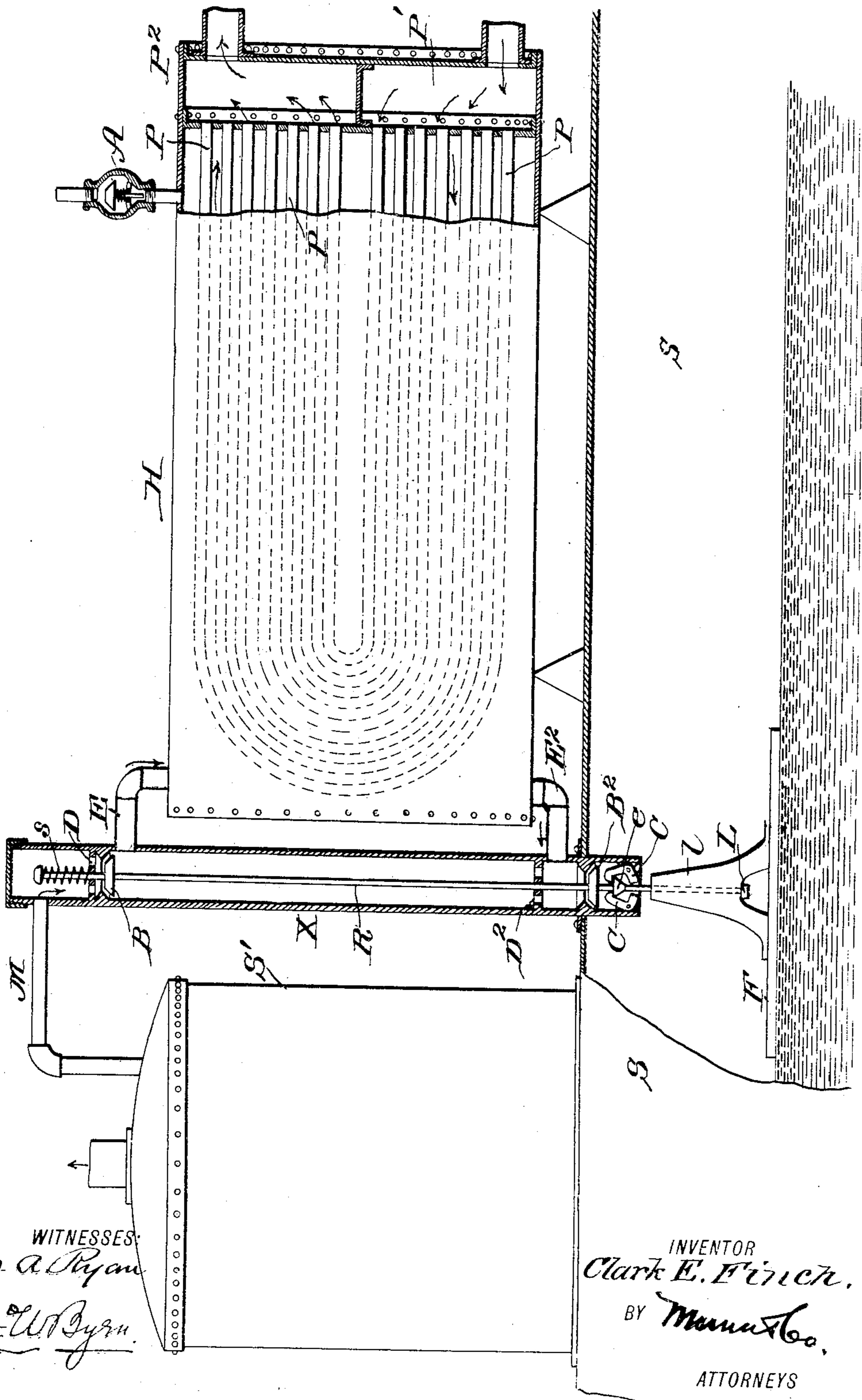


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PATENTED MAR. 28, 1905.

C. E. FINCH.
BOILER FEEDER.
APPLICATION FILED OCT. 10, 1904.



UNITED STATES PATENT OFFICE.

CLARK ETHAN FINCH, OF FORNEY, TEXAS.

BOILER-FEEDER.

SPECIFICATION forming part of Letters Patent No. 786,107, dated March 28, 1905.

Application filed October 10, 1904. Serial No. 227,860.

To all whom it may concern:

Be it known that I, CLARK ETHAN FINCH, a citizen of the United States, residing at Forney, in the county of Kaufman and State of Texas, have invented a new and useful Improvement in Automatic Boiler-Feeders, of which the following is a specification.

My invention is in the nature of a novel feeder for supplying steam-boilers with water in an automatic manner by gravity, so as to maintain the water in the boiler at a practically uniform level; and it consists in the novel construction and arrangement of the parts, which I will now proceed to describe, with reference to the drawing, in which the figure is a vertical longitudinal section.

S is any steam-boiler provided with a dome S'.

H is a feed-water heater, which consists of a casing capable of standing the steam-pressure and containing a series of return-bend pipes P, one end of each of which communicate with an inlet-chamber P' and the other ends of which communicate with an outlet-chamber P². The inlet-chamber P receives the exhaust-steam from the engine, which passes through the coil into the chamber P² and thence into the air or other point of discharge. Water is admitted to the interior of the casing H and surrounds the pipes and absorbs the heat of the exhaust-steam. The water-supply pipe for the feed-water heater is provided with a check-valve A, opening inwardly to the casing H and closing outwardly, so that water will pass into the casing when a partial vacuum exists therein; but when a steam-pressure is within the casing the check-valve will close and maintain such pressure. The feed-water heater is maintained upon suitable supports above the boiler, and between the feed-water heater and the dome of the boiler is arranged a relatively small vertical cylinder X, forming a valve-chamber. This cylinder is connected at the upper end to the feed-water heater by a pipe E and near the bottom is also connected to the feed-water heater by a pipe E². Said cylinder is also connected at the top to the steam-dome by a pipe M, and the lower end of the cylinder enters the boiler-shell and opens into the steam-space within.

In the cylinder X near the top and bottom are arranged valve-stem guides D D², in which plays freely a valve-stem R. On this valve-stem there are carried two rigidly-attached valves B and B². The valve B is located between the steam-pipe M and the steam-pipe E and gives passage to steam from the dome to the top of the feed-water heater. The valve B² is located between the water-pipe E², leading from the feed-water heater and the open lower end of the cylinder, which is in communication with the steam-space of the boiler. Both the valves B and B² close upwardly against seats formed in the cylinder. At its lower end the valve-stem extends through the open lower end of the cylinder X into the boiler and is therein loosely attached by a suitable head L to a large float F, which rests upon the water in the boiler and has a limited sliding movement on the valve-stem. As this float rises and falls with the water-level it closes or opens the valves in the manner hereinafter described.

In the upper end of the cylinder X there is a spiral spring s, coiled around the valve-stem and pressing at its lower end against the guide D for the valve-stem and at the top pressing against a head on the valve-stem and tending to lift the same.

In the lower end of the cylinder X there are pivoted one or more elbow-catches C. Between these catches the valve-stem slides, and at this point it has a shoulder e, tapered on its lower side and flat or square on top. When the valve-stem is down and the valves open, this shoulder passes beneath the hooks of the catches, and the latter lock and hold the valve-stem down and the valves open. When, however, the float F rises sufficiently from the inflow of water into the boiler, the hub l of the float strikes the lower arms of the elbow-catches and throws the hooks above away from the shoulder e, allowing the spring s to lift the valve-stem and close the valves.

The operation of my invention is as follows: As the water-level falls on the boiler the float sinks with it and pulls valve B and B² open, and the catches at C hold them open. The boiler-pressure is now in the feed-water heater and is held from escaping by check-valve at A. The warm water in the heater

then flows by gravity through pipe E² and valve B² into the boiler, and the heater fills with steam through pipes M and E and valve B. As the water-level rises the float rises
 5 with the water, sliding up along valve-stem, and the hub l of the float strikes catches C, releasing the valves, which fly upward from the tension of spring C and reseal themselves. The heater is now partly filled with steam,
 10 which replaced the water; but this steam quickly condenses, and cold water enters through check-valve A. As the float falls again the same operation is repeated, keeping the water-level practically constant. The
 15 lower valve B² should be slightly larger than the upper one, so that by the pressure of the steam the valves will tend to stick until weight enough of the float is on them to pull them wide open, so that the hooks or catches C will
 20 positively engage the shoulder e.

I am aware that automatic boiler-feeds operating through the agency of a float within the boiler and coacting valves have already been devised, and I do not claim this broadly.

25 While my invention is shown in connection with a feed-water heater, I would have it understood that the heating features may be omitted, as my feeder works equally well with any chamber H having an inlet check-valve A.

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

1. An automatic boiler-feed, comprising an upright valve-chamber having its lower end
 35 opening into the boiler, a feed-water chamber having an inlet check-valve for water, said feed-water chamber having a pipe connecting its upper part with the valve-chamber and another pipe connecting its lower part with
 40 the valve-chamber, a pipe connecting the steam-space of the boiler with the upper part of the valve-chamber, a valve-stem arranged in the valve-chamber and carrying two downwardly-opening valves, the upper one being lo-
 45 cated between the steam-pipe leading from the boiler and the steam-pipe leading to the feed-water chamber, and the lower valve being located between the boiler and the water-pipe leading from the feed-chamber and a float ar-
 50 ranged in the boiler and connected to the valve-stem to operate the same by the rise and fall of the water-level as described.

2. An automatic boiler-feed, comprising an upright valve-chamber having its lower end
 55 opening into the boiler, a feed-water chamber having an inlet check-valve for water, said feed-water chamber having a pipe connecting its upper part with the valve-chamber and another pipe connecting its lower part with the valve-
 60 chamber, a pipe connecting the steam-space of the boiler with the upper part of the valve-chamber, a valve-stem arranged within the valve-chamber and carrying two downwardly-opening valves, the upper one being located be-

tween the steam-pipe leading from the boiler 65 and the steam-pipe leading to the feed-water chamber, and the lower valve being located between the boiler and the water-pipe leading from the feed-chamber, a float arranged in the boiler and connected to the valve-stem, 70 catches for holding the valve-stem down and the valves open and a spring for lifting and closing the valves substantially as described.

3. An automatic boiler-feed, comprising an upright valve-chamber having its lower end 75 opening into the boiler, a feed-water chamber having an inlet check-valve for water, said feed-water chamber having a pipe connecting its upper part with the valve-chamber and another pipe connecting its lower part with the 80 valve-chamber, a pipe connecting the steam-space of the boiler with the upper part of the valve-chamber, a valve-stem arranged within the valve-chamber and carrying two down-
 85 wardly-opening valves, the upper one being located between the steam-pipe leading from the boiler and the steam-pipe leading to the feed-water chamber and the lower valve being located between the boiler and the water-
 90 pipe leading from the feed-chamber, a float arranged in the boiler and connected to the valve-stem and sliding thereon, catches for holding the valve-stem and valves down, a spring for raising and opening the valves, said float being provided with a projection 95 adapted to strike and release the catches substantially as described.

4. In an automatic boiler-feed of the kind described, an upright valve-chamber having its lower end opening into the boiler, a valve- 100 stem arranged within the valve-chamber, a locking device arranged in the valve-chamber to engage the valve-stem and hold open the valves, and a float arranged in the boiler and sliding on the valve-stem and having a central 105 projection adapted to enter the valve-chamber and to strike against and release the locking devices substantially as shown and described.

5. The combination with a steam-boiler, and a feed-water-supply chamber; of an upright 110 valve-chamber having its lower end opening into the boiler and also into the lower portion of the feed-water chamber and its upper end opening into the steam-space of the boiler and also into the upper portion of the feed-water 115 chamber, a valve-stem completely housed within the valve-chamber and bearing at its upper end a valve controlling the flow of steam to the top of the water-supply chamber, and at its lower end another valve controlling the 120 flow of water from the water-supply chamber to the boiler and a float arranged in the boiler and operating the valve-stem and valves substantially as described.

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Witnesses:

T. H. ARNOLD,
 E. M. DOZIER.