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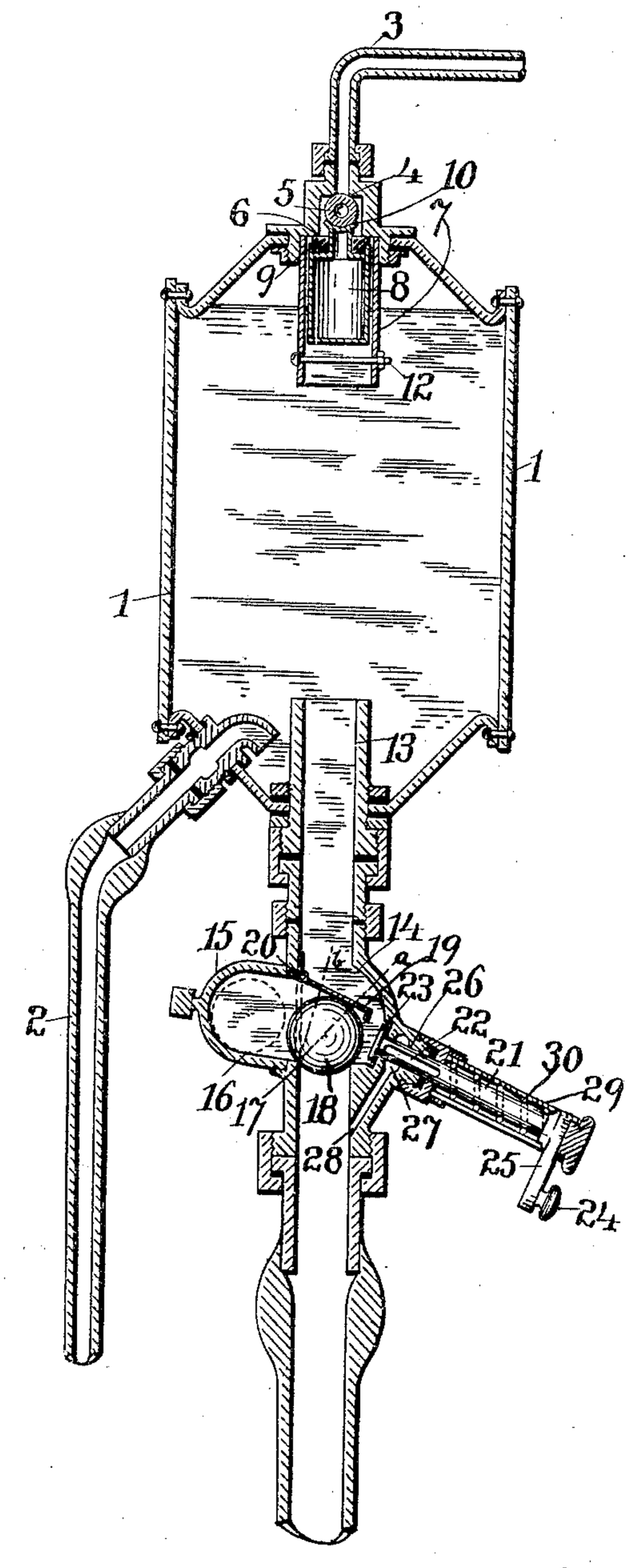
J. SIMPSON.

FLUSHING APPARATUS WITH VALVE CONTROLLING APPARATUS FOR SAME.

(Application filed Mar. 8, 1901.)

(No Model.)



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FLUSHING APPARATUS, WITH VALVE-CONTROLLING APPARATUS FOR SAME.

SPECIFICATION forming part of Letters Patent No. 679,687, dated July 30, 1901.

Application filed March 8, 1901. Serial No. 50,304. (No model.)

To all whom it may concern:

Be it known that I, JAMES SIMPSON, a subject of His Majesty the King of Great Britain, and a resident of New York, State of New York, have invented certain new and useful Improvements in Flushing Apparatus, with Valve-Controlling Apparatus for the Same, of which the following is a specification.

My invention relates to an improvement in valve-controlling devices which are particularly adapted to be applied in connection with flushing apparatus for water-closets, urinals, and other drains, in combination with such flushing devices.

The object and purpose of my apparatus are to provide means by which a volume of water may be introduced into a reservoir, either open or closed, and from which reservoir the water may be rapidly drawn or exhausted for the purpose of flushing the water-closet or for other kindred purposes.

I am aware that there are a number of devices wherein a reservoir is automatically filled, within certain limitations, and by the operation of a valve the contents of the reservoir are exhausted for flushing purposes; but in all such devices of which I have any knowledge it is necessary to hold the exhaust-valve open manually during the period of exhaust. The device which I would here describe differs from those previously constructed in that after an initial movement is given to the exhaust-valve it automatically opens and remains open during the period while the water is exhausting from the reservoir, and the devices for filling the reservoir exhibited in the art differ materially from my present invention.

I have illustrated my invention in the accompanying drawing in vertical section.

The structure is comparatively simple, and I believe the same can be readily understood from such drawing.

In the drawing I have designated the parts by numerals, referring to like parts by like numerals.

By 1 I have designated a reservoir adapted to contain water. In the structure illustrated I have shown the reservoir to be closed; but in the adaptation of my exhausting-valve hereinafter described I may employ the same in connection with an open reservoir adapted to be filled, within certain limitations, by any of the automatic mechanisms exhibited in the art and adapted for this purpose.

2 is the supply or inlet pipe leading into the reservoir, preferably from the base.

3 is a pipe adapted to exhaust from or supply air to the reservoir. This pipe may be opened to the air of the chamber in which the apparatus is set up, or it may be extended and communicate with one of the ventilating-pipes leading to the outer air.

4 is a valve-seat in the pipe 3. 5 is a spherical valve adapted to coöperate with said seat 4.

6 is another valve-seat.

7 is a cylindrical part suitably mounted in the dome of the reservoir 1 and open at its base, except for cross-bar 12, which is intended to limit the movement of the piston 8.

8 is a hollow closed air-tight piston adapted to move freely within the cylindrical part 7.

9 is an annular washer mounted on top of the hollow piston 8.

10 is a pillar having a concave head adapted to carry the spherical valve 5; 12, a cross-bar.

13 is a flushing-pipe of a size adapted to exhaust the contents of the reservoir rapidly and to flush a closet or other device with the full contents of the reservoir in a short interval of time.

14 is a chamber interposed in the flushing-pipe 13. This chamber consists of an enlargement of the pipe 13, as indicated in the drawing, with an extension 15, adapted to receive the spherical valve, hereinafter to be referred to, when the same is removed from its seat. This chamber has a base 16, which is inclined out of the horizontal and toward the valve-seat, so that when the spherical valve, which it is intended to contain, is released from a force sufficient to retain it within such extension 15 it will, by gravity, fall out of said chamber and into its final position on its seat.

17 is a valve-seat in the exhaust-pipe 13.

18 is a spherical valve made of any suitable material, preferably having a certain elasticity.

19 is a shutter hinged within the pipe 13 at the point 20.

21 is a plunger having a slot 22 through the

same. Said plunger is provided with a head 23 and a hand-knob 24, which knob is connected with the plunger by the arm 25.

26 is a circular aperture in which the plunger 21 is mounted to reciprocate, and 27 is an annular chamber communicating with the aperture 26, while 28 is a duct leading from such annular chamber 27 into the exhaust-pipe 13 below the valve.

29 is a casing inclosing a helical spring 30, which is intended to bear upon the casing and upon the arm 25 to retain the plunger 21 normally away from the valve.

The operation of my device is as follows: Normally the pipe 2 is connected with a water-supply adapted to deliver the water to the reservoir under a suitable head. It will therefore be understood that the water flows continuously into the reservoir 1, the exhaust being checked by the fact that the spherical valve 18 is in its normal position, resting on its seat 17. As the reservoir fills with water the inflowing water rises to a point where it makes contact with the air-tight piston 8, and as the water is displaced by the weight of said piston the piston is raised, forcing the annular washer 9 against the seat 6 and also forcing the spherical valve against its seat, thus closing exhaust-pipe 3.

In the drawing I have illustrated the reservoir as full of water, with the air-exhaust valve in pipe 3 closed. It will be understood that when the reservoir is being first filled, the piston 8 not being raised by the water—the water not having reached it—rests on the cross-bar 12. Therefore the air contained within the reservoir 1 is permitted to exhaust through the pipe 3 until such time as the water rises in the reservoir 1, until, by reason of the displacement of the water by the piston 8, that piston is raised until it closes the said air-exhaust valve. Again, when the water is exhausted from the reservoir through the exhaust or flush pipe 13, as will be hereinafter described, the piston 8 falls as soon as the water begins to exhaust through the pipe 13, and thus permits air to be admitted into the reservoir 1 in sufficient quantities not to interfere with the exhaust of the water, which might happen with the pipe 3 closed.

There is another feature which it is desirable to note, which is the result of the operation of my present device. When the water is introduced into the reservoir and rises to the point where the valve in the pipe 3 is closed, a certain air-chamber is formed at the dome of the reservoir, and the water-pressure, if sufficient, will cause a compression of this air, thus leaving the water in the reservoir under a full head of pressure of the supply. When the valve in the exhaust-pipe 13 is thrown open, the expansion of this air operates, in addition to the weight of the water, to force the same out of the reservoir through the exhaust or flush pipe 13. An additional advantage which is found in this method of filling the reservoir is that the operation of filling is noiseless and the operation of exhausting therefrom is rapid.

I will now describe the valve which I employ to control the exhaust or flush of the water from the reservoir. This valve, as stated, is interposed in the exhaust-pipe 13, and consists of the valve-seat 17 and the spherical valve 18. My invention in this connection consists in means for moving said spherical valve from its seat by a manual operation and automatically holding the same away from its seat during the entire period in which the reservoir is being exhausted. I accomplish this as follows: The shutter 19, as stated, is hinged at 20 and normally rests on the spherical valve or ball 18. When I desire to open the valve, I exercise manual pressure on the knob 24 until the head 23 comes in contact with and slightly moves the ball 18. I have indicated the normal axis of the ball 18 by the dotted line *a*. This is the position of the ball when it is engaged by the head 23 of the plunger 21. It will be noted that a slight movement of the ball 18 will bring its axis into the dotted line *b*, and as soon as it arrives in this position the water will have already begun to exhaust through the pipe 13, and its downward flow will bear upon the shutter 19, thus causing the shutter to bear upon the ball 18 and force the same into the chamber 15, into the position shown in dotted lines in the chamber 15. The shutter 19 at the same time will be driven down and close the entrance to the chamber 15, thus retaining the ball 18 within the chamber 15 until the full contents of the reservoir 1 are exhausted through pipe 13. As soon as the exhaust is completed, the pressure which has heretofore held the shutter 19 at the mouth of the chamber 15 being relieved, the weight of the ball 18 will cause the same to roll, under the power of gravitation, along the inclined base 16 of the chamber 15 until it has found its normal seat, and in so doing will raise the shutter 19 to the position shown in the drawing. Thus it will be seen that by this operation the valve is partially opened by giving the ball 18 an initial movement, and it is completely opened and retained open by the hydraulic pressure as the water falls through the exhaust-pipe 13, operating upon the shutter 19.

I have observed in the operation of my device that in order to move the plunger 21 manually by pressure upon the knob 24 it is necessary to overcome the entire hydraulic pressure bearing upon the head 23 of the plunger 21. In order to relieve this pressure, as soon at the plunger is moved I have provided a duct leading through the slot in said plunger to chamber 26 and duct 28, thus establishing a communication around the main valve. It will therefore be understood that when I have imparted to the plunger 21 by pressure upon the knob 24 a slight movement the hydraulic pressure bearing upon the head

23 is considerably relieved, and I am able with slight exertion thereafter to direct the pressure of the plunger 21 against the ball 18 for the purpose of unseating the same, as heretofore described. It will of course be understood that by the operation of the plunger I only impart sufficient movement to the ball 18 to change its axial relation with reference to shutter 19. The plunger is then released and restored to its normal position by the spring 30.

What I claim is—

1. A flushing device consisting of a reservoir and exhaust-pipe with a spherical valve interposed in said pipe in combination with a chamber adjacent to said spherical valve adapted to receive said spherical valve when the same is removed from its seat; a shutter suitably pivoted within said exhaust-pipe and adapted to bear on said spherical valve with means to impart to said spherical valve an initial movement sufficient to change its axial position with reference to said shutter and sufficient to throw said spherical valve into the power of said shutter when the same is operated upon by the hydraulic exhaust and means to restore said valve to its seated position when the pressure of the hydraulic exhaust is removed, substantially as described.

2. A flushing device consisting of a reservoir and exhaust-pipe, with a spherical valve interposed in said pipe in combination with a chamber having an inclined base, said chamber being adapted to receive said spherical valve when the same is removed from its seat, and said base being sufficiently inclined toward said valve-seat to permit the spherical valve to gravitate into its normal seated position, a shutter suitably pivoted within said exhaust-pipe and adapted to bear on said spherical valve, with means to impart to said spherical valve an initial movement sufficient to change its axial position with reference to said shutter, sufficient to throw said spherical valve into the power of the said shutter when the same is operated upon by the hydraulic exhaust, substantially as described.

3. A flushing device consisting of a reservoir and exhaust-pipe, with a spherical valve interposed in said pipe in combination with a chamber having an inclined base, said chamber being adapted to receive said spherical valve when the same is removed from its seat, and said base being sufficiently inclined toward said valve-seat to permit the spherical valve to gravitate into its normal seated position, a shutter suitably pivoted within said exhaust-pipe and adapted to bear on said spherical valve, a plunger suitably mounted to reciprocate by hand, and adapted, when pressed toward the spherical valve, to impart to the same an initial movement sufficient to throw the valve out of its normal axial position into a position in which it may be operated upon by said shutter, when affected by the hydraulic pressure of the exhaust, substantially as described.

4. A flushing device consisting of a reservoir and exhaust-pipe, with a spherical valve interposed in said pipe in combination with a chamber having an inclined base, said chamber being adapted to receive said spherical valve when the same is removed from its seat, and said base being sufficiently inclined toward said valve-seat to permit the spherical valve to gravitate into its normal seated position; a shutter suitably pivoted within said exhaust-pipe and adapted to bear on said spherical valve, with means to exhaust a portion of the water lying before the valve with the initial movement of said plunger, substantially as described.

5. A flushing device consisting of a reservoir and exhaust-pipe, with a spherical valve interposed in said pipe in combination with a chamber having an inclined base, said chamber being adapted to receive said spherical valve when the same is removed from its seat, and said base being sufficiently inclined toward said valve-seat to permit the spherical valve to gravitate into its normal seated position; a shutter suitably pivoted within said exhaust-pipe and adapted to bear on said spherical valve; a plunger suitably mounted to be reciprocated manually and adapted to partially unseat the valve with means to exhaust a portion of the water lying before the valve with the initial movement of said plunger, substantially as described.

6. A flushing device consisting of a reservoir and exhaust-pipe, with a spherical valve interposed in said pipe in combination with a chamber having an inclined base, said chamber being adapted to receive said spherical valve when the same is removed from its seat, and said base being sufficiently inclined toward said valve-seat to permit the spherical valve to gravitate into its normal seated position; a shutter suitably pivoted within said exhaust-pipe and adapted to bear on said spherical valve; a plunger suitably mounted to be reciprocated manually and adapted to partially unseat the valve, with means to exhaust a portion of the water lying before the valve with the initial movement of said plunger by exhausting the water through an aperture in the stem of the plunger to a duct leading below the valve, substantially as described.

Signed by me at New York, in the county and State of New York, this 25th day of February, 1901.

JAMES SIMPSON.

Witnesses:
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