L. B. FULTON.

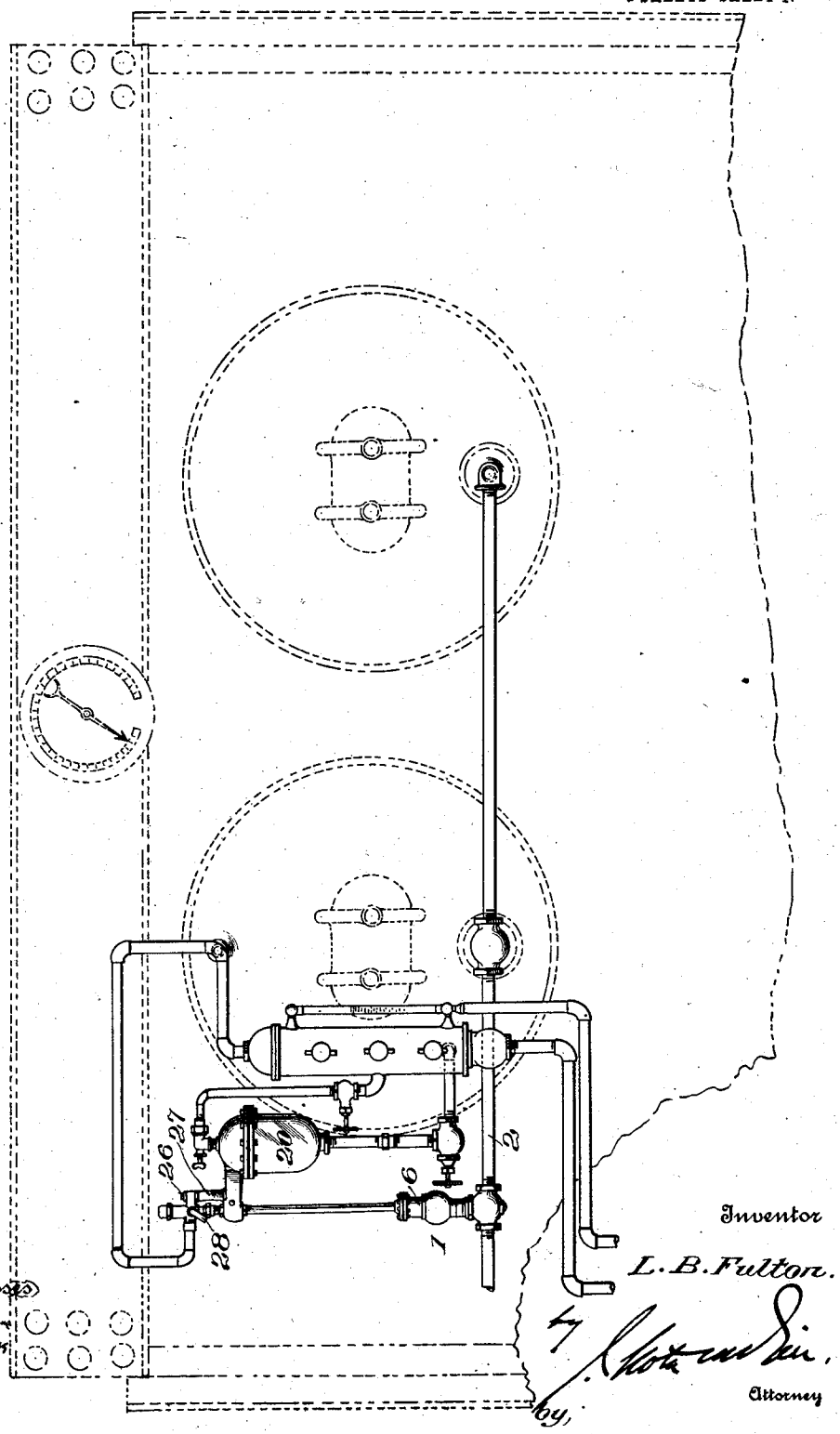
FEED WATER REGULATOR.

APPLICATION FILED NOV. 29, 1910.

1,010,890. **Patented Dec. 5, 1911.**

2 SHEETS—SHEET 1.

Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 2.

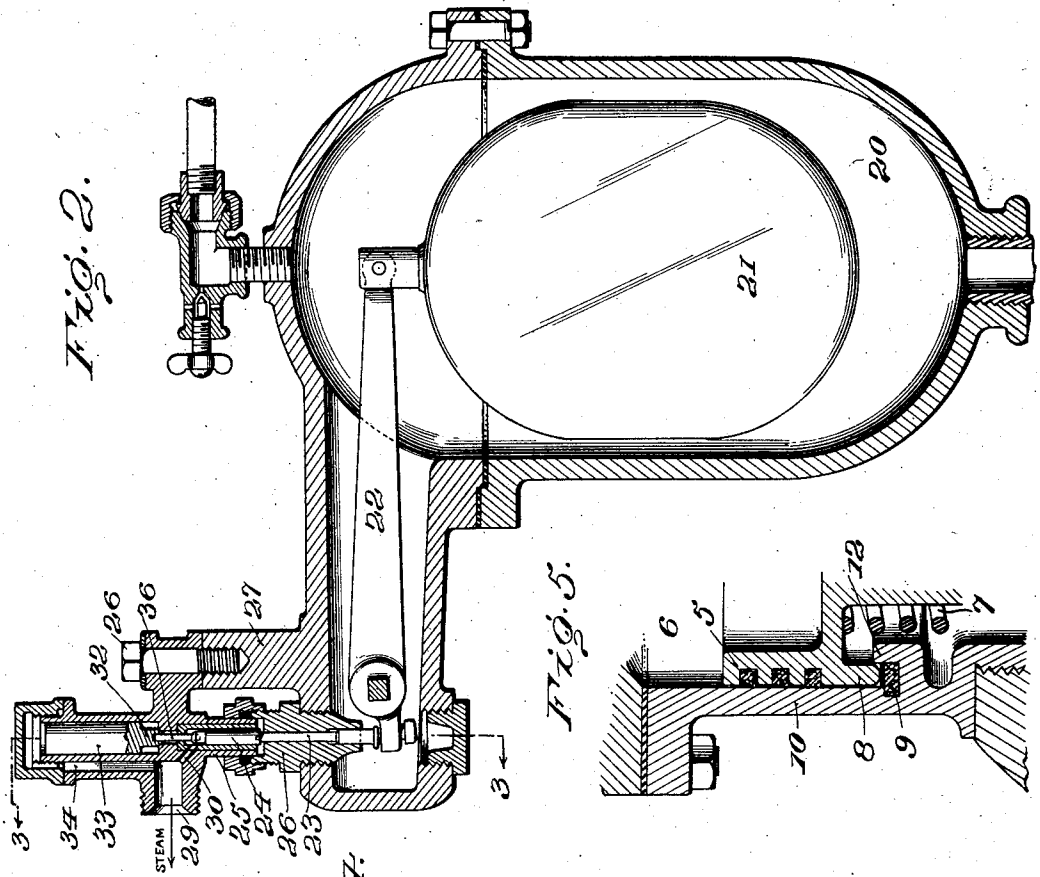


Fig. 5.

Fig. 4.

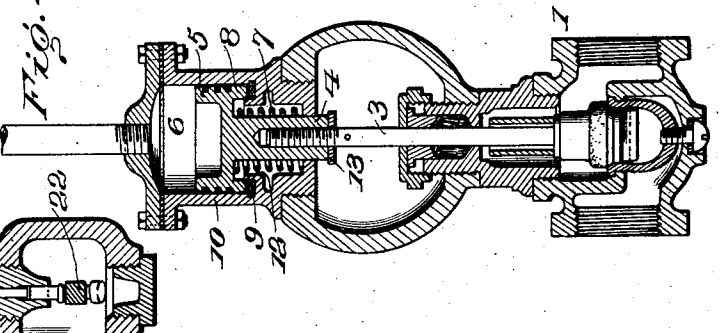
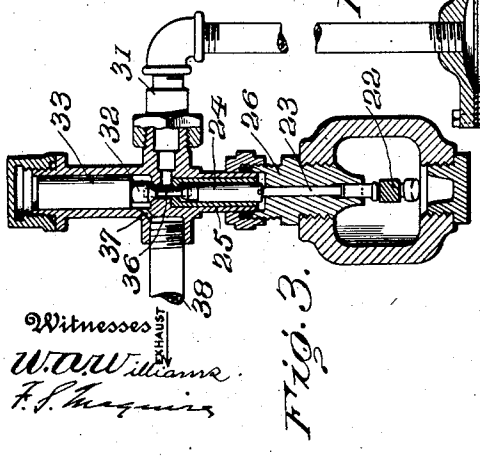


Fig. 3.



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FEED-WATER REGULATOR.

1,010,890. Specification of Letters Patent. Patented Dec. 5, 1911.

Application filed November 29, 1910. Serial No. 594,662.

To all whom it may concern:

Be it known that I, LOUIS B. FULTON, of Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Feed-Water Regulators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to that class of feed water regulators wherein the controlling valve in the feed line is normally held to its seat by steam pressure acting against a piston in a chamber which is connected with the steam space of the boiler, and which pressure is automatically released when the water in the boiler falls below the normal level. the valve thereupon opening automatically and remaining open until the proper quantity of water has been supplied.

The present invention relates more particularly to the construction and arrangement of the means for controlling the admission and the exhaust of steam to and from the pressure chamber of the controlling valve, and the object thereof is to provide simple and highly efficient means which will be positive in operation and not liable to readily get out of order.

A further object of the invention is to provide simple and highly efficient means for avoiding all possibility of leakage of steam from the pressure chamber around the piston of the controlling valve.

The invention will be hereinafter fully set forth and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is an elevation showing the feed water regulator applied to a boiler. Fig. 2 is an enlarged vertical sectional view. Fig. 3 is an enlarged sectional view of the steam supply and exhaust valves at right angles to the position shown in Fig. 2. Fig. 4 is an enlarged vertical sectional view of the controlling valve. Fig. 5 is a fragmentary sectional view of the controlling valve piston.

Referring to the drawings, 1 designates the controlling valve which is shown as located in the feed line 2 and as provided with a stem 3 which has a threaded portion connecting with the depending stem 4 of a piston 5 which is movable longitudinally in a pressure chamber 6, the casing of which forms part of the casing of valve 1. Valve 1 is normally held to its seat by steam pressure in chamber 6, and it is automatically unseated, when this pressure is relieved, by the lifting action of the water against the under face of the valve coupled with the action of spring 7 encircling the piston stem 4. To prevent leakage of the steam around the piston I form the latter with a depending circular flange 8 which is designed to bear against gasket 9 fitted in a groove formed between the outer wall of the bonnet 10 of the valve casing and the parallel portion 12 of an upwardly extending flange thereof. In practice, the piston is forced downwardly as far as possible, with valve 1 bearing fully on its seat, and thereupon, the lock-nut 13 being released, valve stem 3 is given a quarter turn backward, or thereabout, so that thereafter the valve will not be firmly seated before the flange 8 of the piston has been forced into firm engagement with gasket 9.

20 designates a chamber which is designed to be connected at its upper and lower ends to the steam and water spaces of the boiler, such chamber being preferably located above the water level in the boiler after the manner contemplated by Letters Patent No. 662,488 issued to me on November 27, 1900. Within this chamber is a displacement body 21 which is suspended from the long arm of a lever 22, the short arm of which engages the lower end of the stem 23 of a steam valve 24 which is located in a vertically disposed casing 25 coupled at its lower end to a plug 26 mounted in a lateral extension of chamber 20. The casing 25 is also secured by a bolt 26 to a projection 27 of said chamber. When displacement body 21 is raised, steam valve 24 is unseated, and steam from the boiler entering through connection 29 will pass through a small port 30 in the casing into a pressure pipe 31 which leads from one side of the casing to pressure chamber 6 of the controlling valve. At this time an exhaust valve 32 is held to

its seat, which is in vertical line with the seat of the steam valve, the two seats being at opposite ends of a port common to the pressure pipe 31. This exhaust valve 32 has a long cylindrical or piston-like body 33 which is movable within the upper portion of casing 25, and the latter is provided with a vertically extending port 34 which leads from the entrance of the steam connection 29 to the upper end of the casing where the steam acts downwardly on the piston-like portion of valve 32 to hold it to its seat when steam valve 24 is unseated.

When displacement body 21 is lowered in chamber 20 by the fall of the water in the boiler below the normal water level, steam valve 24 will be moved upwardly against its seat, and at the same time exhaust valve 32 will be unseated, this latter action being effected by a connection between the two valves in the form of a rod 36 seated in bores in the two valves, said rod being passed through the vertical passage between the two valve seats. This rod 36 is of less cross sectional area than the passageway through which it is passed so that when valve 24 is unseated steam will pass from port 30 through said passageway to pressure pipe 31. When the exhaust valve 32 is unseated the pressure in pipe 31 will be relieved, the steam escaping therefrom through port 37 to the exhaust connection 38. At the same time the controlling valve will be unseated, and will so remain until the proper quantity of water has been supplied. When water again enters chamber 20 and the displacement body is caused to rise, steam valve 24 will be free to move downwardly from its seat, allowing steam to pass to pressure pipe 31 and chamber 6, effecting the seating of the controlling valve. At the same time the exhaust valve will be seated by the direct action of steam on the piston 33 thereof.

By thus constructing and arranging the steam and exhaust valves in vertical line with each other, I am enabled to produce extremely simple and inexpensive means for regulating the flow of steam to and its exhaust from the controlling valve of a feed water regulator. Should sediment clog either of the valves, the latter, together with the housing or casing may be readily removed for inspection and cleansing.

The advantages of my invention will be apparent to those skilled in the art. Not only do I avoid the possibility of leakage around the piston of the controlling valve, but I insure the positive seating and unseating of such valve by admitting and exhausting steam to the pressure pipe thereof.

It will also be noted that the exhaust valve 32 is positively held to its seat by steam pressure passing upwardly through port 34 when steam valve 24 is unseated, and also that the exhaust valve performs a double function, that is to say, when it is forced to its seat it effects the opening or unseating of the steam valve. In other words, the steam pressure on the piston of the exhaust valve seats the exhaust valve and, through it, opens the steam valve. The valves will, respectively, remain in these positions until forcibly shifted by the prime mover, the rising of which latter is assisted by the downward movement of the piston of the exhaust valve, thus avoiding the necessity for a counterweight.

I claim as my invention:

1. A feed water regulator comprising, in combination, a controlling valve located in the feed line, a casing for said valve having a steam chamber, a piston fitted in said chamber and connected to said valve, said piston having a depending circumferential flange, a gasket with which said flange is designed to engage when said valve is forced to its seat, a seat for said gasket carried by the valve casing, and means for admitting steam to and exhausting it from said steam chamber.

2. A feed water regulator comprising, in combination, a controlling valve located in the feed line, a casing for said valve having a steam chamber, a piston fitted in said chamber having a depending stem, said valve having a stem which is adjustably connected to the piston stem, and said piston having a depending circumferential flange, a gasket with which said flange is designed to engage before the valve is firmly seated, a seat for said gasket carried by the valve casing, and means for admitting steam to and exhausting it from said steam chamber.

3. In a feed water regulator, the combination with a chamber designed to be connected with the steam and water spaces of a boiler, and a prime mover located therein, of a controlling valve in the feed line having a steam chamber, a casing having a steam inlet port and an exhaust port, a pressure pipe connecting said casing to the steam chamber of the controlling valve, a steam inlet valve and an exhaust valve movable in unison within said casing, said exhaust valve being held constantly under steam pressure and when held thereby to its seat unseats said steam valve, the seating of the latter by the prime mover unseating the exhaust valve as against the steam pressure.

4. In a feed water regulator, the combination with a chamber designed to be connected with the steam and water spaces of a boiler, and a prime mover located therein, of a controlling valve in the feed line having a steam chamber, a casing having a steam inlet port and an exhaust port, a pressure pipe connecting said casing to the steam chamber of the controlling valve, a steam inlet valve and an exhaust valve movable

in vertical line with each other within said casing, said steam inlet valve and exhaust valve being connected together, said exhaust valve being constantly under steam pressure and when held thereby to its seat unseats said steam valve, the seating of which latter unseats the exhaust valve.

In testimony whereof, I have signed this specification in the presence of two subscribing witnesses.

LOUIS B. FULTON.

Witnesses:
WM. C. CHAPLIN,
WM. MCKEE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."