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Patented Mar. 20, 1900.

W. E. HINSDALE.
HYDRAULIC FLUSHING VALVE.

(Application filed Mar. 3, 1899.)

(No Model.)

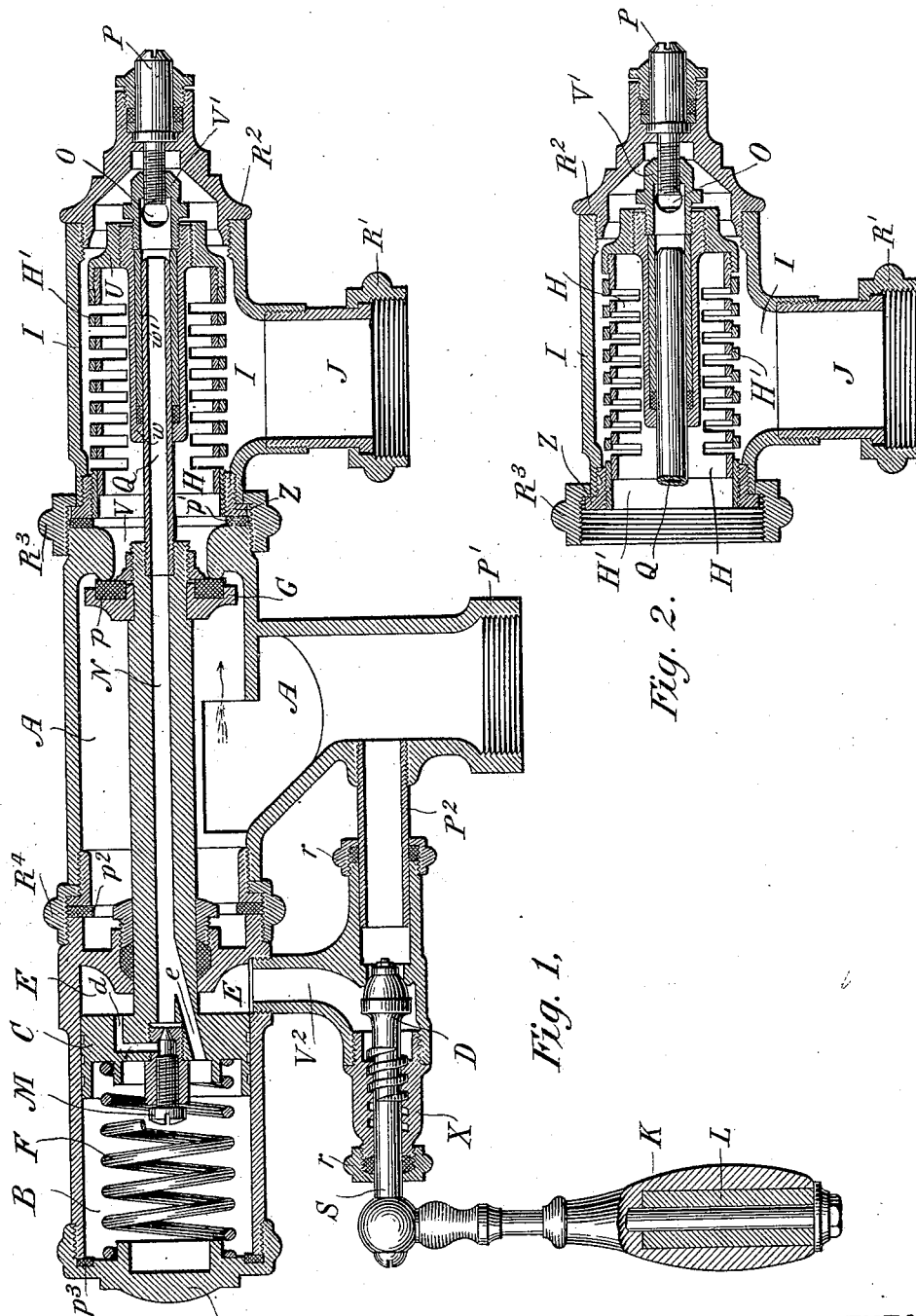


Fig. 1.

Fig. 2.

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UNITED STATES PATENT OFFICE.

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HYDRAULIC FLUSHING-VALVE.

SPECIFICATION forming part of Letters Patent No. 645,622, dated March 20, 1900.

Application filed March 3, 1899. Serial No. 707,581. (No model.)

To all whom it may concern:

Be it known that I, WINFIELD E. HINSDALE, a citizen of the United States, residing in New York, in the borough of Manhattan and State of New York, have made a new and useful Invention in Hydraulic Flushing-Valves, of which the following is a specification.

My invention is designed particularly for use in connection with water-closets, slop-sinks, urinals, &c., but especially with the former; and it has for its objects, first, to provide a flushing valve or device which may be applied to any system of water-supply no matter what may be the pressure and without the intervention of other means for regulating the supply of water where such flushing is required, and, second, to provide a flushing valve or device of the character indicated wherein the time of flow and the pressure and volume of water to be used at the fixture to be flushed may be regulated without breaking any water connection.

My invention will be fully understood by referring to the accompanying drawings, in which—

Figure 1 is a longitudinal sectional view taken through the body of my novel flushing-valve, the valve-operating handle being broken away to show the interior weighted structure thereof; and Fig. 2 is a similar longitudinal sectional view taken through that portion of the valve which regulates the pressure and volume of the water to the fixture to be flushed and illustrates the regulator partially closed.

Prior to my invention it was customary in the manufacture and installation of sanitary fixtures to connect the flushing valve or valves thereof directly in a cistern or a stationary flushing-reservoir located above the fixture, regulating the flow of water therefrom by various types of valve-controlling apparatus, and to utilize the pressure therefrom for performing the flushing function. All such systems, however, are in a measure faulty in that they are productive of disagreeable noises and oftentimes wasteful of water. Furthermore, the inlet-valves to such systems oftentimes become worn or ineffective, causing a hissing noise, due to the waste of the water. The outlet-valves used with such systems also become faulty by reason of the fact that

different kinds of water are liable to corrode joints or incrust close-working parts, rendering them inoperative. Certain waters also destroy the linings of such reservoirs and from many other causes, unnecessary to mention here, these systems are defective. My invention is designed especially to overcome all these objectionable faults and also to do away with the necessity of the use of any intermediate chamber or reservoir for supplying water from a high-pressure system to the low pressure, which is necessitated in connection with flushing systems in general. With my novel hydraulic flushing valve or device the water may be brought directly to the valve from the street-main or from a circulating system in a building having pumps in the basement, or the supply of water may be located in a tank in the attic or upon the top of the building and the water from such tank delivered to my automatic flushing-valves at various points in the building, the invention being of such a nature that it may be quickly and readily applied and adjusted to suit the variable pressures due to the positions where a number of such valves are or may be located upon the different floors of a building, the invention being of such a nature that the valve receives the pressure at full head and delivers it to the fixture to be flushed at the desired flushing pressure and volume, varying at from, say, three pounds per square inch to any desired pressure and volume, approximating that of the head, if need be, and such flushing pressure and volume may be quickly and readily varied at any time without in any way interfering with the flow of water to the valve from the head or source of pressure. In like manner the time of flow or period of action of the valve is adjustable and under perfect control and without in any way interfering with the flow of water therethrough.

Referring now to the drawings in detail, A represents a high-pressure or valve chamber connected directly to the supply-pipe of the system by a screw-threaded part P'.

B represents a cylinder secured by a screw-collar R⁴ to one end of the high-pressure or valve chamber A and provided with water-tight packing p² between said parts, said cylinder having secured to its free end a detach-

able cylinder-head R, provided with a water-tight packing-ring p^3 .

C represents a valve-opening piston provided with grooved water-tight packing, as shown, said piston being secured to or constituting part of a hollow piston-rod N and adapted to be moved in one direction by the inflow of water in an operating-chamber E.

F represents a strong spiral spring, one end of which is seated about an inward projection of the cylinder-head R, the other end being similarly seated about a corresponding projection in the valve-opening piston C and adapted normally to hold it in the position shown.

G represents the flushing-valve, secured to the other end of the piston-rod N and provided with packing p , adapted to be seated when in closed position against the valve-seat of the valve-opening V in the high-pressure or valve chamber A, the arrangement being such that the pressure tendency of the incoming water is always to hold the valve securely closed upon its seat, as indicated by the arrow, and in such manner as to positively avoid all leakage when so closed.

I represents the outlet or flushing chamber, connected by a pipe J and screw-collar R' to the closet or other fixture to be flushed. This outlet or flushing chamber I is secured by a screw-collar R³ directly to one end of the high-pressure or valve chamber A and is made water-tight by a packing-ring p' .

H H' represent the regulator for regulating the volume and pressure of the water flowing to the fixture to be flushed and consists of two cylindrical parts, one sliding within the other and each having a series of slots or openings which are the exact counterparts of those in the other, the outer part H' being secured by screw-threads to a collar Z, which is held in position by the collar R³, while the inner part H is similarly secured by a collar U, sleeve w , and hollow thimble V' to the cylinder-head R³ of the outlet or flushing chamber I by an adjusting-screw P, provided with the necessary packing and screw-collar for maintaining the parts water-tight. The total area of the slots or openings in the regulator H H' is preferably equal to the total area of the outlet at the valve-opening V, so that when the valve G is in its extreme left-hand position and said slots or openings are wide open the flow and pressure will be equal to that of the flow and head from the source of water-supply.

Q is a pipe secured to the end of the hollow piston-rod N and constituting a continuance of said hollow piston-rod, extending through hollow sleeves $w w'$, attached to the collar U, which collar sustains the inner part H of the regulator H H' in such manner that it may move back and forth therethrough.

P² is a branch pipe connecting the high-pressure or valve chamber A with a valve-chamber V², connected in turn with the op-

erating-chamber E, located behind the valve-opening piston C.

D is an operating-valve seated in the valve-chamber V² and secured to one end of a spindle S, said spindle being provided with a high-pitch male screw-thread adapted to be rotated in a corresponding female screw-thread in a supporting part X, secured to the valve-chamber V².

K is an operating-handle attached to the outer end of the spindle S and weighted at its lower end, as shown at L, so that it will normally assume the position shown in the drawings with the valve D seated, the arrangement being such that said operating-handle K can never be swung through an arc of more than one hundred and twenty degrees, so that when held in its upper position it will come mechanically in contact with the cylinder B and when released will fall by its own weight to a closing position.

The valve-chamber V² is made water-tight with relation to the pipe P² and supporting part X by packing and screw-collars $r r'$. The hollow piston-rod N is connected directly with the cylinder B by an opening d , in which is located a time-regulating screw-valve M, adapted to regulate the flow of water therethrough. O is a vent or opening for the hollow piston-rod N.

It will be apparent on inspection of the drawings that the working area or surface of the valve-opening piston C is considerably larger than the corresponding working area or surface of the valve G, such relative proportions being necessary in order that the pressure of the water upon the piston when it is admitted into the operating-chamber E shall overcome the pressure of the spring B and the opposing force or pressure of the water against the working area or surface of the valve G.

The operation of the invention is as follows: Suppose the parts to have been properly regulated for a given pressure or head, the required volume of flushing-water, and time of such flush. The user simply lifts the weighted handle K for an instant and releases it. Water therefore flows from the high-pressure or valve chamber A through the pipe P² and valve-chamber V² into the operating-chamber E and against the working area or surface of the piston C, contained in the cylinder B, thereby forcing it to the left against the compressive action of the spring F and drawing with it the hollow piston-rod N and the flushing-valve G, so that water flows in the direction of the arrow to the right from the high-pressure or valve chamber A around the valve G and through the valve-opening V and the slots or openings in the regulator H H' into the outlet or flushing chamber I, the pressure of such outflow and the volume thereof being determined by the adjustment of the regulator H H'. As the handle is immediately dropped the pressure is of course removed from behind

the valve-opening piston C. Consequently the spring F now exerts its entire energy upon the piston, causing the same to move to the right, and at the same time the pressure of the water in the high-pressure or valve chamber A in the direction of the arrow upon the valve G aids in such tendency. Therefore the piston moves slowly to the right during the time for which the valve is set to flush, the valve G finally coming into its seated position, where it is securely held, as shown in the drawings. As this piston moves to the right under the influence of the spring F the water in the operating-chamber E is forced out through the opening *d* and the adjustable time-regulating valve M into the hollow piston-rod N, finally escaping through the vent or opening O at the extreme right into the outlet or flushing chamber I. At the same time some of this water passes to the left through opening *e* into the cylinder B, so as to constitute a water seat or check for the piston and prevent any damaging influence to or undue noise of the parts in their movement under the action of the high-pressure flow from the chamber A through valve-chamber V² and operating-chamber E on the opening movement of the valve G, as already described.

Should one wish to extend the flushing action temporarily, it is only necessary to hold the weighted handle K in its upper position for the requisite time. If it is desired to increase the time of flushing for an instantaneous opening and closing of the valve D, it is only necessary to remove the cylinder-head R and turn the time-regulating valve-screw M in the proper direction to diminish the flow of water from the operating-chamber E. Should an increased speed of operation be desired, it is of course only necessary to reverse the adjustment of said screw. Should it be desired to either increase or decrease the volume and pressure of water to the fixture to be flushed, it is of course only necessary to turn the regulating-screw P in the proper direction, thereby increasing or decreasing the area made by the slots or openings in the regulator H H'. It is also apparent that these adjustments can all be effected without in any manner interfering with the flow of water to the flushing-valve or without taking the device apart. It will be understood that where a number of such regulating devices or valves are used in a building connected to a supply system of a definite high pressure those located in the upper part of the building would be regulated by the regulator H H', so as to give a definite flow of water at a definite pressure, while those for the lower floors would be correspondingly regulated for a similar flow of water at the same pressure, if desired. The time regulation of such flow would of course be effected as desired by the screw regulating-valve M.

I do not limit myself to the especial details of construction hereinbefore described, and illustrated in the accompanying drawings. I

believe it is broadly new with me to provide a water-supply system with a flushing device which is provided with adjustable means for regulating the time of flow, in combination with additional adjustable means for regulating the volume and pressure of such flow and without the aid of intermediate chambers or cisterns, and my claims are generic as to these features. I believe it is also broadly new with me to so devise a flushing device of the character indicated in which the controlling-valve is opened by the action of the water itself upon a piston in an independent chamber and that the regulation thereof as to the time of flow, pressure, and quantity of water to be used shall be effected without breaking any water connection, and my claims are generic as to these particular features.

I am aware that it has heretofore been proposed to construct a flushing-valve for closets and the like in which the movement of the valve is effected by the pressure of the water itself, said valve being also provided with means for regulating the time of such flow, as disclosed in British patent to Lefevre, No. 21,543, dated November 8, 1894, and I make no claim hereinafter broad enough to include such a structure.

I am also aware that it is old in the art to construct a flushing-valve with two independent chambers, one of which is connected directly with the water-supply and the other with the fixture to be flushed, and to locate a valve in one of said chambers and a piston in the other, said valve and piston being connected together by a piston-rod, as disclosed in United States patent to Smith, No. 177,023, and also that it is old to construct a flushing-valve with the flushing-chamber connected directly to a source of water-supply, the valve being seated in said chamber and operatively connected by a piston with a plunger acting in the nature of a dash-pot, the valve being connected with means for opening it directly by hand and additional means in the nature of a spring for restoring it to its seated position, as disclosed in United States patent to Smith, No. 91,574, and I make no claim hereinafter broad enough to include such structures, the inventions referred to in the aforesaid patents being directed especially to flushing-valves which are actuated at the time of opening them directly by the hand of the user and not by the action of the water itself, as is the case with my novel valve.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. A flushing device consisting of a valve and a valve-chamber, the latter being connected directly to a source of water-supply and to the fixture to be flushed, in combination with a valve-opening piston located in an independent operating-chamber and operatively connected by a hollow piston-rod with the valve; together with means for admitting water from the source of supply into the

operating-chamber behind the piston and in such manner as to open the valve by the direct action of the water, the working area or surface of the piston being greater than the
 5 corresponding working area or surface of the valve acted upon by the outflowing or flushing water, the piston having an opening and a time-regulating screw-valve for gradually releasing the water behind it, substantially as
 10 described.

2. A flushing device consisting of a valve and a valve-chamber, the latter being connected directly to a source of water-supply and to the fixture to be flushed, in combination with a valve-opening piston located in an independent operating-chamber and operatively connected by a hollow piston-rod with the valve; together with means for admitting water from the source of supply into the operating-chamber behind the piston and additional means, in the nature of a spring, for restoring said piston and valve to their normal positions after each operation, the piston having an opening and a time-regulating
 25 screw-valve for gradually releasing the water behind it, substantially as described.

3. A flushing device consisting of a valve and a valve-chamber, the latter being connected directly to a source of water-supply and to the fixture to be flushed, in combination with a valve-opening piston located in an independent operating-chamber and operatively connected by a hollow piston-rod with the valve; together with a branch pipe and a
 35 valve-chamber operatively connecting the source of water-supply with the independent operating-chamber; an operating-valve located in said valve-chamber and regulating means in the piston for regulating the time of the flow of water from the operating-chamber to and through the hollow piston-rod and to the fixture to be flushed, substantially as described.

4. A flushing device consisting of a valve and a valve-chamber, the latter being connected directly to a source of water-supply and to the fixture to be flushed, in combination with a valve-opening piston located in an independent operating-chamber and operatively connected by a hollow piston-rod with the valve; together with a branch pipe and a valve-chamber operatively connecting the source of water-supply with the independent operating-chamber, an operating-valve located in said valve-chamber; means, as a spiral spring, located behind the piston for restoring it to normal position after each operation, the working area or surface of the piston being greater than the corresponding
 60 working area or surface of the valve and regulating means, in the nature of a valve-screw and an opening, in the piston for regulating the outflow of water from the operating-chamber to and through the hollow piston-rod and to the fixture to be flushed, all of said parts acting substantially as and for the purpose described.

5. A flushing device consisting of a valve and a valve-chamber, the latter being connected directly to a source of water-supply and to the fixture to be flushed, in combination with a valve-opening piston located in an independent operating-chamber and operatively connected with said valve, together with a branch pipe and valve-chamber containing an operating-valve, said pipe and valve being connected to the same source of water-supply and to the operating-chamber containing the piston; means operatively connected with the piston for regulating the time
 75 of each flushing action after the operating-valve has been released and an opening through the piston for admitting water behind the same in such manner as to act as a check thereto, substantially as described. 85

6. A flushing device consisting of a valve and a valve-chamber, the latter being connected directly to a source of water-supply and to the fixture to be flushed; in combination with a valve-opening piston located in an operating-chamber and operatively connected with the valve and to the source of water-supply by a branch pipe and valve-chamber connected to the operating-chamber at a point behind the piston-head; a hand-operated valve seated in said valve-chamber, an escape vent or opening and a time-regulating screw-valve for regulating the time of the discharge of the water from the operating-chamber; together with regulating means
 95 located between the flushing-valve and the fixture to be flushed for regulating the pressure and volume of water at the fixture, substantially as described. 100

7. A flushing device consisting of a valve and a valve-chamber, the latter being connected directly to a source of water-supply and to the fixture to be flushed; in combination with a valve-opening piston located in an operating-chamber and operatively connected with the valve and to the source of water-supply by a branch pipe and valve-chamber connected to the operating-chamber at a point behind the piston-head; a hand operating-valve seated in said valve-chamber, an escape vent or opening and a time-regulating screw-valve for regulating the time of the discharge of the water from the operating-chamber; together with means, as a strong spiral spring, for restoring the piston to its normal position and regulating means located between the flushing-valve and the fixture to be flushed for regulating the pressure and volume of water at the fixture, substantially as described. 120

8. A flushing device consisting of a valve and a valve-chamber, the latter being connected directly to a source of water-supply and to the fixture to be flushed; in combination with a valve-opening piston located in an operating-chamber and operatively connected with the valve and to the source of water-supply by a branch pipe and valve-chamber connected to the operating-chamber 125 130

at a point behind the piston-head; a hand-operated valve seated in said valve-chamber, an escape vent or opening and a time-regulating screw-valve for regulating the time of the discharge of the water from the operating-chamber; together with regulating means located between the flushing-valve and the fixture to be flushed and consisting of two slotted cylindrical parts one of which is permanently and the other adjustably secured to the outlet or flushing chamber, substantially as described.

9. In a flushing device, the combination of a valve and a valve-chamber, the latter being connected directly to a source of water-supply and to the fixture to be flushed; an independent operating-chamber; a valve-operating piston located in said chamber and connected to said valve; a connection between said operating-chamber and said valve-chamber behind said piston; a hand-operated valve seated in said connection; an escape vent or opening in said piston, and a time-regulating screw-valve carried by said piston for regulating the time of the discharge of the water from the operating-chamber, substantially as described.

10. In a flushing device, the combination with a main valve and a valve-chamber, the latter being connected directly to a source of supply and to a fixture to be flushed, of an independent operating-chamber, a valve-operating piston located in said chamber and connected to the main valve, a connection between said operating-chamber on the pressure-receiving side of the piston and the source of supply, a hand-valve seated in said connection, said piston being provided with

passages therethrough one of which leads from the side of the operating-chamber opposite the pressure-receiving side of the piston to a point of discharge, and the other of which leads from the operating-chamber on the pressure-receiving side of the piston to a point of discharge, and a time-regulating screw-valve in the latter of said passages, substantially as described.

11. In a flushing device, the combination with a main valve and a valve-chamber, the latter being connected directly to a source of supply and to a fixture to be flushed, of an independent operating-chamber, a valve-operating piston located in said chamber and connected to the main valve, a connection between said operating-chamber on the pressure-receiving side of the piston and the source of supply, a hand-valve seated in said connection, said piston being provided with passages therethrough one of which leads from the side of the operating-chamber opposite the pressure-receiving side of the piston to a point of discharge, and the other of which leads from the operating-chamber on the pressure-receiving side of the piston to a point of discharge, a time-regulating screw-valve in the latter of said passages, and means, such as a spiral spring, for restoring said piston to its normal position, substantially as described.

In testimony whereof I have hereunto subscribed my name this 28th day of February, 1899.

WINFIELD E. HINSDALE.

Witnesses:

CHARLES J. KINTNER,
M. F. KEATING.