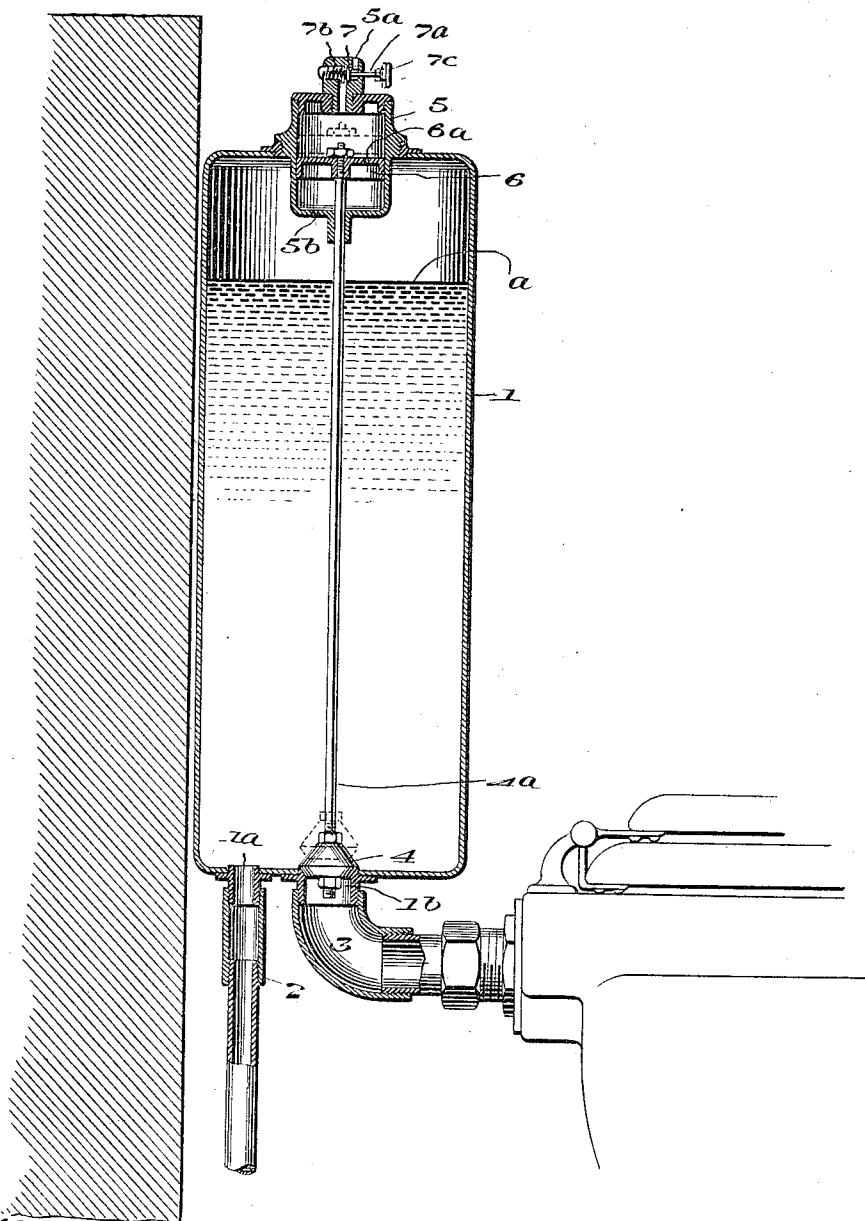


W. F. KNELL.
FLUSHING APPARATUS.
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Patented Dec. 26, 1916.



Witness

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FLUSHING APPARATUS.

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To all whom it may concern:

Be it known that I, WILLIAM F. KNELL, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Flushing Apparatus; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form part of this specification.

This invention is a novel air controlled flushing apparatus for use in lavatories and elsewhere. Its object is to dispense with an open box or tank and with the annoying mechanical controlling devices commonly employed, and to provide an efficient flushing apparatus, simple in construction, not liable to get out of order, and easily installed.

In the accompanying drawings I have illustrated one practical embodiment of the invention and will describe same with reference thereto, but I do not consider the invention restricted to the particular form or construction of parts shown in the drawings; and have set forth the essential features of the invention in the claims following this description.

The drawing represents a sectional view of one flushing apparatus embodying the invention and illustrating the connections thereof with a water supply and a closet bowl; the parts of the apparatus being shown in normal position, with the outlet valve and vent closed in full lines and the dotted lines indicating the positions assumed by the parts when the vent is opened.

In said drawing, 1 designates a tank or chamber, which may be of any suitable construction, and is shown as having an inlet 1^a in its bottom connected to a water supply pipe 2. Said tank also has an outlet 1^b in its bottom which may be connected by a pipe 3 to a water closet bowl, or other object, to which it is desired to discharge the water or liquid in the tank. The outlet 1^b is closable by a valve 4 of any suitable construction, which valve is shown as attached to a rod 4^a that extends preferably vertically through the tank and into an air chamber or cylinder 5 attached to, and preferably extending partly into, the top of the tank, said cylinder being air-tightly connected with the tank or chamber 1, by any suitable means and in any

suitable manner. Within the cylinder 5 is a piston 6 with which the upper end of a rod 4^a is connected.

The cylinder 5 may be of any suitable construction and as shown is provided with a vent or outlet 5^a which is closable by a valve 7 mounted on a stem 7^a, said valve being normally closed, to prevent escape of air from the cylinder, by a spring 7^b. In the example shown the valve 7 may be unseated by pushing rod 7^a inward, said rod having a push button or head 7^c on its outer end to facilitate unseating of the valve. In the inner end of the cylinder is a restricted opening 5^b which permits the passage of air into the cylinder below the piston 5. A suitable by-pass or restricted air passage may be provided between the upper and lower ends of the cylinder to equalize air pressure on opposite sides of the piston; in the example shown this air passage is conveniently provided by a small opening 6^a in the piston 6.

With an apparatus constructed and arranged as indicated in the drawings; when valves 7 and 4 are closed the water entering from pipe 2 will fill the chamber until the air trapped and compressed therein will prevent further inflow of water, by which time the water will have risen to a sufficient height in the tank; the normal water level being indicated as at *a* in the drawing. The pressure of the air in the tank is normally equalized on both sides of the piston 6 in the cylinder 5 by reason of the passages 5^b and 6^a and the piston 6 normally standing about intermediate the ends of the cylinder 5 when valve 4 is closed. If now vent 5^a be opened by unseating valve 7, the compressed air above the piston 6 will, because of the larger area of the vent passage 5^a, escape more quickly than air can escape through the restricted passage 6^a and as a consequence the compressed air, acting against the underside of the piston 6, will lift the piston and through rod 4^a unseat the outlet valve 4, whereupon the water will rapidly escape from the tank through the large outlet 1^b to pipe 3. When the air pressure is equalized on the piston and the tank about emptied, the piston and valve 4 will drop by gravity, and valve 4 will close the outlet 1^b, and valve 7 being already closed the tank will refill until the air trapped in the upper part of the cylinder again stops the inflow of water.

When it is again desired to empty the tank the vent 5^a is again opened and the tank again emptied as above described.

The drawing shows one useful embodiment of the invention and mode of installing same; but if desired the tank could be concealed and nothing but the push button 7^c show on the outside of the wall. Pipe may be used for, or instead of, the tank; all that is essential is an open space below the air chamber or cylinder wherein air can be compressed by the rise of water in the tank.

Operation: When the water is turned on in pipe 2 the tank is gradually filled forcing the air trapped therein to the top, the restricted openings in the cylinder and piston permit air to pass so the air pressure above and below the piston and in the tank are equal; when the air pressure in the tank is equal to that in the water main the apparatus is ready for service. Then by pressing the button 7^c the air is released quickly from above the piston and the pressure below the piston forces the piston up which also lifts the outlet valve from its seat and allows the water in the tank to rush out and flush the bowl thoroughly and quickly. Then as soon as the water body has escaped from the tank and the air pressure becomes equalized, the piston and valve drop closing the outlet, but as the inlet remains open the tank is quickly filled and again ready for use.

What I claim is:

1. Flushing apparatus comprising a chamber having a fluid inlet and outlet, a closure for the outlet, a member adapted to be actuated by the air confined in the chamber, a passage for equalizing pressure on the opposite sides of the member, operative connections between the member and the said closure, a vent opening at the outer side of the member, means controlling the vent opening, the parts being so arranged that when the vent is opened the compressed air trapped in the chamber causes the member to open the outlet.

2. In flushing apparatus, the combination of a chamber having a fluid inlet and outlet, a closure for the outlet, a piston adapted to be actuated by air pressure in the chamber, a restricted air passage for equalizing pressure on opposite sides of the piston, operative connections between the piston and the outlet closure, a vent opening at the outer side of the piston and means controlling the vent opening, the parts being so arranged that when the vent is opened the compressed air trapped in the chamber causes the piston to open the outlet.

3. In a flushing apparatus the combination of a chamber having a water inlet and outlet, a valve for closing the outlet, a member in the upper end of the chamber adapted to be actuated by air pressure, connections between the member and the outlet valve, a

vent at the side of the member opposite the outlet valve, means controlling the vent, a restricted air passage for equalizing pressure on opposite sides of the member; the parts being so constructed and arranged that when the vent is opened the compressed air trapped in the chamber moves the member and causes it to open the outlet valve, substantially as described.

4. Flushing apparatus comprising a chamber having a water inlet and an outlet, a closure for the outlet, a cylinder having a restricted opening communicating with the chamber, and a larger vent; means controlling the vent, a piston in said cylinder intermediate said openings, a passage for equalizing the air pressure in the cylinder on opposite sides of the piston, and connections between the piston and the outlet closure, whereby when the vent is opened the piston will be moved by the pressure of air so as to open the outlet.

5. In a flushing apparatus the combination of a chamber having a water inlet and outlet, a valve for closing the outlet, a piston in the upper end of the chamber adapted to be actuated by air pressure, and connections between the piston and the outlet valve, a vent opening at the side of the piston opposite the outlet valve, a valve controlling the vent opening, a restricted air passage equalizing the air pressure on opposite sides of the piston; the parts being so constructed and arranged that when the vent is opened the compressed air trapped in the chamber moves the piston and causes it to open the outlet valve, substantially as described.

6. In a flushing apparatus the combination of a chamber having a water inlet and an outlet, a valve for closing the outlet, a cylinder connected to the upper part of the chamber and having a small opening communicating with the chamber, a larger vent opening, a valve controlling the vent opening, a piston in said cylinder intermediate said openings having a small passage for equalizing the air pressure on the opposite sides of the piston, and connections between the piston and the outlet valve; whereby when the vent valve is opened the piston will be moved by pressure of air and open the outlet valve.

7. In a flushing apparatus the combination of a tank having an outlet opening, a water supply communicating with the lower portion of said tank, a cylinder in said tank having a restricted air passage communicating with the tank and having a larger vent communicating with the atmosphere, a piston in said cylinder interposed between the said passage and vent, said piston having a small air passage to equalize air pressure on opposite sides of the piston, means for closing the vent and connections between the piston and the outlet valve; whereby when

the vent valve is open the piston is shifted by the compressed air and opens the outlet valve.

5 8. In a flushing apparatus the combination of a tank having an outlet opening in its bottom, a water supply communicating with the lower portion of said tank; a cylinder in the upper part of said tank having a small air passage communicating with the tank and having a larger vent opening communicating with the atmosphere, a piston in said cylinder interposed between the said passage and opening and having a small air

passage for equalizing the air pressure on opposite sides of the piston, a valve for closing the vent opening, and a rod connecting the piston with the outlet valve; the air being compressed in the tank when the vent valve and outlet valves are closed, and when the vent valve is opened the piston is moved by the compressed air to open the outlet valve. 15 20

In testimony that I claim the foregoing as my own, I affix my signature.

WILLIAM FRANKLIN KNELL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."