

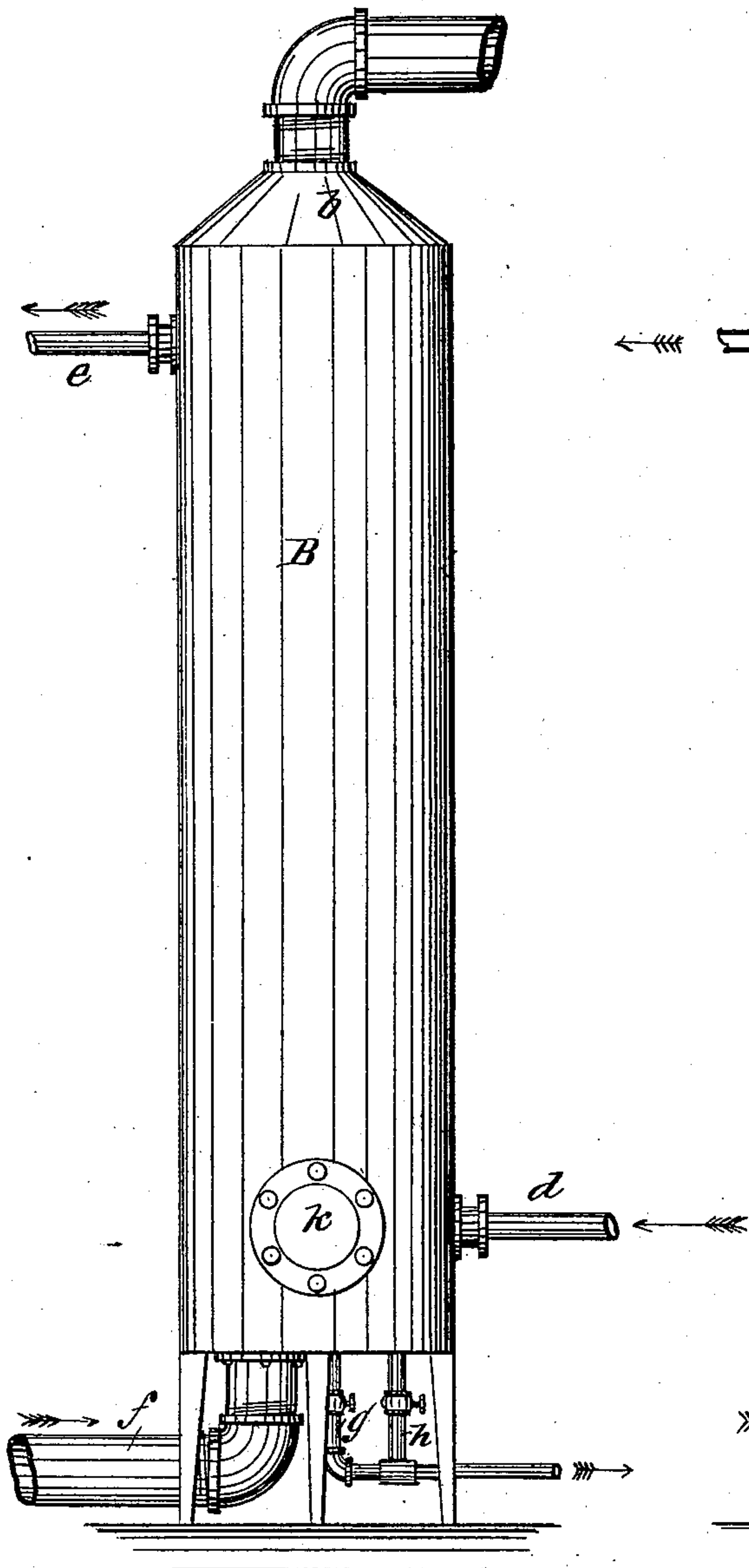
(No Model.)

R. P. VALENTINE.  
FEED WATER HEATER.

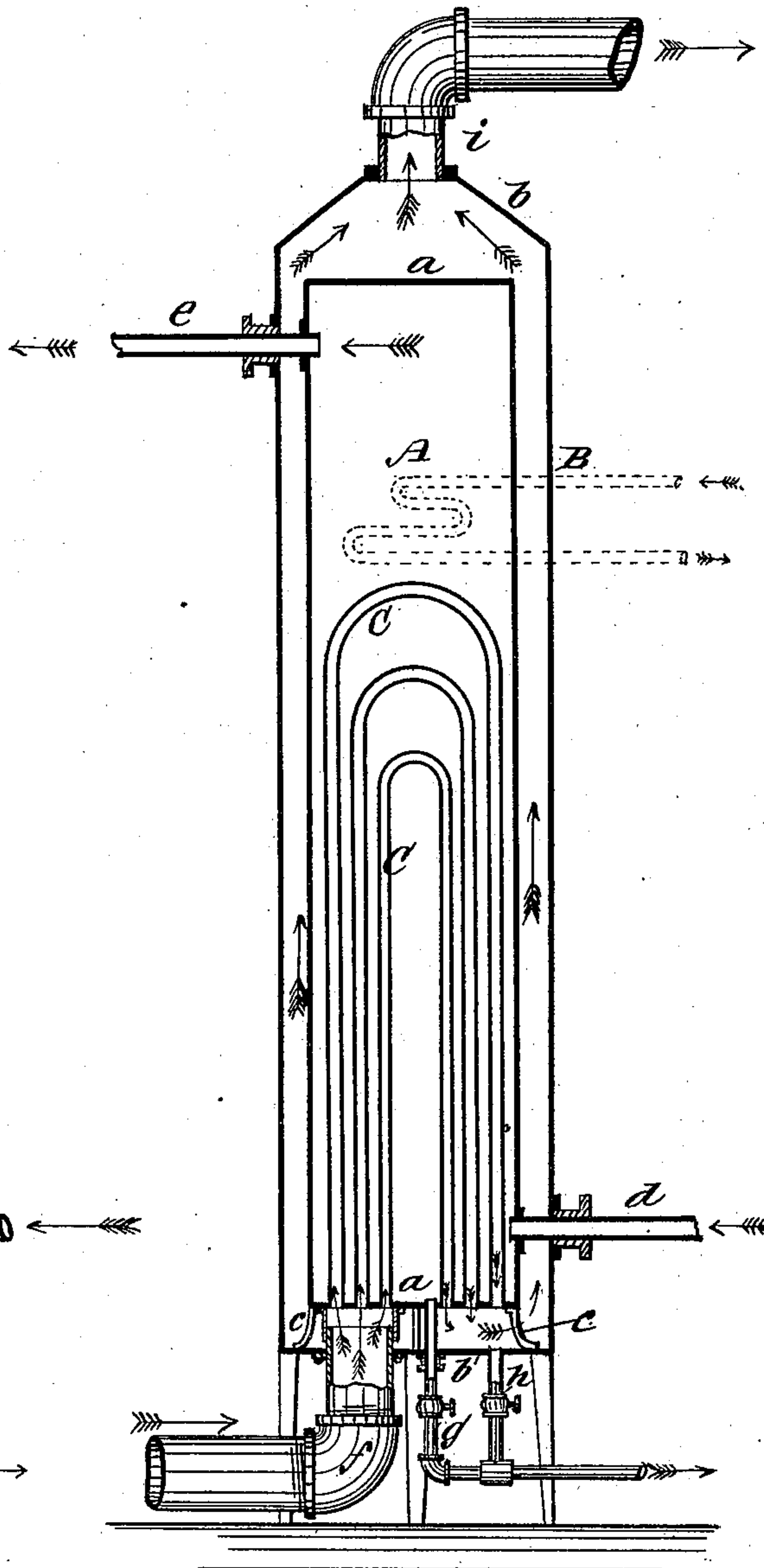
No. 256,080.

Patented Apr. 4, 1882.

*Fig. 1.*



*Fig. 2.*



WITNESSES:

*Theo. G. Hostetler*  
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# UNITED STATES PATENT OFFICE.

RICHARD P. VALENTINE, OF BOSTON, MASSACHUSETTS, ASSIGNOR OF  
ONE-HALF TO PETER COLLAMORE.

## FEED-WATER HEATER.

SPECIFICATION forming part of Letters Patent No. 256,080, dated April 4, 1882.

Application filed December 16, 1881. (No model.)

*To all whom it may concern:*

Be it known that I, RICHARD P. VALENTINE, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain  
5 new and useful Improvements in Feed-Water Heaters, of which the following is a full, clear, and exact description.

The objects of my improvements in feed-water heaters are to obtain the best possible  
10 heating action from the exhaust-steam, thereby raising the temperature of the water to a point which will secure precipitation of foreign matters, and to allow expansion and contraction of the tubes without risk of causing  
15 leakage.

To that end my invention consists in the novel construction hereinafter described and claimed.

Reference is to be had to the accompanying  
20 drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in both the figures.

Figure 1 is a side elevation of my improved heater, and Fig. 2 is a vertical section of the  
25 same.

A is the water-chamber, consisting of a hollow cylinder provided with heads *a a*.

B is an outer cylinder, forming a jacket around the water-chamber, closed at its ends  
30 by heads *b b*, on the bottom one of which the cylinder A is separated by legs *c c*.

CCC are tubes bent in U form; and secured at their ends in the lower head *a* of the cylinder A.

*d* is the inlet water-pipe, passing through cylinder B to the inner cylinder, and *e* is the outlet water-pipe extending from the upper  
35 end of cylinder A.

*f* is the exhaust-steam pipe, passing through  
40 the bottom of cylinder B, and coupled by a slip-joint to head *a* of the inner cylinder, so as to communicate with tubes C at one end. *i* is the exit-pipe for steam at the top of cylinder B.

*g* is the blow-off pipe from the water-chamber for draining off precipitated matter, and  
45 *h* is a drip pipe and cock for relieving cylinder of water. All the pipes are to be provided with stuffing-boxes, to prevent leakage and  
50 allow for expansion and contraction.

In operation the steam entering by pipe *f* rises in the U-shaped tubes C, and descending in the outer legs enters cylinder B below the water-chamber, from whence it rises naturally in the space between the two cylinders  
55 to the discharge-pipe *i*.

The water entering chamber A by pipe *d* comes into intimate contact with the pipes C, and also the surface of the cylinder, which is heated by the steam in the jacket. It is thus possible  
60 to heat the water to or above a boiling temperature, at which mineral and other impurities will be precipitated. The water-chamber being entirely inclosed, loss of heat by radiation is avoided. Further, it is to be observed  
65 that there being no rigid connection between the two cylinders they are free to expand and contract independently, and the U shape of the pipes allows of their expansion and contraction without loosening the joints. At *h*  
70 on the outer cylinder is a hand-hole plate, covering an opening which gives access to the inside of the outer cylinder and to the mid-hole plate of the inner cylinder.

The U-shaped tubes C will extend to nearly  
75 the top of the heater when exhaust-steam is alone used; but in cases when a higher temperature is required in order to settle the impurities in the water, a live-steam coil may be introduced in the upper part of the heater, as  
80 shown by dotted lines.

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

In a feed-water heater, the combination, with  
85 the jacket B, provided with the heads *b* and the steam-exit pipe *i*, the inlet water-pipe *d*, and the outlet water-pipe *e*, of the water-chamber A, provided with the heads *a*, the feet *c*, and the U-shaped pipes C, having their ends  
90 received in the lower head of the said water-chamber, and the exhaust-pipe *f*, passing through the head of the jacket and coupled by a slip-joint to the head of the said water-cyl-  
95 nder directly under the end of the said tubes, substantially as and for the purpose set forth.

RICHARD P. VALENTINE.

Witnesses:

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