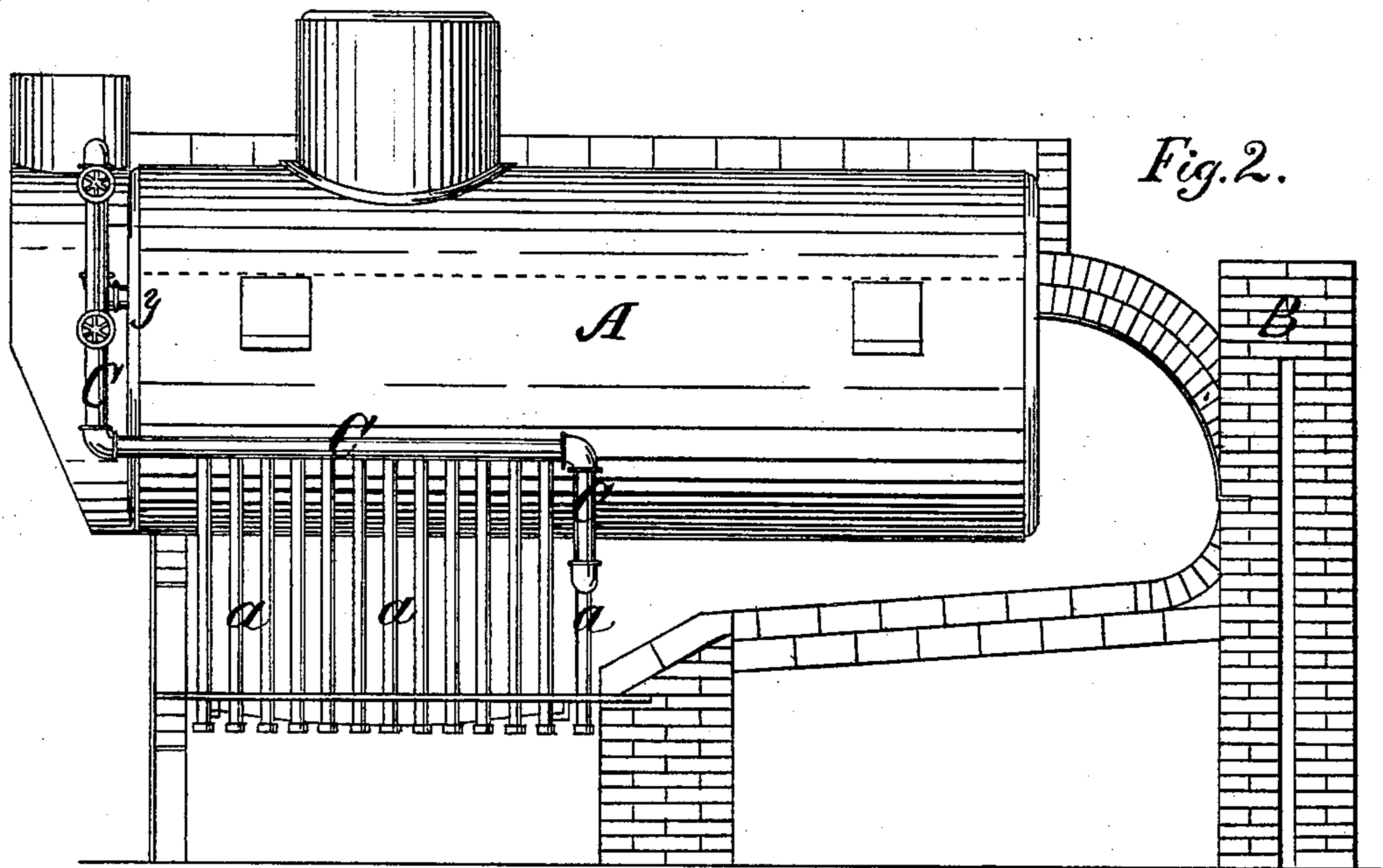
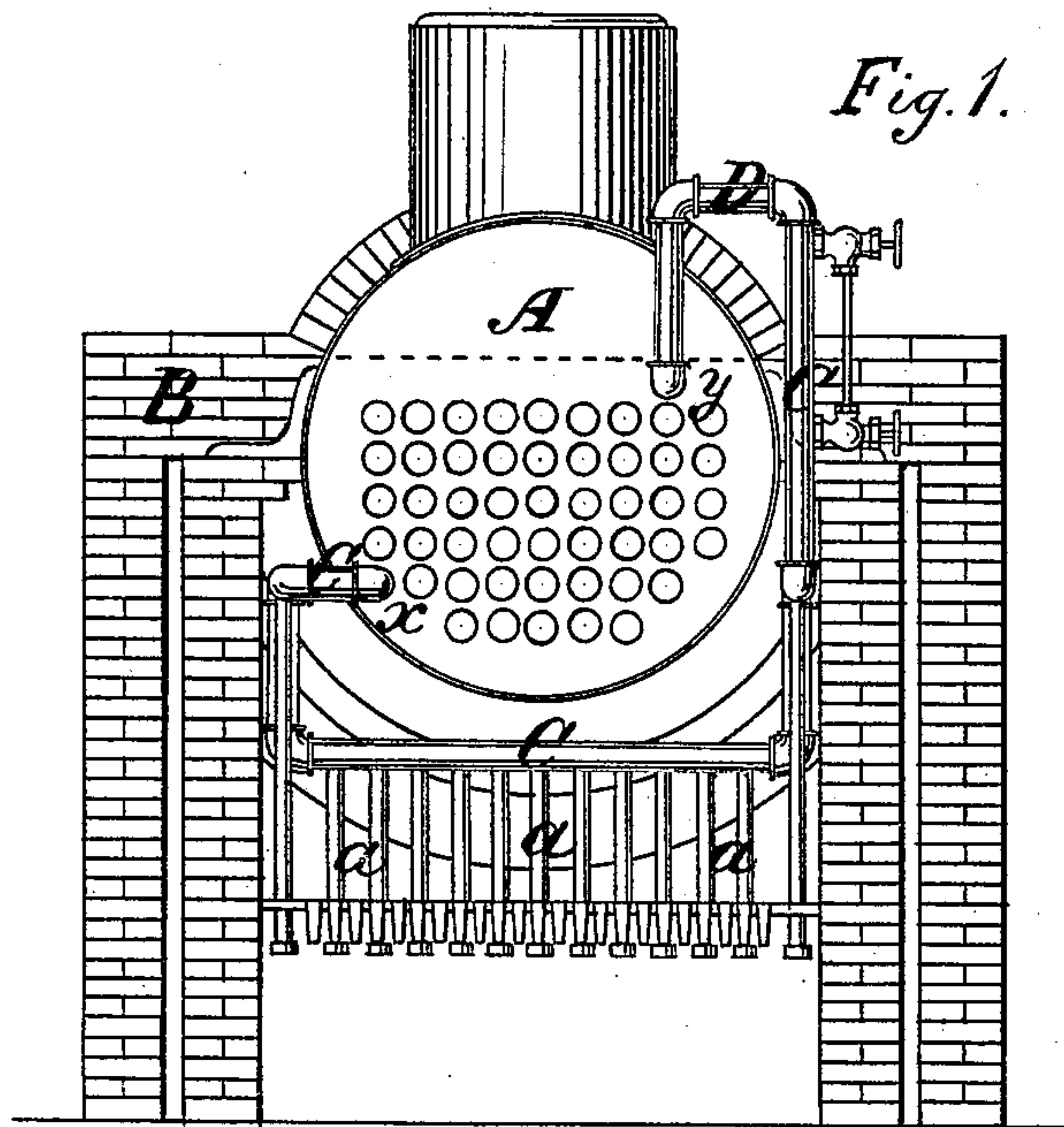


E. G. GOOD.
 Steam Generating and Heating Device for Boilers.
 No. 207,732. Patented Sept. 3, 1878.



Witnesses
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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN STEAM-GENERATING AND HEATING DEVICES FOR BOILERS.

Specification forming part of Letters Patent No. **207,732**, dated September 3, 1878; application filed June 25, 1878.

To all whom it may concern:

Be it known that I, EDWARD G. GOOD, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Steam-Generating and Heating Devices for Steam-Boilers, of which I hereby declare the following to be a full, clear, and exact description, which will enable others skilled in the art to which my invention appertains to construct, apply, and use the same, reference being had to the accompanying drawings, in which—

Figure 1 is a front view of a steam-boiler with the fire-front removed; Fig. 2, a side elevation of the same with the brick-work removed.

The object of my invention is an improved device to be placed in the furnace of steam-boilers for the purpose of increasing the heating-surface and securing economy in the generation of steam by utilizing the heat otherwise absorbed by the brick walls surrounding the combustion-chamber of the boiler, and is intended to be very effective and more efficient in practical results than any improvement for this purpose yet introduced.

The nature of my invention consists in placing in the furnace of a steam-boiler a series of pipes arranged in such a manner as to give the fire-box the appearance of a cage, said pipes having proper connection with the boiler, for the purpose hereinafter more fully described.

In the drawings, A represents the boiler, and B the brick-work surrounding the same. C represents a pipe, one end of which is inserted in the front flue-sheet of the boiler A at *x*. This pipe C is then conducted back from the front end of the boiler, passing between the boiler and the brick-work inclosing the same until the point is reached where the bridge-wall is located, when the pipe C takes a downward direction until it is about four inches below the bottom of the boiler, then runs transversely to the opposite side of the furnace, then taking an upward direction until on a level with the same pipe on the opposite side of the boiler, then running horizontally to the front end of the boiler, as shown in Fig. 2 of the drawings, and taking an upward direction until about six inches above the top of the

boiler, then bent across and downward to form the siphon D, and inserted in the front flue-sheet at *y*, and just below the water-line.

a a a represents a series of short pipes or tubes arranged vertically. The upper end of these pipes are inserted at regular intervals in the under side of the main circulating-pipe C. These pipes inclose both sides and the back ends of the grate-bars. The lower ends of these pipes *a a a* extend a little below the level of the grate-bars and pass through horizontal plates, which are perforated to receive the pipes, said perforated plates being arranged on a level with the grate-bars, and hold the series of vertical pipes in position, and prevent the cold air from the ash-pit passing up around them. The lower ends of the pipes *a a a* are provided with caps, which can be removed for the purpose of taking out any sediment or other matter which may collect in the pipes.

The main circulating-pipe C is provided with proper valves for closing the connection between the boiler and the heating and circulating attachment.

The main difficulty to be overcome in a device of this nature is to be able to keep up a continuous and regular circulation from the point at *x*, where the water passes from the boiler into the pipes inclosing the combustion-chamber until it is again returned to and discharged into the boiler at *y* in the form of steam.

It is evident that the water in the pipes will be converted into steam more rapidly than the water in the boiler. The effect of this will be to slightly increase the pressure of steam in the upper end of the pipe C over that of the pressure in the boiler. This being the case, the water in the boiler at the siphon end of the pipe C is displaced, and the steam generated in the pipes is discharged into the boiler below the water-line.

By having the siphon end of the pipe C enter the boiler at a point below the water-line, the water in the boiler acts as a check, and prevents any water from entering the boiler through the circulating attachment excepting in the form of steam. If the siphon end of the pipe C entered the boiler at a point above the water-line, the water would rush through at times—that is, have a spasmodic and irreg-

ular action—and by heavy firing the water would be forced out of the circulating device, a vacuum formed, and the pipes burned.

Near the top of the siphon end of the pipe C is placed an ordinary glass water-gage for observing the height of the water at this point, which rarely rises to the same level as the water in the boiler.

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

In a steam-generating and circulating attachment for steam-boilers, the combination, with the boiler A, of the main circulating-pipe

C, provided with the siphon end D and the series of vertical pipes *a a a*, said pipe C receiving the water from the boiler at a point near the bottom and returning the same to the boiler again in the form of steam through the siphon end of the pipe C, inserted below the water-line, constructed and arranged substantially as herein described, and for the purpose specified.

EDWARD G. GOOD.

Witnesses:

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