

T. T. PARKER.
BOILER,
APPLICATION FILED JULY 2, 1910

994,656.

Patented June 6, 1911.

2 SHEETS-SHEET 1.

Fig. 1.

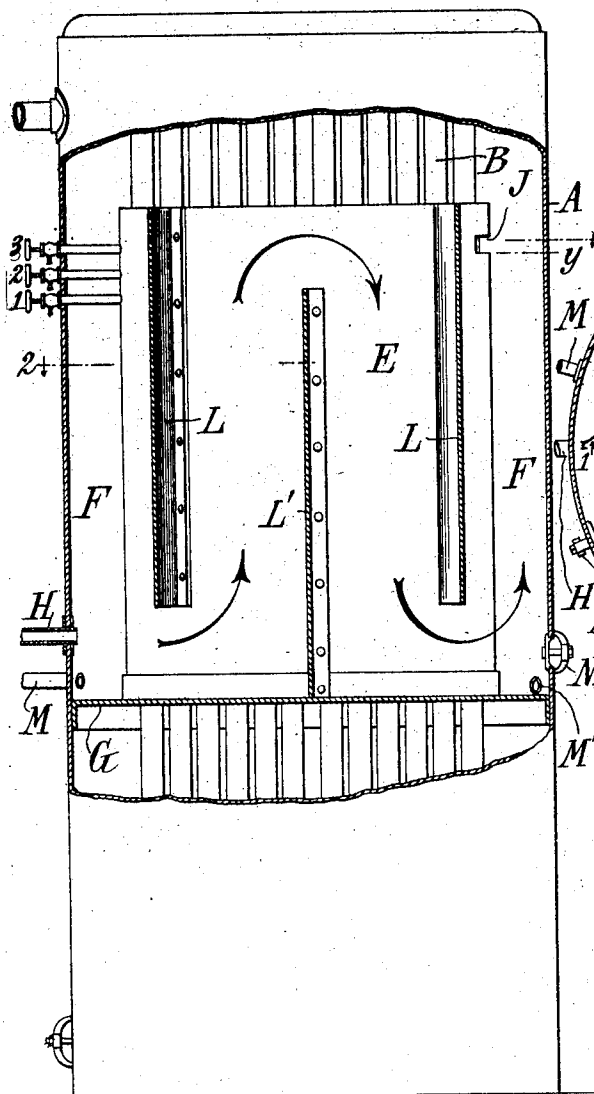
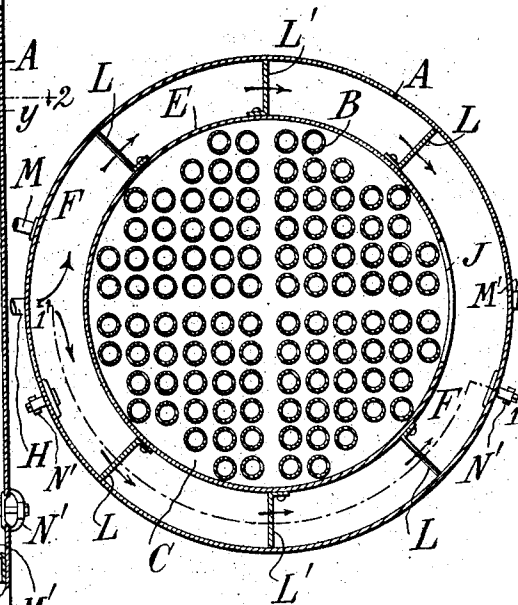


Fig. 2.



WITNESSES:

Fred White
Rene Guine

INVENTOR :

Thomas J. Parker,

By Attorneys,

Fraser & Neave

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BOILER.

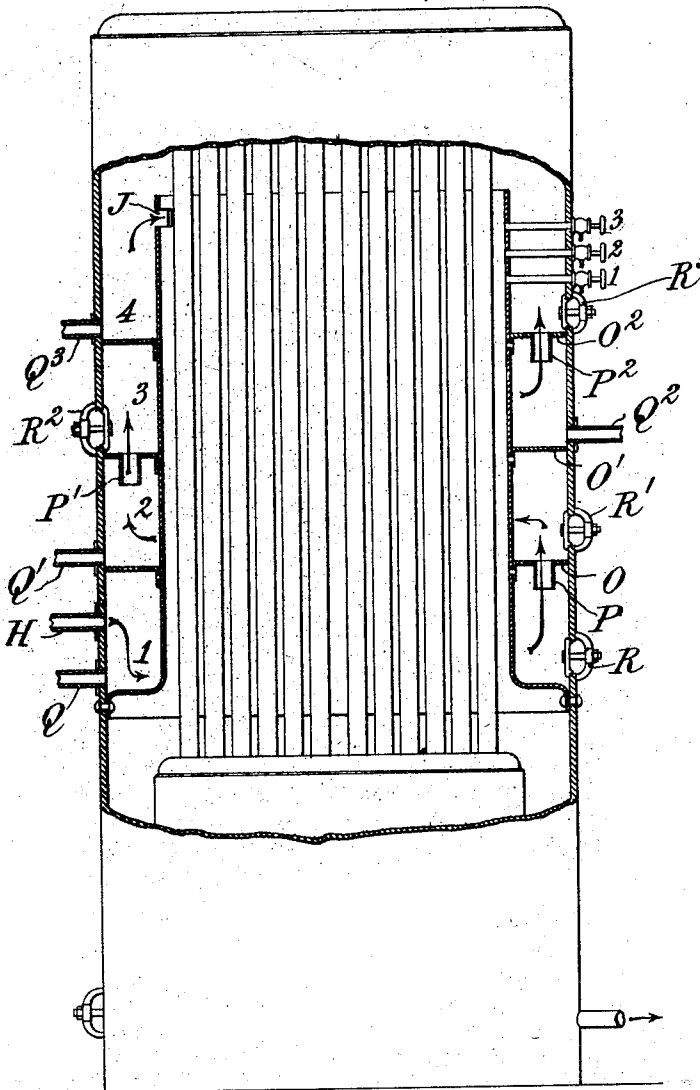
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Fig. 3.



WITNESSES:

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René Maune

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Fraser & Neave

UNITED STATES PATENT OFFICE.

THOMAS T. PARKER, OF HACKENSACK, NEW JERSEY.

BOILER.

994,656.

Specification of Letters Patent.

Patented June 6, 1911.

Application filed July 2, 1910. Serial No. 570,108.

To all whom it may concern:

Be it known that I, THOMAS T. PARKER, a citizen of the United States, residing in Hackensack, in the county of Bergen and State of New Jersey, have invented certain new and useful Improvements in Boilers, of which the following is a specification.

This invention relates to steam boilers and aims to provide certain improvements therein.

The principal object of the present invention is to prevent the formation of scale in boilers, especially of the vertical type, and the accumulation of other solids upon the tube sheet or other fire-swept surfaces. Numerous attempts have been made to accomplish a like result, but these have been only partially successful.

In the operation of a boiler the incoming feed water which is usually heated in a preliminary way is rapidly raised to such a temperature that the solids are liberated. If the feed water is directly introduced into the tube system it speedily reaches a temperature at which its ebullition takes place, and a part of the solids are carried up to the top of the boiler. A certain proportion of these eventually find their way to the bottom surfaces and others become attached to the fire-swept surfaces in the form of scale. Light and flocculent substances such as oils or some of the lighter solids retain their position at the top of the boiler for a considerable time. It has heretofore been proposed to feed the water into a small compartment before passing it to the heating surfaces of the boiler with the idea that all of the solids will be removed from the water actually fed to the boiler by a process of sedimentation. This construction has not been successful for the reason that the solids contained in the water are not given an opportunity to sink to the bottom but are carried over the top of the compartment without being deposited. A further objection to such a construction is that the lighter matters in suspension will not sink to the bottom; and hence are carried into the boiler proper.

In a prior application filed by me June 13, 1910, Serial No. 566,568 I have described and claimed a boiler provided with a large chamber which is preferably circular and preferably surrounds the bank of tubes. The inside shell of the chamber is exposed on its inner surface to the heat of the boiler

water, and is thereby heated to a high heat which heat is transmitted to the water contained in the chamber. By this means the water in the chamber becomes highly heated and effects the liberation of the solids in suspension. The capacity of the chamber is so large that a given body of water passes through it slowly, and thus permits the precipitation of the heavier solids, of which a large part sink to the bottom of the chamber. In said application I have also described and claimed a means for preventing the lighter substances from entering into the tube chamber of boiler proper.

According to the present invention I provide a boiler in which the sedimentation chamber is located as before. Within this chamber I provide means for compelling substantially the entire body of water to travel slowly to the point where it is fed into the boiler proper. I also provide means in said chamber for preventing the ingress into the boiler proper of the lighter substances which at least temporarily rise to the upper surface of the water.

In the drawings wherein I have shown several embodiments of the invention,—Figure 1 is a vertical section on the line 1—1 in Fig. 2 of one form of the invention. Fig. 2 is a horizontal section on the line 2—2 in Fig. 1. Fig. 3 is a vertical section of another modification.

Referring first to Figs. 1 and 2, let A indicate the boiler shell having a bank of tubes B which are supported at their lower ends upon a tube plate C forming the upper wall of the fire-box. Within the boiler is a shell E which preferably extends around the entire bank of tubes and is spaced apart from the boiler shell A to form a chamber F. This chamber is closed at its bottom by an annular ring G, and is preferably open at its top, at least to such an extent that the pressures in the chamber F and the boiler proper may be equalized. The chamber F is of relatively large dimensions and water is fed into the same by a feed pipe H, preferably located near the bottom of the chamber. The chamber F constitutes a separating chamber which in its general form may be shaped as desired, it being essential to this feature of the invention only that it be of large capacity, so that a considerable body of feed water will be contained therein whereby any given body of water will remain a relatively long time within the

chamber before it is fed into the boiler proper. As a means for feeding the water into the boiler proper I have shown a slot J formed in the upper part of the shell E, preferably at the opposite side of the boiler to that at which the feed water enters. This or some other relative location of the parts is preferably adopted so that the water is fed to the boiler proper at a point remote in its travel from the feed water pipe. The water fed into the separating chamber F will be subjected to the high heat of the shell E which is exposed on its inner side to the boiler water, which is itself highly heated. According to the present invention I introduce into the chamber a means for compelling practically all of the feed water in the separating chamber to travel a tortuous course before it reaches the ingress opening into the boiler proper. This aids in the complete heating of the entire body of feed water, and insures that practically all such water will remain in the separating chamber a length of time sufficiently long to provide abundant time for precipitation of the heavier solids and the rising of the lighter matters, such as oils and flocculent substances, to or near the surface. A very thorough purification hence takes place before the water enters the boiler proper. In Fig. 1 I have shown for this purpose a series of what may be called baffle plates which are indicated by the letters L L'. These baffle plates are preferably connected to the shells A and E with a substantially leak-tight joint by riveting or otherwise. The plates L are arranged with their upper ends above the normal feed water line (indicated by the line y), but their lower ends do not reach the bottom of the separating chamber. The water hence cannot pass over the tops of such plates, but is compelled to flow beneath them. The plates L' are reversely arranged, that is to say, their upper ends are below the normal feed water line, and their lower ends are continued to the bottom of the separating chamber. The water in its travel hence is compelled to pass over the top of the plates L'. Any suitable number of such plates may be provided, but I have shown two plates L, and one plate L' on each side of the boiler. By reference to Fig. 2 it will be seen that the incoming water will divide and flow around opposite sides of the boiler proper until it reaches the slot J. The construction of the separating chamber F in Fig. 1 may be otherwise described as being divided into two semi-circular compartments by the plate L', each compartment having baffles L. The construction thus described provides also a means for trapping out the lighter or floating substances so as to prevent their entrance into the boiler proper. It will be observed that

when the separating chamber F is filled the lighter substances, which rise to the top during the travel of the water, are prevented from feeding forward by the plates L, thereby becoming trapped within one or the other of the two semi-circular compartments. The lower ends of the plate L and the upper ends of the plate L' should be preferably so spaced apart from the top and bottom respectively of the sedimentation chamber that the feed water may pass above any accumulation of heavier solids on the one hand and below any accumulation of lighter solids on the other hand.

In operation the engineer will keep the water in the boiler proper at approximately the level of the gage cock 2. The feed water introduced into the pipe H will flow slowly along its tortuous channel, and become highly heated. This process will assist in the dissociation of the solids, and the heavier substances will sink to the bottom while the lighter substances will rise to the top and become trapped as the water proceeds in its travel. The normal water level of the separating chamber is indicated by the line y , and by the time a given body of water has reached the point of the slot J it will have been greatly purified, so that it is no longer a source of danger to the tubes and other fire-swept surfaces. When the floating or precipitated substances have accumulated they may be blown out while the boiler is still in operation through the pipes M M', one of which serves to relieve one of the compartments above referred to, and the other the remaining compartment. Preferably two hand holes N N' are provided whereby such compartments may be cleaned. This operation cannot, of course, take place while the boiler is steaming.

In Fig. 3 I have illustrated another modification of my invention wherein instead of vertical baffles I provide a series of horizontal baffles O O' and O². These baffles are circular in form, and divide the feed water chamber, practically speaking, into four annular compartments, which are lettered respectively 1 to 4. In the construction shown the feed water enters through the pipe H as before, into compartment 1, and flows to the opposite side of the boiler where it rises through pipe P into compartment 2. It then flows in a reverse direction to the opposite side of the boiler and thence through pipe P' into compartment 3. By a similar reverse travel it reaches compartment 4 from which it is fed to the boiler proper through slot J, as in Figs. 1 and 2. The baffle plates O O' O² insure the tortuous travel of the water, which deposits some of its sedimentation in each of the chambers 1, 2, 3 and 4. The lighter matters are trapped in each compartment by the pipes P P' and P² which extend downwardly from

their respective baffle plates so that the water passing from one compartment into another is taken from below the surface of the water in each compartment. Preferably each compartment is provided with a blow-pipe Q Q' Q^2 or Q^3 and also with a hand hole R R' R^2 or R^3 . The operation is similar to that described with regard to Figs. 1 and 2.

10 If desired, the opening J referred to in the foregoing description may be provided with a hood such as is illustrated in my aforesaid application, said hood extending around the opening and being closed at its top and sides, but being open at its bottom. This or any other conduit adapted to feed water from below its surface through the opening J may be used if desired.

20 While I have shown in detail several embodiments of the invention, it will be understood that I do not wish to be limited thereto as various changes can be made therein without departing from the invention.

25 The invention is primarily adapted for vertical tube boilers, although it may be used in other types of boilers if desired. Furthermore the particular character and arrangement of the several parts herein described is not essential to the invention, and these may be considerably varied in practice.

What I claim is:—

35 1. In a boiler, the combination of a separating chamber, means tending to prevent the circulation of water from the boiler proper to said chamber, means for feeding water from said chamber to the boiler proper, and means for providing a tortuous course for the water in said separating chamber.

40 2. In a boiler, the combination of a separating chamber, means tending to prevent the circulation of water from the boiler proper to said chamber, means for feeding water from said chamber to the boiler proper, and means for providing a tortuous course for the water in said separating chamber, said means comprising members dividing said chamber into a plurality of compartments.

50 3. In a boiler, the combination of a separating chamber, means tending to prevent the circulation of water from the boiler proper to said chamber, means for feeding water from said chamber to the boiler proper, and means for providing a tortuous course for the water in said separating chamber, said means comprising a plurality of baffle plates.

60 4. In a boiler, the combination of a separating chamber, means tending to prevent the circulation of water from the boiler proper to said chamber, means for feeding water from said chamber to the boiler proper, and means for providing a tortuous course for the water in said separating

chamber, said means comprising a plurality of vertically-arranged baffle plates.

5. In a boiler, the combination of a separating chamber, means for feeding water from said separating chamber to the boiler proper, and a plate interposed in the travel of the water in said separating chamber, said plate extending above the normal surface of the water in said separating chamber.

6. In a boiler, the combination of a separating chamber, and means for causing the water to travel a tortuous course through said separating chamber and for preventing the flow of floating substances into said boiler proper.

7. In a boiler, the combination of a separating chamber, a boiler proper, a passage from said separating chamber to said boiler proper, a plate in said chamber extending above the normal water level in said chamber, and a plate extending below such normal water level, said first-named plate being adapted to trap floating substances from the feed water before it enters the boiler proper.

8. In a boiler, the combination of a separating chamber, means for feeding water from said chamber to the boiler proper, and a plurality of means in said separating chamber for preventing the passage of floating substances into said boiler proper.

9. In a boiler, the combination of a separating chamber having its under side exposed to the water, means for feeding water from said chamber to the boiler proper, and means for providing a tortuous course for the water in said separating chamber.

10. In a boiler, the combination of a separating chamber having its under side exposed to the water, means for feeding water from said chamber to the boiler proper, and means for providing a tortuous course for the water in said separating chamber, said means comprising members dividing said chamber into a plurality of compartments.

11. In a boiler, the combination of a separating chamber having its under side exposed to the water, means for feeding water from said chamber to the boiler proper, and means for providing a tortuous course for the water in said separating chamber, said means comprising a plurality of baffle plates so arranged that the water passes under one plate and over another.

12. In a boiler, the combination of a boiler proper, a separating chamber extending around said boiler proper, and having a wall extending above the high water level in said boiler proper, means for feeding water from said chamber to said boiler proper near the top thereof, and means for providing a tortuous course for the water in said chamber.

13. In a boiler, the combination of a boiler proper, a separating chamber, extending around said boiler proper, and having a wall

extending above the high water level in said boiler proper, means for feeding water from said chamber to said boiler proper near the top thereof, and a plurality of baffle plates in
5 said chamber for providing a tortuous course for the water in said chamber.

14. In a boiler, the combination of a boiler proper, a separating chamber extending around said boiler proper, and having a wall
10 extending above the high water level in said boiler proper, means for feeding water from said chamber to said boiler proper near the top thereof, said wall being imperforate from said means downwardly, and means
15 for providing a tortuous course for the water in said chamber.

15. In a boiler, the combination of a series of vertical tubes constituting the boiler

proper, a separating chamber extending around said tubes and having a wall extend- 20
ing above the high water level in said boiler proper, means for feeding water to the lower part of said separating chamber, means for feeding water from the lower part of said separating chamber to said boiler proper 25
near the top of said wall, and means for providing a tortuous course for the water from said first-named feeding means to said last-named feeding means.

In witness whereof, I have hereunto signed 30
my name in the presence of two subscribing witnesses.

THOMAS T. PARKER.

Witnesses:

EUGENE V. MYERS,
FRED WHITE.

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