

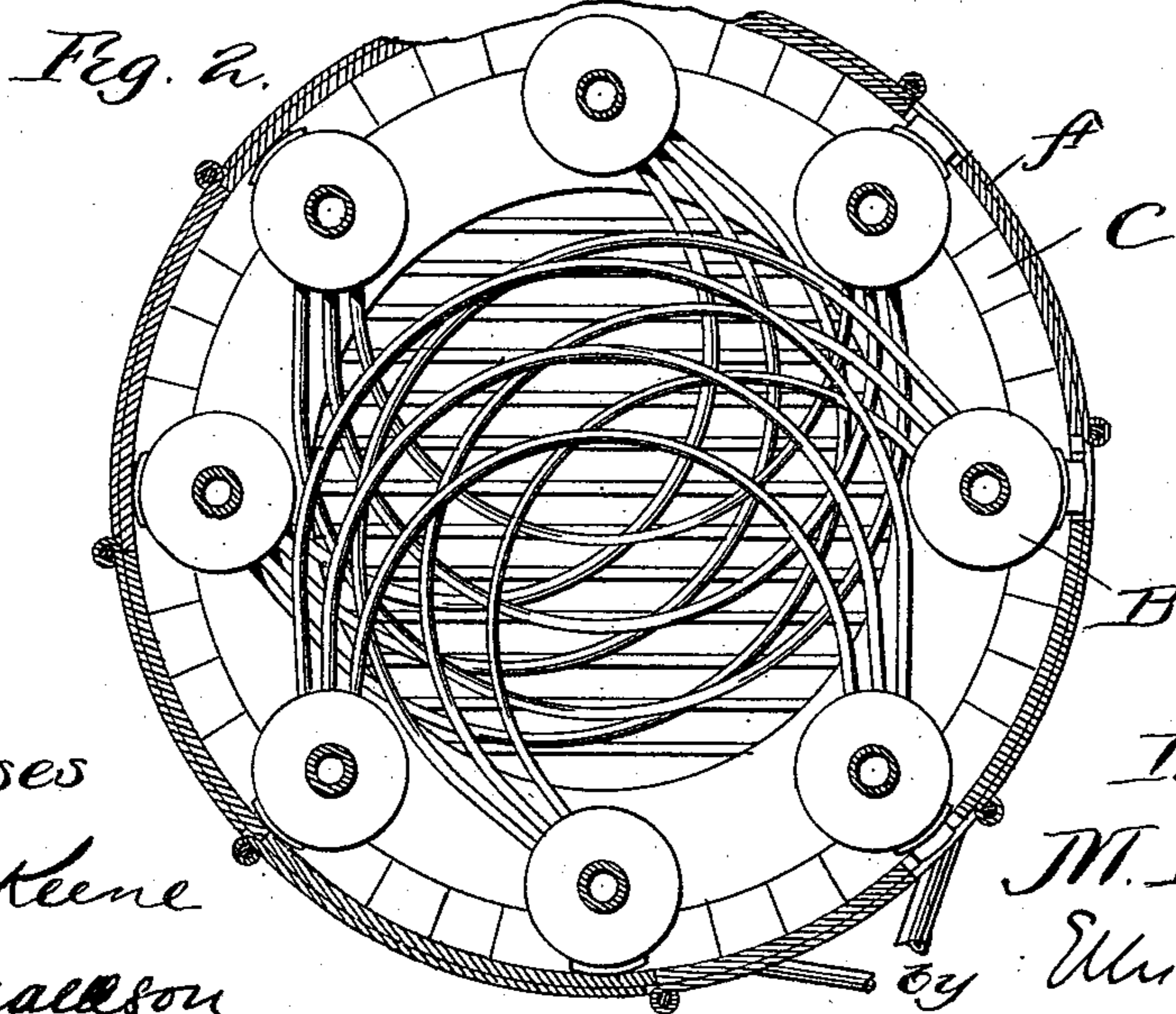
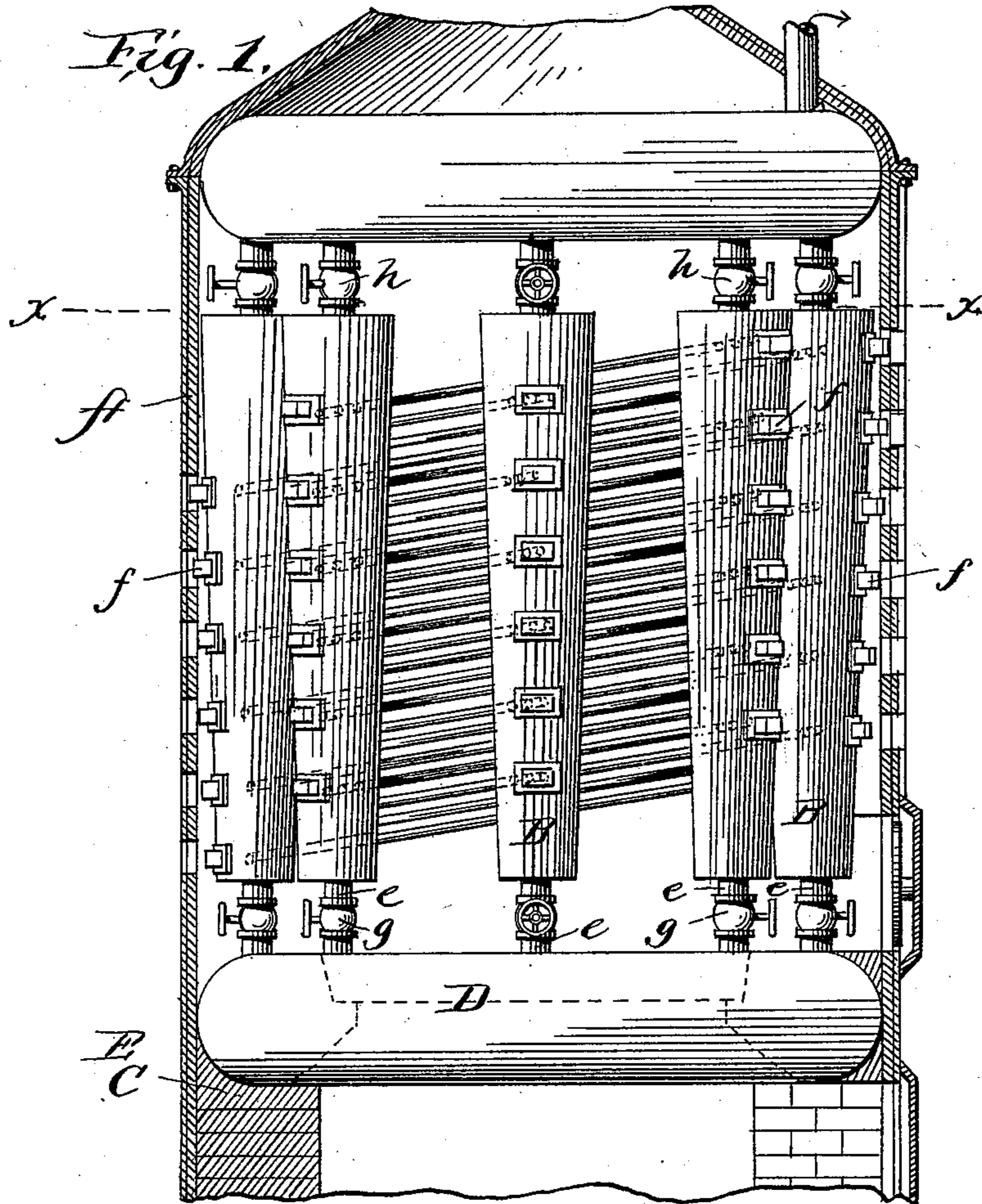
(No Model.)

2 Sheets—Sheet 1.

M. LEVI.  
STEAM BOILER.

No. 447,248.

Patented Feb. 24, 1891.



Witnesses

W. F. Keene

W. D. Donaldson

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(No Model.)

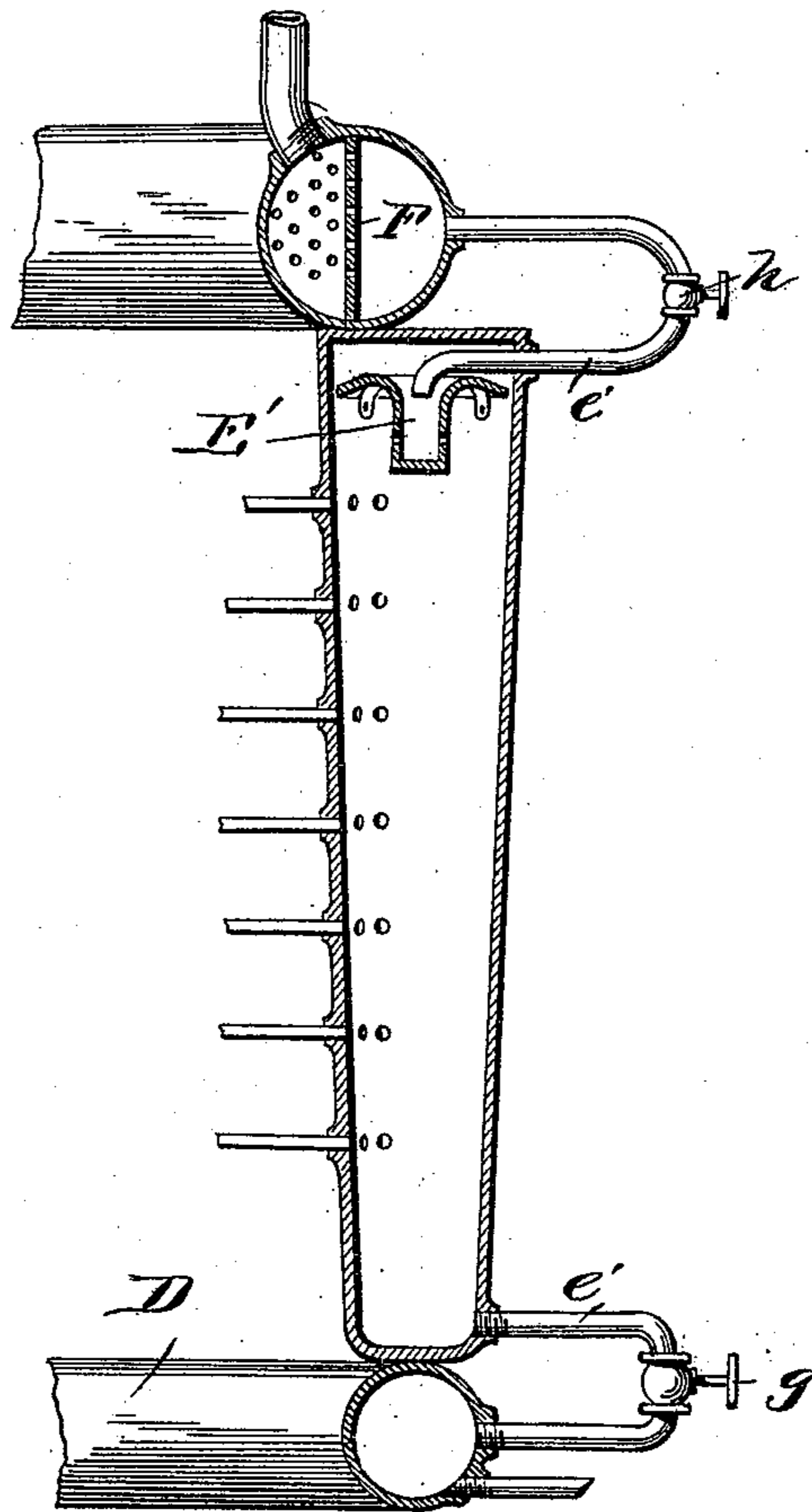
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*Fig. 3.*



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# UNITED STATES PATENT OFFICE.

MORDICAI LEVI, OF CHARLESTON, WEST VIRGINIA, ASSIGNOR OF ONE-THIRD TO WILLIAM T. LEVI, OF SAME PLACE.

## STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 447,248, dated February 24, 1891.

Application filed January 7, 1890. Serial No. 336,127. (No model.)

*To all whom it may concern:*

Be it known that I, MORDICAI LEVI, of Charleston, in the county of Kanawha and State of West Virginia, have invented a new and useful Improvement in Steam-Boilers; and I do hereby declare that the following is a full, clear, and exact description of the same.

The object of my present invention is the production of a simple form of steam-generator which shall be free from the leading objection of water-tube boilers—namely, that of priming or siphoning, which is so injurious as to require the use of a limited amount of water in the tube in order to prevent it, and if the quantity is not accurately maintained the steam will superheat to such a degree as to be destructive to the apparatus. I aim to provide a construction by which all priming will be absolutely prevented and at the same time be capable of carrying a full supply of water in the tubes, with the maximum amount of generating-surface at the upper part of the tube.

The invention consists, primarily, of a water-tube boiler having a mud-drum in connection with the lower end of the tubes and a steam-drum in connection with the upper part of the tubes, the said tubes being made approximately of inverted-cone shape and having connection with the steam-drum through pipes of reduced diameter.

Further, the invention consists in the details of construction hereinafter more particularly set forth.

In the accompanying drawings, Figure 1 is a sectional view of the shell of the boiler, with the water-tubes shown in side elevation. Fig. 2 is a sectional view in line *xx* of Fig. 1. Fig. 3 shows a modified form of connection between the water-tube and the mud-drum and steam-drum.

The casing of the boiler is preferably made of sheet metal, as shown at A, and incloses the series of water-tubes B, fire-brick being preferably interposed, as shown at C, between the metallic casing and the series of water-tubes.

The water-tubes B are preferably of approximately inverted-cone shape, being larger at their upper ends, so as to produce at the

surface of the water in the tube a maximum amount of surface, from which the steam is generated, thus facilitating the generation of steam and at the same time opposing the priming or siphoning action of the generated steam. I do not desire to limit myself to the precise construction of water-tubes, as they need not be circular, but may be of any other shape, so long as their upper ends are of greater size than their lower ends.

The mud-drum is shown at D, resting upon suitable brick-work E and encircling the grate, which may be of any ordinary or improved construction. The tubes surmount the mud-drum and are in connection therewith by vertical sections of pipe *e*, as shown in Fig. 1, or by the curved sections *e'*, as shown in Fig. 3, the latter connection being the preferred one, both between the water-tubes and the mud-drum and the water-tubes and the steam-drum, for the reason that it allows the tube and drum to be placed in contact, and thus reduces the height of the boiler, which is a material advantage. As shown in Fig. 2, I arrange between alternate water-tubes a series of circulating-pipes extending in an inclined direction from one tube to another and curved so as to be directly over the fire-pot, thus receiving the greatest amount of heat. I have shown these pipes arranged three abreast and extending in a series of six for each pair of tubes; but the number may be varied without departing from the spirit of my invention.

I prefer to connect the ends of the circulating-pipes to the water-tubes by passing the pipes through openings and then expanding the inner ends of the pipes through openings left in the opposite wall of each tube, these openings being covered by caps *f*. Any set of tubes, with their circulating-pipes, may be cut out by closing the valves *g h* in case of the rupture or burning out of one of the circulating-pipes, and the pair of tubes may be kept permanently out of work and prevented from burning by allowing a sufficient amount of steam to pass through for the purpose, or through one of the openings covered by the caps *f* a plug may be introduced to close the ruptured pipe, and then the pair of tubes may be restored again to action. As I have said,

the enlarged upper end of the water-tubes tend to prevent priming; but in order to prevent this absolutely I make the connection between the upper end of the tube and the  
5 steam-drum of a reduced size, and in the upper end of the tubes I place a thimble or diaphragm E', supported by brackets from the wall of the tube, this diaphragm having a central tubular portion and a flanged upper portion. The inner end of the connecting-pipe  
10 e' extends downwardly into the interior of the tubular portion of the diaphragm, and as the steam rises it passes around the edge of the diaphragm and through the pipe e' into the  
15 steam-drum; but the circuitous passage thus formed tends also to prevent the water from following the steam. Should any water be carried with the steam around the edge of the diaphragm, it will fall into the tubular part  
20 and through the small openings run back into the tube. A small portion of steam may pass through these openings, but not enough to in any way affect the operation of the boiler or the effective action of this part of the device.  
25 To still further act against the priming action, I locate in the steam-drum a diaphragm F, perforated, as shown, this diaphragm being interposed between the steam-inlet from the water-tubes and the outlet.  
30 The section of jacket inclosing the boiler is provided with interlocking parts upon adjacent sections, and the ends of these interlocking parts are bent upon themselves, so as to form openings in line with each other, through  
35 which a rod may be passed, thus connecting the sections together in such a manner that they may be easily detached when it is de-

sired for any purpose to gain access to the interior of the boiler.

Having thus described my invention, I 40 claim—

1. A steam-generator consisting of a series of water-holding and steam-generating tubes B of inverted-cone shape, a steam-drum, a mud-drum with connections to the tubes B, 45 and the circulating-pipes between the inverted-cone-shaped tubes.

2. In combination, the water-tubes with circulating-pipes, the steam-drum, the mud-drum, and the connecting-pipes e' between 50 the water-tubes and drums, said pipes extending laterally in order to permit the said tubes and drums to be arranged close together.

3. In combination, the water-tubes with circulating-pipes, the steam-drum resting on said 55 tubes, the mud-drum, also bearing against said tubes, and the valved connections e' between the drums and tubes, substantially as described.

4. A steam-boiler consisting of a series of 60 tubes, a steam-drum, a connecting-pipe, and a diaphragm having a tubular portion provided with perforations and a flanged upper portion, the end of the receiving-pipe extending into the tubular portion of the diaphragm, 65 substantially as described.

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

MORDICAI LEVI.

Witnesses:

HENRY E. COOPER,  
WALTER P. KEENE.