

(No Model.)

J. A. ENO.
STEAM GENERATOR.

No. 461,498.

Patented Oct. 20, 1891.

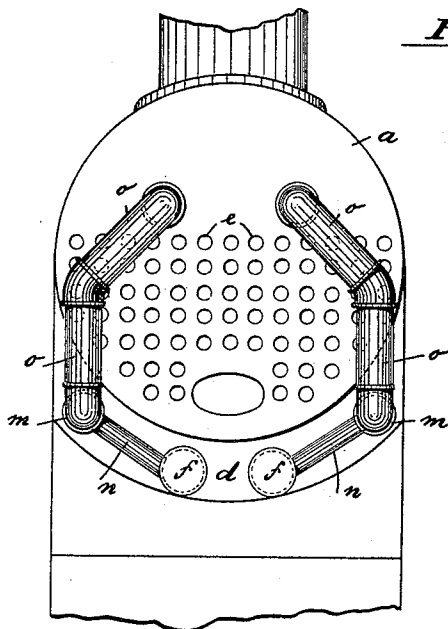
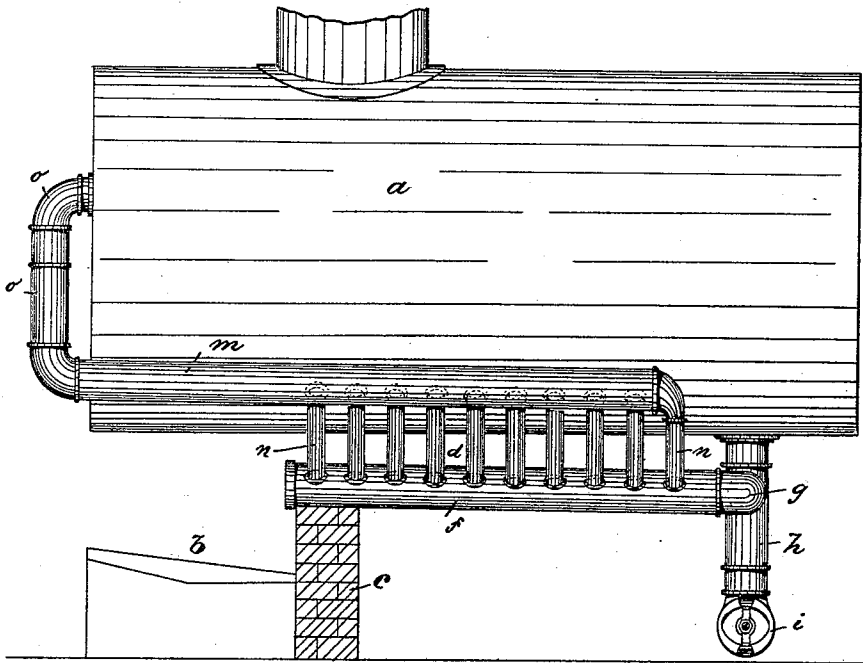


Fig. 1.

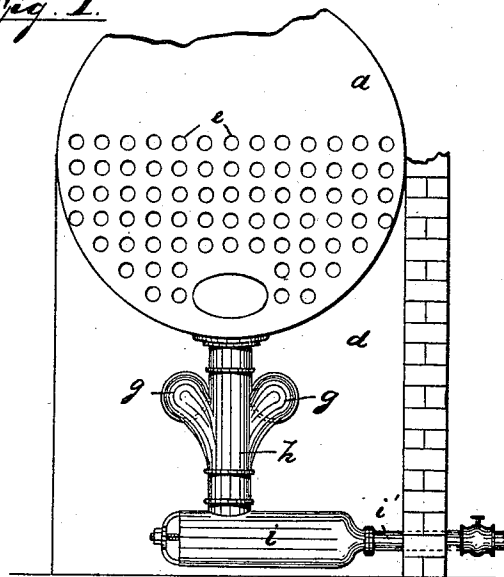


Fig. 2.

Fig. 3.

WITNESSES:

Wm. D. Bell.
E. L. Sherman

INVENTOR:

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BY
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UNITED STATES PATENT OFFICE.

JOSEPH A. ENO, OF NEWARK, NEW JERSEY.

STEAM-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 461,498, dated October 20, 1891.

Application filed January 27, 1891. Serial No. 379,233. (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, Essex county, 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 to steam-generators for boilers; and the object of the invention is to provide an improved and more economical generating and circulating device for boilers readily attached or removed from the boiler for repairs, replacement, or for other purposes. Its object is also to secure a complete and positive circulation of water in and through the boiler to prevent the formation and collection of sediment or foreign deposits therein, to facilitate and hasten the generation of steam, and also to secure other specific and useful results, as will be hereinafter set forth.

The invention consists in the improved steam-generating device for boilers, and the combination of the various parts thereof, substantially as hereinafter described.

It also consists in the novel and peculiar arrangement of the main circulating-pipes at the rear of the furnace or fire-box and within the combustion-chamber.

It also consists in the simple mode of attaching the generator to a boiler, and the facility of removing the same for purposes of repair, replacement, or other purposes.

It also consists in the employment of a single-pipe connection between the generating device and the supply-pipe, mud-drum, and blow-off pipe.

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 a boiler with my improved generator attached, the front plate being removed. Fig. 2 is a front elevation of Fig. 1, showing the arrangement and location of all of the generating-pipes under the boiler and their connections with the boiler; and Fig. 3 is a rear elevation of the

boiler, showing the connection of the generator with the supply-pipe and mud-drum.

In said drawings, *a* indicates the body of the boiler, which may be of any type of boilers wherein the fire-box or furnace is directly under a portion of the body of the boiler. A furnace or fire-box *b* extends backward from the front of the boiler to a bridge-wall *c*. Above this bridge-wall and in the rear thereof is a combustion-chamber *d*, connecting with the fire-tubes *e* within the boiler. Under the boiler and at the rear of the fire-box and within the combustion-chamber are arranged my improved circulating-pipes, consisting of main feed-pipes *f f*, extending longitudinally from the front of the bridge-wall rearward to near the rear end of the boiler, where they connect by a Y-attachment *g* with a pipe *h*, leading from the bottom of the boiler to a mud-drum *i*, connected by pipe *j* with blow-off cock *k*, thus establishing a connection between the water-chamber of the boiler and the generating and circulating pipes *f f*. Above and at one side of the pipes *f* and under the body of the boiler are arranged other circulating-pipes *m m*, connected with the pipes *f* by a series of smaller generating-pipes *n n*, preferably curved to correspond with the curvature of the boiler, or they may be made straight, if desired. The forward ends of the pipes *m m* connect with upwardly and inwardly extending pipes *o o*, which convey the heated water to the upper part of the boiler and at or about the water-line, the pipes *o o* being provided with joints and connections, which allow of detachment from the boiler.

By my improved construction, should it become necessary to remove the generating device for repairs, replacement, or any other purpose, it is only necessary to disconnect the pipes *f* at their junction with the pipe *h* and the pipes *o o* at their connection with the boiler, and then the complete generator can be easily withdrawn.

In operation, when a fire is started under the boiler, the heat and the flame as they pass into the combustion-chamber are both impinged directly upon the pipes *f*, *m*, and *n*, and on account of the great surface presented by these pipes to the heat the water in these pipes is quickly heated and partly converted

into steam, and its movement is thus accelerated. The hot water and steam is then forced through the pipes *o o* into the boiler and over the surface of the water. The water
5 thus driven from the pipes *f* is replaced by the cooler water from the bottom of the boiler through the pipe *g*. In this manner a continuous and increased circulation of hot water and steam is maintained and the temperature
10 of the water in the boiler is rendered more uniform and unequal expansion greatly reduced.

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

The improved generating and circulating device for boilers, combining therein a series of lower longitudinal pipes arranged in the

combustion - chamber, upper longitudinal series of pipes, a series of connecting-pipes, 20 connecting the first two series together, a return pipe connected with said upper series of pipes and adapted to convey the water into the boiler, a supply-pipe connected with the bottom of the boiler, a Y attachment to said
25 supply-pipe and connecting the lower series of generating-pipes with the supply-pipe, all said parts being arranged and adapted to operate substantially as set forth.

In testimony that I claim the foregoing I
30 have hereunto set my hand this 20th day of January, 1891.

JOSEPH A. ENO.

Witnesses:

E. L. SHERMAN,
WM. D. BELL.