

(No Model.)

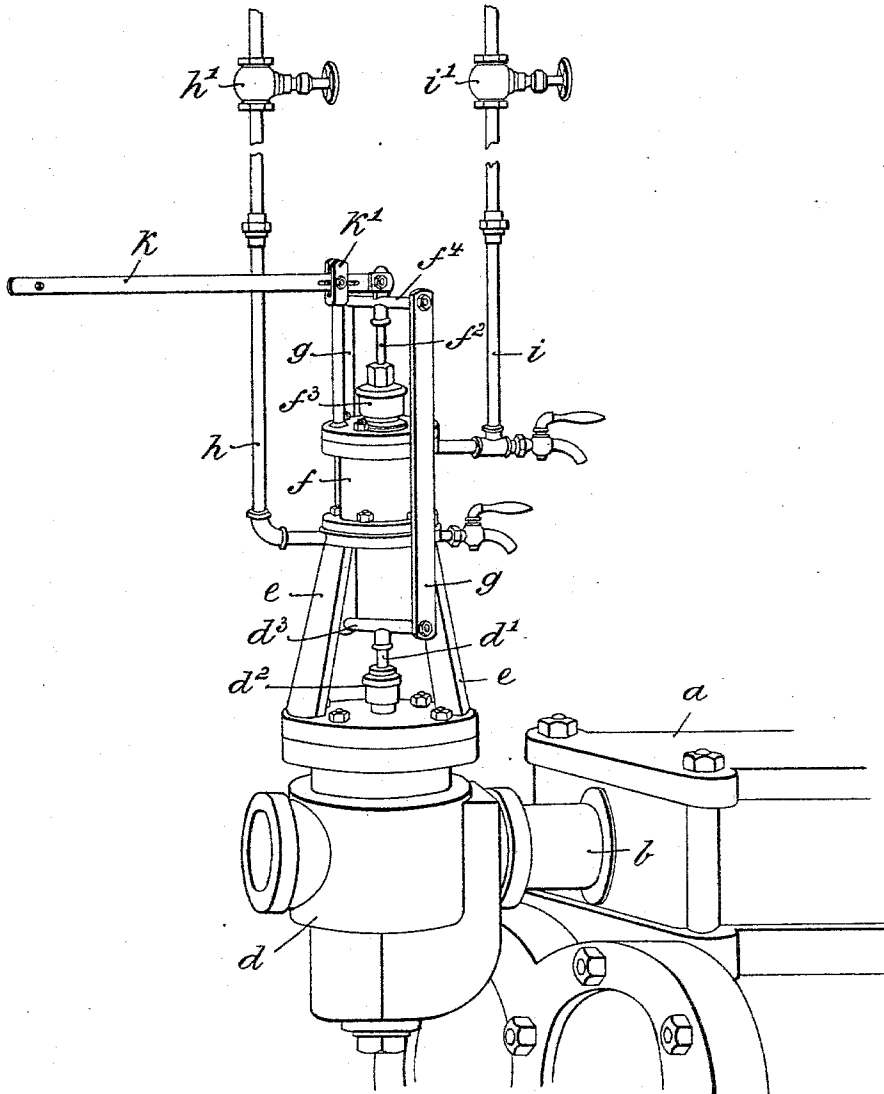
2 Sheets—Sheet 1.

G. H. IMMENDORF & A. H. ENGSTROM.
BOILER FEED PUMP GOVERNOR.

No. 571,834.

Patented Nov. 24, 1896.

Fig: 1.



Witnesses:
Thomas M. Smith.
Richard C. Maxwell

Inventors:
Geo. H. Immendorf, ^{Att}
A. H. Engstrom,
By J. Walter Douglass
Attorneys.

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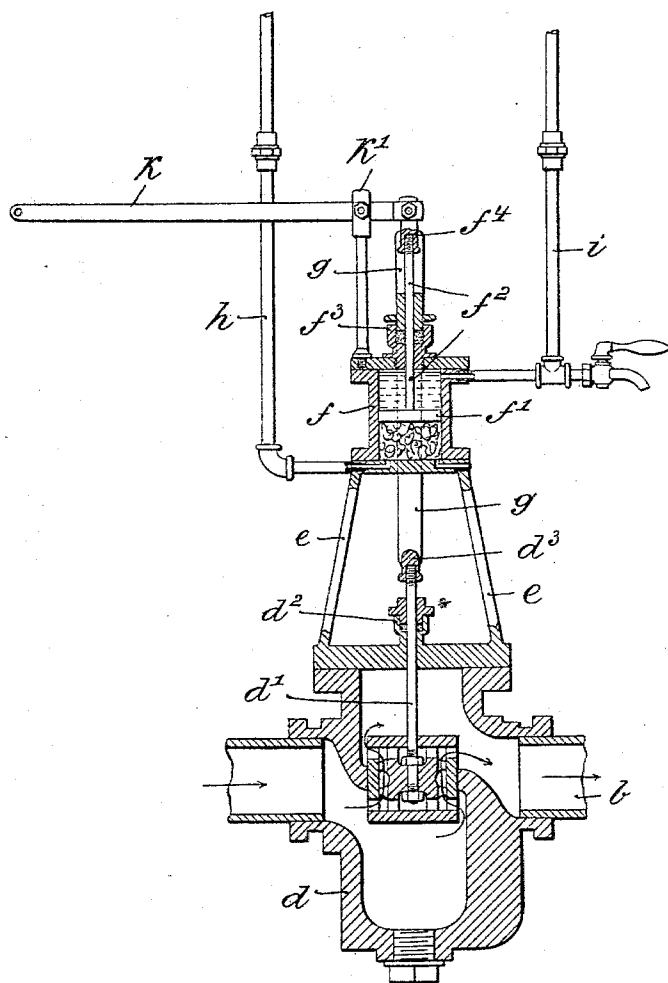
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Fig: 2.



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UNITED STATES PATENT OFFICE.

GEORGE H. IMMENDORF AND AXEL H. ENGSTROM, OF PHILADELPHIA,
PENNSYLVANIA; SAID ENGSTROM ASSIGNOR TO SAID IMMENDORF.

BOILER-FEED-PUMP GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 571,834, dated November 24, 1896.

Application filed January 20, 1896. Serial No. 576,075. (No model.)

To all whom it may concern:

Be it known that we, GEORGE H. IMMENDORF, a citizen of the United States, and AXEL H. ENGSTROM, a subject of the King of Sweden and Norway, both residing at the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Boiler-Feed-Pump Governors, of which the following is a specification.

Our invention has relation to an automatic governor for boiler feed-pumps, and in such connection it relates to the construction of such a governor.

The principal objects of our invention are, first, to provide a governor for boiler feed-pumps, comprising a valve located upon the steam supply to the pump, which valve is automatically regulated by variations in pressure existing between the steam supply to and the water discharge from the pump, and, second, to provide in such a governor a valve provided with a stem, a piston secured to the stem and traversing a cylinder, a pipe connecting one end of said cylinder with the source of steam supply, a valve controlling said pipe, a pipe connecting the opposite end with the water discharge from the pump, and a valve controlling the same, whereby the steam supply to the pump is regulated by variations in pressure of the steam supply and water discharge of the pump, and the pulsations of the pump are not reproduced with the same force upon the piston, and the range of movement of the valve on the steam supply is thereby reduced.

Our invention, stated in general terms, consists of a governor for boiler feed-pumps constructed and arranged in substantially the manner hereinafter described and claimed.

The nature and scope of our invention will be more fully understood from the following description, taken in connection with the accompanying drawings, forming part hereof, and in which—

Figure 1 is a perspective view of a governor for boiler feed-pumps, showing the same located on the steam-supply pipe to the steam-chest of the pump, embodying features of our invention; and Fig. 2 is a vertical central

section of the governor detached from the pump.

Referring to the drawings, *a* represents the steam-chest of the pump, and *b* the steam-supply pipe entering the same. On the pipe *b* is located an ordinary steam-balanced valve *d*, the stem *d'* of which extends through the packing-box *d²*. *d¹⁰* is a removable threaded plug located in the bottom wall of said valve and adapted to permit of the cleaning of the interior thereof when required. To the upper end of the stem *d'* is secured a head or cross-bar *d³*. Above the valve *d* and supported by a suitable framework *e* is a cylinder *f*, the interior of which is traversed by a piston *f'*, provided with a stem *f²*, extending through a packing-box *f³* in the upper head of the cylinder *f*. This stem *f²* is provided with a head or cross-bar *f⁴*. The ends of the cross-bar *d³* are connected with the ends of the cross-bar *f⁴* by means of the rods *g*, substantially as indicated in Fig. 1 of the drawings.

It is manifest from the above description that a movement up or down of the piston *f'* and its stem *f²* will give, through the rods *g*, a corresponding movement of the stem *d'* and valve *d*.

From the lower end of the cylinder *f* leads a pipe *h*, adapted to convey steam either from the boiler (not shown) or the supply-pipe *b* to the under side or face of the piston *f'*. From the upper end of the cylinder *f* leads a pipe *i*, adapted to convey water from the discharge of the pump to the upper side or face of said piston *f'*. On the pipe *h* is a regulating-valve *h'* of the ordinary construction, and on the pipe *i* is a similar valve *i'*.

From the above description it is obvious that should the steam supply decrease or the discharge from the pump become excessive the pressure in the pipe *i*, exerted upon the upper face of the piston *f'*, will depress the piston in the cylinder *f*, and, through the connecting-bars *g*, will partially close the valve *d*, thus shutting off a portion of the supply of steam to the pump. Again, if the discharge from the water decreases the pressure of steam in the pipe *h* will elevate the piston *f'*, and, through the connecting-rods *g*, will open

the valve *d* to permit an increased amount of steam to enter the steam-chest of the pump. Again, when the steam is partially or completely cut off in the pipe *h* the pressure of water in the pipe *i* will immediately either partially or completely close the valve *d*.

It will thus be seen that the supply of steam entering through the pipe *b* to the steam-chest will be regulated by variations in pressure in either the steam supply to or water discharge from the pump; or, in other words, there will be maintained between the steam-pressure and water discharge a constant and uniform difference in pressure, which is the object of the governor.

The valves *h'* and *i'* are located upon the pipes *h* and *i*, so that the pressure therein may be accurately regulated and the pulsations of the pump be not reproduced with the same force upon the piston *f*, and consequently the range of movement of said piston and of the valve *d* will be greatly reduced.

If required, a weighted lever-arm *k*, pivoted to a bracket *k'* of the cylinder *f* and pivotally connected to the stem *f²* of the piston *f'*, may assist in counterpoising said piston and the valve *d*, connected therewith.

Having thus described the nature and objects of our invention, what we claim as new, and desire to secure by Letters Patent, is—

The combination, in a boiler-feed-pump

governor, of the steam-chest of a pump, a vertically-movable valve *d*, provided with side top and bottom inlets and outlets to permit of the passage of steam from the supply to said chest, said valve having a stem extending through a packing-box *d²*, formed integral with the bottom of a framework *e*, supporting a cylinder *f*, and provided with a removable flanged plug, said cylinder provided with a piston and stem adapted to traverse the same, cross-bars connected with the stems of said valve and piston, rods connecting said cross-bars together, pipes *h* and *i*, respectively from said steam supply to one end of said cylinder and connecting the opposite end of said cylinder with the water discharge from said pump, stop-cocks *h'* and *i'*, provided in both of said pipes to regulate the pressure therein, and a threaded plug-valve in the bottom wall of said valve *d*, to permit of removal of extraneous matter from beneath the same, all arranged as shown and described and for the purposes set forth.

In testimony whereof we have hereunto set our signatures in the presence of two subscribing witnesses.

GEO. H. IMMENDORF.
AXEL H. ENGSTROM.

Witnesses:

J. WALTER DOUGLASS,
THOMAS M. SMITH.