

(No Model.)

B. & M. DOERHOEFER.
FEED WATER REGULATOR AND ALARM.

No. 540,585.

Patented June 4, 1895.

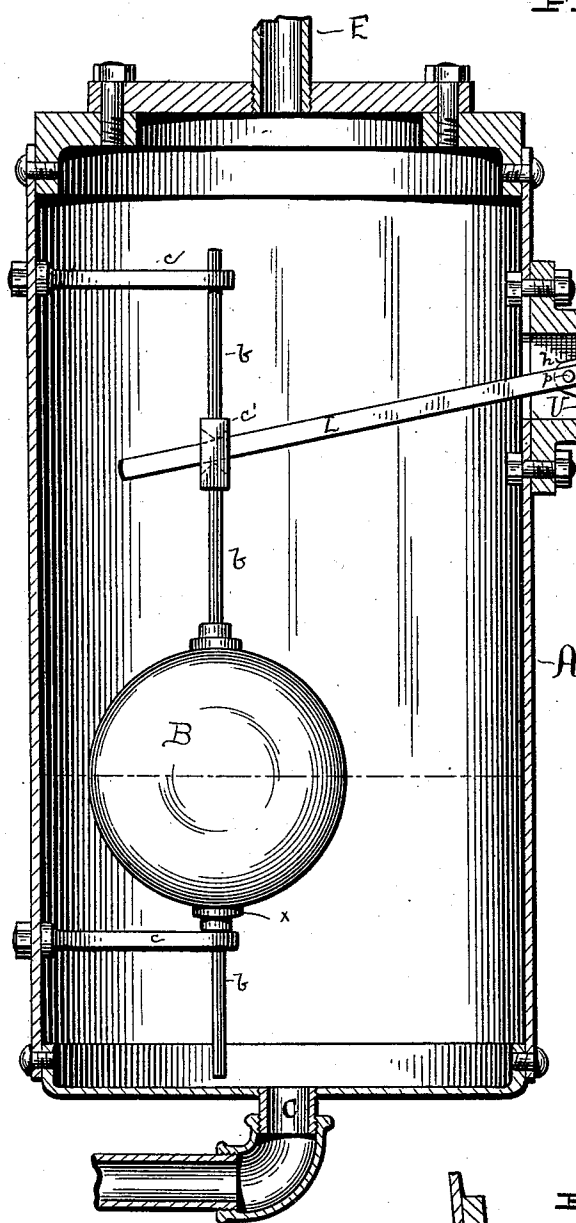


FIG. 1

FIG. 5.

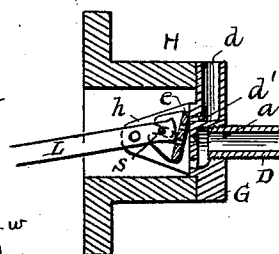


FIG. 2.

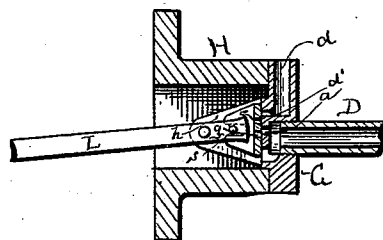


FIG. 3.

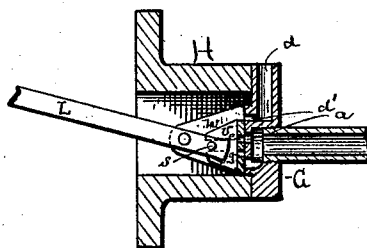
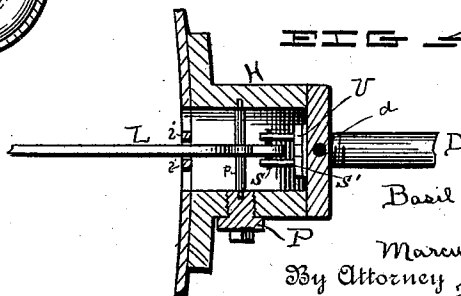


FIG. 4.



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UNITED STATES PATENT OFFICE.

BASIL DOERHOFER AND MARCUS DOERHOFER, OF LOUISVILLE,
KENTUCKY.

FEED-WATER REGULATOR AND ALARM.

SPECIFICATION forming part of Letters Patent No. 540,585, dated June 4, 1895.

Application filed May 18, 1894. Serial No. 511,636. (No model.)

To all whom it may concern:

Be it known that we, BASIL DOERHOFER and MARCUS DOERHOFER, of Louisville, in the county of Jefferson and State of Kentucky, have invented new and useful Improvements in Feed-Water Regulators and Alarms, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to new and useful improvements in feed water regulators adapted to supply feed water to steam boilers and consists of certain new and useful improvements in detail, operation and construction whereby we are enabled to produce a perfectly automatic self-regulating feed water regulator which will keep the supply of water in the boiler at an average depth at the same time which will indicate by means of a steam whistle if by accident the water should be raised to a too great elevation or fall below a fixed line and also indicate by means of the whistle when the pumping engine is stopped if by accident it should become out of order when the boilers are in use.

In the annexed drawings similar letters of reference indicate corresponding parts in all the views, in which—

Figure 1 is a longitudinal vertical section of our improved apparatus with the float B at its lowest point of rest, at which point the full supply of steam would be admitted to the steam-pump and the whistle W would give an alarm, showing that the water in the boiler has fallen below the proper line. Fig. 2 shows the location of the slide-valve when the float is at the proper position because of the requisite depth of water in the boiler, in which case the supply of steam to the whistle is cut off, but a minimum quantity of steam is admitted to the steam-pump. Fig. 3 is a view showing the valve at its lowest position, as when the float is raised to its greatest elevation, the valve being down sufficiently far to permit steam passing over the valve into the passage to the steam-whistle and through the upper opening in the valve to the steam-pump, the whistle and pump both receiving steam. Fig. 4 is a detail view showing a different manner of fulcruming the float-lever. Fig. 5 is a detail sectional view showing the

valve dropped away from its seat in the position it occupies when the pump is stopped from any cause.

In the drawings —A— is the outer shell of the float vessel. —B— is a float suspended therein guided by the stems —b—b— in the fixed brackets —c—c— which are respectively at the lower and upper sides of said float and extend from the interior sides of the shell —A— in vertical alignment to guide the float at all times. The upper stem —b— is provided about the middle of its length with a turn buckle —c'— which is designed to hold the free long end of the lever —L— so as to guide and control its rise and fall with the rise and fall of the float —B—.

The lever —L— is pivotally supported by the pin —p— between the rearwardly extending parallel lugs —h— fixed rigidly to the interior face of the face plate —G— of the extension —H— projecting at right angles to the float vessel —A—.

Attached to the end of the lever —L— next the pivot —p— is a slide valve —V— provided with steam openings —e— and g—, one above the other and each being arranged preferably in pairs side by side.

The face piece —G— is pierced horizontally with the steam openings —a— in coincidence with the steam pipe —D—. It is also pierced vertically from the top with the steam opening —d— which connects at its bottom end with the horizontal opening —d'— entering the same, while secured within the opening —d— is the steam pipe —w— extending to the whistle —W—.

Entering the upper portion of the float vessel —A— is a steam pipe —E— which communicates directly with the steam boiler. At the bottom of the float vessel beneath the float —B— is a water pipe —C— through which water is forced to the interior of the float vessel —A—, the water in rising striking against the float —B— and elevating it through the force of the stream projected in the said shell —A—.

It will be noted that the parallel lugs —h— being attached to the face plate —G— and the lever —L— being secured between said lugs when the face plate —G— is removed the whistle —W—, valve —V—, and lever

—L— will be removed with it, the whole being connected together; but in the modification shown in Fig. 4 the lever —L— is pivotally supported by means of the stem —p— set at one end in the auxiliary chamber —H— and at the other end in the removable and adjustable screw threaded plug —P—.

In both cases however it is desirable that the guides or ways —i—i— be provided at each side of the lever —L— to hold it in perfect alignment and prevent twisting of the valve —V— upon its seat at the interior of the face-plate —G—.

The operation of the device is as follows:
 15 Steam is admitted through the pipe —E— to the interior of the vessel —A— and water is admitted to the interior thereof through the water pipe —C—, the vessel —A— being so located with respect to the boiler that the
 20 level of the water in the boiler and in the vessel A is the same. When the water in the boiler is at the requisite level the valve —V— is so located as to its pivotal elevation that the steam opening —g— is but partly in coincidence with the steam opening —a— extending to the steam pipe —D— and the opening
 25 —e— is beneath the opening —d'— extending to the whistle —W— but in case the water in the boiler and the float vessel falls below the fixed line the steam opening —g— is
 30 brought in more full coincidence with the steam opening —a— and at the same time the steam opening —e— is brought into coincidence with the steam opening —d'— the
 35 float having fallen with the water, thereby carrying down with it the long end of the lever —L—, and throwing up the shorter end, and carrying with it the slide valve —V— pivotally connected thereto. In case the water
 40 in the boiler and vessel —A— rises above the proper line the float —B— is carried with it thereby carrying up the long end of the lever and depressing the shorter end of the said lever carrying with it the valve —V— to the
 45 point shown in Fig. 3, at which point the steam opening —e— is carried down and into coincidence with the steam opening —a— while the valve has fallen sufficiently far to permit free passage into the steam passage —d'—
 50 and through the passage —d— to the whistle —W—. Thus it will be seen that the float —B— and valve —V— are always in such position that the greater or less supply of steam is admitted to the pumping engine which supplies the boiler during which time if the
 55 pumping engine is in operation water will be forced into the shell —A— through the pipe —C— beneath the float —B— and equalizing the pressure of the steam from above in the
 60 vessel —A—. In case, however, through any accident, the pumping engine is thrown out of operation the water will not be forced into the interior of the shell —A— beneath the float —B— and the pressure of steam above
 65 said float —B— will be more than sufficient to depress said float when it will be forced into the lowest position as shown in Fig. 1, at

which time the steam openings —e— and —d— being in coincidence the alarm will be given by the whistle —W—. Thus it will be
 70 seen that owing to the arrangement of the steam openings in the face plate —G— we are enabled to supply steam at all times to the pumping engine and if by chance at any time the pumping engine is temporarily disabled
 75 the result will be immediately communicated to the engineer in charge through the whistle —W— thereby giving him sufficient warning of an accident to enable him to provide other means of supplying his boiler with the requisite amount of feed water and avoid the possibility of entire evaporation of the water in the boiler through inattention or through the failure of the feed water regulator here shown to act properly.

It will be observed that the connection between the end of the lever L and the slide valve is made by means of studs or pins s, which project laterally from the lateral faces of the lever, and engage elongated open slots in the lugs s' which project from the outer face of the valve; also that the valve seats flat upon the seat and is free to move toward and away from such seat upon said pins or studs. The natural position of the valve as
 95 it hangs upon said pins or studs with its points of contact therewith above the center of the valve, is such, as will be observed from Fig. 5, that its lower portion swings away from the valve seat by reason of its gravity. When,
 100 however, the pump is running, the pressure of steam against the back of the valve holds it closely against its seat, in which position it remains so long as the pump is in action. If the pump stops from any cause, an equilibrium of pressure is at once set up upon the two sides of the valve. At the same time the level of the water in the drum or shell falls slightly owing to the cessation of the suctional effect of the passage of steam to the pump
 110 which keeps the small body of water in the shell slightly above the boiler level. As this slight fall of water takes place, the short or valve arm of the lever rises and the pins or studs s impinge against the upper walls of the slots s'. Gravity now acts to throw the lower portion of the valve away from its seat, which admits steam to the port or ports leading to the whistle, and the latter immediately sounds. In this manner the engineer is notified at once
 120 of any accident to the pump. A further advantage of this action is that the valve does not stick or corrode to its seat when the parts are not in operation, being away from the seat, as above described.

It will be noted further that the lugs which afford a fulcrum for the float lever are a part of the face plate G. An advantage of this construction is that no matter what the thickness of the joint between this face plate and the wall of the chamber H may be, the distance between the fulcrum of the float lever and the valve seat is constant, which would not be the case were said lever provided with

a fulcrum support independent of the face plate. It will be apparent that this is a feature of considerable importance to the proper seating of the valve.

5 Having described our invention, what we claim as new is—

1. In a feed water regulator and alarm, the combination with a float vessel or shell, and a float therein, of a secondary chamber whose
10 shell is attached to that of the float vessel, said chamber having a valve seat at its outer end, with a port or ports in line with a steam pipe leading to the feed water pump and a port or ports leading to an alarm whistle, a
15 slide valve arranged to work on said seat and free to move toward and away from the same, said valve having slotted lugs, and ports adapted to be brought in line with the ports of the seat under proper conditions, and a
20 lever connected to said float and having studs or pins which loosely engage the slots of said lugs, the gravity of the valve when it is not under pressure, or when it is subject to an equilibrium of pressure, being such that it
25 falls slightly away from its seat, substantially as specified.

2. In a feed water regulator and alarm, the combination with a float-actuated lever having pins or studs, and a valve seat having
30 a port or ports leading to the feed water pump, and also a port or ports leading to an alarm, of an automatically unseating slide valve free to move toward and away from its seat, and

having slotted lugs, the gravity of the valve as it hangs on said pins or studs when not
35 subject to steam pressure or when subject to an equilibrium of such pressure being such that it unseats, substantially as specified.

3. In a feed water regulator and alarm, the combination with a float vessel, its float, and
40 a supplementary chamber whose shell is attached to that of the float vessel, of the face plate which closes the outer end of said supplementary chamber, said face plate forming a valve seat and having a port or ports there-
45 through which communicate with a feed water pump, and port or ports leading to an alarm, also the parallel lugs *h*, a lever connected to said float and fulcrumed between said lugs, and an automatically unseating slide valve
50 having slotted lugs engaged by pins or studs of the said lever, said valve having ports there-through which are adapted to register with those of the face plate under proper conditions, substantially as specified. 55

In testimony whereof we have hereunto signed our names, in the presence of two attesting witnesses, at Louisville, in the county of Jefferson, in the State of Kentucky, this 17th day of April, 1894.

BASIL DOERHOEFER.
MARCUS DOERHOEFER.

Witnesses:

FREDERICK H. GIBBS,
H. HURD.