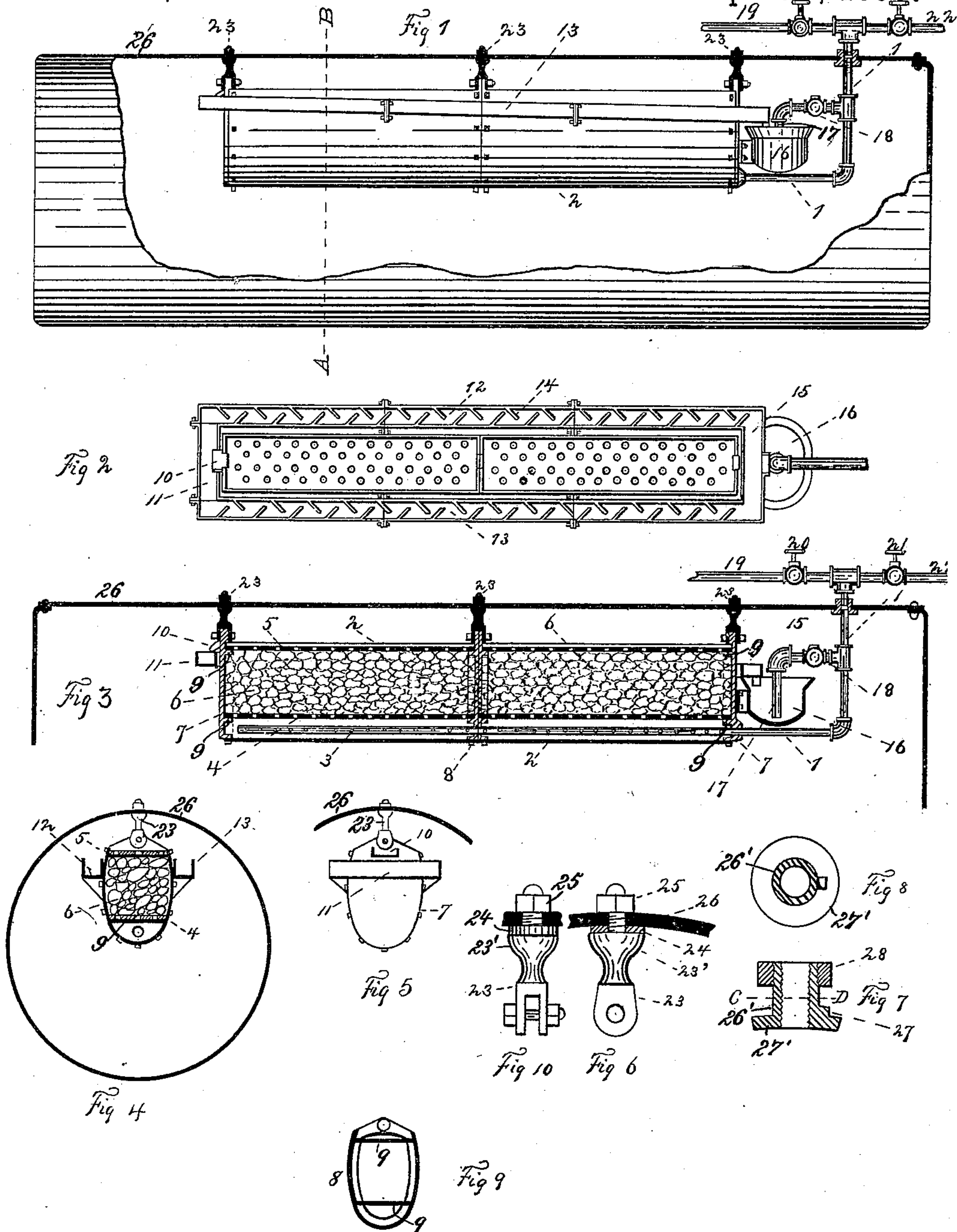


(No Model.)

W. A. TAYLOR.  
FEED WATER HEATER AND CLEANER.

No. 426,881.

Patented Apr. 29, 1899.



WITNESSES:

W. W. Cook  
Robert Ries.

INVENTOR

Walter Anderson Taylor

13  
Medwin  
Attorney



# UNITED STATES PATENT OFFICE.

WALTER ANDERSON TAYLOR, OF NEW ORLEANS, LOUISIANA.

## FEED-WATER HEATER AND CLEANER.

SPECIFICATION forming part of Letters Patent No. 426,881, dated April 29, 1890.

Application filed December 26, 1889. Serial No. 334,970. (No model.)

*To all whom it may concern:*

Be it known that I, WALTER ANDERSON TAYLOR, a citizen of the United States, residing at New Orleans, in the parish of Orleans and State of Louisiana, have invented certain new and useful Improvements in Feed-Water Heaters and Cleaners; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the annexed drawings, making a part of this specification, and to the letters and figures of reference marked thereon.

Figure 1 represents a steam-boiler with one side partly broken away, showing the feed-water heater and cleaner suspended within the boiler. Fig. 2 shows a top view of the feed-water heater and cleaner. Fig. 3 is a longitudinal section of the feed-water heater and cleaner together with part of the boiler-shell. Fig. 4 is a vertical cross-section of the boiler and feed-water heater and cleaner through the line A B, Fig. 1. Fig. 5 represents an end view of the feed-water heater and cleaner with part of the boiler-shell in section. Fig. 6 shows an enlarged scale of one of the bifurcated studs or hangers by which the feed-water heater and cleaner is suspended from the interior of the boiler-shell. Fig. 7 shows a longitudinal section of a bushing for attaching and supporting the feed-water pipe where it passes through the boiler. Fig. 8 is a section of the bushing through the line C D of Fig. 7. Fig. 9 is a face view of one of the flange-heads for fastening together the sections of the feed-water heater and cleaner. Fig. 10 shows an enlarged view, at a right angle to Fig. 6, of one of the bifurcated studs or hangers for suspending the feed-water heater and cleaner.

This invention has for its object to provide a simple and efficient apparatus for economically and perfectly purifying and heating the feed-water for steam-boilers; and it consists in the peculiar features of construction and novel combinations of devices, hereinafter described and claimed.

Referring to the drawings, Figs. 1 and 3, the feed-water pipe 1 after entering the boiler may be made to pass direct to the heater and cleaner 2, as shown, or, if preferred, said feed-pipe 1 may be turned backward and forward

in a coil either vertically or horizontally, (not shown,) so that the feed-water may become more thoroughly heated by the steam around the feed-pipe before the water is allowed to enter the heater and cleaner. That portion of the feed-pipe 1 which is inclosed within the heater and cleaner is provided with a series of perforations 3, as shown in Fig. 3, to permit the free entrance of water into the lower part of the cleaner while excluding the coarser impurities.

The heater and cleaner 2 is a tight and open-top trough-like vessel, which may be made in one piece or in sections, as preferred. In the lower portion of the heater and cleaner 2, above the perforated portion of the feed-pipe 3, is a lower perforated plate 4, and in the upper part of the heater and cleaner is a similar perforated plate 5. Between the lower perforated plate 4 and the upper perforated plate 5 the cleaner 2 is filled with coke or other suitable filtering material 6, as shown in Fig. 3. The top of the heater and cleaner 2 above the upper perforated plate 5 is open or uncovered, while the bottom, sides, and ends of the cleaner are tightly closed. In the preferred construction, as shown, the ends of the heater and cleaner consist of flanged heads 7, to which sheet metal is bolted or riveted to form the bottom and sides of the vessel, and in some cases, when desirable, I make the heater and cleaner in sections bolted to intermediate connecting flanged heads 8. (Shown in Fig. 9.) The flanged heads 7 and 8 are provided with shoulders 9, that support the perforated plates 4 and 5, which are arranged within the heater and cleaner.

The feed-water, after entering the heater and cleaner 2 through the perforations 3 of the feed-pipe, passes upward through the lower perforated plate 4, the coke 6, and through the upper perforated plate 5, and fills the shallow space above said upper perforated plate 5, which shallow space is formed by the projection upward of the sides and ends of the purifying and heating vessel for about one inch, so that the water forms a thin sheet of evaporating-surface above said upper plate.

The whole heater and cleaner 2 is set slightly



inclined toward the rear end, where a spout 10, projecting from the upper part of the cleaner, conducts the water into a cross-trough 11, which leads into the external longitudinal troughs 12 and 13, one of which is arranged on each side of the heater and cleaner and extends forward to its full length, as shown in Fig. 2. These troughs 12 and 13 may be plain-surfaced channels, if desired, but are preferably provided with interior deflecting-plates 14, as shown, in order to afford a tortuous passage for the water passing through the troughs.

The water, after leaving the spout 10 and cross-trough 11, passes into the longitudinal troughs 12 and 13, where its flow is lengthened and somewhat retarded by passage around and between the deflecting-plates 14, thus affording further time for the water to absorb heat and to partially evaporate, depositing also its sediment. The water passing through the troughs 12 and 13 unites again at the front end of the heater and cleaner 2 in the cross-trough 15, whence it is discharged into an open-top pot or chamber 16, and thence overflows into the boiler. In order to remove the sediment that collects in the bottom of the pot or chamber 16 a blow-off pipe 17, Fig. 3, is provided, which is open at its lower end, where it dips into said chamber. This blow-off pipe 17 is provided with a check-valve 18, which is connected to the feed-pipe 1 by means of a T. A portion of the feed-pipe 1 thus serves both for the passage of feed-water and as a part of the blow-off device. This is accomplished by connecting the outer end of the feed-pipe 1, by means of a T, to a pipe 19, having a valve 20, and a pipe 22, having a valve 21, thus enabling the pipe 1 to be used both for feeding the boiler and for blowing off the heater and cleaner 2 and sediment-pot 16. When the valve 20 is closed and valve 21 opened, which by pipe 22 leads to a feed-pump, (not shown,) the boiler will be supplied with water passing through the perforations 3 of the feed-pipe and through the heater and cleaner 2 and sediment-pot 16, while by closing the valve 21 and opening the valve 20 the sediment and dirty water can be blown out through the blow-off 17 and pipes 1 and 19.

The heater and cleaner 2 is suspended from the top of the boiler by means of bifurcated studs or hangers 23, having their lower ends provided with jaws or bifurcations to receive flanges on the upper ends of the heads 7 and 8, to which the studs are connected by means of bolts, as shown. The enlarged part 23' of each stud or hanger, Figs. 6 and 10, is shaped to the curvature of the boiler, and a ring 24, of asbestos or other packing, is placed around the screw-threaded shank of the stud on the inside of the boiler and in immediate contact therewith to form a tight joint. On the outer end of the stud-shank is a nut 25, which on being screwed up draws the packing 24 into

close contact with the boiler-shell, thereby forming a tight joint without requiring a washer under the nut or any external packing.

In the boiler-shell 26, where the feed-pipe 1 passes through, is inserted a bushing 26', Figs. 7 and 8, the lower part of which is provided with a flange 27', to fit against the inner side of the boiler-shell, and above the flange is a dowel or projection 27, which fits into a corresponding recess in the boiler-shell and prevents the bushing from turning when a nut 28 on its outer end is screwed up. A piece of sheet-packing may be employed to make a tight joint inside the boiler-shell at the point where the bushing is attached. This bushing 26' is screw-threaded on the inside in such a manner that the pipe-connections can be screwed into place from both the inside and outside of the boiler, and I find that this way of passing a pipe through the boiler is preferable to the old way of having a nut and washer on each side of the boiler-shell and packing under each washer, the joints being made tight by screwing up the nuts.

The heater and cleaner 2 may be made in a single length instead of in two or more sections by employing cast-brass or other suitable heads and making the sides and bottom from a single piece of metal or from several sheets riveted or bolted together and bolted or riveted at their outer ends to the two heads. By making the shell in one sheet leaking joints are readily avoided, through which water might directly enter the boiler, which is more likely to occur when the sides and bottom are put together in sections; but if circumstances compel the heater and cleaner to be made in sections the joints must be made water-tight.

If the man-hole of the boiler is in the boiler-head, I may make the heater and cleaner in one piece or in several sheets securely riveted together, but having only two heads. In this shape it is shipped completely put together, readily filled with coke or similar material, and can be inserted into the boiler through the man-hole in the boiler-head and hung to the shell of the boiler by means of the suspension studs or hangers 23, before described. If the man-hole of the boiler is in the top of the shell, it will not be possible to get into the boiler a long purifier, heater, or cleaner made in one piece, and therefore in such cases I make the heater and cleaner in two or more sections, short enough to get each one inside the boiler through the man-hole. The sections, after being separately inserted, are bolted together inside the boiler, the perforated feed-pipe, the plates, and the coke or other filtering material are put in place, and the whole purifier is then suspended from the interior of the boiler-shell by means of the hangers or studs, as before described.

The troughs 12, 13, and 15 are put in posi-



tion, the sediment-pot 16 is put up and bolted securely to the head of the cleaner, and the external and internal piping-connections being then made the apparatus will be ready for use.

What I claim is—

1. In a feed-water heater and cleaner, an open-top trough-shaped vessel containing in its lower part a perforated feed-pipe and having above said pipe a lower perforated plate and an upper perforated plate, with a stratum of filtering material between said plates, substantially as described.

2. In a feed-water heater and cleaner, the combination of an open-top trough-like shell or vessel, an internal perforated feed-pipe, an upper and a lower perforated plate, filtering material between the plates, an external trough communicating with the space above the upper perforated plate, a chamber to receive filtered water from said external trough, and a blow-out pipe leading from said chamber, substantially as described.

3. In a feed-water heater and cleaner, the combination of an open-top trough-like shell or vessel provided with an upper and a lower perforated plate, filtering material between said plates, troughs to receive the filtered water from the space above the upper perforated plate, an open sediment port or chamber to receive the filtered water from said troughs, and a combined feed and blow-out pipe, substantially as described.

4. In a feed-water heater and cleaner, the combination, with the boiler and a suspended heater and cleaner, of a sediment pot or chamber communicating with the heater and cleaner, and a feed-water pipe communicating with the heater and cleaner and having a part opening into the sediment-pot, and valves to control the passage of feed-water and to con-

vert the feed-pipe into a blow-off pipe, substantially as described.

5. The combination of a steam-boiler, a suspended feed-water heater and cleaner containing perforated plates and filtering material, and having external troughs for filtered water, a sediment-pot into which the filtered water is discharged, and combined feed and blow-off pipes, substantially as described.

6. The combination, with a steam-boiler and a feed-water heater and cleaner inclosed in the boiler, of a bushing for the feed-pipe inserted in the boiler-shell and provided with an inner flanged end, a dowel to prevent the bushing from turning, a nut to lock the bushing in place, and an internal screw-thread to engage the feed-pipe, substantially as described.

7. The combination, with a steam-boiler, of the feed-water heater and cleaner 2, the sediment-pot 16, the pipe 17, having a check-valve 18, the combined feed and blow-off pipe 1, and the pipes 19 and 22, having valves 20 and 21, substantially as described.

8. The combination, with a steam-boiler and the suspended feed-water heater and cleaner 2, having flanged heads 7, of the bifurcated studs or hangers 23, secured in the boiler-shell and engaged with said flanged heads, substantially as described.

9. The combination, with the feed-water heater and cleaner 2 and the sediment-pot 16, of the troughs 12 and 13, provided with deflecting-plates 14, substantially as described.

In testimony whereof I have hereunto subscribed my name in the presence of two witnesses.

WALTER ANDERSON TAYLOR.

Witnesses:

WALTER H. COOK,  
ROBERT RIES.