No. 892,788. PATENTED JULY 7, 1908.

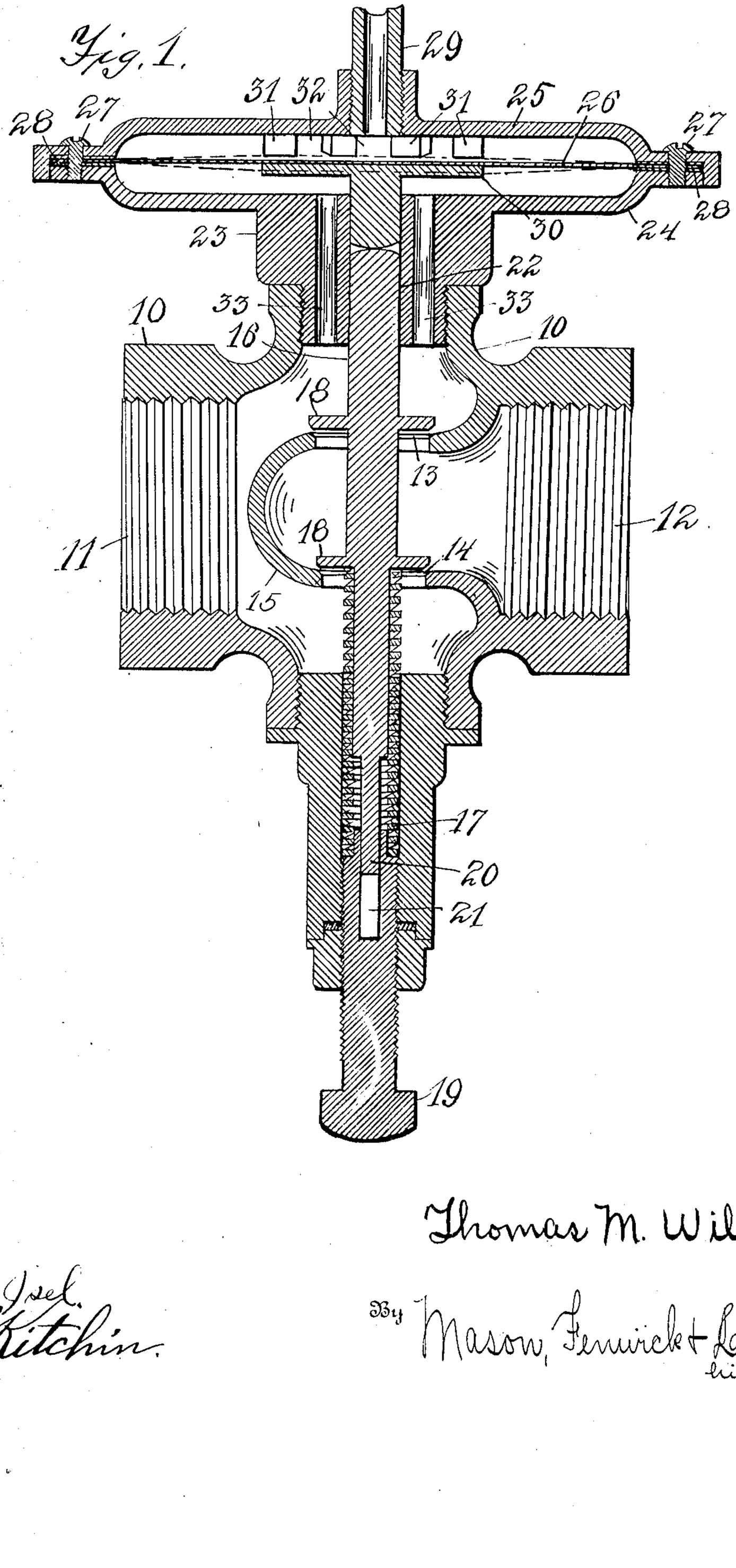
T. M. WILKINS.

PUMP REGULATOR.

APPLICATION FILED MAY 28, 1907.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses
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2 SHEETS—SHEET 2.

Fig. 2.

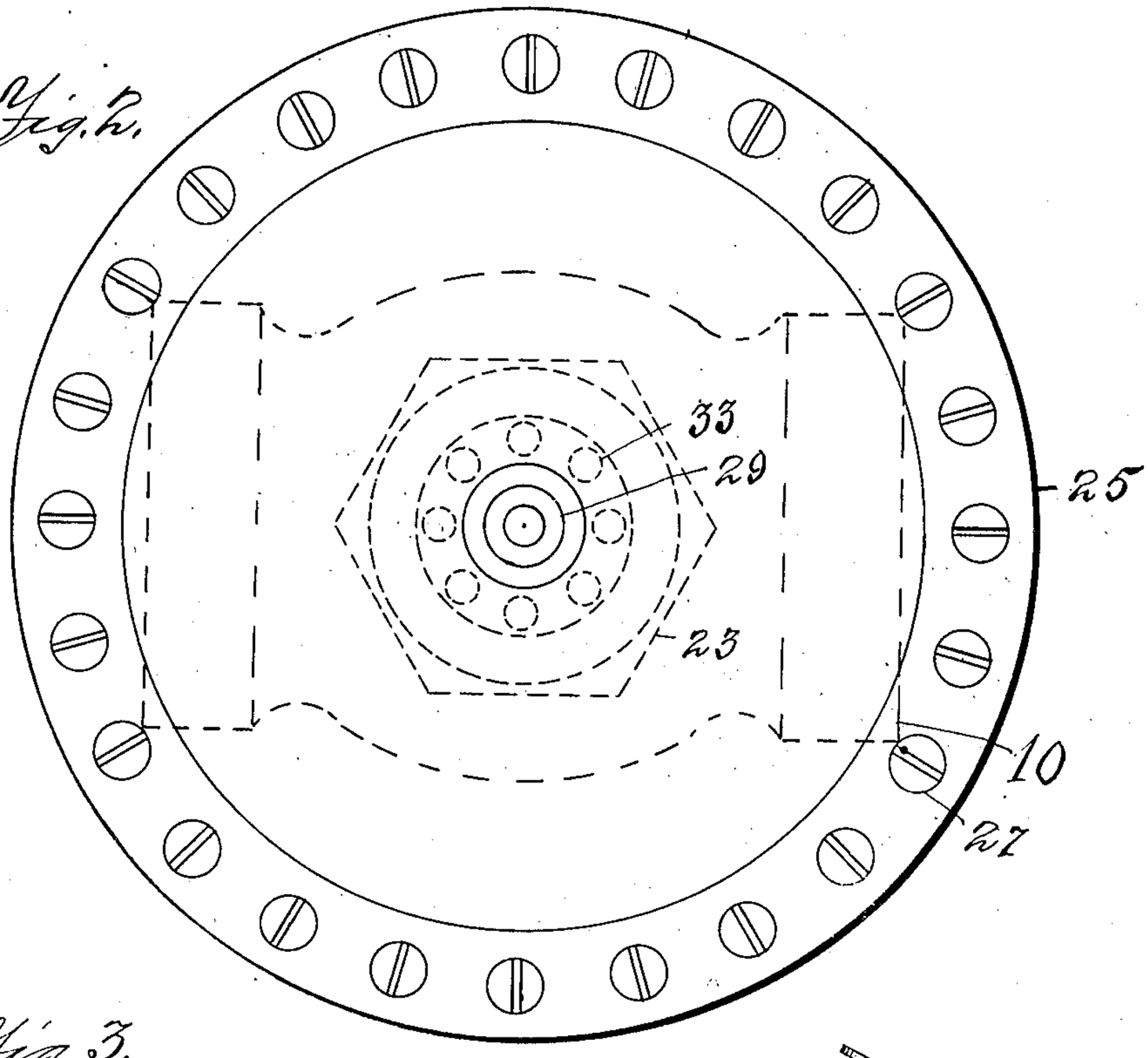


Fig. 3.

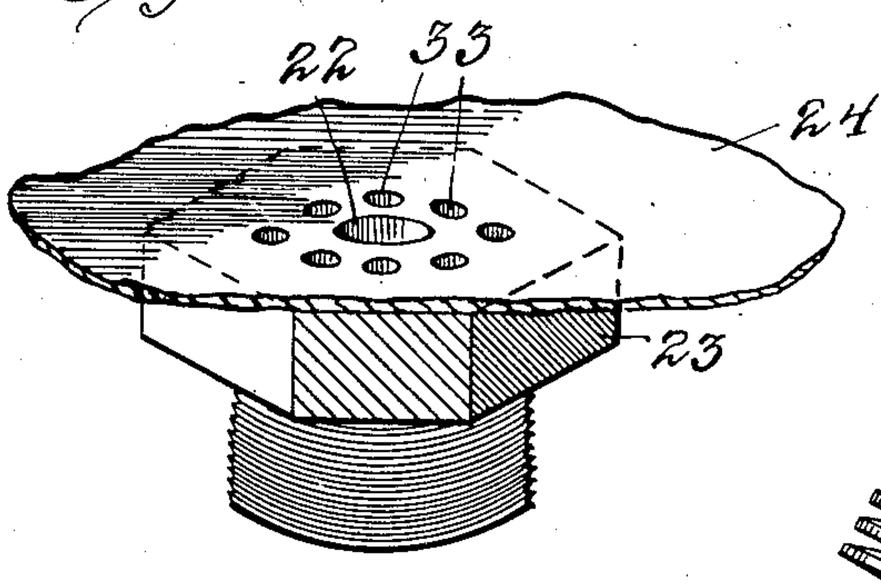
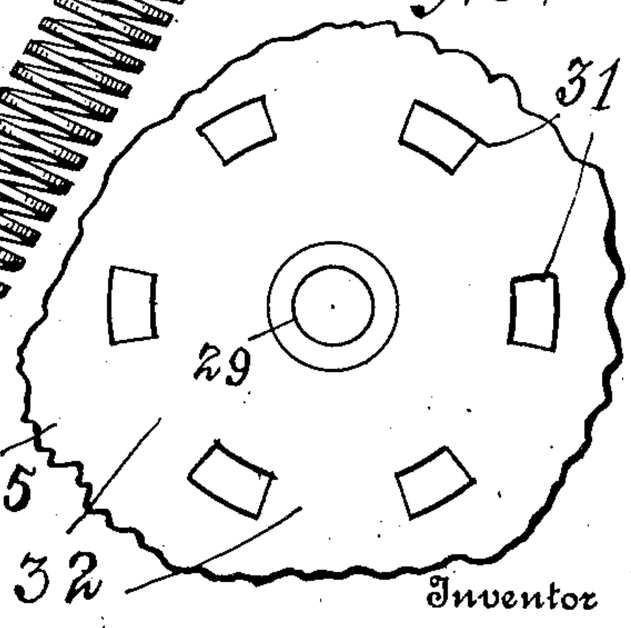


Fig. 4.

Fig. 5.



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UNITED STATES PATENT OFFICE.

THOMAS M. WILKINS, OF EAST RANDOLPH, NEW YORK.

PUMP-REGULATOR.

No. 892,788. Specification of Letters Patent. Patented July 7, 1908.

Application filed May 28, 1907. Serial No. 376,212.

To all whom it may concern:

Be it known that I, THOMAS M. WILKINS, a citizen of the United States, and resident of East Randolph, in the county of Cattaraugus and State of New York, have invented new and useful Improvements in Boiler-Feed-Pump Regulators, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

The invention relates to regulating mechanism for boiler feed pumps; and the object of my improvement is to provide a regulating mechanism for the valves which insures any desired pressure above the steam pressure upon the feed boiler pipes to the boiler. My mechanism for attaining this object will be fully described in this specification and the invention pointed out in the claims.

In the drawings, Figure 1 is a vertical sectional view of the regulator. Fig. 2 is a plan view of the diaphragm showing the hexagonal lower side of the diaphragm case and the steam ports through the same and the general outline and location of the valve in dotted outline. Fig. 3 is a perspective view of the hexagonal and screw extension of the lower side of the diaphragm case, the case being broken away. Fig. 4 is an elevation of the coil valve spring. Fig. 5 is a plan view of the under side of the upper plate of the diaphragm case showing the blocks or extensions thereon for controlling the upward movement of the diaphragm.

Similar numerals refer to corresponding parts in the several views.

The numeral 10 indicates the casing of the valve which has steam inlet 11 from the boiler and outlet 12 to the pump.

Double valve seats 13 and 14 are arranged within the body of the valve 10 by a return partition 15 which extends across the path of the valve rod 16 in the form of a bulb, the valve rod 16 passing through the two sides of the bulb thereby forming the two seats 13 and 14 and an equalized admission for the steam to the outlet 12. The bulbous form arranges the valve seats 13 and 14 so that the steam pressure is approximately equalized on opposite sides of valves 18.

Valve rod 16 is arranged with the spring 17 which holds the valves 18 off their seats with any desired pressure, the pressure being regulated by means of a set screw 19 which supports the lower end of spring 17, the stem 20 of rod 16 working in an opening 21 in the upper end of screw 19, thereby forming a guide for the lower end of rod 16. The upper end of valve rod 16 works in the central aperture 22 in the hexagonal and screw extension 23 of the lower plate 24 of the diaphragm case. The diaphragm case is formed of a lower plate 24 and the upper plate 25, which plates are associated by the upper plate extending down over the edge of the under plate and the two are held together by suitable screws 27 around their contacting surfaces, suitable packing 28 being provided between the two plates..

Diaphragm 26 is preferably formed of spring sheet brass sufficiently thin to have a certain amount of resiliency in its central portion and act as a diaphragm. The diaphragm 26 is held stiffly in place by the pressure on the plates 24 and 25 held together by the screws 27 around its outer edge. To prevent rupturing the diaphragm 26 is stopped in its upward movement by blocks 31 on the lower side of plate 25, which blocks have openings 32 between the blocks to allow admission of the water to the upper side of the diaphragm through the pipe 29. A washer 30 is provided on the under side of diaphragm 26, having a suitable stem to fit within the aperture 22 and rest upon the upper end of valve rod 16 to be moved upward and downward thereby. Washer 30 as it moves upward and downward presses against the diaphragm or is pressed against by the diaphragm so as to regulate the action of the valve rod 16 and valves 18. As shown in Fig. 1, the valves 18 are opened about one-half. This leaves the diaphragm at about the horizontal plane, as shown. The steam is admitted to the under side of the diaphragm and washer 30 through inlets 33 in plate 24 and extension 23. When the pressure of the steam and spring 17 moves the diaphragm to its upward limit, as shown in the dotted line against the blocks 31, spring 17 presses valve rod 16 and washer 30 upward, thereby opening valves 18 to their full extent. This admits the steam through valves 18 and port 12 to the pump thereby actuating the pump and raising the water pressure to any desired point above steam pressure upon the boilers. When the pressure of the water rises to this given point, it will gradually press down upon diaphragm 26, thereby pressing down upon washer 30 and closing valves 18, and should

the water pressure rise too high, this action entirely closes said valves and allows the pressure on the feed water pipes to subside. As soon as the pressure of the water on the upper side of the diaphragm becomes less than the combined pressure of the steam and spring, the valves 18 are again opened and the pump actuated thereby automatically equalizes the pressure of the feed water pipes.

It is apparent that the strength of the spring 17 may be so adjusted as to maintain any desired pressure on valves 18 above the steam pressure on the boiler. For example, the spring 18 may be given just sufficient tension to require a pressure of ten pounds upon the upper surface of the diaphragm 26 in order to seat valves 18, there being only atmospheric pressure on the lower side of said diaphragm. It is now apparent that if pressure be given to the lower side of the diaphragm it will take just ten pounds more pressure on the upper side to seat the valves. Thus for example, should there be given one hundred pounds steam pressure on the lower side of diaphragm 26 it will take one hundred and ten pounds water pressure on the upper side to seat valves 18. Or if the steam pressure is fifty pounds on the lower side of the diaphragm it will take sixty pounds water pressure to seat valves 18. It is obvious that the pressure can thus be automatically regulated by means of diaphragm 26 with its adjustment of pressures on the opposite sides thereof. This insures equal pressure at all times, regardless of steam pressure, upon feed valves to boilers, which is now greatly desired by engineers and which they have never been able to attain.

What I claim is:—

1. In a device of the class described, a casing providing a passage therethrough, a partition disposed within the passage, balanced valves disposed to act in conjunction with the partition, a hollow plug inserted within the lower side of the casing, a valve stem connected with the balanced valves and adapted to move within the hollow plug, a spring positioned within the plug and to hold the valves normally open, means to regulate the tension of the spring, a diaphragm casing in communication with the valve casing, a diaphragm dividing the chamber within the diaphragm casing and adapted to operate the valves, and means to admit fluid upon the side of the diaphragm opposite the valve casing.

2. In a device of the class described, a valve casing defining a passage, a partition disposed within the passage and provided with a plurality of valve seats, a valve stem extending through the valve seats and carrying balanced valves positioned to close the valve seats, a hollow plug inserted within the lower side of the casing and embracing the extremity of the valve stem, a spring within the plug positioned to engage the valve stem and hold the balanced valve normally open, means to regulate the tension of the spring, a diaphragm casing in communication with the valve casing, a diaphragm extending entirely across and dividing the diaphragm casing, a washer carried by the diaphragm and provided with a stem in engagement with the valve stem, means to admit fluid upon the side of the diaphragm opposite the valve casing, and means within the diaphragm casing to prevent fracture of the diaphragm.

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

THOMAS M. WILKINS.

Witnesses:

A. W. KETTLE,

I. A. ELSWORTH.