

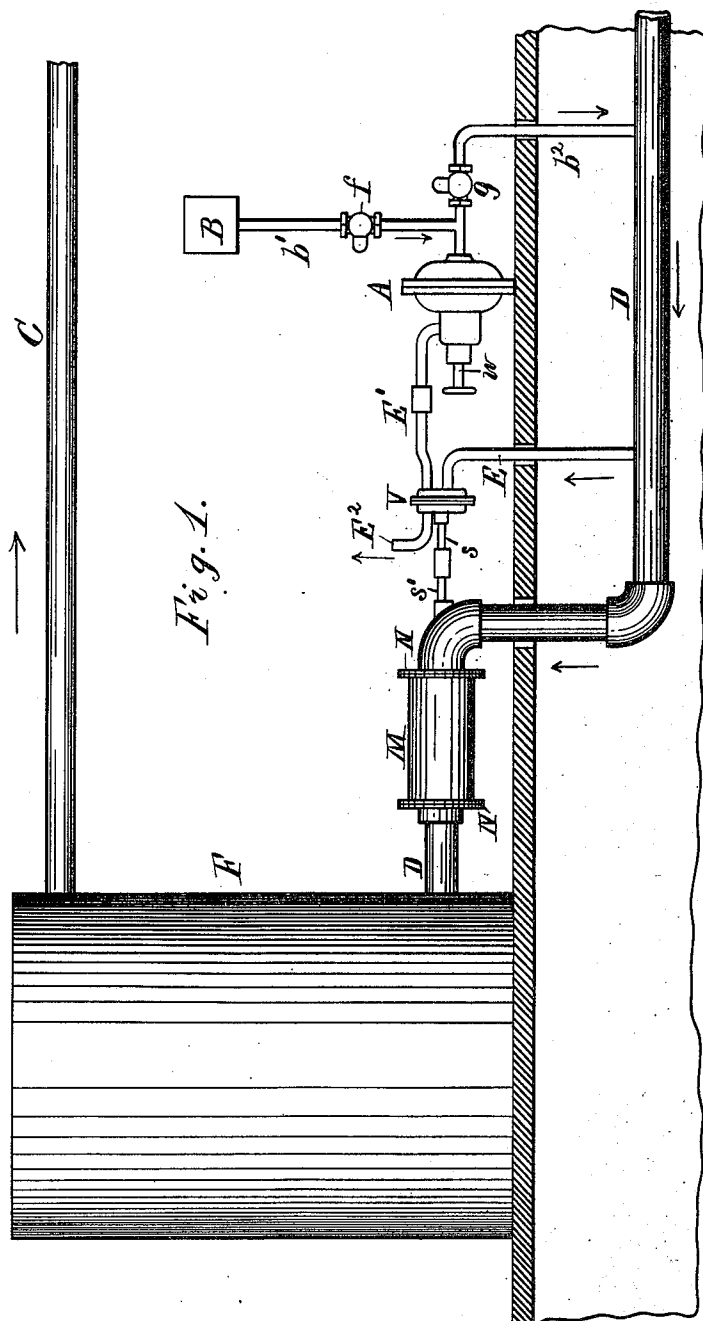
(No Model.)

2 Sheets—Sheet 1.

J. W. HYATT.
AUTOMATIC REAGENT FEEDER.

No. 434,392.

Patented Aug. 12, 1890.



Attest:
S. C. Fisher.
Grand Juror

Inventor.
John W. Hyatt, per
Cram & Miller, Atty.

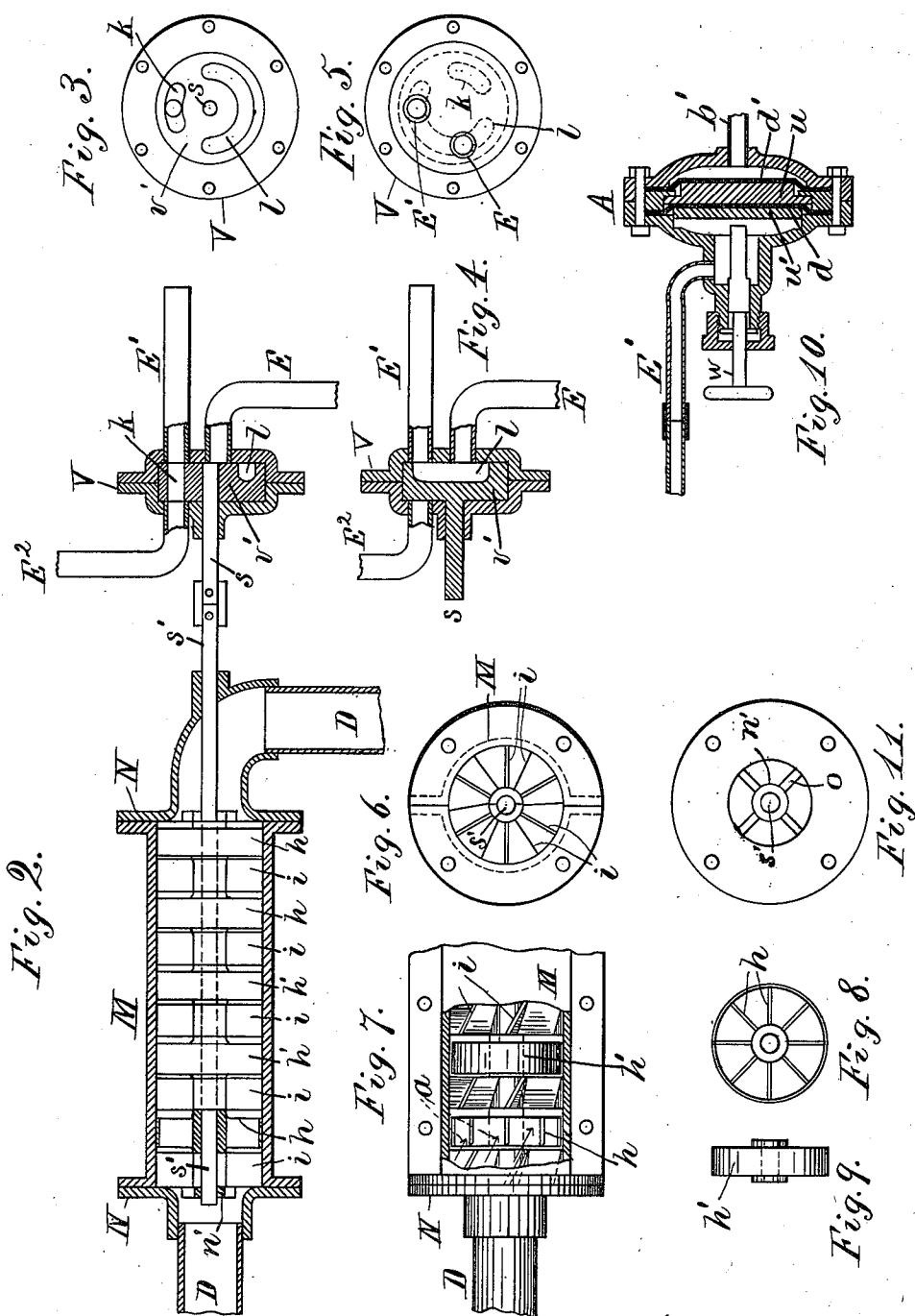
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2 Sheets—Sheet 2.

J. W. HYATT.
AUTOMATIC REAGENT FEEDER.

No. 434,392.

Patented Aug. 12, 1890.



Attest:
F. C. Fischer.
Frank Sommer

Inventor.
John W. Hyatt, per
Crane & Miller, Atty.

UNITED STATES PATENT OFFICE.

JOHN W. HYATT, OF NEWARK, NEW JERSEY, ASSIGNOR TO THE HYATT
PURE WATER COMPANY, OF SAME PLACE.

AUTOMATIC REAGENT-FEEDER.

SPECIFICATION forming part of Letters Patent No. 434,392, dated August 12, 1890.

Application filed September 17, 1889. Serial No. 324,226. (No model.)

To all whom it may concern:

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

This invention relates to a reagent-feeder actuated by a water-motor through which a current of water passes to or from the filter; and the invention consists in the combination, with the filter and the water-motor, of a reagent-feeder actuated intermittently by a supply of water under pressure, and valve mechanism actuated by the water-motor to admit the water-pressure intermittently to the feeder.

It also consists in a particular construction for the water-valve.

The invention will be understood by reference to the annexed drawings, in which Figure 1 is a side elevation of the entire apparatus. Fig. 2 is a longitudinal section of the water-motor and valve mechanism with the parts in section where hatched upon the center line. Fig. 3 is an end view of the valve in one half of its casing. Fig. 4 is a section upon the center line of the valve and casing with the valve turned to exhaust the fluid from the feeder; Fig. 5, an end view of same parts. Fig. 6 is an end view of the motor with head removed. Fig. 7 is a plan of the motor with a portion of the shell broken away to expose the interior. Fig. 8 is an end view, and Fig. 9 an edge view, of one of the motor-wheels. Fig. 10 is a longitudinal section of the reagent-feeder, and Fig. 11 the inside of one head.

In Fig. 1, F is the filter; M, the motor; V, the valve-casing; A, the reagent-feeder; B, the reagent-tank; D, an inlet-pipe conducting unfiltered water to the filter, and C a pipe conveying filtered water from the filter; E, a branch conducting fluid under pressure from the pipe D to the valve-casing V, and E' a pipe conveying the same fluid from the valve-casing to the feeder A.

The reagent-feeder consists of two dia-

phragms *d d'*, secured at their margins within the casing A and connected upon one side by pipe *b'* to the reagent-tank B, in which the reagent would be exposed to atmospheric pressure. The pipe *b'* is provided with a check-valve *f*, and a branch pipe *b²*, provided with a check-valve *g*, connects the same side of the diaphragm with the pipe C, conveying water to the filter. The opposite side of the diaphragm is connected by pipe E' with the valve-casing V, in which a disk-shaped valve *v'* is arranged to rotate in close contact with the casing to interrupt the flow of fluid from the several apertures with which it is provided. A stem *s* connects the disk with the spindle *s'* of the water-motor, which consists of a series of wheels *h'*, having blades *h* rotated between inclined vanes *i*, fixed within a cylindrical shell M.

The pipe D is attached to the heads N at the opposite ends of the shell, and the motor is shown so connected with the filter that the fluid delivered by the pipe passes through the length of the shell and thence through the pipe again to the filter. The heads N are provided with bearings *n'* for the spindle *s'*.

The blades *h* of the motor-wheels are shown parallel with their axis, while the series of vanes *i*, between which they rotate, are shown in Fig. 6 inclined to the axis or shaft of the motor, so that the current of water passing longitudinally through the shell is repeatedly diverted in a spiral direction, and thus impinges against the flat sides of the blades *h*, as indicated by the arrows *a* in Fig. 7.

The disk *d'* is perforated by an aperture *k*, adapted to connect the openings of the pipes E² and E', and is provided in one side with an arched exhaust-passage *l*, adapted to connect the outlet of the pipe E' with the supply-pipe E. A portion of the water flowing under pressure to the motor M is led by the pipe E to an aperture in the valve-casing V, and when the passage *l* in the side of the disk *v'* is opposite such pipe, the water flows through the same into the pipe E' and presses upon one side of the diaphragm *d*. The check-valve *f* opens toward the diaphragm *d*, while the check-valve *g* opens away from the same toward the pipe D, so that a vibration of the

diaphragms operates to draw a charge of the chemical reagent contained in the tank B into the casing A, and to expel it through the valve *g* into the pipe D. The filter shown at 5 F is designed for upward filtration, and the reagent is therefore supplied to the fluid passing to the inlet-pipe D to precipitate the impurities before filtration. By the operation of the motor and valve *v'* the diaphragm 10 *d* is automatically reciprocated to supply, by continued intermittent charges, the desired volume of reagent to the pipe D. This operation is effected as follows: The water flowing through the motor-shell M is repeatedly 15 deflected by the vanes *i* into contact with the blades of the several motor-wheels, and thus positively rotates the spindle *s'* at a speed corresponding with the volume of water passing through the filter. By the rotation of 20 the valve-disk *v'*, connected with the motor-spindle, the passage *l* is, once in each revolution of the disk, brought opposite to the pipes E and E', and connects the two, so that the fluid passing through such pipes may press 25 upon the diaphragm. Such pressure expels a charge of reagent in contact with the opposite side of the same through the valve *g* into the contents of the pipe D. The continued rotation of the disk then connects the pipe E' 30 with the waste-pipe E² by the exhaust-aperture *k* permitting the escape of the fluid from the pipe E', and thus allowing another charge of reagent to enter the casing A from the tank B. The rotation of the disk thus 35 alternately effects a pressure of the fluid upon the diaphragm and discharges such pressure by cutting off the supply of fluid and opening a connection between the diaphragm and the waste-pipe E².

40 Propeller-wheels provided with spiral blades have been heretofore used in motors for operating a reagent-feeder; but in such construction the speed of the propeller-wheel does not vary in the same proportion as the 45 volume of fluid moving over it, and the end-thrust upon the supporting-shaft of the wheel produces a very material degree of friction to retard its movement. It will be noticed, as shown in Fig. 6, that the current of fluid 50 moving in the direction of the arrows *a* past the motor-wheels produces no perceptible end-thrust upon their supporting shaft or spindle *s'*, as the direction of the current is obliquely toward the flat sides of the blades, and there 55 is no pressure upon the wheels to produce any end-thrust except that upon their edges, which may in practice be made so thin as to present no appreciable area. It will be also seen that the current of fluid moving 60 obliquely upon the blades of the motor-wheels presses with substantially the same degree of force upon each of the wheels, as its direction and velocity are the same after passing between each of the series of inclined vanes 65 *i*, and the aggregate force of rotation in the

spindle *s'* is therefore augmented by each of the wheels secured thereon. By such construction I am therefore enabled to avoid the retarding effect of friction upon the motor-spindle, and am enabled not only to secure 70 any desired amount of power for actuating the valve, but the power generated may be made so great in proportion to the frictional resistance of the valve that the latter will have very little effect upon the movements of the 75 motor. The velocity of the motor-spindle will therefore vary accurately in proportion to the volume of fluid moving through the motor, and a reagent-feeder will be actuated exactly in 80 proportion to such volume of fluid and supply the reagent to the unfiltered water in precisely the desired amount. It is obviously immaterial what kind of valve or valves be actuated by the motor to alternately supply the fluid 85 under pressure to one side of the diaphragm *d* and to discharge the fluid from the same; and it is also immaterial whether the motor be actuated by the current of fluid moving toward the filter or by the purified water moving from the same. The pipe D is shown 90 bent adjacent to the motor to permit the extension of the spindle *s'* in a line with the axis of the shell M; but such arrangement of the pipe is not essential, as any suitable gearing may be used to transmit the motion of 95 the spindle laterally, if preferred.

It will be understood that a small volume of water about equal to that of the reagent consumed will be discharged from the pipe E² at each vibration of the diaphragm, and 100 as the only function of such fluid is to press the diaphragm intermittently, as desired, it is immaterial where such fluid under pressure be obtained, and it may therefore be drawn directly from the pipe C, as indicated 105 by the dotted line C', or from any other source of fluid possessing the desired head. It is obviously immaterial whether a flexible diaphragm secured at its edges, as shown in Fig. 9, be employed as the reagent-feeder, or 110 a cylindrical plug or piston moving in a cylinder, because both constructions are already known as equivalent in the art of feeding a precipitating fluid.

Having thus set forth my invention, what I claim herein is— 115

1. The combination, with a filter feed-pipe, of a motor actuated by the fluid passed through the feed-pipe, a moving diaphragm or its equivalent having the reagent supplied 120 to one side thereof, and a valve actuated by the motor and supplying fluid under pressure intermittently to the opposite side, as and for the purpose set forth.

2. The combination, with a filter, of a motor actuated by the fluid passed through the 125 filter, the casing A, containing diaphragm *d*, a reagent-tank B, with pipe and check-valve connecting it to the casing upon one side of the diaphragm, a pipe and check-valve for 130

discharging the reagent from the casing into
the unfiltered water, and a valve actuated by
the motor and suitably connected to the cas-
ing A upon the opposite side of the dia-
5 phragm, and operated to intermittingly supply
fluid to and discharge it from the casing, as
and for the purpose 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,
L. LEE.