No. 765,259. PATENTED JULY 19, 1904.

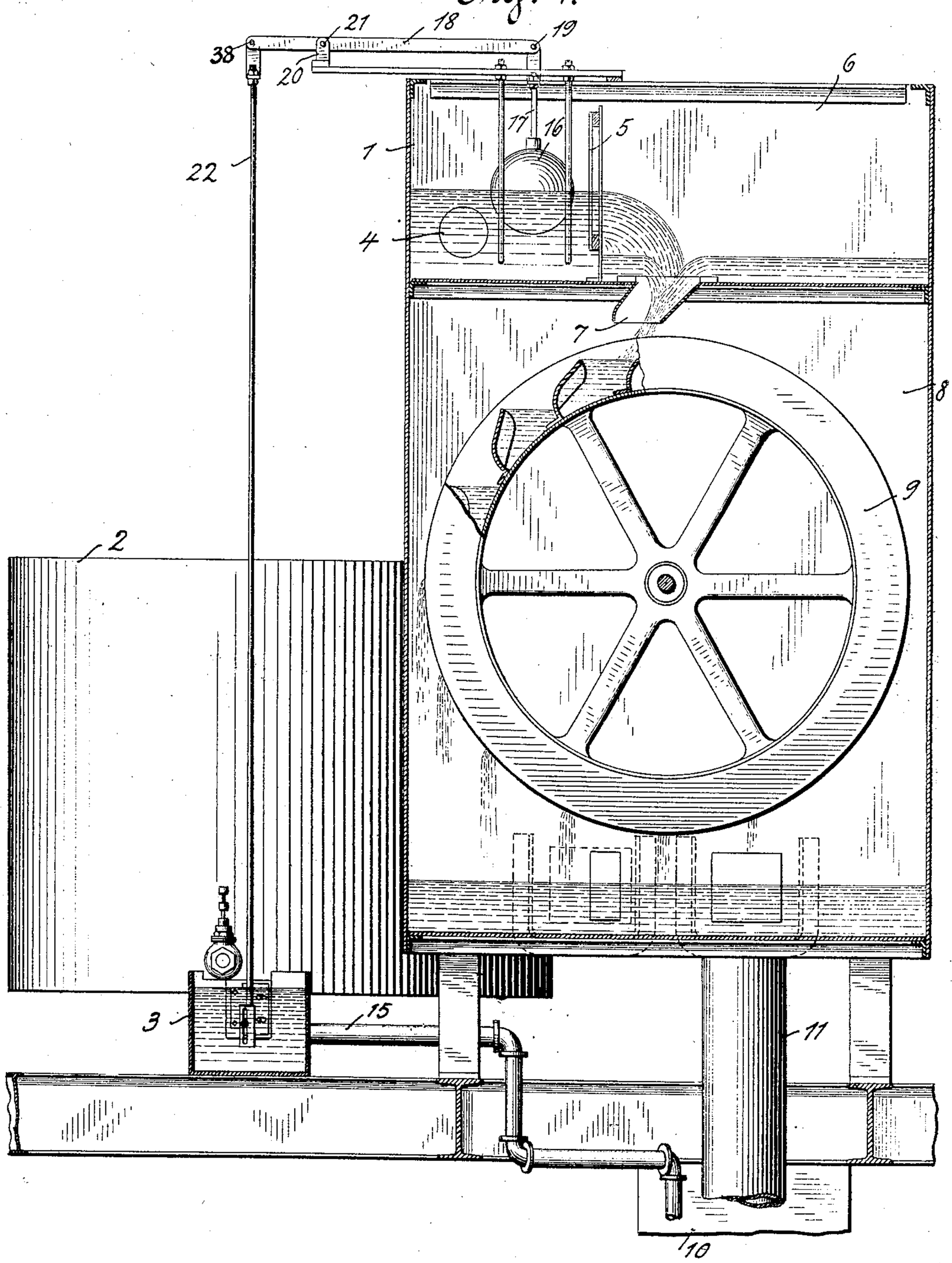
H. H. SUTRO.

APPARATUS FOR PURIFYING WATER.

APPLICATION FILED DEC. 16, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.



Witnesses
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By his Attorney Henry M. Brigham

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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 2.

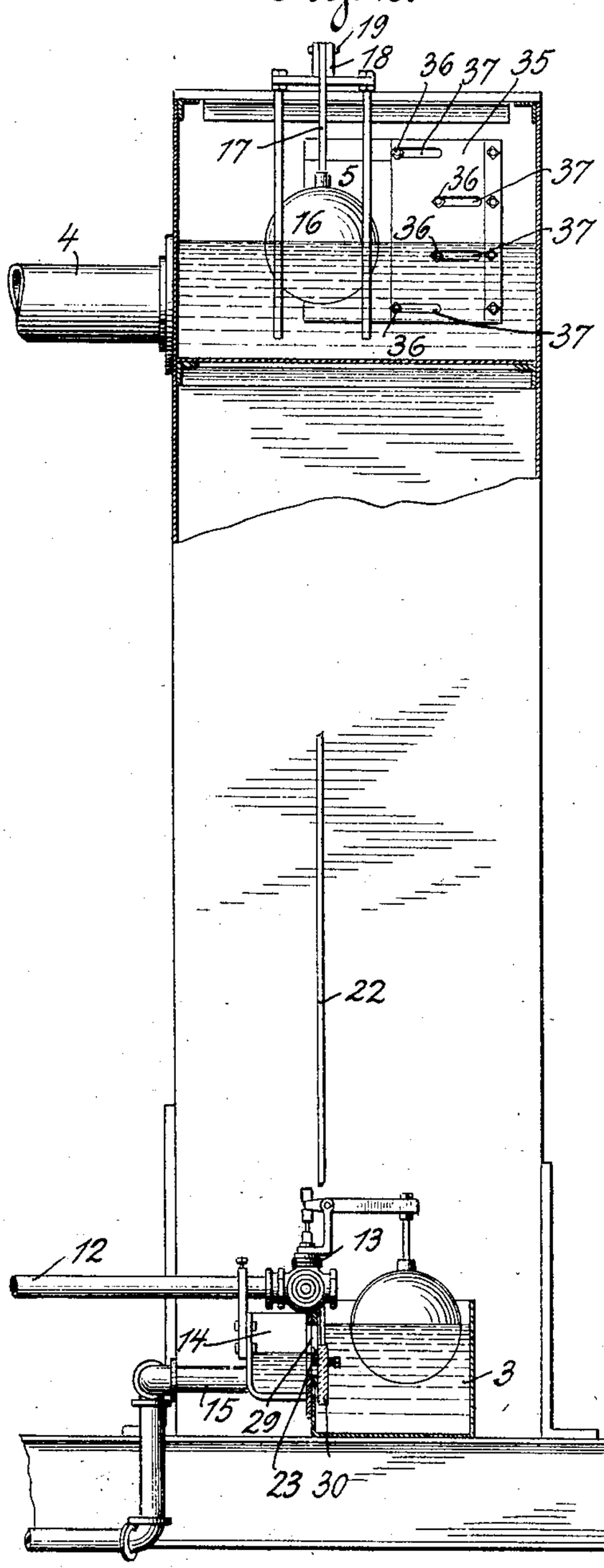


Fig. 3.

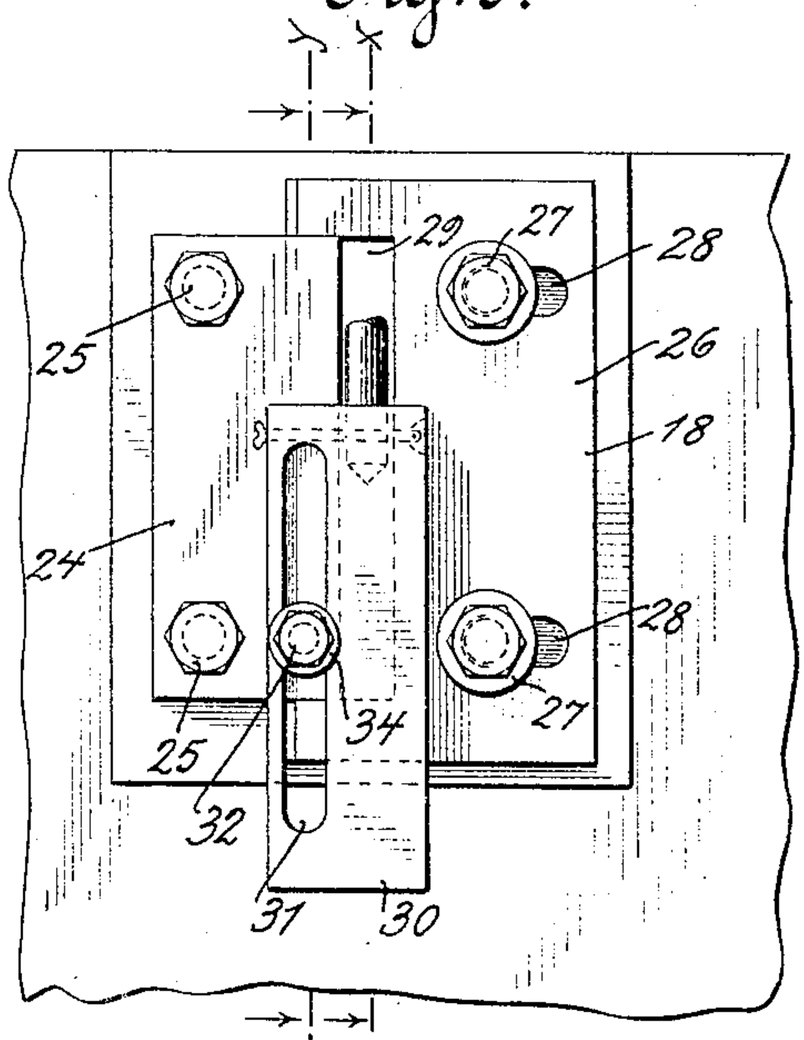


Fig. 4

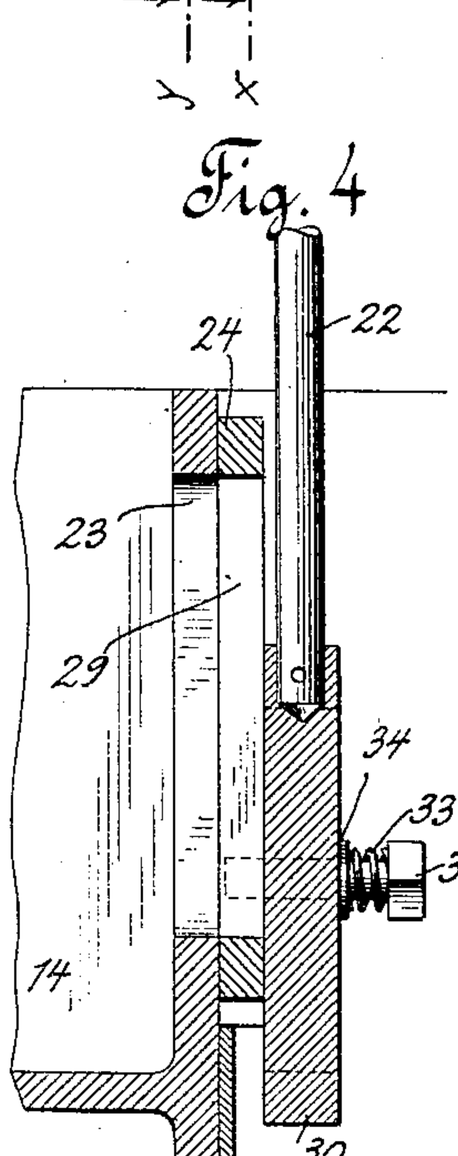
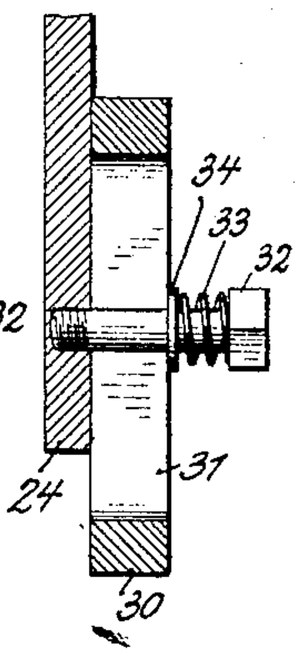


Fig. 5.



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No. 765,259. Patented July 19, 1904.

UNITED STATES PATENT OFFICE.

HARRY HERBERT SUTRO, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO LEVIS MILLER BOOTH, OF NEW YORK, N. Y.

APPARATUS FOR PURIFYING WATER.

SPECIFICATION forming part of Letters Patent No. 765,259, dated July 19, 1904.

Application filed December 16, 1903. Serial No. 185,356. (No model.)

To all whom it may concern:

Be it known that I, HARRY HERBERT SUTRO, a citizen of the United States, residing at No. 120 West Fifty-seventh street, in the borough of Manhattan, city, county, and State of New York, (whose post-office address is No. 126 Liberty street, in said borough of Manhattan,) have invented certain new and useful Improvements in Apparatus for Purifying Water, of which the following is a specification.

My invention relates particularly to water-purifying apparatus in which raw water is purified by being mixed in the proper proportions with purifying agents; and the object of my invention is to provide means whereby the quantity or quantities of the chemical agent or chemical agents admitted to the mixture will be automatically varied to correspond accurately with any change in the quantity of raw water which is admitted to the purifying apparatus; and it consists in the novel construction, arrangement, and combination of the several parts, as will hereinafter be described in the specification and afterward pointed out in the claims.

In the accompanying drawings, Figure 1 is a side view of my improved apparatus, partly in section. Fig. 2 is also a side view of my apparatus, partly in section, taken at the side on which the auxiliary chemical-solution tank is situated. Fig. 3 is a front view of my improved valve for controlling the flow from the auxiliary chemical-solution tank. Fig. 4 is a sectional view on the line X X, Fig. 3, of my improved valve for controlling the flow of the chemical solution from the auxiliary tank. Fig. 5 is a sectional view of a portion of my valve on the lines Y Y, Fig. 3.

Similar figures of reference refer to similar parts in the different views.

My improvement is provided with a raw-water tank 1, a chemical-solution tank 2, and an auxiliary chemical solution-tank 3. The raw water to be treated is supplied to the raw-water tank through the intake-pipe 4 and is discharged from the raw-water tank through the slot 5, which forms the discharge-opening of said tank. The water from the raw-water tank flows through the discharge-opening 5, which is in the form of a vertical slot, into the tank 6 and through the discharge-opening 7 into the motor-chamber 8, which contains the water-wheel 9, which is designed to operate a mixer or agitator (not shown) in the mixing-chamber 10, into which the hard water flows through the pipe 11. I have not shown the agitator or mixing or settling chamber of my improvement, as they are well-known forms shown in many prior patents in the art. The chemical solution which is used to purify the water is stored in a considerable quantity in the tank 2, which discharges through the pipe 12 into the auxiliary tank 3, and the solution is maintained at a uniform level in the tank 3 by means of a float-valve 13. The chemical solution is discharged from the auxiliary tank 3 into the box 14, from whence it is conveyed by the pipe 15 into the mixing-tank 10. In order to properly purify the water to be treated, it is necessary that the flow of solution from the auxiliary tank 3 and of raw water from the tank 1 should be in proper proportion each to the other, and in order to secure this result I have placed in the raw-water tank 1 a ball-float 16, attached to one end of a rod 17, the other end of which is pivoted to a shaft 18 by a pin 19. The shaft is pivoted to a fulcrum 20 by a pin 21. The other end of the shaft 18 is pivoted to a rod 22 by a pivot 38.

The auxiliary tank 3 has in its side a vertical slot 23, which forms the discharge-opening. To the side of the tank 3 is rigidly secured a plate 24 by means of the screw-bolts 25. To the side of the tank is also adjustably secured a plate 26 by means of screw-bolts 27. The plate 26 is provided with slots 28, through which the screw-bolts 27 pass and which permit of a lateral adjustment of the plate 26 relatively to the plate 25, which renders it possible to vary the width of the opening 29, which registers with the discharge-opening 23 in the side of the tank 3. These two plates 24 and 26 form the seat of the valve which regulates the flow of liquid from the auxiliary tank.

30 is a slide-valve provided with a slot 31 and is secured in its position upon the valve-

seat by means of the screw-bolt 32, the spring 33, and the washer 34, the bolt 32 being screwed into the plate 24 until the spring 33 is sufficiently compressed to hold the valve firmly against the valve-seat plates. The lower end of the rod 22 is pivotally connected to the valve 30, so that as the water rises or falls in the raw-water tank the valve 30 also falls and rises and opens and closes the discharge-opening. My apparatus is then so adjusted that the solution in the tank 3 will be maintained at a constant level corresponding with the top of the outlet-opening in that tank, and the connections between the float 16 and the valve 30 are so adjusted that when the water in the raw-water tank is drawn down until it will no longer flow through the discharge-opening 5 the float 16 will fall and raise the valve 30 to such a height that it will entirely close the discharge-opening in the tank 3 and cut off all flow of solution from the auxiliary tank. The plate 26 is so adjusted that the width of the outlet-opening of the auxiliary solution-tank 3 will be in proper proportion to the width of the outlet-opening 5 of the hard-water tank 1.

The operation of my apparatus is as follows: When raw water is introduced into the tank 1 and rises above the lower edge of the outlet 5, the float 16 will rise and force the valve 30 downward, so that a portion of the outlet-opening of tank 3 will be uncovered, and as the float rises and falls to the same extent as the raw water in the tank 1 rises or falls above the lower edge of the outlet-opening 5 the valve 30 will be correspondingly depressed below the top of the outlet-opening in the tank 3. The area of the discharge-opening in the auxiliary solution-tank will be in a constant ratio to the area of the discharge-opening of the raw-water tank through which water is being discharged, and the flow of solution from the auxiliary tank will always bear a certain predetermined proportion to the flow of water from the raw-water tank, with the result that the amount of solution discharged into the mixing-tank will always bear the same predetermined proportion to the water which is discharged from the raw-water tank 1 into the said mixing-tank. As the connections between the float-valve 16 and the valve 30 are rigid connections, the valve 30 will rise and fall as the float falls and rises, and a positive action of the valve is thus secured. By making the plate 26 adjustable, so that the width of the discharge-opening from the solution-tank 3 may be enlarged or decreased at will, the proportion of the chemical solution relatively to the amount of raw water which is to be purified can be readily varied to suit any water, and the same valve can be used in connection with a large apparatus adapted to treat or purify a large volume of water or with a smaller apparatus adapted to treat or purify a smaller quantity of water.

I prefer to construct my apparatus so that the discharge-opening of the raw-water tank will always be of greater capacity than the intake opening or pipe which feeds such tank. The result of this construction is that the water in the raw-water tank never rises to the top of the discharge-opening, and as a consequence the valve 30 is never depressed to such an extent that the discharge-opening of the auxiliary solution-tank 3 is opened to its full length. The result is that the area of the discharge-opening in the auxiliary solution-tank is always in proportion to the area of that portion of the discharge-opening in the raw-water tank which is below the level of the water, and therefore discharging water from such tank.

I prefer to construct my apparatus, as shown and illustrated in the accompanying drawings, with discharge-outlets for the tanks 1 and 3 which are rectangular in form, and I prefer to construct these outlets so that they shall be considerably less in width than in height or depth. I have also provided means for adjusting the width of the discharge-outlet of the raw-water tank by means of a plate or gate 35, which is adjustably secured to the side of the tank by means of screw-bolts 36, which pass through the openings in the side of the tank and through the slots 37 in the gate 35.

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

1. In water-purifying apparatus the combination with a mixing-chamber of a raw-water tank having a stationary discharge-orifice communicating with said mixing-chamber, a solution-tank having a stationary discharge-orifice communicating with said mixing-chamber, a valve adapted to cover the discharge-orifice of the solution-tank, automatic means for maintaining the solution at a constant level in the solution-tank and automatic means for opening and closing such valve as the water rises and falls in the raw-water tank, so that the discharge of solution is substantially proportional to the discharge of raw water, substantially as and for the purposes set forth.

2. In water-purifying apparatus the combination with a mixing-chamber of a raw-water tank having a stationary discharge-orifice communicating with said mixing-chamber, a solution-tank having a stationary discharge-orifice communicating with said mixing-tank, means for regulating the width of the discharge-orifice in the solution-tank, a valve adapted to cover the discharge-orifice of the solution-tank, automatic means for opening and closing such valve as the water rises or falls in the raw-water tank and automatic means for maintaining a constant level of the liquid in the solution-tank substantially as and for the purposes set forth.

3. In water-purifying apparatus the combi-

nation with a mixing-chamber of a raw-water tank having a stationary discharge-orifice communicating with said mixing-chamber, a solution-tank having a stationary discharge-orifice communicating with said mixing-chamber, a valve adapted to cover the discharge-orifice of the solution-tank, a float mounted in the raw-water tank and a connection between said float and a valve covering the discharge-orifice of the solution-tank, and automatic means for maintaining a constant level in the solution-tank, so that the discharge of solution is substantially proportional to discharge of raw water, substantially as and for the purposes set forth.

4. In water-purifying apparatus the combination with a mixing-chamber of a raw-water tank having a discharge-orifice communicating with such mixing-chamber, means for regulating the width of such discharge-orifice, a solution-tank having a discharge-orifice communicating with such mixing-chamber, means for regulating the width of such discharge-orifice, a valve adapted to cover the discharge-orifice of the solution-tank, automatic means for actuating said valve and opening or closing the discharge-orifice of the solution-tank as the water rises or falls in the raw-water tank and automatic means for maintaining a constant level in the solution-tank substantially as and for the purposes set forth.

5. In water-purifying apparatus the combination with a mixing-chamber of a tank having a stationary discharge-orifice communicating with such mixing-chamber, means for maintaining the liquid at a constant level in the said tank, a valve adapted to cover the discharge-orifice of said tank, a second tank having a stationary discharge-orifice communicating with said mixing-chamber and automatic means for opening or closing said valve as the liquid rises or falls in said second tank, so that the discharge of solution is substantially proportional to the discharge of raw water, substantially as and for the purposes set forth.

6. In water-purifying apparatus the combination with a mixing-chamber of a tank having a stationary discharge-orifice communicating with said mixing-chamber, means for maintaining the liquid at a constant level in such tank, a valve adapted to cover the discharge-orifice of said tank, a second tank having a stationary discharge-orifice in the side of the tank communicating with said mixing-chamber and of greater capacity than the intake-pipe by which said tank is supplied with liquid and automatic means for actuating said valve and opening or closing the discharge-orifice of said first-mentioned tank as the liquid rises or falls in said second tank, so that the discharge of solution is substantially proportional to the discharge of raw water, substantially as and for the purposes set forth.

7. In water-purifying apparatus the combination with a mixing-chamber, of a tank having a discharge-orifice communicating with said mixing-chamber, said discharge-orifice being in the form of a slot in the side of said tank, a valve adapted to cover such discharge-orifice, means for maintaining the liquid at a constant level in said tank, a second tank having a discharge-orifice in the form of a slot in the side of said tank, such discharge-orifice being of greater capacity than the intake-pipe by which said tank is supplied with liquid and automatic means for actuating said valve and opening or closing the discharge-opening of the first-mentioned tank as the liquid rises or falls in said second tank, so that the discharge of solution is substantially proportional to the discharge of raw water, substantially as and for the purposes set forth.

8. In water-purifying apparatus the combination with a mixing-chamber of a tank having a discharge-orifice in the form of an opening in the side of the tank, a valve adapted to cover the discharge-orifice of said tank, means for maintaining the liquid at a constant level in said tank, a second tank having a discharge-orifice in the form of an opening in the side of said tank communicating with said mixing-chamber, automatic means for actuating said valve and opening or closing the discharge-orifice of the said first-mentioned tank as the liquid rises or falls in said second tank, so that the discharge of solution is substantially proportional to the discharge of raw water, substantially as and for the purposes set forth.

9. In water-purifying apparatus the combination with a mixing-chamber of a tank having a stationary discharge-orifice communicating with said mixing-chamber, means for maintaining the liquid at a constant level in such tank, a valve for controlling the flow of water from said tank, consisting of a U-shaped plate, a rectangular plate adapted to be inserted between the jaws of the U-shaped plate, means for adjusting the position of such plates relatively to each other and thereby varying the width of the discharge-opening and a plate adapted to slide upon the faces of the plates above mentioned, a second tank having a stationary discharge-orifice in the side of the tank communicating with said mixing-chamber and float-actuated means for opening or closing such valve as the liquid rises or falls in said second tank, substantially as and for the purposes set forth.

10. In water-purifying apparatus the combination with a mixing-chamber of a tank having a fixed discharge-orifice communicating with said chamber, said discharge-orifice being in the form of an opening in the side of such tank, a gate-valve adapted to cover said discharge-orifice, means for maintaining the liquid at a constant level in such tank; a second tank having a discharge-orifice in the form of an opening in the side of such tank communicating with said mixing-chamber, and automatic means for moving said gate-

valve across the face of the discharge-opening and opening or closing the same as the liquid rises and falls in said second tank, so that the discharge of liquid from each tank is substantially proportionate, substantially as and for the purposes set forth.

11. In water-purifying apparatus the combination with a mixing-chamber of a tank having a discharge-orifice in the form of an opening in the side of such tank communicating with said mixing-chamber, a gate-valve adapted to be moved across and cover or uncover the whole or a part of said discharge-opening, means for maintaining the liquid at a constant level in such tank; a second tank having a discharge-orifice in the side of such second tank, such orifice being of a similar form to the discharge-opening in the first tank, a gate-valve covering the discharge-opening in said first tank and automatic means for opening and closing said gate so that as the water rises in the second tank and a portion of the discharge-outlet in said second tank becomes operative that a proportionate part of the discharge-opening in the first tank will be uncovered and likewise operative for the discharge of liquid therefrom, substantially as and for the purposes set forth.

12. The combination with a mixing-chamber of a tank having a discharge-orifice in the form of an opening in the side of such tank communicating with said mixing-chamber, a gate-valve adapted to be moved across and cover or uncover the whole or a part of such discharge-opening, means for maintaining the liquid at a constant level in said tank, a second tank having a discharge-orifice in the side thereof and automatic means for moving said gate-valve and opening or closing the discharge-opening in the first tank as the liquid rises or falls in said second tank, so that the discharge of liquid from each tank into the mixing-chamber is substantially proportionate, substantially as and for the purposes set forth.

Signed at the city of New York, State and county of New York, on the 14th day of December, 1903.

HARRY HERBERT SUTRO. [L. S.]

Witnesses:

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E. QUINN.