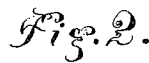
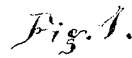


Improvement in Feed-Water Regulators and Low Water Alarms for Steam-Boilers.

Patented April 23, 1872.



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IMPROVEMENT IN FEED-WATER REGULATORS AND LOW-WATER ALARMS FOR STEAM-BOILERS.

Specification forming part of Letters Patent No. 125,993, dated April 23, 1872.

SPECIFICATION.

I, JOHN B. SMITH, of Milwaukee, in the county of Milwaukee, in the State of Wisconsin, have invented certain Improvements in Boiler Feed-Water Regulators and Low-Water Alarms, of which the following is a specification:

Nature and Object of the Invention.

My invention is an arrangement of mechanism for keeping the water at just the right height in a steam-boiler, and is a reservoir of water, connected to the water in the boiler by a stuffing-box. When the water is high enough in the boiler the reservoir will be filled with water and its weight will depress it; and when the water is too low in the boiler the water will run out of the reservoir and lighten it, and the weight will raise it, and, by an attachment to the belt which runs the pump, will throw the belt on or off, as the case may be, and thus supply the boiler with just the amount of water needed; or a cock in a pipe may be turned and the water turned on or off, as may be required. The low-water detector is attached in the same way to the boiler as the feed-water regulator, and the reservoir of the low-water detector is used for a weight to raise and fall the reservoir of the feed-water regulator; and when the water in the boiler is as low as the stuffing-box of the low-water detector it will be at a dangerous point, and the reservoir will be emptied into the boiler, and the weight on the lever attached to the stuffing-box will roll it and elevate the reservoir, and a rod from the pipe of the reservoir will be thrown up, and, with a lever attached to its top end, will open a valve and let steam onto a whistle, which will sound an alarm.

Description of the Drawing forming part of this Specification.

Figure 1 is a side view of the feed-water regulator and low-water alarm; and Fig. 2 is an end view of the same, with the boiler and connections.

General Description.

A is the reservoir or vessel for water; B, a pipe extending from the bottom of vessel

A, and connecting it to another pipe, E, which passes through a stuffing-box into a chamber, H, which is connected to the boiler. This pipe B, when A is filled with water and has fallen to its lowest point, is horizontal, so that the water may run out of vessel A through it into the boiler whenever the water in the boiler is below pipe B. C, a pipe extending from the top of reservoir or vessel A to the pipe E, and is connected to the pipe E just above the end of pipe B. This pipe is for the purpose of conveying steam to the top of vessel A to supply the place of the water that shall run through pipe B back to the boiler. This pipe is not absolutely necessary, for the water will discharge through pipe B without it, but much slower, and this pipe is to facilitate the discharge and make it move more rapidly than it would without it. D, a lever projecting out from the pipe E, which, with a weight on it, forms a counterpoise to the vessel A, so that when the vessel A is emptied of water it will tilt A up, and when A is filled with water this weight on D, being lighter than A filled with water, A will be tilted back again. E, a pipe, which enters the stuffing-box in the side of chamber H, and to which are attached pipes B and C, thus forming a communication between this pipe and vessel A. The outer end of the pipe E has a journal on it, which rests in a box in frame F, the inner end resting in the stuffing-box and the outer end in the frame F. F, frame, connected to chamber H at the top, in which are boxes forming bearings for pipes E and e. G, a reservoir or vessel for a low-water detector. This vessel filled with water is hung as a weight on lever D as a counterpoise to vessel A, but it is not necessary that it should be, for a weight of the required heft may be used instead of weight G, and be entirely independent of it. H, a water-chamber connected to the boiler by pipes P and Q, with stuffing-boxes in its sides for pipes E and e to enter. This chamber is for the purpose of having clean water pass and repass from the vessel A; the pipe P, connecting with the boiler below the water line, and the pipe Q above, so that the water alone passes into this chamber through P and steam alone through Q. I, lever, which extends from pipe C to a belt-shifter, K; or it may pass to a cock

in a pipe running from the pump to a waste-way, so that the cock may be opened when the water is high enough in the boiler, and the water from the pump pass back again to the place from which it is taken, and when the water is too low in the boiler close the cock again and have the water pass to the boiler. L, belt running to the pump. M, cock in the bottom of reservoir A to draw off water and clean the mud out of vessel A. N, cock in pipe B. O, cock in pipe C. P, pipe from boiler to chamber H, with cock in it to convey water to chamber H. Q, steam-pipe from the top of boiler to chamber H, with cock in it. R, cock in the bottom of chamber H to draw off the water. S, glass set in the side of chamber H to show the height of the water. T, stuffing-box in the side of chamber H, into which enters pipe E. U, water-pipe from the bottom of reservoir or vessel G to pipes running into the lower stuffing-box *d*. This pipe U, when vessel G is full of water and descends to its lowest point, discharges that portion of water which is above pipe *e*, in vessel G, into chamber H. Whenever the water in chamber H is below pipe *e*, the weight of vessel A and weight X tilts the vessel G. The weight of vessel A, when the water is out of it, will be sufficient to elevate G, when the water is out of G, up to a level with pipe *e*, up to that point which will make the pipe U lie horizontal, and then the water will run out of pipe G, and it will be elevated sufficient to open the whistle-valve and sound the alarm; or, if wanted to be more certain in its operations, the lever D and pipe U may be elevated, and the rest *g* raised sufficient to have pipe U lie in a horizontal position whenever vessel G has fallen to its lowest point. V, pipe running from pipe *e* to the top of reservoir or vessel G, for the conveyance of steam to the top of vessel G whenever the water is running out of G. W, lever from pipe *e*, which, with its weight, forms a counterpoise to vessel G. X, weight on lever W. Y, cock in pipe U. Z, cock in pipe V. Z', cock in the bottom of reservoir or vessel G. This cock is for the purpose of drawing off the mud that may accumulate in vessel G. *a*, valve-lever to the whistle. *b*, rod from pipe V to valve-lever *a*. *c*, whistle with which to sound an alarm when the water is too low. *d*, lower stuffing-box. *e*, pipe, the inner end resting in the stuffing-box *d* and the outer end in a box in frame F. To this pipe is attached vessel or reservoir G by pipes U and V. *ff*, braces to sustain frame F. *g*, rest for reservoir or vessel G to rest on when it is full of water and vessel A is empty. *h*, rest for reservoir A to rest on when it is full of water, and to prevent vessel A from falling so low that water will not run out of it when the water in chamber H is below pipe E. *i*, handle to cock in pipe Q. *k*, rod attached to handle *i*. *l*, a connection, to which *k* and *m* are attached. This connection *l* is secured to and swings on

a pin in rest *n*, so that when *m* is shoved up the cock is closed, and when *m* is drawn down the cock is opened. *m*, rod attached to pipe *e* and connection *l*. *n*, rest, to which is attached a pin, which holds *l*. This arrangement is for the purpose of opening and closing cock Q. Now suppose the water in the boiler to be below the pipe E; then, if this attachment is applied, when the vessel A is empty and is tilted up, the rod *m* is shoved up and closes the valve in pipe Q; then the steam in chamber H condenses and the water rises through pipe P to fill its place, and when above pipe E is forced out into vessel A and fills it, when the weight of the water in A brings it down, and in going down rod *m* goes down with it and opens the valve in pipe Q, and the water will then find its level and will run out of vessel A, and vessel A will rise again, and so go on alternately.

This machine operates as follows: When the water in the boiler is above the pipe E it is forced, by the steam in the boiler, out through pipes B and C and fills reservoir or vessel A, and the weight of the water in A causes it to fall down till stop *h* arrests it, and the lever I, being attached to pipe C, comes down with it and operates the belt-shifter, and throws the belt L off of the pump, and the pump stops; or, if the lever I is attached to the valve, the valve is opened, and the water passes off through a pipe to the place where it is taken from. Whenever the water falls below the pipe E the water will run out of the vessel A to chamber H, the pipe C letting steam pass to the top of vessel A, and A will, by the weight on the lever D, be tilted up again, and so far as the feeder is concerned. Now, should the pump fail to throw water enough and the water get below pipe *e* in the chamber H, the water in vessel G will run out of G and empty it down to a point in G, which shall be as low as pipe *e*; and when it is emptied to that point it will be lightened enough so that vessel A and weight X will raise it up, so that pipe U will be horizontal, and then the balance of the water will be emptied out of reservoir G, and it will be tilted up high enough so that lever *a* shall be raised by rod *b*, and the whistle *c* shall give the alarm for low water in the boiler. The vessel G is attached to lever D by a strap on the side of it, which shall have an opening from top to bottom, the vessel hanging by this strap at its top; but when vessel G is empty it can rise without being hindered by lever D, for the lever will remain stationary and the vessel G will pass up by it, the strap being long enough for that purpose.

Claims.

I claim as my invention—

1. A feed-water regulator, consisting of reservoir or vessel A, pipes B and E, stuffing-box T, lever D, and weight G, in combination

with chamber H and pipes P and Q, substantially as described.

2. Reservoir or vessel G, pipes U and *e*, stuffing-box *d*, pipe V, rod *b*, lever *a*, and whistle *c*, in combination with chamber H and pipes P and Q, substantially as described.

3. Vessel A, pipes B and C, pipe E, stuffing-box T, rod I, and shifter K, in combination with chamber H and pipes P and Q, substantially as described.

4. Reservoir or vessel A, pipes B and C, pipe E, stuffing-box T, lever D, weight G, handle *i*, and cock in pipe Q, rod *k*, connection *l*, and rod *m*, in combination with chamber H and pipes P and Q, substantially as described.

JOHN B. SMITH.

Witnesses:

F. E. SMITH,
B. L. CORSS.