

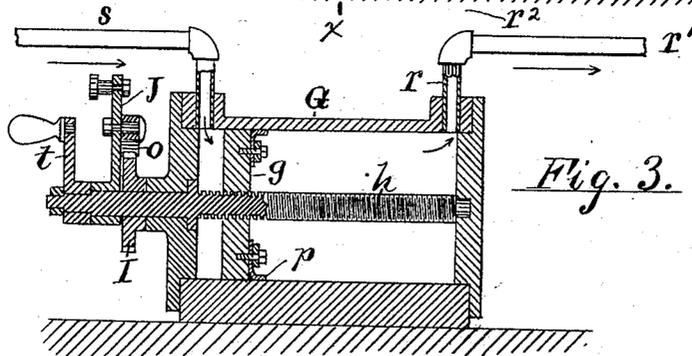
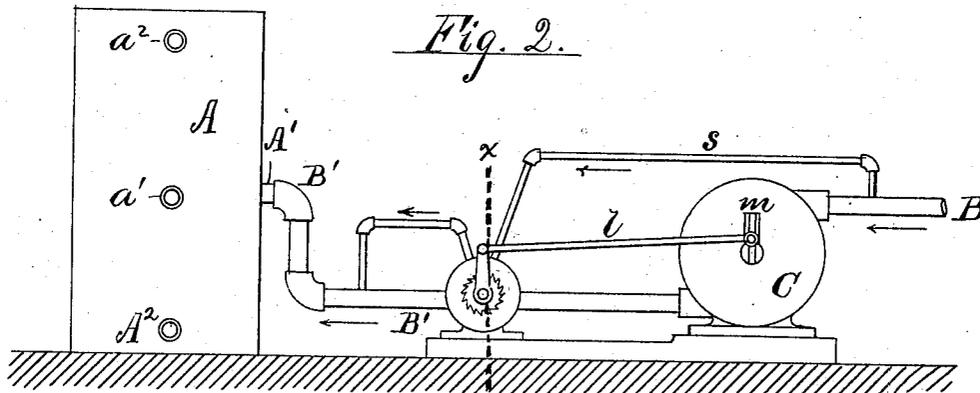
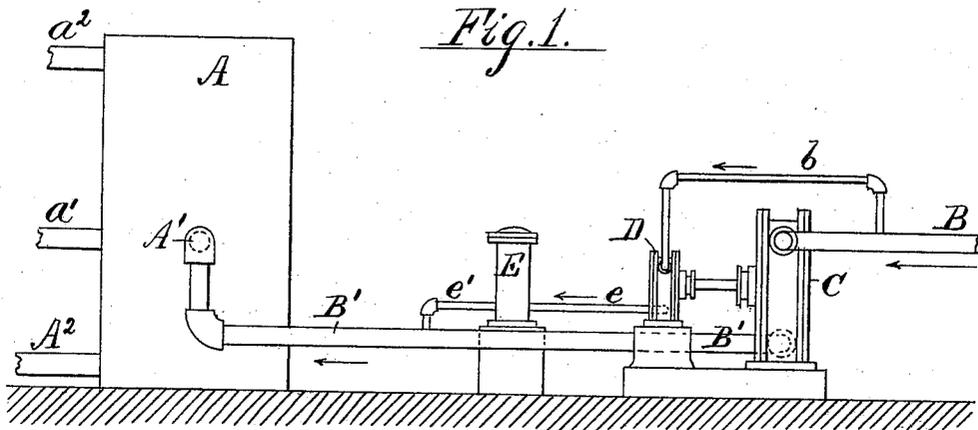
(No Model.)

J. W. HYATT.

APPARATUS FOR PURIFYING WATER.

No. 366,171.

Patented July 5, 1887.



*Attest:*  
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# UNITED STATES PATENT OFFICE.

JOHN W. HYATT, OF NEWARK, NEW JERSEY.

## APPARATUS FOR PURIFYING WATER.

SPECIFICATION forming part of Letters Patent No. 366,171, dated July 5, 1887.

Application filed May 27, 1886. Renewed April 19, 1887. Serial No. 235,431. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN W. HYATT, a citizen of the United States, residing in Newark, Essex county, New Jersey, have invented certain new and useful Improvements in Apparatus for Feeding Coagulant, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

10 The object of this invention is to supply a regulated quantity of coagulant to impure water in a closed conduit under pressure before filtration, to produce a precipitate therein for the removal of the impurities.

15 Heretofore I have patented a mechanism comprising a motor actuated by the entire current of the impure water, and a coagulant-feeding apparatus operated by such motor, as in United States Patent No. 293,749; but in the  
20 construction shown in said patent the entire unbalanced pressure of the water in the main conduit was exerted within the coagulant-receptacle, and the energy required to force the coagulating liquid therefrom was correspond-  
25 ingly great.

The object of my present invention is to provide a balance within the coagulant-receptacle for such pressure, and to thereby diminish the energy required to force the fluid therefrom.

30 In the annexed drawings I have shown two constructions for effecting this object, the means for balancing the pressure being the same in both, and consisting in supplying the coagulant-feeder with water from the main  
35 conduit-pipe under the same pressure as the fluid to which the coagulant is delivered. The effect of such construction is to entirely remove the resistance to the movement of the coagulant-feeder, and confines the operation of  
40 the motor wholly to the function of a regulator for determining the rate at which the coagulant is delivered.

Figure 1 represents a filtering-plant provided with a rotary motor actuating a rotary  
45 pump to force a regulated quantity of water through an alum-tank, and thence into the main conduit, impregnated with the desired proportion of coagulant. Fig. 2 represents a filtering-plant provided with a rotary motor  
50 for actuating a piston feeding device analogous to that shown in my United States Patent

No. 293,749; and Fig. 3 represents the construction of such piston feeding mechanism in section on line *xx* in Fig. 2.

A is the filter; B, the main conduit leading 55 the impure water thereto and passing on its way through a rotary motor, C. After operating the motor, the main current of the water passes from the conduit B' directly to the filter. 60

In Fig. 1 D is the rotary pump, actuated by the motor C and supplied with fluid by a branch, *b*, from the conduit B. The pump delivers the water in a regulated quantity by pipe *e* to the alum-tank E, from whence it 65 passes to the conduit B' through the pipe *e'*, charged with the desired proportion of coagulant, which is thereby mingled with the impure water before its entrance into the filter. The so-called "alum-tank" is not shown in detail 70 herein, but is constructed to expose a fixed area of the alum, lime, or other coagulant material to the current of water passing through the tank, so that a fixed amount of the same will be dissolved by the water and delivered 75 therewith into the fluid in the main conduit.

A' is the inlet to the filter, and A<sup>2</sup> the outlet for the filtered water, while *a'* and *a*<sup>2</sup> are overflow-pipes used in washing the filter.

In Figs. 2 and 3 G is a hollow cylinder con- 80 taining a piston, *g*, for feeding a previously-prepared solution of the coagulant, the piston being moved within the cylinder by a screw, *h*, which is provided outside of the cylinder-head with a ratchet-wheel, I, actuated by the 85 motor C'. A pawl-arm, J, is pivoted upon the screw-shaft adjacent to the wheel I, and is connected by a rod, *l*, with an adjustable crank, *m*, rotated by the motor. A pawl, *o*, operated by the arm J, serves to rotate the 90 ratchet-wheel step by step when the arm J is vibrated, and the rotation of the screw thus produced operates to move the piston longitudinally in the cylinder. The piston is provided upon one side with a packing, *p*, and 95 the cylinder upon that side of the piston is charged with a solution of the required coagulant, which is forced from the cylinder by the movement of the piston through an outlet, *r*, and pipe *r'*, and delivered thereby to the conduit B'. 100

To balance the resistance of the pressure in

the conduit which is transmitted to the piston through the pipe *r'*, I connect the opposite end of the cylinder with the conduit B by a pipe, *s*, and thus produce a nearly equal pressure upon the opposite side of the piston, so that the force required to move it is almost nominal, and the wear upon the screw and its actuating mechanism is correspondingly reduced. The cylinder may be recharged in any convenient manner—as through a pipe, *r''*, connected with the outlet *r*—the piston being retracted during such operation, which may be effected by lifting the pawl *o* and turning the screw by the hand-crank *t*.

The various pipes and connections shown herein may in practice require cocks at various points to operate them conveniently; but the same are not shown herein, as they form no part of my invention.

Having shown the means for balancing the pressure in two different kinds of feeding devices by connecting the opposite sides of the fluid-moving agent with the main conduit-pipe, it will be readily understood how such connections may be applied to other feeding devices of different construction.

In the drawings the fluid-connections which supply a portion of the fluid under pressure from the main conduit to the inlet and outlet of the coagulant-feeder are connected, respectively, with the inlet and outlet conduit-pipes of the motor C. As the internal resistance of the motor C must slightly diminish the pressure in its outlet-pipe B', it is obvious that the pressure supplied from the inlet of the motor B is greater than that against which the feeder operates, and must operate to assist the movements of the fluid-moving agent in the coagulant-feeder, whether the same be a moving piston, as in Fig. 3; or a rotary pumping device, as at D in Fig. 1. Such an arrangement of the pipes, therefore, limits the function of the motor C or C' to a merely regulating device, which determines and controls the movements of the feeding device at the required rate.

I am aware that it is common to connect both the top and bottom of an oil-cup or other feeding-receptacle with a volume of liquid under pressure that the contents of the feeding-

receptacle may be discharged by gravity into such liquid under pressure, and I disclaim such a construction, as my invention consists in applying the fluid-pressure against which the coagulant is to be fed to the opposite sides of the feeding-piston which discharges the coagulant or precipitant from the feeding-vessel. Such piston may be of any desired form or construction—as, for instance, the reciprocating plug *g*, (shown in Fig. 3 of my drawings,) or the fluid-moving agent in any form of rotary pump or other feeding device, operated to propel the coagulant into the unpurified water. I do not, therefore, limit myself to any particular construction for the fluid-moving mechanism, provided the resistance to its movement is balanced by the means herein described.

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

1. In an apparatus for purifying water, the combination, with a feeder supplying a coagulant or precipitant to the impure water under pressure, of separate pipes conducting a portion of the fluid under pressure to the opposite sides of the fluid-moving piston to diminish the resistance to its motion, substantially as herein set forth.

2. In an apparatus for purifying water, the combination, with the coagulant-feeder and a filter-conduit, of a motor actuated by the fluid in the filter-conduit, and separate pipes conducting a portion of the fluid under pressure in such conduit separately to the inlet and outlet of the coagulant-feeder, as and for the purpose set forth.

3. In an apparatus for purifying water, the combination, with the coagulant-feeder, of a motor actuated by the fluid in the main conduit, and separate fluid-connections uniting the inlet and the outlet of the feeder, respectively, with the inlet and outlet conduit-pipes of the motor, substantially as herein set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

JOHN W. HYATT.

Witnesses:

THOS. S. CRANE,  
CHAS. C. MCBRIDE.