No. 610,849. Patented Sept. 13, 1898.

S. McELROY.

APPARATUS FOR PURIFYING WATER.

(Application filed Oct. 20, 1897.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

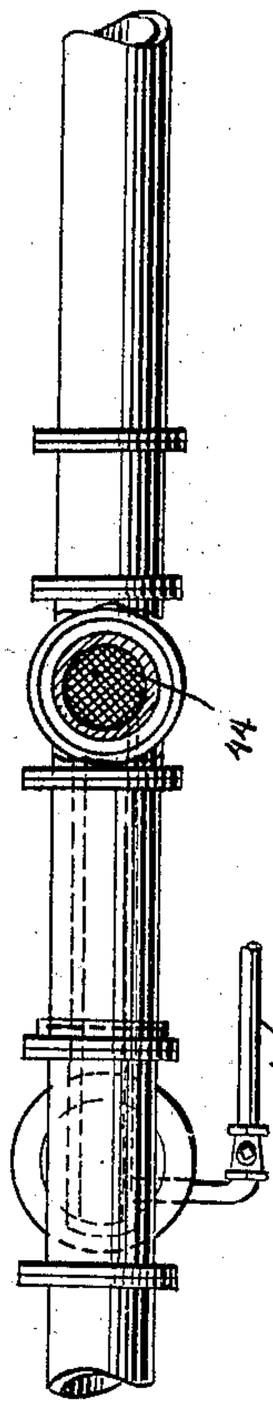


Fig. 2.

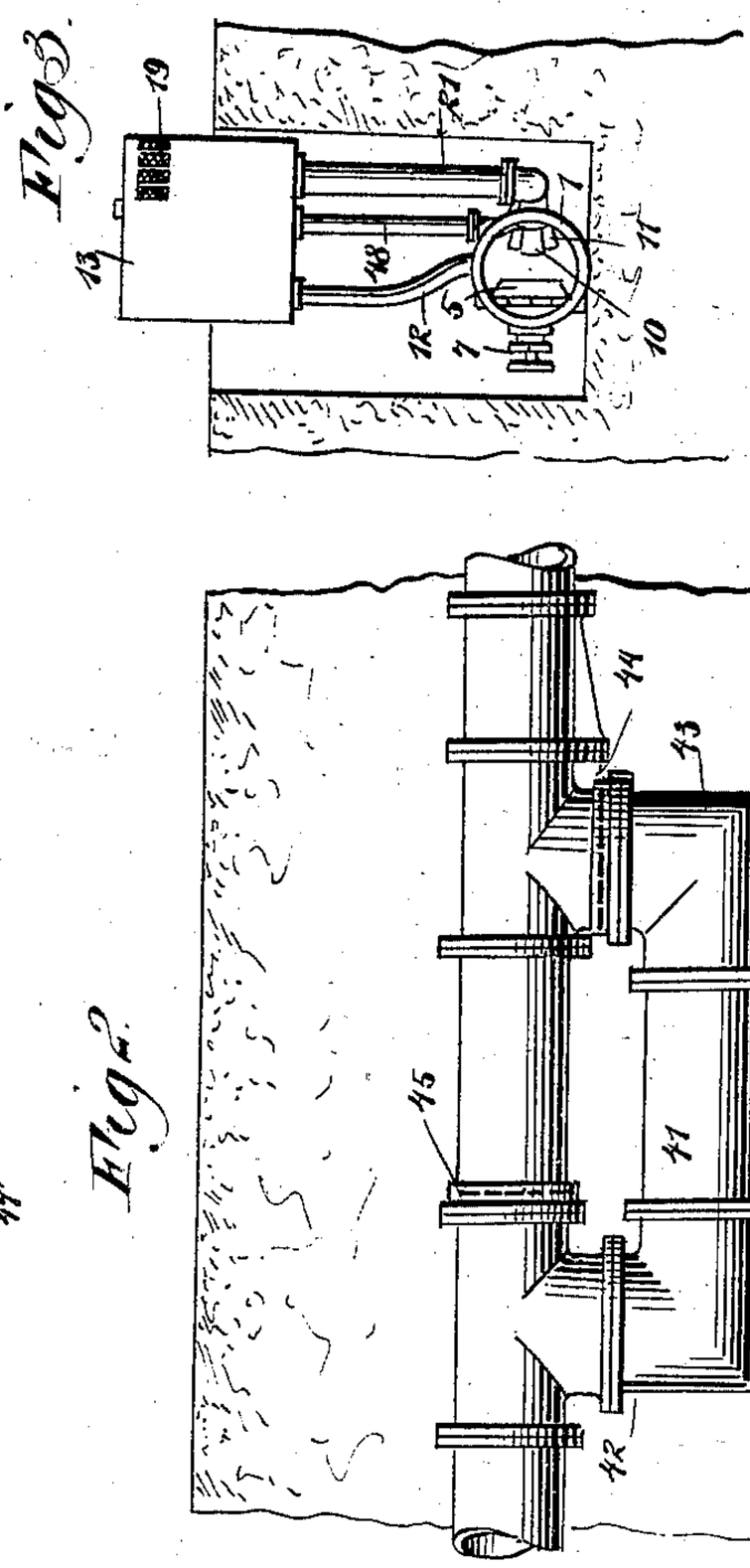
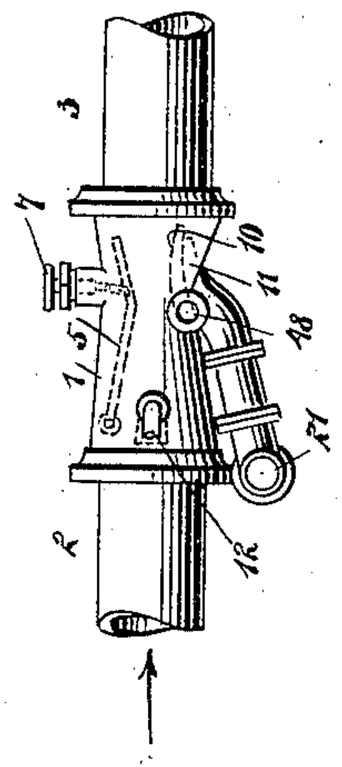
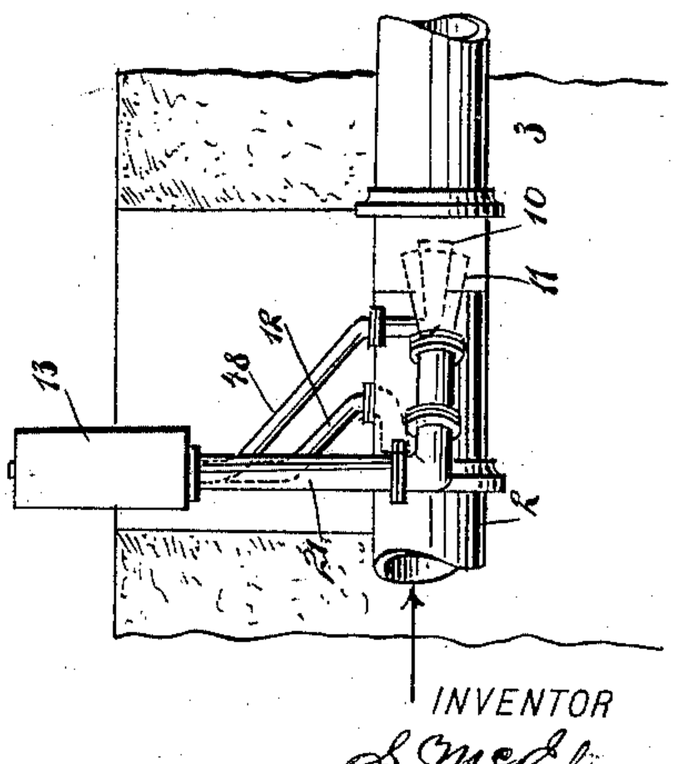


Fig. 3.





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(No Model.) 2 Sheets—Sheet 2.

Fig 4.

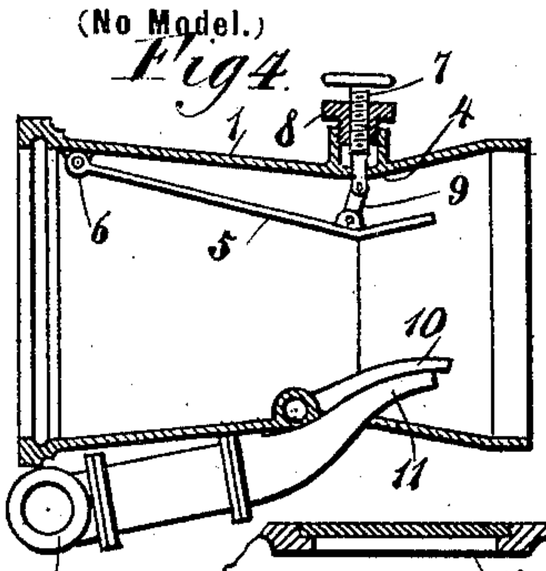


Fig 5.

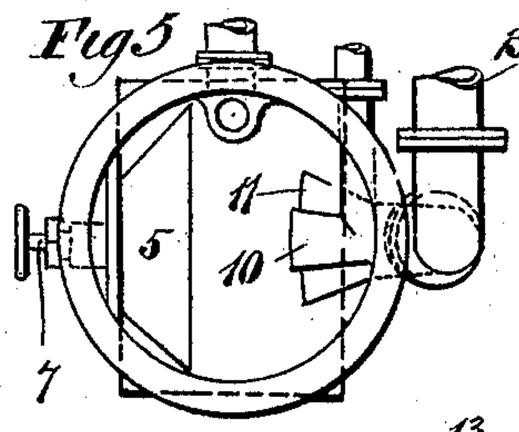


Fig 6.

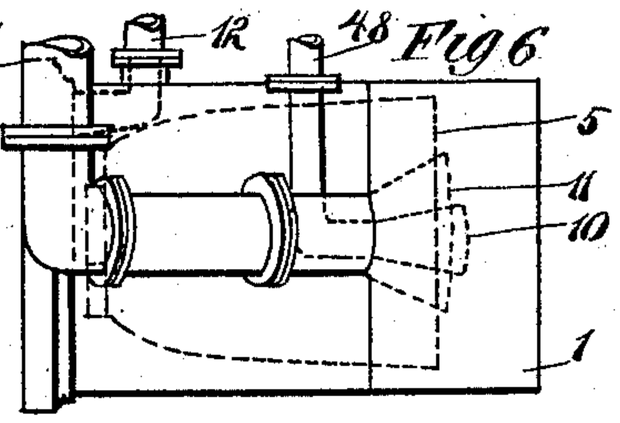


Fig 7.

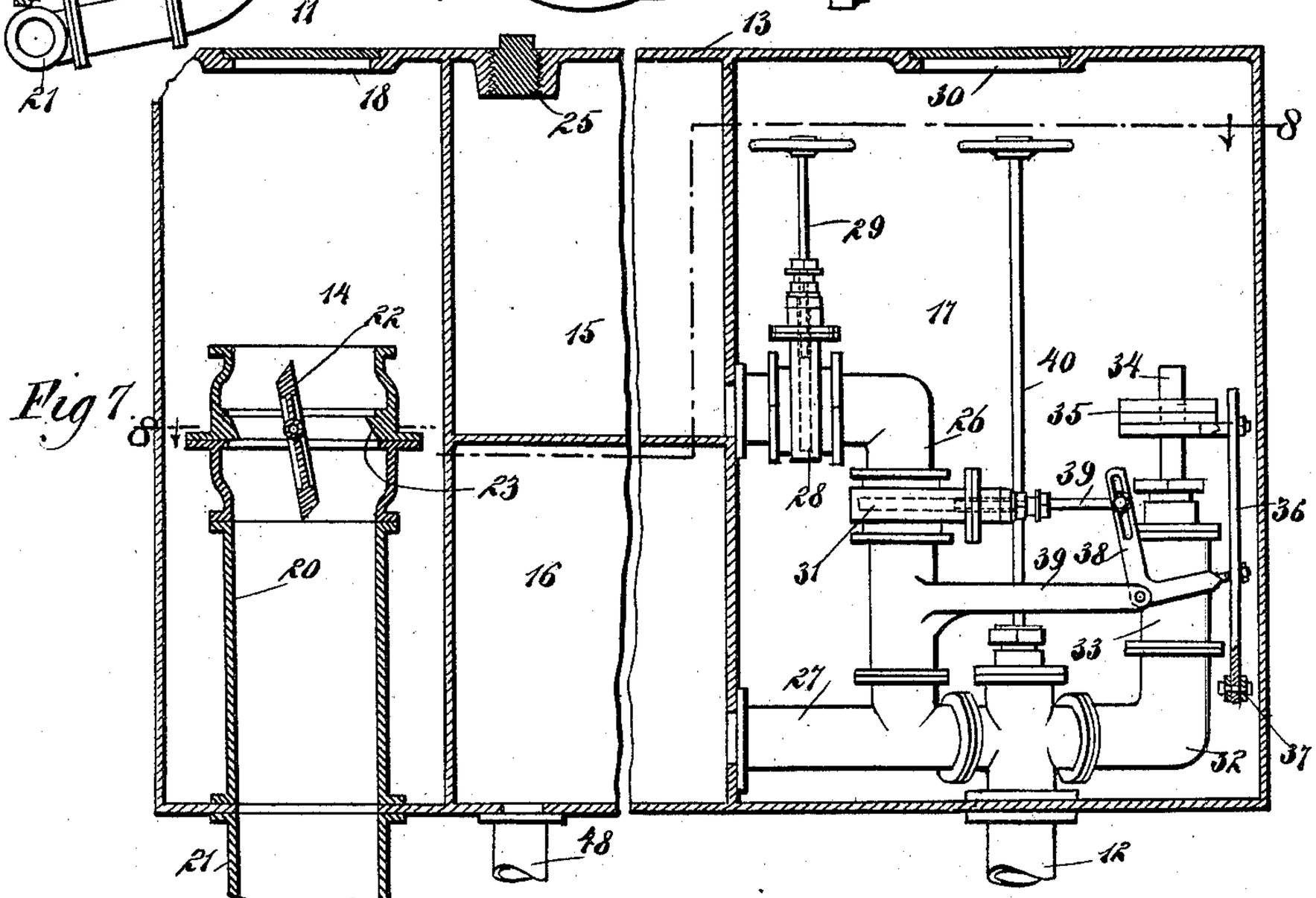
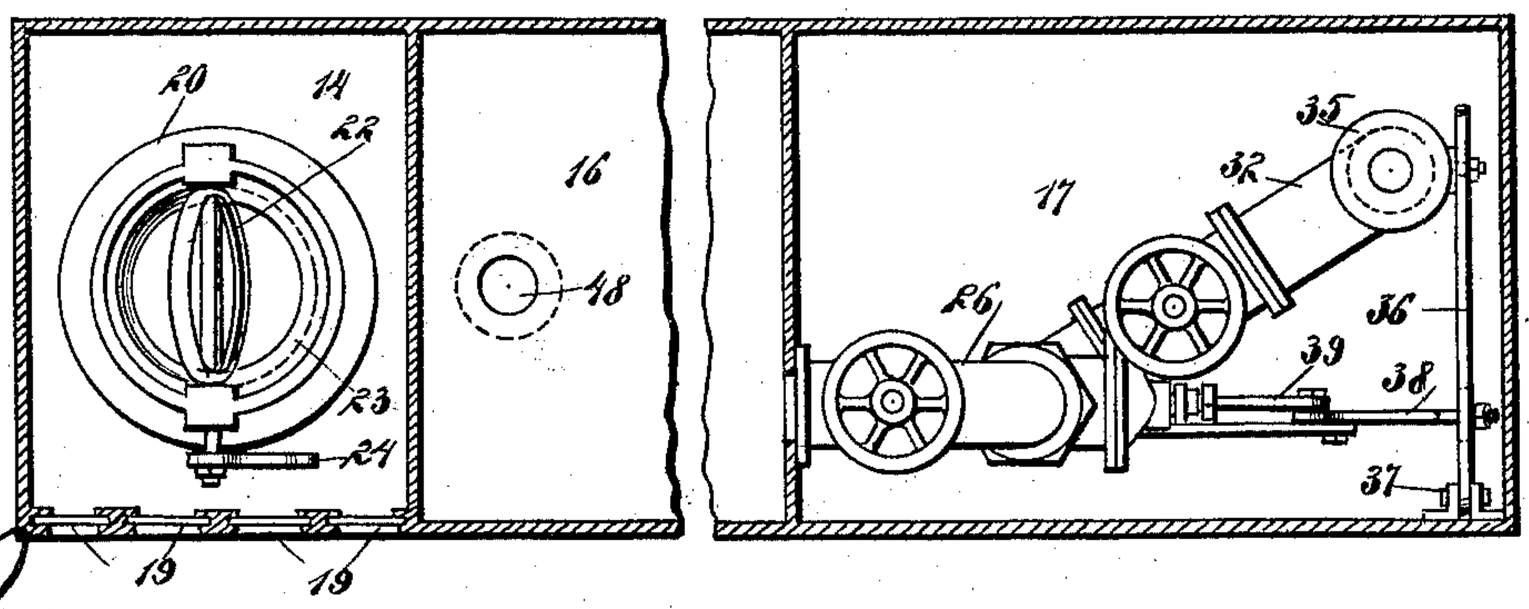


Fig 8.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR PURIFYING WATER.

SPECIFICATION forming part of Letters Patent No. 610,849, dated September 13, 1898.

Application filed October 20, 1897. Serial No. 655,794. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL MCELROY, of New York, (Brooklyn,) in the county of Kings and State of New York, have invented a new and Improved Conduit Induction-Valve, of which the following is a full, clear, and exact description.

This invention relates to certain new and useful improvements in automatic conduit induction-valves for water depuration.

My invention is intended to furnish a simple, direct, and economical method of charging water in conduits in a state of fermentation with air or other antiseptic gases or liquids in the line of delivery of the conduit and from convenient adjacent stations by applying the principle of draft under lateral communication.

It is well known that the oxygen of the air is a valuable corrective and destroyer of organic matter with which water-conduits are apt to be contaminated. The artificial methods generally in use for purifying water involve costly pumping, filtering, and other stations, appliances, and machinery which are superseded by my invention, under which the force of gravity itself becomes the chief method of applying air or corrective gases or solutions directly to the water in motion within the conduit. I therefore place in the line of the conduit a section of its length with substantially the *vena-contracta* form, so as to use the increased current in the section as a means of increasing the draft for certain inlets, producing in them a powerful induction assisted by a special eddy. At a convenient point opposite or near the induction-valve locally adapted for the purpose I place an induction-chamber, with an inlet for air properly connected with an inlet to the induction-valve section, with a check or stop valve to guard reactions, and also a solution-chamber in like manner connected with the induction-valve-section inlet and guarded by proper check and stop valves for the supply of antiseptic gases or solutions composed and proportioned in a natural or compressed state, as the condition of the water and efficient treatment may require.

I will describe a conduit induction-valve embodying my invention, and then point out the novel features in the appended claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a plan view of a section of conduit, showing a portion of my invention as applied thereto. Fig. 2 is a side elevation of the water-conduit and showing my invention applied thereto. Fig. 3 is an end elevation. Fig. 4 is a longitudinal section of an induction-valve employed. Fig. 5 is an end view thereof. Fig. 6 is a side elevation thereof. Fig. 7 is a partial vertical section and partial elevation of an air and antiseptic applying device employed, and Fig. 8 is a section on the line 8 8 of Fig. 7.

The induction-valve comprises a casing 1, which has its inlet end made circular to engage with a conduit or pipe section 2 and its outlet end also made circular to engage with a pipe or conduit section 3. Between the ends the casing is reduced in cross-section, as indicated at 4, and between this reduced portion and the outlet end the casing is made rectangular. This compression of the casing is designed to produce compression in the central current and an increased velocity of water in the throat thus formed. To promote this increased velocity, I use a deflecting-plate 5, which conforms to the side of the induction-valve casing, and to the entrance end of which it is attached by a hinge-joint 6. The plate 5 may be adjusted in or out by means of a screw-rod 7, engaging in a tapped hole formed in a screw-plug 8, engaging with a hollow lug extended from the casing. The inner end of the screw 7 has a link connection 9 with a lug on the plate 5.

On one side of the induction-valve casing and near its throat are two inlet-tubes 10 and 11, which extend through the casing and are longitudinally curved, as plainly shown in Fig. 4. The tube 10 is designed for the inlet for antiseptic gases and solutions, and the tube 11 is designed for the inlet of air. It will be noted that the mouth of the tube 11 is somewhat rearward of the mouth of the tube 10, and these mouth portions will be at a convenient distance beyond the throat of the casing to receive the strongest current draft, the ends being formed flatwise to promote draft-eddies.

To use the differing pressures caused by the change in velocity in the induction-valve and to promote the flow from the induction-chamber by circulation, as will be hereinafter described, a supply-pipe 12 communicates with the interior of the valve-casing 1 or any convenient inlet upstream on the main, and its portion within the valve-casing is extended forward toward the inlet of the casing and is made funnel shape.

13 indicates a casing designed to be located on a reservoir-bank near the pump-main or conduit-inlet, or near the sidewalk curb-line contiguous to and above the induction-valve, or at any suitable point for this use in a flowing-conduit. In this casing is provided an air-inlet 14, a solution-tank 15, a solution and mixing tank 16, and a circulating-pipe-containing tank 17. The air-inlet tank or chamber 14 is provided with a hand-hole 18 at its top and is also provided near its top with air-inlets 19, made in the form of screens.

Extended upward in the chamber 14 is an air-inlet pipe 20, which has a pipe connection 21 with the air-inlet tube 11. At its upper end the air-inlet pipe 20 is provided with an automatic check and stop valve 22. This valve is circular and is pivoted on a stem which is eccentrically placed, and the valve is designed to engage with a bevel-seat 23, formed in the pipe 20. The valve is held by a stop at less than full opening, and in case of reaction on the induction-valve this position favors the tendency to close, which the difference in areas on each side of the pivotal point or stem will insure, as the pressure caused by the reaction on this enlarged area will close the valve. An arm 24 is connected to one end of the pivot of the valve and is designed for use when closing the valve by hand. In case it is desirable to use the chamber 14 under pressure from the conduit and since the other chambers can be used under any back pressure from the conduit, the inlet-top can be closed tight and the air-pipe extended to any desired height for air-supply to the circulating current.

The solution-tank 15 is designed to contain such antiseptic solutions or gases as are to be used. It is provided with a plug-closed inlet 25, through which the material may be passed into the chamber or tank. In the chamber 16 the antiseptic material or gases can be mixed with water as supplied from the conduit or any suitable source. Communication is provided between the tanks 15 and 16 by means of a pipe 26, communicating at its upper end with the tank 15 and communicating at its lower end with a horizontally-disposed pipe 27, leading into the lower portion of the tank 16. The pipe 26 is provided with a stop-valve 28, having an upwardly-extended stem 29, provided at its upper end with a hand-wheel, which may be reached through the hand-hole 30, formed in the top of the casing 13. Also arranged within the pipe 26 is a slide-valve 31, which is operated automatically by the changes of pressure in the conduit, which increase or diminish the quantity of solution fed to the mixing-tank 16.

As a means for supplying water from the conduit I employ the pipe 12 heretofore described. This pipe 12 communicates with the pipe 27 in the casing 13. The pipe 27 has an upwardly-extended branch 32, upon the upper end of which is affixed a cylinder 33, in which a piston is arranged to operate vertically. The upwardly-extended rod 34 of the piston is designed to carry a weight or weights 35, which will normally balance the ordinary pressure from the conduit, but which may be moved by a change in the pressure up or down. Pivotally connected to an arm extended from the piston-rod 34 is a lever 36, which at one end is pivoted to lugs 37, attached to the interior of the casing 13. An angle-lever 38, pivoted to an arm 39, extended from the pipe 26, has its horizontally-disposed member engaged with the lever 36, and its vertically-disposed member is provided with a slot through which a pin on the stem 39 of the valve extends. Obviously an increase of water-pressure will move the piston upward in the cylinder 33, and as the lever 36 is arranged on an incline it will be rocked in such manner as to turn the angle-lever 38, which will force the valve 31 inward, thus automatically diminishing the supply of material from the tank 15 to the tank 16. Upon a reduction of pressure the weighted piston-rod 34 will be moved downward by the weight and move the valve 31 toward its open position. The supply of material may also be regulated by means of the valve 28. A valve is provided to open and close the pipe 12. This valve has a stem 40, extended upward and provided with a hand-wheel at its upper end.

As an adjunct of the depurating induction-valve, which by chemical and mechanical action tends to cause a prompt subsidence and deposit of organic matter in the conduit, at a proper point contiguous to the valve and connected to the pipe or conduit I place a roil-pipe 41. This roil-pipe has branch connections 42 43 with the conduit, and in the branch connection 43, which is downstream, is placed a screen 44 and in the conduit near the branch 42 is placed a screen 45. On the lower side of the pipe 41 and communicating therewith is a chamber 46, designed to receive the sediment or mud, which may be drawn off through a valve-controlled pipe 47, leading to a sewer or other outlet. The screens 44 and 45 will serve to automatically check the flow of water, so that the mud or similar matter carried thereby will be deposited in the roil-chamber.

In operation the water flowing through the conduit will produce a draft which draws the air through the pipe 21 and the antiseptic through a pipe 48, leading from the bottom of the tank 16 and communicating with the outlet tube or pipe 10. This antiseptic air will

of course be mixed with the water and destroy or neutralize the impurities therein.

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

1. In combination with a liquid-conduit, an induction-valve comprising a casing, a plate mounted to swing in the casing, and means for directing air and an antiseptic into the casing, substantially as specified.

2. In combination with a water-conduit, an induction-valve comprising a casing contracted between its ends, a plate mounted to swing in the casing, means for adjusting said plate, and means for directing air and an antiseptic into the casing, substantially as specified.

3. In combination with a water-conduit, an induction-valve comprising a casing contracted between its ends, a pipe leading into the casing and having its outlet for air downstream of the contracted portion, a pipe leading into the casing and having its outlet for antiseptic material downstream of the contracted portion, and a plate adjustable transversely in the casing, substantially as specified.

4. The combination, with a water pipe or conduit, and an induction-valve, of an air-pipe having communication with the interior of the induction-valve, a valve eccentrically mounted in said air-pipe, a casing having a mixing-chamber for an antiseptic, and a pipe leading from said chamber and discharging into the induction-valve, substantially as specified.

5. The combination, with a water pipe or conduit, of an induction-valve having connection with sections of the pipe or conduit, a casing arranged adjacent to the valve, the said casing having chambers for containing and mixing an antiseptic, and also having a chamber containing distributing-pipes, a valve-controlled air-pipe extending upward in a chamber of said casing and having communication with the interior of the induction-valve, and a pipe leading from the induction-valve and connecting with a valve-controlled pipe system in the circulating-pipe chamber, substantially as specified.

6. In combination with a water conduit or pipe and an induction-valve, a roil-pipe arranged below the water conduit or pipe and having branch connections therewith, a screen in the downstream branch of said roil-pipe, a screen in the main pipe adjacent to the upstream branch of the roil-pipe, the said roil-pipe having a sediment-chamber at its lower side, and a valve-controlled pipe leading from said sediment-chamber, substantially as specified.

7. In combination with a water pipe or conduit, an induction-valve, a container for an antiseptic material, a pipe leading from said container to the induction-valve, a pipe leading from the induction-valve to the container, a valve actuated by a change of water-pressure in the conduit or pipe for controlling the pipe leading from the induction-valve into the container for antiseptic material, and an air-pipe leading into the induction-valve, substantially as specified.

SAMUEL McELROY.

Witnesses:
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NATHL. COTHREN.