No. 634,272. Patented Oct. 3, 1899.

F. PYE.

BOILER FEEDER AND PURIFIER.

(Application filed Mar. 31, 1899.)

(No Model.)

Fig. 1

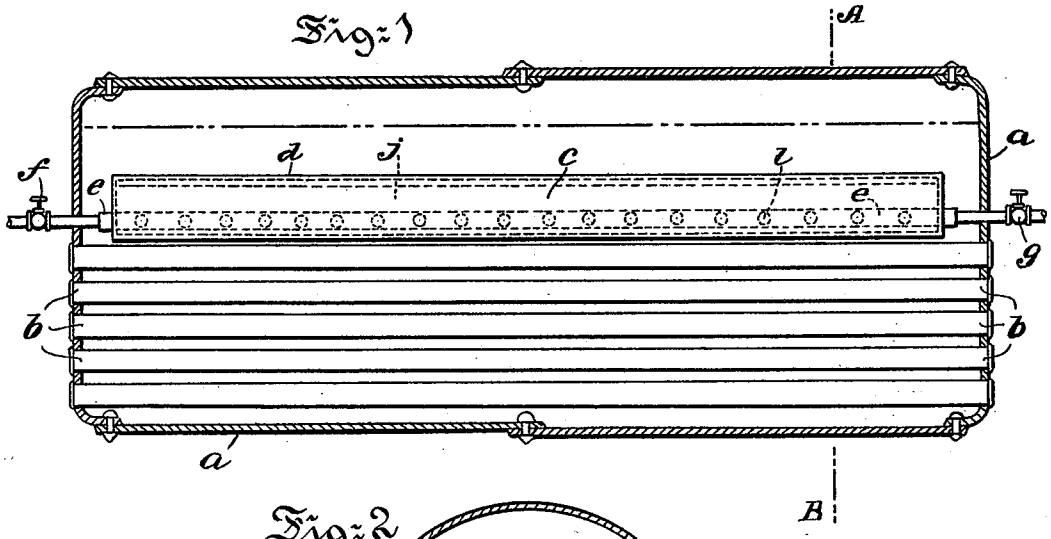


Fig. 2

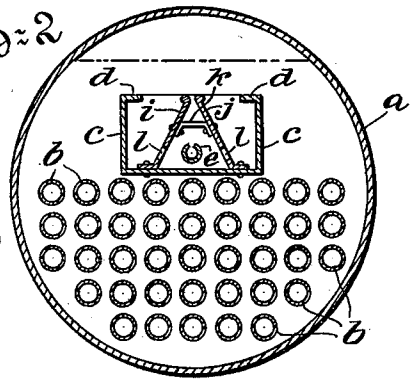


Fig. 4

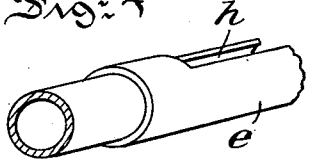


Fig. 5

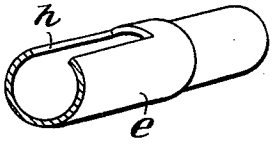
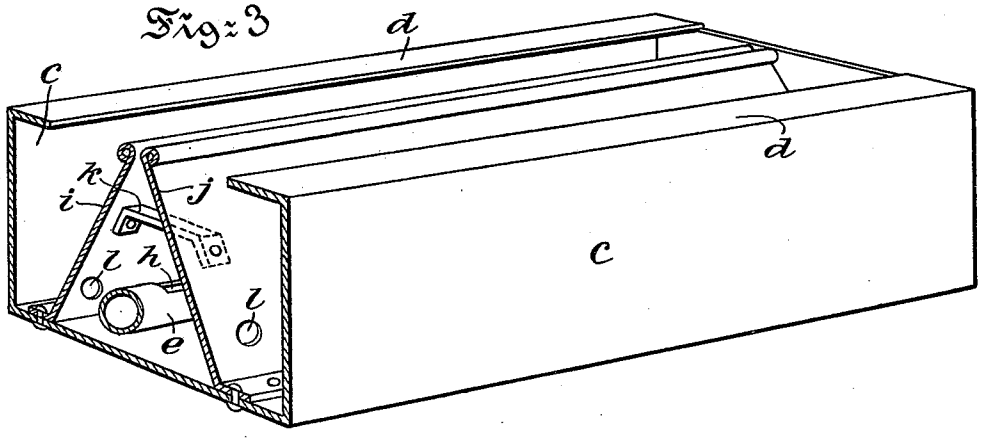


Fig. 3



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BOILER FEEDER AND PURIFIER.

SPECIFICATION forming part of Letters Patent No. 634,272, dated October 3, 1899.

Application filed March 31, 1899. Serial No. 711,213. (No model.)

To all whom it may concern:

Be it known that I, FRANK PYE, a subject of the Queen of Great Britain, and a resident of the city and county of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Overhead Boiler-Feeding and Water-Purifying Devices, of which the following is a specification.

My invention relates to improvements in overhead boiler-feeding devices; and the objects of my invention are, first, to heat the feed-water before it is mixed with the water in the boiler, and thus prevent unequal expansion of the boiler-plates due to introducing a large body of cold water into the heated boiler; second, to furnish, in connection with an overhead boiler-feed, a water-purifier which will collect and retain not only mud and other impurities mechanically mixed with the water, but which also will, owing to the great heat to which it is subjected, separate all or nearly all of the salts which are carried by the water and which are ordinarily separated in the boiler and deposited on the tubes and plates in the form of scale, and, third, to furnish a surface blow-off which will completely rid the apparatus of impurities and all matter collected therein and which will also rid the boiler of any grease or scum which may be on or near the surface of the water.

In the accompanying drawings, forming part of this specification, and in which similar letters of reference indicate similar parts throughout the several views, Figure 1 is a longitudinal section through a boiler furnished with my overhead feeding device which is shown in side elevation; Fig. 2, a section of Fig. 1 on line A B; Fig. 3, a perspective view of my purifying device, one of the ends being removed; Fig. 4, a perspective view of the inlet end of the feed-pipe, and Fig. 5 a perspective view of the outlet end of the feed-pipe.

a is a steam-boiler; *b*, the tubes; *c*, a metal box closed at the bottom, sides, and ends and open at the top, which is preferably furnished with inwardly-projecting flanges *d*, making the opening in the top somewhat narrower than the width of the box. The box is placed in the upper part of the boiler and is completely submerged in the water therein contained.

e is a feed-water pipe passing through boiler *a* and box *c*, which is furnished at each end with suitable stop-cocks *f g*.

h is an opening or series of openings, preferably a slot, in the top of pipe *d*. This slot extends along the pipe nearly or quite the length of the box *c*.

i j are metal plates secured to the bottom of box *c*. These plates converge toward their tops, but do not quite meet or touch. These plates run from one end of the box to the other, and the feed-water pipe is placed between them, as shown.

k are braces secured to the plates, which serve to keep their upper ends in proper position.

l are holes or perforations through the plates *i j* near their lower ends.

The feed-water enters through pipe *e* and passes upward from this pipe through opening or slit *h*, thence between the two plates *i j*, out between these plates, and through the open top of box *c* to the water in the boiler. The water entering through pipe *e* is cold, and in comparison with the water in the boiler the water in the bottom of box *c* is cool and is comparatively unaffected by ebullition. The sediment and mud carried by the entering water are first deposited in pipe *e* and on the bottom of box *c* and are thereby prevented from falling down on or between the boiler-tubes. The discharge of water from pipe *e* is upward. Hence this discharge does not agitate the mud collected on the bottom of box *c*. As the water rises it becomes highly heated, and as the box *c* is placed at about the hottest point in the boiler the water when discharged upward between the tops of the plates *i j* is heated to almost or quite the temperature of the water in the boiler. This heating causes it to give up all or a great part of the salts which it may carry, which are then deposited in the box *c*.

The water contained in box *c* is not affected to any appreciable extent by surging or the movement of currents of water in the boiler. The water contained between the sides of the box *c* and the plates *i j* is practically at rest, the flanges *d* on the box preventing any serious disturbance due to currents which pass up along the sides and over the top of the box. The consequence of this is that mud and

sediment carried across the top of the box with the moving water meeting the still water in the box will be precipitated by gravity and will fall into the box, where it will remain until the boiler is blown off. As the ebullition causes all the water in the boiler to circulate again and again across the top of the box, more and more of the sediment which it may contain will be separated from it.

At more or less frequent intervals, depending upon the nature and condition of the feed-water, the cock *f* is closed and the cock *g* is opened. When this is done, the pressure of steam in the boiler drives the water in box *c* into slot *h* in pipe *e* and out through this pipe and away. The outrushing water causes all scum or grease upon the surface of the water in the boiler to enter box *c*, whence it passes to pipe *e*, and at the same time it thoroughly agitates all sediment or deposit on bottom of box *c*, which passes, with the water, to the pipe *e* and thence out past cock *g* and away. The sediment that may have collected between plates *i j* and the sides of the box *c* passes through holes *l* in these plates to the space between the plates and thence with the water to the pipe *e*. The blowing off completed, the stop-cock *g* is closed and the stop-cock *f* opened to replenish the water-supply.

The blow-off pipe being practically a continuation of the feed-water pipe, this latter is thoroughly cleaned out every time that the boiler is blown off. This prevents the stoppage of the outlet end of the feed-pipe by an accumulation of scale and sediment, which is one of the great objections to an overhead feed system as ordinarily constructed.

The box *c*, arresting and collecting the sediment and scale carried by the feed-water and preventing its accumulation upon the tubes and plates, greatly prolongs the life of these parts of the boiler. It is well known that scale and sediment on the tubes and plates causes them to rapidly deteriorate, while preventing them from transmitting the heat from the fuel to the water. If the tubes be coated with scale and sediment, they must frequently often at great inconvenience and expense, be cleaned or they will rapidly burn out.

By the means described and illustrated it is possible to separate all or nearly all sediment and salts from the water before it is admitted to the boiler, and at the same time feed-water is added to the water in the boiler at a temperature almost or quite as high as that of the water already in it. Hence there is not that danger from unequal expansion which occurs when a body of cold water is suddenly introduced into a hot boiler.

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

1. In combination, a steam-boiler, a combined feed-water and surface blow-off pipe passing continuously through said boiler at a distance beneath the water-line and furnished along its top with an opening or openings and being adapted to receive feed-water at one end and to discharge or blow off at the other end, and stop-cocks upon said pipe without said boiler.

2. The combination with a steam-boiler, of a box closed at its bottom, sides, and ends and open at the top and adapted to be placed beneath the water-level, a combined feed-water and blow-off pipe passing through said boiler and box and furnished with an opening or openings along its top, stop-cocks upon the feed-water and blow-off ends of said pipe, and plates carried by and passing from end to end of said box and converging toward but not touching at their tops and furnished with holes along their bottom edges, all substantially as and for the purposes set forth.

3. The combination with a steam-boiler, of a box closed at its bottom, sides, and end and furnished with inwardly-projecting flanges at its top and adapted to be placed beneath the water-level, a combined feed-water and blow-off pipe passing through said boiler and box and furnished with an opening or openings along its top, stop-cocks upon the feed-water and blow-off ends of said pipe, and plates passing from end to end of said box and converging toward but not touching at their tops and furnished with holes along their bottom edges, all substantially as and for the purposes set forth.

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