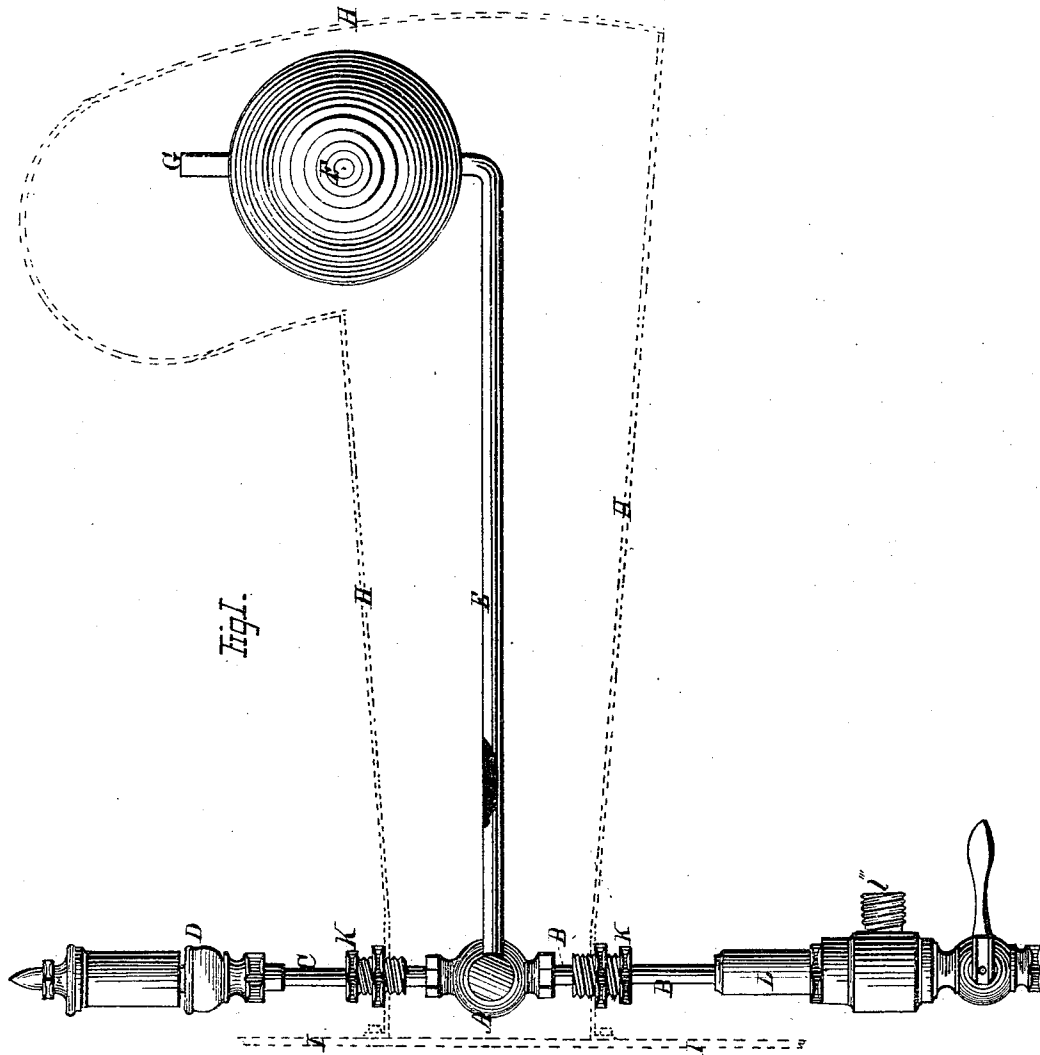


M. S. VOSBURGH.
Feed-Boiler Regulators.

No. 149,011.

Patented March 24, 1874.



WITNESSES:

James Hutchinson
Harry Coleman

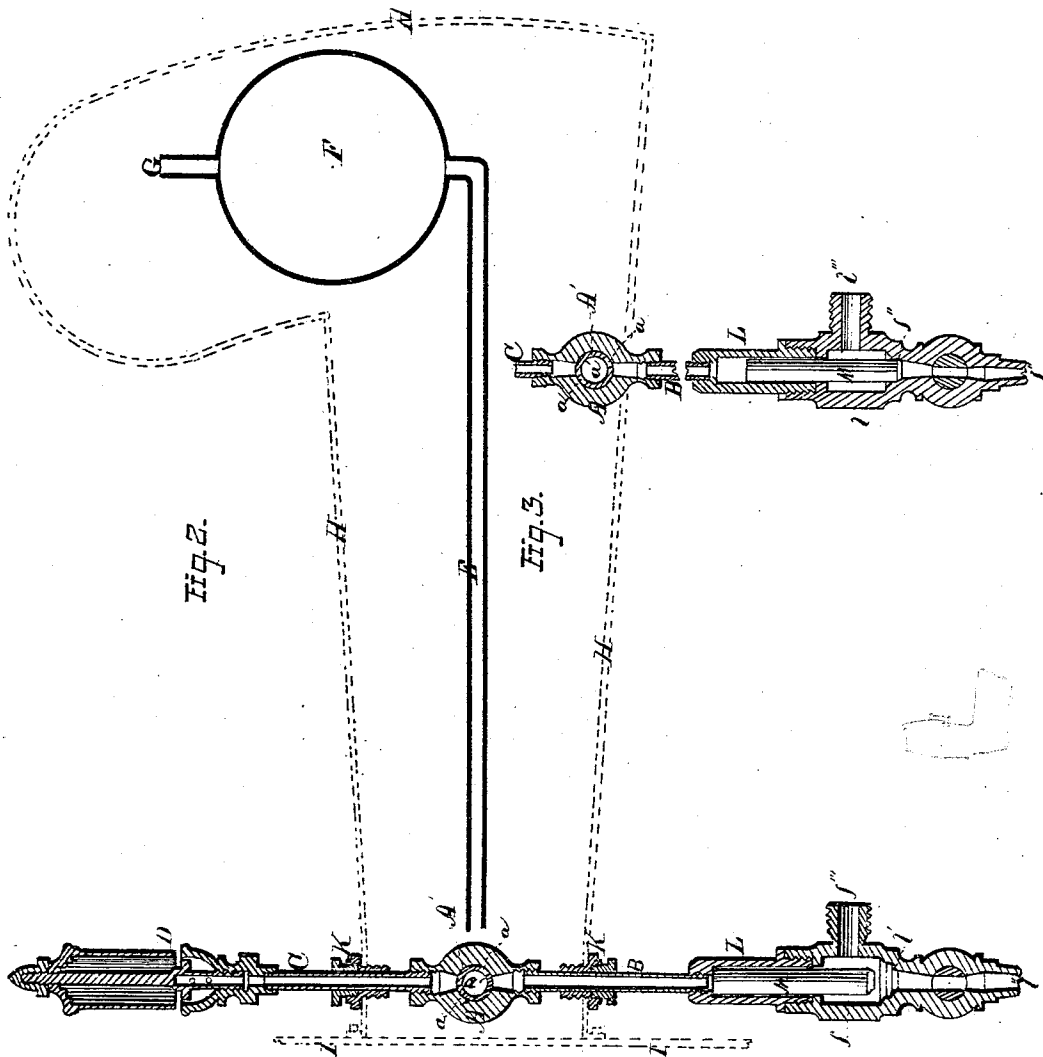
INVENTOR.

W. S. Vosburgh, by
Orindle and Crane his Attys

M. S. VOSBURGH.
Feed-Boiler Regulators.

No. 149,011.

Patented March 24, 1874.



WITNESSES:

INVENTOR.

James Hutchinson
Harry Coleman

W. S. Vosburgh, by
Orindle and Crane, his Attys

UNITED STATES PATENT OFFICE.

MARTIN S. VOSBURGH, OF ATTICA, NEW YORK.

IMPROVEMENT IN FEED-BOILER REGULATORS.

Specification forming part of Letters Patent No. **149,011**, dated March 24, 1874; application filed September 20, 1873.

To all whom it may concern:

Be it known that I, MARTIN S. VOSBURGH, of Attica, in the county of Wyoming and in the State of New York, have invented certain new and useful Improvements in Feed-Boiler Regulators; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings making a part of this specification, in which—

Figure 1 is a side elevation of my apparatus as applied to the side of a boiler, the dotted lines indicating the shell of said boiler and the casing for said apparatus. Fig. 2 is a vertical central section of the same, with the parts in the positions occupied when the water is at the proper height; and Fig. 3 is a like view of the operating cock and water-regulating valve, with their casings, when the water in the boiler has passed below the desired level and the pump is operating.

Letters of like name and kind refer to like parts in each of the figures.

My invention is an improvement upon a "Low-Water Detector," for which Letters Patent No. 134,499 were issued to me upon the 31st day of December, 1872, and has for its object the automatic regulation of the height of water within the boiler, to which end it consists, principally, in combining, with a steam-cock operated by means of a float that rests upon, and rises and falls with, the water of a boiler, a piston or plunger, which, by the action of steam, will cause the feed-pump to operate when said water passes below a fixed point, substantially as and for the purpose hereinafter specified. It consists, further, in arranging said water piston or plunger so that, while its motion by the action of steam shall cause the pump to operate, the removal of steam-pressure and the raising of the water level within the boiler above a certain point shall arrest the action of said pump by wasting its water and admitting air to its cylinder, substantially as and for the purpose hereinafter shown.

In the annexed drawings, A represents a two-way cock of usual construction, connected at its ends to or with suitable pipes B and C, the latter of which extends vertically upward, and has attached to its upper end an ordinary

steam-whistle, D. The plug A' of the cock A is provided with a straight radial channel, *a*, and with a central longitudinal channel, *a'*, the latter of which extends into the end of said plug, and from thence opens radially outward.

A pipe, E, is inserted at one end within the opening *a'*, and from thence extends horizontally outward, and has its outer end turned upward and secured within the lower side of a hollow metal sphere or float, F. A short open pipe, G, inserted within the upper side of said float affords communication between the exterior and interior of the latter and the pipe E. The apparatus thus constructed is placed within a casing, H, which, at its open end, is attached to or upon the side of a boiler, I, near its water-line, the cock A, pipe E, and float F being contained within said casing, while the pipes B and C pass vertically outward through suitable stuffing-boxes K. As thus arranged the water and steam from within the boiler pass freely into the casing, and said water maintains a corresponding height in each, while the float F is supported by said water, and rises and falls with the same. The relative radial lines of the opening *a* through the plug A' and the pipe E of the float F are such that when the water within the casing raises said float until said pipe has substantially a horizontal line, the passage of steam through said pipe and the cock is prevented; but when the water falls much below the required point, said opening *a* coincides with the upper opening in said cock, and steam passes freely through the same into the pipe C and causes the whistle to sound, such construction and operation being substantially the same as is shown in my patent before named.

In order that the operation of the feed-pump may be controlled by the alarm apparatus described, I attach to the lower end of the pipe B a cylinder, L, which at and for some distance below its upper end has a round straight bore, below which the size of said bore is considerably increased, and at the lower end of such enlargement *l* is formed a conical valve-seat, *l'*. An opening, *l''*, extends downward from said seat and is connected to or with the cylinder of the pump, while through one side of said cylinder L is provided a passage, *l'''*, that communicates with the external air. A

piston or plunger, M, is closely fitted to or within the cylinder L, and substantially fills its upper portion, while capable of moving freely in a longitudinal direction. Upon its upper end said plunger is plane, while its lower end is fitted to the valve-seat *l'*, so that when resting upon the same it operates as a valve and closes the passage *l'''*.

The apparatus is now arranged to operate as follows: The portion of the opening *a* within the plug *A'* which connects with the pipe B is slightly enlarged so as to cause steam to pass into said pipe before it is permitted to pass upward to the whistle. Upon its admission to the pipe B, the steam presses the plunger downward upon its seat, and by closing the passage *l'''* prevents the admission of air to the pump-cylinder, or the escape of water from the same, except through the feed-pipe to the boiler, by which means the operation of said pump is insured and the level of water within said boiler raised. When the height of water within the boiler is sufficient to close the steam-cock, steam ceases to enter the pipe B, while such steam as is contained therein escapes into and through the branch pipe *l'''* so as to relieve the plunger from downward pressure, after which the pressure of the water within the pump-cylinder will raise said plunger and permit said water to escape outward through said branch pipe, while at each upward or suction movement of the pump-plunger air will be drawn inward and prevent an equal quantity of water from being drawn into the pump-cylinder. In practice it is found that in cases where a regular quantity of steam is withdrawn from the boiler there is a constant escape of steam into the cylinder L, and the plunger is pressed nearly down to its seat, but not sufficiently near to prevent the egress of water and the ingress of air to the pump, the quantity of both of the latter which passes beneath said plunger being just sufficient to cause the flow of water from said pump to the boiler to just equal in quantity the water which is converted into steam. In the event of a greater or less quantity of steam being suddenly required, the plunger will be forced entirely down upon its seat, so as to give full action to the pump-plunger, or removed so far from said seat as to entirely arrest the action of said pump. The relative areas of the upper end of the plunger, and of the opening covered by its lower end, cause the steam to exert a greater pressure than

that exerted by the water, as, otherwise, the pressure within the pump and boiler being substantially the same, the operation of the device would not be so easily and perfectly controlled. While it is desirable to have the plunger-cylinder L attached directly to the pump, said pump may be removed to any desired point, the only disadvantage arising from such an arrangement being the condensation of steam within the pipe which is used to connect said cylinder to or with the steam-cock. As the apparatus is connected with the casing H by means of the stuffing-box joints only, it will be seen that its vertical position can be varied at will, so as to correspondingly change the height of water within the boiler at which the alarm will sound. Should the pump from any cause fail to supply the boiler with sufficient water to compensate for the consumption, the float will continue to fall until the whistle sounds, and attention is called to the danger.

The apparatus thus constructed and operating furnishes a convenient means for automatically regulating the quantity of water within a boiler, and for warning those in charge whenever the level of said water falls below a safe point, while from the simplicity of its parts it is not liable to get out of order, and can be furnished at a comparatively small cost.

Having thus fully set forth the nature and merits of my invention, what I claim as new is—

1. In combination with a steam-cock, which is operated by means of a float that rises and falls with the water of a boiler, a piston or plunger arranged to open or close the waste-opening of a feed-pump, substantially as and for the purpose specified.

2. The piston or plunger M arranged within its casing L so that the pressure of steam upon its upper end shall cause it to seat upon and close the passage *l''*, while the removal of said steam pressure shall permit the water pressure against the lower end of said plunger to unseat it and open said passage, substantially as and for the purpose shown.

In testimony that I claim the foregoing I have hereunto set my hand this 19th day of September, 1873.

M. S. VOSBURGH.

Witnesses:

GEO. S. PRINDLE,
JOHN R. YOUNG.