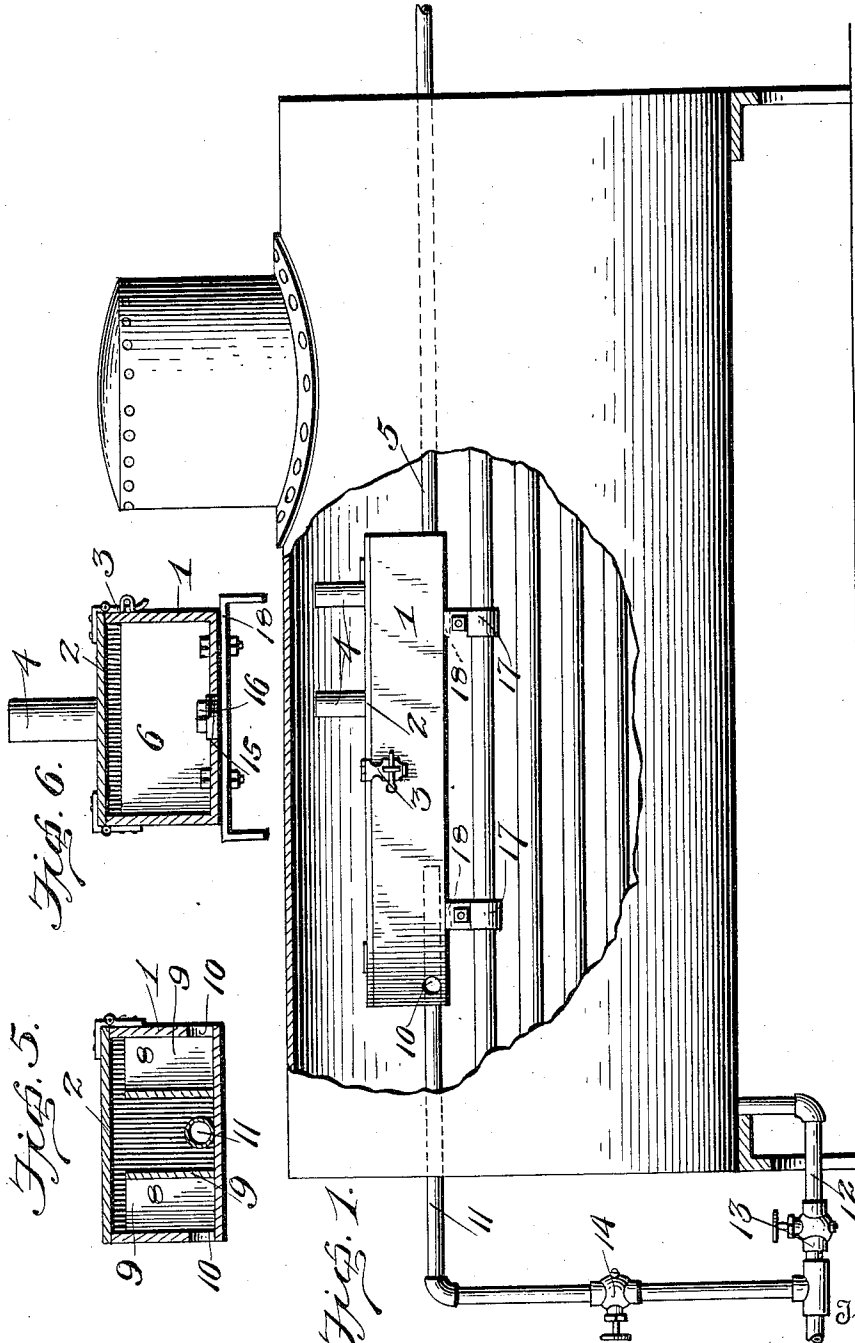


J. W. STEPHENS.
 FEED WATER HEATER AND PURIFIER.
 APPLICATION FILED SEPT. 15, 1911.

1,053,070.

Patented Feb. 11, 1913.

2 SHEETS—SHEET 1.



Witnesses
 C. Hunt.
 O. M. Lomen

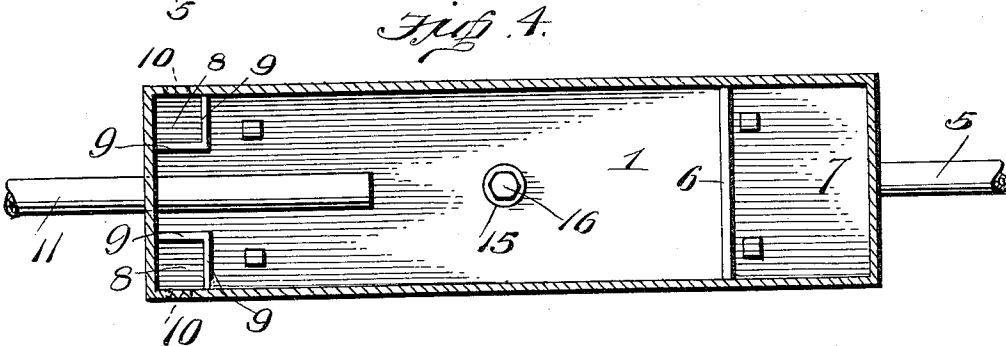
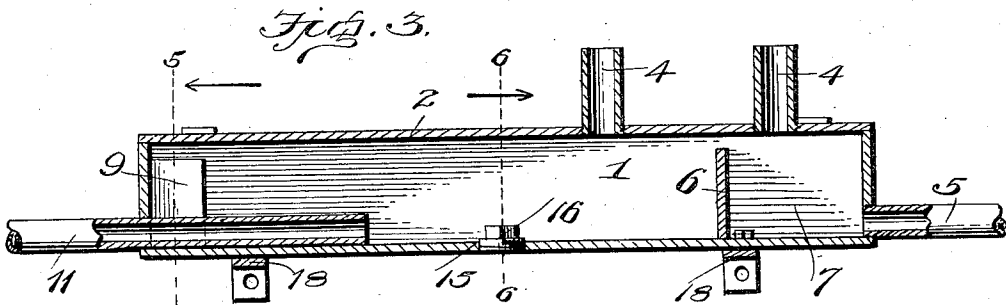
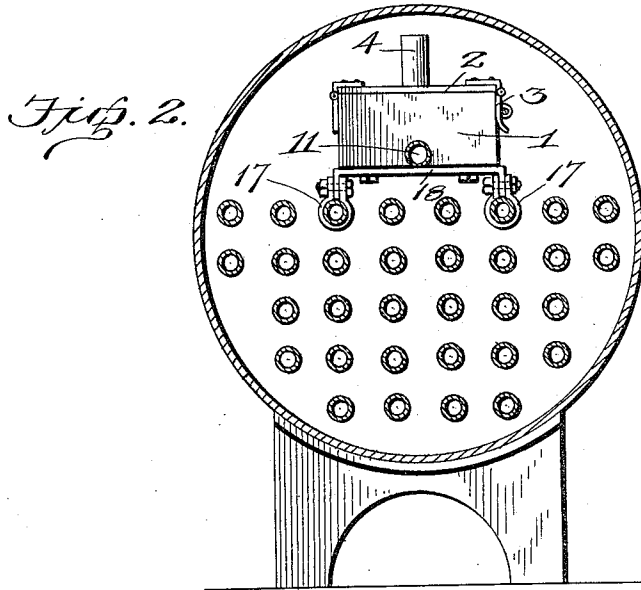
Inventor
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 by A. B. Wilson & Co
 Attorneys

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Witnesses
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UNITED STATES PATENT OFFICE.

JOHN W. STEPHENS, OF STAUNTON, VIRGINIA.

FEED-WATER HEATER AND PURIFIER.

1,053,070.

Specification of Letters Patent.

Patented Feb. 11, 1913.

Application filed September 15, 1911. Serial No. 649,505.

To all whom it may concern:

Be it known that I, JOHN W. STEPHENS, a citizen of the United States, residing at Staunton, in the county of Augusta and State of Virginia, have invented certain new and useful Improvements in Feed-Water Heaters and Purifiers; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in feed water heaters and purifiers for boilers.

One object of the invention is to provide a feed water heater and purifier adapted to be arranged within a boiler whereby the feed water is heated to a high degree thus precipitating the scale producing salts in the water.

Another object is to provide a feed water heater and purifier of this character having means whereby the steam is employed as an additional means in connection with the hot water in the boiler, to heat the feed water.

A further object is to provide a feed water heater and purifier having an open top closed by a cover which may be readily opened to permit access to the heater for cleaning or other purpose and which, when closed will prevent the water in the boiler from entering the heater should said water rise above the latter and which will prevent the water in the heater from passing out of the same except through the regular channels provided for this purpose.

With these and other objects in view, the invention consists of certain novel features of construction, and the combination and arrangement of parts as will be more fully described and claimed.

In the accompanying drawings: Figure 1 is a side view of a boiler with parts broken away and in section, showing the application of the invention; Fig. 2 is a cross sectional view of the same; Fig. 3 is a central vertical longitudinal sectional view of the feed water heater and purifier removed from the boiler; Fig. 4 is a horizontal section of the same; Fig. 5 is a cross sectional view on the line 5—5 of Fig. 3; Fig. 6 is a similar view on the line 6—6 of Fig. 3.

My improved water heater and purifier

comprises a tank or receptacle 1 which may be of any suitable form but which is preferably of flat oblong shape open on its upper side and adapted to be normally closed by a cover 2 which is preferably hinged to the upper edge of one side of the receptacle and is securely fastened in closed engagement therewith by a suitable clasp or fastening mechanism 3 as shown. In the top or cover 2 adjacent to one end thereof are formed upwardly projecting steam conducting tubes 4 which communicate through the cover with the receptacle and which project a suitable distance above the cover as shown. The purpose of the tubes 4 will be hereinafter described.

To one end of the receptacle 1 is connected a feed water conducting or supply pipe 5 which leads to any suitable source of water supply. In the receptacle 1 adjacent to the end thereof to which the supply pipe 5 is connected is arranged a vertically disposed baffle plate or partition 6 which extends upwardly to near the top of the receptacle and forms a water inlet chamber or space 7 in the end of the receptacle. The water after entering the chamber or space 7 is obliged to flow over the partition or baffle plate 6 before entering the main portion of the tank or receptacle. It will be noted that the baffle plate or partition 6 is disposed between the steam inlet tubes 4 and the water in flowing over the plate or partition is brought into contact with or subjected to the heat of the steam entering through the tubes 4. By thus arranging the baffle plate 6 of the steam inlet tubes 4 it will be seen that the steam from the boiler is employed as an additional means for heating the feed water in the receptacle.

An important feature of the invention is in the provision of the closed and hermetically sealed tank or receptacle 1 in which the water passing through the same is confined and properly directed, and the employment of the tubes 4 projecting upwardly from and forming a part of the cover 2, the upper open ends of said tubes being located adjacent to the boiler, whereby, live steam is admitted into the tank or receptacle directly from the boiler and the confined water passing through the tank

heated in addition to the water contained in the boiler thus effectually producing the results previously referred to.

In the corners of the receptacle at the opposite end from that in which the partition or baffle plate 6 is disposed are arranged overflow chambers 8, said chambers being formed by partition plates 9 arranged in the corners of the receptacle as shown. The plates 9 extend from the bottom of the receptacle to near the top of the same, said plates terminating a sufficient distance below the top of the receptacle to permit the water therein to flow over the plates and into the overflow or discharge chambers 8 from which said water is discharged through the discharge openings 10 formed in the sides of the receptacle near the bottom thereof and opening into the chambers 8 as shown. By thus arranging the overflow or discharge chambers 8 it will be seen that before any of the water can flow from the receptacle that the receptacle must fill to the height of the plates 9. By this arrangement the receptacle is kept continuously filled with water.

Connected with the discharge end of the receptacle and extending a short distance therein adjacent to the bottom thereof is a pipe 11. The pipe 11 passes out through the end of the boiler and is connected to the blow-off pipe 12 of the boiler as shown. In the blow off pipe 12 is arranged a cut off valve 13 and in the boiler blow-off pipe 12 between the connection of the blow-off pipe 11 and the boiler is arranged a cut off valve 14. By means of the valves 13 and 14 either of the blow-off pipes 11 and 12 may be employed independently and without interfering with the other. In the center of the bottom of the receptacle is formed a clean out opening 15 which is preferably threaded and provided with a screw plug 16 for normally closing the same.

The tank or receptacle 1 is preferably arranged on or immediately above the upper tubes of the boiler and is secured to said tubes by clamping rings or clips 17 which are engaged with the tubes and have their ends bolted to cross bars 18, said bars being arranged across the under side of the bottom of the receptacle and bolted thereto as shown. When the receptacle is arranged as herein shown and described the normal water level of the boiler will reach about half-way up around the receptacle or in other words, the receptacle will be submerged in the water of the boiler to about one-half the height of the receptacle as shown. In thus submerging the receptacle the feed water entering the same will be heated by the hot water in the boiler coming in contact with the outer side of the receptacle, and by the steam entering through

tubes 4 of the receptacle and coming into direct contact with the feed water in the receptacle as the water flows over the portion 6. This steam heat serves as an additional means for heating the feed water in connection with the heat supplied by the contact of the hot water in the boiler with the receptacle as described.

By subjecting the feed water to the heat of the water and steam in the boiler, said feed water will become heated in the receptacle to such a degree that the scale forming salts and other impurities in the water will be precipitated in the receptacle and only the purified water will be permitted to flow into the boiler from the receptacle. By providing the receptacle with a hinged cover the receptacle may be kept closed when in use so that should the water in the boiler rise to such an extent as to entirely submerge the receptacle, said boiler water will be prevented from flowing into the receptacle and mixing with the feed water therein. The cover of the receptacle will also prevent any possibility of the feed water escaping or flowing out of the receptacle except through the regular discharge passage 10 after the impurities have been removed in the manner described. The hinged cover 2 also provides means whereby access may be readily had to the inside of the receptacle for cleaning the same or for any other purpose.

From the foregoing description taken in connection with the accompanying drawings, the construction and operation of the invention will be readily understood without requiring a more extended explanation.

Various changes in the form, proportion and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of the invention as claimed.

Having thus described my invention, what I claim is:—

The combination with a boiler of a feed water heater and purifier comprising a box, a removable cover for the same, a partition transversely arranged in said box near one end thereof, the upper edge of which is out of contact with the cover forming a baffle plate, water discharging chambers arranged at the opposite corners of the box with their upper edges out of contact with the cover, said chambers having formed therein water discharging apertures located adjacent to the bottom of the box, whereby, the water overflowing from said box into said chambers is discharged therefrom, a water supply pipe connected with the space at the end of the box in advance of the box plate, a blow off pipe leading from the opposite end of the box and located between said chambers, steam conducting pipes projecting upwardly from

said cover and communicating with the receptacle on the opposite sides of said baffle plate, the upper ends of which pipes terminate a short distance from the boiler, & whereby, live steam is admitted to the box on either side of the baffle plate for the purposes described.

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

JOHN W. STEPHENS.

Witnesses:

W. E. WILKERSON,
S. C. STICKLEY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."
