

(No Model.)

2 Sheets—Sheet 1.

W. BARTHOLOMEW.
FLUSHING TANK OR VESSEL.

No. 306,461.

Patented Oct. 14, 1884.

Fig. 2.

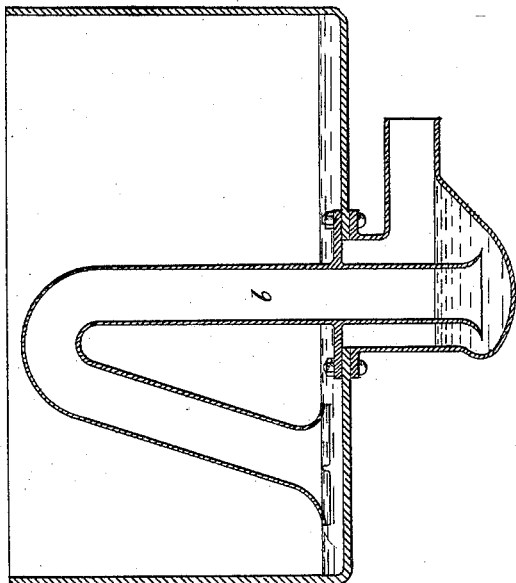
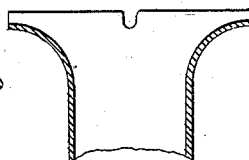


Fig. 4.



Section through A.B.

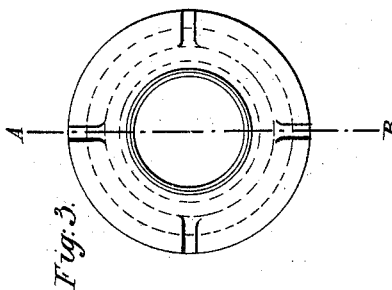


Fig. 1.

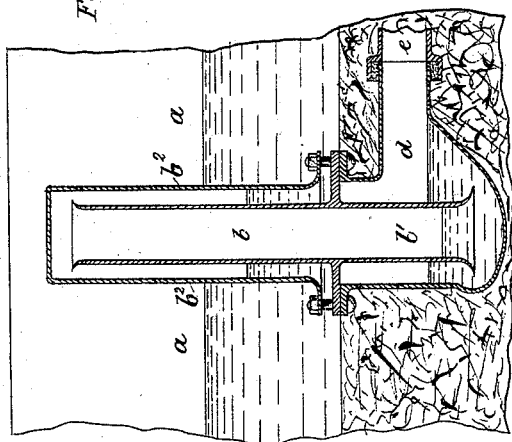
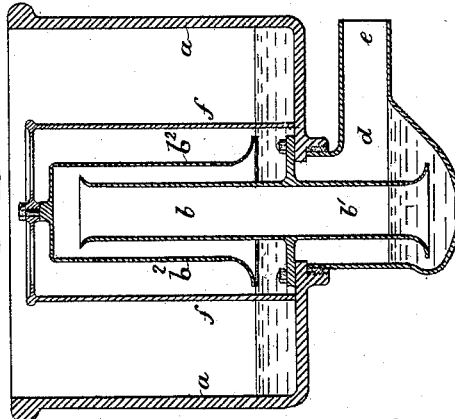


Fig. 5.



Witnesses
Klan McLane Albert
Eugene V. Brown,

Inventor.
Wm. Bartholomew
By Atty — J. Adams, J. H. Adams & J. H. Adams

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Fig. 6.

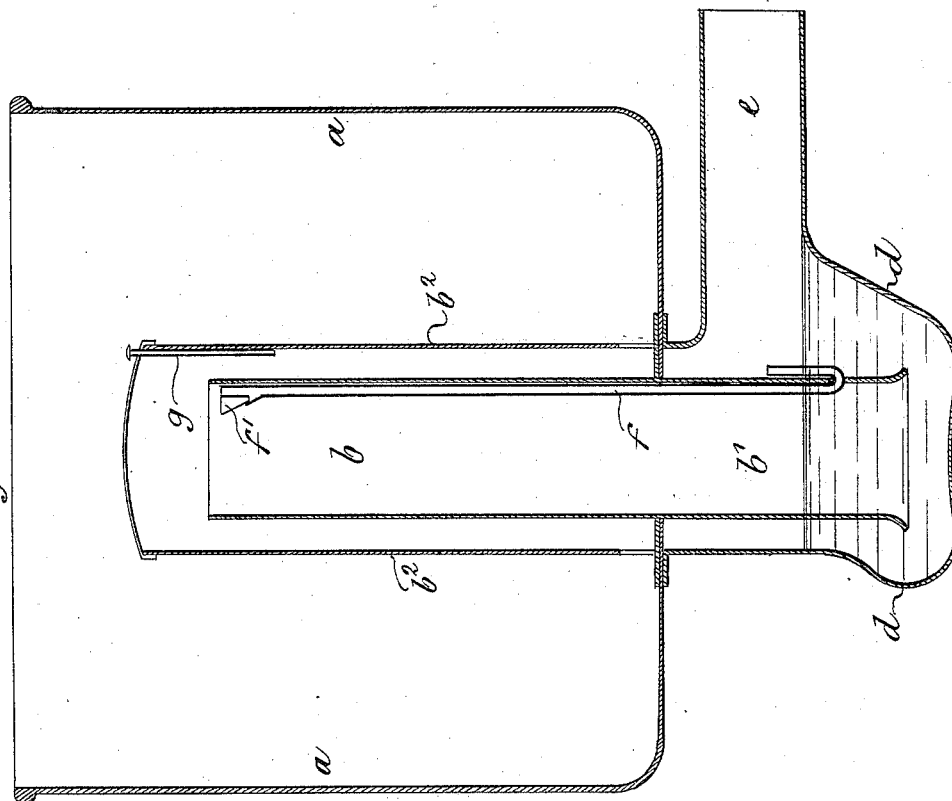
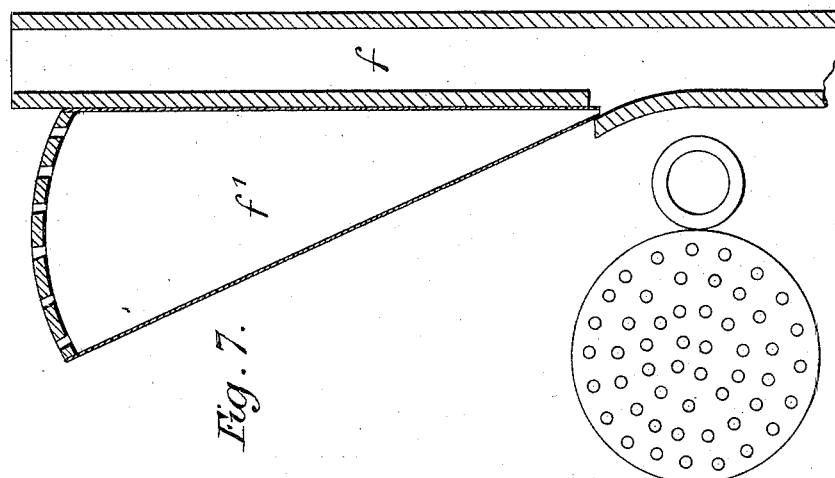


Fig. 7.



Witnesses.
Allan McLane Albert
Eugene V. Brown,

Wm. Bartholomew,
Inventor.
By Atty-
General, Stephen A. Roper.

UNITED STATES PATENT OFFICE.

WILLIAM BARTHOLOMEW, OF LAMBETH, COUNTY OF SURREY, ENGLAND.

FLUSHING TANK OR VESSEL.

SPECIFICATION forming part of Letters Patent No. 306,461, dated October 14, 1884.

Application filed January 10, 1884. (No model.) Patented in England March 24, 1882, No. 1,432; in South Australia February 23, 1883, No. 346; in New South Wales May 27, 1884, No. 1,431, and in New Zealand June 25, 1884, No. 1,149.

To all whom it may concern:

Be it known that I, WILLIAM BARTHOLOMEW, a subject of the Queen of Great Britain, residing at Messrs. Doulton & Co.'s Sanitary Engineering Works, Albert Embankment, Lambeth, in the county of Surrey, England, have invented certain new and useful Improvements in Flushing Tanks or Vessels for Receiving Water or Liquid, and when full automatically discharging it, (for which I have received Letters Patent in Great Britain, No. 1,432, dated March 24, 1882, and in South Australia, No. 346, dated February 23, 1883, and by letters of registration in New South Wales, No. 1,431, dated May 27, 1884, and in New Zealand, No. 1,149, dated June 25, 1884,) of which the following is a specification.

This invention has for its object improvements in flushing tanks or vessels for receiving water or liquid, and when full automatically discharging it. For this purpose I employ a receiving vessel or tank having a pipe or passage ascending through the bottom and formed into a siphon, with its mouth at a short distance from the bottom of the tank. Below the bottom of the tank the siphon-pipe already mentioned terminates in a trumpet-mouth, and it dips down into a box or receptacle, from which there is an outlet leading (in the case of a flushing-tank) to a drain, or to other place where it is required that the liquid should be delivered. This outlet is so placed that the trumpet-shaped outlet end of the siphon-pipe is immersed to some depth in liquid contained in the box or receptacle. If the entrance of the liquid into the receiving-vessel be intermittent, the apparatus will be operative without any further appliance. The siphon action is set up, when the tank or receiving-vessel is full, by the escape of air from the siphon-pipe. In consequence of the mouth of the siphon-pipe dipping into the liquid in the box or receptacle and the trumpet-like form given to the mouth, the escape of air from the siphon-pipe takes place intermittently, a considerable quantity of air passing away at a time, sufficient to start the flow. If the entrance of the liquid to the receiving vessel or tank be always slow, it is advisable, in order to insure efficient action, to provide a vent from the siphon-pipe by a passage sealed by a trap offer-

ing less resistance to the escape of air than is offered by the liquid covering its mouth. The rise of the liquid in the receiving vessel or tank then compresses the air in the siphon-tube until the vent is opened by the liquid being forced out of its trap. The air then freely escapes from the siphon, and is replaced by an inflow of liquid, which starts the siphon action. To recharge the trap upon the air-vent a small pocket is provided, from which liquid gradually descends into it. In order that the vent may not be forced at too early a period, I also provide an orifice, by which air can for a time escape freely from the siphon-pipe; but this orifice after a time becomes covered by the rise of the liquid in the receiving vessel or tank. Thus in this apparatus (which has no moving parts) the discharge is determined by the disturbance of equilibrium resulting from the sudden escape of a considerable quantity of air, and not by the sudden inrush of liquid to the cistern or receiving-vessel, or by the operation of the liquid in the cistern on floats or moving mechanism, as in other flushing-tanks of this class; and in order that my said invention may be fully understood and readily carried into effect, I will proceed to describe the drawings hereunto annexed.

In the drawings, Figure 1 is a vertical section of the flushing apparatus in its simpler form. Fig. 2 shows a like apparatus, but different in the detail of construction. Fig. 3 is an under side view of one limb of the siphon-pipe. Fig. 4 is a section of the same. Fig. 5 shows another modification of Fig. 1. Fig. 6 shows the apparatus with additions to meet the case of a very slow entry of liquid to the receiving vessel or tank. Fig. 7 shows to a larger scale a detail of Fig. 6.

In Fig. 1 the siphon is formed by means of a bell inverted over an upright pipe. *a* is a receiving vessel or tank of metal or pottery-ware. *b* is the portion within the tank of an ascending pipe. *b'* is the part of this pipe below the bottom of the tank *a*. It also terminates at its outlet end in a trumpet-mouth. *b''* is a bell inverted over *b*, and completing the siphon. This bell is supported with its mouth at a short distance from the bottom of the tank, so that there is a free passage beneath it. *d* is a box or receptacle below the tank *a*, into

which the trumpet-like outlet end of the pipe *b'* dips. The outlet *e* is situated some distance above the bottom of the receptacle *d*, so that water always remains in the receptacle *d*, and into this water the pipe *b'* dips.

Fig. 2 shows the apparatus in another form, the pipe *b* itself being bent downward, in place of being covered by a bell. Its trumpet-mouth is channeled in the manner illustrated by Figs. 3 and 4, which are respectively an under side view and a section of the lower end of this pipe. These channels prevent the end of the pipe becoming uncovered. This is of importance where the tank *a* receives fat from a sink, which should not be allowed to pass at once into the drain. The fat floats on the water and remains in the tank. The channels in the mouth of the bell admit air to the siphon-pipe to recharge it.

Fig. 5 shows another form in which the fat or other floating matter is kept back by an outer bell or cylinder, *f*, open above and below, and this then serves as a support for the bell *b*².

To set up the siphon action a sudden escape of air in considerable quantity from *b b'* is requisite; otherwise the water may slowly dribble down the siphon-leg and the tank will not be emptied. The trumpet-mouthed outlet end insures the sudden escape of a considerable quantity of air, and the action may be explained as follows: The surface tension of the water prevents the air escaping immediately it is forced below the level of the lower end of the siphon, and it accumulates as a sort of inverted bubble. The larger the mouth of the pipe the larger this bubble, and the larger the quantity of air which suddenly escapes when the water is broken through. A large disturbance of this sort—such as is obtained by the use of the trumpet-mouth—is competent to start the siphon action, when a less disturbance would not, because not resulting in a sufficient flow of liquid down the siphon-pipe.

Fig. 6 shows the apparatus as arranged to meet the case of a very slow entry of liquid to the receiving vessel or tank *a*. The parts *a*, *b*, *b'*, *b*², *d*, and *e* are as in Fig. 1. *f* is a tube forming a communication between the interior and the exterior of the siphon-pipe. It is bent at its lower end to a U form, and this bend, becoming full of liquid, forms a trap somewhat less deep than the immersion of the lower end of *b'* in the box or receptacle *d*, and as the receiving vessel or tank *a* fills, the liquid is blown out of the bend in the pipe *f* before it can escape from the mouth of the siphon-pipe. *g* is also a small tube, providing an escape of air from the siphon. It terminates at its upper end above the level to which the liquid rises in

the vessel *a*, so that it is not liable to be stopped by floating bodies. The open lower end of this tube is so placed that the liquid may rise nearly to the top of the pipe *b* before the pressure causes the tube *f* to become untrapped. It will be seen that as the tank fills after the lower end of the tube *g* is covered the further rise of the water must compress the air in the upper part of *g* and in *b*, and that when the pressure rises to a certain point it blows the water out of the bend at the bottom of *f*, this being done before the water overflows the top of *b*, and before air escapes from the lower end of *b*, because the bend of *f* offers less resistance than the dip of *b* into the water at *d*. The outside water in *a* at this time is above the top of *b*. Consequently when the air escapes the water flows down and a siphon action is established. By this arrangement, however slow the inflow at a given point, the pressure within the siphon is suddenly relieved, liquid rushes in, and the siphon-like action is set up. The bend of the tube *f* becomes refilled during the delivery from the receiving vessel or tank *a*; but in some cases the suction might again empty it. I therefore provide upon it the pocket *f'*. (Shown to a larger scale at Fig. 7.) This pocket catches a portion of the liquid during the outward rush and allows it gradually to descend into the trap after the siphon-like action has ceased.

Having thus described the nature of my said invention and the manner of performing the same, I would have it understood that I claim as my improvements in flushing tanks or vessels for receiving water or liquid, and when full automatically discharging it—

1. The combination of the receiving vessel or tank *a*, the box or receptacle *d*, the fixed pipe *b b'*, dipping down into said receptacle, and the fixed bell *b*², substantially as and for the purpose set forth.

2. The combination, in an automatic flushing apparatus, of the receiving vessel or tank, the box or receptacle, and the siphon having the trumpet-like mouth or outlet end dipping into the liquid in said receptacle, substantially as and for the purpose set forth.

3. The combination of the receiving vessel or tank *a*, the box or receptacle *d*, the fixed pipe *b b'*, open at its lower end and terminating within said receptacle, the fixed covering-bell *b*², and the air-escape pipe having the bend or trap at its lower end, substantially as and for the purpose set forth.

WILLIAM BARTHOLOMEW.

Witnesses:

JNO. DEAN,

W. J. NORWOOD,

Both of 17 Gracechurch St., London.