

APPLICATION FILED FEB. 24, 1908.

Patented Apr. 26, 1910.



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UNITED STATES PATENT OFFICE.

PETER GRABLER, OF CLEVELAND, OHIO, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO THE CLEVELAND FLUSHOMETER COMPANY, OF CLEVELAND, OHIO.

FLUSH-VALVE.

955,961.

Specification of Letters Patent.

Patented Apr. 26, 1910.

Application filed February 24, 1908. Serial No. 417,336.

To all whom it may concern:

Be it known that I, PETER GRABLER, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Flush-Valves, of which the following is a specification.

This invention relates broadly to flushing devices and is adapted particularly for use in connection with the flush pipe and may be used with or without a tank.

More specifically the invention relates to a suitable valve for controlling the flow of water to the bowl and provided with suitable means suspended in the valve casing and arranged to expand and return the valve to its seat after a predetermined period of operation or after a certain quantity of water has passed into the bowl for the flushing operation.

The invention may be further briefly summarized as consisting in the construction and combination of parts hereinafter set forth in the drawings, specification and claims.

Referring to the drawings Figure 1 is a general view showing the tank, the supply, the flush valve, the bowl and connections therewith; Fig. 2 is a section taken vertically through the flush valve; Fig. 3 is a sectional view through the inlet member showing the rod, for dividing the incoming stream of water, in elevation; and Fig. 4 is a detail sectional view through the relief valve stem.

Any preferred construction and arrangement of parts may be employed in the carrying out of my invention, but I have shown one form in the drawings which meets the requirements with great efficiency and in such embodiment 1 represents a bowl of ordinary construction, 2 the connection leading from the valve casing 3 to the bowl and 4 a suitable flush pipe leading from the valve casing 3 to the tank 5. This tank is supplied with water from a suitable supply pipe 6 which passes into the tank where it is provided with a goose neck 7 having its delivery end within the mouth of and adapted to direct its stream into the flush pipe 4. The outlet from the goose neck 7 into the flush pipe 4 is small enough so that the entire volume of the supply is directed into the flush pipe 4 whereby the water in the tank 5 will be drawn into the flush pipe and forced into the bowl.

The flush valve consists of the casing 3 preferably made rigid with the connection 2 and having upon one side a suitable inlet connection 8 to which is secured the flush pipe 4. The casing 3 is provided at its upper end with a long straight portion 9 having near its upper end an internal threaded portion adapted to receive a threaded plug 10 which has integral therewith a cylindrical portion 11 extending down into the casing within the portion 9 for a purpose to be described. The exterior surface of the bearing portion 11' is provided with a plurality of small pockets 11° which produce two very important results namely, the decreasing of the bearing surface and the collecting of small quantities of water therein which produces a sort of packing for the joint between the plunger and the cylindrical portion 11 of the plug. The bearing portion 11' of the cylindrical portion is never exposed to the sediment while the remaining part is reduced whereby the collecting of sediment or grit upon it would have no effect whatsoever. The casing 3 is further provided with a valve seat 12 below the inlet connection 8 and it is arranged to receive a main valve 13 carried by the lower end of a plunger 14 which is hollow and open at the end opposite to the valve and is adapted to fit snugly around the bearing portion 11' carried by the plug 10. The bottom of the plunger on the inside is preferably formed into a half oval, as it were, for a purpose to be described. A port 15 is provided in the plunger 14 for the purpose of equalizing the pressure above and below the plunger. The plunger is of a length such that when the main valve 13 is on its seat the upper edge of the former comes to the edge of the bearing surface of the cylindrical portion 11 so that none of the bearing surface of either the cylindrical portion or the plunger is exposed to sediment or grit. In the bottom of the plunger a suitable relief opening 16 is provided which empties out into the connection 2 toward the bowl and the plunger at the upper part of this opening is provided with a valve seat 17 which receives a relief valve 18, the stem 19 of which extends down through the opening 16 and is preferably made triangular whereby it will permit the water to flow around it. The stem 19 extends below the lower face of the plunger and is provided with a pin 20 which limits

its the upward movement of the valve. The casing 3 is still further provided with a housing 21 for an operating device and this operating device consists of a shaft 22 passing into the housing and provided with a squared portion 23 carrying thereon an operating lever 24, the end of which projects into the valve casing 3 in a position such that when the lever is rocked upward this end engages the stem 19 of the relief valve and raises the same, until the pin 20 engages the under surface of the main valve 13 when a still further movement of the lever will raise this valve also.

The operation of the device is such that when the tank 5 is supplied with water the shaft 22 is rocked so that the end of the lever 24 engages the stem 19, thus raising the relief valve 18 and relieving the pressure of water which has accumulated in the expansion chamber formed by the plunger and the cylindrical portion 11, so that a further rocking of the lever 24 may raise the plunger and the main valve 13 thus bringing about the flushing operation. As soon as the plunger and the main valve 13 are raised sufficiently to start the flushing operation, the shaft 22 is then released and the lever 24 returns to normal position, but as soon as the end of this lever moves away from the valve stem 19 the relief valve 18 immediately closes by its weight and the plunger carrying the main valve 13 remains suspended until sufficient water passes through the port 15 to let it return to its normal position. It is quite obvious that a period of time will be consumed in the plunger and valve returning to normal position in that water will pass in very slowly through the port 15.

In order to prevent the force of the water from acting directly against the side of the plunger 14, a rod 25 is mounted vertically across the inlet 8, as shown in Figs. 2 and 3, whereby the stream of water is spread laterally in two parts around the sides of the casing and in a manner to envelop the plunger.

The mechanism for operating the shaft 22 consists of a lever 26 secured to the shaft and carrying a lug 27 adapted to engage the end of a screw 28 carried by a projection 29 forming a part of the casing 3. It is obvious that the screw may be adjusted so as to vary the upward movement of the lever 24 and hence the extent to which the plunger 14 is raised thereby furnishing suitable means for regulating and determining the period of time required for closing the main valve 13 and hence the extent of the flushing operation.

Having described my invention, I claim:

1. In a flush valve, in combination, a casing having inlet and outlet openings, a valve seat within said casing between the inlet

and outlet openings, a valve cooperating with said seat, a cylindrical member carried by said casing and having a portion cut away leaving a bearing surface, a hollow plunger engaging said bearing surface, the edge of the exterior bearing surface of one member being flush with the edge of the interior bearing surface of the other member when the valve is closed, said plunger being adapted to operate said valve and having a port for normally equalizing the pressure above and below the same, a relief valve for said plunger, and means for opening the same and raising said plunger.

2. In a flush valve, in combination, a casing having inlet and outlet openings and a cylindrical portion, a valve seat within said casing and between said openings and arranged in alinement with the cylindrical portion of the casing, a plug secured in said cylindrical portion and having a cylindrical member projecting into the cylindrical portion of the casing, said cylindrical member being cut away leaving a bearing surface, a plunger engaging said bearing surface, the edge of the bearing surface of the plunger being flush with the edge of the bearing surface of the cylindrical member when the valve is closed, said plunger being provided with a port for equalizing the pressure above and below the same, a valve carried by said plunger and cooperating with said valve seat, and means for raising the plunger and the valve.

3. In a flush valve, in combination, a casing having inlet and outlet openings and a cylindrical portion, a valve seat within said casing between the inlet and outlet openings and in alinement with the cylindrical portion of said casing, a plug secured in the upper part of the cylindrical portion of the casing and having a cylindrical member provided externally with an enlarged portion adapted to form a bearing surface, a plunger engaging said bearing surface and having its edge flush with the upper edge of the bearing surface of said cylindrical member, said plunger being provided with a port for equalizing the pressure above and below the same, a valve carried by said plunger and adapted to engage said valve seat, and means for raising said valve and said plunger.

4. In a flush valve, in combination, a casing having a cylindrical member with a bearing surface, a valve within said casing and a plunger for operating said valve and having a bearing surface engaging said other bearing surface, one of said surfaces having therein circumferentially isolated pockets for furnishing a water packing therebetween.

5. In a flush valve, in combination, a casing having a cylindrical portion and an inlet and an outlet opening, a valve seat within said casing between said openings and in

alinement with said cylindrical portion of the casing, a plug secured in the upper part of the cylindrical portion of the casing and having a cylindrical member projecting into the cylindrical portion of the casing, said member being cut away leaving a bearing surface, a plunger having a tubular portion engaging said bearing surface, the bearing surface of one of said parts being provided with circumferentially isolated pockets, said plunger being provided with a port for equalizing the pressure above and below the same, a main valve carried by said plunger, a relief valve carried by said plunger, and means for opening the relief valve and raising said plunger and main valve. 15

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

PETER GRABLER.

Witnesses:

RAE WEISS,

G. O. FARQUHARSON.