(No Model.) 2 Sheets—Sheet 1.

G. MARSHALL.

STEAM BOILER.

No. 342,525. Patented May 25, 1886.

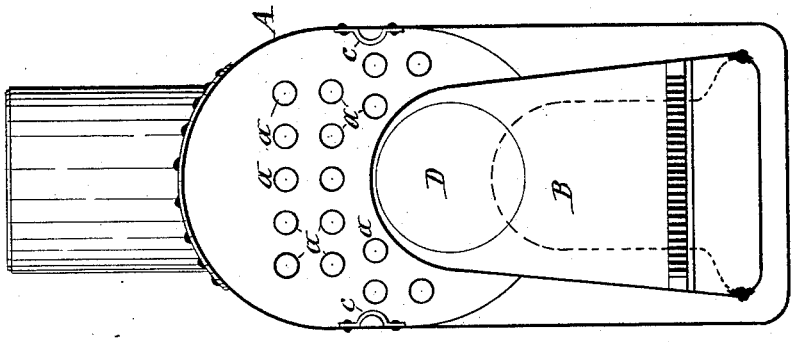

Fig. 4

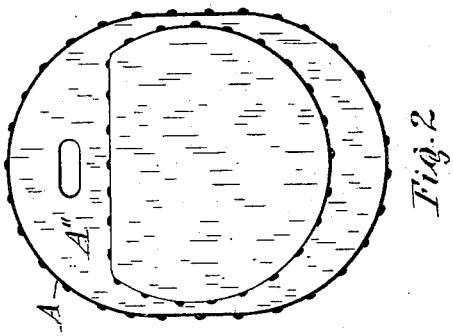

Fig. 2

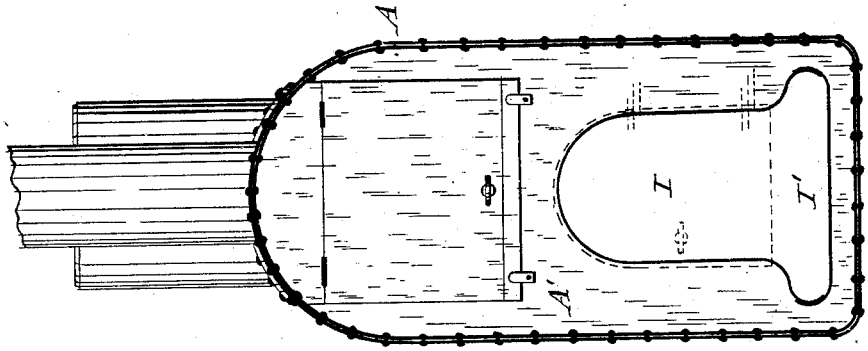

Fig. 1

WITNESSES

C. Bendixon

A. F. Walz

INVENTOR

George Marshall

per Wendell Laass & Hyde
attys

(No Model.) 2 Sheets—Sheet 2.

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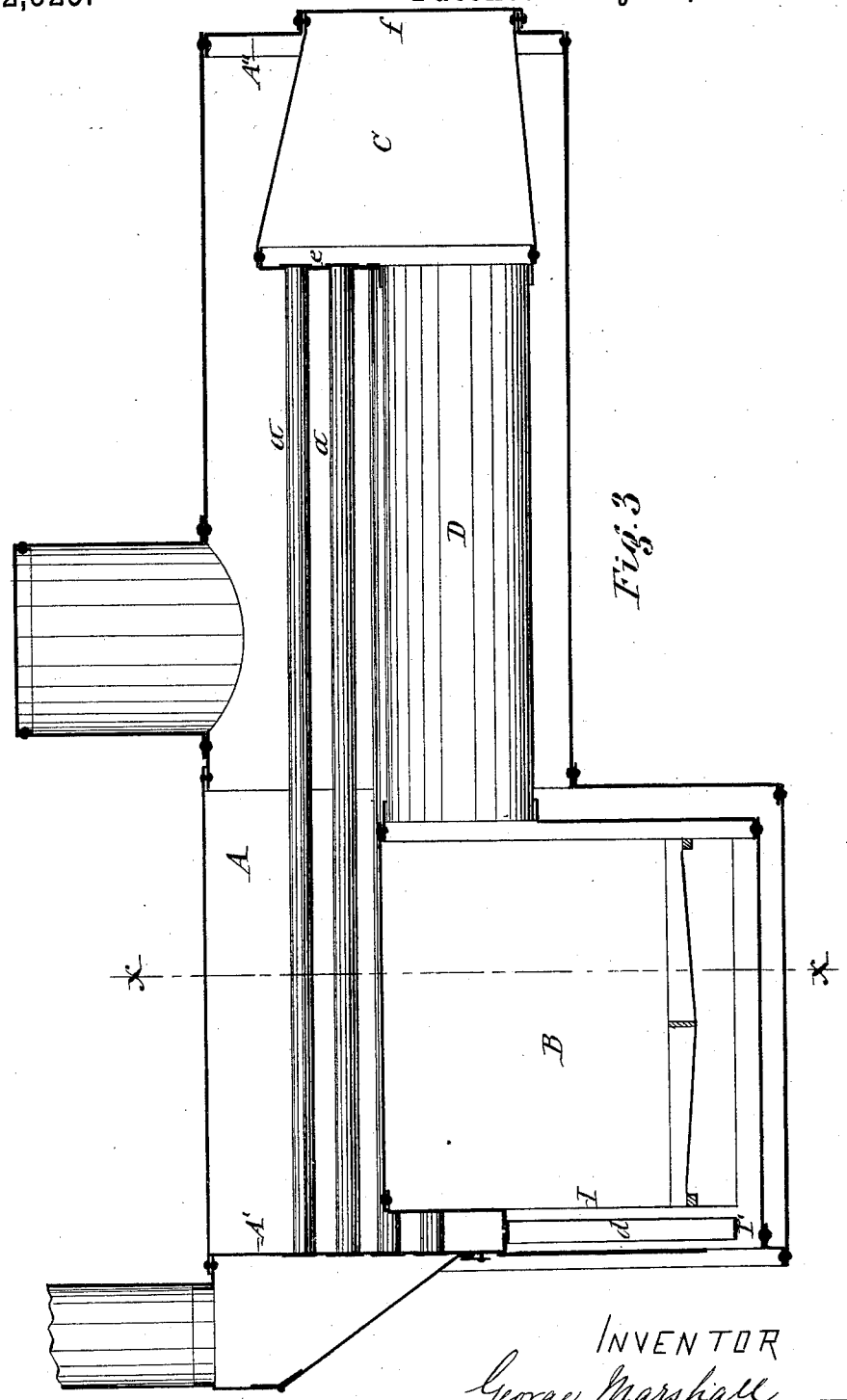

Fig. 3

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WITNESSES
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UNITED STATES PATENT OFFICE.

GEORGE MARSHALL, OF DETROIT, MICHIGAN, ASSIGNOR TO ANDREW J. PHELPS, OF SYRACUSE, NEW YORK, AND ADALINE S. MARSHALL, OF DETROIT, MICHIGAN.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 342,525, dated May 25, 1886.

Application filed March 25, 1886. Serial No. 196,501. (No model.)

To all whom it may concern:

Be it known that I, GEORGE MARSHALL, of Detroit, in the county of Wayne, in the State of Michigan, have invented new and useful Improvements in Steam-Boilers, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to the class of steam-boilers designated "horizontal return-flue boilers," which have the fire-box inside of the boiler-shell with a water-space around the fire-box, a combustion-chamber at the opposite end of the boiler, a direct main flue extending from the fire-box to the combustion-chamber, and return-flues from the latter to the smoke box and stack at the front of the boiler.

The object of my invention is, first, to facilitate the construction of the internal parts of the boiler and the attachment of the same to the boiler-shell; secondly, to obtain better access to the bottom of the fire-box for removing the ashes therefrom, and at the same time provide a larger opening for admission of air to the fire-box, and thus promote the combustion of fuel; thirdly, to impart to the boiler greater capacity of containing water and steam without increasing the width of the boiler; fourthly, to protect the shell of the combustion-chamber from the destructive effects of the products of combustion, and to also augment the heating-surfaces of the boiler; and, fifthly, to form the junction of the fire-box with the front head of the boiler around the fire-door opening in a more perfect manner, and so as to obviate projections around said opening, and thus facilitate the removal of ashes from the fire-box; and to attain these objects my invention consists in the novel construction and combination of parts, as hereinafter fully described, and specifically set forth in the claims.

In the annexed drawings, Figure 1 is a front end view of my improved steam-boiler. Fig. 2 is a rear end view of the same. Fig. 3 is a vertical longitudinal section, and Fig. 4 is a vertical transverse section, of the boiler on line *x x*, Fig. 3.

Similar letters of reference indicate corresponding parts.

A denotes the boiler-shell, the sides of which I compress to impart to said shell an oval or elliptic shape in cross-section, thereby increasing the depth of the steam and water spaces and obtaining more room at the exterior of the boiler.

In order to stiffen the flattened or broad sides of the boiler-shell and maintain them in shape, I secure to the inner sides thereof arched braces *c c*, arranged vertically, so as to bridge said portions of the boiler, as shown in Fig. 4 of the drawings.

A′ is the head or front sheet of the boiler, and A″ the back sheet of the same. Both of said sheets are flanged outward and riveted to the inner side of the shell A in the usual manner. The head A′ is provided with the fire-door opening I, which I extend to the bottom sheet of the fire-box, and widen it thereat, so as to reach nearly or quite across the entire width of the fire-box, as shown at I′, Fig. 1 of the drawings.

B represents the fire-box, the front sheet of which I provide with an opening corresponding to the opening I I′ of the head A′. The fire-box sheet is flanged outward and abuts against the edge of an inward flange on the head A′ around the aforesaid opening, and over the joint between the said flanges I place a plain band, *d*, and rivet the same to the flanges. This band presents a smooth surface around the fire-door opening and makes a more perfect finish thereat. The bottom portion of the enlarged opening I′ is formed by an extension of the bottom sheet of the fire-box, which extension reaches across the front water-space and laps over onto the flange of the head A′, and is riveted directly thereto. Consequently a continuous uniform surface is formed from the bottom of the fire-pot through the opening I′, and therefore no obstructions are presented to the scraping of the ashes out of the fire-box. Besides this, only one seam is formed and only one row of rivets required.

C denotes the combustion-chamber, which communicates with the fire-box by the main flue D. Said combustion-chamber is formed of the flue-sheet *e*, to which the main flue C and the return-flues *a a* are attached. The top of the said flue-sheet I terminate below the water-line of the boiler, and the margin of the

sheet I flange outward, as shown in Fig. 3 of the drawings. The back sheet, A″, of the boiler is provided with an opening, *f*, similar to the flue-sheet *e* in outline, but somewhat smaller in circumference. The sheet A″ is flanged outward around its said opening, and to the flanges of this sheet and flue-sheet *e* is riveted the shell of the combustion-chamber, which is gradually contracted and inclined at the top towards its rear end to lap onto the flange of the opening *f*. It will be observed that by this construction of the combustion-chamber I obtain therein a crown-sheet which is submerged in the water of the boiler, and thus protected against injury from fire, and this crown-sheet adds heating-surface to the boiler, and by inclining said sheet, as shown, it becomes prolonged, and the heating-surface is thus increased. The attachment of the back sheet, A″, to the boiler-shell I make by an inward flange on said sheet, lapping onto the boiler-shell and riveted thereto, as shown in Fig. 3 of the drawings. Said back sheet, A″, is thus set at the greatest possible distance from the flue-sheet *e*, and the combustion-chamber C is accordingly enlarged.

In building my improved boiler I unite all the internal parts of the boiler before introducing and attaching them to the boiler-shell—*i. e.*, I connect the fire-box B to the front head, A′, and connect the combustion-chamber C to the back sheet, A″, and the main flue D to the fire-box B and flue-sheet *e*, and the return-flues *a a* to the said flue-sheet and head A′, the head or end sheet, A′, of the boiler being of proper size to fit to its place in the boiler, and flanged outward and perforated in the flanges for the reception of the rivets. I then introduce the before-described internal parts of the boiler into the boiler-shell and rivet the flanged head or end sheets, A′ A″, to the said shell.

By the described construction I greatly facilitate the attachment of the component members of the boiler, and therefore reduce the cost of manufacture.

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

1. The front head, H, and front sheet of the fire-box B, both provided with the fire-door opening I, formed with the widened extension I′ at the bottom of the fire-box, substantially as described and shown.

2. The combination of the boiler-head A′, formed with an inward flange around the fire-door opening, the fire-box head formed with an outward flange around said opening and abutting against the edge of the flange of the head A′, and the band *d*, placed over the joint of said flanges and riveted thereto, substantially as set forth and shown.

3. The boiler-shell of oval or elliptic shape in cross-section, and braces secured to the broad side thereof to stiffen and maintain the same in shape.

4. The combination, with the boiler-shell of oval or elliptic form in cross-section, of arched braces secured vertically to the inner sides of the broad portions of said shell, substantially as described and shown.

5. In a steam-boiler, the combustion-chamber C, formed of the outwardly-flanged flue-sheet *e*, terminating at its top below the water-line of the boiler, the back sheet, A″, provided with the outwardly-flanged opening *f* of smaller circumference than the flue-sheet *e*, and the combustion-chamber shell gradually contracted in circumference and inclined rearward at the top, and riveted to the flanges of said flue-sheet and back sheet, substantially in the manner described and shown.

In testimony whereof I have hereunto signed my name and affixed my seal, in the presence of two attesting witnesses, at Detroit, in the county of Wayne, in the State of Michigan, this 18th day of March, 1886.

GEORGE MARSHALL. [L. S.]

Witnesses:
WILLIAM MAY,
JOHN W. SWEENEY.