W. H. BARTHOLOMEW.

FEED WATER REGULATOR.

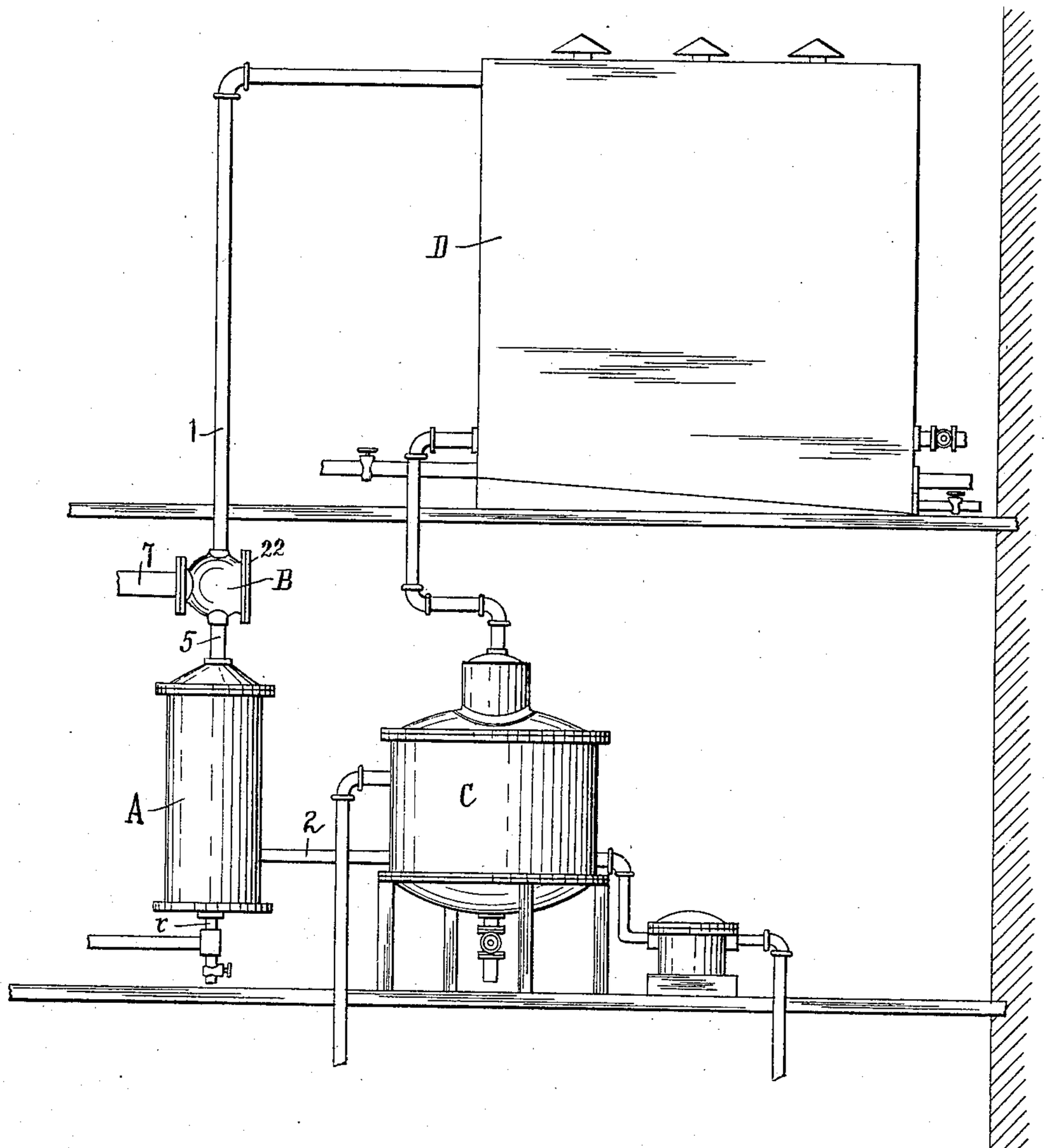
APPLICATION FILED NOV. 22, 1906.

898,625.

Patented Sept. 15, 1908.

3 SHEETS—SHEET 1.

Fig. 1



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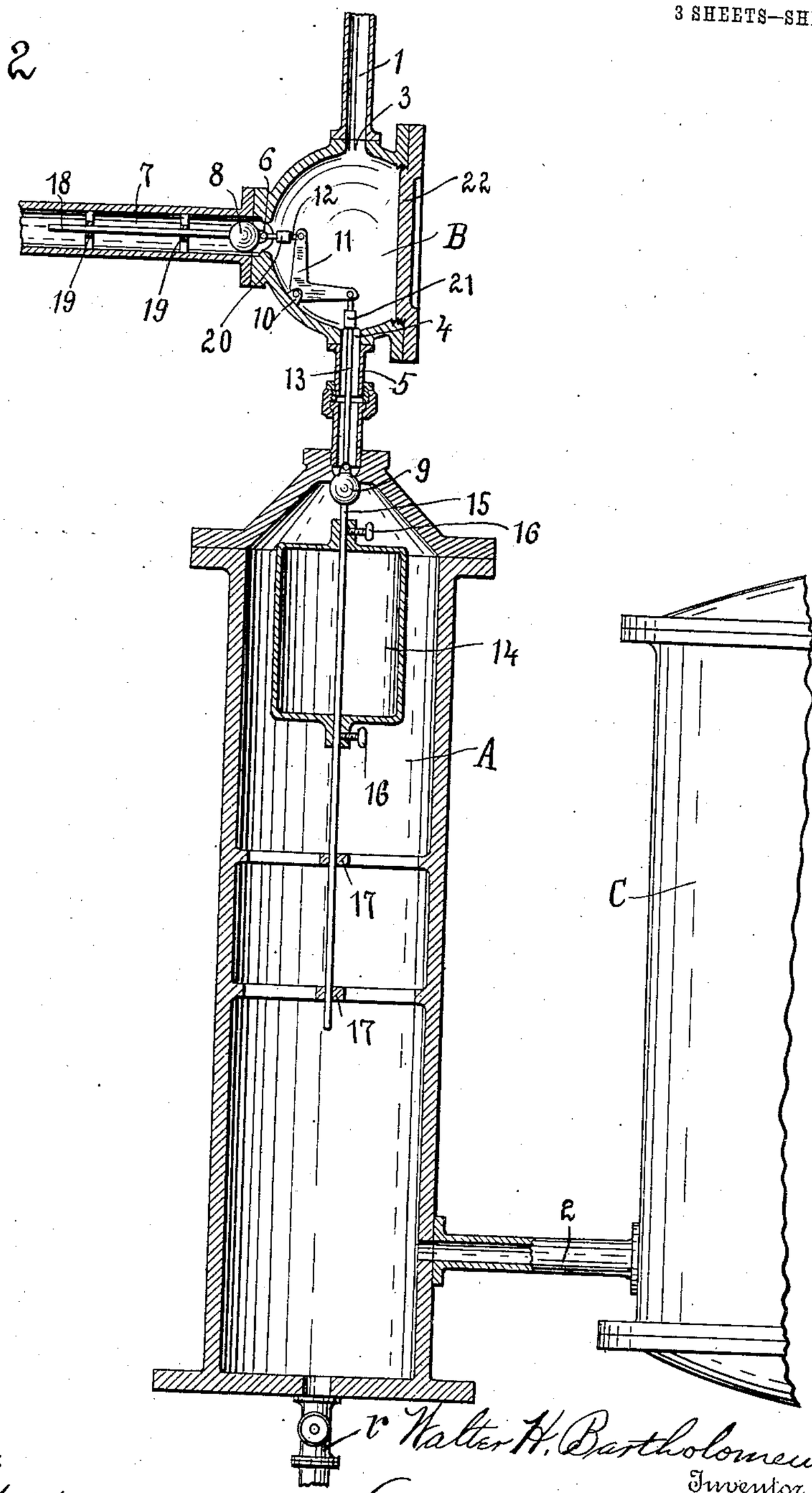
3 SHEETS—SHEET 2.

Fig. 2



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3 SHEETS—SHEET 3.

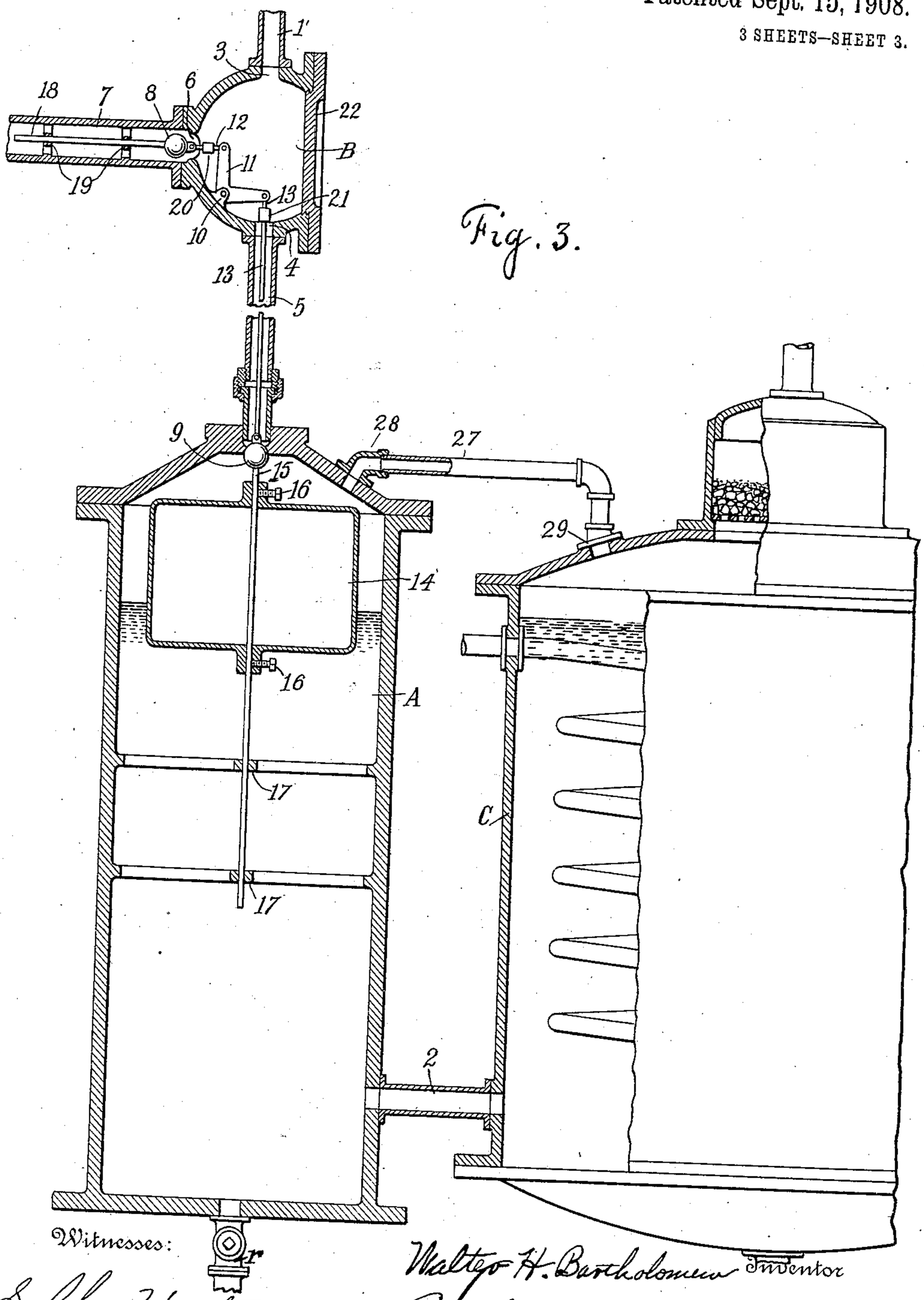

Fig. 3.

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UNITED STATES PATENT OFFICE.

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FEED-WATER REGULATOR.

No. 898,625. Specification of Letters Patent. Patented Sept. 15, 1908.

Original application filed February 7, 1906, Serial No. 299,927. Divided and this application filed November 22, 1906. Serial No. 344,623.

To all whom it may concern:

Be it known that I, WALTER H. BARTHOLOMEW, of East Orange, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Feed-Water Regulators, of which the following is a full, clear, and exact specification, reference being had to the accompanying drawings, wherein—

Figure 1 is the feed water regulator shown in connection with a distilling apparatus; Fig. 2 is a sectional view of the feed water regulator; and Fig. 3 is a sectional view of a modified construction thereof.

This invention relates to devices for regulating the feeding of water to boilers and other apparatus, and consists of the hereinafter more fully described device for automatically regulating the supply of feed water to the evaporator of such water distilling apparatus, as shown in my application filed February 7, 1906, Sr. No. 299,927, of which application this is a sub-division.

Though the regulating device as shown and described is more particularly adapted to be used in connection with water distilling apparatus, it may equally well be used in connection with other apparatus where automatic regulating of feed water is desirable.

The object of this invention is to automatically regulate the supply of feed water to the apparatus where the feed water is to be used; in this instance the evaporator in a water distilling plant, and to that end it is placed in the water conduit from the condenser tank to the evaporator. In this arrangement, besides automatically regulating the flow of water in the evaporator, the use of my improved device effects also a uniform and constant flow of water through the condenser tank, which would not be feasible without employment of such regulating device in such apparatus.

As shown in my application of February 7, 1906, Sr. No. 299,927, a pipe *r* tapped in the bottom of the receptacle, serves for conveying hot water for general household use, and is provided with a stop cock for draining and cleaning the receptacle. The quantity of water required for the condensing process is much in excess of that consumed in the evaporator, and therefore I provide, in connection with my regulating device, these means whereby the surplus of the water, heated by its use in the condenser tank, may be drawn for use in the house or hotel or such institution where the water distilling apparatus is employed. This supplemental device is, however, not essential for the working of my improved feed water regulating device. If it is not used it is advisable to set in the bottom of the receptacle A a discharge-pipe with a stop cock as shown in the accompanying drawings, to facilitate draining of the receptacle and for discharging therefrom whatever sediments or impurities as may accumulate in it.

Connecting with the feed pipe 1 a chamber B is provided, having three openings, the first, designated 3 in the drawings, communicates through pipe 1 with the tank D; the second, designated 4, communicates through pipe 5 with receptacle A, and the third, designated 6, communicates through pipe 7 with the waste pipe. Inlet pipe 1 connects with a source of water supply (in this case with the condenser tank) and enters the receptacle A at its top. Feed pipe 2 connecting the receptacle A with the evaporator C should be located some distance above the bottom of the receptacle A to prevent sediments or impurities as may be contained in the water, from entering the evaporator.

Two valve seats are provided, one in the opening 6, and valve 8 is fitted therein; the other in the joint of pipe 5 with the top of the receptacle A and into this seat the valve 9 is fitted. Valve 8 is secured to guide rod 18 and valve 9 is connected to the guide rod 15 and, by rod 13, to one arm of the crank lever 11 whose other arm is connected by rod 12 to valve 8. On the rod 15 also the float 14 is set, being secured thereto by setscrews 16 to facilitate an adjustment in its position of the float. Spiders 17 are set in the receptacle A below the float, rod 15 sliding through the center openings thereof, and the motions of valve 8 are guided by rod 18 passing through the centers of spiders 19 set in pipe 7. Both valves 8 and 9 are simultaneously actuated by the motions of float 14, thus the rod 15 serves also as a stem to guide the motions of the float 14. Their connections with the arms of bell crank lever 11 are pivotal connections to secure smooth acting of the device and are adjustable, (rods 12 and 13 are adjusted by means of swivels 20 and 21 respectively) and their relative positions are so

arranged that when either of them is moved into its seat the other is simultaneously pushed into an open position.

For better convenience in assembling this part of the mechanism and to facilitate the re-adjustment of rods 12 and 13, if necessary, a large opening is made in the valve chamber B preferably as shown in the drawing. This opening is closed by removable lid 22 which may be in the form of a screwthreaded plug as shown in the drawing or a cover to be secured to the flanges of the opening of chamber B by a packed joint and screw bolts as usually employed in such constructions.

Float 14 must be of sufficient buoyancy to lift valve 9 and press it into its seat so as to effectively close the inflow of water in the receptacle A and also to move the mechanism in chamber B to open valve 8. It must also be of sufficient weight to withdraw valve 9 from its seat and move the mechanism in chamber B to shut valve 8, when dropping.

When assembling the apparatus float 14 must be fixed to rod 15 in such position relatively to valve 9 to hold this valve open until the water fed into the evaporator reaches its predetermined level therein and then to push valve 9 in its seat and close the inlet into receptacle A. When so adjusted the mechanism will automatically and surely maintain the water in the evaporator at the predetermined level and cause the surplus of the feed water to be discharged through pipe 7. It will effectively prevent the rising of the level of the water in evaporator C any higher than desired or required for the efficient operation of the apparatus and it will open the inflow of water into the receptacle A instantaneously when the water in the evaporator sinks beneath the predetermined level.

Practical experience demonstrates that if no netting or filter is employed in tank D the pressure of vapors in the evaporator C offers only a slight resistance to the feed water and that this resistance will under such conditions be more than overcome by the pressure of column of water in receptacle A. It is not quite feasible to formulate a standard rule for determining before hand the position of the float 14 relatively to the valve 9, but this problem offers no difficulty in practical construction to anyone familiar with the art. It may be determined theoretically by a simple mathematical calculation, but it is preferable to determine the position by a practical experiment for each apparatus.

If the steam produced in the evaporator is filtered, the netting and the filtering substance retards the ascent of the steam from the evaporator C to the condenser D. Some times a congestion of the steam in the conduit produces a similar effect. In such case the steam produced in the evaporator exerts a greater pressure upon the feed water, and this pressure might at times be sufficient to prevent the inflow of feed water from the receptatcle A into the evaporator and keep valve 9 in position, closing the inlet port into receptacle A though the water in the evaporator might have been evaporated below the desired or requisite level. To prevent this I have devised the modified construction of my feed water regulating apparatus shown in sectional view in Fig. 3. This modified construction is in all respects similar to the one just described, except that the interior diameter of the receptacle A and of the float 14 are increased, pipe 5 extended as explained further on, and in that in this modified construction the conduit 27, connecting the top of the receptacle A with the top of the evaporator C is provided. Conduit 27 consists of the flanged sockets 28 and 29 fixed to, or made integral with, the heads of the receptacle A and the evaporator C respectively and of the suitably bent conduit 27, connected thereto. When manufacturing such feed water regulating apparatus the flanged sockets 28 and 29 may be provided whether use is to be made of the conduit 27 or not. If it is not required the sockets may be closed by screw caps or stoppers. The object of this conduit is to equalize the pressure upon the water in the receptacle A with the pressure prevailing in the evaporator C. This equalization necessitates an elongation of pipe 5 to produce a static pressure (by the column of water therein) to overcome the pressure of the steam against the inflow of water into receptacle A when valve 9 is open. The arrangement for equalization of pressure requires also a corresponding increase in the buoyancy of the float 14 to increase its motive power.

When my automatic device is used in connection with the distilling apparatus described in my previous application Sr. No. 299,927, the several parts are best arranged as already described and as shown in the drawing forming part of this application; but as can readily be seen, slight changes may be necessary when the device is used in connection with other types of distilling apparatus, or for other purposes where it is desired to automatically regulate the supply of water.

I claim as my invention:—

1. A device for automatically regulating the supply of feed water, comprising a receptacle, a supply conduit to the receptacle, a chamber in the supply conduit, an outlet from the chamber, a valve in the outlet and a valve in said conduit between the chamber and receptacle, said valves being arranged to receive water pressure, operating means disposed on the interior of said chamber and connected to each of said valves for actuat-

ing the latter in unison, and a float connected to one of said valves.

2. A device for automatically regulating the supply of feed water, a receptacle, a chamber overlying said receptacle and connected thereto, a supply conduit for said chamber, an outlet leading from said chamber, a valve in said outlet, a valve in the connection between said chamber and receptacle, said valves being arranged to receive pressure from the water in said chamber, operating means disposed between said valves and connected to each, and a float connected to said valve between the chamber and receptacle.

3. A device for automatically regulating the supply of feed water, comprising a receptacle for the feed water, a supply conduit to the receptacle; a chamber in the supply conduit, an outlet from the chamber, a valve in the outlet and a valve in the conduit between the chamber and the receptacle; a conduit from the receptacle to where the water is to be fed; a float in the receptacle, a bell crank lever fulcrumed in the chamber, a rod connecting the valve in the outlet with one arm of the bell crank lever, a second rod, connecting the other arm of the bell crank lever with the valve in the conduit and with the float in the receptacle, substantially as herein shown and described.

4. A device for automatically regulating the supply of feed water, a receptacle, a chamber connected to said receptacle, a supply conduit to and an outlet for said chamber, a valve in the outlet, a second valve between said chamber and receptacle, said valves being arranged to receive pressure from the water in said chamber, means connected to said first valve, and to one end of said second valve for operating the valves in unison, and means connected to the opposite end of said second valve for automatically actuating said parts by the rise and fall of the water level in the receptacle.

5. A device for automatically regulating the supply of feed water, a receptacle having a supply conduit, a chamber communicating with said supply conduit, an outlet from said chamber, a valve in the supply conduit and a valve in the outlet, each valve being apart from the other and each having a stem projecting into the said chamber, and means arranged within the chamber for operating said valves in unison connected to the stems thereof.

6. A device for automatically regulating the supply of feed water, a receptacle, a supply conduit for the receptacle, an outlet communicating with the supply conduit and arranged at an angle thereto, a valve controlling the supply to the receptacle, a second valve controlling the outlet and moving at an angle to the first valve, connections between said valves for causing simultaneous action thereof in relative opening and closing movements, a float in the receptacle and means for operatively connecting the float with the first named valve.

7. A device for automatically regulating the supply of feed water, a receptacle, a supply conduit, a chamber arranged above the receptacle in the supply conduit, an outlet from the chamber, a valve in the outlet, a second valve independent of the first and arranged to control the ingress of water into said receptacle, said valves being arranged to receive pressure from the water in said chamber, means arranged in said chamber and connected to the inner portion of each of the two valves whereby movement of one is reversely communicated to the other, and means for operating the second valve arranged in the receptacle and operatively connected to the outer portion thereof.

8. A device for automatically regulating the supply of feed water, a chamber connected thereto, an outlet from the chamber, a valve controlling the flow of water through the connection between the chamber and the receptacle, a second valve controlling the flow of water through the outlet, a float in the receptacle, a connection between said float and said first named valve and operative connections between said valves for causing simultaneous operations thereof in relatively opening and closing movements, said valves being arranged to receive pressure from the water in the chamber and being movable in the directions of the axes of said connection and outlet.

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