No. 807,914. PATENTED DEC. 19, 1905.

T. DUGMORE.

FLUSHING APPARATUS.

APPLICATION FILED MAR. 14, 1904.

Fig. 1.

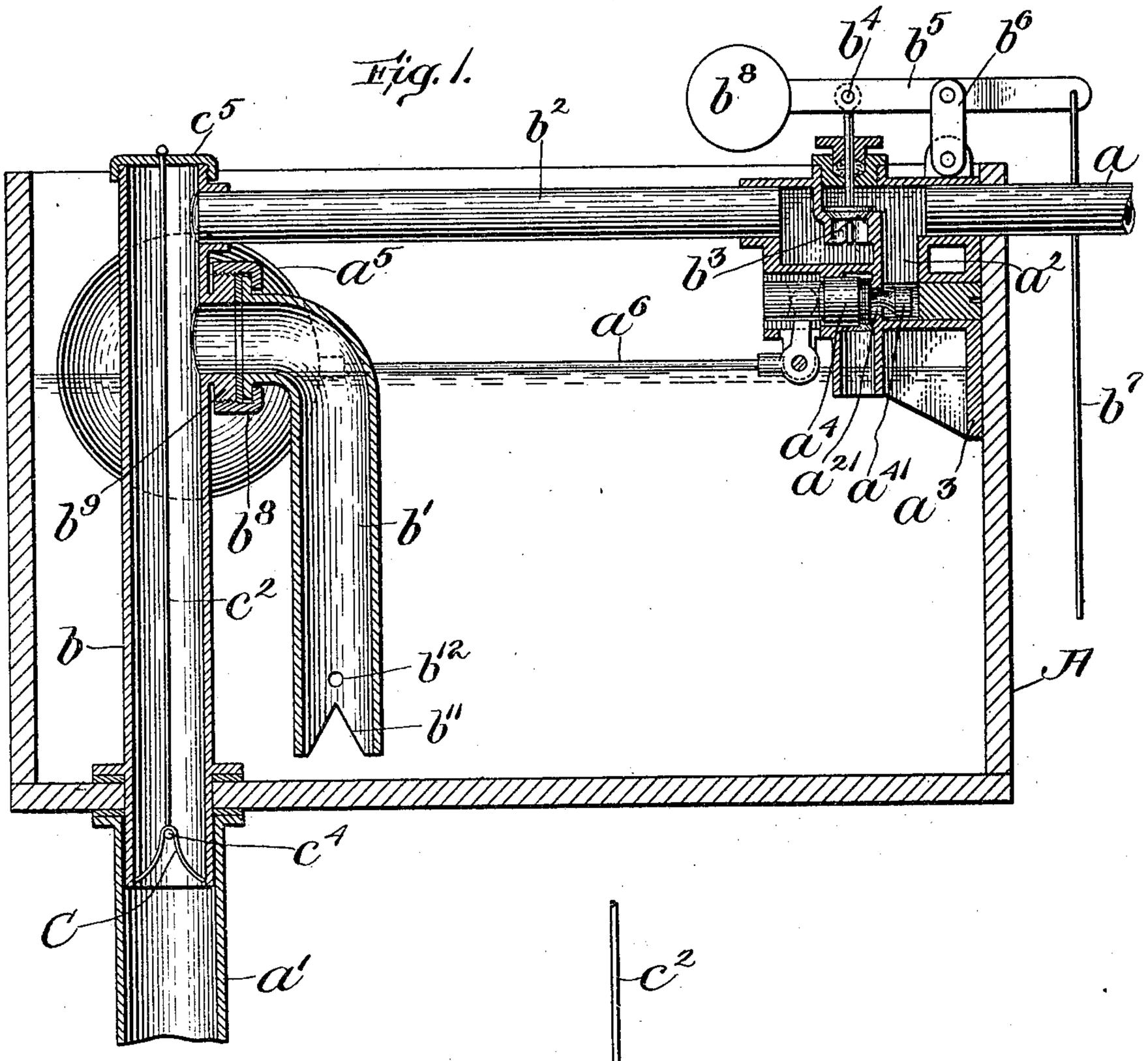
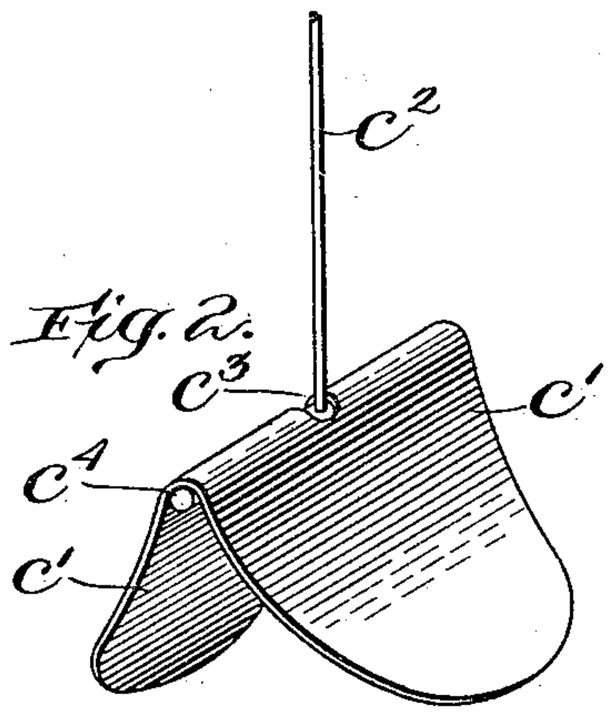


Fig. 2.



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FLUSHING APPARATUS.

No. 807,914. Specification of Letters Patent. Patented Dec. 19, 1905.

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To all whom it may concern:

Be it known that I, TREVELLYAN DUGMORE, a subject of the King of Great Britain, and a resident of Medford, in the county of Middlesex and State of Massachusetts, have invented new and useful Improvements in Flushing Apparatus, of which the following is a specification.

My invention relates to a flushing apparatus particularly adapted for use in a flushing-tank for water-closets. As heretofore constructed flushing devices for this purpose have usually comprised a valve located in the discharge-pipe for controlling the discharge of the water from the tank. An objectionable feature of such devices has been that by reason of wear or of the accumulation of dirt or sediment or by other causes the valve has tended in time to leak, thus permitting a constant flow of water into the basin or bowl of the closet and a constant running of water into the tank past the usual float-controlled valve.

In many of the present flushing devices which employ a siphon for emptying the tank it has been necessary to provide automatic means for admitting air to the top of the siphon to break the siphonic action when the tank is once emptied. This is particularly important where the pressure of the water supplied to the tank is high and the water consequently is admitted by the float-controlled valve with such great rapidity that without the provision of the air-inlet just referred to the supply to the tank would when the float was very low equal or very nearly equal the exhaust through the siphon. As a result the siphon would continue in action. In my device presently to be described no air-inlet for the siphon is required. Furthermore, in the present forms of siphon flushing devices it is impossible to regulate the amount of water discharged from the tank—that is to say, once the siphon is started the full capacity of the tank is emptied into the bowl, the flow stopping only when the air-inlet is automatically opened. This is objectionable, because some closets require more water for flushing purposes than others, and it is highly desirable that the amount of water discharged from the tank should be suited to the requirements of the closet. At present the amount of water discharged cannot be governed, but all the water in the tank down to the level of the inlet end of the short leg of the siphon will be discharged even though a less amount would suffice.

The objects of my invention are to remove the objectionable features above noted and to provide an otherwise improved flushing apparatus.

My improved flushing apparatus comprises a tank, a siphon having its longer member communicating with the outlet of the tank and its shorter member communicating with the interior of the tank. A main water-supply conduit discharging into the tank is provided, controlled, as usual, by a normally closed float-operated valve through which the tank is refilled after each emptying. In connection with the siphon, however, I provide a supplemental water-supply conduit discharging into the longer member of the siphon, and a valve is provided in this supplemental conduit by opening which water is admitted to said longer member to start the siphon. While this construction distinguishes my flushing apparatus from others, yet another feature of my invention consists in providing an additional normally open valve in the main supply-conduit, together with means controlled by the water in the tank for shifting said valve toward its seat to throttle or reduce the supply to the tank when the level of the water falls below a predetermined point. By this construction the supply to the tank from the main supply-conduit is so reduced when the level of the water reaches its lowest point that the siphonic action is stopped and the tank is refilled ready for the next operation more quickly and positively than has heretofore been possible.

In order to provide for regulating the amount of water discharged from the tank to suit said discharge to the requirements of the particular closet where the tank is used, the shorter member of the siphon is made vertically adjustable, preferably by having it swing sidewise relatively to the longer member, so that its inlet end can be fixed in any desired position with relation to the level of the water when the tank is filled.

Other features of my invention are hereinafter pointed out.

In the accompanying drawings, Figure 1 is a central vertical section of a flushing-tank embodying one form of my invention. Fig. 2 is a detail hereinafter described.

Having reference to the drawings, A repre-

sents the usual tank, a a pipe connecting the tank A with a supply of water, and a' a pipe connecting the tank A with the bowl to be flushed.

The pipe a at its discharge end communicates with a main inlet-conduit a^2, discharging into tank A. Said conduit may be supported by a bracket a^3, fastened to the inside of one of the walls of tank A. This main inlet-conduit a^2 is controlled by a normally closed valve a^4, operated by the usual float a^5, acting through a lever a^6, fulcrumed on bracket a^3. The water within tank A is discharged, as hereinafter described, from said tank through a siphon comprising a relatively long member b, having its lower or discharge end connected with pipe a', and a relatively short member b', communicating at its lower or inlet end with tank A near the bottom thereof. In order to prevent any objectionable sucking noise at the lower end of member b' when the level of the receding water reaches said end, said member is notched at its lower end, as at b^{11}, and at a point just above the apex of the notch b^{11} is perforated, as at b^{12}. When perforation b^{12} is uncovered by the water, air is drawn into member b' and acts to check the siphon, and this checking action of the air admitted through perforation b^{12} is supplemented by a gradually-increasing amount of air admitted through notch b^{11} until the siphon is stopped. The perforation is so small and the notch so shaped that little or no sucking or gurgling sounds are produced when the lower end of member b' is uncovered by the water and the siphon stopped.

Normally valve a^4 closes main inlet-conduits a^2 when the level of the water in tank A is at the top of the member b', as indicated in Fig. 1. In order to start the siphon, I provide a supplemental water-supply conduit b^2, discharging at one end into member b of the siphon and connected at its other end with pipe a. Through this conduit b^2 water can be admitted to member b from pipe a independently of the main inlet-conduit a^2. When water is admitted to member b through supplemental conduit b^2, its descent through said member starts the siphon in action and after the supply from b^2 is cut off the siphon will continue in action until the lower end of member b' is uncovered. The supplemental supply-conduit b^2 is controlled by a valve b^3, whose stem is pivotally connected at b^4 to a lever b^5, fulcrumed upon a link b^6, connecting it with bracket a^3. Lever b^5 is moved in one direction to open valve b^3 manually by means of a cord or chain b^7 and in the opposite direction by a weight b^8, carried by the lever.

I find that it is best although it may not always be essential to provide means in the member b of the siphon for temporarily retarding the descent of the water admitted thereto from the supplemental conduit b^2 in order that the water may be permitted to accumulate in pipe b sufficiently to insure the starting of the siphon in action. The means herein shown provided for this purpose consists of a yielding obstruction in the form of a diaphragm C, having two folding or resilient wings c'. This diaphragm C is supported by a hanger, herein shown as a wire or the like c^2, fastened at its upper end to a removable cap b^{13}, closing the upper end of member b. At its lower end wire c^2 extends through a perforation c^3 in diaphragm C and below said diaphragm is connected with a laterally-extending bar c^4, on which the diaphragm is hung. When water is admitted to member b from conduit b^2, its passage down said member is retarded by diaphragm C, the air escaping past C, which does not close the pipe air-tight until the pressure on the wings c' is sufficient to fold them together, whereupon the water is released and the siphon started. When the wings are folded together by the water, the diaphragm C occupies very little space and does not to any appreciable extent affect the capacity of member b. When the siphon discontinues its action, wings c' spring out into closed position again and the flow through member b stops.

As already stated, some closets require more water to flush them than others, and as it is extremely desirable that the amount of water discharged from tank A be suited to the needs of the closet where it is used I have herein employed a construction whereby the inlet end of member b' of the siphon can be raised and lowered, so that the amount of water discharged from tank A can be regulated. An admirable method of making the inlet end of the shorter member b' of the siphon vertically adjustable is to make it in a separate part from the longer member, as shown, and provide a swivel connection between the two. In detail this consists in making the member b' separate from member b and having its upper end connected by a coupling b^8 with a nipple b^9, provided on and communicating with the upper end of member b. This construction permits member b' to be swung laterally on the axis of the coupling b^8, thus allowing a vertical adjustment of the lower end of member b'. The siphon can thereby be caused to discharge any desired amount of water from tank A within the capacity of the tank. It will be understood that I do not desire to limit myself to this particular manner of providing for vertical adjustment of said inlet-opening, but that any convenient construction—such, for example, as a vertically-adjustable sleeve or extension—is within the scope of my invention.

Connected with valve a^4 is a normally open valve a^{41}, which may be termed a "throttle-valve," arranged to control a port a^{21}, which is part of the main supply-conduit. When valve a^4 is moved away from its seat, valve a^{41} is moved toward its seat and acts to re-

duce or throttle the water passing through conduit a^2 to the tank. The valve a^{41} never completely closes port a^{21}, its range of movement being from a wide-open position to a throttling, but not a closed, position. When float a is at its lowest point, the rate of inflow is so reduced by valve a^{41} that it is much less than the rate of outflow through the siphon, and as a result the action of the latter is soon stopped. The level of the water will thereupon rise, thus moving valve a^{41} away from port a^{21} and valve a^4 toward its closed position. During the first part of the downward movement of float a^5 the rate of inflow gradually increases to the maximum as valve a^4 opens until the area of the passages past valve a^4 and past valve a^{41} are equal. During the last part of the downward movement of float a^5 the rate of inflow gradually decreases as valve a^{41} approaches its throttling position until the rate of inflow is so reduced that the action of the siphon will quickly empty the tank. It will thus be seen that if the maximum rate of inflow is caused to be less than the rate of outflow the descent of the float will not be interrupted and that whatever be the pressure on the supply the siphonic action will be stopped when the float reaches its lowest point, and thus an unnecessary or unduly continued outflow from the tank through the siphon is prevented.

What I claim is—

1. In a flushing apparatus of the character described, a siphon, and a yielding obstruction in the longer member of the siphon for temporarily retarding the descent of the water until sufficient water has collected in said member to start the siphon.

2. A flushing apparatus comprising a tank; a siphon for discharging water from the tank having its shorter member communicating with the interior of the tank; a main water-supply conduit discharging into the tank; a valve controlling said conduit; a float for operating said valve; a supplemental water-supply conduit discharging into the longer member of the siphon; a valve controlling the supplemental conduit; and a yielding obstruction in the longer member of the siphon for temporarily retarding the descent of the water admitted to said member from the supplemental conduit until sufficient water has collected in said member to start the siphon.

3. A flushing apparatus comprising a tank; a siphon for discharging water from the tank having its shorter member communicating with the interior of the tank; a main water-supply conduit discharging into the tank; a valve controlling said conduit; a float for operating said valve; a supplemental water-supply conduit discharging into the longer member of the siphon; a valve controlling the supplemental conduit; and a diaphragm in the longer member of the siphon comprising a pair of resilient folding wings for temporarily retarding the descent of the water admitted to said member from the supplemental conduit until sufficient water has collected in said member to start the siphon.

4. A flushing apparatus comprising a tank; a siphon for discharging water from the tank having its shorter member communicating with the interior of the tank; a main water-supply conduit discharging into the tank; a valve controlling said conduit; a float for operating said valve; a supplemental water-supply conduit discharging into the longer member of the siphon; a valve controlling the supplemental conduit; a diaphragm in the longer member of the siphon comprising a pair of resilient folding wings for temporarily retarding the descent of the water admitted to said member from the supplemental conduit until sufficient water has collected in said member to start the siphon; a removable cap fixed to the upper end of the longer member of the siphon, and a hanger for supporting the diaphragm connected at its upper end to said cap.

Signed by me at Boston, Massachusetts, this 3d day of March, 1904.

TREVELLYAN DUGMORE.

Witnesses:
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