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# UNITED STATES PATENT OFFICE.

WILLIAM BOWMAN, OF GREENOCK, SCOTLAND.

## IMPROVEMENT IN BOILER-FEEDERS.

Specification forming part of Letters Patent No. 54,078, dated April 17, 1866.

*To all whom it may concern:*

Be it known that I, WILLIAM BOWMAN, of Greenock, Scotland, have invented a Self-Acting Inductor for Feeding Steam-Boilers with Water; and I do hereby declare the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

The nature of my invention consists in providing a steam-boiler with a self-acting inductor, by which the water in the boiler is always maintained at its proper level without any assistance from the engineer. The supply-water in the heater is placed on a higher level than my inductor, and passes by its gravity through the inductor to the boiler, the quantity admitted being regulated by the inductor itself.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

Figure 1 is a section showing the interior of my inductor. Fig. 2 is a plan with the top off. Fig. 3 is a section through the exhaust-valve. Fig. 4 is a section through the steam-induction valve.

Similar letters in each figure refer to the same parts.

A is the outside case of the inductor, having a lid A' A'' screwed in at each end. B is a check-valve, through which the water from the heater enters the inductor. B' is another check-valve, through which the water passes to the boiler by a connecting-pipe.

C is an exhaust-valve fastened to the casing A by a screw and nut. (See Fig. 3.) This valve has a valve, C', fitting on a seat, C<sup>2</sup>. The valve C' is connected with a rack, C<sup>4</sup>, by means of the rod C<sup>3</sup>.

A lever, E, works on a pin, E'. This lever has a segment of a cog-wheel cut in it at E<sup>2</sup> working into the rack C<sup>4</sup>. The bracket F carries a pendulous arm, F', suspended to it. The arm E has a recess cut in it at E<sup>3</sup> and a lug cast on at E<sup>4</sup>.

The steam-induction valve D, Fig. 4, is fastened to the case A in the same manner as valve C. The valve D', Fig. 4, bears upon a seat, D<sup>2</sup>. It is also screwed at one end into a circular casting having a rack on it, D<sup>4</sup>. A jam-nut serves to set each of the valves C' and D' fast. A lever, G, vibrates on the center-

pin G'. This lever has a segment of a cog-wheel working in the rack D<sup>4</sup>. This lever G is recessed at G<sup>3</sup>, Fig. 2, and has a lug cast on at G<sup>4</sup> and another at G<sup>5</sup>. An arm, H, is fixed to valve D and vibrates on a pivot at H'.

I is an air-tight float screwed to the rod J. K is another air-tight float suspended by K' to the lever E and working the exhaust-valve C. The rod J passes through the float K and embraces the lever G, working the induction-valve D. A pin, m, attached to the head A'', acts as a guide to the lower float. Another pin, n, fixed to head A', acts as a guide to the upper rod, J.

The action of my inductor is as follows: It is placed on a level above the water-line of the boiler and the valve D connected to a pipe which enters the boiler at the desired point for the water-level. The check-valve B is also connected by a pipe to the boiler below the water-level. The inductor being empty and the levers E and G in position, (shown in Fig. 1,) the exhaust-valve C will be open and the valve D closed. The feed-water will force its way into the case A, raising the lower float, I, and causing the rod J to bear upward against the lever G. This lever is prevented from rising by the end of it being caught against the arm F'. As soon as the water rises in the inductor sufficiently to raise the float K the rod K' elevates the lever E, closing the exhaust-valve C. The raising of this lever also liberates the arm F' from the end of the lever G, which said lever G is immediately lifted by the float I, and the steam-valve D opened. The pressure of steam in the inductor being now equal to that in the boiler, the water will flow from the inductor to the boiler. The end of lever E is held up by the catch H<sup>2</sup> until the water has left the inductor and entered the boiler. The float I then descends, bringing with it the lever G, and the lug G<sup>5</sup> presses against the arm H, liberating the arm E from catch H<sup>2</sup>. It immediately falls and opens the exhaust-valve C. The valve D is closed by the falling of the lever G. The inductor is now ready to commence the same action over again.

The lugs E<sup>4</sup> and G<sup>4</sup> operate upon the opposite levers and make it more certain that the valves C and D are secure in their proper positions.

Should water enter the valve D instead of

steam, the floats K and I will not fall and the inductor ceases to operate.

I do not claim admitting water to a steam-boiler when it is first admitted to a tank and a communication made with the boiler by hand; but

I claim—

1. The combination and arrangement of the specific devices herein set forth for feeding steam-boilers, which continues to operate by the direct action of the steam as long as the water is below the proper level, but ceases to operate as soon as the water is high enough, substantially as described.

2. The combination and arrangement of the floats K and I, operating the valves C and D by means of the levers G and E, substantially as described.

3. An inductor in which the upper float, K, rising opens the induction steam-valve and closes the exhaust-valve, and the falling of the bottom float, I, reverses the movement, substantially as herein set forth.

WILLIAM BOWMAN.

Witnesses:

EDWARD BROWN,  
JAMES H. TOMBS.