

UNITED STATES PATENT OFFICE.

SIDNEY W. MILLER, OF PASADENA, CALIFORNIA.

FLUSH-TANK.

SPECIFICATION forming part of Letters Patent No. 449,083, dated March 24, 1891.

Application filed August 7, 1890. Serial No. 361,399. (No model.)

To all whom it may concern:

Be it known that I, SIDNEY W. MILLER, a citizen of the United States, residing at Pasadena, in the county of Los Angeles and State of California, have invented a new and useful Improvement in Flush-Tanks and Analogous Devices, of which the following is a specification.

My invention relates to flush-tanks and analogous devices in which charges of water or other liquids are discharged intermittently through a siphon.

The object of my invention is to dispense with all except a few of the parts heretofore employed, and to make a cheaper and simpler flush-tank without decreasing the efficiency.

A further object of my invention is to enable the operator to wholly apply the flush-tank when desired and also to provide means for establishing the seal.

My invention relates to that class of flush-tanks operating without mechanical movements.

My device differs from devices of this class in that whereas heretofore the discharge-siphon has been brought into action either by the release or by the rarefaction of the air confined in the siphon, my siphon is brought into action by suddenly reducing the length of the column of water in the discharge-limb of the siphon—that is to say, in the siphon of such devices the water in the reservoir is balanced by the column of water in the seal of the discharge-limb of the siphon, and action of the siphon has heretofore been induced by a gradual release or rarefaction of the air confined in the siphon, or by a sudden removal of such air, thereby creating a partial vacuum within the siphon and allowing a discharge of water from the reservoir into and through the siphon. In my device instead of inducing action by such removal or rarefaction of the air in the siphon, I suddenly remove from the seal of the siphon a sufficient amount of water to so shorten the column of water therein that it no longer counterbalances the column of water in the reservoir, which is therefore permitted to flow through the siphon.

By employing this mode of operation I am enabled to considerably simplify and cheapen the device, and at the same time produce a

sensitive siphon more efficient and more reliable than heretofore known.

My invention comprises the combination of a reservoir, a siphon having a trapped heavily-sealed discharge-pipe, and means for suddenly removing from the seal a sufficient quantity of water to so shorten the column of water therein that it will cease to counterbalance the column of water in the reservoir limited between the plane at which the air within the siphon becomes confined by the rising water and the level of the latter at the time when said removal of water from the seal takes place.

I have discovered that efficient automatic intermittent action of the flush-tank will be secured if the tank is provided with a trapped heavily-sealed discharge-pipe provided with an ascending intaking-limb, said intaking-limb having between the receiving-mouth of the discharge-limb and the water-level of the reservoir at which the air within said intaking-limb and discharge-limb becomes confined a capacity approximately equal to but preferably somewhat greater than the capacity of that portion of the efficient seal of the trap adjacent to the intaking-mouth of the discharge-limb, and limited between the upper level of the water within the trap and a vertical plane passing through the lowest point of said trap, and having the discharge end of the discharge-limb of the trap so constructed as to allow ample overflow for the water from the trap which is forced up and raised above the mouth or overflow of said discharge end by the ascending air escaping from within the siphon, said overflow being made most effective when said discharge end is allowed to project wholly and freely into space.

My invention is illustrated by the accompanying drawing, in which the figure is a vertical mid-section of the preferred form of my improved flush-tank.

One modification of the vent or siphonage-breaking device is shown in dotted lines.

A is the reservoir or tank proper.

B is the inflow or feed pipe.

C is the trapped discharge-pipe provided with the seal D.

E is the intaking-limb.

a is the receiving-mouth of the discharge-limb.

F is the siphon-breaking device.

d is the discharge end of the discharge-limb.

For convenience of explanation, the modified forms of the various parts are designated by the same letter as that used to designate the preferred form, and are distinguished by indices indicating the order of preference I give them.

The siphonage-breaking device consists, preferably, of an **S**-pipe *F*, arranged with one end opening into the reservoir or tank proper slightly above the mouth of the intaking-limb and its other end opening into the discharge-pipe below the lowest bend of the **S**, but it may consist of the inverted-**U** pipe *F'*, with one end opening into the reservoir slightly above the mouth of the intaking-limb and with its other end opening into the discharge-pipe below such mouth of the intaking-limb. *I* is an auxiliary siphon designed to be used by itself or in connection with the **S** siphon *F* or **U**-siphon *F'*. It is of inverted-**U** shape, with one end opening into the reservoir below the mouth of the intaking-limb and below the level of the sealing-mouth of the **S**-siphon, while the other end opens into the discharge-limb below this level.

The discharge end *d* of the discharge-pipe *C* extends upward into and terminates above the floor of the **T** branch *J* or similar vessel, closed at one end, and which may be cast integral with the discharge-pipe or may be part of the sewer.

M is a drain and trap supply-pipe leading from the plug-hole *N* in the bottom of the tank proper through the top *T*, branch *J*, and opening directly above the open discharge-mouth of pipe *C*.

O is the plug for closing the plug-hole.

P is the chain by which it is handled.

The operation is as follows: Water is allowed to flow into the tank proper through pipe *B*, and plug *O* is kept removed until the trap is filled with the water seal. Then the plug is inserted, and water being allowed to continue to flow into the reservoir or tank proper in a regulated stream the reservoir fills until the water rises to the open end or mouth *b* of the siphonage-breaking device, thus sealing such mouth, and thus preventing the discharge of air through such device. The rising water will compress the air confined between the water in trap and the water in the intaking-limb and will slowly force the water of the seal to discharge into the sewer until the depth of seal remaining will be somewhat less than the depth of water above the mouth *b* of the siphonage-breaking device *F*. While the seal-water is receding before the air the water in the intaking-limb is rising to supply the vacuum thus formed. The quantity of water rising in the intaking-limb is practically equal to the quantity of seal-water displaced. When the efficient seal of the trap becomes less in depth than the depth of water

above the mouth *b* of the siphon-breaking device *F*, the remaining water seal or a portion thereof is forced out by the sudden escape of a large amount of air and the tension of the air in the intaking-limb is thus relieved, and the water in the reservoir or tank proper is forced through the discharge-pipe until the reservoir is emptied to a level below the sealing-mouth *b* of the siphonage-breaking device. When the level of water falls below this mouth, air is drawn into the discharge-pipe and the flow of water ceases, while the water rises as before until the operation described is repeated.

In order to secure absolute and positive action I prefer to employ the supplementary or auxiliary siphon *I*, which operates invariably to draw the water out of the tank to a point below the sealing-mouth *b*.

The drawing is made on a scale of one to ten and is designed to show a four-inch discharge-limb with an efficient seal of about twenty inches. The intaking-limb is twelve inches in diameter and the receiving-mouth of the discharge-limb is about four inches above the low-water level *L*.

If the discharge end of the discharge-limb of the trap is not so constructed as to allow ample overflow for the immediate and efficient escape of that water from the trap which is forced up and raised above the mouth or overflow of said discharge end by the ascending air escaping from within the siphon, the amount of water (if any) ejected from the trap is insufficient to cause the siphon to come into action, since the vacuum created by the escape of a portion of the confined air is too readily supplied by the water from the trap and reservoir without disturbing materially the levels of the water within the trap and the reservoir; but when the overflow is made ample enough to allow the immediate escape of that water which is heaved and blown up by the sudden escape of large bubbles of air (as is provided in the device shown by allowing the discharge end to project freely into space) the column of water thus shortened which remains in the trap after the escape of such bubbles is insufficient to balance the water in the reservoir, which during this operation remains practically at the same height above the mouth of the intaking-limb, and the siphon is therefore brought into action.

Now, having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination of a reservoir, a siphon having a trapped heavily-sealed discharge-pipe, and means for suddenly removing from the seal a quantity of water for the purpose of starting the siphon into action.

2. The combination of a reservoir, a siphon having a trapped heavily-sealed discharge-pipe, and means for suddenly removing from the seal a sufficient quantity of water to so shorten the column of water therein that it will cease to counterbalance the column of

water in the reservoir limited between the plane at which the air within the siphon becomes confined by the rising water and the level of the water in the reservoir at the time when said removal of the water takes place.

3. The combination of a reservoir and a siphon comprising a trapped heavily-sealed discharge-pipe provided with an ascending intaking-limb having between the receiving-mouth of the discharge-limb and the water-level of the reservoir at which the air within said intaking-limb and discharge-limb becomes confined a capacity greater than the capacity of that portion of the efficient seal of the trap adjacent to the intaking-mouth of the discharge-limb and limited between the upper level of the water within the trap and a vertical plane passing through the lowest point of said trap.

4. The combination of a reservoir and a siphon comprising a trapped heavily-sealed discharge-pipe provided with an ascending intaking-limb having between the receiving-mouth of the discharge-limb and the water-level of the reservoir at which the air within said intaking-limb and discharge-limb becomes confined a capacity greater than the capacity of that portion of the efficient seal of the trap adjacent to the intaking-mouth of the discharge-limb and limited between the upper level of the water within the trap and a vertical plane passing through the lowest point of said trap, the discharge end of the discharge-limb of the trap being so constructed as to allow ample overflow for the immediate and efficient escape of that water from the trap which is forced up and raised above the mouth or overflow of said discharge end by the ascending air escaping from within the siphon.

5. The combination of a reservoir, a siphon comprising a trapped heavily-sealed discharge-pipe provided with an ascending intaking-limb having between the receiving-mouth of the discharge-limb and the water-level of the reservoir at which the air within said intaking-limb and discharge-limb becomes confined a capacity greater than the capacity of that portion of the efficient seal of the trap adjacent to the intaking-mouth of the discharge-limb and limited between the upper level of the water within the trap and a vertical plane passing through the lowest point of said trap, and the T branch or similar vessel with the discharge end of the discharge-pipe projecting freely above the floor thereof.

6. The combination of the reservoir, the siphon comprising the trapped heavily-sealed discharge-pipe provided with an ascending intaking-limb having between the receiving-mouth of the discharge-limb and the water-

level of the reservoir at which the air within said intaking-limb and discharge-limb becomes confined a capacity greater than the capacity of that portion of the efficient seal of the trap adjacent to the intaking-limb and limited between the upper level of the water within the trap and a vertical plane passing through the lowest point of said trap and the siphon-breaking device.

7. The combination of the reservoir, the siphon comprising the trapped heavily-sealed discharge-pipe provided with an ascending intaking-limb having between the receiving-mouth of the discharge-limb and the water-level of the reservoir at which the air within said intaking-limb and discharge-limb becomes confined a capacity greater than the capacity of that portion of the efficient seal of the trap adjacent to the intaking-limb and limited between the upper level of the water within the trap and a vertical plane passing through the lowest point of said trap, the siphonage-breaking S-pipe arranged with one end opening into the reservoir slightly above the mouth of the intaking-limb and its other end opening into the discharge-pipe below the lowest bend of the S.

8. The combination of the reservoir, the siphon comprising the trapped heavily-sealed discharge-pipe provided with an ascending intaking-limb having between the receiving-mouth of the discharge-limb and the water-level of the reservoir at which the air within said intaking-limb and discharge-limb becomes confined a capacity greater than the capacity of that portion of the efficient seal of the trap adjacent to the intaking-limb and limited between the upper level of the water within the trap and a vertical plane passing through the lowest point of said trap, and the siphonage-breaking S-pipe arranged with one end opening into the reservoir slightly above the mouth of the intaking-limb and its other end opening into the discharge-pipe below the lowest bend of the S, and the auxiliary siphon having one end opening from the intaking-limb below the level of the sealing-mouth of the S, as set forth.

9. The flush-tank comprising the T branch of the sewer-pipe closed at one end and sloping therefrom, the trapped discharge-pipe having its discharge end extending upward into and terminating above the floor of such T branch, the drain and trap supply pipe leading from the bottom of the tank proper through the T branch and opening directly above the mouth of the discharge-pipe, and plug and chain.

SIDNEY W. MILLER.

Witnesses:

JAMES R. TOWNSEND,
ALFRED I. TOWNSEND.