(No Model.)

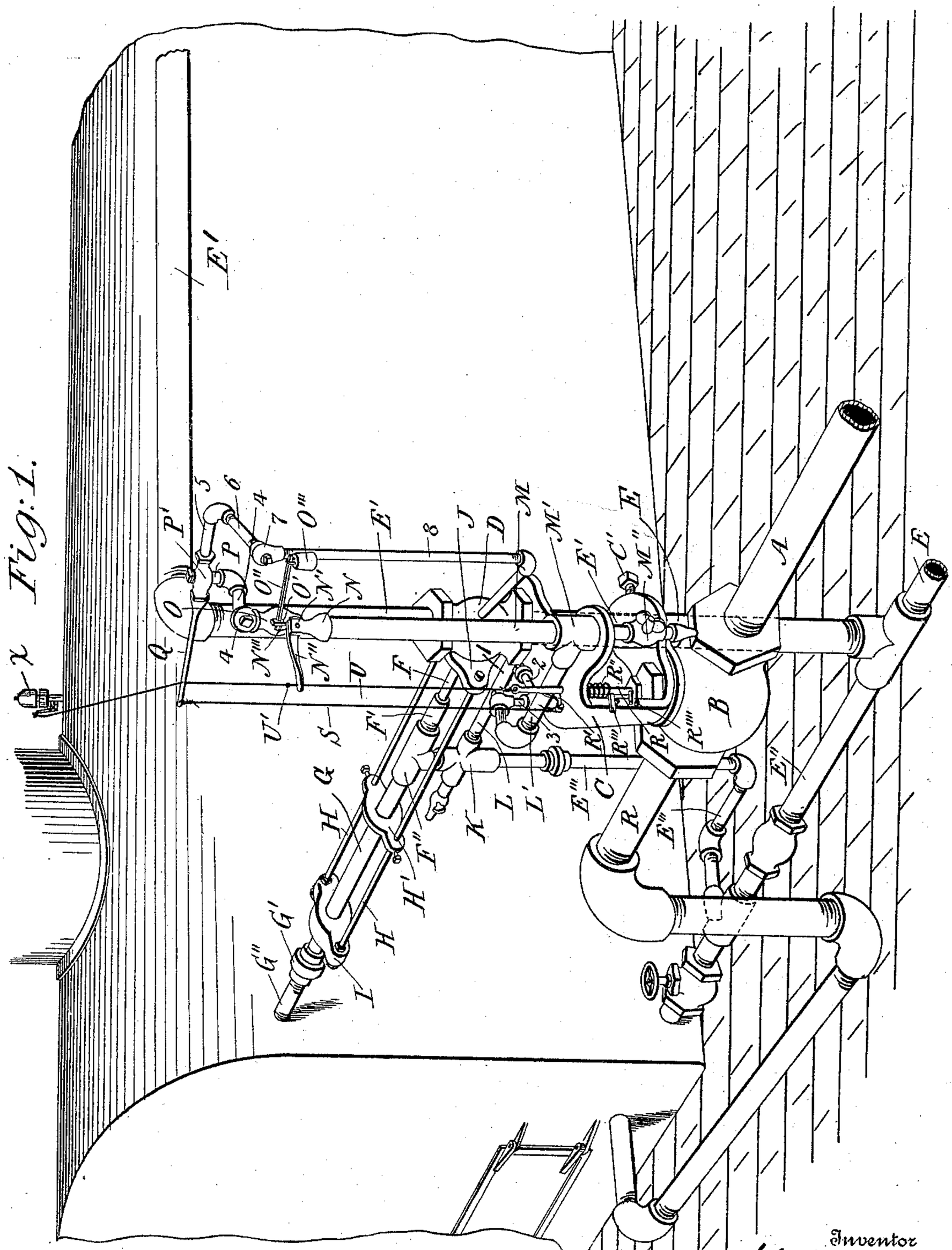
2 Sheets—Sheet 1.

J. W. DEARDUFF.

FEED WATER REGULATOR, GAS CUT-OFF, AND ALARM FOR BOILERS.

No. 598,499. Patented Feb. 8, 1898.

Fig. 1.



Witnesses
A. E. Glascock
Walter W. Darrell.

Inventor
John Wm. Dearduff
by
Charles E. Adamson
his Attorney

(No Model.) 2 Sheets—Sheet 2.

J. W. DEARDUFF.

FEED WATER REGULATOR, GAS CUT-OFF, AND ALARM FOR BOILERS.

No. 598,499. Patented Feb. 8, 1898.

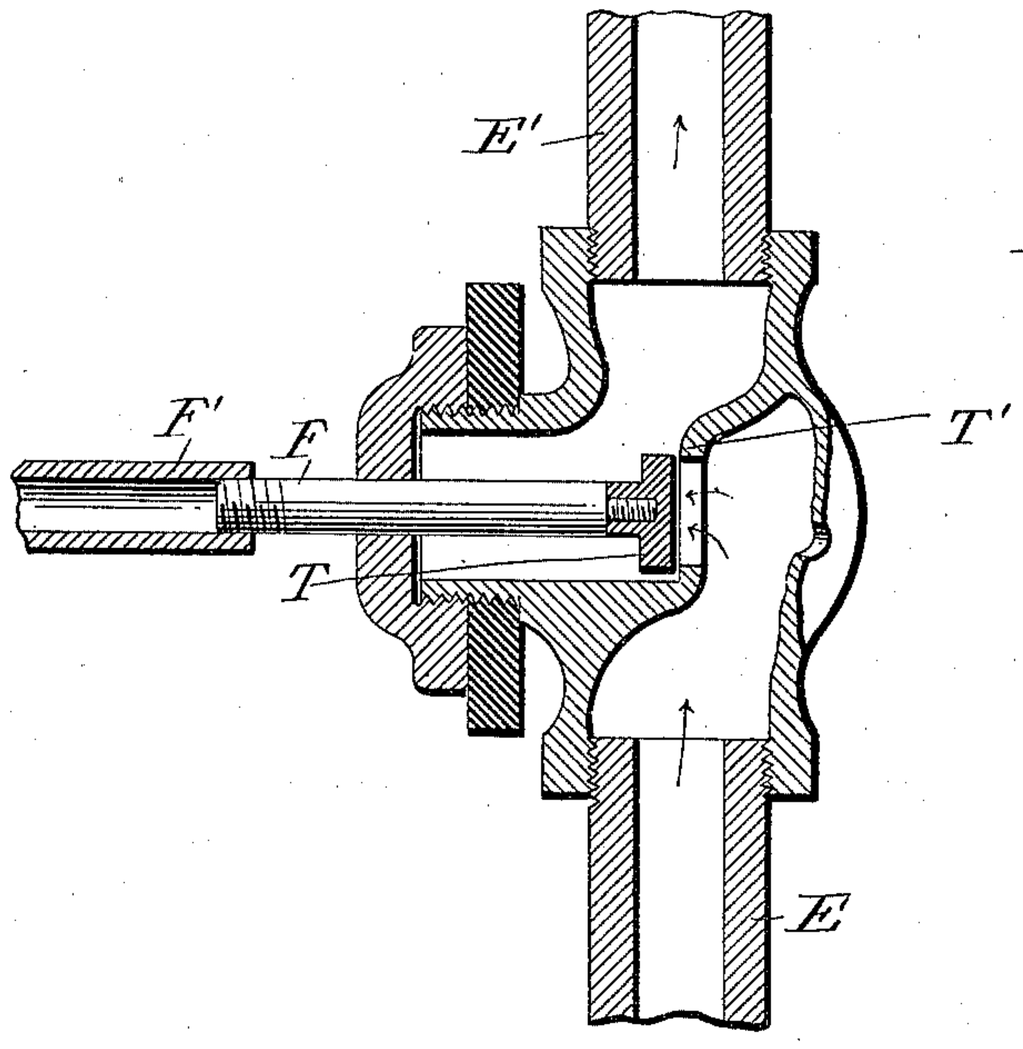


Fig: 2.

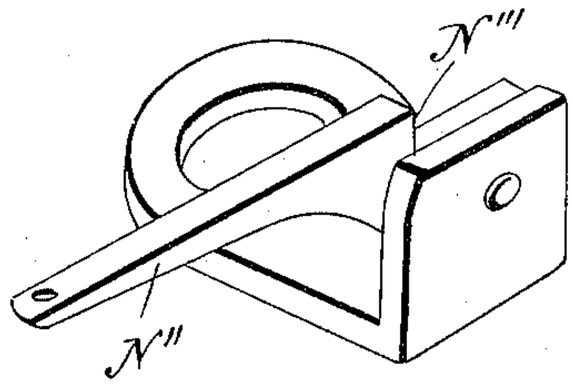
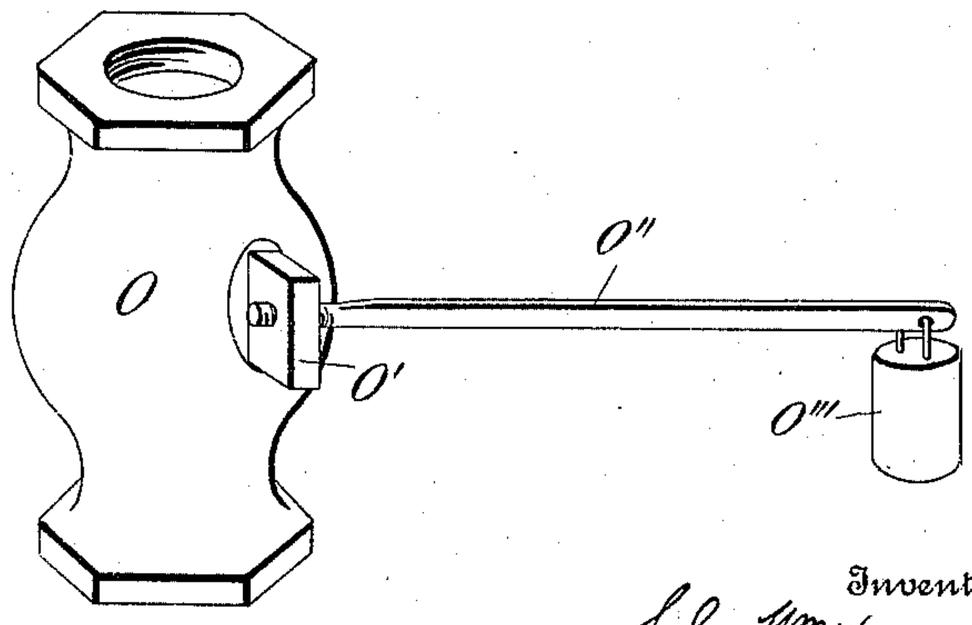


Fig: 3.

Fig: 4.



Witnesses
A. E. Glanzek.
Walter L. Darnell.

Inventor
John Wm. Dearduff
by Charles E. Adamson
his Attorney

UNITED STATES PATENT OFFICE.

JOHN WM. DEARDUFF, OF MOLLIE, INDIANA, ASSIGNOR OF ONE-HALF TO WM. J. BAKER, OF MONTPELIER, INDIANA.

FEED-WATER REGULATOR, GAS CUT-OFF, AND ALARM FOR BOILERS.

SPECIFICATION forming part of Letters Patent No. 598,499, dated February 8, 1898.

Application filed July 2, 1897. Serial No. 643,247. (No model.)

To all whom it may concern:

Be it known that I, JOHN WM. DEARDUFF, a citizen of the United States, residing at Mollie, in the county of Blackford and State of Indiana, have invented certain new and useful Improvements in Feed-Water Regulators, Gas Cut-Offs, and Alarms for Boilers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in feed-water regulators, gas cut-offs, and alarms for boilers; and the objects of my invention are to construct a mechanism that will regulate the feed-water to the boiler, give an alarm in case the feed-water stops or runs too low in the boiler, and shut off the gas or oil fuel supply to the furnace. I attain these objects by the mechanism illustrated by the accompanying drawings, in which—

Figure 1 is a general or perspective view of my mechanism as applied to a boiler. Fig. 2 is a vertical section of the overflow-valve and connecting parts, and Figs. 3 and 4 are detail views.

Similar letters and numerals refer to similar parts throughout the several views.

My invention consists in an arrangement of pipes, valves, &c., suitably connected to a boiler, which will be more fully understood from the following description.

A is the gas or oil fuel supply pipe, which is provided with a shut-off valve B, located at the base of my mechanism a few feet from the boiler, as shown in Fig. 1. C is a saddle or yoke resting on and secured to the valve B. On the upper plate of the yoke C rests the water-overflow valve D. One branch of the feed-water pipe (marked E) comes up through the yoke and enters the lower end of the valve D, all as shown in the drawings.

The feed-water pipe E comes from an ordinary feed-pump or injector, such as is used to feed boilers. It branches off by a T, as shown, one line E′ going up to the water-valve, forming an overflow, and the other line E″ going directly into the lower part of the boiler. A check-valve is located in the line E″ to prevent back flow from the boiler, and a globe-valve is also located in the said line to use in case of repairs, &c. A branch E‴ is attached to the line E″ between the check and globe valves, as shown in the drawings, the said branch E′ reaching up and connecting with the regulating parts, all as shown.

The water regulating or overflow valve D is located at about the water-line of the boiler, and on the side next to the boiler is a valve, the stem F, which is connected to a copper tube G by means of a coupling F′, and a T connection F″, all as shown in Figs. 1 and 2. The tube G extends almost to the boiler, being connected to it at a point on a level with the water-line by a union G′ and a short piece of iron pipe G″, as shown in Fig. 1. The copper pipe is thoroughly braced sidewise by two rods H H, the ends of the said rods being firmly secured to the plates I and J. The tube G is threaded into the plate I and into the T connection F″, being free to slide in the center plate H′ by the hole in said plate being some larger than the tube. The said plate H′ is held rigidly to the brace-rods by set-screws, as shown, and the plate forms a brace for the tube G, all this construction being provided so that the tube may lengthen freely when it is heated by steam from the boiler, the expanding and contracting of the tube causing the valve D to be opened and closed as the level of water in the boiler changes.

To the lower part of the T F″ is connected a short nipple and then a cross connection K is secured, from the lower end of which is connected the upper end of the branch E‴, all as shown in Fig. 1. To one of the side connections of the cross K is secured a branch pipe L. This pipe is provided with three short nipples 1, 2, and 3, connecting and fitting the line L to the line L′, so that the lateral movement of the tube G will not be retarded. The line L′ enters the T connection M′ at the lower end of the vertical copper expansion-tube M, and below which is an outlet or stop cock M″ to be used when necessary.

To the upper end of the tube M is a reduced coupling N, above and to which is secured a cut-off O. Between the said cut-off and coupling is secured a bracket N′, (see

Fig. 3,) in which is pivoted a lever N″. The flat end O′ of the cut-off is made to engage in a notch N‴ when the valve is open and the mechanism in use. A short arm O″ and a weight O‴ are secured to the flat projection O′ of the cut-off, so that when the lever N″ is moved down the lever and weight O″ and O‴ will turn the cut-off so water or steam cannot pass through it. Above the cut-off O is a fitting 4, from which extends a short pipe P, on the end of which pipe is an L, and above this rests a spring check-valve P′. From one end of the check extends an arm Q and from the other end a short pipe 5, connecting to an L, turning again at right angles and connecting to another pipe 6, then to a fitting 7, and then turning down until at a point level with the valve D, where the pipe turns again at right angles and connects into the said valve, all as shown in the drawings.

The operation of my mechanism is as follows: First, the boiler is filled with water up to the proper line and then the gas-shut-off valve is opened by the stem R being raised up and the pawl R′ set in a notch in the stem R, resting on the upper surface of the yoke C, all as shown in Fig. 1. A coil-spring R″ is fitted to the stem and under side of the upper plate of the yoke, so as to press the stem R down. A wire S is fitted and adjusted between the pawl R′ and the arm Q, so that by the least raise on the arm the pawl is drawn out of the notch, allowing the stem to spring down and shut off the gas. A lever or stop R‴ is secured to the stem R, so that by inserting a pin R⁗ in one of the holes in the yoke the valve may be set so that it will shut all or only a part of the gass off. As soon as steam is up in the boiler the water is started from the pump or injector. The water enters the boiler through the pipes E E″, and the flow is set to run just a little more water than the boiler is supposed to require, the surplus going up out through the line E′. The overflow is regulated by the valve D and expansion-tube G, the operation of which is as follows: The tube G is set on the water-line, and it therefore either contains water or steam all the time. If the water runs below it in the boiler, the steam enters the tube, forcing the water back and heating and expanding (lengthening) the tube, thereby closing the water-passage through the valve D, and the water then all enters the boiler. As soon as the water is ahead or above tube G the water enters it from below through the pipes L and E‴, (and from the boiler through pipe G″,) filling it with cold water, causing it to contract, and drawing the valve T away from the seat T′, allowing a portion of the feed-water to escape up through the valve D and out through the upper part of the overflow-line E′. This operation of opening and closing of the valve D T is going on more or less all the time as the condition of the water changes in the boiler, so that the water is practically kept at or nearly one place in the boiler all the time.

Should an accident happen to the feed-water supply by the pump or injector failing to work, the mechanism will act as follows: The water running below the proper line or below the connection G″, steam enters the expansion-tube G, closes the overflow-valve D T, and steam enters the line L L′, passing in at the bottom of the tube M, going up and forcing the cold water up out of it around through the pipes 4, 5, 6, and 8, back into the valve D, and as soon as the steam fills up the tube M it, being made of copper, will expand or lengthen, rising up with the pipe 4 and check-valve P′, which causes the lever Q to rise, pulling the rod S, displacing the pawl R′, and allowing the stem R to drop down, and in dropping it pulls the wire U down, and the wire being connected to a whistle X sounds the alarm. At the time the wire is pulled down the lever N″ is tripped by a knot U′, so that the weight O‴ will close the stop-valve O, preventing steam from escaping back into and through the pipes E′ and E.

The arrangement of the pipes and connections 4, 5, 6, and 7 at the top of the tube M is for the purpose of allowing a free rise or upward movement of the tube and at the same time increase the length of the pull on the rod or wire S.

I may make minor changes in the arrangement of my mechanism to suit the different kinds of boilers or for special purpose without departing from my invention.

Having thus described my invention, I claim the following and desire to secure the same by Letters Patent:

1. In a feed-water and fuel regulator and alarm for boilers, the combination with the feed-water pipe and fuel-feed pipe, of a waste-pipe leading from the feed-water pipe, a valve in the waste-pipe, an expansion-tube leading from the water-line in the boiler controlling the valve, a check-valve in the feed-water pipe, a connecting-pipe E‴ extending from the feed-water pipe between the check-valve and boiler and connected to the expansion-tube, an expansion-tube M connected to the connecting-pipe, a valve in the fuel-pipe and means connecting the valve and expansion-tube M for closing the valve upon the expansion of the said tube.

2. In a feed-water and fuel regulator and alarm for boilers, the combination with the feed-water pipe and fuel-feed pipe, of a waste-pipe leading from the feed-water pipe, a valve in the waste-pipe, an expansion-tube leading from the water-line in the boiler controlling the valve, a check-valve in the feed-water pipe, a connecting-pipe E‴ extending from the feed-water pipe between the check-valve and boiler and connected to the expansion-tube, an expansion-tube M connected to the connecting-pipe, a branch pipe leading from the expansion-tube M to the waste-pipe, a valve in the fuel-pipe, and means connecting the valve and expansion-tube M for closing the valve upon the expansion of the said tube.

3. In a feed-water and fuel regulator and alarm for boilers, the combination with the feed-water pipe and fuel-feed pipe and alarm mechanism, of a waste-pipe leading from the feed-water pipe, a valve in the waste-pipe, an expansion-tube leading from the water-line in the boiler controlling the valve, a connecting-pipe E''' extending from the feed-water pipe and connected to the expansion-tube, an expansion-tube M connected to the connecting-pipe, a valve in the fuel-pipe, means connecting the valve and expansion-tube M for closing the valve upon the expansion of said tube, and mechanism for actuating the alarm mechanism upon the closing of the valve.

4. In a feed-water and fuel regulator and alarm for boilers, the combination with the feed-water pipe and fuel-feed pipe, of a waste-pipe leading from the feed-water pipe, a valve in the waste-pipe, means for controlling the valve, a pipe leading from the water-line in the boiler, a connecting-pipe E''' extending from the feed-water pipe to the pipe leading from the boiler at the water-line, a pipe leading from the connecting-pipe E''' at a point opposite the low-water line of the boiler, an expansion-tube on the end of said pipe, an alarm mechanism, a valve in the fuel-pipe, and means connecting the valve and alarm mechanism with the expansion-tube for closing the valve and actuating the alarm mechanism upon the expansion of the tube.

5. In a feed-water and fuel regulator and alarm for boilers, the combination with the feed-water pipe and fuel-pipe, of a waste-pipe leading from the feed-water pipe, a valve in the waste-pipe, means for controlling the valve, a pipe leading from the water-line in the boiler, a connecting-pipe E''' extending from the feed-water pipe to the pipe leading from the boiler at the water-line, a pipe leading from the connecting-pipe E''' at a point opposite the low-water line of the boiler, an expansion-tube on the end of said pipe, a branch pipe connecting the expansion-tube and waste-pipe, a check-valve in the branch pipe, a valve normally open in the expansion-tube, a valve in the fuel-pipe, means connecting the valve and expansion-tube for closing the valve upon the expansion of the tube and mechanism for closing the normally open valve in the expansion-tube upon the closing of the valve in the fuel-pipe.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN WM. DEARDUFF.

Witnesses:
J. E. OWEN,
A. S. CASTERLINE.