

937,784.

Fig. 1.

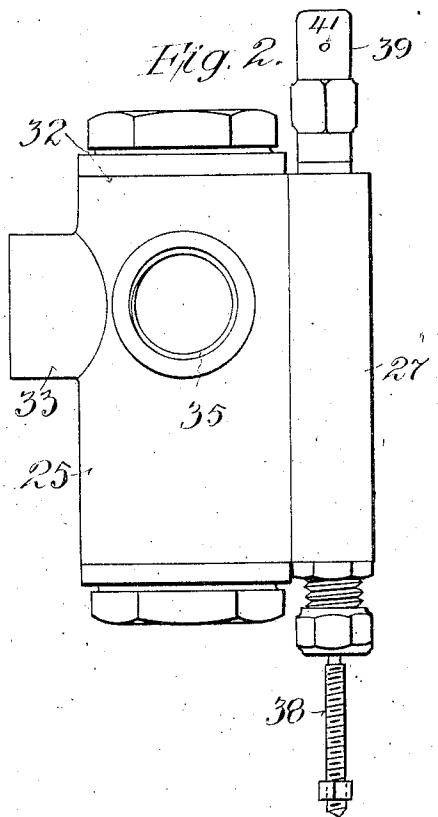


Fig. 2.

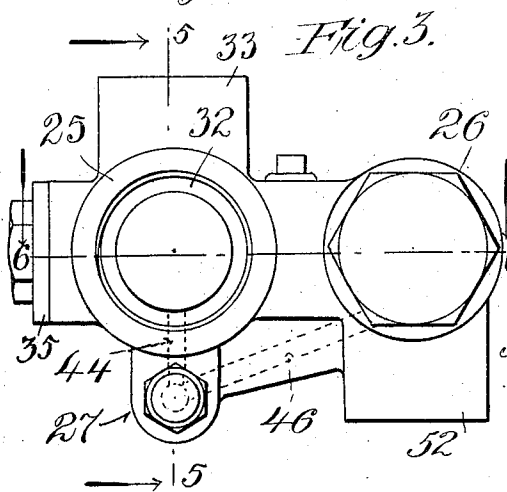


Fig. 3.

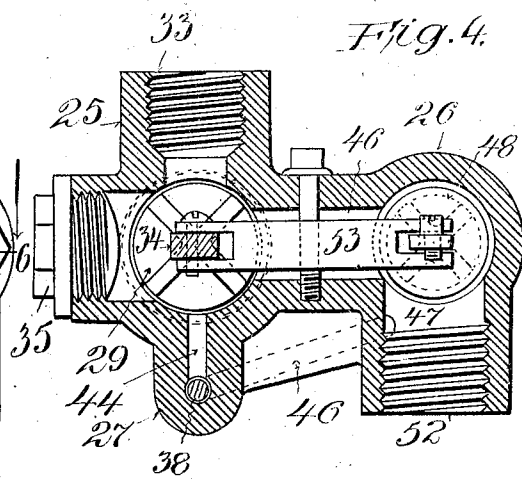


Fig. 4.

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SEWAGE DISCHARGE SYSTEM.
APPLICATION FILED SEPT. 2, 1908.

Patented Oct. 26, 1909.
3 SHEETS—SHEET 2.

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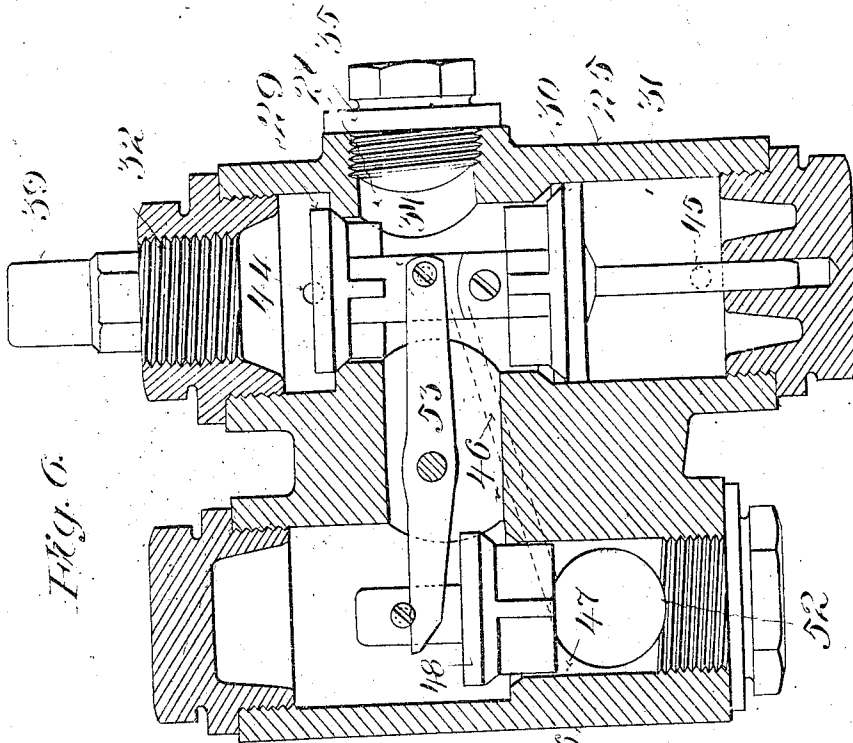


Fig. 6.

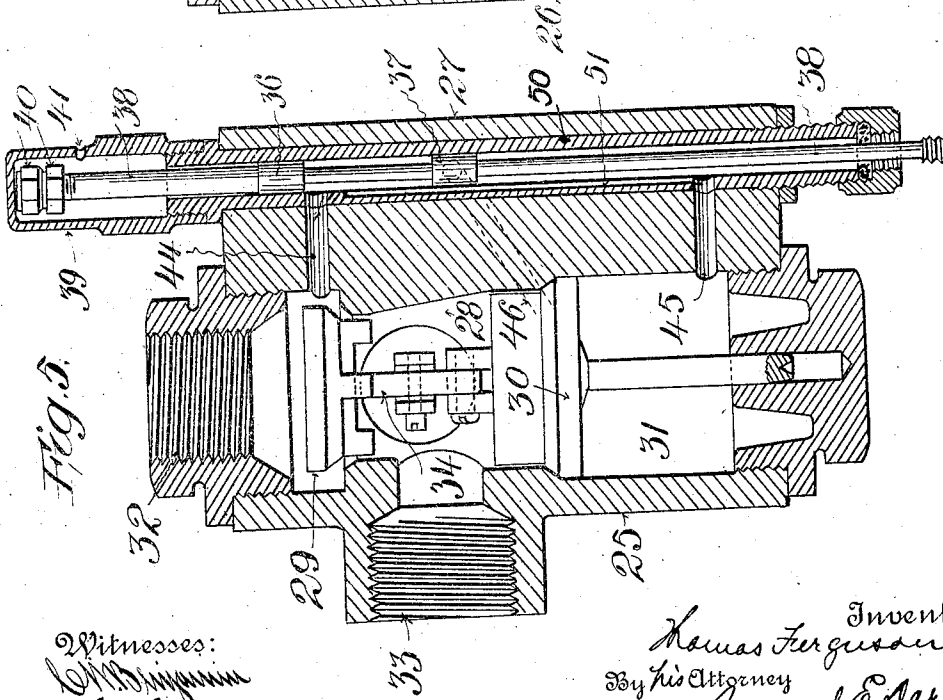


Fig. 5.

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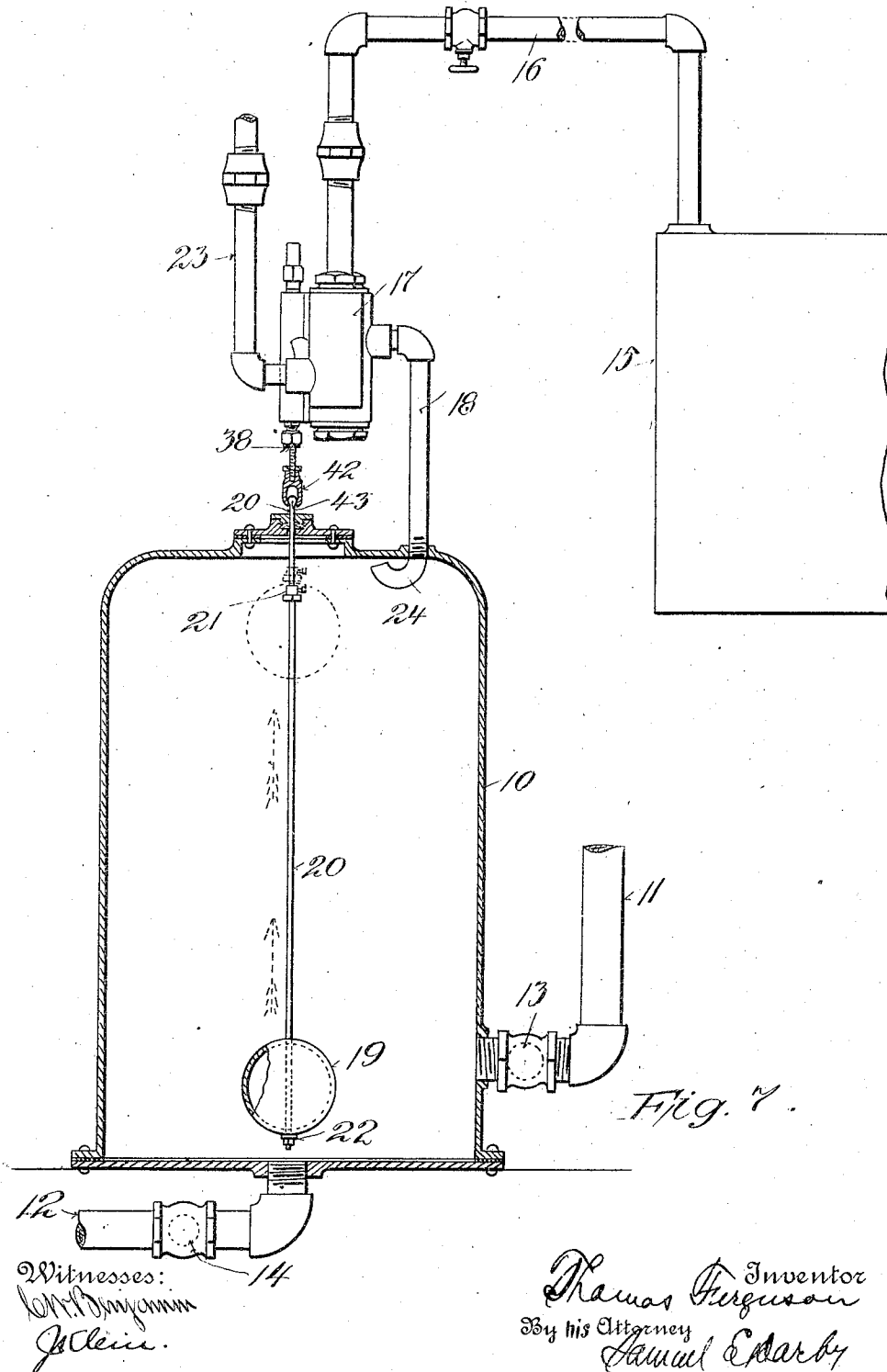


Fig. 7.

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UNITED STATES PATENT OFFICE.

THOMAS FERGUSON, OF NEW YORK, N. Y., ASSIGNOR TO THE LINTON MACHINE COMPANY, OF NEW YORK, N. Y.

SEWAGE-DISCHARGE SYSTEM.

937,784.

Specification of Letters Patent

Patented Oct. 26, 1909.

Application filed September 2, 1908. Serial No. 451,306.

To all whom it may concern:

Be it known that I, THOMAS FERGUSON, a citizen of the United States, residing at New York, in the county of New York, State of New York, have made a certain new and useful Invention in Sewage-Discharge Systems, of which the following is a specification.

This invention relates to sewage discharge systems.

The object of the invention is to provide means which are simple and efficient for automatically discharging sewage into the sewers or the like.

Other objects of the invention will appear more fully hereinafter.

The invention consists substantially in the construction, combination, location and relative arrangement of parts, all as will be more fully hereinafter set forth, as shown in the accompanying drawings, and finally pointed out in the appended claims.

Referring to the accompanying drawings, and to the various views and reference signs appearing thereon,—Figure 1 is a view in side elevation of a valve mechanism embodying the principles of my invention, looking at the pressure exhaust side of the valve casing. Fig. 2 is a similar view looking at the pressure receiving side of the casing. Fig. 3 is a top plan view of the construction shown in Fig. 1. Fig. 4 is a view in horizontal section on the line 4, 4, Fig. 1, looking in the direction of the arrows. Fig. 5 is a section on the line 5, 5, Figs. 1 and 3, looking in the direction of the arrows. Fig. 6 is a section on the line 6, 6, Fig. 3, looking in the direction of the arrows. Fig. 7 is a view partly in side elevation and partly in vertical section showing the application of the valve mechanism to a sewage system.

The same part is designated by the same reference sign wherever it occurs throughout the several views.

The problem of discharging the sewage from buildings, or other places, into the sewers has become a serious one, especially in the construction of large office and apartment buildings, hotels, and other places where large numbers of people are accommodated. In most cities the sanitary requirements regarding the proper discharge of the sewage are rigid and necessary in order to preserve the public health. The solu-

tion of this problem has led to various attempts to provide simple and efficient mechanism and apparatus, but the plans so far undertaken have been more or less crude and inefficient and have required more or less expensive apparatus which is bulky, occupying great space which is not always available, and requiring constant care and attention. Moreover, the apparatus heretofore employed has not proven altogether satisfactory in the operation thereof, and, frequently, has been found inefficient and unreliable.

It is among the special purposes of my invention to provide means which are simple, efficient, reliable and automatic, and which occupies small space and required no special care or attention in the automatic operation thereof, for insuring the proper and regularly recurring discharge of the sewage into the street mains or sewers.

In carrying out my invention I propose to employ a tank or cistern into which the sewage from the building is constantly being collected, and from which such sewage is periodically and automatically discharged into the sewers. In effecting the discharge of the contents of the tank or cistern into the sewers, I propose to employ pneumatic or other pressure, and a valve mechanism for controlling the supply and exhaust of the pressure medium to and from the tank or cistern, said valve mechanism being automatically controlled by the accumulations in the tank or cistern.

My invention may be practically carried out in a wide variety of different ways. While therefore, I have shown, and will now describe, one construction and arrangement for accomplishing the desired objects, my invention as defined in the claims, is not to be limited or restricted to the exact construction and arrangement of details now to be described.

Referring to Fig. 7, reference sign 10, designates a tank, cistern or the like, which for brevity, I will hereinafter refer to as the tank, into which the sewage from a building, is delivered, through the delivery pipe 11, and from which such sewage is discharged into the street mains or sewers, or elsewhere, as may be desired, through the discharge pipe 12. The delivery and discharge pipes 11, 12, are provided with suitable check

valves 13, 14, by which the one of said pipes is closed while the other is performing its function. Reference sign 15, is a pressure tank or reservoir, or other source, from which the pressure medium is delivered through pipe 16, controlling valve casing 17, and pipe 18, into the tank 10. Any suitable pressure medium may be employed. In practice I have found compressed air efficient for the purpose. Within the tank 10, is a float 19, designed to rise and fall with the supply and exhaust of the contents of the tank. If desired, and preferably, this float is guided in its rising and falling movement by the guide rod or stem 20. Near its upper and lower limits of rising and falling movements, the float engages stops 21, and 22, one or both of which may be adjustable, the movements of which stops when engaged by the float effecting the desired automatic operation of the valve mechanism contained in the casing 17. A simple arrangement for accomplishing the desired object is shown wherein the guide rod 20 is arranged to extend through the top of the tank 10, and is itself made longitudinally movable, and carries the stops 21, 22, the extending end of the rod 20, effecting the desired operation of the valve mechanism, through suitable connection therewith, as will be more fully hereinafter explained. The valve casing 17, has connected therewith the pressure supply pipe 16, from the reservoir 15, the pipe 18, delivering from such casing into the tank 10, and an exhaust pipe 23, and, as will be explained hereinafter, the valve mechanism is so constructed that when the pressure supply pipes 16, and 18 are opened to permit the pressure medium to be delivered into the tank, the exhaust pipe 23, is closed, and when the pressure supply pipe 16 is closed, or cut off, the tank is opened to the exhaust pipe 23, through the pipe 18, and the valve casing.

In the operation of the apparatus the sewage from the building empties through the pipe 11 into the tank thereby gradually filling such tank, and causing the float 19, to rise. During this operation the pressure supply is cut off and the tank is opened to exhaust as above described. When the float approaches its upper limit of movement it engages the stop 21 and raises the rod 20, thereby operating the valve mechanism in the valve casing 17, to shut off the exhaust connection 23, and to open the pressure supply connection to the tank. Thereupon, such pressure acting upon the surface of the contents of the tank causes the check valve 13, to close and the check valve 14, to open and forces all of the contents of the tank into the discharge pipe 12, and thence into the sewer or street main. Meanwhile, and during such discharge, the float 19 is gradually falling, as the level of the accumulated contents of the tank falls, until finally the

float reaches the stop 22 and causes the rod 20 to be drawn down, thereby operating the valve mechanism in casing 17, to close the pressure supply connection 16, and to open the tank to exhaust through the pipe 18, the valve casing, and exhaust connection 23, and consequently eliminating any back pressure due to the confining of pressure medium in the tank while said tank is becoming filled.

If desired, and in order to efficiently apply the pressure medium to the entire surface of the contents of the tank in discharging the same, the end 24, of the pipe 18, which extends into the tank may be upturned, as shown, whereby the pressure medium on the initial delivery thereof into the tank is distributed throughout the unfilled area of the tank, and is not forced into the body of the contents of the tank.

I will now describe the construction and operation of the valve mechanism, and the automatic operation thereof.

The valve casing indicated generally in Fig. 7, by reference sign 17, includes the three ports 25, 26 and 27, in each of which there is a valve chamber. The chamber 28 in the portion 25, of the casing contains the valves 29 and 30. The valve 30 is in the form of a piston valve, and operates in the portion 31, of chamber 28, and is subjected to pressure on both sides thereof as will be more fully explained hereinafter. The pressure supply pipe 16, from the reservoir or other source 15 is connected to the portion 25, of the casing, as at 32, and delivers into the chamber 28, the passage of the pressure medium into the chamber 28, being controlled by the valve 29. The pipe 18, which delivers into the tank 10, communicates with the chamber 28, through connection 33, at a point between the valves 29 and 30. The valves 29 and 30, are connected together by link 34, or otherwise, to move in unison, and said valves are arranged to seat in opposite directions, so that when valve 29 is unseated to admit pressure to chamber 28, and thence to the tank, the valve 30, is seated, and when the valve 29 is seated to cut off the supply of pressure to the valve casing from the source of supply, the valve 30 is unseated to permit the exhaust of pressure from the tank 10, as will presently appear more fully. The casing may be provided with an opening in the side thereof, which is normally closed by a removable plug 35, to afford means of access to chamber 28, for inspection or repair. The chamber of the portion 27 of the casing receives the pilot or control valves 36, 37. These valves are carried by a rod 38, which extends longitudinally through said chamber, and has one projecting end received within a removable cap 39, and carries adjustable stop nuts 40. The cap 39 is provided with an air vent 41 to prevent the accumulation 130

of air therein to interfere with the proper operation of the device. The other projecting end of rod 38, is threaded into a boss on a coupling casing 42. Into a chamber of this casing extends freely the end of the float guide rod 20, said rod being provided with a nut or head 43, within said chamber, thereby allowing some relative movement of the rod 20 and the pilot valve rod 38, which may be adjusted. The chamber in which the pilot valve rod 38 works is in communication by means of ducts or passages 44, 45, the former opening from the chamber 28, outside of the valve 29, and the latter opening into the chamber 31 in which the piston valve 30 operates. Also communicating with the chamber in which the pilot valve operates is a duct or passage 46, leading from the chamber 47, of the portion 26, of the casing, in which chamber a valve 48 operates. The duct or passage 47, is controlled by the valve 37, on the valve rod 38. The duct or passage 46, terminates in the chamber of the valve rod 38, at a point intermediate the passages 44, 45. The valve rod 38, with its valves 36, 37, operates in a stationary sleeve 50, on the inner wall of which is a longitudinal groove or channel 51, so arranged that when the duct 44 is uncovered by the valves 36, a free passage for the pressure medium is provided from the supply connection 32, to chamber 28, through duct 44, through groove 51, and duct 45, into the cylinder chamber 31, while at the same time this groove 51 is cut off from the exhaust duct 46. When, however, the valve 36, closes duct 44, the exhaust duct is opened. The chamber 47, in the portion 26, of the valve casing delivers through outlet connection 52, to exhaust pipe 23. The valve 48, which controls the exhaust pipe connection is so connected with the valve 29, that when the one valve is seated the other is unseated. This is accomplished by means of a rod 53, pivotally mounted intermediate its ends in the casing and having connection at its respective ends to the valves 48, and 29, or to lugs or stems carried by said valves, whereby when one valve is seated said lever is rocked in a direction to unseat the other. This being the specific construction shown and which embodies the principles of my invention as broadly defined in the claims, the operation of the valve mechanism will now be pointed out.

Suppose the supply of pressure medium is cut off, and the parts are in the positions occupied thereby during the time the tank 10, is being filled with sewage preparatory to being discharged to the sewer. In this condition the valve 29, is closed upon its seat. The valve 30, is unseated, the valve 48, is unseated, the pilot valve rod 38, is in its lowermost position, and the float 19, is rising as the tank 10, is filled. Now when

the level of the contents of the tank 10, reach such height as to cause the float 19, to raise the stop 21, or rod 20, the valve rod 38, is raised into the position shown in Fig. 5. This movement causes the valve 37, to close the port or opening of duct 46, into the chamber in which said valve and its rod operate, while at the same time the valve 36 is raised to uncover the mouth of duct 44 thereby allowing the pressure medium to enter. Thereupon pressure is admitted through duct 44, the chamber of the pilot valves, channel 51, and duct 45, into chamber 31, and, acting on the piston valve 30, which is of larger area than that of valve 29, which is also exposed to the source of pressure, moves said valve 30 into its closed position, as seen in Fig. 5, the valve 29, at the same time, being raised from its seat. The pressure medium is thereupon admitted from the supply reservoir 15, or other source, through pipe 16, connection 32, the passage controlled by valve 29, chamber 28, connection 33, and pipe 18, into the tank 10, where such pressure, acting upon the surface of the contents of said tank effects an expulsion of the same through the discharge pipe 12. The unseating movement of valve 29, causes a seating movement of the exhaust control valve 48, through the rocking lever 53. As the contents of tank 10, are being discharged therefrom by the pressure admitted, as just described, the float 19 is again descending with the level of such contents. During this time the pilot valve stem 38, is retained in its raised position by the pressure exerted upon the under surfaces of the valves 36, 37, which thus serve as piston valves. In this manner I avoid entirely the use of springs or counterweights for retaining the valve rod 38 in its raised position. When finally, the contents of tank 10, are sufficiently discharged the float 19 engages stop 22, and causes the valve rod 38, to be again returned to its initial position to cause valve 37, to uncover duct 44. This opens the chamber 31, to exhaust and instantly the pressure acting on valves 29, and 30, causes valve 29 to be seated and valve 30 to be unseated, the same movement of said valves causing valve 48 to be unseated. The result is that not only is the supply of pressure medium cut off but the tank 10, is opened to exhaust through pipe 18, connection 33, chamber 28, chamber 31, duct 45, duct 46, chamber 47, and exhaust pipe 23. Thus the refilling of the tank 10 with the sewage or other contents from pipe 11, is not opposed by any back pressure of confined air in the tank.

From the foregoing description it will be readily seen that I provide an exceedingly simple, efficient and inexpensive apparatus for removing and disposing of the sewage from buildings or for other uses and pur-

poses, which apparatus occupies but small space, and which is wholly automatic in action requiring no care or attention when once set in operation except to maintain the desired degree of pressure in the reservoir. It will also be seen that I do not require any delicate mechanisms which are liable to become worn or broken or to require frequent renewals.

Having now set forth the object and nature of my invention, and a construction embodying the principles thereof, and having explained such construction, its purpose, function and mode of operation, what I claim as new and useful and of my own invention and desire to secure by Letters Patent is:

1. In a sewage discharge system, a tank having supply and discharge connections, in combination with a pressure reservoir, and means for controlling the supply and exhaust of pressure to and from said tank, including a casing having a chamber, a pipe connection from the reservoir delivering to the chamber, a pipe connection delivering from said chamber to the tank, and a pipe connection delivering from said chamber to exhaust, a valve seat formed in said chamber, a valve mounted to move toward and from said seat to control the supply of pressure to said chamber, a valve and valve seat to control the exhaust, connections between said valves to secure coincident operation thereof, a piston of larger area than the pressure controlling valve and connected to said valve to operate the same, a cylinder in which the piston is mounted, a passage formed in the casing and delivering from the pressure connection to said cylinder, an exhaust duct delivering from the cylinder, pilot valves mounted in the casing for controlling said passage and duct, a rod connected to said pilot valves, and a float arranged in the tank to be operated by changes in the level of the contents thereof to operate said rod.

2. The combination with a tank and pressure supply reservoir, and connections between them including a casing having a chamber, a connection delivering from the reservoir to said chamber, a connection communicating respectively with the tank and chamber, and an exhaust connection to said chamber, a valve seat in the casing, a valve exposed to the supply pressure cooperating with said seat, a piston mounted in the casing of larger area than said valve and connected thereto, an auxiliary chamber formed in the casing, a sleeve mounted therein, passages formed in the casing and opening from the pressure supply to the interior of the sleeve, and from the interior of the sleeve to the piston, and to exhaust respectively, a duct formed in the sleeve around the exhaust passage, pilot valves mounted in the sleeve

for controlling said passages, a stem connected to said pilot valves, and extending into the tank, and a float in the tank for operating said rod.

3. A valve mechanism for sewage discharge systems comprising a casing having a main chamber, a piston chamber and an auxiliary chamber formed therein, valve seats formed in the main and piston chambers, a main valve and a piston having a valve face and respectively cooperating with said seats, said valves being connected together, and the piston area being greater than the main valve area, pressure supply discharge and exhaust connections, to said main chamber, a passage delivering from the pressure side of the main valve to the auxiliary chamber, a passage delivering from the auxiliary chamber to the piston chamber, and a passage delivering from the auxiliary chamber to exhaust, pilot valves mounted in the auxiliary chamber to control said passages, and means for automatically operating said pilot valves.

4. A valve mechanism for sewage discharge systems comprising a casing having main, piston and auxiliary chambers formed therein, supply, discharge and exhaust connections for said main chamber, disk valves for controlling said supply and exhaust connections, said valves being connected for coincident movement, seats with which said valves cooperate, a piston in the piston chamber having connection with the supply valve, passages formed in the casing and respectively connecting the auxiliary chamber with the pressure supply, the exhaust and the piston chamber, pilot valves in the auxiliary chamber to control said passages, a duct formed in the casing and leading from the pressure supply passage to the piston chamber passage, a rod connected to said pilot valves to operate the same and means for automatically operating said rod.

5. In a sewage discharge system the combination with a tank having supply and discharge connections, of a pressure reservoir, a casing having main, piston and auxiliary chambers formed therein, a supply connection from the reservoir to the main chamber, a supply and discharge connection from the tank to the main chamber, and an exhaust connection with the main chamber, a valve seat formed in the main chamber between the pressure supply connection and the tank and exhaust connections, a valve cooperating with said seat, a piston in the piston chamber and connected to the valve, a valve for controlling the exhaust connection and connected for coincident movement with the main valve, passages formed in the casing and communicating between the auxiliary chamber and the pressure supply, the exhaust and the piston chamber, a duct formed in the auxiliary chamber around the exhaust pas-

sage and communicating between the supply and piston chamber passages, pilot valves for controlling said passages, a rod connected to said pilot valves and extending into the tank, and a float arranged in the tank to operate said rod.

In testimony whereof I have hereunto set

my hand in the presence of the subscribing witnesses, on this 30th day of August A. D., 1908.

THOMAS FERGUSON.

Witnesses:

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J. KLEIN.