(No Model.)

2 Sheets—Sheet 1.

F. J. MITCHELL.

DISINFECTING APPARATUS.

No. 532,473. Patented Jan. 15, 1895.

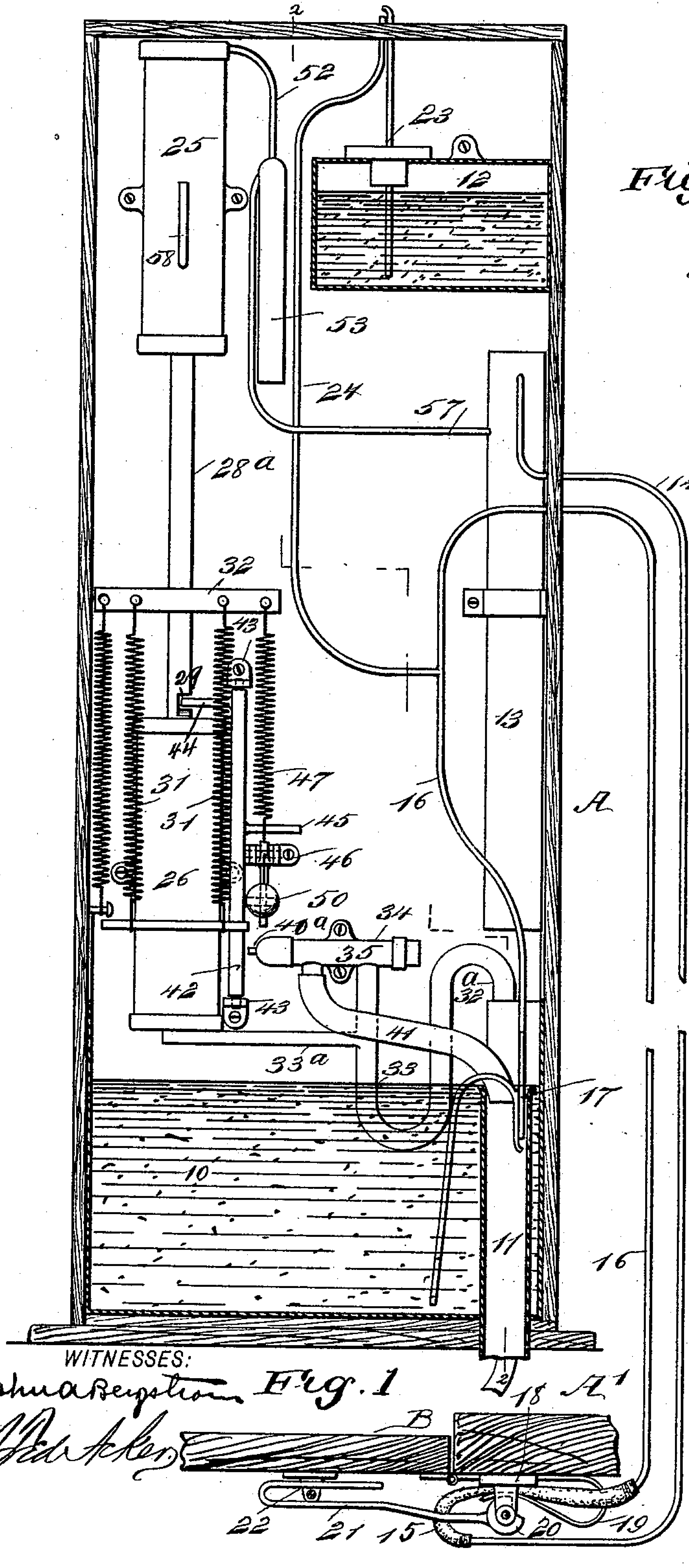
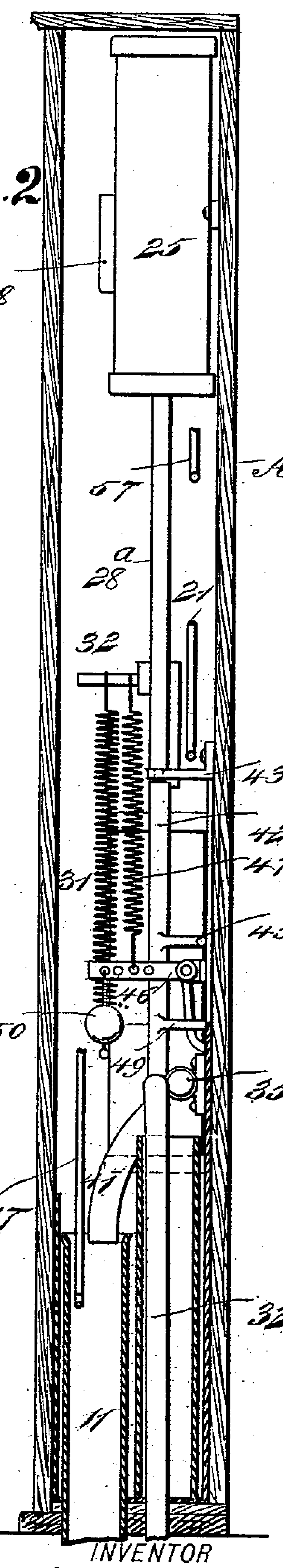


Fig. 1

Fig. 2



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(No Model.) 2 Sheets—Sheet 2.

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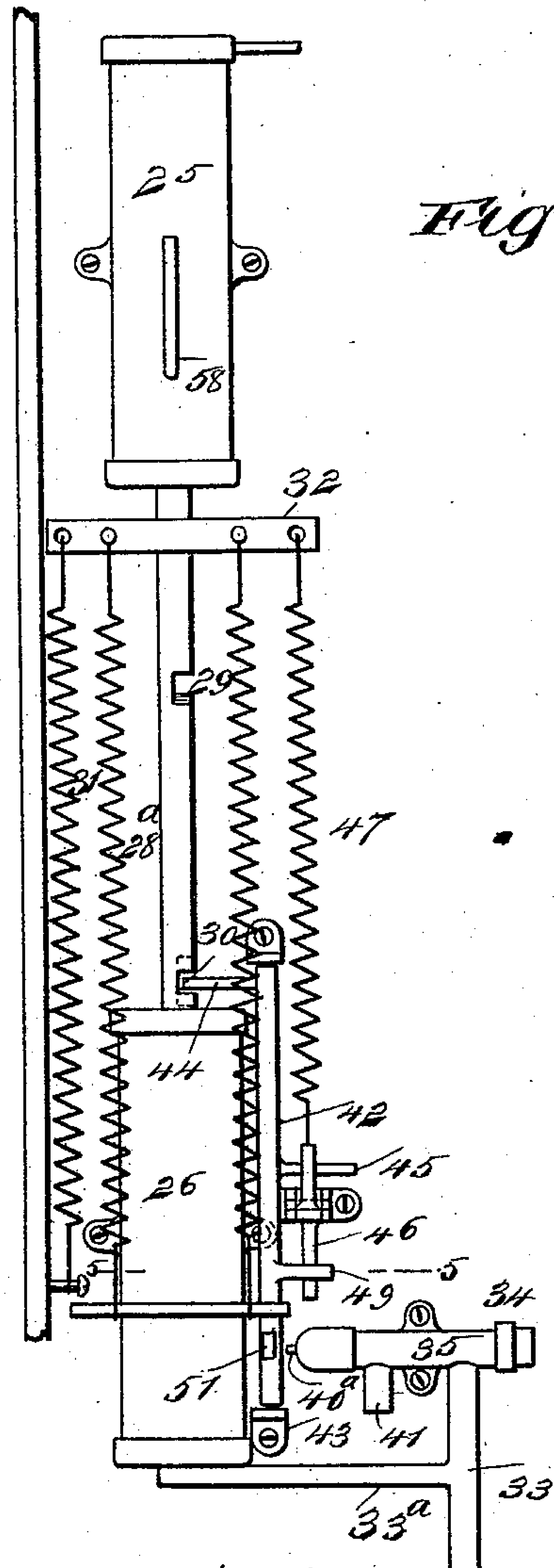

Fig. 3

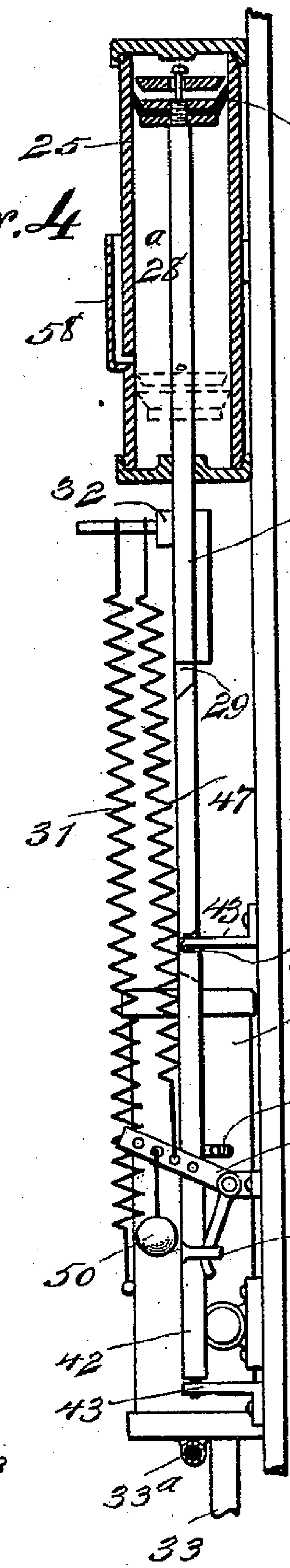

Fig. 4

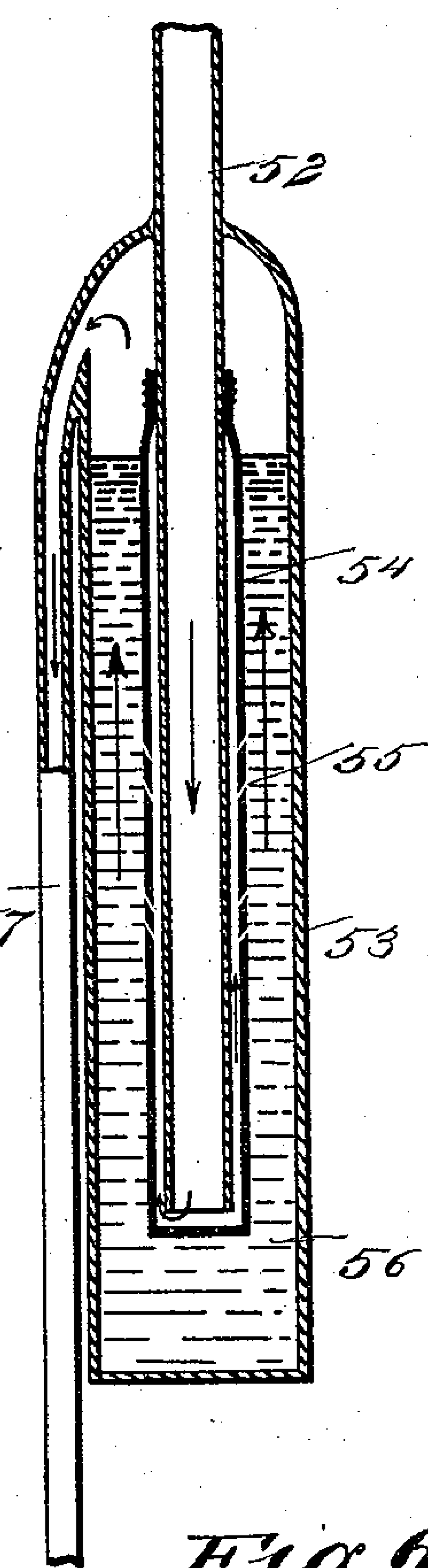

Fig. 6

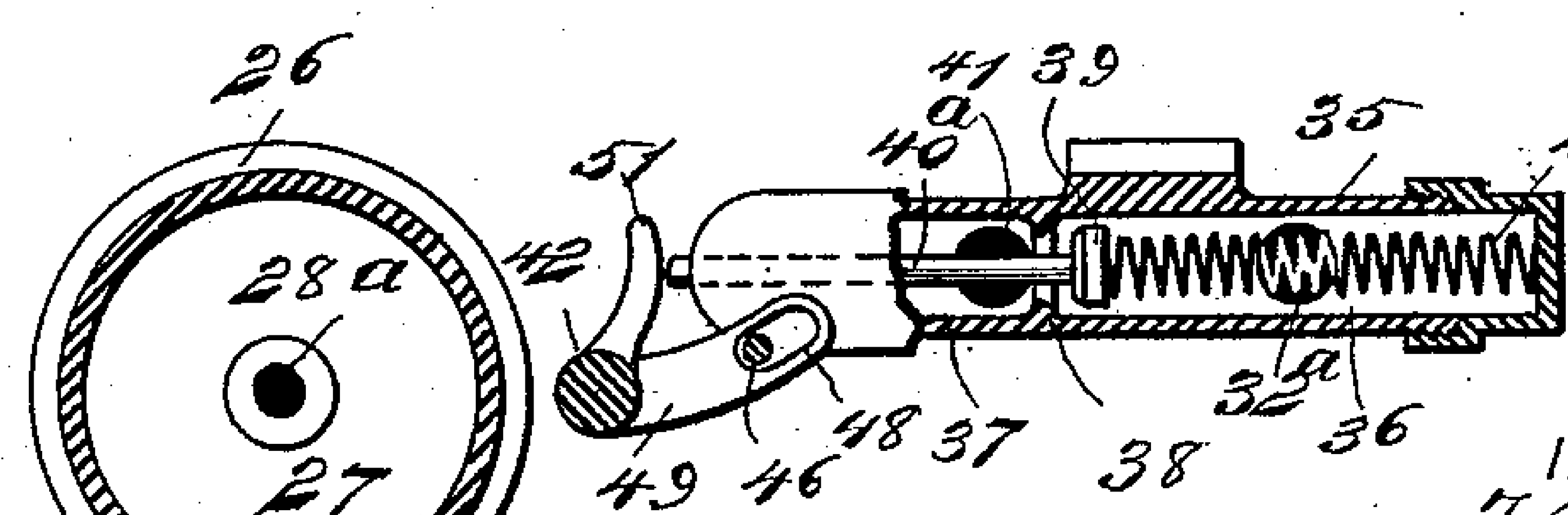

Fig. 5

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UNITED STATES PATENT OFFICE.

FREDERICK J. MITCHELL, OF NEW YORK, N. Y.

DISINFECTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 532,473, dated January 15, 1895.

Application filed March 27, 1894. Serial No. 505,263. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK JAMES MITCHELL, of New York city, in the county and State of New York, have invented a new and Improved Disinfecting Apparatus, of which the following is a full, clear, and exact description.

My invention relates to a disinfecting apparatus, and it has for its object to provide an apparatus of exceedingly simple and durable construction, adapted to be worked by hydraulic or equivalent power, or by a pump or its equivalent operated by compressed air or other motive power.

A further object of the invention is to provide a disinfecting device by means of which drains of all descriptions, soil pipes, waste pipes, or other objects may be disinfected through the medium of a spray, and whereby simultaneously with the disinfecting or spraying of the pipes to be operated upon, the atmosphere in the compartment in which the device is located may be disinfected also.

A further object of the invention is to provide a means whereby the disinfecting may be accomplished directly through the medium of compressed air, the compression of the air being brought about by the pump or other motor employed, the connection between the compressed air receiver and the pump or motor, or motive power of the latter, being such that when a predetermined quantity of air has been forced in the air receiver or reservoir, it will balance the motive power of the pump or motor, thereby stopping the same until air is to be again forced into the air receiver to replace air withdrawn, at which time the pump or motor will be automatically set in operation until an equilibrium is again established.

The invention consists in the novel construction and combination of the several parts, as will be hereinafter fully set forth, and pointed out in the claims.

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

Figure 1 is a vertical section taken through the casing of the disinfecting apparatus, illustrating portions of the operative mechanism in front elevation, and portions thereof in section. Fig. 2 is a section taken vertically through the apparatus, and at a right angle to the view shown in Fig. 1, practically on the line 2—2 of said Fig. 1. Fig. 3 is a front elevation of the air pump employed, and the connection between said pump and a source of water supply, together with the regulating valve for said supply, the pump being shown on its upper stroke. Fig. 4 is a side elevation of the mechanism shown in Fig. 3, one of the cylinders of the pump, or air-compressing cylinder being in vertical section. Fig. 5 is a horizontal section taken essentially on the line 5—5 of Fig. 3, illustrating the detail construction of the cut-off or valve action of the water supply; and Fig. 6 is a longitudinal section through the check valve located between the pump and the air receiver.

In carrying out the invention a casing A, is employed, which may be of any desired dimensions, and ordinarily the front of the casing is made removable, or may be in the nature of a door. In the bottom of this casing a tank 10 is located, adapted to contain a disinfecting compound in liquid form; and an overflow pipe 11 is located in the said tank, adapted to be connected with a waste pipe or other outlet; and in the upper portion of the casing a second tank 12, is located, adapted likewise to contain a liquid disinfecting material, the material in the lower tank being adapted to and intended for disinfecting pipes or drains of any description, while the material in the upper tank is intended for disinfecting the air in the room, or wherever the apparatus may be placed. A reservoir 13, is likewise located within the casing, preferably between the two tanks 10 and 12. This reservoir may be of any desired shape or size, and preferably from one end of the reservoir an air tube 14 is led out through the casing to a connection preferably with a larger section of tubing 15, the enlarged section of tubing being of rubber or an equivalent material, while the air tube 14 may be of lead, block tin, or rubber if desired.

The enlarged flexible tube section 15 at its opposite end is connected with an air delivery pipe 16, and this pipe is carried into the casing and to a connection with an atomizer 17, the nozzle of which extends downward

within the overflow pipe 11, and one member of the atomizer is contained in the liquid of the tank 10. The tube section 15, connecting the air pipes 14 and 16, is adapted to serve as a valve, and when compressed will cut off the supply of air from the reservoir 13 to the atomizer, and when released will permit the air to pass freely from the receiver to the atomizer.

If for example, the device is employed for disinfecting a water closet, the tube 15 may be made to pass through a bracket 18, secured for example to the door jamb A′ of the door B, leading to the closet, and the said valve tube may be made to pass between the members of a spring 19, as shown in Fig. 1. The bracket 18, is made to carry a cam 20, the cam being pivoted in the bracket, and the said cam is provided with a stem 21, leading to and through a bracket 22, attached to the door B. When the door B is closed, as shown in Fig. 1, the cam 20 will have such bearing upon one member of the spring 19 as to compress the valve tube 15, and thus prevent air passing from the supply pipe 14 to the pipe 16, connected with the atomizer; but when for example, the door is open, a recessed face in the cam will be brought opposite the spring 19, permitting said spring to expand and release the valve tube from pressure, thereby supplying the compressed air from the reservoir 13 to the atomizer.

A second atomizer 23, is connected with the liquid in the tank 12, and the spray end or nozzle of this second atomizer is passed through the casing in order that it may deliver its spray in the atmosphere of the room. This second atomizer is connected by a tube 24 with the pipe or tube 16 leading to the lower atomizer 17. Thus it will be observed that when the door B is opened both atomizers will be simultaneously operated.

Any approved mechanism may be employed for maintaining the reservoir 13 filled with air. Preferably, however, a pump is used for this purpose, and when a pump is employed it usually consists of an upper cylinder 25 and a lower cylinder 26, each cylinder being provided with a piston, the piston in the lower cylinder being designated as 27 and that in the upper cylinder as 28. The pistons are attached to the same rod 28ª, and this rod is provided between its ends, or at that portion which is contained between the two cylinders when the lower piston is seated in its cylinder, with two slots 29 and 30, produced both in the same side of the piston rod; and the upper and lower walls of these slots are beveled, the walls of the upper slot being beveled in a direction opposite to the walls of the lower slot, as shown best in Fig. 3.

Any desired number of springs 31, are attached to a cross head 32, secured to the piston rod above its upper slot 29, the said springs at their opposite or lower ends being attached to any fixed support in the casing, and these springs are adapted to return the piston of the lower cylinder to the bottom thereof, carrying the piston of the upper cylinder to a corresponding position.

When the pump is to be hydraulically operated, a supply pipe 32ª is connected with one source of water supply, the said supply pipe being carried upward through the bottom of the casing into the same, and preferably when carried to a predetermined point in the cylinder, it is bent to a substantially S-shape, forming a trap 33, as shown in Fig. 1, the vertical inner member of which S-trap is connected with a valve 34. This valve comprises a casing 35 horizontally located, one end being near one side of the lower cylinder 26 of the pump; and the casing is secured to any fixed support in the casing proper of the apparatus.

The valve casing 35 is usually cylindrical, as shown in Fig. 5, and is divided into two compartments 36 and 37 by a partition 38, which partition is provided with an aperture normally closed by a valve 39, the said valve being held in its closed position through the medium of a spring 40 or its equivalent, located in the chamber 36, while the stem 40ª of the valve is carried outward through the end of the valve casing facing the cylinder, the valve being opened by forcing the said valve inward against the tension of the said spring 40 the water supply pipe 32ª connects with the chamber 36 in the valve casing, while an exit pipe or tube 41, is connected with the chamber 37 in the valve casing, and with the overflow pipe 11 for example.

The member of the trap 33 connected with the chamber 36 in the valve casing is provided with a branch 33ª, which is in direct communication with the bottom of the lower pump cylinder 26. The valve stem 40ª, is operated through the medium of a rock shaft 42, which is journaled at top and bottom in suitable brackets 43, located in the casing of the apparatus. This rock shaft is located parallel with the lower pump cylinder 26, and is provided near its upper end with an arm 44, adapted to enter the slots 29 and 30 in the piston rod 28ª; therefore the arm 44 extends over the upper head of the lower pump cylinder 26, and the shaft is limited in its rocking movement in one direction through the medium of the guide arm 45, adapted to engage with the back of the casing, or with an equivalent stop, as illustrated in Fig. 2.

A bell crank lever 46, is fulcrumed to a fixed support, and one member of the said lever is adjustably connected with one end of a spring 47, the other end of the spring being connected with the cross head 32, to which the springs 31 adapted to govern the pump on its downward stroke are likewise attached. The other member of the said lever 46, is made to enter a slot 48 in an arm 49 extending from the rock shaft, as shown in Figs. 4 and 5; and the arm or member of the lever 46 to which the spring is attached, is provided

with an attached weight 50. The rock shaft carries a shoe 51 near its lower end, which extends therefrom from a different side of the arm 49 receiving the lever 46, as is likewise shown in Fig. 5; and this shoe 51, is adapted to be brought against the valve stem 41 of the controlling valve of the water supply for purposes hereinafter set forth.

An air supply tube or pipe 52 is connected with the upper end of the upper cylinder, and with the top of what may be termed a check valve 53 shown in sectional detail in Fig. 6. This check valve consists of a casing in the upper end of which the tube 52 extends to a predetermined distance from its bottom. The tube 52 within the valve casing is loosely surrounded by a jacket 54 constructed preferably of rubber, which jacket is secured to the tube near its upper end in a practically air-tight manner. This rubber jacket is provided with a number of slits 55, or like openings, and the valve casing is filled with a liquid 56, preferably glycerine, the level of which is near the upper end of the said jacket. A discharge tube 57, is connected with the valve casing above the level of the glycerine, and with the air reservoir 13.

The upper cylinder of the pump is preferably provided with an exterior tube 58, communicating with its interior, through which air is communicated to said cylinder, and the tube may contain glycerine to serve as a lubricator for the upper piston 28.

In the operation of this device, the air reservoir is filled with air in the following manner: When the pistons are in their lower positions, the trip arm 44 of the rock shaft 42 will be in the upper slot 29 of the piston rod 28^a, and as the water enters the lower cylinder 26 the piston therein will be forced upward and the trip arm 44 will be carried to what may be termed the front side of the piston rod 28^a, and the rock shaft will be held in such position as to carry its shoe 51 out of possible engagement with the valve stem 40^a of the water supply regulating valve. When the pistons shall have made their full upward stroke the air in the upper cylinder 25 will have been forced out therefrom through the pipe 52 into the check valve 53, passing through the pipe 52 contained in that valve, as shown by the arrows in Fig. 6, through the slits 55 in the rubber jacket, thence upward through the glycerine seal of the valve and into the pipe 57, from which it will be discharged into the reservoir 13. It is now necessary that the pistons should return to their normal positions; therefore when the piston rod is at the end of its upper stroke the trip arm 44 of the rock shaft will be opposite the lower slot 30 in the piston rod and the tension of the spring 47, which will have been expanded, will carry the upper end of the angle lever 46 upward, thus causing its lower member to rotate the rock shaft in a direction to carry the shoe 51 against the valve stem 40^a of the regulating valve 35, the trip arm 44 of the rock shaft passing through the slot 30 to the opposite side of the valve stem. The valve 39 of the regulating valve casing having been opened, the water entering that valve through the trap 33 or pipe 32^a will pass from the chamber 36 to the chamber 37, and thence through the exit pipe 41 to the overflow pipe 11, relieving the pressure from the under surface of the piston for the lower cylinder. The springs 31 which have been extended at the upper stroke of the piston rod will now serve, together with the force of gravity of the piston rod, to draw the pistons downward, the water escaping from the lower cylinder at the bottom through the branch pipe 33^a; and when the springs shall have assumed practically their normal positions, the spring 47 will relax its tension on the upper member of the angle lever 46 operating the rock shaft 42, and the weight 50 will assert itself to return the rock shaft to its normal position as soon as the upper slot 29 in the piston rod shall have been brought in position to permit the trip arm 44 of the rock shaft to pass, as shown in Fig. 1. The water will now again enter the lower cylinder with sufficient force to operate the piston, and this operation will be continued until the volume of water in the reservoir 13 shall balance the pressure of the water or other agent employed to operate the pump in the lower cylinder of the latter; therefore, whenever air is exhausted from the tank 13 for the purpose of operating the atomizers and disconnecting whatever they are connected with, the pump will immediately and automatically set to work to supply the deficiency of air in the reservoir 13, stopping when the air balances its operating agent.

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

1. In a disinfecting apparatus, the combination, with an air reservoir containing compressed air, and a receptacle containing a disinfecting liquid, of an atomizer adapted to draw from the said liquid, and a pipe for connecting the discharge nozzle of the atomizer with an object to be disinfected, a connection between the reservoir containing the compressed air and an atomizer, and an automatically operating valve located in said pipe between the atomizer and reservoir, controlling the supply of air from the latter, as and for the purpose specified.

2. In a disinfecting apparatus, the combination, with a tank or receptacle adapted to contain a disinfecting liquid, an air-receiving tank or reservoir, and an automatically operating pump for supplying air thereto, of a liquid discharging device having substantially the form of an atomizer, having one member connected with the disinfecting liquid and means for connecting its nozzle with the parts to be disinfected, and a second member connected with the air reservoir or receiver, and a valve located in the pipe between the liquid

discharge device and the air receiver, the said valve being operated substantially in the manner set forth.

3. In a disinfecting apparatus, the combination, with a tank or receptacle adapted to receive a disinfecting liquid, an overflow pipe located in said tank, for communication with the parts to be disinfected, a second tank likewise adapted to contain a disinfecting compound, an air receiver or reservoir, and means, substantially as shown and described, for supplying air thereto, of an atomizer the delivery nozzle of which is contained in the overflow pipe, one member of the said atomizer being introduced into the tank in which the overflow is located, a tube connecting a second member of the atomizer with the air supply reservoir, the said tube being provided with a valve, and a second atomizer having its nozzle end located to deliver spray in the atmosphere, the said atomizer being in communication with the second tank and likewise with the tube connecting the first atomizer with the source of air supply, as and for the purpose specified.

4. In a disinfecting device, the combination, with a tank or receptacle adapted to contain a disinfecting liquid, an atomizer one member of which is introduced into the said liquid, an air supply tank or reservoir, and a tube connection between the atomizer and the said air reservoir, the tube being provided with a valve between its extremities, of an air pump, means substantially as shown and described, for operating the said pump, a connection between the air pump and the air receiver or reservoir, a trip mechanism adapted to be acted upon by the pump piston, and a regulating valve connected with the source of power and operated by the said trip device, the valve being adapted to discharge and relieve the piston heads from pressure upon one stroke of the piston rod, as and for the purpose specified.

5. In a disinfecting device, the combination, with a tank or receptacle adapted to contain a disinfecting liquid, an atomizer one member of which is introduced into said liquid, an air supply tank or reservoir, and a tube connection between the atomizer and the said air reservoir, the tube being provided with a valve between its extremities, of an air pump adapted to be operated by hydraulic pressure, a regulating valve connected with the source of water supply, a trip mechanism operated from the pump piston and operating said valve, and means, substantially as shown and described, for stopping the pump when the air pressure in the air reservoir reaches a predetermined degree, as and for the purpose set forth.

6. in a disinfecting device, the combination, with a tank or receptacle adapted to contain a disinfecting liquid, an atomizer, one member of which is introduced into the said liquid, an air supply tank or reservoir, and a tube connection between the atomizer and the said air reservoir, the tube being provided with a valve between its extremities, of an air pump, means for driving the said pump substantially as shown and described, and a check valve located between the pump and the said air receiver or reservoir, the said check valve consisting of a casing, a tube connected with the air discharge end of the pump and with one end of the casing, extending into the latter, a jacket loosely fitting the inner end of the said tube, the said jacket being provided with openings, a fluid seal surrounding the said jacket, and a tubular connection between the valve casing above the level of the fluid contained therein and the air receiver, as set forth.

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