

(No Model.)

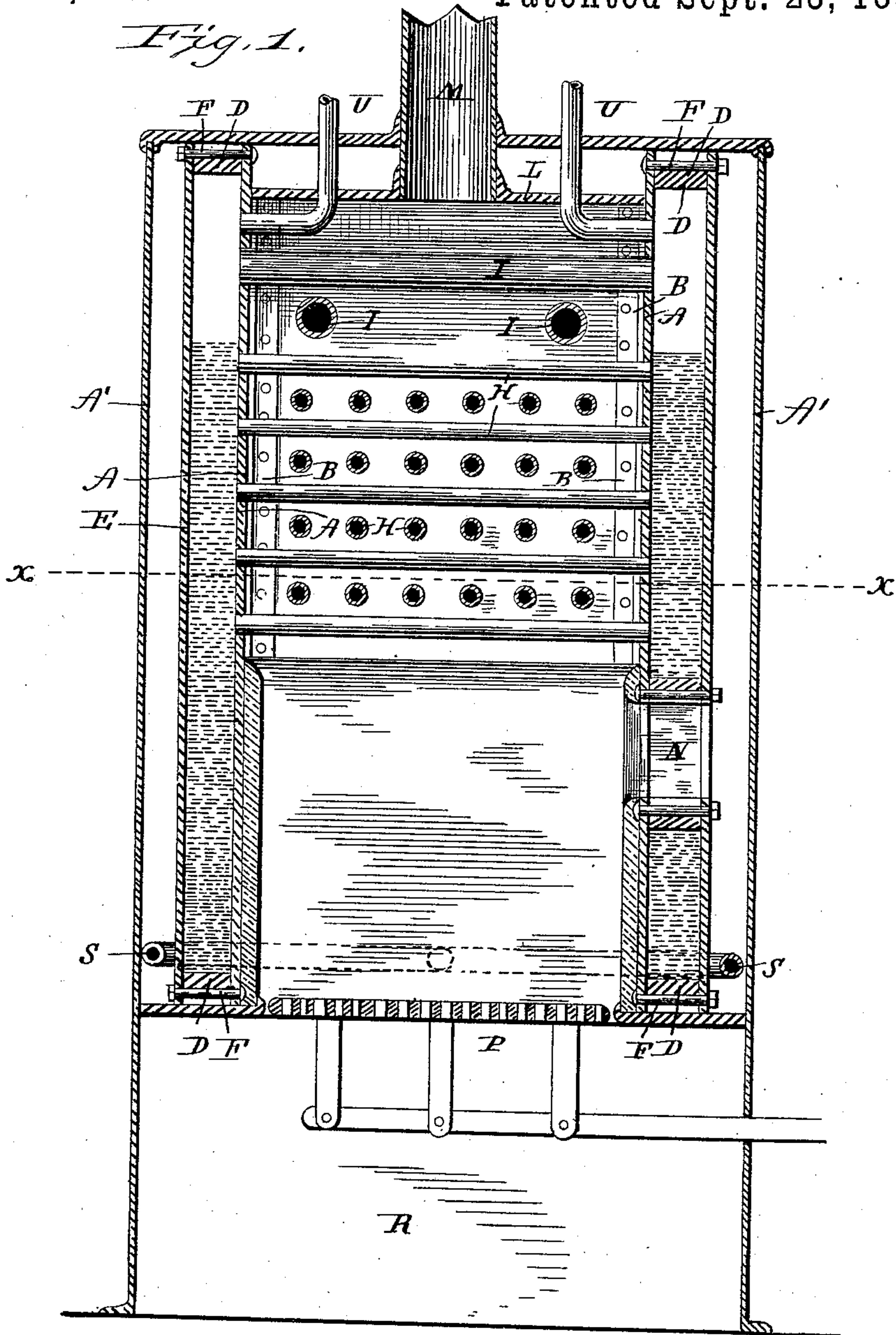
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C. OTIS.  
STEAM BOILER.

No. 437,040.

Patented Sept. 23, 1890.

*Fig. 1.*



Witnesses

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By *his* Attorney

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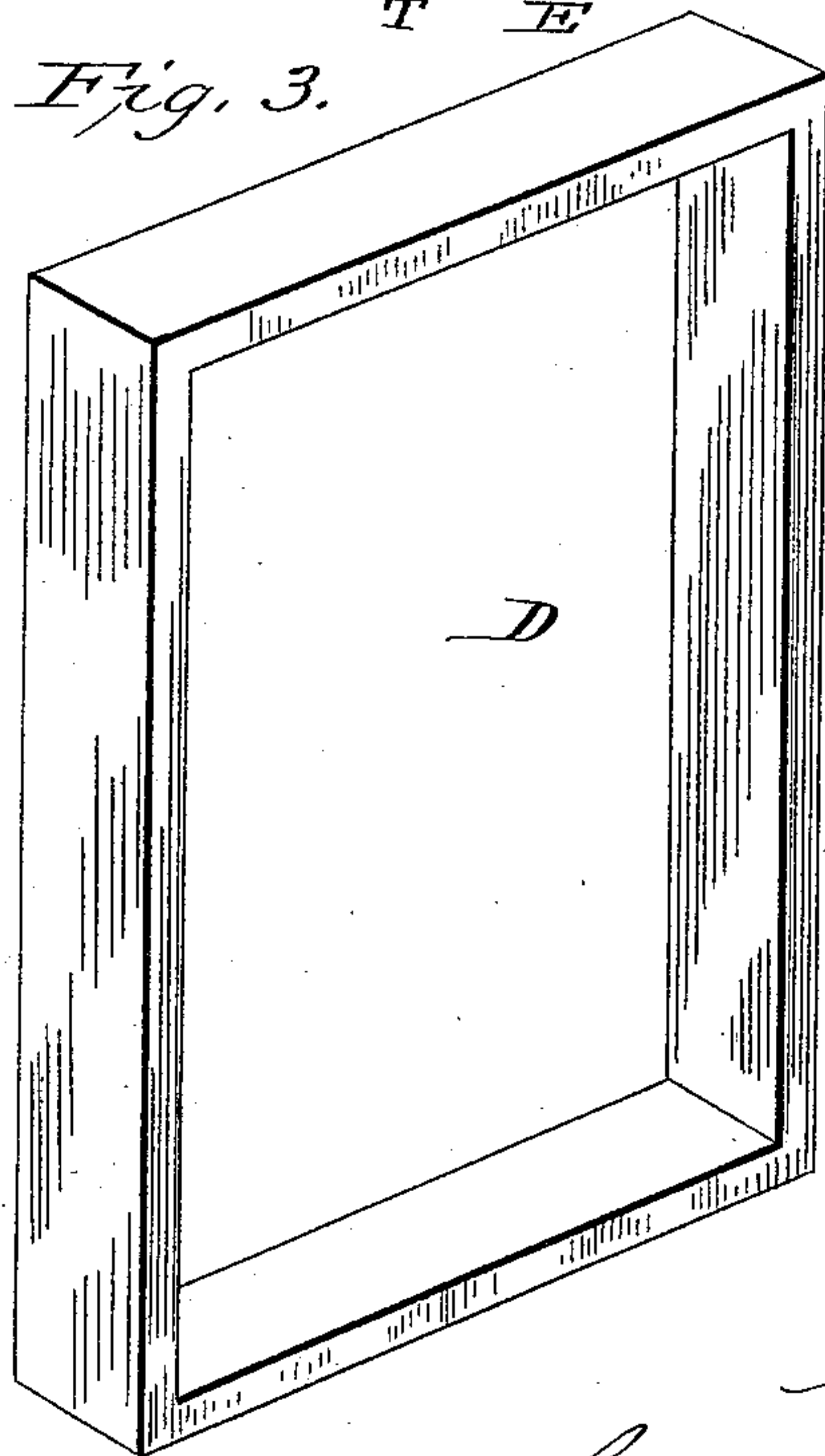
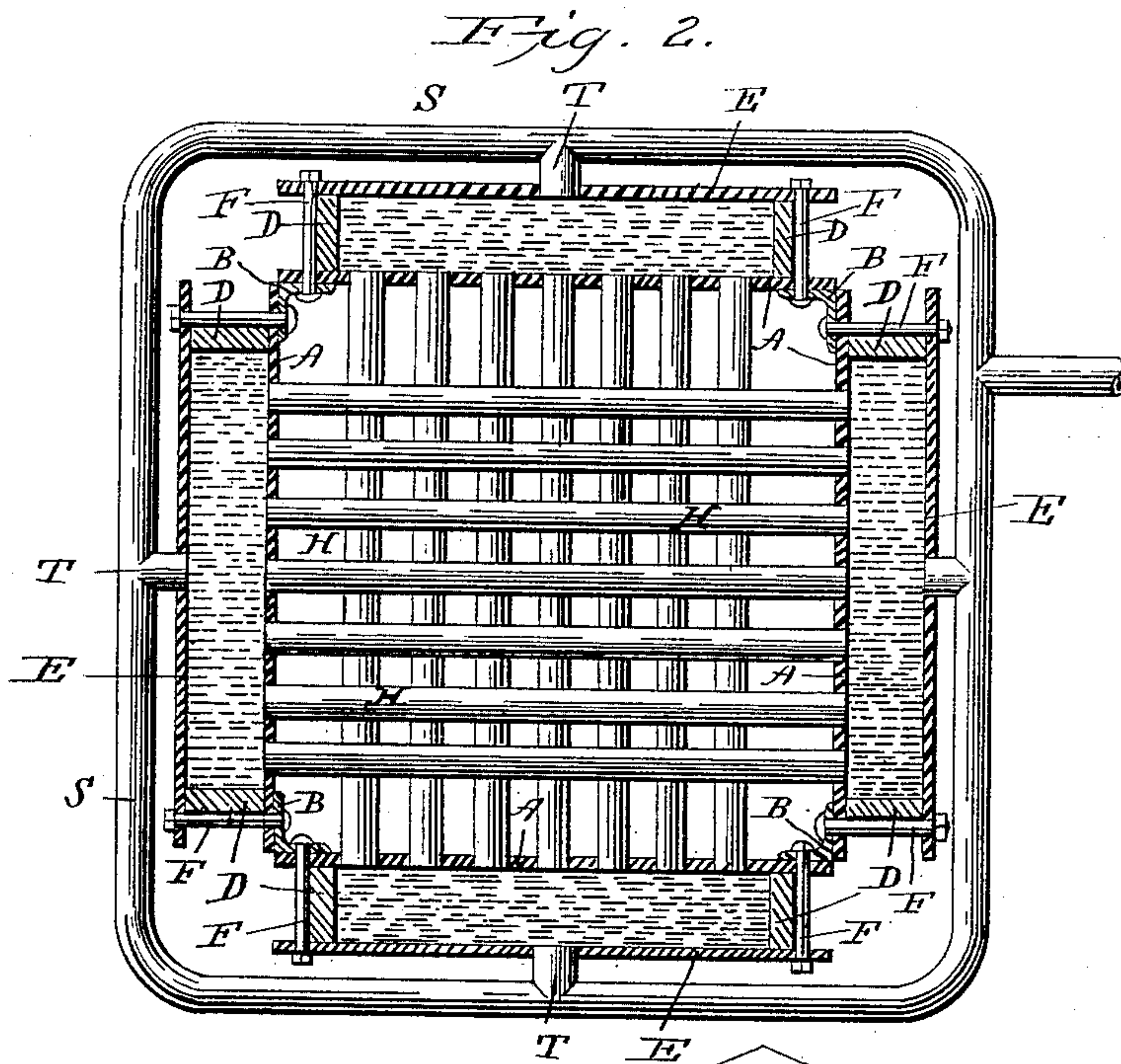
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2 Sheets—Sheet 2.

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# UNITED STATES PATENT OFFICE.

CLARK OTIS, OF FARMER VILLAGE, NEW YORK.

## STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 437,040, dated September 23, 1890.

Application filed June 19, 1890. Serial No. 355,973. (No model.)

*To all whom it may concern:*

Be it known that I, CLARK OTIS, a citizen of the United States, residing at Farmer Village, in the county of Seneca and State of New York, have invented certain new and useful Improvements in Steam-Boilers; and I do 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 the letters of reference marked thereon, which form a part of this specification.

This invention relates to certain improvements in steam-boilers for generating steam for domestic purposes; and it has for its objects to provide a boiler that may be cheaply constructed, easily repaired and cleaned, and in which a thorough circulation of water may be effected and dry or superheated steam generated, as more fully hereinafter explained.

The above-mentioned objects I attain by the means illustrated in the accompanying drawings, in which—

Figure 1 represents a vertical sectional view of my improved boiler. Fig. 2 represents a horizontal sectional view of the boiler on the line  $x x$  of Fig. 1, and Fig. 3 a detail perspective view of one of the cast frames.

Referring to the drawings, the letter A indicates the internal walls of the boiler, constituting the fire-box and combustion-chamber thereof. These walls are composed of four rectangular steel plates, connected at their side edges by means of angle-irons B, extending vertically the full length of their adjoining edges on the inside of the chamber formed by said walls, the angle-irons being bolted to the plates and suitably calked to form tight joints at the adjoining edges of the plates, or any suitable packing may be interposed between the angle-irons and plates for the same purpose.

The letter D indicates four rectangular castings of somewhat less width and length than the plates before mentioned, having their edges truly planed or otherwise finished and setting against the outer surfaces of the said plates.

E indicates a series of four metallic plates, preferably of steel, which are of the same shape and size as the plates constituting the

inner walls of the boiler. These plates set against the outer edges of the castings before mentioned and are bolted to the inner wall-plates of the boiler by means of bolts F, extending along the outside edges of the castings and threaded at their outer ends for the reception of nuts, so that the plates E may be detachably secured to their seats for the purpose of cleaning or repairing the boiler. Across the inside of the chamber formed by the inner walls of the boiler extend a series of metallic tubes H, preferably of wrought-iron, crossing each other in alternating series at right angles and communicating with the chambers formed by the castings and the inner and outer plates of the boiler. These pipes commence just above the fire-chamber of the boiler and terminate below the top thereof, as shown, occupying the lower part of the combustion-chamber of the boiler. Above the said pipes are arranged a series of larger pipes I, which also connect with the chambers formed by the castings of the boiler and the plates thereof. These pipes occupy the upper part of the combustion-chamber, and are above the water-line of the water-chambers, forming, virtually, superheaters, by means of which dry steam is produced.

The letter L indicates the crown of the boiler, from which extends a smoke-stack M, and N the fire-door leading into the fire-box in order to supply the same with fuel. The fire-box at its lower part is provided with the usual grate P and with an ash-pit R.

The water-chambers, formed by the boiler plates and castings, are connected at their lower parts to a water-supply pipe S by means of branch pipes T, in order to provide for filling said chambers and, in connection with the pipes H, to provide for a thorough circulation of water through the chambers and the rapid generation of steam therein.

The letter U indicates two steam-education pipes, extending from the upper portions or steam-space of two of the water-chambers, through which the steam may be carried off for use.

Between the faces of the castings and the boiler-plates suitable packing may be interposed to form water and steam tight joints, or the metal may be calked for the same purpose.



As constructed, it will be seen that the boiler can be readily set up or taken apart, rendering it inexpensive and providing for easily repairing and cleaning it.

- 5 To prevent the radiation of heat, and thus economize fuel, the boiler may be inclosed in a jacket A' of thin sheet metal, as shown in Fig. 1.

10 It will be perceived that no rivets are employed in the construction of the boiler, thus reducing the labor of putting the parts together and providing for readily taking it apart, and that by the arrangement of the internal circulating and superheating flues an  
15 extensive heating-surface is obtained, rendering the boiler very economical in its operation.

It is evident that this boiler may be employed with equal advantage for heating and supplying hot water for heating dwellings, &c.

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

1. The combination, in a steam-boiler, of the rectangular inner walls, angle-irons connecting the adjacent edges of the inner walls  
25 and extending approximately the full length thereof, the castings removably secured against the faces of the inner walls, the outer walls removably bolted to the faces of the

castings, thereby forming water and steam spaces, and crossed tubes connecting the opposite water-spaces, substantially as described.

2. In a steam-boiler, the combination of rectangular inner walls connected together at their adjacent edges, rectangular frames or castings setting against the said inner walls, outer walls removably secured to the said inner walls and setting against the outer faces of the castings, the latter being removably  
40 clamped between the two walls, thereby forming four separate water and steam spaces, and circulating-tubes connecting these water and steam spaces, as and for the purpose described.

3. The combination, in a steam-boiler, of the circulating-pipes, crossing each other and connecting the water-chambers of the boiler and the supply-pipe, and branch pipes connecting the said supply-pipe and water-chamber together, whereby a thorough circulation  
50 of water is effected in the boiler, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

CLARK OTIS.

Witnesses:

D. C. WHEELER,  
J. D. WIGGINS.