

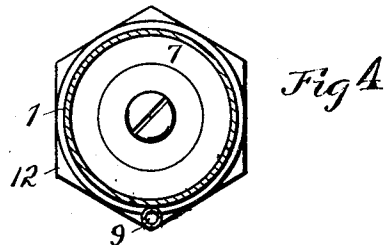
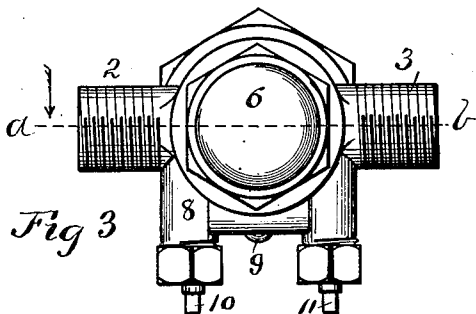
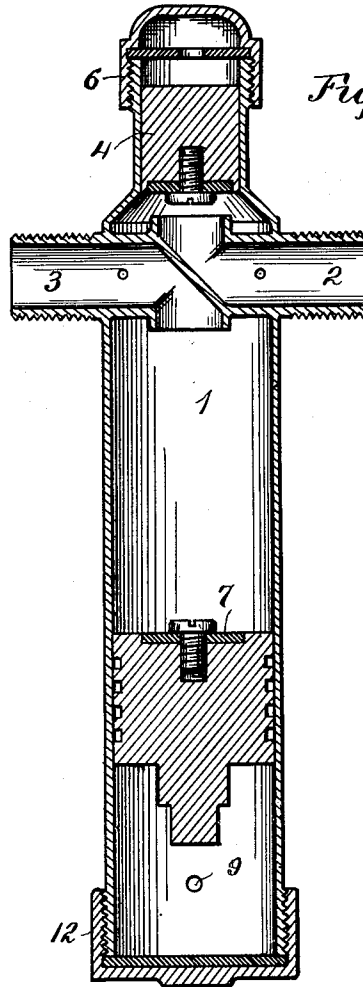
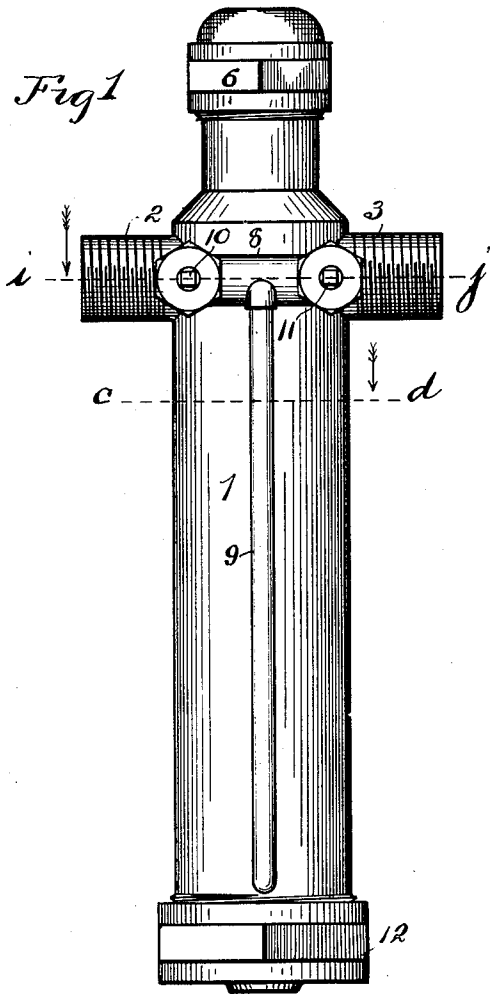
No. 842,279.

PATENTED JAN. 29, 1907.

T. H. WALKER.
AUTOMATICALLY CLOSING VALVE.

APPLICATION FILED OCT. 18, 1905.

2 SHEETS—SHEET 1.



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W. C. Lingler.

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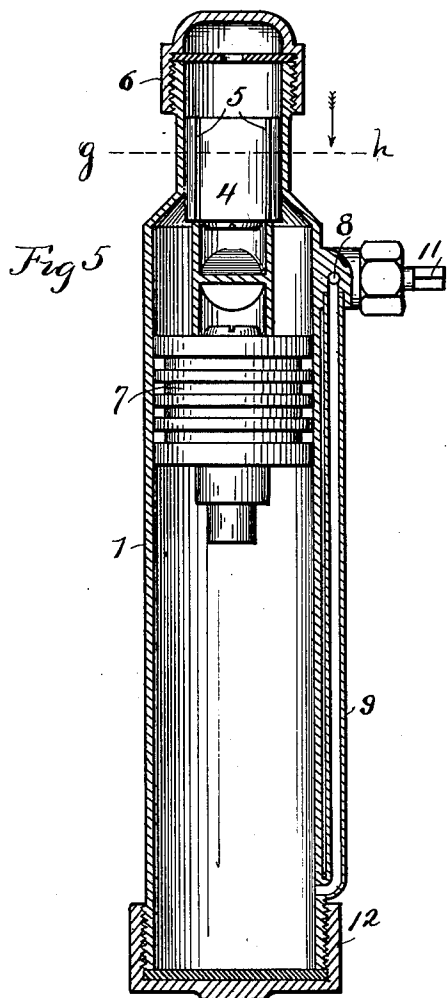


Fig 6

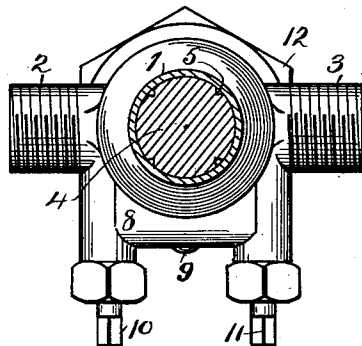


Fig 7

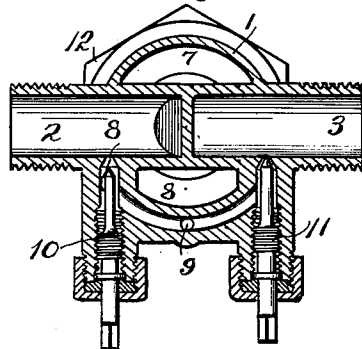
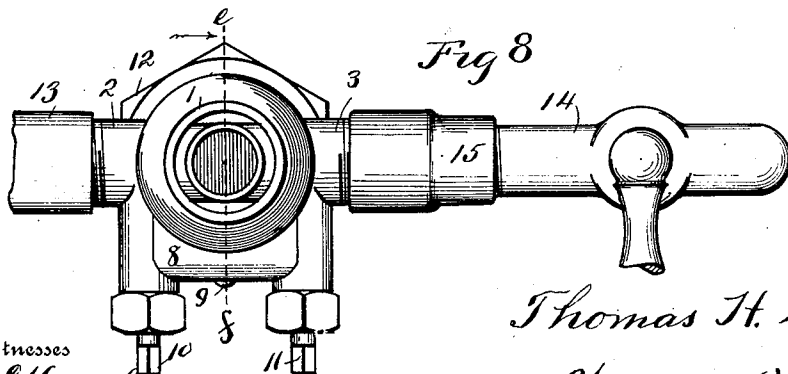


Fig 8



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UNITED STATES PATENT OFFICE.

THOMAS H. WALKER, OF KANSAS CITY, MISSOURI.

AUTOMATICALLY-CLOSING VALVE.

No. 842,279.

Specification of Letters Patent.

Patented Jan. 29, 1907.

Application filed October 18, 1905. Serial No. 283,269.

To all whom it may concern:

Be it known that I, THOMAS H. WALKER, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented new and useful Improvements in Automatically-Closing Valves, of which the following is a specification.

My invention relates to automatically-closing valves.

The object of my invention is to provide an apparatus for automatically cutting off the flow of fluid through a conductor in case of leakage in said conductor or in the event that the discharge-passage of the conductor has been unintentionally left open.

My invention is particularly well adapted for use in connection with the water-supply system of a house, its function in such connection being to shut off the water from the service-pipes in case of leakage or in the event that a faucet has been left turned on.

The novel features of my invention are hereinafter fully described and claimed.

In the accompanying drawings, illustrative of my invention, Figure 1 is a side elevation view of the apparatus. Fig. 2 is a central vertical sectional view taken on the dotted line *a b* of Fig. 3. Fig. 3 is a top view. Fig. 4 is a horizontal sectional view taken on the dotted line *c d* of Fig. 1. Fig. 5 is a vertical sectional view taken on the dotted line *e f* of Fig. 8. Fig. 6 is a horizontal sectional view on the dotted line *g h* of Fig. 5. Fig. 7 is a horizontal sectional view on the dotted line *i j* of Fig. 1. Fig. 8 is a top view with the cap and upper valve removed and showing a faucet connected to the discharge end of the apparatus. In Figs. 2 and 5 the valves are shown respectively in the open and closed positions.

Similar characters of reference denote similar parts.

The apparatus comprises a conductor consisting of a vertical cylindrical chamber 1, having adjacent its upper end two horizontal passages 2 and 3, disposed in alinement with each other and extending diametrically through the cylinder 1. The inlet-passage 2 has its inner end upwardly turned and serving as a seat for a vertically-movable valve or float 4, disposed above the inlet-opening and movable downward against its seat, preferably by gravity. The valve 4 is provided with one or more passages 5 for conveying the fluid from the lower to the upper side of said valve. Said passages 5 consist, preferably, of

longitudinal grooves which extend the full length of the valve. The upper end of the cylindrical chamber 1 is externally screw-threaded and has fitted to it an internally-screw-threaded cap 6, which closes the upper end of the chamber 1.

The inner end of the passage 3 is downwardly turned and serves as a seat, against which is adapted to rest the upper side of a valve 7, which is vertically movable in the chamber 1 below the outlet-opening of the passage 3. The valve 7 is normally held in the open position by its gravity, and its upper side only is exposed to the pressure of fluid entering the chamber through the inlet-passage 2. The valve 7 is preferably of greater diameter than the valve 4, the lower end of the chamber 1, in which the valve 7 is located, being proportionately greater in diameter than the upper end of the chamber, in which is slidably mounted the valve 4. Upon the outer side of the chamber 1 and having its ends communicating, respectively, with the passages 2 and 3 upon opposite sides of the valve-seats of said passages is a by-pass 8, said by-pass having a vertical passage 9, the lower end of which communicates with the chamber 1 below the valve 7. Suitable means for regulating the flow through the by-pass 8 around the inlet and outlet openings to the chamber 1 are provided. Such regulating means comprises, preferably, two needle-valves 10 and 11, constructed in the ordinary manner and adapted to close, more or less, the inlet and outlet ends of the by-pass 8. The lower end of the chamber 1 is externally screw-threaded and has fitted to it the internally-screw-threaded upper end of a cap 12. The valve 4 serves as a medium for resisting the flow of the fluid into the chamber 1 through the passage 2, thus creating a back pressure, which is communicated to the under side of the valve 7 by means of the by-pass 8 and its passage 9. 13 denotes the end of the supply-pipe to which is connected the portion of the conductor containing the inlet-passage 2. 14 denotes a faucet of the ordinary pattern connected by a union 15 to that part of the conductor containing the outlet-passage 3 of the apparatus.

I will describe now the operation of my invention. The fluid—as, for instance, water—enters the inlet-passage 2 from the supply-pipe 13 and by its pressure raises the valve 4 and enters the upper end of the chamber, in

which it passes downwardly around the outer periphery of that portion of the conductor extending through the chamber 1 and having therein the passages 2 and 3.

5 The fluid then passes through the passage 3, the valve 7 being in the open position, and then through the union 15 and into the faucet 14 or into such other fluid-conductor as may be connected to the passage 3. A

10 portion of the fluid entering the inlet-passage 2 will pass from said passage past the valve 10 into the by-pass 8, from which some of the fluid flows through the passage 9 into the cylinder 1 below the valve 7, and a

15 portion of the fluid entering the by-pass 8 will be discharged into the outlet-passage 3, past the valve 11. If the faucet 14 be opened, the pressure of the fluid entering the chamber 1 will retain the valve 4 in the

20 raised position shown in Fig. 2. Said valve in such position will create a back pressure in the passage 2 equivalent to the weight of the said valve. The back pressure thus effected will be communicated to the lower side of the

25 valve 7 through the by-pass 8, passage 9, and the lower end of the cylinder 1. The upper and lower sides of the valve 7 being of equal area in cross-section, the valve 7 will be raised by the additional pressure created in

30 the lower end of the cylinder 1, due to the resistance to the flow of the fluid through the passage 2 by means of the weight of the valve 4. If the faucet is held open for a considerable length of time, the valve 7 will rise to

35 a position in which it will close the outlet-passage 3, thus shutting off the water or other fluid. The valve 10 is adjusted to a position such that the valve 7 will not be closed by the fluid until a predetermined amount of fluid has

40 been delivered from the faucet 14—as, for instance, an amount sufficient to fill an ordinary bath-tub. As soon as the valve 7 becomes seated the valve 4 will fall to its seat by gravity, the pressure of the fluid above

45 and below the valve 4 being the same. If the faucet is unintentionally left open after the predetermined amount of water has passed therethrough, the valve 7 will shut off the supply passing out the faucet, excepting

50 a trifling amount, such as will pass through the by-pass 8 past the valve 11. The valve 7 will remain in the closed position until such time as the faucet shall again be closed, thus preventing a great waste of

55 water or such other fluid as may be passing through the apparatus. If now the faucet be closed, the valve 11 being open, the fluid passing through the by-pass 8 into the passage 3 will at once establish an equal pressure upon the upper and lower sides of the

60 valve 7, which valve will fall by gravity to the bottom of the chamber 1. If there is leakage in the faucet 14 or elsewhere in the service beyond the passage 3 exceeding in

65 amount the amount which can pass through

the by-pass 8 by the valve 11, the valve 7 will be raised to the closed position by the same agency as already described, thus shutting off all waste excepting the small amount passing into the by-pass 8 and by the valve 70 11 into the passage 3. If it were not for the leakage into the passage 3 around the valve 11, the valve 7 after once having raised to the closed position would always remain closed, for the reason that the pressure above the 75 valve could not equal the pressure below the valve, there being no means of conveying fluid into the passage 3 in case the valve 11 were closed or in case the by-pass 8 did not communicate with the passage 3. This fact 80 may be taken advantage of for converting the apparatus into a fluid-measuring device to be operated in the following manner: The valve 10 is first adjusted so that with the valve 11 closed a predetermined amount of 85 fluid shall pass through the passage 2, past the valve 4, into the chamber 1, and from thence be delivered through the faucet 14 by the way of the passage 3 and union 15 before the valve 7 shall rise to close the passage 3. 90 As soon as the valve 7 shall become seated the faucet 14 is closed and then the valve 11 is opened, thus equalizing the pressure upon both sides of the valve 7, which will fall to the bottom of the chamber 1 by gravity. 95 The valve 11 is then again closed, after which the faucet 14 is opened. The valve 4 will again be lifted, and the fluid to the predetermined amount will be delivered through the faucet in the manner already described. 100

It will be obvious that my invention may be modified in many ways from the construction shown and described without departing from the spirit of the invention.

Having thus described my invention, what 105 I claim, and desire to secure by Letters Patent, is—

1. The combination with a conductor for conveying fluid under pressure and having an inlet-valve opening and an outlet-valve opening, of two valves located intermediate said 110 valve-openings, one valve being movable toward the inlet-valve opening by gravity and movable away from said opening by pressure of the incoming fluid entering 115 through the inlet-valve opening, the other valve being movable by gravity away from the outlet-valve opening, the side of the outlet-valve adjacent the outlet-opening being exposed to the pressure of the incoming 120 fluid, and a by-pass connected at its ends with said conductor at points located outside respectively of said inlet and outlet valve openings and having communicating with it a passage which communicates with 125 the conductor adjacent the side of the outlet-valve distant from the outlet-valve opening.

2. The combination with a conductor for conveying fluid under pressure and having an inlet-valve opening and an outlet-valve open- 130

ing, of two valves located intermediate said valve-openings, one valve being movable toward the inlet-valve opening by gravity and movable away from said opening by pressure of the incoming fluid entering through the inlet-valve opening, the other valve being movable by gravity away from the outlet-valve opening, the side of the outlet-valve adjacent the outlet-opening being exposed to the pressure of the incoming fluid, a by-pass connected at its ends with said conductor at points located outside respectively of said inlet and outlet valve openings and having communicating with it a passage which communicates with the conductor adjacent the side of the outlet-valve distant from the outlet-valve opening, and adjustable means for controlling the passage of fluid from the conductor into said by-pass.

3. The combination with a conductor for conveying fluid under pressure and having an inlet-valve opening and an outlet-valve opening, of two valves located intermediate said valve-openings, one valve being movable toward the inlet-valve opening by gravity and movable away from said opening by pressure of the incoming fluid entering through the inlet-valve opening, the other valve being movable by gravity away from the outlet-valve opening, the side of the outlet-valve adjacent the outlet-opening being exposed to the pressure of the incoming fluid, a by-pass connected at its ends with said conductor at points located outside respectively of said inlet and outlet valve openings and having communicating with it a passage which communicates with the conductor adjacent the side of the outlet-valve distant from the outlet-valve opening, and two valves disposed one at each side of said passage for controlling the passage of fluid through said by-pass.

4. The combination with a conductor for conveying fluid under pressure and having an inlet-valve opening and an outlet-valve opening, of two valves located in said conductor, one being movable by gravity toward and adapted to close the inlet-valve opening the other valve being disposed below the outlet-valve opening and movable therefrom by gravity the upper side of the outlet-valve being exposed to the pressure of fluid entering the inlet-opening, and a conductor connected to the first-named conductor at a point below the outlet-valve and at points outside of the said two openings respectively.

5. The combination with a conductor for conveying fluid under pressure and having an inlet-valve opening and an outlet-valve opening and provided with a valve-chamber embracing said openings, of two valves in said chamber, one valve being normally held in position closing the inlet-opening, the other valve being movable in the chamber to a position closing the outlet-opening but nor-

mally held in the open position and having the side adjacent the outlet-opening exposed to the pressure of the fluid entering the chamber through the inlet-opening, and a conductor connected to the first-named conductor at points outside the said inlet and outlet openings respectively and connected to the said chamber at a point adjacent the side of the outlet-valve distant from the outlet-opening.

6. The combination with a conductor for conveying fluid under pressure and having an inlet-valve opening and an outlet-valve opening and provided with a valve-chamber embracing said openings, of two valves in said chamber, one valve being normally held in position closing the inlet-opening, the other valve being movable in the chamber to a position closing the outlet-opening but normally held in the open position and having the side adjacent the outlet-opening exposed to the pressure of the fluid entering the chamber through the inlet-opening, a by-pass connected at its ends with said conductor at points located outside respectively of said openings and having a passage between its ends communicating with said chamber at a point adjacent the side of the outlet-valve distant from the outlet-valve opening, and adjustable means disposed at each side of said passage for controlling the passage of fluid through said by-pass.

7. The combination with a conductor for conveying fluid under pressure and having an upwardly-facing inlet-opening and a downwardly-facing outlet-opening and provided with a vertical valve-chamber embracing said openings, of two valves vertically movable in said chamber, one being disposed above and movable by gravity downward to a position closing the inlet-opening, the other valve being disposed below and movable upwardly to a position closing the outlet-opening and movable downward therefrom by gravity, both sides of the upper valve being exposed to the pressure of the fluid entering the chamber through the inlet-opening, the upper side only of the lower valve being exposed to the fluid entering the chamber through the inlet-opening, and a conductor having its lower end connected to said chamber below the lower valve and having a bifurcated upper end connected to the first-named conductor upon opposite sides respectively of the said two openings.

8. The combination with a conductor for conveying fluid under pressure and having an upwardly-facing inlet-opening and a downwardly-facing outlet-opening and provided with a vertical valve-chamber embracing said openings, of two valves vertically movable in said chamber, one being disposed above and the other below said openings respectively, the valve above the inlet-opening being movable to a position closing said open-

ing by gravity, and the valve below the outlet-opening being movable downward from said opening by gravity, the outlet-valve being exposed to the pressure of the fluid entering the chamber through the inlet-opening on its upper side only, the inlet-valve having its upper and lower sides both exposed to the fluid entering the chamber through the inlet-opening, a by-pass connecting with the conductor upon opposite sides respectively of said openings and having a passage communicating with the chamber below the outlet-valve, and adjustable means disposed at each side of said passage for controlling the passage of fluid through said by-pass.

9. The combination with a conductor for conveying fluid under pressure having an inlet-opening and an outlet-opening, of means located in said conductor intermediate said openings for creating a back pressure upon the fluid passing through said inlet-opening, a valve movable in said conductor to a position closing said outlet-opening, the side of said valve adjacent said outlet-opening being exposed to the pressure of the fluid passing through the inlet-opening, and a by-pass connected at its ends to said conductor upon opposite sides respectively of said openings and having a passage communicating with the conductor at a point adjacent the side of the valve distant from the outlet-opening.

10. The combination with a conductor for conveying fluid under pressure having an inlet-opening and an outlet-opening, of means located in said conductor intermediate said openings for creating a back pressure upon the fluid passing through said inlet-opening, a valve movable in said conductor to a position closing said outlet-opening, the side of said valve adjacent said outlet-opening being exposed to the pressure of the fluid passing through the inlet-opening, a by-pass connected at its ends to said conductor upon opposite sides respectively of said openings and having a passage communicating with the conductor at a point adjacent the side of the valve distant from the outlet-opening, and adjustable means for controlling the passage of fluid in said by-pass.

11. The combination with a conductor for conveying fluid under pressure having an inlet-opening and an outlet-opening, of means located in said conductor intermediate said openings for creating a back pressure upon the fluid passing through said inlet-opening, a valve movable in said conductor to a position closing said outlet-opening, the side of said valve adjacent said outlet-opening being exposed to the pressure of the fluid passing through the inlet-opening, a by-pass connected at its ends to said conductor upon opposite sides respectively of said openings and having a passage communicating with the conductor at a point adjacent the side of the valve distant from the outlet-opening, and

adjustable means for controlling at each side of said passage the flow of fluid through said by-pass.

12. The combination with a conductor for conveying fluid under pressure having an inlet-opening and an outlet-opening, of gravity-actuated means located in said conductor for resisting the passage of the fluid through said inlet-opening, a valve in said conductor movable to a position closing said outlet-opening and having gravity and the pressure of the fluid passing through the inlet-opening opposing its closing movement, and a by-pass connected to the conductor upon opposite sides respectively of said openings and having a passage communicating with the conductor at a point where the fluid flowing through said passage will exert a pressure tending to move the valve to the closed position.

13. The combination with a conductor for conveying fluid under pressure having an inlet-opening and an outlet-opening, of means located in said conductor for resisting the inward flow of the fluid through said inlet-opening, a valve movable in said conductor to and from a position closing said outlet-opening, the closing movement of said valve being opposed by the fluid entering through the inlet-opening, a by-pass connected to the conductor upon opposite sides respectively of said openings and having a passage communicating with the conductor at a point where the fluid flowing through said passage will exert a pressure for forcing the valve to the closed position, and adjustable means for regulating the admission of fluid from the conductor into the by-pass.

14. The combination with a conductor for conveying fluid under pressure having an inlet-opening and an outlet-opening, of means located in said conductor for resisting the inward flow of the fluid through said inlet-opening, a valve movable in said conductor to and from a position closing said outlet-opening, the closing movement of said valve being opposed by the fluid entering through the inlet-opening, a by-pass connected to the conductor upon opposite sides respectively of said openings and having a passage communicating with the conductor at a point where the fluid flowing through said passage will exert a pressure for forcing the valve to the closed position, and adjustable means for regulating the discharge of fluid from the by-pass into the discharge portion of the conductor.

15. The combination with a chamber having an inlet and an outlet passage having valve-seats facing upwardly and downwardly respectively, of a valve vertically movable in said chamber and movable downward by gravity against the valve-seat of the inlet-passage, said valve having a passage for conveying the fluid from the lower to the upper

side thereof, a valve located in said chamber below the outlet-passage and movable upwardly against the seat of said outlet-passage and movable downward by gravity, the upper side of the second-named valve being exposed to the pressure of the fluid entering the chamber through the inlet-passage, and a by-pass having its ends connected to the inlet and outlet passages at opposite sides respectively of said valve-seats and having a passage connecting with said chamber at a point below the valve which closes the outlet-passage.

16. The combination with a chamber having an inlet and an outlet passage having valve-seats facing upwardly and downwardly respectively, of a valve vertically movable in said chamber and movable downwardly by gravity against the valve-seat of the inlet-passage, said valve having a passage for conveying the fluid from the lower to the upper side thereof, a valve located in said chamber below the outlet-passage and movable upwardly against the seat of said outlet-passage and movable downwardly by gravity, the upper side of the second-named valve being exposed to the pressure of the fluid entering the chamber through the inlet-passage, a by-pass having its ends connected to the inlet and outlet passages at opposite sides of the said valve-seats respectively and having a passage connecting with the chamber at a point below the valve which closes the outlet-passage, and adjustable means for regulating at each side of said passage the flow of fluid through said by-pass.

17. The combination with a chamber having an inlet-passage and an outlet-passage, of two valves movable respectively in said chamber to and from positions closing said passages, the valve for the inlet-passage normally being in the closed position, and the valve for the outlet-passage resting normally in the open position, one side of the valve adjacent the outlet-passage being exposed to the pressure of the fluid entering the chamber through the inlet-passage, and means for conveying fluid from the inlet-passage to the chamber at a point adjacent the side of the outlet-valve distant from the outlet-passage.

18. The combination with a chamber having two open ends, of two removable closures for said open ends respectively, the chamber having an inlet-passage and an outlet-passage facing said open ends respectively, two valves mounted in said chamber adjacent said ends respectively, said valves being movable toward and from said passages respectively, the valve for the inlet-passage normally being in position closing the inlet-passage, and the other valve normally resting in the open position, the side of the outlet-valve adjacent the outlet-passage being exposed to the pressure of fluid entering the chamber through the inlet-passage, a by-pass connect-

ed at its ends to said passages upon opposite sides respectively of the inner ends of said passages, and a passage connecting said by-pass and the chamber at a point adjacent the side of the outlet-valve distant from the outlet-passage.

19. The combination with a vertical chamber having open upper and lower ends and provided with an inlet-passage and an outlet-passage, the inner ends of which face respectively upwardly and downwardly, of two removable closures one for each open end of the chamber, a by-pass connected at its ends to the said two passages upon opposite sides respectively of the inner ends of said passages, a conductor connected at one end to said by-pass and at the other end to the chamber, a valve vertically movable in said chamber below the inner end of the outlet-passage and adapted to close said inner end of said passage and disposed above the end of the conductor which is connected with the chamber, the side of the valve adjacent the inner end of the outlet-passage being exposed to the pressure of fluid entering the chamber through the inlet-passage, and a valve in said chamber vertically movable to and from a position closing the inner end of the inlet-passage.

20. The combination with a vertical chamber having open upper and lower ends and provided with an inlet and an outlet passage the inner ends of which face upwardly and downwardly respectively, of two removable closures for said open ends of the chamber, two valves in said chamber disposed respectively one above the inlet-passage and the other below the outlet-passage, and movable to and from positions respectively closing said passages, the valve for the outlet-passage having the side adjacent the outlet-passage exposed to the pressure of fluid entering the chamber through the inlet-passage, the inlet-valve being normally movable by gravity to a position closing the inlet-passage, the other valve being normally movable by gravity to a position away from the outlet-passage, a by-pass connected at its ends to said passages upon opposite sides respectively of the inner ends of said passages, a conductor connecting said by-pass with the chamber at a point below the outlet-valve, and adjustable means for controlling the admission of fluid into said by-pass.

21. The combination with a vertical chamber having open upper and lower ends and having an inlet-passage and an outlet-passage the inner ends of which face upwardly and downwardly respectively, of two removable closures for said open ends respectively, two valves both movable in said chamber downwardly by gravity, one valve being disposed above and adapted to close the inner end of the inlet-passage, the other valve being disposed below and adapted when up-

wardly moved to close the inner end of the outlet-passage; the upper side of the outlet-valve being exposed to the pressure of fluid entering the chamber through the inlet-passage, a by-pass connecting said passages upon
5 opposite sides respectively of the inner ends of said passages, a conductor connected to the chamber below the outlet-valve and also connected to the by-pass, and adjustable

means for regulating at each side of the said conductor the flow of fluid through said by-pass.

In testimony whereof I affix my signature in presence of two subscribing witnesses.

THOMAS H. WALKER.

Witnesses:

WARREN D. HOUSE,

HENRY F. ROSE.