

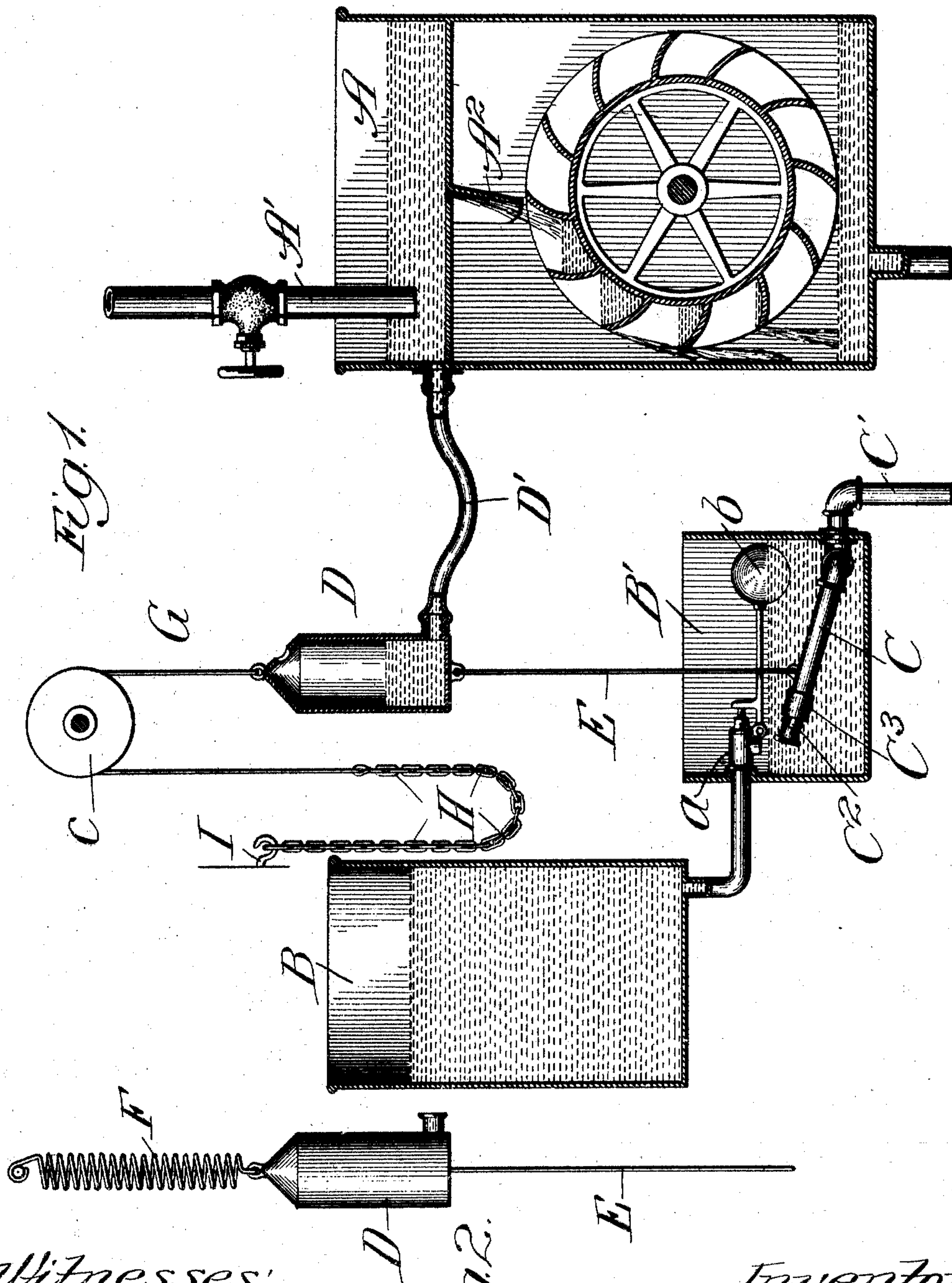
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R. H. WILES.
APPARATUS FOR PURIFYING WATER.

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NO MODEL.



Witnesses:
Ed. Chyford
John Enders

Inventor:
Robert H. Wiles
By Dymfuth, Dymfuth & Co.
Attys.

UNITED STATES PATENT OFFICE.

ROBERT H. WILES, OF CHICAGO, ILLINOIS.

APPARATUS FOR PURIFYING WATER.

SPECIFICATION forming part of Letters Patent No. 767,093, dated August 9, 1904.

Application filed April 4, 1904. Serial No. 201,427. (No model.)

To all whom it may concern:

Be it known that I, ROBERT H. WILES, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Apparatus for Purifying Water, of which the following is a specification.

My invention relates to means for purifying or "softening" water by mixing therewith one or more chemicals in solution, and it relates particularly to means for automatically maintaining a constant relation between the flow of unpurified water and the flow of chemical solution to be mixed with it. United States Patent No. 665,606, dated January 8, 1901, to Cass L. Kennicott, shows and describes an apparatus in which such constant ratio of flow is maintained by maintaining the same head of pressure in the tank from which the unpurified water flows and the tank from which the chemical solution flows, the discharge-orifices of the two tanks having such ratio of size as to give the desired ratio of flow whatever may be the equal head of pressure in the two tanks.

The primary object of my improvement is to provide a novel, simple, and reliably-operating device for automatically actuating the means, in whatever form they may be provided, for varying the head of pressure in or flow from the chemical-solution tank; and to this end I provide a movable counterbalanced chamber having a flexible tubular connection with the water-supply tank, whereby the same level is maintained in the chamber and tank, and connect this chamber with the means employed for varying the head of pressure in or flow from the chemical-solution tank for controlling said means through the rise and fall of the chamber under variation in the head of pressure in the water-supply tank.

Referring to the accompanying drawings, Figure 1 shows the apparatus containing my improvement in its preferred form by a view in sectional elevation, and Fig. 2 is a view in elevation of the counterbalance for the chamber in a modified form.

In the drawings, A is the supply-tank for unpurified water.

A' is the pipe for admitting water to the tank, and A² is a discharge-spout for the escape of water from the tank.

B is a chemical-solution-supply tank of any desired size, discharging into a chemical-solution tank B', in which a constant level of solution is maintained by means of a valve α , governed by a float b . In the tank B is a vertically-oscillating tube C, communicating at one end with a stationary discharge-pipe C'. The free end of the pipe C is closed; but there is a slot C² in the wall of the pipe near its closed end. This slot may be covered to any desired extent by a sleeve C³ for the purpose of fixing the working size of the slot, which is the actual discharge-orifice of the solution in the tank. The bore of the pipe C is greater than the size of the slot C², so that the distance from the surface of the solution in the tank to the slot C² constitutes the head of pressure of the solution.

The free end of the pipe C is connected, by means of a cord E, with a chamber D of small diameter, suspended by means of a cord G, which passes over a pulley c and engages one end of a chain H, the other end of the chain being fastened at some stationary point, such as the hook I. It is evident that any upward or downward movement of the chamber D must correspondingly lower or raise the free end of the chain H, and thus correspondingly vary the weight of the chain, serving to counterbalance the chamber. In other words, the chain is one form of positive mechanical variable counterbalance adapted to permit a given rise or fall of the chamber on account of a given decrease or increase of the weight of the chamber.

The chamber D is connected, by means of a small flexible tube D', with the water-supply in the tank A, and the level of water in the tank and in the chamber D must therefore always remain the same. Assuming that the water in the tank and chamber is at any given level and that the chamber is counterbalanced by the chain H, so as to be held stationary, it is obvious that an inch rise of the water in the tank A must cause an inch rise in the level of the water in the chamber D

and that this rise of water in the chamber must increase its weight and cause it to move downward and to correspondingly lift the free end of the chain H. If the weight of the chain is such in comparison with the diameter of the chamber D that a lift of one inch at the free end of the chain will counterbalance two inches of water in the chamber D, it is evident that the rise of one inch in the tank will cause two inches of water to flow into the chamber D, one inch being accommodated by the rise of level and the other inch being taken care of by the downward movement of the chamber. Under these conditions a rise of an inch in the tank A will cause the chamber D to drop down an inch and lower the free end of the pipe C one inch, thus maintaining the same head of pressure in the chemical-solution tank B' as in the water-supply tank A.

Any other suitable mechanical take-up may be substituted for the chain H as a variable counterbalance for the chamber D, or a spring F, such as is shown in Fig. 2, may be substituted for a positive mechanical counterbalance, the spring being of such length and so adjusted as to give an equal drop for the same addition of weight throughout its working range of movement.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a water-purifying apparatus, the combination with a water-supply tank and a chemical-solution tank provided with means for varying the flow of liquid therefrom, of a movable counterbalanced chamber having a tubular connection with the water-supply tank for maintaining the same water-level in both, and connected with said flow-varying means to actuate the same by the movements of said chamber under variation of the head of pressure in the water-supply tank, substantially as described.

2. In a water-purifying apparatus, the combination with a water-supply tank and a chemical-solution tank provided with means for varying the head of pressure therein, of a variable counterbalance and a chamber suspended thereon having a tubular connection with the water-supply tank for maintaining the same water-level in the chamber and tank, and connected with said pressure-varying means to actuate the same by the movements of said chamber under variation of the head of pressure in the water-supply tank, substantially as described.

3. In a water-purifying apparatus, the combination of a water-supply tank, a movable counterbalanced chamber having a tubular connection with said tank for maintaining the same water-level in both, a chemical-solution tank provided with means for varying the head of pressure therein and a connection between said chamber and said pressure-varying means

for moving the latter by the movements of the chamber under variation of the head of pressure in the water-supply tank, substantially as described.

4. In a water-purifying apparatus, the combination of a water-supply tank, a movable counterbalanced chamber having a tubular connection with said tank for maintaining the same water-level in both, a chemical-solution tank provided with a vertically-adjustable discharge-orifice, and a connection between said chamber and discharge-orifice for moving the latter by the movements of the chamber under variation of the head of pressure in the water-supply tank, substantially as described.

5. In a water-purifying apparatus, the combination of a water-supply tank, a movable counterbalanced chamber having a tubular connection with said tank for maintaining the same water-level in both, a chemical-solution tank provided with a pipe perforated at one end to form the discharge-orifice and vertically movable at said end, and a connection between said chamber and pipe for moving the latter by the movements of the chamber under variation of the head of pressure in the water-supply tank, substantially as described.

6. In a water-purifying apparatus, the combination of a water-supply tank, a variable counterbalance and a chamber suspended thereon having a tubular connection with said tank for maintaining the same water-level in the chamber and tank, a chemical-solution tank provided with a pipe perforated at one end to form the discharge-orifice and vertically movable at said end, and a connection between said chamber and pipe for moving the latter by the movements of the chamber under variation of the head of pressure in the water-supply tank, substantially as described.

7. In a water-purifying apparatus, the combination with a water-supply tank and a chemical-solution tank provided with means for varying the head of pressure therein, of a chamber suspended from an overhead pulley on a variable counterbalance comprising a chain suspended at one end from a stable support and connected at its opposite end over said pulley with the chamber, a tubular connection between said water-supply tank and chamber for maintaining in both the same water-level, and a connection between the chamber and said pressure-varying means whereby the latter is actuated by the movements of the chamber under variation of the head of pressure in the water-supply tank, substantially as described.

8. In a water-purifying apparatus, the combination of a water-supply tank, a chamber having a tubular connection with said tank for maintaining the same water-level in both, a chemical-solution tank provided with a pipe perforated at one end to form the discharge-orifice and vertically movable at said end, a

variable counterbalance on which said chamber is suspended, comprising a chain suspended at one end from a stable support and connected at its opposite end over an overhead
5 pulley with said chamber, and a connection between said chamber and pipe for moving the latter by the movements of the chamber under

variation of the head of pressure in the water-supply tank, substantially as described.

ROBERT H. WILES.

In presence of—

WALTER N. WINBERG,
ALMA U. THORIEN.