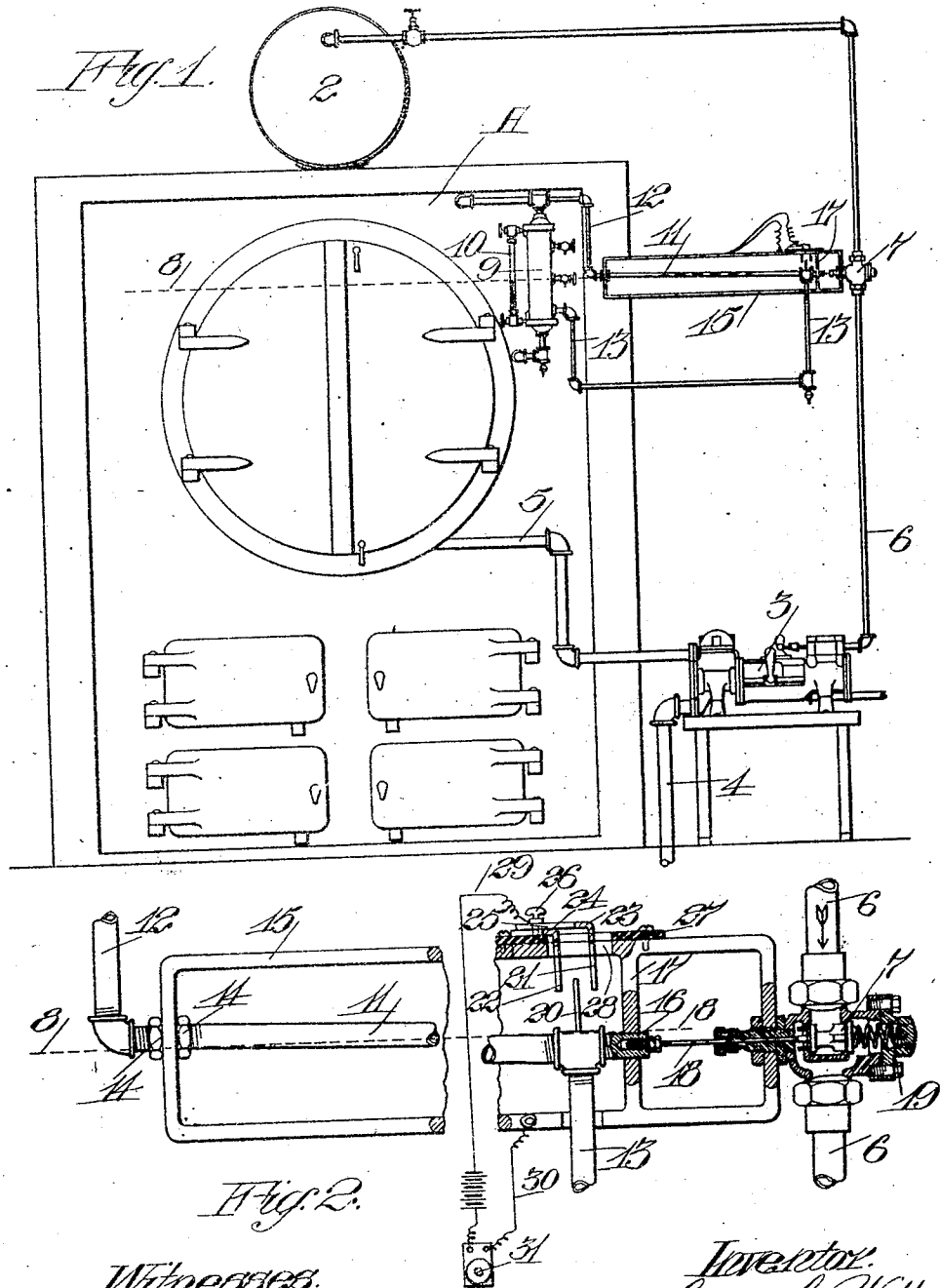


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 • AUTOMATIC BOILER FEED PUMP GOVERNOR.
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1,012,782.

Patented Dec. 26, 1911.



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UNITED STATES PATENT OFFICE.

GEORGE E. WITT, OF SAN FRANCISCO, CALIFORNIA.

AUTOMATIC BOILER-FEED-PUMP GOVERNOR.

1,012,782.

Specification of Letters Patent.

Patented Dec. 26, 1911.

Application filed April 12, 1910. Serial No. 554,947.

To all whom it may concern:

Be it known that I, GEORGE E. WITT, citizen of the United States, residing in the city and county of San Francisco and State of California, have invented new and useful Improvements in Automatic Boiler-Feed-Pump Governors, of which the following is a specification.

This invention relates to an apparatus for maintaining a constant water level in steam boilers, and pertains especially to an automatic boiler-feed-pump governor.

The object of this invention is to provide a simple, practical means for controlling the pump which feeds the water to the boiler, so that the pump will not start up suddenly or cease suddenly, and thereby cause an undesired disturbance in the boiler and an undesired fluctuation of the water level in the boiler.

I have devised a simple, practical system which has proven eminently satisfactory in practice, by which I control the movements of the water pump according to the water level in the boiler, and with such a nicety that there is not to exceed a quarter of an inch in the variation of the boiler water level in the gage glass; the valves controlling the steam to the pump gradually and without thump or jar. In this system the water flow is practically constant, although varying in volume; but there is no intermittent shutting off or turning on of the water (unless the load is shut off entirely) as is common in most systems.

The invention consists of the parts and the construction and combination of parts as hereinafter more fully described and claimed, having reference to the accompanying drawings, in which—

Figure 1 is an elevation of a steam boiler showing the invention applied. Fig. 2 is a detail in partial section showing the regulating mechanism.

A is a steam boiler and furnace of any description to which the invention is applicable, 2 is the steam dome, and 3 is the feed water pump taking its water 4 from any suitable source of supply and delivering to the boiler through connections 5 under the control of a mechanism constituting the present invention. The pump is run by steam received through a pipe 6 from the dome 2, the flow of steam through pipe 6 being controlled by a balanced valve 7. This balanced valve 7 is positioned about on

a level with the normal water line 8 of the boiler, for reasons hereinafter stated.

9 is a vertical water column connected at one end with the water in the boiler, and at the other end with the steam above the water level.

10 is the gage glass.

11 is an expansion tube arranged substantially horizontal but at a slight incline, and in such position that one end of it and a part of its middle portion are above the water level 8, and the rest of the tube is below the water level; the upper end above the water level being connected by a pipe 12 with the dry steam in the boiler and with the top of the water column 9, and the lower end of the tube 11 which is below the water level being connected by a pipe 13 with the water end of the column 9, and through the latter with the body of water in the boiler. The upper end of the expansion tube 11 is fixedly secured by suitable means, as the lock-nuts 14, in an appropriate support or frame 15, while the other, or closed end of the tube, has a plug extension 16 with a loose sliding fit in a cross-rib 17 of the frame 15. This plug 16 at the closed lower end of the tube 11 operates, when the tube expands, on the stem 18 of the valve 7 to open the latter against the tension of a spring 19 and allow steam to pass from the boiler to the pump, and so operate the pump. When the tube 11 contracts, by reason of the flow of water from the boiler up into the tube and through it, the spring 19 will act to close valve 7 more or less, and so shut off the steam to the pump and cause the latter to stop or slow down. The vertical legs of the water pipe 13 which connects the water column 9 with the expansion tube 11 are of sufficient size and length as to afford the necessary spring to permit the tube 11 readily to expand and contract under the alternating action of the steam in one end of the tube 11, and the water at the other end of the tube.

The slight inclination of the tube 11 and its disposition crosswise of the plane of the normal water level in the boiler are important, for the reason that thereby, a very slight variation or fall in the water level, say not to exceed a quarter of an inch, will allow the steam from pipe 12 to completely fill the tube, instantly heating up the same so that it expands and opens up the valve 7 sufficiently to set the pump going strongly

enough to bring the water level in the boiler back to its normal condition. As the water level in the boiler rises, it also rises in the outer leg of the tube 13, and entering the horizontal expansion tube 11 spreads out so that a very little rise of the water in the boiler will tend to cover a considerable area of tube 11, thereby quickly cooling the same and causing it to contract and correspondingly to shut off the steam to the pump. The pump action will vary directly as the valve 7 is opened more or less, and when all the steam is cut off entirely to the pump the action of the pump will cease. By this means the water feed is accurately regulated according to the steam consumption, and the water can practically be fed to the boiler in approximately the same ratio that the steam is drawn therefrom. Experience shows that with this arrangement the pump is hardly ever idle, there being a continuous flow to the boiler, although varying in volume. There is no sudden starting and stopping of the pump, as in most systems. The closeness of its regulation is one of its remarkable, noteworthy and novel features.

In order to safeguard against any breaking down of the pump or other disarrangement of the apparatus, I employ a high and low water alarm which will indicate any abnormal rise of water in the boiler or any depletion of the water in the boiler approaching the danger point. To this end I attach a metallic pin or projection 20 to the expansion tube 11 adapted to contact with and close a circuit through a contact 21 when the water falls below a desired level, or to contact with the complementary projection 22 when the water rises abnormally. The contacts 21—22 are preferably made adjustable toward and from each other, so that the limits within which the pin 20 may move, due on the alternate contraction and expansion of the tube 11, may be varied according as to whether the low and high water levels are to be increased or diminished more or less. In order to make these points 21—22 adjustable I make them as

shown in Fig. 2, in which each point is carried on a horizontal plate 23—24, the two plates 23—24 being each slotted lengthwise, as shown at 25, to receive a set-screw 26 adapted to screw into an insulating fiber plate or washer 27 suitably secured to frame 15; the points 21—22 passing through a lengthwise slot in the fiber bushing 27 and also through a slot 28 in frame 15. By loosening up on screw 26 the points 21—22 may be moved closer to or farther from one another, and correspondingly to and from the movable contact point 20. The two points 21—22 may be in electrical connection with each other and with one terminal of a battery through the wire 29, both contacts being insulated from frame 15 and the rest of the apparatus by the bushing 27. Frame 15 and likewise point 20 are connected with the other terminal of the battery through the wire 30. A suitable alarm, as 31, may be interposed in the circuit.

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

The combination with a boiler, of a pump for supplying water thereto, steam connections with the steam side of the boiler for operating the pump, a valve in said connections, and an expansion tube arranged substantially horizontal and in the plane of the water level of the boiler, said tube having one end fixed and connected with the steam side of the boiler, and the other end movable and connected with the boiler below the water level, said valve having a stem disconnected from the tube and forming an axially aligned prolongation adapted to be engaged by the tube to open the valve adjusting nuts on said stem, and a spring acting on the valve to close the same as the tube contracts.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

GEORGE E. WITT.

Witnesses:

CHARLES EDELMAN,
C. C. COOK