

(No Model.)

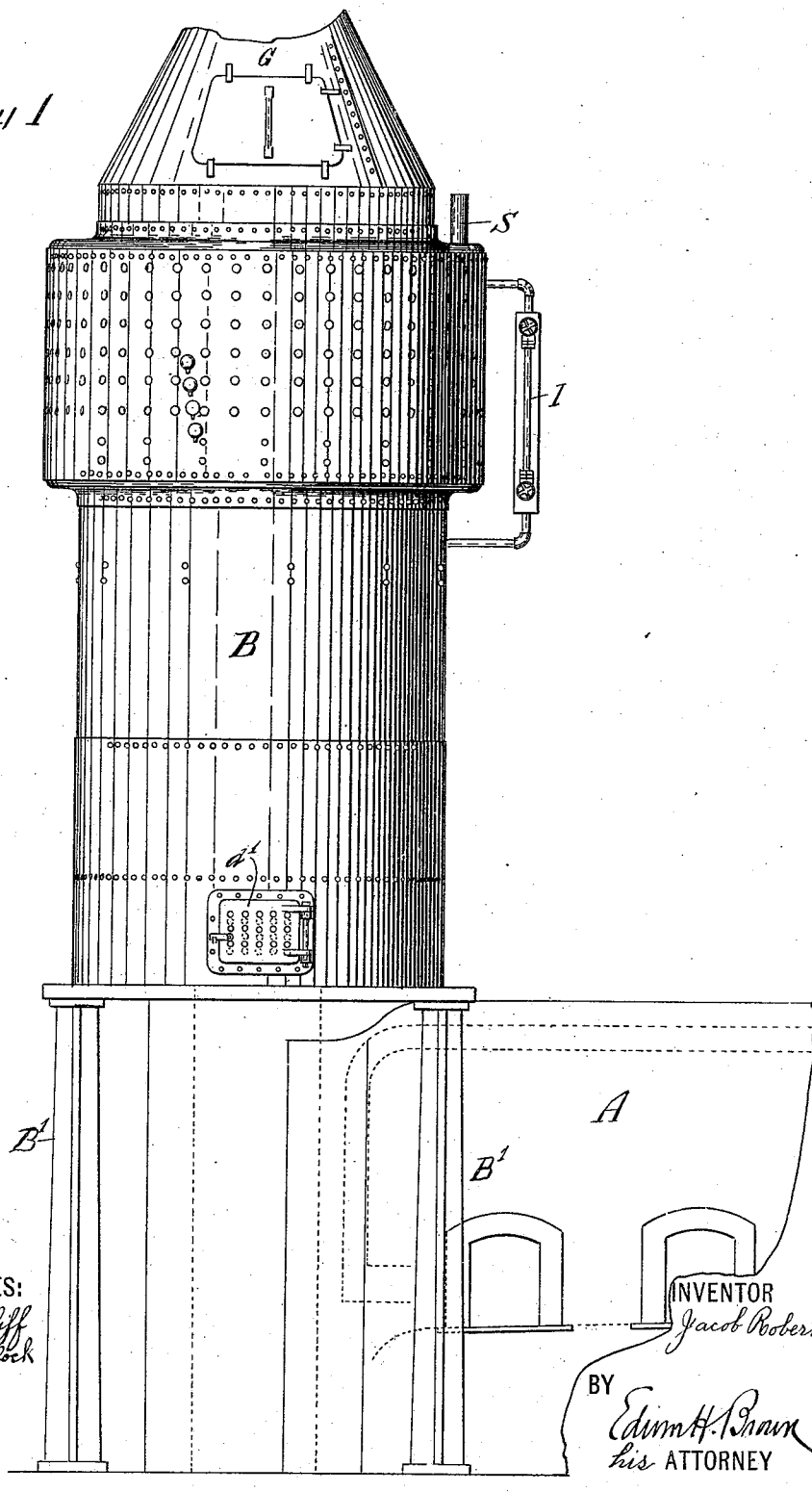
3 Sheets—Sheet 1.

J. ROBERTS.
STEAM GENERATOR.

No. 553,689.

Patented Jan. 28, 1896.

Fig 1



(No Model.)

3 Sheets—Sheet 2.

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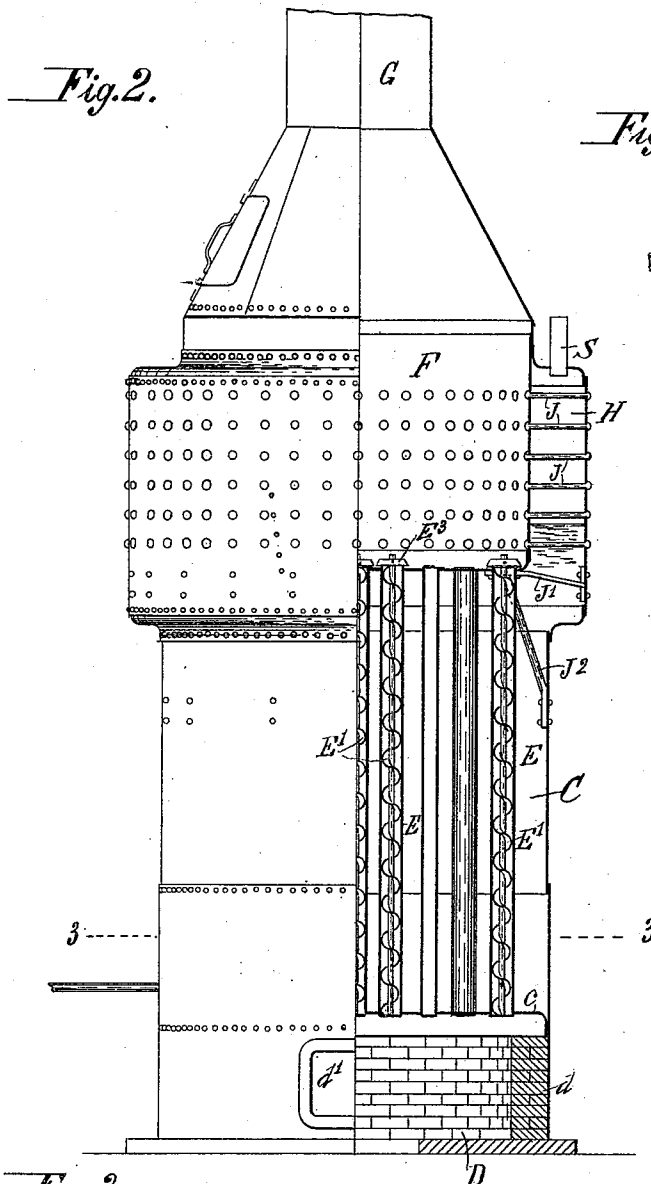


Fig. 4.

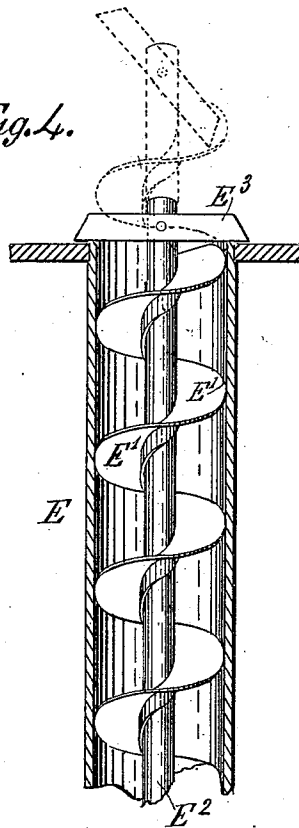
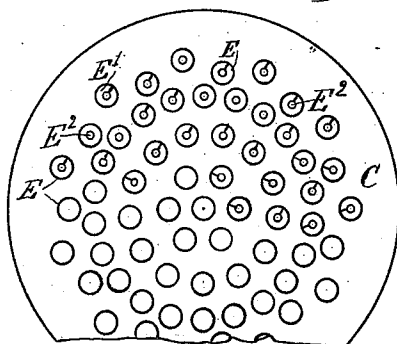


Fig. 3.



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INVENTOR
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his ATTORNEY

(No Model.)

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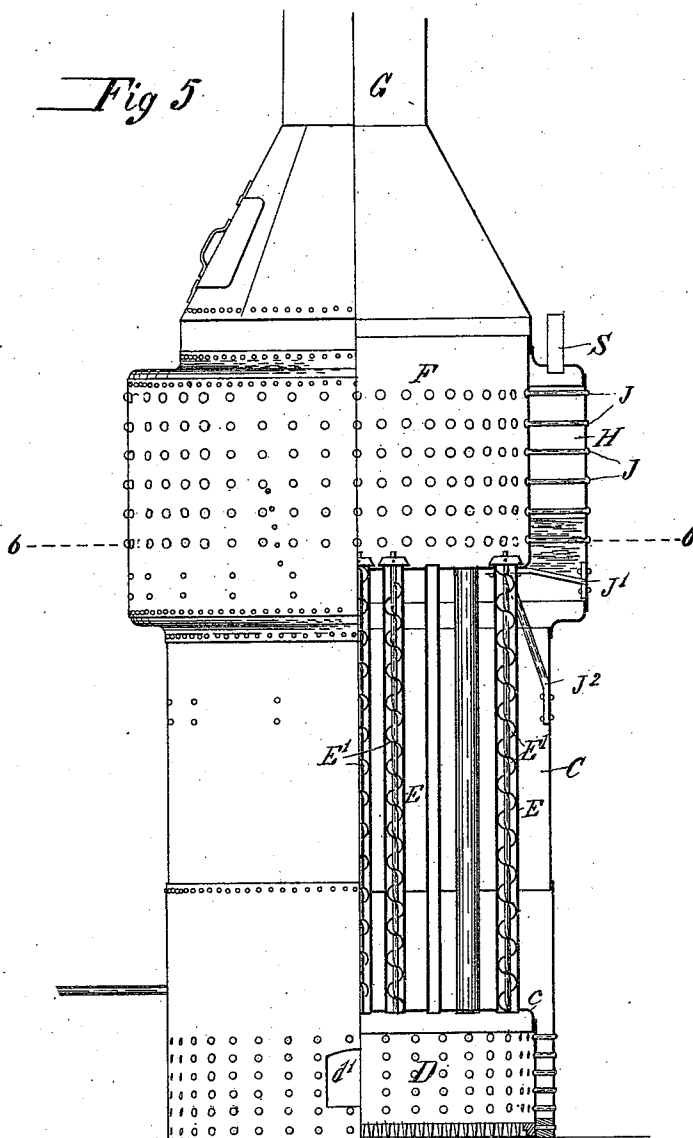
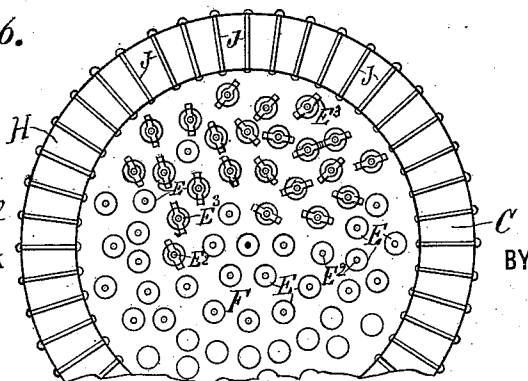


Fig. 6.

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UNITED STATES PATENT OFFICE.

JACOB ROBERTS, OF CATASAUQUA, PENNSYLVANIA.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 553,689, dated January 28, 1896.

Application filed November 25, 1893. Serial No. 492,026. (No model.)

To all whom it may concern:

Be it known that I, JACOB ROBERTS, of Catasauqua, county of Lehigh, and State of Pennsylvania, have invented a certain new and useful Improvement in Steam-Generators, of which the following is a specification.

I will describe a steam-generator embodying my improvement, and then point out the novel features in the claims.

10 In the accompanying drawings, Figure 1 is a side view of a steam-generator embodying my improvement, and also a side view of a puddling-furnace combined therewith. Fig. 2 is partly an elevation and partly a vertical
15 section of the steam-generator. Fig. 3 is a horizontal section on the plane of line 3 3, Fig. 2. Fig. 4 is a central vertical section of a pipe or flue. Fig. 5 is a view like Fig. 2, but it illustrates a modification. Fig. 6 is a horizontal
20 section on the plane of the line 6 6, Fig. 5.

Similar letters of reference designate corresponding parts in all the figures.

25 A designates a puddling-furnace of any approved form.

B designates a steam-generator mounted upon supports B', so as to communicate with the uptake or waste flue of the puddling-furnace.

30 My generator comprises, as shown in Figs. 1, 2, and 3, a water-chamber C, which may be made in cylindric form with a bottom *c*. In this example of my improvement there is an extension D below the water-chamber. This
35 may be of cylindric form and is intended to be lined with fire-bricks *d*. Its purpose is to communicate with the uptake or waste flue of a puddling or other metal-reducing furnace. In this extension is an opening fitted with a
40 door *d'*, composed of two plates, the inner of which may be wrought-iron and the outer be cast-iron, both these plates being perforated, but the perforations being out of line. Thus air for combustion may be freely admitted.
45 This door may be opened for cleaning. It will be seen by reference to Fig. 1 that this extension D communicates with the said uptake or waste flue of the furnace A, so as to receive the waste products of combustion there-
50 from. A suitable door or slide (not shown on the drawings) opens or closes communication between the boiler and the waste-flue.

From the bottom of the water-chamber C a number of pipes or flues E extend upwardly. The waste products of combustion rise
55 through these pipes or flues. The other ends of the pipes or flues E communicate with the chamber F, and this in turn communicates with a waste-flue G, whence the products of combustion escape. The pipes or flues E are
60 fastened at their lower ends to the bottom of the water-chamber and at their upper ends to the bottom of the chamber F, the means employed to secure them being of any suitable kind—as, for example, riveting or expanding.
65

The upper part of the water-chamber C is shown as expanded below the chamber F and around the same. Thus the water-level may be maintained higher than the extremities of the pipes or flues. Above the water-level is
70 a space or chamber H for steam.

S represents a steam-delivery pipe.

I designates a water-gage, which may be of ordinary form, to facilitate the maintaining
75 of the water at the desired level.

The offset portion of the generator-shell; which forms the upper portion of the water-chamber and also forms the steam-generator, is connected by braces J with the chamber F. These braces may consist of long rivets, and
80 are shown as extending horizontally. Obliquely-extending braces J' and J² are also shown as extending between the shell of the generator and the chamber F. These extend
85 at different angles, and they are shown as having plate-like ends, which are fastened by short rivets to the generator-shell and to the chamber F.

The braces which I have described compensate for contraction and expansion, prevent-
90 ing collapsing.

In the pipes or flues E are spirals or spiral flanges E' coiled around a rod or pipe E². These flanges may be made of cast-iron and bolted or otherwise secured to the rods or
95 pipes. Pipes are preferred instead of rods for the parts E². The flanges rest in the pipes or flues, but are not fastened. To the other ends of the rods or pipes E² are pivotally connected cross-bars E³, which while the spirals are in
100 their normal position extend across the bottom of the chamber F and prevent the spirals from descending within the pipes or flues. By rocking the cross-bars, as indicated by

dotted lines in Fig. 4, the spirals may be raised for the purpose of cleaning the pipes or flues. The dome-shaped upper portion of the chamber F and the central location of the waste-flue G enable the spirals to be lifted upwardly for a considerable distance.

The products of combustion ascend through the pipes or flues E, thereby heating the water within the water-chamber. As the water is maintained at a higher level than these pipes or flues, the latter will be protected at their upper ends as well as at their lower ends, and hence will not be liable to become loosened. The products of combustion on escaping from the pipes or flues fill the chamber F and thereby superheat the steam in the chamber H. Ordinarily they pass off through the waste-flue G. Air being admitted through the door *d'*, the products of combustion are fully combined with oxygen, so that nothing shall be wasted.

In Figs. 5 and 6 I have shown the extension D as made in the form of a water-leg and not lined with fire-brick but fitted with a grate, or, in other words, constructed so as to constitute a furnace for supplying the heat necessary for generating and superheating steam.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a steam generator, a vertical cylindrical shell, an upper and a lower chamber within said shell, the said upper chamber having an

uninterrupted upward opening into a waste flue, flues connecting the two, an enlargement around the upper chamber, brick work in the lower chamber for retaining and radiating heat, one opening in said lower chamber for communication to the waste flue of a reheating furnace, and a second opening provided with a double door consisting of two plates whose entire areas are perforated with holes, these holes being out of line with each other, substantially as set forth.

2. In a steam generator, a vertical cylindrical shell, an upper and a lower chamber within said shell, a furnace in the lower chamber, flues connecting the upper and the lower chamber, brick work in the lower chamber for retaining and radiating heat, one opening in lower chamber for communication to the waste flue of a reheating furnace, and a second opening provided with a double door consisting of two plates whose entire areas are perforated with holes, these holes being out of line with each other, substantially as set forth.

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

JACOB ROBERTS.

Witnesses:

EDWIN H. BROWN,
ANTHONY GREF.