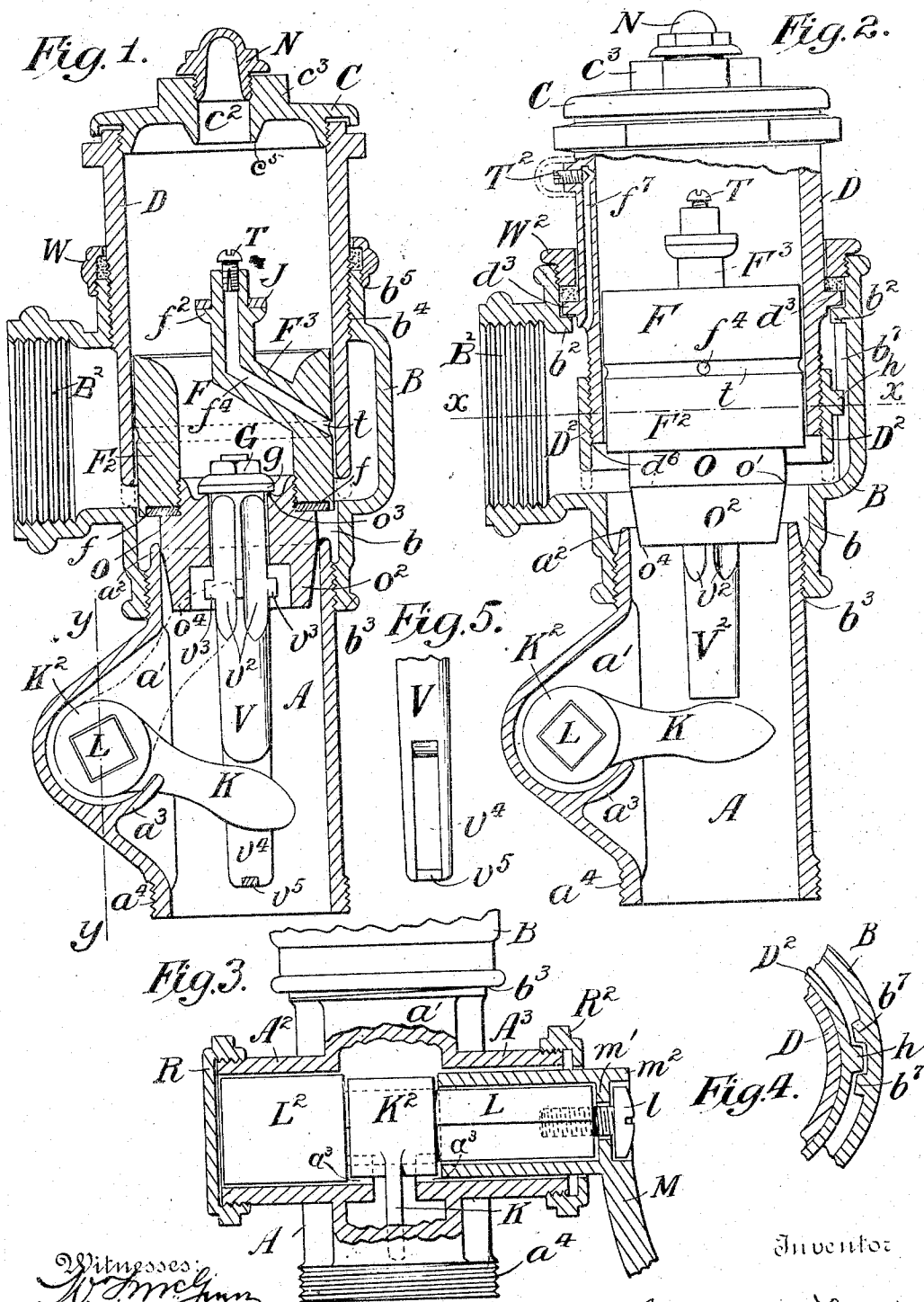


Patented Jan. 18, 1910.

947,183.



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FLUSHING-VALVE.

947,183.

Specification of Letters Patent.

Patented Jan. 18, 1910.

Application filed March 16, 1903. Serial No. 421,495.

To all whom it may concern:

Be it known that I, SAMUEL W. LEWIS, a citizen of the United States, residing at the borough of Brooklyn, in the city of New York, county of Kings, and State of New York, have invented certain new and useful Improvements in Flushing-Valves, of which the following is a specification and description, reference being made to the accompanying drawing by letters, which indicate identical parts in all the views.

My invention relates to the class of flushing valves described in my previous patents No. 663,284 dated Dec. 4, 1900 and No. 715,675 dated Dec. 9, 1902 and the objects of my invention are fully set forth in the following description.

In the drawing, Figure 1 is a sectional view showing one form of the valve in the act of closing, Fig. 2 is a similar view showing a modified and improved construction. Fig. 3 is a sectional view on the vertical line $y-y$ of Fig. 1, Fig. 4 is a sectional plan on the horizontal line $x-x$ of Fig. 2 and Fig. 5 shows a detail of part of Fig. 1.

In the drawing A is a discharge chamber or passage provided with the lateral recess a^1 which contains an operating arm K and its hub K^2 , shaft or journal L and retaining guards a^2 , the discharge chamber A is also provided exteriorly with lateral arms A^2 A^3 to support the operating mechanism as hereinafter described.

The main valve body or casing B is preferably connected to the part A by a screw thread b^1 , it is provided with an inlet connection B² and a counter-bored chamber or dashpot b surrounding the main-valve seat and outlet a^2 .

The cylinder D has one end open to the pressure and its other end normally closed preferably by a removable screw cap C, the cap C is provided with a removing nut c^1 , valve seat c^2 and an opening c^3 which is closed by the screw cap N. The cylinder D is revoluble within the casing B to regulate the volume of discharge or to shut it off completely as hereinafter described.

A piston F adapted to freely reciprocate within the cylinder D and having the usual slight annular clearance between piston and cylinder is made integral with a main valve F^2 , which latter is about 1/32 of an inch less in diameter than the piston F and is provided with a valve washer f which is adapted to

close upon the seat and outlet a^2 within the counterbored chamber b .

An interior hollow arm F^3 forms a by-pass f^1 controlled by the regulating screw T, the by-pass f^1 leads from the side of the main valve below the piston to the space which constitutes a pressure chamber in the closed end of the cylinder between the piston F and cap C. The arm F^3 is provided with a shoulder f^2 to support a washer J which is adapted to engage and be held against the seat c^2 , whereby the cap N can be removed and the screw T adjusted without having to shut off the water. To facilitate a free flow to the by-pass f^1 I provide the annular groove t below the piston, whereby the fluid around the entire periphery of the main-valve can find free flow by the groove t to and through the by-pass f^1 .

A piston extension O O² is connected by screw thread or otherwise to the main valve K^2 and is provided with a valve seat o^3 for a relief valve G g . The part O is adapted, when closing, to form a close piston fit within the outlet and valve seat a^2 , the part O² tapers slightly from the point O¹ to its end at o^4 , whereby when closing, the flow will be gradually reduced and an after-fill provided until wholly stopped by the piston-extension O when it enters the outlet.

V is a stem having limited movement within the part O O² and is provided with a relief valve G and washer g adapted to close upon the seat o^3 , it is also provided with flutes v^2 for passage of fluid, and stops v^3 . In Figs. 1 and 5 the stem V is extended to form a loop v^4 v^5 , around the operating arm K, whereby the main-valve can be drawn to its seat. In Fig. 2 the stem V² is shown without the loop and entirely free from the arm K.

In Fig. 1 the cylinder D is threaded at b^4 , whereby it can be screwed in or out to regulate the volume of discharge or screwed against the end of the valve body B about the counterbore and outlet to shut off the flow as indicated by dotted lines and as described and claimed in my said previous patent, and when thus shut off, by removing the cap C, and moving the operating arm K to the position shown by the dotted line, the main-valve, piston, stem V and relief valve can be taken out, and replaced in the same manner.

In Figs. 2 and 4 the cylinder D is provided with an annular gland d^3 which bears

and revolves upon a similar gland b^2 within the casing B and it is also provided with a packing nut W^2 . A cylindrical extension D^2 which constitutes a regulating and shut-off valve is screwed at d^0 onto the open end of the cylinder D and is provided with a lug or guide h adapted to move between the guide ribs b^1 b^2 within the casing B, the bearing gland b^2 being cut through between the ribs b^1 to allow the passage of the guide h into its place between the ribs when assembling the parts of the apparatus. Thus the cylindrical valve D^2 is prevented by its guide h from turning, and rotation of the cylinder D within the screw thread d^0 causes the cylindrical valve D^2 to move in or out to regulate the volume of discharge or to shut off the flow by forcing said cylindrical valve against its seat around the outlet as effected by the construction shown in Fig. 1, but with the advantage that the position of the cylinder D is always relatively the same with the other parts of the apparatus. Whereas in the construction shown in Fig. 1 the distance between the valve J and its seat c^0 is variable, and the efficiency of the arm K is also affected.

In Fig. 3 m^2 is one part of an operating journal or shaft having a core preferably made square and provided with the gland m^1 and an operating handle M of any suitable length and form to conveniently operate the apparatus. L^2 is another part of the shaft or journal having an extension L which latter is preferably square and adapted to pass through a corresponding square hole in the hub K^2 of the operating arm K and to closely engage the core of the part m^2 , a screw l bearing against the gland m^1 and engaging the square extension L retains the parts together and the packing nuts R^2 prevent leak at the ends of the arms A^2 A^3 . By unscrewing the packing nuts R and R^2 also the retaining screw l the several parts can be removed, at the same time the retaining guards a^3 will sustain the operating arm and its hub K^2 securely in place.

In operation, movement of the handle or lever M rotates the journal m^2 L^2 which causes the operating arm K to open the relief valve G g by moving the stem V until its stops v^3 engage the piston O, when the pressure within the closed end of the cylinder D being relieved by the free vent afforded through the flutes v^2 the main-valve is easily moved to the end of its stroke, and when the handle is released, the relief valve G g instantly closes and the main valve will move toward its seat fast or slow according to the admission of fluid into the closed end of the cylinder through the bypass f^4 or f^1 .

The counterbore b about the valve seat a^2 is substantially of the same diameter as the cylinder D and as the piston moves toward its seat, the tapered extension O^2 enters the

outlet as shown in Fig. 2 and gradually reduces the flow until the part O enters as a close fitting piston within the outlet and valve seat a^2 which completely stops the discharge, at the same time the main-valve F^2 enters the counterbore b as shown in Fig. 1, when the space for admission of pressure between the walls of the counterbore b and periphery of the main valve being greater than any possible space for leakage or escape of fluid under pressure around the closely fitting piston extension O, the fluid pressure within the counterbore b between the main valve F^2 and its seat a^2 is maintained to the instant of seating and serves as a cushion to prevent water-hammer as the valve noiselessly settles to its seat, which is of great practical advantage, because a valve that hammers soon destroys its valve seat and washer, strains the several parts and piping of the system, causes leaks and continual repairs; but with this construction the apparatus operates without perceptible jar or concussion under the highest pressure I have found obtainable for purposes of trial and demonstration, and even with the regulating screw T entirely removed the valve closes without hammer.

Both of my previous patents show a perforated tubular-extension below the main valve adapted to enter the outlet to gradually reduce the flow chiefly for purposes of after-fill, but there was space for passage of fluid around the periphery of such extension and also through the holes or perforations shown. Whereas in my present construction, it is essential that the piston-extension O is made to fit piston tight within the outlet to completely stop the flow when it enters, and the space around the main valve within the counterbore is the same as within the cylinder, about $1/32$ of an inch, so that the pressure can be maintained under the main valve as it settles to its seat. And this is the great difference between my previous and present constructions.

Various modifications can be effected within the scope of the features herein described. For instance, the arm and by-pass F^4 and annular groove t could be omitted, and a by-pass arranged in the wall of the cylinder D as at f^1 in Fig. 2 and regulated by a controlling screw T^2 and such regulating screw might be covered by a removable cover or cap indicated by the dotted lines. The part L and the corresponding cores in the hub K^2 and journal m^2 might also be any other shape than square to effect the same result.

Having described my invention, I claim.

1. The combination of a valve casing provided with an inlet, an outlet, a valve seat and a counterbored chamber surrounding said seat and outlet, a valve reciprocable in said casing and so proportioned to said

chamber-as to provide a slight clearance between the walls of the chamber and the valve in the closing movement of the valve, and an extension on said valve adapted to enter and completely close the outlet in advance of the seating of the valve.

2. The combination of a valve casing provided with an inlet, an outlet, a valve seat and a counterbored chamber surrounding said seat and outlet, a valve reciprocable in said casing and so proportioned to said chamber as to provide a slight clearance between the walls of the chamber and the valve in the closing movement of the valve, an extension on said valve, a part of said extension being tapered to first enter the outlet and gradually reduce the flow and a part adapted to completely close the outlet in advance of the seating of the valve.

3. The combination of a valve casing provided with an inlet, an outlet, a valve seat and a counterbored chamber surrounding said seat and outlet, a cylinder revoluble within said casing, a piston for said cylinder provided with a valve reciprocable in said casing and so proportioned to said chamber as to provide a slight clearance between the walls of the chamber and the valve when closing, and an extension on said valve adapted to enter and completely close the outlet in advance of the seating of the valve.

4. The combination of a valve casing provided with an inlet, an outlet, a valve seat and a counterbored chamber surrounding said seat and outlet, a revoluble cylinder having one end within said casing and open toward the outlet, its other end without the casing and closed by a removable head, a piston for said cylinder provided with a valve which is reciprocable in said casing and so proportioned to said chamber as to provide a slight clearance between the walls of the chamber and the valve in the closing movement of the valve, an extension on said valve adapted to enter and completely close the outlet in advance of the seating of the valve.

5. The combination of a valve casing provided with an inlet, an outlet, a valve seat and a counterbored chamber surrounding said seat and outlet, a revoluble cylinder having one end closed by a removable head, its other end open toward the outlet, a piston for said cylinder provided with a valve reciprocable in said casing and so proportioned as to provide a slight clearance between the walls of the chamber and the valve in its closing movement, an extension on said valve adapted to enter and completely close the outlet in advance of the seating of the valve, and a by-pass to admit pressure into the closed end of the cylinder when the valve is closing.

6. The combination of a valve casing provided with an inlet, an outlet, a valve seat

and a counterbored chamber surrounding said seat and outlet, a cylinder revoluble within the casing and having one end open toward the outlet, a piston for said cylinder provided with a valve reciprocable in said casing and so proportioned as to provide a slight clearance between the walls of the chamber and the valve in its closing movement, an extension on said valve adapted to enter and completely close the outlet in advance of the seating of the valve, a by-pass to admit pressure into the closed end of the cylinder when the valve is closing, and a means for relieving the pressure above the piston to facilitate opening the valve.

7. In a flushing valve, the combination of a valve casing having an inlet, an outlet and a cylinder with one end open toward the outlet, a piston for said cylinder provided with a valve adapted to close the outlet, a by-pass through the periphery of said piston and valve leading to the closed space within the cylinder, a valve on the inner end of said by-pass to engage a valve seat in the head of the cylinder and means of access through the head of the cylinder to adjust the flow through the by-pass.

8. The combination of a casing having an inlet and an outlet, a piston-valve controlling said outlet, and a tubular member composed of two telescoping sections, one section serving as a piston chamber in which said piston valve is reciprocable, the second section serving as a regulating and shut-off valve, said first section being rotatably mounted in the casing and secured thereto against longitudinal movement, and said second section being non-rotatably mounted in the casing and longitudinally adjustable on said first section whereby rotation of the first section will move the second section to or from its seat around said outlet to shut off or vary the flow therethrough.

9. The combination of a valve casing having an inlet and an outlet, a piston-valve controlling said outlet, a tubular member composed of two telescoping sections, one section serving as a piston chamber in which said piston-valve is reciprocable, the second section serving as a regulating and shut-off valve, said first section being rotatably mounted in the casing and secured thereto against longitudinal movement, and said second section being non-rotatably mounted in the casing and longitudinally adjustable on said first section whereby rotation of the first section will move the second section to or from its seat around said outlet to shut off or vary the flow therethrough, and a head closing the outer end of said first section and separable therefrom to permit the removal of the piston-valve.

10. The combination of a valve casing provided with an inlet and an outlet, a piston valve controlling said outlet, a hollow

cylinder in which said piston-valve is reciprocable, said hollow cylinder being revoluble in said casing, one end of said cylinder being within said casing and open toward the outlet, its other end outside the casing and closed by a removable head, a cylindrical regulating and shut-off valve in communication with the open end of the cylinder, means to prevent said shut-off valve turning, whereby revolving the cylinder will force the cylindrical shut-off valve against its seat around the outlet, to permit removal of the cylinder head and piston.

11. The combination of a valve casing provided with an inlet, an outlet, a valve seat and a counterbored chamber surrounding said seat and outlet, a hollow cylinder having one end within said casing and open toward the outlet, its other end outside the casing and provided with a removable head, said cylinder being revoluble within a packing nut secured to said casing, a non revoluble cylindrical extension secured to the open end of the cylinder, a piston and valve reciprocable in said cylinder and casing and so proportioned to said chamber as to provide a slight clearance between the walls of the chamber and the valve in its closing movement and an extension on said valve adapted to enter and completely close the outlet in advance of the seating of the valve.

12. The combination of a valve casing provided with an inlet, an outlet, a valve seat and a counterbored chamber surrounding said seat and outlet, a hollow cylinder having one end outside the valve casing and closed by a removable head, its other end open toward the outlet and revoluble within the casing to shut off the water, a piston and valve reciprocable in said cylinder and valve casing and so proportioned as to provide a slight clearance between the walls of the chamber and the valve in the closing movement of the valve, and an extension on said valve adapted to enter and completely close the outlet in advance of the seating of the valve.

13. The combination of a valve casing provided with an inlet, and an outlet, a valve seat and a counterbored chamber surrounding said seat and outlet, a hollow cylinder having one end open toward the outlet, its other end closed by a removable head, said cylinder being revoluble within said casing and provided with a non revoluble cylindrical extension on its open end, a piston and valve reciprocable in said cylinder and casing and so proportioned to said chamber as to provide a slight clearance between the walls of the chamber and the valve when closing, an extension on said valve adapted to enter and completely close the outlet in advance of the seating of the valve and means to relieve the pressure above the valve to facilitate opening the valve.

14. The combination of a valve casing provided with an inlet, an outlet, a valve seat and a counterbored chamber surrounding said seat and outlet, a hollow cylinder which is revoluble within said casing and having one end open toward the outlet and its other end closed by a removable head, a cylindrical extension which is not revoluble on the open end of said cylinder, a piston and valve reciprocable in said cylinder and casing and so proportioned to said chamber as to provide a slight clearance between the walls of said chamber and the valve in its closing movement, an extension on said valve the lower part of which is adapted to enter the outlet and reduce the flow and the upper part is adapted to completely close the outlet in advance of the seating of the valve, and a means of relieving the pressure above the valve to facilitate opening it.

15. The combination of a valve casing provided with an inlet, an outlet, a cylinder adjustably connected to said casing and having one end open toward the outlet, a piston and main valve reciprocable in the cylinder and casing to close the outlet, a relief valve for the main valve, a stem to open the valves, a lifting arm to operate the stem and provided with a hub having a non circular hole through it, retaining guards in which said hub is adapted to turn, an operating journal composed of two parts, one part having one of its ends cylindrical to form a bearing and covered by a packing nut, its other end of a shape to fit and pass through the non circular hole in the hub and into a similar hole in the other part of the journal said other part being cylindrical to form a bearing and being provided with a packing nut through which its outer end projects, a screw in said outer end to bind the two parts of the journal together and means to operate the journal and arm to open the valves.

16. In a flushing valve of the character described, provided with an inlet and a counter bored outlet, the combination of a cylinder open toward the outlet, a piston and main valve operative within the cylinder to close the outlet, a relief valve for the main valve, a stem to operate both the relief and main valves and provided with a loop at its lower end, an operating arm to engage the valve stem within the loop, a journal adapted to operate the arm and an exterior means to operate the journal, and guards to retain or support the arm in position when both journal and valve stem are removed, substantially as described.

17. In a flushing valve of the character described, the combination of a valve body provided with inlet and outlet ports, a cylinder adjustably connected to the valve body and adapted to close about the outlet, a piston and main valve operative within the cylinder and adapted to seat upon the outlet,

a relief valve for the main valve, a stem connected to the relief valve to open both valves and provided with a loop at its lower end, a removable and reversible journal provided
5 with an exterior handle, an operating arm carried by the journal and engaging the stem within the loop to open the valves, and retaining guards to support and retain the operating arm in position when the journal
10 and valve stem are both removed.

18. In a flushing valve such as described, the combination of a valve body provided with an inlet and outlet and a cylinder adjustably connected to said body, and having

one end closed and its other end open to- 15
ward the outlet, a piston valve within the cylinder to close the outlet, a relief valve for the piston valve, a stem to operate both valves, an operating arm to engage the stem, a journal operably connected with said arm 20
and provided with exterior operating means, a hub on the arm and retaining guards to keep the hub and arm in place when the journal is removed.

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