(No Model.)

J. A. ENO.

STEAM GENERATOR.

No. 384,898. Patented June 19, 1888.

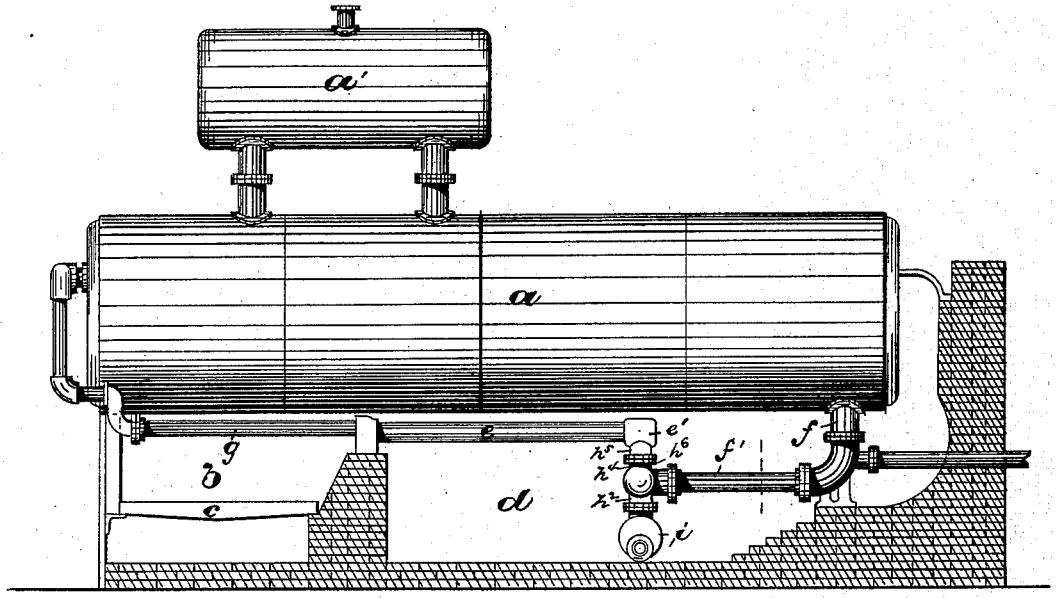

Fig. 1.

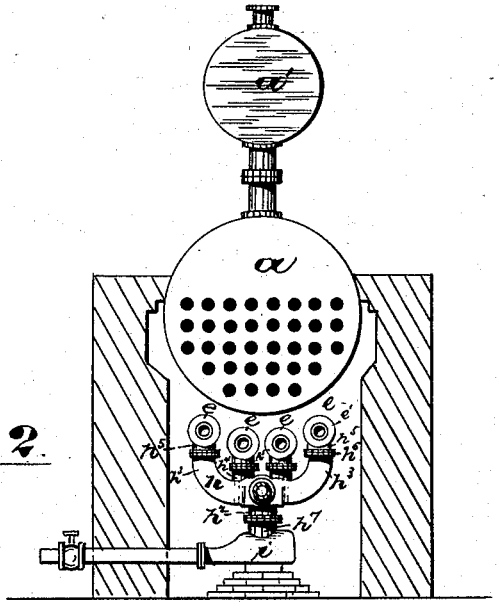

Fig. 2.

WITNESSES:

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UNITED STATES PATENT OFFICE.

JOSEPH A. ENO, OF NEWARK, NEW JERSEY, ASSIGNOR TO THE ENO STEAM GENERATOR COMPANY, OF SAME PLACE.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 384,898, dated June 19, 1888.

Application filed February 7, 1888. Serial No. 263,271. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH A. ENO, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Steam-Generators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

This invention relates more especially to certain improvements in that class of steam-generators illustrated by me in Patent No. 344,522, granted June 29, 1886, the object being to facilitate the gravitation of sediment in the mud-drum of such generators, and to thus secure a more perfect freedom from deposit on the walls or surfaces of the generator.

The invention consists in the improved steam-generator having the arrangements and combinations of parts substantially as will be hereinafter set forth, and finally embodied in the clauses of the claim.

Referring to the accompanying drawings, in which like letters of reference indicate corresponding parts in each of the several figures, Figure 1 is a side elevation of the improved generator, and Fig. 2 is a rear view of the same.

In said drawings, *a* indicates a boiler of any ordinary construction, and *a'* a steam-dome thereof. *b* indicates the fire-chamber formed over the grate *c*. *d* indicates a heat-chamber, through which the heat passes before entering the rear end of the boiler. *e e e* indicate a series of pipes disposed in the heat-chamber, through which pipes the water courses in its passage from one end of the water-chamber of the boiler to the other, the said series of pipes being supplied with water from the boiler through a supply-pipe, *f*, Fig. 1, from whence it passes to the series of pipes *e e e*, and is heated in said pipes and delivered again to the boiler through the pipe or pipes *g* at the opposite end of the boiler.

At the rear end of the series of pipes *e* the same are connected by a branch pipe, *h*, which joins the several pipes of the series, as shown more clearly in Fig. 2, and causes the water passing from the pipes *f f'* to be delivered to each of the series of generating-pipes *e*.

i indicates a mud-drum adapted to receive the sediment by gravitation as the latter is carried by the water through the generating-pipes over the passage h^2 to said drum. In the prior patent above referred to, the said mud-drum was disposed immediately beneath the pipe *f*, leading downward from the bottom of the boiler. In the improved construction the said drum is disposed at a point beneath the rear end of the pipes *e*, or beneath the branch pipe *h* connecting the same. At this point, it may be observed, the water as it courses through the pipes *f*, *f'*, and *h* is caused to pass upward against gravity into the pipes *e*, through vertical pipes h^3, h^4, and h^5, which connect the branch with the said pipes *e*. The sediment-pipe h^2, which connects the branch pipe with the mud-drum *i*, being in a vertical line with the pipes receiving the upward flow of water, receives the sediment, which is heavier than the water, with more certainty than if the said drum were placed as in my prior arrangement, where the water simply makes a downward and lateral course, it being more difficult, as will be evident, to cause the sediment to rise in a vertical direction than to make a simple downward and horizontal course through the pipes.

By the improved arrangement the sediment is more certainly caught at each circulation of the water, and thus the steam-generating surfaces of the boiler are kept more perfectly free or clear of incrustation.

The peculiar formation of the branch *h* shown in Fig. 2 also facilitates the clearing of the pipes and reduces the resistance or friction in the pipes, such as would be produced were the said branch of a cylindrical form, as in my prior device, and the water caused to turn very sharp angles. The said branch pipe *h*, it may be observed, is an integral casting, with upwardly-turned extremities h^3 h^3, which are flanged, as at h^6, and are thus adapted to be bolted to the downwardly-extending pipes h^5 of the rear head, *e'*, of the pipes *e*. The said branch is also provided with integral inter-

mediate branches, h^4, to couple with the center of the series of pipes *e*. At the lower part of the branch the same is also provided with the downwardly-extending portions h^2, which are also flanged to be coupled with a portion, h^7, of the mud-drum *i*.

The peculiar construction of the pipes which connect the mud-drum *i*, generating-pipes *e*, and the supply-pipes *f f'* are also of an advantage in securing a series of durable joints or connections which will not be affected by the expansion and contraction of the parts, and by means of the flanges the parts can be readily disconnected.

Having thus described the invention, what I claim as new is—

1. In a steam-generator, the combination, with a boiler, *a*, circulating-pipes *f f'*, a series of generating-pipes, *e*, a branch pipe, *h*, and vertical connecting-pipes, of a mud-drum having the inlet-pipe thereof disposed beneath the said branch, substantially as set forth.

2. In a steam-generator, the combination, with the boiler and a series or collection of circulating-pipes disposed horizontally beneath the boiler and having a vertical course or turn, as at h^3 h^4 h^5, in their length, and a mud-drum or sediment-receptacle, *i*, disposed beneath the said vertical course or turn in said circulating-pipes, substantially as and for the purposes set forth.

3. In combination, a steam-generator with a series of generating-pipes, *e*, a branch, *h*, and a mud-drum directly connected with said branch and receiving the sediment therefrom, substantially as and for the purposes set forth.

4. The combination, in a steam-generator, with a series of pipes, *e*, a mud-drum, *i*, and circulating-pipes *f f'*, of a branch, *h*, having upwardly-turned extremities h^3 and intermediate pipes, h^4, and a downwardly-extending pipe, h^2, all formed integral with said branch and providing means for coupling with the said pipes, and a mud-drum, substantially as and for the purposes set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 1st day of February, 1888.

JOSEPH A. ENO.

Witnesses:
CHARLES H. PELL,
OSCAR A. MICHEL.