

(No Model.)

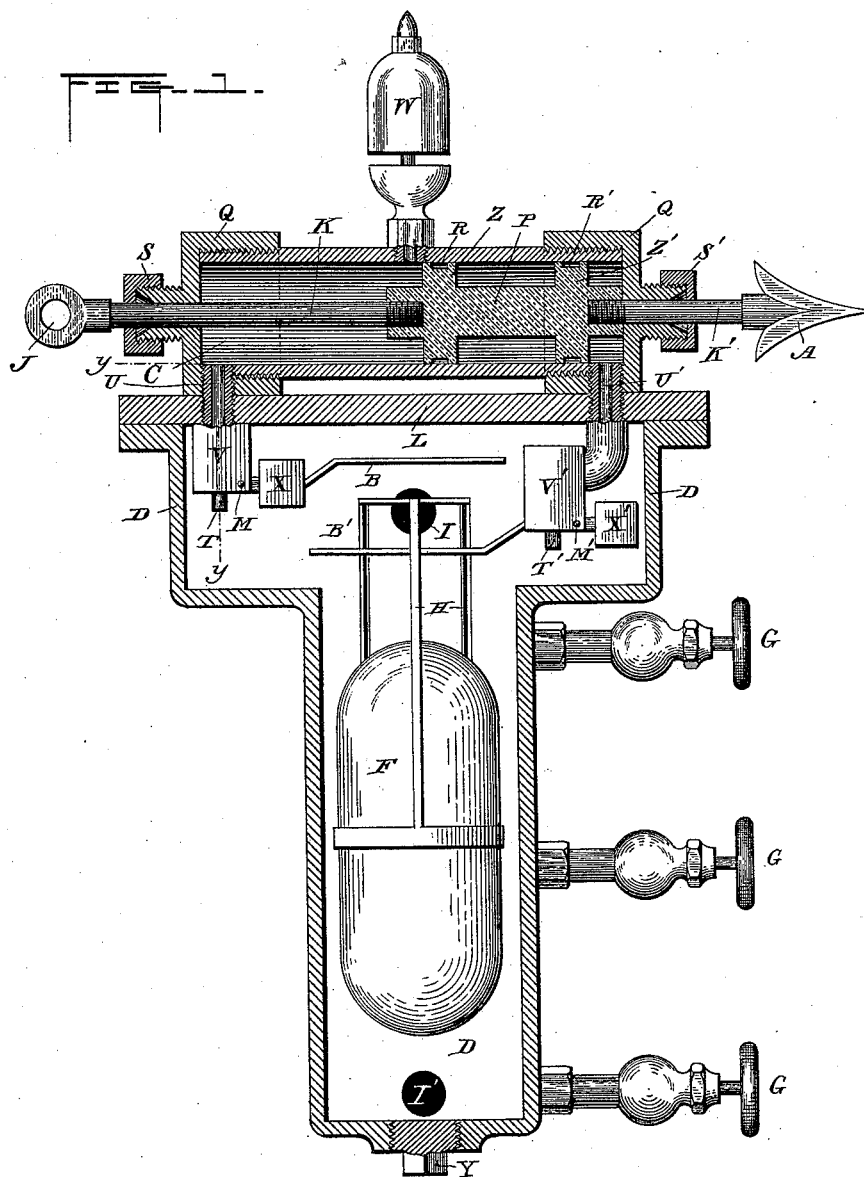
2 Sheets—Sheet 1.

J. S. FORBES.

STEAM BOILER FEEDER AND INDICATOR.

No. 418,607.

Patented Dec. 31, 1889.



WITNESSES.

W. B. Conwin
A. S. Morrow

INVENTOR.

John Sims Forbes
by W. B. Caldwell & Sons
his Attorneys

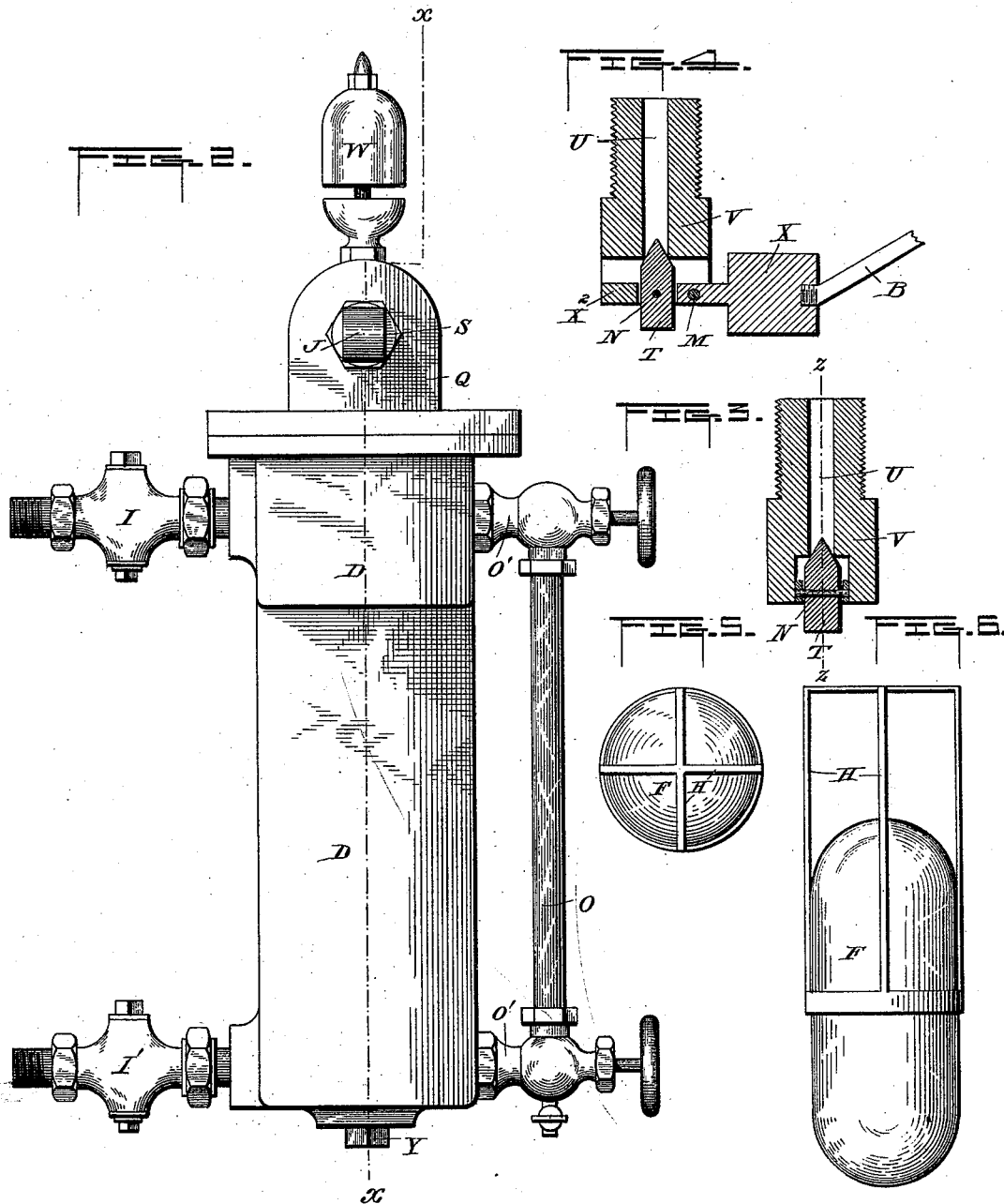
(No Model.)

2 Sheets—Sheet 2.

J. S. FORBES.
STEAM BOILER FEEDER AND INDICATOR.

No. 418,607.

Patented Dec. 31, 1889.



WITNESSES.

M. D. Conway
H. S. Morrow

INVENTOR.

John Sims Forbes
by W. Baxendell & Sons
his Attorneys

UNITED STATES PATENT OFFICE.

JOHN SIMS FORBES, OF PHILADELPHIA, PENNSYLVANIA.

STEAM-BOILER FEEDER AND INDICATOR.

SPECIFICATION forming part of Letters Patent No. 418,607, dated December 31, 1889.

Application filed September 12, 1888. Serial No. 285,180. (No model.)

To all whom it may concern:

Be it known that I, JOHN SIMS FORBES, of the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a new and useful Improvement in Steam-Boiler Feeders and Indicators; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a vertical central section of a water-level indicator constructed according to the principles of my invention. Fig. 2 is a side elevation thereof, the line xx indicating the section-plane of Fig. 1. Fig. 3 is a vertical section of one of the valves shown in Fig. 1, the section being on the line yy of that figure. Fig. 4 is a vertical section on the line zz of Fig. 3. Fig. 5 is a top plan view of the float F and its inclosing-frame, and Fig. 6 is a side elevation thereof.

Like symbols of reference indicate like parts in each.

In the drawings, D represents a drum or chamber, which is adapted to be connected to a steam-boiler at the top and bottom by means of connecting-pipes I , and which is preferably fitted with a water-gage tube O , connected with the drum by connections O' , Figs. 1 and 2. The drum D is preferably provided with several gage-cocks G , and its upper end is enlarged, as shown in Fig. 1, for the purpose of conveniently accommodating the mechanism of the apparatus, and is fitted with a covering-cap L , on the top of which is mounted a cylinder C . This cylinder communicates at its ends with the drum through passages $U U'$, and contains a plunger P , having at each end a shoulder or piston $Z Z'$, these pistons being provided with the usual packing-grooves $R R'$.

W is a whistle, which is connected with the cylinder C , so as to be in communication therewith when the plunger P is at either end of its stroke.

K is a rod, which projects from one end of the plunger, and which has at its end a coupler-joint J , by which it may be attached to the valve which governs a feed-pump or injector, and K' is a rod which projects from the other end of the plunger, and which has at its end a pointer or arrow A . The rods K

and K' fit movably in stuffing-boxes $S S'$ in the heads or caps $Q Q'$ of the cylinder. The passages $U U'$, which lead from the cylinder C to the drum, are provided with hollow valve-casings $V V'$, which are controlled by valves $T T'$. The construction of the valves is shown in Figs. 1, 3, and 4.

Referring to the casing V , T is the valve, which is preferably provided with a ground or conical point, and is pivotally mounted by a pin N in a hole or slot in the arm of a lever X^2 . This lever is pivoted by a pin M in a slot in the lower end of the casing V , and is provided with a weight X , which tends to hold the valve to its seat in the orifice of the casing.

B is an arm or lever which projects from the weight X within the enlarged portion of the drum D .

The valve-casing V' is provided with a similar valve T' , having a weight X' , projecting arm B' , and pivot M' ; but in this valve the arm B' projects from the inner end of the lever X^2 and not from the weighted end, so that whereas the valve T is unseated by raising its lever B , the valve T' is unseated by depressing its lever B' . The motions of these levers necessary to operate the valves are effected by a float F , which is within the drum D , and is provided with an upwardly-extending cage H . The arms of the lever B' extend through the uprights of the cage and the lever B is above, but in the path of vertical movement of the cage. The function of this cage is to afford means for operating the levers, and it may therefore be changed in form, the only essential being that the float be provided with devices for engaging and moving the levers, without rigid connection therewith.

At the bottom of the drum D , I prefer to have a plug Y , which may be opened to discharge mud or sediment deposited in the drum from the water.

The operation of the apparatus is as follows: By reason of the connection of the drum with the boiler, the water stands at the same level in both, and any change in level of the water produces a corresponding rise or fall of the float F and its cage H . Suppose that the water in the boiler falls to an improper extent. In the consequent downward motion

of the float it moves freely until the top wires of the cage H engage the lever B', when the weight of the float overcomes the gravity of the counter-weight X' and depresses the lever so as to unseat the valve T'. This affords an open passage through the opening U' for steam, which ascends therethrough into the cylinder C to the clearance-space at the right of the piston Z', and forces the plunger P through the cylinder to the right until the piston Z' passes the port of the whistle W. The effect of this is twofold. It opens the whistle-port, and the steam entering it sounds the whistle and indicates to the engineer the fall of water, and the movement of the piston-system K opens the valve of the injector and causes the latter to discharge water into the boiler. When a sufficient quantity of water has been introduced, the consequent elevation of the float disengages the top of the cage H from the lever B', the weight X' closes the valve T' automatically, and by thus cutting off the entrance of steam to the cylinder C stops the sounding of the whistle, and when the normal quantity of water has been injected into the boiler the engineer may close the injector-valve, and thus restore the plunger P into the position shown in Fig. 1. If, however, from inattention or otherwise, the engineer should neglect to shut the injector-valve the rise of water in the boiler will elevate the float F, so that the top of the cage H will raise the lever B, thus unseating the valve T and permitting steam to enter the cylinder C to the left of the piston Z. This forces the plunger P to the right into the position shown in Fig. 1, thus automatically closing the injector-valve. It also opens the whistle-port, and the whistle will continue to blow until the water-level is lowered either by the engineer or by natural vaporization. At each sound of the whistle the position of the plunger is shown by the pointer A, and the engineer may therefore know at a glance whether the alarm is sounding for high or for low water. The pointer is therefore a convenient accessory to the apparatus; but it may be omitted without impairing the action of the other parts.

If it be desired that the apparatus be used simply for the purpose of sounding an alarm and not as an automatic feed-water regulator, the plunger P and its accessory parts may be omitted, in which case the part C will serve merely as a communicating channel between the passages U U' and the whistle W.

The many advantages of my improvement will be apparent to those skilled in the art who may read this specification or who may make use of the apparatus. It is simple and cheap in its construction, very reliable in its action, and is not apt to leak steam or to get out of order. The cylinder C, being normally cut off from the drum D by the valves T T', is not under ordinary conditions filled with live steam, and the stuffing-boxes of the stems

of the plunger P need not be made so tight as to exert too much frictional resistance against motion thereof.

I claim—

1. The combination of a drum or chamber adapted to be connected with a boiler, and provided with a steam-actuated alarm—such as a whistle—valves which control the communication between the drum and whistle, a float situate within the drum, and levers projecting from said valves into the path of motion of the float, said levers being so arranged relatively to the float that one thereof shall be directly engaged and opened thereby on the rise of the float, and the other engaged and opened on the fall thereof, substantially as and for the purposes described.

2. The combination, with the valve-seat of the steam-passage and the float, of a valve which is mounted on a pivoted stem, the stem of the valve being arranged to be engaged by the float, and a counter-weight on said pivoted stem, which tends to seat the valve, substantially as and for the purposes described.

3. The combination of the steam-boiler, a chamber D, connected therewith by at least two passages, which afford constantly open communication between the boiler and said chamber, one of said passages leading from said boiler below the normal water-level therein; and the other leading therefrom above said water-level, a cylinder C, a plunger or piston within the cylinder, having a stem adapted to be connected with an injector or pump valve, steam-passages leading to the opposite ends of the cylinder, valves controlling the same and so arranged relatively to the float that one of said valves shall be opened by the rise of the float and the other opened by descent thereof to effect motion of the plunger or piston in reverse directions, substantially as and for the purposes described.

4. The combination of the float, a cylinder C, a plunger or piston within the cylinder, having a stem which is adapted to be connected with an injector or pump valve, steam-passages leading to the opposite ends of the cylinder, valves controlling the same and so arranged relatively to the float as to be opened by motion thereof, one passage being opened by rise of the float and the other by the fall thereof, and a steam-actuated alarm—such as a whistle—having a connection with the cylinder, which is controlled by motion of the plunger or piston, substantially as and for the purposes described.

5. The combination, with the float and the pivoted valves having projecting stems or levers, of a cage on the float, one of said stems or levers extending within the cage and the other arranged outside the same, substantially as and for the purposes described.

6. The combination of the float and its inclosing-chamber, valves controlling passages

leading from said chamber, and pivoted le-
vers projecting from the valves into the path
of the float, one valve being on the outer side
of the pivot of its lever and the other valve
5 being between the pivot and the end of the
lever, whereby one valve may be opened by
rise of its lever, and the other opened by de-
pression of its lever, substantially as and for
the purposes described.

In testimony whereof I have hereunto set to
my hand this 31st day of August, A. D. 1888.

JNO. SIMS FORBES.

Witnesses:

JNO. C. SIMS, Jr.,
WM. R. CUSHMAN.