

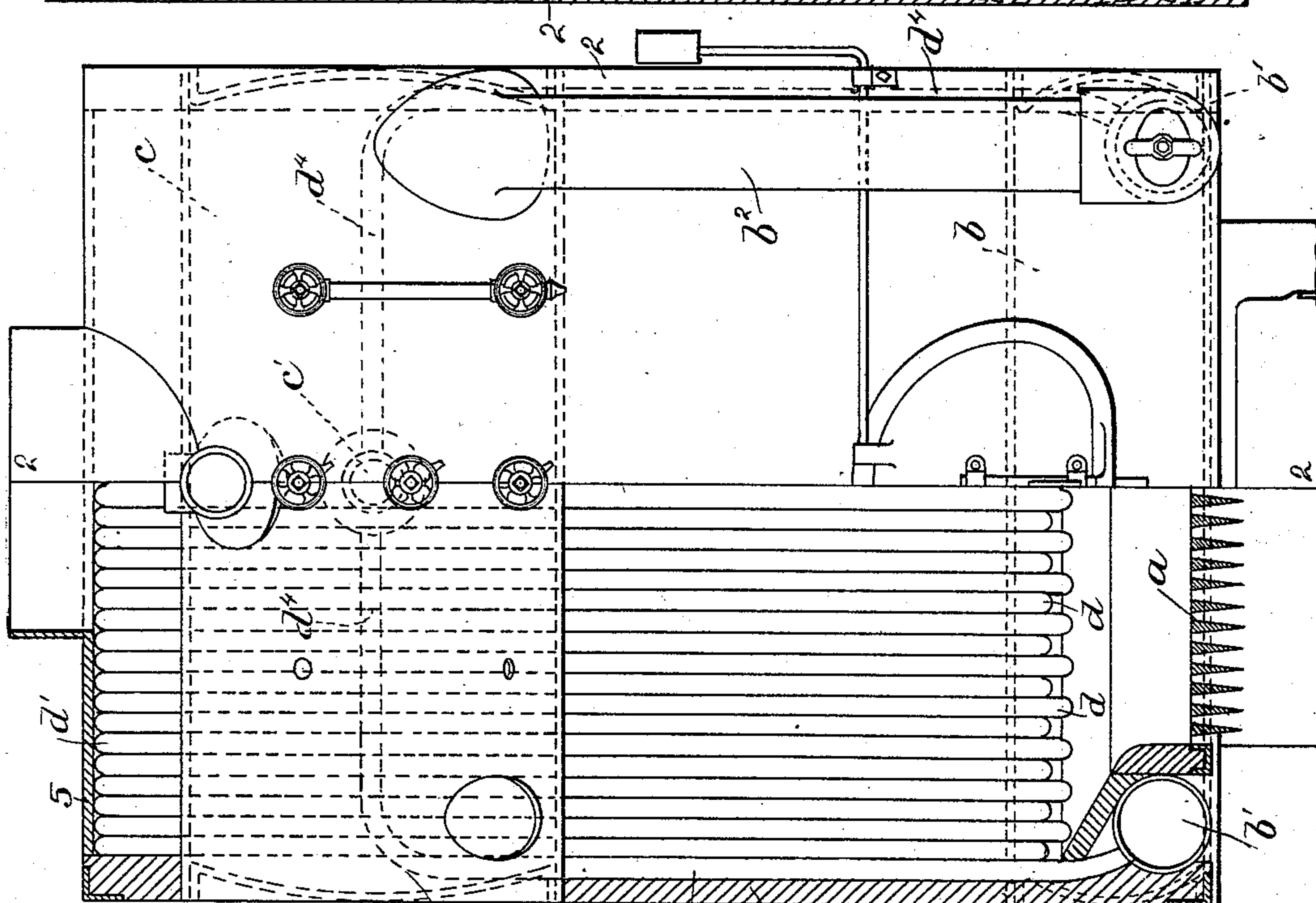
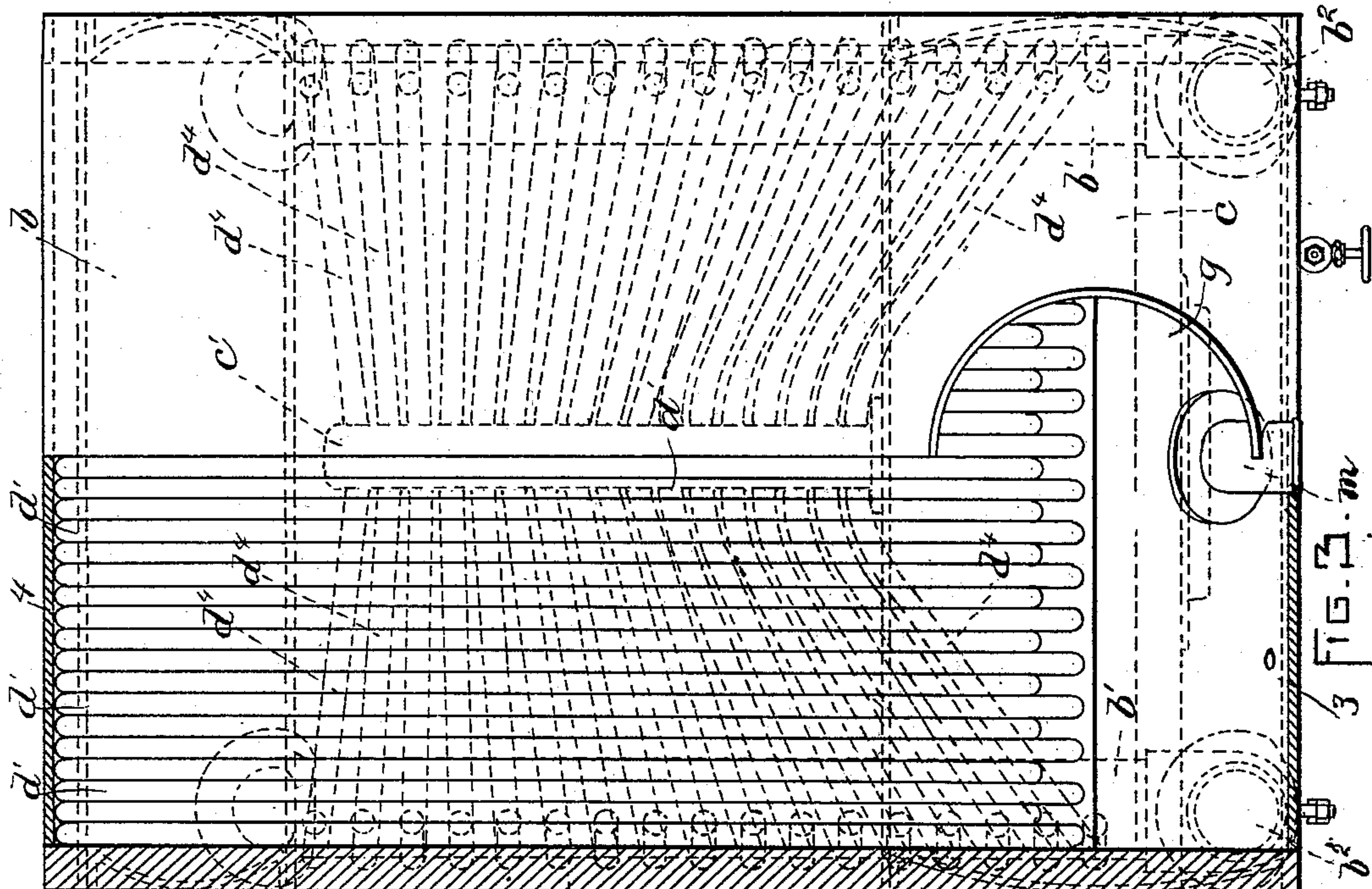
(No Model.)

2 Sheets—Sheet 1.

C. D. MOSHER.  
BOILER OR STEAM GENERATOR.

No. 524,391.

Patented Aug. 14, 1894.



WITNESSES:

H. A. Hall.

A. D. Harrison.

1951

INVENTOR:

C. Mosher  
G. Wright Brown & Bradley  
Attys.



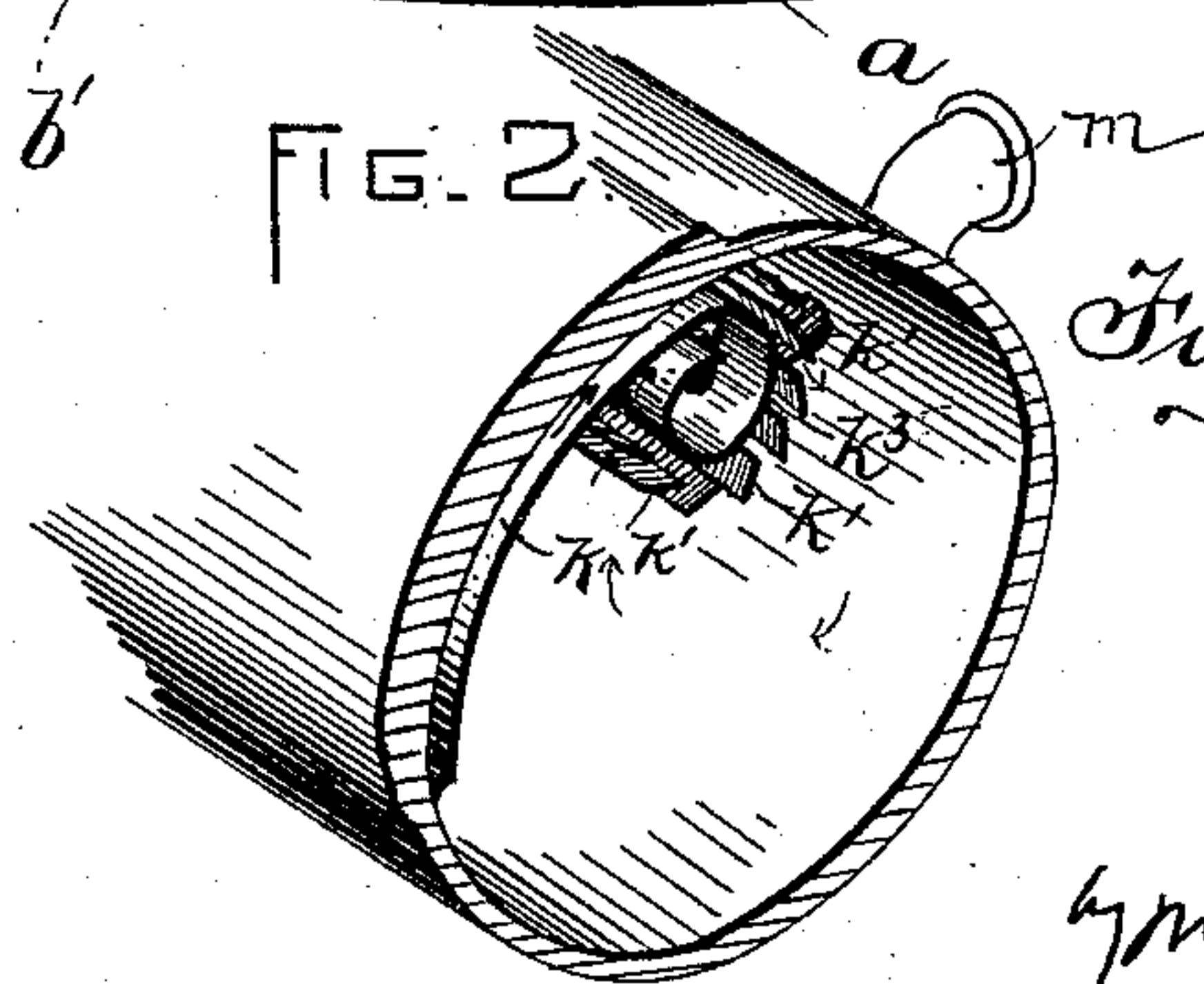
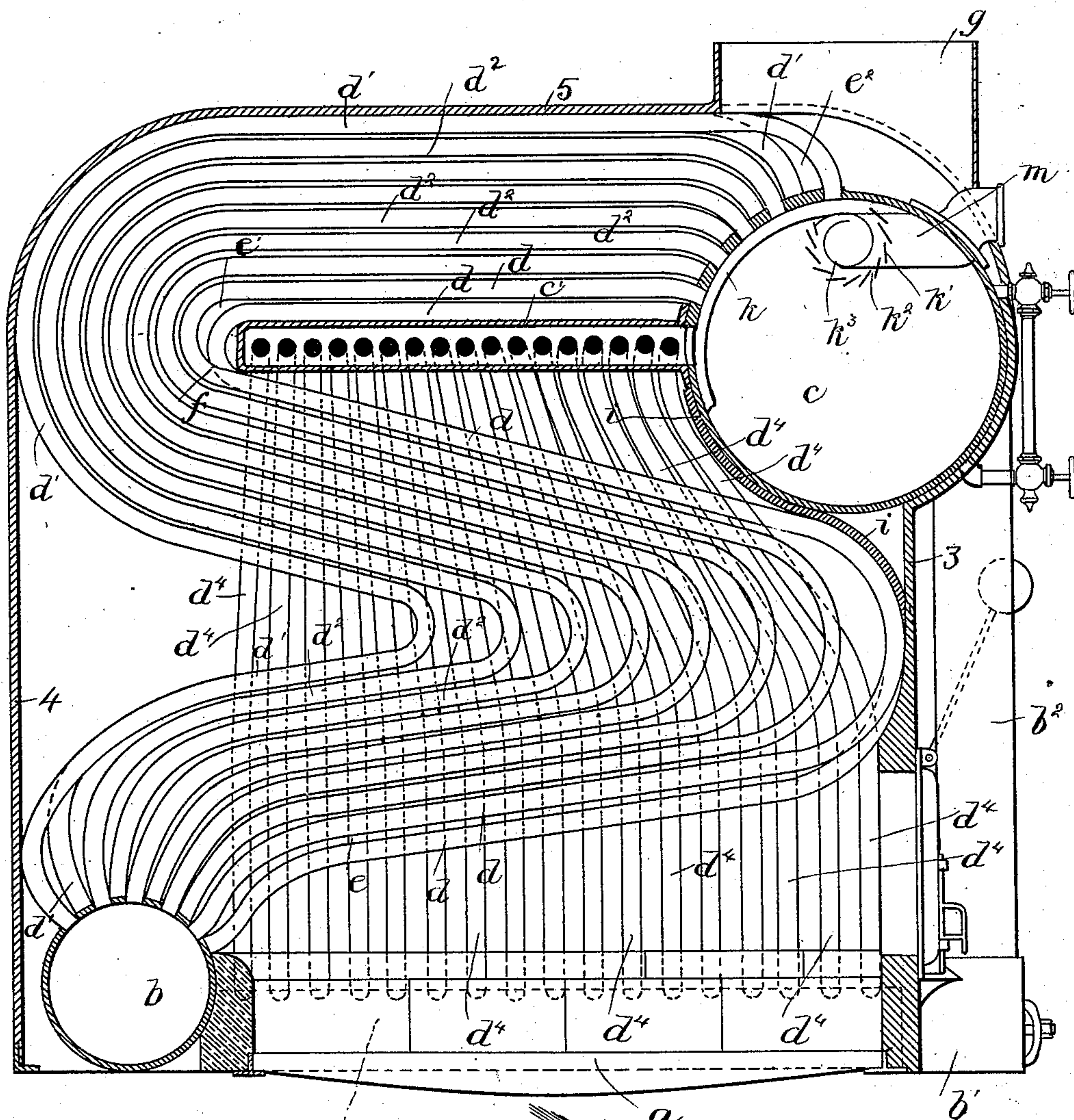
(No Model.)

2 Sheets—Sheet 2.

C. D. MOSHER.  
BOILER OR STEAM GENERATOR.

No. 524,391.

Patented Aug. 14, 1894.



WITNESSES:

H. A. Hall.  
A. D. Harrison.

INVENTOR:

C. D. Mosher  
by M. B. Brown, Attorney  
Atty.



# UNITED STATES PATENT OFFICE.

CHARLES D. MOSHER, OF NEW YORK, N. Y.

## BOILER OR STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 524,391, dated August 14, 1894.

Application filed January 7, 1893. Serial No. 457,603. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES D. MOSHER, of New York city, in the county of New York and State of New York, have invented certain  
5 new and useful Improvements in Boilers or Steam-Generators, of which the following is a specification.

This invention relates to that class of boilers or steam generators, in which a water  
10 drum or receptacle located at or near the level of the grate is connected by a plurality of tubes with a steam drum or receptacle located at a higher point, the said tubes being  
15 arranged so that their contents will be subjected to the heat of the fire, as shown in Letters Patent of the United States, No. 432,760, granted to me July 22, 1890. In the generator shown in said patent, two water drums and two steam drums are employed, the drums  
20 extending lengthwise of the furnace.

My present invention has for its object to provide a generator of the class above indicated, of more compact and less expensive construction than those heretofore made, and  
25 to this end the invention consists in the improvements which I will now proceed to describe and claim.

Of the accompanying drawings, forming part of this specification: Figure 1 represents  
30 a front elevation of my improved boiler, a portion of the casing being shown in section. Fig. 2 represents a longitudinal section on line 2—2, Fig. 1. Fig. 3 represents a top plan view, showing a portion of the casing in section. Fig. 4 shows a detail perspective sectional view illustrative of a separator device  
35 employed in the steam drum.

The same letters and numerals of reference indicate the same parts in all the figures.

40 In the drawings: *a* represents the grate of the furnace or fire-box, the same being contained in a suitable casing, composed of the sides 2 2, front end 3, rear end 4 and top 5.

*b* represents the water drum, which extends  
45 across the fire-box at one end of the grate, the lower side of the drum being preferably at or near the level of the top of the grate.

*c* represents the steam drum, which is located at the opposite end of the fire-box from  
50 the water drum and at a higher point. The

steam and water drums are substantially parallel with each other, and both are arranged at right angles to the direction of the length of the fire-box.

*d d' d<sup>2</sup>* represent the group of tubes which  
55 connect the upper portion of the water drum with the upper portion of the steam drum. Said tubes are bent to form loops, each of which occupies a vertical plane extending  
60 lengthwise of the fire-box, the tubes being bent so that their lower portions are inclined from the water drum toward the front end of the fire-box; while their upper portions extend in a substantially horizontal, or if preferred slightly inclined direction along the  
65 upper portion of the casing, their intermediate portions being inclined upwardly from the front toward the rear of the casing, all as shown in Fig. 2.

The lower inclined portions of the tubes *d*  
70 are separated from each other by spaces *e*, which extend substantially the entire length of the fire-box, and permit the products of combustion to enter the space between the tubes *d* and *d'*, the intermediate tubes *d'* being  
75 separated, so that the products of combustion can circulate freely among them. The intermediate inclined portions of the tubes *d* are arranged in close proximity to each other, and constitute a close wall of tubes, extending  
80 from the front wall of the casing back to the point *f*, from which point to the steam drum the tubes *d* are separated by spaces *e'*. The tubes *d'* at the opposite side of the group are arranged in close proximity to each other,  
85 and form a closed wall of tubes extending from a point near the water drum nearly to the steam drum, the ends of the tubes *d'* that join the steam drum being separated by  
90 spaces *e<sup>2</sup>*, which permit the escape of the products of combustion to the stack or chimney *g*. The arrangement of the tubes in loops, each occupying a vertical plane and extending lengthwise of the fire-box, enables  
95 each tube to have a considerably greater length than has been possible under the arrangements heretofore adopted, so that I am enabled to obtain a much greater area of heating surface in a generator of a given size than heretofore. This result is due to the  
100



above-described arrangement of the tubes and to the arrangement of the steam drum and water drum crosswise of the fire-box. It will be observed that the loops extend from the water-drum to the front wall of the furnace below the steam-drum and thus completely separate said steam-drum from all parts of the fire. The close wall formed by the tubes  $d'$  at the back side of the group retains the products of combustion within the space between the tubes  $d$  and  $d'$  until they reach the chimney, while the close wall formed by the intermediate inclined portions of the tubes  $d$  at the opposite side of the group interposed between the fire and the steam drum protects the latter against injury from the heated gases in case the steam drum should accidentally become empty. The steam drum is additionally protected by a partition  $i$ , which may consist of asbestos or other non-conducting material, and is suitably affixed to the front wall of the casing and to the rear portion of the steam drum. The elongated openings  $e$  between the lower inclined portions of the tubes  $d$  permit free access of the products of combustion to the space between the tubes  $d$   $d'$  along the entire length of the fire-box.

The described form of the tubes  $d$   $d'$   $d^2$  provides a deep recess extending backwardly from the steam drum, as shown in Fig. 2. I utilize this recess for the reception of a substantially horizontal hollow arm  $c'$  extending from the steam drum into said recess and communicating with the interior of the steam drum. Said arm is preferably composed of a length of tubing, one end of which is closed, and the other end flanged and secured by riveting or otherwise to the steam drum. The arm is connected by bent tubes  $d^4$ , which communicate at their lower ends with side return pipes  $b'$ , which, with the vertical return pipes  $b^2$ , constitute connections conducting the return water from the steam drum  $c$  to the water drum  $b$ , the horizontal pipes  $b'$  extending along the opposite sides of the fire-box, substantially at right angles with the steam and water drums. The tubes  $d^4$  are connected at their lower ends with the horizontal return pipes  $b'$ , and at their upper ends with the arm  $c'$ . The upper portions of the tubes  $d^4$  are bent inwardly, as shown in Fig. 1, the row of tubes rising from one of the pipes  $b'$  being bent inwardly in one direction, while the row of tubes rising from the other pipe  $b'$  are bent in the opposite direction.

It will be seen that the tubes  $d^4$  largely increase or add to the heating surface of the boiler, and obviate the necessity of using fire brick at the sides of the fire-box to protect the sides of the furnace. The steam generated in the tubes  $d^4$  passes to the steam drum through the arm  $c'$ .

The steam drum is provided with a steam separator, which comprises a pocket  $k$ , affixed to the interior of the steam drum, and

a scroll-shaped continuation or extension of said pocket, composed of a series of slats  $k'$  separated by slots or openings  $k^2$ , and an imperforate inner portion  $k^3$ . The pocket  $k$  is closed at its bottom and ends, and is arranged to receive all the steam and water delivered by the tubes. The slotted part of the scroll communicates with the upper edge of the pocket, and receives steam and water therefrom, and constitutes a scroll-shaped passage, leading to a steam-pipe  $m$ , which conducts steam from the generator to the engine. The steam, in passing through the slotted portions of the scroll, parts with the entrained water by centrifugal action, the water being thrown outwardly and escaping through the slots, the steam reaching the imperforate inner portion of the scroll and passing from thence through the pipe  $m$ .

I claim—

1. In a boiler or steam generator, the combination of a furnace or fire box, a water drum located at the rear end of the fire box, a steam drum located at the front end of the fire box, said drums extending across the fire box, a group of curved tubes connecting the upper portion of the water drum with the upper portion of the steam drum, said tubes being bent to form loops disposed in vertical planes extending lengthwise of the fire box, return pipes extending vertically downward from the steam drum along the front of the fire box and horizontally along the sides of the fire box to the water drum, and side tubes springing from the horizontal portion of the return-pipes and extending along the sides of the fire-box and constituting a lining therefor as set forth.

2. In a boiler or steam generator comprising a steam drum, a water drum and tubes connecting the said drums, the steam drum provided with an internal longitudinal partition forming a pocket which is closed at its ends and lower edge, and is arranged to receive the steam and water delivered by the tubes, a scroll shaped separator at the upper open edge of said pocket, the outer portion of said separator being composed of longitudinal slats separated by slots while its inner portion is continuous or imperforate, and a steam pipe extending from the inner portion of the separator through the wall of the steam drum, as set forth.

3. In a boiler or steam generator, the combination of a furnace or fire-box, a water drum located at one end of the same and extending crosswise of the fire-box, a steam drum substantially parallel with the water drum and located at a higher point, a plurality of curved tubes connecting the upper portion of the water drum with the upper portion of the steam drum and bent to form loops which are disposed in substantially vertical planes extending lengthwise of the fire-box, said loops forming a recess extending rearwardly from the steam drum, an arm extending from the



steam drum into said recess, horizontally arranged return pipes at the sides of the fire-box, and bent tubes connecting said return pipes with said arm, said tubes increasing  
5 the heating surface and protecting the sides of the furnace, as set forth.

In testimony whereof I have signed my

name to this specification, in the presence of two subscribing witnesses, this 27th day of December, A. D. 1892.

CHARLES D. MOSHER.

Witnesses:

C. F. BROWN,

A. D. HARRISON.