(No Model.)

W. W. J. TOUSSAINT.

BOILER.

No. 598,686. Patented Feb. 8, 1898.

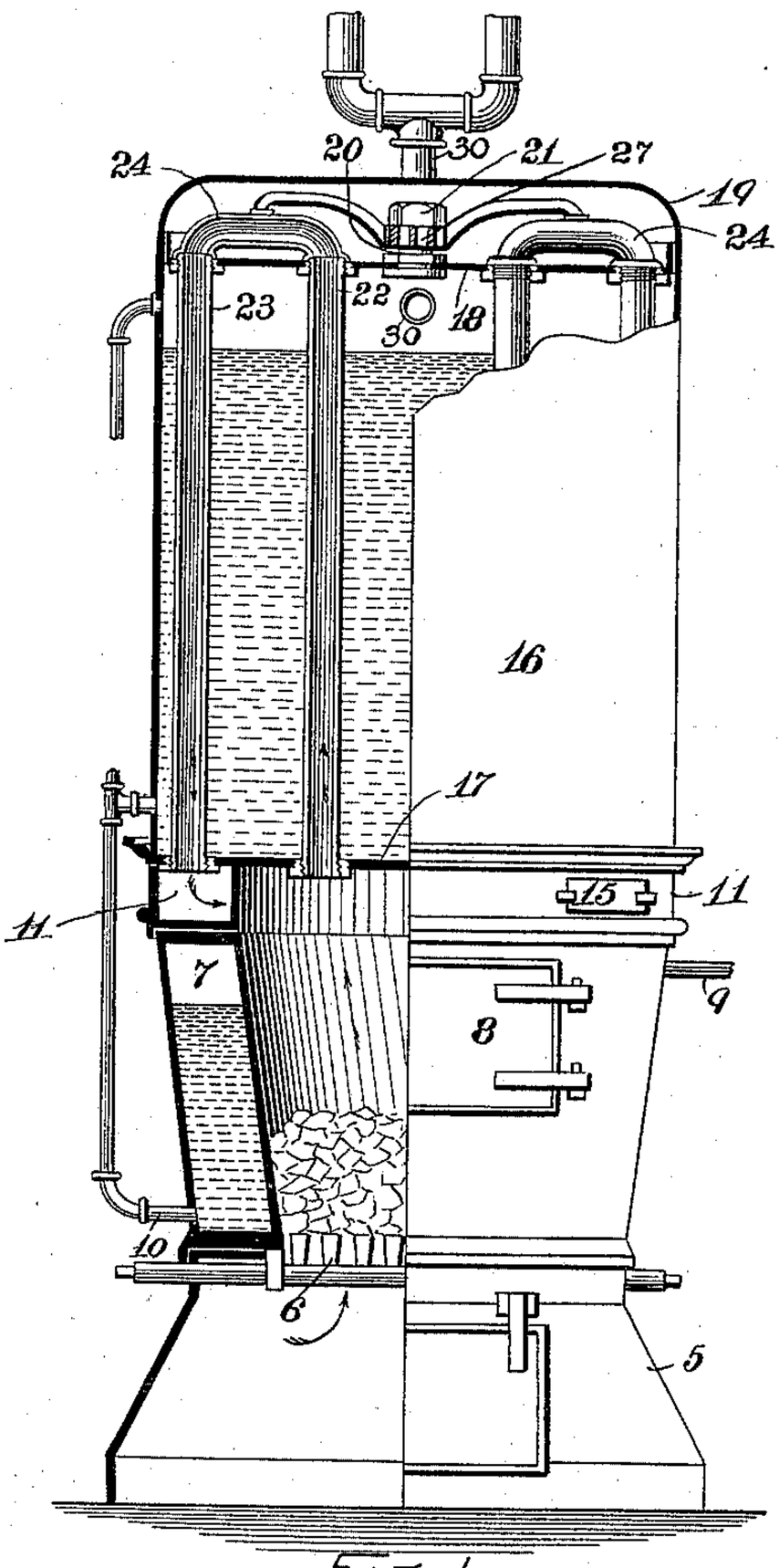

Fig. 1.

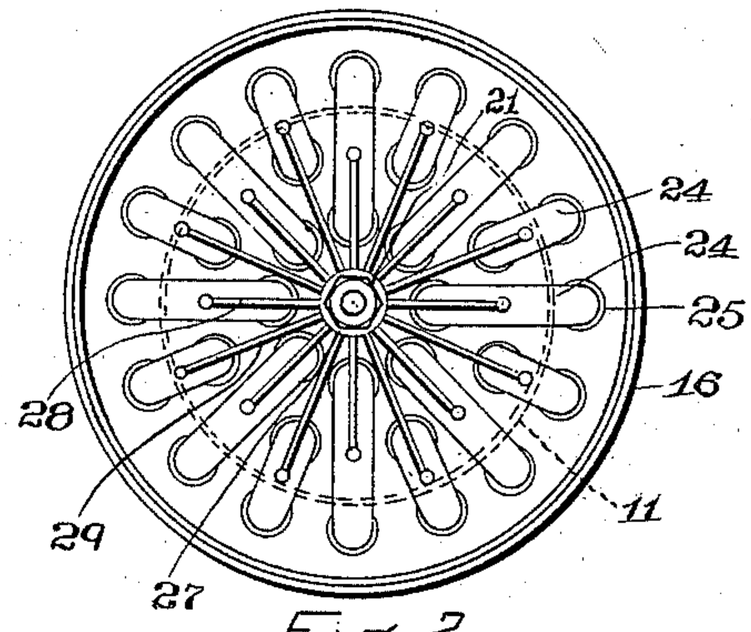

Fig. 2.

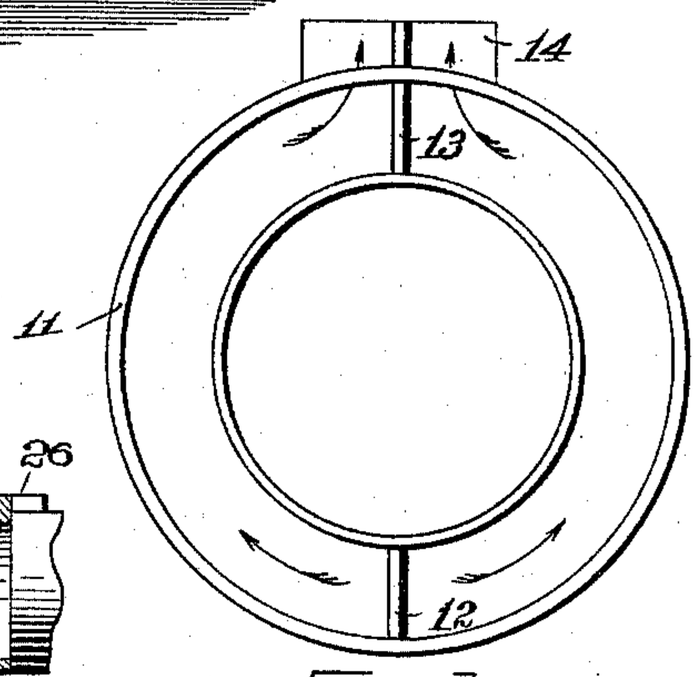

Fig. 3.

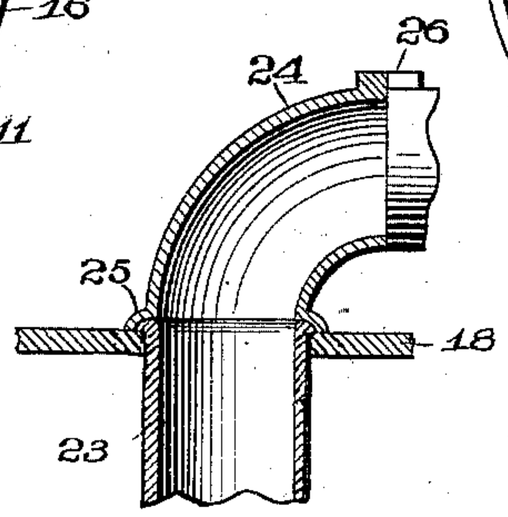

Fig. 4.

WITNESSES.

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UNITED STATES PATENT OFFICE.

WINAND WM. J. TOUSSAINT, OF BROOKLINE, MASSACHUSETTS.

BOILER.

SPECIFICATION forming part of Letters Patent No. 598,686, dated February 8, 1898.

Application filed June 23, 1897. Serial No. 641,900. (No model.)

To all whom it may concern:

Be it known that I, WINAND WM. J. TOUSSAINT, of Brookline, in the county of Norfolk and State of Massachusetts, have invented certain new and useful Improvements in Boilers; and I hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification.

This invention has reference to improvements in steam-boilers, and particularly in upright boilers.

The object of the invention is to more fully utilize the heat in its passage from the fire-box to the chimney.

Another object of the invention is to simplify the construction of the boiler.

Another object of the invention is to so construct a boiler having a return-fire-tube system that the tubes may be more readily cleaned than as heretofore constructed.

Another object of the invention is to improve the connections between the direct and the return tubes and the securing devices for such connections.

The invention consists in the combined fire-box and feed-water heater and the flue-connecting section mounted thereon, in combination with the boiler-section mounted on the flue-section and having direct tubes located above the fire-box and return-tubes connecting with the flue-section.

The invention also consists in the tubular connections between the direct tubes and the return-tubes and in the means for securing such connections.

The invention also consists in such other novel features of construction and combination of parts as shall hereinafter be more fully described, and pointed out in the claims.

Figure 1 represents a front elevation of the improved boiler, partially in vertical section. Fig. 2 represents a top plan view of the same with the dome removed. Fig. 3 represents a plan view of the flue-section. Fig. 4 represents an enlarged detail view of a portion of one of the tubes shown in relation to its connecting-elbow.

Similar numbers of reference designate corresponding parts throughout.

In the drawings, 5 represents the base or ash-pit, which may be of any usual construction, being furnished with a door through which ashes may be removed. At the upper portion of the ash-pit is mounted a grate 6, forming the lower portion of the fire-box. The fire-box is mounted on the upper end of the ash-pit and consists of an annular water-chamber 7, boxed between its walls around the opening for the fire-door 8. This water-chamber is provided with the usual inlet-pipe, as 9, and with the outlet 10, connecting with the shell of the boiler. The water passing through this chamber of the fire-box is raised in temperature before entering the boiler.

On the combined fire-box and feed-water heater is mounted the flue-section 11, annular in shape, and having the partition 12 in its front portion and the partition 13 extending from its rear inner wall into the flue connection 14. Openings are formed in the outer wall of this section for the purpose of entering cleaning-scrapers, doors, as 15, being supplied for closing these openings.

The boiler proper is mounted on the flue-section and comprises a shell 16, having the lower tube-plate 17 and the upper tube-plate 18, in which the tubes are secured, and the dome 19. On the tube-plate 18 is axially secured the bolt 20, furnished with the nut 21. In the tube-plates are secured the double system of tubes—namely, the direct tubes 22, disposed above the fire-box, and the return-tubes 23 near the peripheries of said plates and connecting at their lower ends with the flue-section. The direct and the return tubes are secured in the tube-plates in any usual manner. At their upper ends they are connected in pairs by means of the elbow connections 24, which have cup-shaped ends 25 fitting over the upper ends of the tubes 22 and 23 of each pair. These elbows have the bearing portions 26 and are proportioned in size to the distance between the direct and return tubes. On the bolt 20 is secured, by means of the nut 21, the spider 27, having a series of radial arms 28 and 29, which bear on the bearing portions 26 of the elbows 24, to hold the elbows in place over their respective pairs of tubes.

The steam-outlet 30 is connected with the upper portion of the boiler or with the usual steam-drum or steam-separator.

It will be noticed that both the boiler and the flue sections are larger in diameter than the interior of the fire-box. This allows the location of a large body of water in heating proximity to the fire-box. The flue-section, being heated from radiation from the fire-box, will impart some of its heat to the water in the boiler.

The gases from the fire-box pass up through the direct tubes, then through the elbows 24, and down the return-tubes to the flue-section, whence they pass around under the boiler to the flue connection. In this manner almost all the heating qualities of the gases are utilized to raise the temperature of the water in the boiler, the flue-section also being raised in temperature by these gases.

The tubes may be readily cleaned by removing the spider 27 and the elbows 24 and passing a cleaner down through the tubes.

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

1. The combination, in a boiler, with a fire-box, and the annular flue-section 11 mounted thereon, of a boiler-section mounted on the flue-section and comprising the plates 17 and 18, a suitable shell, the tubes 22 and 23 secured in said plates and disposed as described, and a series of elbows for connecting the upper ends of the tubes in pairs, and releasable means for securing the elbows.

2. In a boiler, the combination with the fire-box having the annular water-chamber 7, and the flue-section 11 mounted thereon, of a boiler-section mounted on the flue-section and comprising the shell 16 having the tube-plates 17 and 18, the tubes 22 secured in said plates and disposed above the fire-box, and the tubes 23 secured in said plates and disposed above the flue-section.

3. In a boiler, the combination with the fire-box comprising an annular water-chamber, and a flue-section mounted thereon, of a boiler mounted on the flue-section and having a series of direct vertical tubes disposed above the fire-box, a series of return-tubes disposed above the flue-section and connecting therewith, and removable connections between the upper ends of each pair of tubes.

4. In a boiler, the combination with a shell having upper and lower tube-plates, and direct and return tubes secured in said plate, of a series of elbows removably seated at the upper ends of the tubes and connecting them in pairs, a spider having arms bearing on the several elbows, and means for securing the spider.

5. The combination with the fire-box having the annular water-chamber, and the annular flue-section 11 mounted thereon and having the partitions 12 and 13 and the flue connection 14, of the boiler-section mounted on the flue-section and comprising the shell 16 having the plates 17 and 18, the plate 18 having the bolt 20 with the nut 21, the tubes 22 and 23 secured in said plates, elbows 24 connecting the tubes in pairs, and the spider 27 secured on the bolt 21 and having arms as 28 and 29 bearing on the elbows, as and for the purpose described.

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Witnesses:
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