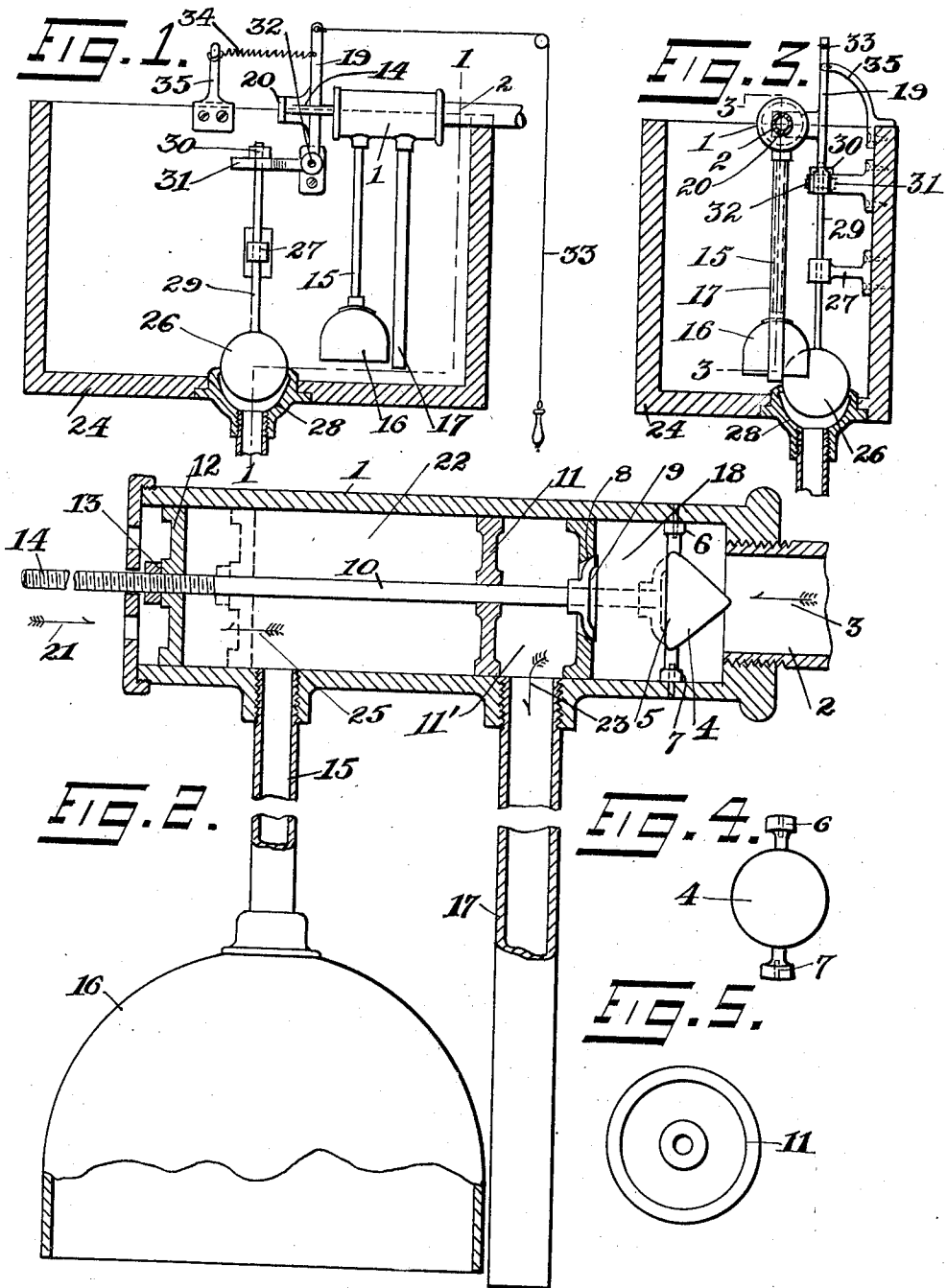


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 FLUID CONTROL SUPPLY VALVE FOR FLUSH TANKS.
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UNITED STATES PATENT OFFICE.

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FLUID-CONTROL SUPPLY-VALVE FOR FLUSH-TANKS.

1,059,038.

Specification of Letters Patent.

Patented Apr. 15, 1913.

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To all whom it may concern:

Be it known that I, EDWARD G. COOK, a citizen of the United States, residing in Brooklyn, New York, in the county of Kings and State of New York, have invented certain new and useful Improvements in Fluid-Control Supply-Valves for Flush-Tanks, of which the following is a specification.

My present invention relates to an improved form of fluid-control supply valve for flush tanks of the well known type used in conjunction with toilets.

By means of my present construction I obviate one of the most annoying features of the well known ball float control, owing to the fact that the said ball float, usually made of metal, corrodes after a period of time and consequently becomes leaky and fills with water allowing the air to escape, thereby defeating the purpose for which it was intended. When hollow vitreous floats are used to prevent corrosion, they are of such a very fragile nature that they are apt to break in use and are more or less difficult to attach to the actuating float rod, and at which point of attachment leaking is apt to occur.

In my device no floats are used and the control of the filling and emptying of the flush tank is accomplished by the compression of air in a closed chamber or suction of air from said chamber, said suction or compression being caused by the rising and the falling of the water in the tank, by the emptying or the filling of the same.

A further advantage in my present device is the absolute noiselessness of the device during the operation of filling its container with water or other fluid.

Another advantage is the simplicity of its structure and the quickness of the operation of the valve, both in opening and closing.

A further advantage is that this type of valve control is actuated by means of air under compression or partial vacuum.

In the accompanying drawings Figure 1 is a sectional view of a flush box showing my mechanism adapted thereto. Fig. 2 is an enlarged view of the valve mechanism taken on the line 3—3, Fig. 3. Fig. 3 is a sectional view on line 1—1, Fig. 1. Fig. 4 is

a view of the current deflector. Fig. 5 is a view of the guide for the valve stem.

By referring to Fig. 2 it will be noted that the cylinder 1 has threaded at its rear end a portion of a water pipe 2 which may be connected to any suitable source of supply, the fluid entering the chamber 18 as indicated by the arrow 3. Near the end of the pipe 2 where it enters the cylinder 1 is placed a cone shaped deflector member 4, the apex of the cone being faced into or toward the in-rushing fluid, the back end of the said cone shaped member, as at 5, being slightly rounded for the purpose to be hereinafter described. The cone shaped member 4 has integrally attached thereto a pair of opposite outstanding arms 6 and 7 which are utilized to maintain the said cone shaped member in central alinement in the interior of the cylinder 1 and they are attached to the inner walls thereof by such means as soldering, pinning, or the cone shaped member may be cast integral with the said outer cylinder 1. A short distance away from the cone shaped member is arranged a circular valve seat 8 which is adapted to receive therein a lift valve 9 of the mushroom type. At the back end of this valve is arranged a stem 10 which passes through a short bracket 11 attached to the interior wall of the cylinder 1, and on the other end of this stem 10 is arranged a close fitting piston 12 which is attached to the said shaft 10 by means of threads so as to permit of adjustment and a lock nut 13 is utilized with the said piston to jam or lock the piston in any of the adjusted positions to which it may be set. The stem 10 protrudes a certain amount at the front end of the cylinder 1, as indicated at 14, and the purpose to which this is applied will be given later. At the lower part of the cylinder 1 in Fig. 2 is connected a short tube 15 of suitable material, preferably metal, to which is attached at its lower end an air bell 16 and, as indicated, this bell is bottomless and may be of any desired length. A short distance away from tube 15 is arranged fluid inlet tube 17 of larger diameter which carries the fluid without any splash to the bottom of the tank, and which is of a length to suit the various depths of different di-

mentioned flush boxes or tanks. It may be here noted that the casing or cylinder 1 is divided into three separate chambers, namely, the air chamber 22, the chamber 11', and the water chamber 18.

In Fig. 4 is shown a front elevation of the small deflector cone 4 showing the arms 6 and 7. In Fig. 5 the dividing member 11 is shown in front elevation.

This device is operated as follows: By referring to Fig. 1 in which like numbers represent like parts as described in Fig. 2, the valve cylinder or body 1 has connected to it a pipe 2 from any suitable source of fluid supply and when the water or other pressure is turned on the fluid immediately fills the pipe and the chamber 18, Fig. 2 in front of the said valve 9. This pressure causes the said valve 9 to seat itself, thereby normally shutting off the water supply. When, however, by a suitable means 19, shown in Fig. 1 as an L-shaped lever having a side lug 20 thereon which is in position to engage the back end 14 of the stem 10, the said stem is acted upon in the direction of the arrow 21, Fig. 2, the valve 9 is forced off its seat, thereby admitting the fluid into the chamber generally denoted by 11'. The fluid thereupon goes in the direction of the arrow 23 through the outlet pipe 17 and is thence conducted with little or no noise to the bottom of the tank 24. As the level of the fluid in the tank rises it finally covers the bell member 16 causing the air in the said bell member 16 and the tube 15 to be forced back upward into the chamber 22. The pressure in chamber 22 becomes so great as to act on the piston 12 causing it to suddenly move in the direction of the arrow 25 and carry with it the valve member 9 which is attached to the other end of the stem and this movement shuts off the flow of fluid from the supply pipe 2, the level of the fluid in the tank 24 having then reached the required height. For the purpose of emptying the tank I have shown the conventional rubber ball valve 26 which is carried on a stem 29 which slides in a bracket 27 attached to the side of the tank and the said valve 26 being acted upon by the fluid pressure in the tank is caused to seat itself on the edges of the bowl 28, thereby cutting off the out-flow of the fluid in the tank until it is required. The stem 29 having a head 30 is suitably attached to the said float member 26 and is engaged by a lower member 31 of the lever 19, the entire lever being pivoted at the point 32. It is obvious that upon actuating the lever 19 to relieve the tank of the contained fluid by means of a pull cord 33, that the lever 19 forces the stem 14 forward, thereby unseating the valve 9, this movement moving the piston forward in the same direction and, simultaneously with the starting of the flow of the fluid from the pipe 2, the rubber ball member is

lifted from off its seat permitting the fluid in the said tank to rush out, thereby emptying the said tank. As the said fluid flows out a natural suction effect takes place in the bell member 16 and the tube 15, causing the piston member to retain its forward position, thus aiding in preventing the valve 9 from taking its seat against the flow of fluid from the pipe 2. For the purpose of returning the lever 19 to the normal position and to relieve the piston 12 of any undue pressure therefrom, a spring 34 is attached to the lever, the other end of which is attached to an upright 35 which is attached to the side of the tank 24, so that when the handle 33 is released the lever 19 returns to its first or normal position without effecting any of the other operating parts. This lever is so designed to operate to unseat both valves but has nothing to do with the reseating of the same. In regard to the use of the cone shaped deflector 4, I have found that a deflector made in this form and having a rounded back edge, as indicated by 5, Fig. 2, prevents the full force of the current from striking on the head of the valve 9, thereby acting to press the same back upon its seat 8, and I have found by experiment that to properly relieve the valve 9 from this inflow pressure that this form of deflecting member is absolutely necessary.

Having thus described my invention, I claim:

1. In a device of the character described, a tank, a water inlet pipe in the tank, a cylinder at the upper portion of the tank, a piston working in said cylinder, a valve seat in the water inlet of the cylinder, a valve controlling said seat, means connecting said valve with said piston whereby the movement of the piston will open and close the valve, and a conduit leading from the said cylinder between the closed end and said piston down through the tank with its extremity open and located a considerable distance below the water line of the tank, whereby the rise of the water in the tank will compress the air in the conduit and cylinder to advance the piston and close the said valve when the water reaches a certain predetermined level.

2. In a device of the character described, a tank, a water inlet pipe in the tank, a cylinder at the upper portion of the tank, a piston working in said cylinder, a valve seat in the water inlet of the cylinder, a valve controlling said seat, means connecting said valve with said piston whereby the movement of the piston will open and close the valve, a conduit leading from the said cylinder between the closed end and said piston down through the tank with its extremity open and located a considerable distance below the water line of the tank, whereby the rise of the water in the tank will compress

the air in the conduit and cylinder to advance the piston and close the said valve when the water reaches a certain pre-determined level, an operating member outside of the tank, and connections between the operating member and said piston to shift the piston and open said water valve.

3. In a device of the character described, a tank, a water inlet pipe in the tank, a cylinder at the upper portion of the tank, a piston working in said cylinder, a valve seat in the water inlet of the cylinder, a valve controlling said seat, means connecting said valve with said piston whereby the movement of the piston will open and close the valve, a conduit leading from said cylinder between the closed end and said piston down through the tank with its extremity open and located a considerable distance below the water line of the tank, whereby the rise of the water in the tank will compress the air in the conduit and cylinder to advance the piston and close the said valve when the water reaches a certain pre-determined level.

4. In a device of the character described, a tank, a water inlet pipe in the tank, a cylinder at the upper portion of the tank, a piston working in said cylinder, a valve seat in the water inlet of the cylinder, a valve controlling said seat, means connecting said valve with said piston whereby the movement of the piston will open and close the valve, a conduit leading from the said cylinder between the closed end and said piston down through the tank with its extremity open and located a considerable distance below the water line of the tank, whereby the rise of the water in the tank will compress the air in the conduit and cylinder to advance the piston and close the said valve when the water reaches a certain pre-determined level, a deflector member positioned to be engaged by the said water valve in its upper position in the water inlet, the deflector being centrally positioned and having a substantially free annular space around it for passage of the water and having the side facing the flow of water arranged substantially conical.

5. In a device of the character described, the combination of a tank, a cylinder arranged at the upper portion of the tank, a water inlet connected with one end of the cylinder, a valve seat in the cylinder in proximity to said end, a piston in the cylinder controlling said valve seat, a water outlet from the cylinder beyond the valve seat, a partition in the cylinder beyond the said outlet and having a central bore, a piston working in the cylinder beyond said partition, a valve stem on the piston passing through said bore of the partition and secured to said valve, the cylinder having openings beyond said piston, a conduit leading from the cylinder between said partition

and said piston and passing downwardly with its extremity open to the tank a considerable distance below the normal water line, whereby the air in the conduit and cylinder between the said partition and said piston will be compressed as the water level rises after the tank has been emptied to advance the piston and seat the valve preventing further inflow of water.

6. In a device of the character described, the combination of a tank, a cylinder arranged at the upper portion of the tank, a water inlet connected with one end of the cylinder, a valve seat in the cylinder in proximity to said end, a piston in the cylinder controlling said valve seat, a water outlet from the cylinder beyond the valve seat, a partition in the cylinder beyond the said outlet and having a central bore, a piston working in the cylinder beyond said partition, a valve stem on the piston passing through said bore of the partition and secured to said valve, the cylinder having openings beyond said piston, a conduit leading from the cylinder between said partition and said piston and passing downwardly with its extremity open to the tank a considerable distance below the normal water line whereby the air in the conduit and cylinder between the said partition and said piston will be compressed as the water level rises after the tank has been emptied to advance the piston and seat the valve preventing further inflow of water, and an operating member outside of the tank for advancing the stem to open the water valve and shift the said piston.

7. In a device of the character described, the combination of a tank, a cylinder arranged at the upper portion of the tank, a water inlet connected with one end of the cylinder, a valve seat in the cylinder in proximity to said end, a piston in the cylinder controlling said valve seat, a water outlet from the cylinder beyond the valve seat, a partition in the cylinder beyond the said outlet and having a central bore, a piston working in the cylinder beyond said partition, a valve stem on the piston passing through said bore of the partition and secured to said valve, the cylinder having openings beyond said piston, a conduit leading from the cylinder between said partition and said piston and passing downwardly with its extremity open to the tank a considerable distance below the normal water line, whereby the air in the conduit and cylinder between the said partition and said piston will be compressed as the water level rises after the tank has been emptied to advance the piston and seat the valve preventing further inflow of water, a deflector in the cylinder beyond the said valve in the direction of the inflow of water in the form of a conical member centrally positioned to pro-

vide substantially free passage of water around the same and having a flat side to receive the valve when opened with its conical side facing the flow of water to prevent the flow of the water pressing on the back of the valve to close it.

8. In a device of the character described, a tank, a water inlet pipe in the tank, a cylinder at the upper portion of the tank, a piston working in said cylinder, a valve seat in the water inlet of the cylinder, a valve controlling said seat, means connecting said valve with said piston whereby the movement of the piston will open and close the valve, and a conduit leading from the said cylinder between the closed end and said piston down through the tank with a bell at its extremity located a considerable distance below the water line of the tank, whereby the rise of the water in the tank will compress the air in the conduit and cylinder to advance the piston and close the said valve when the water reaches a certain pre-determined level.

9. In a device of the character described, a tank, a water inlet pipe in the tank, a cylinder at the upper portion of the tank, a piston working in said cylinder, a valve seat in the water inlet of the cylinder, a valve controlling said seat, means connecting said valve with said piston whereby the movement of the piston will open and close the valve, a conduit leading from said cylinder between the closed end and said piston down through the tank with a bell at its extremity located a considerable distance below the water line of the tank, whereby the rise

of the water in the tank will compress the air in the conduit and cylinder to advance the piston and close the said valve when the water reaches a certain pre-determined level.

10. In a device of the character described, the combination of a tank, a cylinder arranged at the upper portion of the tank, a water inlet connected with one end of the cylinder, a valve seat in the cylinder in proximity to said end, a valve controlling said seat, a piston in the cylinder controlling said valve, a water outlet from the cylinder beyond the valve seat, a partition in the cylinder beyond the said outlet and having a central bore, a piston working in the cylinder beyond said partition, a valve stem on the piston passing through said bore of the partition and secured to said valve, the cylinder having openings beyond said piston, a conduit leading from the cylinder between said partition and said piston and passing downwardly with a bell at its extremity open to the tank a considerable distance below the normal water line whereby the air in the conduit and cylinder between the said partition and said piston will be compressed as the water level rises after the tank has been emptied to advance the piston and seat the valve preventing further inflow of water, and an operating member outside of the tank for advancing the stem to open the water valve and shift the said piston.

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