T. HOUSTON.

Drain-Cistern.

No. 213,886. Patented April 1, 1879.

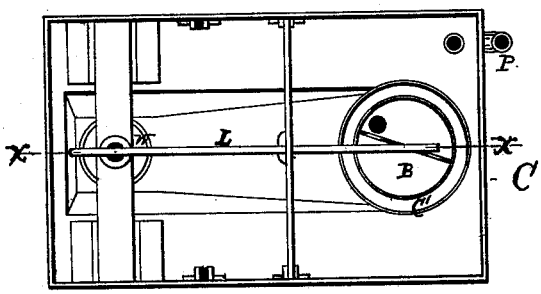

Fig. 1.

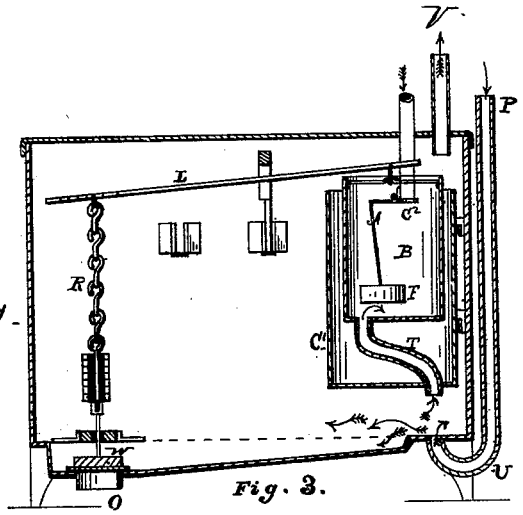

Fig. 3.

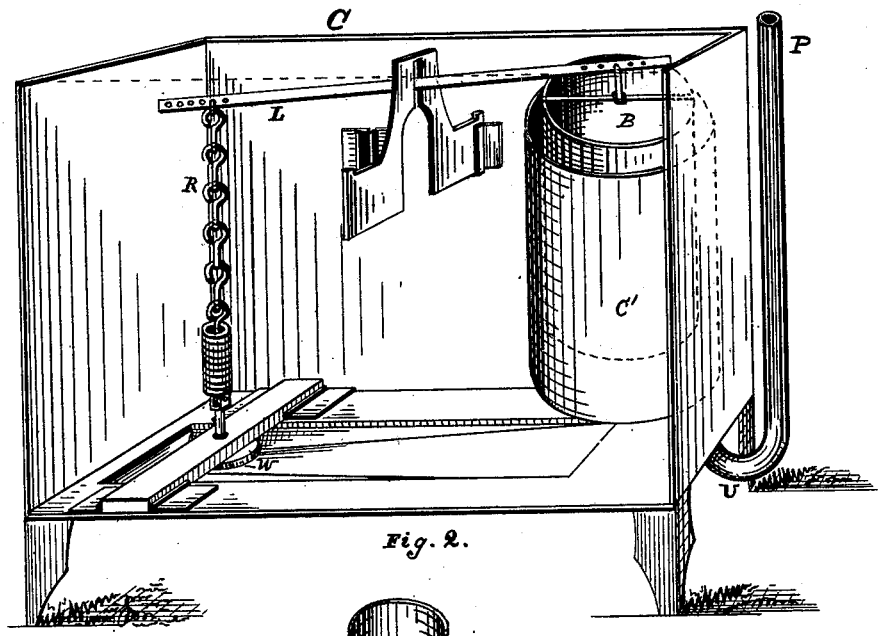

Fig. 2.

Fig. 4.

Witnesses:

Theodore R. Shear.

George A. Hammel

Inventor:

Thos. Houston

UNITED STATES PATENT OFFICE.

THEODORE HOUSTON, OF MONT CLAIR, NEW JERSEY.

IMPROVEMENT IN DRAIN-CISTERNS.

Specification forming part of Letters Patent No. **213,886**, dated April 1, 1879; application filed July 9, 1878.

To all whom it may concern:

Be it known that I, THEODORE HOUSTON, of Mont Clair, in the county of Essex and State of New Jersey, have invented a new and useful Improvement in Drain Cisterns or Reservoirs and Traps, for the periodical discharge of sewage, of which the following is a specification:

My invention relates to tanks, cisterns, or reservoirs for collecting and holding sewage for a time, to be discharged at intervals or intermittently, as required, and also to the devices for accomplishing the same.

Heretofore drain-cisterns have been made so as to discharge their contents at intervals, and according to two different systems, as follows: first, by means of a siphon introduced into the cistern, with its short limb extending nearly to the bottom of the cistern, passing up and over the side of the same, and continuing in the usual long limb extension outside of the cistern to the sewer; second, by means of an outlet in the bottom of the cistern provided with a valve and valve-stem intended to be lifted by hand at intervals. The first of these systems is objectionable, for the reason that it will not perfectly discharge the more solid contents of the cistern, and is otherwise generally feeble and somewhat uncertain, and is not positive in its action. The second is open to the objections of requiring personal attention for the purpose of opening the valve and discharging the contents of the cistern, and consequent liability to neglect.

The object of my invention is to provide a system of drain cisterns, tanks, or reservoirs, which shall be automatic in its action, and permit the discharge of both the fluid and the more solid contents of the cistern as completely as may be desired.

The invention consists in a drain-cistern provided with an outlet and outlet-valve operated automatically at intervals to discharge its contents by means of a balance-bucket to which the fluid contents of the cistern are admitted and from which they are discharged automatically as the cistern is filled and emptied, respectively; and it also consists in the devices and combinations of devices employed for performing the required functions automatically at intervals, as set forth in the several claims attached hereto.

In the accompanying drawings, in which similar letters of reference indicate like parts, Figure 1 is a top view of the tank or cistern and interior devices with the top removed. Fig. 2 is a side view with the front side removed. Fig. 3 is a vertical and sectional view on the line *x x*, Fig. 1. Fig. 4 is a vertical sectional view of the inner box or cistern for operating the weighted outlet-valve, showing its inlet and outlet aperture partially closed by a rubber time-valve.

C is the cistern, tank, or reservoir, and should be located between the house or building and street or outdoor drains, so as to receive the flow from the former through the inlet-pipe P, and, after holding it for a time, discharge its contents into the street or outside drains through the outlet O.

The cistern should, wherever possible, be made solid or continuous throughout, except as to the necessary inlets and outlets and openings for necessary access to the working parts, and preferably of glazed pottery, so as to absorb as little objectionable matter from the sewage as possible.

The bottom of the cistern is shown as sloped from a point near the inlet-aperture of the pipe P to the outlet-aperture O, the object of which is to facilitate the passage of the sewage, especially the more solid parts, out of the cistern, but the bottom may be made flat.

The inlet-pipe is trapped by the trap U, or any suitable trap, and connects with the tank at or near its bottom, so that its outlet may be constantly covered by water, and thereby have the protection of the contents of the tank to prevent the passage of sewer-gas into the house-pipes. The inlet being at the bottom, the tendency of the gas is to find outlet away from rather than in the direction of the house-pipes. The cistern C is ventilated at top by means of a pipe, V, which should extend far enough to conduct any gas therefrom to some place where it can do no harm.

As thus arranged the cistern becomes a trap as well as a cistern, through or from which gas can only pass into the ventilating-flue V in the top. The outlet O has the weighted valve W

fitted tightly thereto. This valve may be made in any known and suitable way to close the outlet O, and hold the drainage flowing from the house-pipes into the cistern C as a receptacle until it is discharged at the proper time by the operation or opening of the valve W, in a manner to be described hereinafter. The outlet O leads into or toward the external system of pipes and drains, which may be trapped near the tank with advantage in some instances where the pressure of the sewer-gas toward the tank is such as to require traps to hold it back, and such traps may be ventilated into the tank-ventilating pipe V, if desired.

The valve W is connected by means of a valve chain or rod, R, with a lever, L, which may be graduated for adjustment. The lever L is suspended near the top of the cistern, and connects the weighted valve W with a bucket, box, or movable cistern, B, which, at the proper time, is intended to become so filled with the sewage-water from the tank as to more than counterbalance the weighted valve W and the weight of the column of sewage-water over the same, and thereby open the outlet O, permit the discharge of the contents of the cistern C through the same, while its own contents are more slowly discharged or emptied back into the tank, thus eventually permitting the weighted valve W to again overcome the weight of the suspended bucket B when sufficiently emptied, and close the outlet O preparatory to the repetition of the operation. The weight of the bucket B and its contents may be brought to bear upon the valve W in other equivalent ways; but I prefer that shown, because by using glass in the upper part of the cistern C, I can at any time examine and ascertain the working condition of the operating parts. C^1 is an air cistern or tank, placed at one end of the main cistern C, and so constructed as to carefully prevent the entrance of the fluid contents of the cistern C into it, but provided with an aperture in its bottom, which is connected with an aperture in the bottom of the movable cistern or bucket B.

The function performed by the cistern C^1 consists chiefly, if not entirely, in the exclusion of the fluids in the tank C from all contact with the outside of the bucket or cistern B, in order that the latter may be free to move up and down in operating the valve W.

The two apertures in the bottoms of C^1 and B are connected by the flexible tube T, the function of which is to admit the passage of fluids from the main cistern C into the movable cistern B as they rise in the former, while preventing the passage of the same into the air-cistern C^1. As the fluids rise, therefore, in the cistern C they, on reaching its level, begin to pass through the flexible tube T into the bucket B, and when the weight of its contents is sufficient for the purpose the valve W will be lifted through the lever L by the dropping of B in the chamber C^1. If C^1 contained water the desired result would not come to pass; but as air only lies between the bottoms of C^1 and B, the weight of its contents depresses B at the proper time and causes the valve W to rise.

When the bucket B is sufficiently emptied to allow the weighted valve W and rod R to overbalance it the valve will drop to its seat, the bucket B will rise, and the parts will be ready for a repetition of the operation.

The tube T, or the outlet or inlet thereof, should be so much less than the outlet O in diameter as to delay the emptying of B, while that of C takes place as speedily as possible. This object may be accomplished by using a flexible tube, T, of a larger size, and controlling the escape of the contents of B by means of a valve like the rubber ball B′, which does not fit the outlet O′ tightly, but may have spaces left between it and the outlet of any dimensions required to accomplish the desired purpose.

A hollow ball-valve made of rubber or other suitable material will be lifted up by the incoming fluid, so as to increase the size of the opening; but as the current flows in the other direction it will cause the ball-valve to drop, and thus delay the outflow of the contents of the bucket B long enough to allow the contents of the cistern C to escape.

Instead of the flexible tube T, a jointed tube may be substituted, or any known kind of flexible tubing. It may, in some instances, be advisable to have auxiliary means to fill and operate the bucket B, or means to operate it entirely independent of the weight of the original contents of the cistern C. This I provide by introducing through the top of the cistern C, or directly over the bucket B, the auxiliary water-pipe of the supply system of pipes, with a cock, C^2, connected to a float, F, placed inside of the bucket well toward the bottom by an arm, A, so that on the admission of a small amount of fluid matter into the bucket through the flexible tube T the float will begin to move the cock C^2, and eventually open it, causing such a supply of water to fall into the bucket B as to insure its acting upon and overcoming the valve W, thereby discharging the contents of the cistern C.

I do not intend to confine my invention to the use of the particular form of valve shown and marked W, but contemplate the use of any other suitable valve in place thereof.

I consider it desirable, however, to close the outlet O as perfectly as possible against the entrance of gas from the outside system of pipes, &c., for the purpose of limiting the amount of gas in the tank C to be taken care of.

For this purpose, in addition to the ordinary traps placed in the outside pipes, I prefer to so time the discharge of the contents of the bucket B that the last of it will flow down around and over the same, thereby helping to seal the valve-joint. This may be accomplished by so weighting the valve and valve-rod that they will counterbalance the bucket B, and, in addition, a sufficient amount of its contents

for the purpose, which will continue to flow into the cistern C after the valve is closed and until the bucket is empty.

The outlet O, being made larger than the tube T, or the apertures in C^1 and B, will facilitate this desired result, and as the tank C fills from the house-pipes through the pipe P, the weight of the water increasing gives increased protection. The frequency of discharge of the contents of the cistern C will depend of course upon its size and the amount of flow; but the period during which gas can be forced from the sewers back toward the house-pipes will be limited to the times when the cistern has just been emptied, and for the escape of all such gas, as well as of all gas generated in the cistern itself, ample provision is made by the ventilating-pipe V.

The whole top of the cistern C, or any part thereof, may be left free from all inlet or outlet pipes or apertures, may be hinged at one side, and may be made to drop upon or into contact with rubber packing of any suitable kind, secured to or in the top edge of the cistern, for the purpose of giving sufficient access to the cistern to repair or adjust the operating devices, while, on being closed, a perfectly tight joint will be made, so as to prevent the escape of gas from the cistern.

I also contemplate locating a float, as F, outside of the bucket B and in the cistern C, so as to be moved by its contents, and caused to operate the cock C^2. This may be used as an auxiliary to guard against any danger from clogging of the inlets of B, and to insure the operation of the bucket and the opening of the outlet O.

Instead of the cylindrical air-cistern C^1, I contemplate placing a tight partition at one end of the cistern C, without which the bucket B, made in any desirable form, may be placed in substantially the same relations as previously shown and described.

I claim as my invention—

1. A drain-cistern provided with an outlet and outlet-valve opened automatically at intervals to discharge the contents of the cistern by means of the weight of the fluid contents of the cistern admitted to a balance-bucket connected with the valve by a lever.

2. A drain-cistern provided with an outlet and outlet-valve opened automatically at intervals to discharge by means of the weight of the fluid contents of the cistern admitted to a balance-bucket connected with the valve by a lever, and closed automatically at intervals to retain the contents of the cistern, after the fluid contents of the cistern, which have been admitted to the balance-bucket, have passed back into the cistern.

3. A drain-cistern provided with an outlet and outlet-valve at or near its bottom, operated intermittently and automatically to open and close the same by means of a balance-bucket and the weight of fluid contents admitted to and allowed to escape therefrom, in the manner and for the purposes specified.

4. The movable cistern or bucket B and the stationary air-cistern C^1, in combination, the former being placed within the latter, and attached by means of a balance-lever to the valve W, for the purposes named.

5. The cisterns C, C^1, and B, in combination, C being provided with the outlet O and weighted outlet-valve W, B being connected to the valve W, by means of the lever L, and located within the air-cistern C^1.

THEO. HOUSTON.

Witnesses:
THEODORE R. SHEAR,
GEORGE A. HAMMEL.