No. 841,487. PATENTED JAN. 15, 1907.

C. B. DAY.

FLUSHING APPARATUS.

APPLICATION FILED JULY 22, 1902.

2 SHEETS—SHEET 1.

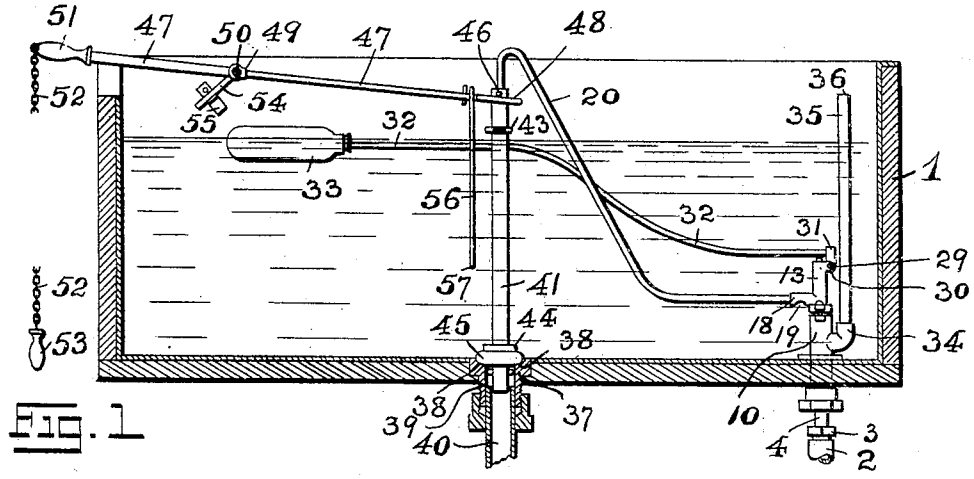


FIG. 1

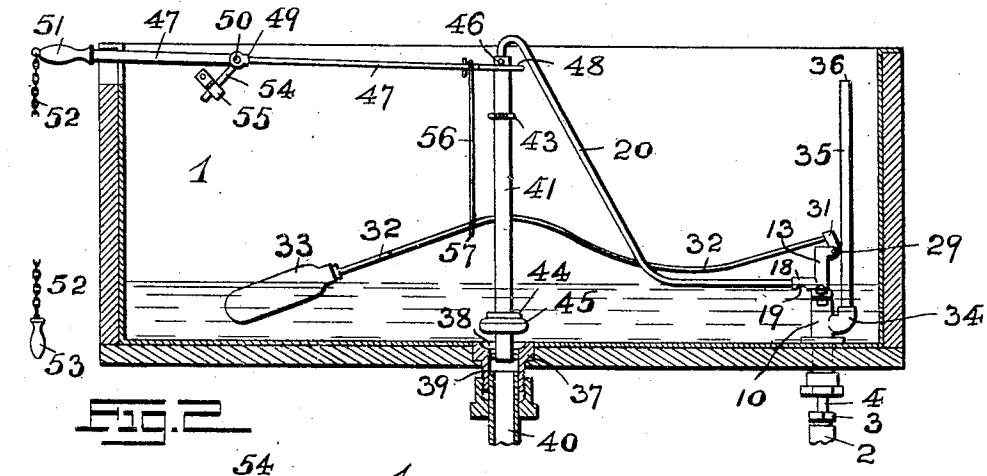


FIG. 2

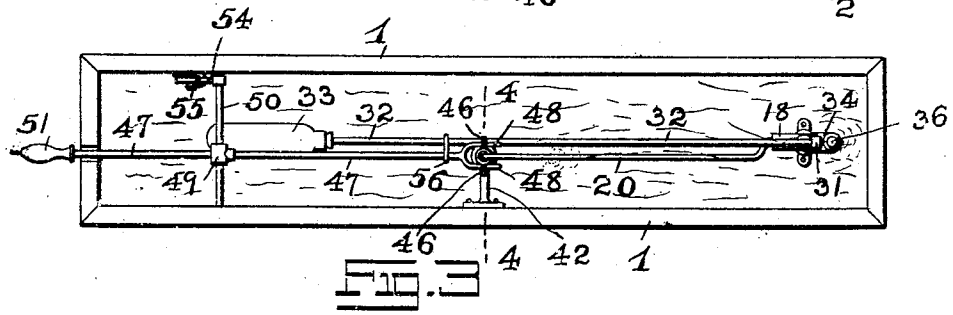


FIG. 3

WITNESSES:

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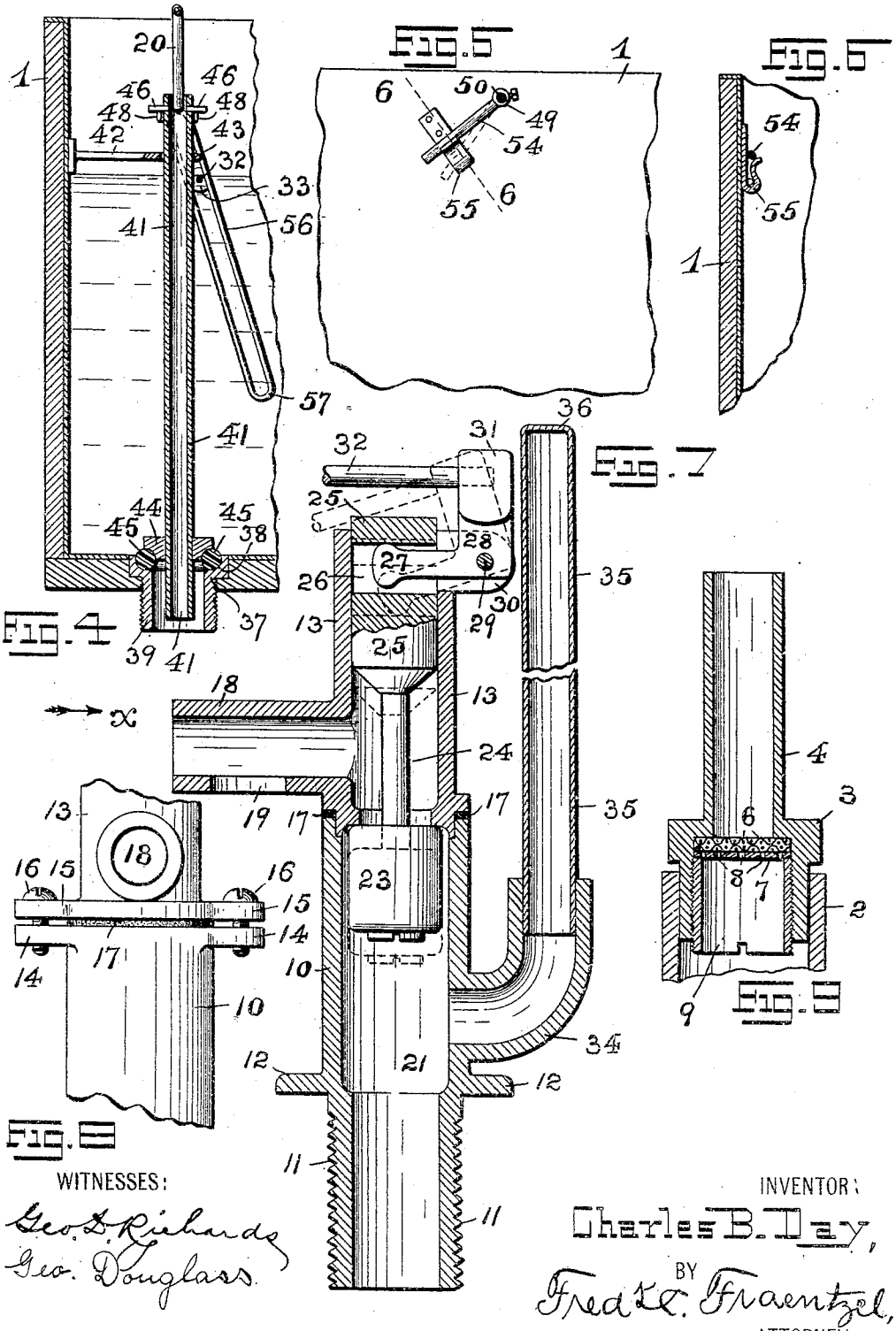
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2 SHEETS—SHEET 2.



WITNESSES:

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UNITED STATES PATENT OFFICE.

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FLUSHING APPARATUS.

No. 841,487. Specification of Letters Patent. Patented Jan. 15, 1907.

Application filed July 22, 1902. Serial No. 116,487.

To all whom it may concern:

Be it known that I, CHARLES B. DAY, a citizen of the United States, residing at East Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Flushing Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to figures of reference marked thereon, which form a part of this specification.

This invention relates to improvements in flushing apparatus or tanks for water-closets, urinals, and other similar devices; and the invention relates more particularly to a novel arrangement and combination, with the valve-actuating mechanism for the apparatus of the character specified, of a water-inlet valve combined with an air-chamber to dispense with any back pressure of the water upon the valve, and thereby overcome the objectionable hammering of the valve upon the valve-seat and also avoiding the shaking and rattling of the various parts of the flushing-out apparatus.

My present invention, therefore, has for its primary object to provide a novel construction of water-inlet valve for flushing apparatus or tanks, combined with a suitably-disposed air-chamber, to prevent the hammering or thumping of the valve upon its valve-seat and preventing the shaking and rattling of the various parts of the apparatus.

Other objects of my invention are simplicity and cheapness of construction and various novel details of construction of the various parts of mechanism.

The invention therefore consists, broadly, in the combination of a flushing apparatus with an air-inlet and air-check or device, such as will be hereinafter more fully specified; and, furthermore, the invention consists in the various novel arrangements and combinations of the devices and the details of the construction thereof, all of which will be fully described in the accompanying specification and then finally embodied in the clauses of the claim.

The invention is clearly illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal vertical section of a water-tank and the valve controlling and operating mechanisms, illustrating in connection therewith my novel form of inlet-valve and air-check or device, the various parts being represented in their normally inactive positions. Fig. 2 is a similar view of all the said parts represented in their operated positions when the inlet-valve is opened and the outlet-valve in the bottom of the tank is just about to be closed, and Fig. 3 is a plan or top view of the various parts. Fig. 4 is a detailed vertical cross-section, on an enlarged scale, of the outlet-valve, its stem, and a portion of the tank, and various other parts of the device, said section being taken on line 4 4 in said Fig. 3. Fig. 5 is a detailed view of an oscillating lever for raising the outlet-valve and its stem and a spring-clamp at the side of the tank adapted for holding engagement with said lever in its "pulled" or lowered position and the said outlet-valve and stem in their raised positions; and Fig. 6 is a cross-section of said spring-clamp, taken on line 6 6 in said Fig. 5. Fig. 7 is a vertical section of an inlet-valve and an air-check or device connected with the valve-casing. Fig. 8 is a detailed view of portions of the said valve-casing looking in the direction of the arrow x in said Fig. 7, and Fig. 9 is a sectional representation of the water-inlet pipe leading to said inlet-valve and a pressure-reducing device in said inlet-pipe.

Similar characters of reference are employed in all of the said hereinabove-described views to indicate corresponding parts.

Referring to the several figures of the drawings, the reference character 1 indicates any ordinary form and construction of tank, cistern, or the like, such as is used with water-closets, urinals, &c., and 2 indicates the main water or inlet pipe. The end of this pipe 2 is preferably connected with a connection or union 3, having a pipe-shaped portion 4, which extends through any suitable portion of the tank or cistern 1, preferably the bottom thereof, and is connected with the casing of an inlet-valve in the manner to be presently described. If desired, the said union or connection 3 may be provided with a reducing device for reducing the pressure and retarding the flow of the water from said pipe into the inlet-valve casing. This pressure-regulating means consists, essentially, of a suitable screen 6, of wire-mesh, and a disk or plate 7, provided with suitably-disposed holes or perforations 8, and all being held in place by means of a screw-threaded

ring 9, which is screwed into the inner portion of said part 5 substantially in the manner illustrated in Fig. 9.

The water-inlet valve is illustrated more particularly in Fig. 7 of the drawings, and it consists, essentially, of a tubular member 10, provided with a screw-threaded end 11 and a flange 12, the end 11 being screwed in a proper hole in the tank 1 and the flange 12 being fitted against the inner surface of the said tank 1. The end pipe-shaped portion 4 of the main water-inlet is inserted in the tubular portion of said screw end 11 of the member 10 in the usual and well-known manner. Suitably connected with the tubular member 10 is another tubular member 13, the members 10 and 13 being respectively provided with the perforated flanged portion 14 and 15 and the tightening bolts or screws 16 for securely connecting the said members and causing their respective ends to be tightly closed down upon a packing ring or gasket 17, as shown. The said member 13 is provided with an outlet 18, having an opening 19 for a quick delivery of the water into the tank 1 to fill said tank when the outlet-valve has been closed after the flushing operation, the said outlet 18 also having secured thereto a pipe 20, of a small diameter, leading into the tubular stem of the outlet-valve, through which the water is passed into the bowl to fill the same while the outlet-valve in the tank 1 is closed and while said tank 1 is being filled. This pipe 20 is not an absolute necessity and may, however, be dispensed with. The member 10 of the valve-casing is provided with a valve-chamber 21. Fitting against a valve-seat 22 in said member 13 is a valve plug or disk 23, having a rod 24 extending into the upper end of the tubular member 13, being provided with a guide-plunger 25, slidably arranged in the open-ended and tubular portion of said member 13. The said plunger 25 is made with a slot 26, in which is operatively arranged the end of a finger 27 of a bell-crank 28. This bell-crank is pivotally arranged upon a pin or bolt 29 and moves between a pair of lugs 30, extending from the side of said member 13, so that when said finger 27 oscillates between said lugs 30 the guide-plunger 25 is made to reciprocate in the tubular portion of said member 13 to thereby open and close the valve plug or disk 23, substantially as and for the purposes hereinafter more particularly set forth. Suitably secured to the upper end portion of the member 31 of the bell-crank 28 is a float-rod 32, having its opposite end secured to any suitably-constructed float 33.

Extending from one side of the member 10 at a point below the valve-seat 22 is an outlet 34, preferably in the form of an elbow, to which is attached a tube 35, having a suitably-closed end 36. The said tube 35 is to contain air and is for the purpose of checking the back pressure against the valve plug or disk 23 and causing a sufficient and direct pressure of the water upon the opposite surface of the said valve plug or disk 23, whereby the latter is firmly closed upon its valve-seat when the water in the tank 1 and the float 33 have reached the highest level and whereby the hammering and thumping now so common in flushing apparatus for water-closets, &c., is entirely overcome and a noiselessly-operating device is the result.

The outlet-valve to be used with the flushing apparatus may be of any suitable construction, that herein shown consisting, essentially, of a valve-casing 37, secured in an opening in the bottom of the tank 1 and being provided with an annular seat 38. The said valve-casing 37 is made with the lower tubular portion 39, which extends from the bottom of the tank 1 and is for the purpose of securing thereto in any suitable manner a flushing-out pipe 40. Movably arranged in the said valve-casing 37 is the lower end of a valve-stem 41, which is preferably of a tubular cross-section, the upper end portion of said stem 41 being movably arranged in a ring-shaped portion 43 of a bracket 42, extending from one of the inner sides of the tank 1. Suitably secured to the lower end portion of the said stem 41 is a valve-disk 44, having a rubber or other flexible gasket or ring 45, which normally fits upon the said valve-seat 38, and thereby closes the water-outlet in the bottom of said tank 1. The upper portion of said stem 41 is provided with oppositely-extending pins or projections 46, which rest directly upon a bifurcated or forked portion 48 of an actuating-lever 47. This lever is secured, by means of a connection 49 or in any other suitable manner, upon cross-rod or spindle 50, having its ends arranged so as to oscillate in the opposite sides of the tank 1. The said lever 47 is provided at its opposite end with a handle 51 or a chain or other flexible connection 52, provided with a pull-piece 53, by means of which the lever 47 can be actuated to raise the valve-stem 41, and thereby open the outlet-valve to permit of the water to be discharged from the tank 1 into the discharge or flushing-out pipe, as will be clearly understood. Connected with the previously-mentioned cross-rod or spindle 50 is an arm 54, which is forced down into holding engagement with a suitably-constructed spring-clamp 55, attached to the inner side of the tank, preferably as shown, to hold the various parts in their actuated positions (indicated in Fig. 2) while the water is passing out through the open outlet-valve. These parts are maintained in these positions until the receding level of the water brings the float arm or rod 32 forcibly against the lower loop portion 57 of a link 56 or the equivalent thereof, which is suspended from the lever

47, whereby the arm 54 is forced from its holding engagement with the spring-clamp 55 and the said valve-stem 41, and valve-disk 44 will then by their own gravity fully close the outlet in the bottom of the tank. At this point the level of the water in the tank is practically that indicated in Fig. 2 of the drawings, and at this level the outlet-valve closes the opening in the bottom of the tank. The inlet-valve being open, a fresh supply of water is admitted into the tank until the rising float again closes the inlet-valve at the height of the water. (Indicated in Fig. 1 of the drawings.)

It has been found in practice that the inlet-valve, especially where there is a great pressure of water, will hammer or thump upon its seat, whereby a noisy construction is the result, and the valve will also be rendered useless; but with the use of my novel form of air-check or device there is no possible back-pressure, since the air acts as a cushion upon the under surface of the inlet-valve plug or disk in opposition to the water-pressure against the opposite side of the valve-plug and the latter is securely retained against its valve-seat at the time that the water in the tank 1 has again reached its proper height.

From the above description it will be clearly evident that I have devised a practical, efficient, and noiselessly-working device for the various purposes stated.

I am aware that changes may be made in the different arrangements and combinations of the devices and their parts without departing from the scope of my invention. Hence I do not limit my invention to the exact arrangements and combinations of the said devices and their parts as herein described and as illustrated in the accompanying drawings, nor do I confine myself to the details of the construction of any of the said parts.

Having thus described my invention, what I claim is—

1. In a flushing apparatus, or the like, the combination, with a tank adapted to receive and contain water, said tank being provided with a tubular water-outlet movably connected with an opening in the bottom of the tank and extending to a point near the top of the tank, and means for lifting said tubular water-outlet for opening the opening in the bottom of the tank, of an inlet-valve in said casing, comprising, a tubular valve-casing having a single water-inlet at the bottom, a water-outlet near the top having a means of water connection with said tubular water-outlet of the tank, and being provided with an additional outlet for a quick delivery of water into the body of the tank, and provided with a valve-chamber between the said inlet and outlet, a valve-seat in said chamber at a point immediately below the outlet of said chamber, a valve or plug arranged against the under side of said valve-seat, a second outlet in the side of said valve-casing at a point below the said valve-seat and normally below the said valve or plug, and a tube having a closed end extending above the highest level of the water in the tank, said tube containing air and being connected at its lower end with the said second outlet for producing air-pressure upon the water against the under side of said valve or plug when in its closed relation against the under surface of the said valve-seat, substantially as and for the purposes set forth.

2. In a flushing apparatus, or the like, the combination, with a tank adapted to receive and contain water, said tank being provided with a tubular water-outlet movably connected with an opening in the bottom of the tank and extending to a point near the top of the tank, and means for lifting said tubular water-outlet for opening the opening in the bottom of the tank, of an inlet-valve in said casing, comprising a tubular valve-casing having a single water-inlet at the bottom, a water-outlet near the top having a means of water connection with said tubular water-outlet of the tank, and being provided with an additional outlet for a quick delivery of water into the body of the tank, and provided with a valve-chamber between the said inlet and outlet, a valve-seat in said chamber at a point immediately below the outlet of said chamber, a valve or plug arranged against the under side of said valve-seat, a second outlet in the side of said valve-casing at a point below the said valve-seat and normally below the said valve or plug, and a tube having a closed end extending above the highest level of the water in the tank, said tube containing air and being connected at its lower end with the said second outlet for producing air-pressure upon the water against the under side of said valve or plug when in its closed relation against the under surface of the said valve-seat, a guide-plunger in the upper portion of the said valve-casing, above the main water-outlet in said casing, a stem connecting said plunger with the said valve, and means for causing a reciprocatory motion of said plunger and valve, substantially as and for the purposes set forth.

3. In a flushing apparatus, or the like, the combination, with a tank adapted to receive and contain water, said tank being provided with a tubular water-outlet movably connected with an opening in the bottom of the tank and extending to a point near the top of the tank, and means for lifting said tubular water-outlet for opening the opening in the bottom of the tank, of an inlet-valve in said casing, comprising, a tubular valve-casing having a single water-inlet at the bottom, a water-outlet near the top having a means of water connection with said tubular water-outlet of the tank, and being provided with an additional

outlet for a quick delivery of water into the body of the tank, and provided with a valve-chamber between the said inlet and outlet, a valve-seat in said chamber at a point immediately below the outlet of said chamber, a valve or plug arranged against the under side of said valve-seat, a second outlet in the side of said valve-casing at a point below the said valve-seat and normally below the said valve or plug, and a tube having a closed end extending above the highest level of the water in the tank, said tube containing air and being connected at its lower end with the said second outlet for producing air-pressure upon the water against the under side of said valve or plug when in its closed relation against the under surface of the said valve-seat, a guide-plunger in the upper portion of the said valve-casing, above the main water-outlet in said casing, a stem connecting said plunger with the said valve, and means for causing a reciprocatory motion of said plunger and valve, consisting, essentially, of a float and a float-rod connected with said plunger, substantially as and for the purposes set forth.

4. In a flushing apparatus, or the like, the combination, with a tank adapted to receive and contain water, said tank being provided with a water-outlet having a valve-seat, a valve on said seat, and a tubular stem connected with said valve, of an inlet-valve in said casing, comprising, a tubular valve-casing having a single water-inlet at the bottom, a water-outlet near the top and provided with a valve-chamber between said inlet and outlet, said water-outlet consisting of a portion 18 provided with an opening 19 for quick delivery, and a pipe 20 connected at one end with said portion 18 and at the other end with said tubular stem of the outlet-valve in said casing, a valve-seat in the chamber of said tubular valve-casing, a valve or plug arranged against the under side of the said valve-seat, a second outlet in the side of said valve-casing at a point below the said valve-seat and normally below the said valve or plug, and a tube having a closed end extending above the highest level of the water in the tank, said tube containing air and being connected at its lower end with the said second outlet for producing air-pressure upon the water against the under side of said valve or plug when in its closed relation against the under surface of the valve-seat, substantially as and for the purposes set forth.

5. In a flushing apparatus, or the like, the combination, with a tank adapted to receive and contain water, said tank being provided with a water-outlet having a valve-seat, a valve on said seat, and a tubular stem connected with said valve, of an inlet-valve in said casing, comprising, a tubular valve-casing having a single water-inlet at the bottom, a water-outlet near the top and provided with a valve-chamber between said inlet and outlet, said water-outlet consisting of a portion 18 provided with an opening 19 for quick delivery, and a pipe 20 connected at one end with said portion 18 and at the other end with said tubular stem of the outlet-valve in the casing, a valve-seat in the chamber of said tubular valve-casing, a valve or plug arranged against the under side of the said valve-seat, a second outlet in the side of said valve-casing at a point below the said valve-seat and normally below the said valve or plug, and a tube having a closed end extending above the highest level of the water in the tank, said tube containing air and being connected at its lower end with the said second outlet for producing air-pressure upon the water against the under side of said valve or plug when in its closed relation against the under surface of the valve-seat, a guide-plunger in the upper portion of the said valve-casing, above the main water-outlet in said casing, a stem connecting said plunger with the said valve, and means for causing a reciprocatory motion of said plunger and valve, substantially as and for the purposes set forth.

6. A flushing apparatus, or the like, comprising a tank, a water-outlet in the bottom of said tank, provided with a valve-seat, a valve-stem and a valve-disk on said stem, movably arranged above said valve-seat, a spring-clamp at one side of the tank, an oscillating spindle, having its ends arranged in the opposite sides of the tank, a lever connected with said spindle, and with said valve-stem for raising said stem and the valve-disk thereon, and a rod extending from said spindle adapted to be brought in holding engagement with said spring-clamp, for holding said stem in its raised position while the level of the water is being lowered, and means actuated by the receding water for releasing said rod from its holding engagement with said spring-clamp, consisting, of a float and a float-rod, and a link suspended from said lever having a large loop portion in which said float-rod moves and is adapted to be brought in engagement with the lower end thereof, substantially as and for the purposes set forth.

7. A flushing apparatus, or the like, comprising a tank, a water-outlet in the bottom of said tank, provided with a valve-seat, a valve-stem and a valve-disk on said stem, movably arranged above said valve-seat, a spring-clamp at one side of the tank, an oscillating spindle having its ends arranged in the opposite sides of the tank, a lever connected with said spindle, and with said valve-stem for raising said stem and the valve-disk thereon, and a rod extending from said spindle adapted to be brought in holding engagement with said spring-clamp, consisting of a float and a float-rod, and a link suspended from said lever having a large loop portion

in which said float-rod moves and is adapted to be brought in engagement with the lower end thereof, substantially as and for the purposes set forth.

8. A flushing apparatus, or the like, comprising a tank, a water-outlet in the bottom of said tank, provided with a valve-seat, a valve-stem and valve-disk on said stem movably arranged above said valve-seat, a spring-clamp at one side of the tank, an oscillating spindle having its ends arranged in the opposite sides of the tank, a lever connected with said spindle and with said valve-stem for raising said stem and the valve-disk thereon, a rod extending from said spindle adapted to be brought in holding engagement with said spring-clamp, for holding said stem in its raised position while the level of the water is being lowered, means actuated by the receding water for releasing said rod from its holding engagement with said spring-clamp, consisting of a float and a float-rod, a link suspended from said lever having a large loop portion in which said float-rod moves and is adapted to be brought in engagement with the lower end thereof, and a water-inlet valve connected with said tank, the valve being connected with and operated by said float-arm, substantially as and for the purposes set forth.

9. A flushing apparatus, or the like, comprising a tank, a water-outlet in the bottom of said tank, provided with a valve-seat, a valve-stem and valve-disk on said stem movably arranged above said valve-seat, a spring-clamp, at one side of the tank, an oscillating spindle having its ends arranged in the opposite sides of the tank, a lever connected with said spindle, and with said valve-stem for raising said stem and the valve-disk thereon, a rod extending from said spindle adapted to be brought in holding engagement with said spring-clamp, for holding said stem in its raised position while the level of the water is being lowered, means actuated by the receding water for releasing said rod from its holding engagement with said spring-clamp, consisting of a float and a float-rod, a link suspended from said lever having a large loop portion in which said float-rod moves and is adapted to be brought in engagement with the lower end thereof, and a water-inlet valve connected with said tank, comprising, a casing having a valve-chamber, a slotted plunger in said casing, a valve-disk connected with said plunger, and a bell-crank pivotally connected with said casing, having one portion extending into the slotted part of said plunger, and having another portion connected with said float-rod, substantially as and for the purposes set forth.

In testimony that I claim the invention set forth above I have hereunto set my hand this 18th day of July, 1902.

CHARLES B. DAY.

Witnesses:
FREDK. C. FRAENTZEL,
GEO. D. RICHARDS.