

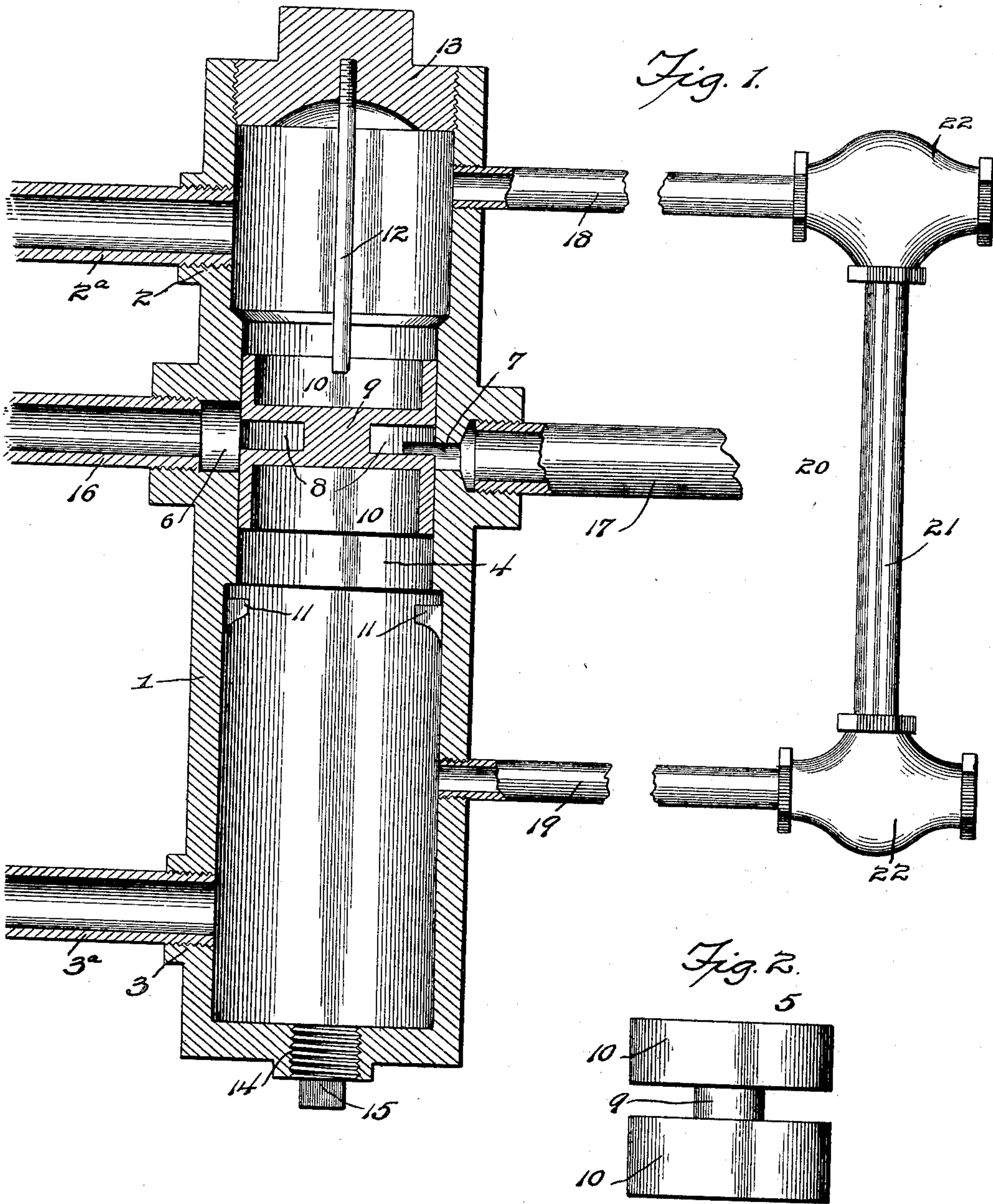
No. 630,171.

Patented Aug. 1, 1899.

H. BOWLES.
FEED WATER REGULATOR FOR BOILERS.

(Application filed May 15, 1899.)

(No Model.)



Witnesses

Ralph A. Shepard.
[Signature]

By His Attorneys,

Hardy Bowles, Inventor

Chas. H. Bowles.

UNITED STATES PATENT OFFICE.

HARDY BOWLES, OF CORSICANA, TEXAS.

FEED-WATER REGULATOR FOR BOILERS.

SPECIFICATION forming part of Letters Patent No. 630,171, dated August 1, 1899.

Application filed May 15, 1899. Serial No. 716,890. (No model.)

To all whom it may concern:

Be it known that I, HARDY BOWLES, a citizen of the United States, residing at Corsicana, in the county of Navarro and State of Texas, have invented a new and useful Feed-Water Regulator for Boilers, of which the following is a specification.

My invention relates to a feed-water regulator for boilers, and has for its object to provide a valve mechanism whereby the communication of steam-pressure to a boiler feed-pump is controlled by relative fluid-pressures upon opposite sides of a diaphragm or piston-valve to maintain the water in a boiler at an approximately uniform level, the supply of water by the pump being equal to the evaporation.

Further objects and advantages of this invention will appear in the following description, and the novel features thereof will be particularly pointed out in the appended claims.

In the drawings, Figure 1 is a sectional view of a regulator constructed in accordance with my invention, showing an attached gage. Fig. 2 is a view of the diaphragm or piston-valve detached.

Similar reference characters indicate corresponding parts in all the figures of the drawings.

In the drawings I have illustrated a preferred embodiment of my invention, wherein 1 represents a cylinder provided adjacent to its opposite ends with feed-ports 2 and 3, which may, as illustrated, be constructed to form pipe-couplings for engagement with pipes 2^a and 3^a, leading from the boiler (not shown) respectively above the normal level and below the crown-sheet. At a point between said feed-ports the bore of the cylinder is contracted to form a tubular guide 4, in which fits for reciprocatory movement a diaphragm or piston-valve 5, which is exposed at opposite sides to fluid-pressures, respectively steam and water. The cylinder or valve-casing is also provided at an intermediate point and in communication with the guide 4 with inlet and outlet ports 6 and 7, and for registration with said ports the diaphragm or valve is provided with a channel 8, formed by reducing the valve at an intermediate point to produce a neck 9, connect-

ing spaced disks or elements 10, which bound the annular channel 8 at its upper and lower sides. The outlet-port 7 is of a width corresponding approximately with that of the channel, whereas the inlet-port 6 may be of a diameter considerably exceeding the width of the channel, whereby said channel may be in full registration with the inlet-port, while the outlet-port is partly or wholly closed by the flanges of the disks which bound the channel at its upper and lower sides, for a purpose which will be explained hereinafter. Located in the path of downward movement of the valve are lugs 11, forming stops, and correspondingly located in the path of upward movement of the valve is a rod 12, also constituting a stop, and depending from a cap or plug 13, by which the upper end of the cylinder or casing is closed. The lower stops 11 serve to prevent displacement of the valve from the guide 4 when the lower portion of the cylinder or casing is wholly relieved of pressure, as by the withdrawal of the water or the draining thereof through a normally-closed drain-port 14 in the lower extremity thereof, said port normally being closed by a plug 15, and the upper stop 12 serves to prevent the upward displacement of the valve, except upon removal of the upper cap or plug 13, which is preferably constructed with an exterior wrench or key-seat to facilitate its removal.

The inlet-port 6 is adapted for communication by means of an inlet-pipe 16 with a boiler (not shown) at a point above the water-level, preferably the dome, while the outlet-port 7 is adapted for communication by means of an outlet-pipe 17 with a feed-water pump. (Not shown.)

In operation the lowering of the water-level in the boiler, due to the evaporation of the water, is accompanied by the reduction of pressure upon the lower surface of the valve, which causes the descent thereof to register the channel 8 with the inlet and outlet ports 6 and 7, and thus the communication of steam-pressure to the feed-water pump. As the water-level rises in the boiler the pressure upon the lower surface of the valve is correspondingly increased until the outlet-port is wholly or partly closed. In practice the valve rises until the outlet-port is reduced or cut off un-

til there is just sufficient pressure supplied from the boiler to the feed-pump to cause an operation of the feed-pump at a rate necessary to supply the waste from the boiler, and
 5 when the valve reaches this point of equilibrium an even pressure is maintained except when disturbed by a variation of the rate of exhaust of steam from the boiler, whereupon the valve varies in position to maintain an
 10 approximately uniform level of the water. Also in practice I prefer to connect the steam and water feed-tubes 18 and 19 of a water-gage 20 with the interior of the casing or cylinder 1 at opposite sides of the plane of the
 15 valve 5, said water-gage, as illustrated in the drawings, being of the ordinary construction, with a transparent gage-tube 21 and terminal valve-boxes 22.

Various changes in the form, proportion,
 20 size, and minor details of construction within the scope of the appended claims may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

25 Having described my invention, what I claim is—

1. In a feed-water regulator, the casing provided with an intermediate valve-seat, inlet and outlet ports in communication with the
 30 valve-seat, steam and water feed-ports in communication with the casing respectively at opposite sides of the plane of said seat, and a single piston-valve working within the seat and having means for opening and closing
 35 communication between said inlet and outlet ports, substantially as set forth.

2. A feed-water regulator having a cylinder or casing provided with an intermediate valve seat or guide, inlet and outlet ports in
 40 communication with the valve-seat, and steam and water feed-ports in communication with the cylinder or casing at opposite sides of the plane of said seat, and a piston-valve fitted in said seat or guide and provided with a
 45 channel for registration with said inlet and outlet ports, substantially as specified.

3. A feed-water regulator having a cylinder or casing provided with an intermediate valve seat or guide, inlet and outlet ports in
 50 communication with the valve-seat, and steam and water feed-ports in communication with the cylinder or casing at opposite sides of the plane of said seat, and a piston-valve fitted in said seat and provided with an annular

channel for registration with said inlet and
 55 outlet ports, said channel being bounded by spaced flanged disks, substantially as specified.

4. A feed-water regulator having a cylinder or casing provided with an intermediate
 60 valve seat or guide, inlet and outlet ports in communication with the valve-seat, and steam and water feed-ports in communication with the cylinder or casing at opposite sides of the plane of said seat, a piston-valve fitted in said
 65 seat or guide and provided with a channel for registration with said inlet and outlet ports, and stops for limiting the movement of the valve in opposite directions, substantially as specified.
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5. A feed-water regulator having a cylinder or casing provided at an intermediate point with a valve seat or guide, inlet and outlet ports in communication with the valve-seat, and steam and water feed-ports in com-
 75 munication with the cylinder or casing at opposite sides of the plane of said seat, said cylinder being provided at one end with a removable cap or plug, and at the other end with a drain-port, a piston-valve fitted in said
 80 seat and provided with a channel for registration with said inlet and outlet ports, a stop-rod extending axially from said removable plug or cap and disposed terminally in the path of the valve, and fixed lugs 11 for determining
 85 the movement of the valve in the opposite direction, substantially as specified.

6. A feed-water regulator having a cylinder or casing provided at an intermediate point with a valve seat or guide and communicating inlet and outlet ports, of which the latter is of a width less than the former, and said cylinder or casing also having steam and water feed-ports arranged at opposite sides
 90 of the plane of the valve-seat, and a piston-valve fitted in said seat and provided with a channel for registration with said inlet and outlet ports, the channel of the valve being of a diameter approximately equal with that
 95 of the outlet-port, substantially as specified.
 100

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

HARDY BOWLES.

Witnesses:

J. L. HALBERT,
 RUFUS HARDY.