

No. 681,244.

Patented Aug. 27, 1901.

S. D. MOTT.  
WATER CIRCULATOR FOR BOILERS.

(Application filed Dec. 4, 1900.)

(No Model.)

Fig. 1.

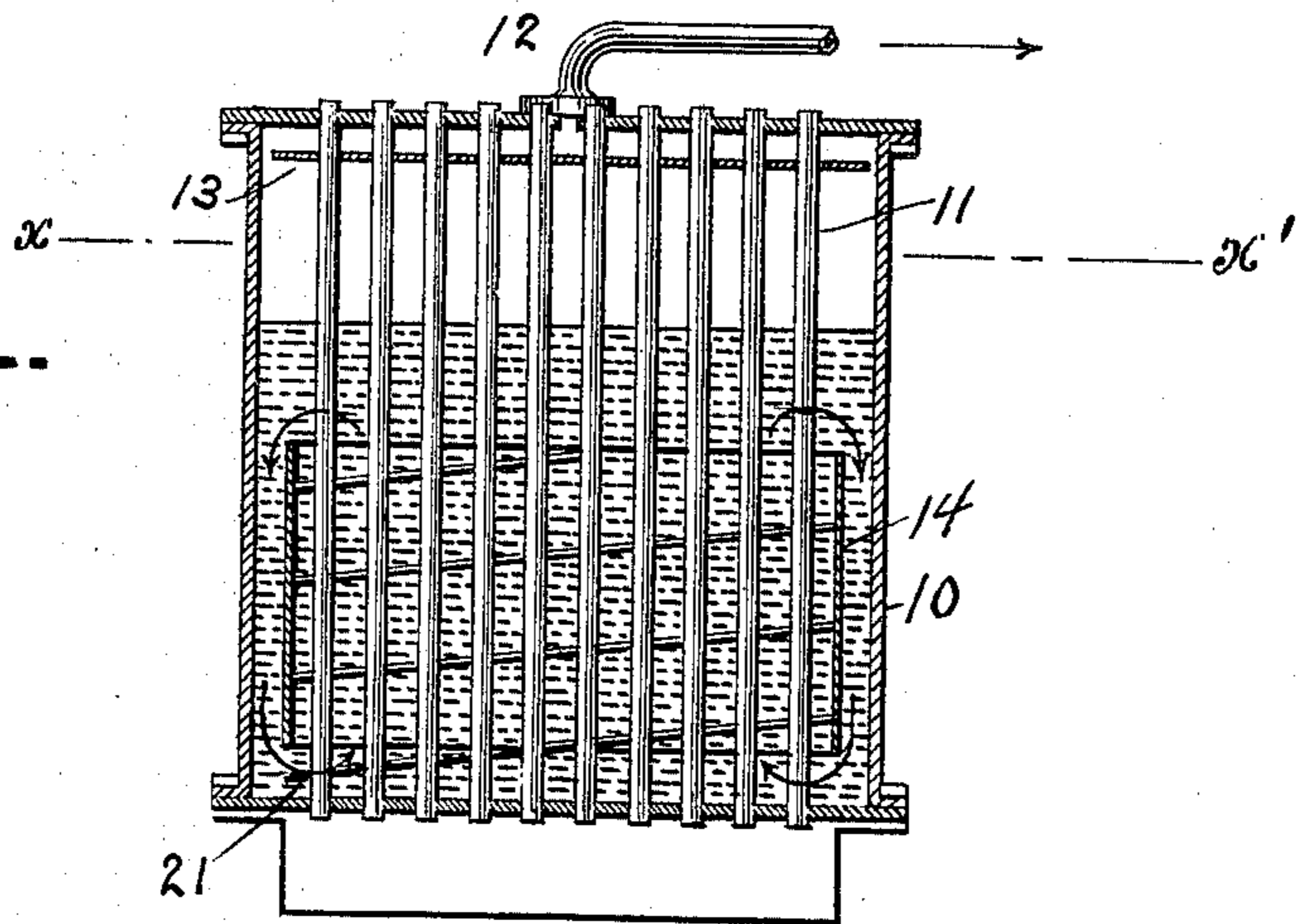


Fig. 2.

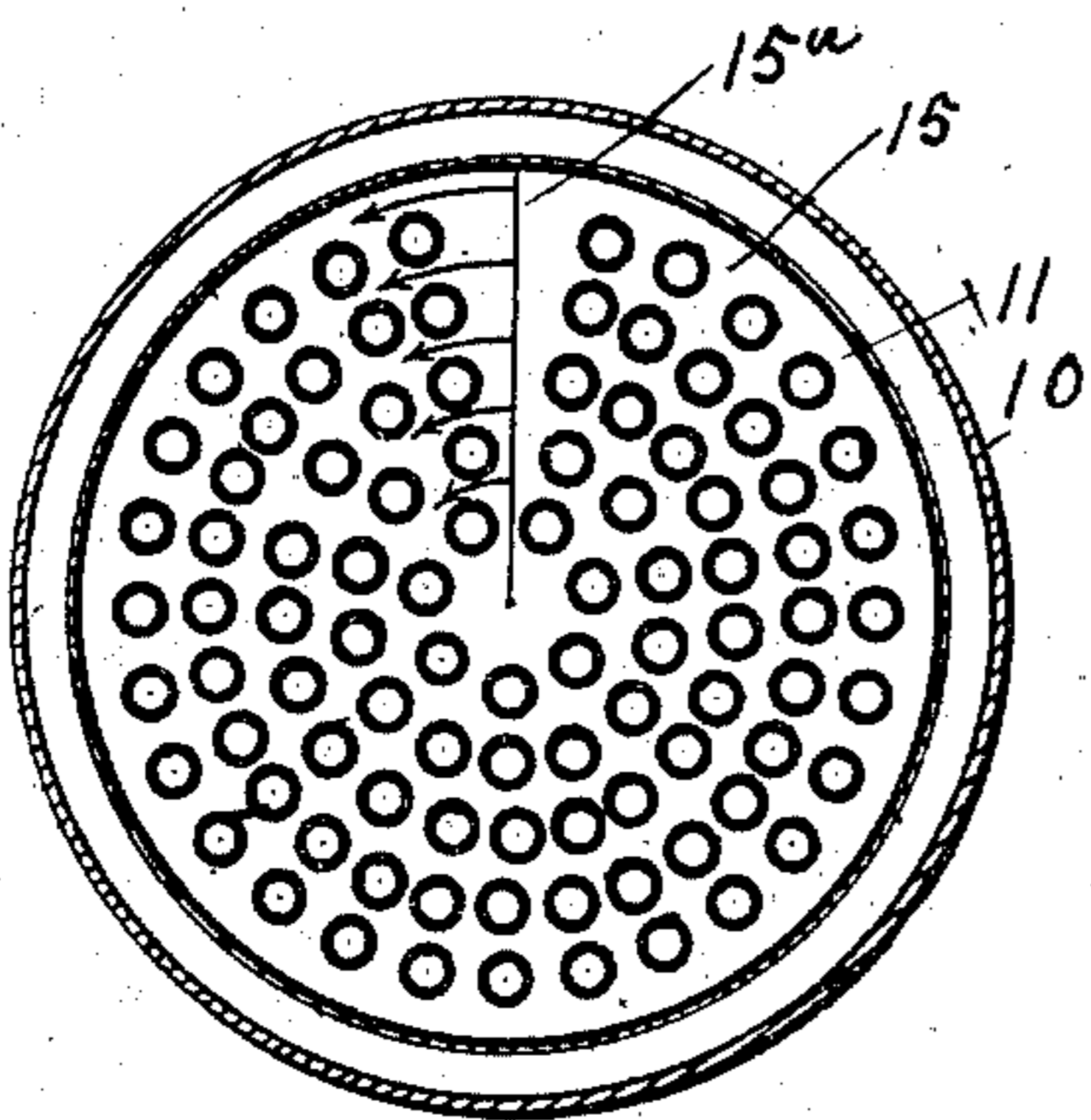


Fig. 3.

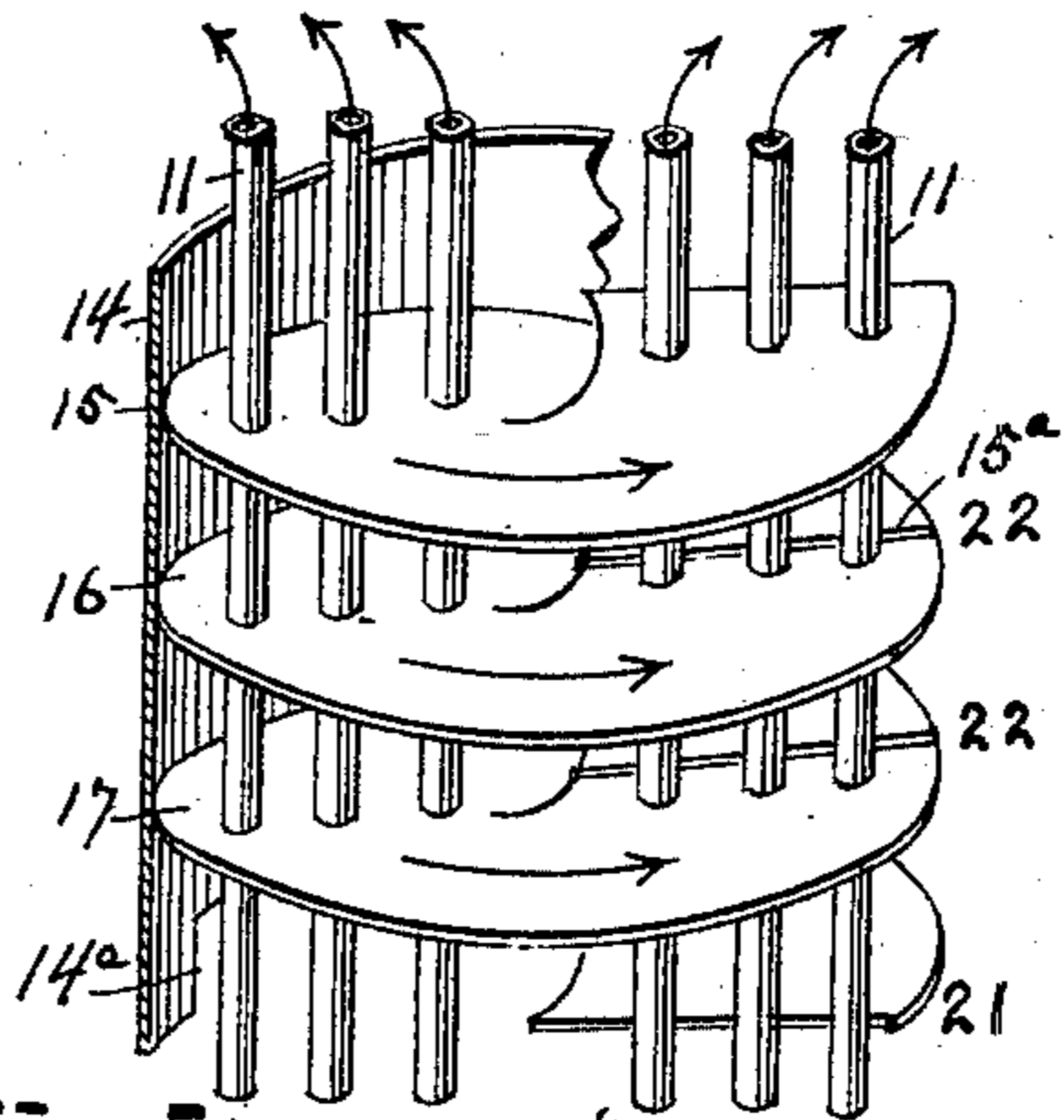


Fig. 4.

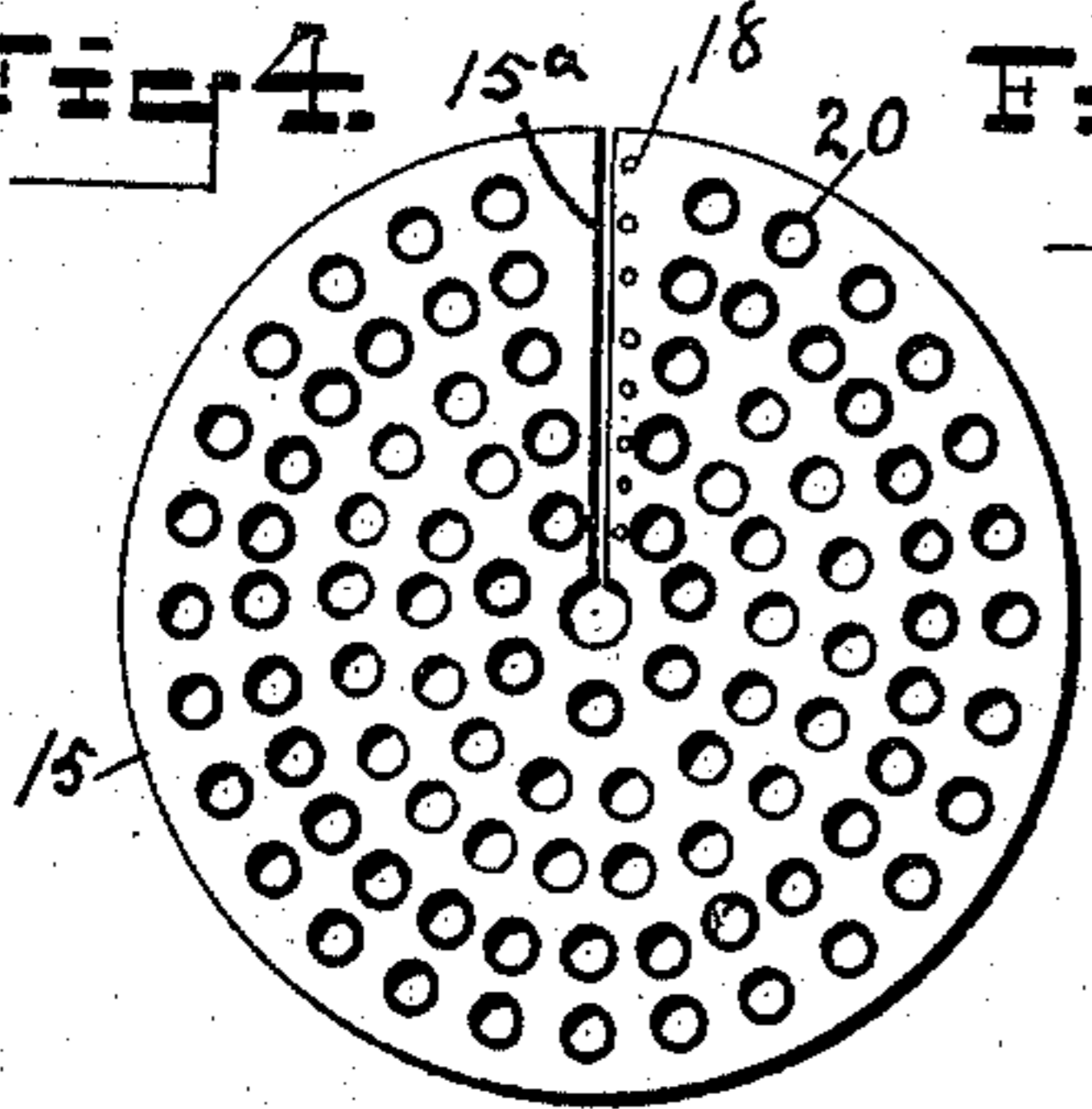


Fig. 5.

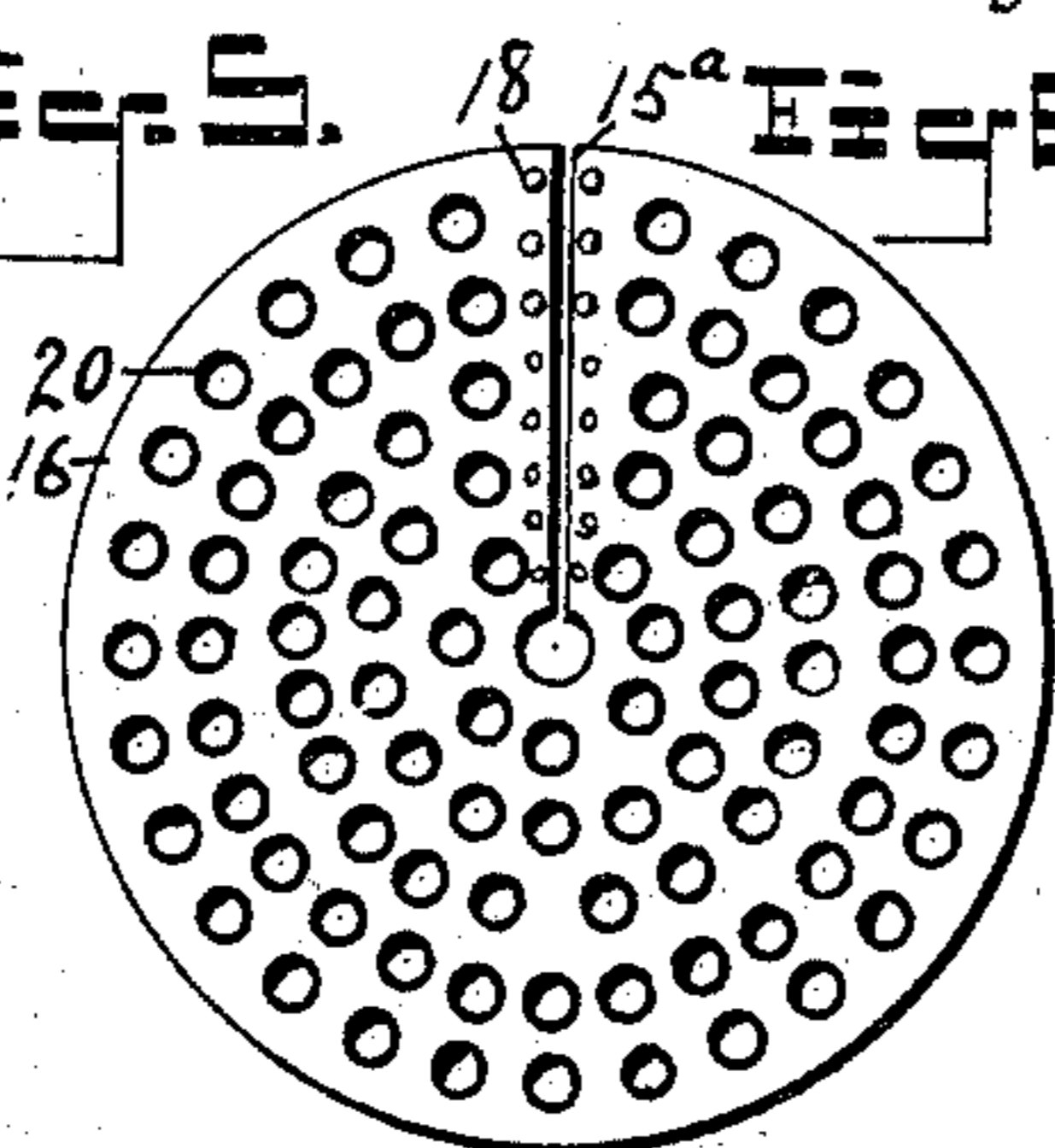
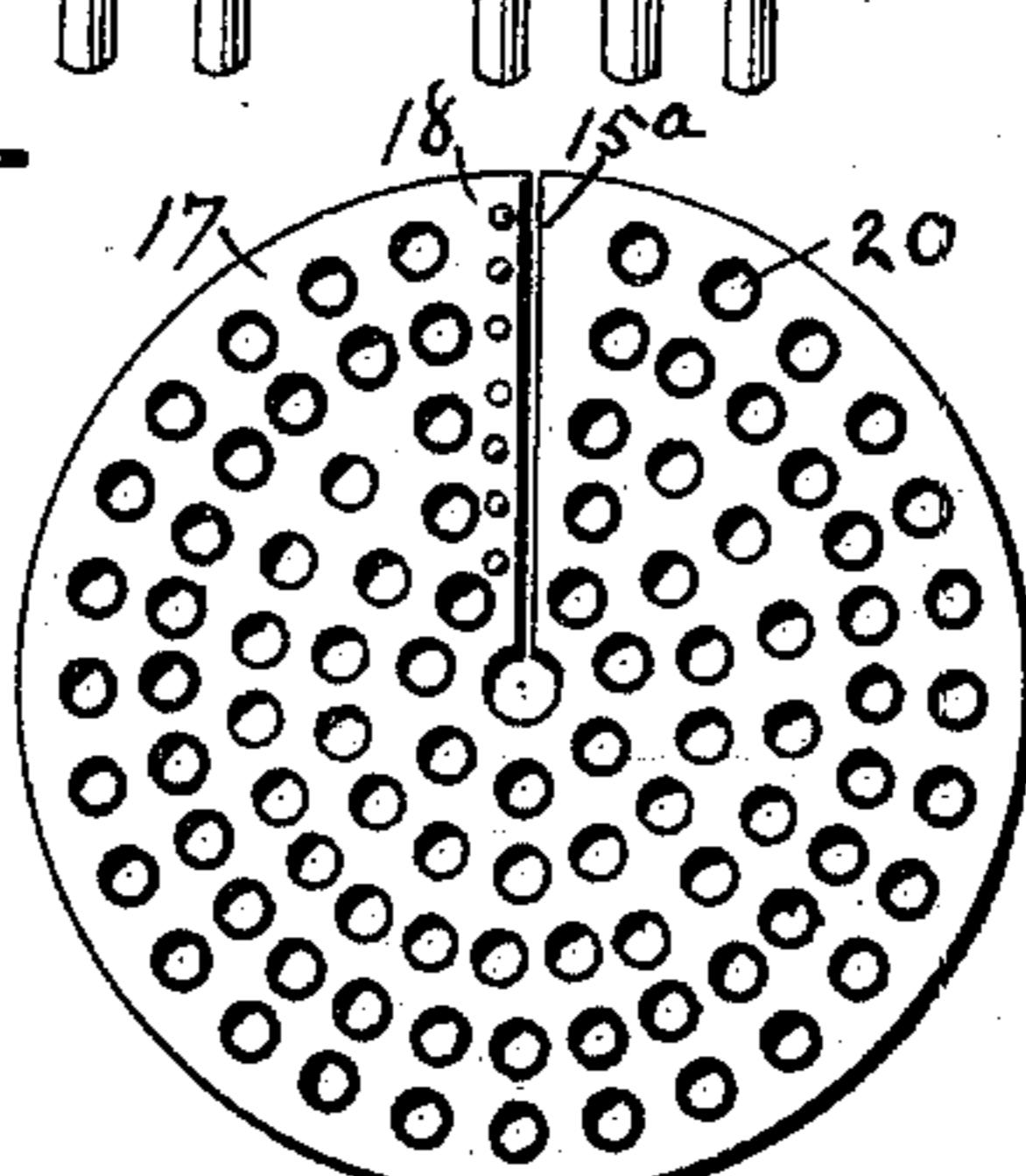


Fig. 6.



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# UNITED STATES PATENT OFFICE.

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## WATER-CIRCULATOR FOR BOILERS.

SPECIFICATION forming part of Letters Patent No. 681,244, dated August 27, 1901.

Application filed December 4, 1900. Serial No. 38,703. (No model.)

*To all whom it may concern:*

Be it known that I, SAMUEL D. MOTT, of Passaic, Passaic county, New Jersey, have invented certain new and useful Improvements in Water-Circulators for Boilers, of which the following is a full, clear, and exact description.

My invention relates to improvements in water-circulators for boilers; and the object of my invention is to produce a very cheap and simple device which is particularly adapted for use in connection with the internal upright vertical flue-boilers. It is well known that the speed with which a boiler makes steam depends in a great measure on the circulation of the boiler, and in boilers of the kind referred to the means for circulation is usually deficient. My invention overcomes this objection by providing a simple means for keeping up a rapid and thorough internal circulation of the water. In the drawings I have shown my attachment with the ordinary boiler and with the internal downtake; but it will be understood from the description to follow that it is immaterial, so far as my invention is concerned, whether the downtake be internal or external.

Another object of my invention is to produce a device in which no mechanism is employed, but which causes the heating of the water to set the latter in motion and keep it moving, so that all parts of the water are subjected practically to the same heat.

To these ends my invention consists of certain features of construction and combinations of parts, which will be hereinafter described and claimed.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar figures of reference refer to similar parts throughout the several views.

Figure 1 is a central vertical section of an upright boiler provided with my improved circulator. Fig. 2 is a sectional plan on the line X X'. Fig. 3 is a broken perspective view, partly in section, showing the circulator-plates in detail; and Figs. 4 to 6 are detail plans of the several circulator-plates.

In the drawings I have shown a common

form of upright boiler 10, having the customary vertical flues 11, the usual steam-outlet 12, and a baffle-plate 13, arranged below the steam-outlet to prevent the boiler from foaming over. Within the boiler and a little removed from the top I place my circulating apparatus, which is provided with a shell 14, the section of which corresponds to the section of the boiler in shape, though of course it is smaller in cross-section, and this shell or cylinder 14 is open at top and bottom. Within the cylinder or shell 14 and extending preferably through its entire length is a spiral circulating-way, made up, preferably and most easily, by the plates 15, 16, and 17, which are spaced apart and arranged one above another, each plate being cut radially from the center to the edge, as shown at 15<sup>a</sup>, so as to permit the edges opposite the said slit to be bent up and down, as desired. The plates 15, 16, and 17 when shaped as hereinafter described are made fast at their edges to the shell 14, and the meeting edges of adjacent plates may be riveted, as shown at 18, or they may be made simply to abut and fasten in this position in any suitable way. The plates are provided with holes 20 to permit them to be slid upon the tubes 11, and in producing the spiral circulating-way one part of each plate opposite the slit 15<sup>a</sup> is bent upward and the other part bent downward. Beginning at the top plate and referring to Fig. 3, it will be seen that the downbent part of the plate 15 meets the upbent part of the plate 16 and the downbent part of the plate 16 meets the upbent part of the plate 17, as shown at 22 in the figure referred to, and the lower plate is finally bent down to the position shown at 21 in Fig. 3. Consequently it will be seen that a continuous spiral way or deflector is produced, so that when the water is heated it is guided by the plate, which is made continuous in the manner described, and so follows up through the shell in the direction shown by the arrows in Fig. 3 and coming out at the top passes down between the shell 14 and the shell of the boiler 10, as shown by the arrows in Fig. 1, then rising up through the shell 14 again.

In this way a continuous and perfect circulation is maintained, and consequently the steaming capacity of the boiler is greatly increased. If desired, the shell 14 may be cut  
5 away on one side, as shown at 14<sup>a</sup> in Fig. 3, to permit the water to more readily pass into the spiral way above referred to. The plates 15, 16, and 17 may be spaced apart and fixed in relation to each other by any suitable bolts  
10 or other well-known mechanical means, and likewise any suitable means may be employed to support the shell 14 and the plates 15, 16, and 17 in the desired position.

I have shown the spiral way made up of a  
15 series of plates 15, 16, and 17, because this, in my opinion, is the cheapest way to make it; but obviously the effect would be the same if a single and continuous plate were made of the desired shape.

20 I have referred already to the fact that the downtake of the boiler might be inside or out, and it will be seen from the foregoing description and by reference to Fig. 1 that this fact is immaterial, as I lay no claim to any part  
25 of the boiler construction, but merely to this circulating attachment.

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

30 1. The combination with a boiler, of an internal spiral way open at top and bottom and supported within the boiler so as to provide a space between the way and the boiler-bottom.

35 2. The combination with a boiler, of an internal circulating apparatus comprising a shell open at opposite ends and supported so that its ends are free from contact with the boiler, and a spiral way extending through  
40 the shell.

3. The combination with a flue-boiler, of a vertically - arranged open - ended shell supported within it so as to leave a space between the shell and the boiler-bottom, and a spiral way traversing the shell from end to end. 45

4. The combination with a boiler having vertical flues or tubes, of a spiral way arranged within the boiler and supported on the said tubes.

5. The combination with a boiler having 50 vertical tubes, of the shell contained within the boiler and of less diameter than the boiler, said shell being open at top and bottom, and a spiral way extending through the internal shell from end to end, the walls of the said 55 way fitting the boiler-tubes so as to support the said internal structure, substantially as described.

6. The combination with a boiler, of a vertically-arranged spiral way therein, said way 60 being formed of a series of plates split from the center to one edge and superposed with the split edge of one plate brought adjacent to the split edge of the next so as to form  
65 practically a continuous plate.

7. The herein-described circulating apparatus comprising a spiral way formed of a shell open at top and bottom, and a series of radially - split plates within the shell, said plates being spaced apart and spread at their 70 split portions so as to meet and form a continuous way.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

SAMUEL D. MOTT.

Witnesses:

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