

(No Model.)

A. R. SMITH.
FEED WATER HEATER AND PURIFIER.

No. 433,104.

Patented July 29, 1890.

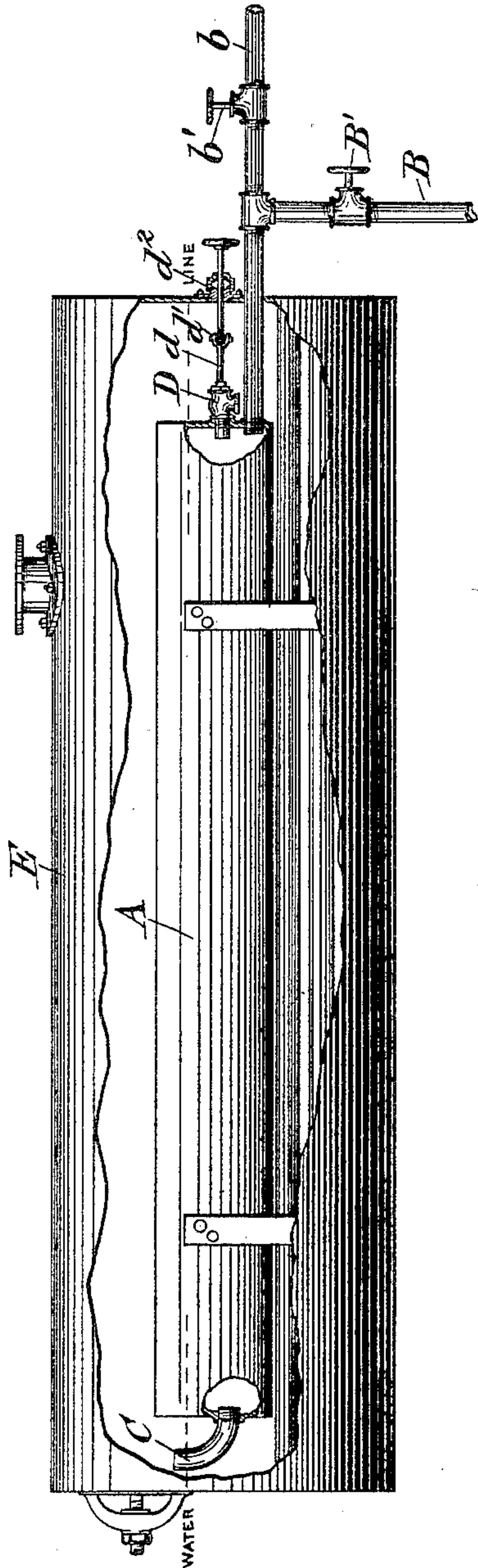


Fig. 1.

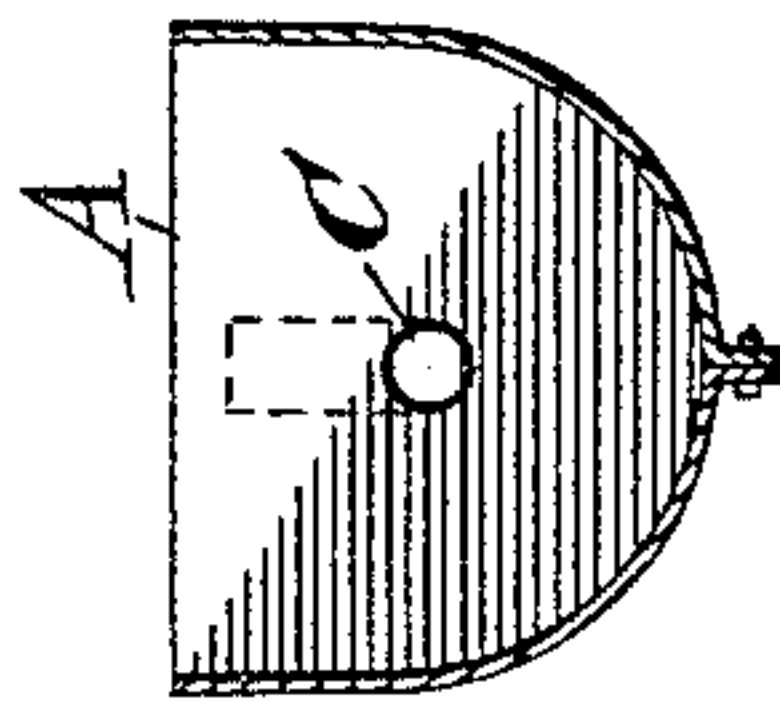


Fig. 3.

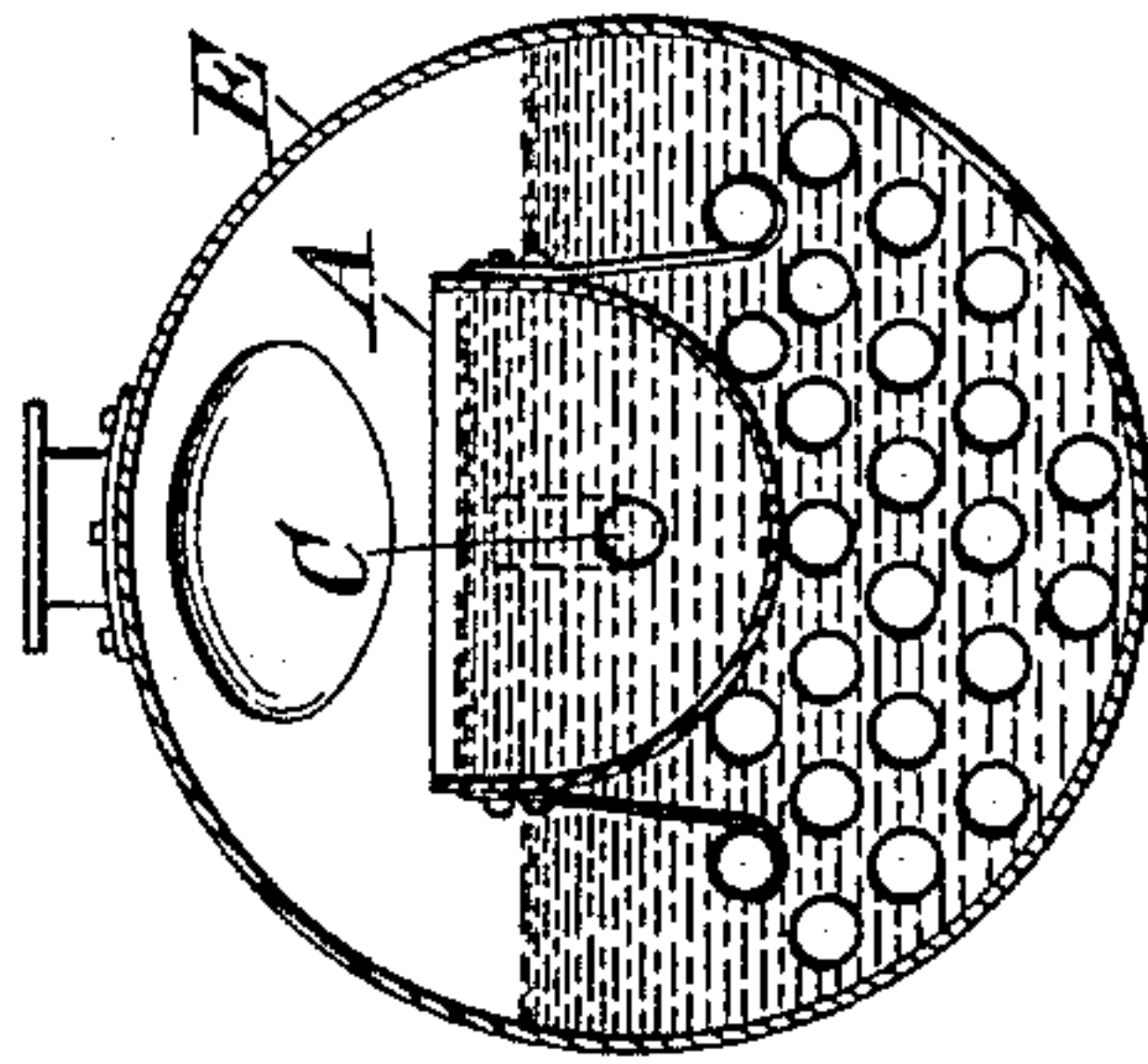


Fig. 2.

Witnesses:

Geo. W. Heffinger.
John Williams.

Inventor.

Adrian R. Smith

By his Atty. W. R. Smith.

UNITED STATES PATENT OFFICE.

ADRIAN R. SMITH, OF SAN FRANCISCO, CALIFORNIA.

FEED-WATER HEATER AND PURIFIER.

SPECIFICATION forming part of Letters Patent No. 433,104, dated July 29, 1890.

Application filed December 10, 1889. Serial No. 333,235. (No model.)

To all whom it may concern:

Be it known that I, ADRIAN R. SMITH, a citizen of the United States, residing in the city and county of San Francisco, and State of California, have invented a new and Improved Feed-Water Heater and Purifier, of which the following is a specification.

My invention relates to that class of feed-water heaters and purifiers which are located in the boiler and purify the feed-water by the precipitation of impurities through the action of heat.

It consists, essentially, of an open-topped trough located in the interior of the boiler in such a position as to be partly immersed in the water and partly in the steam-space.

The objects of my invention are to provide a simple, durable, and cheap feed-water heater and purifier so arranged that it can be cleansed without removing it from the boiler; to so arrange it that the shocks and vibration incident to this class of heaters and purifiers will be entirely avoided; also to provide that it shall be entirely under control from the exterior of the boiler. I accomplish these objects by means of the devices illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal section of a boiler, showing my device in position. Fig. 2 is a cross-section of a boiler, showing my device in position. Fig. 3 is a cross-section of my device when made in sections.

Referring to the accompanying drawings, A is an open-topped trough; B, supply-pipe; B', supply stop-valve; b, blow-off pipe; b', blow-off valve; C, feed-water pipe; D, valve; d, valve-rod; d', universal coupling; d², stuffing-box; E, boiler.

The construction of my device is as follows: An open-topped trough of any suitable section, closed at the ends, is placed in the boiler in such position that a portion of its depth is immersed the whole of its length. Into one end of the trough, at the bottom, is introduced a pipe which extends outside the boiler-shell, where it is provided with a stop-valve B'. Between this valve and the boiler a branch pipe is also provided, suitably connected, to conduct the feed-water to the interior of the trough. This pipe is also supplied with a stop-valve B' and connected with the feed-pump or other source of water-supply. At

the opposite end of the trough is a bent pipe, one end of which opens into the trough at a point about midway of its depth, the other end opening into the interior of the boiler at the height at which it is intended to keep the level of the water in the trough. At one of the ends is also provided a valve D, forming a communication, when open, between the water-space of the boiler and the interior of the trough. This valve is provided with an operating stem or rod, which extends through the boiler-shell, its outer end being provided with a hand-wheel or operating-lever. To provide against leakage around this stem, a suitable stuffing-box is provided where it passes through the boiler-shell. This valve-stem is preferably made in two parts connected together by a universal coupling or other flexible connection.

The operation of my device is as follows: Before admitting the cold water through the feed-water pipe B the valve D is opened to permit the trough to fill with hot water from the boiler. The stop-valve B' is then opened and the feed-water is allowed to enter the trough A. As the cold feed-water strikes the hot water of the boiler in the trough, it is almost immediately raised to a like temperature, the effect of this being to precipitate many of the mineral and earthy impurities and to cause the lighter impurities to rise to the surface in the form of scum. As the feed-water pipe C leaves the trough at a point about midway of its depth, it takes the water from that portion which is most free from impurities. Its position being at the opposite end of the trough from where the feed-water enters, and the trough being large in proportion to the stream passing through it, no perceptible current is caused, so that ample time is allowed for the separation of the impurities. To cleanse the trough, the water-supply valve is closed and the blow-off valve b' is opened. The water in the trough is thus blown out through the blow-off pipe b, carrying with it most of the impurities retained by the trough. Those impurities which, owing to their adhering too firmly to the sides of the trough, fail to be carried off through the blow-off pipe can be readily removed by hand through the man-hole when the boiler is cold.

The flexible connection *d'* is provided, so that if from any cause the position of the trough is slightly altered the working of the valve D is in no way affected.

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

1. The combination, in a feed-water heater and purifier, of a boiler, a vessel contained
10 therein provided with suitable feed-water inlet and outlet, and a valve opening from the interior of the vessel into the water-space of the boiler, suitably arranged and connected to be operated from the outside of the boiler-
15 shell, substantially as described.

2. The combination, in a feed-water heater and purifier, of a boiler, the open-topped trough A, contained therein, having a portion of its depth the whole of its length below the

water-line of the boiler, and having at one 20 end suitable feed-water and blow-off pipes extending through the boiler-shell into the interior of the trough, near its lower side, and its other end being provided with a feed-water pipe C, opening into the trough near 25 the middle of its depth, the pipe C extending a short distance above the water-line of the boiler, the trough also being provided with a valve D, opening into the interior of the trough from the water-space of the boiler, the 30 valve being provided with a jointed operating stem or rod which passes through a suitable stuffing-box in the boiler-shell, substantially as described.

ADRIAN R. SMITH.

Witnesses:

GEO. W. WEEFINGER,
JOHN WILLIAMS.