

(No Model.)

C. C. FERGUSON.
AUTOMATIC FEED REGULATOR.

No. 486,668.

Patented Nov. 22, 1892.

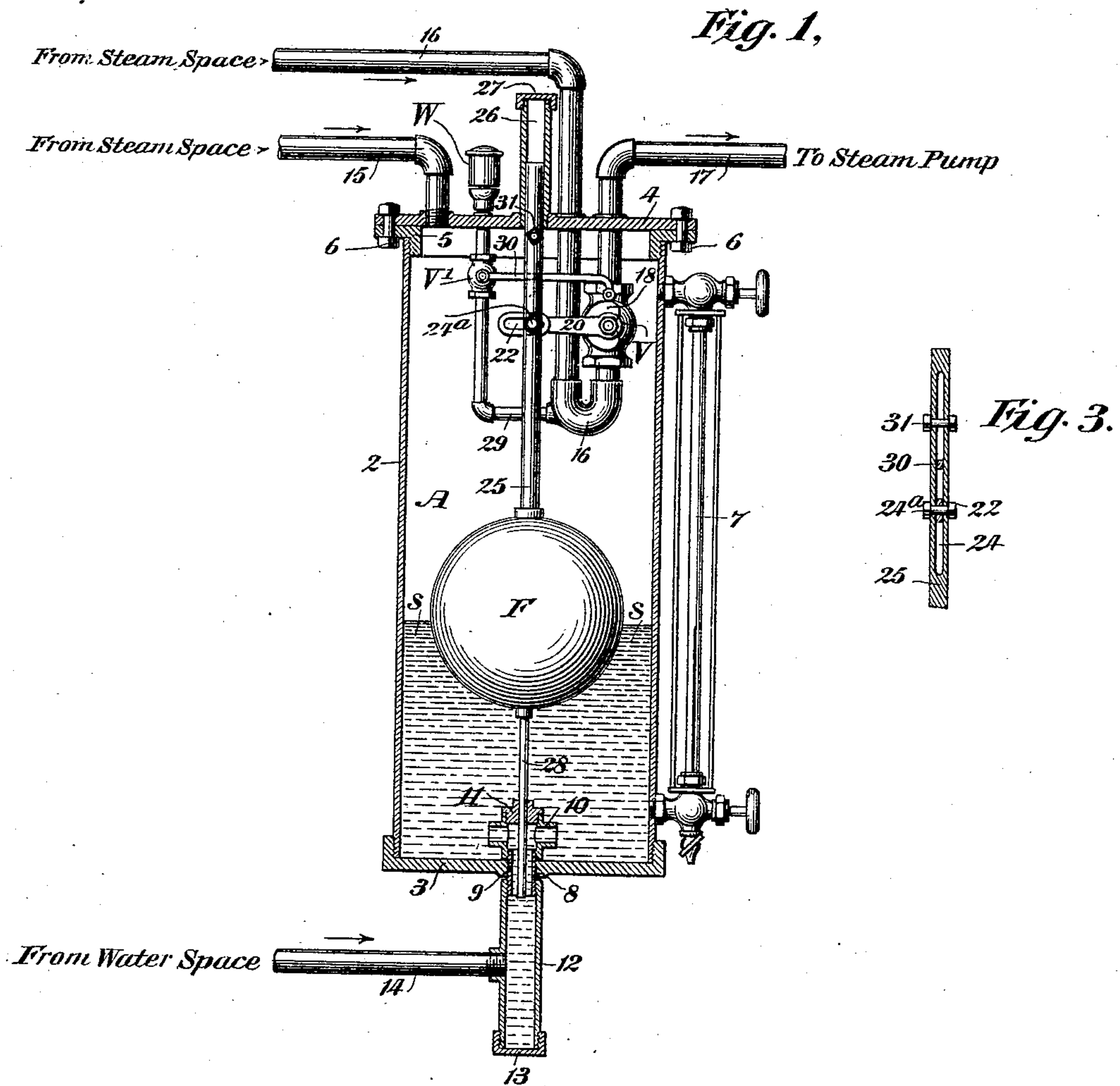
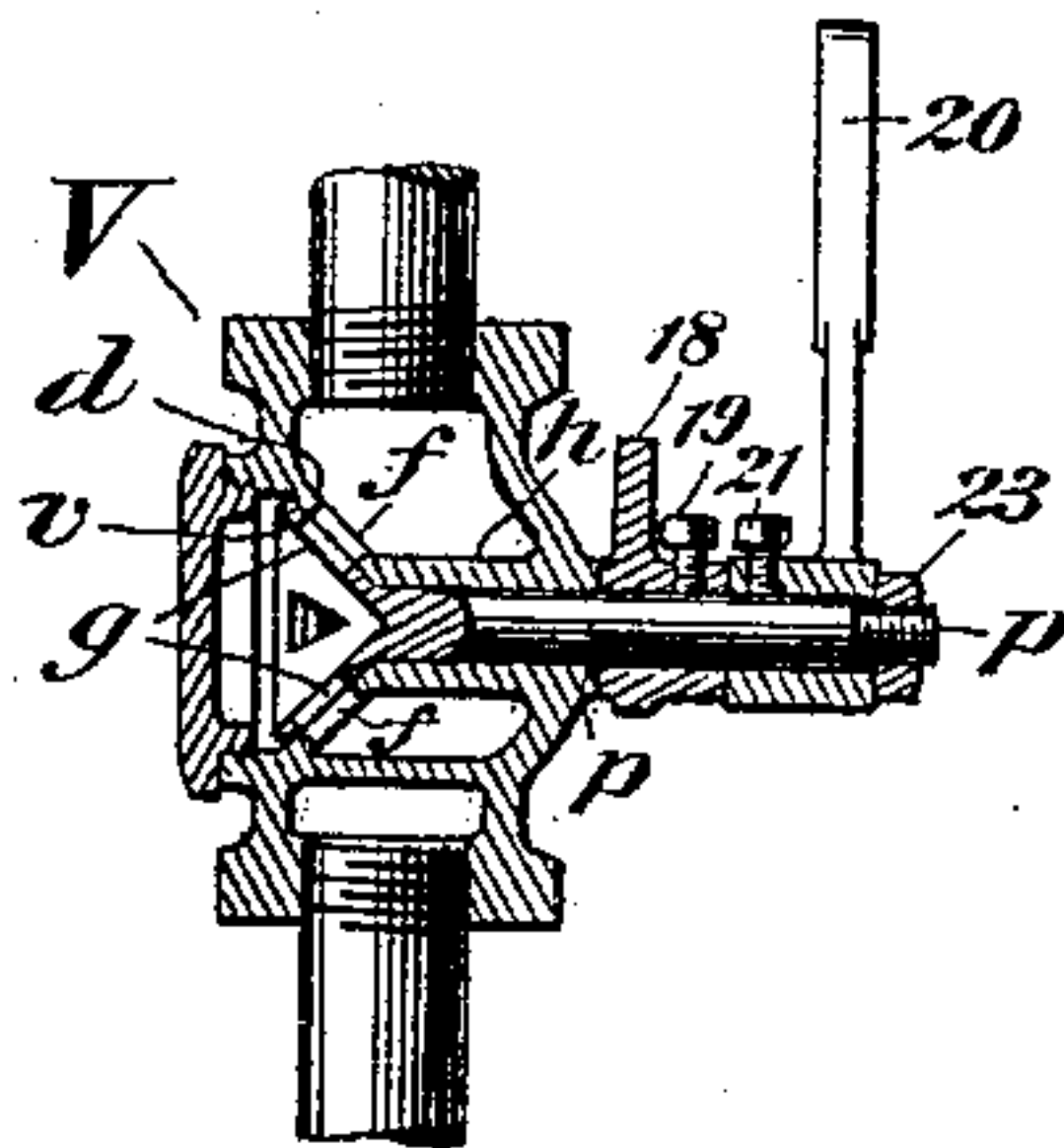


Fig. 2,



Witnesses
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UNITED STATES PATENT OFFICE.

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AUTOMATIC FEED-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 486,668, dated November 22, 1892.

Application filed March 31, 1892. Serial No. 427,164. (No model.)

To all whom it may concern:

Be it known that I, CLAYTON C. FERGUSON, a citizen of the United States, and a resident of the city, county, and State of New York, have invented certain new and useful Improvements in Automatic Feed-Regulators and Alarms, of which the following is a specification.

My invention relates to means for automatically regulating the feed of water to boilers and for other purposes; and it consists of a float on the water and a valve or valves for controlling the feed located in a steam-space, the valve or valves being controlled by the rising and falling of the water and suitable connections.

This invention relates more specifically to that method of boiler-feed wherein a pump is used to supply the water, though it is applicable to other methods of feeding water to steam-boilers without the use of a pump.

The preferred form of my invention is shown in the accompanying drawings, wherein—

Figure 1 is an elevation, partly in section, of a chamber, the float, the valves, and connections. Fig. 2 is a sectional view of the valve, and Fig. 3 is a detail.

The chamber A is formed by the cylindrical shell 2 and heads 3 4 attached thereto in any usual way. I show the bottom head 3 as being attached by a screw-thread to the shell 2 and the head 4 as being bolted to a flanged ring 5, attached to the shell 2, as by the screw-threads. The bolts and nuts are indicated by the references 6 6. A water-gage, as 7, may be connected with the shell 2 in the usual way. The bottom 3 is shown as having a threaded perforation 8, in which a threaded tube 9 fits in a water and steam tight manner, the tube extending above and below the bottom 3. Screwing upon the top of tube 9 is the T 10, having crossing openings, of which one is a continuation of the tube 9 and the other opens laterally into the chamber A. A perforated plug 11 screws into the upper end of the vertical opening and guides the stem of the float F. Attached to the downwardly-extending end of tube 9 is a tube 12, whose lower end is closed by cap 13, screwed thereto. This tube 12 may rest on a suitable floor or beam to support the chamber A and attached parts. There may be a blow-off cock in tube 12 if desired. Entering tube 12 from one side is

the tube 14 from the water-space of the boiler. (Not shown.) The water passes from the boiler through tubes 14 12 9 and T 10 into the chamber A, its surface being indicated by lines s.

The pipe 15 from the steam-space of the boiler passes through the head 4 and introduces steam in the upper part of chamber A. A valve-casing V within the chamber A is connected with the steam-space of the boiler (or the steam-pipe) by the pipe 16, which also passes through the head 4. A pipe 17 leads from the valve-casing V through head 4 to the steam-pump. The valve is shown in cross-section in Fig. 2. It consists of a diaphragm *h*, having a hollow cone-shaped seat *d*, within which the hollow cone-shaped valve *v* fits and works, the spindle *p* of the valve fitting in and passing through the diaphragm *h* and outside the casing. The valve and valve-seat have an equal number of perforations *f g*, which by the rotation or rocking of the valve *v* may be caused to partly or fully register and open a passage for the steam or to close and shut off all passage. The valve is operated by its spindle *p*. I do not claim the construction of the valve thus far described as my invention, nor do I limit myself to this or any other form of the valve for use in my invention. On the spindle *p* I may place a cam 18, held in place by a screw-bolt 19, for a purpose hereinafter referred to. On spindle *p* I place an arm 20, held thereto by screw-bolt 21, the said arm extending laterally and having a slot 22 therethrough. A nut 23 holds this arm on the spindle and permits of adjustments for wear, &c. The arm 20 passes through a slot 24 in the guide-rod or tube 25, fast to the upper side of float F. A pin or bolt 24^a, passing through the tube 24 and slot 22, connects the arm and tube. Said tube 25 fits in a tube 26, opening into chamber A through the head 4, said tube 26 having a closed upper end 27. The float F has a rod 28 extending downward from its under side, said rod passing through the perforated plug 11, hereinbefore described.

The operation of the parts thus far described is as follows: Assuming that the valve has been closed and that the surface of the water begins to fall, the float F likewise falls and pulls down arm 20, and thus opens the valve *v*, whereupon the steam passes through the

valve and pipe 17 to and starts the pump. (Not shown.) As the water enters the boiler the water in the chamber A will rise, since it is in free communication with the water and steam spaces of the boiler. The rising of float F closes the valve *v* and stops the pump. In practice, the valve would be open more or less and the pump at work constantly when using steam. It will be noted that the head 4 supports the valve and all the pipe connections except the water-pipe 14. By removing bolts 6 6 the shell 2 may be removed and the valve *v* and other parts be handily reached without having to disconnect any pipe other than pipe 14. Of course suitable hand holes in the shell 2 may be used for access to the valve-spindle *p* and other parts for purposes of adjustment of the valve, &c.

To provide against dangers resulting from a failure of the pump to supply feed-water to the boiler, I prefer to have a suitable alarm set to operate when the water in the boiler shall have fallen to a predetermined point. This alarm may consist of and is shown as a steam-whistle W, above and supported by head 4. A pipe 29 connects the whistle with the pipe 16 within the chamber A, said pipe 29 having a suitable valve therein, (see V'.) This valve may be similar to that hereinbefore described, the spindle being provided with an arm 30 only. Arm 30 extends over and is preferably bent at its end toward the spindle *p* in the plane of cam 18, hereinbefore described. It may have a roller on the end to bear on the cam 18 in certain positions of the parts. Arm 30 passes through the slot 24 of tube 25 under a pin or bolt 31, passing through the tube. The function of the pin 31 is to push the arm 30 downward when the float falls to a predetermined level, (the cam 18 will have been turned until there is a space between it and arm 30,) thus opening valve V' and sounding the alarm. When the valve V' is opened, the whistle W will sound until the cam 18 shall have raised the arm 30. Warning will thus be given of low water in time for attendants to prevent damage or disaster. The top of slot 24 may be used to move the arm 30 in lieu of pin 31.

It is understood that all joints are calked or otherwise rendered steam-tight, according to the nature of the same.

The constructions set forth possess some advantages over existing constructions for similar purposes, among which advantages may be mentioned simplicity of construction, absence of stuffing-boxes, full access to the working parts by detaching the shell 2 and flanged ring 5 from the head 4, absence of strain on the pump, maintenance of given level of the water, ease of attachment to existing boilers and pumps, and its automatic action. The valves being in the steam-space will work under about the same conditions of temperature at all times.

To prevent sticking of the valve, there may be an oil-cup on the pipe 16 or on the head

4, with a tube leading therefrom through head 4 to and into the bearing for spindle *p* in the diaphragm *h*. An oil that will be unacted on by steam or hot water should be used.

In case the water-feed is from an overhead tank the pipes 16 17 would connect, respectively, with said tank and the boiler, dispensing with the alarm and attachments; but I do not recommend such a use of the invention, as it may involve the introduction of cold water into the steam-space.

Many changes in details may be made without departing from the substance of my invention.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a feed-regulator, the combination of a casing for containing water and steam, a float and a valve within the casing, pipes leading to and from said valve, and connections between the float and valve, whereby the latter is operated by the rising and falling of the former, substantially as described.

2. In a feed-regulator, the combination of a shell or casing, a float therein, steam-pipes passing through a head of said casing, a valve connected with and supported by said pipes, and connections between said valve and float for operating the first, substantially as described.

3. In a feed-regulator and alarm, the combination of a casing for containing water and steam, a float and two valves within the casing, a steam-pipe leading to one of said valves and having a branch to the other valve, a pipe leading away from said first-named valve, an alarm connected with said second valve, and connections between the float and valves, whereby the last are controlled, substantially as described.

4. The combination of two valves, means for moving them, one in both directions, the other in one direction, a cam on the spindle of the first of said valves, and connections therefrom to the second of said valves, whereby the latter is moved in the other direction, substantially as described.

5. In a feed-regulator, the combination of a casing for containing water and steam, a float and valves therein, connections between said float and said valves, whereby one valve is moved in both directions and the second in one direction, a cam on the first valve, a connection from said cam to said second valve for moving the same in the other direction, and pipe connections to and from said valves, substantially as described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 21st day of March, 1891.

CLAYTON C. FERGUSON.

Witnesses:

PAUL WILCOX,
RICHARD W. BARKLEY.