

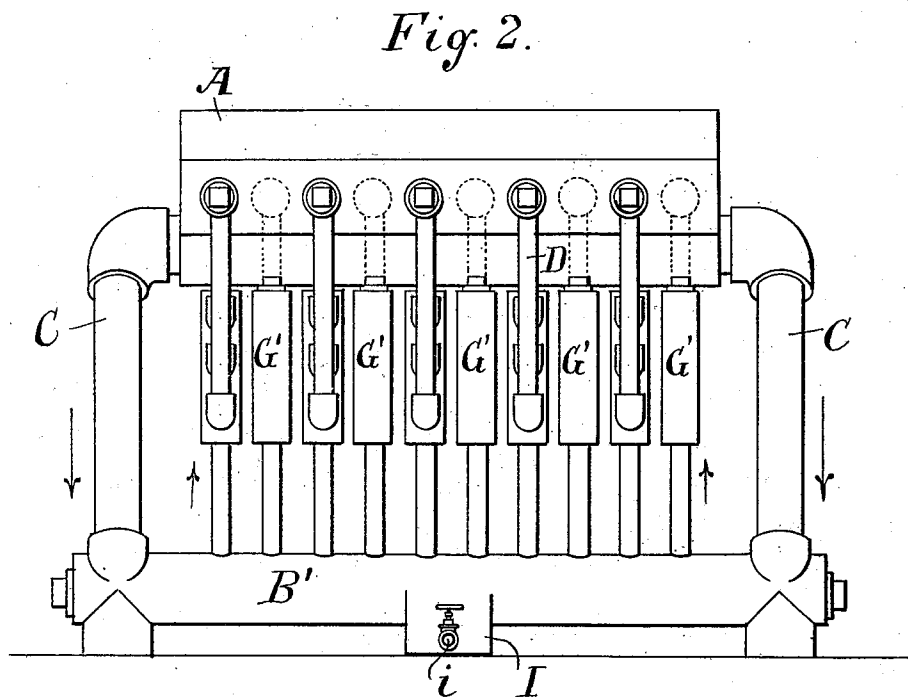
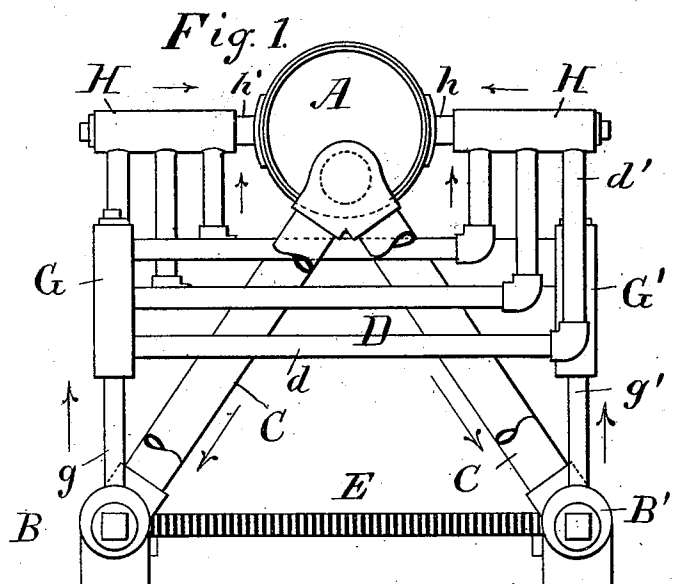
(No Model.)

2 Sheets—Sheet 1.

E. E. ROBERTS.
STEAM GENERATOR.

No. 507,505.

Patented Oct. 24, 1893.



Witnesses
Chas. Hanemann
H. Marler

Inventor
Edward E. Roberts
By his Attorney
Chas. W. Forbes

(No Model.)

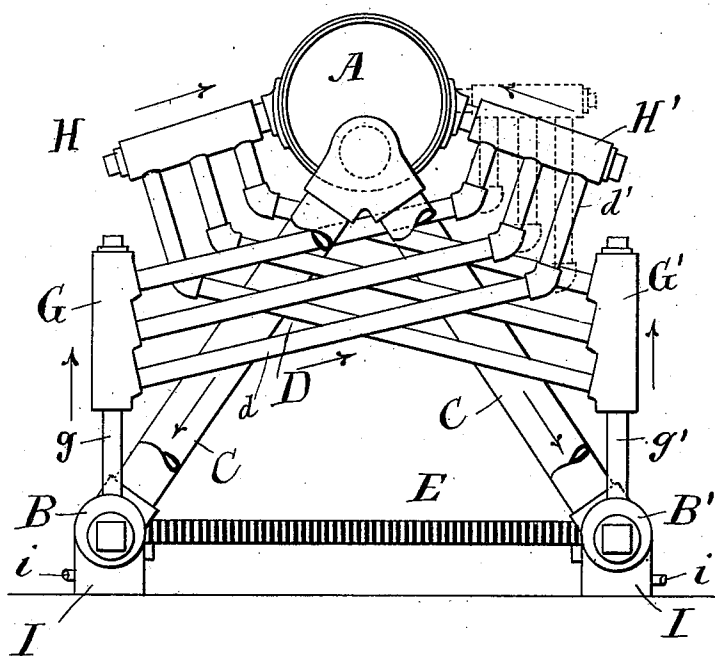
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Fig. 3.



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UNITED STATES PATENT OFFICE.

EDWARD E. ROBERTS, OF RED BANK, NEW JERSEY, ASSIGNOR TO THE
ROBERTS SAFETY WATER TUBE BOILER COMPANY, OF SAME PLACE.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 507,505, dated October 24, 1893.

Application filed January 4, 1892. Renewed May 27, 1893. Serial No. 475,797. (No model.)

To all whom it may concern:

Be it known that I, EDWARD E. ROBERTS, residing at Red Bank, county of Monmouth, and State of New Jersey, have invented certain new and useful Improvements in Steam-Generators, of which the following is a specification.

This invention relates generally to steam generators, and more particularly to an improvement on that form of boiler set forth and shown in Letters Patent No. 371,710, granted to me October 18, 1887.

The object of the present improvements is to provide an efficient and comparatively inexpensive generator, and in which the various parts may be readily renewed should occasion require.

To this end, it consists in the novel structure hereinafter fully set forth.

The accompanying drawings illustrate so much of a boiler as is necessary to a perfect understanding of the invention; in which drawings—

Figure 1 is a sectional elevation; Fig. 2, a side view. Fig. 3, is a diagram of a modified form.

The generator embodying the improvements consists of a steam and water drum A, two lower water drums B, B', down flow pipes C, connecting the steam and water drum with each of the lower water drums, and a series of sets of transversely arranged return tubes D, connecting the lower water drums B, B', with the steam and water drum A. The steam and water drum may be of the usual form, arranged horizontally of the generator over the grate E, from the two opposite ends of which drum and at a point at or near its bottom there leads the down flow pipes C, extending to and connecting with the lower water drums B, B', arranged upon opposite sides of the grate, whereby each end of the upper drum is connected with each end of the two lower drums, as in my said patent. The down flow pipes may be arranged in any suitable manner and may extend by right angular connections or by the direct inclined connections shown.

The sets of return tubes D extend transversely across and above the grate E, and

lead from a vertical header G, and thence into a horizontal or substantially horizontal header H. The vertical header G is in connection by a short pipe *g*, with the lower drum B, while the longitudinal header H is connected directly with the side of the steam and water drum A. A similar set of return tubes extends in a like manner, but in an opposite direction from a vertical header G', connected by a short pipe *g'* with the lower water drum B', and thence into a substantially horizontal header H', connected directly with the side of the drum A, opposite the like header H. The two ends of the short pipes *g* and *g'* will be right and left screw threaded, so as to facilitate the removal of the headers and the connected sets of tubes. There will be a number of sets of these return tubes D, depending upon the length of the generator, the sets extending transversely to the right alternating with those extending to the left. Each of the horizontal headers H and H' instead of being secured directly to the water drum may have interposed short pipes *h* and *h'* which have right and left screw threaded ends to permit the ready removal of the headers with the connected sets of tubes, by which and the pipes *g*, *g'*, any pair of headers and their set of tubes may be removed from the boiler without dismantling it.

Each of the sets of return tubes D consist of the horizontal or substantially horizontal portions *d*, and the substantially vertical portions *d'*.

From the foregoing it will be understood that a constant circulation of water is kept up from and back into the steam and water drum. Thus the flow will be from both ends of the drum A down the down flow pipes C into the opposite ends of each of the lower drums B, B', and thence by the vertical headers G, G', sets of return tubes D and horizontal headers H, H', back into said drum A.

The precise arrangement of the headers and their connecting tubes thus far described may be modified somewhat by inclining the headers H, H', and similarly inclining the sets of tubes D, as shown in Fig. 3, without departing from the spirit of the invention. The

headers H, H', may be horizontal, with the vertical portions d' vertical instead of inclined as in dotted lines.

5 The joints between the headers H, H', and the connecting pipes and the drum A, and between the sets of tubes and the headers may obviously be screw or expanded joints, according as may be deemed best. The mid
10 portion of each of the lower drums B, B' may have in addition to or in lieu of the usual end pockets a sediment pocket I, with a blow off valve i , for the collection or removal of any impurities that may collect in the boiler.

What is claimed is—

15 1. In a steam generator, the combination with the steam and water drum, the two lower drums and the connecting downflow pipes, of a series of alternating sets of return tubes each set connected at one end to a vertical
20 header in communication with one of the lower

drums and the opposite end with a substantially horizontal header in turn connected with the steam and water drum, substantially as described.

2. In a steam generator, the combination 25 with the steam and water drum, the lower water drums and the connecting down flow pipes, of a series of alternating sets of return tubes consisting of horizontal and vertical portions, vertical headers in communica- 30 tion with the lower water drums with which the horizontal portions connect, and horizontal headers in communication with the steam and water drum with which the vertical portions of said sets of tubes connect, 35 substantially as described.

EDWARD E. ROBERTS.

Witnesses:

GEO. H. GRAHAM,
N. MARLER.