No. 615,830.

Patented Dec. 13, 1898.

C. E. FERREIRA.

FEED WATER HEATER AND PURIFIER.

(Application filed June 28, 1897.)

(No Model.)

Fig. 2.

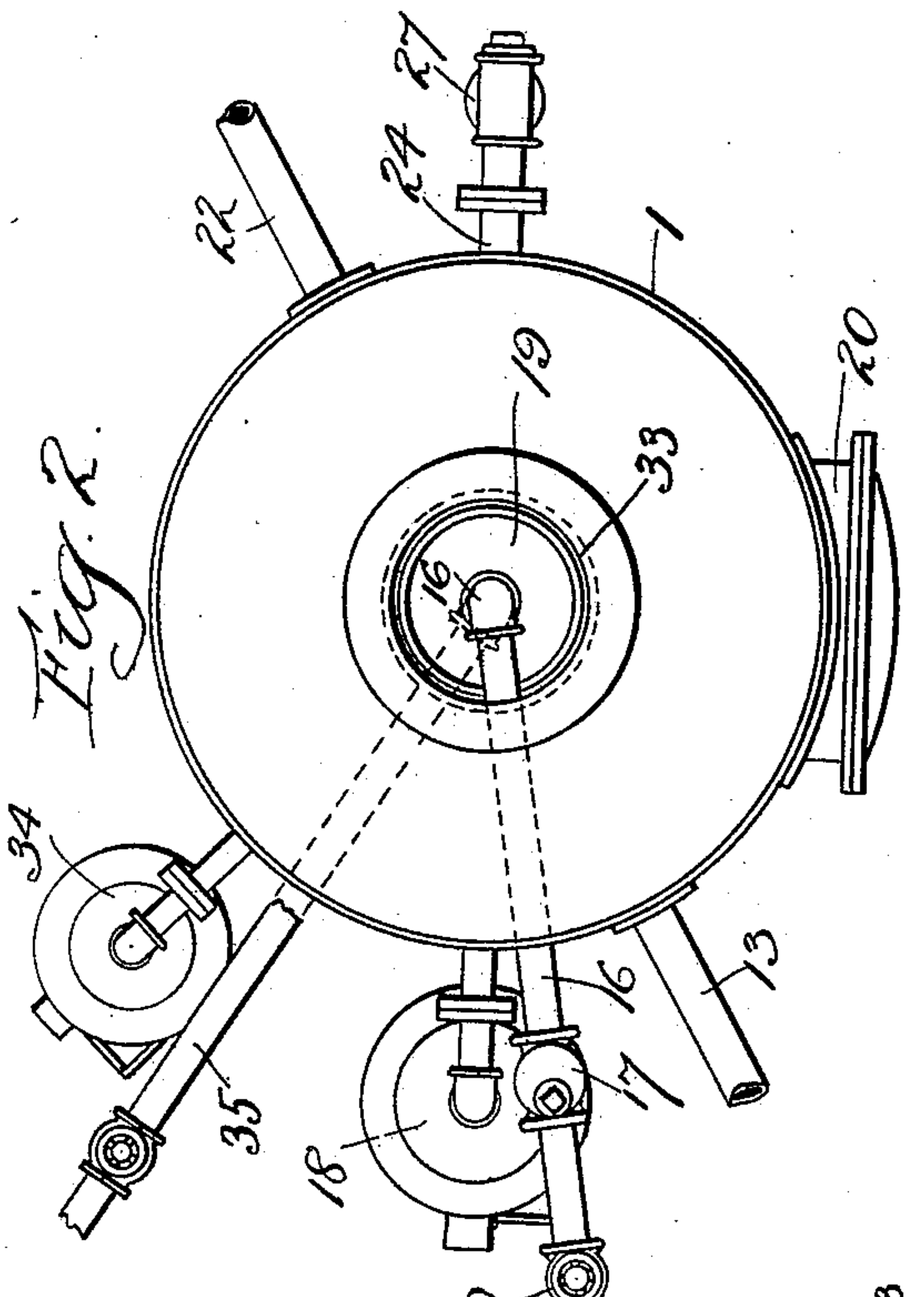


Fig. 3.

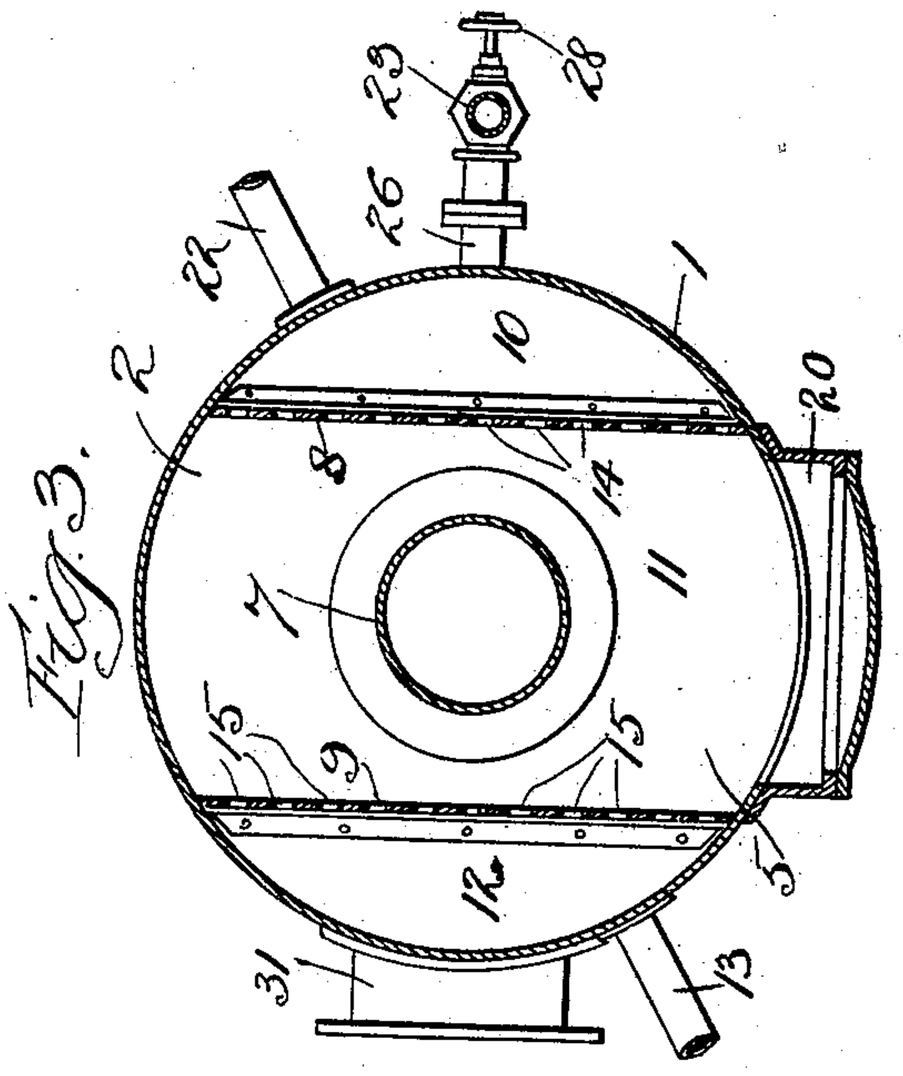
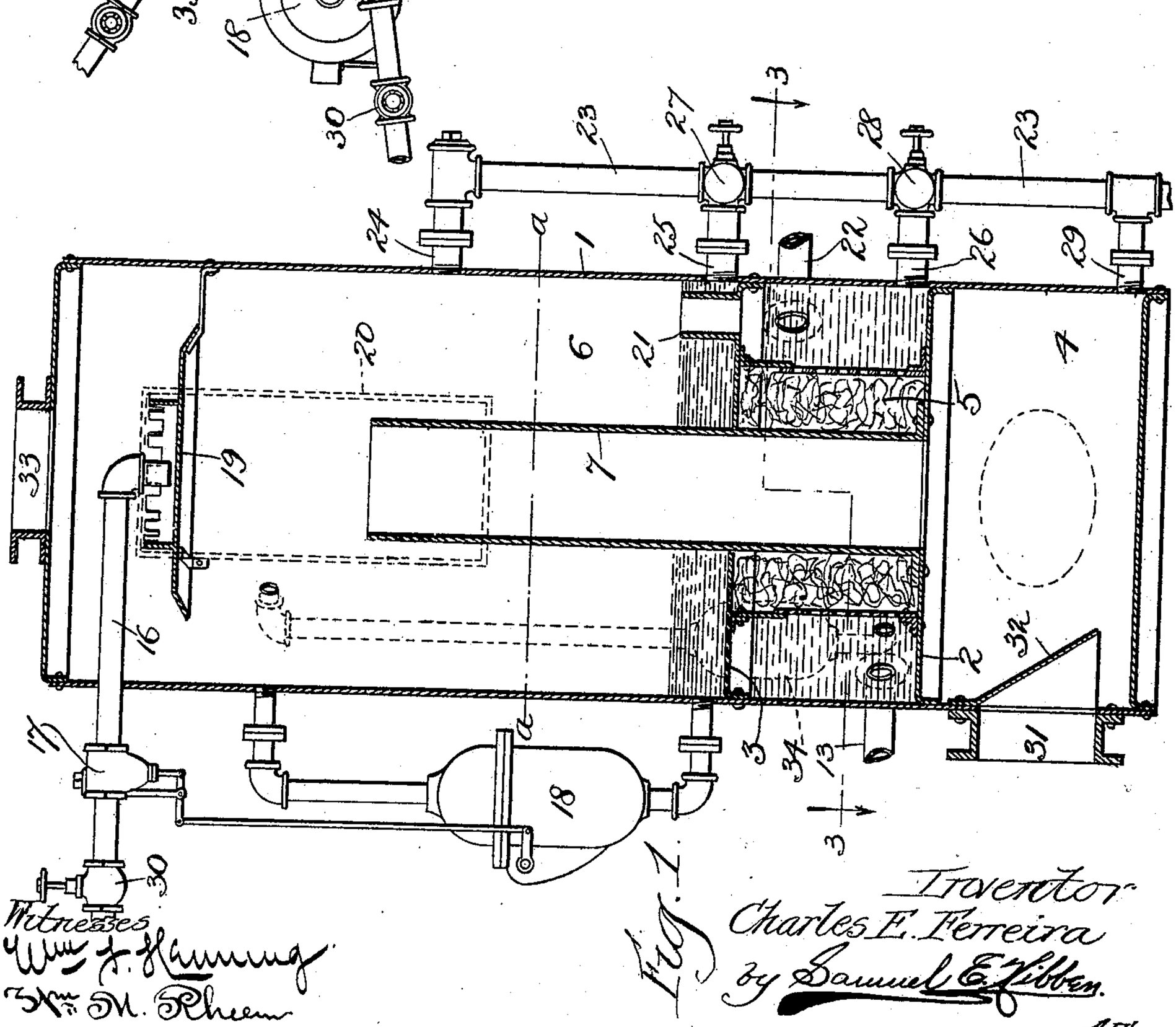


Fig. 1.



Witnesses
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UNITED STATES PATENT OFFICE.

CHARLES E. FERREIRA, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO SAMUEL T. BLEYER, OF SAME PLACE.

FEED-WATER HEATER AND PURIFIER.

SPECIFICATION forming part of Letters Patent No. 615,830, dated December 13, 1898.

Application filed June 28, 1897. Serial No. 642,598. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. FERREIRA, residing at Chicago, Cook county, Illinois, have invented certain new and useful Improvements in Feed-Water Heaters and Purifiers, of which the following is a specification.

My invention has relation to a feed-water heater and purifier; and its object is to provide such a device embodying many advantages, besides being simple in its construction and arrangement and reliable in its operation.

One of the main objects is to provide for the maintenance of different water-levels, as required in summer and winter or at other times. These heaters are frequently used in large cities in low basements, and when the steam-heating system, for instance, is in operation in winter it is necessary that the water-line shall be below the lowest radiator to prevent its flooding. Consequently for winter service I provide a low-water line.

My invention embodies other advantages and valuable features, which will be apparent from the description hereinafter given.

In the drawings, Figure 1 is a sectional elevation of my feed-water heater and purifier; Fig. 2, a plan thereof, and Fig. 3 a sectional plan on line 3 of Fig. 1.

My device comprises any suitable shell or casing 1 of the desired shape and dimensions and divided by partitions 2 and 3 into three separate chambers intercommunicating, as hereinafter explained. The lowest chamber 4 is the expansion and oil-separating chamber and is located below what I will term for a whole and for convenience the "filtering-chamber" 5. The third chamber 6 is the heating and settling chamber and is located above the other two.

A suitable pipe or passage 7 extends from the expansion-chamber upward into the heating-chamber and communicates only with the latter. This pipe extends a suitable distance above the normal high-water line, predetermined in a manner to be described.

The filter-chamber is subdivided by vertical transverse partitions 8 and 9 into three chambers, the chamber 10 being a receiving-chamber for the water before filtration, chamber 11 the filter-chamber proper, and chamber 12 the purified-water chamber, from which the water is drawn through pipe 13 by pump-suction or otherwise. The partitions 8 and 9 have suitable perforations or passages 14 and 15, respectively, and chamber 11 is supplied with any suitable filtering material.

The pipe 16 is the cold-water inlet, entering the casing above the highest normal water-level and provided with a valve device 17, operated in the well-known manner by a float in a case 18, so as to maintain a normal water-line in the heating-chamber.

Supported within the heating-chamber below the water-inlet I arrange a suitable deflecting vessel or plate 19, preferably circular or umbrella-shaped, so as to provided a circular shower around the pipe 7. The heating-chamber preferably has a suitable manhole 20.

The heating-chamber communicates with the expansion-chamber through pipe 7 and by a passage 21 with chamber 10, into which also enters the condensation-return 22 for the condense-water of a steam-heating system.

A discharge-pipe 23, which is in connection with the sewer or other discharge-point, is arranged extraneous of the heater and communicates with the heating-chamber by overflow branch 24, above the normal water-line, and by blow-off branch 25, substantially at the bottom of the chamber. The chamber 10 also communicates with the pipe 23 by a blow-off pipe 26. These blow-offs are governed by suitable valves 27 and 28, respectively. The expansion and oil-separating chamber likewise communicates with the discharge-pipe 23 by a branch or oil-outlet 29.

The operation of my device as thus far described and with a single water-line is as follows: Cold water is admitted by opening the valve 30, and the flow will continue until the predetermined water-line is reached and maintained in the heater-chamber. Exhaust-steam enters the chamber 4 through the inlet 31, whereupon it is deflected downward and allowed to expand in the chamber. Oil and water are thereby separated. The steam then passes upward and strikes the deflector-plate 19, being thrown against the cold-water shower, which runs continuously so long as the feed-water is being used. Most, if not all, of the exhaust-steam is condensed and

falls in the chamber. What may not have been condensed passes out through the outlet 33. The pipe or passage 21 projects above the bottom of the chamber, so as not to draw off sediment that settles therein. The water is thus drawn off into chamber 10, also fed by the pure condense-water from the return 22. If the heating system is in operation and if the lowest radiator is above the normal water-line, the water then passes through the perforations into the filter-chamber 11, where it is properly filtered. It thence enters the chamber 12 in a purified condition.

The water-line maintained as above described, which I have designated by the line *a a*, is the one that may be used in summer or if the lowest radiator is above that line; but, as frequently happens, such radiator is below, so that the water-line must be lower when the heating system is in service. This lowering of the water-line is accomplished as follows: A second float-valve device 34, having a connection entering the intermediate chamber 5 and operating a valve in a cold-water inlet 35, maintains the water-line in the intermediate chamber and below the partition 3. Of course there is water in the heating-chamber of a depth equal to the height of the pipe 21, as shown in Fig. 1, and water overflows therethrough when the level below in the intermediate chamber is lowered. It will be understood the other water-inlet is closed when the inlet 35 is opened. By these means I am able to obtain and maintain different water-lines, as desired, for the special purpose specified or for any other purpose.

In my device the exhaust-steam enters below both the other chambers, and the heat thereof is utilized to its fullest extent. The intermediate chamber is located adjacent to the expansion-chamber, and the water therein is highly heated just prior to its withdrawal for use. Likewise in passing through the large pipe 7 considerable heat is communicated to the intermediate chamber and to the body of water in the settling-chamber. Such novel arrangement of chambers is thus of advantage in the practical operation of feed-water heaters and purifiers.

I claim—

1. In a feed-water heater, the combination of a water-holding chamber, a water-inlet therefor, a steam-chamber having a steam-inlet, and a steam pipe or passage therefrom into the water-chamber, and a third chamber intermediate of the other two chambers and surrounding such steam-pipe, means of communication between the water-chamber and the intermediate chamber, an outlet from said latter chamber, and means for maintaining a predetermined water-line in the water-chamber.

2. In a feed-water heater, the combination of a water-holding chamber having a water-inlet, a steam-chamber having a steam-inlet and a steam pipe or passage entering the water-chamber, a chamber intermediate of the other two chambers and surrounding such steam-pipe, a water-outlet from such intermediate chamber, means for maintaining a predetermined water-line in the water-chamber and means for maintaining a lower water-line in the intermediate chamber when desired.

3. In a feed-water heater, the combination of a water-holding chamber, a steam-chamber having a steam-inlet, means of communication between the steam-chamber and the water-chamber, a water-outlet chamber intermediate of the other two chambers and having communication with the water-chamber, two separate water-inlets into the water-chamber and float-valve devices governing such water-inlets and operating independently to maintain normal water-levels in the water-chamber or the intermediate chamber.

4. In a feed-water heater, the combination of a casing, a water-holding chamber therein, a filter-chamber therebelow, a steam-chamber located below the other two chambers and passing through and communicating with the water-chamber, water-inlets for the water-chamber and filter-chamber, float-valve devices governing the water-inlets and operating at different times as desired to maintain normal water-levels in the water-chamber and intermediate chamber respectively, means of communication between the water-chamber and intermediate chamber and a water-outlet from the latter chamber.

5. In a feed-water heater, the combination of a water-holding chamber having a water-inlet, a steam-chamber having a steam-inlet, a steam pipe or passage leading therefrom into the water-chamber, and a water-outlet chamber communicating with the water-chamber and arranged intermediate of the other two chambers, said intermediate chamber surrounding said steam pipe or passage.

6. In a feed-water heater, the combination of a water-holding chamber having a water-inlet, a water-outlet chamber communicating with, and located below the water-chamber, and a steam-chamber located below the other two chambers and having a steam-inlet and also a steam pipe or passage entering the water-chamber.

7. In a feed-water heater, the combination of a water-holding chamber having a water-inlet, a second chamber below the water-chamber and communicating at its top with the water-chamber, a water-outlet from such second chamber, a steam-chamber located below the other two chambers and communicating with the water-chamber, and a steam-inlet for the steam-chamber.

8. In a feed-water heater, the combination of a casing, a water-holding chamber therein having a water-inlet, a second chamber located below the water-chamber and having a water-outlet, means of communication between such chamber and a steam-chamber located below the other two chambers and having a steam-inlet and also a passage ex-

tending upwardly through the second chamber and into the water-chamber.

9. In a feed-water heater, the combination of a casing, a water-holding chamber therein having a water-inlet, a filter-chamber located below the water-chamber and communicating therewith, a water-outlet and a condense-water inlet for the filter-chamber, and a steam-chamber located below the other chamber and having a steam-pipe extending upwardly through the filter-chamber and partially through the water-chamber and communicating with the latter.

10. In a feed-water heater, the combination of a water-holding chamber having a water-inlet, a filter-chamber located below the water-chamber and communicating therewith, a water-outlet and a condense-water inlet for the filter-chamber and a steam-chamber located below the filter-chamber and having a steam pipe or passage communicating with the water-chamber, such filter-chamber surrounding such steam pipe or passage.

11. In a feed-water heater, the combination of a water-holding chamber having a water-inlet, a steam-chamber having a steam-passage in communication with the water-chamber, a steam-inlet for the steam-chamber, a third chamber in communication with the water-chamber and having a water-outlet such third chamber being intermediate of the other two chambers and surrounding said steam-passage, and perforated partitions dividing such third chamber into three intercommunicating chambers, the first being in direct connection with the water-chamber, the second being the filter-chamber proper and the third being the purified-water chamber communicating with the water-outlet.

12. The combination of a water-holding chamber having an inlet, a plate for spreading or showering the water, a filter-chamber below the water-chamber, and communicating with the latter, perforated partitions dividing the filter-chamber into a receiving-chamber, a filter-chamber proper and a purified-water chamber respectively, a water-outlet in communication with the purified-water chamber and a steam-chamber below the water-chamber and filter-chamber, a steam-inlet for the steam-chamber, and a pipe extending centrally from the steam-chamber through the filter-chamber and upward partially through the water-chamber with which it communicates.

13. The combination of a water-holding chamber having a water-inlet, an expansion and oil-separating chamber located below the water-chamber and having an exhaust-steam connection, a filter-chamber arranged between the water-chamber and the expansion-chamber and having a water-outlet, means of communication between the filter-chamber and water-chamber, perforated partitions dividing the filter-chamber into a receiving-chamber, a filter-chamber proper and a purified-water chamber respectively, a water-outlet communicating with the purified-water chamber, a steam pipe or passage extending from the expansion-chamber into the water-chamber and surrounded by the filter-chamber, and an oil-outlet communicating with the expansion and oil-separating chamber.

14. In a feed-water heater, the combination of a water-holding chamber having a water-inlet, a steam-chamber having a steam-inlet, a steam pipe or passage leading therefrom into the water-chamber, and a third chamber arranged intermediate of the other two chambers and communicating with the water-holding chamber and means for retaining a bed of water upon the bottom of the uppermost chamber.

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