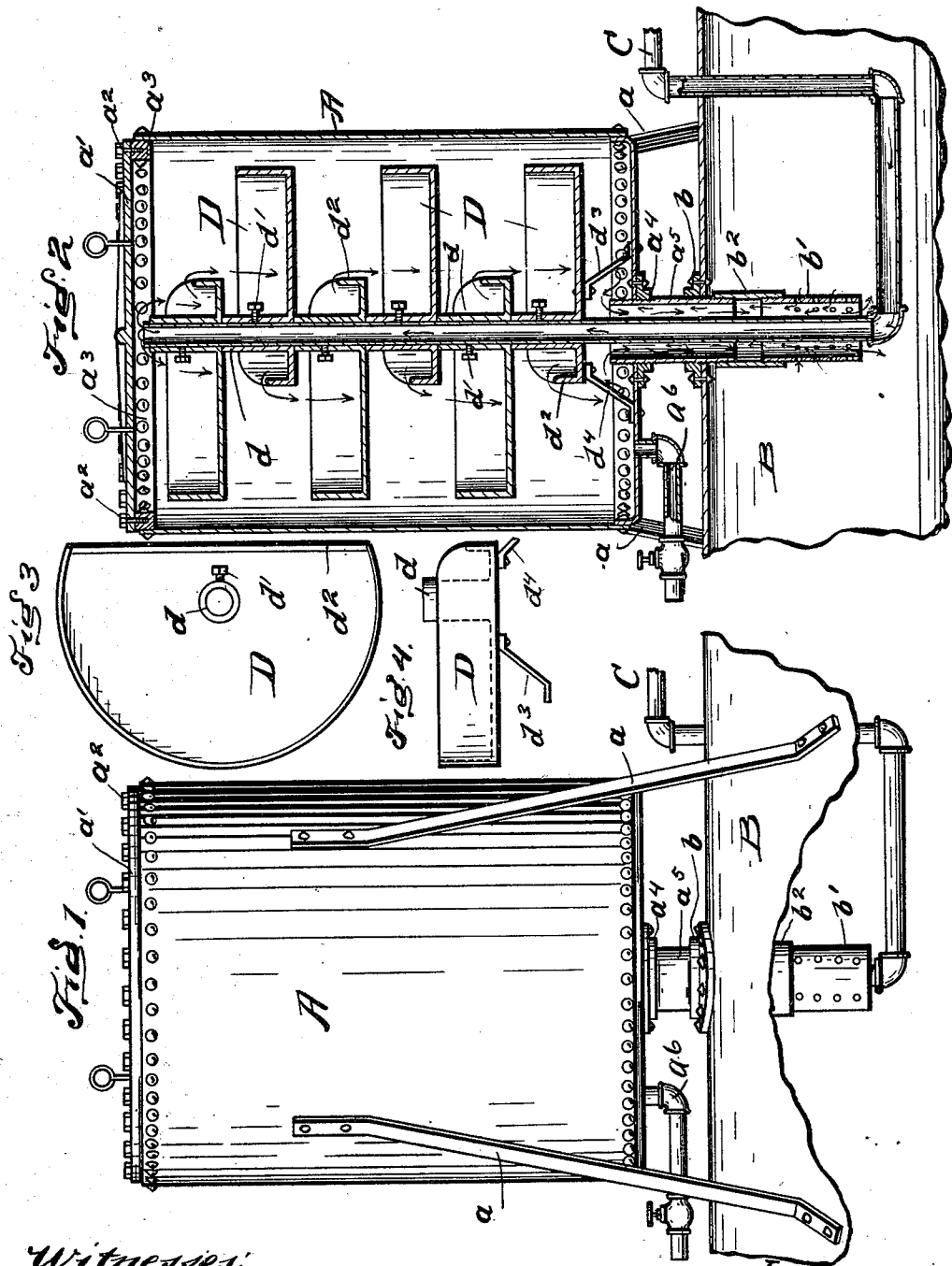


E. SMITH.  
FEED WATER HEATER.  
(Application filed Nov. 12, 1900.)

(No Model.)



Witnesses:  
*James Chadwick*

INVENTOR  
*Edward Smith*  
By *Chas. Miller*  
Att'y.

# UNITED STATES PATENT OFFICE.

EDWARD SMITH, OF CANTON, OHIO.

## FEED-WATER HEATER.

SPECIFICATION forming part of Letters Patent No. 669,667, dated March 12, 1901.

Application filed November 12, 1900. Serial No. 36,195. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD SMITH, a citizen of the United States, residing at Canton, in the county of Stark and State of Ohio, have invented new and useful Improvements in Feed-Water Heaters, of which the following is a specification.

My invention relates to improvements in feed-water heaters, and has for its object the providing of a dome adapted to be mounted upon the top of a steam-boiler and communicating therewith, a water-supply pipe entering the top of the boiler outside of the dome, passing through the steam zone of the boiler and thence up through and terminating at the top of the dome and having mounted thereon a series of alternating pans, by means of which the water to be purified in passing through the steam zone becomes highly heated and is carried to a point near the top of the dome, where it is discharged into the uppermost pan and thence runs through each succeeding pan, depositing its sediment, and enters the boiler through the pipe connection of the dome with the boiler, as will be hereinafter more fully described and claimed.

In the accompanying drawings similar letters of reference refer to similar parts.

Figure 1 is a perspective view of my invention. Fig. 2 is a cross-sectional view. Fig. 3 is a plan view of one of the pans. Fig. 4 is a side view of the lowest pan.

The dome A may be of any desired form and may be constructed so as to be supported directly upon the boiler and directly communicating therewith; but I have shown it as cylindrical in form and supported vertically upon the boiler by means of the stay-rods  $a$  and provided at its top with the removable plate  $a'$ , which is held in position by means of the retaining-bolts  $a^2$ , which engage with the metal ring  $a^3$ , which is securely riveted to the top of the dome. The bottom of the dome is provided with an internally-screw-threaded flanged plate  $a^4$ , which has a screw-threaded engagement with the pipe  $a^5$ , connecting the dome A with the boiler B. The pipe  $a^5$  has a screw-threaded engagement with the boiler B through the internally-screw-threaded flanged plate  $b$ , which is riveted to the top of the boiler. The pipe  $a^5$  extends up into the dome and down into the boiler

and is coupled to the pipe  $b'$  by means of the joint  $b^2$ . The extension-pipe  $b'$  is provided with apertures or openings by means of which the steam enters the dome. The water-supply pipe C is substantially L-shaped and enters the boiler B at the top, extends downward to a point above the boiler-flues, thence along the same to a point under the dome, and thence upward through the connecting-pipe  $a^5$  into and through the dome, terminating at a point near the top thereof. Mounted upon that portion of the supply-pipe C which extends up into the dome there is a series of alternating pans D, practically semicircular in form and provided with a flanged opening  $d$  in the center thereof, which extends above the sides of the pan and carries a locking-bolt  $d'$ , by means of which the pans are securely locked in engagement with the water-supply pipe. The straight edge  $d^2$  of the pans is lower than the other sides, and thus permits of the overflow of the water and at the same time the retention of the sediment. The lower pan is supported above the bottom of the dome by means of feet  $d^3$  and  $d^4$ . In the bottom of the dome and at one side thereof there is provided the blow-off pipe  $a^6$ .

In the construction of a new boiler it may be more desirable to build the dome and the boiler together; but for the purpose of adapting my invention to old boilers the form above shown and described is desirable; but it is manifest that many changes in the form and arrangement of the parts may be made without departing from the spirit of my invention, which consists, primarily, in heating the feed-water to a high temperature by passing it through the steam zone of the boiler and discharging it into a series of alternating pans supported in a steam-heated atmosphere, by means of which the sediment carried in the water is precipitated into and retained in the pans, while the purified water in its highly-heated form is passed into the boiler and immediately converted into steam.

In operation the water passing into the boiler through the supply-pipe is raised to a high degree of temperature during its passage through the steam zone of the boiler and up through the dome, which is also highly heated by the steam from the boiler. The water is then discharged from the top of the supply-

pipe into the uppermost pan of the series of alternating pans and thence runs over one edge of the pan into the next pan, and so on to the bottom of the dome, the sediment or solids carried by the water being in the meantime precipitated into the pan and there retained during the passage of the water. The water then flows from the bottom of the dome down into the boiler through an atmosphere of steam, which is at the same time passing up through the pipe *a*<sup>5</sup>, which connects the dome with the boiler, and by the time the water reaches the boiler it is immediately converted into steam.

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

1. The combination in a feed-water heater and boiler, of a dome mounted upon and communicating with the boiler-shell, a series of alternating communicating pans supported within the dome, a feed-water pipe leading from the exterior of the boiler through the steam zone and water-space, and thence upward through the series of pans in the dome, and emptying into the uppermost pan, substantially as described and for the purpose set forth.

2. The combination in a feed-water heater and boiler, of a series of alternating communicating pans supported within a dome mounted upon and communicating with the shell of the steam-boiler, a feed-water supply-pipe leading from the exterior of the boiler through

the steam zone and water-space, and thence through the steam zone and dome, and terminating above the uppermost pan, substantially as described and for the purpose set forth.

3. The combination in a feed-water heater and steam-boiler, of a series of alternating communicating pans located within a dome mounted upon and communicating with the shell of a boiler, a feed-water pipe leading from the exterior of the boiler down through the steam zone and water-space, and thence upward through the pans and terminating above and emptying into the uppermost pans, and means for engaging said pans with the water-supply pipe, substantially as described and for the purpose set forth.

4. The combination in a feed-water heater and steam-boiler, of a series of alternating communicating pans located within a dome supported upon a shell of a boiler, and communicating therewith, a feed-water pipe leading from the exterior of the boiler through the shell thereof, and upward through and terminating at the top of the dome, and means for engaging the pans therewith, substantially as described and for the purpose set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

EDWARD SMITH.

Witnesses:

CHAS. R. MILLER,  
CHAS. M. BALL.