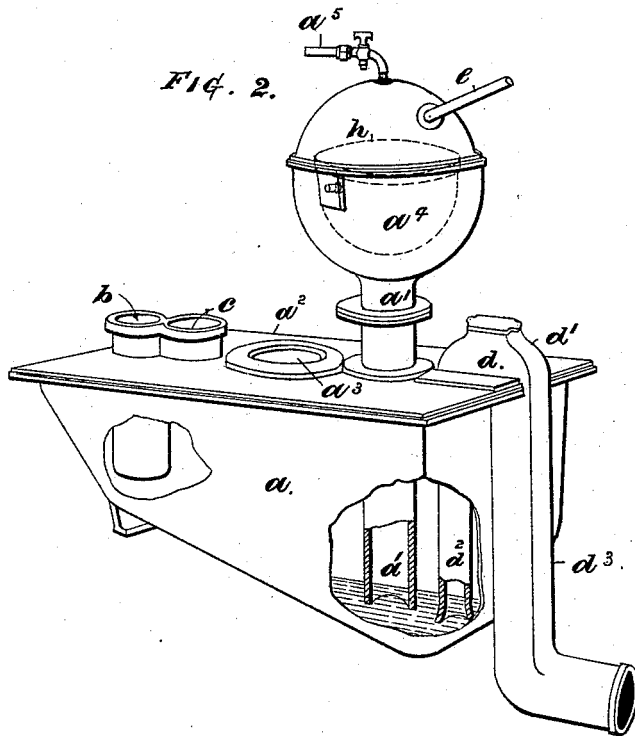
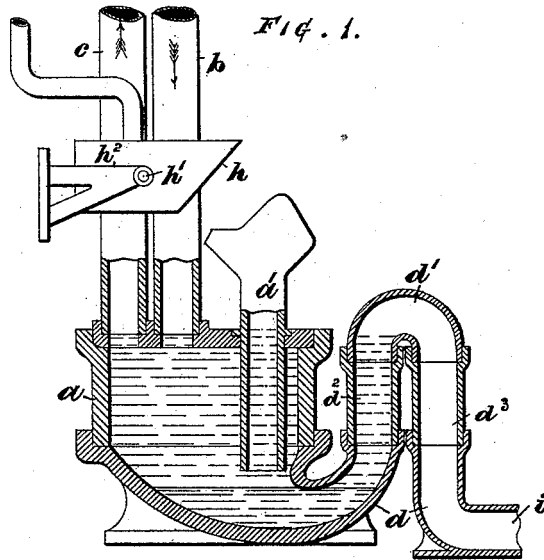


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No. 417,100.

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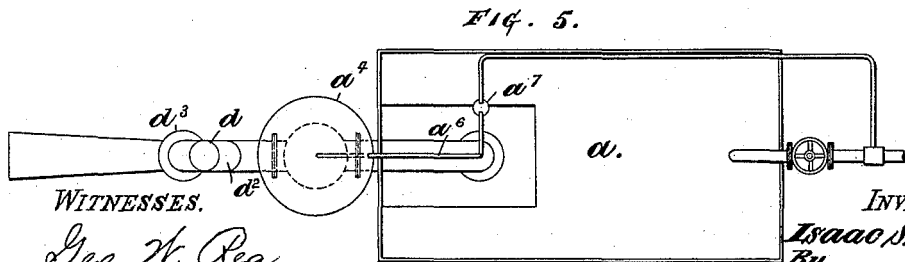
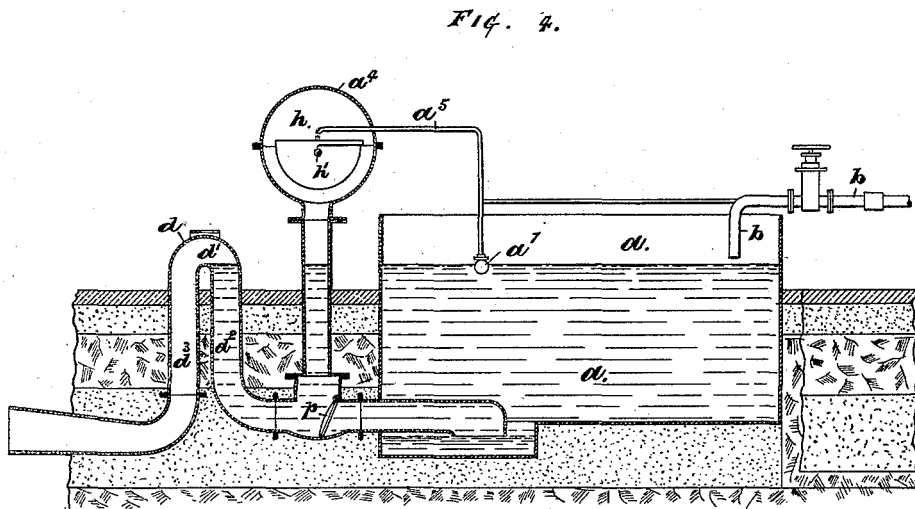
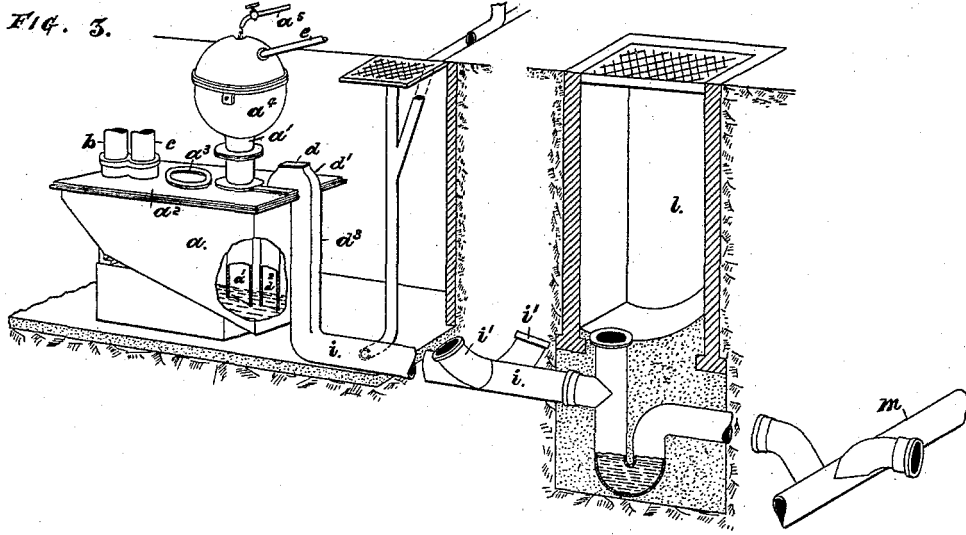
WITNESSES  
*Geo. H. Rea*  
*Robert Everett*

INVENTOR  
*Isaac Shone*  
 By *James E. Morris*

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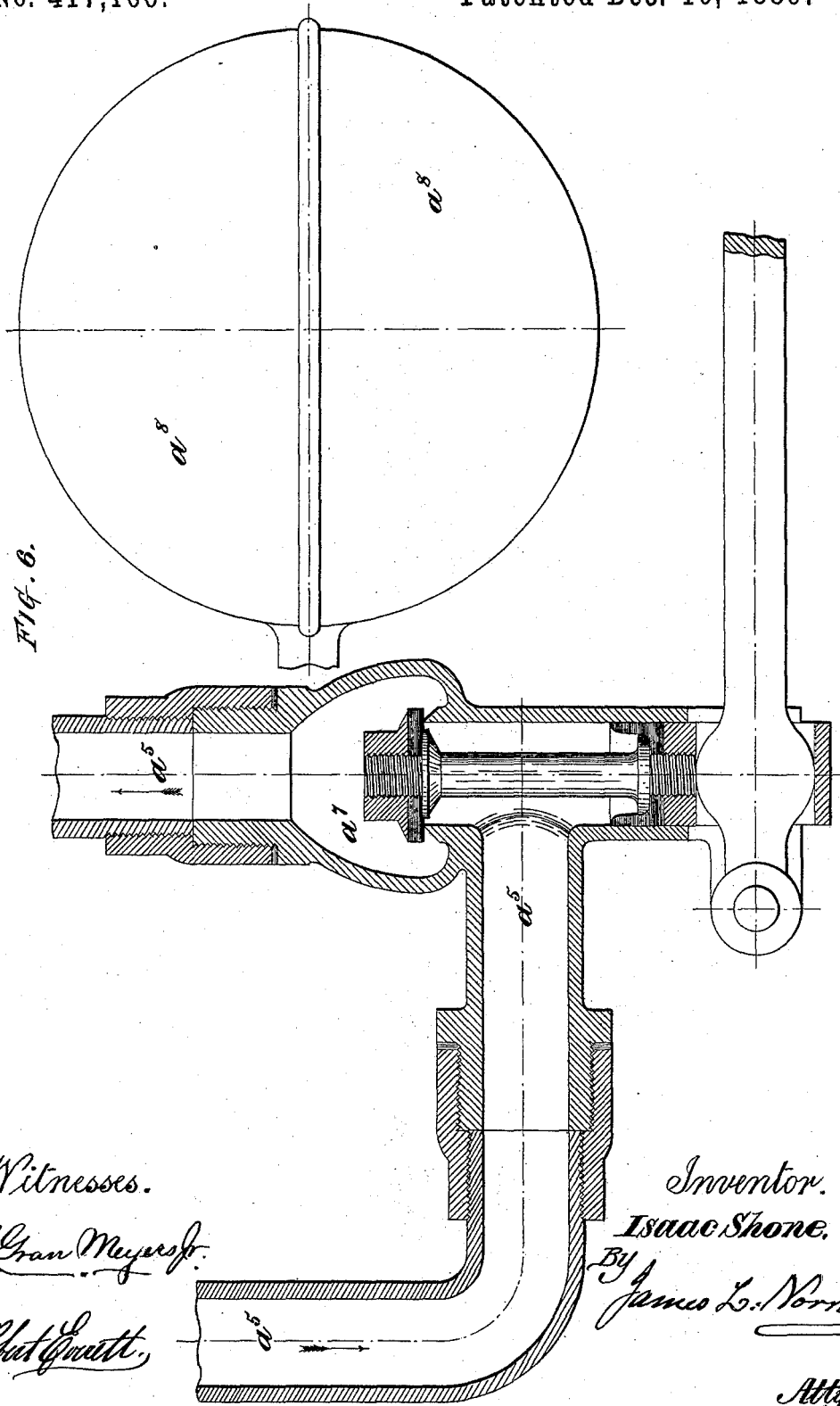


FIG. 6.

Witnesses.

*John Meyer*

*Albert Smith*

Inventor.

*Isaac Shone*

By *James L. Norris*

*Atty.*

# UNITED STATES PATENT OFFICE.

ISAAC SHONE, OF LONDON, ENGLAND.

## FLUSHING-TANK.

SPECIFICATION forming part of Letters Patent No. 417,100, dated December 10, 1889.

Application filed August 16, 1888. Serial No. 282,867. (No model.) Patented in England June 28, 1879, No. 2,624.

*To all whom it may concern:*

Be it known that I, ISAAC SHONE, a subject of the Queen of Great Britain, a resident at Great George Street Chambers, Parliament Square, London, England, have invented new and useful Improvements in Flushing-Tanks, (for which I have obtained a patent in Great Britain, No. 2,624, bearing date June 28, 1879;) and I do hereby declare that the following is a full, clear, and exact description of my invention sufficient to enable others skilled in the art to which it appertains or with which it is most nearly connected to make, use, and put the same into practice, reference being had to the two sheets of drawings, making a part of this specification, and to the letters and figures of reference marked thereon, which correspond with those used in the specification, like letters and figures being used to denote the same or corresponding parts throughout the various views and figures.

My invention has for its object certain improvements in and relating to that class of tanks, cisterns, or gulleys in which the siphon system of emptying is adopted, such tanks, cisterns, or gulleys being self-acting and automatically emptying as soon as a given level has been reached by the contents of the tank, cistern, or gully.

In the drawings, Figure 1 shows a sectional side elevation of a flushing-tank according to my invention for house-sewage. Fig. 2 shows a side elevation of another form of flush-tank for house-sewage according to my invention. Fig. 3 shows a side elevation, partly in section, of a flush-tank, as shown in Fig. 2, in connection with the house-drainage system. Fig. 4 shows a sectional side elevation of a flushing-tank for a main drain or sewer. Fig. 5 is a plan of the tank shown in Fig. 4, and Fig. 6 is a sectional elevation, drawn to an enlarged scale, of the valve employed in connection with the flushing-tank.

My invention consists in certain improvements hereinafter described in and in connection with siphon flushing-tanks, whereby such tanks are so charged or filled that the siphon is certain to discharge full bore the instant or immediately after the tank shall have become charged with liquid.

The principle of emptying flushing-tanks

by siphons has long been in use; but before my invention in tanks so emptied it has been found very often the case that when the tank fills slowly and evenly without agitation the contents are apt to dribble over the bend or lip of the siphon and thus destroy the flushing properties. This objection is overcome in my invention by the means which I adopt to charge and fill or assist to fill the tank, which means consist in the use for this particular purpose of a tipping basin or vessel arranged over or in an inlet or supply-pipe or contracted duct which opens into and feeds or assists to feed the tank. The tipping vessel is arranged in such a manner that the tank is filled or assisted to be filled by the intermittent tipping of the vessel, the vessel being of sufficient capacity to fill with its last charge the upper part of the tank and suddenly to raise the level of the liquid in the supply-pipe or contracted duct in excess of the capacity of the bend or lip of the siphon and so cause the siphon to discharge full bore the contents of the tank.

With reference to the drawings, Figure 1 shows a flush-tank designed to receive all domestic waste liquids, including the house-sewage. *a* is the body of the tank. *b* is the soil-pipe from the water-closet opening out direct into the tank *a*. *c* is a ventilating-pipe. *a'* is a funnel-shaped supply-pipe to the tank *a*. The tank *a* is made of glazed stoneware, and the bottom is formed on the "wash-out" principle, having a discharge-outlet which rises into and joins a siphon discharge-pipe *d*, which is brought up in a bend outside of the tank-body *a*. The long leg *d'* of the siphon discharge-pipe *d* is brought down below the level of the tank-body *a* and is connected to the house-drain *i*. *h* is a vessel, which is hung on trunnions *h'* between two brackets *h<sup>2</sup>*, the vessel *h* being so formed and hung by its trunnions *h'* that when the vessel *h* is filled or nearly filled with liquid the center of gravity of the whole vessel *h* is raised above and to one side of the axis or trunnions *h'* of the vessel and it naturally and automatically overbalances and discharges its contents. The tumbling or tipping vessel *h* is placed so as to discharge into the funnel supply-pipe *a'*, which has a sectional area about equal to the sectional area of the si-

phon-pipe  $d$  each time it overbalances. The capacity of the vessel  $h$  is such that when the tank-body  $a$  is charged with liquid the next discharge of the tumbling vessel  $h$  into the pipe  $a'$  will suddenly raise the level of the liquid in the pipe  $a'$  and the short leg  $d^2$  of the siphon  $d$  in excess of the capacity of the bend or lip of the siphon  $d$ , and so cause the siphon to discharge the contents of the tank  $a$  full bore into the drain  $i$ .

Figs. 2 and 3 show a flush-tank, also designed as a house-sewage flush-tank, but made of cast-iron and in one piece, and provided with a cover  $a^2$  to the body  $a$ . The sewage-inlet or soil-pipe  $b$ , the ventilating-pipe  $c$ , the funnel supply-pipe  $a'$ , and the short leg  $d^2$  of the siphon discharge-pipe  $d$ , all pass through this cover  $a^2$ , which is also provided with a man-hole and cover  $a^3$ , through which access can be had to the tank  $a$ . The sewage-inlet pipe  $b$ , the funnel-pipe  $a'$ , and the short leg  $d^2$  of the siphon  $d$  are all brought nearly to the bottom of the tank  $a$ , and the two latter are trapped by the liquid in the tank, which is made deeper at one end for this purpose. The funnel-pipe  $a'$  is provided with a spherical head  $a^4$ , within which the tumbling vessel  $h$  is hung on trunnions  $h'$ , as shown in dotted lines. The tumbling vessel  $h$  is fed by a small stream direct from a water-service pipe  $a^5$ , or by sink, lavatory, or bath wastes through the pipe  $e$ . The tank  $a$  is filled with house-sewage through the soil-pipe  $b$ . The water-supply from the pipe  $a^5$  or lavatory-wastes from the pipe  $e$  flow into the tumbling vessel  $h$  in the funnel-pipe  $a'$ , and when the vessel  $h$  is filled it suddenly cants over and discharges its contents into the funnel-pipe  $a'$ , (entering the tank  $a$ .) The effect of this action is to start the siphon  $d$  into operation by suddenly filling its bend  $d'$ . The siphon  $d$  continues its action until the tank is emptied, when the entrance of air into its short leg stops its working. The flush-tank  $a$  acts also as a perfect trap between the house and the drain or sewer  $i$ , and is ventilated by the pipe  $c$ . Its use in connection with house-drainage will be apparent by reference to Fig. 3. In this figure there is shown the connection of the tank  $a$  with a gravitating sewer  $m$  in the street. It will be seen that the house-drain  $i$  connects with tributary drains  $i'$  and leads to a ventilated man-hole  $l$  and then joins the street-sewer  $m$ . In this case the supply to the tumbling vessel  $h$  may be by a water-service through the pipe  $a^5$ , or from the sink-slops and lavatory or bath wastes through the pipe  $e$ . If desired, the tumbling vessel  $h$  may be fed solely by the water-service pipe  $a^5$ , and the sink-slops taken direct to the house-drain through the pipe  $e'$ . The adoption of the flushing-tank  $a$  in connection with house-drainage confers advantages that cannot be overestimated, inasmuch as it utilizes the sewage proper of the house as a means of cleans-

ing and keeping clean the pipe leading to the street-sewer.

Figs. 4 and 5 show a flush-tank, with the siphon discharge-pipe  $d$  and funnel-shaped pipe  $a'$  and tumbling basin  $h$  provided outside the tank-body  $a$ . The tank  $a$  is fed with water or other liquid or sewage through the pipe  $b$ . The tumbling vessel  $h$  is supplied with water by means of the service-pipe  $a^5$ , and comes into action only when the tank  $a$  is filled to the required level. The supply is opened and closed by a valve or cock  $a^7$ , which is actuated by a float. This float is placed in the tank  $a$  at the level to which the liquid is to rise in it before it is flushed out. This float and valve or cock may be of any known kind, which, when raised by the rise of level of the water in a tank, opens a valve, and when such level falls closes it. Between the funnel-pipe  $a'$  and the tank  $a$  there is a non-return valve  $p$ , which prevents the liquid from the funnel-pipe  $a'$  entering the tank-body  $a$  when the tumbling basin  $h$  tips over. Thus the siphon  $d$  is sure to fill and start full bore and continue until the contents of the tank  $a$  are discharged, and the tank can be discharged at any level by setting the float-valve to act at that level.

The detail of the valve  $a^7$  and its float is shown in Fig. 6. As before stated, the valve  $a^7$  is placed in the tank with its float  $a^8$  on a float-lever set at the level to which the liquid is to rise in the tank before it is flushed out. The auxiliary water-service pipe  $a^5$  will in practice connect with a water-main, and is used to charge the tumbling basin  $h$  when the liquid in the tank  $a$  has reached the level at which it is to be discharged. The valve  $a^7$  is brought into action by the float  $a^8$  being lifted. When the liquid in the tank  $a$  reaches the level at which the float  $a^8$  is set, then the valve  $a^7$  opens by the rising of the float  $a^8$  and float-lever, the water flows through the pipe  $a^5$  and charges the tumbling basin  $h$ , which, when full, tips over, and thus starts the siphon  $d$ . As the liquid in the tank  $a$  is discharged, the float  $a^8$  and float-lever fall and close the valve  $a^7$ , which remains closed until the tank  $a$  is again filled.

An apparatus constructed according to my invention can be used with great advantage for flushing sewers or drains at their heads or sources. The apparatus may be supplied with liquid by a branch from the sewer itself or with water from a main or otherwise, which water may be slowly running into the flush-tank, which when full will flush the sewer or drain. The flow of water may be so arranged as to flush the sewer or drain a given number of times during the day or other period of time. Thus a constant automatic flushing of the sewer or drain is obtained, which can be applied to any gravitating or other system of sewerage.

I do not broadly claim the combination of a tilting tank with a siphon which is charged

and brought into action by the tilting of the tank when full. My invention involves a novel construction and combination of devices for improving the efficiency of this type of flushing-tanks. It will be observed that according to my invention I provide an internal supply-pipe having an enlarged head and a lower portion of contracted area, the contracted area extending above the bend of the siphon, whereby the siphon is sure to start on the least tip of the tumbling vessel when the tank is full. The cubic capacity of the tumbling vessel is greater than that of the top bend of the siphon at the other end of the tank, and whenever the latter has been filled up to the level of the inside of the siphon-bend any more sewage entering the tank from the contributory sewers will of course fall down the longer leg of the siphon and find its way to the sewer at the same rate as it enters the tank; but at the next oversetting of the tumbling box a head of water is momentarily raised in the contracted area of the supply-pipe, which is sufficient to fill the upper bend of the siphon and inevitably set the latter in continuous action until the whole tankful of sewage has been discharged at the high velocity beginning with that due to the height of the upper end of the filled tank above its point of exit into the sewer requiring to be flushed.

In my invention it will be seen that means are provided for filling or charging the tank independently of the tumbling vessel, and that the tumbling vessel is only used to start the siphon; and, further, my flushing-tank is arranged for flushing sewers, and, through the contracted supply-pipe, is positive in ac-

tion. Ninety per cent. of the supply to the tank may be sewage proper, and ten per cent. may be water from a water-main or from a rivulet or other costless source.

The water-tap may be so adjusted as to afford the impulse necessary to discharge the flushing-tank as frequently or as seldom as may be required with the smallest possible expenditure of clean water from the street-main, and all the benefits of periodical flushing may thus be obtained by means of only a very small percentage of the clean water, which is often wasted in order to attain this object.

What I claim is—

1. The combination, with a flushing-tank, a discharge-siphon therefor, and a tumbling vessel, of a supply-pipe comprising an enlarged head located above the highest part of the siphon and a lower portion of contracted area extending downward from the enlarged head, substantially as described.

2. The combination of a flushing-tank, a discharge-siphon, a tumbling vessel, a service-pipe for the tumbling vessel, an independent service-pipe for charging the tank, and a supply-pipe comprising an enlarged head located above the highest part of the siphon, and a lower portion of contracted area extending downward from the enlarged head, substantially as described.

ISAAC SHONE.

Witnesses:

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