Jan. 5, 1932. D. F. TRACEY 1,839,424

FLUSH TANK APPARATUS

Filed Aug. 6, 1930

Fig. 1.

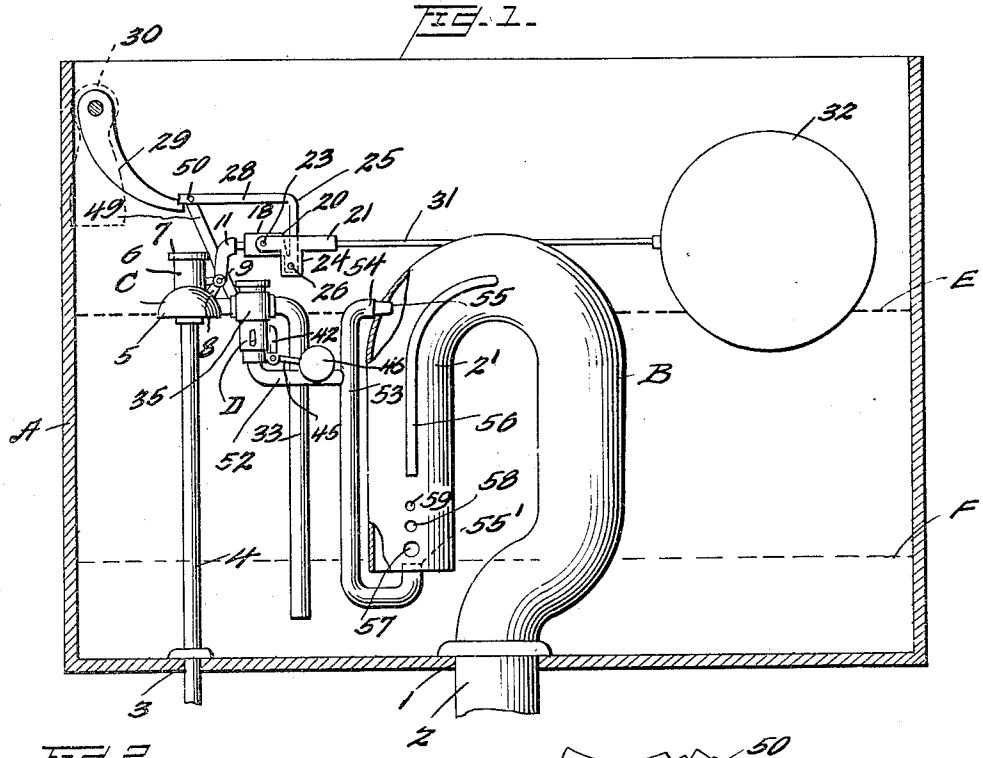


Fig. 2.

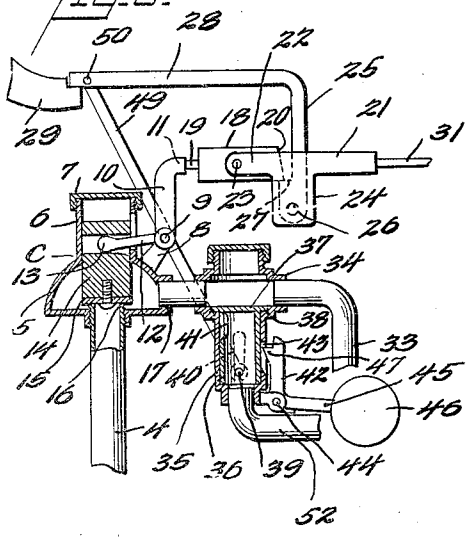
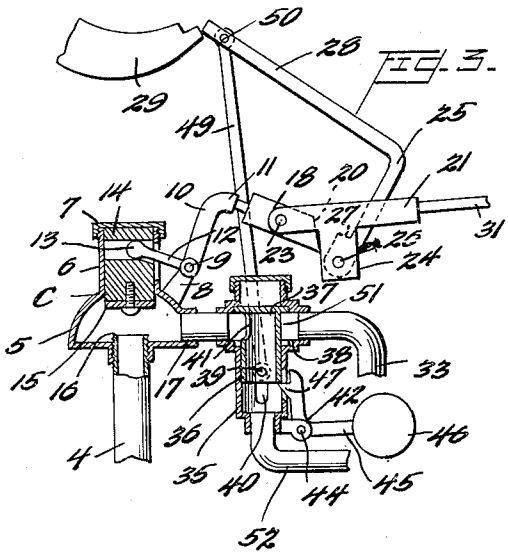


Fig. 3.



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UNITED STATES PATENT OFFICE

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FLUSH TANK APPARATUS

Application filed August 6, 1930. Serial No. 473,402.

Generically this invention relates to a silent flushing tank apparatus, but is more particularly directed to that class of flushing tanks having means to accelerate the siphoning action and effect quicker emptying of the tank, at the same time preventing the continuous siphoning action, which has frequently attended, attempts to effect a quick discharge of the tank contents.

One of the principal objects of this invention is the provision of a method and apparatus for directing a stream of water under full line pressure directly to the short leg of the siphon at its upper end and at the same time into its lower end to start the siphoning action, whereby the velocity and volume of water passing through the siphon over the amount that would pass through if the siphon was started by the ordinary means, effects the emptying of the tank in a much shorter time than as heretofore been prevalent.

Another important object of this invention is the provision of an improved valve operating mechanism for effecting the quick opening of the inlet valve, and an auxiliary valve mechanism simultaneously operable therewith to effect simultaneous discharge of the stream of water from the inlet valve direct into the siphon at the lower end of the intake leg and through a spray jet into the upper ends of the intake and outlet legs, and by virtue of the line pressure effecting immediate starting of the siphon and quick emptying of the tank, and automatically operable means when the water has reached a predetermined point in the tank to operate said auxiliary valve to cut off the flow into the siphon and permit its discharge directly into the tank, and means in connection with the inlet valve to close the same when the normal water level within the tank has been reached.

A further object of this invention is the provision of a tank flushing apparatus including an inlet valve mechanism and a siphon device in communication therewith, an inlet valve mechanism, and an auxiliary valve mechanism controlling the flow of water from the inlet mechanism to the siphon device, valve operating means for effecting the simultaneous operation of both valve mechanisms in opening direction, additional means cooperating with said operating means for closing the inlet valve and independent means associated with the auxiliary valve mechanism for closing the latter.

With these and other objects in view which will become apparent as the description proceeds, the invention resides in the construction, combination and arrangement of parts, hereinafter more fully described and claimed, and illustrated in the accompanying drawings, in which like characters of reference indicate like parts throughout the several figures, of which:

Fig. 1 is a longitudinal section showing the tank filled.

Fig. 2 shows the tank partially filled with auxiliary valve in raised position.

Fig. 3 is an enlarged detail of the inlet valve trigger mechanism.

To provide an apparatus capable of immediately starting the siphoning action and effecting silent and rapid emptying and refilling of the tank has long occupied the minds of those skilled in this art, but with more or less scant success, since the quick emptying of the tank is often accompanied by a continuous siphoning action, and a quick opening of the inlet valve not only contributes to the disadvantages of the continued siphoning, but tends to produce an unpleasant noise during the refilling operation, and, frequently where a more quiet operating valve action is obtained, a slow filling of the tank with its attendant disadvantages is effected. Therefore, it was to overcome the deficiencies of such devices and to provide a flushing tank apparatus, silent in operation, having valve and auxiliary valve mechanisms simultaneously operable to direct water under line pressure through a jet at the bottom of the intake leg and direct into the upper end thereof through a spray jet to instantly start the siphoning action, and by the increased velocity quickly empty the tank, said auxiliary valve being automatically operable when the water within the tank reaches a predetermined level to cut off the flow into the siphon and permit its direct discharge

into the tank, whereby a continued siphoning is prevented, and means for automatically closing the inlet valve when the tank has been filled to the desired water level, that I designed the silent flushing tank apparatus forming the subject matter of this invention.

In the illustrated embodiment characterizing this invention, there is shown a tank A, a siphon B, inlet valve mechanism C, and auxiliary valve structure D which will be hereinafter described in detail.

The tank A is formed in its bottom with an opening 1 through which is adapted to extend the discharge leg 2 of siphon B, conventionally mounted therein, and is also formed with aperture 3 through which extends inlet pipe 4. Suitably mounted on the upper end of pipe 4 is inlet valve mechanism C comprising casing 5 formed with an upstanding cylindrical projection 6 having a threaded closure cap 7 mounted thereon. The casing 5 is formed exterior thereof with spaced lips 8 between which is mounted on pin 9 the substantially L-shaped lever 10 internally threaded in its upper end as at 11 for a purpose hereinafter appearing, and horizontal portion 12 is adapted to extend within member 6 terminating in an enlarged ball-like portion 13 seating in a correspondingly shaped opening in valve stem 14 by means of which said stem is vertically reciprocated in member 6 to engage and disengage valve 15 from its seat 16, as and for a purpose well understood. Said casing 5 is formed adjacent its lower edge with an internally threaded outlet opening 17.

The trigger block 18 substantially rectangular in configuration and formed with a rearwardly extended projection 19 is threadedly engageable with valve lever 10 as at 11 and with its outer or free end formed with an inclined face 20. A yoke block 21 formed with a longitudinally extending yoke portion 22 is adapted to embrace trigger block 18 and is pivotally connected thereto by pin 23, said member 21 being also formed with fork members 24 adapted to receive trip finger member 25 having its lower end pivotally connected to said forked members by pin 26, said finger being formed with a ledge or seat 27 on which is adapted to seat trigger block 18, as will hereinafter more fully appear. Said trip finger 25 is formed at its upper end with a horizontally extending arm 28, the free end of which is adapted to engage trip member 29 suitably connected to an operating handle 30 mounted exterior of the tank and by means of which the arm 28 may be raised, disengaging block 20 from seat 27, thereby permitting it to fall, operating lever 10 to reciprocate valve stem 14 and raise valve 15 to open position, as will hereinafter more fully appear. Threadedly engageable in the free end of trigger block 21 or otherwise suitably connected thereto is rod 31 on the free end of which is suitably mounted a float 32 which normally maintains the arm 28 in lowered position and through the instrumentality of trip finger 25, trigger block 18, lever 10 and valve stem 14 maintains valve 15 in closed position.

An outlet pipe 33 has one end threadedly or otherwise suitably engageable in opening 17 of valve casing 5 and extends horizontally and downwardly at right angles terminating at a point suitably spaced from the bottom of the tank and through which water may be discharged from the inlet valve directly into the tank as will be well understood.

Mounted in said pipe 33 spaced from the opening 17 is the auxiliary valve mechanism D, substantially T-shaped with the longitudinally aligned pipe sections 34 threadedly or otherwise secured or mounted in pipe 33 to form a continuation thereof, with the vertical barrel or cylindrical housing 35 of greater diameter than pipe 33 extending above and below said pipe. Mounted within housing 35 is a tubular valve member 36 open at its lower end and provided with a closure cap 37 of slightly larger diameter adapted to normally seat in the counter-sunk portion 38 to form a continuation of the bottom wall of pipe 33, and is formed with pins 39 spaced from its lower edge, adapted for slideable movement in slots 30 formed in the opposite walls of member 35. Said valve 36 is also formed with an opening 41 in one side adjacent its upper end for a purpose hereinafter appearing.

A latch finger 42 is adapted to be mounted in slot 43 formed adjacent the lower end of member 35 and is pivotally mounted therein by pin 44. Said finger is formed with a substantially right angularly extending trigger arm 45 on the outer end of which is suitably mounted trigger float 46. The free end of trigger 42 is formed with latch face 47 adapted to engage the lower edge of valve 36 when the latter is elevated as shown in Fig. 3, to maintain the same in elevated position by means of float 46 until recession of the water level below the normal position of said float, whereupon it will be released to fall to its initial position as will be apparent. In order to elevate said valve member 36, a connecting rod 49 is loosely connected to one of the pins 39 at its lower end and its upper end pivotally connected to arm 28 as at 50, whereupon elevation of arm 28 will effect the opening of valve 15 and through the instrumentality of rod 49 simultaneously the valve 36 will be raised to effect registration of opening 41 with pipe 33 which will close said pipe as at 51 and direct the flow of water from valve mechanism C downwardly through housing 35 and valve member 36 as will hereinafter more fully appear.

Suitably connected to the lower end of housing 35 is a conduit pipe 52 extending

downwardly and outwardly terminating in a two-way conduit 53 extending upwardly and outwardly from 52, communicating as at 54 with the upper end of inlet leg 2′ of siphon B, terminating in spray nozzle 55 suitably connected thereto, and extending downwardly from said conduit 52 outwardly and upwardly within the open end of leg 2′ and terminating in a jet 55′ suitably connected thereto, so that water flowing through pipe 52 under line pressure will be caused to discharge directly into the upper end of the siphon as at 54 through spray nozzle 55, and into its lower end through jet 55′ which will create a vacuum therein and immediately start the siphonic action as will be well understood.

The siphon B is preferably formed with an air inlet tube 56 communicating with its upper end and terminating substantially central of the tank, and with graduated air inlet openings 57, 58 and 59, respectively, which further assists in the siphoning action as will be well understood.

The operation of the device is thought to be clear from the above description, but it might be well to further state that when the tank is filled to the normal water level E, the float 32 by virtue of the yoke block 21 against trip finger 25 will maintain trigger block 18 in contact with seat 27 and through lever 10 maintain valve 15 in closed position or in contact with seat 16. Operation of handle 30 will actuate member 29 to elevate arm 28 and through connecting rod 49 elevate member 36 to align opening 41 with pipe 33 preventing flow through said pipe beyond said member 36, and as arm 30 is raised, trigger block 18 will be disengaged from its seat 27 and by its own weight drop down and through lever 10 raise valve 15, whereby water under line pressure will be directed through pipe 33 valve member 36, housing 35, conduits 52 and 53 to be discharged into the siphon device through nozzle 55 and jet 55′ simultaneously to start the siphoning action. When the valve 36 is elevated as shown in Fig. 3, float 46 will be impelled upward placing latch 47 under the lower end of member 36 to maintain the same in elevated position, but as the water level recedes below said casing 35, trigger finger 42 will be retracted, permitting valve member 36 to drop, seating valve cap 37 in seat 38, whereupon the flow will be cut off from conduit 53 and directd through outlet pipe 33 to discharge into the tank. The float 32 having been lowered by emptying of the tank, as it is elevated by the rising water level in tank filling direction, seat 27 will engage the trigger block 18 to elevate the same and close valve 15, so that by the time the water level has reached its normal point E the valve and valve actuating components will have been returned to their initial position, as will be clear without further discussion.

It will be especially noted from the above description, that the lower ends of the intake leg 2′ of the siphon and pipe 33, respectively, are located slightly below the normal low water line F, thereby contributing to effect at all times a silent filling and emptying of the tank. Likewise, the creation of a vacuum and the immediate starting of the siphoning action is effeceted by the simultaneous discharge of water from the inlet valve at different points in the siphon and the filling of the outlet leg thereof with spray from nozzle 55, as will be apparent without further discussion.

From the above it is apparent that I have designed a flushing tank method and apparatus, which by reason of the direct water discharge from the inlet mechanism to the siphon device and subsequent diversion into the tank, a silent filling operation is effected, and by virtue of the jet at the lower end, and direct discharge from the inlet valve into the upper end of said siphon, that silent siphonic action will immediately be established and by reason of the pressure, the velocity and volume of outflow through said siphon materially increased, and having means jointly operable to simultaneously open the inlet and auxiliary valves to direct the water to the siphon, and cooperating means for closing the auxiliary valve and inlet valve at proper time intervals to quickly refill the tank and at the same time prevent continued siphoning action, yet one simple in construction, manufacturable at a reasonable cost, comprising few parts and efficient for the purposes intended.

Although in practice I have found that the form of my invention illustrated in the accompanying drawings and referred to in the above description as the preferred embodiment, is the most efficient and practical; yet realizing the conditions concurrent with the adoption of my invention will necessarily vary, I desire to emphasize that various minor changes in details of construction, proportion and arrangement of parts, may be resorted to within the scope of the appended claims without departing from or sacrificing any of the principles of this invention.

Having thus described my invention, what I desire protected by Letters Patent is as set forth in the following claims:

1. A flush tank apparatus comprising an inlet valve mechanism and an outlet siphon device, conduit means connecting said inlet valve mechanism and intake leg of the siphon device at its upper and lower ends, an auxiliary valve mechanism associated with said conduit, means for effecting the simultaneous operation of the inlet and auxiliary valves, whereby the water under pressure is directed from the inlet valve into said siphon device to start the siphon and increase the volume of flow therethrough.

2. A flush tank apparatus comprising an

inlet valve mechanism and a siphon device, means for operating the valve mechanism, conduit means connected to the inlet mechanism and with the upper and lower ends of the siphon intake leg and an outlet pipe intercepting said conduit and discharging into the tank, an auxiliary valve mechanism associated with said outlet pipe and conduit, and valve operating means associated therewith, whereby water under line pressure is directed from the inlet valve into the upper and lower ends of said siphon to start the same and increase the volume of flow therethrough, said auxiliary valve operating to divert the flow from the siphon, and direct it through said outlet pipe, when the water in the tank reaches a predetermined level, and means associated with the inlet valve operating means to close said valve when the water has reached its normal level.

3. A flush tank apparatus comprising an inlet valve mechanism and an outlet siphon device, means for operating said valve mechanism, conduit means interconnecting the inlet valve mechanism and the siphon device, said means including an outlet pipe discharging into the tank, an auxiliary valve mechanism mounted in said pipe forming a continuation thereof and a conduit connected to said valve mechanism, said conduit terminating in a two way conduit, one end of which is connected with the upper end of the inlet leg of the siphon and terminating in a spray nozzle, the other end extending within the lower end of said leg, and valve operating means for effecting the simultaneous operation of the inlet and auxiliary valves in opening direction, whereby water under pressure is directed from the inlet valve into the upper end of the siphon through the spray nozzle and simultaneously into the open end thereof to start the siphonic action and increase the volume of flow through said siphon to effect quick emptying of the tank.

4. A flush tank apparatus comprising an inlet valve mechanism and an outlet siphon device, means for operating said valve mechanism, conduit means interconnecting the inlet valve mechanism and the siphon device, said means including an outlet pipe discharging into the tank, an auxiliary valve mechanism mounted in said pipe forming a continuation thereof and a conduit connected to said valve mechanism, said conduit terminating in a two way conduit, one end of which is connected with the upper end of the inlet leg of the siphon terminating in a spray nozzle and the other end extending within the lower end of said leg, and valve operating means for effecting the simultaneous operation of the inlet and auxiliary valves in opening direction, whereby water under pressure is directed from the inlet valve into the upper ends of both legs of the siphon and simultaneously into the open end thereof to start the siphonic action and increase the volume of flow through said siphon to effect quick emptying of the tank, additional means associated with said valve operating means to divert the flow from the inlet valve to the siphon and direct it into said tank when the water has reached a predetermined level in the tank, and means operable to close the inlet valve when the said water level has reached a predetermined level.

5. A flush tank apparatus comprising an inlet valve mechanism and an outlet siphon device, conduit means connecting said inlet valve mechanism and siphon device, an auxiliary valve mechanism associated with said conduit and including a valve member, an inlet valve operating means including a trigger block and trip finger engageable with said block and formed with an arm extension, a connecting rod connected to said arm and auxiliary valve member, and means for operating said arm, whereby operating of said arm effects the simultaneous opening of the inlet and auxiliary valves and directs water under pressure simultaneously to the top and bottom of the siphon intake leg and upper end of the outlet leg to start the siphonic action, and means for closing said valves.

6. A flush tank apparatus comprising an inlet valve mechanism and an outlet siphon device, conduit means connecting said inlet valve mechanism and siphon device and having an outlet pipe into the tank, an auxiliary valve mechanism connecting said conduit and outlet pipe and having a valve member, means for operating said inlet valve, said means including a level connected to said valve and terminating in a trigger block, a yoke member pivotally connected to said valve and terminating in a trigger block, a trigger finger also pivotally connected to said yoke member, and formed with an arm extension, a connecting rod interconnecting said arm and said auxiliary valve, a float connected to said yoke member, and means for elevating said arm whereby said trigger block is disengaged from said trigger finger, and said auxiliary valve and inlet valve are simultaneously elevated to open position and water under pressure is directed through said conduit to the upper and lower ends of the intake siphon leg to start the siphonic action and increase the volume of flow through said siphon to quickly empty the tank, and float control means operable to cut off the flow of the water through said conduit and divert it through said outlet pipe, when a predetermined water level has been reached, the float connected to said yoke member adapted to elevate said trigger block and close the inlet valve when the water level has reached a further predetermined point.

7. A flush tank apparatus including an inlet valve mechanism and an outlet siphon device having intake and outlet legs, and

conduit means connecting said valve mechanism and siphon device, whereby water is simultaneously directed into the lower end of the intake leg and into the upper ends of both of said legs in the form of a spray.

8. A flush tank apparatus including an inlet valve mechanism and an outlet siphon device having intake and outlet legs, conduit means connecting said valve mechanism and siphon device, and a spray nozzle connected to said conduit means, whereby water is simultaneously directed into the lower end of the intake leg and into the upper ends of both of said legs in the form of a spray.

This specification signed this 15 day of April, A, D. 1930.

DANIEL F. TRACEY.