

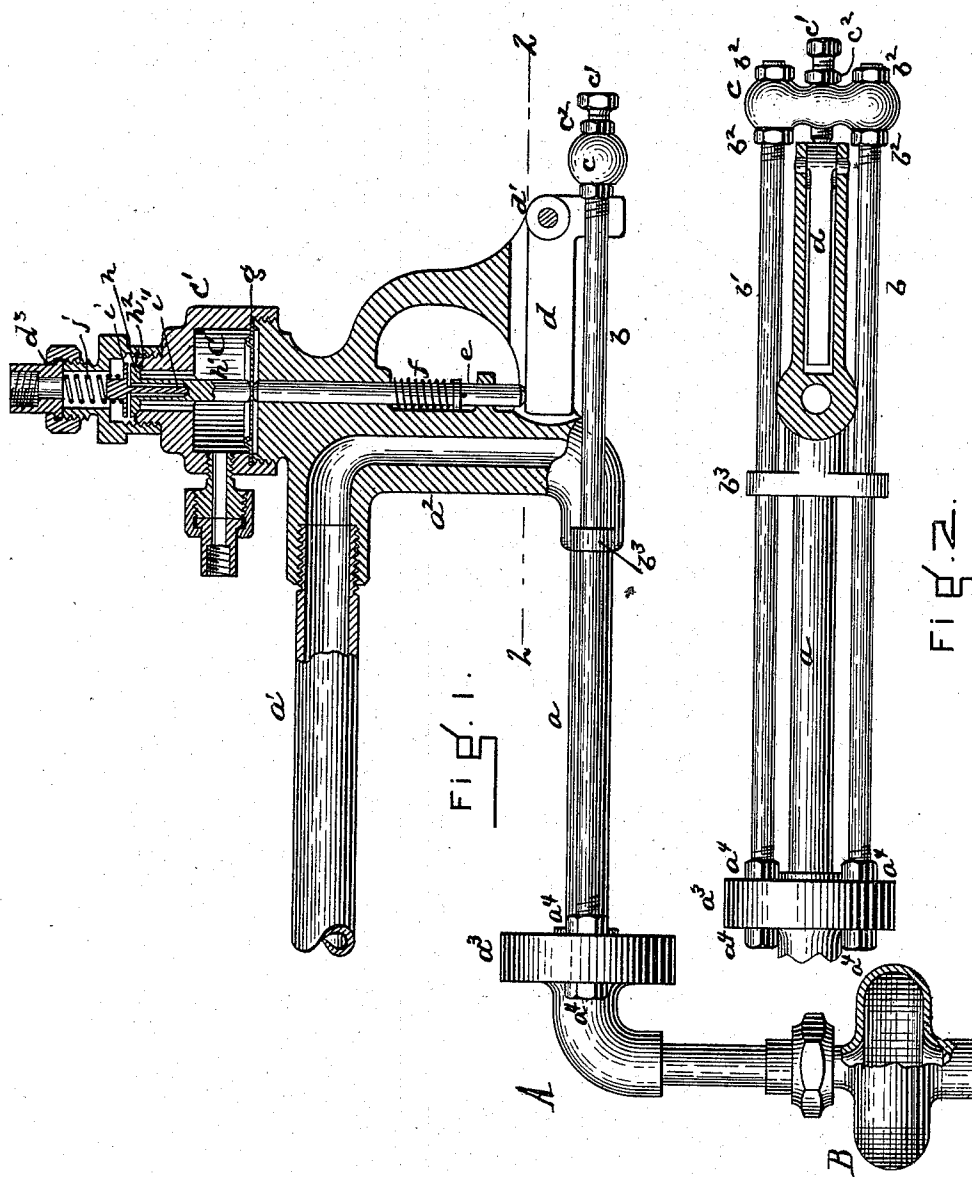
(No Model.)

C. B. BOSWORTH.
FEED WATER REGULATOR.

2 Sheets—Sheet 1.

No. 530,388.

Patented Dec. 4, 1894.



WITNESSES.
C. F. Hadel
C. H. Mayers

INVENTOR.
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att'y.

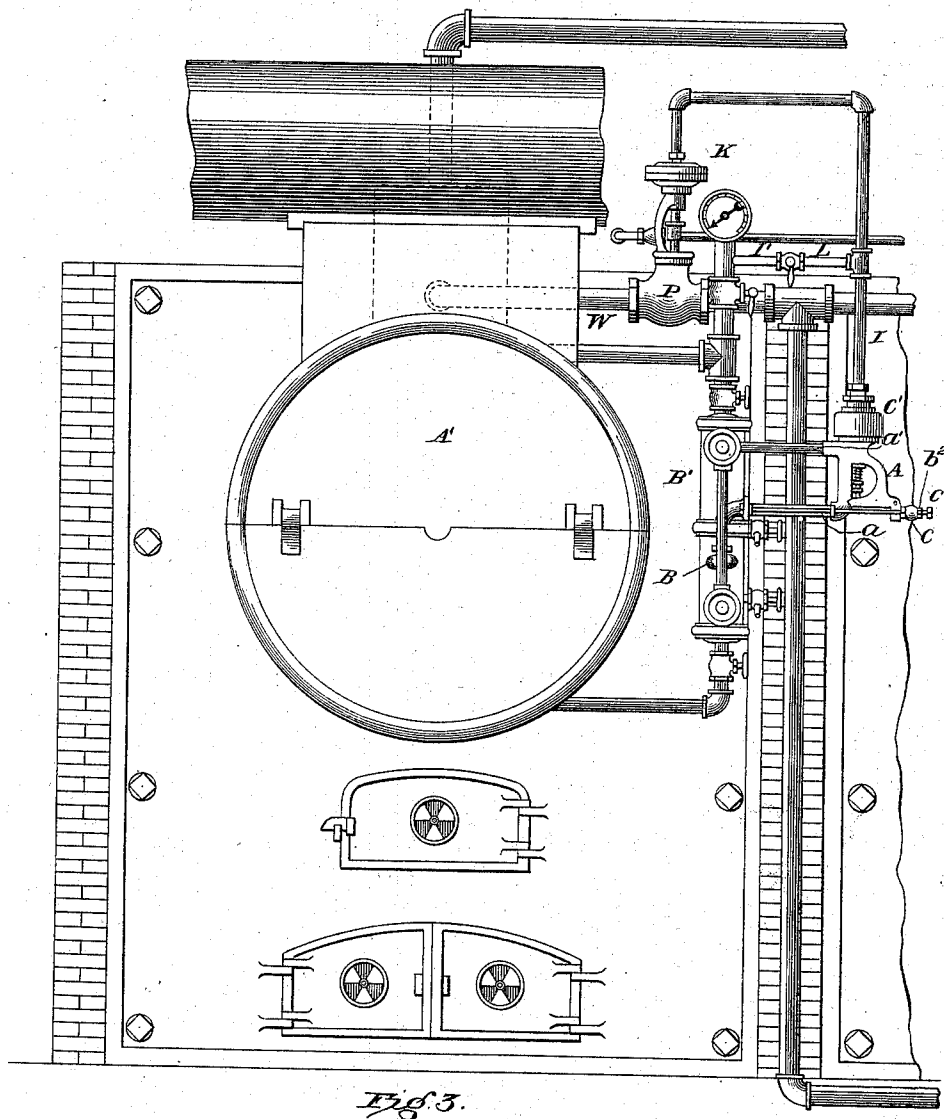
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C. B. BOSWORTH.
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No. 530,388.

Patented Dec. 4, 1894.



Witnesses:

F. M. Johnson
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UNITED STATES PATENT OFFICE.

CHARLES BARTLETT BOSWORTH, OF EVERETT, ASSIGNOR TO THE CROSBY STEAM GAGE AND VALVE COMPANY, OF BOSTON, MASSACHUSETTS.

FEED-WATER REGULATOR.

SPECIFICATION forming part of Letters Patent No. 530,388, dated December 4, 1894.

Application filed November 18, 1893. Serial No. 491,323. (No model.)

To all whom it may concern:

Be it known that I, CHARLES BARTLETT BOSWORTH, a citizen of the United States, residing at Everett, in the county of Middlesex and State of Massachusetts, 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 an improvement in automatic boiler feeders such as that in Letters Patent No. 467,148, dated January 19, 1892.

Figure 1 represents in elevation a thermostatic device attached to the water column of a steam boiler, as illustrated in Fig. 1 of said patent. Fig. 2 represents a longitudinal sectional view through the line 2—2, Fig. 1. Fig. 3 represents the device in place.

A is the thermostatic device.

B is a reservoir or chamber located in the vertical pipe upon the water side of the water column and below the water level of the boiler and is to supply water to the lower tube of the thermostat when the water rises in the boiler, injected therein by means of the steam pump. Heretofore the water, when coming directly from the water column, had more heat than is found in the water contained in this chamber, and thus did not act so sensitively upon the lower pipe of the thermostat to cool it and thus cause its contraction, as is the case when the water is held in such chamber.

C' is the casing which forms the chamber, C, which is mounted on top of the connecting piece, a^2 .

a is the lower tube of the thermostat and connects at one end with the water column, and at the other end with the connecting piece, a^2 , which contains a bore or hole running through it, so to communicate with the upper pipe of the thermostat, a' , whose other end connects with the steam space of the water column, thus making a continuous opening from the steam space to the water space of the water column, allowing complete circulation of steam and water through it.

b and b' are two iron or steel rods, which are located along the longitudinal axis of the lower pipe, a , having their inner ends connected to the flange, a^3 , by nuts, a^4 , while their outer ends are connected to the yoke, c , and held in place upon the same by the nuts, b^3 . These rods, in order that they may be held in a longitudinal course, pass through lugs, b^3 , on the sides of the connecting piece, a^2 . Through the yoke, c , is screwed the screw, c' , whose inner end impinges upon the shorter arm of the bell crank lever, d , and has the check-nut, c^2 , to hold it securely in place when it is adjusted. The bell crank lever, d , is pivoted to the connecting piece, a^2 , at d' , the long arm of which lies longitudinally in a slot made in the said connecting piece and above the plane of the two iron rods. Resting on the upper edge of the longer arm of the bell crank lever, d , is a spindle, e , which runs vertically through an opening in the connecting piece, a^2 , until its upper end reaches the under side of a diaphragm or elastic packing, g . Surrounding the spindle, e , is a spiral spring, f , which serves to hold it constantly upon the top of the bell crank lever, d .

On the top of the diaphragm, g , which forms the bottom of the chamber, C, and prevents any leakage of steam or water from the same, rests the valve, h , by its guide, h' . This valve is seated upon the upper edge of the casing, C' , at h^2 . Above the valve, h , is its spindle, i , having a spiral spring, j , about it, which compresses the valve to its seat. The point of bearing upon the valve to do this is at the bottom of the long pintle, i' , centrally located upon the valve far below its seat and within the guide h' . This thermostatic device is connected to the boiler below the water level at one side or the side where is the chamber, B, and at the other side has a coupling, d^3 , for connection with the steam pipe, I. This pipe leads from the thermostat to the water valve governor, K. A pipe, I', leads from the pipe, I, to the steam space of the boiler and has a valve, L. The water supply pipe, W, runs to the boiler and has a valve, P, controlled by the governor, K. A' represents the boiler, and B' the water column. This device is to be used in place of the thermostat shown in

Fig. 4 in Patent No. 467,148. The thermostat is to be connected up like the one shown in such figure.

The operation will be as follows: As the thermostat is expanded by the steam within it, the rods, *b b'*, move the bell crank lever, *d*, lifting the spindle, *e*. This bearing through the diaphragm, *g*, against the lower end of the guide, *h'*, of the valve, *h*, lifts the latter from its seat, opening it. Steam is thus permitted to pass down into the top of the thermostat and escape out thereof. When this takes place there is a flow of water from the water pump into the boiler, and as the water rises into the thermostat, the latter cools, contracts and the valve, *h*, lowers, cutting off the escape of steam.

The object of this improvement is to obtain the full movement of the bell crank lever, *d*, whenever the steam enters the lower pipe, *a*, upon the falling of the water therefrom, and thereby expanding it; or upon the inflow of the rising water to cool and hence contract it. In the device described in said patent, the location of the single iron rod of the thermostat was so far below the axis of the lower pipe that there was a yielding under expansion and contraction, which prevented it from operating energetically and actively, as it does in this device. The method and adjustment of the rods to the shorter arm of the bell crank lever here is more even and more sensitive than could be obtained by the method shown in said patent, when it was done by the two nuts at the inner end of the rod, where it passed through the flange. The addition of the spiral spring to the spindle, *e*, compels the latter to rest upon the longer arm of the bell crank lever and forces the shorter arm against the yoke of the rods, thus rendering the whole of the device below the diaphragm, *g*, always connected and operative under whatever movement there may be of the device due to expansion or contraction. The valve shown in the said patent, designated here as *h*, did not operate very quickly, due to the absence of the spiral spring above it, where here it exerts its force upon the valve below its seat. The valve in the said

patent would sometimes bind, which does not happen in the present device, as the valve always comes quickly to its seat when the pressure of steam is admitted above it. This is due to the contraction of the lower pipe, allowing the long arm of the bell crank lever to fall, and with it the spindle, *e*.

Having thus described my invention, what I claim is—

1. The combination of the diaphragm; the valve above it having the guide resting on the diaphragm; the spindle above such valve and having a long pintle, the point of bearing upon the valve being at the bottom of the pintle and below the valve seat, and a spring about such spindle above the valve, as set forth.

2. The combination of the diaphragm, the valve above it; the spindle below it, the spring surrounding such spindle; the bell crank lever; the yoke; the two rods and the tubes and connecting pieces, as set forth.

3. The combination, in a thermostatic device, of a water chamber on the water side of the thermostat and below the water line, of the boiler with the two rods, *b b'*, located alongside of the tubular part of the thermostat, the yoke connected to such rods; the bell crank lever adjacent to such yoke; the spindle resting upon one end of the bell crank lever and having a spring surrounding it; the diaphragm above such spindle, and the valve above such diaphragm and resting thereon, as set forth.

4. The combination of the valve, *h*; the diaphragm, *g*, upon which the valve rests; the spindle, *e*, the upper end of which is against the diaphragm, *g*, and its lower end resting on a bell crank lever, *d*; the bell crank lever, *d*; the yoke, *c*, the two rods, *b b'*, secured at one end to the yoke, *c*, and the tubes, *a a'*, and their connecting piece, *a²*, as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES BARTLETT BOSWORTH.

Witnesses:

JOSHUA H. MILLETT,
DUDLEY P. BAILEY.