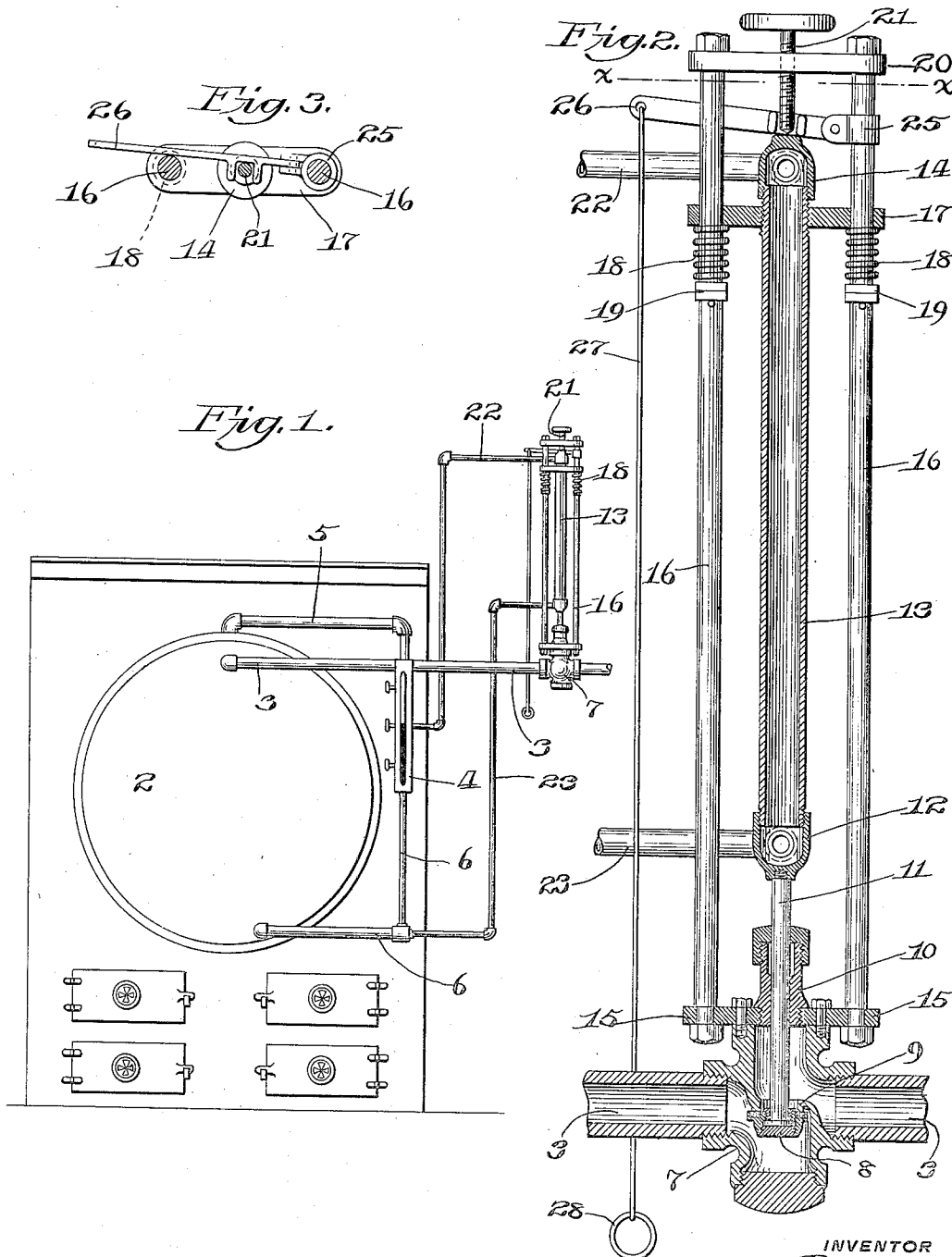


H. EVANS.
FEED WATER REGULATOR.
APPLICATION FILED NOV. 30, 1908.

932,007.

Patented Aug. 24, 1909.



WITNESSES

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HARRY EVANS, OF BRYN MAWR, PENNSYLVANIA.

FEED-WATER REGULATOR.

932,007.

Specification of Letters Patent.

Patented Aug. 24, 1909.

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To all whom it may concern:

Be it known that I, HARRY EVANS, citizen of the United States, and resident of Bryn Mawr, Montgomery county, State of Pennsylvania, have invented certain new and useful Improvements in Water-Feed Regulators for Steam-Boilers, of which the following is a full, clear, and exact description.

This invention relates to water feed regulators for steam boilers.

The object of the invention is to provide a simple and efficient means under the automatic control of the steam and water contained within the boiler, whereby the valve controlling the water feed pipe leading to the boiler may be opened when the water within the boiler reaches a predetermined level and closed when the water within the boiler reaches a predetermined level.

The invention consists in the novel construction and combinations of parts which will be hereinafter fully described and claimed.

In the drawings:—Figure 1 is an end view of a steam boiler having my invention applied thereto. Fig. 2 is a vertical section enlarged of the valve for controlling the feed water pipe and parts directly connected therewith. Fig. 3 is a detail in section as on the line $x-x$ of Fig. 2.

2 designates a steam boiler, and 3 a feed water pipe leading to the upper portion of the boiler.

4 is a water gage tube of usual and well known construction. The upper end of the water gage tube 4 is connected to the upper portion of the boiler 2 by a pipe 5, and the lower end of the tube 4 is connected to the lower portion of the boiler by a pipe 6. Thus the tube 4 will always indicate the level of the water within the boiler in the usual manner.

The feed pipe 3 has inclined therein a valve casing 7 within which is arranged a valve 8 adapted to a seat 9, for opening and closing the passageway through the feed pipe 3 and regulating the feed of water to the boiler 2. The valve casing 7 is provided with a head 10 through which the stem 11 of the valve 8 projects from the interior of the casing. Fixed to the outer or upper end of the valve stem 11 is a head 12 on the lower end of an expansion tube 13, the upper end of which is provided with a head 14. The tube 13 is in line with the stem 11 and forms in effect a continuation thereof.

Projecting laterally from the valve casing 7 are arms 15 to which are secured the lower ends of vertical rods 16 extending parallel to the tube 13, one rod 16 being arranged on one side of the tube and the other side 16 being arranged on the other side of the tube. The upper portion of the expansion tube 13 has fixed thereto a cross bar 17, which extends between the rods 16, the ends of the bar 17 being provided with openings therein through which the rods 16 extend.

Encircling the rods 16 directly below the bar 17 are springs 18, the lower ends of which bear against nuts 19 on the rods 16, and the upper ends of which bear against the bottom of the bar 17, thus forcing the bar 17 and therewith the tube 13 and valve stem 11 upwardly in a manner to seat the valve 8.

Extending between the upper ends of the rods 16 and secured thereto above the bar 17 is a bar 20, which is provided with a vertically-arranged adjustable screw 21, which is adapted to engage said head 20 to limit the upward movement of the expansion tube 13. By adjusting the screw 21 the extent of the upward movement of the expansion tube 13 may be nicely regulated.

Leading from the head 14 on the upper end of the expansion tube 13, is a pipe 22 which is connected to the water gage tube 4 on the horizontal plane at which it is desired to maintain the water level within the boiler 2, the pipe 22 establishing communication between the upper end of the expansion tube 13 and the water gage tube 4. The head 12 on the lower end of the expansion tube 13 is connected by a pipe 23 to the pipe 6 leading to the lower end of the water gage tube 4 and also to the lower portion of the boiler 2. Thus communication is established between the lower end of the expansion tube 13, the lower portion of the boiler 2, and the lower end of the water gage tube 4.

It is sometimes desirable to open the valve 8 by hand, for various purposes, and in order to do this I provide one rod 16 with a collar 25 adjacent the upper end of the expansion tube 13, and pivot to this collar 25 one end of an arm 26 which extends over the head 14 and has secured to its free end the upper end of a depending cord or rod 27 the lower end of which is provided with a ring 28. The arm 26 extends over the head 14 and into engagement therewith, whereby, when the rod or cord 27 is pulled

downwardly by hand, the arm 26 will engage the head 14 and depress the expansion tube 13 and therewith the stem 11, in a manner to unseat the valve 8. The rod or
5 cord 27 may extend to any convenient position to be operated by hand.

As previously stated, the plane on which the pipe 22 is connected to the water gage tube 4 is the plane at which the water level
10 within the boiler is desired to be maintained. Therefore, when the desired water level is within the boiler, the parts are in the normal position shown in the drawings; that is to say, the valve 8 is closed to prevent
15 water being supplied to the boiler through the pipe 3, and the lower portion of the water gage tube 4, the expansion tube 13, and the pipes 6, 22, and 23 are filled with water; while the upper portion of the water
20 gage tube 4, and the pipe 5 connected with the upper portion of the boiler 2, are filled with steam.

When the water level within the boiler 2 falls below the desired plane; that is to say,
25 below the point of communication between the pipe 22 and water gage 4; steam will enter the pipe 22 and force the water from the expansion tube 13 through the pipes 23 and 6 into the boiler 2. The heat of the
30 steam thus filling the expansion tube 13 causes it to expand or elongate. During the expansion of the tube 13 its upper end engages the adjustable screw 21 to prevent its upward movement, and therefore causes it
35 to expand downwardly and carry with it the valve stem 11 in a manner to unseat the valve 8 and permit the supply of feed water through the pipe 3 to the boiler 2. The valve 8 now remains open to permit the supply
40 of water to the boiler 2 until the water therein again reaches the desired level, at which point it closes communication between the pipe 22 and the water gage 4, thus cutting off the supply of steam from the boiler 2
45 through the pipe 22 to the expansion tube 13. The steam within the pipe 22 and expansion tube 13 now condenses, thus causing the water to flow into and fill said tube and pipe. This causes the expansion tube 13 to cool
50 and contract in a manner to raise the stem 11 and close the valve 8, the springs 18 compensating for the difference between the degree of contraction of the tube 13 and the movement of the valve 8 to its seat.

55 I claim:—

1. The combination of a boiler, a water feed pipe communicating therewith, a valve casing included in said feed pipe, a valve in

said casing controlling said pipe, an expansion tube connected to said valve, yielding
60 means acting upon said tube and holding said valve in the closed position, and adjustable means positioned to engage and limit the movement of said tube in one direction during the expansion thereof. 65

2. The combination of a boiler, a water feed pipe communicating therewith, a valve casing included in said feed pipe, a valve in said casing controlling said pipe, a stem projecting from said valve, an expansion
70 tube connected to said stem, yielding means for forcing said stem and tube outwardly, and means to limit the outward movement of the stem and tube.

3. The combination of a boiler, a water
75 feed pipe communicating therewith, a valve casing included in said feed pipe, a valve in said casing controlling said pipe, a stem projecting from said valve, an expansion tube connected to said stem, a pair of fixed
80 rods, a cross bar extending between said rods and fixed to said tube, springs acting upon said bar and forcing said stem and tube outwardly, and means to limit the outward movement of said stem and tube. 85

4. The combination of a boiler, a water feed pipe communicating therewith, a valve casing included in said feed pipe, a valve in said casing controlling said pipe, a stem projecting from said valve, an expansion
90 tube connected to said stem, a pair of fixed rods, a cross bar extending between said rods and fixed to said tube, springs acting upon said bar and forcing said stem and tube outwardly, a cross bar fixed to said rods,
95 and an adjustable screw carried by the last named bar for limiting the outward movement of said stem and tube.

5. The combination of a boiler, a water feed pipe communicating therewith, a valve
100 casing included in said feed pipe, a valve in said casing controlling said pipe, a stem projecting from said valve, an expansion tube connected to said stem, yielding means for forcing said stem and tube outwardly,
105 means to limit the outward movement of the stem and tube, and a hand-operated lever positioned to engage the expansion tube and force said tube and said stem inwardly against the action of said yielding means. 110

In testimony whereof, I have hereunto affixed my signature.

HARRY EVANS.

Witnesses:

S. I. HARPER,
A. V. GROUPE.