

No. 871,249.

PATENTED NOV. 19, 1907.

E. L. J. WERA.
STEAM BOILER.

APPLICATION FILED SEPT. 26, 1906.

2 SHEETS—SHEET 1.

Fig. 1.

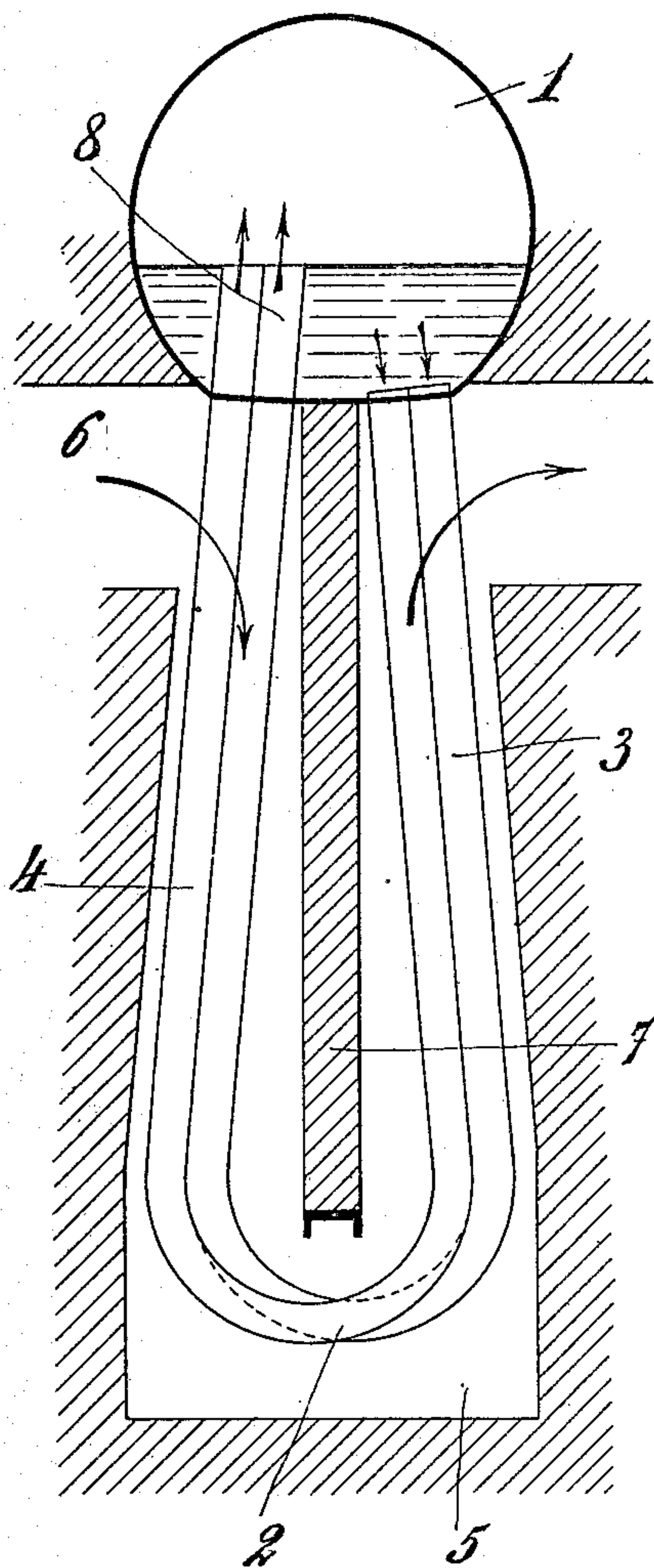
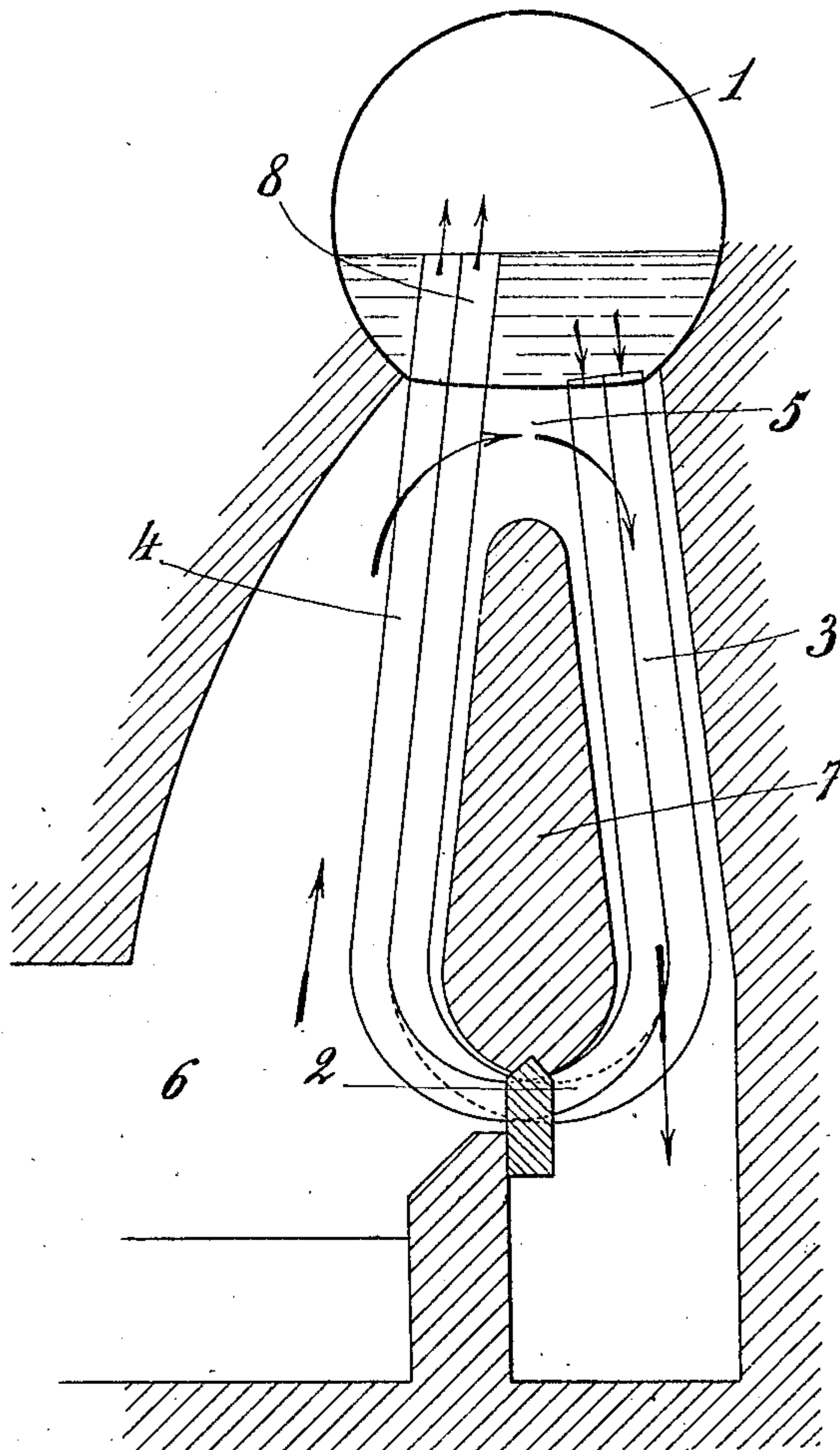


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

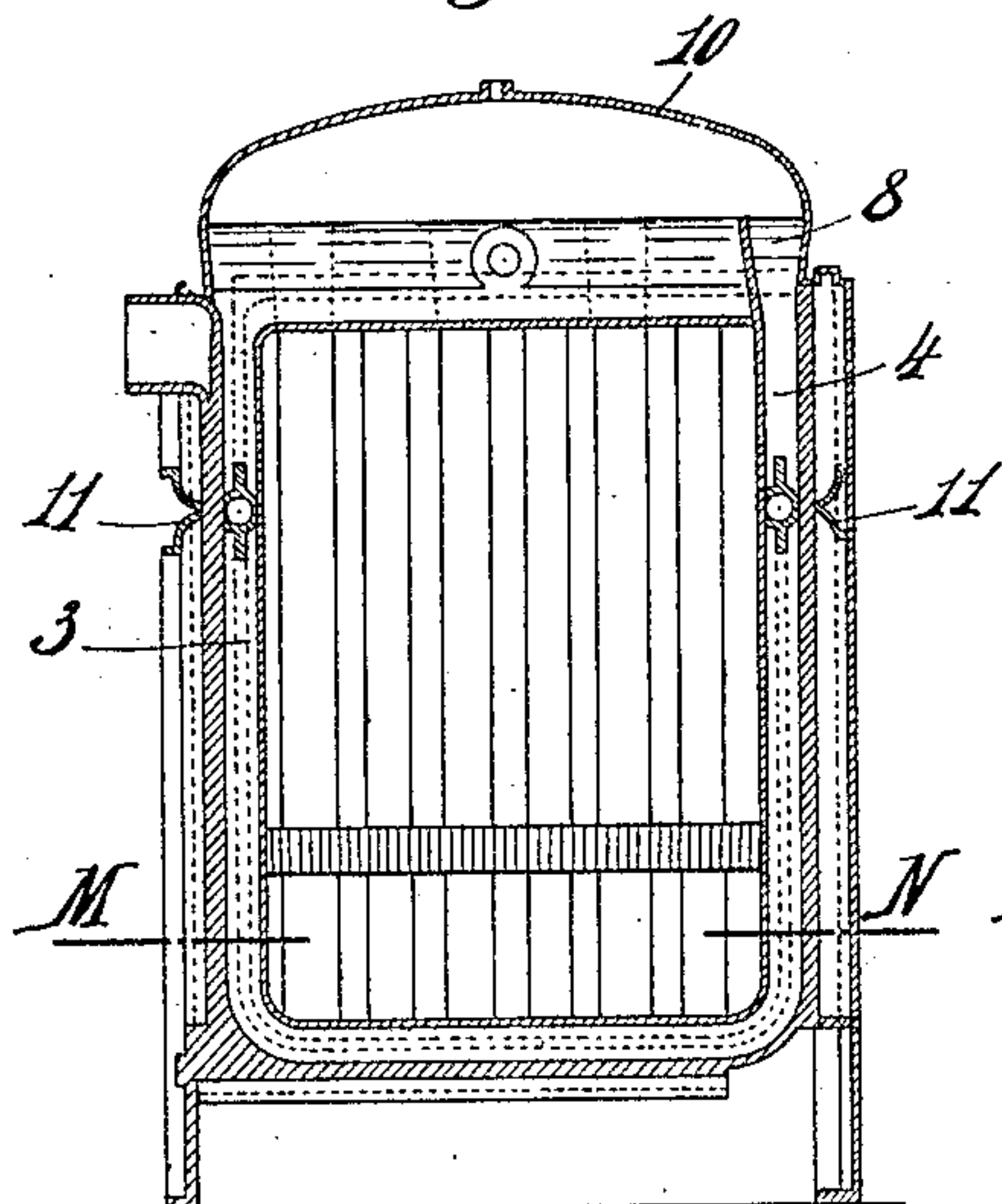


Fig. 4.

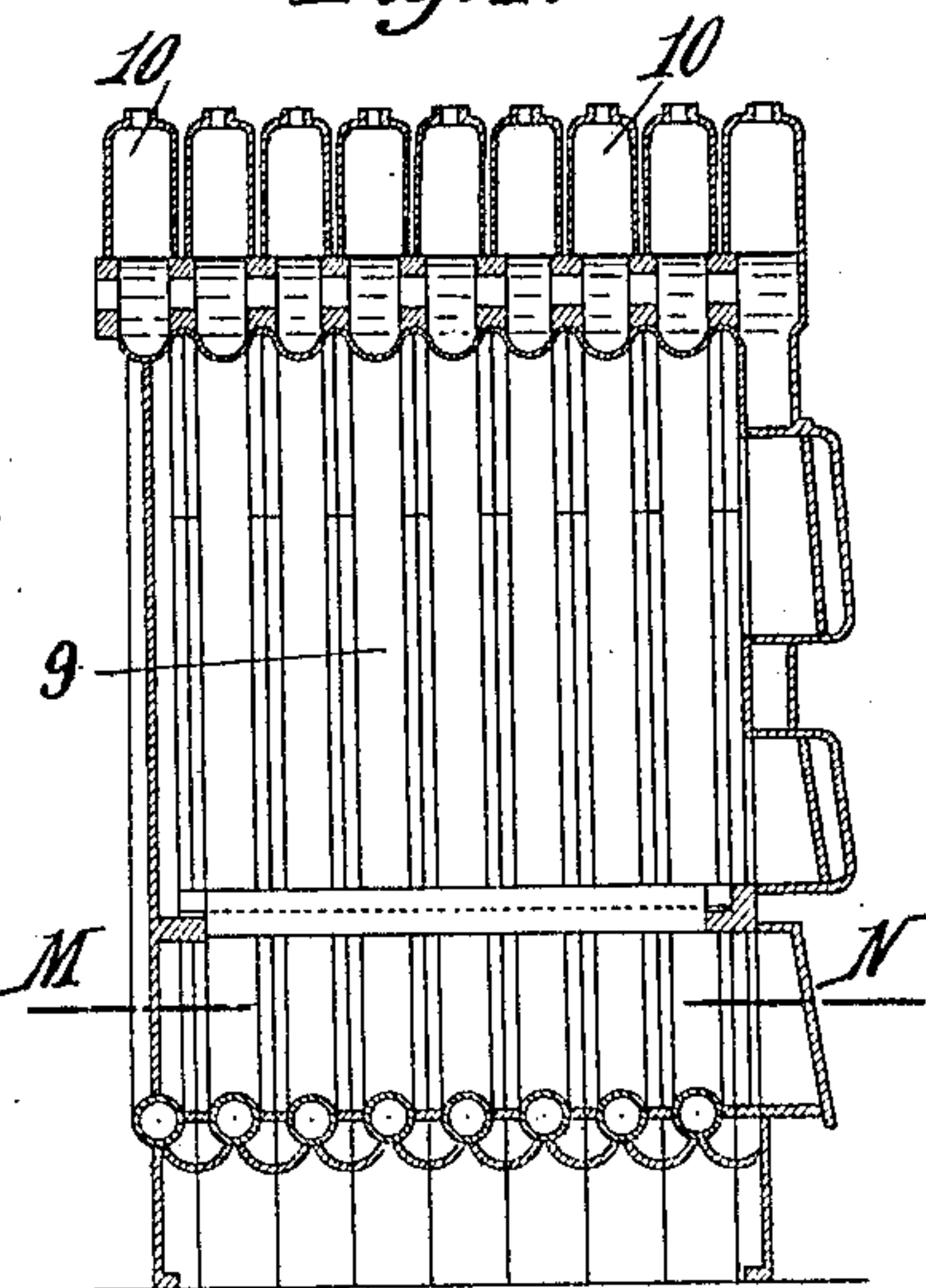


Fig. 5.

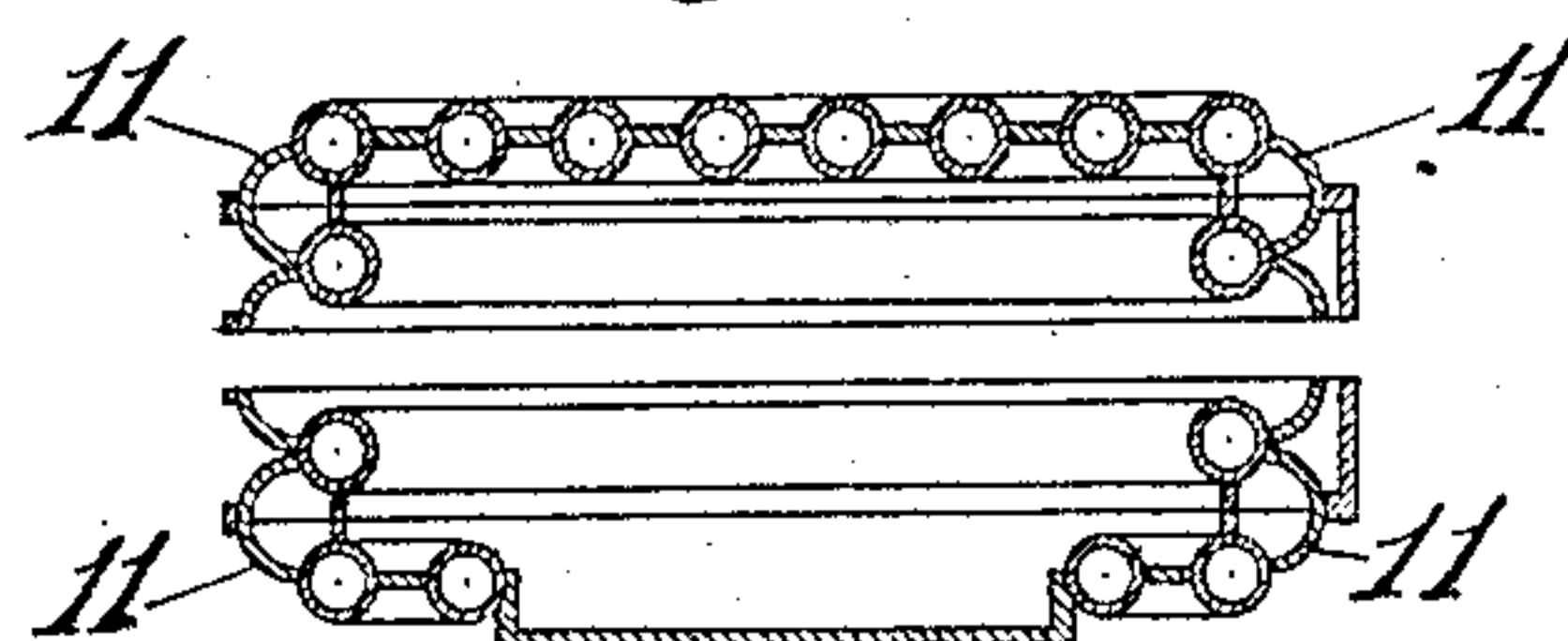


Fig. 6.

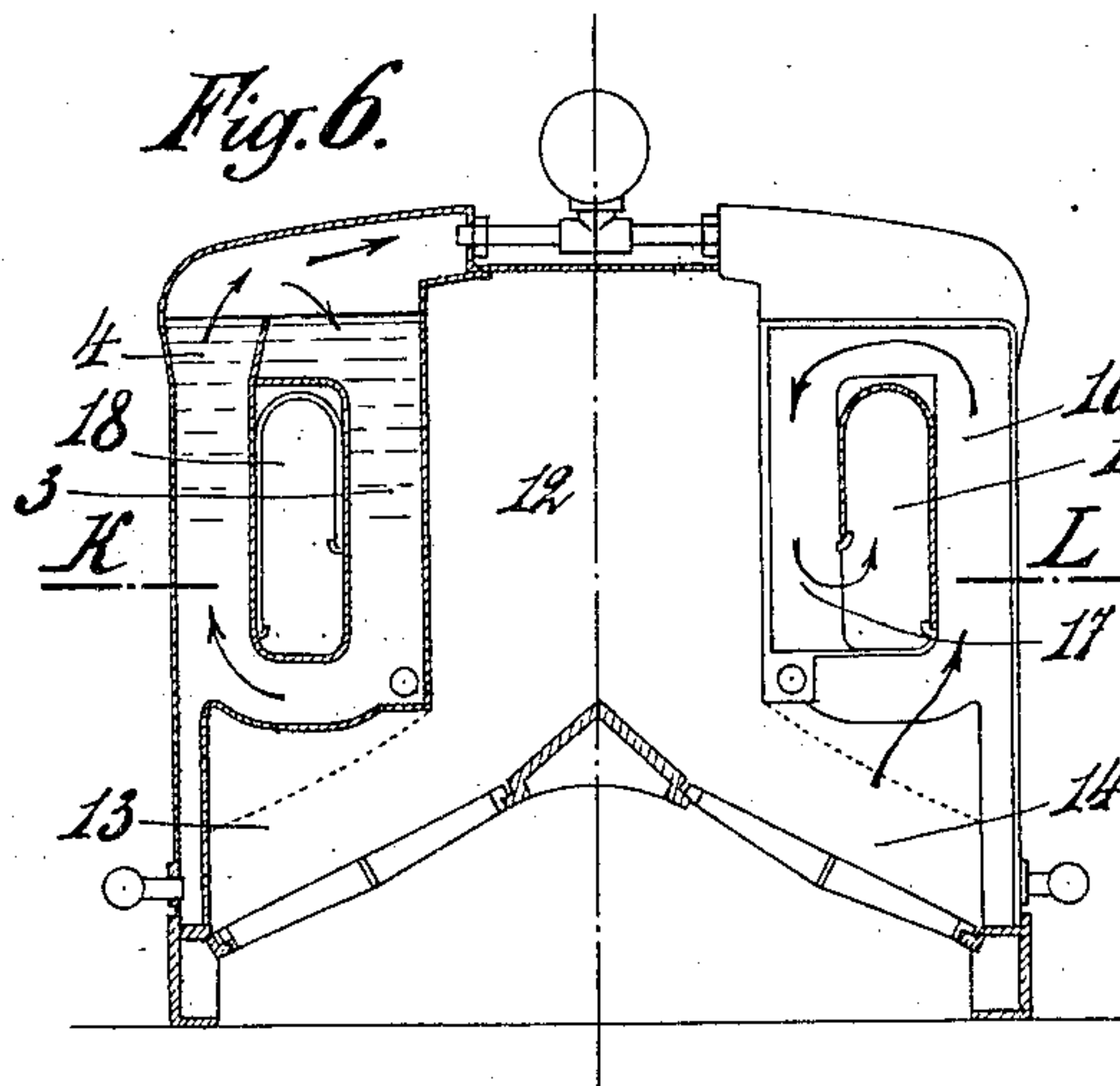
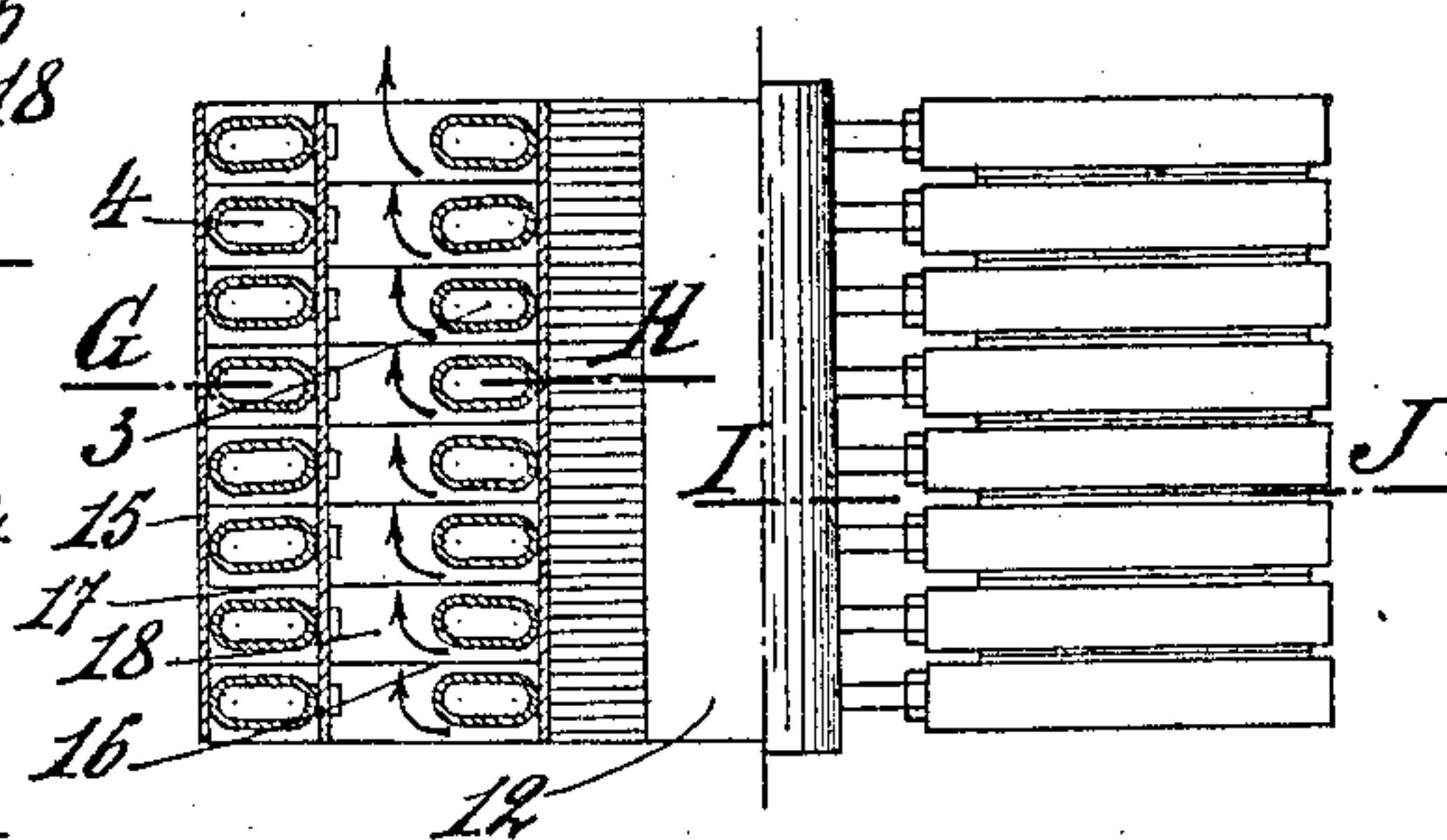


Fig. 7.



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STEAM-BOILER.

No. 871,249.

Specification of Letters Patent.

Patented Nov. 19, 1907.

Application filed September 26, 1906. Serial No. 336,253.

To all whom it may concern:

Be it known that I, EUGENE LAMBERT JOSEPH WERA, a subject of the King of Belgium, residing in Liege, Rue de Fétinne 120, in the Kingdom of Belgium, have invented certain new and useful Improvements in Steam-Boilers; and I do hereby 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, reference being had to the accompanying drawings, and to letters or figures of reference marked therein, which form a part of this specification.

The present invention has for its object a steam boiler adapted to produce industrially, that is to say, economically and without danger, great vaporizations per unity of heating surface.

This invention has for its purpose more particularly to produce a rapid and continuous circulation of the water which moistens and cools the entire heating surface and prevents calcareous deposits from adhering to the sides of the boiler.

There are known boilers comprising as elements vaporization tubes in the shape of a U with unequal branches. However, in all these boilers the circulation is defective because the said two branches are equally heated.

In order to realize the purpose of the present invention, the two branches of the U-shaped tubes of my boiler are, on the contrary, unequally heated by hot gases circulating parallelly to said tubes which insures an effective circulation of the water in a determined direction.

In the accompanying drawing, Figures 1 and 2 are two diagrammatic views of the mode of heating tubes being characteristic of the present invention. Figs. 3, 4 and 5 are vertical, transversal and horizontal sections of a form of application of the mode of circulation represented in the diagram, Fig. 1, to a calorifere boiler. Fig. 6 gives in its two halves two transversal sections of a form of applying the mode of circulation represented in diagram, Fig. 2, to a calorifere boiler; the part on the left is a section along G H of Fig. 7 and the part on the right is a section along I J of this figure. Fig. 7 shows on one half a horizontal section along K L of Fig. 6 and on the other half an inside view of Fig. 6.

As represented in Figs. 1 and 2, the boiler

comprises a reservoir 1 for water and steam, in the inner part of which open the U-shaped tubes 2 whose vertical branches 3 and 4 are located in a conduit for the return of the flame 5 lengthening the conduit 6 of a hearth. The U-shaped tubes 2 are located in the conduit 5 divided by a partition 7 in such manner that the branches 3 and 4 are unevenly heated. This difference in the heating has for its purpose to draw the current in a determined direction so that there is produced at first a current of convection toward the most heated branch 4; in this place are released the first steam bubbles which, owing to the vertical position of the tubes, take the form of steam pistons and drive before them the water which is there. Within certain limits of the ratio of the diameter of the tubes to their length, the draft descending in the return tube 3, the water can never boil there because the pressure to which it is submitted increasing from the water column of the tube, the boiling temperature increases in proportion as the water descends; the draft being rapid, the water does not absorb enough heat to raise the whole mass of water to the boiling temperature before its arrival at the bottom of the tube. Only after the water has again ascended in the branch, the boiler tube 4 has, therefore, a certain height (which depends from the charge and from the pressure), that this water commences to boil. The adjoining piece 8 permits the utilization of the pressure of the height of the water contained in the body 1 of the boiler in behalf of the circulation and, besides, it avoids the resistance which this same mass of water would oppose to the release of the steam. In the arrangement shown in Fig. 1 the hot gases which pass at the upper part of the branch 4 descend along this branch and reascend along the branch 3. In the arrangement of Fig. 2 the hot gases pass, on the contrary, at the lower part of the branch 4, reascend along this branch, pass at the top of branch 3 and descend along this latter.

If there is applied to calorifere boilers the mode of circulation represented in Fig. 1 the boiler is composed of a certain number of elements 10 suitably assembled and each forming branches 3 & 4 of the U-shaped tubes. The combustion is effected in this case in the chamber 9 limited by the branches 3 and 4 of the U-shaped tubes. These tubes are cast with adjoining pieces 11 forming

canals for the evacuation of the chimney gases and for their cooling off. Said canals 11 extend over the entire length of the U shaped tube; the difference of heating re- 5 quired for drawing the circulation of water in a determined direction is obtained simply by the cooling of the chimney gases on the length of their travel.

If there is applied to calorifere boilers the 10 mode of circulation represented in Fig. 2 the boiler is composed of a certain number of elements suitably assembled, the coal reserve being located in 12 the combustion occurs in 13 and 14. Each of these ele- 15 ments comprises two tubes 3 and two tubes 4; the spaces left free between these elements and limited by outer ribs 15 serve as conduits for the gases of combustion. The latter ascend through the canal 16 while 20 heating the tube 4, they descend again through canal 17 while heating the tube 3 and they are evacuated through the hori-

zontal conduit 18 collecting the gas of these various canals 17.

I claim:

A boiler comprising a reservoir of water and of steam, tubes of U shape connected with this reservoir and having arms of unequal length, the longer of the arms terminating at the level of the water of the reser- 25 voir, and partitions arranged between the arms of each tube in such a way that the hot gases, encountering first the longer arm shall circulate parallel with this arm, then meeting the shorter arm shall circulate like- 30 wise parallel with the latter. 35

In testimony that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

EUGENE LAMBERT JOSEPH WERA.

Witnesses:

GEORGES VANDER HAEGHEN, _____
LEONARD FÉVA. _____