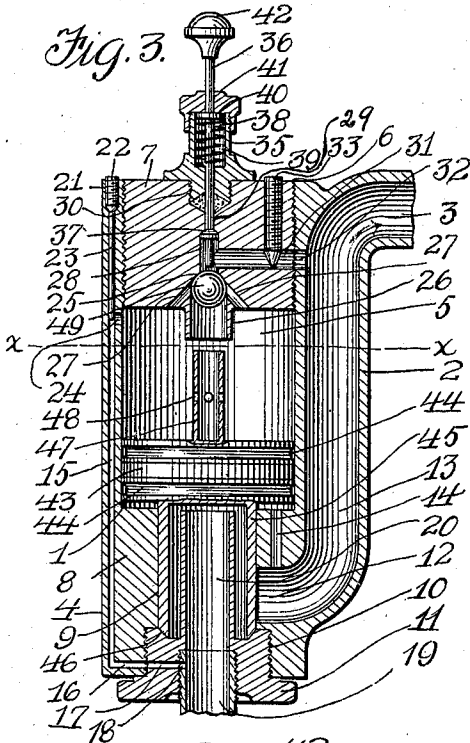
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FLUSHING VALVE.

APPLICATION FILED FEB. 12, 1910.

Patented June 27, 1911.

2 SHEETS—SHEET 2.



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FLUSHING-VALVE.

996,346.

Specification of Letters Patent. Patented June 27, 1911.

Application filed February 12, 1910. Serial No. 543,524.

To all whom it may concern:

Be it known that I, THOMAS W. KEEN, a citizen of the United States of America, residing at Swissvale, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Flushing-Valves, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to flushing valves, and has for its object to provide a valve construction in a manner as hereinafter set forth which can be installed upon a water supply pipe adjacent to the hopper or bowl for admitting a sufficient quantity of water to the hopper or bowl to thoroughly flush the same.

A further object of the invention is to provide in a manner as hereinafter set forth a flushing valve including a piston chamber permanently in communication with a water supply at each end and having a water outlet closed by an auxiliary valve, a piston so disposed in said chamber that when the auxiliary valve is closed, the normal pressure above the piston is the same per square inch as that acting on a portion of the under face of the piston, so that when the auxiliary valve is shifted to open the water outlet of the chamber, it results in the lowering of the pressure above the piston and this in turn unbalances the normal pressure acting on the said portion of the lower face of the piston thereby lifting the latter. The upward movement of the piston eventually results in the seating of the auxiliary valve for closing the water outlet of the piston chamber, but in the meanwhile sufficient water has been supplied to the hopper or bowl to thoroughly flush the same due to the fact that on the upward movement of the piston it causes the opening of a water outlet passage which communicates at one end with a water supply and at its other end with the bowl or hopper. When the piston moves downwardly, due to an increase of pressure in the upper portion of the chamber when the auxiliary valve is closed, it causes the closing of the outlet water passage thereby cutting off the supply of water to the hopper or bowl.

With the foregoing and other objects in view, the invention consists of the novel construction, combination and arrangement of parts as hereinafter more specifically described and illustrated in the accompanying drawings, wherein is shown the preferred embodiment of the invention, but it is to be understood that changes, variations and modifications can be resorted to which fall within the scope of the claim hereunto appended.

In the drawings wherein like reference characters denote corresponding parts throughout the several views, Figure 1 is a side elevation of a hopper or bowl showing the adaptation therewith of a flushing valve in accordance with this invention. Fig. 2 is a plan of the same. Fig. 3 is a vertical sectional view of the flushing valve in a closed position. Fig. 4 is a vertical sectional view of the valve with the auxiliary valve released and the piston closed. Fig. 5 is a vertical sectional view illustrating the piston in an open position and the auxiliary valve closed. Fig. 6 is a plan of the flushing valve. Fig. 7 is a horizontal sectional view taken on line *x-x*, Fig. 3.

Referring to the drawings in detail 1 denotes a cylindrical casing having one side thereof provided with a relatively large vertically-disposed offset 2 extending from within proximity to the lower end of the casing to the upper end. The upper end of the offset 2 terminates in an angular extension 3. The offset 2 as well as the extension 3 is hollow from end to end forming an outlet water passage indicated by the reference character 13. The opposite side of the casing 1 is provided with a vertically disposed offset 4 extending from the lower to the upper end of the casing 1 and being somewhat smaller in diameter than the offset 2. The function of the offset 4 will be presently referred to.

The casing 1 is provided with a chamber 5 which is of less height than the height of the casing 1. The upper part of the chamber 5 constitutes a back pressure chamber. The wall of the chamber 5 at the upper end thereof is threaded, as at 6. Extending into the upper end of the chamber 5 and engag-

ing the thread 6 is a threaded plug 7 to be more specifically referred to hereinafter. The lower part of the casing is formed with a solid portion 8 provided with a centrally-disposed vertically-extending bore 9 having the end thereof enlarged and threaded, as at 10. Extending into the enlarged portion of the bore 9 is a threaded cap 11 which engages with the threads of the enlarged portion 10 of the bore. The cap 11 will be referred to more specifically hereinafter. The portion 8 of the casing 1 is provided with a laterally-extending port 12 which opens into the water outlet passage 13 and which also opens into the bore 9 at a point above the inner end of the plug 11. The portion 8 of the casing 1 is furthermore provided with a vertically disposed duct 14 which communicates at its top with the lower portion of the chamber 5 and at its lower end opens into the outlet port 12 and by such arrangement communication is established between the lower portion of the chamber 5 and the outlet port 12.

The offset 4 is provided with a vertically-disposed passage 15 extending from the upper end of said offset to a point in proximity to its lower end. The passage 15 at its lower end opens into a right angularly-disposed port 16 formed in the portion 8 of the casing 1. The port 16 opens into a radially disposed duct 17 formed in the cap 11. The cap 11 is provided centrally with an opening, the lower portion thereof being of greater diameter than the upper portion. That portion of greater diameter having the wall thereof threaded and engaging with the said threaded wall is the threaded end of a water inlet pipe 19 which is provided with an opening 18 which communicates with the duct 17. By setting up the passage 15, the port 16, duct 17 and opening 18 in the manner as stated communication is established between the passage 15 and the water inlet pipe 19. Formed integral with the inner face of the cap 11 is a hollow tubular stem 20 which extends upwardly into the bore 9 of the casing 1. The stem 20 in connection with the upper portion of the opening in the cap forms a continuation of the water inlet pipe 19.

The upper end of the passage 15 is enlarged as at 21, the wall of said enlargement being threaded for the reception of a threaded plug 22 having a depending stem 23. The passage 15 communicates with the back pressure chamber 5 through the medium of a small port 24 which is formed in the wall of the chamber 5 adjacent to the lower end of the plug 7. The depending stem 23 of the plug 22 is adapted to control the flow from the passage 15 through the port 24 into the back pressure chamber 5. The plug 7 approximately centrally thereof in its top is

formed with a recess 30 having the wall thereof threaded with which engages a threaded gland 35 provided with a socket 38 having arranged therein a coil spring 39. The socket 38 is closed by a cap 41. The plug 7 is furthermore provided with a centrally-disposed vertical opening 29 which communicates at its upper end with the recess 30 and at its lower end with a vertically-disposed recess 28. Formed within the plug 7 is a laterally-extending outlet duct 31, which at one end opens into the recess 28 and at its other end communicates with an outlet port 32 formed in the casing 1 and opening into the outlet water passage 13 near the upper end thereof. Within the plug 7 and in proximity to the lower portion of the recess 28 is formed a valve chamber 25, the top of said chamber constituting a valve seat which is adapted to be engaged by a globular valve 49 for closing the lower end of the recess 28 and thereby shutting off the outlet duct 31 to the valve chamber 25. The plug 7 in its lower end is provided with a plurality of angularly-disposed ports 27 for establishing communication between the back pressure chamber 5 and the recess 28 when the valve 49 is moved from its seat and by such an arrangement the water can pass from the back pressure chamber 5, through the ports 27, into the recess 28, through the duct 31 and outlet 32 and into the outlet water passage 13. Formed integrally with and depending from the lower face of the plug 7 is a sleeve 26 which is of the same diameter as the valve chamber 25, as well as registering therewith, and which constitutes a guide for the valve 49 when the latter is shifted from its seat.

The valve 49 is shifted manually from its seat through the medium of a plunger rod 36 which extends through the cap 41, gland 35, opening 29 and into the recess 28. That portion of the plunger rod 36 within the recess 28 is provided with a collar 37 adapted to engage the upper end wall of the recess 28 whereby the upward movement of the plunger rod 36 is limited. The plunger rod 36 extends through the coil spring 39 within the socket 38 and carries a collar 40 which engages the spring 39. The function of the spring 39 is to return the plunger rod 36 to an elevated position after it has been shifted downwardly to move the valve 49 from its seat. The valve 49 is normally retained against its seat by the pressure of water from the back pressure chamber 5 and is automatically returned to its seat in a manner to be hereinafter referred to.

The flow of water through the duct 31 is controlled by a screw-threaded valve plug 33 which is mounted in the top of the plug 7 and provided with a tapering lower end adapted to extend across the port 31, as

clearly shown in Figs. 3, 4 and 5. The plug 7 is provided with a screw-threaded opening for the reception of the regulating or controlling valve plug 33 for the duct 31.

5 Mounted in the back pressure chamber 5 is a piston 43 having its periphery provided with packing rings 44 for forming a water tight connection between the piston 43 and the wall of the back pressure chamber 5. Depending from the lower face of the piston 43 is a cylindrical shell 45 of a diameter to snugly fit the wall of a bore 9, but the engagement between the shell and the wall of the bore 9 is such as not to interfere with the movement of the piston 43 when occasion so requires. The shell 45 when the piston 43 is in its lower position closes the outlet opening 12. The lower end of the shell 45 when the piston is at the limit of its lowering movement engages the plug 11 and the length of the shell 45 is such that when the shell 45 engages the plug 11, the piston 43 will be slightly above the solid portion 8 of the casing 1 so as not to close the upper end of the duct 14.

Projecting from the upper face of the piston 43 is a tube 47 provided with a circumferential series of openings 48 at a point removed from the upper end thereof. The tube 47 is arranged below the sleeve 26 and is of such diameter with respect to the sleeve 26, that when the piston 43 moves upwardly, the tube 47 will extend into the sleeve 26. When the valve 49 is shifted from its seat and down through the guide sleeve 26, it engages the upper end of the tube 47, so that when the piston 43 moves upwardly the valve 49 will be carried toward its seat and eventually engage the seat thereby closing the recess 28. The openings 48 provide for water to enter into the tube 47 flowing upwardly therein and assisting in carrying the valve 49 back to its seat. The openings 48 are so positioned that when the tube 47 extends into the sleeve 26, the said openings will not be closed by the sleeve.

The water inlet pipe 19 is connected by an elbow 50 to a water supply pipe 51. Connected to the extension 3 by a union 52 is a water outlet pipe communicating with a rearward extension or support 59 of a hopper or bowl 60. The water outlet pipe is formed of the pipe branches 53, 57 and 58 connected together by elbows 54, 55 and 56.

55 The operation of a flushing valve in accordance with this invention is as follows: It will be assumed that the valve is in a closed position as shown in Fig. 3 of the drawings. In such position the opening 12 is closed by the shell 45, and the recess 28 closed by the valve 49. The pressure of the water within the back pressure chamber 5 will retain the valve 49 upon its seat. When the parts are in the position shown in Fig. 3, the normal

pressure above the piston is the same per square inch as that acting on that portion of the lower face of the piston surrounded by the shell 45. Now it will be assumed that the valve 49 is shifted from its seat through the medium of the plunger rod 36. This action results in the lowering of the pressure above the piston and this in turn unbalances the normal pressure acting on the said portion of the lower face of the piston and the incoming fluid elevates the piston. On the upward movement of the piston the shell 45 will be carried therewith, opening the outlet 12 and allowing a supply of water through the passage 13 to the hopper or bowl. When the valve 49 is unseated pressure is reduced in the upper portion of the back pressure chamber 5, due to the passage of the water through the ports 27, recess 28, duct 31 and outlet 32 into the passage 13. As the piston 43 gradually rises and as the valve 49 is then carried by the tube 47, the valve is gradually brought toward its seat and eventually contacts therewith, closing the recess 28 thereby gradually increasing pressure with the back pressure chamber 5 until the pressure becomes normal. As the pressure gradually increases in the chamber 5 the piston is lowered moving the valve 49 against said seat. As the piston descends, the outlet opening 12 is gradually closed through the medium of the shell 45. During the elevating and lowering operation of the piston 43 sufficient water has been supplied to the hopper or bowl 60 to flush the same. The port 14 is provided for draining the water from the lower portion of the chamber 5.

What I claim is:—

A flushing valve comprising a casing having a water outlet at its bottom, a back pressure chamber, a bore opening into said outlet, and a water outlet passage communicating with said outlet and extending to the top of the casing, a plug secured to the casing and having an inlet pipe projecting through the bore, said plug and the wall of said casing provided with means for establishing communication between said pipe and said chamber at the top of the latter, means carried by the casing at the top thereof for regulating the supply of water to said chamber, a plug arranged within the casing and forming the top wall of said chamber and having channels opening into said chamber and into the water outlet passage near the top of the latter, a shiftable valve for controlling said channels and adapted when shifted in one direction to open the channels thereby reducing the water pressure in said chamber, and a piston within the casing and having depending means projecting into the bore and surrounding said pipe for opening and closing said outlet and

further having upwardly-extending means
for closing said valve, said piston actuated
on a reduction of pressure in said chamber to
open the outlet and to seat said valve and
5 actuated in the opposite direction on an in-
crease of pressure in said chamber to close
said outlet.

In testimony whereof I affix my signature
in the presence of two witnesses.

THOMAS W. KEEN.

Witnesses:

K. H. BUTLER,
EVA A. MILNE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."
