I. B. DAVIS.

FEED WATER HEATER.

No. 244,039. Patented July 12, 1881.

Fig. 1.

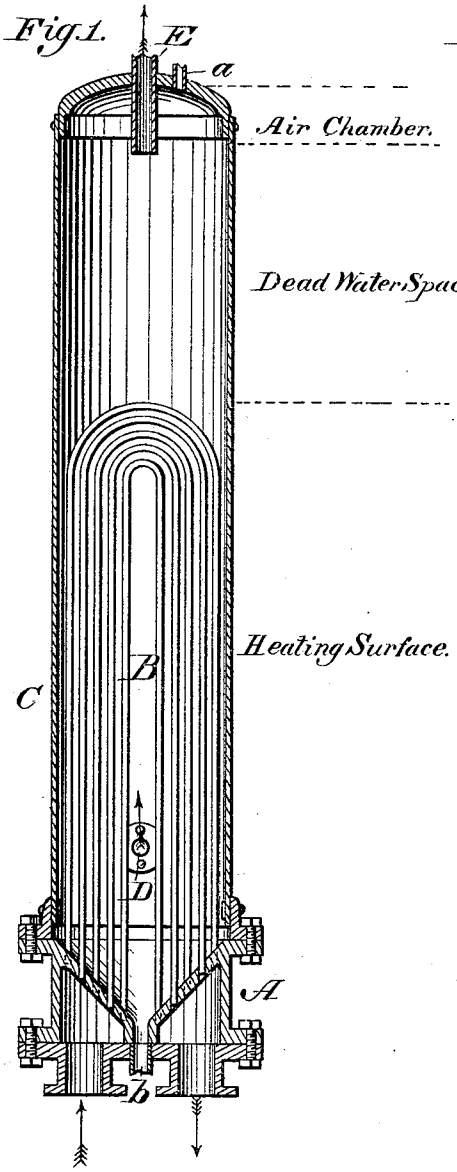
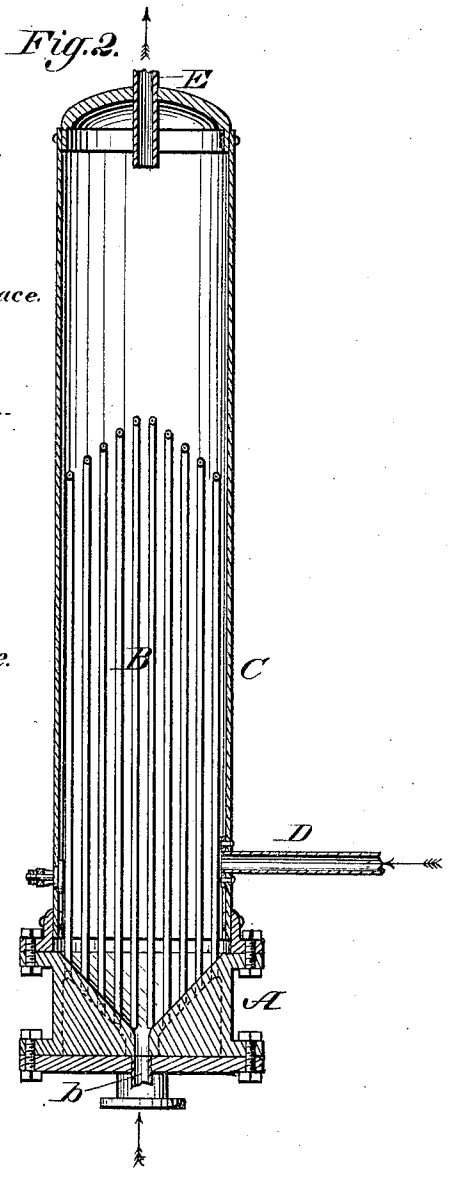


Fig. 2.



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UNITED STATES PATENT OFFICE.

ISAAC B. DAVIS, OF HARTFORD, CONNECTICUT.

FEED-WATER HEATER.

SPECIFICATION forming part of Letters Patent No. 244,039, dated July 12, 1881.

Application filed May 5, 1879.

To all whom it may concern:

Be it known that I, ISAAC B. DAVIS, of Hartford, in the county of Hartford and State of Connecticut, have invented certain Improvements in Feed-Water Purifiers and Heaters, of which the following is a specification.

The object of my invention is to produce an apparatus whereby the feed-water for steam-boilers may be deprived of all impurities and foreign matters, the invention being designed as an improvement upon feed-water heaters, whereby they are adapted to serve the two purposes of heating and purifying the water.

To this end the invention consists in providing that class of heaters which consist of upright steam-tubes mounted in a water body or jacket with an upward extension of said body, so as to maintain a large body of water above the level of the tubes. In practice it is found that by so doing the water, becoming highly heated under the boiler pressure, and entering the extension or dead-water space, will at once set free all the impurities contained in it, so that it is delivered from the apparatus in a clean and pure condition. In practice it is found that the vertical height of the extension or dead-water space above the tubes should be about one-half the height of the tubes themselves.

My invention is more particularly applicable in connection with the feed-water heater for which Letters Patent were granted to the Berryman Manufacturing Company, assignee of Robert Berryman, April 9, 1872, numbered 125,526, and it is this form of apparatus that I have represented in the drawings, which present two vertical central sections of my improved apparatus, taken on lines at right angles to each other.

A represents the base of the apparatus, divided by a central partition into two chambers, which are provided respectively with a steam inlet and outlet.

B represents the steam-pipes, made of an arched or inverted-U form, and each arranged to communicate with the two chambers at opposite ends, as shown.

C represents the water body or jacket, extending upward from the base and surrounding and inclosing the tubes, as shown.

The above-described arrangement of parts is the same as in the Berryman patent, with the exception that the body or jacket is extended upward in the present case a considerable distance above the top of the tubes—a distance equal to one-half the height of the tubes—so that when the apparatus is in action there will be a large body or volume of water within the jacket above the level of the tubes. While it is not necessary that the body shall be exactly one and one-half time as high as the tubes, that proportion is recommended. The body is provided with an inlet-tube, D, near the bottom and an outlet-tube, E, near the top, and in operation the water is forced, in a continuous stream and under a pressure equal to or slightly greater than that in the boiler to which it is attached, inward at the bottom and outward at the top, while at the same time steam is passed continuously through the tubes from one chamber to the other.

Under the above construction and mode of operation the water, rising gradually and under the boiler-pressure within the body or jacket, becomes highly heated, and when it reaches the upper portion of the extension or dead-water space, through which it moves with comparative slowness, it sets free all foreign matters held in suspension, all substances which will separate by heat, which consist of carbonate of lime, earthy matters, and all impurities contained in feed-water, except salt and sulphate of lime, which separate and fall to the bottom, while magnesia and some vegetable matters rise to the top, at which point the impurities remain until blown off.

For the purpose of removing the impurities the body is furnished at its upper end with a blow-off, *a*, and the base with a second blow-off, *b*, as shown in Fig. 1. In order that the impurities which rise to the top may not enter the outlet-pipe E, the end of the latter extends downward slightly below the water-level, while by causing the water to enter the body a short distance above the bottom the sediment which is deposited at the bottom is allowed to remain undisturbed thereby.

Having thus described my invention, what I claim is—

1. The feed-water purifier consisting of the series of upright steam-flues and the closed surrounding body, extended above the flues to

the distance specified, and provided with an inlet at or near the base and an outlet at the top, below the water-level, as described and shown, whereby all impurities are removed from the water.

2. The combination of the base A, the upright steam-flues, and the tight surrounding jacket, of a height at least one and one-half time that of the flues, provided with the inlet-pipe near the base and the outlet-pipe near the top, below the water-level.

3. The combination of the base, the vertical flues, and the tight body, constructed of the proportions specified, the inlet-pipe D near the base, the outlet-pipe near but below the top, and the top blow-off pipe, *a*, as shown.

4. The herein-described method of purifying feed-water, consisting in passing the same under high pressure into the foot of a tall closed receiver and causing it to flow constantly upward therein to an outlet near the top, below the water-level, and subjecting the flowing water to the action of heated surfaces from the base upward to a point not exceeding two-thirds of the distance to the outlet.

ISAAC B. DAVIS.

Witnesses:
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