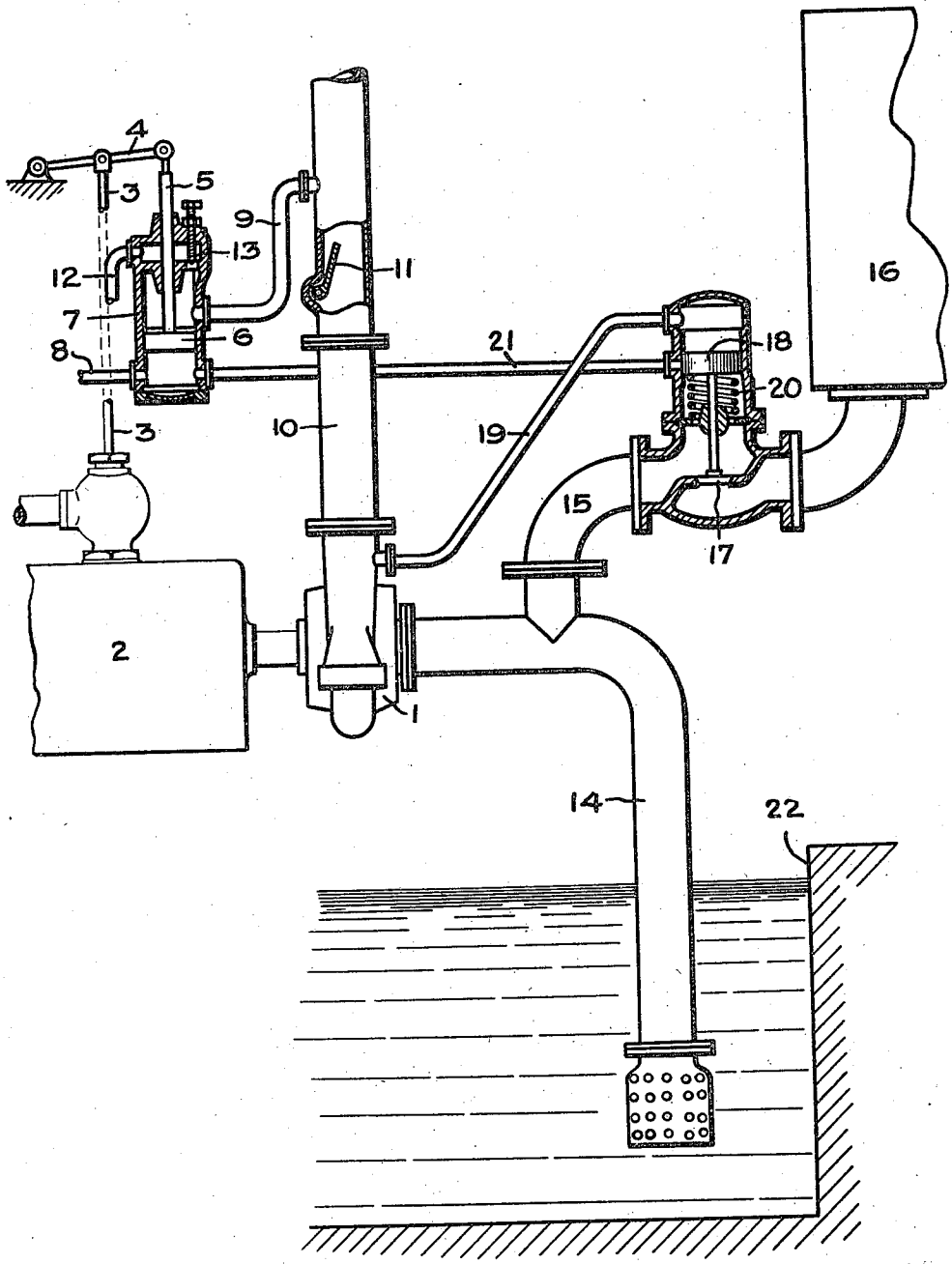
F. HUTTNER.

REGULATION OF BOILER FEED PUMPS.

APPLICATION FILED SEPT. 4, 1912.

1,147,401.

Patented July 20, 1915.



Witnesses:

Marcus L. Byng.

J. Whi Hla

Inventor,

Fritz Hüttner,

by Albert G. Davis

Att'y.

UNITED STATES PATENT OFFICE.

FRITZ HÜTTNER, OF BERLIN, GERMANY, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

REGULATION OF BOILER FEED-PUMPS.

1,147,401. Specification of Letters Patent. Patented July 20, 1915.

Application filed September 4, 1912. Serial No. 718,536.

To all whom it may concern:

Be it known that I, FRITZ HÜTTNER, a subject of the King of Prussia, residing at Berlin, Germany, have invented certain new and useful Improvements in Regulation of Boiler Feed-Pumps, of which the following is a specification.

This invention relates to boiler feed apparatus, and its object is to provide for automatically priming the pump when the suction becomes inoperative, and at the same time automatically preventing the racing of the engine which drives the feed pump.

The novel features are shown in the accompanying drawing, which is a diagrammatic representation of a boiler feed system embodying my invention; said system constituting in some respects an improvement upon the invention disclosed in my pending application, filed December 19, 1911, Serial No. 671,972.

The pump 1 is preferably of the rotary type and is driven by any suitable engine 2. The throttle valve of said engine is provided with a stem 3 which is connected to a lever 4 whose free end is pivoted to the rod 5 of a piston 6 working in a cylinder 7. The under side of said piston, which is of greater area than the upper side, is exposed to the boiler pressure by means of a pipe 8 which runs to the steam space of the boiler. The space above the piston is connected by the pipe 9 to the delivery pipe 10 of the feed pump, above a check valve 11. This space is also open to the atmosphere through a pipe 12, the entrance of which is controlled by a valve 13 whose threaded stem can be adjusted to permit a leakage of feed water and vary the effective water pressure on the upper side of the differential piston 6, and consequently the ratio of pressure acting upon opposite sides of said piston.

The suction pipe 14 of the pump has a branch 15 running to a water tank 16 located above the level of the pump. Said branch normally is kept closed by a valve 17 whose stem is attached to a movable abutment, such as the piston 18. A pipe 19 leads from the delivery pipe 10 to the upper side of said abutment so that the pressure of the column of feed water keeps the valve 17 closed against the tension of a spring 20 which tends to open it. The piston 18 serves in this position to close a vent pipe 21, leading from the steam space below the piston 6; but said pipe is opened when the piston 18 moves upward and opens the valve 17.

The operation is as follows:—When the feed pump is operating, the parts stand as shown in the drawing. By properly adjusting the valve 13, the proper ratio is maintained between the pressure above and below the piston 6 to cause said piston to regulate the position of the throttle valve of the engine 2, and thereby cause the pump to deliver the feed water at a pressure always a given amount higher than that of the steam in the boiler to be fed. If now the water supply fails so that air penetrates into the pump and destroys the vacuum, the drop in pressure in the delivery pipe 10 and pipe 19 permits the spring 20 to lift the valve 17 and at the same time open the vent pipe 21. Two results follow: On the one hand, the water in the tank 16 can flow down through the branch pipe 15 to the pump and prime it, so that as the water level rises again in the feed water reservoir 22 the pump can immediately resume delivery. On the other hand, the steam under the piston 6 escapes through the pipe 21 to the suction side of the pump, so that the water pressure above the piston 6 can move said piston downward and thereby so far close the throttle of the engine 2 as to prevent the latter from racing. Although the pump ceases to deliver, when the vacuum breaks, there will yet be enough pressure retained in the upper part of the delivery pipe by the closing of check valve 11 to effect this movement of the piston 6, especially if the pump is operating in parallel with other feed pumps.

In order to insure the automatic resumption of delivery by the feed pump when the water supply in the reservoir 22 becomes sufficient to enable the pump to reëstablish its suction, it is necessary to so devise the throttle valve and other regulating members of the engine 2 that even at the lowest position of the piston 6 said engine will not come to a stop but will continue to turn over slowly. As soon as the pump pressure builds up, the valve 17 will be closed by the piston 18 and the differential piston 6 will resume its work of regulating the speed of the engine and the supply of feed water.

In accordance with the provisions of the patent statutes, I have described the principle of operation of my invention, together with the apparatus which I now consider

to represent the best embodiment thereof; but I desire to have it understood that the apparatus shown is only illustrative, and that the invention can be carried out by other means.

What I claim as new and desire to secure by Letters Patent of the United States, is,—

1. The combination of a feed pump, a suction conduit, a delivery conduit, a main water supply for the pump, an auxiliary water supply, a branch conduit connecting the suction conduit with the auxiliary supply, a valve in said branch conduit, and a movable abutment connected with the valve and subjected on one side to a constant pressure and on the other to the pressure of the feed water on the delivery side of the pump.

2. The combination with an engine-driven feed pump, of an auxiliary water supply, a valve controlling the same, a spring tending to open said valve, and means responsive to the pressure of the feed water in the delivery pipe of said pump for holding said valve closed.

3. The combination with an engine-driven feed pump, of a differential piston controlling the speed of the engine and exposed on one side to steam pressure and on the other to feed water pressure, and means for reducing the effective steam pressure when the pump vacuum breaks.

4. The combination with an engine-driven feed pump, of a differential piston controlling the speed of the engine and responsive to pressures of steam and feed water, a vent from the steam side of said piston, and a device controlling said vent and responsive to a drop in feed water pressure.

5. The combination with an engine-driven feed pump, of a differential piston controlling the speed of said engine, and responsive to pressures of steam and feed water, a vent from the steam side of said piston, an auxiliary water supply, a valve controlling the same, and a piston exposed to the feed water pressure and normally holding said valve and vent closed.

In witness whereof, I have hereunto set my hand this 17th day of August, 1912.

FRITZ HÜTTNER.

Witnesses:
ERICH ÜBERLEÉ.
ADELBERT PRAGER.