J. A. ALMIRALL.

WATER HEATER.

APPLICATION FILED SEPT. 22, 1913.

1,123,201.

Patented Dec. 29, 1914.

Fig. 1.

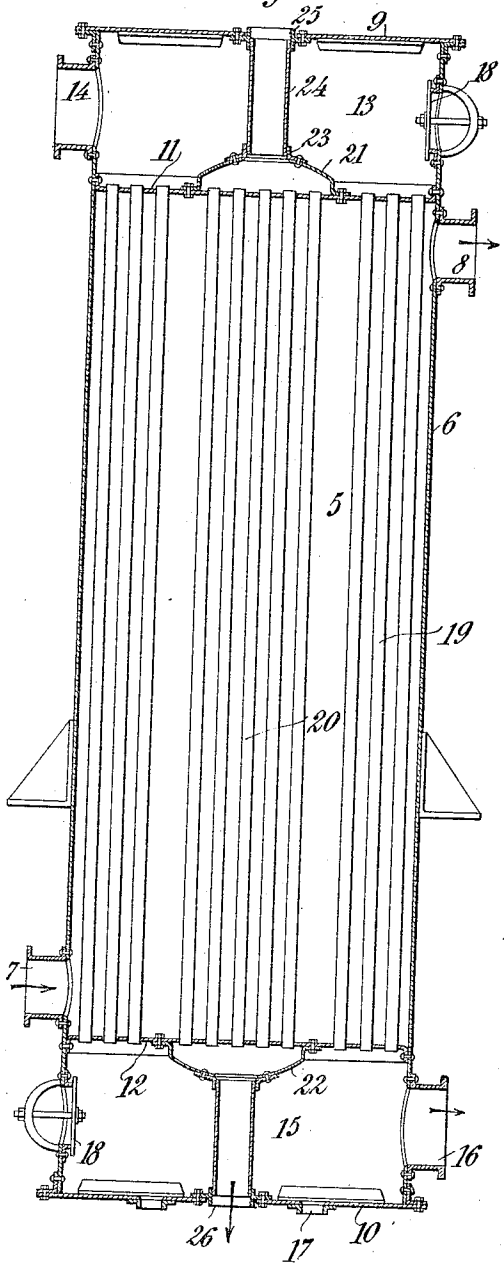


Fig. 4.

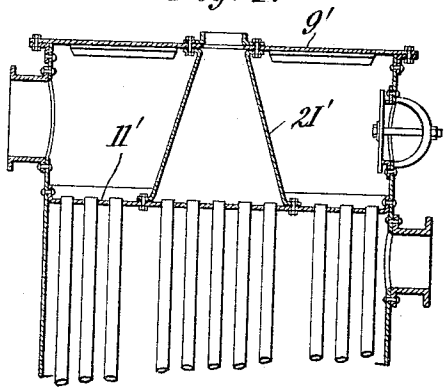


Fig. 2.

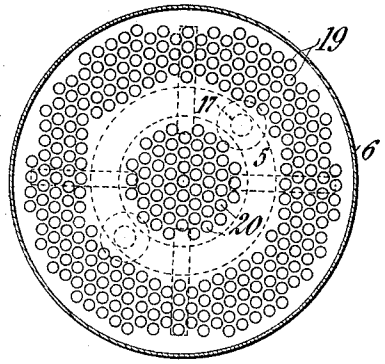
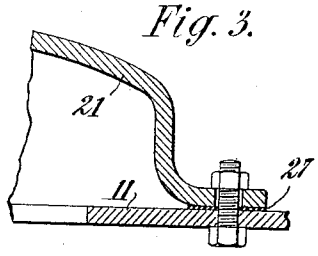


Fig. 3.



WITNESSES:

René Pruine

Fred White

INVENTOR:

Juan A. Almirall,

By Attorneys,

Fraser, Tuck & Myles

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JUAN A. ALMIRALL, OF NEW YORK, N. Y.

WATER-HEATER.

1,123,201. Specification of Letters Patent. Patented Dec. 29, 1914.

Application filed September 22, 1913. Serial No. 791,114.

To all whom it may concern:

Be it known that I, JUAN A. ALMIRALL, a citizen of the United States, residing in the borough of Brooklyn, county of Kings, city and State of New York, have invented certain new and useful Improvements in Water-Heaters, of which the following is a specification.

This invention relates to an improved water heater particularly for use in those systems of heating wherein a forced circulation is employed, and wherein the main heating is effected by means of exhaust steam, but in which the auxiliary heating is effected by live steam.

In the present improvement the exhaust steam and the live steam are caused to act upon the water passing through a common water chamber, and the tubes for the passage of the live steam and for the exhaust steam are substantially of equal length and proportions and are connected to common tube sheets.

In the drawings accompanying this specification a practicable embodiment of the invention is illustrated, in which drawings—

Figure 1 represents a central vertical section of an upright heater equipped with a form of the invention; Fig. 2 is a cross-section of the shell and tubes illustrated in Fig. 1; Fig. 3 is an enlarged detail of the connection between the live steam hood and the tube sheet; and Fig. 4 is a view similar to the upper portion of Fig. 1, but showing a modified construction.

A common water chamber 5 is provided within the shell or casing 6. This chamber is provided at its lower end with a water inlet 7 and at its upper end with a water outlet 8. The shell is shown provided at its upper and lower ends respectively with cover plates 9 and 10 which are removably secured to the shell, preferably by bolts. Inwardly of the cover plates or ends 9 and 10 are provided tube sheets 11 and 12 which are suitably secured to the shell 6, in the construction illustrated, by means of rivets. The tube sheets are located at sufficient distances inwardly of the adjacent cover plates that at the top there is provided a chamber 13 for receiving the exhaust steam through a suitable opening 14, and at the bottom a chamber 15 which will receive the exhaust steam after passing the tubes and from which chamber a discharge connection 16 is provided. The chamber 15 is also provided with drip connections 17. Chambers 13 and 15 are provided with suitable manholes 18.

The tube sheets 11 and 12 carry between them a plurality of tubes which, in the present illustration, are shown assembled in two groups, 19 and 20. The group 19 comprises a larger number of tubes than does the group 20. The tubes of the group 19 are open to the exhaust steam chambers 13 and 15, and during such time as it is desired to heat the water in the chamber 5 by means of exhaust steam, this group will be active in effecting such heating.

The smaller group 20 is shown disposed inwardly of the group 19, which latter group is illustrated of circular formation and surrounding the smaller group laterally. The group 20 which is, as before stated, the smaller group, is for the purpose of heating the water by means of live steam. There is shown removably secured to the tube sheet 11 a dome or hood 21 covering the ends of the tubes of group 20. It is in the present illustration secured by bolts. A similar hood 22 is shown secured to the tube sheet 12. The dome or hood 21 is shown provided with an interiorly screw-threaded collar 23 which has screw-threaded connection with a pipe 24, such pipe having screw-threaded connection with a connecting device 25 removably connected to the cover plate 9. The connection 25 will also serve for means for coupling the live steam supply. A similar connection 26 is provided at the lower portion of the apparatus for the live steam exhaust connection. The domes or hoods 21 and 22 and their associated parts completely isolate the tubes of group 20 from the tubes of group 19 and from the exhaust steam chambers 13 and 14.

When it is desired to gain access to the tubes of group 19 it is merely necessary to open manholes 18. If, however, it is desired to gain access to the tubes of group 20, access may be had through the manhole 18 and the domes 21, 22 removed. When, however, it is desired to remove any of the tubes the cover plates 9 and 10 will be removed and if the tubes which are to be removed are of group 20, the domes 21, 22 will also be removed.

It is found desirable in most cases to provide a very tight and secure joint between

the domes 21, 22 and the tube sheets 11, 12. A suitable gasket 27 is illustrated, particularly in Fig. 3, which gasket will be held securely in place by means of the bolts.

In certain installations it will be found desirable to enlarge the chamber space provided within the domes covering the ends of the live steam group. Such a construction is illustrated in Fig. 4, wherein the dome 21′ is formed in the shape of a frustrated cone, the base portion being bolted to the tube sheet 11′, and the smaller or upper end bolted to the cover plate 9′. In this instance it will be seen that but a single piece is employed in place of the dome 21 and the tube 24 illustrated in Fig. 1.

The operation of the invention will be readily apparent to those familiar with this class of apparatus. Water to be heated will enter the chamber 5 at the connection 7 and, after being heated, will rise and pass out through the water outlet connection 8. The exhaust steam will enter the chamber 13 through the connection 14 and pass through the tubes of group 19, heating the water in its passage. The exhaust steam, after passing through the tubes, will enter chamber 15 and pass out through the outlet connection 16. When, however, it is desired to heat the water by means of live steam, the exhaust steam will be shut off and live steam be permitted to pass into the dome 21 through the connection 25, and pipe 24 and will traverse the tubes of group 20, enter the dome 22 and pass out through the live steam discharge 26.

By reference to the drawings it will be seen that the parts at the respective ends are duplicates, the tube sheets, domes, and the parts associated with the domes being identical. The cover plates differ only in that one is provided with drip connections.

In the manufacture of my improved heater the fact that the parts at the respective ends are duplicates one of the other simplifies the assembling operation and lowers the cost of construction.

It will be apparent that the device shown in the drawing is illustrative of the invention, and that I do not purpose limiting myself to the exact details thereof, since changes may be made within the scope of the claims without departing from the spirit of the invention.

What I claim is:—

1. In a water heater, the combination with a pair of tube sheets, of two groups of tubes of uniform length mounted in said sheets, one of said groups comprising a larger number of tubes than does the other, the larger group surrounding the smaller group laterally, a water chamber common to both groups, means for supplying exhaust steam to the tubes of the larger group, and means for supplying live steam to the tubes of the smaller group.

2. In a water heater, the combination with a pair of tube sheets, a plurality of tubes mounted in said sheets, an exhaust steam chamber disposed outwardly of each of said tube sheets, an exhaust steam connection with each of said chambers, a dome located within each of said chambers and secured to the adjacent tube sheet and covering the ends of some of the tubes, and a live steam connection with each of said domes.

3. In a water heater, the combination with a tube sheet, of a plurality of tubes mounted in the tube sheet, a chamber disposed outwardly of the tube sheet, a steam connection with the chamber, a dome located within the chamber and secured to the tube sheet and covering the ends of some of the tubes, and a steam connection with the dome.

4. A water heater comprising a plurality of tubes, a shell inclosing said tubes, and identical parts in connection with each of the respective ends of such shell, comprising a cover plate, a tube sheet inwardly of the cover plate for all the said tubes, there being a chamber between the cover plate and tube sheet, a steam connection to such chamber, a water connection inwardly of the tube sheet, a dome disposed within such chamber and connected to the tube sheet and covering the ends of some of said tubes, a pipe connected to the dome and extending to the cover, and a steam connection for the said pipe.

In witness whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

JUAN A. ALMIRALL.

Witnesses:
F. M. NORTON,
E. V. RIEDEL.

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