(No Model.) 2 Sheets—Sheet 1.

J. H. BLESSING.

APPARATUS FOR PURIFYING WATER.

No. 395,651. Patented Jan. 1, 1889.

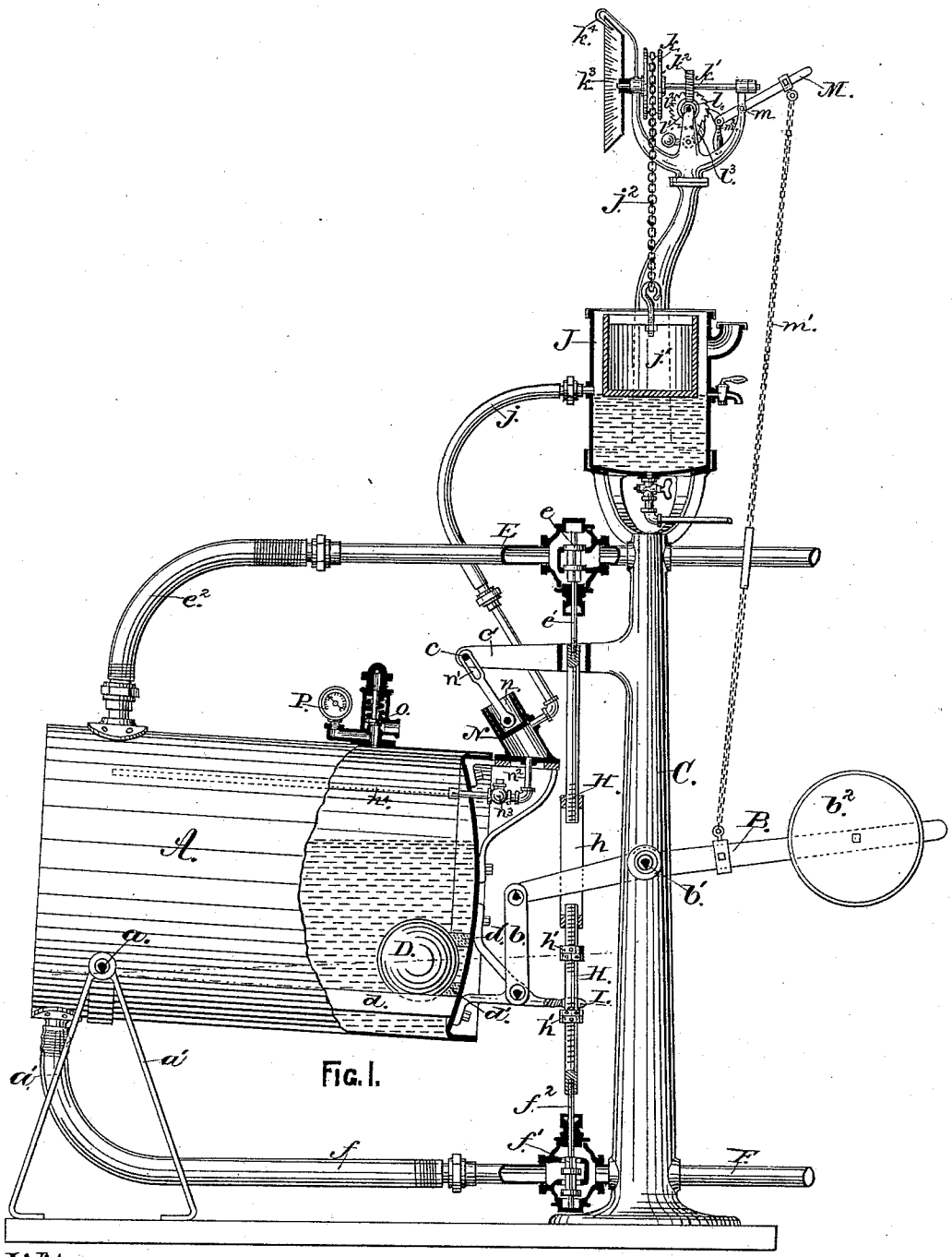

Fig. 1.

Witnesses:
S. B. Brewer
W. W. Seeley.

Inventor:
JAMES H. BLESSING
by William N. Low,
Attorney.

(No Model.) 2 Sheets—Sheet 2.

J. H. BLESSING.

APPARATUS FOR PURIFYING WATER.

No. 395,651. Patented Jan. 1, 1889.

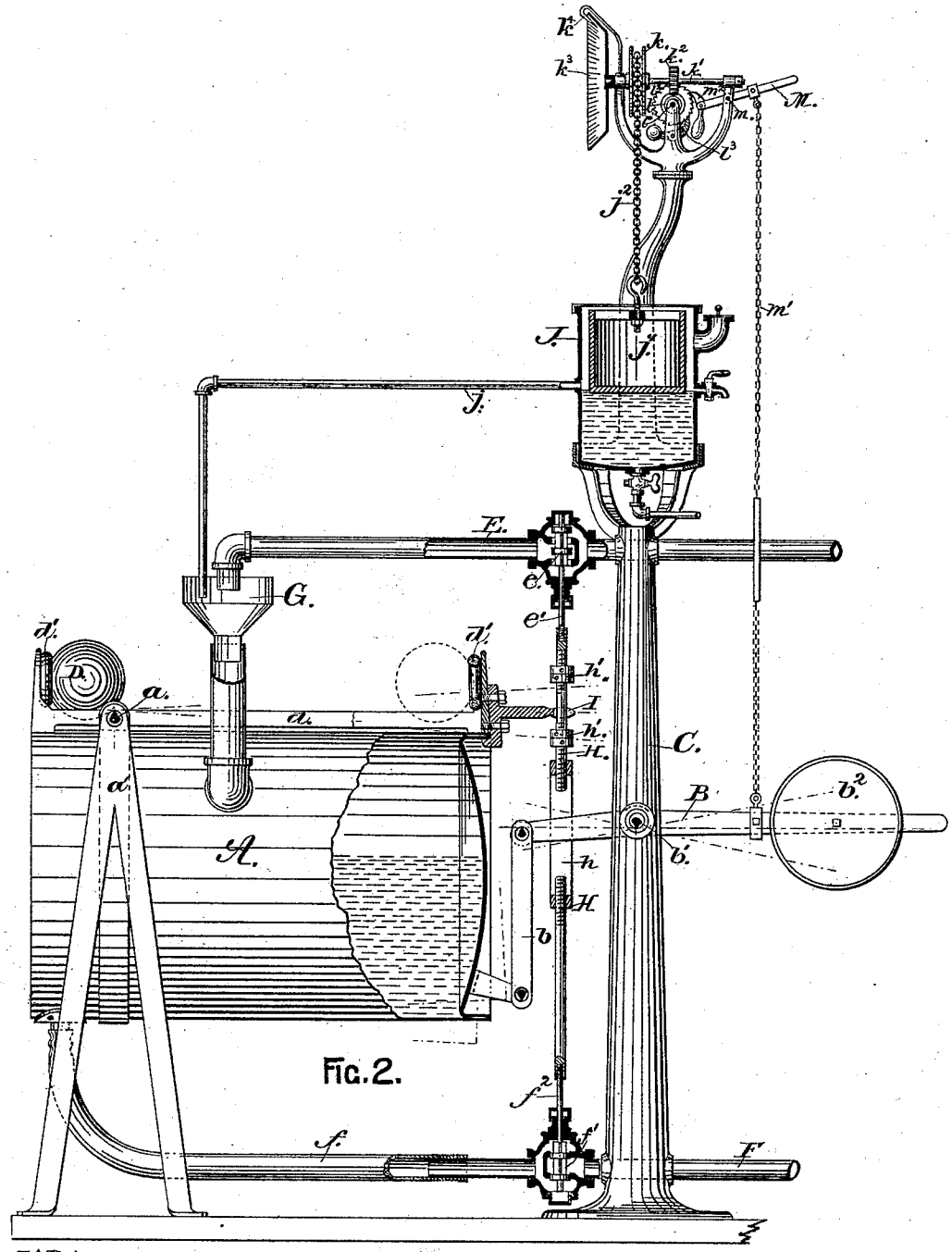

Fig. 2.

Witnesses:
S. B. Brenner.
W. W. Seeley.

Inventor:
JAMES H. BLESSING.
by William H. Low,
Attorney.

UNITED STATES PATENT OFFICE.

JAMES H. BLESSING, OF ALBANY, NEW YORK.

APPARATUS FOR PURIFYING WATER.

SPECIFICATION forming part of Letters Patent No. 395,651, dated January 1, 1889.

Application filed December 4, 1886. Serial No. 220,702. (No model.)

To all whom it may concern:

Be it known that I, JAMES H. BLESSING, of the city and county of Albany, in the State of New York, have invented a new and useful Improvement in the Mode of Mixing Coagulants with Water and other Liquids, of which the following is a specification.

My invention consists in the mode herein described of automatically injecting, inserting, or introducing into a known quantity of water or other liquid a given proportionate charge of liquid coagulant, for the purpose of precipitating the impurities held in suspension or solution in said water or other liquid; and to this end an apparatus like or similar to the one illustrated in the accompanying drawings may be employed to effect the purpose named.

In said drawings, which are herein referred to and form part of this specification, Figure 1 is a side elevation, partially in section, of an apparatus adapted for use in a closed system wherein the water is under pressure; and Fig. 2, a like view of an apparatus adapted for use with a water-supply flowing by gravity alone.

As represented in the drawings, A is an oscillating receiver fitted to rock on the pivots *a*, which are secured near the rearmost end of the receiver. Said pivots are preferably formed with knife-edges and have their bearings in the standards *a'*. The outer end of the receiver A is connected, by means of the link *b*, to one end of a vibrating lever, B, that is pivoted at *b'* to the column or standard C, and has at its opposite end an adjustable weight, b^2, by which the outer end of the receiver will be lifted when the latter has discharged the required quantity of its contents; and it is obvious that when the weight *b* is fixed near the outer end of the lever B a smaller quantity of water will be discharged from the receiver between the oscillations of the latter than when said weight is fixed nearer the pivot *b'*; and by the adjustment of said weight the quantity to be discharged from said receiver can be altered from time to time, as circumstances may require. In order to avoid a premature lifting of the outer end of the receiver A, by reason of the discharge of just sufficient water to permit the weighted lever B to lift the outer end of the receiver A and its contained water, said receiver is provided with a shifting weight, D, which is adapted to roll on ways *d*, which have elastic cushions or bumpers *d'* at each end to receive the impact of said shifting weight. As shown in Fig. 1, said weight, ways, and cushions are arranged inside the receiver A, and, as shown in Fig. 2, they are arranged on the outside of said receiver; but in either arrangement the shifting weight will perform its functions with equal facility.

Water is conveyed into the receiver A through the supply-pipe E, which is provided with an upwardly-opening puppet-valve, *e*, whose valve-stem *e'* projects through the under side of the valve-casing. As shown in Fig. 1, said supply-pipe is connected directly to the receiver A by means of a flexible tube, e^2; but, as shown in Fig. 2, said supply-pipe is arranged to deliver the water into a funnel, G, secured to the receiver A. The water is taken from the receiver through the discharge-pipe F, which is connected to the lower part of said receiver by a flexible tube, *f*, so as to permit the receiver to oscillate as required. The discharge-pipe F is provided with a downwardly-opening puppet-valve, *f'*, whose valve-stem f^2 projects through the upper side of the valve-casing. The valve *f'* is ranged in line with and is directly under the valve *e*, and the valve-stems *e'* and f^2 are coupled together by a connection, H, so that the two valves will move as one piece; and the arrangement is such that when either one of said valves is in position to open the passage through the pipe belonging thereto the other valve will reciprocally close the passage through its attached pipe. The connection H is provided with an open link or turn-buckle, *h*, by which the valves *e* and *f'* can be adjusted at an exact distance apart to produce the required operation; and said connection is also provided with adjustable collars *h'*, with which a tappet-arm, I, attached to the receiver A, engages in such manner that the connection H will be moved by the oscillations of the receiver to operate the valves *e* and *f'* in a suitable manner—that is to say, to open the valve *e* (and close the valve *f'*) when the receiver A is at the highest point of its movement, and to open the valve *f'* (and close the valve *e*) when said receiver is at the lowest point of its movement.

A tank, J, fixed to the column C or other convenient place, contains the liquid coagulant, and is provided with an outlet-pipe, j, which is attached thereto at a height corresponding to that at which the level of the liquid coagulant will be maintained during the operation of the apparatus. Said outlet-pipe, in the construction shown in Fig. 1, connects with an injector, N, operated by the oscillatory movements of the receiver A; but, as shown in Fig. 2, said outlet-pipe is arranged to discharge directly into the funnel G. A weight or plunger, j', of smaller diameter than the bore of the tank, is arranged within the tank J to bear upon the surface of the liquid coagulant. Said plunger is connected by a chain, j^2, to a sheave, k, on the shaft k', and the latter is provided with a worm-wheel, k^2, which engages with a worm or endless screw, l. Said worm is secured to a shaft, l', which is arranged at a right angle to the shaft k'. A ratchet-wheel, l^2, is also secured to the shaft l', and a slight intermittent motion is imparted to said shaft by means of a vibratile arm, M, which rocks on a pivot, m, and is connected by a chain, m', to the lever B, so as to be operated thereby. Said arm is provided with a gravity-pawl, m^2, which engages with the teeth of the ratchet-wheel l^2, so that as the inner end of said arm is raised the ratchet-wheel will thereby receive a partial rotation, and through the worm and worm-wheel the sheave k will receive a slight rotative movement, whereby the chain j^2 will be unwound from said sheave, so as to permit the plunger j' to move downward a sufficient distance to cause the coagulant in the tank to rise above the opening of the outlet-pipe j just far enough to permit the required charge of coagulant to enter said pipe, and through the latter said charge will pass into the receiver A, either through the injector N, as shown in Fig. 1, or through the funnel G, as shown in Fig. 2. The plunger j', being lowered a uniform distance by each oscillation of the receiver A, will displace a uniform quantity of the coagulant at each depression of said plunger, and each displacement will be the measure of the coagulant delivered into each charge of liquid that enters the receiver. To prevent any retrocession of the plunger j' while the arm M is making its return movement, a gravity detent or pawl, l^3, is fitted to engage in the teeth of the ratchet-wheel l^2, so as to stop said wheel from being turned backward, except when said detent is thrown back for that purpose, as in the case of refilling the tank with the coagulant. The outer end of the shaft k' is provided with an indicator-wheel, k^3, graduated in such manner as to indicate the quantity of coagulant displaced by each downward movement of the plunger. A stationary pointer, k^4, is fixed in position to show at a glance the number of charges displaced from the tank after each filling of said tank.

The injector N is secured to the receiver A, and it consists of a cylinder and a plunger, n, fitted to reciprocate therein. The outlet-pipe j from the tank J enters the said cylinder, preferably at a point just above where the plunger attains the highest point of its movement. The plunger n is provided with a rod in which a slotted opening, n', is formed, and said slotted opening engages with a stud, c, secured in the stationary arm c' of the column C, the arrangement being such that by the upward oscillation of the receiver A the plunger n will be near the bottom of the cylinder, and by the reverse oscillation of the receiver the plunger will be near the top of the cylinder. The slotted opening n' will permit the plunger to remain in a stationary position until the receiver A has nearly completed its oscillation in either direction. A delivery-pipe, n^2, provided with a check-valve, n^3, leads from the bottom of the injector into the receiver A, the part n^4 of said delivery-pipe that is inside of said receiver being perforated for the purpose of producing a perfect distribution of the coagulant into the water in the receiver.

A safety-valve, O, is attached to the receiver A, for the purpose of preventing an excessive accumulation of compressed air from interfering with the proper operation of the apparatus. The air which is carried into the receiver by the current of water rises into the upper part of the receiver and is held therein by the body of water, and, unless some provision is made for its escape, will soon accumulate to prevent the admission of a sufficient quantity of water to effect the downward oscillation of the receiver. To avoid this trouble, the safety-valve O should be adjusted to lift at a pressure slightly below the pressure acting on the inflow of water, so that when the volume of confined air is compressed to a point that will nearly balance the pressure of the water the safety-valve will permit the compressed air to escape until the required charge of water has entered the receiver to cause the latter to tilt downward. The pressure-gage P may also be connected with the receiver A, (through the safety-valve or otherwise,) to aid in determining when the safety-valve is properly adjusted to the required pressure.

The operation of the apparatus shown in Fig. 1 is as follows: The receiver A being empty, its outer end will be lifted by the weighted lever B to the highest point of its oscillation, and thereby a charge of the coagulant will be forced by the injector N into the receiver A, and the shifting weight D will roll to the rear end of said receiver. While the latter is in the position just described the valve f' will be closed to prevent any outflow of the water, and the valve e will be reciprocally opened to permit the water (under pressure) to pass into the receiver and compress the air confined therein, until a sufficient quantity of water has entered to overcome the effect of the weighted lever B. When

this point is attained, the outer end of the receiver tilts downward, thereby causing the shifting weight D to roll to the outer end of the receiver, the valve *e* to close, the valve *f'* to open, and the plunger *n* to be brought to its highest position in the injector, thereby permitting a fresh charge of coagulant to enter said injector. The water (charged with the coagulant) is forced by the confined compressed air from the receiver A until the latter is sufficiently emptied to allow the weighted lever B to again raise the outer end of said receiver to the highest point of its movement. By the vibrations of the lever B the plunger *n* is operated to pass a fresh charge of coagulant into the injector N, in the manner hereinbefore described.

The operation of the apparatus shown in Fig. 2 is like the one just described, excepting the forcible discharge of the water from the receiver and the mode of introducing the charges of coagulant thereinto, both of said operations in this apparatus being accomplished by gravity alone.

I claim as my invention—

1. The combination of an oscillating water-receiver whose movement in one direction is effected by the weight of its contained liquid, and in the opposite direction by means of a counter-balance, said receiver being provided with a shifting weight, as herein described, an inlet water-pipe provided with an upwardly-opening valve, an outlet water-pipe provided with a downwardly-opening valve, said inlet and outlet valves being connected together, so that as one is opened the other will be reciprocally closed by the oscillations of said receiver, a tank containing liquid coagulant, and mechanism, substantially as described, whereby a given charge of coagulant will be fed into the receiver at each oscillation of the latter, as and for the purpose specified.

2. The combination of an oscillating water-receiver whose movement in one direction is effected by the weight of its contained liquid, and in the opposite direction by means of a counter-balance, said receiver being provided with a shifting weight, as herein described, an inlet water-pipe provided with an upwardly-opening valve, an outlet water-pipe provided with a downwardly-opening valve, said inlet and outlet valves being connected together, so that as one is opened the other will be reciprocally closed by the oscillations of said receiver, a tank containing liquid coagulant, and an injecting-pump operated by the oscillations of said receiver, by which a given charge of the coagulant is forcibly fed into each charge of water held in said receiver, as and for the purpose herein specified.

JAMES H. BLESSING.

Witnesses:

JOHN W. WHEELOCK,

WM. H. LOW.