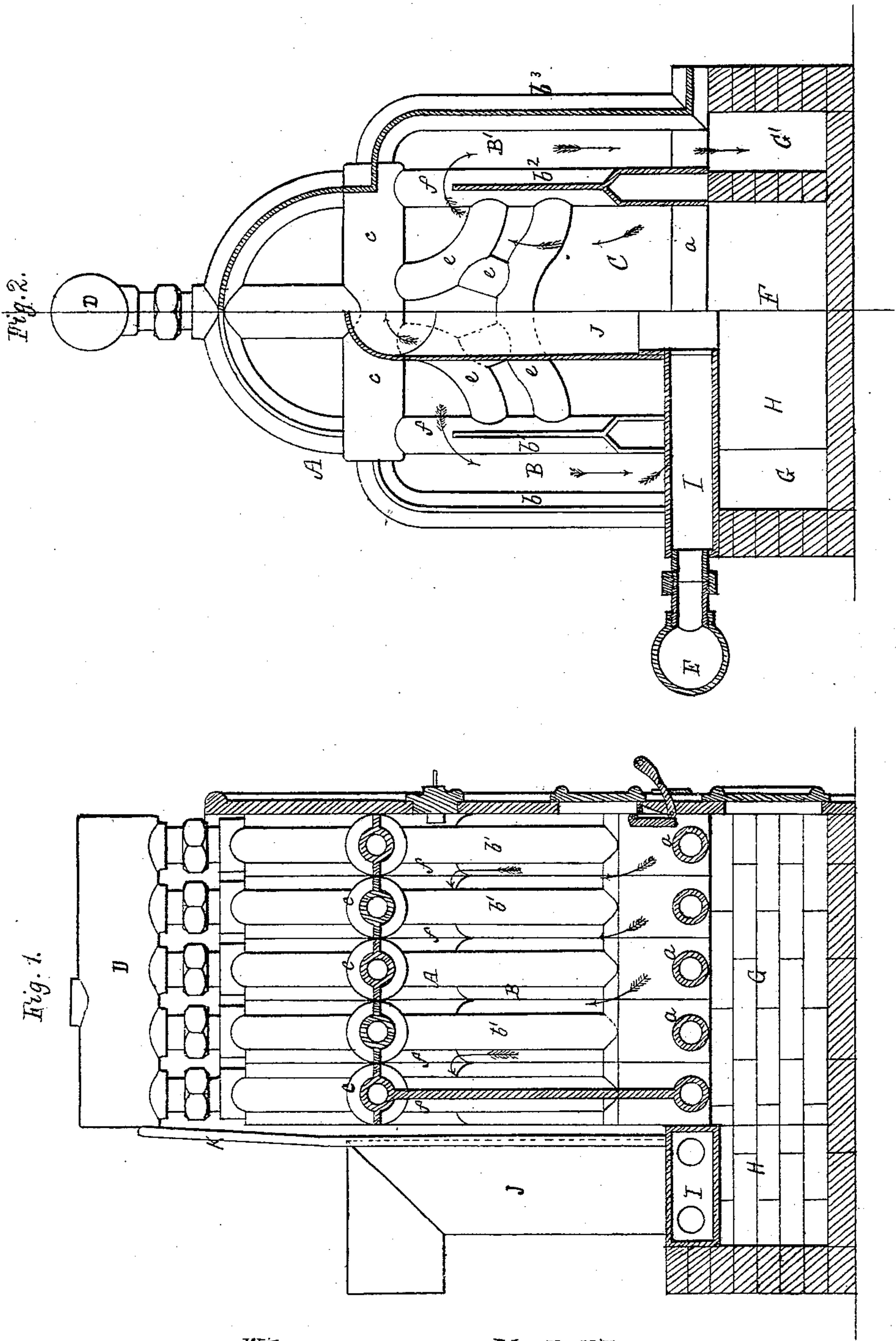


J. H. MILLS.
Steam-Generators.

No. 148,736.

Patented March 17, 1874.



Witnesses,
J. S. Hubbard
W. E. Boardman.

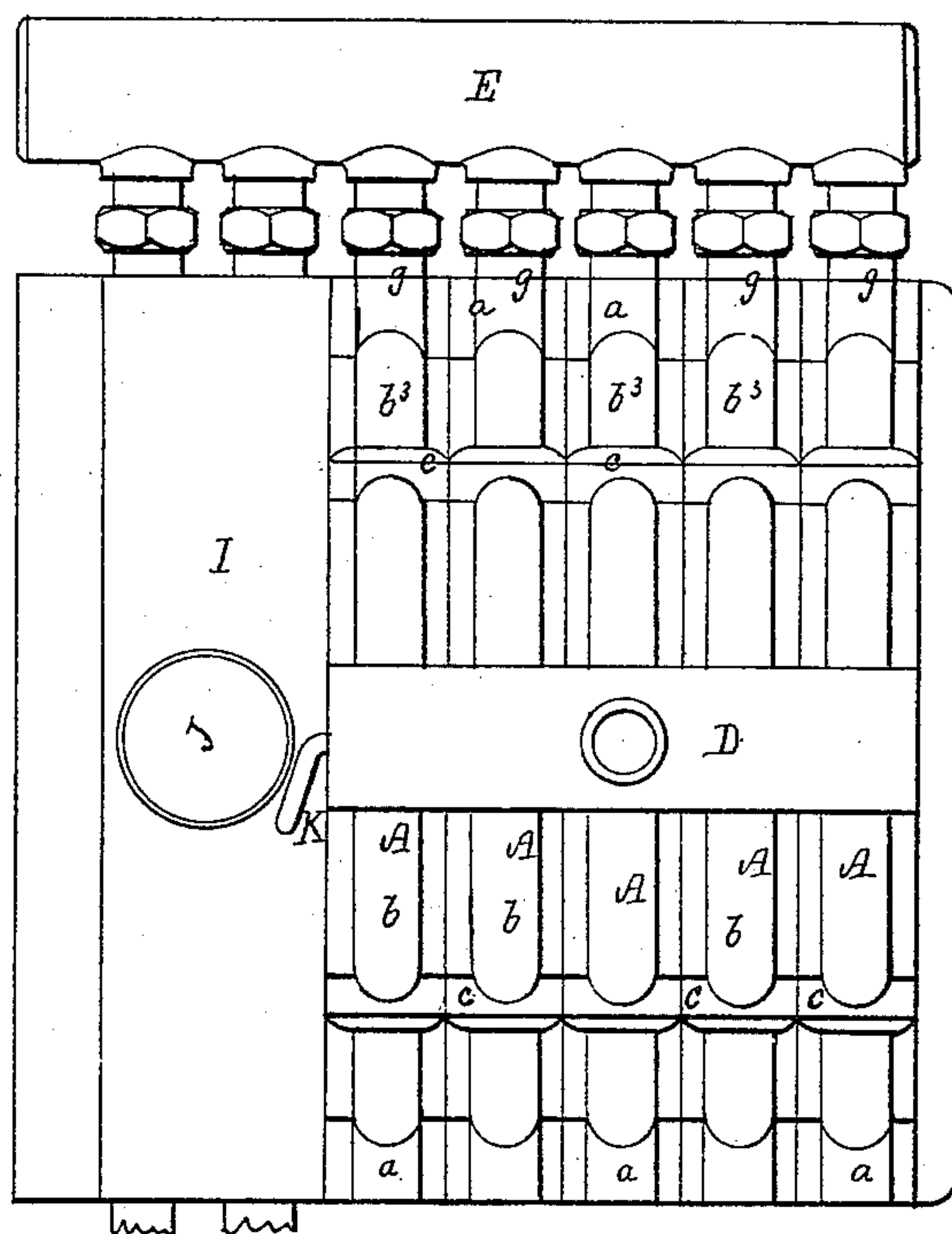
John H. Mills.
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Fig. 3.



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JOHN H. MILLS, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN STEAM-GENERATORS.

Specification forming part of Letters Patent No. 148,736, dated March 17, 1874; application filed September 15, 1873.

To all whom it may concern:

Be it known that I, JOHN H. MILLS, of Boston, Suffolk county, Massachusetts, have invented certain Improvements in Steam-Generators, of which the following is a specification:

The object of this invention is to obtain in steam-generators a more perfect combustion of the fuel and its gases and smoke, and to obtain a large amount of active heat-absorbing surface, as well as to retain the heat within the generator or about its flues until it is nearly absorbed by them. Another object of this invention is to avoid accumulation of deposits on or about the tubes, or in the flues.

Heretofore, in the construction of steam-generators, it has been the custom to conduct the heat, smoke, and gases from the furnace upward about the flues or tubes, and discharging them into the smoke-flue immediately from contact with or after leaving the highly-heated portions of the generator, thus wasting a large amount of valuable heat.

My present invention may be said to be, in some respects, an improvement upon a steam-generator shown and described in Letters Patent of the United States numbered 121,395, and issued to me on the 28th day of November, 1871, although this invention possesses certain peculiarities of construction which entitle it to original claims. As in my patent last named, I employ in this generator a series of iron sections, cast of one homogeneous piece of metal, and containing in itself an entire generator, a number of these sections being placed side by side together for convenience of heating, and conducting their steam to a suitable receiver or drum. In my patented generator the heat and gases passed laterally on each side, between the inner and outer side legs of the generator, into chambers formed by such legs, thence horizontally throughout the length of the generator, and turning upward return to the front, and again upward and rearward before making their exit into the chimney. In lieu of this mode of circulation I close communication between the lower part of the furnace and of the side chambers by casting ribs on the legs, but leave spaces between them near the crown-pipe, thus leaving passages whereby heat and gases from the furnace may, after ascending, pass between the legs and enter

the side chambers; thence pass downward in contact with the lower limbs or cross water-pipes of each section, and warm the cool entering water therein, and finally descend still lower into flues formed below such water-pipes, encountering in their passage to the chimney a heating tank or reservoir for heating the return or feed water before it enters the boiler.

In the drawings accompanying this specification, Figure 1 represents a vertical section of a steam-generator embodying my present improvements, taken through the side chambers or passages to be explained. Fig. 2 is a vertical cross-section taken between two adjacent single sections. Fig. 3 is a plan of the generator.

In these drawings, A A, &c., represent a series of cast-metal iron tubular boxes or sections, of a shape shown in Fig. 2 of the drawings, such sections being composed briefly of a bottom horizontal water-pipe, *a*, two side upright legs, *b b*¹ or *b*² *b*³, a horizontal pipe, *c*, entering the top of the side legs, a crown or arch, *d*, surmounting and making part of the pipe *c*, and a series or group of intermediate pipes, *e*, &c., which constitute a large heat-absorbing surface, the space between the side legs *b b*¹ or *b*² *b*³ constituting chambers B or B', for reception and passage of heat, smoke, and gases, while the central portion C, between the inner legs *b*¹ *b*², constitutes the fire place or box. A number of the sections A A, corresponding to the desired capacity of the generator, are placed side by side, and abutted closely together throughout, except a small space or passage, *f*, between each, on both sides, at the upper part of the chambers B B', and between the horizontal lower water-pipes *a*, the latter pipes constituting the grate of the furnace. Each water-pipe *a* is supplied individually with water at one end, as shown at *g*, and each section generates its own steam, and discharges it into a common receiver or drum, D, without regard to its neighbor, the pipes *a* being for convenience all supplied from a main pipe, E, which connects them all. Below the series of sections A A, &c., I create, by suitable masonry or otherwise, a central chamber, F, which constitutes the ash-pit, and on each side of this ash-pit a passage or flue, G and G', which extends from the front

box or section A to some distance beyond the rearmost section, as shown in Fig. 1 of the drawings, the said flues having free communication with each other at rear by a cross-flue, H. The entire series of sections A should be inclosed in walls of masonry, and the rear or cross portion H of the flues G is covered by a cast iron box or reservoir, I, into which the return or feed water enters before it passes to the conduit E, which supplies the generators A, smoke-flue J of the furnace passing upward centrally through the heater, as shown in the drawings. Heat, smoke, and gases from the furnace rise and act directly upon the inner legs $b^1 b^2$, upper pipes c , and cluster of pipes ee , &c., of each section A; thence pass through the ports or passages f , &c., between the legs $b^1 b^2$, and enter the chambers B B', and fill the same; thence descend between the water-grate pipes a , into the flues G G', and pass rearward below the heating-tank I, and upward into and through the smoke-flue J into the chimney. The flues G G' are heated to a considerable extent by the ash-pit F, and for this reason the draft through them is much greater than would be the case were the temperature within them low. Furthermore, all sediment is deposited upon the bottom of the flues G G', and does not collect about the heating portions of the generator.

It will thus be seen that I compel the heat and gases to remain a long time in contact with the various parts of each section, which absorbs the greater part of the heat, the remaining heat, to a great extent, being absorbed by the heater I, and the water within it. I thus utilize much heat which otherwise would

escape into the chimney, and I compel this heat to greatly raise the temperature within the heater I. The position of the heater I is not an arbitrary one, as it may be situated within any convenient part of the flues G G' or H, or it may be placed outside of the generator altogether, and connected in a suitable manner to such flues. The heater should be provided with a suitable pipe, K, leading to the steam-dome or receiver D, in order to allow of escape of steam should any be generated within it.

I claim—

1. The sections or individual generators A, constructed and arranged substantially as described, to form the flues f and side chambers B B', through which flues the products of combustion from the fire-box or furnace C will, after rising to the crown-pipes c , pass into said side chambers, substantially as shown and described.

2. The combination with the sections A, constructed as described, of the flues G G', into which the products of combustion from the side chambers B B' of the sections are caused to descend, and, after circulating about the lower water-pipes a , to pass rearward before entering the chimney, substantially as shown and set forth.

3. The flues G G', arranged, in relation to the fire-place F and lower water-pipes a of the sections A, as and for the purposes shown and described.

JOHN H. MILLS.

Witnesses:

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