

(No Model.)

H. BOWMAN.  
FEED WATER REGULATOR.

No. 525,484.

Patented Sept. 4, 1894.

Fig. 1.

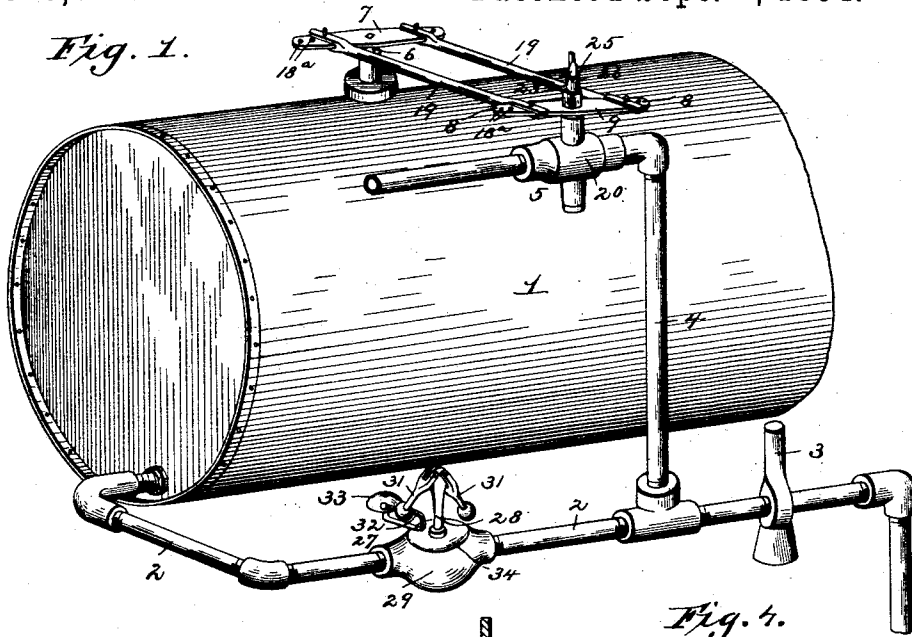


Fig. 2.

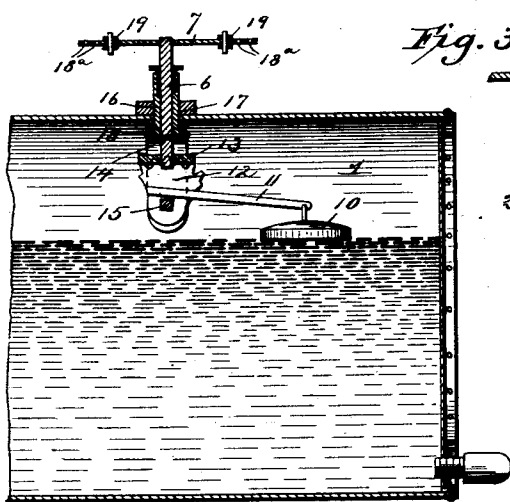


Fig. 3.

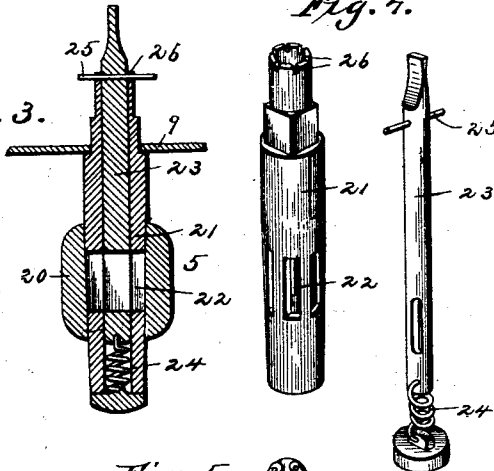
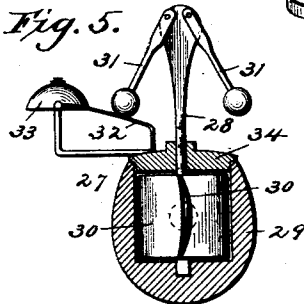


Fig. 4.

Fig. 5.



Inventor

*Hadoram Bowman*

Witnesses

*Harry L. Amer.*  
*[Signature]*

By his Attorneys,

*Chas. Snow & Co.*

# UNITED STATES PATENT OFFICE.

HADORAM BOWMAN, OF HUNT SPUR, MICHIGAN, ASSIGNOR OF ONE-HALF  
TO JESSE G. WHEELER, OF SAME PLACE.

## FEED-WATER REGULATOR.

SPECIFICATION forming part of Letters Patent No. 525,484, dated September 4, 1894.

Application filed March 31, 1894. Serial No. 505,920. (No model.)

*To all whom it may concern:*

Be it known that I, HADORAM BOWMAN, a citizen of the United States, residing at Hunt Spur, in the county of Mackinac and State of Michigan, have invented a new and useful Feed-Water Regulator, of which the following is a specification.

My invention relates to a feed-water regulator for steam boilers, and it has for its object to provide a simple and effective device whereby the flow of water into a boiler is controlled automatically to maintain the same at a given height.

Further objects and advantages of the invention will appear in the following description, and the novel features thereof will be particularly pointed out in the claims.

In the drawings: Figure 1 is a perspective view of a regulating device embodying my invention applied to a boiler. Fig. 2 is a longitudinal vertical section of a part of a boiler showing the float and connections therein. Fig. 3 is a detail vertical section of the controlling valve. Fig. 4 is a detail view, in perspective of the same, with parts detached. Fig. 5 is a detail section of the alarm mechanism. Fig. 6 is a vertical transverse section of a portion of the boiler, to show the float-operated mechanism.

Similar numerals of reference indicate corresponding parts in all the figures of the drawings.

1 designates a boiler in connection with which I have illustrated my improved feed-water regulator; 2 represents the feed-pipe which taps the boiler at a suitable point; and 3 represents a pump or injector by which the water is supplied continuously and which may be of any ordinary or preferred construction.

4 represents a waste-pipe connected with the feed-pipe and provided at an intermediate point with a controlling valve 5 adapted to be opened and closed by means of a float-operated mechanism comprising a spindle 6, provided at its outer end with a cross-head 7, and rods connecting the extremities of the arms of said cross-head with the extremities of arms 8 of a similar cross-head 9 which is connected to the valve.

The float 10 is carried by pivotal arm 11

arranged within the boiler and provided with a segment gear 12 which meshes with a segment gear 13 carried by said spindle 6, whereby as the float rises and falls with the water in the boiler the spindle is turned in opposite directions.

The means for mounting the float-arm and gearing within the boiler comprise a yoke 14, the lower ends of the arms of which are connected by a spindle 15 upon which the float arm is fulcrumed, a bearing-sleeve 16 fitting in an opening 17 in the wall of the boiler and provided at its lower end with a head 18 which bears against the inner surface of said wall, and a nut threaded upon the upper end of said bearing-sleeve. In this bearing-sleeve is mounted the spindle 6, suitable packing being provided to prevent escape of steam.

The cross-heads 7 and 9 are provided near the extremities of their arms with series of perforations 18<sup>a</sup> whereby the pivotal connections of the rods 19 therewith may be adjusted to vary the throw of the cross-head 9.

The controlling valve consists of a casing 20, in a transverse opening in which is revolvably fitted the tapered shell 21 provided within the casing with a series of longitudinal slots 22, and a plug 23 fitting loosely within said shell and capable of rotary adjustment to vary the position of its opening with relation to the passage through the casing, whereby more or less angular adjustment of the shell is necessary in order to open or close the said passage. The plug is held in place within the shell by means of a spring 24 and is provided adjacent to its upper end, and outside of the shell, with a transverse pin 25 to fit in diametrically opposite notches 26 in the upper end of the shell. A plurality of pairs of these notches are provided, whereby the plug is capable of a series of adjustments, and the said spring 24 holds the transverse pin in the notches with which it is engaged and thus locks the plug at the desired adjustment.

Arranged in the feed-pipe at a point between the pump or injector and the boiler is an obstructing valve 27, adapted to impede without stopping the passage of water through the pipe. This valve preferably consists of a stem 28 mounted rotatably in the casing 29

and provided within the cavity of the latter with a series of radial wings 30, whereby as the water passes through the casing the stem is rotated. Connected to the upper or outer end of the stem are pivotal weighted arms 31 which are adapted to coact with the spring knocker 32 of an alarm-bell 33, whereby as long as the rotation of the stem is rapid the weighted arms are elevated above the plane of said knocker, and as the rotation becomes slower they descend and by contacting with the knocker ring the bell. The cap 34 in which the stem is mounted is preferably threaded in the upper side of the casing and carries the alarm-bell and knocker.

The operation of the device as above described is as follows: The pump operates continuously, and owing to the obstructing valve 27 the water, unless otherwise checked, will flow through the free passage afforded by the waste-pipe, but when said waste-pipe is closed by means of the controlling valve the water passes through the feed-pipe to the boiler. The closing and opening of said controlling-valve are governed, as hereinbefore described, by the weight-operated mechanism, and the necessary height of the water in boiler to open the controlling valve may be regulated by the adjustment of the plug of said valve. The boiler receives water only when the level in the boiler is below normal, and as the above described parts respond quickly to any variation in the height of the water it will be understood that a uniform height is maintained.

The advantages derived from maintaining a uniform height of water in the boiler will be obvious to those skilled in this art, and they include the following: Condensation in the boiler is prevented, the temperature is uniform, and hence a saving of fuel is effected.

It will be understood that various changes in the form, proportion, and minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

Having thus described my invention, I claim—

1. In a device of the class described, the combination with a continuously operating pump and a pipe in communication therewith, of a controlling valve having a station-

ary casing in communication with said pipe, a conical or tapered tubular member revolvably mounted in said casing and provided with lateral slots, said tubular member being provided at its upper end with a series of notches, an axial member or plug fitting in said tubular member and provided with an opening adapted to register with the lateral openings in the tubular member, an actuating spring connected at one end to the lower end of said axial member or plug and at the other end to the tubular member, a cross-pin carried by the axial member or plug to engage diametrically opposite notches in the upper end of the tubular member, and float operated means connected to the tubular member for opening and closing the valve, substantially as specified.

2. In a device of the class described, the combination with a boiler feed-pipe, a continuously operating pumping device, and a waste-pipe communicating with the feed-pipe, of means for obstructing the passage through the feed-pipe, a controlling valve arranged in the waste-pipe, a spindle mounted in the wall of the boiler, float-operated mechanism connected to said spindle, cross-heads secured to the spindle and the plug of the controlling-valve, and rods connecting the arms of said cross-heads and capable of adjustment toward and from the extremities of the arms to vary the throw thereof, substantially as specified.

3. In a device of the class described, the combination with a boiler feed-pipe, a continuously operating pumping device, a waste-pipe, a controlling-valve arranged in the waste-pipe, and float-operated means for actuating said valve, of an obstructing-valve arranged in the feed-pipe and having a rotatable stem provided within the casing of the valve with radial wings, and an alarm mechanism connected to and operated by said stem, substantially as specified.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

HADORAM BOWMAN.

Witnesses:

F. H. FOOTE,  
A. E. HOWARTH.