R. MILL.

Circulation in Steam-Generators.

No. 164,580. Patented June 15, 1875.

Fig. 1.

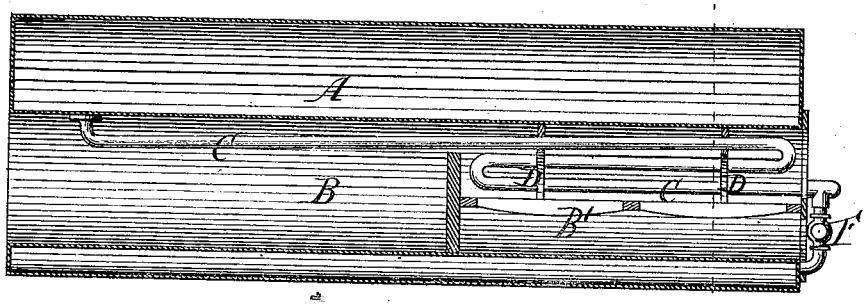


Fig. 2.

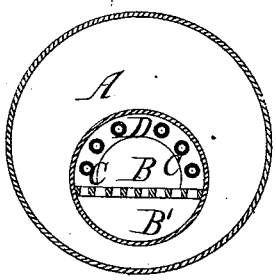
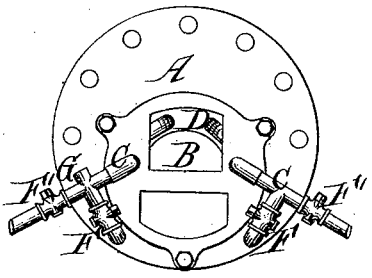


Fig. 3.



Witnesses.
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UNITED STATES PATENT OFFICE.

RICHARD MILL, OF ISLAND OF JERSEY, ENGLAND.

IMPROVEMENT IN CIRCULATION IN STEAM-GENERATORS.

Specification forming part of Letters Patent No. **164,580**, dated June 15, 1875; application filed January 9, 1874.

To all whom it may concern:

Be it known that I, RICHARD MILL, of Jersey, (one of the Channel Islands,) England, have invented a new and useful Improvement in Steam-Generators; and I do hereby declare the following to be a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawing forming part of this specification, in which drawing—

Figure 1 represents a vertical longitudinal section of this invention. Fig. 2 is a transverse section thereof in the line *x x*, Fig. 1. Fig. 3 is a front view of the same.

Similar letters indicate corresponding parts.

The primary object of this invention is to increase the heating-surface of steam-boilers, more particularly those called Cornish and egg-ended boilers, and the subsidiary object is to heat the feed-water.

My invention consists in the employment of a system of pipes, in combination with the boiler of a steam-generator, which pipes are supported directly beneath the crown of the furnace by means of an arched bridge, and extend from front to rear of the boiler, one end thereof being connected with the lower or water space, and the other end with the water-space above the flue of the boiler, in such a manner that a constant circulation is kept up in said pipes and in the boiler; and, furthermore, by employing such pipes as a conduit for the feed-water, the same becomes heated before it enters the boiler, effecting a great saving in fuel.

In order to keep the pipes clean, I provide the same with a blow-off and circulation cock at the front end of the boiler.

In the drawing, the letter A designates an ordinary Cornish boiler, which is provided with a flue, B, containing a furnace, B′. The letters C C designate a system of steam-generating pipes, which are supported by means of an arched bridge, D, and arranged so as to allow of their free expansion and contraction under the crown of the furnace, being led backward and forward serpentine fashion, and placed or suspended so as to leave a space between the pipes and said crown, to afford the flame sufficient play to uniformly heat such pipes. From said furnace B the pipes C C branch off in opposite directions, the rear ends thereof leading into the upper part of the water-space at or near the rear end of the boiler, and the front ends of said pipes terminating at or below the water-level on the outer end of the boiler, as shown in Figs. 1 and 3.

The pipes C are each provided with a cock, F, which I term the "circulation-cock," the same being arranged on the pipes between their exit and entrance in said front end of the boiler. At this point is also fitted a blow-off cock; and if this cock is opened, and the circulation-cock F is closed, the steam-pipes C C are cleared of any sediment that may have collected therein by the steam and water escaping by the blow-off. The feed-pipe is connected to one of the pipes C, as at G, Fig. 3, by which means the feed-water is made to pass through the fire-chamber of the furnace B′, and thereby becomes partially heated; but said feed-pipe may be connected to and at any other part of the boiler, as the pipes C C will still be supplied with water from the boiler.

I do not broadly claim establishing a communication between the water and steam space of a boiler by means of a pipe, for such, of itself, is not new; but

What I claim as new, and desire to secure by Letters Patent, is—

The combination, with an ordinary boiler, A, having a flue, B, and a furnace, B′, of the coiled pipes C′ C and the arched bridge D, supporting said coiled pipes beneath the crown of the furnace, and directly above the grate of the furnace, the said coiled pipes communicating with the upper water-space of the boiler at its rear end, and at the front end of the same below the water-level, and provided with circulation-cocks F, all substantially as and for the object specified.

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