(No Model.) 2 Sheets—Sheet 1.

J. J. POWERS.

APPARATUS FOR TREATING SEWAGE.

No. 499,583. Patented June 13, 1893.

Fig. 1

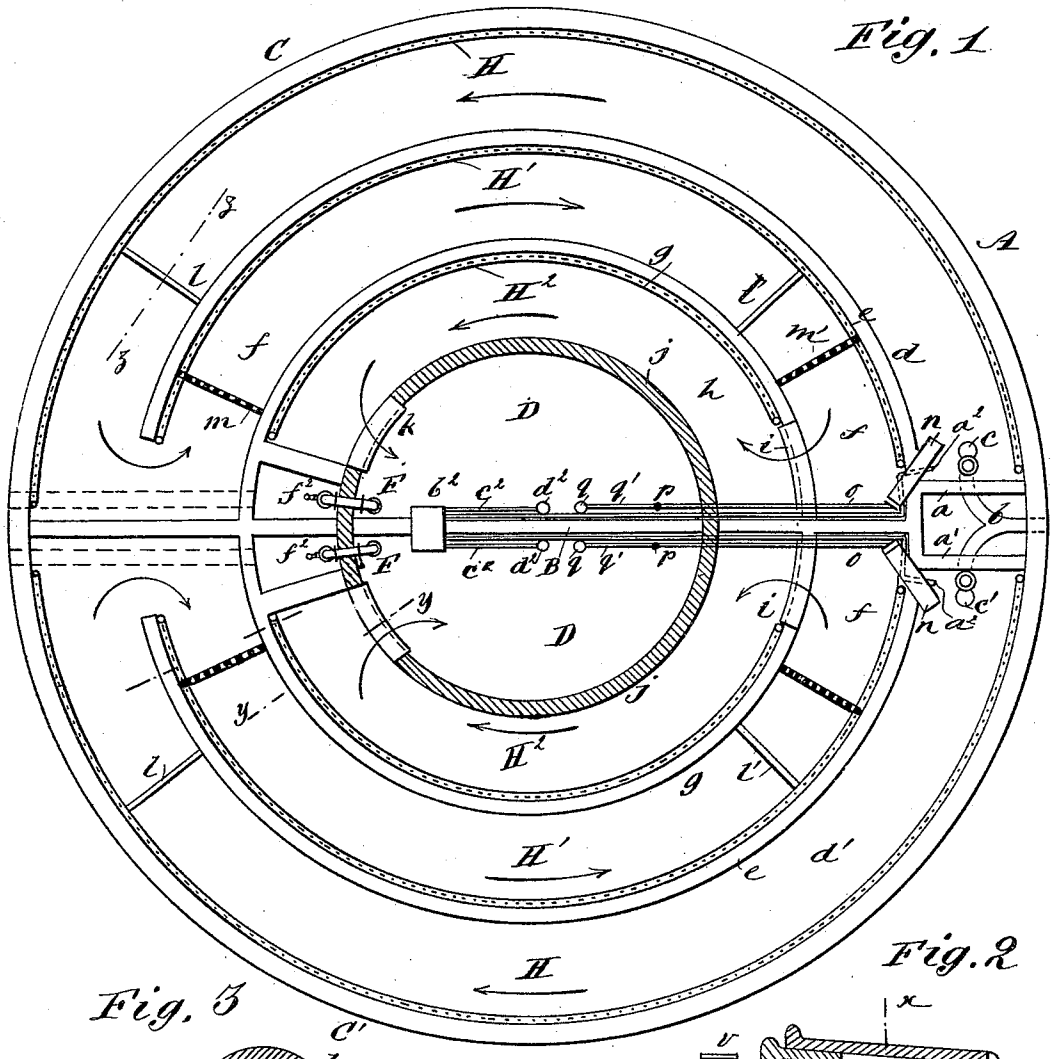


Fig. 2

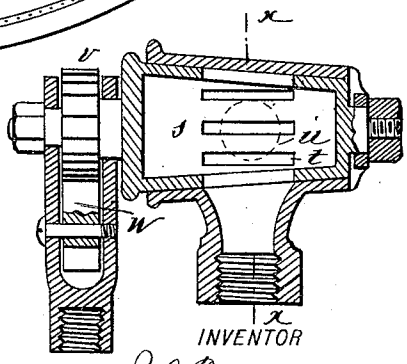


Fig. 3

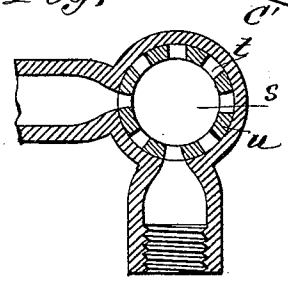
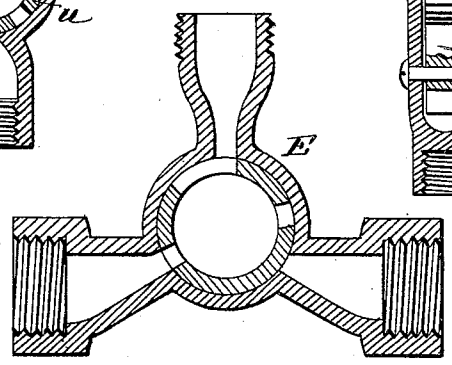


Fig. 4



WITNESSES:

C. Neveux

C. Sedgwick

INVENTOR

J. J. Powers

BY Munn & Co

ATTORNEYS.

(No Model.) 2 Sheets—Sheet 2.

J. J. POWERS.

APPARATUS FOR TREATING SEWAGE.

No. 499,583. Patented June 13, 1893.

Fig. 5

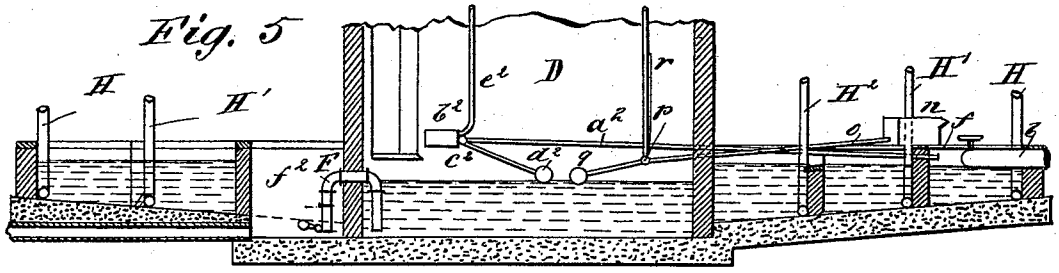


Fig. 6

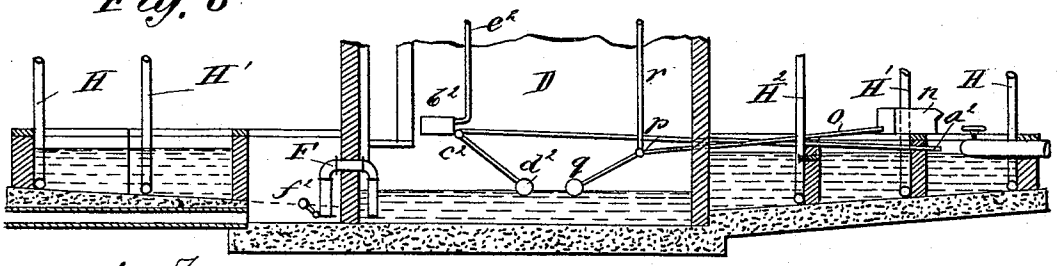


Fig. 7

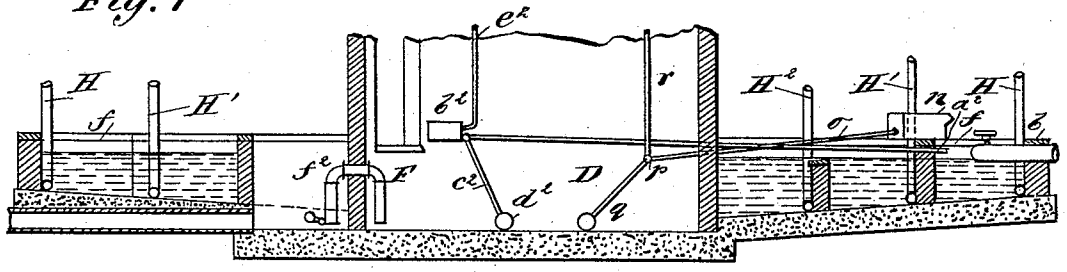


Fig. 8

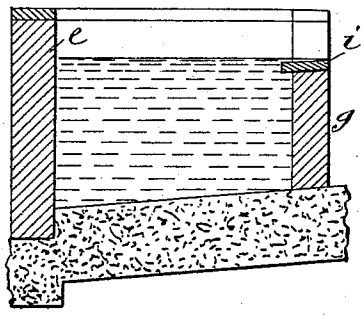


Fig. 9

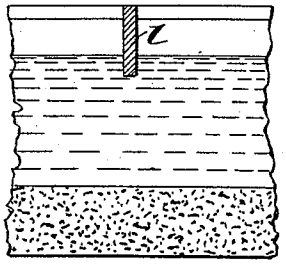
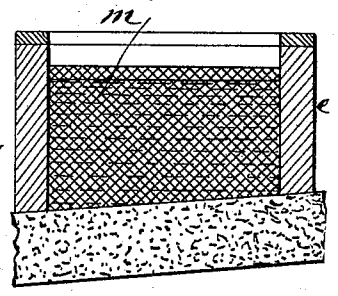


Fig. 10



WITNESSES:

C. Neveux

A. Sedgwick

INVENTOR

J. J. Powers

BY Munn & Co

ATTORNEYS.

UNITED STATES PATENT OFFICE.

JAMES J. POWERS, OF BROOKLYN, NEW YORK.

APPARATUS FOR TREATING SEWAGE.

SPECIFICATION forming part of Letters Patent No. 499,583, dated June 13, 1893.

Application filed November 11, 1892. Serial No. 451,658. (No model.)

To all whom it may concern:

Be it known that I, JAMES J. POWERS, of Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Apparatus for Treating Sewage, of which the following is a specification, reference being had to the annexed drawings, forming a part thereof, in which—

Figure 1 is a plan view, partly in section, of my improved apparatus for treating sewage. Fig. 2 is a longitudinal section of a ratchet valve for admitting water to the lime tank. Fig. 3 is a transverse section taken on line *x*—*x* in Fig. 2. Fig. 4 is a transverse section of the valve for admitting chemicals. Fig. 5 is a diametrical section of the apparatus, showing the central portion filled with sewage which has been treated, with the apparatus nearly ready to discharge. Fig. 6 is a diametrical section showing the discharging valve in operation. Fig. 7 is a similar section showing the floats depressed and the parts in position to discharge the chemicals into the receiving end of the apparatus. Fig. 8 is an enlarged transverse section, taken on line *y*—*y* in Fig. 1 of one of the weirs. Fig. 9 is an enlarged section of the dip board, taken on line *z*—*z* in Fig. 1, and Fig. 10 is an enlarged side elevation of one of the screens.

Similar letters of reference indicate corresponding parts in all the views.

The object of my invention is to provide an effective apparatus for chemically treating sewage so as to purify it before it is discharged into streams or upon the land.

My invention consists in a tank made in duplicate, each half being provided with labyrinthic sluiceways for the passage of sewage, and in the combination with the sluices, of weirs and screens for holding back the solid matter, and dip boards for retaining oily matter and other floating substances.

It also consists in the combination with the sluices, of apparatus for introducing the chemicals, a receptacle for the treated sewage, and an automatic discharge siphon, all as will be hereinafter more fully described.

In the present case I have shown my improved apparatus built up in circular form, but I do not limit or confine myself to this particular form, as rectangular sluice-ways or sluices built on any other plan answer equally well. The wall A incloses a circular space which is divided diametrically by the wall B, which is branched at the inlet end of the apparatus, forming the two walls *a*, *a'*, which support the sewer pipe *b*, which is branched, the arm *c* of the said pipe extending through the branch wall *a* and the arm *c'* extending through the branch wall *a'*. The two opposite halves C, C', of the apparatus being exactly alike, one description will answer for both. The branch *c* of the sewer pipe *b* delivers the sewage to the sluice *d*, which is bounded by the outer wall A and inner wall *e*, which is concentric with the outer wall. The inner wall *e* extends from the branch wall *a* toward the partition wall B, leaving a space, the width of which is nearly the same as that of the sluice, through which the sluice *d* communicates with the sluice *f*, the said sluice being bounded by the wall *e* and the wall *g* which is concentric with the said wall *e*, and the sluice *f* discharges into the sluice *h* over the weir *i*, and the sluice *h*, which is bounded by the wall *g* and the weir *j*, discharges over the weir *k* into the central receiver D. The sewage in flowing through the sluice *d*, passes under the dip board *l*, which extends across the sluice and near the end thereof, and projects far enough into the flowing stream to retain the floating matter such as grease and like solid substances, and in the sluice *f* near the receiving end thereof, is inserted a screen *m*, which strains out the larger particles of solid matter and allows the fluid portions to pass on, and in the said sluice near the discharging end thereof, is arranged a second dip board *l'* for retaining any floating matter that may pass the dip board *l*, and beyond the dip board is arranged a second screen *m'* for catching the solid particles that pass through the screen *m*. The liquid contained in the sluice *f* is discharged into the sluice *h* over the weir *i*, and the great bulk of sedimentary matter is retained in the sluice *f* by the wall *g*. The sluice *h* discharges the fluid matter over the weir *k* into the central receptacle D.

Upon the wall *e*, at the head of the sluice *d*, is placed a box *n*, which is filled with lime or equivalent disinfecting material, the said box

being connected with a pipe *o* which communicates with a ratchet valve *p*, operated by the float *q*, the said valve being in communication with the water supply pipe *r*, so that whenever the float rises, the valve shown in Figs. 2 and 3 will be opened or closed, the opening and closing being in alternation. The valve is provided with a plug *s*, furnished with series of equidistant apertures *t* and intermediate blank spaces *u*. The shank of the plug is furnished with a ratchet wheel *v*, having as many teeth as there are blank spaces and apertures in the plug of the valve, the said ratchet wheel being operated by a pawl *w* carried by the float lever *q'*. When the float rises, if one of the apertures of the plug *s* is opposite the aperture of the casing, the rising of the float will turn the valve plug so as to bring one of the blank spaces opposite the opening in the casing, thus closing the valve. The next rise of the float turns the valve plug another space, causing another space of the plug to coincide with the opening of the valve casing, thus again opening the valve, the valve being alternately opened and closed in this manner. It will be seen that with this construction, if the valve is closed when the float rises, it will bring the ports opposite the inlet and outlet passages of the valve, and when it again rises it will bring blank spaces opposite these inlets and outlets, thereby causing the valve to alternate in its action. As the water enters the box *n*, it bubbles up through the lime and carries the finely divided particles of lime into the sewage. A pipe a^2, which opens in position to discharge into the sluice *d* is connected with a chemical tank b^2, which contains a solution of per-chloride of iron or permanganate of potash. The said tank is provided with a three-ported valve E, shown in Fig. 4. The valve casing of the valve E is provided with three ports, and the plug is also provided with three ports, and the plug of the valve is connected with the float arm by which the said plug receives its motion. The plug of the said valve is turned first in one direction and then in the other by the oscillation of the float lever c^2, which carries the float d^2 which is acted upon by the liquid contained in the central compartment D. When the water rises the float opens the valve E, and allows the contents of the chemical tank b^2 to be discharged through the pipe a^2 into the head of the sluice *d*. When the water falls, the float drops and shuts off communication with the pipe a^2 and opens communication with the pipe e^2 which is connected with a larger chemical tank, thereby allowing the tank b^2 to be refilled preparatory to being again discharged into the solution in the manner already described.

Beyond the discharge end of the sluice *h* is arranged a discharge passage f^2, communicating with pipes for carrying away the disinfected sewage. A siphon F, communicates between the central compartment D and the passage f^2, and is provided on its discharge end with a weighted valve which is designed to retain some of the liquid in the descending arm of the siphon, causing it to automatically start when the liquid in the central compartment D rises above the bend of the siphon. The said siphon is thus seen to be automatic in its action. Whenever the central compartment D is sufficiently filled it overflows through the siphon, thus starting it, and the siphon being of sufficient capacity, withdraws the liquid from the central compartment with greater rapidity than the in-flow.

In the several sluices are arranged perforated pipes H, H', H^2, which are placed below the level of the surface of the liquid contained in the sluices, and are connected with a chlorine generator, and chlorine gas is forced into the sewage in its progress through the apparatus, thus destroying the germs which may be carried by the sewage, at the same time disinfecting both the liquid and the solid matter.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In apparatus for treating sewage, the combination of the semi-circular sluices H, H', H^2, forming two series, each series being in communication alternately at opposite ends, the inner one of the series being arranged to discharge into the central reservoir D, dip-boards and strainers placed in the sluices which arrest floating and submerged matter carried in the sewage, perforated pipes placed in the sluices and communicating with the chlorine gas supply, siphons communicating between the central reservoirs and the waste pipe, so as to cause an intermittent discharge of the reservoirs, and a disinfecting tank furnished with float-operated automatic valves for admitting disinfectants to the central reservoirs and to the inlet end of the sluices, substantially as specified.

2. In an apparatus for treating sewage, the combination, with a series of sluices, dip-boards depending from the top of the said sluices and adapted to retain any matter floating upon the sewage, and screens for arresting submerged matter carried in the sewage, of weirs for controlling the final discharge of the treated sewage, substantially as specified.

JAMES J. POWERS.

Witnesses:
GEO. M. HOPKINS,
C. SEDGWICK.