V. V. VEENSCHOTEN.

FEED WATER REGULATOR SYSTEM.

APPLICATION FILED AUG. 15, 1918.

1,340,846. **Patented May 18, 1920.**

Fig. 1

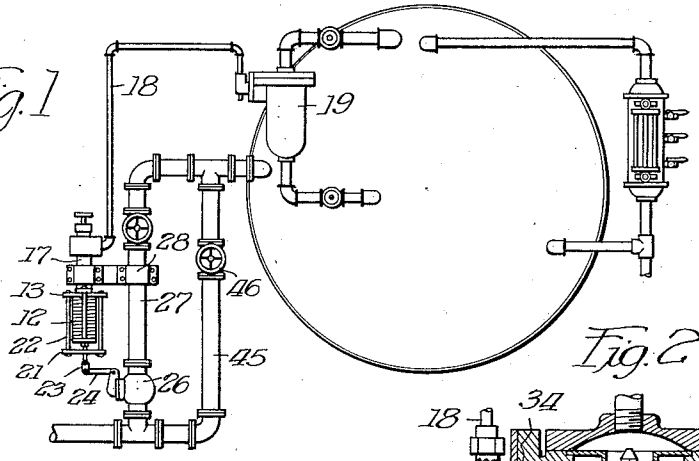


Fig. 2

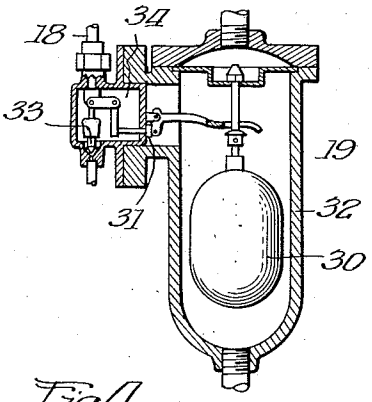


Fig. 3

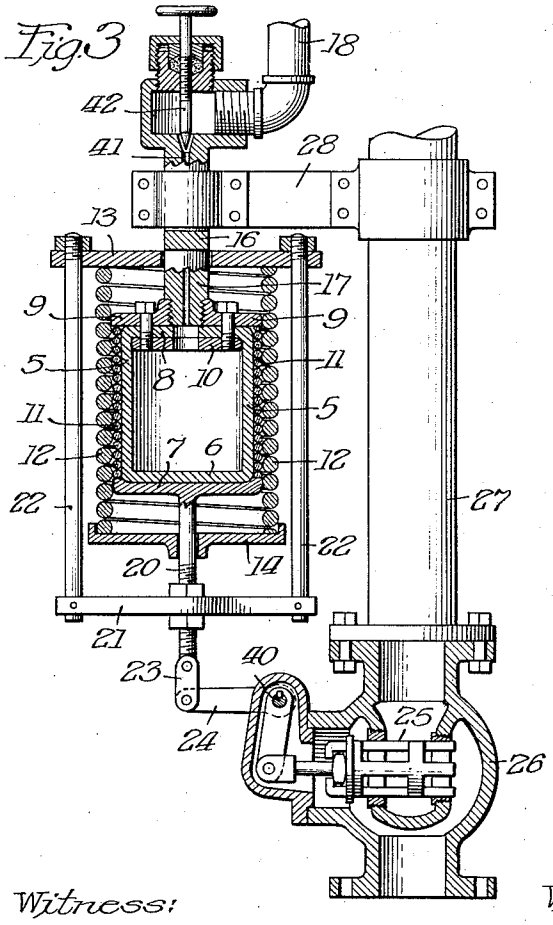
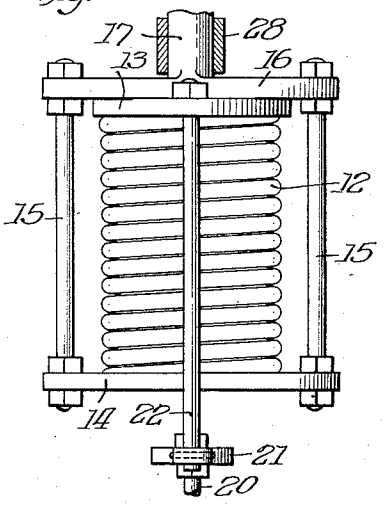


Fig. 4



Witness:

Leonard W. Novander.

Inventor

Vincent V. Veenschoten

By E. J. Andrews

Atty

UNITED STATES PATENT OFFICE.

VINCENT V. VEENSCHOTEN, OF ERIE, PENNSYLVANIA, ASSIGNOR TO NORTHERN EQUIPMENT COMPANY, OF ERIE, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

FEED-WATER-REGULATOR SYSTEM.

1,340,846. Specification of Letters Patent. Patented May 18, 1920.

Application filed August 15, 1918. Serial No. 249,977.

To all whom it may concern:

Be it known that I, VINCENT V. VEENSCHOTEN, a citizen of the United States, residing at Erie, in the county of Erie and State of Pennsylvania, have invented certain new and useful Improvements in Feed-Water-Regulator Systems, of which the following is a specification.

This invention relates to feed-water regulator systems, and particularly to such systems which include float regulators which operate pilot valves; and it has for its object the combination with the regulator of a device which controls the operation of the feed-water valve so as to materially reduce the oscillations of the water level in the boiler, and also to decrease materially the number of times the pilot valve is operated. Other objects of the invention will be apparent from a consideration of the accompanying drawings and the descriptions thereof.

Of the accompanying drawings—

Figure 1 is an elevation, more or less diagrammatic, of a feed-water regulator system embodying features of my invention;

Fig. 2 is a central sectional view of the regulator system;

Fig. 3 is a central sectional view of the feed-water valve controller of the system and of the feed-water valve controlled thereby; and

Fig. 4 is an elevation of the controller.

The controller comprises a cylinder 5, having elastic walls. This cylinder may be of any suitable construction or material. I prefer rubber for the material; the diameter and length of the cylinder being determined by the particular use thereof. One end of the cylinder is hermetically closed in any suitable manner as by means of the rubber 6, and it is supported by means of a disk 7. The other end of the cylinder is closed also by any suitable means, for instance by clamping the flange 8 of the cylinder between the plate 9 and the disk 10. Encircling the cylinder is a coil 11, which is adapted to prevent transverse expansion of the cylinder when pressure is exerted within. The cylinder and coil are encircled in a resilient coil 12. The coil 12 is positioned between the plates 13 and 14. Plate 14, by means of the rods 15, Fig. 4, is fixed to the cross bar 16, which is fixed to, or integral with, the tube 17, which, in turn, is fixed to, or integral with, the disk 9. By this arrangement the disk 9 and the plate 14 are rigidly connected.

Projecting upwardly from the tube 17 is a pipe 18 leading to the feed-water regulator 19; and projecting downwardly from the disk 7 is a rod 20 fixed to the cross bar 21; and the cross bar 21, by means of the rods 22, has a fixed spaced relation with the disk 13. Pivoted to the rod 20, by means of a link 23, is an arm 24 adapted to operate the plunger 25 in the valve 26. The tube 17 is fixed to the pipe 27 by means of the bracket 28.

A consideration of the structure will show that, as fluid pressure is exerted on the interior of the cylinder 5, the cylinder will force downwardly the disk 7, and, hence, will tend to force downwardly the rod 20, and thus to force inwardly the plunger 25 toward the closed position. The cross bar 21 will also be forced downwardly, but, by means of the rods 22 and plate 13, will be opposed by the compression of the coil spring 12. On the other hand, as the fluid pressure in the cylinder decreases, the coil spring will gradually force upwardly the plate 13, and hence will tend to bring the plunger back to its open position. As the cylinder 5 expands or contracts the supporting coil 11 will expand and contract accordingly, and will at all times prevent transverse expansion of the cylinder. In this instance the controller is used in an ordinary steam boiler float feed-water regulator system comprising the float 30, adapted to open in a well known manner, a pilot valve 31, when the water rises abnormally. The pilot valve allows steam pressure to be exerted on condensed water in the pipe 18, and in the cylinder 5. The pressure exerted in the cylinder, forcing downwardly the plate 7, and the rod 20, closes the feed-water valve 26, and thus stops the flow of water to the boiler through the pipe 27. When the water in the boiler sinks below a predetermined water level the float, sinking in the casing 32, allows the valve 31 to close and at the same time open the exhaust valve 33. The steam then exhausts from the chamber 34, and the pressure on the water in the cylinder 5 being thus withdrawn, the cylinder contracts and allows the spring 12 to open the feed water valve 26.

It is common with pilot valve float reg-

ulators to use an ordinary movable diaphragm in a rigid casing for operating the feed-water valve through a stuffing box. As a consequence, the movement of the diaphragm being limited, the valve is frequently opened wide or closed entirely as soon as the friction of the stuffing box is overcome and any operation occurs. With my resilient cylinder the plate 7 and hence the rod 20, may be made to move through a very material distance, depending upon the length of the cylinder; and hence the movement will be gradual and the valve plunger 25 may also be moved gradually toward the open or closed position. This effect is increased by the use of the rod 40, which connects the external valve operating means with the internal means, and is arranged to rotate instead of reciprocate; so that much less force is required to operate the plunger. When steam is admitted into the chamber 34, the valve 26 will begin to close before the full steam pressure is reached, thus quickly affecting the water flow and the water level, and frequently bringing the level back to normal before the valve is entirely closed. This prevents serious oscillations of the water level and many operations of the pilot valve. When the valve is quickly entirely opened or closed the water level overruns and oscillates up and down; thus causing, at each oscillation, an operation of the pilot valve and of the feed-water valve, causing undue wear of the movable parts, and wasting large amounts of steam at the pilot valve chamber exhaust valve 33.

To further reduce the number of operations of the pilot valve, I so mount the cylinder 5 as to keep it at all times full of condensed water, and reduce the passage way 41 in the tube 17, so that a material length of time is required to force water into and out of the cylinder. While, as thus arranged, the pressure of the steam will quickly cause the plunger 25 to begin to close, yet the time required for much water to pass into the cylinder will increase the time required to fully close the valve, and hence the over-running of the water level and the number of operations of the pilot valve will be reduced still further. In order to control this effect I place a needle valve 42 in the passageway 41 so as to vary the restriction of the passageway at pleasure; and by the use of the by-pass 45 and the valve 46 a continuous flow of water may be allowed to pass into the boiler, and thus the number of operations of the pilot valve is further reduced.

I claim as my invention:

1. In a feed-water regulator system the combination of a float feed-water regulator having a pilot valve; a vessel having elastic walls, said vessel being adapted to receive a fluid under pressure and to be materially elongated thereby and being operatively related to said pilot valve; a feed-water valve having a plunger; and means, comprising a rotatable member, connecting said plunger with said vessel.

2. In a feed-water regulator system the combination of a float feed-water regulator having a pilot valve; a vessel having elastic walls, said vessel being adapted to receive a fluid under pressure through a restricted passageway and to be elongated by said fluid and being operatively related to said pilot valve; a feed-water valve having a plunger; and means, comprising a rotatable member, connecting said plunger with said vessel.

3. In a feed-water regulator system the combination of a float feed-water regulator having a pilot valve; a vessel having elastic walls, said vessel being adapted to receive a fluid under pressure through a restricted passageway and to be elongated by said fluid and being operatively related to said pilot valve; a feed-water valve having a plunger; means, comprising a rotatable member, connecting said plunger with said vessel, and means for varying the magnitude of said passageway.

4. In a feed-water regulator system the combination of a float feed-water regulator having a pilot valve; a cylinder having longitudinally resilient walls, said cylinder being operatively related to said valve and being adapted to receive a fluid under pressure; and a feed-water valve operatively connected with said cylinder.

5. The combination of a feed-water regulator, a pilot valve controlling a fluid under pressure operatively connected with said regulator, a cylinder having longitudinally resilient walls, said cylinder being adapted to receive a fluid under pressure and being operatively related to said valve, and a feed-water valve operatively connected with said cylinder.

6. The combination of a boiler, a feed-water regulator connected with said boiler, a pilot valve controlling a fluid under pressure, a cylinder having longitudinally elastic walls, said valve being operatively related to said regulator and to said cylinder, and a balanced feed-water valve operatively connected to said boiler and to said cylinder.

In testimony whereof, I hereunto set my hand.

VINCENT V. VEENSCHOTEN.

Witnesses;

WILLIAM E. HIRT,

JOHANNA SPANGGAARD.