(No Model.)

G. S. HERRICK.

FEED WATER REGULATOR.

No. 373,403. Patented Nov. 15, 1887.

Fig. 1.

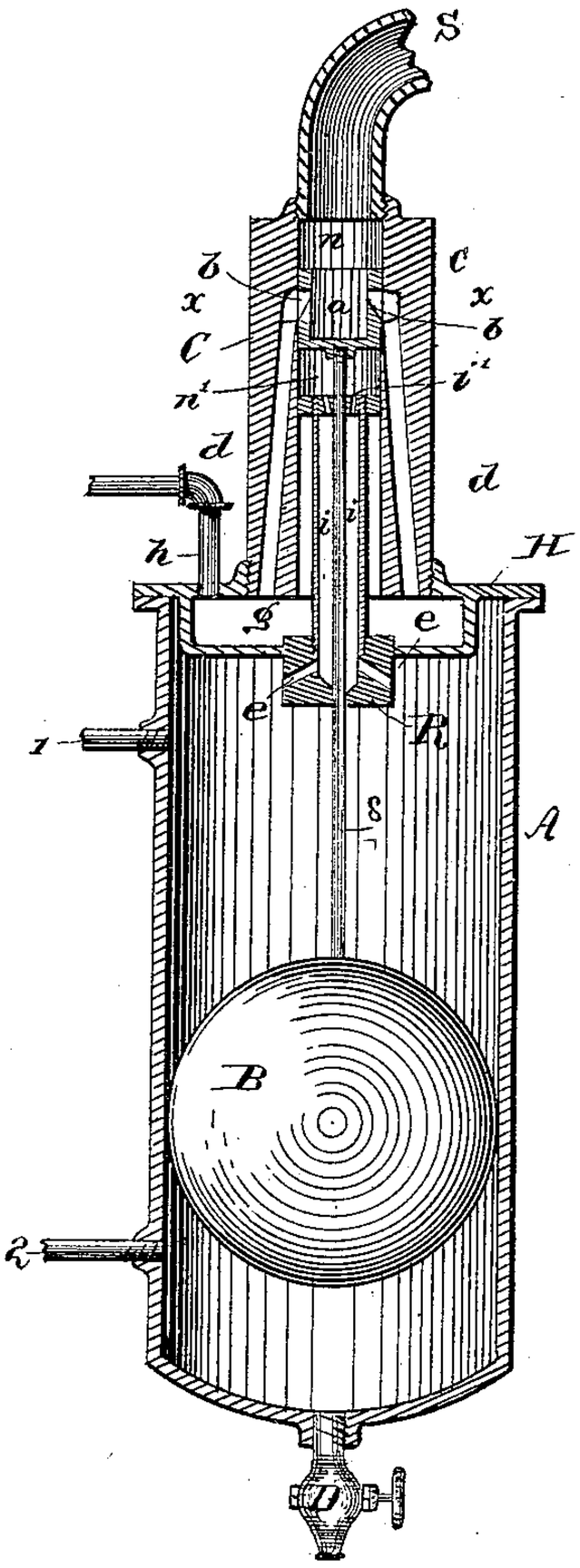


Fig. 3.

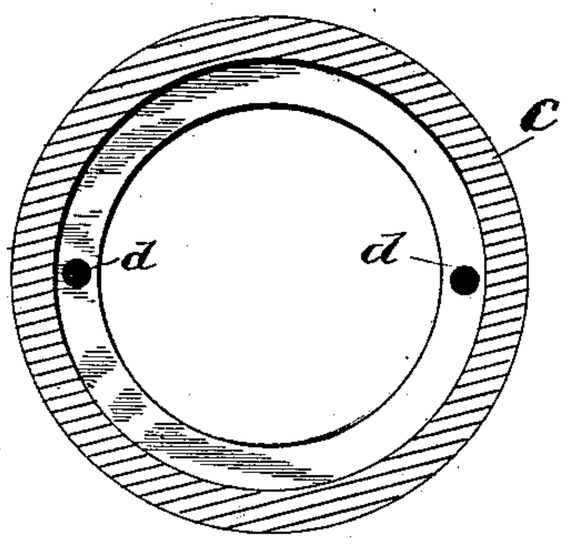


Fig. 4.

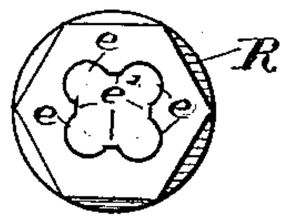
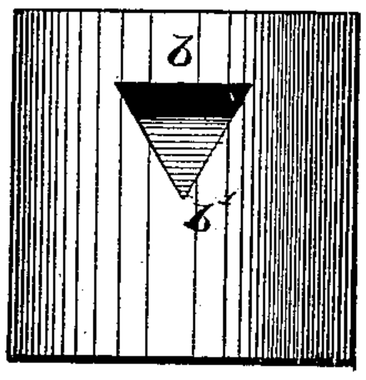


Fig. 2



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FEED-WATER REGULATOR.

SPECIFICATION forming part of Letters Patent No. 373,403, dated November 15, 1887.

Application filed May 10, 1887. Serial No. 237,716. (No model.)

To all whom it may concern:

Be it known that I, GEORGE S. HERRICK, of Syracuse, in the county of Onondaga, in the State of New York, have invented new and useful Improvements in Feed-Water Regulators, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

My invention relates to improvements in feed-water regulators of the class described in my application of February 14, 1887, Serial No. 227,641; and the invention consists in providing the head or top of the float-vessel with an isolated steam-passage and connecting the same with a valve-chamber provided with a valve, which supplies steam from the steam-supply pipe of a boiler to the steam-pump, controlled by the height of water in the boiler through the medium of a float connected to the valve and located in the float-vessel.

It consists, furthermore, in providing the valve-chamber with steam-passages connected to the isolated steam-passage in the head of the float-vessel, and in also providing steam-passages into the float-vessel leading through to the lower side of the valve, whereby the steam-pressure on the valve and the steam-pressure on the float are balanced in perfect equilibrium, which is undisturbed by the passage of the steam through the isolated steam-passage in the float-head to the pump, as hereinafter more fully described.

It consists, furthermore, in the detail construction and arrangement of the valve and valve-chamber, all as hereinafter more fully described, and pointed out in the claims.

In specifying my invention reference is had to the accompanying drawings, forming part of this specification, in which like letters indicate corresponding parts in all the figures.

Figure 1 is a vertical section through the valve-chamber and float-vessel, illustrating the general arrangement and construction of the parts. Fig. 2 is an enlarged detached view of the valve. Fig. 3 shows an enlarged transverse section, taken on line *x x*, Fig. 1, illustrating the annular recess in the valve-chamber; and Fig. 4 is an enlarged end view of a modification in the construction of the sleeve or bearing for the rod or stem of the float.

A represents the float-vessel, which may be constructed of any suitable shape or form, but preferably cylindrical and steam-tight, as best shown in the vertical-section view, Fig. 1.

B is the float located within the float-vessel A, and operated to rise and fall automatically by the water in the boiler, the float-vessel A being connected with the boiler by the connections 1 and 2. The float-vessel A is provided with the blow-off valve D, which affords access to clear the float-vessel.

In the head or top H of the float-vessel A, I provide the steam-passage *g*, preferably constructed integral with the head of the float-vessel, as shown in Fig. 1. This passage *g* is isolated from the interior of the float-vessel A, and is connected to the steam-pump which supplies the boiler with water by the pipe *h*.

On top of the head H of the float-vessel, above the isolated steam-passage *g*, is seated the valve-chamber C, which is preferably cylindrical in form, and securely affixed to the float-vessel A, either by coupling on with a screw-thread, or in any other suitable manner, to form a steam-tight connection.

The valve-chamber C is provided with the circular valve seat or opening *n* and the steam-passages *d d*, Figs. 1 and 3, connecting with the steam-passage *g* in the head of the float-vessel H. The valve-chamber C is provided with the annular recess *c*, as best shown in Figs. 1 and 3, the office of which will be presently explained.

The valve *a* is seated within the valve-opening *n* and moves freely vertically in the circular valve-seat, and is provided with the V-shaped ports *b b* through the sides thereof, as best shown in Figs. 1 and 2.

The V-shaped ports *b b* coincide in length with the width of the annular recess or groove *c*, formed in the circular valve-seat *n*, and the valve *a* is connected by the valve-stem *s*, Fig. 1, to the float B.

The circular opening or valve-seat *n* is connected by means of a pipe, S, to the steam-supply pipe of the boiler. The valve-seat or circular opening *n* is elongated, so as to afford a space, *n'*, below the valve *a*, the object of which will be presently explained. The valve-stem *s* passes through a sleeve or bushing, R, secured in the casing of the steam-passage *g* in the head of the float-vessel, and steam-inlets *e e* are formed therein connecting with the passages *i i*, through which the stem *s* passes, and lead-

ing into the space n', below the valve a, through the inlets i'.

It will be observed that the valve a is located in the circular valve seat n, and the ports b b communicate circumferentially with the annular recess or groove c in the valve-chamber C, and that the valve a is surrounded on its upper and lower sides by steam entering the circular valve-seat n n' through the supply-pipe S and through the float-vessel A, owing to the inlets e e and connections i i, and that consequently the valve is so balanced as to be in equilibrium while steam is taken through the supply-pipe S and passages d d into the isolated passage g, and from thence to the steam-pump. Furthermore, the float B is in constant equilibrium, owing to the connections 1 and 2 with the boiler being at a point above and below the float and that the equilibrium of the parts is maintained independently of each other through the medium of the isolated connections, as previously described.

In devices of this character heretofore employed it was found in practical use that when steam was admitted to the valve the float was forced downward and the pressure below the float was insufficient to close the valve; hence the action of the device was irregular and inaccurate. In other devices of this character, when the steam-supply was applied, a vacuum was created, lifting the float and drawing the water out of the float-vessel into the steam-pipe of the steam-pump, shutting off the steam-pump entirely, thus causing the steam-pump to work intermittently and requiring constant attendance to keep the apparatus in working order. These defects exist in all of the devices which have hitherto been patented, and I overcome these difficulties by providing the isolated steam-passage g, connected to the steam-supply through the medium of the valve and the steam-passages, as previously described, balancing the valve independently of the float and the float independently of the valve, as stated, which provides an efficient and accurate device for the desired purpose.

The valve a, being cylindrical in form, is liable to turn in its seat as it rises or falls by the action of the float B in the float-vessel; hence in order to insure accuracy in its working I provide the annular recess or groove c in the valve-chamber C. As stated, the valve opening or port b is of the same length as the width of the annular groove or recess c; hence it will be apparent that the valve a may be turned in its seat without interrupting or affecting its efficiency, since at any point of its movement in the seat the port b opens into the annular recess c and admits steam to the passages d d.

The sleeve or bushing R may be constructed as shown in Fig. 4, and in this case the openings e are in the under side of the sleeve adjacent to the opening for the passage of the float-stem s. In this case the valve-stem s is guided on the four points, e', of the opening, and this construction prevents the valve-stem from binding by reason of dirt working into the opening. When the sleeve is seated as shown in Fig. 4, it is preferably elongated, so as to connect with the lower casing of the circular valve-seat n', and the steam-inlet passages i i are formed by the interior of the sleeve R.

The operation of my improved feed-water regulator is as follows: It will be understood that the steam feed-water pump of the boiler is connected to the pipe h, and that the feed-water regulator is connected to the steam-supply by the pipe S, the float-vessel being connected to the boiler by the pipes 1 and 2. The water in the boiler freely enters the float-vessel and stands at the same level in the float-vessel as in the boiler. When the supply of water in the boiler is sufficient, the valve is closed and the steam-pump at rest. When the water in the boiler falls below the point to which the apparatus is regulated, the float B descends and draws the valve a downward, opening the ports b b at the point b', which opens into the annular recess or groove c, allowing steam-supply entering through S to enter the passages d d and pass into the steam chamber or passage g, and from thence into the steam-pump, which is thereby actuated and the boiler supplied with water.

The float-vessel is steam-tight, and the water of the boiler enters the float-vessel under steam-pressure, and a water-glass may be applied to the float-vessel to indicate the height of water therein, if desired.

The device is simple in construction, strong and compact, and the working parts thereof, being formed of non-corrosive metal, are very durable.

The valve a may be provided with water-packing spaces, and is preferably provided with such spaces in practice.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a feed-water regulator, the combination of a float-vessel having an isolated steam-passage in its head or top provided with a pipe connected to the steam-pump, and a valve-chamber seated above the steam-passage in the float-vessel having steam-inlets connected, respectively, to the steam-supply pipe and steam-passage by a valve connected to the float in the float-vessel, substantially as and for the purpose set forth.

2. In a feed-water regulator, the combination of the valve a and float B, connected by the stem s and located, respectively, in the valve-chamber C, and float-vessel A, the valve-chamber and float-vessel being provided with steam-passages above and below the valve and above and below the float, the steam-passage above the valve being isolated from those below it and connected to the steam-pump, whereby the valve and float are in equilibrium under steam-pressure, substantially as and for the purpose specified.

3. The combination of the head H, having the steam-passage g integral therewith, with

the valve-chamber C, seated above the passage *g* in the head H and having steam-inlets connected to the passage *g*, substantially as and for the purpose set forth.

4. The combination of the valve-chamber C, head H, having the isolated steam-passage *g*, and sleeve R, having steam-inlets *e*, substantially as and for the purpose set forth.

In testimony whereof I have hereunto signed my name, in the presence of two attesting witnesses, at Syracuse, in the county of Onondaga, in the State of New York, this 27th day of April, 1887.

GEORGE S. HERRICK.

Witnesses:
FREDERICK H. GIBBS,
E. C. CANNON.