Oct. 21, 1930. I. C. JENNINGS 1,779,319

SEWAGE EJECTING MECHANISM

Filed Aug. 4, 1926 3 Sheets-Sheet 1

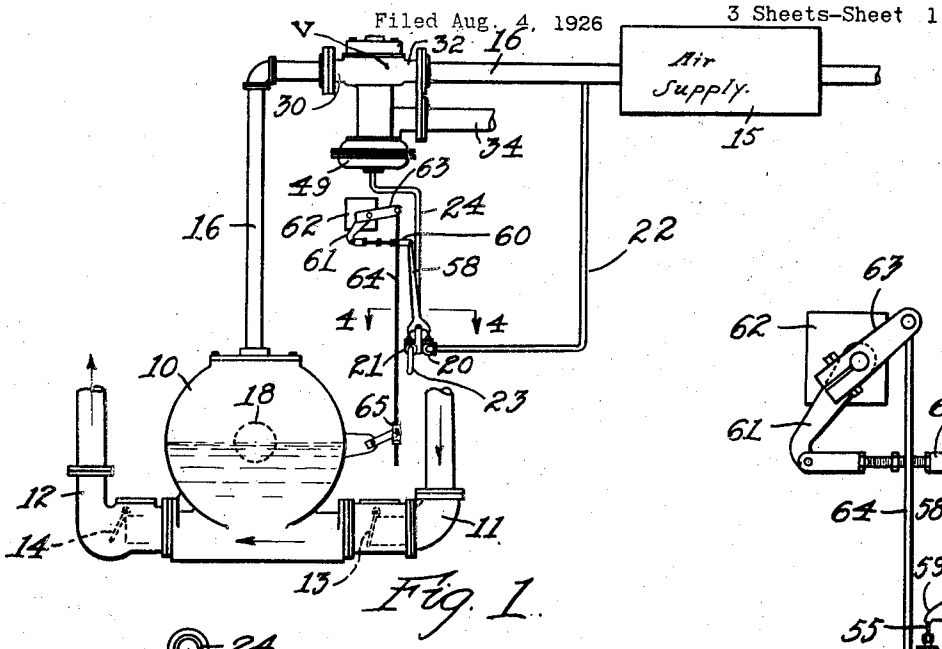


Fig. 1.

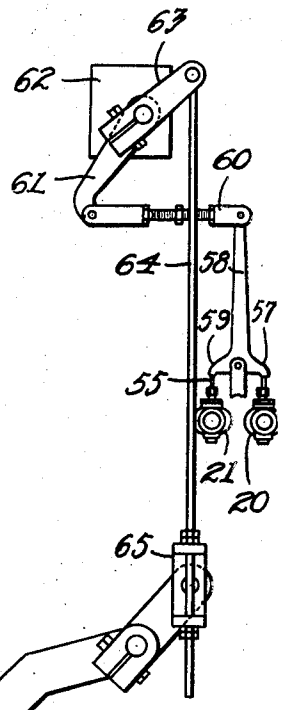


Fig. 5.

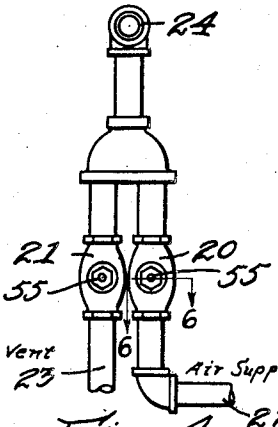


Fig 4

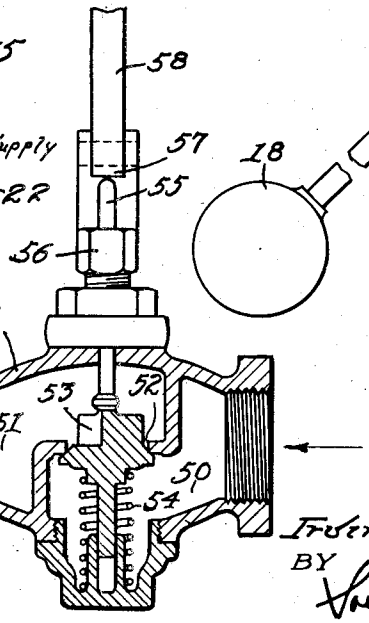


Fig. 6

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SEWAGE EJECTING MECHANISM

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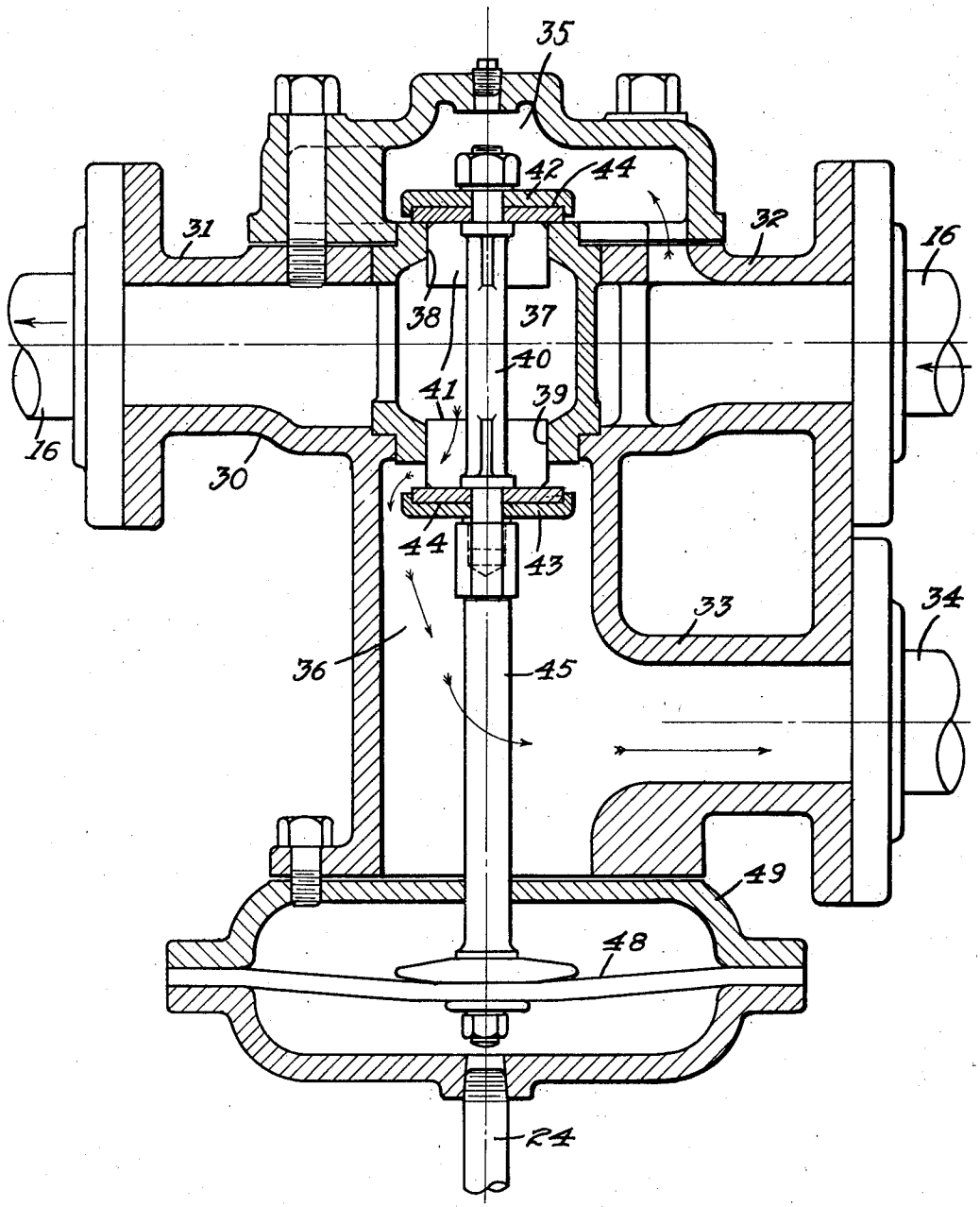


Fig. 2.

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SEWAGE EJECTING MECHANISM

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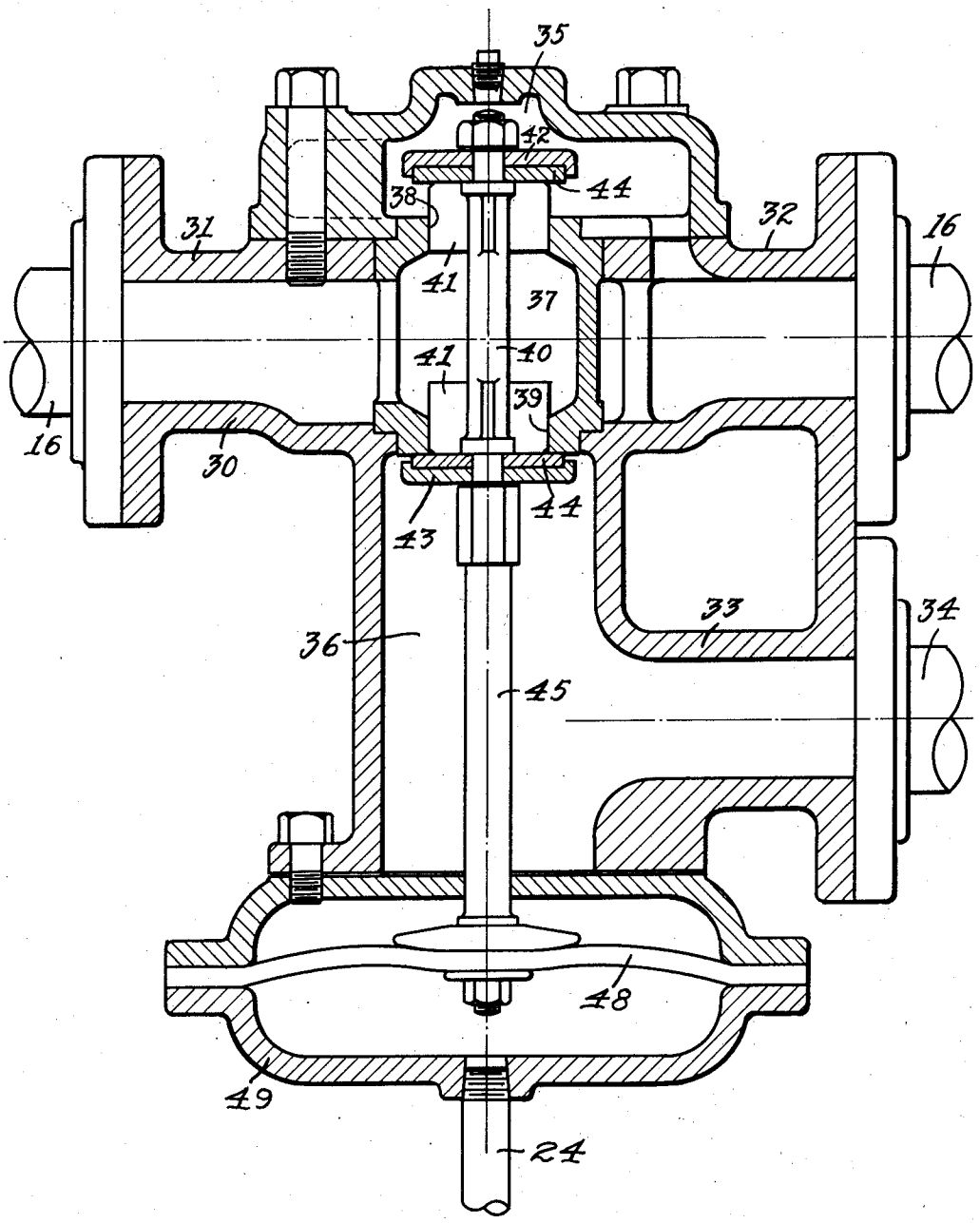


Fig. 3.

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UNITED STATES PATENT OFFICE

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SEWAGE-EJECTING MECHANISM

Application filed August 4, 1926. Serial No. 127,164.

This invention relates to apparatus for raising sewage or other liquids from a lower to a higher level, and is particularly applicable to the handling of liquids containing much foreign matter. A sewage ejector of this type is shown in my prior Patent No. 1,492,171, issued April 29, 1924, and comprising essentially a low level receiver or tank into which the sewage may flow by gravity, an intermittently operated air compressor, and float-controlled mechanism for starting and stopping the air compressor. This mechanism is very effective and has been largely used commercially. In many places, however, a supply of compressed air is already available and the operation of a separate air compressor is not necessary.

It is the general object of my invention to provide an improved valve and controlling mechanism for a sewage ejector, operable in connection with an independent supply of compressed air, whereby the ejector is alternately filled and emptied under the control of a float in the sewage receiver.

With this general object in view, an important feature of my invention relates to the provision of a single valve effective in one position to cause discharge of sewage from the receiver and in another position to vent the receiver, permitting it to receive additional sewage.

Another object of my invention is to provide actuating mechanism for the single valve by which the valve is moved quickly from one operative position to the other, without depending upon the float in the sewage receiver for the actual movement of the valve.

My invention further relates to arrangements and combinations of parts which will be hereinafter described and more particularly pointed out in the appended claims.

A preferred form of the invention is shown in the drawings, in which

Fig. 1 is a side elevation of a sewage ejecting mechanism embodying my improvement;

Fig. 2 is a sectional elevation of my improved valve mechanism;

Fig. 3 is a view similar to Fig. 2 but showing the parts in a different position;

Fig. 4 is a detail plan view, taken along the line 4—4 in Fig. 1;

Fig. 5 is an elevation of certain valve operating mechanism; and

Fig. 6 is a sectional elevation, taken along the line 6—6 in Fig. 4.

Referring to the drawings, I have shown a closed tank or receiver 10 (Fig. 1), having an inlet 11 and an outlet 12. Check valves 13 and 14 are placed in the inlet and outlet pipes respectively, permitting the sewage or other liquid to flow in the directions indicated by the arrows in Fig. 1.

As usually installed, the sewage flows by gravity through inlet pipe 11 to the tank or receiver 10 and is forced out of the tank 10 through the pipe 12 by admitting compressed air to the receiver. An air compressor or storage tank or other source or supply of compressed air is indicated at 15 and is connected by a pipe 16 to the upper part of the receiver 10.

A valve mechanism V is inserted in the pipe 16 between the air supply 15 and the receiver 10 and is controlled by a float 18 positioned in the receiver and connected to actuate control valves 20 and 21 in an air-supply pipe 22 and a vent pipe 23. The pipes 22 and 23 are connected above the valves 20 and 21, to a common air pipe 24, leading into the lower part of the valve mechanism V, as will be later described.

The valve mechanism V is shown in detail in Figs. 2 and 3 and comprises a casing 30 having an outlet connection 31 to the pipe 16 and having an inlet connection 32 receiving compressed air from the air supply 15. The casing 30 also has a vent passage 33 connected to the atmosphere through a pipe 34.

The inlet pipe 32 of the casing 30 is connected to an air passage 35 in the upper part of the casing, and the vent passage 33 is connected to an air chamber 36 in the lower part of the casing, while the outlet passage 31 is connected to an air chamber 37 centrally located between the chambers 35 and 36 and provided with ports 38 and 39 communicating therewith.

A valve rod 40 is slidable in the ports 38 and 39 and may be provided with spaced arms or spiders 41 for centering the rod in the ports. Valve heads 42 and 43 are provided on the valve rod 40 and these heads are provided with discs of soft packing 44 adapted to close the ports 38 and 39 alternately.

When the valve rod is in the lowered position shown in Fig. 2, the sewage receiver 10 is vented through the vent passage 33 and pipe 34 to the atmosphere, and when the valve is in the raised position shown in Fig. 3, the compressed air supply 15 is directly connected to the upper part of the receiver 10 and operates to eject the charge of sewage therefrom.

For actuating the valve rod 40, I provide a lifting plunger 45 loosely connected at its upper end to the valve rod 40 and secured at its lower end to the center of a flexible diaphragm 48. The diaphragm is mounted in a casing 49 and the lower portion of the casing below the diaphragm is connected to the pipe 24 previously described, controlled by the float-operated valves 20 and 21.

The valves 20 and 21 are preferably constructed as shown in Fig. 6 and each comprises an inlet chamber 50 and outlet chamber 51 connected by a port 52 having a valve member 53 seated therein. A spring 54 holds the valve 53 yieldingly in closed position and a rod or plunger 55 extends up through a suitable stuffing box 56. The plunger 55 for the valve 20 is engaged by a projection 57 on a rocking lever 58, and the plunger 55 for the valve 21 is engaged by a similar projection 59 (Fig. 5) at the opposite side of the rocking lever.

The lever 58 is connected by an adjustable link 60 to an arm 61 which is connected through a snap-action mechanism 62 to an arm 63 connected by a link 64 and lost motion device 65 to the float 18 previously described.

When the float is raised, the lever 58 will be rocked in a direction to depress the valve member 53 in the air supply valve 20, admitting air under pressure to the diaphragm 48, thus raising the main valve 42—43 and admitting air from the air supply 15 through the pipe 16 to the receiver 10, which will thereupon be promptly emptied of sewage.

As the float 18 approaches its lower limit of movement, it rocks the lever 58 in the reverse direction, permitting the air valve 20 to close and opening the exhaust valve 21 to the atmosphere, whereupon the pressure of the compressed air upon the main valve 42—43, together with the weight of the valve, causes the valve to shift quickly to the position shown in Fig. 2, connecting the receiver 10 to the vent pipe 34, so that sewage may flow into the receiver.

Prompt action of the valve mechanism V in both directions is thus assured and the receiver 10 is changed almost instantly from a discharging to a receiving condition and vice versa. This rapid change from one position of operation to the other is of much importance, as it substantially increases the operative capacity of a receiver of given size, as the receiver is operating practically all of the time, either receiving or discharging sewage.

While I have shown and described a pneumatic diaphragm for actuating the valve mechanism V, it will be understood that my invention is not limited thereto, and that other forms of actuating mechanism, such as a piston or bellows construction, may be substituted, and that other fluids may be substituted in place of compressed air for actuating the diaphragm 48. Water under pressure could obviously be used in substantially the same manner and for the same purpose.

Furthermore, it will be evident that the valve 20 need not necessarily be closely adjacent the casing 49, but may be removed to a substantial distance therefrom if so desired.

Having thus described my invention and the advantages thereof, it will be seen that I have provided an exceedingly simple and effective mechanism for actuating a single valve to control the emptying of the receiver and the venting thereof for filling under conditions where an independent supply of compressed air is available.

Having thus described my invention, I do not wish to be limited to the details herein disclosed otherwise than as set forth in the claims, but what I claim is:—

1. Valve mechanism for controlling flow of pressure fluid into a sewage receiver and venting of said receiver comprising a casing, having at the top thereof a compressed air inlet and outlet, and an air vent therebelow; a double headed valve between said inlet and outlet effective in one position to pass compressed air from the inlet to the outlet of the casing, and effective in the opposite position to admit air from the outlet to the vent of the casing, said casing having a by-pass between the inlet and the outlet effective to direct incoming compressed air to said first-mentioned valve head; said valve having a stem projecting below the double head and connected to a diaphragm at the bottom of said casing, said diaphragm being operable under the action of compressed air to move said valve from one position to another.

2. A valve mechanism for controlling flow of pressure fluid into a sewage receiver and venting of said receiver, comprising a casing having at the top thereof a compressed air inlet and outlet and an air vent therebelow; a double headed valve between said inlet and outlet effective in one position to pass compressed air from the inlet to the outlet and effective in the opposite position to admit air from the outlet to the vent of the casing, said valve having a stem project-

ing from the double head, and a pneumatic device operatively connected to said stem for positioning said valve unit in either position.

3. A valve mechanism for controlling flow of pressure fluid into a sewage receiver and venting of said receiver, comprising a casing having at the top thereof a compressed air inlet and outlet and an air vent therebelow; a double headed valve between said inlet and outlet effective in one position to pass compressed air from the inlet to the outlet and effective in the opposite position to admit air from the outlet to the vent of the casing, said valve having a stem projecting from the double head, and a pneumatic device operatively connected to said stem for positioning said valve unit in either position, and float actuated means effective to control said device.

4. A valve mechanism for controlling flow of pressure fluid into a sewage receiver and venting of said receiver, comprising a casing having at the top thereof a compressed air inlet and outlet and an air vent therebelow; a double headed valve between said inlet and outlet effective in one position to pass compressed air from the inlet to the outlet and effective in the opposite position to admit air from the outlet to the vent of the casing, said valve having a stem projecting from the double head, and a quick-acting air operated mechanism operatively connected to said stem for moving said valve unit from one operative position to the other, comprising a second valve unit, and means to operate said latter unit.

5. A valve mechanism for controlling flow of pressure fluid into a sewage receiver, and venting of said receiver, comprising a casing having at the top thereof a compressed air inlet and outlet and an air vent therebelow; a double headed valve between said inlet and outlet effective in one position to pass compressed air from the inlet to the outlet and effective in the opposite position to admit air from the outlet to the vent of the casing, said valve having a stem projecting from the double head, and a quick-acting air operated mechanism operatively connected to said stem for moving said valve unit from one operative position to the other, comprising a second valve unit, and a float to operate said latter unit, said float having a lost motion connection to said latter unit permitting a substantially vertical movement of the float between its two operative positions.

6. Valve mechanism for controlling flow of pressure fluid into a sewage receiver and venting of said receiver, comprising a casing having a compressed air connection, a vent and a connection to said receiver, a double headed valve unit in said casing effective in one position to open the vent and cut off the compressed air, and in another position to admit the compressed air, a casing offset from said valve casing and having a diaphragm therein, said unit having a stem projecting from one side only thereof and connected to said diaphragm and float controlled means effective to admit fluid under pressure to said diaphragm casing and to discharge fluid therefrom.

7. Valve mechanism for controlling flow of pressure fluid into a sewage receiver and venting of said receiver, comprising a casing having a compressed air connection, a vent and a connection to said receiver, a double headed valve unit in said casing effective in one position to open the vent and cut-off the compressed air and in another position to admit the compressed air, and float controlled means effective to cause compressed air to move said double valve unit quickly in one direction, and means to apply compressed air to the valve unit on the opposite side thereof from said float controlled means to move said valve member quickly in the opposite direction, whereby said valve is quick-acting in both directions.

8. Valve mechanism for controlling flow of pressure fluid into a sewage receiver, and venting of said receiver, comprising a casing having at the top thereof, a compressed air inlet and outlet and an air vent therebelow; a double headed valve between said inlet and outlet effective in one position to pass compressed air from the inlet to the outlet of the casing and effective in the opposite position to admit air from the outlet to the vent of the casing, means connected to the air supply to indirectly operate said valve in one direction, said valve being directly operated in the opposite direction by the compressed air from the supply.

9. Valve mechanism for controlling flow of pressure fluid into a sewage receiver and venting of said receiver, comprising a casing having at the top thereof a compressed air inlet and outlet and an air vent therebelow; a double headed valve between said inlet and outlet effective in one position to pass compressed air from the inlet to the outlet of the casing, and effective in the opposite position to admit air from the outlet to the vent of the casing, means connected to the air supply to indirectly operate said valve in one direction, comprising a pair of valves operative respectively to admit compressed air to said valve casing and to exhaust air therefrom, said valve being directly operated in the opposite direction by the compressed air from the supply.

10. Valve mechanism for controlling flow of pressure fluid into a sewage receiver and venting of said receiver, comprising a casing having at the top thereof, a compressed air inlet and outlet and an air vent therebelow; a double headed valve between said inlet and outlet effective in one position to pass com-

pressed air from the inlet to the outlet of the casing and effective in the opposite position to admit air from the outlet to the vent of the casing, a diaphragm control means for moving said valve in one direction and connected to the air supply, said valve being movable in the opposite direction by direct action of air from the supply thereagainst, a pair of valves located between said diaphragm and said air supply, one of said valves being adapted to admit air against said diaphragm and the other of said valves being adapted to exhaust air from said diaphragm.

11. Valve mechanism for controlling flow of pressure fluid into a sewage receiver and venting of said receiver comprising a casing having at the top thereof a compressed air inlet and outlet and an air vent therebelow; a double headed valve between said inlet and outlet effective in one position to pass compressed air from the inlet to the outlet of the casing and effective in the opposite position to admit air from the outlet to the vent of the casing, diaphragm controlling means for moving said valve in one direction and connected to the air supply, said valve being movable in the opposite direction by direct action of air from the supply thereagainst, a pair of valves located between said diaphragm and said air supply, one of said valves being adapted to admit air against said diaphragm and the other of said valves being adapted to exhaust air from said diaphragm, and float control means for said pair of valves.

12. Valve mechanism for controlling flow of pressure fluid into a sewage receiver and venting of said receiver comprising a casing having at the top thereof a compressed air inlet and outlet and an air vent therebelow; a double headed valve between said inlet and outlet effective in one position to pass compressed air from the inlet to the outlet of the casing and effective in the opposite position to admit air from the outlet to the vent of the casing, diaphragm controlling means for moving said valve in one direction and connected to the air supply, said valve being movable in the opposite direction by direct action of air from the supply thereagainst, a pair of valves located between said diaphragm and said air supply, one of said valves being adapted to admit air against said diaphragm and the other of said valves being adapted to exhaust air from said diaphragm, and float control means for said pair of valves, and a snap action mechanism connecting said float control means and said pair of valves.

13. Valve mechanism for controlling flow of pressure fluid into a sewage receiver and venting of said receiver comprising a casing having at the top thereof a compressed air inlet and outlet and an air vent therebelow; a double headed valve between said inlet and outlet effective in one position to pass compressed air from the inlet to the outlet of the casing and effective in the opposite position to admit air from the outlet to the vent of the casing, diaphragm controlling means for moving said valve in one direction and connected to the air supply, said valve being movable in the opposite direction by direct action of air from the supply thereagainst, a pair of valves located between said diaphragm and said air supply, one of said valves being adapted to admit air against said diaphragm and the other of said valves being adapted to exhaust air from said diaphragm, and float control means for said pair of valves, and a snap action mechanism connected to said pair of valves and connected to said float control means by a lost motion device.

14. Valve mechanism for controlling flow of pressure fluid into a sewage receiver and venting of said receiver comprising a casing having at the top thereof a compressed air inlet and outlet and an air vent therebelow; a double headed valve between said inlet and outlet effective in one position to pass compressed air from the inlet to the outlet of the casing and effective in the opposite position to admit air from the outlet to the vent of the casing, said valve being provided with a projection extending from one head thereof, diaphragm controlling means positively connected to said projection for moving said valve in one direction, and connected to the air supply, said valve being movable in the opposite direction by direct action of air from the supply thereagainst, a pair of valves located between said diaphragm and said air supply, one of said valves being adapted to admit air against said diaphragm and the other of said valves being adapted to exhaust air from said diaphragm.

In testimony whereof I have hereunto affixed my signature.

IRVING C. JENNINGS.