(No Model.) 3 Sheets—Sheet 1.

J. H. BLESSING.

AUTOMATIC FEEDER.

No. 412,910. Patented Oct. 15, 1889.

FIG. 1.

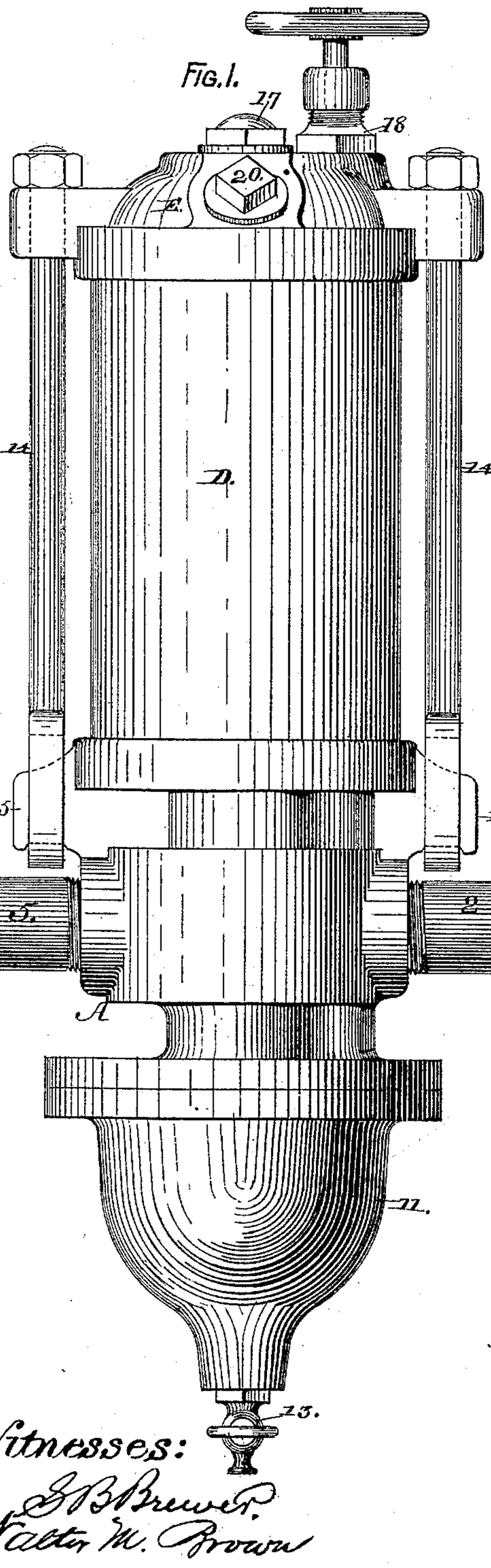
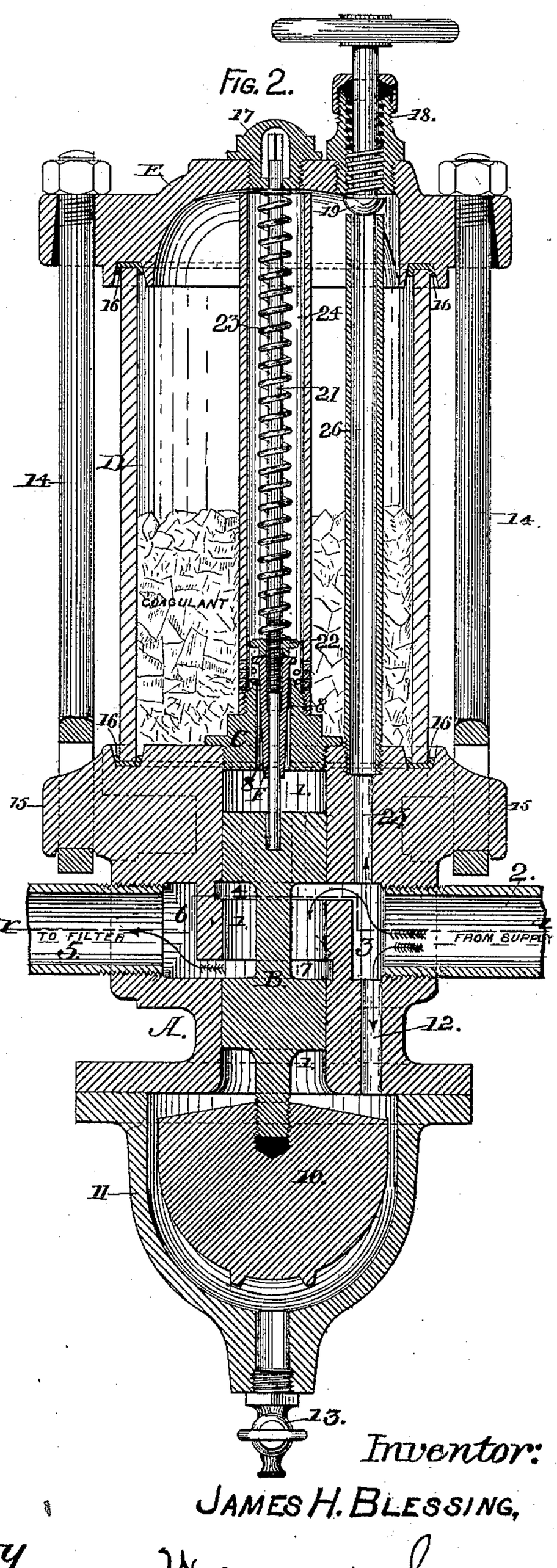


FIG. 2.



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(No Model.) 3 Sheets—Sheet 2.

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FIG. 4.

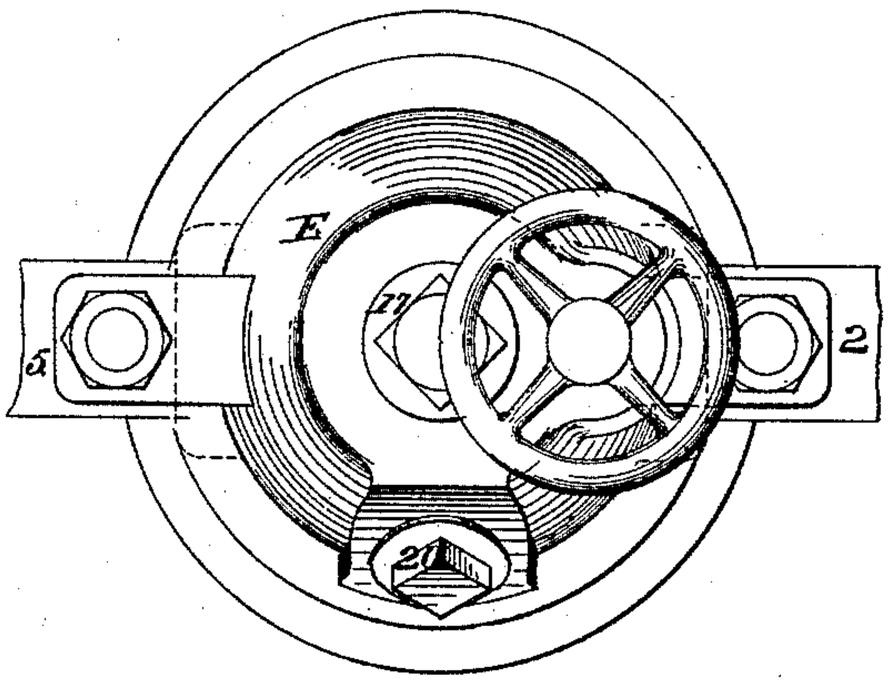


FIG. 5.

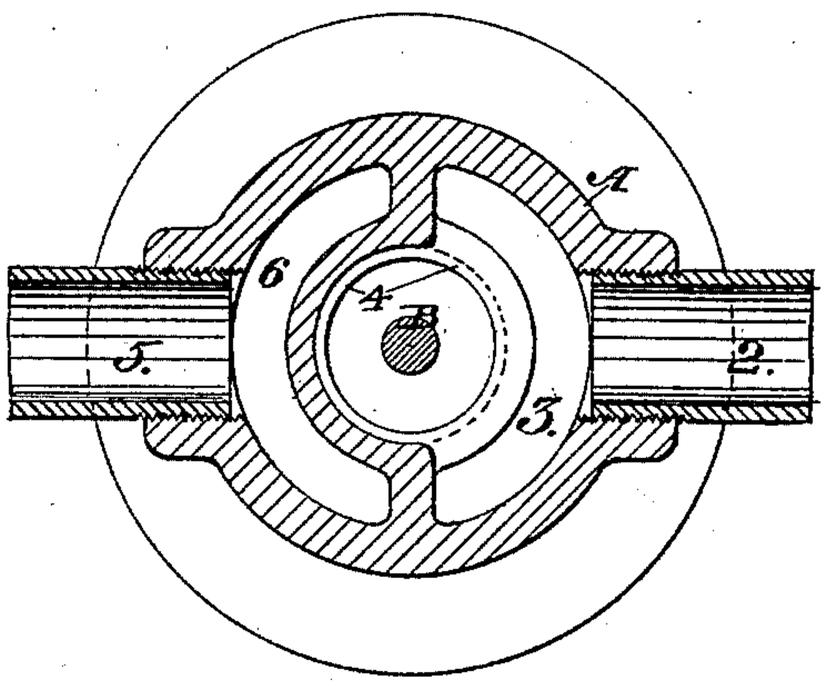


FIG. 6.

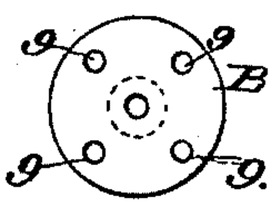
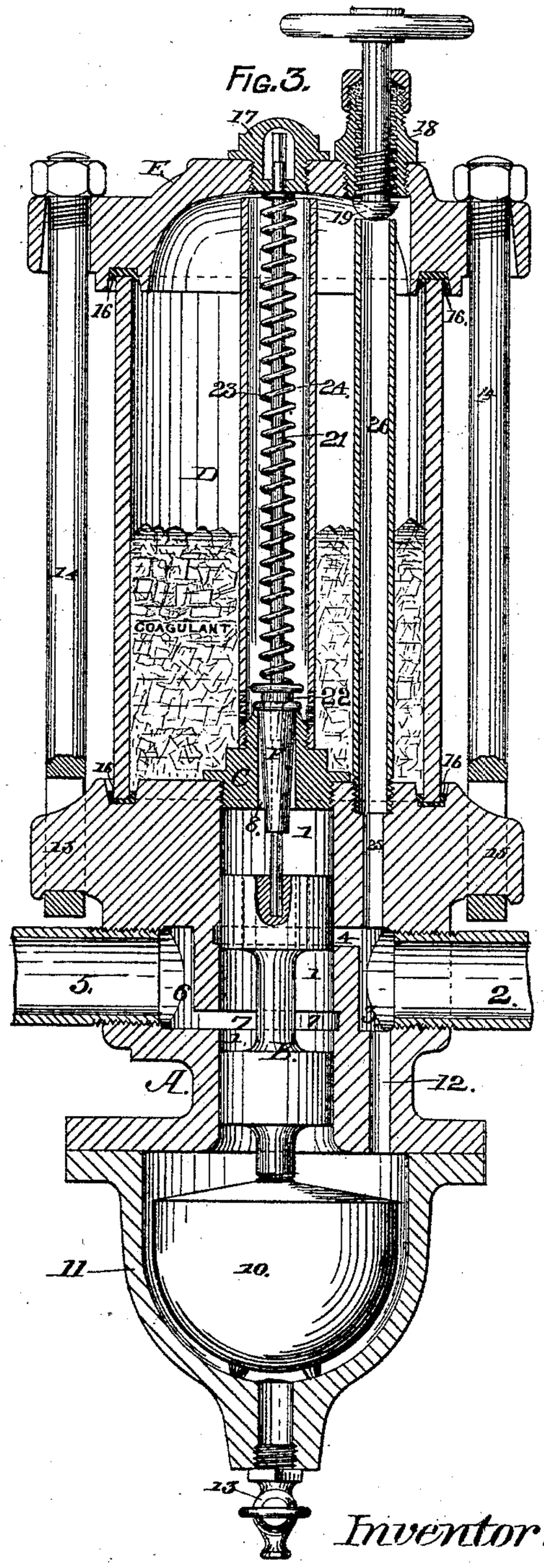


FIG. 3.



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(No Model.) 3 Sheets—Sheet 3.

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AUTOMATIC FEEDER.

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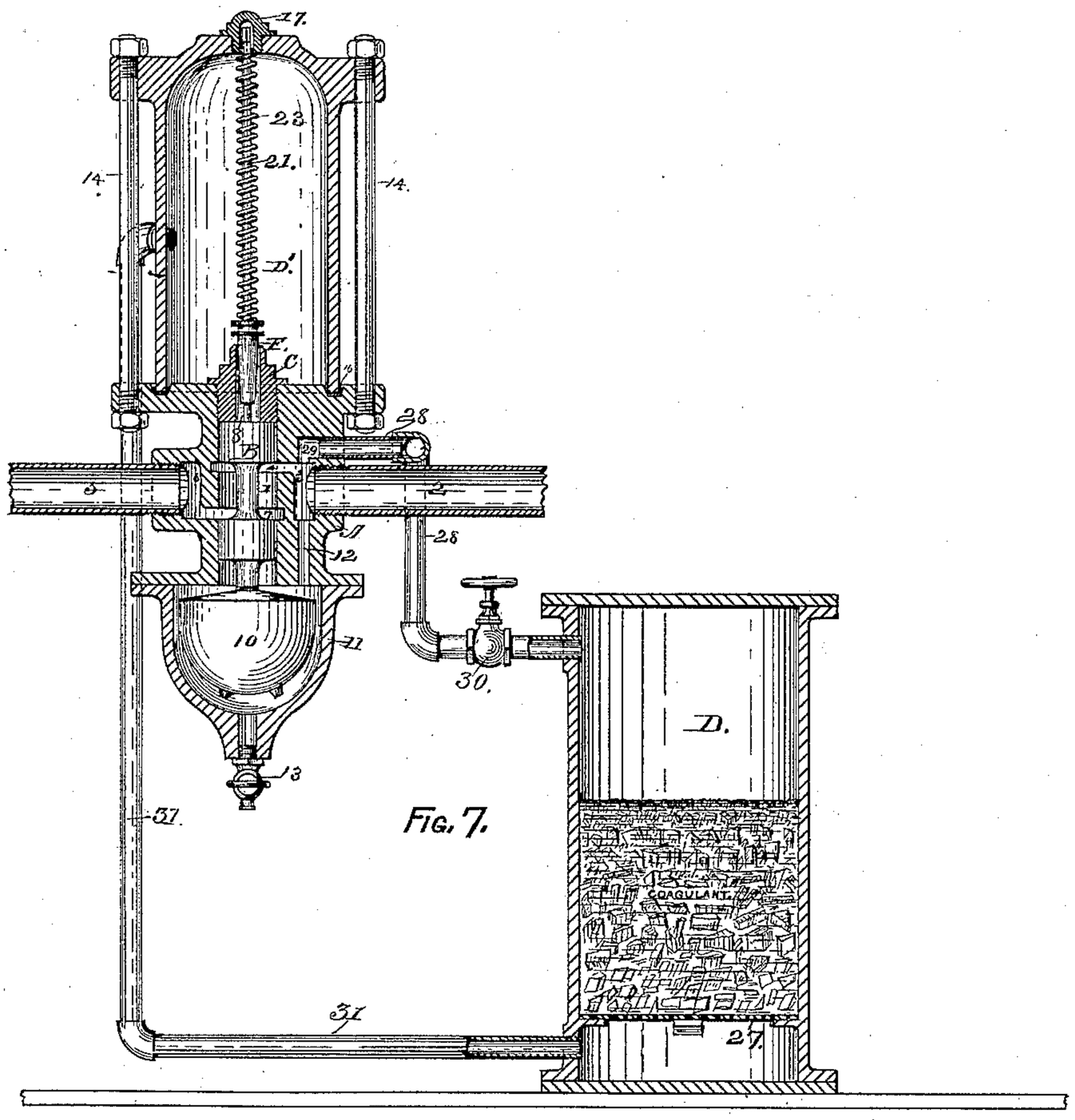

FIG. 7.

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UNITED STATES PATENT OFFICE.

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AUTOMATIC FEEDER.

SPECIFICATION forming part of Letters Patent No. 412,910, dated October 15, 1889.

Application filed May 26, 1888. Serial No. 275,169. (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 Automatic Coagulating and Pressure-Reducing Attachment for Water-Purifying Apparatus, of which the following is a specification.

My invention relates to an attachment to water-purifying apparatus whereby a coagulant will be automatically introduced into the water before it enters the filter, and whereby the pressure of the water will be reduced before it enters the filter below the pressure maintained in the water-supply pipes; and the object of my invention is to provide an automatic attachment for water-purifying apparatus by means of which a definite proportion of coagulant will be commingled with each gallon of water as it passes into the filter, and by which a reduction of pressure below that which is carried on the supply-pipes can be effected before the water enters the filter. I attain this object by the mechanism illustrated in the accompanying drawings, which are herein referred to and form part of this specification, and in which—

Figure 1 is a side elevation of my attachment. Fig. 2 is a vertical section of the same, with the piston-valve raised to permit a full flow of water to pass through the attachment. Fig. 3 is a like section with the piston-valve shown in elevation in its lowest position. Fig. 4 is a plan view. Fig. 5 is a horizontal section at the irregular line X X on Fig. 2. Fig. 6 is a detached plan view of the piston-valve, and Fig. 7 is a modified form of my attachment.

As represented in the drawings, A is the valve-casing of my device, which has a central cylindrical bore 1, into which a double-headed piston-valve B is fitted to move easily and comparatively frictionless. At one side of said casing an inlet water-pipe 2, which connects this device with the water-supply, is inserted to communicate with a semi-annular passage 3, having at its upper end an inlet-port 4, which communicates with the bore of the casing. At the opposite side of said casing is an outlet water-pipe 5, which leads to the filtering apparatus, and which communicates with a semi-annular passage 6, that has at its lower end an outlet-port 7, that leads from the bore of the casing. The two heads of the piston-valve B are spaced apart at a distance which equals the outer boundaries, in a vertical direction, of the ports 4 and 7, so that when said valve is placed in the position shown in Fig. 2 both of said ports will be fully opened. A bonnet C is secured in the upper end of the bore of the valve-casing A, and said bonnet is provided with a central opening 8, for a purpose hereinafter explained.

The upper head of the piston-valve B is provided with a series of openings 9, as shown in Fig. 6 and indicated by dotted lines in Figs. 2 and 3, and by means of said openings there will be established an equilibrium of pressure between the water contained in the space between the two heads of the piston-valve B and the water contained in the space between the upper head of said valve and the bonnet C, which pressure will be that of the outflowing water which passes through the pipe 5, and it should be understood that said pressure will very rarely, if ever, equal the pressure of the water which acts against the lowermost face of the lower head of said valve. A weight 10, attached to the lower end of the piston-valve B, is inclosed in a casing 11, which forms a water-tight chamber at the lower end of my device. Into said chamber a passage 12 is made to form a constantly-open communication between said chamber and the water-supply, and thereby the full pressure of said water-supply will be constantly exerted against the lowermost face of the lower head of said piston-valve, which pressure will tend to force said valve upwardly. If it is required that the pressure of the outflowing water should be two pounds less to the square inch than the pressure of the incoming water, and if the area of the bore of the valve-casing A is five square inches, then the combined weight of the valve B and weight 10 should be ten pounds to produce the required effect, and any other difference in said pressures can be determined in a like manner.

In considering the effect of the water-pressures acting on the different faces of the two heads of the piston-valve B it must be borne

in mind that the pressures acting on the lower face of the upper head and the upper face of the lower head will at all times practically balance each other, that the pressure on the upper face of the upper head while water is flowing out of the device can never exceed the reduced pressure of the outflowing water, and that the pressure acting on the lower face of the lower head will always be equal to the pressure of the inflowing water which enters the device through the pipe 2—that is to say, the water-pressure acting on the lower face of the lower head will be in excess of the pressure acting on the upper face of the upper head to a degree that is equal to the difference of the pressures of the incoming water and outflowing water. A petcock 13 is inserted in the lower end of the casing 11 for the purpose of discharging from the chamber of said casing any impurities that may collect therein.

D is a coagulant-chamber, which is made of a cylindrical form, and is preferably fixed upon the upper side of the valve-casing A. A removable top E is fixed upon the upper end of the chamber D, and is preferably secured thereon by means of yoke-bolts 14, so that when the nuts of said bolts are slackened off the yoke ends of the bolts may swing clear from the lugs 15 of the valve-casing, and thereby the top E will be left free to be removed from its place. Packing 16 is interposed between the cylinder, which forms the coagulant-chamber, the valve-casing A, and the removable top E, for the purpose of forming water-tight joints at those points. The removable top E has a centrally-located removable cap 17, for a purpose hereinafter explained, a stuffing-box 18, which forms a nut for the screw-stem of the valve 19, and a screw-plug 20, for closing the opening through which the coagulant is fed into the chamber D. By means of the valve 19 the water can be stopped from flowing into chamber D, and thereby the device will be put in condition to let the water unmixed with the coagulant flow through it.

F is a spring-actuated valve having a long tapering form that is fitted to slide freely in the opening 8 of the bonnet C, the tapering form of said valve producing a constantly-increasing area of the annular space between said valve and the cylindrical bore of the opening 8 for each increase in the height to which said valve is lifted. Said valve is adjustably attached to the screw portion of the stem 21, whose upper end is guided in the cap 17, and whose lower end engages in the upper end of the piston-valve B. A jam-nut 22 is fitted on said stem for the purpose of securing the valve F at any required height thereon, and a spring 23, which surrounds said stem, is interposed between the cap 17 and jam-nut 22 for the purpose of forcing the valve F downward when it is relieved from the pressure exerted thereon by the piston-valve B. The stem 21 and spring 23 are surrounded by a tube 24, which is attached to the bonnet C, and which is perforated at its lower end, so as to permit the water saturated with coagulant that is contained in the chamber D to pass into and through the opening 8 and thence into the upper part of the bore of the valve-casing A above the valve B. From thence the saturated water will pass through the openings 9 into the space between the two heads of the said valve, wherein it will commingle with the water that enters through the inlet water-pipe 2. The supply of water for the chamber D is admitted thereinto through a passage 25, which communicates with a stand-pipe 26 in said chamber. The valve 19 is fitted to close up the upper end of said standing pipe when occasion requires.

The operation of my invention is as follows: The coagulant, which is preferably used in the form of crystals, is inserted in the chamber D, and is at all times, excepting when the valve 19 is closed over the upper end of the standing pipe 26, subjected to the action of the water that flows into the chamber D through the passage 25, and thereby the water in said chamber is maintained in a saturated condition. When the water is stopped from flowing through the apparatus, the piston-valve B, which operates as an automatic stop-valve that will regulate the volume of water which flows through the apparatus, will be carried by the weight 10 into the position shown in Fig. 3, where the inflowing water can only exert its pressure on the lowermost face of the lower head of the piston-valve, and the valve F will be depressed by the spring 23 into the opening 8, thereby preventing the flow of the saturated water from the chamber D into the bore of the valve-casing A. Coincidently with the starting of the outflow of water through the pipe 5 the piston-valve B will be raised by the pressure of the water against the lowermost face of the lower head of said valve to partially open the port 4, so as to allow the water to flow through the apparatus. The rising movement of the piston-valve effects a corresponding movement of the valve F to permit the required proportionate quantity of the saturated water to pass from the chamber D through the openings 9 into the bore of the valve-casing A, wherein it will commingle with the water which enters the apparatus through the port 4 and passes out through the pipe 5. It is obvious that by increasing the weight of the valve B by attaching the weight 10 thereto said valve will not be raised as high by the same pressure of water as it would be if it were unweighted, and that the effect of this diminished lift of said valve will be to decrease the volume and correspondingly the force of the water which passes through the apparatus. Thereby a diminution of the water-pressure below the pressure of the incoming water is established between the two heads and above the upper head of the valve B, while the full pressure of the incoming wa-

ter is maintained against the lowermost face of the lower head of said valve to move the latter upwardly whenever such pressure exceeds the effect of the weight of the valve and its attached weight in conjunction with the lesser pressure that tends to move it downward.

Provision is made for increasing or diminishing the proportion of saturated water to the quantity of unsaturated water by making the valve F adjustable on the stem 21, and this adjustment can be made by removing said stem and valve through the opening covered by the cap 17.

In the modification shown in Fig. 7 the coagulant-chamber D is made separately from the valve-chamber A, and it is provided with a perforated diaphragm 27 for holding the crystal coagulant. A chamber D′ is fixed on the top of the valve-chamber A for the purpose of containing the valve F and stem 21. Said chamber is provided with the removable cap 17 for the same purpose that said cap is used in the coagulant-chamber shown in Fig. 1. A water-supply pipe 28 forms a communication from the passage 29, leading from the semi-annular passage 3 of the valve-casing A to the upper part of the chamber D, and said pipe is provided with a stop-valve 30 for the purpose of shutting off the communication through the pipe 28 when occasion requires. A saturated water-pipe 31 forms a communication from the chamber D to the chamber D′, to convey the saturated water from under the diaphragm 27 to the chamber D′. The operation of said modification is substantially like the one hereinbefore described, and a repetition is therefore unnecessary.

I claim as my invention—

1. In an automatic coagulating and pressure-reducing attachment for water-purifying apparatus, the combination of a valve-casing having a cylindrical valve-chamber and provided with inlet and outlet water-passages, which communicate through corresponding induction and eduction ports with said valve-chamber, said inlet water-passage having constantly-open branch passages—one leading into a coagulant-chamber and the other into a chamber beneath the lower open end of said valve-chamber—a water-controlling valve fitted to reciprocate freely in said valve-chamber, a coagulant-chamber that is connected to the inlet water-opening by a pipe having a shut-off valve, and a spring-actuated valve that is contained in said coagulant-chamber and is fitted to close the opening between said chamber and the valve-chamber, the lower end of said spring-actuated valve lying in the path of motion of said water-controlling valve, as and for the purpose herein specified.

2. An attachment for automatically controlling the supply of liquid coagulant fed into a water-purifying apparatus, the same consisting of a valve-chamber, which contains an automatic water-controlling valve, and a coagulant-chamber provided with an opening which leads into said valve-chamber, and with a spring-actuated valve, which is fitted to close said opening, and which extends downward into said valve-chamber, said water-controlling valve being actuated by the water-pressure, and said spring-actuated valve being governed by the movement of the water-controlling valve, as and for the purpose herein specified.

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